UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Klamath River Renewal Corporation	**Project Nos. 14803-001;**
PacifiCorp	**2082-063**

AMENDED APPLICATION FOR SURRENDER OF LICENSE FOR MAJOR PROJECT AND REMOVAL OF PROJECT WORKS

EXHIBIT M
Terrestrial and Wildlife Management Plan
(Amended December 15, 2021)

Lower Klamath Project
FERC Project No. 14803

Terrestrial and Wildlife Management Plan

Klamath River Renewal Corporation
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December 2021

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1.0 Introduction

The Lower Klamath Project (FERC No. 14803) consists of four hydroelectric developments on the Klamath River: J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate (Figure 1-1). Specifically, the reach between J.C. Boyle dam and Iron Gate dam is known as the Hydroelectric Reach. In September of 2016, the Klamath River Renewal Corporation (Renewal Corporation) filed an *Application for Surrender of License for Major Project and Removal of Project Works,* FERC Project Nos. 2082-063 & 14803-001 (License Surrender). The Renewal Corporation filed the License Surrender Application as the dam removal entity for the purpose of implementing the Klamath River Hydroelectric Settlement (KHSA). In November of 2020, the Renewal Corporation filed its Definite Decommissioning Plan (DDP) as Exhibits A-1 and A-2 to its Amended License Surrender Application (ALSA). The DDP is the Renewal Corporation's comprehensive plan to physically remove the Lower Klamath Project and achieve a free-flowing condition and volitional fish passage, site remediation and restoration, and avoidance of adverse downstream impacts (Proposed Action). The Limits of Work is a geographic area that encompasses dam removal and restoration related activities associated with the Proposed Action. The Limits of Work may extend beyond the Federal Energy Regulatory Commission (Commission) boundary associated with the Lower Klamath Project where specifically noted.

The Proposed Action includes the deconstruction of the J.C. Boyle Dam and Powerhouse (Figure 1-2), Copco No. 1 Dam and Powerhouse (Figure 1-3), Copco No. 2 Dam and Powerhouse (Figure 1-4), and Iron Gate Dam and Powerhouse (Figure 1-5), as well as associated features. Associated features vary by development, but generally include powerhouse intake structures, embankments and sidewalls, penstocks and supports, decks, piers, gatehouses, fish ladders and holding facilities, pipes and pipe cradles, spillway gates and structures, diversion control structures, aprons, sills, tailrace channels, footbridges, powerhouse equipment, distribution lines, transmission lines, switchyards, original cofferdams, portions of the Iron Gate Fish Hatchery, residential facilities, and warehouses. Facility removal will be completed within an approximately 20-month period.

This Terrestrial and Wildlife Management Plan describes the measures that the Renewal Corporation will implement to protect terrestrial and wildlife species as part of the Proposed Action. The Renewal Corporation has prepared 16 Management Plans for the Commission's review and approval as conditions of a License Surrender Order. These Management Plans were developed in consultation with federal, state, and county governments and tribes.

In February 2021, the Renewal Corporation filed the 16 Management Plans with the Commission. Since that time, the Renewal Corporation has undertaken further consultation, resulting in material revisions. Table 2-2 herein shows the material revisions to the February 2021 version of this Terrestrial and Wildlife Management Plan. An updated Consultation Record for the Terrestrial and Wildlife Management Plan is included as Appendix D.

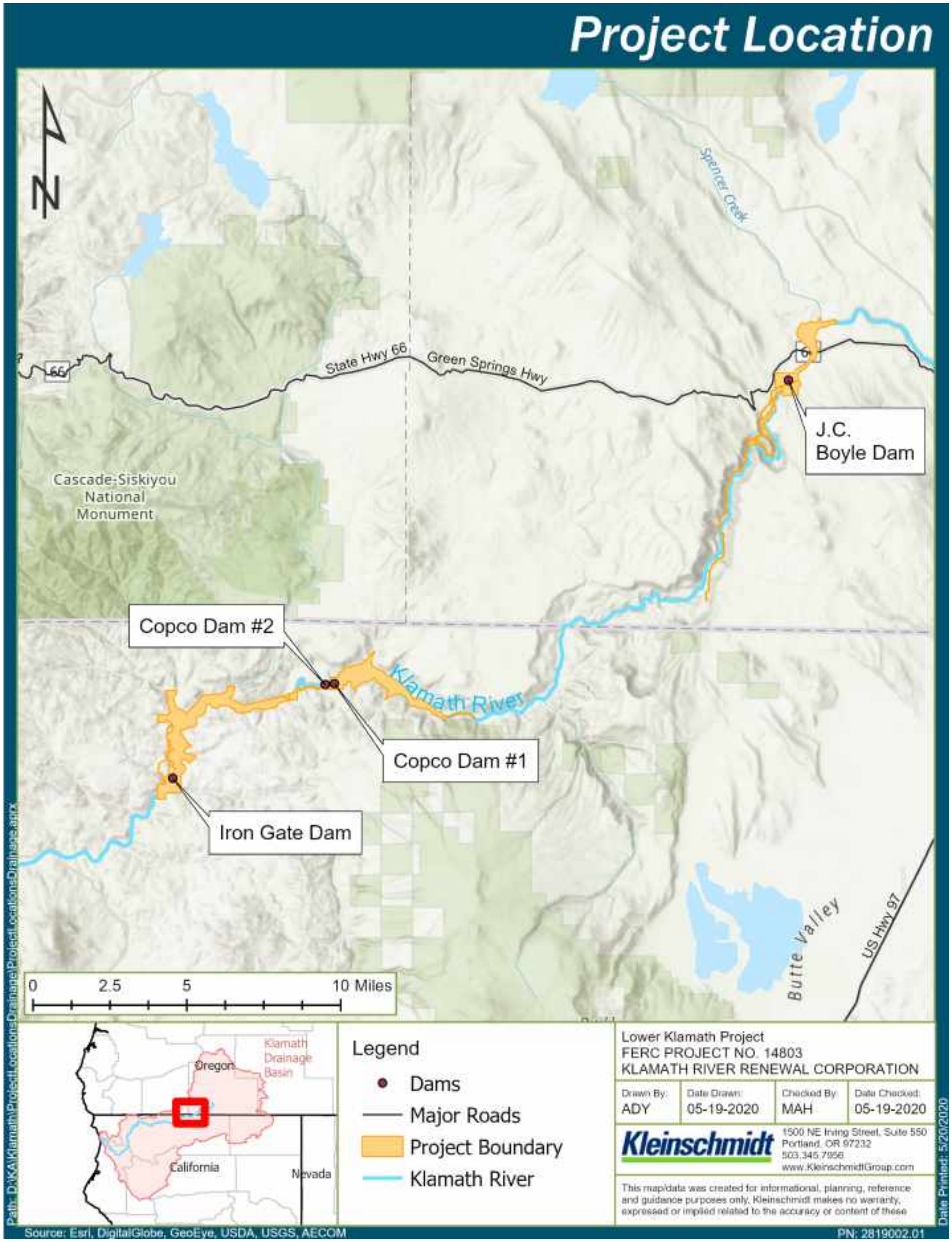

Figure 1-1. Lower Klamath Project Location

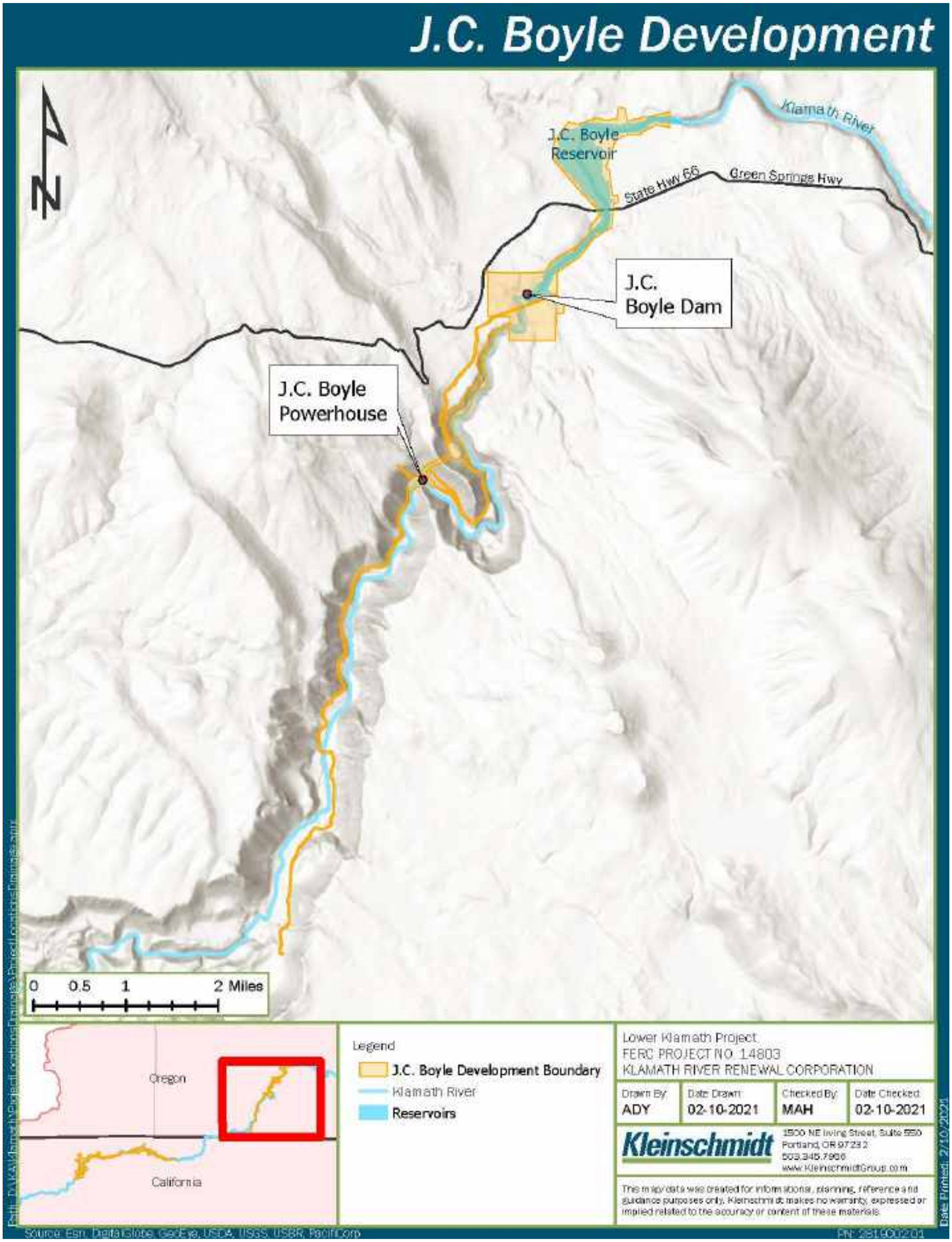

Figure 1-2. J.C. Boyle Development Facility Details

Figure 1-3. Copco No.1 Development Facility Details

Figure 1-4. Copco No.2 Development Facility Details

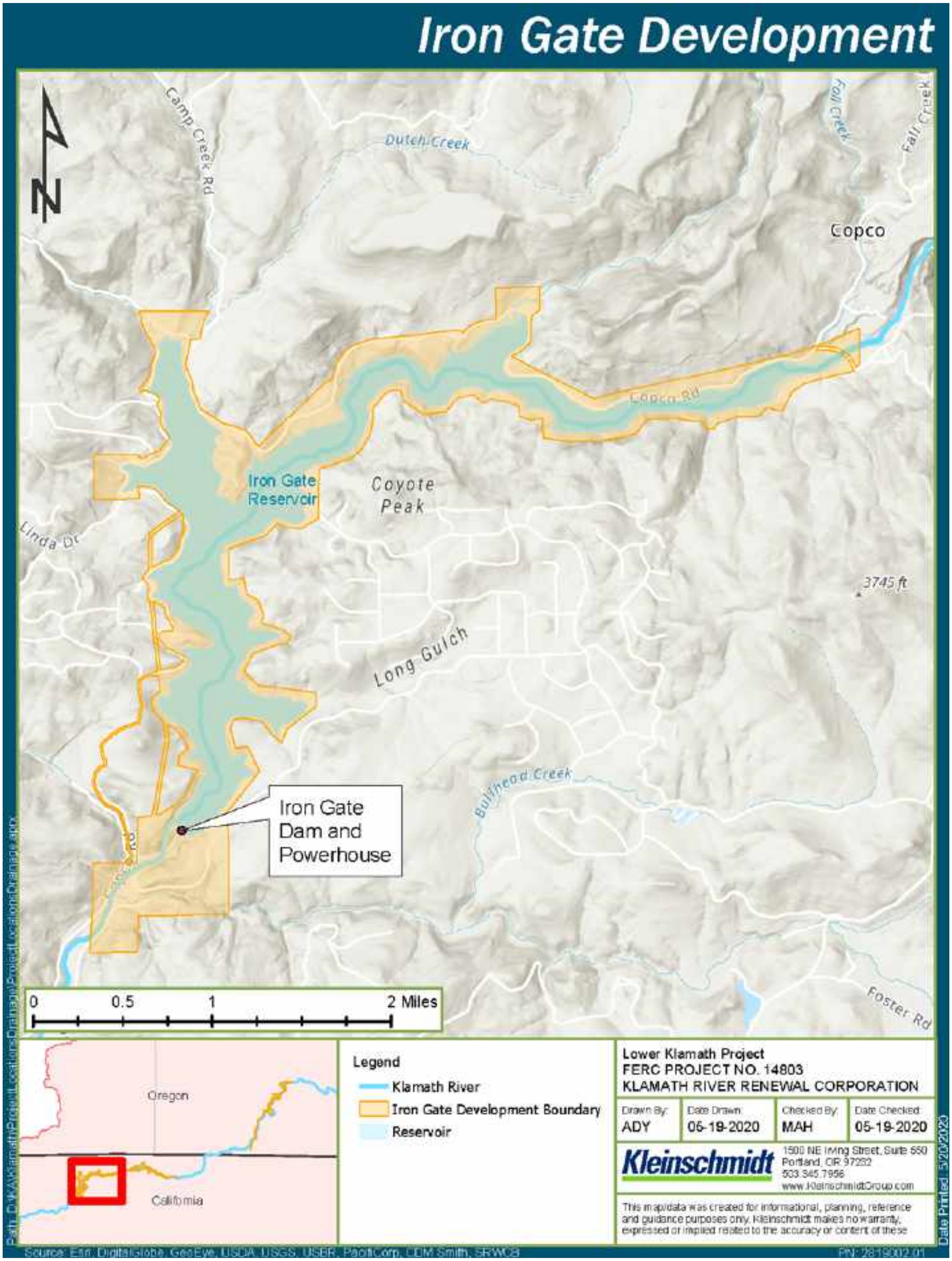

Figure 1-5. Iron Gate Development Facility Details

2.0 Regulatory Context

As described in Table 2-1, the Terrestrial and Wildlife Management Plan is one of 16 Management Plans implementing the DDP.

Table 2-1. Lower Klamath River Management Plans

1. Aquatic Resources Management Plan	9. Remaining Facilities Plan
2. Construction Management Plan	10. Reservoir Area Management Plan
3. Erosion and Sediment Control Plan	11. Reservoir Drawdown and Diversion Plan
4. Hatcheries Management and Operations Plan	12. Sediment Deposit Remediation Plan
5. Health and Safety Plan	13. Terrestrial and Wildlife Management Plan
6. Historic Properties Management Plan	14. Waste Disposal and Hazardous Materials Management Plan
7. Interim Hydropower Operations Plan	15. Water Quality Monitoring and Management Plan
8. Recreation Facilities Plan	16. Water Supply Management Plan

2.1 Organizational Structure

The Terrestrial and Wildlife Management Plan identifies measures the Renewal Corporation will implement to protect species with special status (state or federally protected) known or suspected to be present within the Limits of Work. The Terrestrial and Wildlife Management Plan also contains best management practices related to bats, nesting birds, and other species that will be implemented by the Renewal Corporation. Specifically, the Terrestrial and Wildlife Management Plan includes an updated Consultation Record and three sub-plans, included amongst the Appendices identified below.

- Appendix A: California Terrestrial and Wildlife Management Plan
- Appendix B: Oregon Terrestrial and Wildlife Management Plan
- Appendix C: Bald and Golden Eagle Management Plan Status Update
- Appendix D: Consultation Record

2.2 Specific Regulatory Interests

The Renewal Corporation considered the following regulatory interests in the development of the Terrestrial and Wildlife Management Plan:

- California Section 401 Water Quality Certification
- Oregon Section 401 Water Quality Certification
- California Department of Fish and Wildlife Memorandum of Understanding
- Oregon Memorandum of Understanding

- Endangered Species Act Section 7
- California Environmental Quality Act, Final Environmental Impact Report
- Biological Assessment (U.S. Fish and Wildlife Service and National Marine Fisheries Sevice)

2.3 Results of Consultation since February 2021

The Renewal Corporation has revised the February 2021 version of this plan, on the basis of further consultation, in the following material respects.

Table 2-2. Results of Consultation

SUB-PLAN	CHANGES TO FEBRUARY 2021 VERSION
Appendix A: California Terrestrial and Wildlife Management Plan	• Added obligation for the Renewal Corporation to survey a subset of newly exposed WPT habitat within 300-500 meters of the NOPE. • Added obligation to conduct VES surveys for native nesting birds if material vegetation clearing occurs between April 1 and August 31. • VES survey area for native nesting birds expanded from the “work area” to the “disturbance area”. • Added obligation to conduct VES survey for nesting raptors if tree removal activities occur between February 1 and March 31. • Added obligation to establish a set-back, alter timing of construction activity and/or observe active nests if construction activities are expected to disturb an active nest. • Added obligation to promptly contact CDFW if special status birds or species protected under the MBTA are exhibiting stress behaviors. • Added obligation to conduct protocol-level willow flycatcher surveys if certain activities occur within 300 feet of willow flycatcher habitat during nesting season. • Added obligation to coordinate with CDFW to identify an appropriate buffer if an active willow flycatcher nest is documented in a disturbance area. • Added obligation to coordinate best management practices with CDFW and/or USFWS if northern spotted owls or foothill yellow-legged frogs are observed within the Plan Boundary. • Added multiple obligations with respect to bats, including bat exclusion measures, bat eviction measures, installation of bat boxes and/or condos, and consultation with CDFW if structure removal cannot occur during the preferred dates for bat removal. • Added obligation to avoid known occurrences of special status plants. • Added obligation to comply with USFWS BO and BMPs set forth in the RAMP during herbicide application. • Added obligation to notify USFWS if the Renewal Corporation observes a species listed under the ESA within the Plan Boundary.

SUB-PLAN	CHANGES TO FEBRUARY 2021 VERSION
Appendix B: Oregon Terrestrial and Wildlife Management Plan	• Added obligation to conduct VES surveys for native nesting birds if material vegetation clearing occurs between April 1 and August 31. • VES survey area for native nesting birds expanded from the "work area" to the "disturbance area." • Added obligation to establish a set-back, alter timing of construction activity and/or observe active nests if construction activities are expected to disturb an active nest. • Added obligation to promptly contact ODFW if special status birds or species protected under the MBTA are exhibiting stress behaviors. • Added obligation to coordinate with ODFW as necessary if an active willow flycatcher nest is documented in a disturbance area. • Removed time restrictions with respect to northern spotted owl to conform to the USFWS Biological Opinion. • Added obligation to coordinate best management practices with ODFW and/or USFWS if northern spotted owls, foothill yellow-legged frogs, or Oregon spotted frogs are observed within the Plan Boundary. • Added multiple obligations with respect to bats, including bat exclusion measures, bat eviction measures, installation of bat boxes and/or condos, and consultation with ODFW if structure removal cannot occur during the preferred dates for bat removal. • Added list of Oregon special status plants and obligation to avoid known occurrences of the special status plants. • Added obligation to comply with USFWS BO and BMPs set forth in the RAMP during herbicide application. • Added obligation to notify USFWS if the Renewal Corporation observes a species listed under the ESA within the Plan Boundary.
Appendix C: Bald and Golden Eagle Management Plan Status Update	• Not Applicable.

2.4 Regulatory Approval Process

The Renewal Corporation will implement the Terrestrial and Wildlife Management Plan as approved by the Commission in the License Surrender Order. The Renewal Corporation will obtain and report to the Commission any required approvals from other agencies.

3.0 Force Majeure

The Terrestrial and Wildlife Management Plan includes metrics, objectives, and obligations that are dependent upon natural systems, which are inherently variable. Acts of God, natural disasters, flooding, fire, drought, labor shortages, and other events beyond the control of the

Renewal Corporation (Force Majeure Event) may affect or delay compliance with a given obligation in the plan. If there is a Force Majeure Event, the Renewal Corporation will report to the Commission and SWRCB, ODEQ, and/or USFWS, as applicable, proposing a variance or other appropriate adjustment of the plan.

4.0 Reporting

By April 15 of each year, the Renewal Corporation will prepare and submit to the Commission an Annual Report which will include information pertaining to implementation of the Terrestrial and Wildlife Management Plan.

Appendix A

California Terrestrial and Wildlife Management Plan

Lower Klamath Project
FERC Project No. 14803

California Terrestrial and Wildlife Management Plan

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1.0 Introduction

This California Terrestrial and Wildlife Management Plan is one of three sub-plans of the Terrestrial and Wildlife Management Plan to be implemented as part of the Proposed Action for the Lower Klamath Project (Proposed Action). The geographic area that encompasses dam removal-related activities associated with the Proposed Action is referred to as the Limits of Work. The Renewal Corporation will implement the management measures described herein within the portions of the Limits of Work that are within the state of California, including any associated buffers for specific species as described in the following sections (together, the California Terrestrial and Wildlife Management Plan Boundary).

For purposes of this California Terrestrial and Wildlife Management Plan, Year 1 refers to the year before drawdown, Year 2 refers to the drawdown year and Year 3 refers to the year following the drawdown year.

1.1 Purpose of Terrestrial and Wildlife Management Plan

The purpose of the California Terrestrial and Wildlife Management Plan is to state the measures the Renewal Corporation will implement to avoid and minimize impacts to terrestrial and wildlife species (excluding bald and golden eagles) within the California Terrestrial and Wildlife Management Plan Boundary from the Proposed Action. Avoidance and minimization measures for bald and golden eagles are provided in the Bald and Golden Eagle Management Plan, a subplan of the Terrestrial and Wildlife Management Plan.

The impacts from the Proposed Action are set forth in the *Amended Application for Surrender of License for Major Project and Removal of Project Works,* FERC Project Nos. 14803-001 & 2082-063 (KRRC and PacifiCorp, 2020). The California State Water Resources Control Board (SWRCB) found that the Proposed Action will have long-term beneficial impacts, in part due to implementation of the proposed measures set forth in the California Terrestrial and Wildlife Management Plan and the Bald and Golden Eagle Management Plan (SWRCB 2020b). In particular, the Renewal Corporation anticipates that approximately 2,000 acres of terrestrial habitat will be created as a result of the Proposed Action, including dry uplands, riparian and wetland habitat. See Table 6-17 in the Reservoir Area Management Plan.

1.2 Relationship to Other Management Plans

The California Terrestrial and Wildlife Management Plan supports elements of all construction-related management plans. So as not to duplicate information, elements from those management plans are not repeated herein but are, where appropriate, referred to in this California Terrestrial and Wildlife Management Plan.

2.0 Designated Biologist(s)

The Renewal Corporation will use designated biologists (each a DB) with appropriate species-related qualifications to undertake the management measures described herein. DB qualifications will vary depending on the species-specific management measure. The Renewal Corporation will review DB qualifications with the California Department of Fish and Wildlife (CDFW) and SWRCB at least 60 days prior to starting any work activities that will require the implementation of any of the management measures described herein.

2.1 Construction Crew Training

Before any ground-disturbing work (including vegetation clearing and grading) begins within the California Terrestrial and Wildlife Management Plan Boundary, a DB will conduct mandatory biological resources awareness training for all site superintendents and construction foremen. The training will teach the construction crews to identify special status species that could be on site and to support the Renewal Corporation's implementation of the California Terrestrial and Wildlife Management Plan. The training will include a discussion of:

- Species identification,
- Habitat requirements,
- Protection status,
- Management measures,
- Necessary response actions if a crew member identifies a special status species or any of the non-special status species listed on Table 3-2 within the California Terrestrial and Wildlife Management Plan Boundary during construction activities, and
- What to do if an injured species is found.

Upon completing the training, all employees will sign an acknowledgment form stating that they attended the training and understand the applicable management measures. The Renewal Corporation will give similar training to any new personnel and updated training to all personnel if there is a change in the status of a special status species. The Renewal Corporation will also issue species identification cards for the species identified in Table 3-1 to site superintendents and construction foremen. These cards will have photos and descriptions of species and describe the actions that will be taken if a special status species is identified during construction.

3.0 Management Measures

Proposed Action work activities during the pre-drawdown, drawdown and restoration phases have the potential to impact special and non-special status species within the California Terrestrial and Wildlife Management Plan Boundary. For purposes of the California Terrestrial and Wildlife Management Plan, "drawdown phase" refers to the calendar year in which drawdown occurs. "Pre-drawdown phase" refers to the period of time from the commencement of pre-drawdown activities until the beginning of the drawdown phase. "Restoration phase" refers to the period of time from the end of the drawdown phase until completion of the restoration activities under the Reservoir Area Management Plan. Table 3-2 below summarizes the management measures the Renewal Corporation will implement within the California Terrestrial and Wildlife Management Plan Boundary to avoid and minimize impacts to terrestrial and wildlife species, including the special status species specifically identified on Table 3-1 below. Sections 3.1 - 3.6 provide a full description of the management measures summarized in Table 3-2. Appendix A contains all figures referenced in Section 3.

In addition, this plan includes information relating to herbicide application guidelines and the establishment of wetland buffers within the California Terrestrial and Wildlife Management Plan Boundary.

Table 3-1. Special Status Species Covered in the California Terrestrial and Wildlife Management Plan

COMMON NAME	SCIENTIFIC NAME	CALIFORNIA STATE LISTING	FEDERAL STATUS
Western Pond Turtle	*Actinemys marmorata*	Species of Special Concern	Under Review[1]
Willow Flycatcher	*Empidonax traillii*	Endangered	Not Listed
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened	Threatened
Gray Wolf	*Canis lupus*	Endangered	De-listed[2]

1. The western pond turtle's status is under review for possible listing as threatened or endangered under the federal Endangered Species Act.
2. The gray wolf was de-listed as of January 4, 2021 – Federal Register 85 FR 69778 & 69895

Table 3-2. Species Specific Management Measures

SPECIES IMPACTED	MANAGEMENT MEASURE	PHASE(S)
Western Pond Turtle (WPT)	Visual Encounter Surveys (VES surveys, as defined below in Section 3.1.1) prior to construction	Pre-Drawdown and Drawdown
	VES surveys during the reservoir drawdown phase	Drawdown
	VES survey upon the completion of reservoir drawdown	Drawdown
	Rescue and relocation	Pre-Drawdown and Drawdown
	Entrapment prevention and exclusion	Pre-Drawdown and Drawdown
Non-listed Reptiles and Amphibians	VES surveys in conjunction with WPT VES surveys and prior to use of heavy equipment	Pre-Drawdown, Drawdown and Restoration

SPECIES IMPACTED	MANAGEMENT MEASURE	PHASE(S)
	Rescue and relocation	Pre-Drawdown, Drawdown and Restoration
	Entrapment prevention and exclusion	Pre-Drawdown and Drawdown
Nesting Birds (including Cliff Swallow, Osprey and Great Blue Heron)	VES surveys if tree removal or vegetation clearing activities will occur during the primary nesting period of April - August	Pre-Drawdown, Drawdown and Restoration
	VES surveys for raptors if tree removal will occur in February or March	Pre-Drawdown, Drawdown and Restoration
	Limit vegetation clearing to areas where maintenance activities are necessary or construction or restoration actions (ground disturbance) will occur	Pre-Drawdown, Drawdown and Restoration
	Limit vegetation clearing (other than willow cutting and harvesting) to September - March (i.e., outside the nesting season)	Pre-Drawdown, Drawdown and Restoration
	Limit willow cutting and harvesting to September – January during the pre-drawdown and drawdown phases	Pre-Drawdown and Drawdown
	Avoid willow cutting and harvesting in June and July (i.e., the willow flycatcher nesting season) during the restoration phase	Restoration
	Leave transmission/distribution poles with active osprey nests in place	Pre-Drawdown, Drawdown and Restoration
	With respect to transmission/distribution poles without active osprey nests in place, install nest deterrents or remove nesting platforms prior to osprey nesting season (March – September)	Pre-Drawdown, Drawdown and Restoration
	Establish a set-back for construction actions and/or alter timing of construction, if required to avoid disturbing an active nest	Pre-Drawdown, Drawdown and Restoration
	Avoid disturbance to great blue heron rookery near Copco No. 2 wood-stave penstock	Drawdown
	Outside of the cliff swallow nesting season, remove unoccupied cliff swallow nests from structures scheduled to be modified or removed	Drawdown

SPECIES IMPACTED	MANAGEMENT MEASURE	PHASE(S)
Willow Flycatcher	Limit vegetation clearing to areas where maintenance activities are necessary or construction actions (ground disturbance) will occur	Pre-Drawdown, Drawdown and Restoration
	Limit vegetation clearing (other than willow cutting and harvesting) to September - March (i.e., outside the nesting season)	Pre-Drawdown, Drawdown and Restoration
	Limit willow cutting and harvesting to September – January during the pre-drawdown and drawdown phases	Pre-Drawdown and Drawdown
	Avoid willow cutting and harvesting in June and July (i.e., the willow flycatcher nesting season) during the restoration phase	Restoration
	Establish a set-back for construction actions and/or alter timing of construction, if required to avoid disturbing an active nest	Pre-Drawdown, Drawdown and Restoration
Northern Spotted Owl	Helicopter flight path restrictions	Pre-Drawdown, Drawdown and Restoration
Gray Wolves	Contact CDFW regarding wolf observations	Pre-Drawdown, Drawdown and Restoration
	Determine best management measures in coordination with CDFW	Pre-Drawdown, Drawdown and Restoration
Bats	Visual surveys prior to structure and tree removal	Pre-Drawdown and Drawdown
	Remove structures within designated seasonal timeframes (i.e., March 1 to April 15 and September 1 to October 15)	Pre-Drawdown and Drawdown
	Phased removal of structures and trees	Pre-Drawdown and Drawdown
	With respect to remaining structures, permanently close and barricade after evicting bats	Pre-Drawdown
	Install bat boxes and/or bat condos provided by USFWS	Pre-Drawdown

3.1 Western Pond Turtle Management Measures

Previous surveys have documented western pond turtle (WPT) presence throughout the California Terrestrial and Wildlife Management Plan Boundary (PacifiCorp 2004b; AECOM 2019; 2020) as described in Appendix C. WPT utilization of habitat within the California Terrestrial and Wildlife Management Plan Boundary includes nesting, over-wintering, foraging, and basking and is fully described in the WPT study report (AECOM 2019).

Pre-drawdown, drawdown and restoration work activities may impact WPT located in the California Terrestrial and Wildlife Management Plan Boundary. Management measures to be implemented by the Renewal Corporation include pre-construction surveys, drawdown surveys, and rescue and relocation. These measures are described in more detail within this section. In addition, the Renewal Corporation will implement the management measures for entrapment prevention and exclusion set forth in Section 3.8.

The structure and contents of the WPT database will be developed and agreed by CDFW, ODFW and the Renewal Corporation no later than three (3) months prior to the start of pre-drawdown activities. The Renewal Corporation will then create the WPT database and provide CDFW with access to the WPT database prior to the start of pre-drawdown activities. The WPT database will include a map of previously identified overwintering sites (AECOM 2019). The Renewal Corporation will regularly update the WPT database with the field data collected during the VES surveys (as defined below in Section 3.1.1) and rescue and relocation efforts.

All WPT-related work performed by the Renewal Corporation, including VES surveys and rescue and relocation efforts, will be performed pursuant to the WPT checklist developed by CDFW, ODFW, SWRCB and the Renewal Corporation no later than three (3) months prior to the start of pre-drawdown activities (VES Checklist).

3.1.1 VES Surveys and Rescue and Relocation – Pre-Construction

The Renewal Corporation will conduct pre-construction Visual Encounter Surveys (VES surveys) for WPT no more than 24 hours prior to the commencement of pre-construction activities that require heavy equipment operation within WPT habitat (see Appendix A – Figure 1). "VES surveys" means surveys completed using the VES Checklist. The VES Checklist will state that the Renewal Corporation will visually inspect the entire WPT habitat within a work area prior to heavy equipment operation. Depending upon the timing of the VES survey, individuals may or may not be easily located. For example, it is unlikely that hibernating/aestivating individuals will be observed during VES surveys in the winter months. The probability of observation is expected to increase with the seasonal transition to spring and summer, increasing the likelihood of WPT individuals, nest sites, dens and burrows being observed. The VES Checklist is expected to account for this seasonality and cover multiple WPT life stages.

Upon discovery of a WPT during a VES survey for WPT, a DB or a trained member of the construction crew under the guidance of a DB will alert work crews and attempt to relocate the individual out of harm's way. The DB will use their best professional judgment to determine if an individual should be relocated based on the nature of the work and the risk to the individual. All relocation will be done in accordance with the VES Checklist.

3.1.2 VES Surveys and Rescue and Relocation - Drawdown

Reservoir drawdown will occur during winter and spring of Year 2. The Renewal Corporation will conduct VES surveys during the winter and spring of Year 2. VES surveys will be conducted in the areas identified as WPT habitat in Appendix A – Figure 1. Within these areas, the Renewal Corporation will survey the reservoir's Normal Operating Pool Elevation (NOPE), to the extent practicable based on safety considerations, terrain, the Renewal Corporation's ability to access the habitat, and other considerations. In addition, the Renewal Corporation will survey a subset of newly exposed potential WPT habitat within a minimum of 300 meters and a maximum of 500 meters of the NOPE. The Renewal Corporation will determine the final distance, in consultation with CDFW, based on relevant factors, including topography. Specific survey dates, frequency of surveys and the location of the subset areas will be determined during the development of the VES Checklist. Finally, the Renewal Corporation will conduct a final VES survey of WPT habitat (as described in this paragraph, including newly exposed habitat) within 30 days of when the Klamath River lowers to, and permanently occupies, its original 100-year flood channel.

Upon discovery of a WPT during a reservoir drawdown VES survey, a DB or a trained member of the construction crew under the guidance of a DB will determine if an individual should be relocated. Such decision will be made using the DB's best professional judgment and in accordance with the VES Checklist. In determining if relocation is warranted, the Renewal Corporation will identify stranding behavior (for example, the individual is not moving towards water or has retracted its head and legs). If stranding behavior is identified and an appropriate escape route is not feasible, qualified personnel will attempt to capture and relocate the individual.

3.1.3 Rescue and Relocation Plan

If capture is required, the Renewal Corporation will attempt to capture the individual in accordance with the VES Checklist, which is anticipated to permit hand capture, dip-net, or drift fence traps. Captured WPT will be checked for injuries, sexed, measured, weighed, and aged by counting plastron scute annuli before being released. Data collected on WPT will be regularly uploaded into the WPT database and provided in the reports described in Section 4.

The Renewal Corporation will relocate WPT that are captured in connection with pre-construction or drawdown VES surveys to previously identified WPT habitat on public land outside of the California Terrestrial and Wildlife Management Plan Boundary, as shown in Appendix A – Figure 1. The Renewal Corporation will coordinate with CDFW prior to drawdown to confirm appropriate relocation areas and will update Appendix A – Figure 1 if required. Relocation will be done in accordance with the VES Checklist. The VES Checklist will describe ideal relocation areas, timing of release and means and methods for capture and release. For example, ideal relocation areas are anticipated to include slow-moving water, basking sites, aquatic refugia, streamside refugia, and upland nesting habitat. The Renewal Corporation will release captured WPT on the banks near water features within 12 hours of initial capture. WPT captured for relocation will be placed in sturdy plastic containers or coolers with ventilation holes. Gloves will be worn and plastic containers will be washed between each use. WPT held in captivity will be handled in accordance with the VES Checklist and kept at an appropriate location based on meteorological conditions. For example, WPT will be kept in shaded locations during hot sunny days until the time of release. Upon release, individuals will be set on the bank near cover objects and allowed to either enter the water or seek refuge under the cover objects.

3.2 Amphibian and Reptile Rescue Management Measures

3.2.1 VES Surveys

The Renewal Corporation will conduct VES surveys for non-listed reptiles and amphibians in conjunction with the VES surveys for WPT. In addition, prior to the start of any work activities that require the use of heavy equipment, the Renewal Corporation will conduct a VES survey for non-listed reptiles and amphibians in the relevant construction area. Construction personnel will be trained on avoidance and minimization measures during the mandatory biological resources awareness training described in Section 2.1.

3.2.2 Rescue and Relocation

If the Renewal Corporation observes native, non-listed reptiles or amphibians in the California Terrestrial and Wildlife Management Plan Boundary during a VES survey or during construction activities, the reptile or amphibian will be avoided and encouraged to leave the area on its own volition. If the amphibian or reptile is not capable of leaving the work area of its own volition or does not promptly leave the work area, either a DB or a trained member of the construction crew under the guidance of a DB will attempt to relocate the individual outside the work area, to the extent practicable. In addition, the Renewal Corporation will implement the management measures for entrapment prevention and exclusion set forth in Section 3.8. Avoidance, rescue, relocation, entrapment prevention and exclusion measures will be undertaken in coordination with construction activities to avoid delays to construction. The Renewal Corporation will have no obligation to relocate reptiles or amphibians that are non-native and/or invasive.

3.3 Nesting Birds – Management Measures

Previous surveys within the California Terrestrial and Wildlife Management Plan Boundary have identified nesting bird utilization (AECOM 2019; 2020), as described in Appendix C. During these surveys, species identified included, but were not limited to, great blue heron (*Ardea herodias*), cliff swallow (*Petrochelidon pyrrhonota*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos),* and willow flycatcher (*Empidonax traillii*). Proposed Action work activities may affect these species. To avoid and minimize these impacts, the Renewal Corporation will implement the following management measures with respect to all nesting birds during the Proposed Action work activities. See the Bald and Golden Eagle Management Plan for additional management measures for bald eagles and golden eagles. Additional provisions for the great blue heron, cliff swallow, willow flycatcher and northern spotted owl are described below.

3.3.1 VES Surveys

A DB or a trained member of the construction crew under the guidance of a DB will conduct VES surveys for native nesting birds if tree removal and/or material vegetation clearing activities will occur during the primary nesting period of April 1 - August 31. For purposes of the California Terrestrial and Wildlife Management Plan, clearing activity does not include activities related to invasive exotic vegetation (IEV) management. The VES surveys will focus on identifying active and inactive nests as well as potential nesting habitats located within areas where construction and/or restoration crews will remove trees or clear vegetation. The VES surveys will determine if any nesting birds may potentially be affected by the tree removal and/or vegetation clearing activities.

To maximize visual survey coverage, the VES surveys will consist of walking evenly spaced transects within the disturbance area. The boundaries of the disturbance area shall be determined by the DB based on the nature of the work, species of nesting birds, topography and habitat type. The Renewal Corporation will conduct these VES surveys in the morning after sunrise no more than one week prior to tree removal and vegetation clearing. The Renewal Corporation will visually inspect brush, grassland, and canopy for nests and avian nesting behavior. Duration of the survey will be sufficient (in the professional judgment of the surveyor) to ensure coverage of the area to be surveyed. If the Renewal Corporation observes a nest during the nesting period, subsequent VES surveys may occur prior to construction to monitor the nest for activity or to further determine its status (e.g., eggs have hatched, nestlings present). A nest with eggs, chicks, or nestlings will be considered "active".

If tree removal activities will occur between February 1st and March 31st, the Renewal Corporation will conduct a VES survey for nesting raptors prior to tree removal.

3.3.2 Nesting Bird Disturbance Avoidance

To avoid disturbance to nesting birds, the Renewal Corporation will implement the following management measures, in each case to the extent practicable given, among other things, the construction schedule and nature of construction:[1]

- The Renewal Corporation will limit material vegetation clearing to areas where maintenance activities are necessary or construction or restoration actions (i.e., ground disturbance) will occur based on 100 percent (%) design drawings.
- The Renewal Corporation will limit material vegetation clearing (other than willow cutting and harvesting) to September 1st to March 31st (i.e., outside the primary nesting period)).
- The Renewal Corporation will limit willow cutting and harvesting to September 1st to January 31st.
- The Renewal Corporation will leave transmission/distribution poles with active osprey nests in place.

[1] These dates were established in consultation with CDFW.

- With respect to transmission/distribution poles without active osprey nests in place, the Renewal Corporation will install nest deterrents or remove nesting platforms prior to osprey nesting season (March 1st – September 30th).
- If construction activities are expected to disturb an active nest identified during a VES survey, the Renewal Corporation will establish a set-back for construction actions.
- If it is not practicable to establish a set-back that will avoid disturbing the active nest, the Renewal Corporation will attempt to alter the timing of construction activity.
- If it is not practicable to either establish a set-back that will avoid disturbing the active nest or alter the timing of construction activity, a site superintendent or foreman trained and supported by a DB will observe active nests of special status species and species protected under the Migratory Bird Treaty Act (MBTA) during construction to determine if any nesting birds are exhibiting stress behaviors, including visual displays, human interactions, and other visual behavioral indicative of agitation *(Cornell Ornithology 2019).* If special status birds or species protected under the MBTA are exhibiting stress behaviors, the Renewal Corporation will promptly contact CDFW and discuss a potential resolution that will not delay construction.

In certain circumstances tree removal and/or material vegetation clearing may occur during the nesting season (e.g., unanticipated construction activities due to schedule changes, vegetation re-grew during the growing season or removal of vegetation to remediate fish passage barriers). If so, the Renewal Corporation will conduct a VES survey prior to tree removal and/or vegetation clearing as required under Section 3.3.1 and follow the avoidance measures described above to limit impacts on active nests.

During the drawdown and restoration phases, the Renewal Corporation may, to the extent permissible under applicable law, remove nests that are deemed inactive. The purpose of removing inactive nests is to decrease the likelihood that nesting birds will return or reuse nests located in trees or vegetation scheduled to be removed or cleared.

If an active nest is observed in an area that needs to be cleared to facilitate construction and the avoidance measures described above are not practical (e.g., it is not feasible to delay construction), the Renewal Corporation will promptly inform CDFW and discuss a potential resolution that will not delay construction.

Specific avoidance measures for great blue heron, cliff swallows, northern spotted owl and willow flycatcher are described below.

3.3.2.1 Great Blue Heron

A great blue heron rookery was identified near the Copco No 2 wood stave penstock (AECOM, 2019). This rookery is located outside of the California Terrestrial and Wildlife Management Plan Boundary but could be disturbed by construction noise. Removal of the Copco No. 2 wood stave flowline will occur after final reservoir drawdown and is anticipated to occur in late June or later after the juveniles have fledged. Given the timing of the removal of the Copco No. 2 wood stave flowline, such removal is not anticipated to affect breeding or nesting within the rookery.

3.3.2.2 Cliff Swallow

Copco No. 1, Copco No. 2, and Iron Gate and their dam crest facilities have known, or have the potential for, cliff swallow nests. The Renewal Corporation will survey these facilities between October of Year 1 and February of Year 2 (i.e., non-nesting season) prior to the removal of the dam crest facilities and remove all unoccupied nests from structures planned for modification or removal. The purpose of removing nests is to decrease the likelihood that cliff swallows will return to, or reuse, nests on the structures that are scheduled to be modified or removed. While Cliff swallows are known to use bridges for nesting habitat, the proposed bridge improvement activities are not anticipated to significantly impact nesting behavior. Therefore, the Renewal Corporation does not expect to remove nests from the bridges scheduled for improvement.

3.3.2.3 Willow Flycatcher

Pre-Drawdown and Drawdown Phases: Tree removal and vegetation clearing may occur in willow flycatcher habitat (see Appendix A – Figure 2) during the pre-drawdown and drawdown phases of the Proposed Action. Such clearing may be necessary for a number of reasons, including staging area accommodation, equipment storage, and road realignment. If tree removal or vegetation clearing is required in willow flycatcher habitat, the Renewal Corporation will follow the avoidance measures described in Section 3.3.2.

Restoration Phase: After Year 2, restoration activities may require the removal and/or clearing of a minimal amount of trees and vegetation suitable as willow flycatcher habitat. During the restoration phase, the Renewal Corporation will follow the avoidance measures described in Section 3.3.2, including avoiding removal of willow flycatcher suitable habitat (see Appendix A – Figure 2) during the willow flycatcher nesting season (i.e., June 1 – July 31), except as required for IEV management and fish passage barrier remediation or otherwise permitted in the paragraphs below.[2]

If construction activities or the removal of established riparian vegetation is required within 300 feet of potentially suitable willow flycatcher habitat during the willow flycatcher nesting season (i.e., June 1 – July 31) in any year following Year 2, the Renewal Corporation will conduct protocol-level surveys of the areas in and adjacent to the suitable willow flycatcher habitat prior to the construction activity and/or vegetation removal (Bombay et. al. 2003).

Because the restoration phase will extend several years, there may be newly established riparian vegetation that needs to be cleared to prevent volitional fish passage barriers from forming or to remove newly formed barriers to volitional fish passage. Because (1) newly established riparian patches would not likely provide habitat for willow flycatcher due to their early growth state, patch size, and overall lack of structural complexity and (2) the actions will be temporary and minimal in scale, VES surveys will not be conducted before removing newly established riparian vegetation.

[2] These dates were established in consultation with CDFW.

If the Renewal Corporation documents an active willow flycatcher nest in a proposed or active disturbance area within the California Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will follow the avoidance disturbance actions described above in Section 3.3.2. In addition, the Renewal Corporation will coordinate with CDFW to identify an appropriate buffer to be implemented as well as appropriate protective measures to take if construction or restoration activities need to occur within the buffer.

3.4 Northern Spotted Owl

In California, there is a northern spotted owl activity center approximately 1.3 miles southeast of the eastern end of Copco Lake (CNDDB SIS0301 and BLM MSNO 2191). The Renewal Corporation will require helicopter flight paths to stay at least 1 mile away from the center during all work activities to prevent disturbance. See Appendix A – Figure 3 for a description of helicopter flight restriction zones.

If northern spotted owls are observed within the California Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will determine, in coordination with CDFW and the United States Fish and Wildlife Service (USFWS), the best management measures, which may include disturbance buffers and avoidance of key areas. Such measures will be coordinated so as not to unduly interfere with the dam removal construction and restoration schedule.

3.5 Gray Wolf

While gray wolves do not, to the Renewal Corporation's knowledge, currently rendezvous or den in the California Terrestrial and Wildlife Management Plan Boundary, previous observations have documented wolves in Siskiyou County. The Renewal Corporation will contact the CDFW staff identified in Appendix B – Agency Contacts prior to construction activities to determine if there is potential wolf activity in the area where construction will occur. During Proposed Action work activities, CDFW is expected to provide the Renewal Corporation with all relevant information regarding gray wolves' status. If the Renewal Corporation observes any gray wolves within one mile of the California Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will immediately contact CDFW.

If gray wolves, rendezvous sites, or denning sites are observed within the California Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will determine, in coordination with CDFW's wolf biologist, the best management measures, which may include reduced driving speeds, signage on haul roads, limited operating periods, disturbance buffers, and avoidance of key areas. Such measures will be coordinated so as not to unduly interfere with the dam removal construction and restoration schedule.

3.6 Bats

The Renewal Corporation has conducted bat occupancy surveys at facilities impacted by the Proposed Action. During these surveys, surveyors assessed potential bat roosting features (e.g., buildings, bridges, trees) for bat utilization. A total of 17 structures were confirmed to have bat activity associated with them, as shown in Table 3-3, Appendix A – Figure 4 (AECOM 2020).

Table 3-3. Bat Roosting Locations

PROJECT FEATURE	STRUCTURE	HABITAT FEATURES AND ENTRY POINTS
Copco No. 1	Maintenance Building	Cavity in open interior roof spaces, crevices in potential gaps under corrugated metal roof, openings at garage door, and windows that are open/missing panes.
	Gatehouse C-12	Cavity in attic space and crevice beneath copper roof material.
	Gatehouse C-11	Cavity in attic space and crevice beneath copper roof material.
	Diversion Tunnel Outlet	Cavity in interior and crevices in rock.
	Powerhouse	Cavities in interior rooms and spaces, walls, top of walls at roof perimeter, and lower floor rooms and spaces; crevices in roll-up doors, cable hoists, and top of walls beneath corrugated metal roofing; and small bore holes in lower floor concrete deck and walls.
	Vacant House #21601	Cavities in attic, interior rooms, and beneath corrugated roofing material.
Copco No. 2	Powerhouse	Cavities in ground floor interior rooms and spaces, walls, top of walls at roof perimeter, and lower floor rooms and spaces; and crevices in roll-up doors and cable hoists.
	Vacant House #4 (peach)	Cavities in attic, garage, and soffit; crevices in siding, roof fascia, gable vent between louvers and screen, and beneath corrugated roofing material above underlayment.
	Vacant House #3 and Garage (yellow-green)	Cavity in attic; crevices in gaps behind siding and roof facias.
		Cavity in detached garage interior.
	Cookhouse	Crevices in gaps at gutter edge of roofing, gaps at flashing, gable wall, and gap at side door awning.
	Vacant House #2 (blue)	Cavities in the attic, garage, and potentially in interior rooms; and crevices in gaps behind siding, gutters, and fascia.
	Vacant House #1 (tan)	Cavity potential in interior rooms, garage, and attic; and crevices in gaps behind warped or cupped siding, window flower box, and roof fascia.

PROJECT FEATURE	STRUCTURE	HABITAT FEATURES AND ENTRY POINTS
Iron Gate	Penstock Intake Structure	Interior cavity, crevices. Entry at side of exterior trash rack into space in concrete base, up into building through floor grates.
	Powerhouse	Many large spaces and crevices in interior rooms in upper floor and lower floor, including draft pipe channels below grade. Entry through wire mesh covers over windows and access doors.
	Diversion Tunnel Outlet	Cavity in interior of tunnel, crevices in rock.
	Barn/Garage	Cavity/crevice interior spaces; crevices in exterior wall boards/battens; and crevices between roof shingles and corrugated roof above.
	Lakeview Road Bridge	Expansion joints – crevices.
	Residence 2 (occupied)	Behind clock on back porch.

As described below, the Renewal Corporation's management measures include seasonal considerations with respect to structure removal, visual surveys prior to structure removal, phased removal, barricading remaining structures to exclude bats and building replacement habitat.

The Renewal Corporation will implement structure removal activities with consideration of seasonal bat behavior. This will minimize potential impacts to bats in their maternity state, bat pups, and hibernating bats. The following time periods represent the preferred dates for structure removal.

- March 1 to April 15 and
- September 1 to October 15 (SWRCB 2020a).

If bat-containing building removal cannot occur during these time periods, removal will occur at such other time as is determined in consultation with CDFW.

Prior to structure and tree removal construction activities, the Renewal Corporation’s DB will conduct visual surveys at the appropriate time of day or night for bats or signs of recent use to determine if the surveyed structures and/or trees are subject to the time period restrictions set forth above.

If the Renewal Corporation detects bats in a fabricated structure, removal will occur in two phases.

> **Phase 1:** Construction crew will remove windows and doors from the structure to alter the temperature, ambient light, and natural airflow. Construction crew may also remove a limited portion of the roof and siding/walls of the structure, as necessary. The structure will then be left undisturbed overnight to allow bats to vacate. If warranted, the Renewal Corporation will install acoustic disrupter units and/or high-intensity LED floodlights to repel bats. To the extent practicable, all phase 1 activities shall take place in the evening to minimize the likelihood that bats are flushed from the structure during daylight hours. Prior to implementation, the Renewal Corporation will coordinate with the CDFW regarding the partial removal and bat exclusion activities described in this paragraph.
>
> **Phase 2:** Construction crew will perform the final demolition of the structure within ten (10) days.

Likewise, if the Renewal Corporation detects bats in trees designated for removal, construction crew will remove these trees in two phases. Construction crew will remove tree branches in the initial phase. The tree will then be left undisturbed overnight to allow bats to vacate the tree. Construction crew will fell the tree on the following day. An alternative phased tree removal method involves allowing a felled tree to remain in place for 24-hours prior to chipping or removal. Construction crew will carry out one of these phased tree removal methods when practicable. To the extent practicable, branch and tree removal shall take place in the evening to minimize the likelihood that bats are flushed from the tree during daylight hours.

Structures that will remain intact include portal outlets, tunnels, and other water conveyance structures. These structures will be permanently closed and barricaded with concrete rubble, earth fill, and/or steel plates. To the extent practicable, the Renewal Corporation will attempt to evict all bats from the remaining structure prior to barricading them.

Finally, the Renewal Corporation has concluded that the Proposed Action will not have an adverse impact on native bat species within the California Terrestrial and Wildlife Management Plan Boundary, given the abundance of natural habitat. Nonetheless, in recognition that the Proposed Action will result in the loss of some artificial habitat currently found within structures that will be fully or partially demolished in connection with the Proposed Action, the Renewal Corporation will install (as a discretionary enhancement measure) bat boxes and/or condos, pursuant to subsequent agreement with state and federal agencies. The Renewal Corporation expects the bat boxes and/or condos to be provided and installed at least three months prior to full or partial structure demolition.

3.7 Other Special Status Species

3.7.1 Wildlife

Special status species that were not identified during the pre-construction wildlife monitoring but have the potential to occur in the California Terrestrial and Wildlife Management Plan Boundary include the foothill yellow-legged frog (*Rana boylii*); a CDFW species of special concern (SSC, CDFW 2019, AECOM 2019; AECOM 2020).[3] While the Renewal Corporation will not perform any formal surveys for the foothill yellow-legged frog, observations of the species during VES surveys for WPT and other species will be noted and reported to the Commission, USFWS, SWRCB, and CDFW in the monthly status report (Section 4.1). If the foothill yellow-legged frog is observed in or near a construction area during a VES survey, the Renewal Corporation will determine, in consultation with CDFW, the best management measures to minimize impact on the species. If CDFW recommends that individuals be relocated, such relocations will be conducted pursuant to the guidelines developed in coordination with CDFW.

3.7.2 Plants

The Renewal Corporation commissioned special status plant species surveys in and around the California Terrestrial and Wildlife Management Plan Boundary in 2018 and 2019 (AECOM 2019; 2020) as described in Appendix C. Surveyors did not identify any federally or state-listed plant species during these surveys. The California Rare Plant Rank 1B and 2 Species located within the California Terrestrial and Wildlife Management Plan Boundary are set forth below in Table 3-4 (CDFW 2021). In addition, Appendix A – Figure 5 provides the general locations where such species were located. Known occurrences of special status plant populations will be avoided to the extent practicable.

Table 3-4. California Rare Plants (Rank 1B and 2) within the California Terrestrial and Wildlife Management Plan Boundary

COMMON NAME	SCIENTIFIC NAME	TOTAL OCCURRENCES	FEDERAL STATUS	STATE RANK	RARE PLANT RANK[1]
Detling's Silverpuffs	*Microseris laciniata ssp. detlingii*	1	None	S1	2B.2
Greene's mariposa-lily	*Calochortus greenei*	50	None	S2S3	1B.2
Holzinger's orthotrichum moss	*Orthotrichum holzingeri*	7	None	S2	1B.3
[1]California Native Plant Society, Inventory of Rare and Endangered Plants of California (CNPS 2021)					

[3] The foothill yellow-legged frog's status is under review for possible listing as threatened or endangered under the federal Endangered Species Act.

3.8 Entrapment Prevention and Exclusion

The Renewal Corporation will fence construction areas such as trenches or pipes that could entrap small mammals, large mammals, amphibians or reptiles, when feasible. The Renewal Corporation will implement additional exclusion fencing or other appropriate measures determined by the Renewal Corporation in consultation with CDFW to be necessary to reduce the likelihood that special status species access areas within the California Terrestrial and Wildlife Management Plan Boundary. The Renewal Corporation will make daily observations of the fenced construction areas for any entrapped species.

In addition, construction crews will either cover or place escape ramps in any material open hole or trench left open overnight. The escape ramps can be in the form of a 2" x 6" board. All constructed holes and trenches that are open will be inspected daily for entrapped wildlife throughout the construction period and prior to fill. Any wildlife discovered will first be allowed to escape voluntarily. If an entrapped individual will not voluntarily escape, the Renewal Corporation will use its best professional judgment in removing and relocating the entrapped individual.

3.9 Herbicide Application

The Renewal Corporation may apply herbicides approved by BLM, EPA and California Department of Pesticide Regulation to control the spread of IEV in the California Terrestrial and Wildlife Management Plan Boundary, as needed. The Renewal Corporation will comply with all requirements set forth in both the USFWS and National Marine Fisheries Service Biological Opinions regarding the application of herbicides and will apply all BLM, EPA and California Department of Pesticide Regulation approved herbicides according to labeling directions. The Reservoir Area Management Plan identifies the management measures related to herbicide application that will be undertaken by the Renewal Corporation to avoid impacts to special status species. See Appendix C of the Reservoir Area Management Plan for a list of the BMPs related to Herbicide Application that will be implemented by the Renewal Corporation.

3.10 Wetland Buffer

Non-dam removal construction activities (e.g., staging areas, temporary spoils and construction trailer sites) may occur near wetland habitats. The Renewal Corporation will review construction designs and delineated wetland locations within the California Terrestrial and Wildlife Management Plan Boundary to determine if any temporary construction sites are near existing non-reservoir dependent wetlands, see Appendix A – Figure 6. If temporary construction sites are near non-reservoir dependent wetlands, the Renewal Corporation will establish wetland buffers that meet all applicable legal requirements prior to the start of construction activities. Independent of the legal requirements, the wetland buffer established by the Renewal Corporation will be a minimum of 20 feet in order to minimize unnecessary impacts to wetlands. The Renewal Corporation will demarcate the wetland buffer with flagging or fencing, as needed.

4.0 Reporting

The Renewal Corporation will report the activities outlined in the California Terrestrial and Wildlife Management Plan as described below. In addition, the Renewal Corporation will promptly notify USFWS if it observes a species listed under the Endangered Species Act of 1973 within the California Terrestrial and Wildlife Management Plan Boundary. The Renewal Corporation will also promptly notify CDFW and USFWS if it finds an injured special status species that needs to be transported to an appropriate wildlife rehabilitation center for care.

4.1 Monthly Reports

The Renewal Corporation will provide monthly status reports to the Commission, USFWS, SWRCB and CDFW no later than ten (10) days after the end of each month. Monthly reports will be provided during Year 1, Year 2, and Year 3. Reporting after Year 3 will only occur for months in which the management measures identified by the California Terrestrial and Wildlife Management Plan are required in connection with construction activities have the potential to disturb the special status species listed in the California Terrestrial and Wildlife Management Plan.

Monthly status reports will include a summary of the following:

1. WPT VES survey methods, conditions and results, including WPT observations, weather conditions during surveys, frequency and duration of survey efforts to date, actions taken to rescue/relocate WPT (including the number of WPT relocated and which relocation area they were released) and data collected on handled individuals as identified in Section 3.1.3. This will be in addition to the WPT reporting described in Section 4.3.
2. Avian nesting VES survey methods, conditions and results, including weather conditions during surveys, survey efforts to date, duration of surveys, any active or inactive nests encountered, any CDFW coordination to date and measures implemented.
3. With respect to willow flycatcher protocol-level surveys undertaken during the restoration period pursuant to Section 3.3.2.3, survey methods, conditions and results, including weather conditions during surveys, survey efforts to date, any active or inactive nests encountered, any CDFW coordination to date and measures implemented.
4. Bat visual survey results, including weather conditions during surveys, measures taken to exclude bats from facilities prior to removal and removal activities.
5. Special status species observations made during VES surveys.
6. Location of wetland buffers established pursuant to Section 3.10.
7. Crew training completed since the last monthly status report.

4.2 Annual Reporting

The Renewal Corporation will provide annual status reports by April 1 of every year to the USFWS, SWRCB and CDFW detailing the application of management measures, construction status and agency consultation. The Renewal Corporation will prepare annual reports beginning Year 1 and ending the year that license surrender is effective.

4.3 Western Pond Turtle Reporting

The Renewal Corporation will submit a WPT Rescue and Relocation Report to the Commission, SWRCB and CDFW no later than 60 days after completion of the post-drawdown surveys. This report will include the following information:

- Survey timing (which covers multiple life stages),
- Survey frequency,
- Survey locations,
- Relocation areas with suitable habitat, and
- Survey methodology.

The Renewal Corporation will submit the Final WPT Compliance Report to the Commission, CDFW, SWRCB, and USFWS within 30 days of Proposed Action completion. The final report will identify all activities that took place in connection with the pre-construction and drawdown VES surveys for WPT. The final report will include the following:

- All individuals handled during rescue and relocation,
- Location, date, time, and duration of the handling,
- Enumeration of species handled,
- Identification of species life stage and health,
- Identification of capture personnel,
- Stream, transport, and receiving water temperatures, and
- Location, date, and time of release.

4.4 California Natural Diversity Database

The Renewal Corporation will report observations of special-status species in the California Terrestrial and Wildlife Management Plan Boundary to the California Natural Diversity Database (CNDDB) online through the duration of restoration.

5.0 References

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Appendix A

Figures

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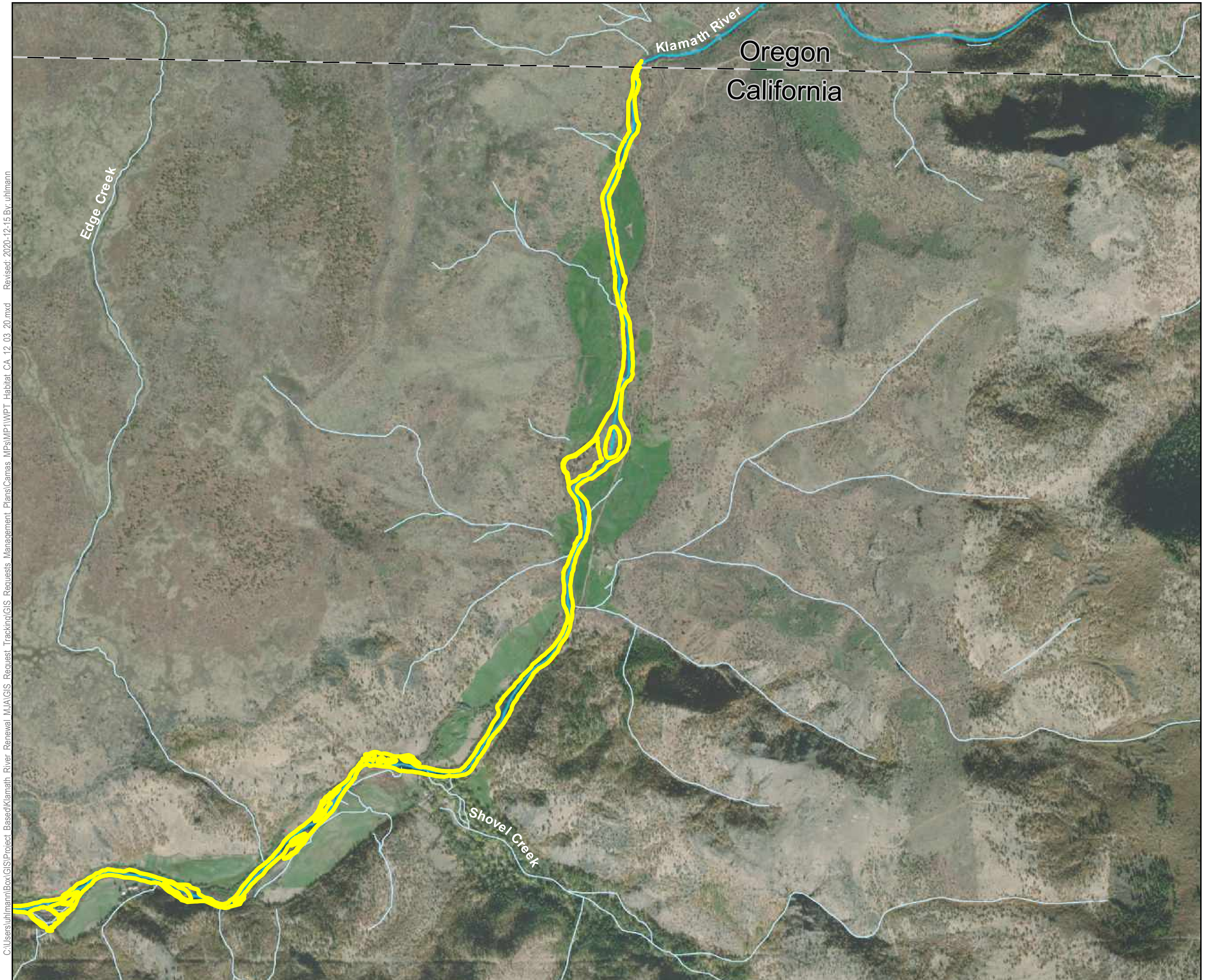

KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey and Relocation Areas in California

December, 2020

Klamath River

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0 0.25 0.5 Miles

PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

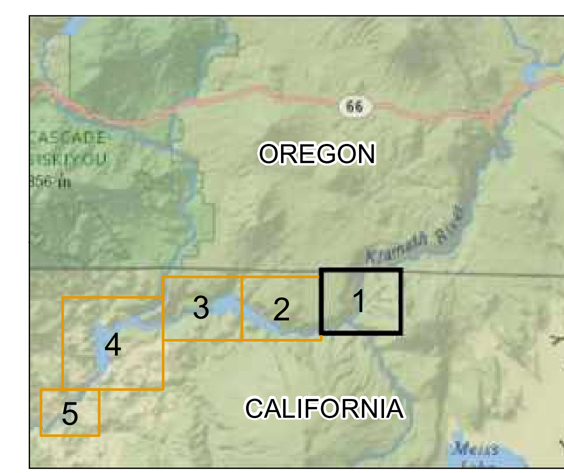
WPT Relocation Habitat

Survey prior to construction activity

Klamath River

Streams

CA-OR State Boundary



Notes

1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US
2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Pond Turtle Habitat: Pacificorp and EDAW; Limot of Work: 90% Design Draft (6/19/20) Knight Piesold
3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey and Relocation Areas in California

December, 2020

Copco Reservoir

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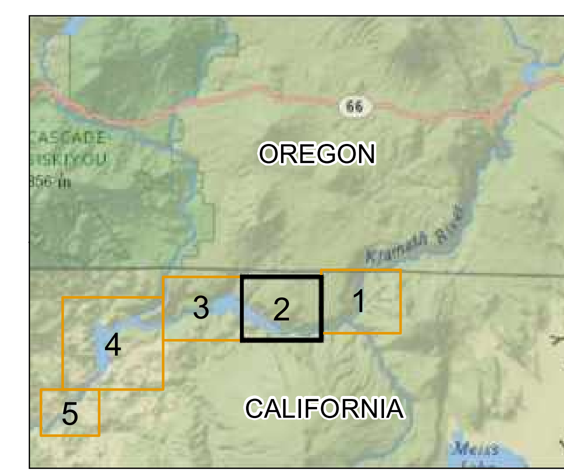
0 0.25 0.5 Miles

PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

- WPT Relocation Habitat
- Survey prior to construction activity
- Limits of Work
- Reservoir Area
- Klamath River
- Streams
- CA-OR State Boundary



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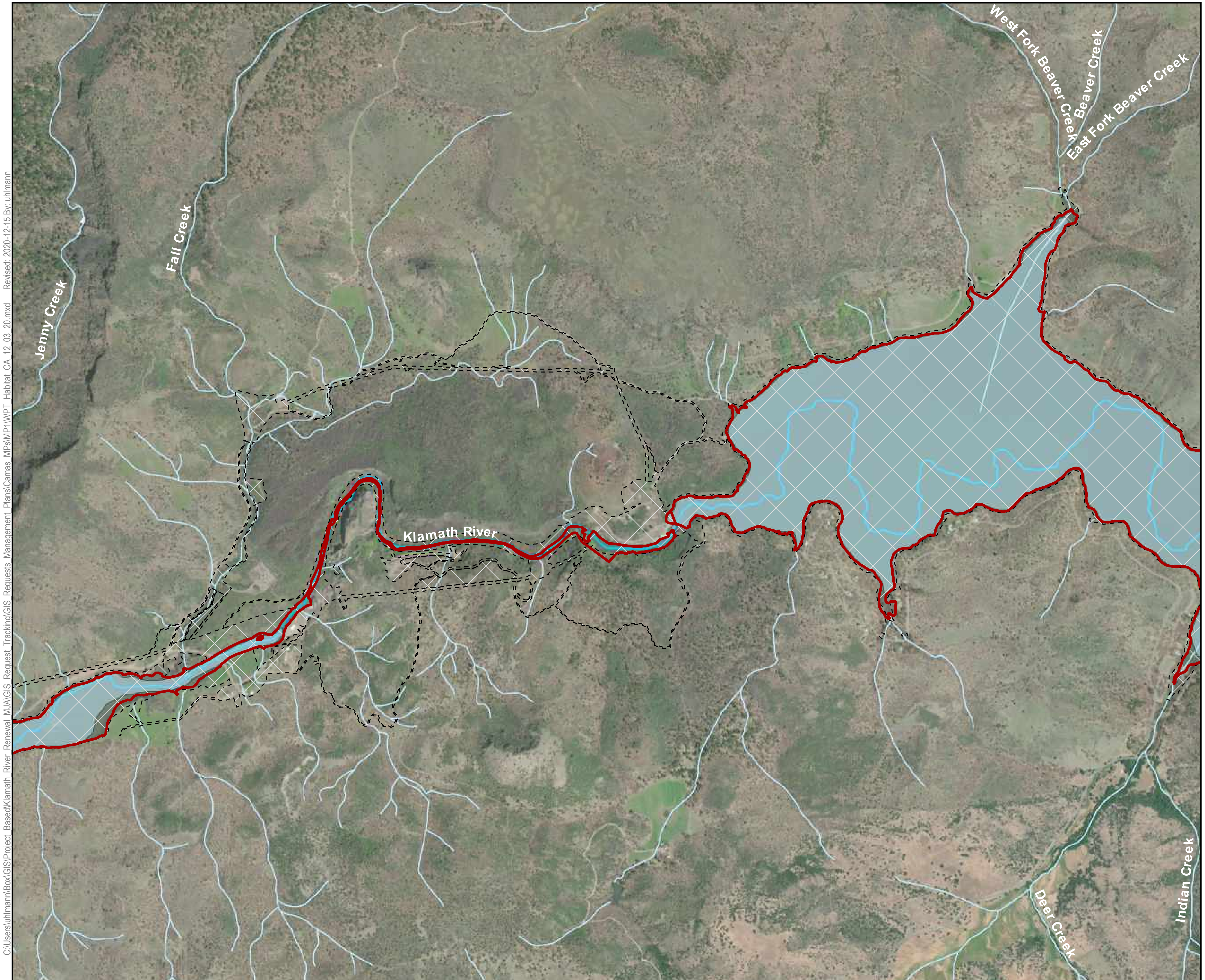

KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey and Relocation Areas in California

December, 2020

Copco Dams 1 and 2

(At original document size of 11x17)
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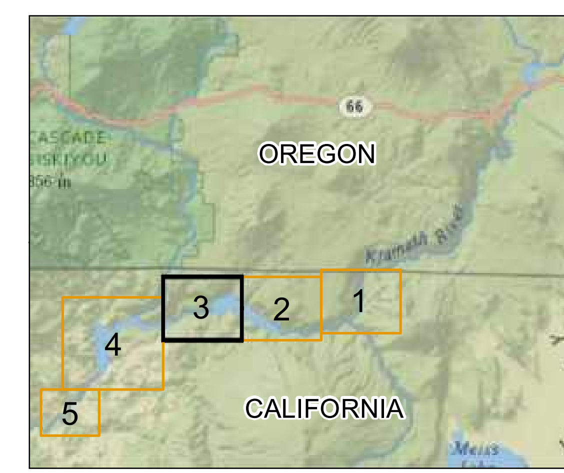
0 0.25 0.5 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

- Survey prior to construction activity
- Limits of Work
- Reservoir Area
- Klamath River
- Streams
- CA-OR State Boundary



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3. *Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

Sheet 3 of 5

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KLAMATH RIVER RENEWAL CORPORATION

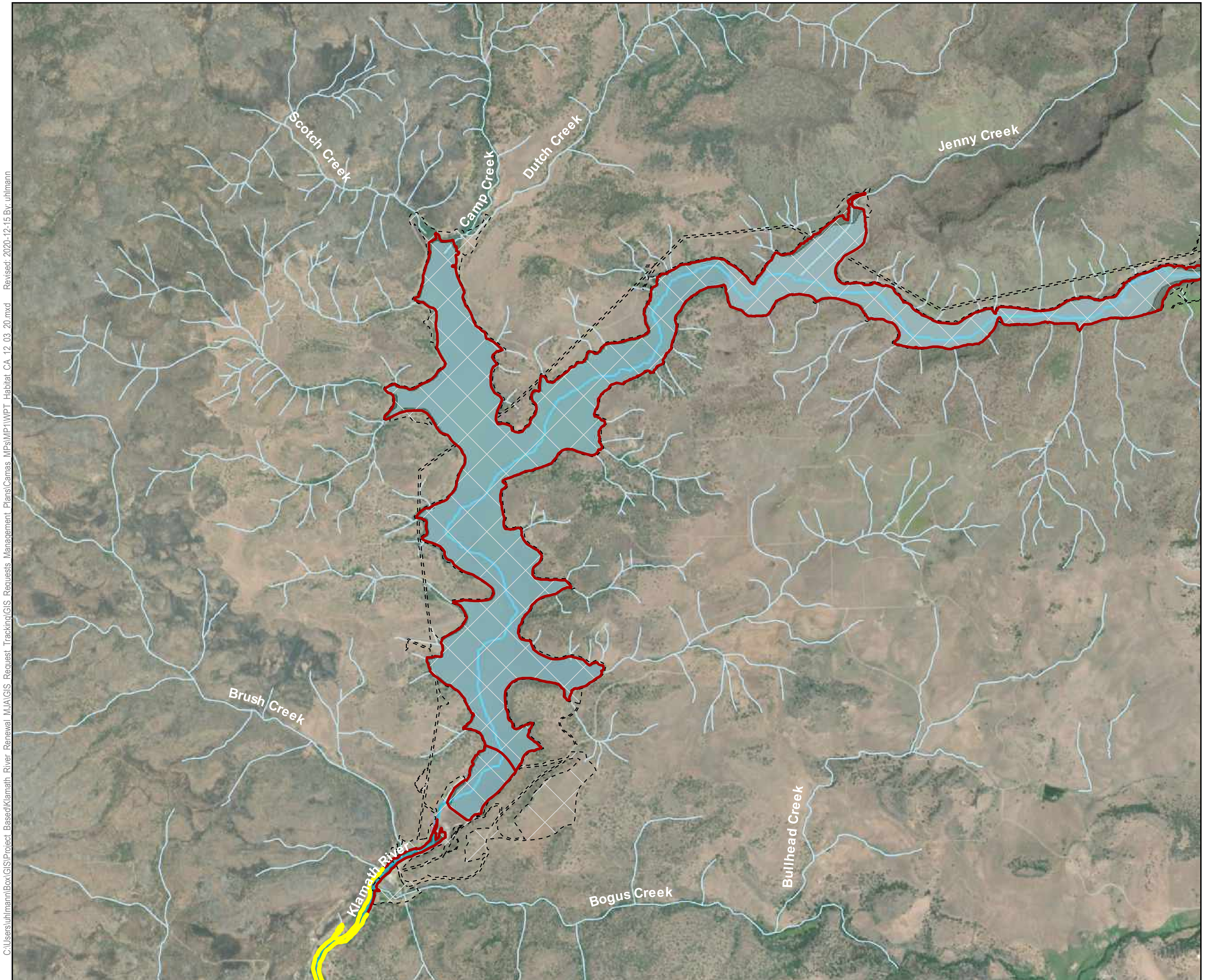
Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey and Relocation Areas in California

December, 2020

Iron Gate

(At original document size of 11x17)
1:29,500

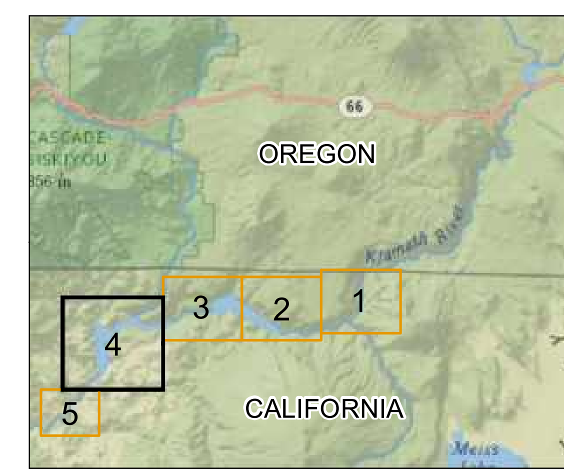


0 0.25 0.5 0.75 Miles

N

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

- WPT Relocation Habitat
- Survey prior to construction activity
- Limits of Work
- Reservoir Area
- Klamath River
- Streams
- CA-OR State Boundary



Notes
1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US
2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Pond Turtle Habitat: Pacificorp and EDAW; Limot of Work: 90% Design Draft (6/19/20) Knight Piesold
3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Sheet 4 of 5

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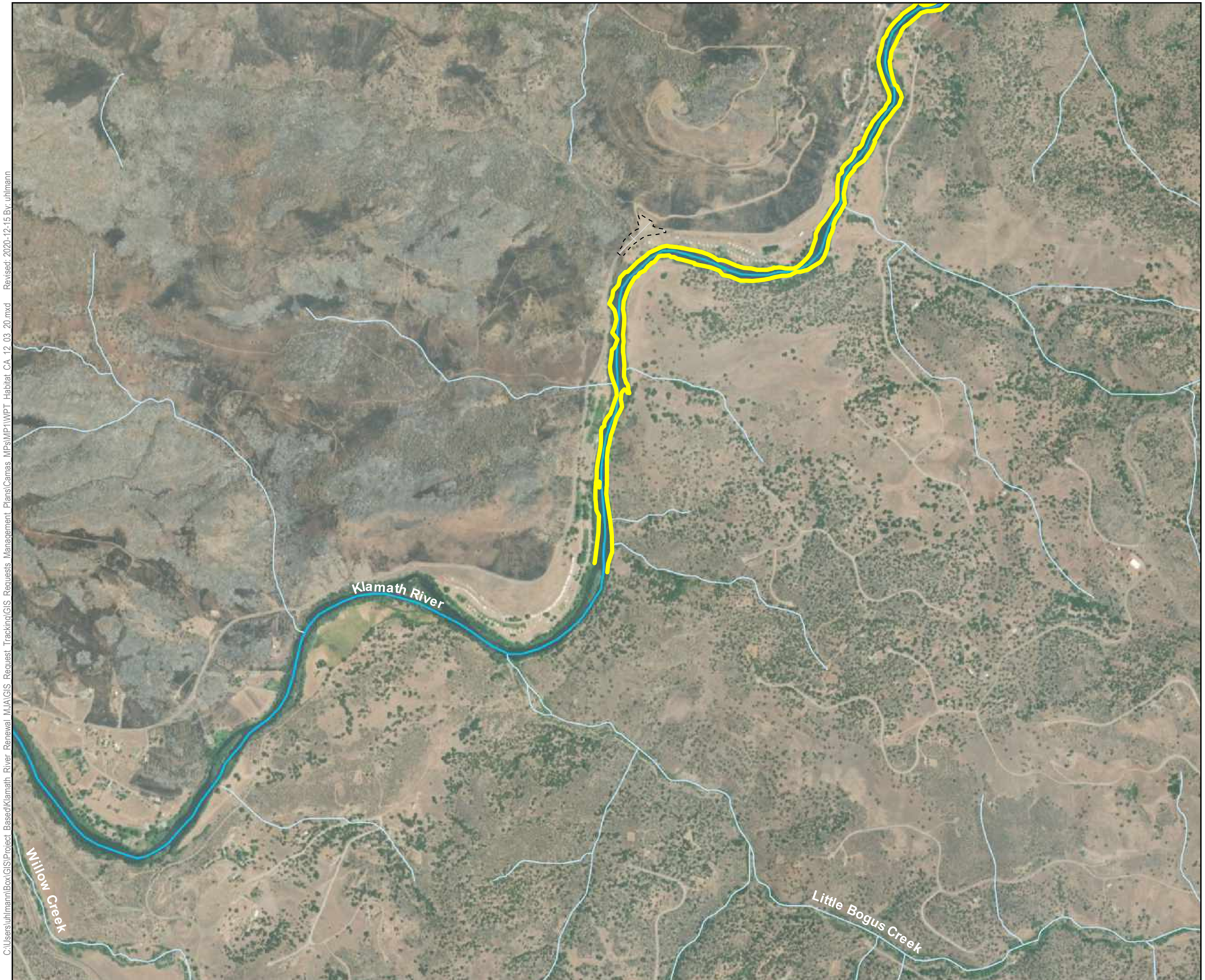


KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey and Relocation Areas in California

December, 2020

Klamath River

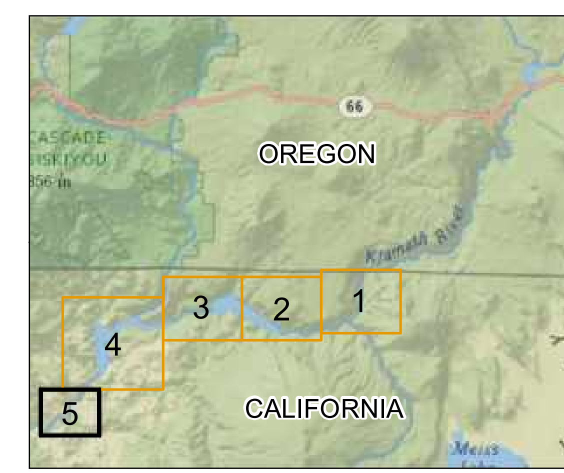
(At original document size of 11x17)
1:15,430

N

0 0.25 Miles

PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

- WPT Relocation Habitat
- Survey prior to construction activity
- Limits of Work
- Klamath River
- Streams
- CA-OR State Boundary



Notes
1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*
2. *Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Pond Turtle Habitat: Pacificorp and EDAW; Limot of Work: 90% Design Draft (6/19/20) Knight Piesold*
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Sheet 5 of 5

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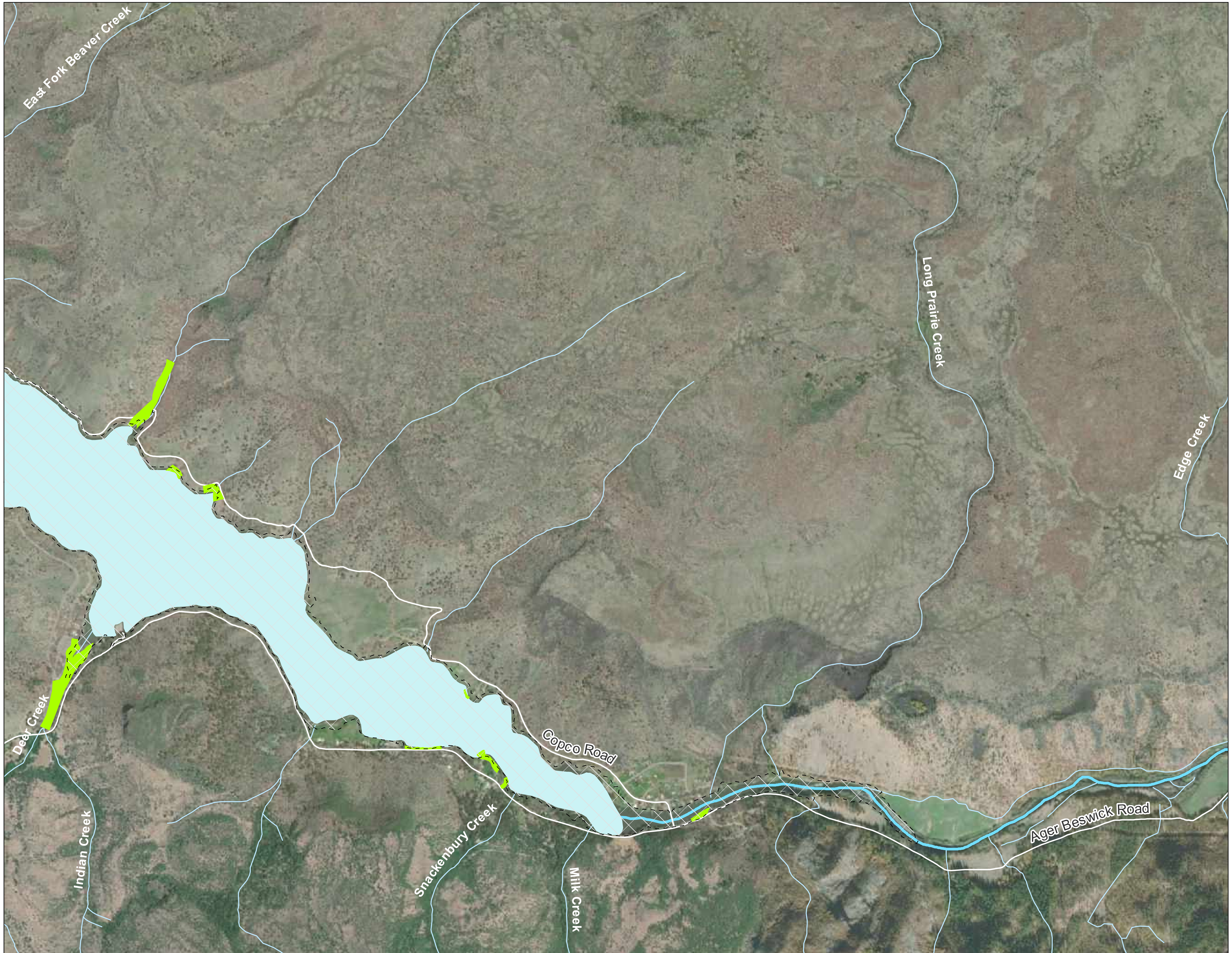


KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 2. Willow Flycatcher Habitat

Copco Reservoir

February, 2021

N

(At original document size of 11x17) 1:22,210

0 0.25 0.5 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Limits of Work

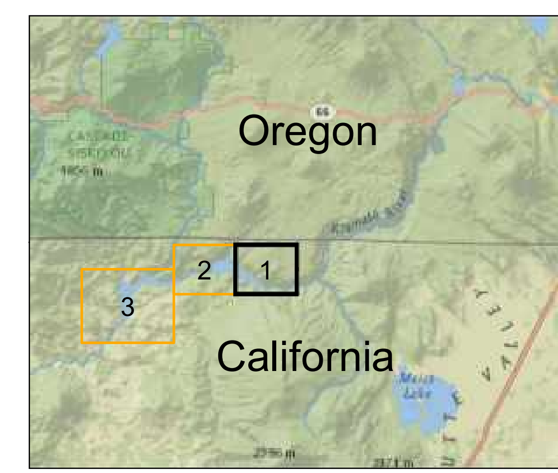
Willow Flycatcher Habitat

Access Routes

Reservoir

Klamath River

Streams



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1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US

2. Data Sources: Limits of Work: Knight Piesold 100 Design Draft; Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Willow Fly Catcher: CDM Smith Field-collected Survey Data; Access Routes: AECOM.

3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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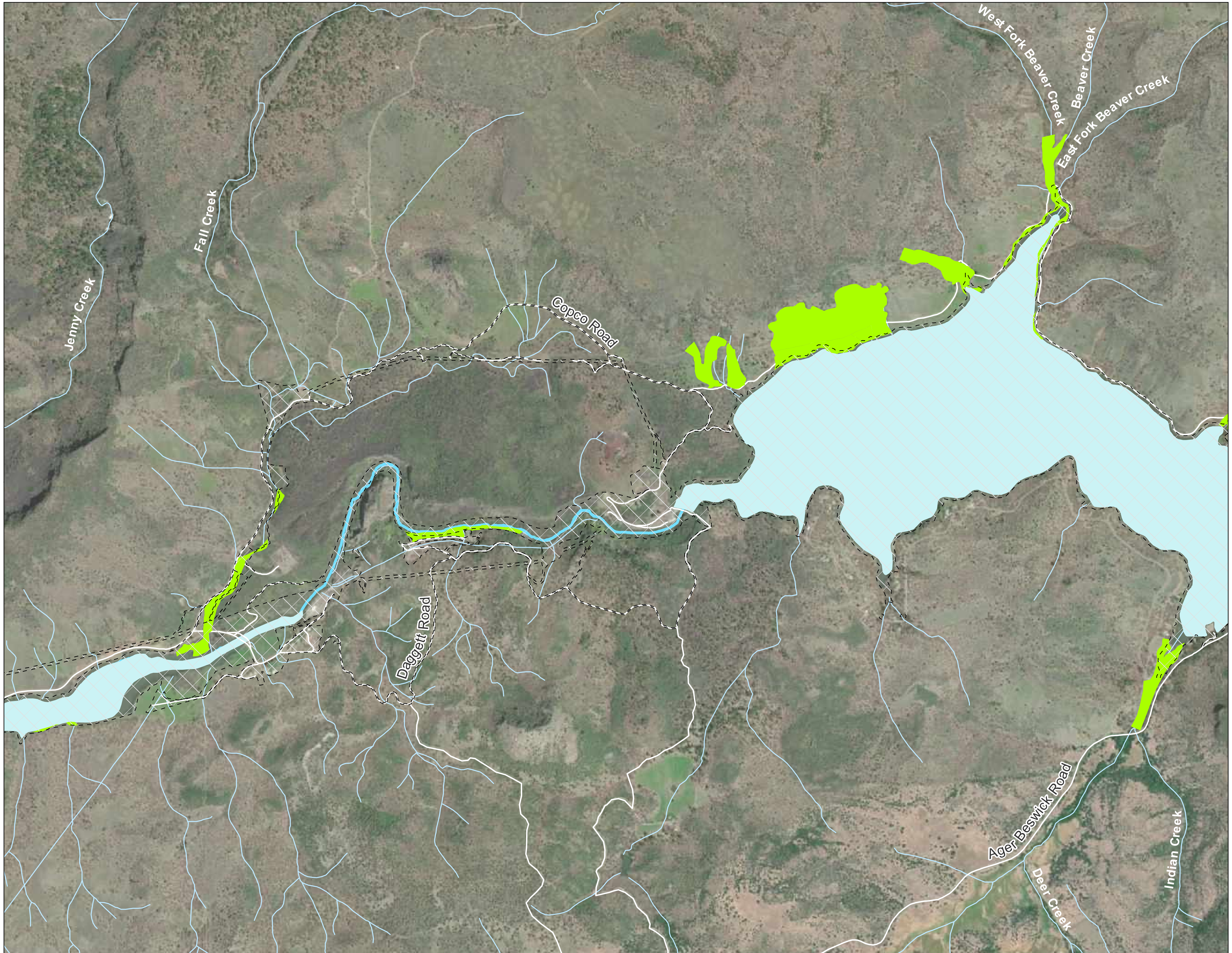


KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 2. Willow Flycatcher Habitat

Copco Dams 1 and 2

February, 2021

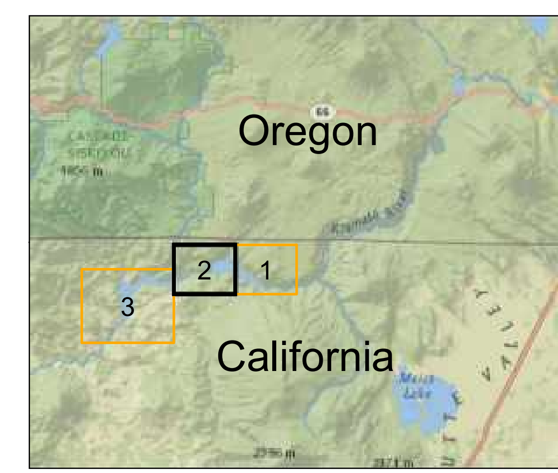
(At original document size of 11x17) 1:22,210

N

0 0.25 0.5 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Limits of Work
Willow Flycatcher Habitat
Access Routes
Reservoir
Klamath River
Streams



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1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*

2. *Data Sources: Limits of Work: Knight Piesold 100 Design Draft; Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Willow Fly Catcher: CDM Smith Field-collected Survey Data; Access Routes: AECOM.*

3. *Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

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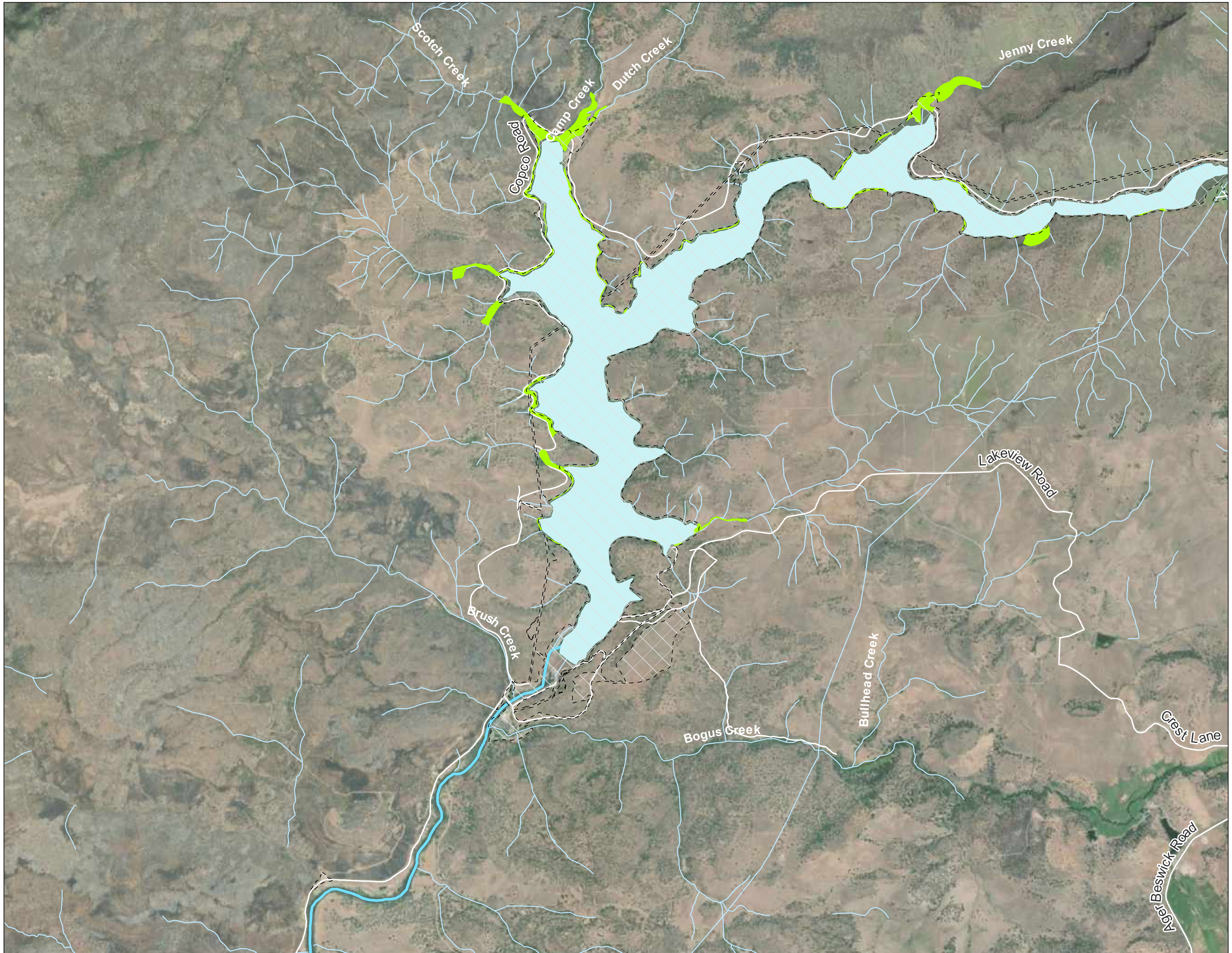

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KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 2. Willow Flycatcher Habitat

Iron Gate

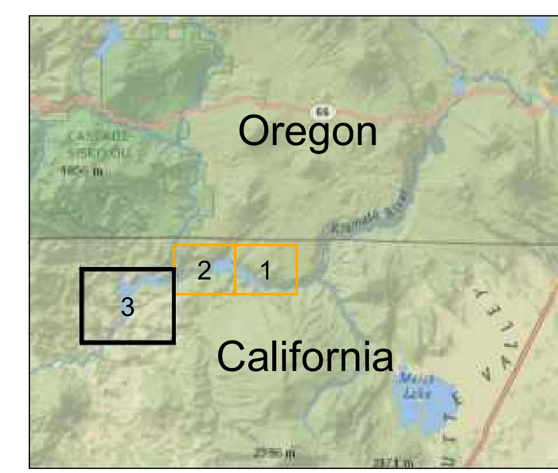
February, 2021

(At original document size of 11x17) 1:33,310

0 0.25 0.5 0.75 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

- Limits of Work
- Willow Flycatcher Habitat
- Access Routes
- Reservoir
- Klamath River
- Streams



Notes

1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*

2. *Data Sources: Limits of Work: Knight Piesold 100 Design Draft; Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Willow Fly Catcher: CDM Smith Field-collected Survey Data; Access Routes: AECOM.*

3. *Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

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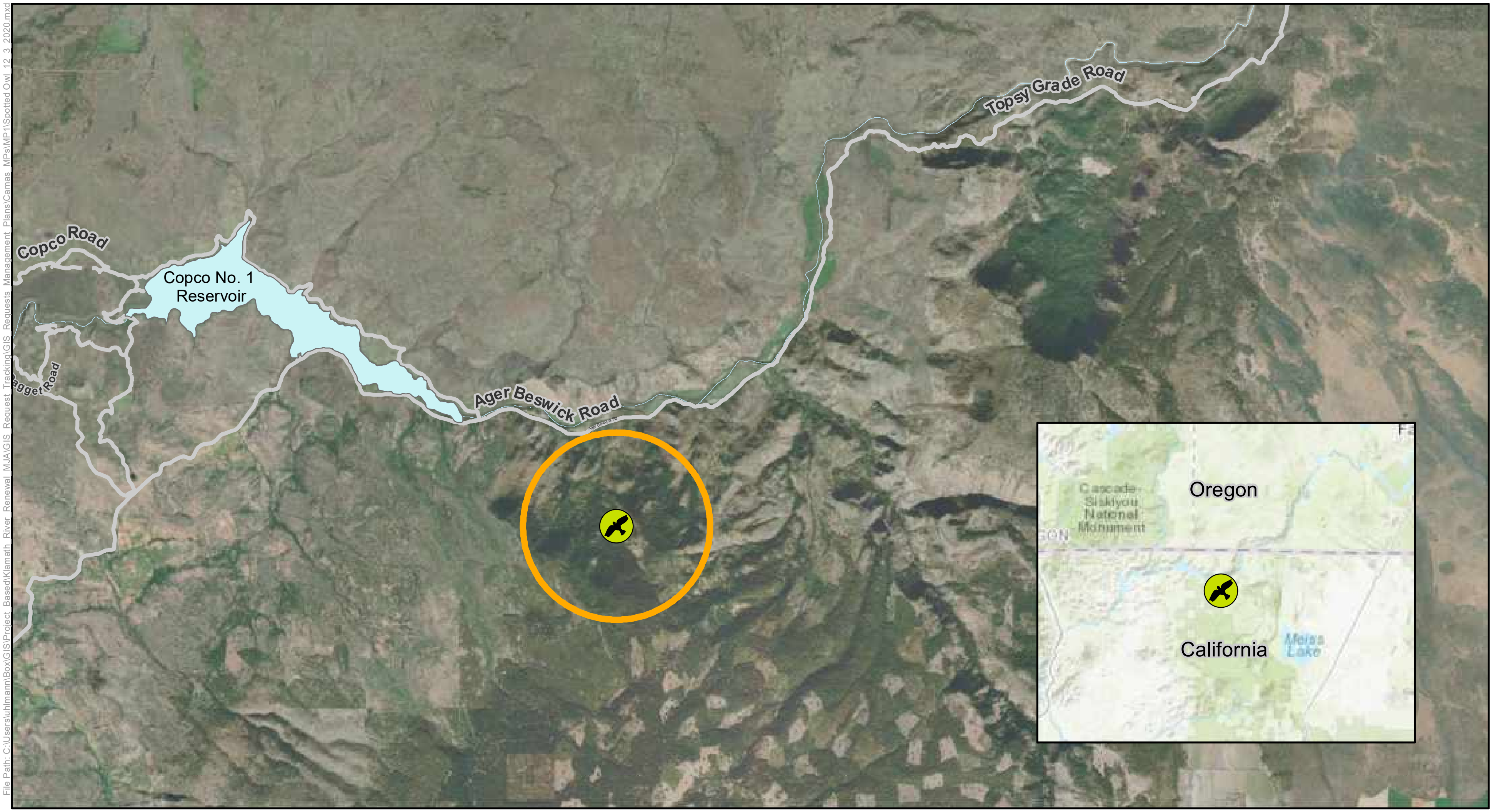

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KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 3. Helicopter Flight Restriction Zone

December, 2020

(At original document size of 11x17)

1:100,000

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

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0 1 2 Miles

Northern Spotted Owl Activity Center

Helicopter Exclusion Zone

Reservoir Area

Access Routes

Klamath River

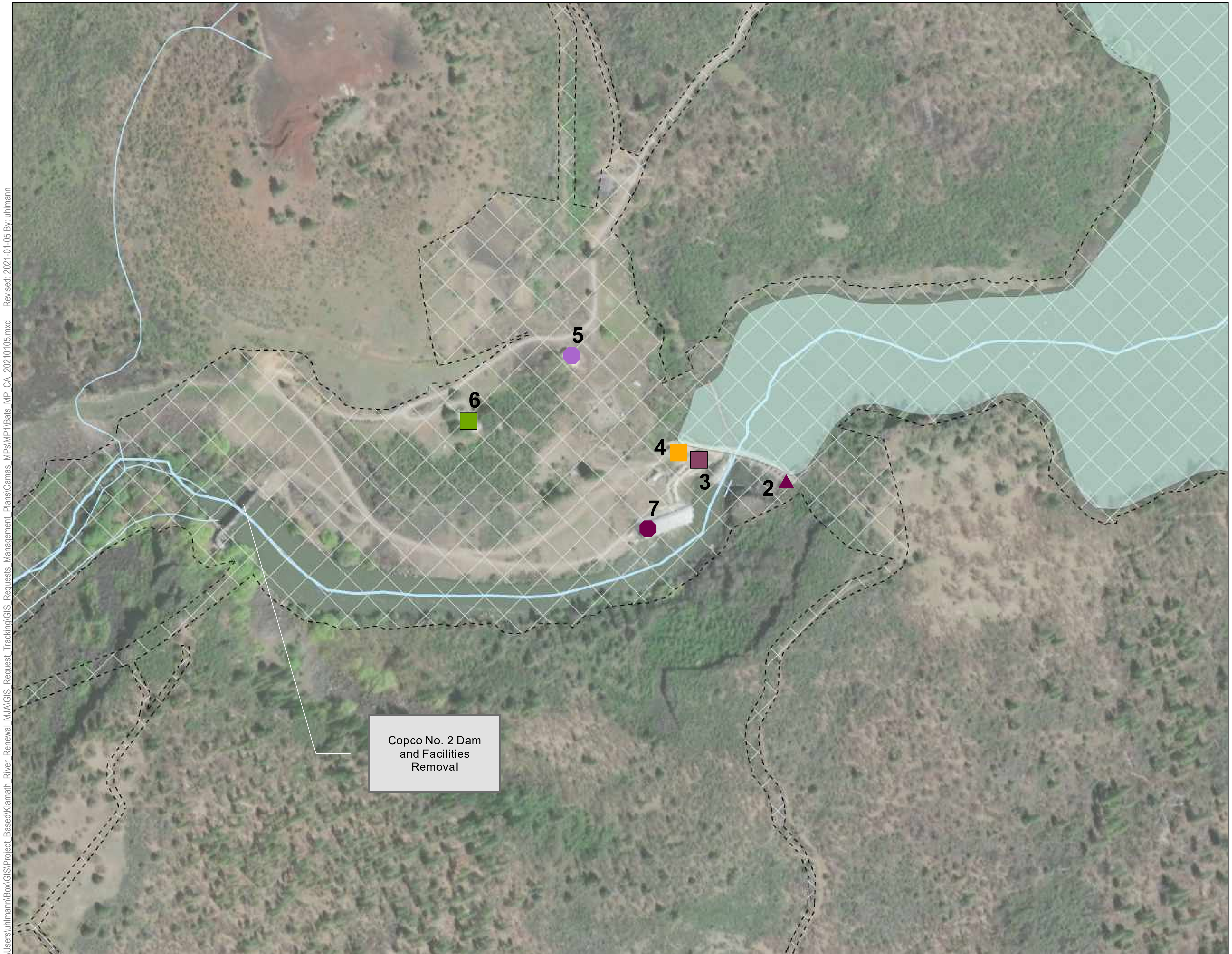
N

Notes

1. Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

2. Data Sources: Spotted Owl Activity Center: Klamath River Renewal Project 2018 Annual Terrestrial ResourcesSurvey Report; Klamath River: AECOM, 3/21/2019'; Roads: AECOM 6/2017, combined Tiger, Oregon state data, and California state data improved using aerial imagery.

3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 4. Structures with Potential Bat Roosts California

January, 2021

N

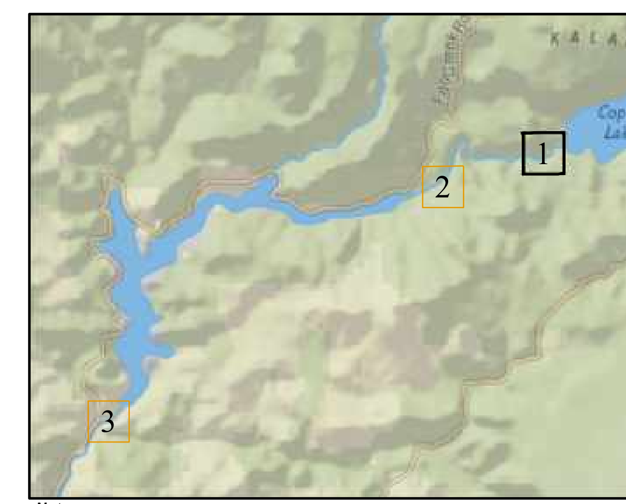
(At original document size of 11x17)
1:3,620

0 0.1 Miles

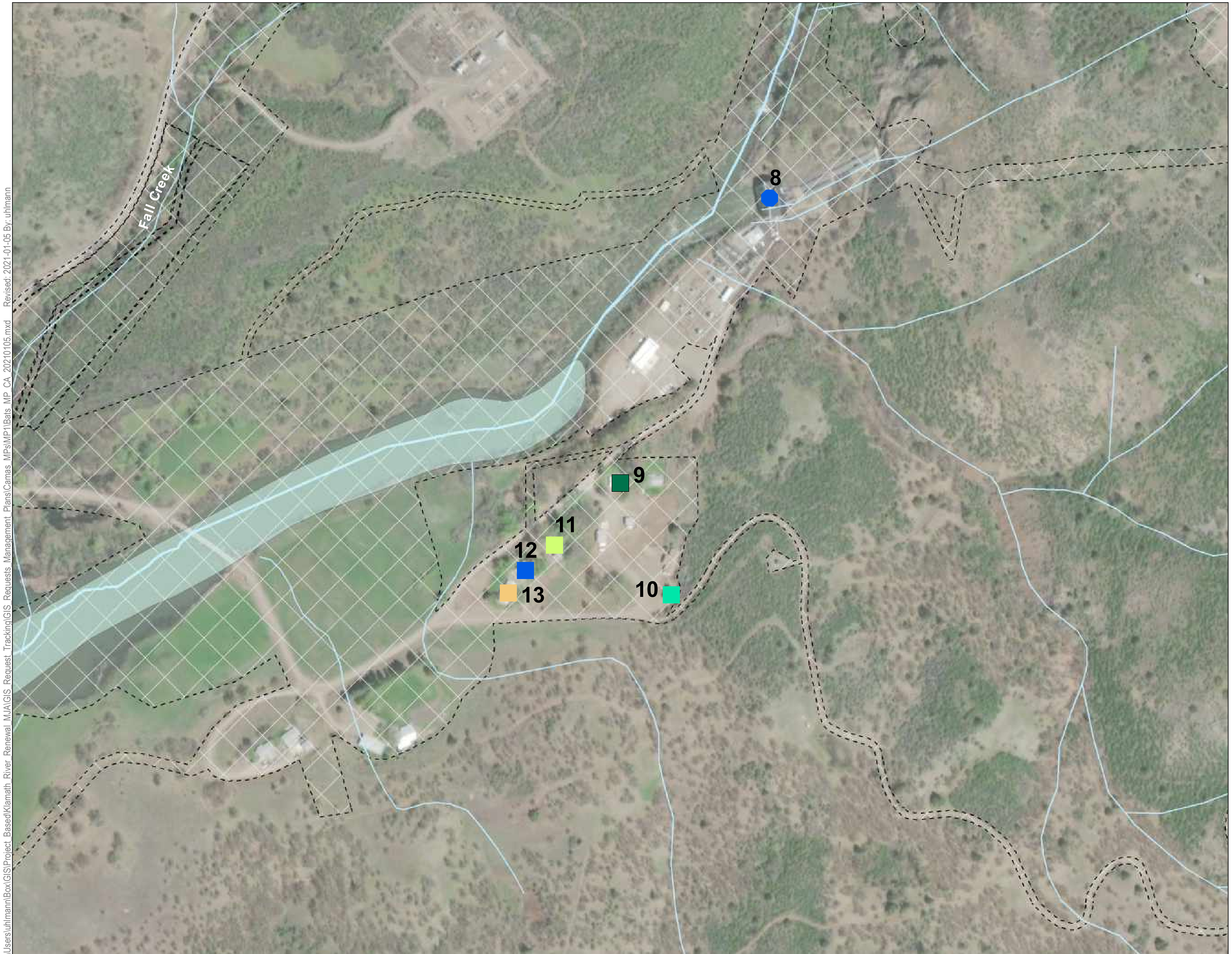
PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

Structures with Potential Bat Roosts

- 2 Diversion Tunnel Outlet
- 3 Gatehouse C-11
- 4 Gatehouse C-12
- 5 Maintenance Building
- 6 Vacant House #21601
- 7 Powerhouse
- Limits of Work
- Reservoir Area
- Klamath River



Notes
1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*
2. *Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Bat Roosts: Shannon Leonard AECOM 2019; Access Routes: AECOM; Limits of Work; Knight Piesold 90 Design Draft*
3. *Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*



KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 4. Structures with Potential Bat Roosts California

January, 2021

N

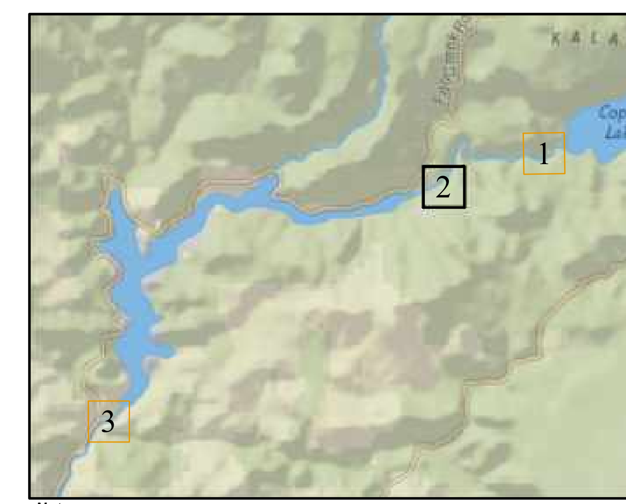
(At original document size of 11x17)
1:3,620

0 0.1 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Structures with Potential Bat Roosts

- 10 Cookhouse
- 11 Vacant House 3 (yellow green)
- 12 Vacant House 2 (blue)
- 13 Vacant House 1 (tan)
- 8 Powerhouse
- 9 Vacant House 4 (peach)
- Limits of Work
- Reservoir Area
- Klamath River



Notes
1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US
2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Bat Roosts: Shannon Leonard AECOM 2019; Access Routes: AECOM; Limits of Work; Knight Piesold 90 Design Draft
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KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 4. Structures with Potential Bat Roosts California

January, 2021

(At original document size of 11x17)
1:3,610

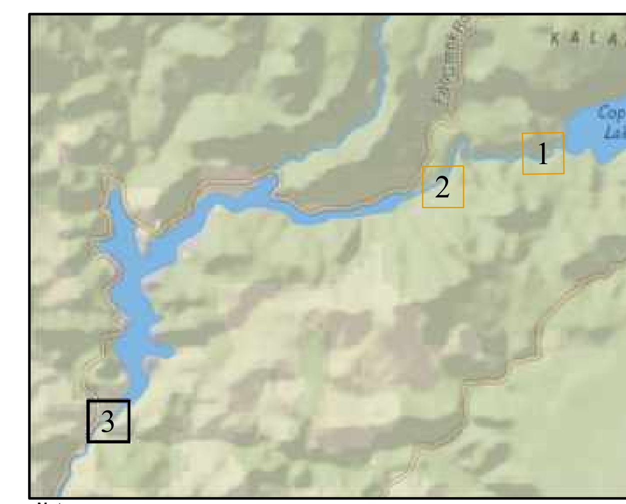
0 — 0.1 Miles

N

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Structures with Potential Bat Roosts

- 14 Penstock Intake Structure
- 15 Diversion Tunnel Outlet
- 16 Powerhouse
- 17 Barn/Garage
- 18 Lakeview Road Bridge
- Limits of Work
- Reservoir Area
- Klamath River



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1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US
2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Bat Roosts: Shannon Leonard AECOM 2019; Access Routes: AECOM; Limits of Work; Knight Piesold 90 Design Draft
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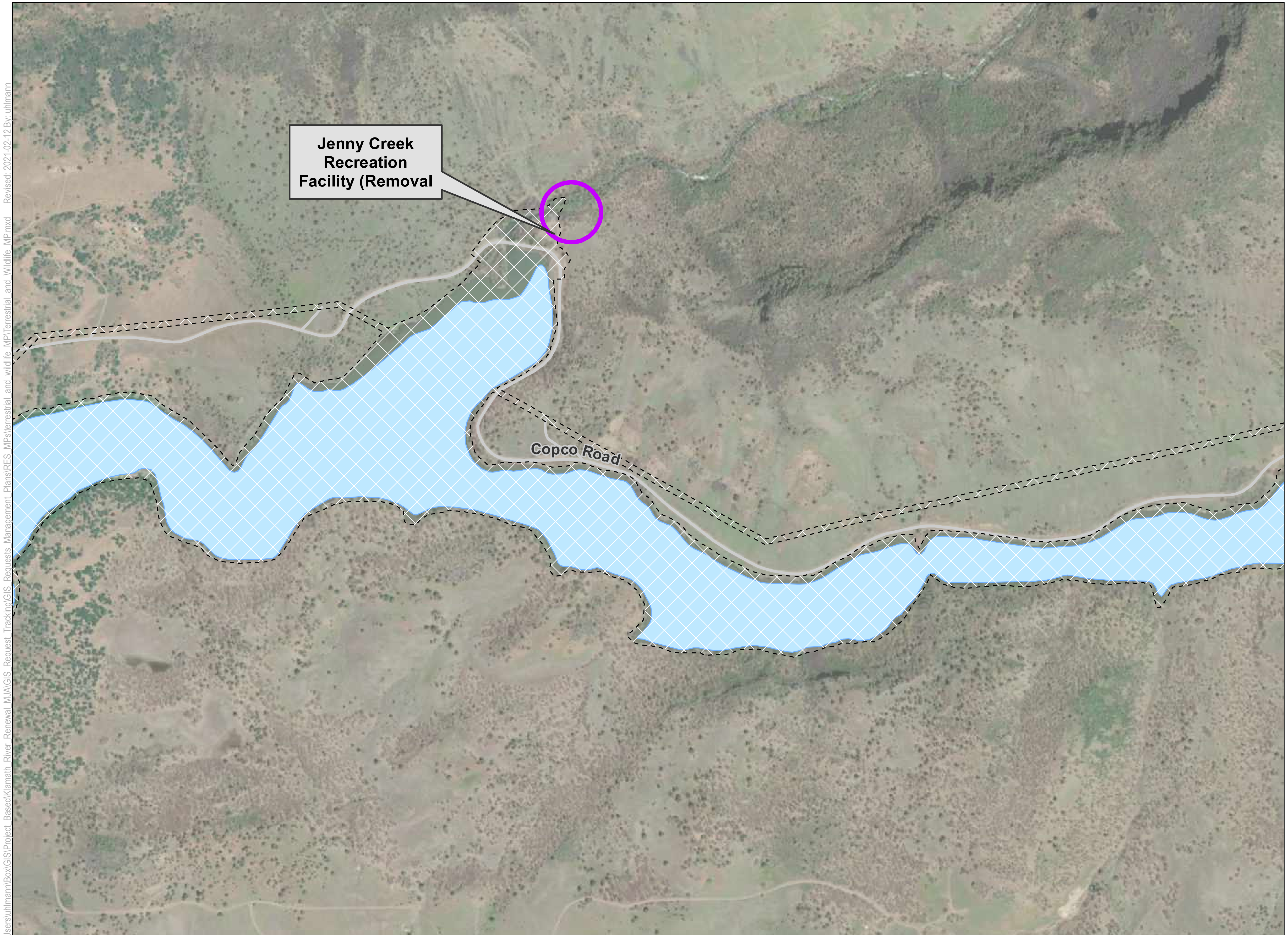


KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 5.
Special Status Plant Occurrences within Limits of Work

February, 2021

N

(At original document size of 11x17)
1:10,580

0 400 800 1,200 1,600 Feet

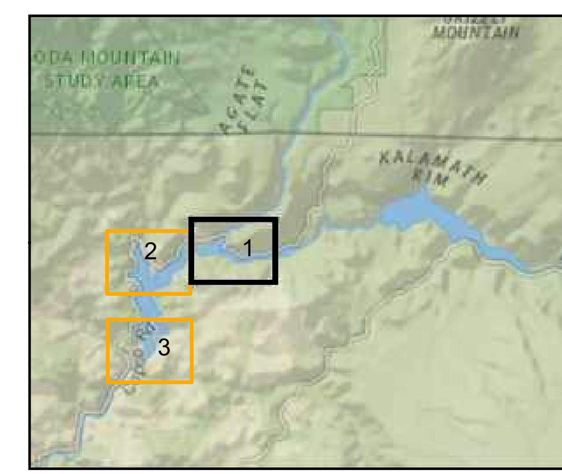
PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

Limits of Work

Klamath River

Special Status Plants

Holzinger's orthotrichum moss



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1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*
2. *Data Sources: California Natural Diversity Database (CNDDB); Downloaded on 1/31/2021; Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset*
3. *Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 5.
Special Status Plant Occurrences within Limits of Work

February, 2021

N

(At original document size of 11x17)
1:10,580

0 400 800 1,200 1,600 Feet

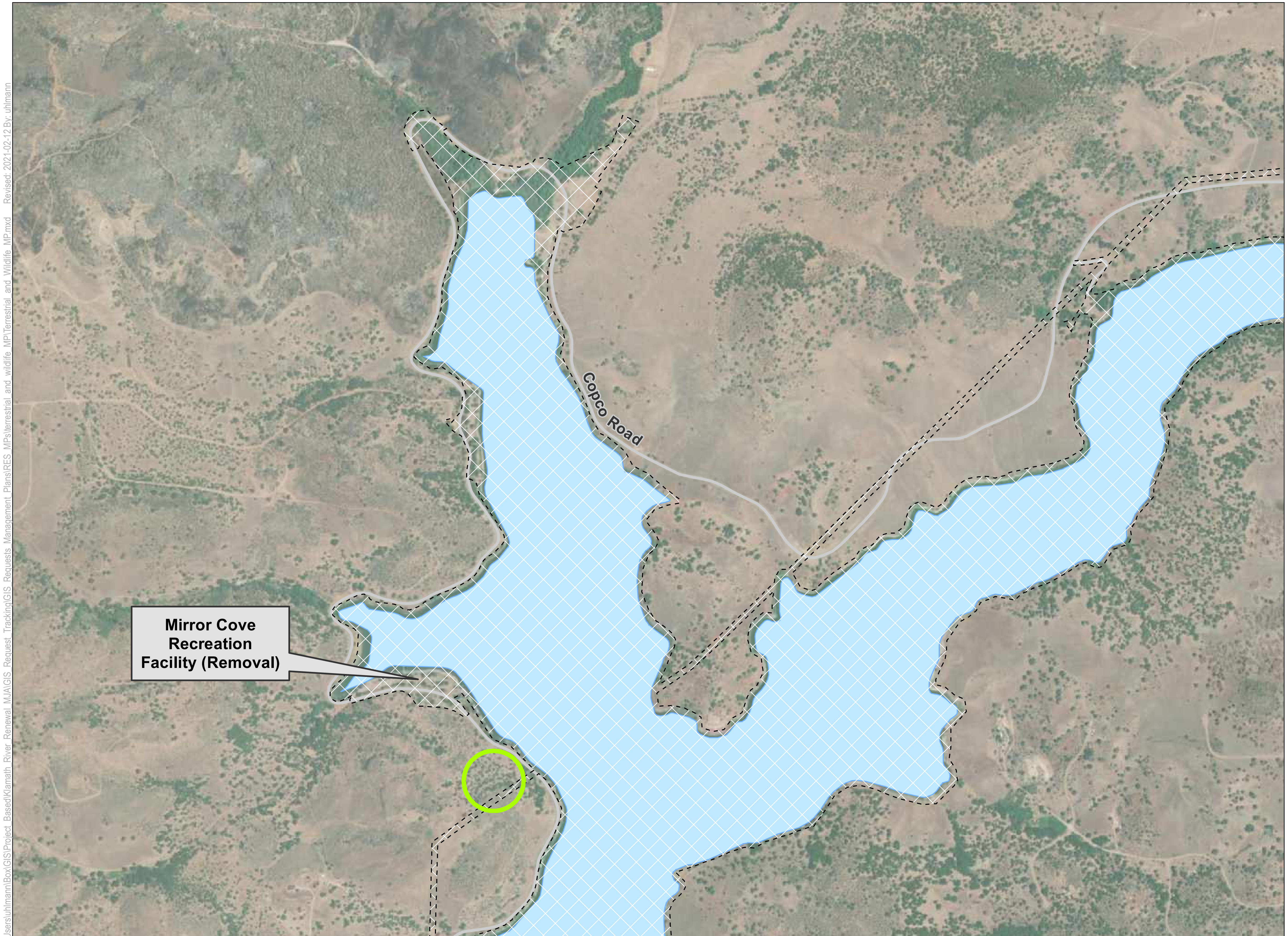
PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

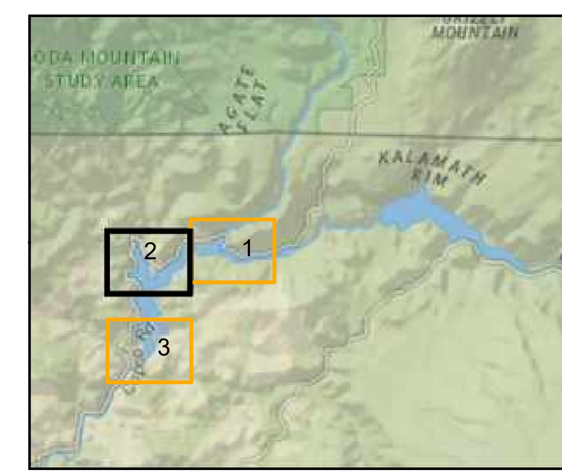
Limits of Work

Klamath River

Special Status Plants

Greene's mariposa-lily





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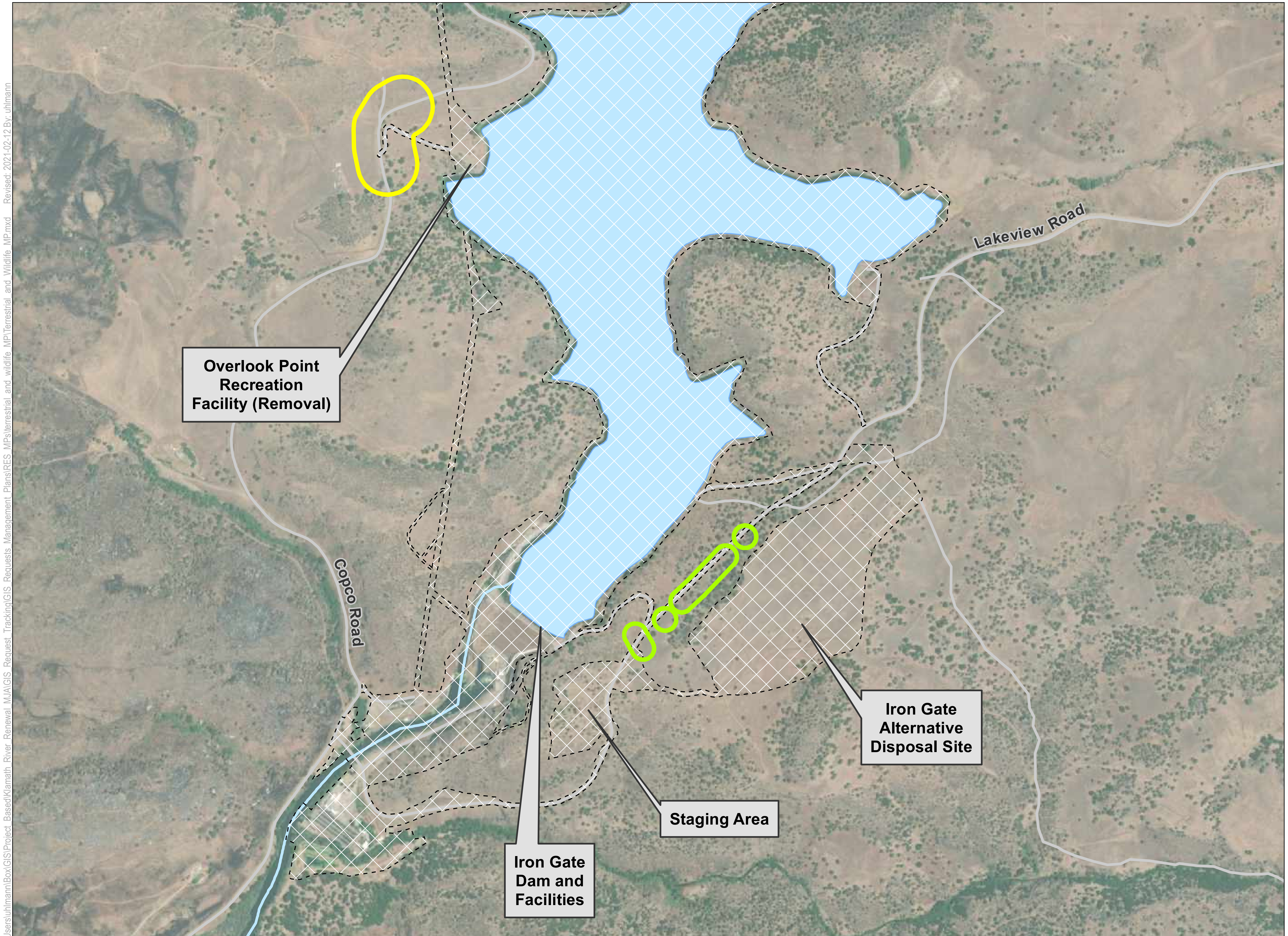


KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 5.
Special Status Plant Occurrences within Limits of Work

February, 2021

N

(At original document size of 11x17)
1:10,580

0 400 800 1,200 1,600 Feet

PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

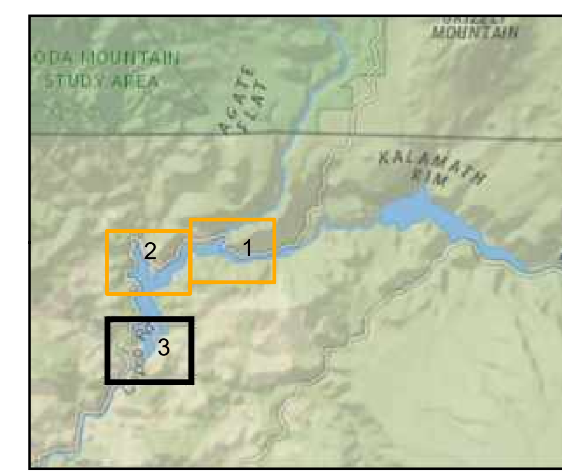
Limits of Work

Klamath River

Special Status Plants

Detling's silverpuffs

Greene's mariposa-lily



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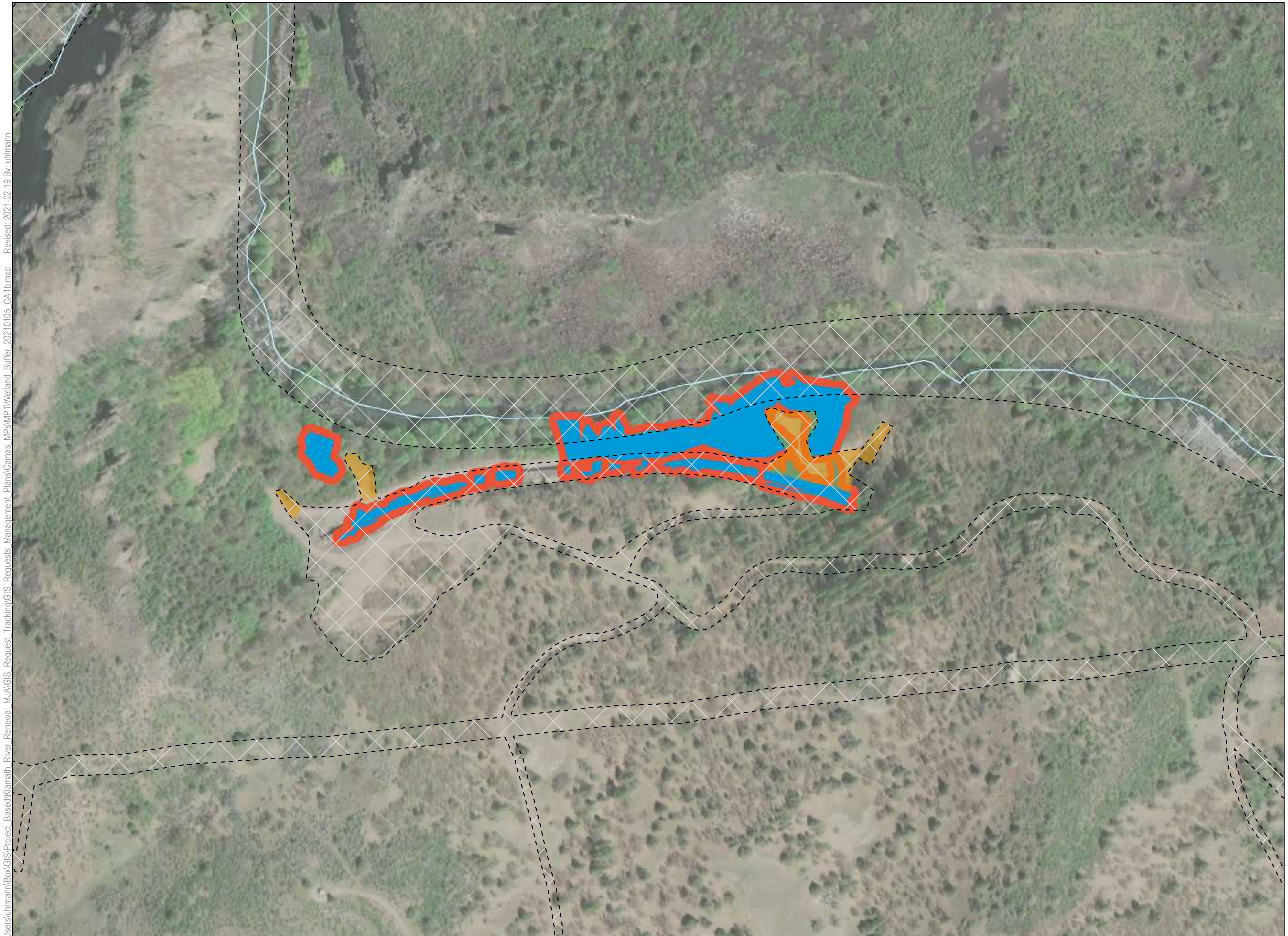

KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 6. Wetland Buffers

Copco No. 2

February, 2021

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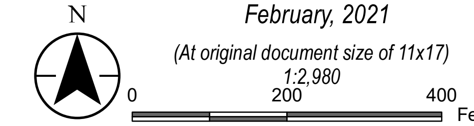
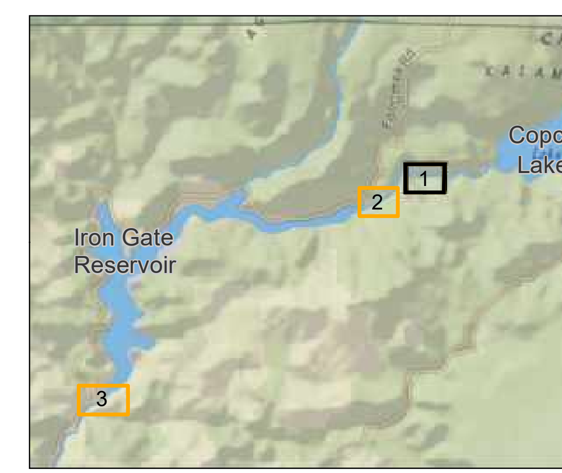
1:2,980



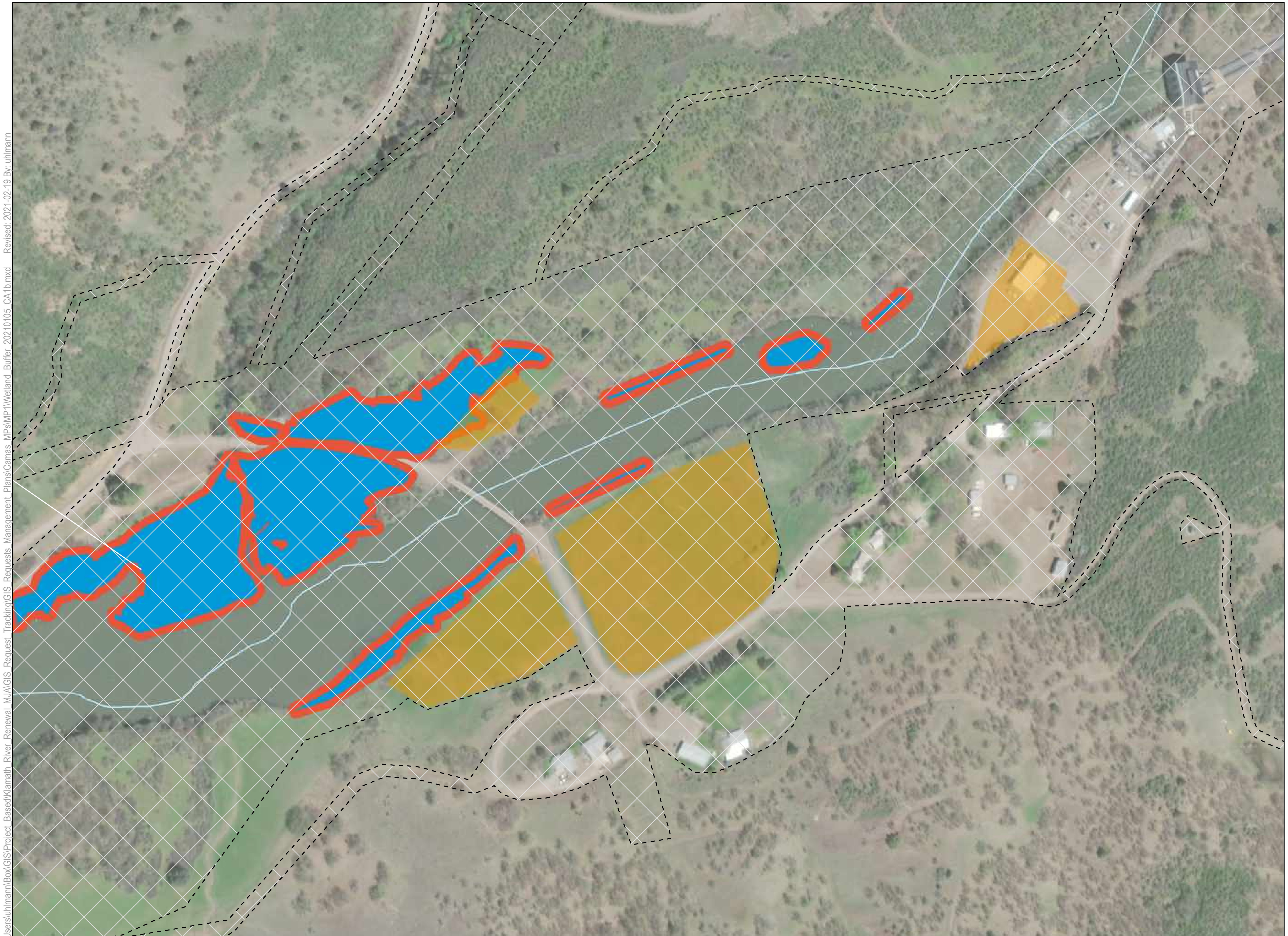
PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

- Wetlands
- 20 ft buffer
- Staging Areas
- Limits of Work
- Klamath River



Notes

1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US
2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Wetlands: JonesJM@cdmsmith.com, field survey data May 2019; Staging and Limits of Work: Knight Piesold 100 Design Draft.
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.



KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 6. Wetland Buffers

Copco No. 2

February, 2021

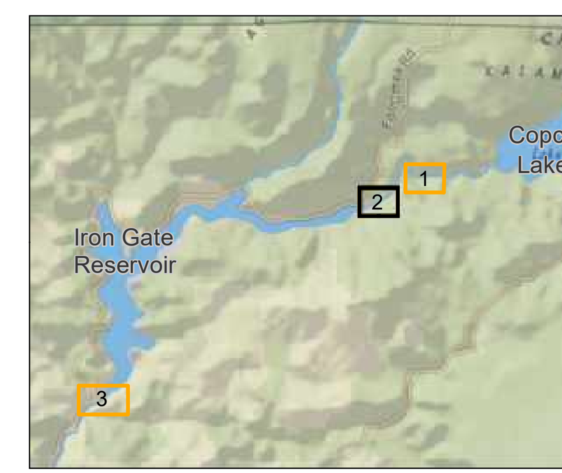
(At original document size of 11x17)
1:2,980

N

0 200 400 Feet

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

- Wetlands
- 20 ft buffer
- Staging Areas
- Limits of Work
- Klamath River



Notes
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2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Wetlands: JonesJM@cdmsmith.com, field survey data May 2019; Staging and Limits of Work: Knight Piesold 100 Design Draft
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

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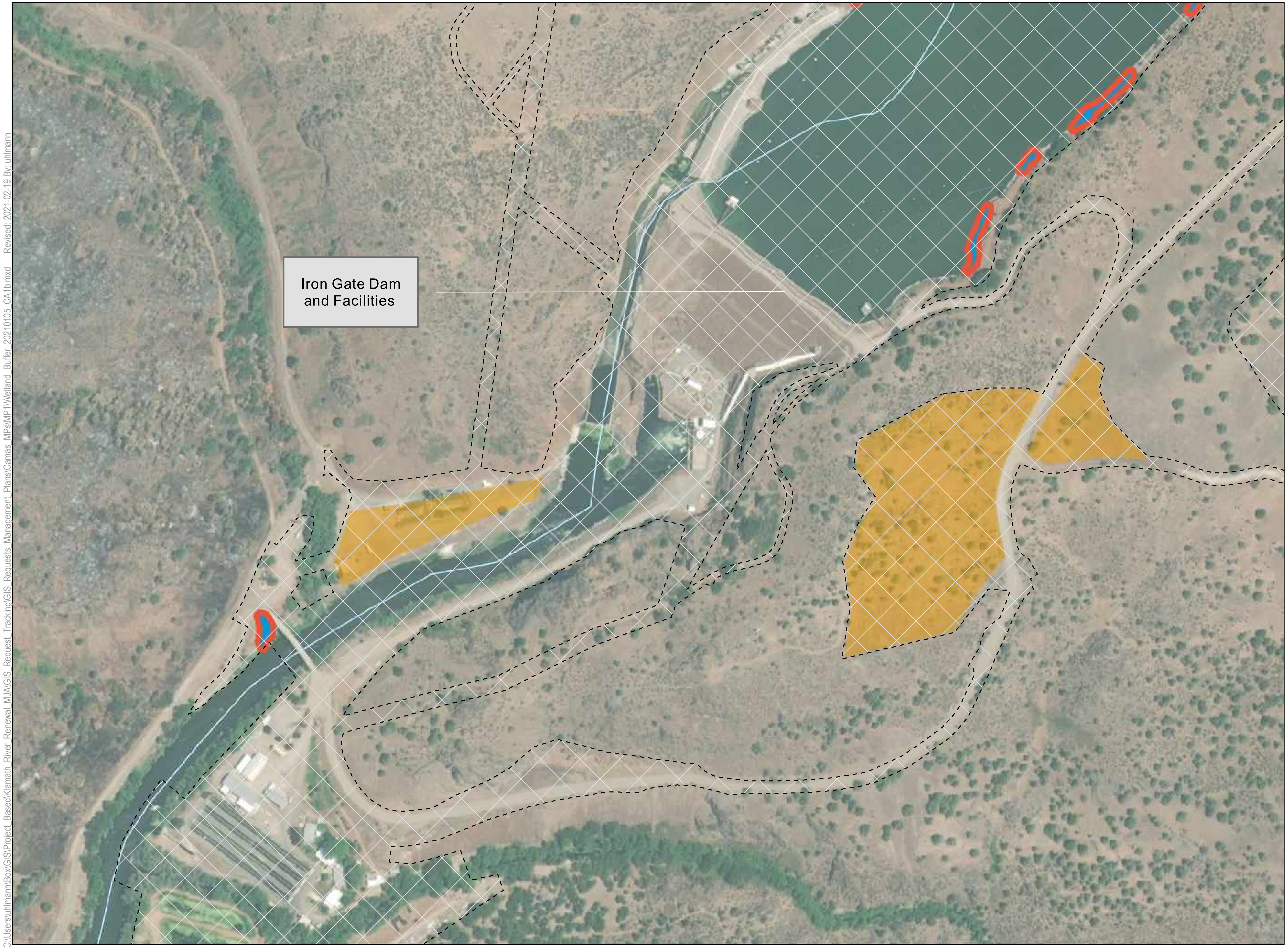


KLAMATH RIVER RENEWAL CORPORATION

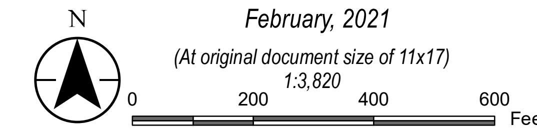
Lower Klamath Project

Figure 6. Wetland Buffers

Iron Gate

February, 2021

(At original document size of 11x17)
1:3,820



PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

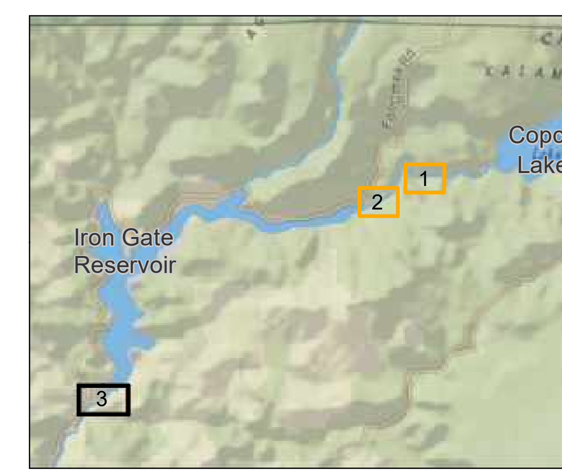
Wetlands

20 ft buffer

Staging Areas

Limits of Work

Klamath River



Notes
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2. Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Wetlands: JonesJM@cdmsmith.com, field survey data May 2019; Staging and Limits of Work: Knight Piesold 100 Design Draft
3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Appendix B

Agency Contacts

Western Pond Turtle

California Department of Fish and Wildlife: [NAME][EMAIL][PHONE]

Willow Flycatcher

California Department of Fish and Wildlife: [NAME][EMAIL][PHONE]

Non-special Status Nesting Birds

California Department of Fish and Wildlife: [NAME][EMAIL][PHONE]

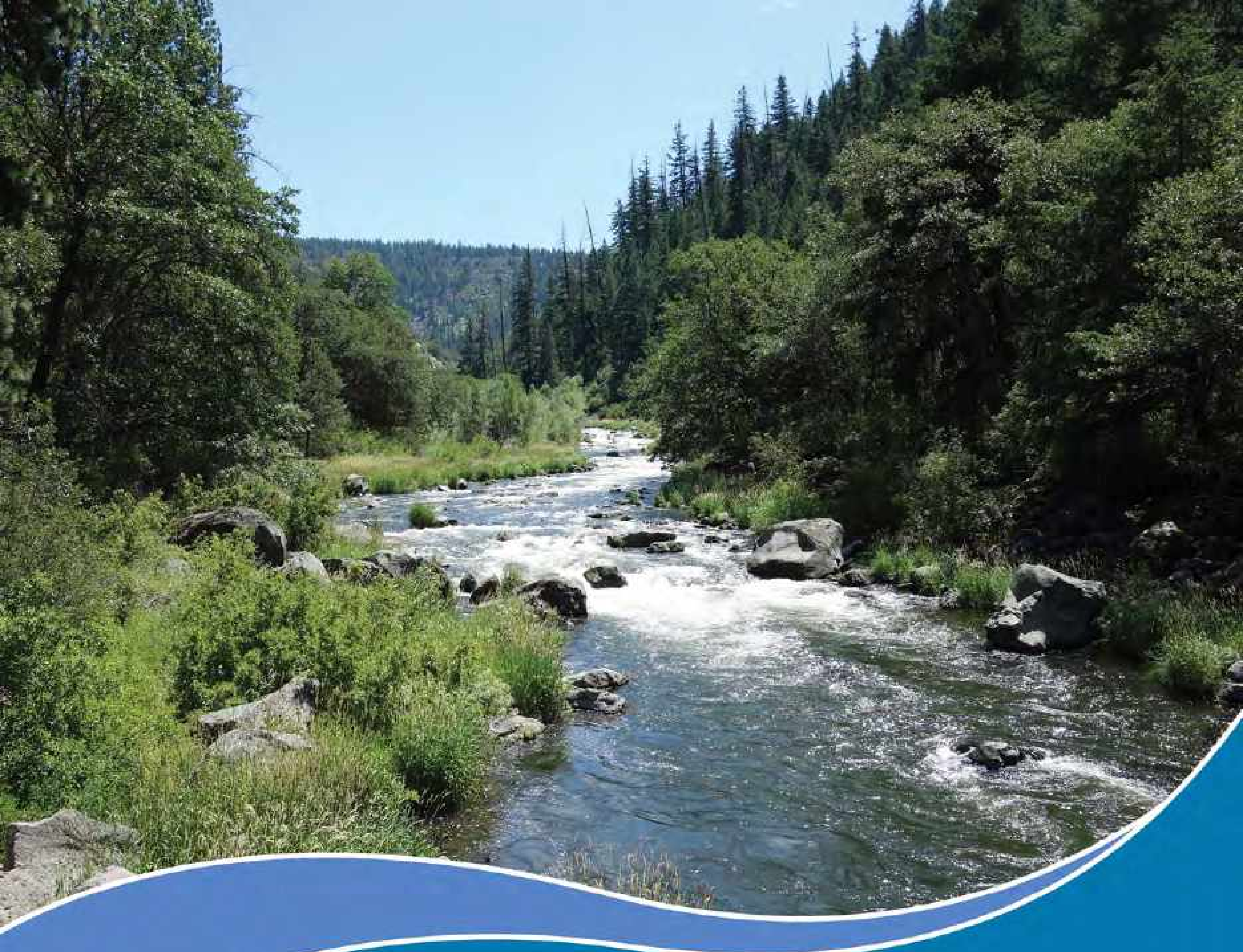
Gray Wolf

California Department of Fish and Wildlife: Pete Figura, Wildlife

Management Supervisor, [EMAIL], 530-227-3980

Appendix C

Terrestrial Resources Technical Report



Klamath River Renewal Project

2018 Annual Terrestrial Resources Survey Report

April 2019

KLAMATH RIVER RENEWAL CORPORATION

Prepared for:

Klamath River Renewal Corporation

Prepared by:

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Acronyms and Abbreviations

BLM	Bureau of Land Management
Cal-IPC	California Invasive Plant Council
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CE	California Endangered
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COTO	Corynorhinus townsendii (Townsend's big-eared bat)
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
°F	degrees Fahrenheit
FE	Federal Endangered
FSC	Federal Species of Concern
GNR	Global not reported
GPS	Global Positioning System
IEV	invasive exotic vegetation
IPaC	USFWS Information for Planning and Consultation database
KCBC	Klamath County Board of Commissioners
KNF	Klamath National Forest
KRRC	Klamath River Renewal Corporation
MYYU	Myotis yumanensis (Yuma myotis)
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NSO	Northern Spotted Owl
OC	Candidate listing by Oregon Department of Agriculture
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ONHP	Oregon Natural Heritage Program
ORBIC	Oregon Biodiversity Information Center
Project	Klamath River Renewal Project
SDA	Siskiyou Department of Agriculture
SNR	State not reported
USBR	United States Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

Chapter 1 Introduction

1. INTRODUCTION

This report summarizes the terrestrial resources surveys conducted in 2018 for the Klamath River Renewal Project (Project). The Klamath River Renewal Corporation (KRRC) and its consultants carried out field investigations to collect existing condition information on the following terrestrial resources:

- Special-status wildlife
- Northern spotted owl
- Bald and golden eagles
- Bats
- Western pond turtle
- Special-status plants
- Vegetation communities
- Invasive exotic vegetation

1.1 Purpose of the Terrestrial Resources Surveys

The KRRC and project stakeholders require information on the existing condition of terrestrial resources to inform the ongoing Project design and regulatory permit processes, as described in previous studies and regulatory compliance documents, including the 2012 Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (USBR and CDFW 2012) and the Joint Preliminary Biological Opinion (NMFS and USFWS 2012). As described in the Definite Plan, Appendix J (KRRC 2018), the KRRC has incorporated terrestrial resources surveys and avoidance and minimization measures into the Project as Terrestrial Resources Measures. These measures include the 2018 surveys described in this annual report. This report provides the findings of the surveys, along with conclusions based on an analysis of the information collected with regard to its suitability for informing the design and meeting regulatory requirements.

1.2 Study Area

This report describes the methods followed during field investigations for each resource listed above, which were based on survey work plans developed in close coordination with federal and state resource agencies, including the United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and Oregon Department of Fish and Wildlife (ODFW). Unless otherwise noted, surveys were conducted by KRRC biologists within a specific buffer around the limits of work (hereinafter referred to as study areas) for each resource. The KRRC developed these study areas in cooperation with the resource agencies listed above during development of the survey work plans (Appendix J of the Definite Plan [KRRC 2018]). Each of the following sections of this report focuses on a different terrestrial resource; the study area for each resource is described in the corresponding section. The limits of work (or Project area) include the dams and structures to be removed, the disposal sites, the haul and access roads that may undergo improvements, and the reservoirs, and are defined in the Definite Plan (KRRC 2018). The limits of work represent the physical extent of on-the-ground construction activities, including demolition, removal, and restoration activities proposed as a part of this Project, as well as the extent of the J.C. Boyle Reservoir, Iron Gate Reservoir, and Copco Lake (see Figure 5.1-1 of the Definite Plan [KRRC 2018]). The 0.25-mile buffer shown in the overall Project map (Figure 1-1, Appendix A) represents the study area applied to general wildlife surveys and vegetation community surveys, as detailed in Sections 2 and 8, respectively. Surveys for osprey, northern spotted owl, eagles, and bats used different study areas, which are described in their respective sections and specified in related figures.

Figures cited in the text of this report are provided in Appendix A.

Chapter 2 Special-Status Wildlife

2. SPECIAL-STATUS WILDLIFE

The KRRC identified special-status wildlife species with potential to occur in or near the Project area from a variety of sources. PacifiCorp identified several special-status wildlife species as occurring in or near the Project area (PacifiCorp 2004), and the United States Bureau of Reclamation and CDFW compiled this in the 2012 EIS/EIR (USBR and CDFW 2012). The KRRC also obtained information on the occurrences of special-status wildlife from USFWS, CDFW, ODFW, the Bureau of Land Management (BLM), and the United States Forest Service (USFS) from sources that include the Oregon Biodiversity Information Center (ORBIC), the California Natural Diversity Database (CNDDB), and the USFWS Information for Planning and Consultation (IPaC) database. Special-status wildlife species that were considered during survey planning included those that are federal and/or state threatened, endangered, proposed, or candidate species, California Species of Special Concern, Oregon Natural Heritage Program (ONHP) List 1 and 2 species, and Oregon Sensitive species. BLM and USFS Sensitive Species, Assessment Species, Tracking Species, and Survey and Manage species were also considered, where BLM and USFS lands occur in the study area; however, not all of these species trigger a regulatory concern.

Most of the special-status species are birds; some are year-round residents while others are migratory, using the study area either for nesting or for overwintering. In addition, a small number of special-status invertebrate, amphibian, reptile, and mammal species have the potential to occur in or near the Project area. A comprehensive list of special-status species with potential to occur in or near the Project area is provided in Appendix J of the definite plan (KRRC 2018); this document focuses more narrowly on presenting the results of 2018 field surveys.

The primary objective of the 2018 surveys for special-status wildlife was to collect baseline information on the species using the study area and on the habitats present that have potential to support special-status wildlife. This information is needed to identify potential impacts on species and/or habitats from Project activities, identify federal and state permit requirements, and develop measures needed to avoid or minimize potential impacts on species and habitats. The KRRC applied a 0.25-mile buffer around the Project area to generate the study area for the special -status wildlife surveys. The rationale for this study area is described in more detail in Section 2.1. Based on input from USFWS, CDFW, and ODFW, the KRRC did not conduct focused surveys requiring trapping or other invasive methods, with the exception of surveys for western pond turtle (see Section 6). Rather, field surveys focused on identifying suitable habitats for these species, to determine whether and to what extent suitable habitat exists in the study area and where it may be modified, affected, or destroyed by Project activities.

Northern spotted owls, bald eagles, golden eagles, bats, western pond turtle, and special-status plants are discussed in separate sections of this document.

2.1 Methods

KRRC biologists conducted general wildlife surveys from May 14 through 24 and June 11 through 15, 2018. Biologists established transects to cover the 0.25-mile study area described in Section 1.2. The KRRC developed the 0.25-mile study area in cooperation with the resource agencies during development of the survey work plans, which are provided in Appendix J of the Definite Plan (KRRC 2018). Biologists walked the length of each transect, recording all wildlife observations, including direct visual and auditory observations, scat, and other signs of presence. Field teams recorded wildlife behaviors, particularly breeding activity. In addition to land-based transects, biologists surveyed reservoir shorelines and open water by boat to record observations of aquatic and semi-aquatic species (e.g., western pond turtle, waterfowl, etc.). Biologists noted all special-status species seen or heard, and their approximate number, location, and behavior (e.g., roosting, loafing, foraging, courtship, mating, incubating eggs, or feeding young).

The following special-status species received additional focus:

- Osprey (Pandion haliaetus): There are several osprey nest platforms within 0.25 mile of the limits of work that may be removed or disturbed during construction. Biologists surveyed all nest platforms, transmission line towers, and reservoir and river shorelines within a slightly larger 0.75-mile study area for osprey nests.
- Willow flycatcher (Empidonax traillii): Because willow flycatcher is a California endangered species, its habitat is protected. Biologists noted and mapped willow flycatcher habitat during wildlife and vegetation surveys.
- Nesting great blue heron (Ardea herodias): Nesting bird colonies are protected under California and Oregon state laws. Biologists visually surveyed the study area for great blue heron colonies during wildlife surveys.
- Peregrine falcon (Falco peregrinus): Peregrine falcons may use the same nest for multiple years, and these nest sites are protected under state laws. Biologists visually surveyed the study area for nesting peregrine falcon during wildlife surveys.
- Greater sandhill crane (Grus canadensis tabida): Sandhill crane is a California threatened species, and nest sites are protected. Biologists visually surveyed the study area for nesting sandhill crane during wildlife surveys.
- Tricolored blackbird (Agelaius tricolor): Tricolored blackbird is a California threatened species, and nesting colonies are protected. Biologists visually surveyed the study area for tricolored blackbird colonies during wildlife surveys.

2.2 Findings

Biologists observed a total of 32 special-status wildlife species in the study area during the special-status wildlife surveys conducted in May and June 2018 (Table 2-1). For the purposes of this report, species observations were organized in association with the three Project reservoirs closest to the observation (i.e., if a species was observed in a tributary to the Iron Gate Reservoir, it was grouped with other species observed in the vicinity of the Iron Gate Reservoir). Some species were found at all three reservoirs, while others were only observed at one or two reservoirs. Of the 33 special-status wildlife species observed, there were 3 reptile species, 29 bird species, and 1 mammal species.

Table 2-1: Special-Status Species Observed in the Study Area during 2018 Surveys

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Reptiles			
Western Pond Turtle Actinemys marmorata	Observed throughout reservoir shorelines; noted in Mirror Cove and near Camp and Jenny Creeks. Observed in Jenny Creek near the Copco Road bridge.	Observed throughout reservoir shorelines, typically within coves.	Observed throughout reservoir shorelines; occurring in higher numbers at the southernmost portion of the reservoir on top of the boom near the dam.
Northern Sagebrush Lizard Sceloporus graciosus	Observed throughout the reservoir area. Noted near the fish hatchery, Long Gulch Cove shoreline, Jenny Creek shorelines, and recreational areas.	Observed throughout the reservoir area, particularly on dry, rocky slopes. Noted in rocky areas to the east of Fall Creek.	Observed throughout the reservoir area on dry, rocky slopes. Noted in the dam spillway area.
California Mountain Kingsnake Lampropeltis zonata			Observed on a rocky outcrop below the dam.
Birds			
Bufflehead Bucephala albeola	Observed throughout reservoir in mixed rafts with other waterfowl.	Observed throughout the reservoir in mixed rafts with other waterfowl.	Observed in the northern portion of reservoir.
Mountain Quail Oreotyx pictus		Observed throughout the reservoir area; a large covey was observed just east of Beaver Creek cove.	Observed throughout the reservoir area; noted along the utility line corridor west of the canal and at the Topsy Campground near the Highway 66 bridge.
Vaux's Swift Chaetura vauxi			Observed flying over the eastern shore of the reservoir.
Greater Sandhill Crane Grus canadensis tabida			Active nest observed on the northwestern shore of reservoir; adults also heard calling from the emergent wetlands along the northeastern shore.
Caspian Tern Sterna caspia	Observed throughout the reservoir, flying overhead and foraging.	Observed throughout the reservoir, flying overhead and foraging.	Observed throughout the reservoir, flying overhead and foraging.
Forster's Tern Sterna forsteri		Observed throughout the reservoir.	Observed in the southern portions of the reservoir.

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Common Loon Gavia immer		Observed throughout the reservoir; noted in Keaton Cove.	
Double-crested Cormorant Phalacrocorax auritus	Observed throughout the reservoir; noted in Long Gulch Cove, Camp Creek, and on the boom near the dam.	Observed throughout the reservoir; most often flying overhead or foraging/resting in the northern coves.	Observed throughout the reservoir; noted along the northeastern shore, and on the boom near the dam.
American White Pelican Pelecanus erthorhynchos	Observed throughout the reservoir; noted in Mirror Cove, Juniper Point, and the upstream extent of the reservoir, as well as on the boom near the dam.	Observed throughout the reservoir; noted near the dam and in Keaton Cove.	Observed throughout the reservoir; noted in the vicinity of the Highway 66 bridge and on the boom near the dam.
Great Blue Heron Ardea herodias	Observed throughout the reservoir; noted in Mirror Cove, Jenny Creek, and Bogus Creek.	Observed throughout the reservoir area; noted perching atop the canyon along the Copco Bypass Reach. Active nesting colony observed in the riparian area near the Copco No. 2 penstock.	Observed throughout the reservoir area; noted near Spencer Creek, along the northeastern shore, and near Topsy Campground.
Great Egret Casmerodius albius	Observed along the Klamath River immediately downstream of the fish hatchery.	Observed throughout the reservoir area.	
Osprey Pandion haliaetus	Observed throughout the reservoir. Several active nests observed on platforms atop utility poles.	Observed throughout the reservoir. Several active nests observed on platforms atop utility poles.	Observed throughout the reservoir. Several active nests observed on platforms atop utility poles.
Golden Eagle Aquila chrysaetos	A pair observed along the southern shoreline of the upstream extent of the reservoir.	Observed perched on a slope above the northern shoreline of the reservoir. A pair was also observed near a northern cove; one bathing in the shallow water.	
Northern Harrier Circus hudsonius	Observed along the northern shoreline in the northeast portion of the reservoir and just downstream of the dam.		
Cooper's Hawk Accipiter cooperii	Observed along the northern shoreline of the reservoir. A potential nest was observed near the confluence of Camp and Dutch Creek.	Observed throughout the reservoir area; noted in the forested seep area along the northern shoreline of the reservoir.	Observed throughout the reservoir; noted on the southeastern side of the reservoir in the dense mixed woodlands just north of the dam spillway.
Bald Eagle Haliaeetus leucocephalus	Observed throughout the reservoir area; noted flying over Long Gulch Cove, along the southeastern side of reservoir, and near the dam.	Observed throughout the reservoir area; noted flying overhead near Keaton Cove.	Observed throughout the reservoir area; most frequently observed flying overhead or perched in pines in the vicinity of the Highway 66 bridge.
Lewis Woodpecker Melanerpes lewis	Observed throughout the reservoir area; noted at the fish hatchery.	Observed throughout the reservoir area; noted along the northern shoreline at Beaver Creek cove.	Observed along the eastern shoreline of the reservoir.

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Acorn Woodpecker Melanerpes formicivorus	Observed along the eastern shoreline of the reservoir, southwest of Horseshoe Ranch Wildlife Area, and near the fish hatchery.	Observed throughout the reservoir area in relatively dense oak and mixed forests.	
Pileated Woodpecker Drycopus pileatus			Observed throughout the reservoir area in densely forested habitats.
American Peregrine Falcon Falco peregrinus anatum	An active nest was observed on the northeastern side of the reservoir in a rocky outcrop above Copco Road.		An active nest was reported by BLM on a cliff along the eastern side of the Klamath River Canyon, less than 1 mile southeast of the end of the canal.
Olive-sided Flycatcher Contopus cooperi		Observed in riparian woodlands along the northern shoreline, particularly at Beaver Creek cove.	Observed throughout the reservoir area.
Willow Flycatcher Empidonax traillii	Observed in willow riparian habitat at Jenny Creek near the confluence with the reservoir.	Observed in reservoir fringe willow habitat at the confluence of Beaver Creek.	
Purple Martin Progne subis	Observed on a utility pole just west of reservoir; possibly nesting there.	Nesting activity observed in a cavity in a utility pole near the intersection of Copco Road and dam access road. Also observed nesting in a utility pole along the Copco No. 2 bypass reach.	
Bank Swallow Riparia riparia		One individual observed among a group of tree and cliff swallows near the dam.	
Black-capped Chickadee Parus atricapillus			Observed throughout the reservoir area.
Pygmy Nuthatch Sitta pygmaea	Observed in a few locations around the reservoir, including in the woodland south of Jenny Creek.	Observed throughout the reservoir area, including in forested areas near the dam and near the upstream extent of the reservoir.	Observed throughout the reservoir area in ponderosa pine forests.
Yellow-breasted Chat Icteria virens	Observed in a northern cove of the reservoir near Camp Creek and Horseshoe Ranch Wildlife Area. Also observed near the fish hatchery.	Observed in riparian habitats throughout the reservoir, mostly along the southern shoreline east of Keaton Cove. Also observed along Fall Creek.	Observed in dense riparian areas; noted near the proposed staging area in the southeastern corner of the reservoir.
Tricolored Blackbird Agelaius tricolor	One individual observed just downstream of the Copco No. 2 powerhouse along the north bank of the River.		
Yellow Warbler Dendroica petechial	Observed throughout the reservoir area near tributaries including Brush Creek, Camp Creek, and Jenny Creek, and at the fish hatchery.	Observed throughout the reservoir area, typically in riparian woodlands and the hillside seep area.	Observed throughout the reservoir area; noted nesting in the willow riparian area near the dam spillway.

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Mammals			
Western Gray Squirrel *Sciurus griseus*	Observed in densely forested habitats associated with tributaries to the reservoir.	Observed in densely forested habitats; noted near the falls at Fall Creek, along the northern shoreline in the seep area, and along the southern shoreline near Ager Beswick Road.	Observed throughout the reservoir in forested stands with dense canopies, including near the disposal area. An individual and a nest were observed in the staging area just east of the dam.

Note:

BLM = Bureau of Land Management

2.2.1 Osprey

KRRC biologists observed osprey throughout the study area for osprey (i.e., within 0.75 mile of the limits of work; see Figures 2-1 through 2-4), and found a total of 17 active osprey nests. Active nests were those with adults and/or chicks observed at the nest. Biologists also observed several inactive nests. All nests were on utility poles, typically but not always on platforms installed on the pole to provide for osprey nesting.

Biologists observed three active osprey nests in the vicinity of the Iron Gate Reservoir (Figures 2-1 and 2-2). Of these, one was on a utility pole in the staging area west of the Iron Gate Dam (Photograph 2-1); one was on a utility pole along the western side of the Iron Gate Reservoir; and one was on a utility pole along Copco Road where it turns north at the upstream end of the Iron Gate Reservoir. In addition, biologists observed four active osprey nests along the Klamath River downstream of Iron Gate Dam (excluding the one described above near the dam itself). These four nests were on utility poles along Copco Road between Iron Gate Dam and Interstate 5 (Figure 2-1).

Photograph 2-1: Active Osprey Nest on a Utility Pole in the Staging Area West of the Iron Gate Dam

Biologists observed a total of five active nests in the vicinity of Copco Lake (Figure 2-3). Of these, one was on a utility pole in the parking area for the Copco No. 1 powerhouse and a second was on a utility pole along the eastern side of the Copco No. 1 Reservoir, directly upslope from the Copco No. 1 Dam. The three other active nests are atop utility poles along Copco Road along the northern side of Copco Lake. Biologists observed one inactive osprey nest atop a utility pole upslope from the Copco No. 2 Dam on the southern side of the river.

Biologists observed a total of five active osprey nests in the vicinity of the J.C. Boyle Reservoir (Figure 2-4). Of these, one nest was on a utility pole along the Klamath River just south of the J.C. Boyle Dam, and two others were atop utility poles along the southern end of the J.C. Boyle Reservoir east of the dam. Biologists observed an additional inactive nest on a utility pole in that vicinity. Biologists observed an active nest along the southeastern side of the J.C. Boyle Reservoir and an active nest atop a utility pole in the proposed J.C. Boyle disposal site.

2.2.2 Willow Flycatcher

Biologists observed a single willow flycatcher at two locations: in willow riparian habitat at the confluence of Jenny Creek and Iron Gate Reservoir (Figure 3-1) and along the northern shoreline of Copco Lake just south of the confluence with Beaver Creek (Figure 3-2). Willow flycatcher nesting habitat typically consists of dense riparian vegetation (e.g., Geyer and Shining willow thickets), with foraging taking place in these areas or in other riparian habitats (e.g., bigleaf maple or Oregon ash groves). The locations of these willow flycatcher habitat types are shown on Figures 3-1 through 3-3. Biologists found these habitats along the shoreline of Iron Gate Reservoir, most notably at the larger stream confluences (e.g., Scotch Creek, Camp/Dutch Creek, and Jenny Creek). Biologists also noted patches of willows along the shoreline of Copco Lake, particularly at the confluences with Beaver Creek, Raymond Gulch, and at Mallard Cove. In addition, willow flycatcher habitat is present along Fall Creek. Suitable habitat is also present just below the J.C. Boyle Dam and patches of willows occur along portions of the J.C. Boyle power canal.

2.2.3 Nesting Great Blue Heron

During helicopter surveys for eagles (see Section 4) biologists observed a great blue heron colony along the Klamath River in the Copco No. 2 bypass reach (Figure 4-1). Biologists noted at least 12 nests during the helicopter survey, and herons were heard vocalizing in this area by ground crews. This colony is located in riparian habitat approximately 100 feet north of the Copco No. 2 penstock (Photograph 2-2).

Photograph 2-2: Active Great Blue Heron Colony near the Copco No. 2 Penstock

2.2.4 Peregrine Falcon

Biologists observed a peregrine falcon nest in a rocky outcrop north of Iron Gate Reservoir, east of Jenny Creek (Figure 4-1). A second peregrine falcon nest is known by BLM to be located on a cliff along the eastern side of the Klamath River canyon below J.C. Boyle (Hayner 2018) (Figure 4-2). BLM also provided the general location of a prairie falcon (Falco mexicanus) nest approximately 1 mile upstream, also along the eastern side of the canyon (Hayner 2018). Although prairie falcon is not a sensitive species in Oregon, it is protected along with nearly all other bird species under the Migratory Bird Treaty Act, and nest disturbance must be avoided.

2.2.5 Sandhill Crane

KRRC biologists observed an active sandhill crane nest along the northwestern shore of the J.C. Boyle Reservoir (Figure 4-3). In May 2018, the nest was occupied by two adults brooding three eggs. Biologists also heard sandhill cranes vocalizing from the dense bulrush habitat along the northeastern shore of the J.C. Boyle Reservoir, where the cranes were likely nesting.

2.2.6 Tricolored Blackbird

The KRRC biologists did not observe tricolored blackbird colonies in the study area. However, in June 2018, biologists observed a flock of 25 tricolored blackbirds in an agricultural field along the Yreka-Ager Road, approximately 12 miles southwest of the Iron Gate Dam. In addition, biologists observed a single male tricolored blackbird in June 2018 among a flock of red-winged blackbirds in the bulrush habitat near the confluence of Fall Creek and the Klamath River, within the limits of work along Daggett Road.

2.3 Conclusions

KRRC biologists observed several special-status wildlife species in the study area during 2018 surveys, as listed in Table 2-1. Of the 33 special-status species observed, three were reptiles, 29 were birds, and one was mammalian.

Biologists observed 15 active osprey nests in the osprey study area (i.e., within 0.75 mile of proposed limits of work) (Figures 2-1 through 2-4). This number is consistent with previous PacifiCorp surveys that noted 16 active nests in the hydroelectric reach (PacifiCorp 2004). All osprey nests were on utility poles or towers, typically on platforms installed for that purpose. These osprey nests have the potential to be disturbed during proposed construction activities. Biologists will evaluate each nest site to determine the potential for disturbance; relocation or removal of some nests and nesting platforms may be needed. During the 2019 breeding season, additional nest surveys will be conducted to confirm the locations of active nests, collect additional information to determine the potential for nest disturbance during construction, and develop a plan for nest removal, exclusion, or relocation and monitoring activities.

KRRC biologists observed willow flycatchers on two occasions during the 2018 surveys. Both detections were of individual birds in willow riparian habitat. Biologists observed suitable willow flycatcher habitat most often around the Iron Gate Reservoir, but also along Copco Lake (Figures 3-1 and 3-2). Habitat was primarily associated with the confluences of larger streams, but patches of willow thickets were also found along reservoir shorelines away from streams or other apparent surface water sources. Some proposed Project activities overlap with these locations, such as bridge improvements and reservoir drawdown. As construction plans are developed, avoidance and minimization measures will be developed, if necessary. Wetland investigations in 2019 will focus on mapping and quantifying suitable willow flycatcher habitat along with other wetland habitats (e.g., tule/bulrush communities).

KRRC biologists observed several other special-status bird species during the 2018 surveys, and many are assumed to be breeding in the study area. During 2019 surveys, biologists will confirm specific nest sites and further evaluate them for potential impacts from Project activities, including:

- Great blue heron colony near the Copco No. 2 penstock – potential for disturbance from demolition activities
- Peregrine falcon nest above Iron Gate Reservoir near Copco Road – potential for disturbance from truck traffic and hauling activities
- Peregrine and prairie falcon nests in the Klamath River Canyon – potential for disturbance from demolition of J.C. Boyle power canal and/or powerhouse

KRRC biologists will continue to coordinate with CDFW, ODFW, and USFWS to obtain any new information on special-status wildlife use of the study area. One such species is the gray wolf (Canis lupus). Gray wolves may occur transiently in the study area. In Oregon, the Rogue pack uses the Wood River Valley more than 10 miles northeast of Upper Klamath Lake (ODFW 2017). In California, the only currently known gray wolf pack is the Lassen Pack, which inhabits portions of Lassen and Plumas counties to the southeast of the study area (CDFW 2018a).

Chapter 3 Northern Spotted Owl

3. NORTHERN SPOTTED OWL

Northern spotted owl (NSO) (Strix occidentalis), a federally threatened species, has the potential to occur in or near the Project area. If an NSO activity center (i.e., an area of concentrated activity of either a pair of NSO or a single territorial NSO) is located within established disturbance distances from proposed construction activities, there could be an adverse effect, such as nest abandonment. Based on USFWS guidelines, established disturbance distances are as follows: 1 mile from blasting (e.g., at the dams), 0.5 mile from helicopter use (e.g., at the reservoirs during restoration work), and 0.25 mile from heavy equipment use, rock crushing, and hauling (USFWS 2006).

The 2012 Joint Preliminary Biological Opinion included several measures specifically addressing potential effects on NSO (measures NSO 1 through 4) (NMFS and USFWS 2012). These measures included protocol-level surveys to identify any NSO activity centers (including any nesting sites) that are near proposed construction and disposal areas, to avoid or minimize the potential for disturbance during NSO nesting, roosting, or foraging activities. The KRRC developed the NSO survey plan in coordination with USFWS to outline protocol surveys to be conducted during the 2018 breeding season, as described below.

3.1 Methods

Based on a desktop evaluation and field reconnaissance conducted in 2017 with USFWS, the KRRC determined that NSO protocol surveys would focus on suitable habitat around J.C. Boyle Dam and associated facilities, the disposal site, and haul and access roads. Facilities associated with Copco No. 1 Dam, Copco No. 2 Dam, and Iron Gate Dam and associated reservoirs were not included based on the lack of suitable habitat for NSO. Because the Project is not anticipated to result in modification of NSO habitat, the KRRC conducted protocol surveys for noise-only disturbance following the 2012 USFWS NSO Survey Protocol (USFWS 2012).

Biologists confirmed calling routes and stations in the field to achieve complete coverage of all habitat in the survey area, allowing biologists to hear responding owls within the entire survey area. The spacing of calling stations was determined by the topography and acoustical characteristics of the area (e.g., background noise such as creeks); stations were spaced between 0.25 and 0.5 mile apart. Eighteen calling stations were initially identified, as shown on Figures 5-1 and 5-2. One calling station (Number 2) was subsequently determined to be on inaccessible private property and was therefore eliminated from the survey route.

During the 2018 breeding season, KRRC biologists conducted six NSO protocol surveys at eighteen calling stations. Field teams conducted visits in April, May, June, July (two visits), and August 2018. As required by the 2012 USFWS NSO Survey Protocol, teams of two, led by a biologist with experience conducting NSO protocol surveys, conducted all surveys. Beginning in June, field teams conducted calling at an additional location near the J.C. Boyle forebay at the end of the power canal. The new location is along the west access road, approximately 800 feet north of the junction with the east access road. The lead biologist (as defined in the USFWS protocol) recommended calling at this location due to the presence of large conifers on the slope up toward the west from the access road.

Field teams initiated NSO surveys approximately one-half hour following sunset, and recorded weather conditions, including wind, precipitation, cloud cover, and moon phase. Surveys were not conducted under inclement weather, including rain, heavy fog, or high (> 12-mile-per-hour) winds. At each calling station, field teams used a calling device to broadcast NSO calls. Calls were broadcast for approximately 1 minute, and then biologists listened for responses for approximately 1 minute, alternating this for a total of 10 minutes at each station. Following the calling session at each station, field teams used high-intensity flashlights to briefly scan nearby trees for the presence of owls. Teams noted observations of other wildlife, including visual observations and vocalizations. Field teams also noted noises from the river or other sources (e.g., vehicles on nearby roads).

3.2 Findings

Field teams did not note any calling responses or visual identifications of NSO during the 2018 NSO protocol surveys. Biologists heard and saw great horned owls during several visits, and one follow-up daytime stand search confirmed the presence of a great horned owl fledgling in the vicinity of an NSO calling station. Field data sheets are provided in Appendix B.

3.3 Conclusions

Field teams did not detect northern spotted owls, NSO nests, or activity centers during the 2018 NSO surveys. KRRC biologists conducted surveys consistent with the 2012 USFWS NSO Survey Protocol (USFWS 2012), with six visits spaced out over the 2018 breeding season.

USFWS has the authority to determine whether additional follow up surveys are warranted in 2019. Based on the findings of the 2018 surveys, the KRRC does not propose additional NSO surveys for the Project. If the proposed construction locations are changed in such a way that suitable habitat would be modified, or if additional information on the presence of NSO in the study area is obtained, additional NSO surveys may be warranted in 2019.

Chapter 4 Eagles

4. EAGLES

Bald eagles (Haliaeetus leucocephalus) and golden eagles (Aquila chrysaetos) are protected under the Bald and Golden Eagle Protection Act (16 Code of Federal Regulations 668) and the Migratory Bird Treaty Act (16 United States Code §§ 701-12), and are fully protected under California law. Bald eagles are listed as Endangered under the California Endangered Species Act but are not listed in the State of Oregon. The Upper Klamath Basin provides suitable habitat for and is known to support bald eagle and golden eagle populations.

The 2012 EIS/EIR (USBR and CDFW 2012) describes measures to reduce Project impacts on bald and golden eagles. The objective of the eagle surveys was to identify, document, and confirm eagle presence and eagle use of areas that may be directly or indirectly disturbed by Project construction.

4.1 Existing Information

4.1.1 Bald Eagle

The upper Klamath Basin provides extensive bald eagle nesting and foraging habitat and supports the largest wintering population of bald eagles in the coterminous United States (Shuford et al. 2004). In some years, as many as 117 bald eagle pairs nest and 1,100 individuals winter in the Klamath Basin (PacifiCorp 2004). Shorelines provide a rough approximation of bald eagle habitat extent as they breed, forage, and roost near water (Isaacs and Anthony 2011). Bald eagles often nest in large trees with a line of sight to water; however, nests have also been documented on rocky outcrops, on the ground, on cliffs, and on artificial structures such as power poles (USFWS 2007). Bald eagles often use the same nests for multiple years, and nesting sites are known to exist in the vicinity of the Project area.

The Oregon Cooperative Fish and Wildlife Research Unit conducted bald eagle nest surveys in the Klamath River area on March 27, 2002, and May 29, 2002 (PacifiCorp 2004). Surveyors recorded six known nests within a 10-mile buffer of the Project area, with distances to the nearest facility ranging from approximately 0.7 mile to 7.1 miles (two near J.C. Boyle Reservoir, three near the J.C. Boyle peaking reach, and one near Copco Lake). Aerial surveys conducted in 2003 found another nest approximately 540 feet southeast of Copco No. 1 Dam.

PacifiCorp (2004) documented additional bald eagle observations at the Iron Gate Reservoir, Copco Lake, and J.C. Boyle Reservoir, and at other locations along the middle and lower Klamath River. Targeted avian surveys recorded at least 37 individual sightings of bald eagles in flight, perched, or foraging in 2002, and numerous incidental sightings occurred during general wildlife surveys, facility surveys, and other field studies (PacifiCorp 2004). These data were used to establish the presence of historical nesting and foraging habitat throughout the limits of work and the surrounding area. By agency request, exact nesting locations were not published in the PacifiCorp 2004 report.

4.1.2 Golden Eagle

Golden eagles occur throughout northern California and Oregon, preferring open and semi-open habitats. Nesting habitat includes cliffs and trees large enough to support nest structures (e.g., pine juniper and oak trees). Foraging and nesting habitats occur throughout the vicinity of the Project area. Though natural densities for this species in southern Oregon and northern California are low, historical records indicate the presence of nesting activity on cliffs from the J.C. Boyle bypass reach to Iron Gate Reservoir (USBR and CDFW 2012). During PacifiCorp surveys, biologists observed golden eagles in several locations, including Copco Lake, Iron Gate Reservoir, and near J.C. Boyle powerhouse, but no nests were found (PacifiCorp 2004).

4.2 Methods

Prior to initiating field surveys, KRRC biologists reviewed existing databases (CNDDB and ORBIC) and reports on bald and golden eagles to locate historically known nests and territories. During 2017, the USFWS and the BLM provided an updated dataset of bald and golden eagle nests and territories that have been monitored in the region (Willy 2017 and Hayner 2017). In addition, the KRRC obtained data from previous aerial helicopter surveys conducted in the Klamath Basin by Frank Isaacs of the Oregon Eagle Foundation (Isaacs 2017; Willy 2017).

Biologists conducted a viewshed analysis to identify the potential impact area. Using ArcGIS (ESRI, Version 10.4.1), biologists generated visibility extents using a 30-foot resolution National Elevation Dataset topographic surface and observer points derived from the limits of work (see Survey Area section below).

In defining the study area for the eagle surveys, KRRC biologists considered the viewshed analysis and the nature, timing, and location of proposed construction activities. The study area included areas of high and low potential impact

- High-Impact Areas: High-impact areas include a 0.5-mile buffer surrounding the limits of work, as well as those access roads that are anticipated to have an increase in traffic and movement of heavy equipment. High-impact activities include proposed construction and demolition activities associated with the decommissioning of the dams and facilities and creation of disposal sites.

- Low-Impact Areas: Low-impact areas include a 2-mile buffer surrounding the limits of work, excluding the extent of each reservoir where minimal or no work will occur.

The study area encompassed the extent of the viewshed in these high- and low-impact areas and represents the portion of the habitat that may be affected by Project activities. In the 2018 surveys, biologists also opportunistically surveyed beyond the study area boundaries to account for the wide-ranging nature of the eagle species and to gain a general understanding of eagle use and occupancy in the study area.

Biologists conducted concurrent bald and golden eagle surveys. The surveys focused on areas with suitable nesting, roosting, or foraging habitat for bald and golden eagles, as well as known nest locations. The survey goals were to identify nest site locations, characterize baseline eagle nesting activity, and document other key habitat features. Field surveys employed a variety of techniques and multiple temporal windows to capture dynamic seasonal activity. All survey data were digitally recorded through Collector for ArcGIS, using iPads (Apple, Inc.), which preserve the location and survey time for each observation. The KRRC biologists conducted field reconnaissance surveys from July 24 to 26, 2017, and from November 6 to 8, 2017. Surveyors assessed habitats in the study area, noted bird activity, and attempted to locate all previously identified nests. Additionally, because the viewshed analysis considered bare earth topography (i.e., it did not account for existing vegetation), biologists used the reconnaissance surveys to ground-truth the results of the viewshed analysis to determine where trees further limited the viewshed. Biologists spent 1 day at each dam and associated facilities and reservoir.

The 2018 bald and golden eagle survey protocol was informed by the review of existing data, information obtained during the 2017 reconnaissance surveys, discussions with the wildlife agencies, and established protocols including:

- Bald Eagle Nest Survey and Reporting Guide: Reporting Observations at Nest Sites in Oregon (Isaacs 2009),
- Protocol for Evaluating Bald Eagle Habitat and Populations in California (Jackman and Jenkins 2004), and
- Interim Golden Eagle Inventory and Monitoring Protocols (Pagel et al. 2010).

Field teams collected data using a combination of ground-based and aerial surveys (via a helicopter). Field surveys emphasized microhabitats that could support nesting eagles (e.g., rocky cliffs for golden eagles and large conifers for bald eagles). Survey efforts included:

1. Two breeding season surveys (late January through July 2018).

    a. An initial nest search was conducted early in the breeding season (i.e., from January 29 to February 1, 2018) to determine occupancy. Two biologists conducted ground-based observations from vehicles and on foot, spending 1 day at each reservoir and corresponding dam. Surveys included observing historical nests and recording all eagle detections. For this early-breeding season survey, the survey area included all known golden eagle nests within 10 miles of the limits of work, and bald eagle nests within 2 miles. Survey distances were established in coordination with USFWS.

    b. Two teams of two biologists conducted a second survey from June 4 to 7, 2018, to observe eagle behavior and mid-season nesting activity, and to determine the number of active nests and nestlings in the survey area. One team conducted ground-based surveys, spending 1 day at each reservoir. The second team conducted aerial helicopter surveys for 2 days, covering all reservoirs, and a ground-based survey for 1 day. All historical and newly discovered nests and locations where eagle pairs or territorial behavior had been previously observed were revisited from the ground and helicopter.

2. To identify adult and sub-adult habitat use, one additional survey was conducted from August 20 to 22, 2018, after the young had fledged. Three teams of two biologists each conducted ground-based surveys.

4.3 Findings

Observations of bald and golden eagles are summarized in Table 4-1. Results are summarized by location, date, species, and age. The status of each nest site observed is summarized in Table 4-2, including the proximity of the nest to the Project area and noting whether the nest was determined to be active or inactive in 2018. The number of nestlings observed at active nests is summarized in Table 4-3 by species. Observations and behavioral notes not captured in the tables are noted in the following sections.

Reconnaissance Surveys 2017

- During the July 2017 survey, biologists located three of the four known nests within a 0.5-mile radius of the Project area (nests BE1-36, BE1-31, and BE1-32). Biologists observed one sub-adult bald eagle near nest BE1-36. This nest was presumed active for this year because substantial whitewash and prey remains (fish bones) were found under the nest. The other two nests did not exhibit conspicuous indications of activity; no whitewash, prey remains, or sub-adults were observed.
- During the November 2017 survey, biologists located one golden eagle nest and three bald eagle nests. Bald eagle nest BE1-36 contained abundant whitewash and there were prey remains at the nest site. The other two nests (BE1-31 and BE1-32) did not have signs of recent activity but were in good structural condition. The assumed golden eagle nest (GE4-206) was notably small and did not appear to be recently active. Biologists observed two nests that were not included in historical data and had the potential to be active eagle nests. Biologists attempted to view 14 historic nests that were either inaccessible or were not found.

January – February 2018

Eagle Activity

- Observers recorded approximately 50 eagles, including 30 bald eagles and 20 golden eagles; however, some may have been resightings of the same individuals. Both species of eagles appeared to prefer certain perches, and surveyors noted the use of these same perches during different survey times and dates.
- Common bald eagle behavior included:
  - perching on trees and utility poles close to and within sight of the reservoirs, with several adult bald eagle pairs perched together;.
  - soaring on thermals with other bald eagles and golden eagles, usually near the reservoirs but also over the Klamath River;
  - foraging in Iron Gate Reservoir; and
  - vocalizing from a perch at Copco Lake.

Table 4-1: Total Number of Eagle Observations by Site,[1] Survey, Species, and Age

Survey Date	Golden Eagle Adults	Golden Eagle Sub-Adults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Sub-Adults	Bald Eagle Young of the Year
Iron Gate Reservoir						
July 2017	0	0	0	0	0	0
November 2017	0	0	0	0	0	0
January – February 2018[2]	12	0	0	6	1	0
June 2018	8	0	2	18	5	0
August 2018	0	0	0	2	0	0
Total	**20**	**0**	**2**	**26**	**6**	**0**
Copco Lake						
Survey Date	Golden Eagle Adults	Golden Eagle Sub-Adults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Sub-Adults	Bald Eagle Young of the Year
July 2017	0	0	0	0	0	0
November 2017	1	0	0	1	2	0
January – February 2018[2]	8	0	0	6	10	0
June 2018	10	2	3	4	2	2
August 2018	0	0	4	5	0	1
Total	**19**	**2**	**7**	**16**	**13**	**3**
J.C. Boyle Reservoir						
Survey Date	Golden Eagle Adults	Golden Eagle Sub-Adults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Sub-Adults	Bald Eagle Young of the Year
July 2017	0	0	0	0	1	0
November 2017	1[3]	0	0	0	1	0
January – February 2018[2]	0	0	0	6	1	0
June 2018	1	0	1	6	2	5
August 2018	2	1	0	3	1	0
Total	4	1	1	15	6	5

Notes:
1 The number of eagles observed is influenced by the visibility at each site and should not be interpreted as relative abundance across sites. Visibility at J.C. Boyle Reservoir is poorer than at Copco Lake and Iron Gate Reservoir.
2 The number of eagles detected during the winter survey period is likely to include wintering and migratory individuals.
3 Species identification unconfirmed.

Table 4-2: Active and Inactive Bald and Golden Eagle Nests Observed in 2018 Field Surveys

Nest Name	Golden Eagle		Bald Eagle		Bald or Golden Eagle – Species not Confirmed
Nest Status in 2018	Active	Inactive	Active	Inactive	Inactive
Within 0.5 mile of Project area	1	0	1	3	2
Between 0.5 and 2 miles from Project area	2	3	0	3	0
Total Nests within 2 Miles	**3**	**3**	**1**	**6**	**2**
Outside of 2-mile buffer surrounding Project area, but within 0.5 mile of haul roads	2	0	3	0	0

Table 4-3: Number of Nestlings Observed at Each Active Nest in 2018

Nest Name	Golden Eagle Nestlings	Bald Eagle Nestlings
BE1-32	–	2
BE1-15	–	1
GE4-206	1	–
BE1-43	–	2
F_GE3	2	–
GE3-3	1	–
GE3-5	2	–
F_GE4	2	–
F_BE2 (outside of survey area)	–	2
Total Number of Nestlings	**8**	**7**

Notes:
BE = Bald eagle nest
GE = Golden eagle nest
F_GE = New golden eagle nest found during these 2017 – 2018 surveys, not included in historically active data
F_BE = New bald eagle nest found during these 2017 – 2018 surveys, not included in historically active data

- Golden eagle activity included:
  - perching on trees and cliffs that were not typically near or within sight of the reservoirs;
  - foraging on the ground;
  - soaring on thermals with other eagles;
  - flying in pairs; and
  - performing undulating flight behavior (i.e., breeding behavior).
- Biologists identified three potential golden eagle territories around Iron Gate Reservoir, one of which was in the 0.5-mile high-impact area. Territories were identified by observations of high levels of

golden eagle activity and/or undulating flight behavior, and observations of birds perching for long periods. At Iron Gate Reservoir, field teams identified two potential bald eagle territories, where they observed pairs of bald eagles perched. At Copco Lake, biologists identified two potential golden and bald eagle territories, based on high golden and bald eagle activity.

- Although biologists observed substantial eagle activity during the early 2018 surveys, it is difficult to determine how many of the observed birds represented resident birds, due to the potential presence of wintering and migratory birds.
- At J.C. Boyle Reservoir, there was notably less eagle activity observed than at the other two sites; however, this may have been due to low visibility at J.C. Boyle Reservoir, due to the high density of trees and limited road access. Biologists were unable to define areas of high eagle activity at J.C. Boyle Reservoir during the survey period.

Eagle Nests

- Biologists were unable to access 26 historically active nests due to poor visibility resulting from dense tree cover, limited access through private property, or poor road conditions. Observers were able to survey the area around 15 other historical nests, including six historically active nests. The conditions of the nests varied. Some appeared old and unused, while others appeared to have been recently active.
- At J.C. Boyle Reservoir, biologists found a pair of bald eagle adults less than 100 feet from the known nest BE1-15, which was visibly in good condition. Field teams found a sub-adult bald eagle perched near what was likely an active nest, BE1-36 (based on July 2017 survey information). In a few cases where a nest was likely active and could not be observed from a distance, biologists did not approach the nest, so as not to disturb the eagles. This occurred often at J.C. Boyle due to low visibility and dense tree cover. Figures 6-1 through 6-7 present the eagle nest survey results for the 2018 survey season.

June 2018

Eagle Activity

- With the exception of nestlings, some of the observations noted in Table 4-1 may have been resightings of the same eagle.
- Observed eagle activities were similar to those described above. More golden eagles were observed in the vicinity of the reservoirs during this survey than during previous surveys. Golden eagles also exhibited territorial behavior toward bald eagles and were observed vocalizing.
- Bald eagles exhibited territorial behavior toward other eagles and raptors. Most bald eagle observations were close to the reservoirs; however, there were some observations near the Klamath River or over ridgelines.

Eagle Nests

- At J.C. Boyle Reservoir, biologists observed three bald eagle nests and one golden eagle nest, with one to two chicks observed per nest. At both Copco Lake and Iron Gate Reservoir, biologists observed three active golden eagle nests, with one to two nestlings per nest.
- Biologists estimated golden eagle nestlings to be 5 to 8 weeks old, and bald eagle nestlings to be 8 to 11 weeks old at the time of the survey. Biologists often observed adults perched or flying near these nests and occasionally visiting the nests to feed nestlings. Field teams also found several inactive nests, as well as many potential alternate nests. One of the active golden eagle nests identified was not previously recorded as an active nest. Additionally, there were several historically active nests that no longer exist. This may be a result of the nest being abandoned, the nest structure falling, the tree or surrounding forest being disturbed or logged, or the effects of a wildfire.

August 2018

Due to several fires in the surrounding areas, conditions during the August 2018 surveys were smoky, and visibility became especially poor in the afternoon, making long-distance observations difficult.

Eagle Activity

- Biologists observed two young-of-the-year golden eagles flying over a nest that was classified as active during the June 2018 surveys (F_GE3). Additionally, field teams observed two young-of-the-year golden eagles flying over a new nest that was not found during previous surveys (F_GE4). This suggests that young-of-the-year golden eagles stayed near their territories following fledging for at least a few weeks and can be detected by post-fledging surveys.
- Biologists did not observe any young-of-the-year bald eagles near their nest territories during these surveys; however, one young-of-the-year bald eagle was observed begging food from an adult bald eagle, indicating that young-of-the-year bald eagles and their parents had moved farther from their nest territories to forage elsewhere at the time of the August 2018 surveys.

Eagle Nests

- Golden eagle nest (F_GE4) was located on a cliff face that was surveyed by helicopter in June 2018. The nest was apparently missed at that time, although an adult golden eagle was observed nearby. The nest structure was found during the ground-based survey in August 2018, and there were two fledged eaglets in close proximity.

4.4 Conclusions

Biologists observed a total of nine active nests surrounding Copco Lake, Iron Gate Reservoir, and J.C. Boyle Reservoir in 2018 (Table 4-2). Five of these were golden eagle nests and four were bald eagle nests. Of the nine active nests, seven were within 0.5 mile of the Project area or more than 2 miles from the Project area but within 0.5 mile of a haul road (high-impact areas), and two were between 0.5 mile and 2 miles from the Project area (low-impact area).

Additionally, biologists observed a total of nine inactive nests within 2 miles of the Project area (Table 4-2). It is not uncommon for eagles to suspend breeding in some years or use alternative nest sites (USFWS 2004); therefore, these inactive nests will continue to be surveyed in 2019.

Project activities (e.g., site preparation) are scheduled to begin in early 2020. Biologists will conduct three bald and golden eagle surveys in 2019 to determine nest occupancy, and to gather more information on baseline eagle activity immediately prior to construction. If the start of construction is delayed, this field schedule will be reevaluated.

Similar to the field surveys conducted in 2018, a synthesized field survey to encompass bald and golden eagle nesting habitat will include:

1. One courtship/early-breeding season survey between late January and late February. Biologists will conduct ground-based surveys on foot and in vehicles when eagles are most likely to be found near nest sites and displaying courtship behavior, to determine territory occupancy.

2. One mid-nesting season survey will be conducted between late April and early May. Biologists will conduct ground-based surveys on foot and in vehicles, and aerial surveys from a helicopter. This survey will be conducted at a time when the number and age of nestlings at each active nest, as determined from previous surveys, can be estimated.

3. One late-nesting season survey will be conducted between late June and early July. Biologists will conduct ground-based surveys on foot and in vehicles, and aerial surveys from a helicopter. This survey will be conducted at a time when the number of fledglings can be estimated, and behavior and habitat use following fledging can be observed.

Chapter 5 Bats

5. BATS

Based on a review of California and Oregon occurrence records, presence of suitable habitat, species range overlap, and previous survey results, eight bat species have potential to occur in the Project area. Yuma myotis have been previously documented at structures in the Project area (PacifiCorp 2004). Townsend's big-eared bat and Yuma myotis have been previously documented in the Klamath Basin outside of the Project area, in maternity roosts at Hoover Ranch and Salt Caves (approximately 6 miles east of Copco Lake and 9 miles downstream from the J.C. Boyle powerhouse) (Cross et al. 1998; PacifiCorp 2004).

Oregon and California state regulations provide protection for bats through general wildlife protection policies. TER-6 of the 2012 EIS/EIR (USBR and CDFW 2012) describes measures to reduce Project impacts on bats. The 2012 EIS/EIR recommended surveys to identify the locations of active bat roosts in facilities that may be affected by the dam removal. KRRC has incorporated this measure into the Project. Structures with the potential to support bats include all built structures in the Project area, bridges, and diversion tunnels. All of these features were included in the surveys.

5.1 Methods

The KRRC biologists conducted surveys for all bat species with potential to occur at Project structures. The objectives of the surveys were to identify which species occupy the habitat throughout the year, understand how the habitat is used throughout the year, and quantify habitat usage. A reconnaissance-level assessment was conducted from July 24 to 26, 2017. The KRRC planned a follow-up visit during the 2017 maternity season to conduct emergence surveys, but the survey was canceled due to lack of right-of-entry to PacifiCorp property for the specific survey task.

Biologists conducted four focused, seasonal bat surveys in 2018: one in late winter, two in summer, and one in fall. The 2018 seasonal bat roost surveys assessed habitat suitability and determined roosting activity at Project structures. Additionally, a biologist accompanied interior inspections of the Iron Gate and Copco diversion tunnels in February 2018.

During all surveys, KRRC biologists conducted daytime visual inspections of the interior and exterior of each facility proposed for removal or modification for indications of bat use (e.g., occupancy, guano, staining, smells, or sounds). Dead specimens were identified in the field using a dichotomous key. When live bats were found, species were identified visually to the extent possible, using night vision when needed to minimize disturbance. All surveys were conducted cautiously to avoid disturbing bats at potential roost sites. Because interior access to human-occupied houses was prohibited, those structures were assessed from the exterior only.

5.1.1 Winter 2018

On February 13 and 14, 2018, a KRRC biologist participated in inspections inside the Iron Gate and Copco diversion tunnels to assess the interior habitat features. Both tunnels were accessed by a small inflatable boat, and inspections were attended by one engineer and one safety/confined space entry specialist, in addition to the KRRC biologist.

On March 1, 2018, two KRRC biologists conducted interior and exterior inspections of structures at Copco No. 1 and Copco No. 2. These winter bat surveys were originally planned for late January/early February but were delayed and were ultimately limited to the Copco No. 1 and Copco No. 2 dams due to access constraints. Care was taken to target areas where guano and staining had been seen during the 2017 survey and to minimize the potential for disturbance of hibernating bats.

5.1.2 Summer 2018

A team of three KRRC biologists conducted surveys from May 14 through 18, 2018, and a team of four biologists conducted surveys from June 16 through 22, 2018. In addition to interior/exterior inspections, summer efforts included dusk emergence surveys and acoustic detection at structures known to house roosting bats, and at structures where suitable roosting habitat or sign was found but occupancy was uncertain based on previous surveys. Night vision was used during all emergence surveys, and an infrared camera was used to capture images of an emergence at the Copco No. 1 C-12 gatehouse. Points of egress were documented during all emergence surveys. Two iPads (Apple, Inc.) running Echo Meter Touch 2 Pro (Wildlife Acoustics) and one Dell laptop running Sonobat software (Version 4) with a Binary Acoustics ultrasonic microphone (Binary Acoustic Technology, LLC) were deployed during all emergence surveys. Field teams conducted emergence surveys when weather conditions were suitable for the evening emergence of bats (e.g., warm temperatures and minimal rain and wind).

In May, biologists placed drop cloths around significant roost locations and inspected them during the June visits to passively assess bat activity levels. Field teams installed long-term temperature and humidity data loggers in structures with significant roosts. Biologists discussed maintenance routines, bat observations, and previous bat management techniques with PacifiCorp staff. Bridges in the Project area that are scheduled for removal or modification were also inspected.

5.1.3 Fall 2018

Two KRRC biologists conducted surveys from October 29 through November 1, 2018, to support the development of the Project Bat Management Plan (currently in draft). The team inspected the interior and exterior of all buildings being used by bats, and other structures that may be removed and that provide suitable roosting habitat (such as buildings that contain suitable crevices and cavities without evidence of recent bat use, bridges, and trees). Previously installed temperature data loggers were checked for maintenance and continued operation. Detailed photographs and notes were taken at each structure to document specific locations for exclusion, and to record other structural characteristics such as roofing and other building construction materials.

5.2 Findings

Bat survey findings are summarized in Table 5-1. Summaries of the results from the winter, summer, and fall 2018 surveys follow the table. Bat roosts were confirmed in ten buildings at Copco No. 1 and Copco No. 2, the diversion tunnel at Copco No. 1, three buildings and the diversion tunnel at Iron Gate, and one building at J.C. Boyle (Figures 7-1 through 7-5). Photographs 5-1 through 5-5 depict the exterior view of some of the structures with large roosts. Photographs 5-6 and 5-7 show the interior conditions of the diversion tunnels.

Table 5-1: 2017-2018 Bat Findings

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Copco No. 1 and Copco No. 2						
Vacant House 1 (tan)	high	Yes	Yes – small numbers of bats present under exterior side panels in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House 2 (blue)	high	Yes	Yes – small numbers of bats present under exterior side panels in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House 3 (yellow-green)[2]	high	Yes	Yes – large colony in garage behind wood window framing and under rotting wood panels. Present in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House 4 (peach)	high	Yes	Yes – present between flashing and fascia board all around roof edge in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House #21601 (light yellow)[2]	high	Yes	Yes – 200 to 300 bats roosting in attic in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	Temperature/humidity data logger installed.
C-11 Gatehouse (at Copco No. 1)	high	Yes	About 20 Myotis clustered in exposed roof apex (interior) in fall. Not found in summer. Not surveyed in winter.	MYYU (visual)	July 2017, June 2018, October through November 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
C-12 Gatehouse (at Copco No. 1) [2]	high	Yes	Yes – 2,000 to 3,000 bats present in summer. Several dozen present in fall. Not surveyed in winter.	MYYU (visual, acoustic)	July 2017, June 2018, October through November 2018	Temperature/humidity data logger installed. Infrared images of emergence.
Copco No. 1 powerhouse	high	Yes	Yes – several dozen bats clustered on walls in transformer bays and small numbers in lower level in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, June 2018, October through November 2018	Abundant staining/guano on lower level but no large roosts found. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
Diversion Tunnel Outlet[2]	high	Yes – via emergence only.	Yes – ~100 bats emerged in summer, absent in winter.	MYYU (visual, acoustic)	February 2018 inspection, June 2018 emergence.	Small number of COTO detected acoustically on summer emergence, but not confirmed to be present inside tunnel. Highly suitable habitat.
Copco No. 2 powerhouse	high	Yes	Yes – not found during interior inspections, but confirmed summer use by evening emergence of ~50 bats.	MYYU (visual, acoustic)	July 2017, February 2018, June 2018, October through November 2018	Six dead Myotis adults and pups found on ground level and lower level in summer. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
House 19038 (next to schoolhouse)	high	Yes – abundant guano in garage.	No	NA	July 2017, February 2018, June 2018, October through November 2018	Potential entry points noted.
Maintenance Building (next to switchyard)	high	Yes – guano and staining in garage.	No	NA	July 2017, June 2018, October through November 2018	Potential entry points noted.

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Bunkhouse	mod	No	No	NA	July 2017, February 2018, June 2018, October through November 2018	Potential entry points noted.
Cookhouse	mod	Yes	Yes – small number of bats present in awning over side door outside in summer. Absent in fall and winter.	MYYU (visual)	July 2017, February 2018, May and June 2018, October through November 2018	No signs of interior use. Potential entry points noted.
Vacant House (light blue) on Access Road	mod	No	No	NA	July 2017	None
Occupied House next to Vacant House 4	mod	Unknown	Unknown	NA	July 2017 exterior only.	No interior survey access to occupied residences. Resident stated he is not aware of any bats in the attic.
Schoolhouse	low-mod	No	No	NA	July 2017	None
Haz Waste Storage/Wood Shop	low-mod	No	No	NA	July 2017, February 2018, June 2018	None
Groundwater Well House (at entrance to Copco Village)	low-mod	No	No	NA	July 2017, October through November 2018	Small amount of guano on roof indicates bat use of rock crevices above/behind the structure.
Maintenance Building (next to Copco No. 2 powerhouse)	low	No	No	NA	July 2017, June 2018	None
Equipment Shed (in front of bunkhouse/cookhouse)	low	No	No	NA	July 2017, February 2018, June 2018	None
Copco No. 2 Dam (concrete dam and associated structures)	low	No	No	NA	July 2017	None

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Tin Pumphouse (across from light blue house on Access Road)	low	No	No	NA	July 2017	None
Control Center at Copco No. 2 powerhouse	low	No	No	NA	July 2017, February 2018, June 2018	None
Iron Gate						
Diversion Tunnel Outlet[2]	high	Yes – via summer evening emergence only.	Yes – several hundred bats emerged during May and June 2018 surveys. Absent in winter.	MYYU (visual, acoustic)	February 2018 inspection, May 2018 emergence, June 2018 emergence	Small number of COTO detected acoustically on summer emergence, but not confirmed to be roosting inside tunnel. Highly suitable habitat.
Penstock Intake Structure[2]	high	Yes	Yes – several hundred bats roosting inside at top of structure in summer. Absent in fall.	MYYU (visual, acoustic)	July 2017, June 2018, October through November 2018	Temperature/humidity data logger installed.
Communication Building/ Powerhouse	high	Yes	Yes – several hundred bats emerged from concrete shaft in lower portion of powerhouse in summer. Heavy guano/staining.	MYYU (visual, acoustic)	July 2017, May and June 2018, October through November 2018	Temperature/humidity data logger installed. Lowest, subterranean level of powerhouse not accessed due to confined space entry restriction.
Barn/Garage at Iron Gate Village	high	Yes	Yes – bats present in rafters/ ceiling in summer, abundant guano. Absent in fall.	MYYU (visual, acoustic)	July 2017, May and June 2018, October through November 2018	Temperature/humidity data logger installed.
Residence 1 (occupied) blue/gray	mod-high (attic)	Unknown	Unknown	NA	June 2017 exterior only	No interior survey access to occupied residences.
Residence 2 (occupied) tan with green roof	mod-high (attic)	Yes	Yes – ~15 bats huddled behind clock on back porch. Potential attic access through loose screen over vent.	MYYU (visual, acoustic)	July 2017 exterior only	No interior survey access to occupied residences.

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Fish Holding Facilities	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Diversion Tunnel Gate Structure	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Restrooms (near powerhouse)	low-mod	No	No	NA	July 2017, June 2018	None
Emergency Spill Equipment shed	low	No	No	NA	July 2018	None
J.C. Boyle						
Spillway Control Center[2]	high	Yes	Yes – several hundred bats present in summer. Absent in fall.	MYYU (visual)	July 2017, May and June 2018, October through November 2018	Temperature/humidity data logger installed.
Office/Red Barn	high	Yes – abundant guano in attic.	No	MYYU (visual – dead specimen)	July 2017, May and June 2018, October through November 2018	Found two dead Myotis sp. adults inside the attic – desiccated.
Fish Screen House	mod-high	No	No	NA	July 2017, June 2018, October through November 2018	None
Fire Protection Building	mod	Yes	Yes – outside only, a few bats in exterior crevice near roof edges (western side and eastern side) in summer. Absent in fall.	MYYU (visual)	July 2017, June 2018, October through November 2018	

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Dam Communications	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
J.C. Boyle powerhouse	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Maintenance Building (next to powerhouse)	low-mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Truck Shop	low-mod	No	No	NA	July 2017, May 2018 and June 2018, October through November 2018	Maintenance staff have found a few dead bats inside over the years, but no roosting. No sign found inside. Multiple potential access points along roof at the covered parking area.
Headgate Control	low-mod	No	No	NA	July 2017, June 2018	None
Gate Control and Communications	low-mod	No	No	NA	July 2017, October through November 2018	None
Power Canal/Spillway	low	No	No	NA	July 2017, June 2018	None
HazMat Storage Shed	low	No	No	NA	July 2017	None
Pump House	low	No	No	NA	July 2017	None
Two occupied residences	Unknown	Unknown	Unknown	NA	NA	No interior survey access to occupied residences.

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes

Notes:

1 "High" suitability was assigned to structures with bats present and/or where signs of heavy bat use were found, or to structures that showed little or no sign of use or could not be accessed but contain external or internal features generally preferred by roosting bats, such as attics/roof spaces, soffits, fascias, weather boarding, spaces between roof felt/membrane and tiles/slates, window frames, cave/cavity walls, flashing, and the like. "Moderate" suitability was assigned to structures where no bats or very few bats were found, with little or no sign of bat use, that contain points of entry/exit and limited internal and external features preferred by roosting bats. "Low" suitability for roosting was assigned to well-sealed structures with no points of entry/exit, and generally lacking cavities, crevices, and other features generally preferred by roosting bats.

2 Photograph included in report

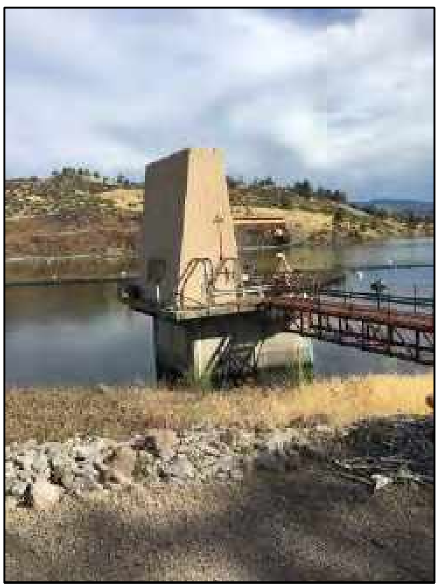
NA = Not Applicable

MYYU = Myotis yumanensis (Yuma myotis)

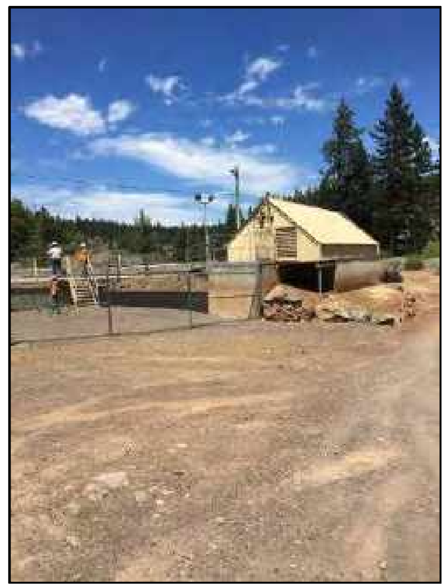
COTO = Corynorhinus townsendii (Townsend's big-eared bat)

Photograph 5-1: Garage of Vacant House 3, Copco Village

Photograph 5-2: Vacant House #21601, Copco Access Road



Photograph 5-3: Penstock Intake, Iron Gate



Photograph 5-4: Spillway Control Center, J.C. Boyle

Photograph 5-5: C-12 Gatehouse, Copco No. 1

Although there is potential for other bat species to be present, the only species confirmed to be roosting in structures were Yuma myotis (Myotis yumanensis) (Table 5-1). The Lakeview Road Bridge at Iron Gate contains expansion joints that indicate bat use, and emergence surveys at this bridge are planned for summer 2019. The KRRC biologists did not detect any roosting bats or signs of bat use at any other Project bridges where removal or modifications are planned.

5.2.1 Winter 2018

On February 13, 2018, conditions were sunny and clear. Air temperatures outside the Iron Gate tunnel were 48 degrees Fahrenheit (°F) at 12:50 P.M. Inside the tunnel, temperatures were 67°F at the entrance (1:35 P.M.) and 52°F at the terminus (1:51 P.M.). Most of the Iron Gate tunnel is rock, except for the entrance and just before the closure gate, where it is lined with reinforced concrete (25 feet at the entrance and 120 feet leading to the closure gate) (Photograph 5-6). Water depths in the tunnel ranged from 2.7 feet to 5.5 feet. The full length of the accessible portion of the tunnel—approximately 500 feet in length from the entrance to the closure gate, of which approximately 354 feet is unlined, exposed rock— was surveyed. Cliff swallow nests were observed just inside the tunnel entrance. Pigeons were present at various locations throughout the tunnel. No bats or signs of bat use were found; however, both the rock- and concrete-lined portions of the tunnel provide interior spaces and/or irregular rock surfaces suitable for use by roosting bats.

Photograph 5-6: Iron Gate Diversion Tunnel Interior Section of Unlined Rock, February 13, 2018

On February 14, 2018, conditions were sunny and clear. Air temperatures outside the Copco tunnel were 41°F at 10:15 A.M. Inside the tunnel, temperatures were 48°F at the entrance (10:20 A.M.) and 44°F at the terminus (10:30 A.M.). The entire length of the Copco tunnel is unlined, exposed rock (~160 feet) (Photograph 5-7). Water depths in the tunnel ranged from 1.1 feet to 3.2 feet. The full length of the accessible portion of the tunnel was surveyed, from the entrance to the closure gate. Cliff swallow nests and a few pigeons were observed in the tunnel. No bats or signs of bat use were found; however, the tunnel provides suitable habitat.

Photograph 5-7: Copco Diversion Tunnel Interior Substrate and Cliff Swallow Nests, February 14, 2018

On March 1, 2018, the midday outdoor temperature was 45°F. No bats were observed in any structures at Copco No. 1 and Copco No. 2, and no new signs of bat activity were found at these sites.

5.2.2 Summer 2018

During the May surveys, the average high daytime outdoor temperature was 74°F. In June, the average high during the day was 83°F. Biologists observed evening emergences of several hundred bats from both the Copco and Iron Gate diversion tunnels and an attic at Copco “Vacant House #21601.” More than 2,000 Myotis spp. emerged from the Copco No. 1 C-12 gatehouse, the interior of which had not previously been inspected due to access constraints.

Field teams heard small numbers of Townsend's big-eared bats (Corynorhinus townsendii) during acoustic surveys outside the diversion tunnel outlets and the Copco No. 1 and Copco No. 2 powerhouses; however, it is not certain that these bats came from inside the structures or tunnels. Particularly at the Copco diversion tunnel, access limitations prohibit targeted placement of recording equipment at or near the mouth of the tunnel. Only small numbers of roosting bats have been observed emerging from the Copco powerhouses during summer surveys, despite abundant sign of previous bat use in these structures. Maintenance staff reported that sonic deterrents (Bird-X Transonic Pro) and mothballs and other naphthalene products were used in the past few years in these powerhouses in an attempt to deter bats, but that these efforts were not effective.

5.2.3 Fall 2018

During the week of October 29, 2018, the average high daytime outdoor temperature was 63°F. Bats were only present in two structures: the C-11 and C-12 gatehouses at Copco No. 1. Several dozen bats were counted in the attic at C-12, and about a dozen were seen in the open, at the roof apex inside C-11.

5.3 Conclusions

Significant bat roosts are present in many structures across the Project area. The KRRC biologists will continue coordinating with Project engineers on plans for structure retention, modification, and removal. Sufficient information was collected to provide recommendations for take avoidance, humane exclusion, and compensatory roosting habitat for each structure. The KRRC will provide these site-specific details in a Bat Management Plan. Seasonal surveys in 2019 will focus on structures that will require exclusion, modification, and/or replacement.

The KRRC will develop and finalize a Bat Management Plan in 2019, prior to commencement of any Project activities that could disturb roosting bats. According to the current Project timeline, site preparation is scheduled to begin in early to mid-2020, which will include work in the diversion tunnels. Therefore, humane exclusion in these locations is anticipated to occur in fall-winter 2019. Building removal is currently scheduled to occur after reservoir drawdown, in March 2021. Therefore, exclusion and installation of replacement habitat in these locations is anticipated to occur in 2020.

The KRRC will assess significant roosting habitat outside of buildings as Project activities such as tree removal are further refined. Although no roosting trees have yet been identified, the KRRC will provide general recommendations for removal of potential tree-roosting habitat in the Bat Management Plan. The KRRC will evaluate significant roosting habitat in the vicinity of major Project disturbances for its potential to be affected by noise or vibrations during ongoing survey efforts, or as otherwise dictated by the Project schedule.

Chapter 6 Western Pond Turtle

6. WESTERN POND TURTLE

Western pond turtles are known to occur at Project reservoirs. The United States Geological Survey conducted visual surveys of basking turtles at J.C. Boyle Reservoir in the mid- to late-1990s and recorded turtle use (Wray 2017). The 2001-2003 PacifiCorp surveys also noted the presence of western pond turtles and suitable basking and nesting habitat at Project reservoirs (PacifiCorp 2004), as shown on Figure 8-1 through 8-3.

The western pond turtle is listed on the Oregon Sensitive Species List and is a species of special concern in California. A petition for listing under the federal Endangered Species Act is currently being considered by USFWS, with a decision regarding listing expected by 2021. In light of its special status, the KRRC conducted an evaluation of potential risks to western pond turtles during drawdown when turtles would be hibernating. In coordination with ODFW, CDFW, and USFWS, the KRRC concluded that there is potential for impacts, including mortality, to western pond turtles from the effects of drawdown and other components of the proposed action. Based on this evaluation, it was determined that the following additional investigations were warranted:

- Conduct surveys of Project reservoirs for basking western pond turtles during special-status wildlife surveys. Document turtle observations and map suitable habitat.
- Conduct a mark/recapture survey and tracking study at J.C. Boyle Reservoir to a) estimate the abundance of western pond turtles in the J.C. Boyle Reservoir area and b) obtain data on western pond turtle overwintering locations and behaviors. The methodology for the study was developed in coordination with ODFW, as described further below.

6.1 Methods

6.1.1 Western Pond Turtle Surveys and Habitat

The KRRC biologists noted observations of western pond turtles in the 0.25-mile study area during general wildlife surveys. Biologists recorded the number of turtles, behavior, and other observations. Surveyors observed habitat along reservoir shorelines via boat.

6.1.2 Western Pond Turtle Tracking Study at J.C. Boyle Reservoir

The western pond turtle tracking study was led by the KRRC, with assistance from ODFW biologists. The study was initiated during late summer, when turtles would have finished breeding but would still be active prior to the hibernation season. In coordination with ODFW, two primary objectives were identified:

1. Capture enough western pond turtles (30+) for a mark-recapture study, to produce a population estimate for the J.C. Boyle Reservoir.

2. Capture 14 western pond turtles (8 females and 6 males) and attach radio transmitters and temperature data loggers to them for a telemetry tracking study. The purpose of the telemetry study was to determine the timing and locations of western pond turtle overwintering in the J.C. Boyle Reservoir.

Field teams conducted initial trapping in August 2018, with an additional capture effort conducted in September 2018.

Trap locations are shown on Figures 9-1 and 9-2. During the August trapping event (August 6 through 12, 2018), field teams focused trapping in areas of J.C. Boyle Reservoir where turtles had been observed in the greatest numbers during previous visual surveys, including those conducted by the KRRC biologists in 2018 and historical PacifiCorp surveys (PacifiCorp 2004). This included along the western shore of the reservoir, north of the Highway 66 bridge (referred to as the “west” site, as shown on Figure 9-2); and the southeastern cove near Topsy Campground and the southwestern cove behind the floating log barrier immediately upstream of the dam (referred to together as the “south” site, as shown on Figure 9-1). During the September trapping event (September 4 through 7, 2018), field teams also deployed traps in other areas around the reservoir, including the western and eastern shores south of the bridge, the northernmost shore of the reservoir, and the mouth of Spencer Creek.

The August trapping event consisted of six nights of trapping. Field teams deployed traps in the south or west sites on alternating nights. On the first night of trapping (August 6, 2018), field teams deployed 12 traps in the south site. Due to the low capture rate, teams deployed 20 traps on each subsequent trapping night. Field teams deployed traps in the evenings between approximately 7:00 and 9:00 P.M. and collected them the next morning between approximately 7:30 and 9:30 A.M. Overnight traps were deployed for at least 12 hours each.

Due to the low capture rate, the trapping strategy was altered during the September trapping event to include day trapping, longer trap deployment, and trapping in areas outside the south and west sites. Field teams deployed traps overnight as described above for three nights (September 4 through September 6, 2018), and also deployed traps during the day on September 5 and September 6, 2018. Some of the day traps were deployed around 8:00 A.M. and retrieved in the afternoon approximately 8 hours later; others were left in place, rebaited, and allowed to run another night. In addition, field teams used hand nets to attempt to catch turtles from kayaks and during snorkeling.

The primary trapping method employed commercial opera house-style crab traps baited with canned sardines, diced clams, or cat food. Field teams placed traps near downed trees, snags, and other refugia where turtles tend to forage, and placed traps away from the shore so that terrestrial predators could not easily reach the bait. Field teams also employed hand capture, dip nets, and seine nets as secondary trapping methods. Inflatable kayaks were used to access trap sites around the reservoir.

When caught, turtles were collected in tubs and taken to land for processing in accordance with the methods described in Bury et al. (2012). Processing included recording morphometric data (e.g., size, weight, age, and gender), taking photographs, and making qualitative observations about turtle morphology and health. Biologists took photographs of each turtle to document size, coloration, growth rings, plastron patterns, and other identifying features. Notches were filed into the marginal shields according to the notching code described by Holland (1994), to provide identifying marks for future studies.

For the telemetry study, biologists affixed suitably sized turtles with a radio transmitter (Holohil Ltd. Model RI-2B, up to 12-month battery life) and temperature logger (Thermochron Model DS1922L). A two-part epoxy was used to affix the transmitter and temperature logger to a suitably sized costal scute toward the back of the turtle. The epoxy was nonexothermic and did not produce heat that could harm the turtle. Application of epoxy to scute sutures (where carapace growth occurs) was avoided. The epoxy was colored black with printer toner to improve camouflage. The epoxy was allowed to dry and harden before releasing the turtle back to the site where it was caught. Field teams confirmed the functionality of the radio transmitter prior to deployment. The transmitter, temperature logger, and epoxy were allowed to make up a maximum of 5 percent of total turtle body weight; smaller turtles were not considered suitable for tracking.

In accordance with the permit restrictions, the KRRC biologists turned over live bycatch of any nonnative, nonfish animals, which included only American bullfrogs (Lithobates catesbeianus), to ODFW for euthanization. Live bycatch of fishes included three nonnative species identified by ODFW staff as goldfish, largemouth bass, and pumpkinseed. On three occasions, small fish were found dead in traps; these all appeared to be the same species and were later identified as goldfish.

To provide environmental baseline temperature data, teams attached temperature data loggers to 250-foot cables which were deployed along a transect in the south and west trapping areas during the August event (Figures 9-1 and 9-2). Along each transect, three temperature loggers were deployed in the upland area in suitable terrestrial overwintering habitat, one data logger was placed on shore, and three were deployed in the reservoir along the weighted cable to provide information about the temperature gradient across potential in-water overwintering habitats.

6.2 Findings

Biologists observed western pond turtles in all three Project reservoirs during the 2018 wildlife surveys in May and June (Figures 8-1 through 8-3). Observations of turtle habitat generally agreed well with historical PacifiCorp turtle habitat mapping.

Western pond turtles were observed in the following numbers at each reservoir:

- Iron Gate Reservoir: 8
- Copco Lake: 42
- J.C. Boyle Reservoir: 46

The KRRC did not conduct formal basking surveys, so these numbers do not represent a population estimate.

During the August 2018 trapping event at J.C. Boyle, field teams deployed 112 traps over the six nights of trapping. Biologists captured a total of five individuals (three at the west site and two at the south site), for a capture rate of 4.5 percent. All turtles were caught within the first three nights of trapping. Traps with each of the three baits (sardines, clams, and cat food) resulted in captures. Attempts to capture turtles via hand capture and seine nets were unsuccessful, mainly due to the abundance of aquatic vegetation on and below the water surface. No turtles were recaptured during this event. Preliminary radio telemetry indicated that the two turtles caught and tagged at the north site had moved south of the bridge (approximately 0.5 river mile from where they were released) over the course of 2 days.

Only four of the five turtles captured during the August event were tagged with radio transmitters and temperature data loggers. One female turtle exhibited signs of an unknown shell disorder; her vertebral scutes were detaching from the carapace. The costal scutes appeared intact, but there was concern that the shell integrity would continue to deteriorate, so the team did not affix a transmitter or temperature logger to this animal.

During the September trapping event, the team deployed an equivalent of 89 traps (i.e., 89 trap deployments lasting 12 hours) over 3 days and nights of trapping. Biologists caught five turtles in traps, four of which were tagged with radio transmitters and temperature loggers. One juvenile turtle caught with a hand net was too small for a radio transmitter.

In summary, biologists outfitted a total of eight western pond turtles with transmitters and temperature loggers during the two 2018 trapping events. Trap locations and successful capture sites are shown on Figures 9-1 and 9-2. Trapping effort details and photographs are provided in Appendix C.

The trapping study did not include a formal visual survey; however, biologists observed western pond turtles throughout the J.C. Boyle Reservoir in numbers comparable to those observed in previous visual surveys. Areas of concentrated turtle use were identified by field teams near the dam and along the western shore north of the Highway 66 bridge. In addition to these areas, biologists observed 5 to 10 turtles in the large southeastern cove, and groups of 3 to 6 turtles in smaller coves around the reservoir. Biologists most commonly observed turtles basking on logs or stumps, or basking aquatically at the water surface.

6.3 Conclusions

Biologists observed western pond turtles in all three Project reservoirs during 2018 wildlife surveys in May and June. Field teams observed the highest number of turtles in the J.C. Boyle Reservoir.

The number of turtles caught during the two trapping events at the J.C. Boyle Reservoir (11 caught in total, eight tagged with tracking equipment) was below the targets set for the telemetry study (14 turtles) and population study (30+ turtles). Possible explanations for the low capture rate include:

- Other prey sources (aquatic snails, tadpoles, small fish, and various invertebrates) were already abundant throughout the reservoir, so turtles were not attracted to the bait. The unusually fast growth rate and large average size of western pond turtles noted in J.C. Boyle Reservoir indicated a consistently high availability of food sources.

- Successful trapping with baited traps has been widely reported during fall months, but baited traps are generally more successful in the spring. Western pond turtles typically feed less as the summer goes on because they cannot digest food while overwintering. If the J.C. Boyle Reservoir population typically initiates overwintering in late summer, then they would likely have reduced their feeding rates and been less prone to capture in baited traps.

As part of the tracking study, the KRRC biologists are conducting winter field visits to the J.C. Boyle Reservoir to locate radio-tagged turtles. The locations of turtles will be determined to the extent feasible from shore; however, if turtles are found to be overwintering in deeper waters far from shore and more precise locations are desired, a boat may be used. The locations of overwintering radio-tagged turtles will help determine whether western pond turtles at J.C. Boyle Reservoir tend to overwinter on land or in reservoir sediments. If turtles are found overwintering in shallow sediments, the specific locations of those turtles in the reservoir will aid in determining whether they could be affected by erosion and other potential effects during drawdown.

In spring 2019, the KRRC biologists will conduct additional trapping for approximately six nights, to attempt to capture enough turtles to enable a population estimate and to recover data loggers. As with the initial trapping effort, traps will be set by inflatable kayak or by shore to the extent possible. Radio-transmitters will be used to locate the radio-tagged turtles and set traps nearby. If trapping efforts are insufficient to capture enough additional untagged turtles for a population estimate, additional efforts such as snorkeling may be used.

Biologists will also retrieve environmental data loggers measuring ambient air and water temperatures in spring 2019. Thermographs from environmental data loggers will be compared to those carried by turtles, to aid in determining whether turtles are overwintering on land or in water (and potentially at what depth in the water/sediment), and if they remain stationary or are active for part of the winter.

Chapter 7 Special-Status Plants

7. SPECIAL-STATUS PLANTS

Several special-status plant species have been identified as occurring in the Project area. PacifiCorp (2004) documented several special-status plant species during extensive surveys in 2002 and 2003. In addition, the KRRC biologists identified occurrences of special-status plant species through state and federal databases (ORBIC 2017; CNDDB 2018; IPaC 2018); the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California (CNPS 2018a); and information obtained from USFWS (Yreka), BLM (Klamath Falls), and USFS (Klamath National Forest).

For the purposes of the surveys, special-status plants were defined to include those species with federal status (federally listed as threatened, endangered, or proposed for listing), state threatened or endangered species, species included in ONHP Lists 1 and 2, and species listed as California Rare Plant Rank 1 and 2. Where BLM and USFS lands occur in the study area, BLM and USFS Sensitive Species are also considered.

The objective of the surveys was to identify any special-status plants that are present 1) in the study area (i.e., within a 0.25-mile buffer around the Project area) and/or 2) in areas such as reservoir shorelines that may be affected by the Project.

7.1 Methods

Based on documented occurrences and the presence of suitable habitat, the KRRC biologists developed a focused list of special-status plant species, as shown in Table 7-1.

Table 7-1: Special-Status Plants with Potential to Occur in or near the Project Area

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Survey Effort
Greene's mariposa-lily *Calochortus greenei*	FSC, BLM, OC, ONHP List 1, CNPS List 1B	Occurs primarily in annual grassland, wedgeleaf ceanothus chaparral, and oak and oak-juniper woodlands	Several locations around Iron Gate Reservoir	May through July	Within the limits of work in suitable habitat
Bristly Sedge *Carex comosa*	ONHP List 2	Marshes, lake shore, and wet meadows	Eastern shore of J.C. Boyle Reservoir in two locations (east of dam and south of Highway 66); also, west of dam	May through September	Along reservoir margins and within the limits of work in suitable habitat
Mountain Lady's Slipper *Cypripedium montanum*	ONHP List 4, CNPS List 4	Dry, open conifer forests, more often in moist riparian habitats	J.C. Boyle peaking reach (location details unknown)	March through August	Within the limits of work in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Survey Effort
Gentner's fritillary Fritillaria gentneri	FE, CNPS List 1B	Cismontane woodland, chaparral; mixed hardwood-conifer vegetation dominated by Oregon oak	Habitat present in the reach along Copco Lake and Iron Gate Reservoir; no known locations	Late March to early April; April and May at higher elevations	Within the limits of work in suitable habitat
Bolander's sunflower Helianthus bolanderi	BLM, ONHP List 3	Occurs in yellow pine forest, foothill oak woodland, chaparral, and occasionally in serpentine substrates or wet habitats.	South of Iron Gate Reservoir near proposed disposal site; J.C. Boyle peaking reach (location details unknown)	June through October	Within the limits of work in suitable habitat
Bellinger's meadow-foam Limnanthes floccosa ssp. bellingerana	FSC, BLM, OC, ONHP List 1, CNPS List 1B	High elevation vernal pools in shallow soiled rocky meadows in spots that are at least partially shaded in the spring	J.C. Boyle peaking reach (location details unknown)	April through June	Within the limits of work in suitable habitat
Detling's silverpuffs Microseris laciniata ssp. detlingii	CNPS List 2	Chaparral and grassy openings among Oregon white oak trees	One location on the western side of Iron Gate Reservoir	May through June	Within the limits of work in suitable habitat
Egg Lake monkeyflower Mimulus pygmaeus	FSC, CNPS List 4	Occurs in damp areas or vernally moist conditions in meadows and open woods	East of J.C. Boyle Reservoir in two locations (north of Highway 66 and southeast of dam); west of dam in two locations in damp mudflats; also west of canal near access road in one location	May through August	Along reservoir margins and within the limits of work in suitable habitat
Holzinger's orthotrichum moss Orthotrichum holzingeri	CNPS List 1B.3	Found on vertical calcareous rock surfaces and at the bases of Salix bushes just above rock that is frequently inundated by seasonally high water in dry coniferous forests	Just upstream of Iron Gate Reservoir on Jenny Creek		Where in-stream work could occur at Jenny Creek at bridge
Western yampah Perideridia erythrorhiza	FSC, BLM, OC, ONHP List 1	Occurs in moist prairies, pastureland, seasonally wet meadows, and oak or pine woodlands, often in dark wetland soils and clay depressions	Along three drainages into the western side of J.C. Boyle Reservoir and in two locations west of canal near access road	Mid July through August	Along reservoir margins and within the limits of work in suitable habitat
Howell's yampah (Howell's false caraway) Perideridia howelii	ONHP List 4	Moist meadows, stream banks	One location along the drainage southeast of J.C. Boyle Reservoir; one location along the northern side of Copco Lake north of the road	July and August	Along reservoir margins and within the limits of work in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Survey Effort
Yreka phlox Phlox hirsuta	FE, CE, CNPS List 1B	Open areas on dry serpentine soils, found at elevations ranging from 2,500 to 4,400 feet.	Not known to occur near the limits of work; no suitable ultramafic soils occur within 0.5 mile of the limits of work (NRCS 2017)	March and April	None – suitable soils not present within the limits of work
Strapleaf willow Salix ligulifolia	ONHP List 3	Riverbanks, wetlands, floodplains	One location west of J.C. Boyle Dam in a boulder flood channel in the dam release zone	March through June	Along reservoir margins and within the limits of work in suitable habitat
Fleshy sage Salvia dorrii var. incana	CNPS List 3	Occurs in silty to rocky soils in great basin scrub, pinyon, and juniper woodland	Three locations around Iron Gate Reservoir	May through July	Within the limits of work in suitable habitat
Pendulous bulrush Scirpus pendulus	BLM, ONHP List 2, CNPS List 2	Occurs along streambanks and in wet meadows	One location along Fall Creek	June through August	Along reservoir margins and within the limits of work in suitable habitat
Lemmon's silene lemmonii	ONHP List 3	Open pine woodlands	J.C. Boyle peaking reach to J.C. Boyle Reservoir (location details unknown)	Spring and summer	Within the limits of work in suitable habitat
Western yellow cedar Callitropsis nootkatensis	Petitioned for federal listing, CNPS List 4.3	Wet to moist sites, from the coastal rainforests to rocky ridgetops near the timberline in the mountains	Not documented during PacifiCorp surveys or listed on CNDDB or ORBIC for the Project area; may occur based on information from USFWS Yreka office (May 23, 2017)		Within the limits of work in suitable habitat

Key:

BLM: Bureau of Land Management sensitive species—species that could easily become endangered or extinct
CE: California Endangered
CNDDB: California Natural Diversity Database
CNPS List 1A: California Native Plant Society (CNPS)—presumed extinct in California
CNPS List 1B: rare, threatened, or endangered in California and elsewhere
CNPS List 2: rare, threatened, or endangered in California, but more common elsewhere
CNPS List 3: on the review list—more information needed
CNPS List 4: on the watch list—limited distribution
FE: Federal Endangered
FSC: Federal Species of Concern
OC: Candidate listing by Oregon Department of Agriculture
ONHP List 1: Oregon Natural Heritage Program (ONHP) threatened with extinction or presumed to be extinct throughout their entire range
ONHP List 2: threatened with extirpation or presumed to be extirpated from the State of Oregon
ONHP List 3: more information is needed before status can be determined, but may be threatened or endangered in Oregon or throughout their range
ONHP List 4: of conservation concern but not currently threatened or endangered
ORBIC: Oregon Biodiversity Information Center
USFWS: United States Fish and Wildlife Service

In consideration of the various peak bloom times of the species listed in Table 7-1, the KRRC biologists planned three surveys: early season (April), mid-season (May), and late season (July). The mid-season and part of the late season surveys were conducted in 2018. The early season survey was not conducted, due to lack of access to PacifiCorp lands. A wildfire in the California portion of the study area in July restricted the late season survey to the J.C. Boyle Reservoir study area.

The KRRC biologists conducted focused surveys for special-status plants in the areas where construction would occur. These focused surveys followed the CDFW "Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities" (CDFW 2018b). In areas along reservoir shorelines, where changes in hydrology and geomorphology could occur due to the Project, biologists focused surveys on the locations of known and potential occurrences of special-status plants documented during surveys conducted by PacifiCorp (2004) and data obtained from a desktop review of existing databases (CNDDB, ORBIC, and CNPS).

In accordance with the CDFW protocol, detailed floristic surveys conducted in areas where construction would occur entailed identification of every plant taxon observed, to the taxonomic level necessary to determine rarity and listing status. These planned construction areas include proposed disposal sites, staging areas, utility line corridors, facility removal areas, and locations where clearing could occur for road modifications such as road widening, turnouts, equipment and material storage, and bridge replacement or modification. In these areas, biologists walked parallel transects generally spaced 5 to 10 meters apart and recorded plant species observed. Biologists also surveyed reservoir shorelines from a boat, focusing on areas of suitable habitat and locations of known and potential occurrences of special-status plants. Biologists recorded Global Positioning System (GPS) coordinates for all special-status plants found, along with descriptions of habitat conditions and proximity to proposed work activities or other notable features.

7.2 Findings

As shown on Figures 10-1 through 10-3, the KRRC biologists identified seven special-status plant species (including one potential observation) in the study area, as follows:

- Calochortus greenei (Greene's mariposa-lily) was observed in several locations in the vicinity of the Iron Gate Reservoir, including in the footprint of the Iron Gate disposal site. The species was also observed along utility corridors between the Copco No. 1 and Copco No. 2 Dams. A Calochortus species was observed along the southeastern side of Copco Lake in two locations, which will be revisited to confirm species identification in future surveys during the appropriate bloom time. In addition, there is one known historical observation of the species northeast of the staging areas for the Copco No. 1 Dam; however, this area could not be accessed during the 2018 surveys and will be visited in 2019.

- Salvia dorrii var. incana (fleshy sage) was observed in two locations near Iron Gate Reservoir; both locations are in proximity to but outside of the potential disturbance area associated with proposed removal of utility poles.

- A previously documented population of Perideridia erythrorhiza (western yampah) north of the J.C. Boyle Dam was verified. The plants are in a dry meadow and will likely be outside the area of impact from the drawdown of the reservoir.

- Carex comosa (bristly sedge) was observed along the J.C. Boyle Reservoir at the location of a previously documented occurrence. The plants were not in bloom during the survey, so that area will be revisited during future surveys to confirm species identification.

In addition to the species with known potential to occur discussed above, the KRRC botanists observed three other rare plant species in the study area:

- Mirabilis greenei (Greene's four o'clock), CNPS 4.2, was observed in four locations along the northern side of the Klamath River, downstream of the Copco No. 2 Dam.
- Iris longipetala (coast iris), CNPS 4.2, was observed in one location along the northwestern shoreline of the J.C. Boyle Reservoir.
- Lilium washingtonianum ssp. purpurascens (purple-flowered Washington lily), CNPS 4.3, was observed in two locations: near the Fall Creek diversion and along the northern side of Copco Lake.

7.3 Conclusions

The KRRC biologists documented special-status plants in the study area, including some locations near or in the Project area, as shown on Figures 10-1 through 10-3. Additional special-status plant surveys will be conducted in 2019 to complete surveys within the early (April) and the late (July) bloom times. In addition, biologists will visit the locations of unconfirmed sightings during the appropriate bloom times to confirm occurrences of specific species (e.g., Carex comosa). Additional areas insufficiently surveyed during 2018 will be covered, including the proposed Fall Creek hatchery area and bypass river reaches.

Chapter 8 Vegetation Communities

8. VEGETATION COMMUNITIES

The KRRC biologists classified and mapped vegetation communities to identify the location of sensitive natural communities that may be affected by the Project.

8.1 Methods

PacifiCorp mapped existing vegetation cover types/wildlife habitat in a primary study area of 0.25 mile surrounding the reservoirs, facilities, and river reaches (PacifiCorp 2004). The intent of the 2018 vegetation community mapping conducted by the KRRC was to verify the general extent of vegetation communities and classify them to the alliance level in accordance with the Manual of California Vegetation (CNPS 2018b). An alliance is a floristically defined vegetation type identified by its dominant and/or characteristic species.

In June 2018, the KRRC biologists conducted vegetation community mapping in the 0.25-mile study area. During mapping efforts, the KRRC biologists walked the length of proposed construction areas and visually classified the vegetation communities into similar (or dissimilar) groups. The team mapped polygons to delineate each area where vegetation communities and percent cover were internally consistent. In each polygon, the dominant and characteristic plant species were recorded, and the percent cover for the ground, understory, and canopy layers was noted. A list of all identified species was compiled for each polygon. Upon encountering an area with different dominant species and/or percent coverage, a new polygon, denoting a new alliance, was established. Vegetation community and coverage data were then used to classify each area by alliance in accordance with CNPS methods.

8.2 Findings

Biologists recorded 17 alliances in the 0.25-mile study area (Table 8-1). Vegetation communities (as alliances) are depicted on Figures 11-1 through 11-16.

Table 8-1: Vegetation Community Alliances Recorded in the Study Area

Alliance Scientific Name	Alliance Common Name	Lifeform	California Rarity	Global Rarity
Pinus ponderosa	Ponderosa pine forest	Tree	S4	G5
Fraxinus latifolia	Oregon ash groves	Tree	S3.2	G4
Acer macrophyllum	Bigleaf maple forest	Tree	S3	G4
Quercus garryana	Oregon white oak woodland	Tree	S3	G4
Juniperus occidentalis	Western juniper woodland	Tree	S4	G5
Ceanothus cuneatus	Wedgeleaf ceanothus chaparral	Shrub	S4	G4
Cercocarpus montanus	Birchleaf mountain mahogany chaparral	Shrub	S4	G5
Purshia tridentata	Bitterbrush scrub	Shrub	S3	G4
Prunus subcordata	Klamath plum shrubland	Shrub	NA	NA
Prunus virginiana	Chokecherry thicket	Shrub	S2	G4
Salix lucida	Shining willow grove	Tree	S3.2	G4
Salix geyeriana	Geyer willow thicket	Shrub	S2	G4
Salix sp.	Willow thicket	Tree/Shrub	NA	NA
Schoenoplectus acutus	Hardstem bulrush marsh	Herb	S4	G5
Carex sp.	Sedge meadow	Herb	NA	NA
Bromus tectorum – Taeniatherum caput-medusae	Cheatgrass – medusahead grassland	Herb	SNR	GNR
Bromus (diandrus, hordeaceus)	Annual brome grassland	Herb	SNR	GNR

Key

California Rarity/Global Rarity
S1/G1: Statewide/Worldwide <6 viable occurrences and/or <518 hectares
S2/G2: 6 to 20 occurrences and/or 518 to 2,590 hectares
S3/G3: 21 to 100 occurrences and/or 2,590 to 12,950 hectares
S4/G4: >100 occurrences and/or > 12,950 hectares
S5/G5: Demonstrably secure because of its worldwide abundance
SNR – State not reported
GNR –Global not reported
NA – Alliance not identified by CNPS

8.3 Conclusions

CDFW has ranked natural communities according to their rarity in the state of California. Natural Communities with ranks of S1-S3 are considered Sensitive Natural Communities (CDFW 2018c). Biologists identified the following sensitive natural communities in the study area:

- Oregon ash groves
- Bigleaf maple forest
- Oregon white oak woodland

- Bitterbrush scrub
- Chokecherry thicket
- Shining willow grove
- Geyer willow thicket

The KRRC did not conduct wetland surveys or focused delineations during the 2018 field season. Biologists mapped emergent wetlands along the fringes of the reservoirs and riparian habitat primarily associated with streams and drainages that flow into the reservoirs. Additional sensitive vegetation communities may be identified during wetland investigations to be carried out in 2019.

In 2019, the KRRC will delineate wetlands in the Project area in accordance with the 1987 United States Army Corps of Engineers Wetland Delineation Manual and applicable Regional Supplements (i.e., Western Mountains, Valleys, and Coast Region and Arid West). Additionally, the KRRC will use the Oregon Rapid Wetland Assessment Protocol to assess functional values of wetlands, as applicable to areas in Oregon. In addition, the KRRC will conduct additional mapping of wetlands and riparian habitats adjacent to reservoirs and/or associated with streams but outside the direct limits of work.

Chapter 9 Invasive Exotic Vegetation

9. INVASIVE EXOTIC VEGETATION

After a close review of invasive exotic vegetation (IEV) survey findings for the Project area documented by PacifiCorp in 2002-2003 (PacifiCorp 2004), the KRRC determined that surveys reflecting current IEV conditions were required. Information on IEV locations and extent are needed to effectively plan for control of IEV in the Project area, to support restoration success.

9.1 Methods

In 2017 and 2018, KRRC biologists conducted surveys of invasive exotic plant species targeted by federal, state, and county agencies. The timing of these surveys corresponded to when IEV were positively identifiable (by leaf or flower) (Table 9-1). The study area included uplands around the reservoir edges and other areas within the limits of work.

Biologists conducted a partial survey in late fall of 2017, between November 10 and December 8. At that time, 15 to 20 percent of the shoreline at each reservoir was surveyed on foot. A principal survey was conducted between May 19 and June 22, 2018, in a study area that included all areas where construction activities are planned and along reservoir shorelines. Early spring surveys were planned but not executed because access was not granted by PacifiCorp.

The November 2017 surveys were conducted by two biologists, but the 2018 surveys were conducted by three to four biologists at a time. Biologists surveyed approximately 566 acres in total, which included the Project acreage above the water surface (uplands). When feasible, biologists divided into teams of two. A two-person team allowed for a fast, systematic survey of Project shorelines with one biologist walking near the shoreline below riparian vegetation and the second biologist walking in parallel along the upper portion of the bank, closer to the boundary of the Project area. Biologists kept in constant communication to ensure that each invasive species of concern was recorded accurately, and that no data were repeated or skipped.

The KRRC developed a prioritized list of invasive species (Table 9-1) based on historical data and on lists of IEV species with a potential to occur in the Project area derived from data available from the California Department of Food and Agriculture, Oregon Department of Agriculture, California Invasive Plant Council, Klamath and Siskiyou County Departments of Agriculture, and the Klamath National Forest. Biologists logged the presence of high- and medium-priority invasive species (as designated in Table 9-1, last column) with either a point representing an 8-foot-diameter circle for smaller populations, or a polygon representing a larger IEV population. If multiple species were present in the same area, they were all included in the GPS data of either the point or polygon. Because areas of invasive vegetation can serve as seed banks for the Project site, areas of dense invasive coverage outside the limit of work were also recorded. These areas will be used to inform the invasive species removal plan but were not used to calculate the area of IEV coverage.

Table 9-1: Prioritized List of IEV Species

Scientific Name	Common Name	CDFA[1]	ODA[2]	Cal-IPC[3]	Klamath County[4]	Siskiyou County[5]	Klamath NF[6]	# of Agencies[7]	Priority[8]
Chondrilla juncea	skeleton weed	AW	B & T	Moderate	A	CA-A	High	5	High
Centaurea diffusa	diffuse knapweed	AW	B	Moderate	A	CA-A	High	4	High
Centaurea virgata ssp. squar.	squarrose knapweed	NR	A & T	Moderate	A	CA-A	High	4	High
Euphorbia esula	leafy spurge	AW	B & T	NR	B	CA-A	High	4	High
Onopordum acanthium	Scotch thistle	AW	B	High	B	CA-A	High	4	High
Acroptilon repens	Russian knapweed	BW	NR	Moderate	A	CA-A	High	3	High
Carduus acanthoides	plumeless thistle	AW	NR	limited	A	NR	High	3	High
Centaurea stoebe ssp. micr.	spotted knapweed	NR	B	High	B	CA-A	High	3	High
Cytisus scoparius	Scotch broom	BW	B	High	A	CA-C	High	3	High
Lepidium latifolium	perennial pepperweed	BW	B & T	High	B	NR	High	3	High
Lythrum salicaria	purple loosetrife	BW	B	High	A	NR	High	3	High
Carduus nutans	musk thistle	AW	B	Moderate	B	CA-A	High	2	High
Fallopia japonica	Japanese knotweed	BW	NR	Moderate	A	NR	High	2	High
Linaria dalmatica	Dalmatian toadflax	NR	B	Moderate	B	CA-A	High	2	High
Onopordum tauricum	Taurian thistle	AW	A	NR	NR	NR	High	2	High
Sonchus arvensis	field sowthistle	AW	NR	NR	NR	NR	High	2	High
Tamarix parviflora	small flower tamarisk	NR	NR	High	NR	NR	High	2	High
Anchusa officinalis	alkanet	NR	B & T	NR	NR	NR	NR	1	Medium
Bromus madritensis ssp. rubens	foxtail brome	NR	NR	High	NR	NR	NR	1	Medium
Bromus tectorum	cheatgrass	NR	NR	High	NR	NR	NR	1	Medium
Centaurea solstitialis	yellow starthistle	CW	B	High	B	CA-C	Moderate	1	Medium
Cirsium ochrocentrum	Beaumont thistle	AW	NR	NR	NR	NR	NR	1	Medium
Convolvulus arvensis	field bindweed	CW	B & T	NR	NR	NR	NR	1	Medium
Crupina vulgaris	bearded creeper	AW,Q	B	Limited	NR	NR	NR	1	Medium
Dipsacus fullonum	teasel	NR	B	Moderate	A	NR	NR	1	Medium
Elymus caput-medusae	medusahead	CW	B	High	C	NR	NR	1	Medium
Foeniculum vulgare	fennel	NR	NR	Moderate	NR	NR	High	1	Medium

Scientific Name	Common Name	CDFA[1]	ODA[2]	Cal-IPC[3]	Klamath County[4]	Siskiyou County[5]	Klamath NF[6]	# of Agencies[7]	Priority[8]
Halogeton glomeratus	saltlover	AW	B	Moderate	NR	NR	NR	1	Medium
Isatis tinctoria	dyer's woad	BW	B	Moderate	A	CA-B	Moderate	1	Medium
Linaria vulgaris	butter and eggs	NR	B	Moderate	A	NR	NR	1	Medium
Phalaris arundinacea	reed canary grass	NR	B & T	Not Listed	NR	NR	NR	1	Medium
Rubus armeniacus	Himalayan blackberry	NR	B	High	NR	NR	NR	1	Medium
Salvia aethiops	Mediterranean sage	BW	B	Limited	B	NR	High	1	Medium
Tribulus terrestris	puncture vine	CW	B	Limited	B	NR	High	1	Medium
Xanthium spinosum	spiny clotbur	NR	B	None	A	NR	NR	1	Medium
Aegilops cylindrica	goatgrass	BW	B	Watch	NR	NR	NR	0	Low
Avena barbata	slender oat	NR	NR	Moderate	NR	NR	NR	0	Low
Brassica nigra	black mustard	NR	NR	Moderate	NR	NR	NR	0	Low
Bromus diandrus	ripgut grass	NR	NR	Moderate	NR	NR	NR	0	Low
Cirsium arvense	Canada thistle	BW	B	Moderate	B	CA-B	Moderate	0	Low
Cirsium vulgare	bull thistle	NR	B	Moderate	C	CA-C	Low	0	Low
Conium maculatum	poison hemlock	NR	B	Moderate	B	NR	Low	0	Low
Festuca arundinacea	tall fescue	NR	NR	Moderate	NR	NR	NR	0	Low
Hirschfeldia incana	summer mustard	NR	NR	Moderate	NR	NR	NR	0	Low
Hordeum murinum	foxtail barley	NR	NR	Moderate	NR	NR	NR	0	Low
Hypericum perforatum	Klamath weed	CW	B	Limited	B	NR	Low	0	Low
Lepidium draba	hoary cress	BW	NR	Moderate	B	NR	Moderate	0	Low
Leucanthemum vulgare	oxeye daisy	NR	NR	Moderate	NR	NR	NR	0	Low
Marrubium vulgare	white horehound	NR	B	Limited	NR	NR	NR	0	Low
Mentha pulegium	pennyroyal	NR	NR	Moderate	NR	NR	NR	0	Low
Persicaria wallichii	Himalayan knotweed	BW	NR	Watch	NR	NR	NR	0	Low
Rumex acetosella	common sheep sorrel	NR	NR	Moderate	NR	NR	NR	0	Low
Torilis arvensis	field hedge parsley	NR	NR	Moderate	NR	NR	NR	0	Low

Notes: (Lighter cells indicate a high priority to the corresponding agency)

1. CDFA: California Noxious Weed List (CDFA 2018); Ratings descriptions as follows:

"A"	A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. If found entering or established in the state, A-rated pests are subject to state (or commissioner when acting as a state agent) enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.
"B"	A pest of known economic or environmental detriment and, if present in California, it is of limited distribution. At the discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action.
"C"	A pest of known economic or environmental detriment and, if present in California, it is usually widespread. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness.
"Q"	An organism or disorder suspected to be of economic or environmental detriment, but whose status is uncertain because of incomplete identification or inadequate information.
"W"	This notation indicates that a plant is included in the CCR Section 4500 list of California State Noxious Weeds.

2. ODA Noxious Weed Policy and Classification System (ODA 2018). (Equivalent to the Pacific Northwest Invasive Plant Council (PNW-IPC). Ratings descriptions as follows:

A	A weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. Recommended action: Infestations are subject to eradication or intensive control when and where found.
B	A weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Recommended action: Limited to intensive control at the state, county or regional level as determined on a site specific, case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the primary control method.
T	A designated group of weed species that are selected and will be the focus for prevention and control by the Noxious Weed Control Program. Action against these weeds will receive priority.

3. Cal-IPC. The Cal-IPC Plant Inventory (Cal-IPC 2018). Ratings descriptions as follows:

High	These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment.
Moderate	These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance.
Limited	These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Alert	An Alert is listed on species with High or Moderate impacts that have limited distribution in California, but may have the potential to spread much further.
Watch	These species have been assessed as posing a high risk of becoming invasive in the future in California.

4. KCBC. Noxious Weeds in Klamath County for the year 2019 (KCBC 2019). Ratings descriptions as follows:

A	A weed of known economic importance which occurs in the county in small enough infestations to make eradication/containment possible, or if not known to occur, but its presence in neighboring counties make future occurrence in Klamath County seem imminent.
B	A weed of economic importance which in some parts of the county is abundant but may have limited distribution in other parts of the county. Where implementation of a fully integrated county wide management plan is infeasible, biological control shall be the main control approach.
C	A weed which in most parts of the county is abundant. While not subject to enforcement regulations, these species can cause similar economic and ecological impacts as other noxious weed species. Education and control recommendations will be the main approach.

5. SDA. Identification and Characteristics of Invasive Noxious Weed Infestations. (SDA 2015). Ratings:

A	"A" Rated: A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state. A-rated pests are subject to state (or commissioner) enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.
B	"B" Rated: A pest of known economic or environmental detriment and it is of limited distribution. Subject to state endorsed holding action and eradication to provide for containment. At the discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action.
C	"C" Rated: A pest of known economic or environmental detriment and is usually widespread. They are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness.

6. USFS-KNF: KNF Noxious Weed and Non-native Invasive Plant List (USFS 2013). Ratings descriptions as follows:

High	These species are currently either limited in distribution, highly invasive, or not present on the KNF. Treatment may vary by location.
Moderate	These species are generally common and are treated on a case by case basis depending on location (Wilderness and Research Natural Area (RNA) increase the priority for treatment).
Low	These species are either widespread throughout the KNF or are not considered to be highly invasive in our area. Usually not treated unless located in a high priority area, such as Wilderness or RNA.

7. Number of Agencies Considering Plant a High Priority for Eradication

8. IEV Survey and Control Priority

Cal-IPC = California Invasive Plant Council
CDFA = California Department of Food and Agriculture
IEV = Invasive Exotic Vegetation
KCBC = Klamath County Board of Commissioners
KNF = Klamath National Forest
ODA = Oregon Department of Agriculture
SDA = Siskiyou Department of Agriculture
USFS = United States Forest Service

The majority of the study area was accessible by foot, except for the southern end of J.C. Boyle Reservoir and the southeastern side of Iron Gate Reservoir. South of Highway 66, J.C. Boyle Reservoir narrows between two rock face cliffs for approximately 0.75 mile. The majority of the southeastern side of Iron Gate is inaccessible because there are no roads, and steep cliffs border the reservoir. For these areas, biologists surveyed from a boat, landing along the shoreline to walk selected accessible areas. For areas too steep to survey by foot, biologists carefully maneuvered the boat to the shoreline and used a pair of binoculars to identify plants.

Ninety percent of the area surrounding Copco Lake is privately owned; consequently, access from the landside was not permitted in most areas. However, during the summer survey in 2018, the water levels in the reservoir were 10 to 15 feet lower than the high water mark, and the biologists were able to use this extended shoreline area to walk along the reservoir without trespassing on any private land.

9.2 Findings

Tables 9-2, 9-3, and 9-4 list the IEV species found in the areas surrounding the J.C. Boyle Reservoir, Copco Lake, and Iron Gate Reservoir, respectively. The area values were calculated as the area where each species was dominant in the survey area. Percent cover represents the area of the dominant species in the study area, divided by the total area of the study area (excluding the reservoir footprints themselves). Figures 12-1 through 12-26 depict the IEV vegetation communities, based on the dominant species, as shown in the tables. Although the figures show invasive species recorded beyond the Project boundary, only areas of invasive species within the limits of work were used to calculate the extent of each species.

Table 9-2: Invasive Exotic Vegetation Extent in the J.C. Boyle Reservoir Uplands

Scientific Name	Common Name	Area (square feet)	Area (acres)	Percent Cover
Bromus tectorum	cheatgrass	288,780	6.629	4.29%
Dipsacus fullonum	teasel	209,250	4.804	3.11%
Phalaris arundinacea	reed canarygrass	206,210	4.734	3.07%
Elymus caput-medusae	medusa head	190,960	4.384	2.84%
Centaurea solstitialis	yellowstar thistle	61,690	1.416	0.92%
Cirsium vulgare	bull thistle	49,260	1.131	0.73%
Lepidium draba	whitetop	46,510	1.068	0.69%
Mentha pulegium	pennyroyal	17,040	0.391	0.25%
Onopordum acanthium	Scotch thistle	13,620	0.313	0.20%
Rumex acetosella	sheep sorrel	6,370	0.146	0.09%
Convolvulus arvensis	field bindweed	1,670	0.038	0.02%
Linaria dalmatica	Dalmatian toadflax	1,530	0.035	0.02%
Rubus armeniacus	Himalayan blackberry	1,330	0.030	0.02%
Acroptilon repens	Russian knapweed	990	0.023	0.01%
	Total	**1,095,210**	**25.142**	**16.26%**

Table 9-3: Invasive Exotic Vegetation Extent in Copco Lake Uplands

Scientific Name	Common Name	Area (square feet)	Area (acres)	Percent Cover
Centaurea solstitialis	yellowstar thistle	262,320	6.022	4.42%
Elymus caput-medusae	medusa head	237,180	5.445	4.00%
Rubus armeniacus	Himalayan blackberry	234,590	5.385	3.96%
Phalaris arundinacea	reed canarygrass	199,440	4.578	3.36%
Dipsacus fullonum	teasel	91,680	2.105	1.55%
Bromus tectorum	cheatgrass	56,790	1.304	0.96%
Lepidium draba	whitetop	8,010	0.184	0.14%
Mentha pulegium	pennyroyal	6,680	0.153	0.11%
Cirsium vulgare	bull thistle	2,210	0.051	0.04%
Conium maculatum	poison hemlock	1,260	0.029	0.02%
Tribulus terrestris	puncture vine	730	0.017	0.01%
Bromus madritensis ssp. rubens	foxtail chess	240	0.006	0.00%
Carduus nutans	musk thistle	100	0.002	0.00%
	Total	**1,101,230**	**25.281**	**18.57%**

Table 9-4: Invasive Exotic Vegetation Extent in the Iron Gate Reservoir Uplands

Scientific Name	Common Name	Area (square feet)	Area (acres)	Percent Cover
Centaurea solstitialis	yellowstar thistle	4,331,510	99.438	36.13%
Elymus caput-medusae	Medusa head	3,631,210	83.361	30.29%
Dipsacus fullonum	teasel	321,720	7.386	2.68%
Bromus tectorum	cheatgrass	318,740	7.317	2.66%
Rubus armeniacus	Himalayan blackberry	179,260	4.115	1.50%
Convolvulus arvensis	field bindweed	64,500	1.481	0.54%
Phalaris arundinacea	reed canarygrass	43,300	0.994	0.36%
Conium maculatum	poison hemlock	29,730	0.682	0.25%
Xanthium spinosum	spiny cocklebur	16,040	0.368	0.13%
Tribulus terrestris	puncture vine	9,200	0.211	0.08%
Isatis tinctoria	dyers woad	3,230	0.074	0.03%
Lepidium draba	whitetop	2,860	0.066	0.02%
Mentha pulegium	pennyroyal	150	0.003	0.00%
Linaria vulgaris	butter and eggs	50	0.001	0.00%
Cirsium vulgare	bull thistle	50	0.001	0.00%
	Total	**8,951,550**	**205.498**	**74.67%**

9.3 Conclusions

Yellowstar thistle (106.88 acres and 18.89 percent cover of Project uplands) and medusa head (93.19 acres and 16.47 percent cover of Project uplands) were dominant throughout the entire Project area. Cheatgrass, teasel, reed canary grass, and Himalayan blackberry each cover between 9 and 16 acres (i.e., 1 to 3 percent) of the total Project upland area. IEV species present in the upland areas of the Project having less than 2 acres of coverage each include field bindweed, whitetop, bull thistle, poison hemlock, pennyroyal, spiny cocklebur, Scotch thistle, puncture vine, sheep sorrel, dyer's woad, Dalmatian toadflax, Russian knapweed, foxtail chess, musk thistle, and butter and eggs.

At J.C. Boyle Reservoir, the dominant IEV species differ from those identified throughout the rest of the study area. The reason for this may be J.C. Boyle Reservoir's higher elevation, closed canopy forest coverage, and gradual slopes. Cheatgrass, teasel, reed canarygrass, and medusa head make up the dominant species at the J.C. Boyle Reservoir area.

The dominant IEV species at the Copco Lake area are yellowstar thistle, medusa head, and Himalayan blackberry. In comparison to the landscape surrounding the J.C. Boyle Reservoir, uplands surrounding Copco Lake are drier due to their lower elevation, lack of overstory cover, and higher evapotranspiration rate.

The dominant IEV species at the Iron Gate Reservoir are yellowstar thistle, medusa head, and teasel. The upland areas at this reservoir are the driest of all due to their low elevation, openness, and high evapotranspiration rate.

The findings and conclusions of the IEV surveys are being used to inform the Reservoir Area Management Plan, including selecting methods for IEV eradication and control during Project implementation.

Chapter 10 References

10. REFERENCES

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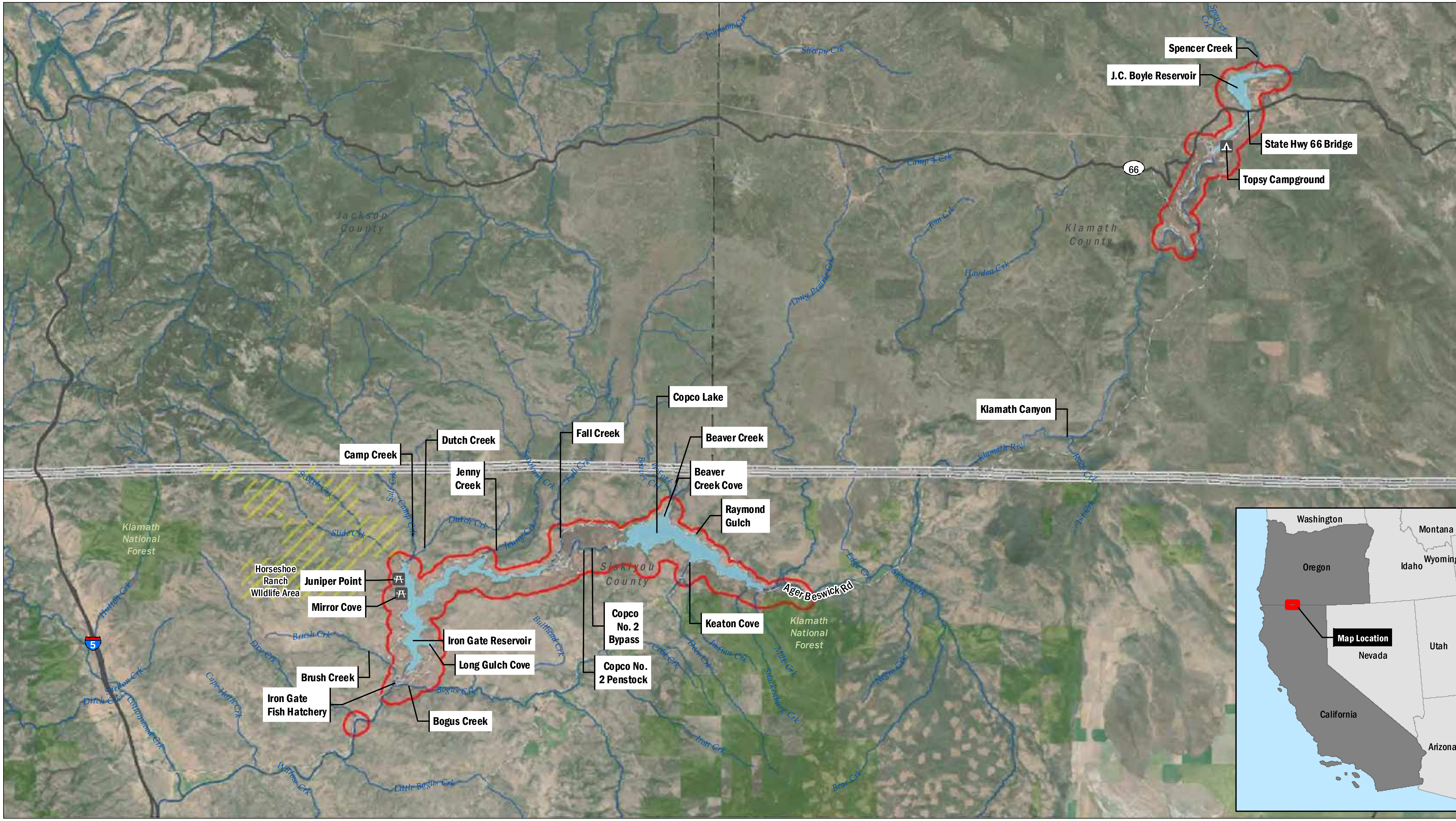
Appendix A Figures

CDM Smith 3/15/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_1_1_Overall_Project_Map_and_Study_Area.mxd



Data Source: 2018 TIGER/Line Shapefiles
Basemap Source: Esri, USGS, NOAA

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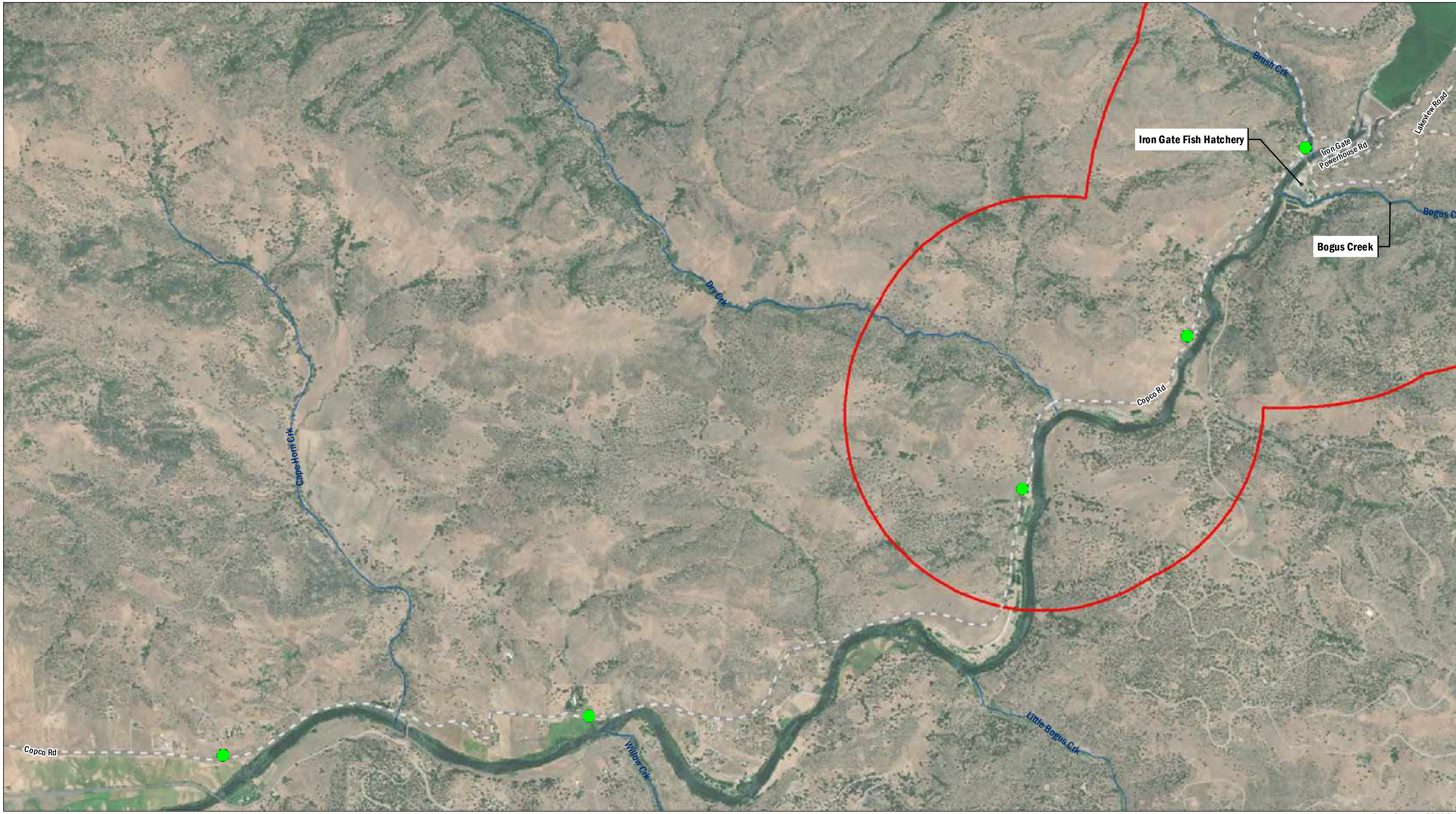
Klamath River Renewal Project

- Primary Road
- Access Route
- Stream
- Water Body
- State
- County
- National Forest
- Wildlife Area
- 0.25 Mile Study Area Buffer

FIGURE 1-1
Overall Project Map and Terrestrial Resources Study Area



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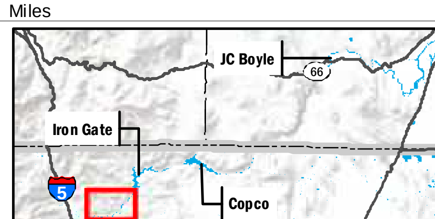
0 0.5 1
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

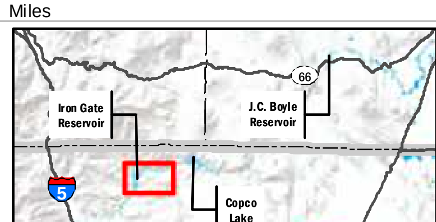


Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

- State
- County
- Stream
- Access Route
- 0.75 Mile Study Area Buffer

FIGURE 2-1
Osprey (Pandion haliaetus)
Observations and Nest Locations
Klamath River (Below Iron Gate Dam)

Klamath River Renewal Corporation
Klamath River Renewal Project

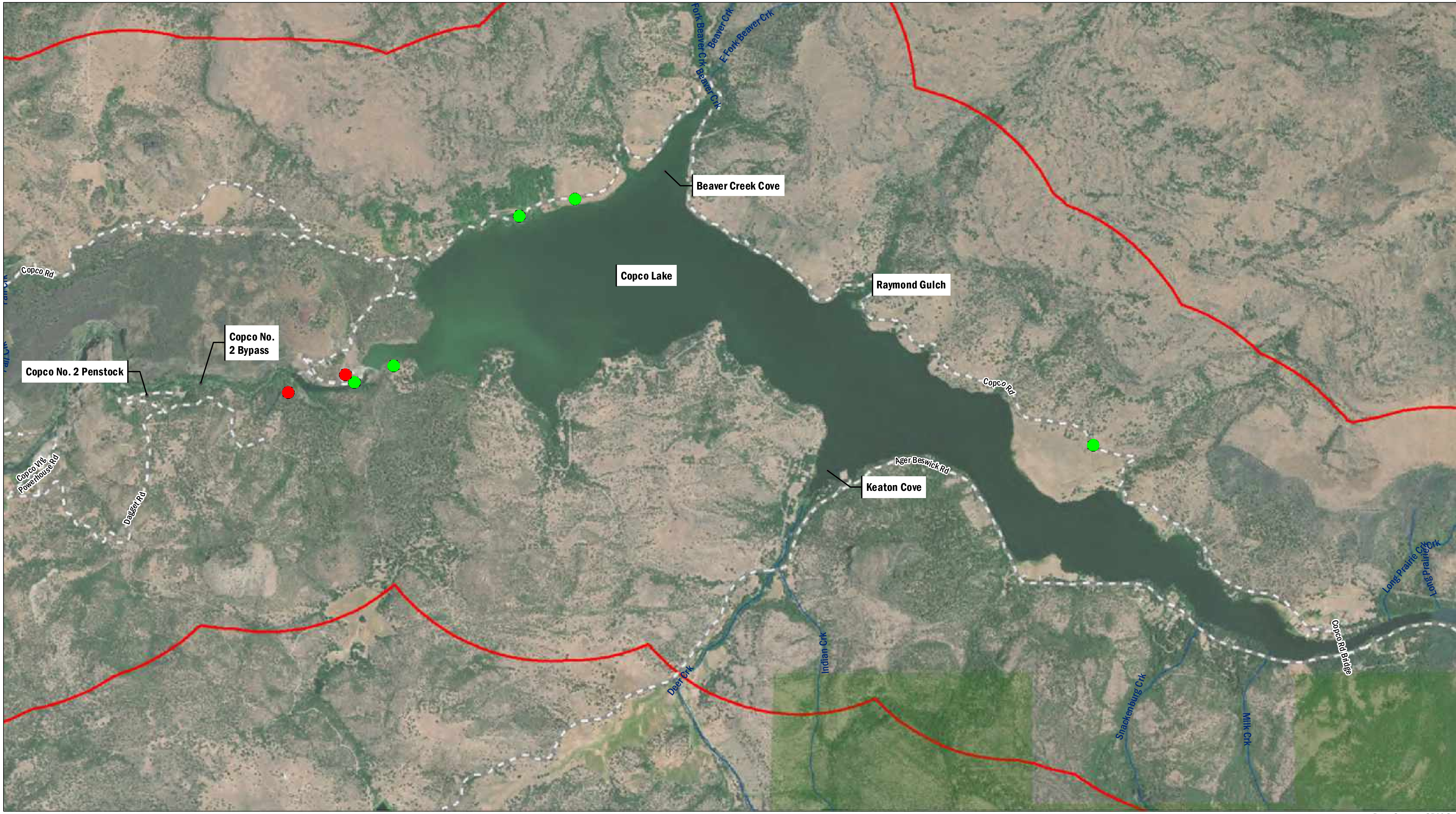


Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

- State
- County
- Access Route
- Stream
- 0.75 Mile Study Area Buffer

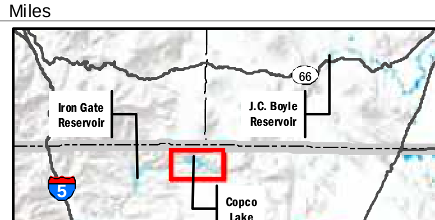
FIGURE 2-2

Osprey (Pandion haliaetus) Observations and Nest Locations Iron Gate Reservoir



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

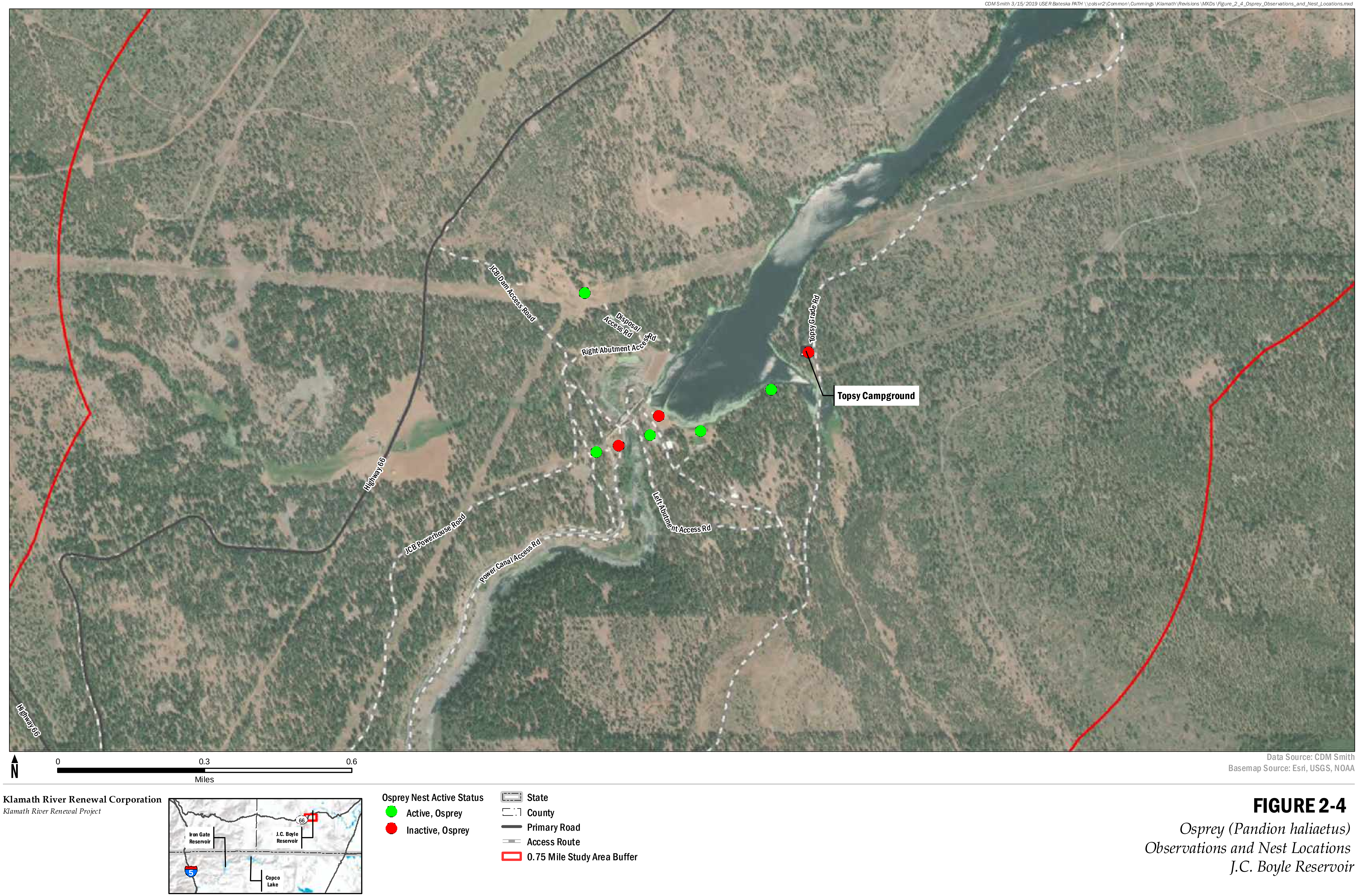


Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

- State
- County
- Stream
- Access Route
- 0.75 Mile Study Area Buffer

FIGURE 2-3

Osprey (Pandion haliaetus) Observations and Nest Locations Copco Lake



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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FIGURE 2-4

Osprey (Pandion haliaetus) Observations and Nest Locations J.C. Boyle Reservoir

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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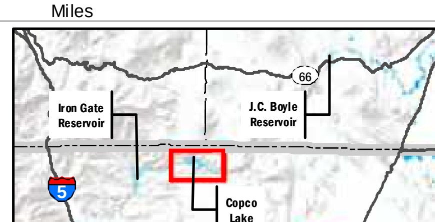


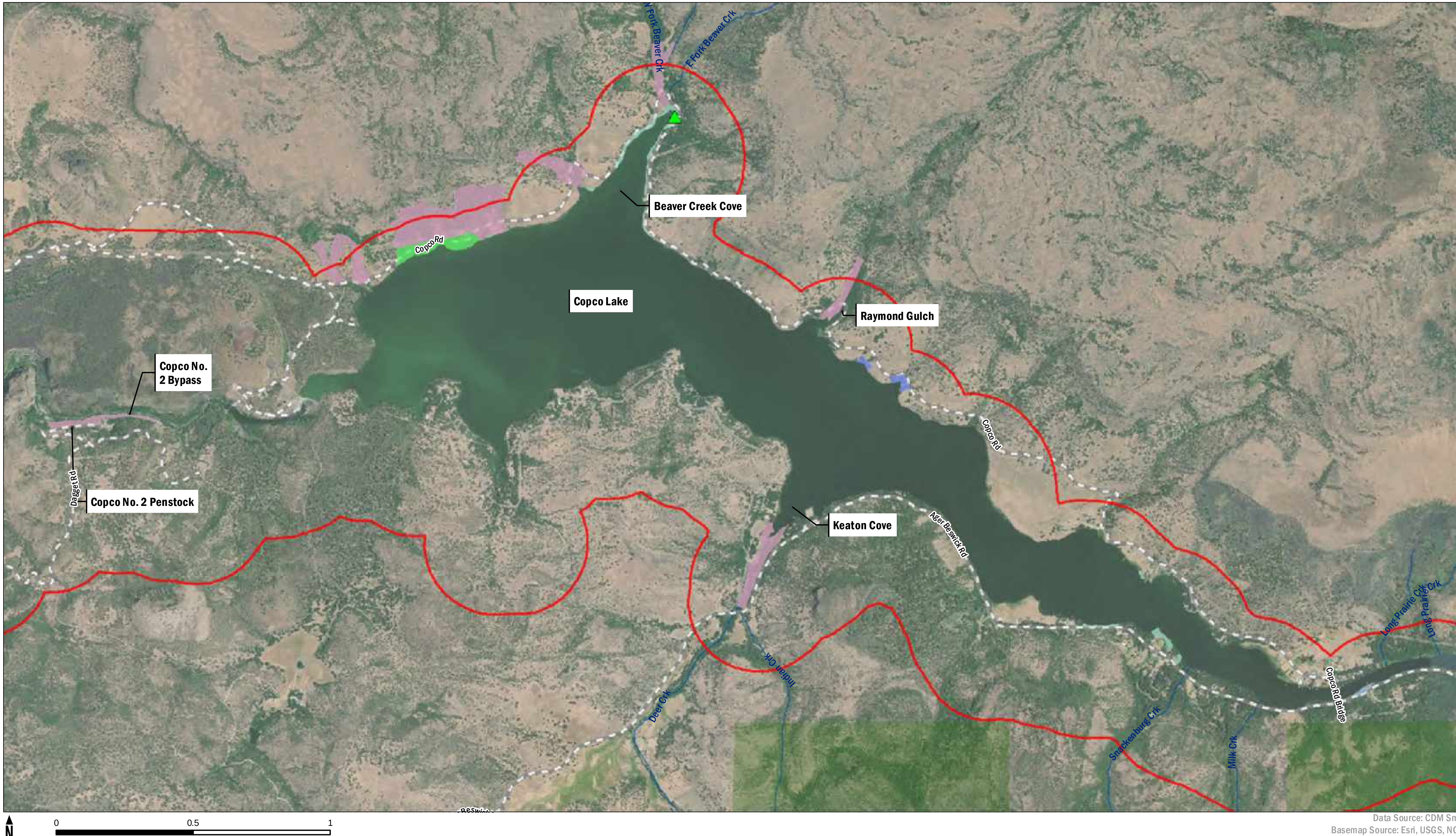
Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Geyer willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 3-1
2018 Willow Flycatcher Habitat and Observations
Iron Gate Reservoir

CDM Smith 3/15/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_3_2_Willow Flycatcher_Habitats_and_Observations.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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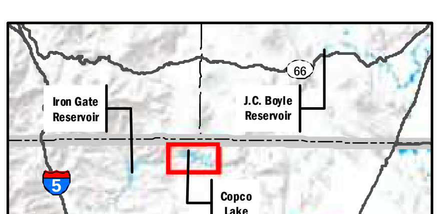
Klamath River Renewal Project



Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Geyer willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 3-2

2018 Willow Flycatcher Habitat and Observations
Copco Lake

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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Klamath River Renewal Project

Willow Flycatcher Observation
Willow Flycatcher Habitat
Bigleaf maple forest
Geyer willow thicket
Oregon ash grove
Shining willow grove
Willow thickets

State
County
Stream
0.25 Mile Study Area Buffer
Access Route

FIGURE 3-3
2018 Willow Flycatcher Habitat and Observations
J.C. Boyle Reservoir and Canal

CDM Smith 3/15/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_4_1_Other_Special_Status_Wildlife_Observations.mxd

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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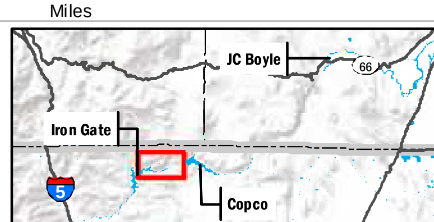
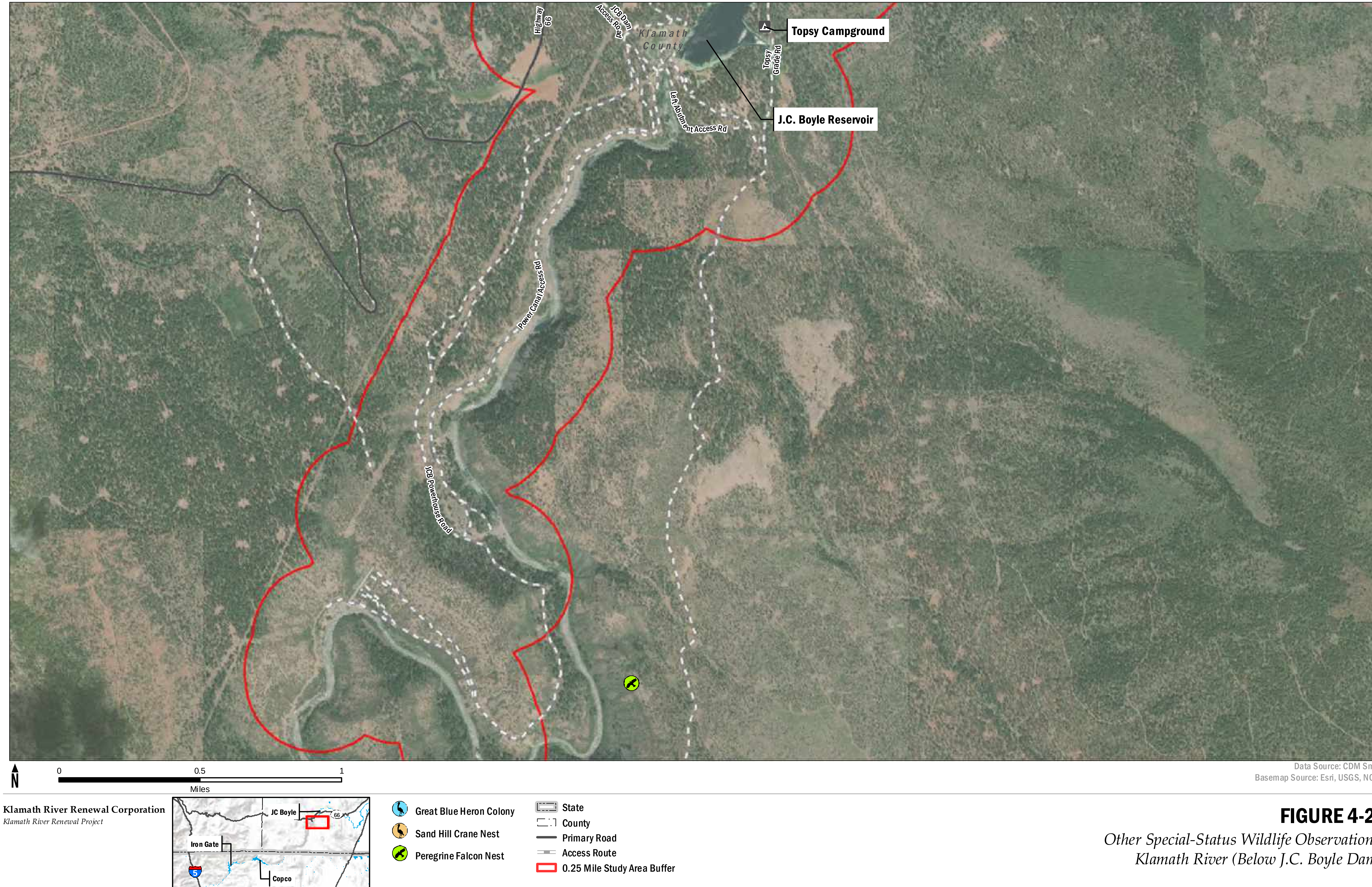
Klamath River Renewal Project



Great Blue Heron Colony
Sand Hill Crane Nest
Peregrine Falcon Nest

State
County
Stream
Access Route
0.25 Mile Study Area Buffer

FIGURE 4-1
Other Special Status Wildlife Observations
Iron Gate Reservoir



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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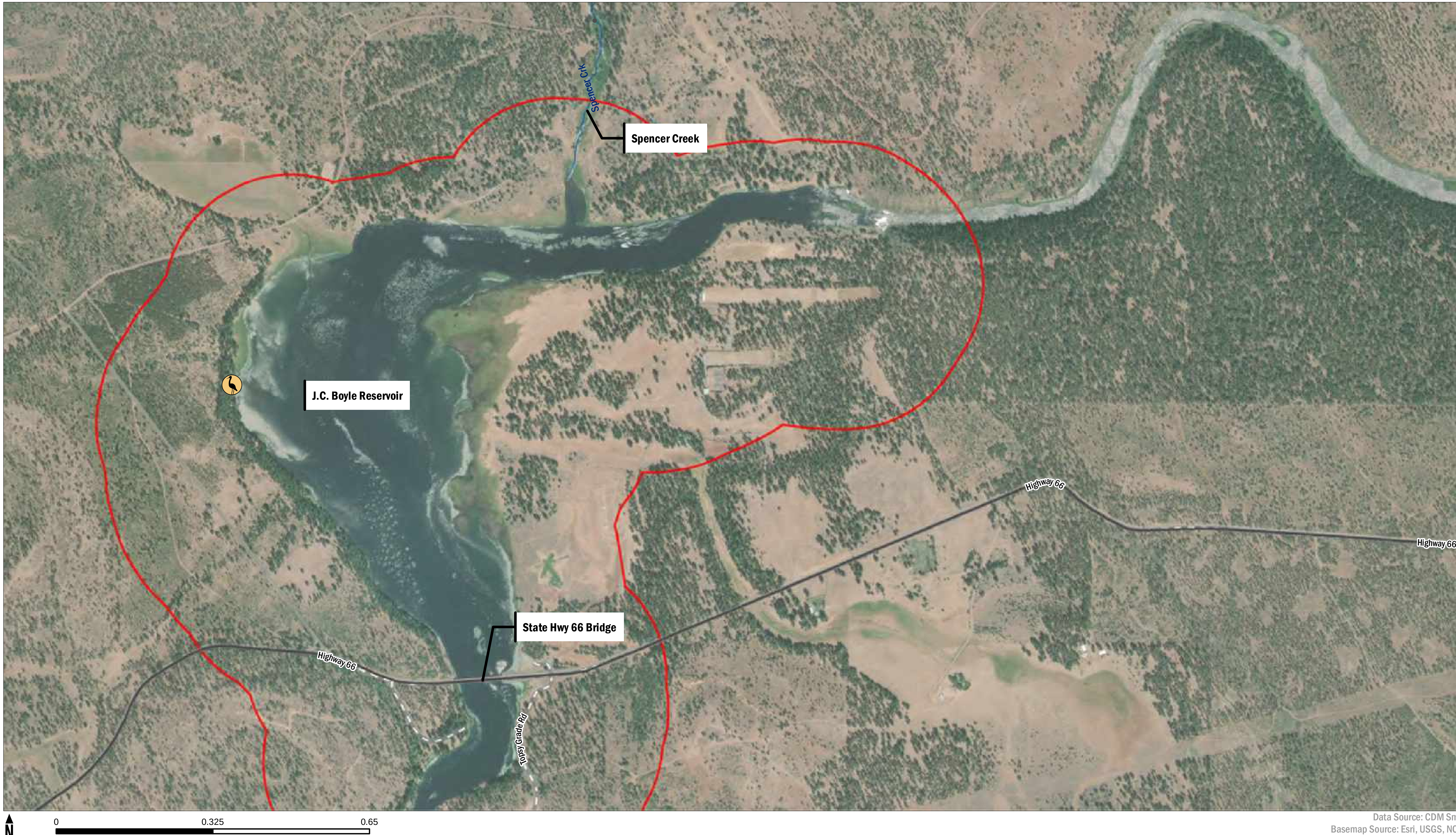
Klamath River Renewal Project

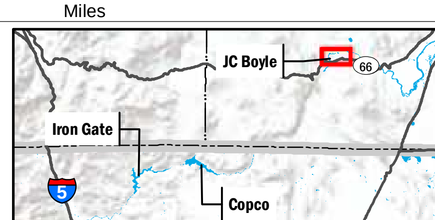
FIGURE 4-2
Other Special-Status Wildlife Observations
Klamath River (Below J.C. Boyle Dam)

CDM Smith 3/18/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_4_3_Other_Special_Status_Wildlife_Observations.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Great Blue Heron Colony
Sand Hill Crane Nest
Peregrine Falcon Nest

State
County
Stream
Primary Road
Access Route
0.25 Mile Study Area Buffer

FIGURE 4-3
Other Special Status Wildlife Observations
J.C. Boyle Reservoir

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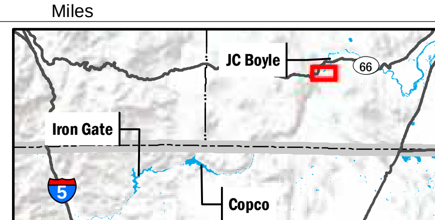
Klamath River Renewal Project

FIGURE 5-1
Northern Spotted Owl (NSO) Calling Stations
J.C. Boyle Lower Stations

Klamath River Renewal Corporation
Klamath River Renewal Project



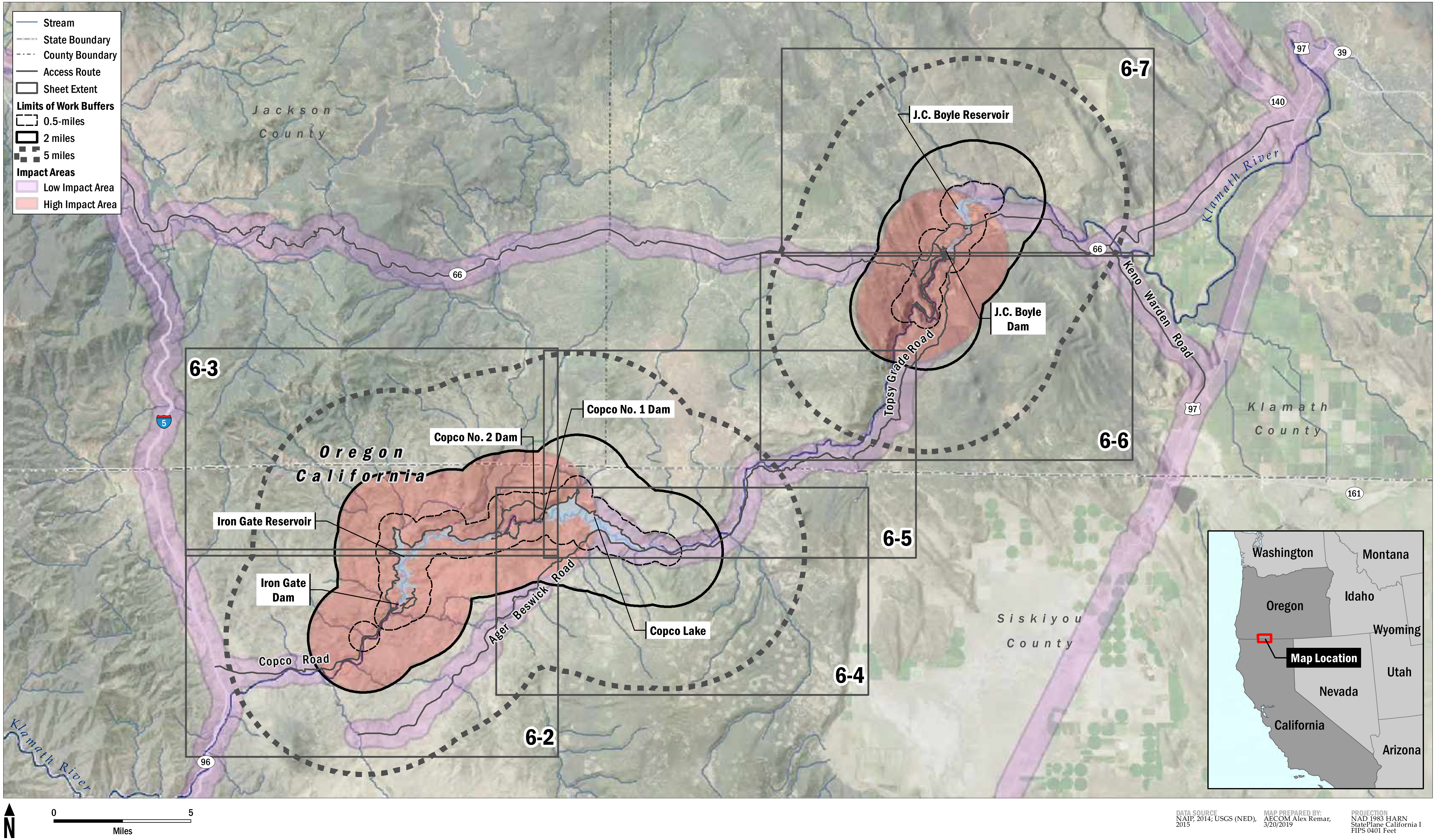
NSO Callling Station

State
County
Stream
Primary Road
Access Route

FIGURE 5-2

Northern Spotted Owl (NSO) Calling Stations
J.C. Boyle Upper Stations

AECOM Oakland CA 3/20/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\Figure_6-1_EagleNests_Overview.mxd



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

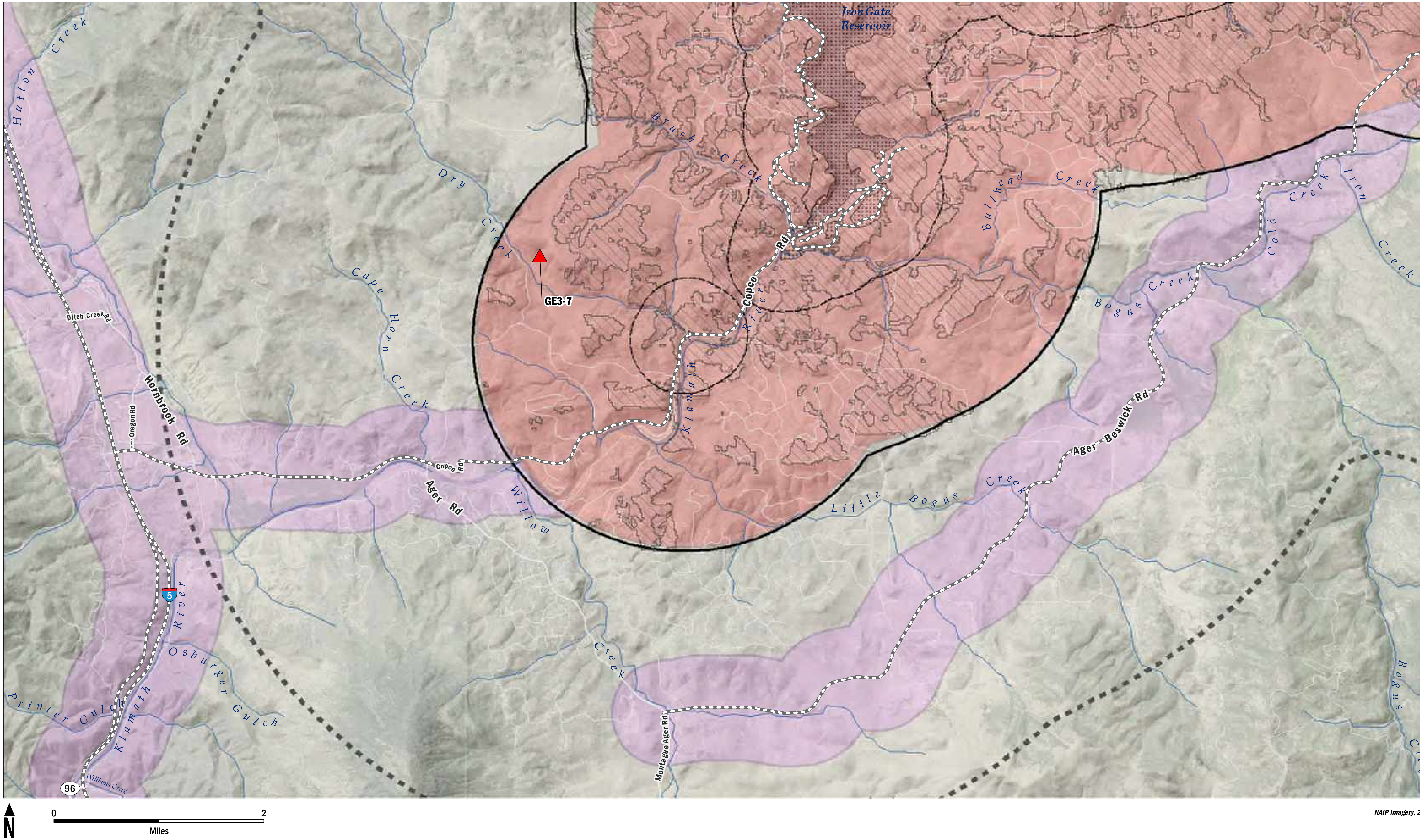
AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

FIGURE 6-1

2018 Eagle Nest Survey Results Overview



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Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area

Access Routes

Limits of Work

2-Mile Viewshed from Limits of Work

Impact Areas

Low Impact Area

High Impact Area

Eagle Nest Active Status

Inactive, Golden Eagle

Limits of Work Buffers

0.5-miles

2 miles

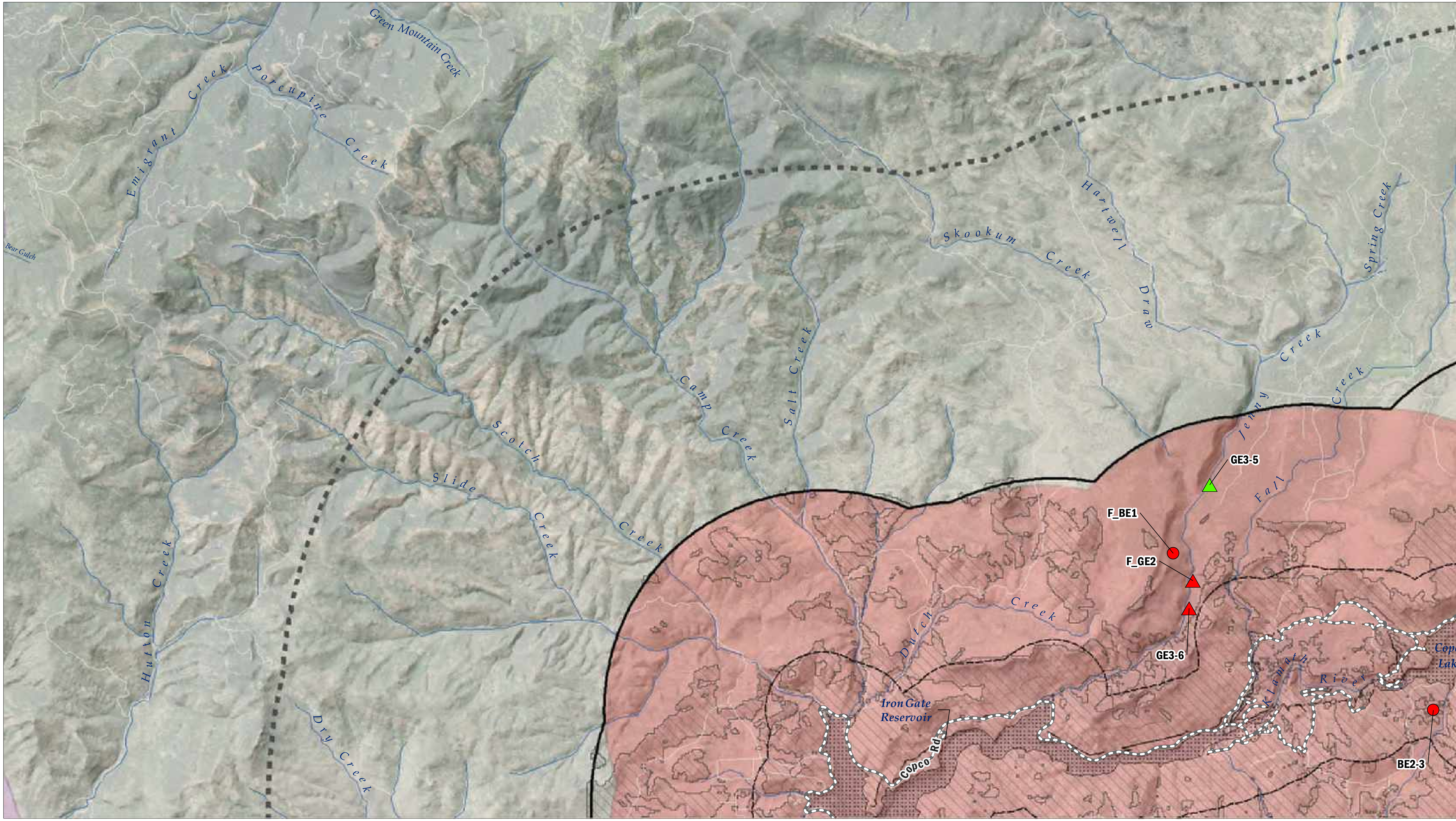
5 miles

FIGURE 6-2

2018 Eagle Nest Survey Results

Sheet 1 of 6

AECOM Oakland CA 12/4/2018 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\Figure_5-2-7_EagleNests_Mapbook.mxd

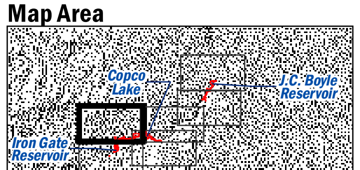


AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes

Limits of Work

2-Mile Viewshed from Limits of Work

Impact Areas

Low Impact Area

High Impact Area

Eagle Nest Active Status

Active, Golden Eagle

Inactive, Bald Eagle

Inactive, Golden Eagle

Limits of Work Buffers

0.5-miles

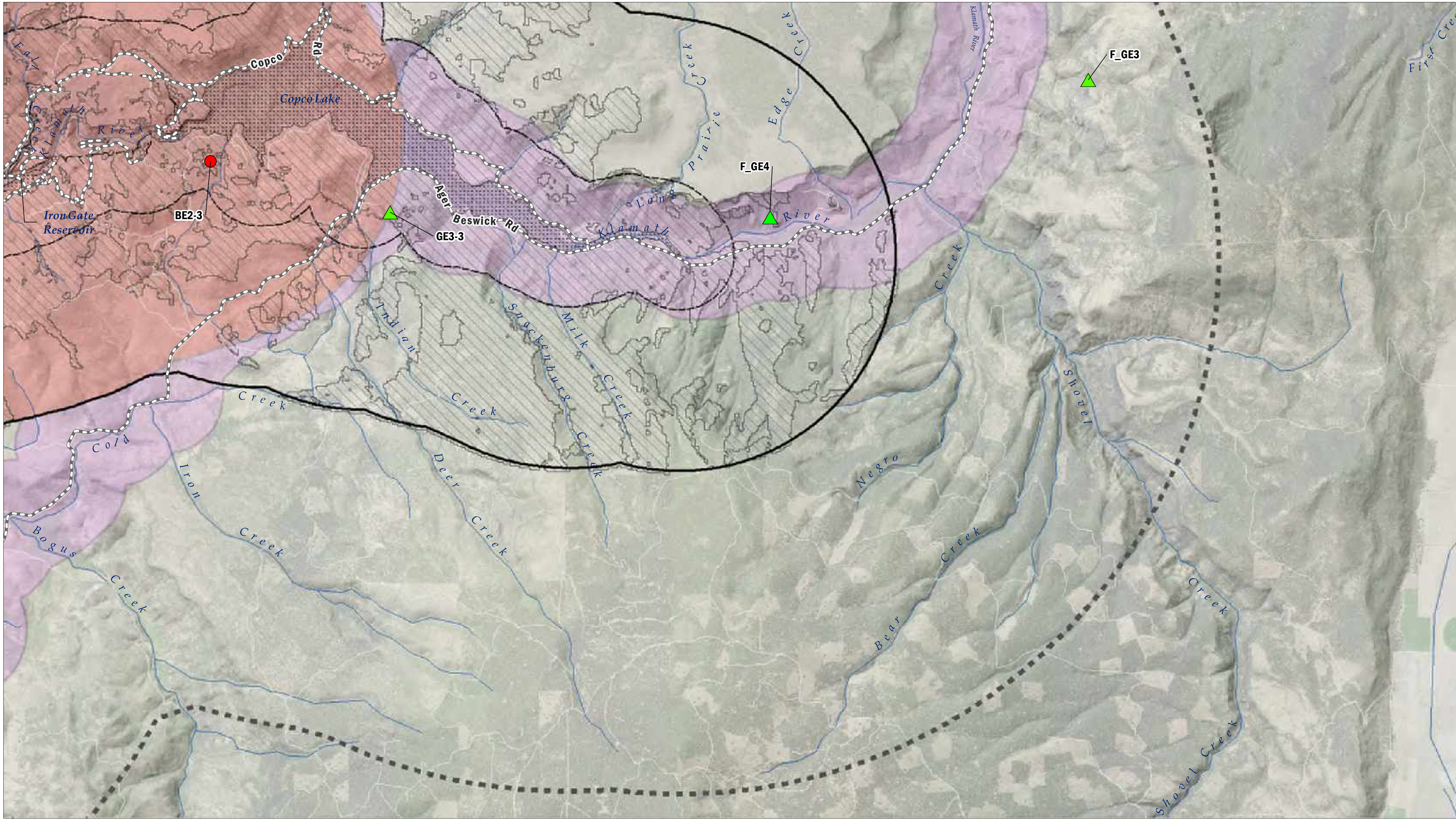
2 miles

5 miles

FIGURE 6-3

2018 Eagle Nest Survey Results

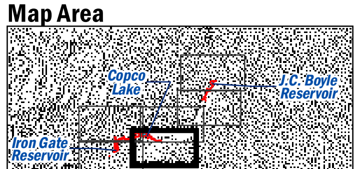
Sheet 2 of 6



AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

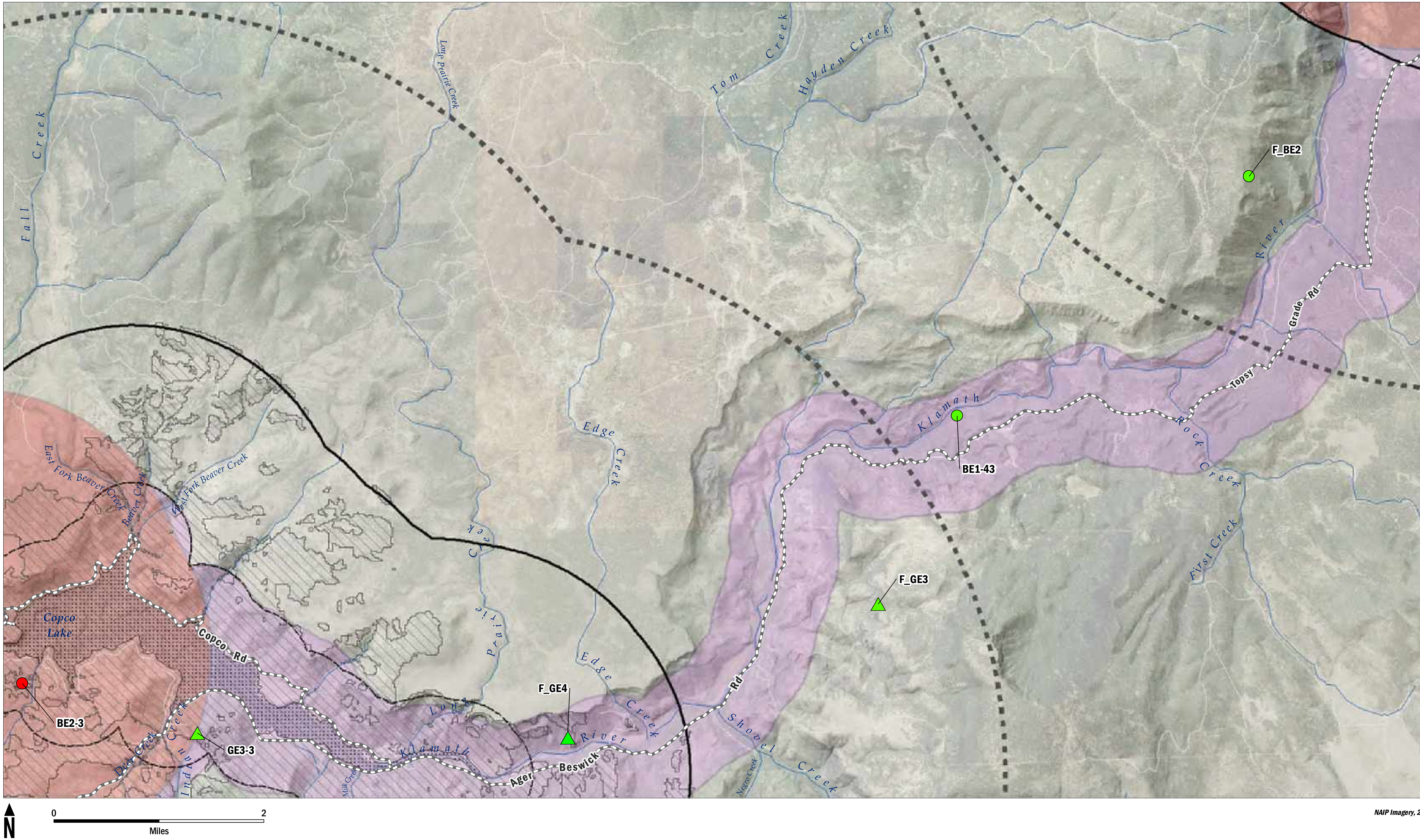


Access Routes	Impact Areas	Eagle Nest Active Status	Limits of Work Buffers
Limits of Work	Low Impact Area	Active, Golden Eagle	0.5-miles
2-Mile Viewshed from Limits of Work	High Impact Area	Inactive, Bald Eagle	2 miles
			5 miles

FIGURE 6-4

2018 Eagle Nest Survey Results

Sheet 3 of 6



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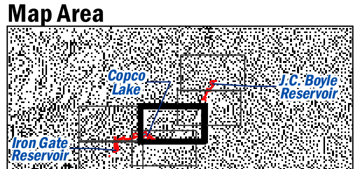
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

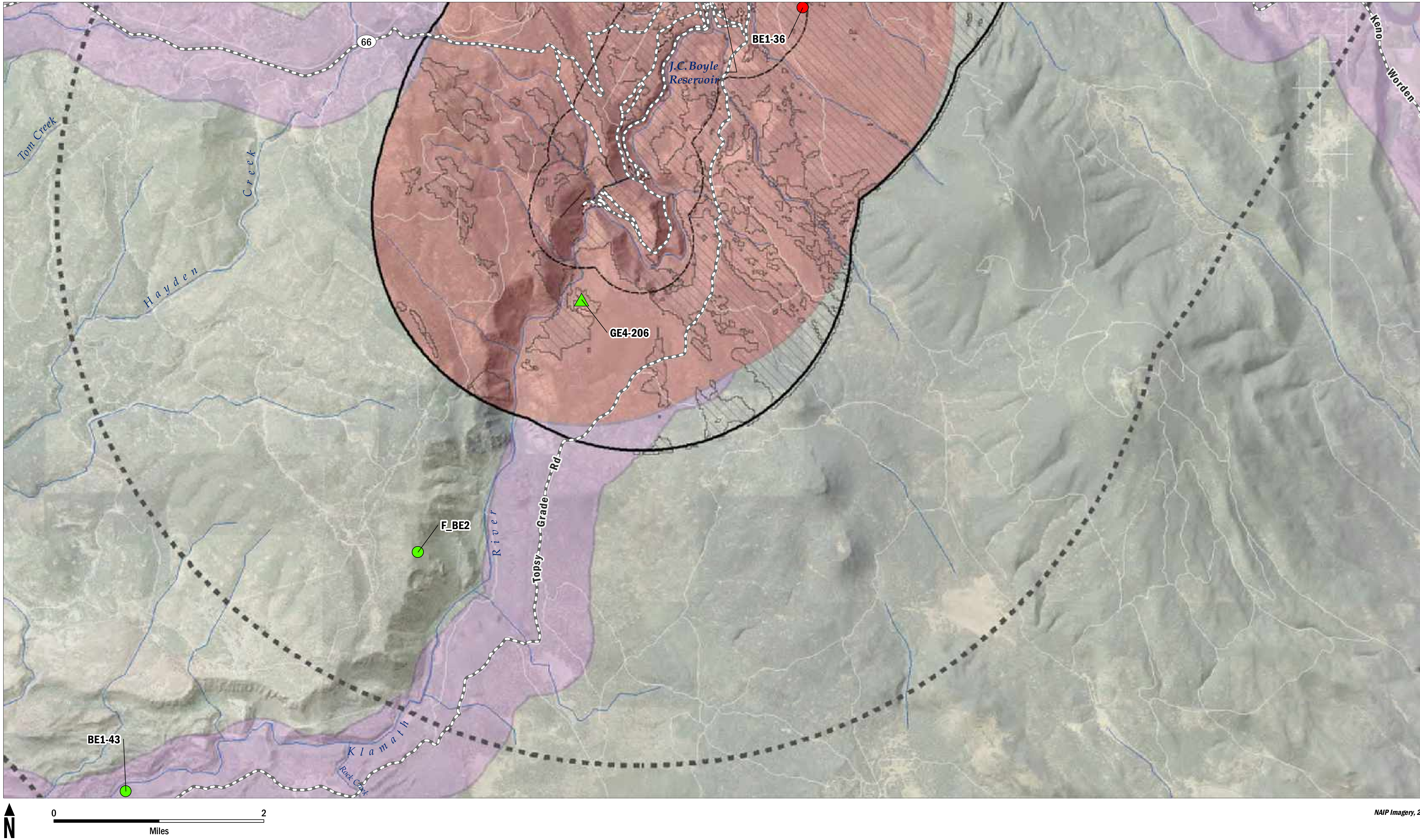
Impact Areas
Low Impact Area
High Impact Area

Eagle Nest Active Status
Active, Bald Eagle
Active, Golden Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-5

2018 Eagle Nest Survey Results
Sheet 4 of 6

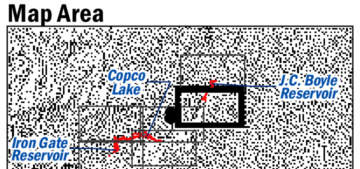


AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

Impact Areas
Low Impact Area
High Impact Area

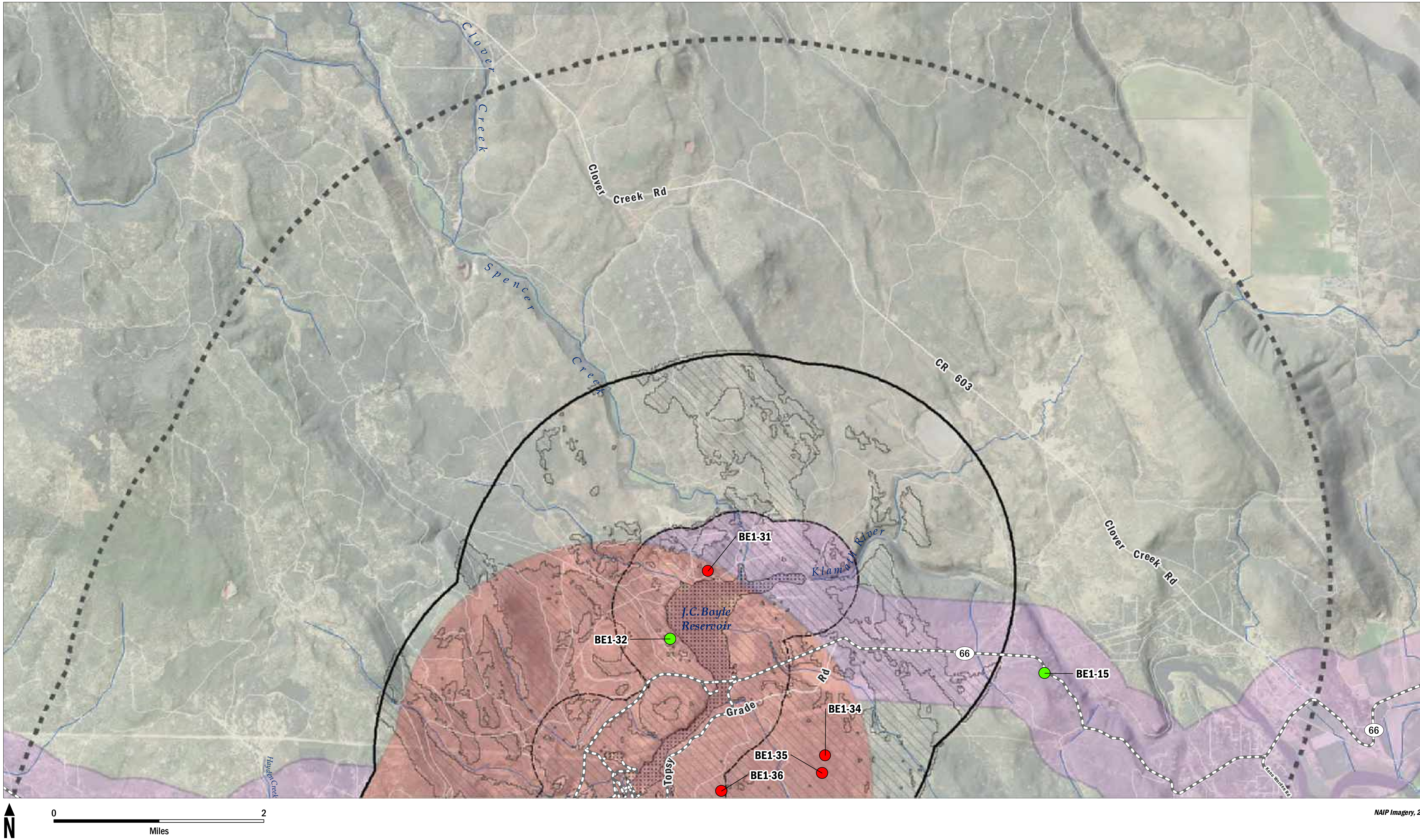
Eagle Nest Active Status
Active, Bald Eagle
Active, Golden Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-6

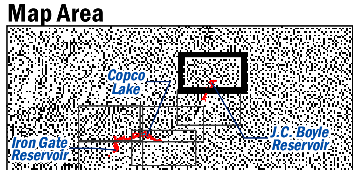
2018 Eagle Nest Survey Results

Sheet 5 of 6



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

Impact Areas
Low Impact Area
High Impact Area

Eagle Nest Active Status
Active, Bald Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

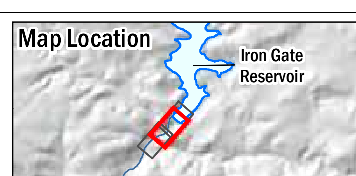
FIGURE 6-7
2018 Eagle Nest Survey Results
Sheet 6 of 6

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

Active Bat Roost Confirmed

Roosting Bats Not Found

FIGURE 7-1

2017-2018 Bat Surveys
Iron Gate Dam Area

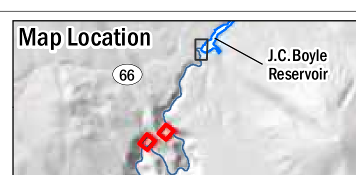
AECOM Oakland CA 2/28/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2018\Figure 6-4 2017-2018 Bat Surveys.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



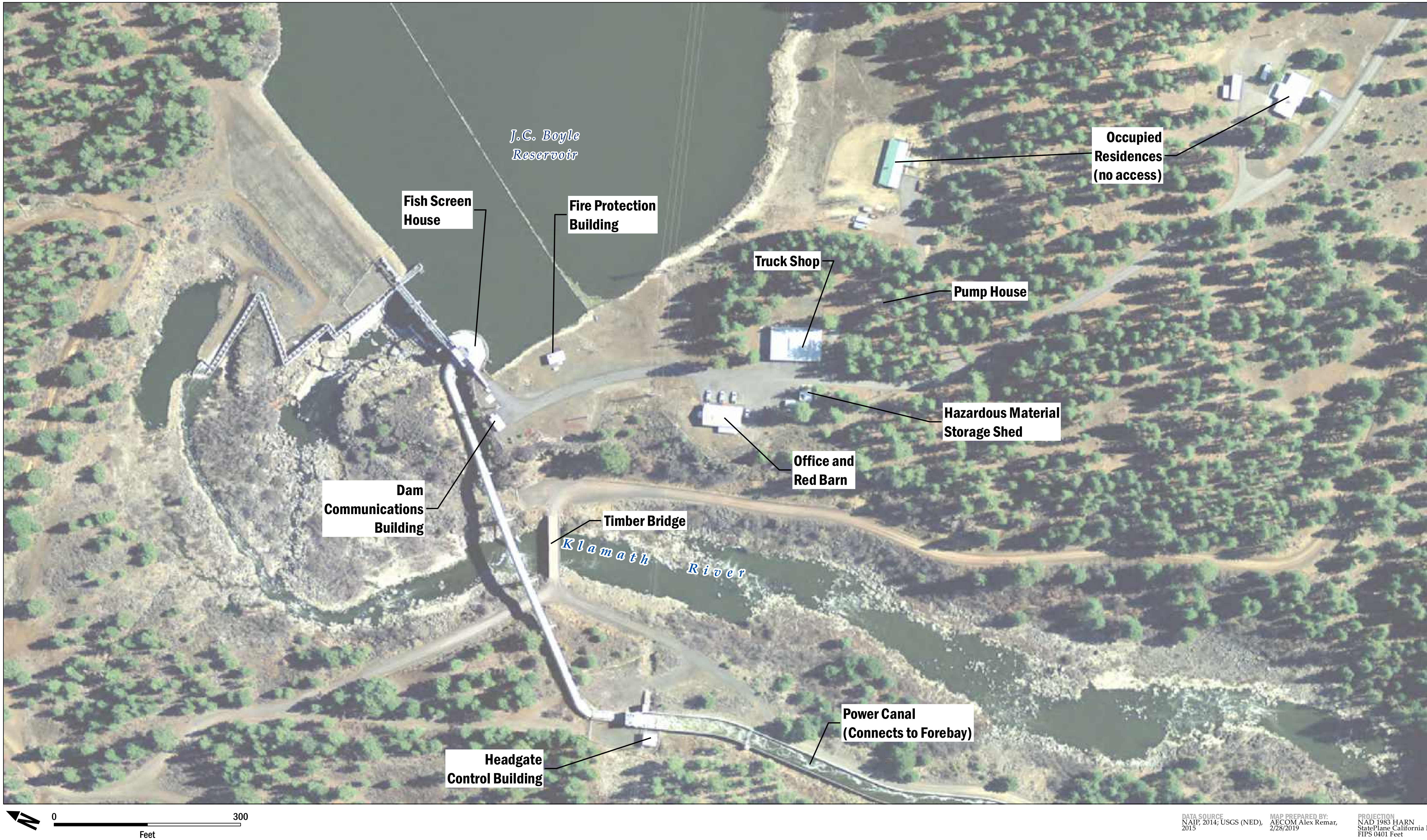
Labels

Active Bat Roost Confirmed

Roosting Bats Not Found

FIGURE 7-2

2017-2018 Bat Surveys
J.C. Boyle Forebay and Spillway Area, Penstocks and Powerhouse Area

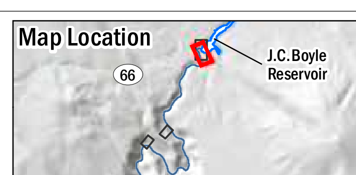


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

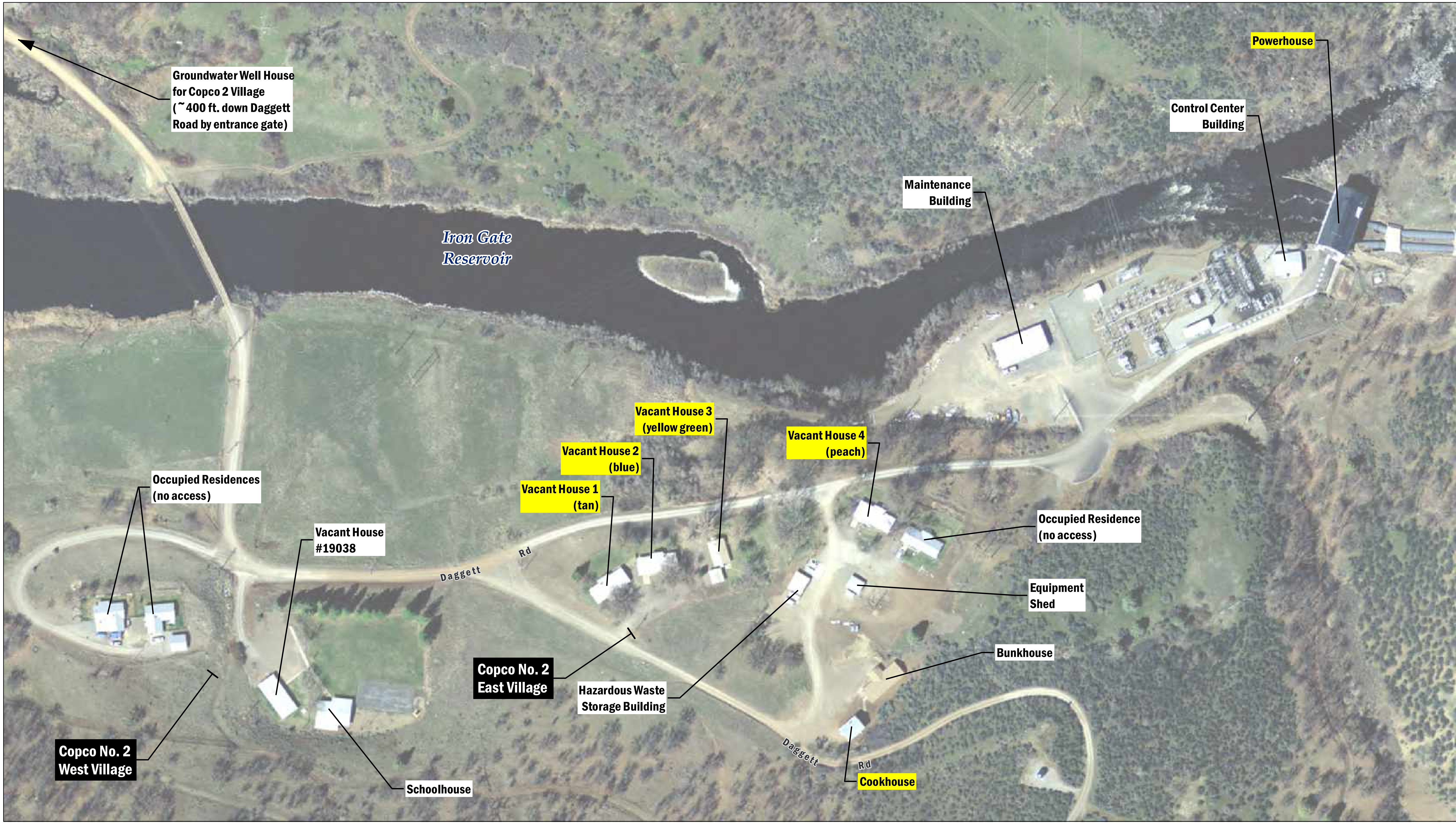


Labels

Roosting Bats Not Found

FIGURE 7-3

2017-2018 Bat Surveys
J.C. Boyle Dam Area

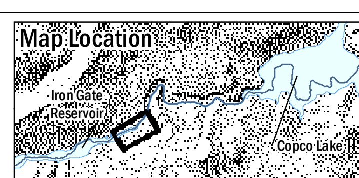


DATA SOURCE NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY: AECOM Alex Remar, 2/28/2019

PROJECTION NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



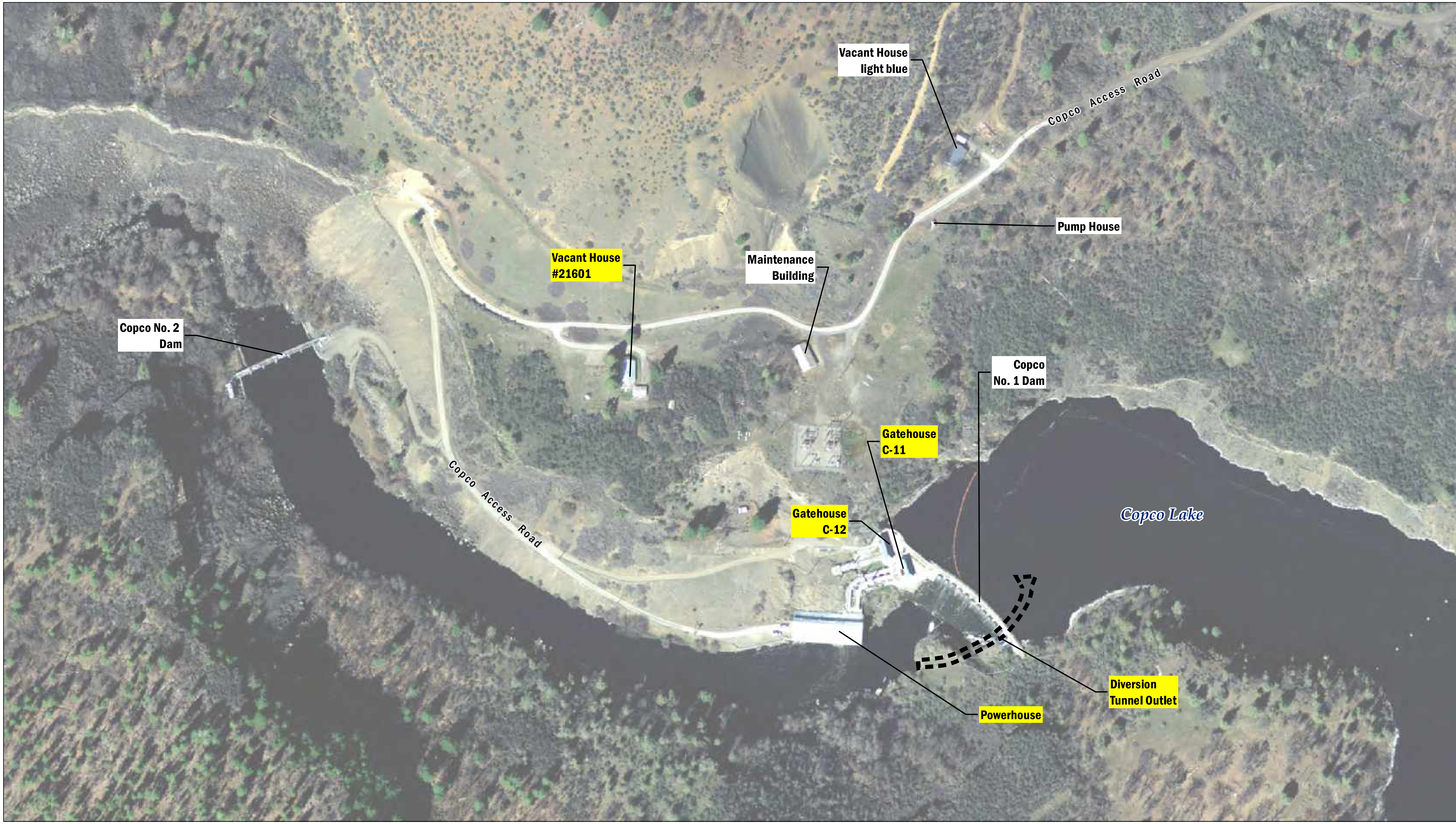
Labels

- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 7-4

2017-2018 Bat Surveys
Copco No. 2 Powerhouse Area

AECOM Oakland CA 2/28/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2018\Figure 6-1 2017-2018 Bat Surveys.mxd



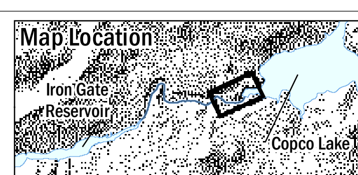
0 300
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

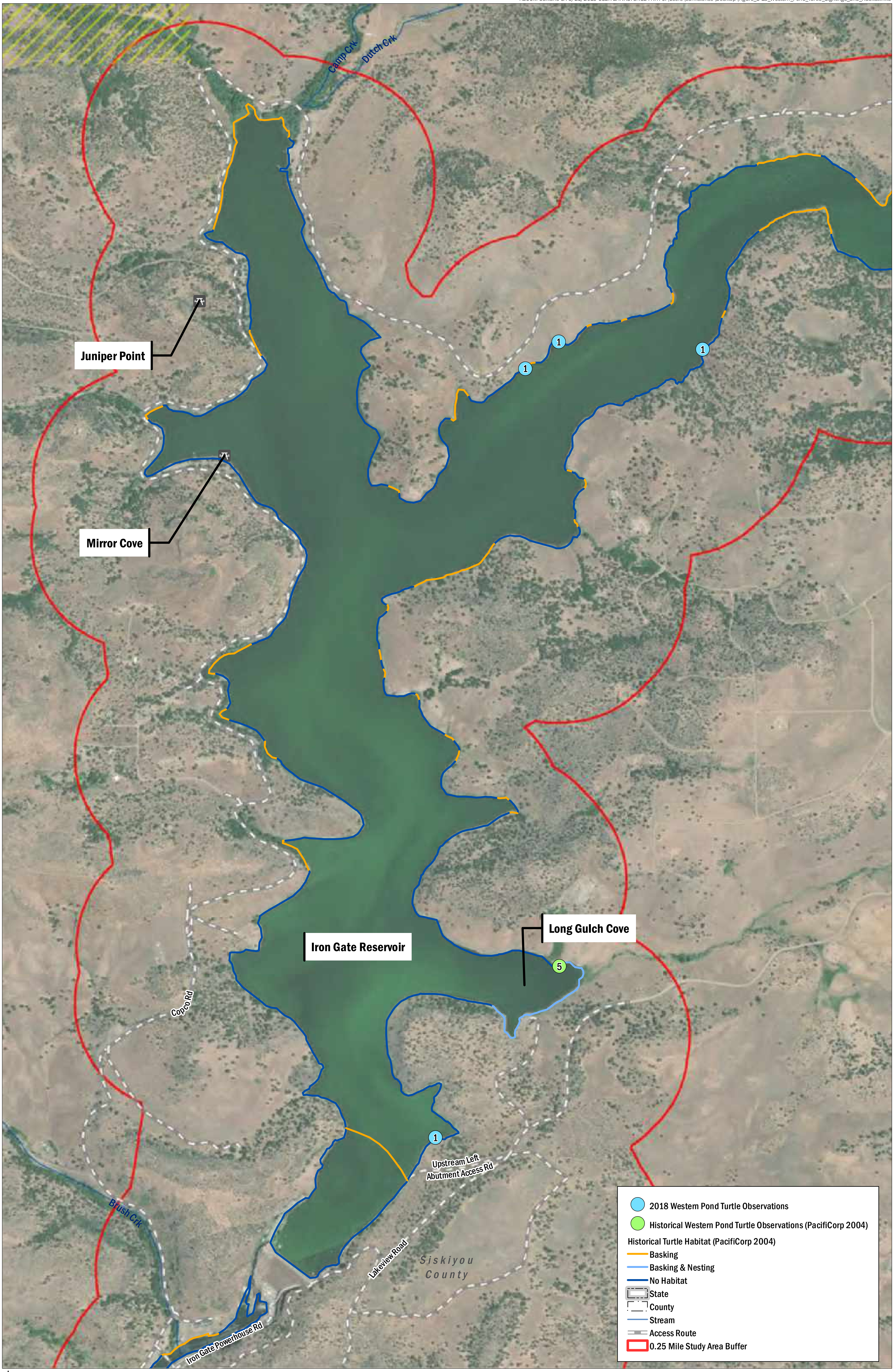
AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels
Active Bat Roost Confirmed
Roosting Bats Not Found

FIGURE 7-5
2017-2018 Bat Surveys
Copco No. 1 Dam Area and
Copco No. 2 Dam Area

AECOM Oakland CA 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-1a_Western_Pond_Turtle_Sightings_and_Habitat.mxd



N

0 0.5

Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

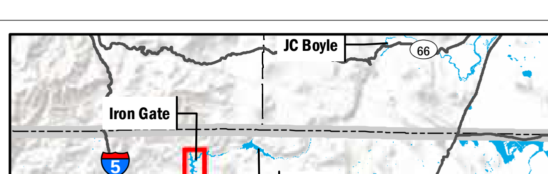
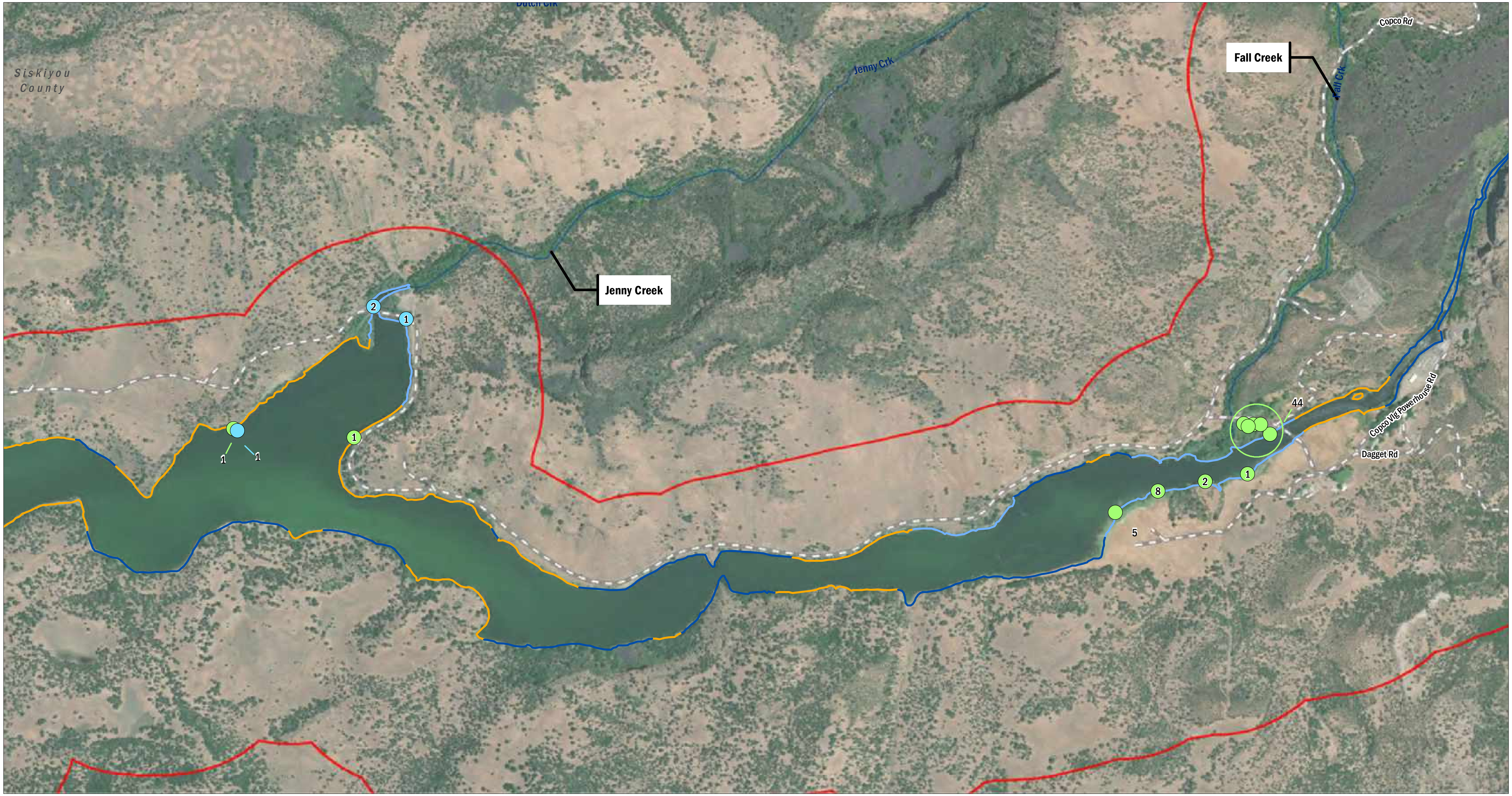


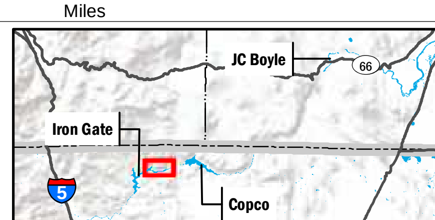
FIGURE 8-1A

Western Pond Turtle Sightings and Habitat
Iron Gate Reservoir



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

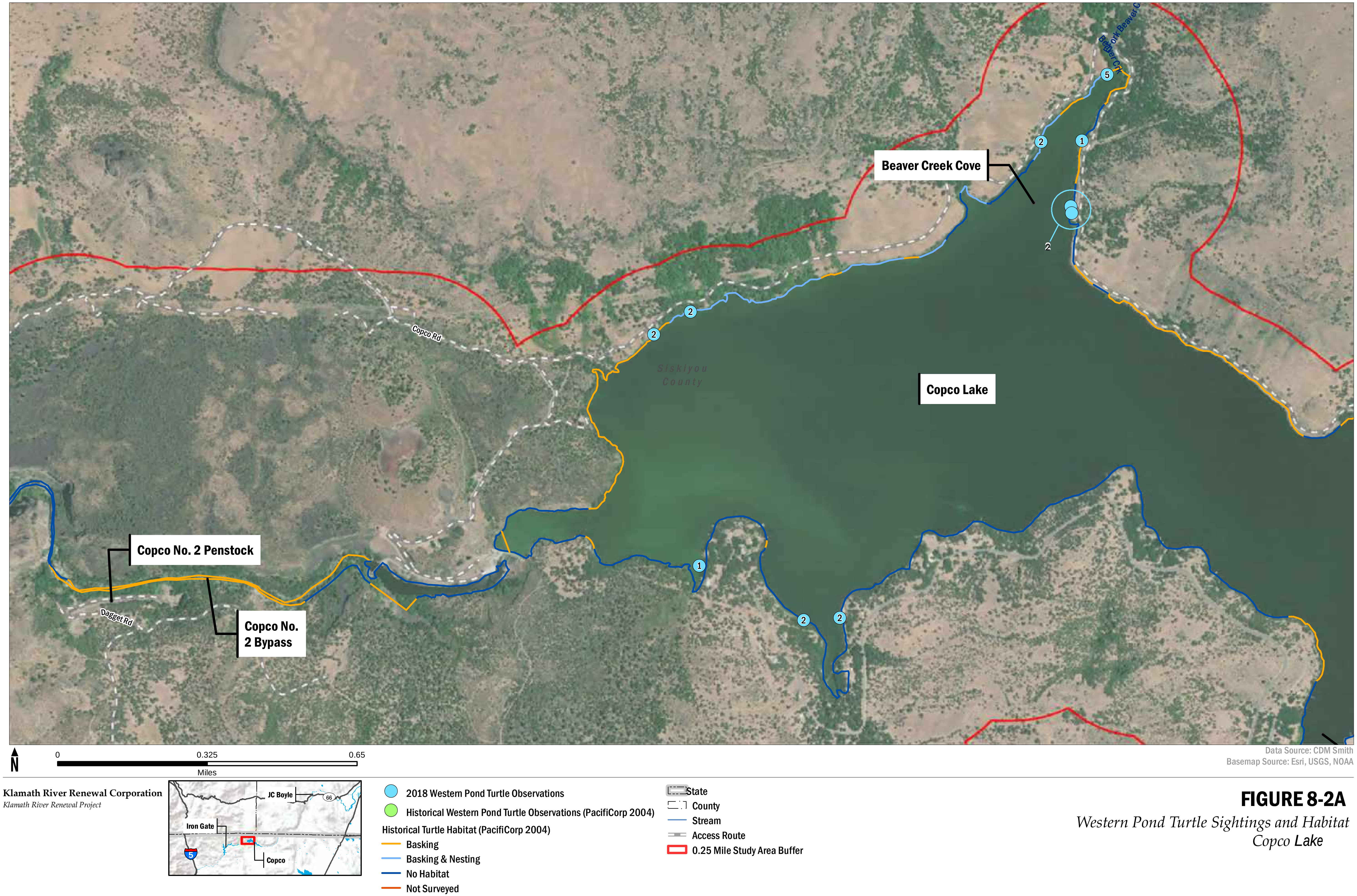


2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
Basking
Basking & Nesting
No Habitat
Not Surveyed

State
County
Stream
Access Route
0.25 Mile Study Area Buffer

FIGURE 8-1B

Western Pond Turtle Sightings and Habitat
Iron Gate Reservoir



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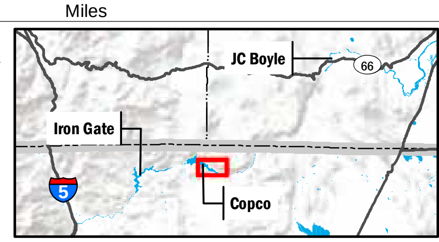
Klamath River Renewal Project

FIGURE 8-2A
Western Pond Turtle Sightings and Habitat
Copco Lake

CDM Smith 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-2b_Western_Pond_Turtle_Sightings_and_Habitat.mxd

Klamath River Renewal Corporation
Klamath River Renewal Project

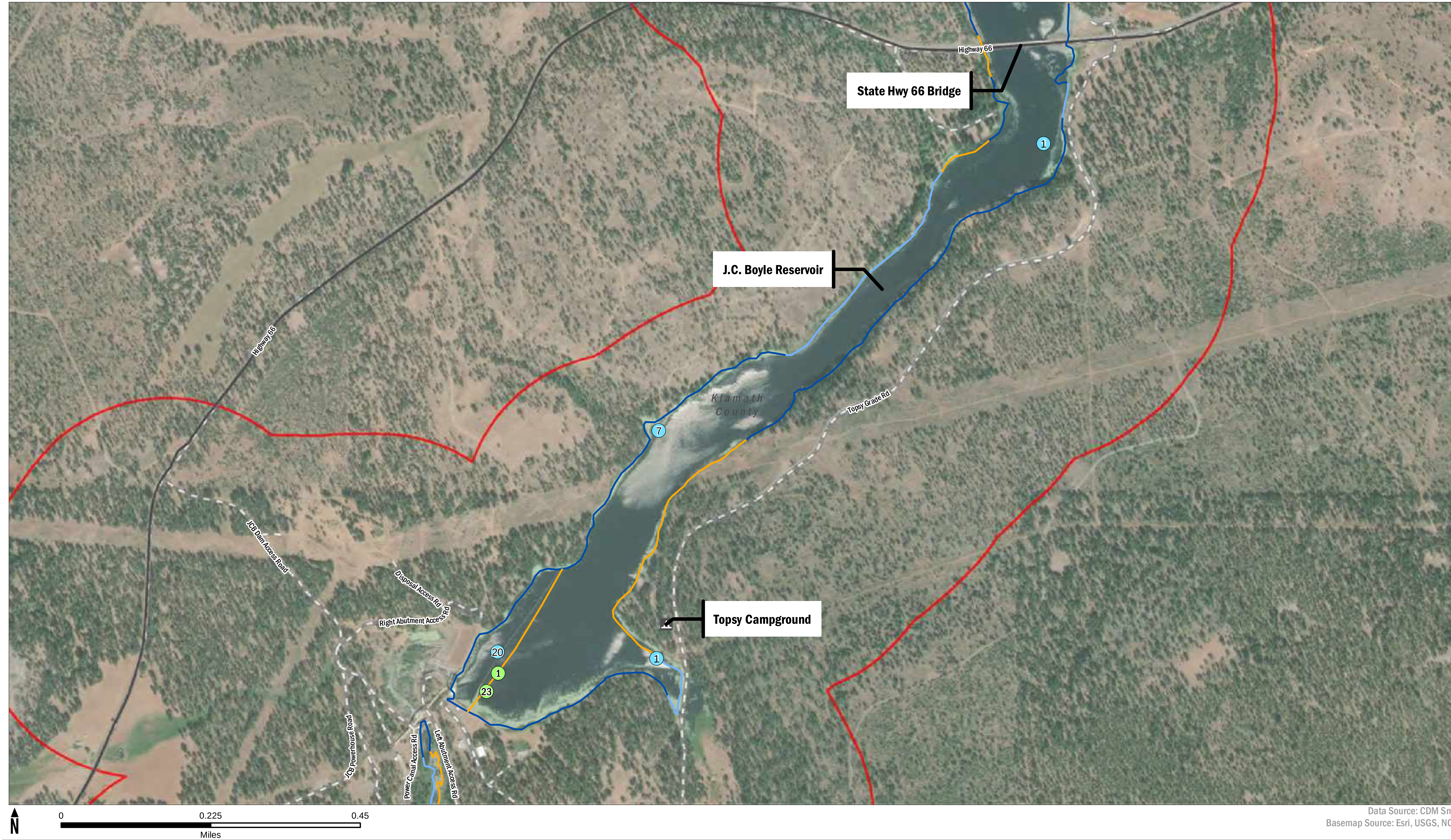


2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifiCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
Basking
Basking & Nesting
No Habitat
Not Surveyed

State
County
Stream
Access Route
0.25 Mile Study Area Buffer

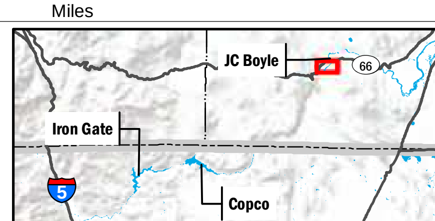
FIGURE 8-2B
Western Pond Turtle Sightings and Habitat
Copco Lake

CDM Smith 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-3a_Western_Pond_Turtle_Sightings_and_Habitat.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



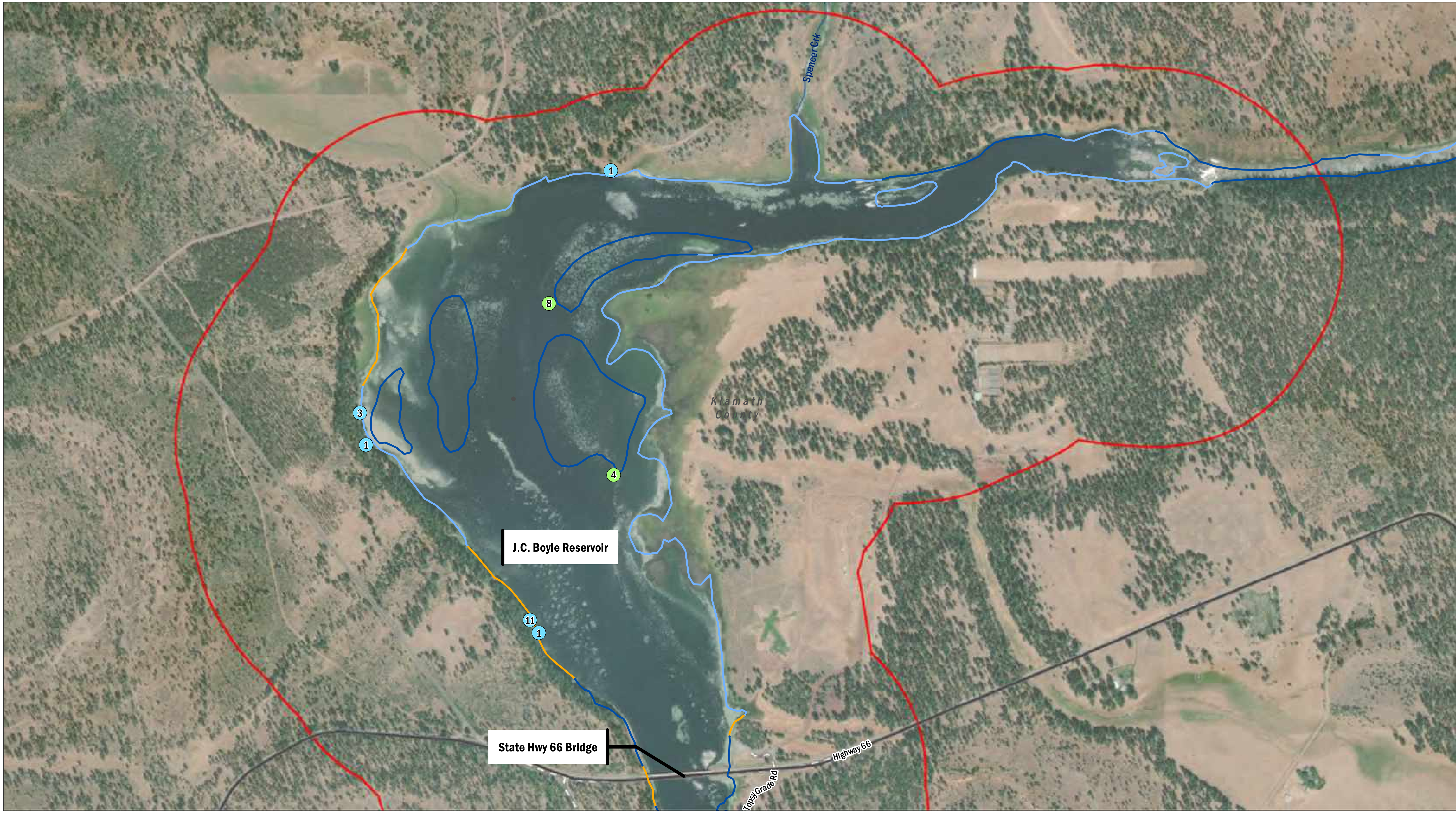
- 2018 Western Pond Turtle Observations
- Historical Western Pond Turtle Observations (PacifiCorp 2004)

Historical Turtle Habitat (PacifiCorp 2004)
- Basking
- Basking & Nesting
- No Habitat
- Not Surveyed

- State
- County
- Primary Road
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 8-3A
Western Pond Turtle Sightings and Habitat
J.C. Boyle Reservoir

CDM Smith 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-3b_Western_Pond_Turtle_Sightings_and_Habitat.mxd



N

0 0.25 0.5
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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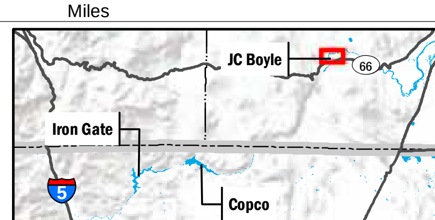
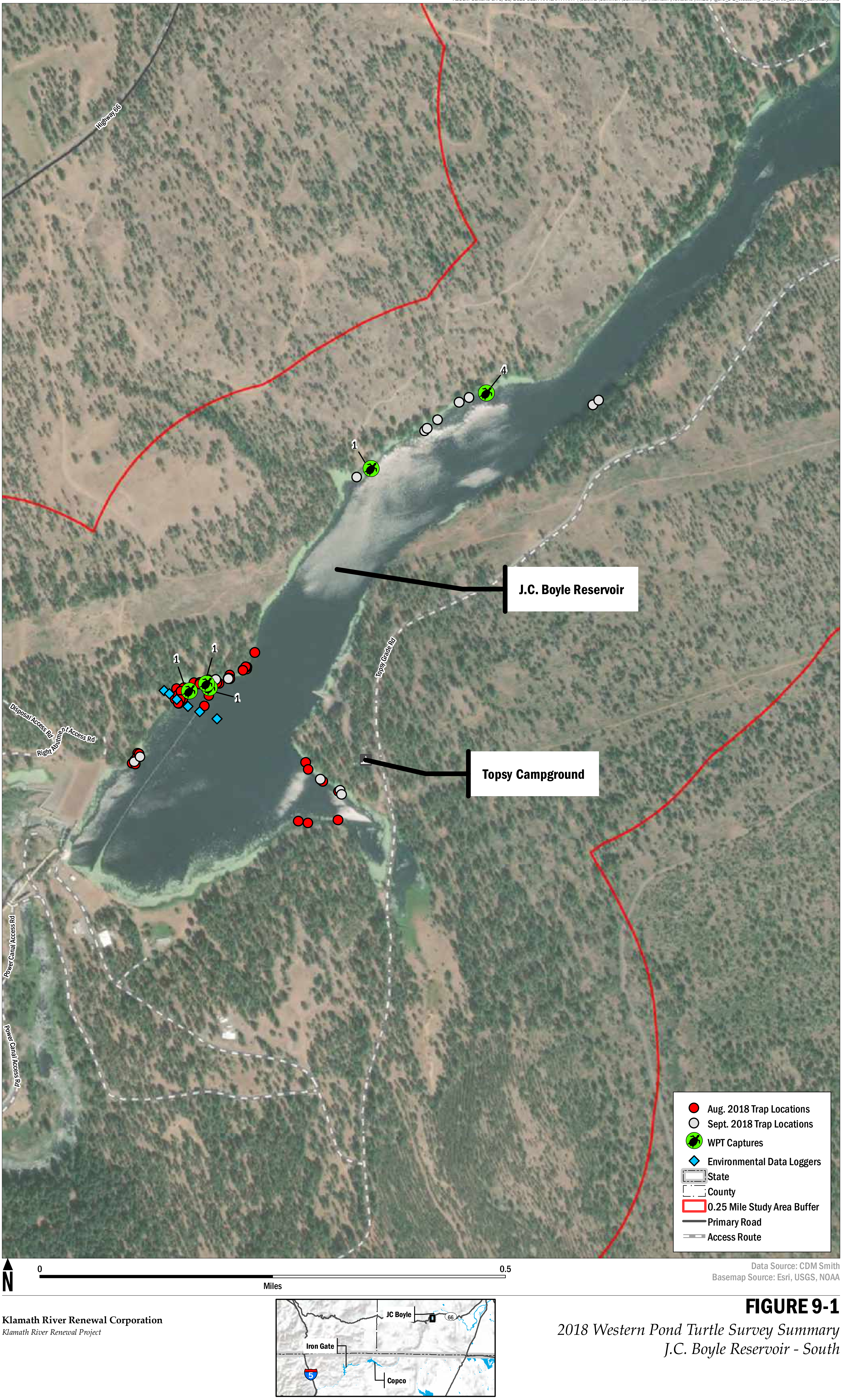


2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifiCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
- Basking
- Basking & Nesting
- No Habitat
- Not Surveyed

- State
- County
- Stream
- Primary Road
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 8-3B
Western Pond Turtle Sightings and Habitat
J.C. Boyle Reservoir



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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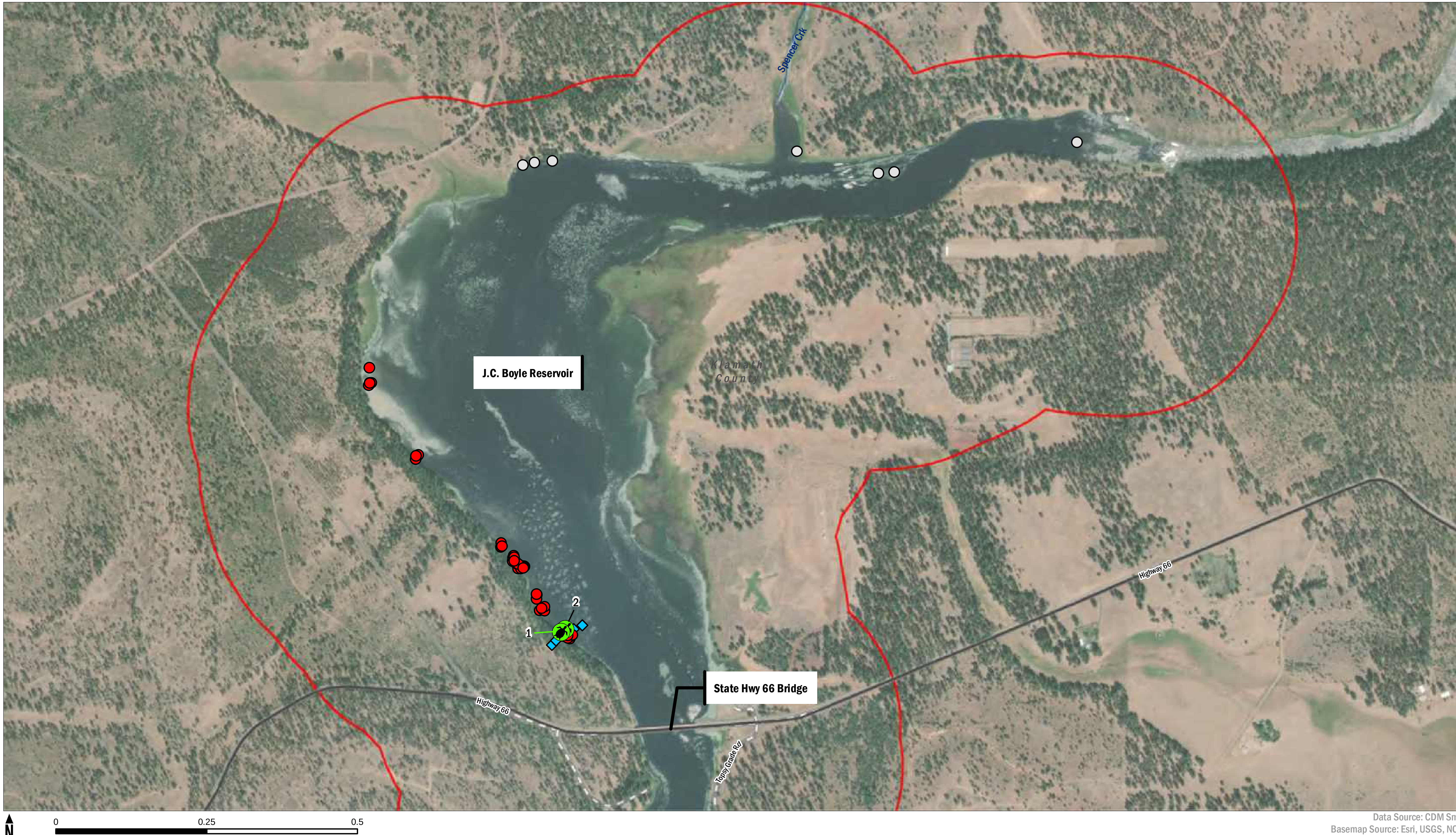
FIGURE 9-1
2018 Western Pond Turtle Survey Summary
J.C. Boyle Reservoir - South



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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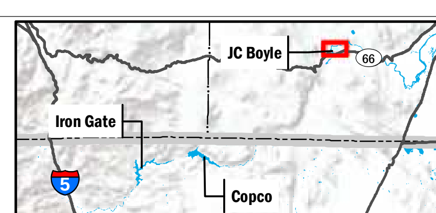
Klamath River Renewal Project



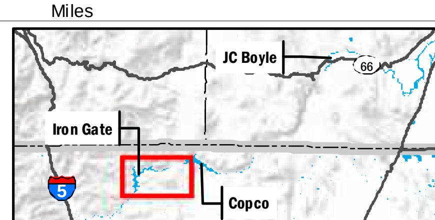
- Aug. 2018 Trap Locations
- Sept. 2018 Trap Locations
- WPT Captures
- Environmental Data Loggers
- State
- County
- Stream
- Primary Road
- Secondary Road
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 9-2
2018 Western Pond Turtle Survey Summary
J.C. Boyle Reservoir - North

CDM Smith 3/15/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_10_1_Special_Status_Plants.mxd

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

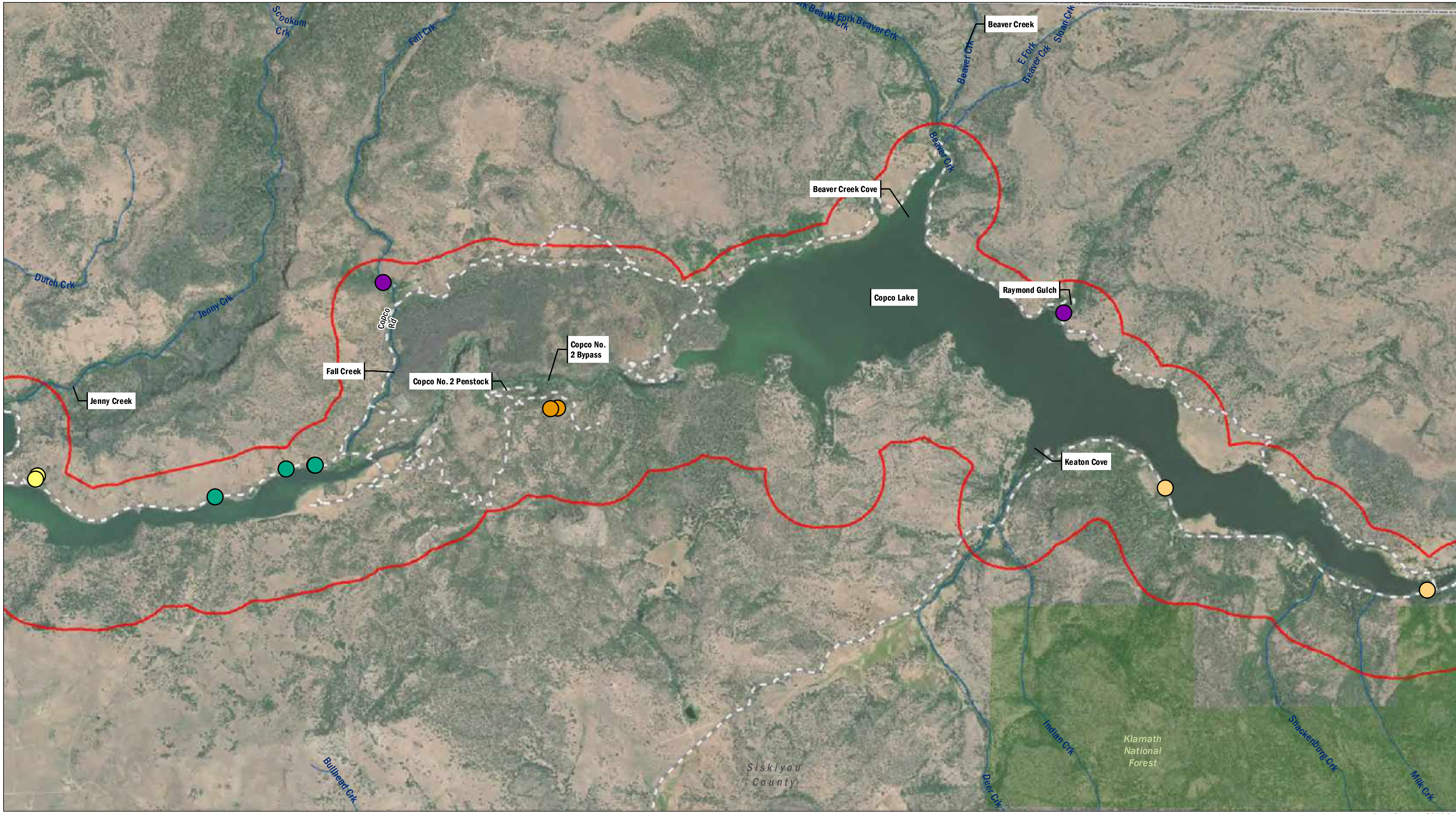


2018 Special Status Plants Observations
- Greene's Mariposa Lily (Calochortus greenei)
- Washingotn Lily (Lilium washingtonianum ssp. purpurascens)
- Greene's Four O'Clock (Mirabilis greenei)
- Fleshy Sage (Salvia dorii)

- Primary Road
- Access Route
- Stream
- 0.25 Mile Study Area Buffer

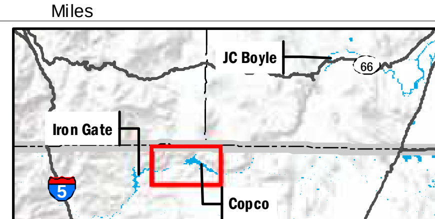
FIGURE 10-1
2018 Special-Status Plant Surveys
Iron Gate Reservoir

CDM Smith 3/15/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_10_2_Special_Status_Plants.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

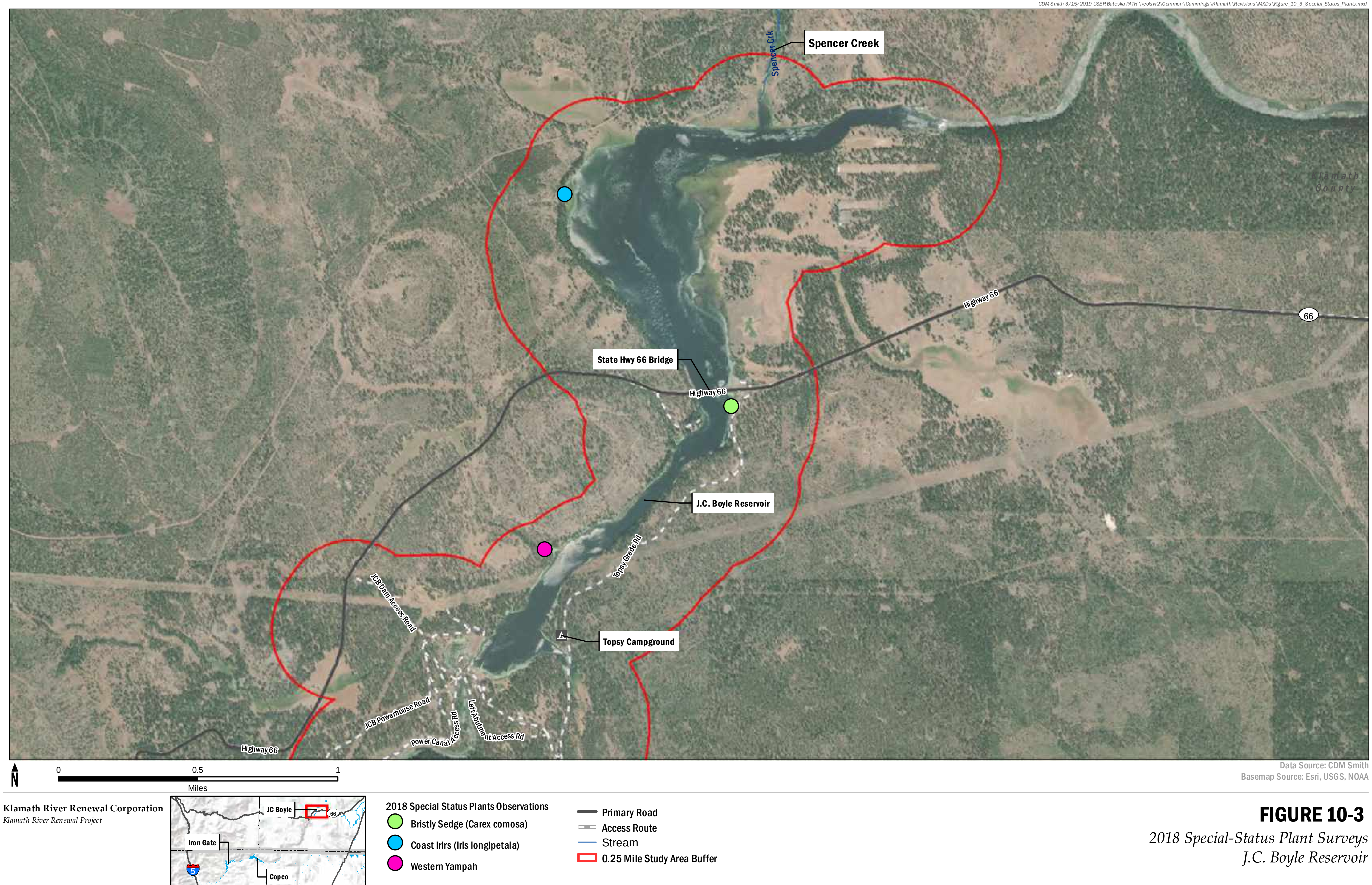
Klamath River Renewal Corporation
Klamath River Renewal Project



2018 Special Status Plants Observations
- Greene's Mariposa Lily (Calochortus greenei)
- Calochortus sp.
- Washingotn Lily (Lilium washingtonianum ssp. purpurascens)
- Greene's Four O'Clock (Mirabilis greenei)
- Fleshy Sage (Salvia dorii)

- 0.25 Mile Study Area Buffer
- State
- County
- Stream
- Access Route

FIGURE 10-2
2018 Special-Status Plant Surveys
Copco Lake



Klamath River Renewal Corporation

Klamath River Renewal Project

FIGURE 10-3

2018 Special-Status Plant Surveys

J.C. Boyle Reservoir

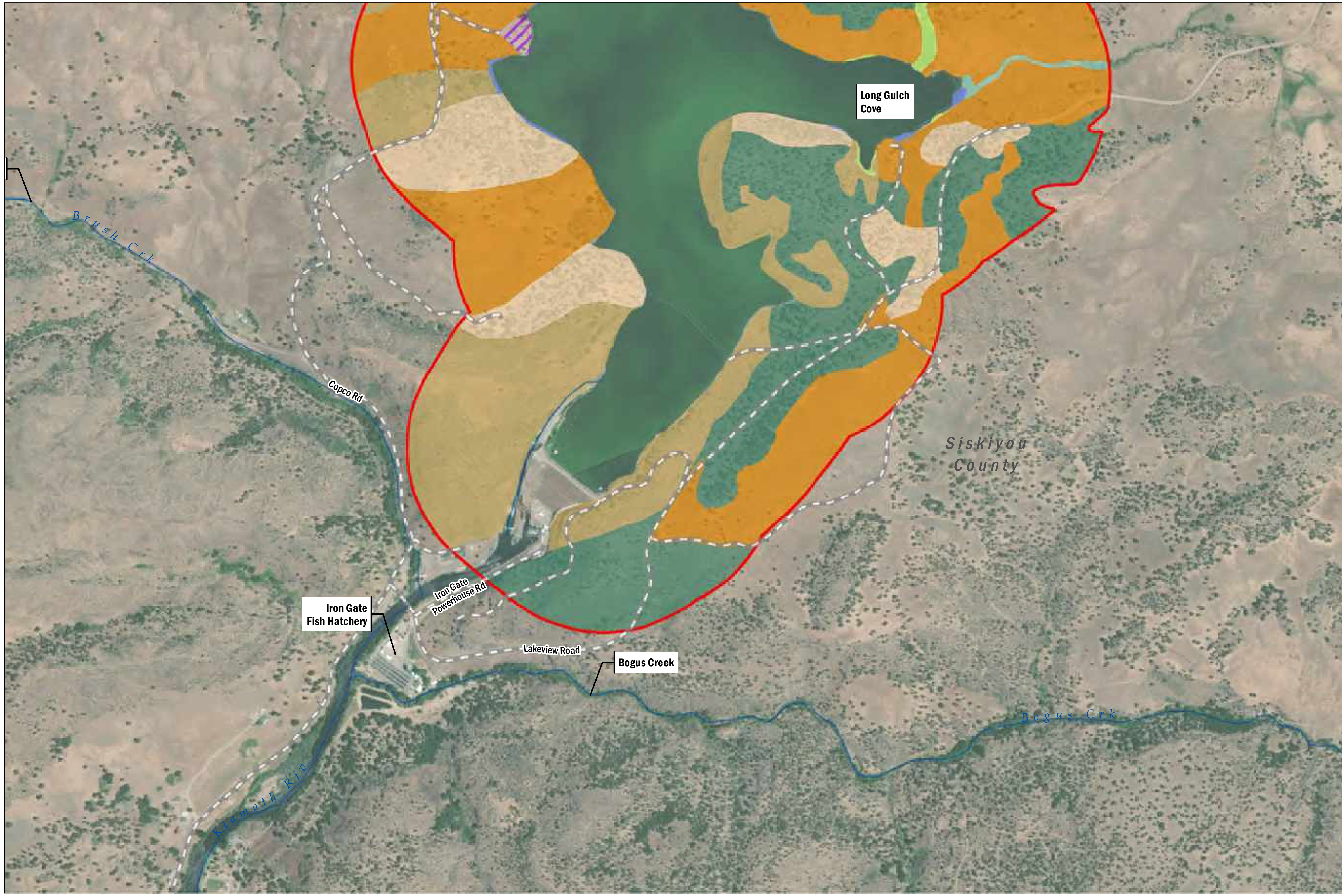
AECOM Oakland CA 3/20/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

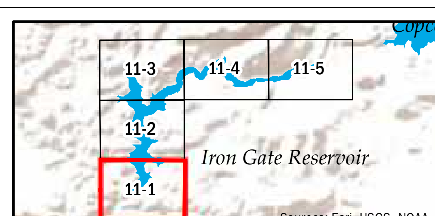


FIGURE 11-1
Vegetation Communities
Iron Gate Reservoir

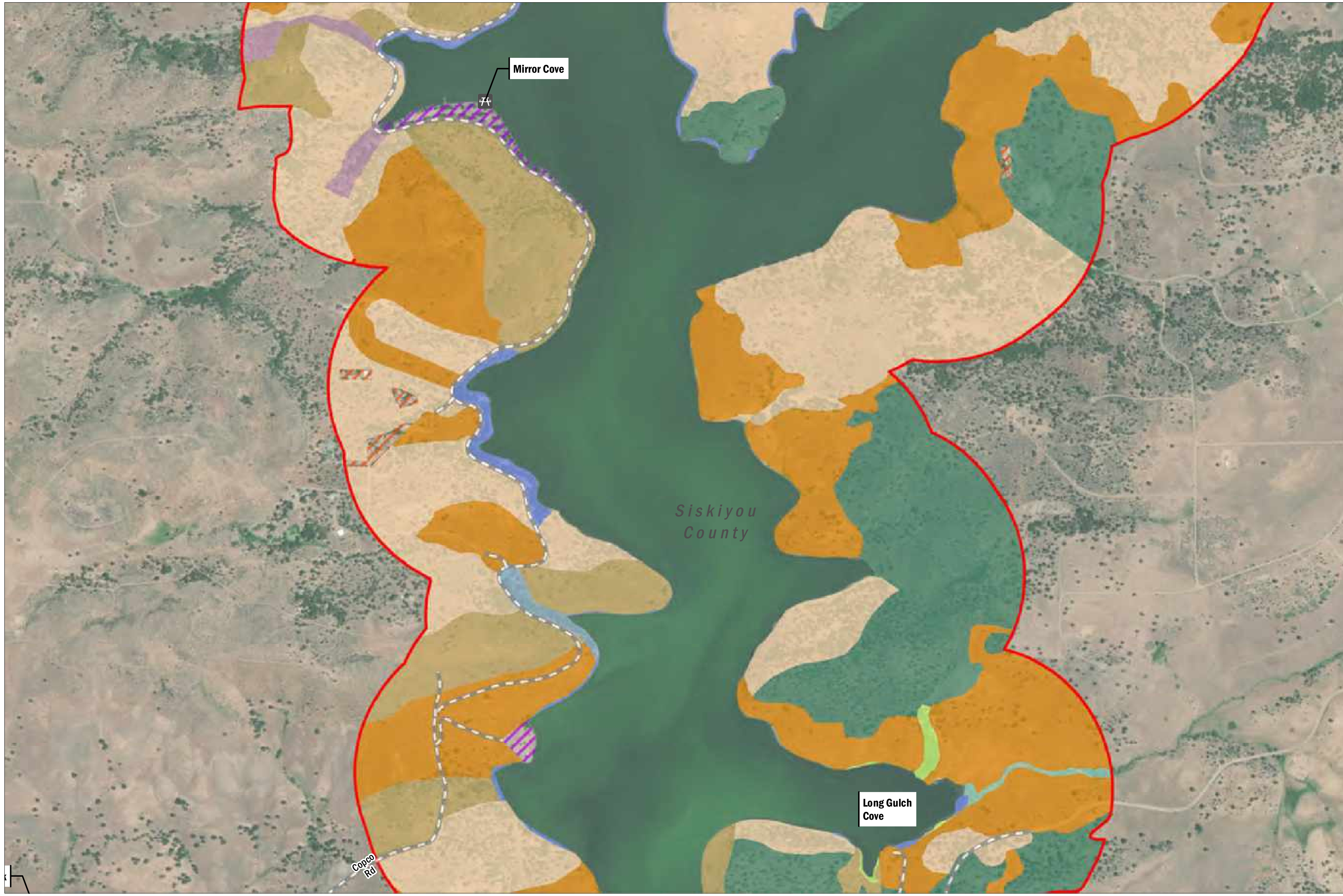
AECOM Oakland CA 3/20/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

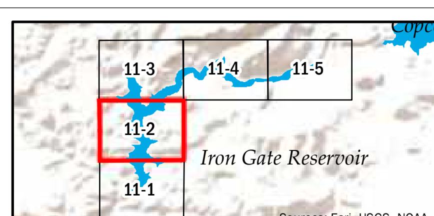
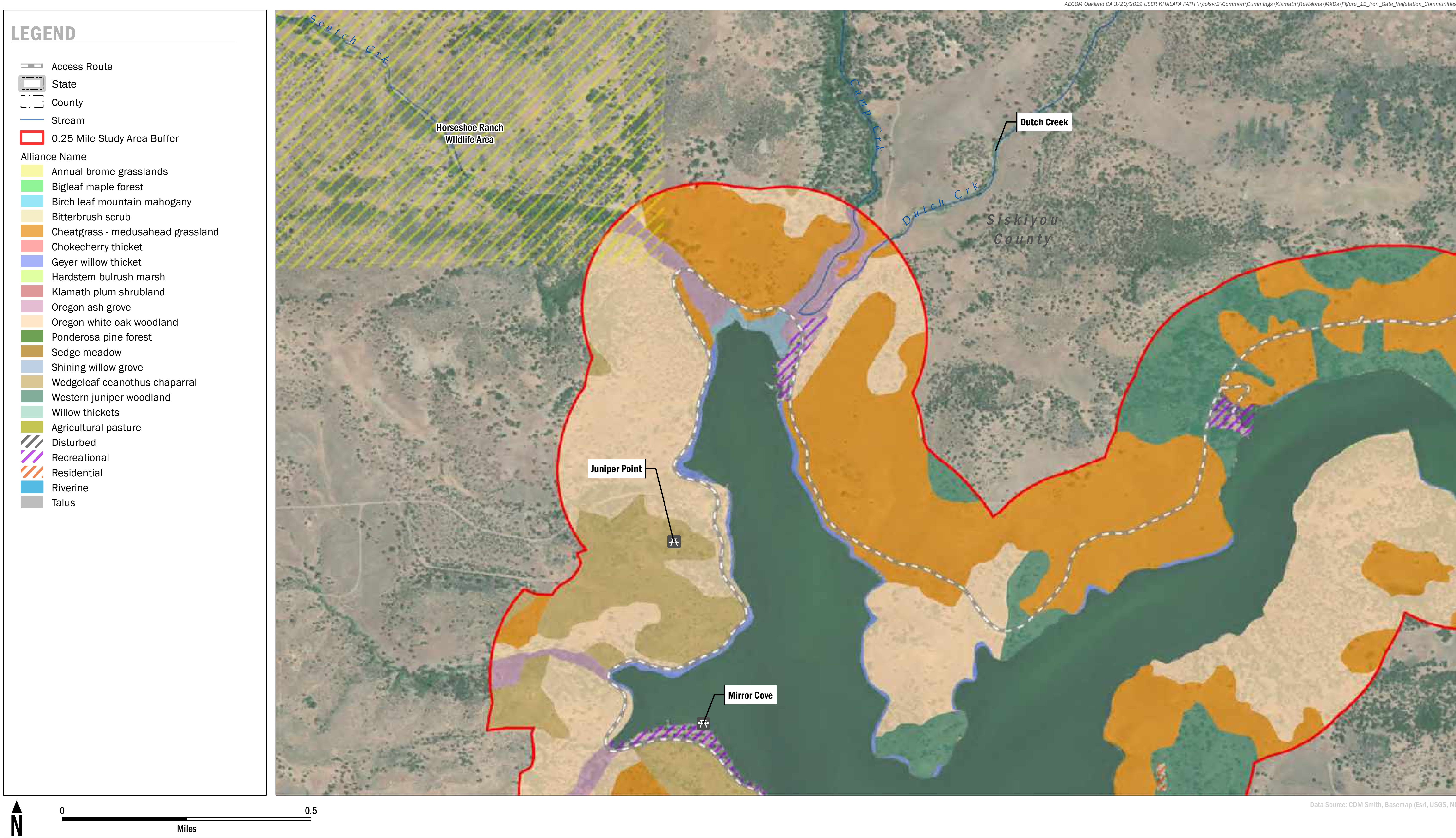


FIGURE 11-2
Vegetation Communities
Iron Gate Reservoir



Klamath River Renewal Corporation
Klamath River Renewal Project

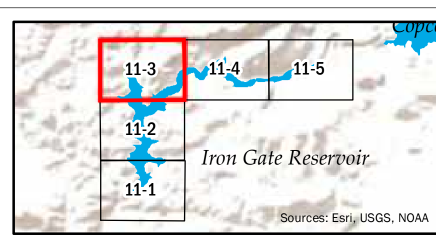


FIGURE 11-3
Vegetation Communities
Iron Gate Reservoir

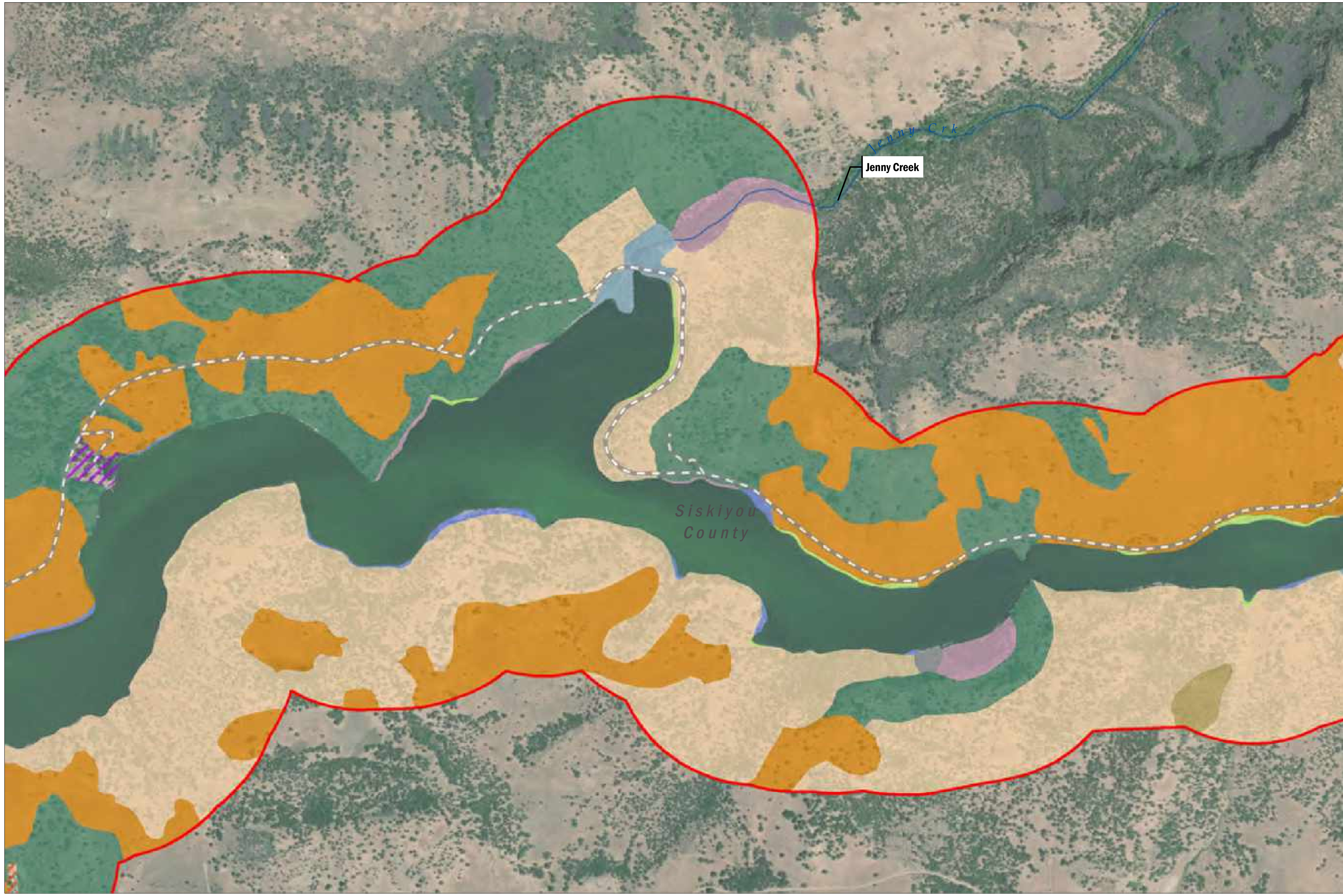
AECOM Oakland CA 3/20/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

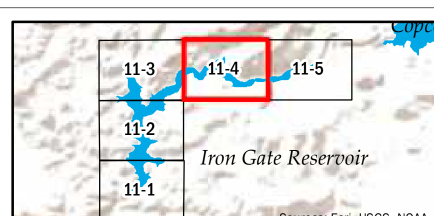


FIGURE 11-4

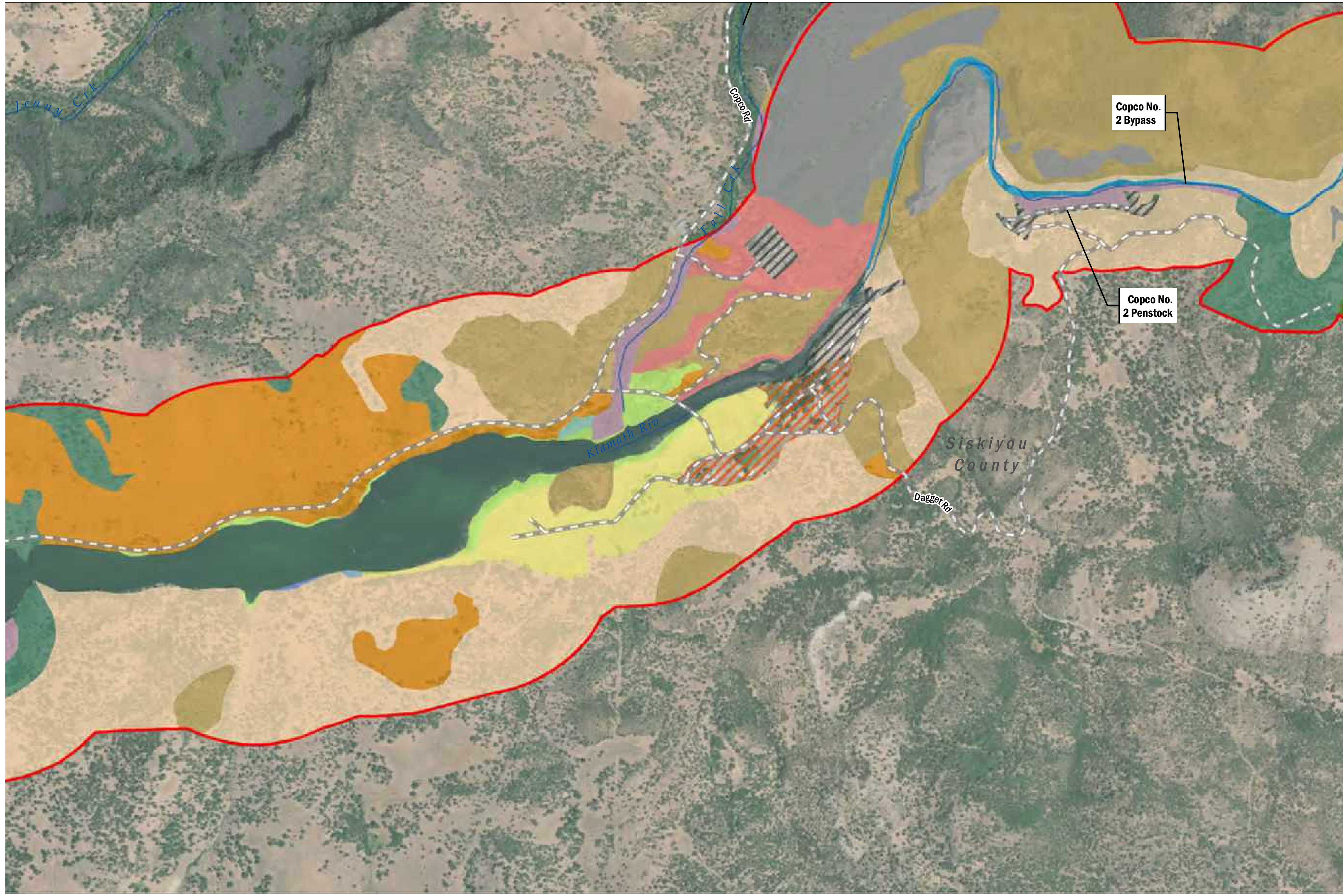
Vegetation Communities
Iron Gate Reservoir

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

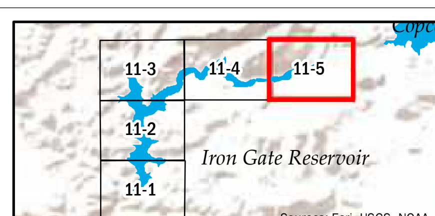
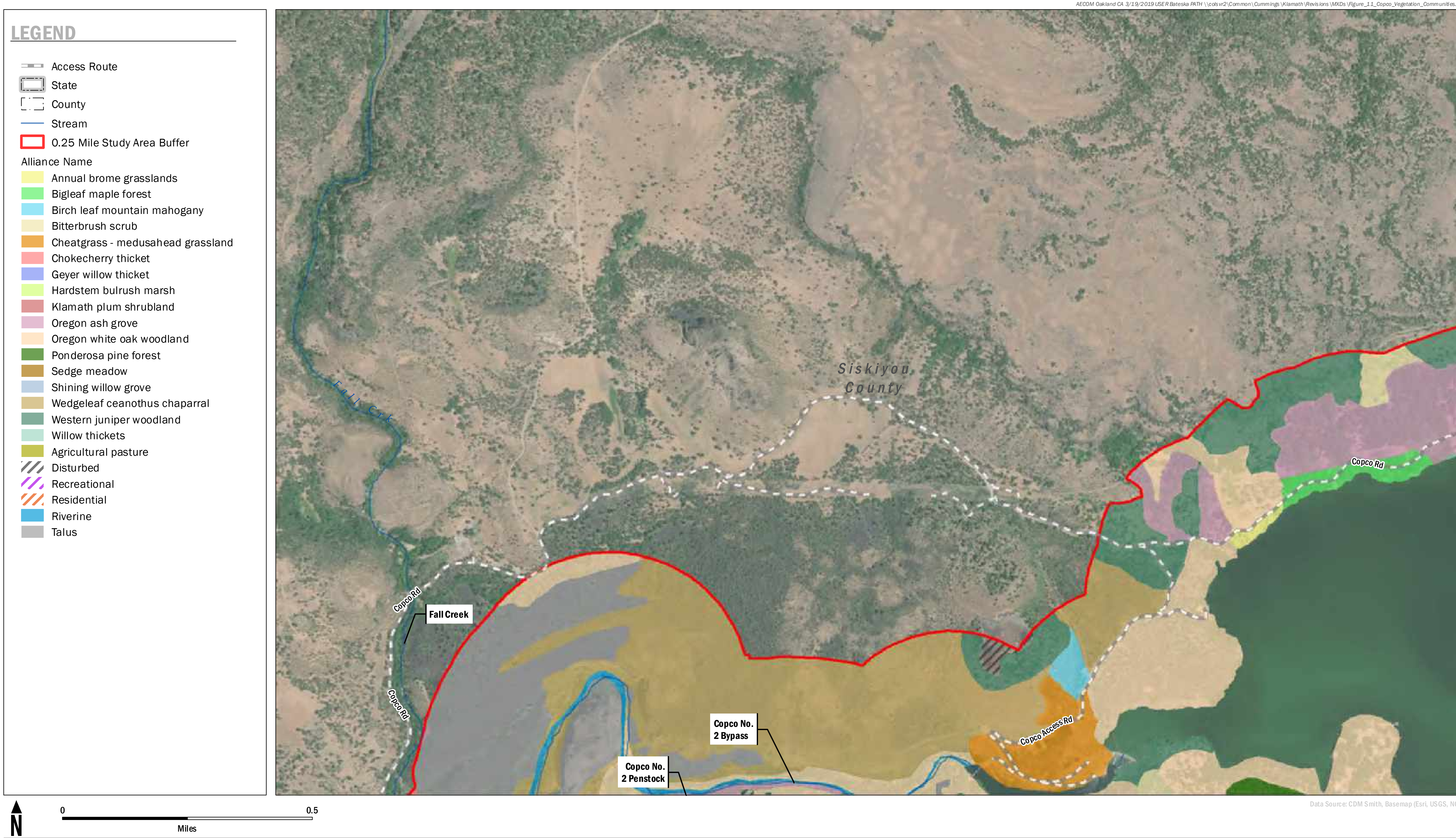


FIGURE 11-5

Vegetation Communities

Iron Gate Reservoir

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

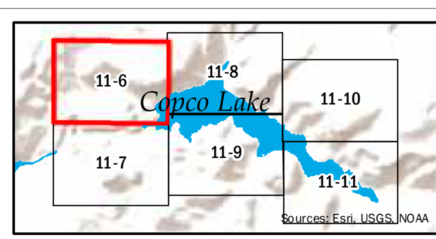


FIGURE 11-6
Vegetation Communities
Copco Lake

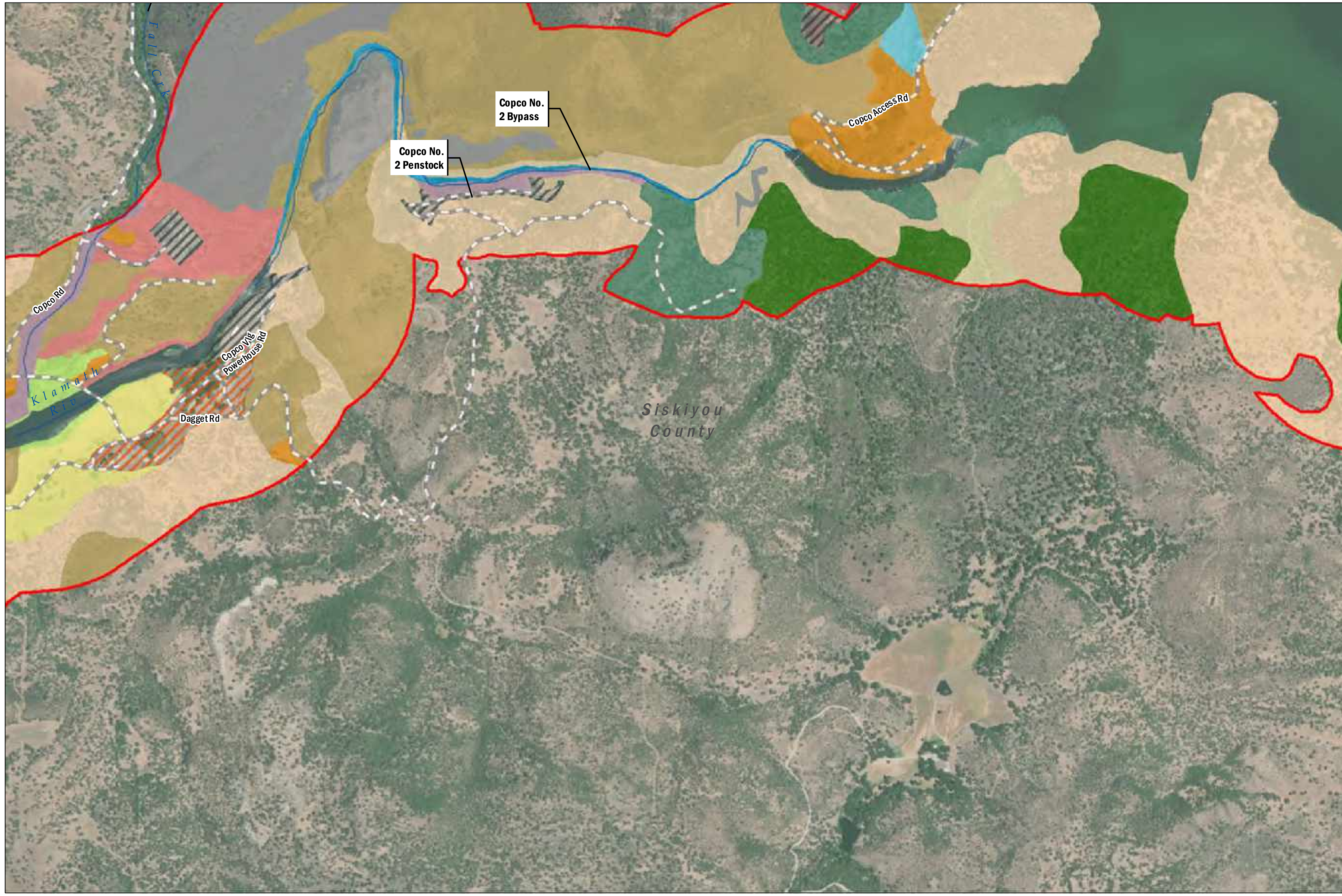
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

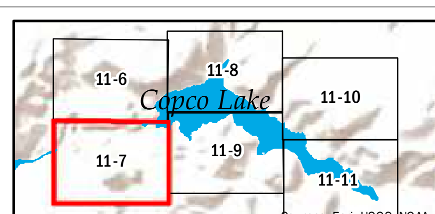


FIGURE 11-7
Vegetation Communities
Copco Lake

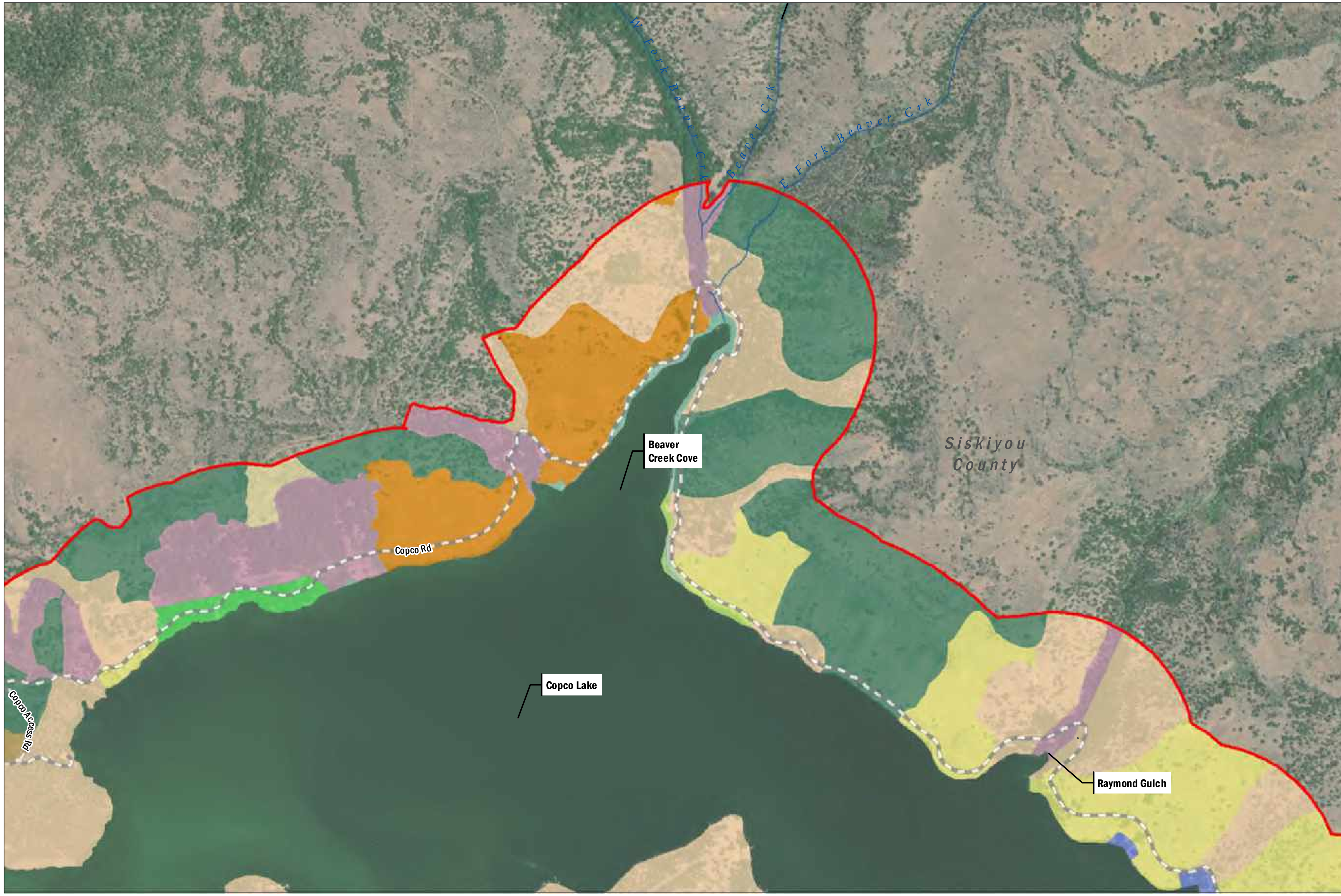
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

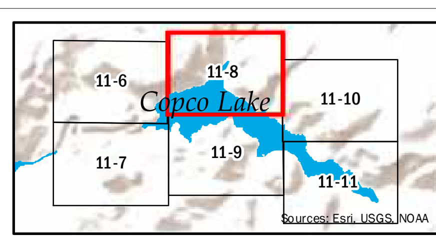


FIGURE 11-8

Vegetation Communities
Copco Lake

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

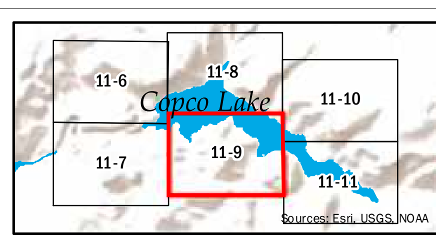


FIGURE 11-9

Vegetation Communities

Copco Lake

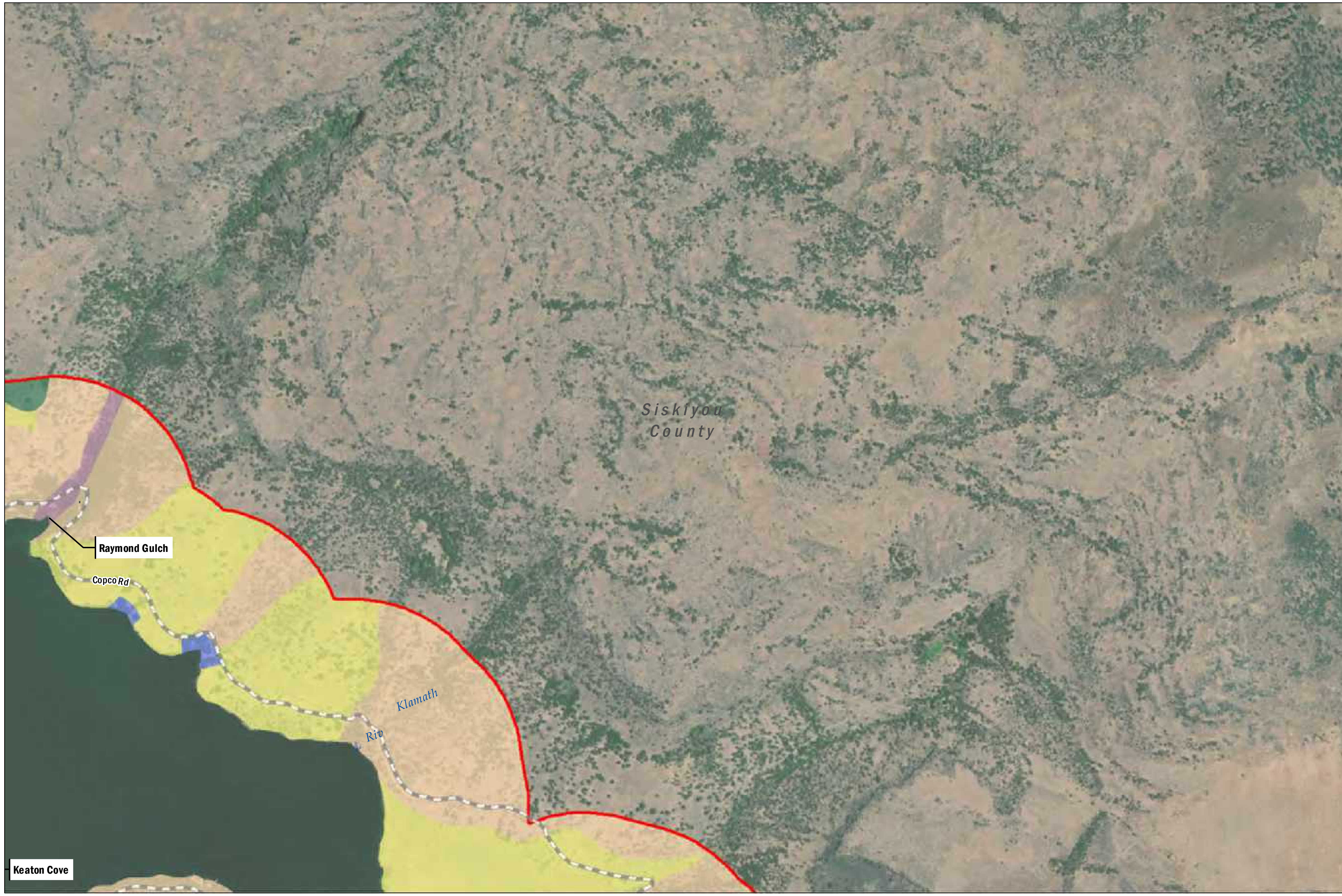
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5

Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

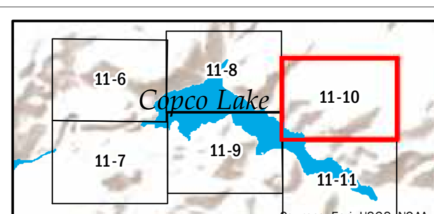


FIGURE 11-10

Vegetation Communities

Copco Lake

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

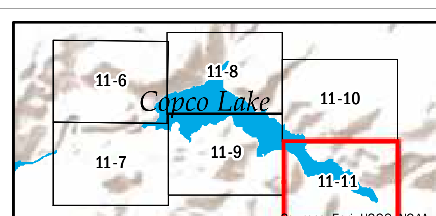


FIGURE 11-11
Vegetation Communities
Copco Lake

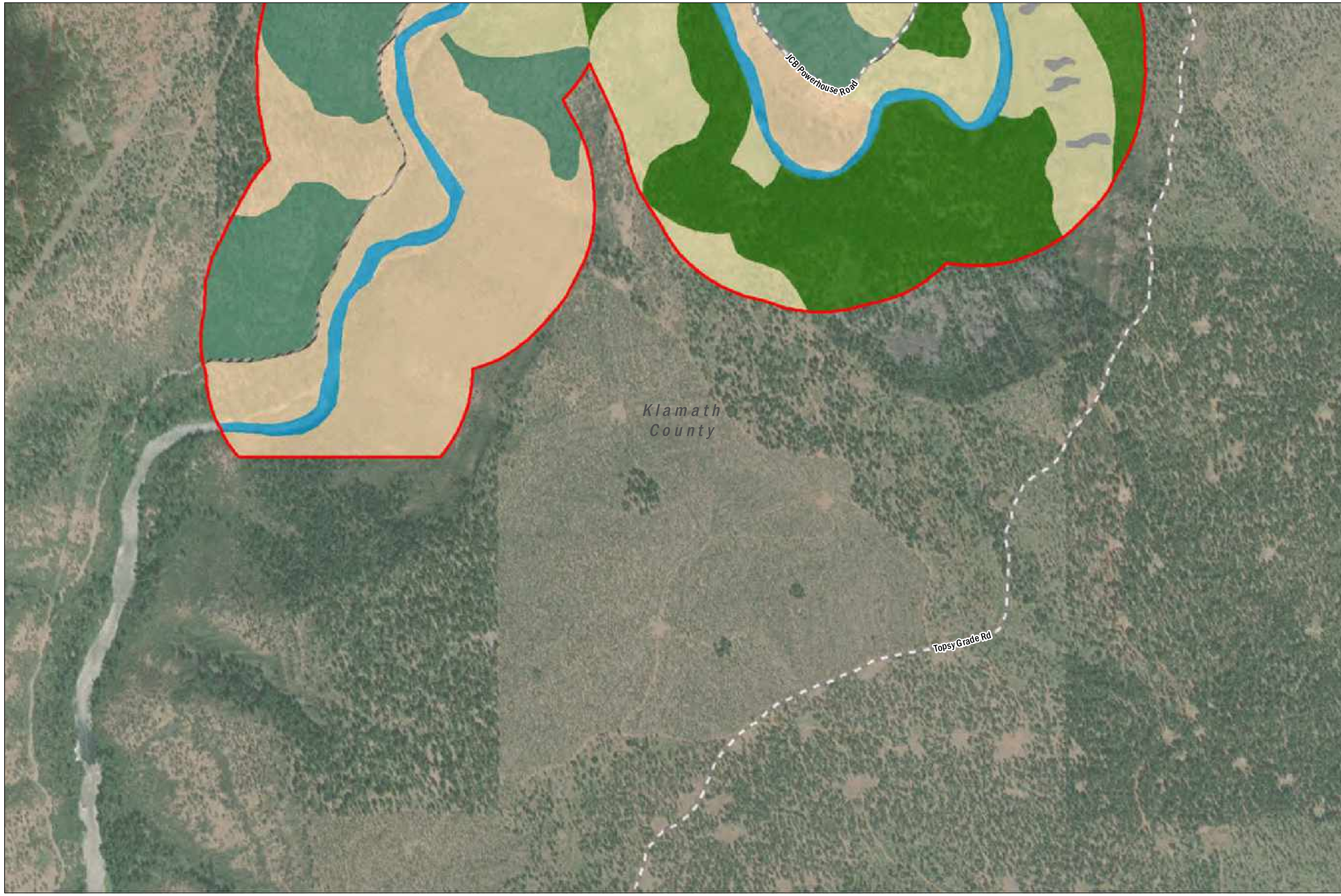
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5

Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

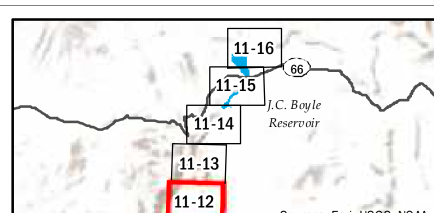


FIGURE 11-12

Vegetation Communities

JC Boyle Reservoir

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

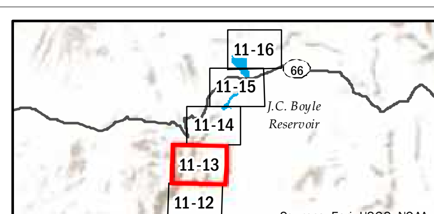


FIGURE 11-13

Vegetation Communities
JC Boyle Reservoir

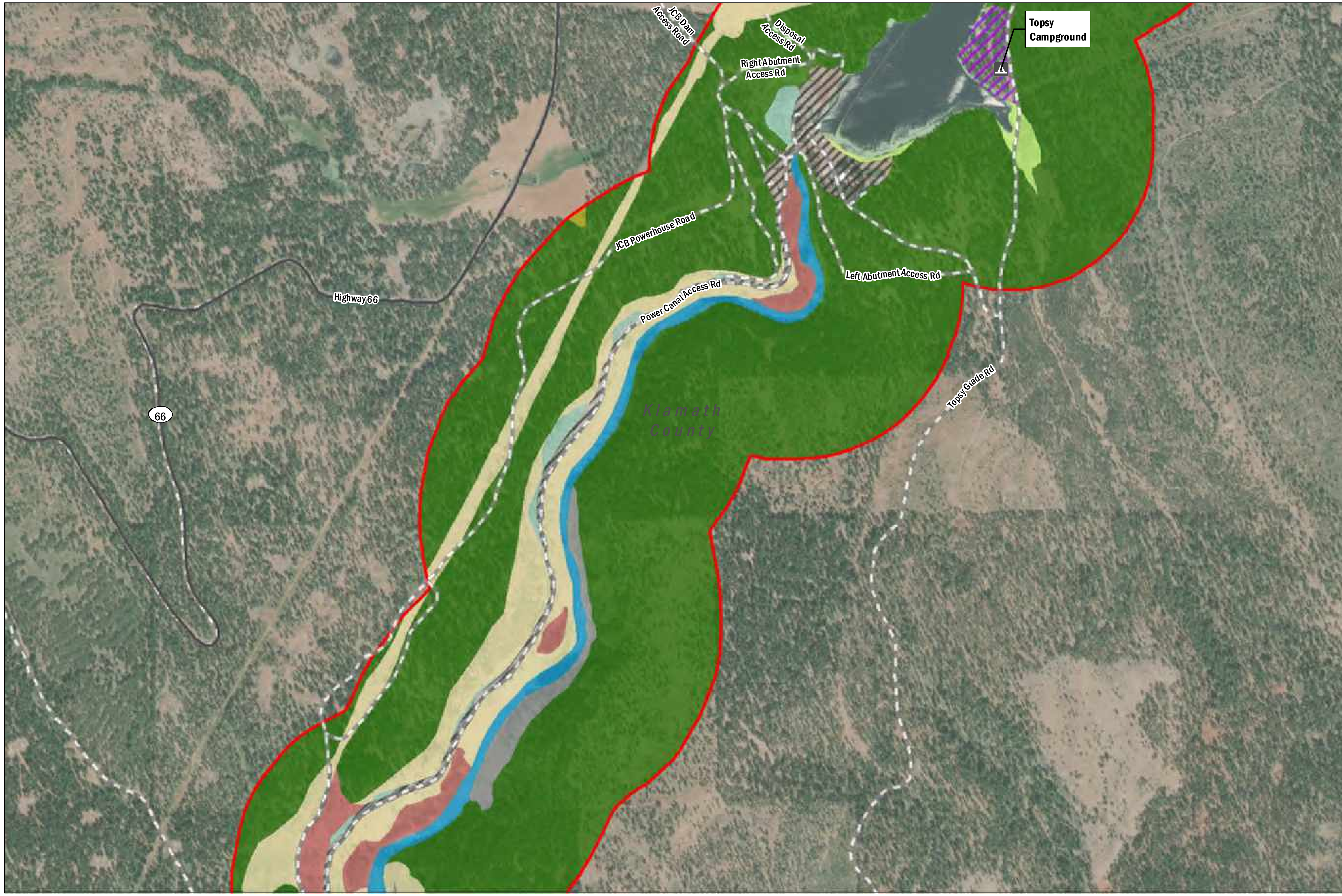
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5 Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

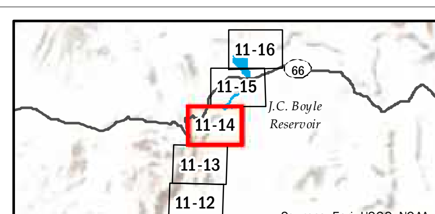


FIGURE 11-14
Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

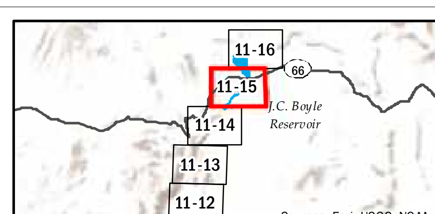
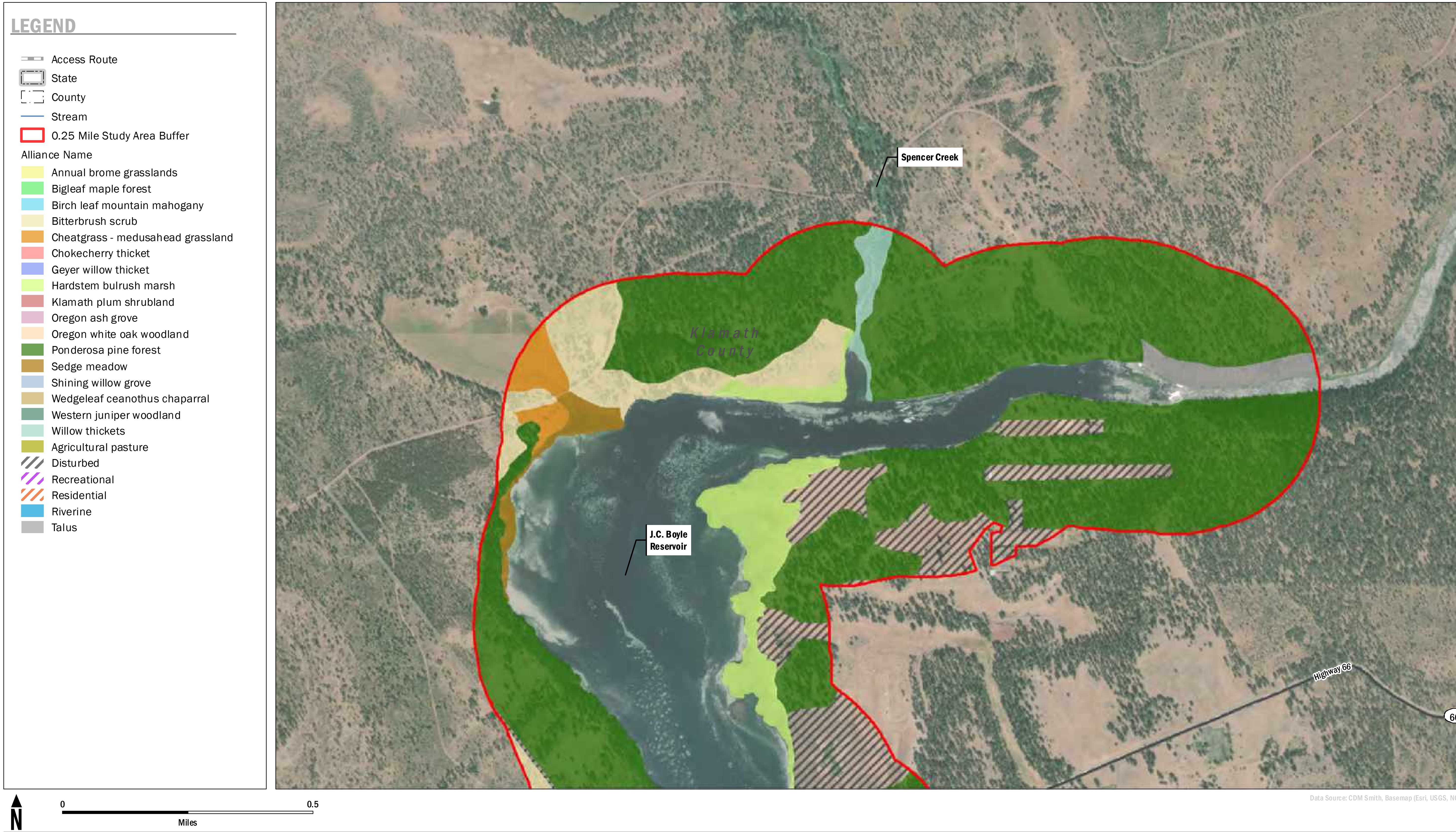


FIGURE 11-15

Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

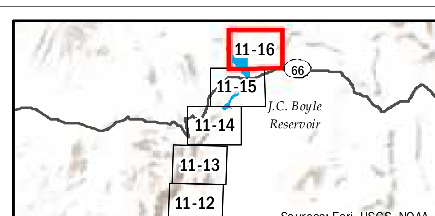
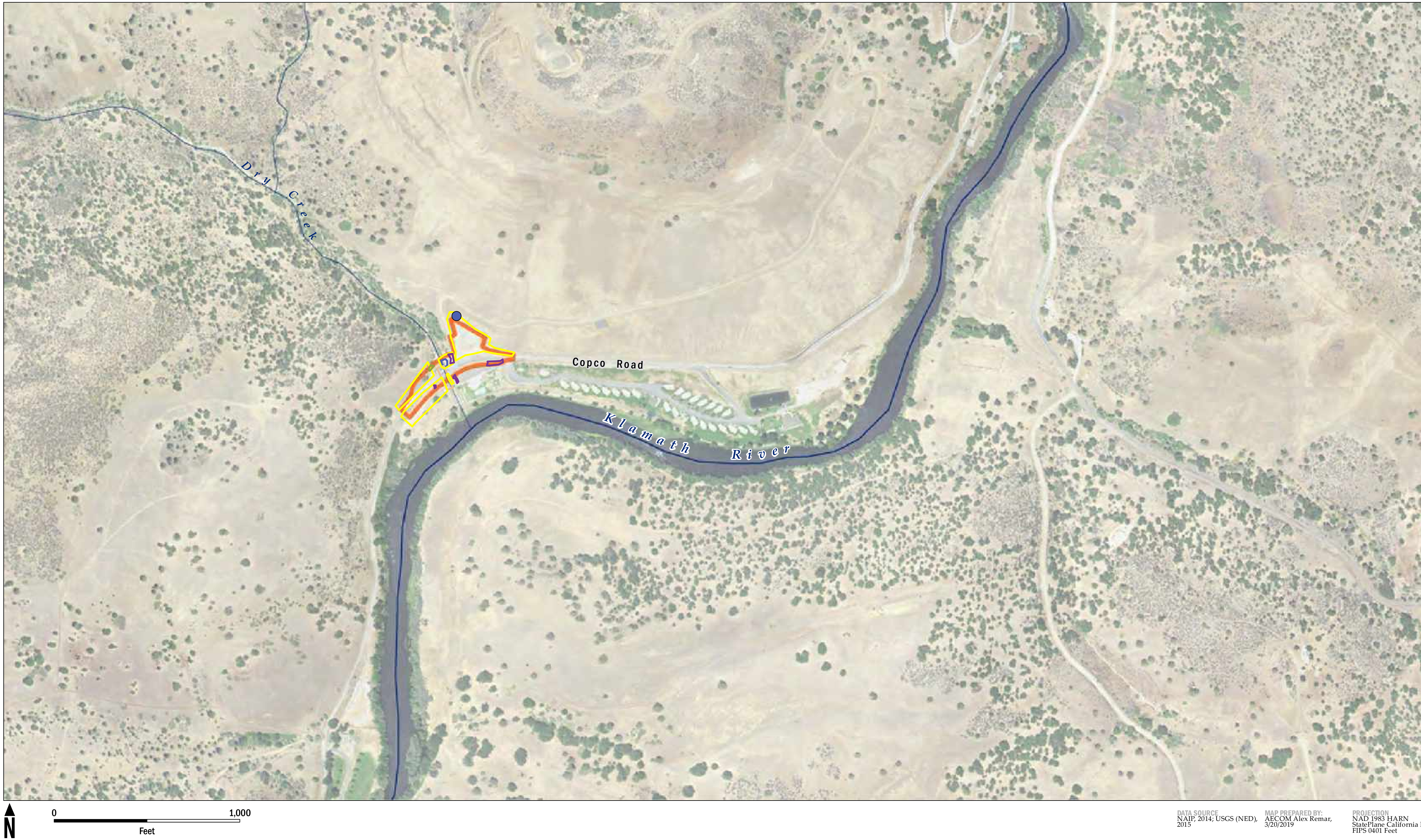


FIGURE 11-16

Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

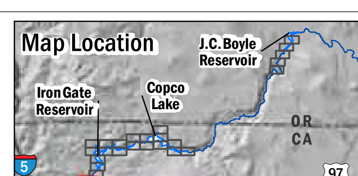


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



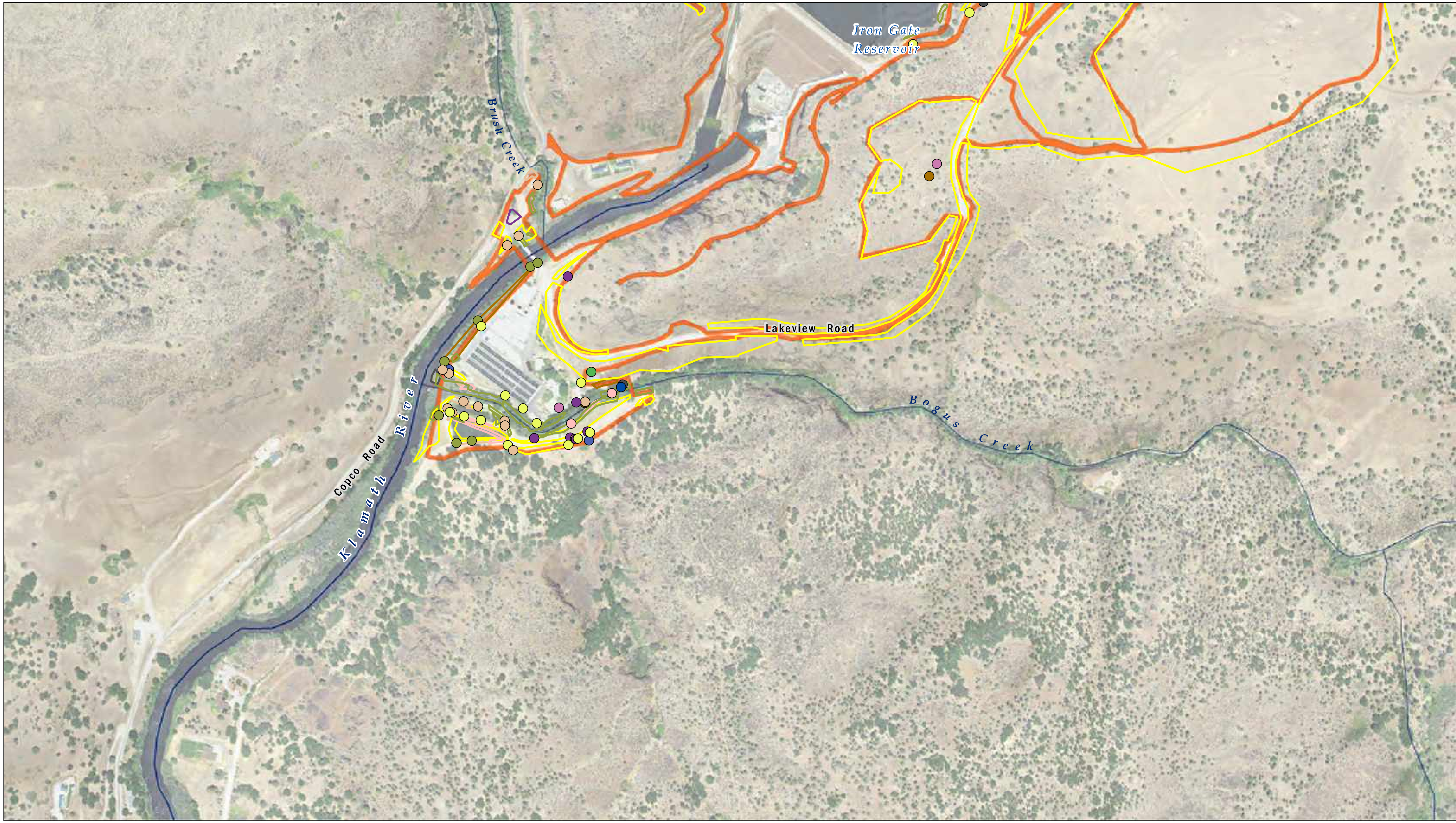
Klamath River
Streams
Limits of Work

Species - Surveyed Point
Convolvulus arvensis

Species - Surveyed Polygon
Centaurea solstitialis
Convolvulus arvensis
Dipsacus fullonum
Rubus armeniacus
Tribulus terrestris

FIGURE 12-1

Invasive Exotic Vegetation Observations



N

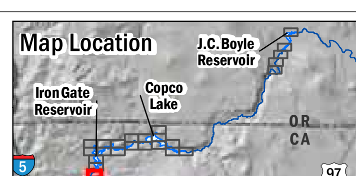
0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Centaurea solstitialis
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Isatis tinctoria
Phalaris arundinacea
Rubus armeniacus
Tribulus terrestris
Cirsium vulgare
Conium maculatum
Lepidium draba

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Rubus armeniacus
Tribulus terrestris
Conium maculatum
Lepidium draba

FIGURE 12-2
Invasive Exotic Vegetation Observations

N

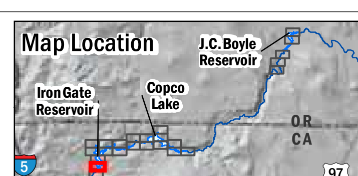
0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Centaurea solstitialis
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba
- Mentha pulegium

Species - Surveyed Polygon
- Bromus tectorum
- Centaurea solstitialis
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Rubus armeniacus

FIGURE 12-3

Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

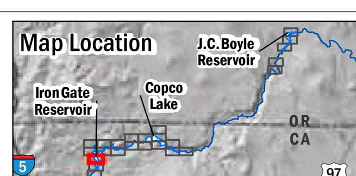
N
0
1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Isatis tinctoria
- Linaria vulgaris
- Phalaris arundinacea
- Rubus armeniacus
- Xanthium spinosum

Species - Surveyed Polygon
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Isatis tinctoria
- Phalaris arundinacea
- Rubus armeniacus
- Xanthium spinosum

FIGURE 12-4
Invasive Exotic Vegetation Observations

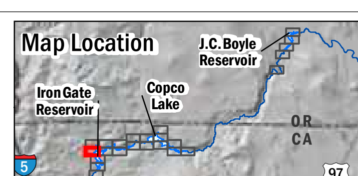
N
0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Dipsacus fullonum
Elymus caput-medusae
Mentha pulegium

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Rubus armeniacus

FIGURE 12-5
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

N
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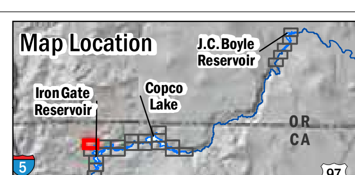
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Dipsacus fullonum
Phalaris arundinacea
Tribulus terrestris

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Rubus armeniacus
Tribulus terrestris
Conium maculatum

FIGURE 12-6
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

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Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

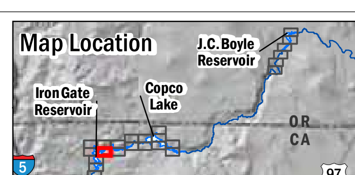
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River

Streams

Limits of Work

Species - Surveyed Point

Centaurea solstitialis

Phalaris arundinacea

Rubus armeniacus

Species - Surveyed Polygon

Centaurea solstitialis

Dipsacus fullonum

Elymus caput-medusae

Phalaris arundinacea

Rubus armeniacus

Xanthium spinosum

FIGURE 12-7

Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

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Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

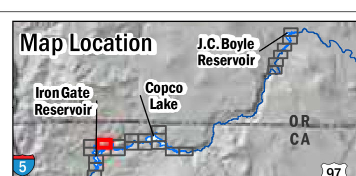
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River

Streams

Limits of Work

Species - Surveyed Point
- Centaurea solstitialis
- Dipsacus fullonum
- Isatis tinctoria
- Phalaris arundinacea

Species - Surveyed Polygon
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea

FIGURE 12-8

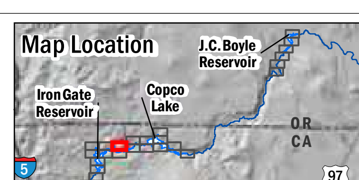
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Phalaris arundinacea

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus

FIGURE 12-9
Invasive Exotic Vegetation Observations

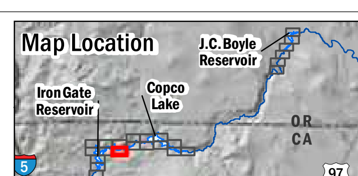
AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



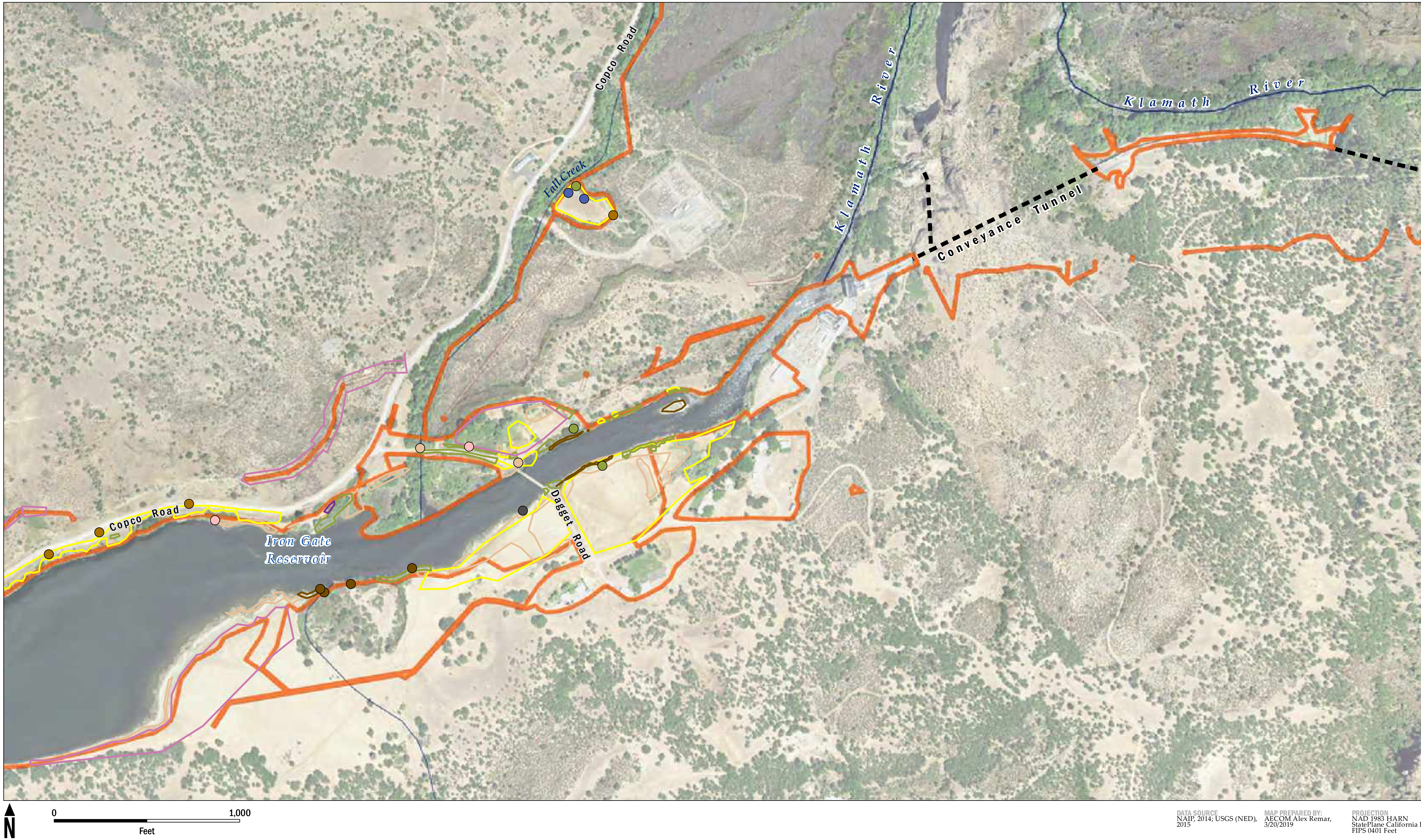
Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Lepidium draba

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus

FIGURE 12-10
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

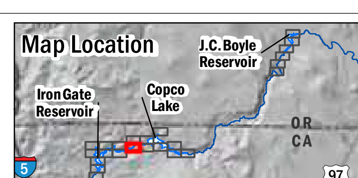


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

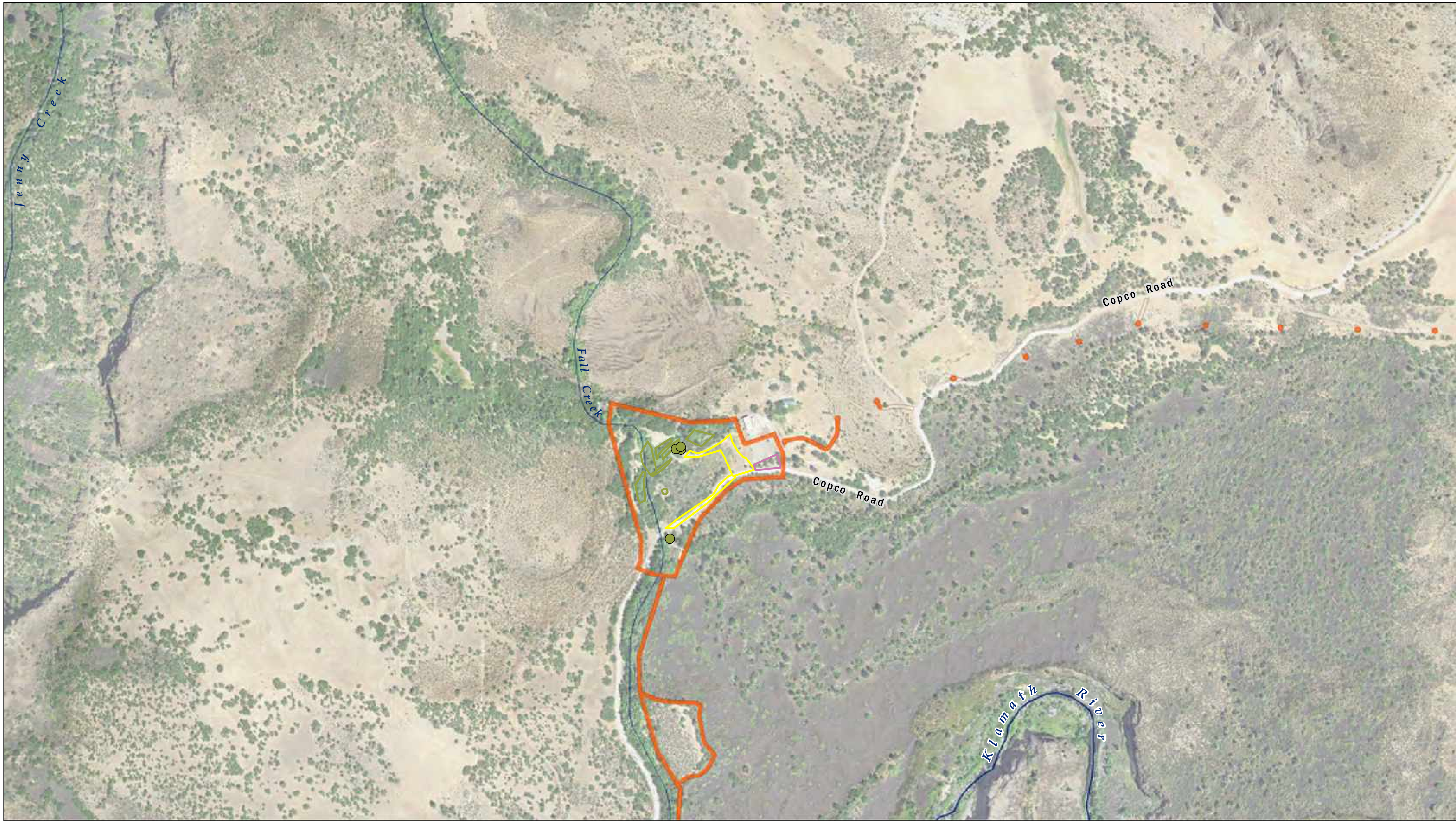


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Convolvulus arvensis
Dipsacus fullonum
Phalaris arundinacea
Rubus armeniacus
Conium maculatum
Lepidium draba

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Tribulus terrestris
Conium maculatum

FIGURE 12-11
Invasive Exotic Vegetation Observations



N

0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Location
J.C. Boyle Reservoir
Iron Gate Reservoir
Copco Lake
OR
CA
5
97

Klamath River
Streams
Limits of Work

Species - Surveyed Point
Rubus armeniacus

Species - Surveyed Polygon
Centaurea solstitialis
Elymus caput-medusae
Rubus armeniacus

FIGURE 12-12

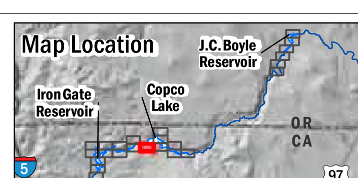
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

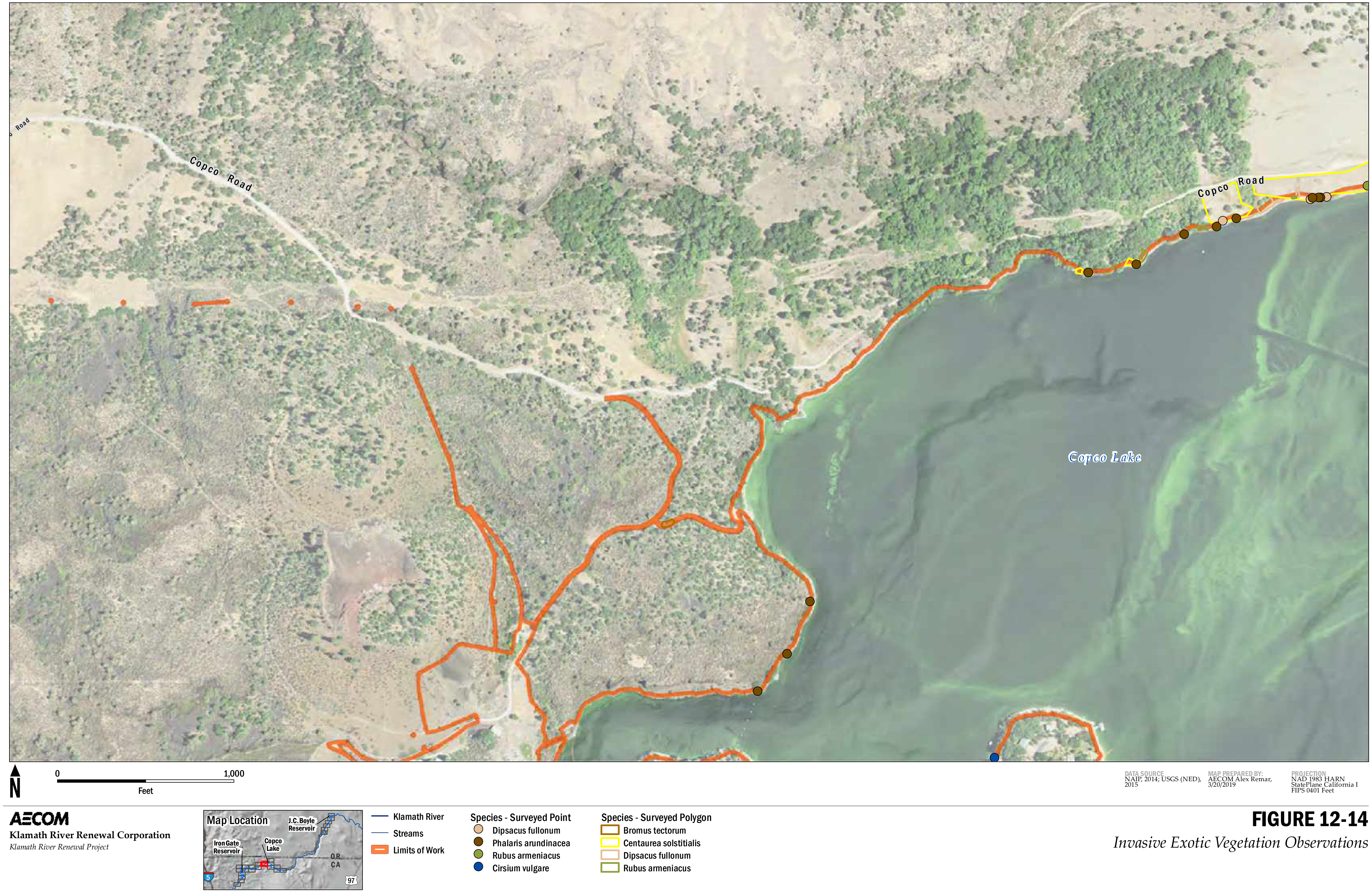


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Cirsium vulgare

Species - Surveyed Polygon
Dipsacus fullonum
Elymus caput-medusae
Rubus armeniacus

FIGURE 12-13
Invasive Exotic Vegetation Observations



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

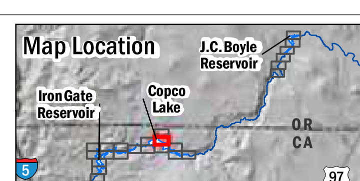
FIGURE 12-14
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



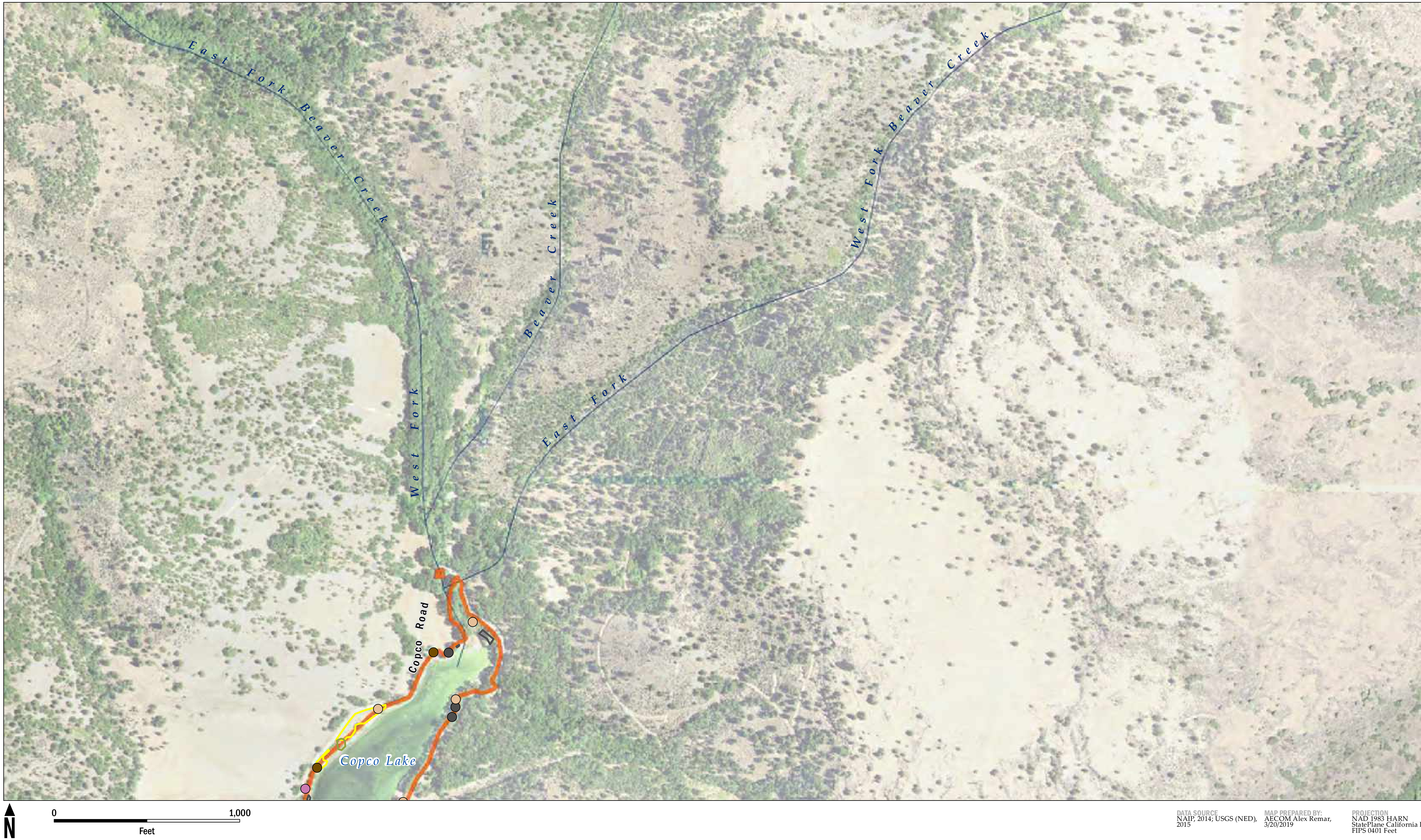
- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba

Species - Surveyed Polygon
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba

FIGURE 12-15
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EN 2018 Annual Report Mapbook.mxd

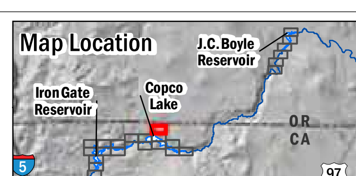


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Lepidium draba

Species - Surveyed Polygon
- Centaurea solstitialis
- Dipsacus fullonum
- Rubus armeniacus
- Lepidium draba

FIGURE 12-16
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

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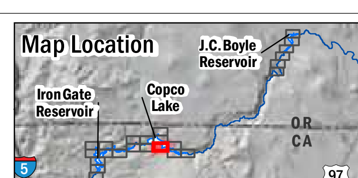
DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Carduus nutans
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Cirsium vulgare
Lepidium draba

Species - Surveyed Polygon
Bromus madritensis ssp. rubens
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Lepidium draba

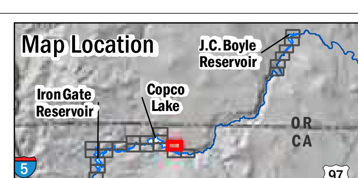
FIGURE 12-17
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus madritensis ssp. rubens
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Conium maculatum

Species - Surveyed Polygon
Bromus madritensis ssp. rubens
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Lepidium draba

FIGURE 12-18

Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

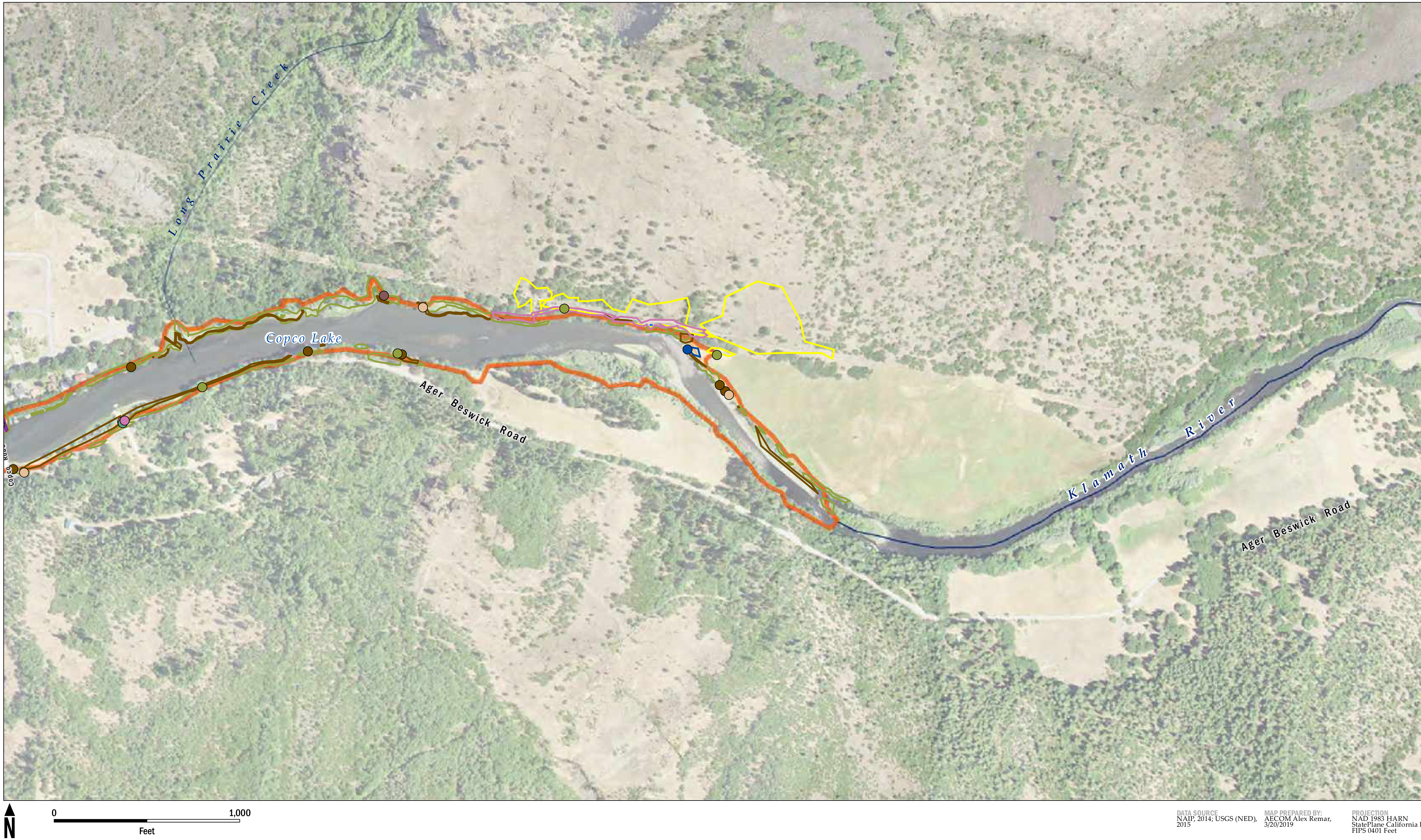
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 12-19
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

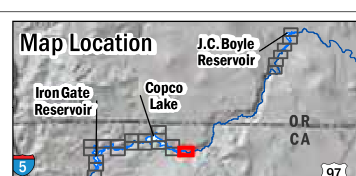


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

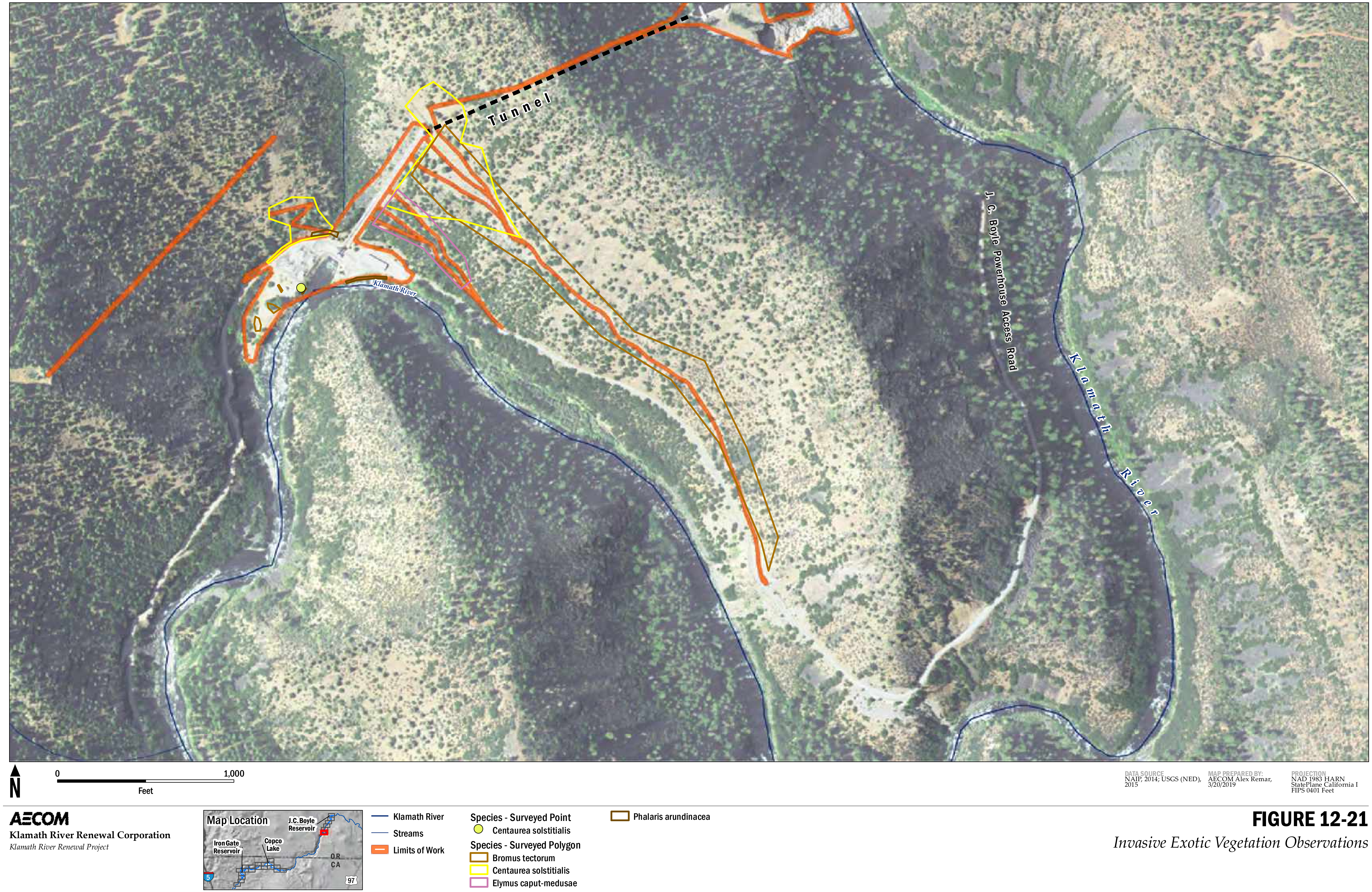


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Carduus nutans
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Bromus diandrus
Cirsium vulgare
Conium maculatum
Marrubium vulgare

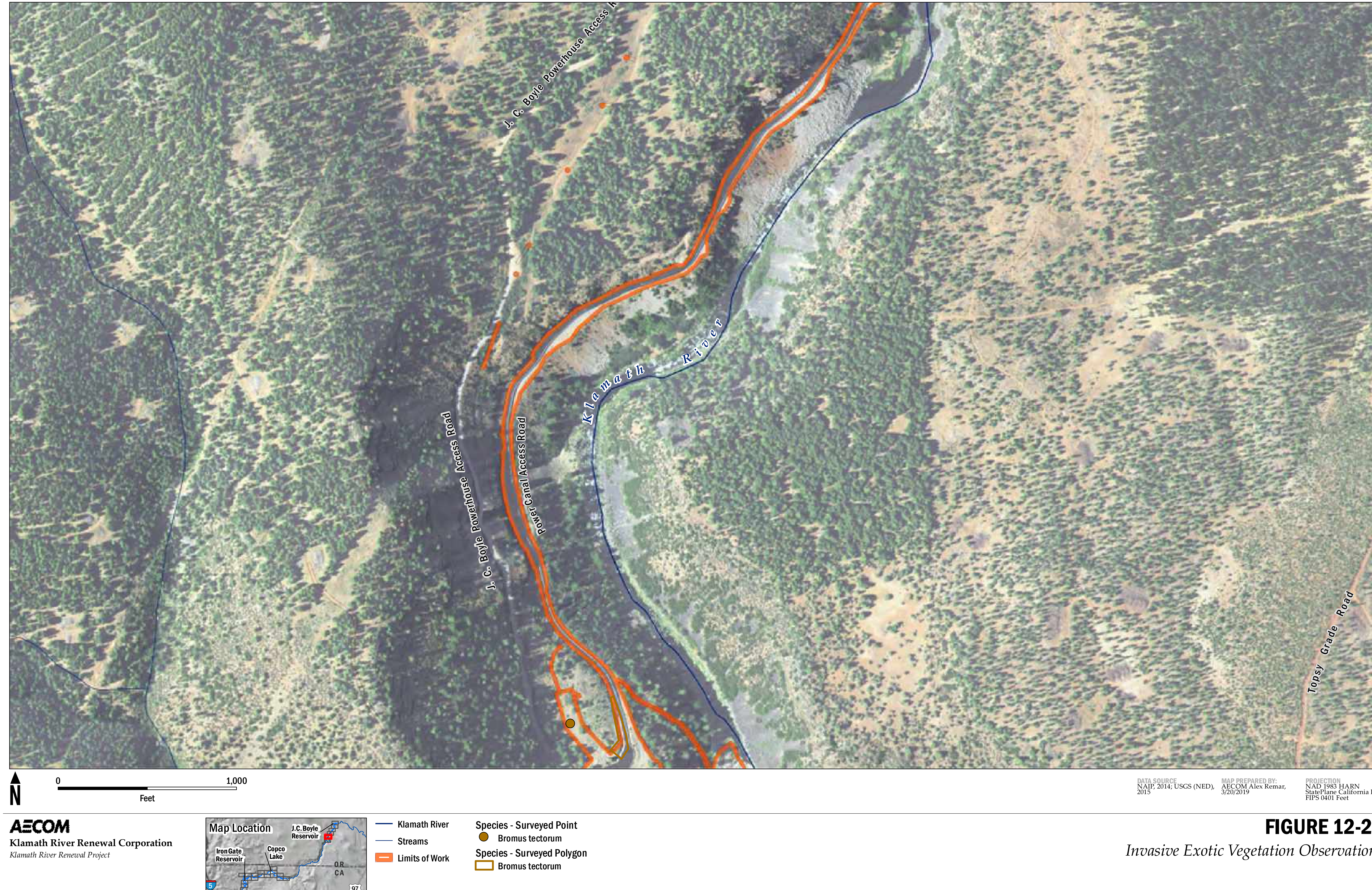
Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Tribulus terrestris
Aegilops cylindrica
Cirsium vulgare

FIGURE 12-20
Invasive Exotic Vegetation Observations



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 12-21
Invasive Exotic Vegetation Observations



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

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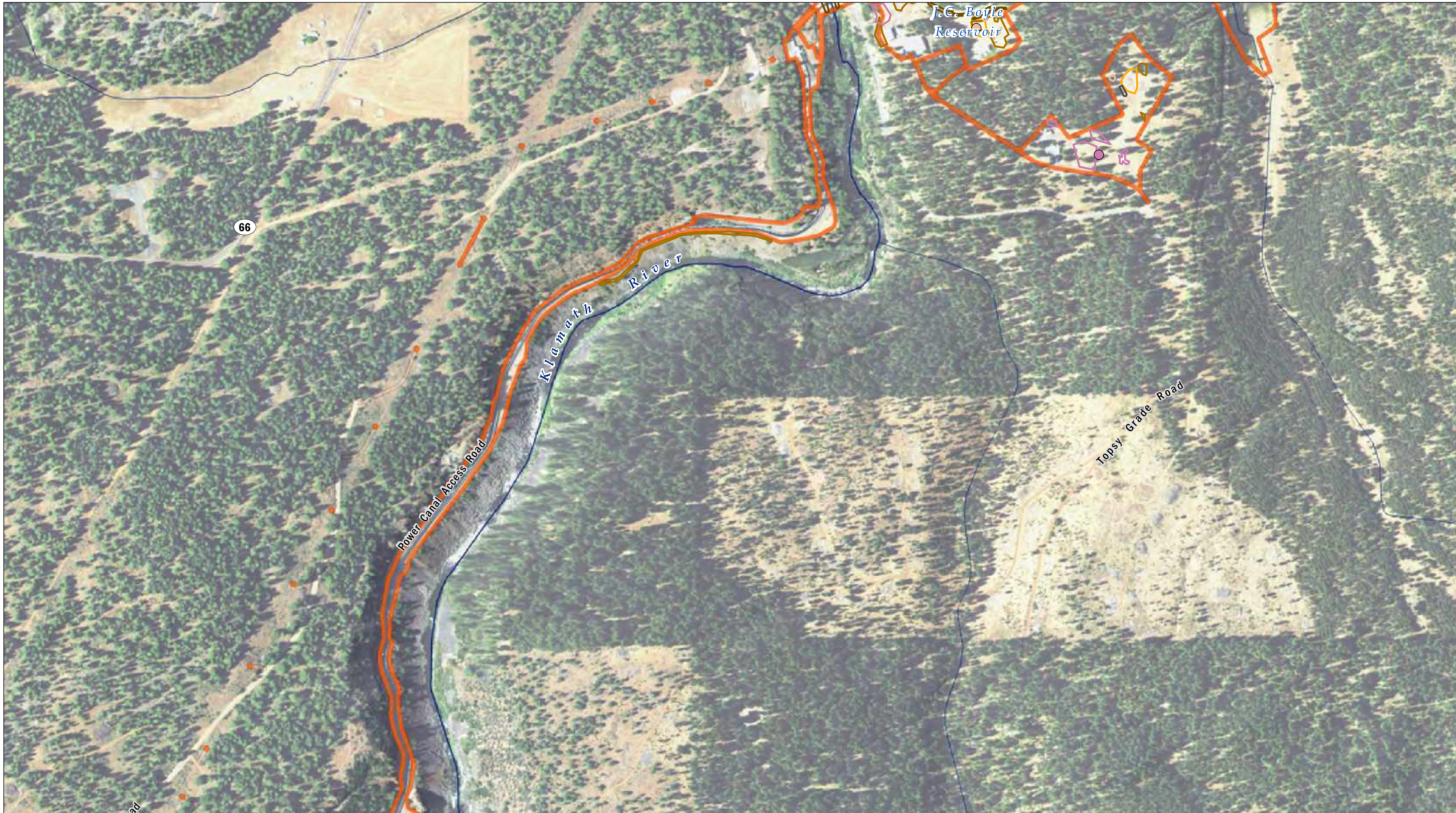
Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 12-22
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

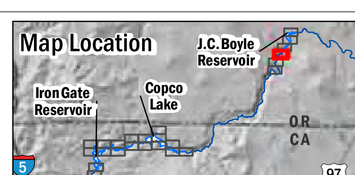


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



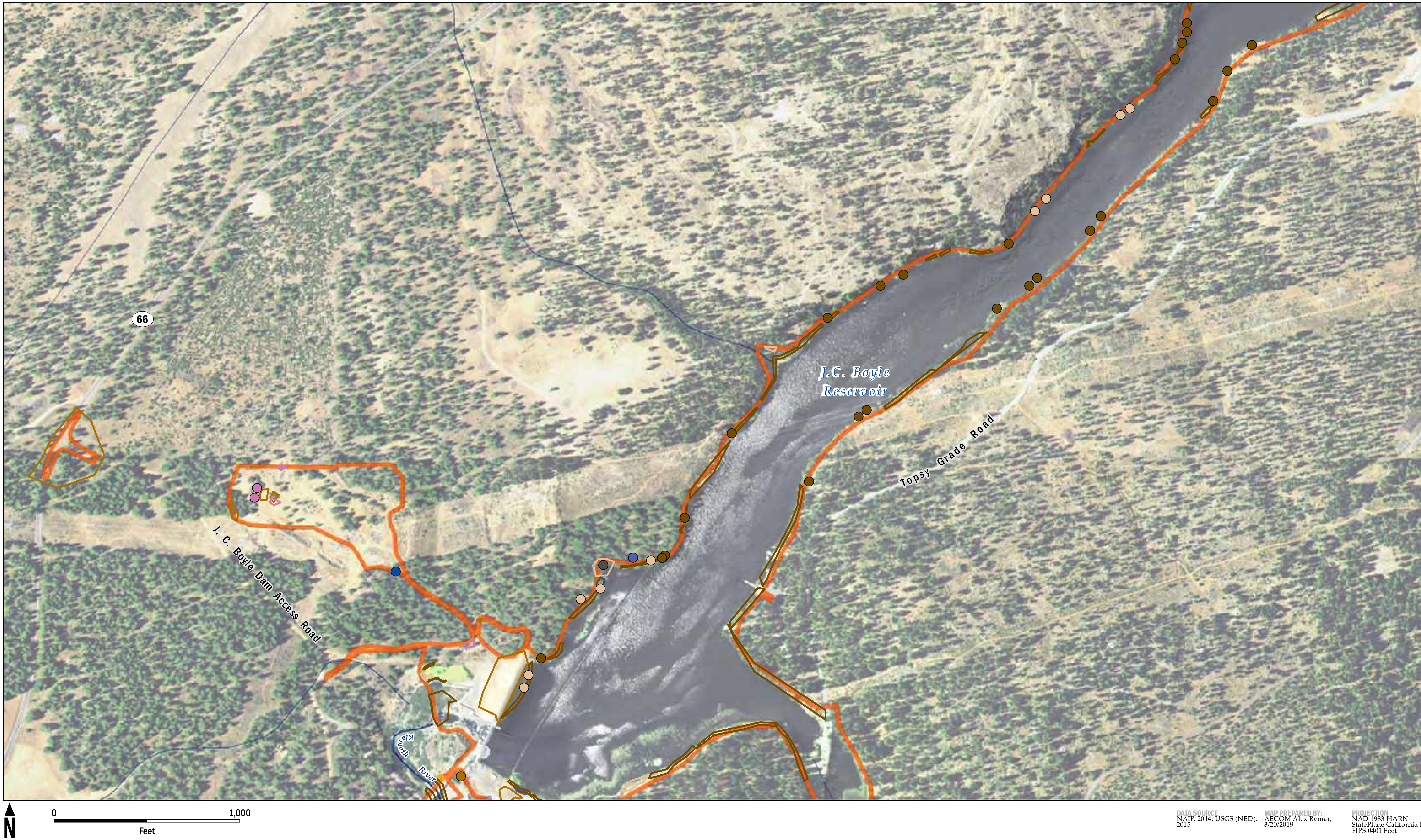
Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Elymus caput-medusae

Species - Surveyed Polygon
Onopordum acanthium
Bromus tectorum
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Lepidium draba

FIGURE 12-23
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

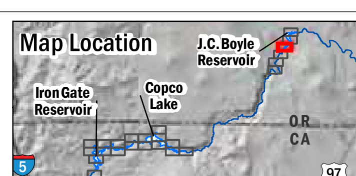
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Cirsium vulgare
- Lepidium draba

Species - Surveyed Polygon
- Onopordum acanthium
- Bromus tectorum
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Lepidium draba

FIGURE 12-24

Invasive Exotic Vegetation Observations

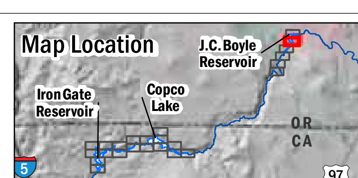
AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

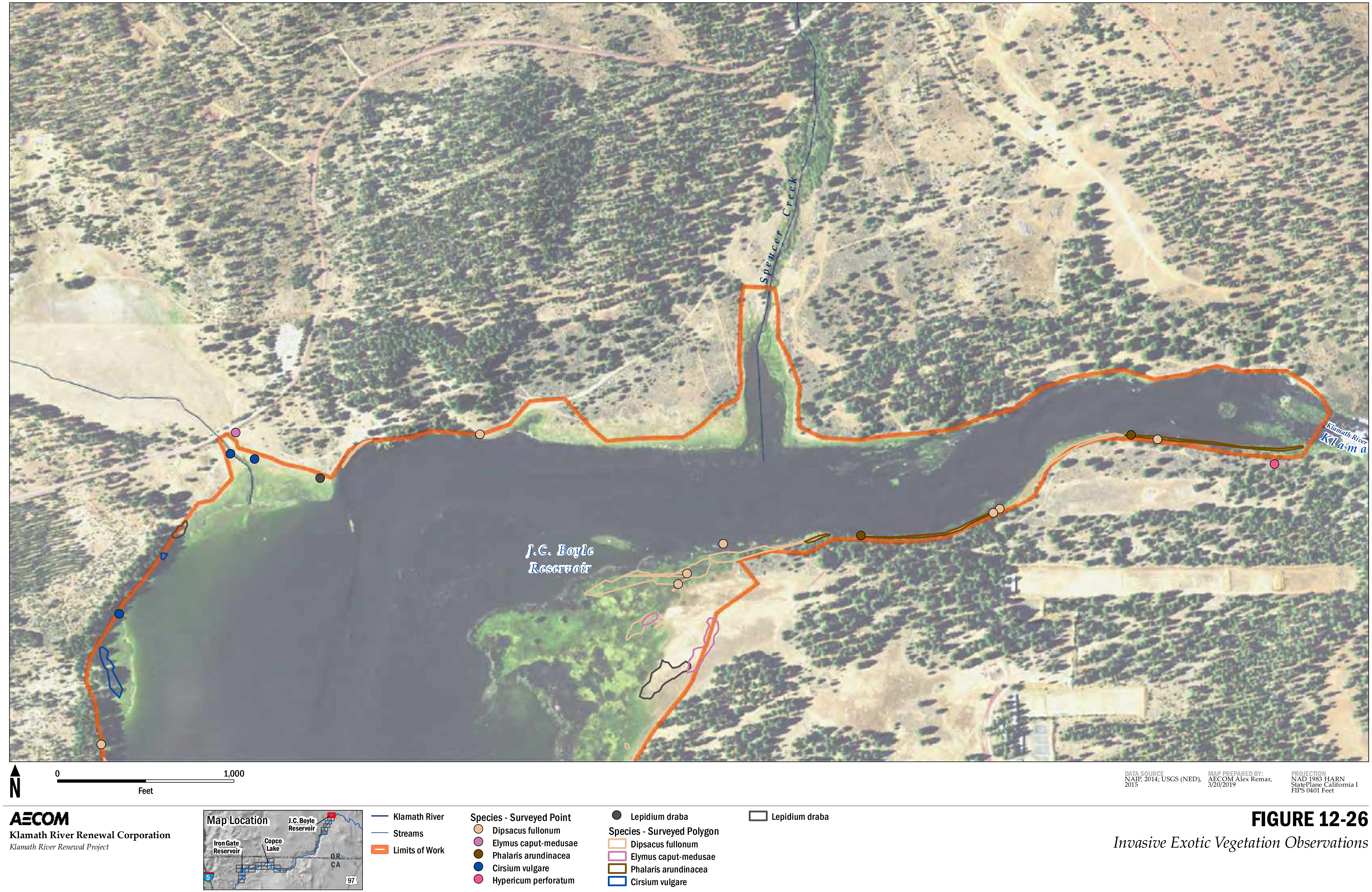


Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Dipsacus fullonum
- Phalaris arundinacea
- Cirsium vulgare
- Lepidium draba

Species - Surveyed Polygon
- Bromus tectorum
- Dipsacus fullonum
- Phalaris arundinacea
- Rubus armeniacus

FIGURE 12-25
Invasive Exotic Vegetation Observations



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 12-26

Invasive Exotic Vegetation Observations

Appendix B Northern Spotted Owl Survey Data Sheets

Visit 1: April 24-25, 2018
Surveyor(s): Lidia D'Amico, AECOM; Jennifer Jones, CDM Smith

4/24/2018 Klamath Dam NSO Detection Surveys Weather: 68 F, partly cloudy, 0-5mph wind NE				
Station	Begin Time	End Time	NSO Detection	Notes
5	20:43	20:53	No	Canada Geese heard calling from reservoir
4	21:15	21:25	No	
7	21:40	21:50	No	
14	22:00	22:10	No	Bats heard
16	22:19	22:30	No	Heard frogs and bats
15	22:36	22:46	No	Bat species flyover
18	22:52	23:02	No	
17	23:10	23:20	No	Site adjacent to the Klamath River, ambient noise from river

4/25/2018 Klamath Dam NSO Detection Surveys Weather: 64 F, clear, 0-4 mph wind WNW				
Station	Begin Time	End Time	NSO Detection	Notes
8	20:35	20:45	No	Bat species flyover
12	21:00	21:10	No	Surveyed from edge of stand, walked into area approximately 260 feet from access road.
6	21:25	21:35	No	Site adjacent to off-site recreation area; bonfire pit.
10	21:40	21:50	No	Performed outside of Pacificorp Property; stood at edge of boundary. Saw raccoons
11	22:02	22:12	No	Great-horn owl detected
9	22:35	22:45	No	
13	22:55	23:05	No	

Note: Did not survey stations located on PacifiCorp property (Stations 1 and 3) due to lack of access agreement. Unable to access proposed Station 2 (west of dam); station is behind fence on private property.

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date: _5/29/2018__ **Site Name:** J.C. Boyle Dam
Surveyor(s): Jennifer Jones, Kent Barnes **Visit #:** __2_ **Outing #**__1___
Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*
Moon phase: *Full* *Half* *Quarter* *None*
Wind: 0 1 2 3 4 5 Temp:__54____ Rain In prior 24hrs: YES NO
Type of Survey: ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
17	2107	2119	Chorus Frogs	NR
18	2128	2140	Quiet	NR
15	2150	2200		NR
16	2210	2221	Chorus Frogs	NR
14	2229	2241	Crickets	NR
7	2250	2303	Unidentified Raptor call	NR
11	2318	2334	Great Horned Owl very distant Coyote vocalizations toward reservoir	NR
10	2341	2358	Second group of coyote vocalizations off toward the East	NR
5	2410	2421		NR

NSO Detection?	**Y**	**N**
BAOW Detection:	**Y**	**N**

NSO Survey Data Sheet

Date: 5/30/2018 **Site Name:** J.C. Boyle Dam Site

Surveyor(s): Jennifer Jones, Kent Barnes **Visit #:** 2 **Outing #** 2

Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*

Moon phase: *Full* *Half* *Quarter* *None*

Wind: 0 1 2 3 4 5 Temp: 55 Rain In prior 24hrs: YES NO

Type of Survey: ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
12	2106	2127	Great horned owl call before survey started—Quiet during	NR
8	2133	2146		NR
6			Did not call teenagers having campfire at survey station	NR
1	2222	2236	Human noise from campground across reservoir	NR
4	2250	2302	Fighter jet noise from base in Kfalls,	NR
9	2312	2325		NR
13	2331	2341		NR
3	2352	2403		NR

NSO Survey Data Sheet

NSO Detection? Y $\boxed{N}$
BAOW Detection: Y $\boxed{N}$

Date: 6/11/2018 **Site Name:** J. C. Boyle Dam
Surveyor(s): Kent Barnes, Jennifer Jones **Visit #:** 3 **Outing #** 1
Weather *(circle one)*: Precipitation: $\boxed{None}$ *Trace Drizzle Light Heavy Snow*
Cloud cover: $\boxed{Clear}$ *Partly/Cloudy Overcast Fog*
Moon phase: *Waning Crescent*
Wind: $\boxed{0}$ 1 2 3 4 5 Temp: 62 f Rain In prior 24hrs: YES $\boxed{NO}$
Type of Survey: ACS $\boxed{SC}$ CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
17	2116	2128	River noise	NR
18	2138	2149	Crickets and River noise	NR
15	2201	2212		NR
19	2220	2232	This is new point added on this date. Chorus frogs below us by weir.	NR
13	2240	2250	Quiet	NR
9	2258	2309	Quiet	NR
4	2319	2329	Great horned owl very distant, from the north- no bearing taken	NR
3	2341	2351	Quiet	NR
1	2400	2412	Great horned owls calling still distant but closer than before, possible pair. No bearing taken	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date: 6/12/2018   Site Name: J. C. Boyle Dam
Surveyor(s): Kent Barnes, Jennifer Jones   Visit #: 3   Outing # 2
Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*
Moon phase: *Waning Crescent*
Wind: 0 1 2 3 4 5   Temp: 60 f   Rain In prior 24hrs: YES NO
Type of Survey: ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
8	2115	2127	Nighthawks calling and diving prior to and throughout survey. Osprey call from cliffs over the Klamath River just after survey ended	NR
12	2142	2152	Quiet	NR
6	2205	2219	Quiet	NR
10	2227	2239	Unknown owl contact call (not *strix*) Possible great horned owl. Bearing 300°. Follow up survey should occur.	NR
11	2255	2306	Quiet	NR
7	2322	2333	River noise	NR
14	2342	2352	Crickets	NR
16	2402	2415	Chorus frogs	NR
5	2434	2446	Quiet	NR

NSO Survey Data Sheet

NSO Detection?	**Y**	$\boxed{\textbf{N}}$
BAOW Detection:	**Y**	$\boxed{\textbf{N}}$

Date: **6/13/2018** **Site Name:** **J. C. Boyle Dam**

Surveyor(s): **Kent Barnes, Jennifer Jones** **Visit #:** **3** **Outing #** **2**

Weather *(circle one)*: Precipitation: $\boxed{\textit{None}}$ *Trace* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: $\boxed{\textit{Clear}}$ *Partly/Cloudy* *Overcast* *Fog*

Moon phase: *New*

Wind: $\boxed{0}$ 1 2 3 4 5 Temp:______ Rain In prior 24hrs: YES $\boxed{\text{NO}}$

Type of Survey: ACS SC CC $\boxed{\text{FO}}$ RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
10	1015	1115	Research indicated that our detection the evening before most likely had been a female great horned owl protecting a nest. This follow up survey was conducted to search for this nest. We proceeded from call station 10 and headed Northwest in the general direction of the owl call from the previous night. We used NSO electronic calls in an attempt to solicit a response. We called with 2-3 minute duration approximately every 10 minutes. While conducting our stand search we found no structure, whitewash, feathers, or pellets indicative of nesting owls. While returning to our vehicles Jennifer visually located a fledgling great horned owl. Downy feathers were still visible but the fledgling appeared to have flight capabilities.	

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7/13/18__ Site Name: _J. C. Boyle Dam______________
Surveyor(s):__Mathew Petty, Kent Barnes_______________________ Visit #:__4___ Outing #__1___
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Thunder Storms in Area
Moon phase: *Full* *Half* *Quarter* *None* New Moon
Wind: 0 1 2 3 4 5 Temp:_82 f_____ Rain In prior 24hrs: YES NO
Type of Survey:_____ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
10	2050	2102	Mourning doves in trees above station, great horned owl call	NR
6	2115	2128	Multiple bats	NR
12	2146	2156	Car noise on access road- no visual	NR
8	2215	2225	Osprey call very agitated by NSO calls, possible nest	NR
11	2243	2253		NR
5	2317	2329	Audible bat wing beats, truck noise	NR
3	2343	2354	Quiet	NR
1	2412	2423	Deer near call station, at least gave alarm call (snort)	NR
4	2444	2454	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7/14/18__ Site Name: _J. C. Boyle Dam_____________
Surveyor(s):__Mathew Petty, Kent Barnes______________________ Visit #:__4___ Outing #__2___
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*
Moon phase: *Full* *Half* *Quarter* *None* Waxing Crescent
Wind: 0 1 2 3 4 5 Temp: 82 f_____ Rain In prior 24hrs: YES NO
Type of Survey:_____ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit. AV=Additional Visit. OPP=Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	**Response**
17	2058	2110	Bats observed, river noise	NR
18	2122	2134	Quiet	NR
15	2146	2158	Quiet	NR
19	2212	2224	Matt heard movement in canopy, source unidentified	NR
13	2235	2247	Wood rat in bushes (visual)	NR
9	2254	2307	Motorcycles on Route 66, unidentified chirp after end of NSO calling (once)	NR
16	2316	2328	River noise	NR
14	2336	2347	Crickets	NR
17	2404	2415	Bull Frogs	NR

NSO Survey Data Sheet

NSO Detection? Y N
BAOW Detection: Y N

Date: 7/21/18 **Site Name:** J. C. Boyle Dam
Surveyor(s): Mathew Petty, Kent Barnes **Visit #:** 4 **Outing #** 2
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Hazy Smoke
Moon phase: *Full* *Half* *Quarter* *None* Saxing gibbous
Wind: 0 1 2 3 4 5 Temp: 75 f Rain In prior 24hrs: YES NO
Type of Survey: ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit. AV=Additional Visit. OPP=Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
17	2108	2119	One bat observation	NR
18	2127	2138	Quiet, night hawk call as finishing NSO calls	NR
15	2154	2206	Quiet	NR
19	2212	2223	Cricket Noise	NR
13	2229	2240	Electrical noise in overhead power lines	NR
9	2248	2259	Quiet	NR
4	2308	2319	Car stopped on Route 66, no visual	NR
3	2330	2340	Quiet	NR
1	2348	2358	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7-22-18__ Site Name: _J. C. Boyle Dam______________

Surveyor(s):__Jennifer Jones, Kent Barnes_____________________ Visit #:__5___ Outing #__2___

Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Thunder Storms in Area

Moon phase: *Full* *Half* *Quarter* *None* Waxing Gubbous

Wind: 0 1 2 3 4 5 Temp:______ Rain In prior 24hrs: YES NO

Type of Survey:_____ ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
16	2101	2112	Bats observed, crickets	NR
14	2122	2133	Bats observed (one larger than others- big brown bat?)	NR
7	2145	2157	Quiet	NR
10	2208	2218	Quiet (No GHOW response)	NR
8	2235	2247	Osprey called back- less agitated than previous encounter at this location	NR
12	2304	2314	Quiet	NR
6	2330	2341	Quiet	NR
11	2354	2405	Quiet	NR
5	2421	2435	Coyotes, Bull Frogs, Unknown avian call- not strix	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date: 8/8/2018 Site Name: J. C. Boyle Dam

Surveyor(s): Jennifer Jones, Kent Barnes Visit #: 6 Outing #: 1

Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Smokey conditions- low visibility

Moon phase: *Full* *Half* *Quarter* *None* Wanning Crescent

Wind: 0 1 2 3 4 5 Temp: 77 Rain In prior 24hrs: YES NO

Type of Survey: ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
5	2026	2038	Cattle lowing, nighthawks overhead, motorcycles on road, mule deer at call station, unknown raptor call.	NR
			While in-route from station 5 to station 7, we made visual encounter of owl flying across the road. We stopped and used NSO call to try and solicit a response, I heard one call from GHOW very distant, this was not confirmed by Jennifer. Call duration was about 5 minutes.	NR
7	2109	2120	Crickets, Quiet	NR
14	1933	1951	Batteries in the digital caller died mid-way through survey. Extended survey to compensate. Quiet.	NR
16	2200	2211	Very dark, smoke blocking stars, low visibility.	NR
15	2217	2228	River noise	NR
18	2237	2248	Quiet, river noise	NR
17	2258	2309	Quiet	NR
19	2319	2330	Crickets	NR
13	2337	2347	Powerline buzz	NR
9	2355	245	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_8/9/2018__ Site Name: _J. C. Boyle Dam_____________

Surveyor(s):__Jennifer Jones, Kent Barnes______________________ Visit #:__6___ Outing #__2___

Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Smoky, low visibility
Moon phase: *Full* *Half* *Quarter* *None* Wanning gibbour
Wind: 0 1 2 3 4 5 Temp:___85___ Rain In prior 24hrs: YES NO

Type of Survey:_____ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	**Response**
4	2030	2041	Cattle lowing to north, vehicles on HWY 66, Robin Call	NR
3	2050	2101	Quiet, one visual-small boat	NR
1	2113	2126	Cattle lowing, motorcycles on HWY 66, single hoot non-strix possible GHOW	NR
	2143	2150	Turtle crews notified us of an incidental owl detection they made north of the Topsy campground, possible strix. We stopped and used the digital caller, with both NSO and BDOW calls, we heard no response.	NR
11	2201	2213	Cattle lowing, visual detection of GHOW, flew in and sat on branch approximately 20 meters from the call station. It made no calls.	NR
8	2235	2247	Quiet, Crickets	NR
12	2305	2316	Crickets	NR
6	2333	2345	Quiet	NR
10	2355	2404	Quiet	NR

Appendix C Western Pond Turtle Trapping Study Summary Data and Photographs

Summary of 2018 J.C. Boyle Western Pond Turtle Trapping Events

Date	**Night**	**Site**	**# of traps**	**# of traps that caught turtles**	**# turtles captured**	**# transmitters applied**
8/6	1	S	12	1	1	1
8/7	2	W	20	2	3	2
8/8	3	S	20	1	1	1
8/9	4	W	20	0	0	0
8/10	5	S	20	0	0	0
8/11	6	W	20	0	0	0
9/4	7	W, S, O	10	0	0	0
9/5	8	W, S, O	37*	2	5	4
9/6	9	W, S, O	42*	0	1**	0
	TOTALS		**201**	**4**	**11**	**8**

S – South
W – West
O – Other
*includes day and night trapping
**turtle caught by hand capture

Photo 1. Commercial opera-style crab trap used for turtle trapping

Photo 2. Side view of trap

Photo 3. Deployment of trap near fallen tree, South site

Photo 4. Deployment of trap near rock face, South site

Photo 5. Deployment of trap near fallen tree, West site

Photo 6. Western pond turtle (WPT), male, captured 8/7 at South site.

Photo 7. Weight measurement using spring scale

Photo 8. Radio transmitter and temperature logger attached to WPT.

Photo 9. WPT, female, caught 8/8 at West site.

Photo 10. Checking female WPT for eggs

Photo 11. Vertebral scutes of female WPT detaching from carapace, indicating unknown shell disease

Photo 12. WPT, male, caught 8/8 at West site.

Photo 13. Morphometric measurements using calipers

Photo 12. WPT, male, caught 8/8 at West site.

Photo 13. Shell height measurement

Photo 14. Plastron of male WPT showing growth rings (used to estimate age) and unique plastron pattern

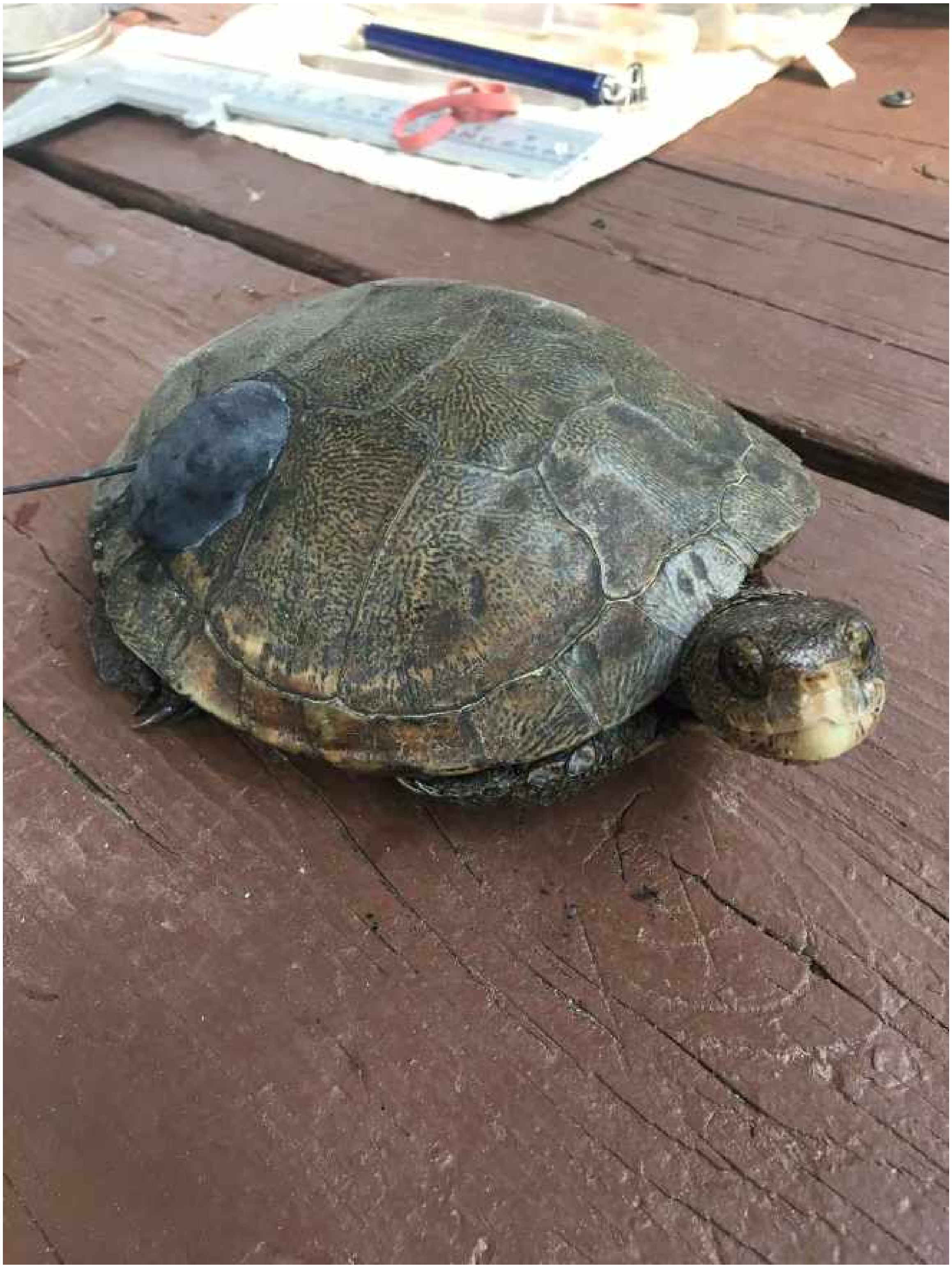


Photo 15. WPT, female, caught 8/9 at South site. With radio tracker and temperature logger attached.

Photo 16. Filing identification mark into marginal shields

Photo 17. WPT with identification notches on marginal shields. Note notches at front and rear shields.

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
100	8/7/2018	1	M	>10	20+	163.0	159.5	117.7	149.4	143.5	82.9	53.4	552

100

Transmitter

Freq **151.790**

Photo 18. WPT morphology data




MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
101	8/8/2018	1	F	13	20+	182.2	176.3	138.5	176.9	168.0	96.2	68.1	662

101

Peeling verbal shields,
No transmitter applied

Photo 19. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
102	8/8/2018	1	M	99	99	187.7	186.1	140.1	166.1	159.5	97.3	64.8	905

102

- Transmitter
  Freq **151.701**

Photo 20. WPT morphology data




MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
103	9/5/2018	1	F	3	4	121.3	117.0	97.3	112.2	110.2	63.4	44.0	258

103

- Juvenile
- No Transmitter

Photo 21. WPT morphology data




MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
104	9/5/2018	1	M	99	99	180.9	175.1	131.8	165.0	153.5	89.6	60.0	782

104

- Transmitter

  Freq **151.750**

Photo 22. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
105	9/5/2018	1	F	20	20+	166.3	164.0	119.4	156.0	150.0	186.9	61.5	718

105

- Transmitter
  Freq **151.760**

Photo 23. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
106	9/5/2018	1	F	20	20+	170.7	167.4	126.4	157.5	151.1	90.6	65.0	765

106

- Transmitter
  Freq **151.729**

Photo 24. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
107	9/5/2018	1	M	99	99	188.8	186.9	141.0	170.9	163.0	195.5	62.5	865

107

- Transmitter
  Freq **151.770**

Photo 25. WPT morphology data




MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
108	9/6/2018	1	J	2	2	97.3	94.5	81.2	92.7	89.7	52.4	36.0	144



108

- No Transmitter

Photo 26. WPT morphology data

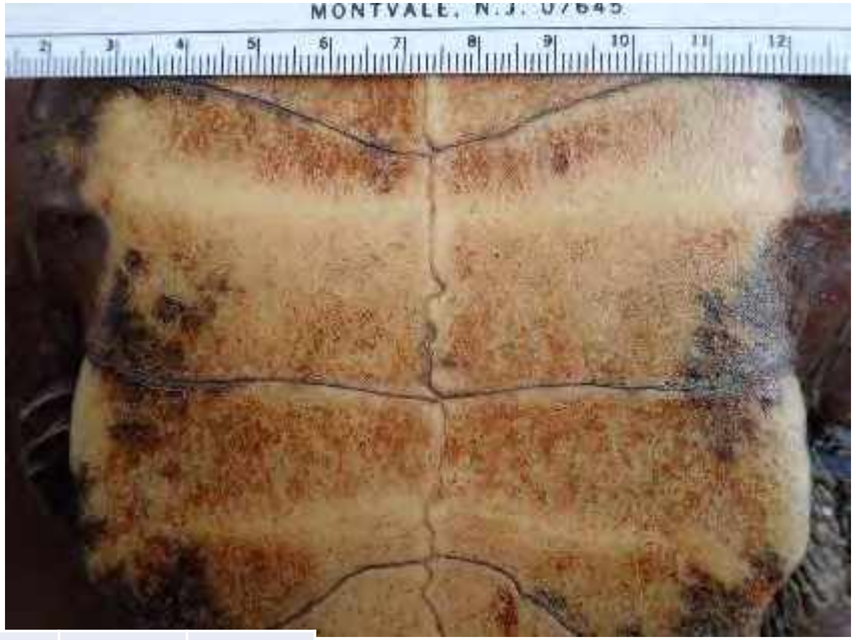
MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
119	8/8/2018	1	M	9	10	163.0	160.1	123.6	151.8	148.2	87.7	54.3	600

Photo 27. WPT morphology data

119

- Transmitter

  Freq **151.919**

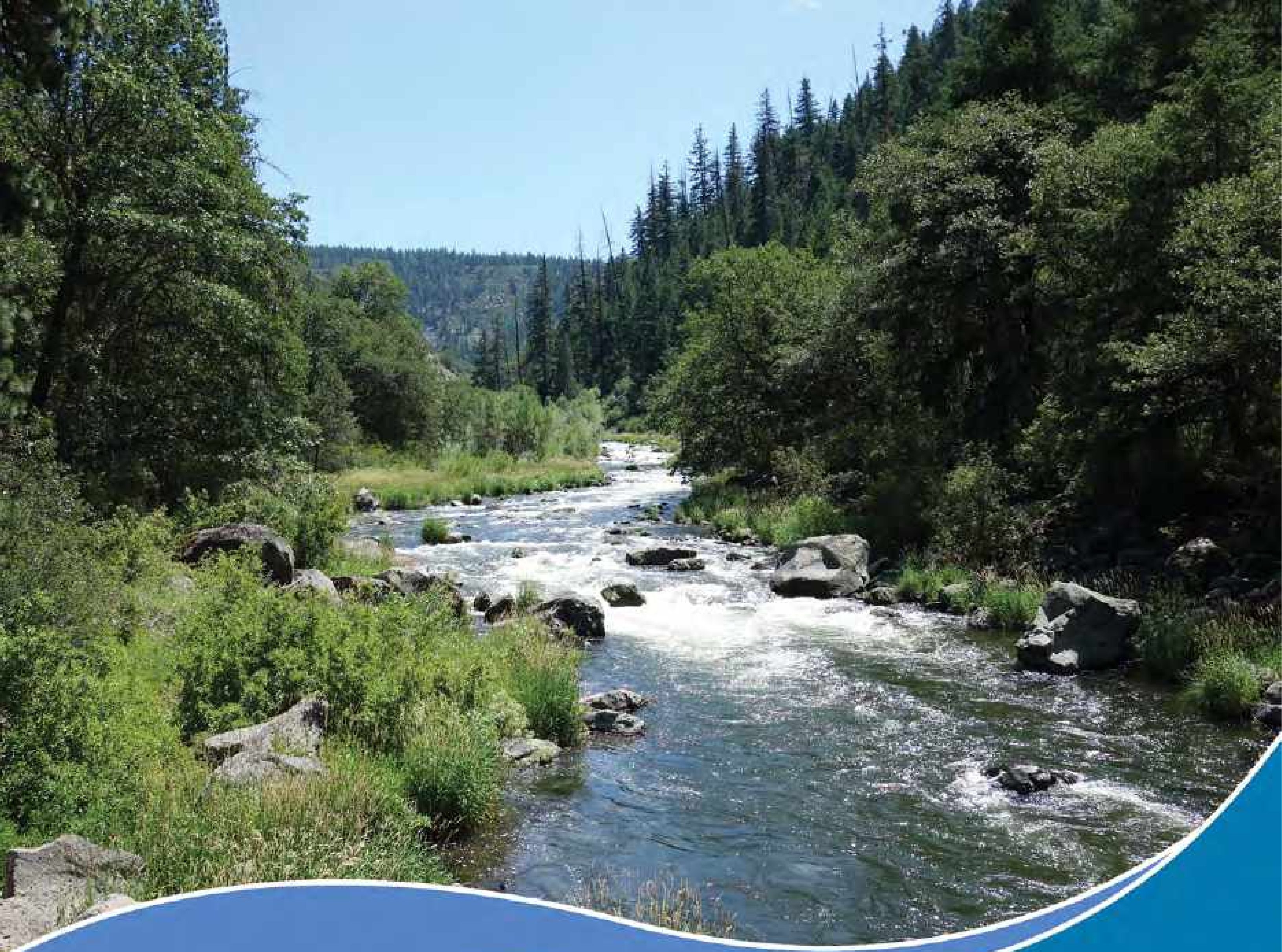


MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
120	8/9/2018	1	F	99	99	178.8	176.4	143.0	171.7	164.2	100.5	71.5	975

120

- Transmitter
  Freq **151.820**

Photo 28. WPT morphology data



Klamath River Renewal Project

2019 Annual Terrestrial Resources Survey Report

March 2020

KLAMATH RIVER RENEWAL CORPORATION

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Acronyms and Abbreviations

BLM	Bureau of Land Management
CDFW	California Department of Fish and Wildlife
CE	California Endangered
CEQA	California Environmental Quality Act
CMR	capture-mark-recapture
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COTO	*Corynorhinus townsendii* (Townsend's big-eared bat)
FE	Federal Endangered
FSC	Federal Species of Concern
GIS	Geographic Information System
GPS	Global Positioning System
IPaC	USFWS Information for Planning and Consultation Database
KRRC	Klamath River Renewal Corporation
MYYU	*Myotis yumanensis* (Yuma myotis)
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
OC	Candidate listing by Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Department of State Lands
OHWM	ordinary high-water mark
ONHP	Oregon Natural Heritage Program
ORBIC	Oregon Biodiversity Information Center
ORWAP	Oregon Rapid Wetland Assessment Protocol
OSHA	Occupational Safety and Health Administration
Project	Klamath River Renewal Project
RCB	riparian corridor boundary
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WPT	western pond turtle

Chapter 1 Introduction

1. INTRODUCTION

This report summarizes the terrestrial resources surveys conducted in 2019 for the Klamath River Renewal Project (Project). The Klamath River Renewal Corporation (KRRC) and its consultants carried out field investigations to collect existing condition information on the following terrestrial resources:

- Bald and golden eagles
- Bats
- Western pond turtles (WPTs)
- Special-status plants
- Wetlands

KRRC initiated several of these surveys in 2018. This report provides a summary of both 2018 and 2019 findings for the resources listed above. KRRC completed surveys for other terrestrial resources in 2018, as described in the 2018 Annual Terrestrial Resource Survey Report (KRRC 2019a). Section 7 provides a correction to the willow community data previously reported in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a).

1.1 Purpose of the Terrestrial Resources Surveys

Information on the existing condition of terrestrial resources in the Project area is needed to inform the ongoing Project design and regulatory permit processes. Early Project planning identified information gaps, as described in previous studies and regulatory compliance documents, including the 2012 Environmental Impact Statement/Environmental Impact Report (USBR and CDFW 2012) and the Joint Preliminary Biological Opinion (NMFS and USFWS 2012).

1.2 Study Area

For each resource listed above, this report describes the methods followed during field investigations. Methods were based on survey work plans developed in close coordination with federal and state resource agencies, including the United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and Oregon Department of Fish and Wildlife (ODFW). The survey work plans are available in Appendix J of the Definite Plan (KRRC 2018).

Unless otherwise noted, surveys were conducted within 0.25 mile of dams and structures to be removed, disposal sites, and haul and access roads (collectively referred to as the study area). The 0.25-mile study area is shown in Figure 1-1 and was developed in cooperation with the resource agencies listed above during development of the survey work plans. Surveys for eagles and bats used different study areas, which are described in the respective sections of this report. This report summarizes the findings of the surveys. Figures cited in the text of this report are provided in Appendix A, and figures updated from the 2018 Annual

Terrestrial Resources Survey Report (KRRC 2019a) are provided in Appendix B. Appendix C provides a list of all plant and wildlife species observed during field investigations.

Chapter 2 Eagles

2. EAGLES

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act (16 Code of Federal Regulations 668) and the Migratory Bird Treaty Act (16 United States Code §§ 701-12), and are fully protected under California law. Bald eagles are listed as endangered under the California Endangered Species Act, but do not have listing status in the State of Oregon. The upper Klamath Basin provides suitable habitat for and is known to support bald eagle and golden eagle populations. Existing information on bald and golden eagles in the Klamath Basin and results from the 2017-2018 eagle surveys can be found in the Klamath River Renewal Project 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a).

2.1 Methods

KRRC developed the approach to the 2019 field surveys based on previous work, including a desktop review of historical and current nest data; a Geographic Information System (GIS) viewshed analysis conducted in 2017 and 2018 that helped define the study area; development of a survey plan in coordination with state and federal agencies; and results of previous eagle surveys (PacifiCorp 2004, KRRC 2018, KRRC 2019a).

2.1.1 Study Area

KRRC defined the study area by the viewshed analysis (KRRC 2019a) and the nature, timing, and location of proposed construction activities. The terms used to describe the study area are defined below.

- The limits of work are those defined in the Definite Plan for the Lower Klamath Project (KRRC 2018).
- High-impact areas include a 1-mile buffer surrounding the limits of work anticipated to have high-impact activities (excluding the extent of the reservoir where no work will occur). High-impact activities include proposed construction and demolition activities associated with the decommissioning of the dams and facilities, and creation of disposal sites.
- Low-impact areas include a 0.5-mile buffer surrounding the limits of work, as well as those access roads that are anticipated to have an increase in traffic and movement of heavy equipment.

The study area encompassed the extent of the viewshed in the high impact areas and low impact areas. The study area defined here is intended to represent the portion of habitat that may be affected by Project activities. In 2019, KRRC biologists surveyed beyond this defined area to account for potential future changes to the Project area and activities and to gain a general understanding of eagle use and occupancy surrounding the Project area.

2.1.2 Field Surveys

Qualified KRRC avian biologists conducted bald eagle and golden eagle surveys concurrently. The surveys focused on areas with suitable nesting, roosting, or foraging habitat for bald and golden eagles, as well as known nest locations. The goal of the surveys was to determine nest site locations in the study area and to determine baseline eagle use and other key habitat features. Additionally, by monitoring eagle behavior at nests prior to construction, it will be easier to identify changes in behavior that may occur during construction. Field surveys employed a variety of techniques and multiple temporal windows to capture seasonal activity. Biologists recorded all survey data digitally through Collector for ArcGIS, using iPads (Apple, Inc.) which preserve the location and time of the observation. Table 2-1 summarizes the 2019 survey date and type.

Table 2-1 Eagle Survey Types and Dates

Survey Type	Survey Date
Ground-based early breeding season survey	February 18 , 2019
Ground-based and helicopter mid-breeding season survey	May 21 through 23, 2019
Ground-based and helicopter late-breeding season survey	June 13 through 19, 2019

2019 Surveys

KRRC biologists used binoculars and spotting scopes when surveying for nest occupancy. Teams were able to view the entire study area using a combination of ground-based surveys on foot and in vehicles, and aerial surveys from a helicopter. In the field, biologists emphasized surveys on microhabitats that could support nesting eagles (e.g., rocky cliffs for golden eagles, large conifers for bald eagles). Biologists surveyed all nests that were historically active. Biologists recorded detailed data based on the guidelines and datasheets provided in the protocols (see field survey protocol in KRRC 2019a). The surveys included three breeding season surveys (February through June 2019), as follows:

1. To determine occupancy, biologists conducted an initial nest search early in the breeding season, from February 18 through 20, 2019, when eagles were most likely to be found near nest sites. The timing of this survey was informed by findings from the 2018 surveys. By estimating the age of chicks in May 2018, biologists were able to determine what winter survey timing would capture the most eagle activity at nests. In this survey, six biologists conducted ground-based observations from vehicles and on foot for 3 days, spending 1 day at each reservoir and corresponding dams. Biologists conducted this first inventory and monitoring survey during courtship, when the adults were mobile and conspicuous. Surveys included observing historical nests and recording all eagle detections in the study area. Biologists also documented courtship behavior and areas of high eagle activity to follow up on during the May and June 2019 surveys. For this early-breeding season survey, biologists extended the study area to include observations at all golden eagle nests within 10 miles of the limits of work, and bald eagle nests within 2 miles. Biologists established survey distances in coordination with wildlife agencies.

2. Biologists conducted a second survey from May 21 through 23, 2019, to observe eagle behavior and mid-season nesting activity, and to determine the number of active nests and nestlings in the study area. Biologists based the survey timing on the results of the 2018 surveys to observe nests when they contained nestlings and to avoid disturbing nests when they were most vulnerable. Three teams of two biologists conducted this survey. Two teams conducted ground-based surveys for 3 days, spending 1 day at each reservoir. The second team conducted aerial helicopter surveys for 2 days, covering all reservoirs; and a ground-based survey for 1 day. Biologists thoroughly surveyed locations where eagle pairs or territorial behavior were observed during previous surveys from the ground and during helicopter surveys. Additionally, biologists surveyed all historical and newly discovered nests from the helicopter and from the ground when accessible.

3. Biologists conducted a late breeding season survey from June 13 through 19, 2019, when the nestlings were near fledging age. One team of three biologists conducted ground-based surveys for 7 days at all reservoirs, and one team of two biologists conducted helicopter surveys for 1 day, covering all reservoirs.

2.2 Findings

2.2.1 Field Surveys

February 2019

Eagle Activity

Biologists observed approximately 117 eagles in the study area, of which 78 were bald eagles and 39 were golden eagles; however, many of these could have been resightings of the same individuals. Common bald eagle behavior observed included subadults and adults perching on trees and utility poles near and in sight of the reservoirs. Biologists observed several adult bald eagle pairs perched together, and exhibiting courtship behavior, acting territorial, vocalizing, performing undulating flight (breeding behavior), visiting nests, and nest-building. Biologists observed bald eagles soaring on thermals with other bald eagles and golden eagles, usually near the reservoirs but also over the Klamath River. Biologists also observed bald eagles foraging in the reservoirs. Biologists observed golden eagles perching on trees and cliffs that were not typically near the reservoirs. Biologists also observed golden eagles foraging on the ground, soaring on thermals with other eagles, flying in pairs, and performing undulating (breeding behavior) flight. Both species of eagles appeared to prefer certain perches and were observed using these same perches during different survey times and days.

At Iron Gate Reservoir and Copco Lake, biologists were able to discern areas of high eagle activity, which had the potential to include nest sites. Biologists observed thirteen potential bald and golden eagle territories surrounding Iron Gate Reservoir. In these areas, biologists observed high eagle activity, undulating flight, or pairs of adult eagles perching for long periods. Additionally, biologists identified five potential golden and bald eagle territories around Copco Lake with high golden and bald eagle activity. Biologists thoroughly surveyed these areas during subsequent field surveys in May and June of 2019.

At J.C. Boyle Reservoir, there was significantly less eagle activity observed than at the other two sites, with only seven eagles observed. However, this may have been due to the lower visibility at J.C. Boyle, resulting from the high density of trees and limited road access surrounding the reservoir. Biologists noted three potential bald eagle territories where high eagle activity or courtship behavior was observed. Biologists thoroughly surveyed these areas during subsequent field surveys in May and June of 2019. Due to the presence of potential wintering and migratory birds in the area, it is difficult to determine how many of the observed birds represented resident birds. Table 2-2 presents the number, age, and species of eagles observed at each reservoir.

Table 2-2 Total Number of Eagle Observations by Site, Survey, Species, and Age

Iron Gate Reservoir[1]						
Survey Date	Golden Eagle Adults	Golden Eagle Subadults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Subadults	Bald Eagle Young of the Year
February 2019[2]	18	1	0	19	1	0
May 2019	2	0	0	12	6	2
June 2019	2	0	0	6	0	2
Total	**22**	**1**	**0**	**37**	**7**	**4**
Copco Lake[1]						
Survey Date	Golden Eagle Adults	Golden Eagle Subadults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Subadults	Bald Eagle Young of the Year
February 2019[2]	19	0	0	15	28	0
May 2019	17	0	3	13	10	3
June 2019	6	1	2	2	4	3
Total	**42**	**1**	**5**	**30**	**42**	**6**
J.C. Boyle Reservoir[1]						
Survey Date	Golden Eagle Adults	Golden Eagle Subadults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Subadults	Bald Eagle Young of the Year
February 2019[2]	0	1	0	13	2	0
May 2019	2	0	0	8	0	5
June 2019	0	0	0	3	0	7
Total	**2**	**1**	**0**	**24**	**2**	**12**

Notes:

1 The number of eagles observed is influenced by the visibility at each site and should not be interpreted as relative abundance across sites. Visibility at J.C. Boyle Reservoir is poorer than at Copco and Iron Gate Reservoirs.

2 The number of eagles detected during the winter survey period is likely to include wintering and migratory individuals.

Eagle Nests

Biologists were unable to access 26 historically active nests because of poor visibility, resulting from dense tree cover, limited access through private property, or poor road conditions. In the case of the 19 remaining nests where access was not limited, observers were able to survey the area and look for eagle activity. Biologists observed bald eagles visiting three historically active nests, and one new nest. Biologists also observed golden eagles visiting three historically active nests, and one new nest. Out of the 26 inaccessible historically active nests, biologists observed bald eagles in the vicinity of four bald eagle nests and golden eagles in the vicinity of five golden eagle nests. This suggested that the inaccessible nests could be active. The conditions of the accessible nests varied. Some nests appeared to be old and unused, while other nests appeared to have been recently active. Biologists also located several observation points that provided exceptional visibility, allowing survey of historically active areas for eagle activity and occupancy. Details of the nest observations are provided in the following paragraphs, and nest locations are shown on Figures 2-1 through 2-6. Historically active nests that were not observed in the 2017-2019 KRRC surveys are excluded from the figures. All nests that were active in 2019, active in 2018, or found to be inactive are depicted on the figures.

At Iron Gate Reservoir, biologists observed a bald eagle pair nest-building at one new bald eagle nest location that had not been historically documented (F19_BE1). No other nests at Iron Gate were accessible by car; however, biologists were able to observe adult bald and golden eagle pairs in the vicinity of each historically active nest (four golden eagle nests and one bald eagle nest: GE3-7, GE3-5, F_GE2, GE3-6, and F_BE1).

At Copco Lake, biologists observed a golden eagle pair perching near and landing in one new golden eagle nest location (F19_GE1) that had not been historically documented. Additionally, biologists observed nest building at one historically active golden eagle nest (GE3-3) within 0.5 mile of the limits of work. Biologists observed a golden eagle pair visiting an existing golden eagle nest (F_GE4) and a bald eagle pair visiting an existing bald eagle nest (BE1-43) outside of the 0.5-mile buffer, but within 0.5 mile of access roads between Copco and J.C. Boyle reservoirs. Several nests were not accessible from the ground (five golden eagle nests and four bald eagle nests); however, biologists observed an adult golden eagle in the vicinity of one historically active nest (GE3-8).

Biologists observed bald eagle adults visiting two existing bald eagle nests (BE1-31, BE1-32) at J.C. Boyle Reservoir. Additionally, biologists observed adult bald eagle activity in the vicinity of two other historically active bald eagle nests (BE1-34, BE1-35), but these nests were not accessible from the ground. Most existing nests at J.C. Boyle were inaccessible due to snowy and icy road conditions.

May 2019

Eagle Activity

Biologists observed several adult bald and golden eagles at all reservoirs, some subadults, and nestlings in active nests. Biologists observed an estimated 21 adult golden eagles, in addition to 3 nestlings described below. Except for the nestlings, some of these observations may have been resightings of the same eagle. Golden eagle activity included perching near, flying around, and visiting active nests, often in pairs. Biologists also observed golden eagles foraging over land and flying over ridgelines and the reservoirs. Golden eagles exhibited territorial behavior toward bald eagles and other birds.

Photograph 2-1 Two Bald Eagle Nestlings at Nest F19_BE1

Biologists observed an estimated 33 bald eagle adults and 16 subadults, in addition to the 10 nestlings described below. Except for the nestlings, some of these may have been resightings of the same individual. Bald eagle activity included perching near, flying around, defending, and visiting active nests; and feeding chicks. Bald eagles exhibited territorial behavior toward other eagles and raptors and were observed perching and flying around the reservoirs. Bald eagles were also observed soaring on thermals, vocalizing, engaging in courtship behavior, foraging, and flying in pairs. Most bald eagle observations were close to the reservoirs; however, there were some observations near the Klamath River or over ridgelines. Table 2-2 presents the number, age, and species of eagles observed at each reservoir; nest locations are shown on Figures 2-1 through 2-6.

Eagle Nests

Biologists observed a total of seven active bald eagle nests, each with one or two nestlings present; and two golden eagle nests, each with one or two nestlings present. Biologists found one new active bald eagle nest within 0.5 mile of the limits of work (F19_BE5).

At Iron Gate Reservoir, biologists observed one active bald eagle nest (F19_BE1) immediately adjacent to Copco Road and the reservoir. There were two chicks about 6 to 8 weeks old in the nest, often with one or both bald eagle adults perched nearby. Biologists observed one inactive bald eagle nest (F_BE1), which was also inactive in 2018, within 2 miles of the limits of work. Biologists observed two inactive golden eagle nests (GE3-6, F_GE2) within 2 miles of the limits of work, both of which were also inactive in 2018. Biologists observed one inactive golden eagle nest, which was also inactive in 2018, within 2 miles of the limits of work (GE3-7). Biologists were unable to locate the nest structure of one golden eagle nest that was active in 2018 (GE3-6), within 2 miles of the limits of work.

At Copco Lake, biologists observed two active bald eagle nests at Copco Lake. One of these nests (BE2-3) was within 0.5 mile of the limits of work and contained two nestlings about 8 weeks old, with an adult perched nearby. The other nest (BE1-43) was within 0.5 mile of an access road but more than 2 miles from the limits of work and contained one large chick about 9 weeks old, with an adult perching and flying nearby. The only active golden eagle nests for the 2019 surveys were at Copco Lake. Biologists observed one nest (F19_GE1) that was newly discovered in February 2019 and was within 0.5 mile of the limits of work; this nest contained two 1.5- to 2-week-old nestlings, with an adult perched and flying nearby. The other nest (F_GE3) was within 5 miles of the limits of work and contained one unattended nestling, about 4 to 5 weeks old. Biologists observed two inactive golden eagle nests at Copco Lake. Both nests (GE3-3, and F_GE4) were active in 2018, and biologists observed nest-building activity at these nests during the February 2019 surveys. Biologists observed three subadult bald eagles flying in the territory of nest GE3-3, with no golden eagles defending the nest territory, and therefore confirmed that this nest was inactive in 2019.

Biologists observed four active bald eagle nests around J.C. Boyle Reservoir, including one nest that had not been observed in previous surveys (F19_BE5). Three of these nests (F19_BE5, BE1-36, and BE1-32) were within 0.5 mile of the limits of work, and one of these nests (F_BE2) was within 5 miles of the limits of work. Nest F19_BE5 had a large nest structure in good condition, with 2 adults perched nearby, exhibiting territorial behavior. Based on the behavior of the adults, biologists assumed that this nest was active and that a chick was nearby; however, the nest was empty. Nests BE1-36 and BE1-32 both contained two nestlings approximately 8 weeks old. Nest F_BE2 contained one nestling approximately 9 weeks old. Biologists observed two inactive bald eagle nests. One of these nests (BE1-31) was within 0.5 mile of the limits of work; the other (BE1-15), which was active in 2018, was within 2 miles of the limits of work and within 0.5 mile of an access road. Biologists could not find the nest structure of one bald eagle nest that was inactive in 2018 (BE1-35). Biologists observed one inactive golden eagle nest (GE4-206), which had been active in 2018, within 2 miles of the limits of work.

June 2019

Eagle Activity

Biologists observed an estimated 11 adult bald eagles, four subadult bald eagles, and 12 nestlings. Except for the nestlings, some of these observations may have been resightings of the same eagle. Bald eagle adults were perching by reservoirs and in or near nests; foraging; feeding chicks; and flying over nests, reservoirs, and ridgelines. Subadult bald eagles were flying, perching by reservoirs, and foraging.

Biologists observed approximately eight adult golden eagles, one subadult golden eagle, and two nestlings during the June 2019 survey. Except for the nestlings, some of these observations may have been resightings of the same eagle. Biologists observed golden eagles flying over ridgelines and flying around, perching near, and visiting nests. Biologists also observed golden eagle adults flying in pairs and vocalizing near nests. Table 2-2 presents the number, age, and species of eagles observed at each reservoir.

Eagle Nests

Biologists observed ten active nests during the June 2019 survey: eight bald eagle nests, each with one or two nestlings present; and two golden eagle nests, each with one or two nestlings present. Biologists found one new active bald eagle nest (F19_BE7) containing two nestlings near the 0.5-mile buffer of the limits of work at J.C. Boyle Reservoir in proximity to a historical nest. Biologists found one new inactive bald eagle nest north of Iron Gate Reservoir, within 0.5 mile of the limits of work; one new inactive golden eagle nest that was in good condition, on a cliff face north of the Copco No. 2 Dam, within 0.5 mile of the limits of work (F19_GE2); and a cavity in a cliff face that could be suitable golden eagle nest habitat, at the northeastern edge of Copco Lake where it meets the Klamath River (F19_GE4).

At Iron Gate Reservoir, biologists observed one active bald eagle nest (F19_BE1) immediately adjacent to Copco Road at Iron Gate Reservoir, within 0.5 mile of the limits of work. This nest contained two large nestlings approximately 11 weeks old, and an adult was observed feeding these chicks. Biologists found one new inactive bald eagle nest, north of Iron Gate Reservoir within 0.5 mile of the limits of work (F19_BE6). Biologists observed one inactive golden eagle nest (GE3-7) within 2 miles of the limits of work, which was inactive in 2018. Additionally, three golden eagle nests (GE3-5, GE3-6, and F_GE2) observed to be active or inactive during 2018 surveys were not found during aerial surveys.

At Copco Lake, biologists observed two active bald eagle nests. Nest BE2-3 was within 0.5 mile of the limits of work and contained two large nestlings about 11 weeks old, with one adult perched nearby. Nest BE1-43 was within 0.5 mile of an access road, but more than 2 miles from the limits of work and contained one large nestling about 12 weeks old. Biologists observed two active golden eagle nests at Copco Lake. One of these nests (F19_GE1) was within 0.5 mile of the limits of work; the other (F_GE3) was within 5 miles of the limits of work. Due to the survey angle from the ground and the adult obscuring the view from the helicopter, biologists could only confirm one nestling in nest F19_GE1, which had two nestlings in May 2019. At nest F_GE3, biologists observed one chick approximately 7 weeks old in the cliff nest, and an adult visiting the nest. Biologists observed two inactive golden eagle nests at Copco Lake. One of these nests (F_GE4) was active in 2018, with breeding activity observed near nest F_GE4 during the February 2019 surveys, but was confirmed empty through both aerial surveys (May and June 2019). The second inactive golden eagle nest (GE3-3) was confirmed inactive during the May 2019 survey and was therefore not surveyed during the June 2019. Biologists found an empty cliff cavity that could be suitable golden eagle nest habitat (F19_GE4) and should be surveyed during future eagle surveys. This potential nest site is categorized as inactive on Figures 2-1 through 2-6, but is not included in Table 2-3.

Table 2-3 Active and Inactive Bald and Golden Eagle Nests Observed in 2019 Field Surveys

Nest Name	Golden Eagle		Bald Eagle	
Nest Status in 2019	Active	Inactive	Active	Inactive
Within 0.5 mile of Project footprint	1	2	5	2
Between 0.5 and 2 miles from Project footprint	0	4	1	2
Total Nests within 2 Miles	**1**	**6**	**6**	**4**
Outside of 2-mile buffer surrounding Project footprint, but within 0.5 mile of haul roads	0	0	2	1

At J.C. Boyle Reservoir, biologists observed five active bald eagle nests, one of which was a new nest (F19_BE7) observed during the June 2019 survey. Four of these nests (F19_BE5, BE1-36, BE1-32, and F19_BE7) were within 0.5 mile of the limits of work, and one of these nests (F_BE2) was within 5 miles of the limits of work. At nest F19_BE5, biologists were able to confirm one nestling in the nest, about 8 to 9 weeks old. This nest appeared empty in the May 2019 survey. Nest BE1-36 had one chick about 10 weeks old and one adult perched nearby. This nest contained two nestlings in May 2019. Nest F_BE2 contained one chick about 11 weeks old. Nests BE1-32 and F19_BE7 each contained two chicks approximately 10 to 11 weeks old. Biologists observed two inactive bald eagle nests. One of these nests (BE1-31) was within 0.5 mile of the limits of work; the other (BE1-15), which was active in 2018, was within 0.5 mile of an access road. One bald eagle nest found inactive in 2018 was not found in 2019 (BE1-35). One golden eagle nest (GE4-206) which had been active in 2018 was inactive in 2019, within 1 mile of the limits of work. Biologists searched the surrounding trees for alternate nests for GE4-206, because this nest is in a dead tree and is therefore less suitable for nesting; the search was unsuccessful.

2.3 Conclusions

Biologists observed a total of ten active nests at Copco, Iron Gate, and J.C. Boyle Reservoirs in 2019. Two are golden eagle nests and eight are bald eagle nests. Nine of these nests are within 2 miles of the limits of work or within 0.5 mile of haul roads (Table 2-3).

Additionally, biologists observed eleven inactive nests within 2 miles of the limits of work or within 0.5 mile of haul roads. Five of these are presumed bald eagle nests and six are presumed golden eagle nests, based on historical use data and 2018 surveys. Biologists also observed one potential golden eagle nest site within 0.5 mile of the limits of work. It is not uncommon for eagles to suspend breeding in some years or use alternative nest sites (USFWS 2004); therefore, these inactive nests will continue to be surveyed in the future.

The 2019 survey results showed a higher number of successful bald eagle nests than golden eagle nests in the study area (Table 2-4). However, in 2018, there were more successful golden eagle nests than bald eagle nests in the study area. Several nests that were active in 2018 were not active in 2019, demonstrating that eagles could be suspending breeding in some years in the study area. There are more bald eagle nests surrounding J.C. Boyle Reservoir than there are surrounding Copco and Iron Gate Reservoirs, and there are more golden eagle nests surrounding Copco and Iron Gate Reservoirs than surrounding J.C. Boyle Reservoir. Trends in eagle activity cannot be compared across reservoirs due to different levels of visibility and access.

Table 2-4 Summary of Active and Inactive Eagle Nests from 2017 through 2019 Surveys

Species	Nest Name	Nest Status	Number of Nestlings in 2018 or 2019
Bald Eagle	BE1-15	Active in 2018	1
Bald Eagle	BE1-31	Inactive	0
Bald Eagle	BE1-32	Active in 2019	2
Bald Eagle	BE1-35	Inactive	0
Bald Eagle	BE1-36[1]	Active in 2019	2
Bald Eagle	BE1-43	Active in 2019	1
Bald Eagle	BE2-3	Active in 2019	2
Bald Eagle	F_BE1	Inactive	0
Bald Eagle	F_BE2	Active in 2019	1
Bald Eagle	F19_BE1	Active in 2019	2
Bald Eagle	F19_BE5	Active in 2019	1
Bald Eagle	F19_BE6	Inactive	0
Bald Eagle	F19_BE7	Active in 2019	2
Golden Eagle	F_GE2	Inactive	0
Golden Eagle	F_GE3	Active in 2019	1
Golden Eagle	F_GE4	Active in 2018	2
Golden Eagle	F19_GE1[1]	Active in 2019	2
Golden Eagle	F19_GE2	Inactive	0
Golden Eagle	GE3-3	Active in 2018	1
Golden Eagle	GE3-5	Active in 2018	2
Golden Eagle	GE3-6	Inactive	0
Golden Eagle	GE3-7	Inactive	0
Golden Eagle	GE4-206	Active in 2018	1
Golden Eagle	F19_GE4	Potential Future Nest Site	0

Notes:
BE = Bald eagle nest
GE = Golden eagle nest
F19_GE = New golden eagle nest found during the 2019 surveys, not included in historically active data or the 2017-2018 surveys
F19_BE = New bald eagle nest found during the 2019 surveys, not included in historically active data or the 2017-2018 surveys
[1] For some nests, the number of nestlings decreased by one from May to June 2019. This table reflects the highest number of nestlings observed at each nest.

Chapter 3 Bats

3. BATS

In 2019, KRRC biologists conducted targeted surveys at structures where either 1) additional data were sought to supplement previous summer surveys (2017-2018) for bats; or 2) evidence of bat use had been found during previous inspections, but summer roosting had not been confirmed. The 2017-2018 survey methods and results are described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a).

3.1 Methods

A team of four KRRC biologists conducted evening emergence and acoustic surveys for bats from June 12 through 15, 2019, at structures at J.C. Boyle, Iron Gate, and Copco. KRRC biologists targeted the following structures where additional data were sought to supplement previous summer surveys (2017-2018); or where evidence of bat use had been found during previous inspections, but summer roosting had not been confirmed:

- J.C. Boyle red barn
- Iron Gate diversion tunnel outlet
- Iron Gate powerhouse
- Lakeview Road bridge (at Iron Gate entrance)
- Maintenance Building on Copco Access Road
- Copco No. 1 gatehouse C-12
- Copco No. 1 diversion tunnel outlet

KRRC biologists used night vision during all emergence surveys and documented points of egress. During all emergence surveys, KRRC biologist used iPads (Apple, Inc.) running Echo Meter Touch 2 Pro (Wildlife Acoustics) and a laptop running Sonobat software (Version 4) with a Binary Acoustics ultrasonic microphone (Binary Acoustic Technology, LLC). Field teams conducted emergence surveys when weather conditions were suitable for the evening emergence of bats (e.g., warm temperatures and minimal rain and wind).

3.2 Findings

All bat survey findings from 2017 through 2019 are summarized in Table 3-1; the structures surveyed in 2019 are indicated by green rows. A summary of the 2019 survey results follows the table.

Table 3-1 2017-2019 Bat Survey Findings

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Iron Gate						
Lakeview Road Bridge	High	Yes	Yes – 200 bats estimated during summer emergence.	MYYU	October 2018, June 2019	First emergence survey in June 2019.
Diversion Tunnel Outlet	High	Yes	Yes – 200 bats estimated during summer emergence. Absent in winter.	MYYU	February 2018 (interior), May-June 2018 (emergence only), June 2019 (emergence only)	None
Powerhouse	High	Yes	Yes – 400 bats estimated during summer emergence.	MYYU	July 2017, May and June 2018, October 2018, June 2019	None
Penstock Intake Structure	High	Yes	Yes – several hundred bats roosting inside at top of structure in summer.	MYYU	July 2017, June 2018, October 2018	None
Barn/Garage at Iron Gate Village	High	Yes	Yes – bats present in rafters/ceiling in summer.	MYYU	July 2017, May and June 2018, October 2018	None
Residence 1 (occupied) blue/gray	Mod-high (attic)	Unknown	Unknown	NA	June 2017 (exterior only)	No interior survey access to occupied residences.
Residence 2 (occupied) tan with green roof	Mod-high (attic)	Yes	Yes – 15 (estimated) bats found huddled behind clock on back porch in summer. Potential attic access through loose screen over vent.	MYYU	July 2017 (exterior only)	No interior survey access to occupied residences.
Fish Holding Facilities	Mod	No	No	NA	July 2017, June 2018, October 2018	None
Restrooms (near powerhouse)	Low - mod	No	No	NA	July 2017, June 2018	None
Emergency Spill Equipment shed	Low	No	No	NA	July 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Copco No. 1 Diversion Tunnel Outlet	High	Yes	Yes – 100 bats estimated during summer emergence.	None	February 2018 inspection, June 2018 emergence	Access limitations prohibit safe, targeted placement of acoustic recording equipment at or near the mouth of the tunnel.
C-12 Gatehouse at Copco No. 1	High	Yes	Yes – 2,000 to 3,000 bats estimated during summer emergence. Several dozen present in late October.	MYYU	July 2017, June 2018, October-November 2018, June 2019	Maternity roost; largest roost found on Project site. Gatehouses C-11 and C-12 are the only Project structures found to have bats present in late October/early November.
C-11 Gatehouse at Copco No. 1	High	Yes	Yes – 100 bats estimated during summer emergence. Approximately 20 bats clustered in interior roof apex in late October.	MYYU	July 2017, June 2018, October-November 2018	Gatehouses C-11 and C-12 are the only Project structures found to have bats present in late October/early November.
Copco No. 1 powerhouse	High	Yes	Yes – several dozen bats clustered on walls in transformer bays and small numbers in lower level in summer.	MYYU	July 2017, February 2018, June 2018, October through November 2018	Abundant staining/guano on lower level but no large roosts found. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
Vacant House (light blue) on Copco Access Road	Mod	No	No	NA	July 2017	None
Maintenance Building (next to switchyard on Copco Access Road)	High	Yes	Yes – 30 bats estimated on summer emergence.	*Myotis* spp.	July 2017, June 2018, October-November 2018, June 2019	First emergence survey in June 2019. One COTO call detected on emergence.
Tin Pumphouse (across from light blue house on Copco Access Road)	Low	No	No	NA	July 2017	None
Groundwater Well House (at entrance to Copco Village)	Low - mod	No	No	NA	July 2017, October-November 2018	None
Vacant House 1 (tan)	High	Yes	Yes – small numbers of bats present under exterior side panels in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Vacant House 2 (blue)	High	Yes	Yes – small numbers of bats present under exterior side panels in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Vacant House 3 (yellow-green)	High	Yes	Yes – large colony present in summer, in garage behind wood window framing and under rotting wood panels.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Vacant House 4 (peach)	High	Yes	Yes – present between flashing and fascia board all around roof edge in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Vacant House #21601 (light yellow)	High	Yes	Yes – 300 bats estimated during summer emergence.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	Presumed maternity roost.
Occupied House next to Vacant House 4	Mod	Unknown	Unknown	NA	July 2017 exterior only.	No interior survey access to occupied residences. Resident stated he is not aware of any bats in the attic.
House 19038 (next to schoolhouse)	High	Yes	No	NA	July 2017, February 2018, June 2018, October November 2018	None
Bunkhouse	Mod	No	No	NA	July 2017, February 2018, June 2018, October-November 2018	None
Cookhouse	Mod	Yes	Yes – small number of bats present in awning over side door outside in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Equipment Shed (in front of bunkhouse/cookhouse)	Low	No	No	NA	July 2017, February 2018, June 2018	None
Schoolhouse	Low - mod	No	No	NA	July 2017	None
Hazardous Waste Storage/Wood Shop	Low - mod	No	No	NA	July 2017, February 2018, June 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Copco No. 2 powerhouse	High	Yes	Yes – 50 bats estimated during summer emergence.	MYYU	July 2017, February 2018, June 2018, October-November 2018	Six dead Myotis adults and pups found on ground level and lower level in summer. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
Maintenance Building (next to Copco No. 2 powerhouse)	Low	No	No	NA	July 2017, June 2018	None
Copco No. 2 Dam (concrete dam and associated structures)	Low	No	No	NA	July 2017	None
Control Center at Copco No. 2 powerhouse	Low	No	No	NA	July 2017, February 2018, June 2018	None
J. C. Boyle						
Office/Red Barn	High	Yes	No	None	July 2017, May and June 2018, October 2018, June 2019	June 2019 survey conducted from outside of perimeter fence due to gate access constraint. Two desiccated dead MYYU found in attic in 2017. No live bats found to-date.
Spillway Control Center	High	Yes	Yes – several hundred bats present in summer.	MYYU	July 2017, May and June 2018, October 2018	Presumed maternity roost.
Fish Screen House	Mod-high	No	No	NA	July 2017, June 2018, October 2018	None
Fire Protection Building	Mod	Yes	Yes – outside only, a few bats day roosting in exterior crevices near roof edges (western side and eastern side) in summer.	MYYU	July 2017, June 2018, October 2018	None
Dam Communications	Mod	No	No	NA	July 2017, June 2018, October 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
J.C. Boyle powerhouse	Mod	No	No	NA	July 2017, June 2018, October 2018	None
Maintenance Building (next to powerhouse)	Low - mod	No	No	NA	July 2017, June 2018, October 2018	None
Truck Shop	Low - mod	No	No	NA	July 2017, May 2018 and June 2018, October 2018	None
Headgate Control	Low - mod	No	No	NA	July 2017, June 2018	None
Gate Control and Communications	Low - mod	No	No	NA	July 2017, October 2018	None
Power Canal/Spillway	Low	No	No	NA	July 2017, June 2018	None
HazMat Storage Shed	Low	No	No	NA	July 2017	None
Pump House	Low	No	No	NA	July 2017	None
Two occupied residences	Unknown	Unknown	Unknown	NA	NA	No interior survey access to occupied residences.

Notes:

[1] “High” suitability was assigned to structures with bats present and/or where signs of heavy bat use were found, or to structures that showed little or no sign of use or could not be accessed but contain external or internal features generally preferred by roosting bats, such as attics/roof spaces, soffits, fascias, weather boarding, spaces between roof felt/membrane and tiles/slates, window frames, cave/cavity walls, flashing, and the like. “Moderate” suitability was assigned to structures where no bats or very few bats were found, with little or no sign of bat use, that contain points of entry/exit and limited internal and external features preferred by roosting bats. ”Low” suitability for roosting was assigned to well-sealed structures with no points of entry/exit, and generally lacking cavities, crevices, and other features generally preferred by roosting bats.

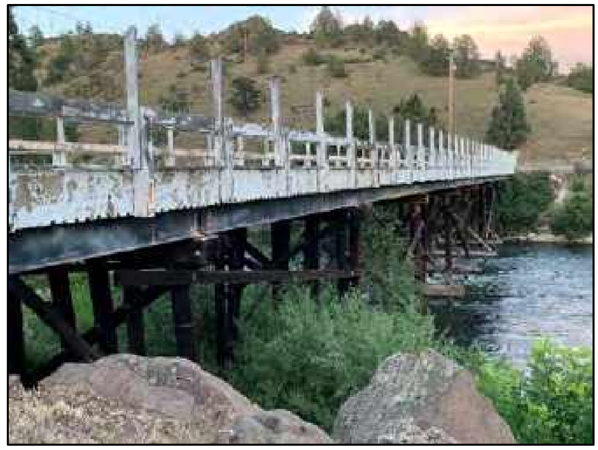
[2] Photograph included in report

NA = Not Applicable

MYYU = *Myotis yumanensis* (Yuma myotis)

COTO = *Corynorhinus townsendii* (Townsend's big-eared bat)

Photograph 3-1 Maintenance Building on Copco Access Road, June 15, 2019



Photograph 3-2 Lakeview Road Bridge, June 12, 2019

During the June 2019 surveys, bat emergences occurred when the average evening outdoor temperature was 75 degrees Fahrenheit. KRRC biologist confirmed bat roosts in six of the seven structures surveyed. Figures 3-1 through 3-5 show all structures across the Project area where active bat roosts have been confirmed during surveys from 2017-2019. Photographs 3-1 and 3-2 depict the exterior view of the Maintenance Building and Lakeview Road Bridge prior to emergence surveys.

Biologists observed evening emergences of approximately 100 bats from the Copco diversion tunnel and approximately 200 bats from the Iron Gate diversion tunnel. More than 2,000 *Myotis* spp. emerged from the Copco No. 1 C-12 gatehouse. As before, more than 400 bats emerged from the below-grade draft pipe channels at the Iron Gate powerhouse. At the J.C. Boyle red barn, no bats were seen emerging from the structure. Big brown bat (*Eptesicus fuscus*) and hoary bat (*Lasiurus cinereus*) were identified acoustically in small numbers in flight nearby. The results of the June 2019 surveys at these five structures are consistent with the emergence and acoustic surveys conducted at these same locations in 2018.

Biologists surveyed the Lakeview Road Bridge and Maintenance Building for emergence and acoustic detections for the first time in June 2019. At the Lakeview Road bridge, biologists observed bats emerging from three discrete locations underneath the bridge. Most of the acoustic detections at this location were not definitively classified; however, a small number of Yuma myotis were confirmed. At the Maintenance Building, most of the calls showed characteristics of *Myotis* spp. These were primarily auto-classified as Yuma myotis and California myotis (*Myotis californicus*), with a small number of long-legged myotis (*Myotis volans*) and/or western small-footed myotis (*Myotis ciliolabrum*). Because these species are difficult to distinguish acoustically, the species detected at this structure are collectively reported as *Myotis* spp. One call at the Maintenance Building was auto-classified as Townsend's big-eared bat (*Corynorhinus townsendii*) and later confirmed by manual vetting. KRRC biologist observed many bats circling around the open area at the back of the building and foraging among the trees behind the building; therefore, the Townsend's big-eared bat call confirmed the species presence in the vicinity but did not confirm the species to be roosting inside of the structure.

Additionally, during meetings with the design-build contractor in September 2019, KRRC biologists were informed that an engineering team observed one bat in a cavity in a historic concrete gate control structure on the upstream side of the Copco No. 1 dam (Figure 3-3) in March 2018. This structure has not been inspected by KRRC biologists to-date for potential bat roosting.

3.3 Conclusions

Surveys conducted from 2017-2019 confirmed that significant bat roosts are present in many structures across the Project area.

Chapter 4 Western Pond Turtle

4. WESTERN POND TURTLE

4.1 Introduction

KRRC biologists completed general wildlife surveys and noted observations of WPTs in the 0.25-mile study area in 2018, as described in the 2018 Annual Report (KRRC 2019a). In accordance with condition 4.c of the Clean Water Act Section 401 Certification issued by the Oregon Department of Environmental Quality, KRRC conducted a study of WPTs at J.C. Boyle Reservoir. This study was conducted by KRRC biologists in partnership with ODFW from August 2018 through April 2019. This study was implemented to inform key knowledge gaps about native turtles. This study had two primary objectives: 1) to estimate the WPT population size and 2) to determine the timing and locations of WPT overwintering behavior. The results of the study are summarized here. For more detail, figures, and data, please see the full report, Western Pond Turtle Study Report, J.C. Boyle Reservoir (KRRC 2019b).

To assess the population size, KRRC biologists conducted capture-mark-recapture (CMR) in areas known to be used by turtles. In addition, biologists conducted a springtime basking survey to provide a rough estimate of relative abundance. It should be noted that visual surveys do not provide rigorous estimates of population size or density.

Biologists used radio telemetry to track adult turtles through the winter and determine the overwinter timing and location of refugia for WPTs in J.C. Boyle Reservoir. Biologists used temperature data loggers, some attached to radio-tagged turtles and some installed along a transect from upland to deeper waters, to compare temperatures associated with turtle locations with the baseline environmental temperatures. This comparison required the recapture of radio-tagged animals in spring 2019 to retrieve transmitters and recover temperature data.

As described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a), KRRC biologists carried out trapping events and installed environmental temperature loggers in August and September of 2018. Radios and temperature loggers were affixed to eight turtles.

Additional field efforts completed by KRRC biologists in 2019 included:

- Monthly radio-telemetry surveys to identify overwintering habitat and characterize seasonal movement patterns
- Trapping for CMR and for recovery of telemetry equipment and temperature data loggers
- A springtime basking survey to provide a rough estimate of relative abundance
- Retrieval of environmental data loggers to collect baseline temperature data

The WPT Study Report, J.C. Boyle Reservoir (KRRC 2019b) provides additional details of the methods and findings of the study.

4.2 Methods

4.2.1 Fall 2018 – Winter 2019

Telemetry Surveys

Field teams completed telemetry surveys during monthly site visits from November 2018 through April 2019 to ascertain the overwintering habits (timing and location) of the eight radio-tagged WPT. KRRC tested all equipment and found that telemetry receiver accuracy was consistently under 6.5 feet (2 meters). The equipment typically provided locations that were within the margins of error for handheld Global Positioning System (GPS). Locations were recorded using a handheld GPS (Garmin Map78s), with error typically between 10 to 16 feet (3 and 5 meters).

4.2.2 Spring 2019

Trapping and Recovery of Data Loggers

KRRC biologists conducted trapping for CMR and for recovery of telemetry equipment and temperature data loggers in spring of 2019, with site visits on April 3 through 5 and April 23 through 29. Considering the low trap capture success in 2018, the team chose to focus the spring trapping on recapture of radio-tagged WPT to recover the transmitters and temperature data loggers. Trapping was therefore targeted in areas where radio-tagged WPT were found to be present based on telemetry. All eight turtles were successfully radio-located prior to trap deployment in April.

Photograph 4-1 Deployment of Turtle Trap near Large Woody Debris

Biologists placed twenty traps around the reservoir near large woody debris, rock crevices, and other refugia near where radio-tagged turtles were detected. Traps were left in place near radio-tagged turtles and were checked one or more times each day. Bait was replaced as necessary. If telemetry indicated that radio-tagged turtles were no longer in the area, traps were repositioned near the radio-tagged turtle's new location and rebaited.

On April 27, 2019, KRRC retrieved the environmental data loggers that had been placed along land-to-water transects in the summer of 2018 to collect baseline environmental temperature data.

Basking Surveys

Biologists completed formal basking surveys from April 23 through 29, 2019. These surveys consisted of visually inspecting various basking habitats, such as rock faces, exposed stumps, and downed trees throughout the study area. Biologists recorded the locations of all basking turtles using a handheld GPS unit.

4.3 Findings

4.3.1 Telemetry Study

All eight radio-tagged animals were located via telemetry during each site visit, with the two exceptions noted below. KRRC biologists tracked the approximate travel paths based on monthly telemetry checks for each individual turtle. The telemetry results from the end of summer, through fall and winter and into early spring, are summarized below:

- On September 7, 2018, biologists successfully radio-located seven of the eight turtles. One turtle (#701) only had a faint signal that could not be accurately triangulated.
- On November 14, 2018, biologists located all eight turtles at the reservoir shoreline, apparently inside bank cavities or under large woody debris at the water's edge. Although no radio-tagged turtles were visible, cavities in the bank, crevices, and root wads were visible. Based on telemetry signals, some radio-tagged turtles appeared to be fewer than 3 feet into the bank. Some radio-tagged turtles were located under root wads of standing trees or stumps. Openings to these refugia were often just below the water surface but were completely exposed when the water level was low. Turtles were in the zone exposed to regular fluctuations of reservoir water levels.
- On December 10, 2018, seven of the eight turtles appeared to be in the same locations recorded on the previous visit in November. One turtle had moved, apparently to avoid ice pack.
- On January 29, 2019, there were no recorded movements for any of the turtles; all eight animals appeared to be in the same locations as in December.
- On February 22, 2019, four of the eight turtles had moved short distances (<5 meters) from their overwinter sites, while the other four appeared to be in the same locations reported in December and January.
- On March 5, 2019, most radio-tagged turtles exhibited short distance movements, and by March 13, 2019, telemetry information indicated that turtles were becoming more active.

- From April 3 through 5, 2019, radio-tagged turtles were actively moving throughout the reservoir. Biologists observed some turtles basking. By April 23 through 29, 2019, basking turtles were abundant, and radio-tagged turtles were frequently moving over long distances.

4.3.2 Spring Recapture Efforts

In early April (April 3 through 5), telemetry data indicated that turtles had left overwinter refugia and were actively moving throughout the J.C. Boyle Reservoir. No turtles were caught in baited traps, but two turtles were hand-captured with a dip net. Biologists observed turtles basking on the first day, but observations declined dramatically over the 3-day visit as a large winter storm advanced.

During a second visit in April (April 23 through 29, 2019), weather conditions were more favorable, and biologists regularly observed basking turtles. It appeared that most radio-tagged turtles were moving away from overwinter sites (i.e., shoreline refugia) to more typical spring/summer-use microhabitats during the day (i.e., areas with aerial basking perches, such as woody debris, emergent rocks, and the floating log boom near the dam).

Photograph 4-2 Releasing a Captured Western Pond Turtle

Biologists captured several turtles during the first few days of trapping, but the capture rate declined after the first day. Turtles, including radio-tagged individuals, were consistently observed near trap locations, but the capture rate remained low. Eleven new turtles were caught in traps in 2019, but no recaptures occurred. One radio transmitter (radio #919) was recovered from a trap, but it was no longer attached to the turtle, indicating that the radio-tagged turtle had entered the trap and later escaped. A few turtles were caught by dip net; however, seine netting, snorkeling, and a drift fence trap did not capture any turtles. Due to extremely low underwater visibility and high water levels, active methods of turtle capture were not effective.

Due to the lower-than-required number of captures and recaptures, the CMR data were insufficient to calculate a valid population estimate A larger sample size and higher proportion of recaptures would be required to produce a valid population estimate.

4.3.3 Basking Observations

During basking surveys, KRRC biologists observed a maximum of 35 turtles in 1 day. As observed in previous surveys, WPT used a variety of basking habitats, including exposed rock features and large woody debris. Biologists consistently observed the greatest numbers of basking turtles at the northern end of the floating log boom near the J.C. Boyle Dam; more than a dozen turtles were observed here at one time on several occasions.

4.3.4 Temperature Monitoring

Biologists successfully recovered environmental temperature data from 9 of the 16 environmental temperature loggers. Thermographs from a land-to-water transect reveal distinct signatures between land and water sensors. Based on the environmental thermographs, the greatest temperature fluctuations occurred at the shoreline sensor, which was nearest to where radio-tagged turtles in this study overwintered. However, temperatures in turtle refugia are unknown because no functional temperature loggers were recovered from the study animals. Only one data logger was recovered from a turtle, but the data were not recoverable due to water damage.

4.4 Conclusions

The study of WPTs occupying the J.C. Boyle Reservoir area had two primary objectives: to generate a population estimate for WPTs at the J.C. Boyle Reservoir and to gain information about their overwintering habits. The number of turtles captured and recaptured was insufficient to produce a statistically valid population estimate, but visual surveys confirmed that WPTs are common in the reservoir. Frequent observations of juveniles indicated that the reservoir supports a reproducing population of turtles.

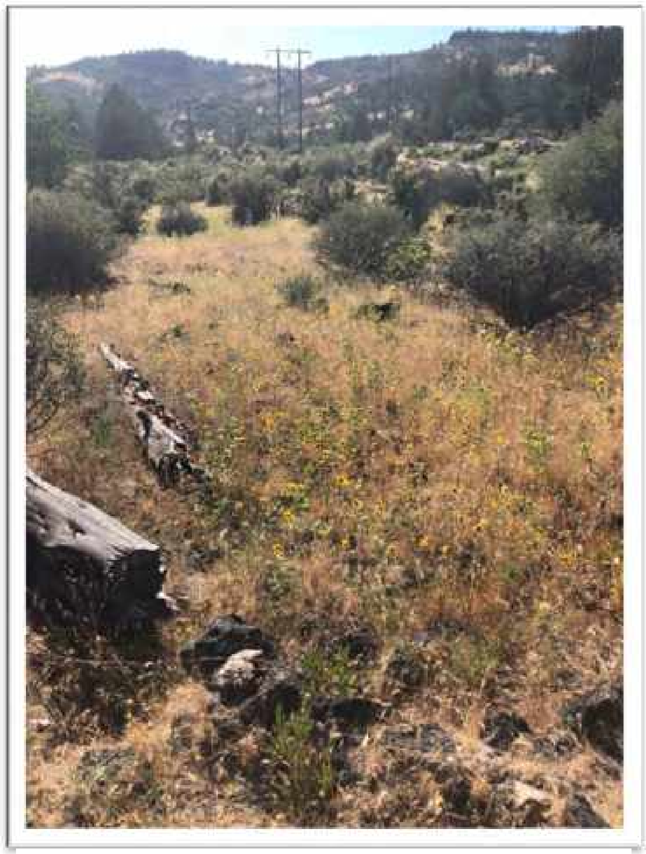
The telemetry study determined that all eight radio-tagged animals overwintered in refugia at the reservoir shoreline. It must be noted that this study was limited in scope and describes the behavior of a subset of turtles at J.C. Boyle Reservoir. Literature on WPT overwinter habits demonstrate that turtles in different systems often behave differently. The findings of this study should be cautiously applied to turtles in the other Project reservoirs. Additional information of WPT life cycle and habitat requirements can be found in previous Project documents (AECOM and CDM Smith 2017).

Chapter 5 Special-Status Plants

5. SPECIAL-STATUS PLANTS

5.1 Introduction

KRRC defined special-status plants to include those species with federal status (federally listed as threatened, endangered, or proposed for listing); state threatened or endangered species, and species on the Oregon Natural Heritage Program Lists 1 to 4 and California Rare Plant Rank 1 to 4. BLM and USFS Sensitive Species are also considered where BLM and USFS lands occur in the study area. The list of special status species in Oregon and California was refined to those with the potential to occur in the project area based on available habitat types and historical records. The species with potential to occur are listed in Table 5-1.



Photograph 5-1 Survey Transect near Copco No. 1 Dam

KRRC biologists identified special-status plant species with the potential to occur in the Project area, based on historical records and review of plant databases. PacifiCorp (2004) documented several special-status plant species during extensive surveys in 2002 and 2003. In addition, KRRC biologists identified documented occurrences of special-status plant species through reviews of state and federal databases, including the Oregon Biodiversity Information Center (ORBIC), the California Natural Diversity Database (CNDDB), and the USFWS Information for Planning and Consultation database (ORBIC 2017, IPaC 2018, CNDDB 2018). Other sources of information on special-status plant species in the Project area include the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California, USFWS – Yreka, the Bureau of Land Management (BLM) – Klamath Falls, and the United States Forest Service (USFS) – Klamath National Forest. Table 5-1 shows the documented occurrences for each species with the potential to occur in the project area. If a special status species was previously documented (e.g., on ORBIC, CNDDB) within the project area, it was included in the list of species with the potential to occur even if available habitat did not appear to be present.

Table 5-1 Preliminary List of Special-Status Plants with Potential to Occur

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Proposed Survey Effort
Western yellow cedar *(Callitropsis nootkatensis)*	Petitioned for federal listing, CNPS List 4.3	Wet to moist sites, from the coastal rainforests to rocky ridgetops near the timberline in the mountains	Not documented during PacifiCorp surveys or listed on CNDDB or ORBIC for the Project area; may occur based on information from USFWS Yreka office (May 23, 2017)	NA	In construction areas in suitable habitat
Greene's mariposa-lily *(Calochortus greenei)*	FSC, BLM, OC, ONHP List 1, CNPS List 1B	Occurs primarily in annual grassland, wedgeleaf ceanothus chaparral, and oak and oak-juniper woodlands	Several locations around Iron Gate Reservoir (PacifiCorp 2004; CNDDB 2018)	May through July	In construction areas in suitable habitat
Bristly Sedge *(Carex comosa)*	ONHP List 2	Marshes, lake shore, and wet meadows	East Shore of J.C. Boyle Reservoir in two locations (east of Dam and south of Highway 66); also, west of dam (ORBIC 2017)	May through September	Along reservoir margins and in construction areas in suitable habitat
Mountain Lady's Slipper *(Cypripedium montanum)*	ONHP List 4, CNPS List 4	Dry, open conifer forests, more often in moist riparian habitats	J.C. Boyle peaking reach (location details unknown) (PacifiCorp 2004)	March through August	In construction areas in suitable habitat
Gentner's fritillary *(Fritillaria gentneri)*	FE, CNPS List 1B	Cismontane woodland, chaparral and mixed hardwood-conifer vegetation dominated by Oregon oak	Habitat present in the reach along Copco and Iron Gate Reservoirs; no known locations	Late March to early April; April and May at higher elevations	In construction areas in suitable habitat
Bolander's sunflower *(Helianthus bolanderi)*	BLM, ONHP List 3	Occurs in yellow pine forest, foothill oak woodland, and chaparral, and occasionally in serpentine substrates or wet habitats	South of Iron Gate Reservoir near alternative disposal site, J.C. Boyle peaking reach (location details unknown) (PacifiCorp 2004)	June through October	In construction areas in suitable habitat
Washington lily *(Lilium washingtonianum* ssp. *purpurascens)*	CNPS List 4	Forest openings, chaparral, burned clearcuts, and roadsides	Several locations around Copco Lake, including near Copco Road along the seep area (KRRC 2019a)	June through August	Within the limits of work in suitable habitat
Bellinger's meadow-foam *(Limnanthes floccosa* ssp. *Bellingerana)*	FSC, BLM, OC, ONHP List 1, CNPS List 1B	High elevation vernal pools in shallow soiled rocky meadows in spots that are at least partially shaded in the spring	J.C. Boyle peaking reach (location details unknown) (PacifiCorp 2004)	April through June	In construction areas in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Proposed Survey Effort
Detling's silverpuffs (*Microseris laciniata* ssp. *detlingii)*	CNPS List 2	Chaparral and grassy openings among Oregon white oak trees	One location on the western side of Iron Gate Reservoir (CNDDB 2018)	May and June	In construction areas in suitable habitat
Egg Lake monkeyflower *(Mimulus pygmaeus)*	FSC, CNPS List 4	Occurs in damp areas or vernally moist conditions in meadows and open woods	East of J.C. Boyle Reservoir in two locations (north of Highway 66 and southeast of Dam); west of Dam in two locations in damp mudflats; also west of canal near access road in one location (PacifiCorp 2004)	May through August	Along reservoir margins and in construction areas in suitable habitat
Greene's four o-clock *Mirabilis greenei*	CNPS List 4	Dry slopes and flats among juniper and foothill woodlands, and grasslands	Along the western side of the Iron Gate Reservoir (KRRC 2019a)	May and June	Within the limits of work in suitable habitat
Holzinger's orthotrichum moss *(Orthotrichum holzingeri)*	CNPS List 1B.3	Found on vertical calcareous rock surfaces and at the bases of Salix bushes just above rock that is frequently inundated by seasonally high water in dry coniferous forests	Just upstream of Iron Gate Reservoir on Jenny Creek (CNDDB 2018)	N/A	Where in-stream work could occur at Jenny Creek at bridge
Western yampah *(Perideridia erythrorhiza)*	FSC, BLM, OC, ONHP List 1	Occurs in moist prairies, pastureland, seasonally wet meadows, and oak or pine woodlands, often in dark wetland soils and clay depressions	Along three drainages into the western side of J.C. Boyle Reservoir, and in two locations west of the canal near the access road (PacifiCorp 2004)	Mid July and August	Along reservoir margins and in construction areas in suitable habitat
Howell's yampah (Howell's false caraway) *(Perideridia howelii)*	ONHP List 4	Moist meadows and stream banks	One location along the drainage southeast of J.C. Boyle Reservoir; one location along the northern side of Copco Lake north of the road (PacifiCorp 2004)	July and August	Along reservoir margins and in construction areas in suitable habitat
Yreka phlox *(Phlox hirsuta)*	FE, CE, CNPS List 1B	Open areas on dry serpentine soils and at elevations ranging from 2,500 to 4,400 feet	Not known to occur near construction areas; no suitable ultramafic soils occur within 0.5 mile of construction areas (NRCS 2017)	March and April	None – suitable soils not present in construction areas
Strapleaf willow *(Salix ligulifolia)*	ONHP List 3	Riverbanks, wetlands, and floodplains	One location west of J.C. Boyle Dam in a boulder flood channel in the dam release zone (ORBIC 2017)	March through June	Along reservoir margins and in construction areas in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Proposed Survey Effort
Fleshy sage *(Salvia dorrii* var. *incana)*	CNPS List 3	Occurs in silty to rocky soils in great basin scrub, pinyon, and juniper woodland	Three locations around Iron Gate Reservoir (PacifiCorp 2004)	May through July	In construction areas in suitable habitat
Lemmon's silene *(Silene lemmonii)*	ONHP List 3	Open pine woodlands	J.C. Boyle peaking reach to J.C. Boyle Reservoir (location details unknown) (PacifiCorp 2004)	Spring and Summer	In construction areas in suitable habitat

Key:
BLM: Bureau of Land Management sensitive species -species that could easily become endangered or extinct.
CE: California Endangered
CNDDB: California Natural Diversity Database
CNPS List 1A: California Native Plant Society (CNPS)-Presumed extinct in California
CNPS List 1B: rare, threatened, or endangered in California and elsewhere
CNPS List 2: rare, threatened, or endangered in California, but more common elsewhere
CNPS List 3: on the review list – more information needed
CNPS List 4: on the watch list – limited distribution
FE: Federal Endangered
FSC: Federal Species of Concern
OC: Candidate listing by Oregon Department of Agriculture
ONHP List 1: Oregon Natural Heritage Program threatened with extinction or presumed to be extinct throughout their entire range
ONHP List 2: threatened with extirpation or presumed to be extirpated from the State of Oregon
ONHP List 3: more information is needed before status can be determined, but may be threatened or endangered in Oregon or throughout their range
ONHP List 4: of conservation concern but not currently threatened or endangered
ORBIC: Oregon Biodiversity Information Center
USFWS: United States Fish and Wildlife Service

As described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a), KRRC began conducting special-status plant surveys in 2018 to identify any special-status plants that are currently present 1) within a 0.25-mile buffer around the Project area, defined as the dams and structures to be removed, the disposal sites, the haul and access roads that may undergo improvements, and the reservoirs; and/or 2) in areas such as reservoir shorelines that may be affected by the Project. Findings of KRRC surveys in 2018 and 2019 are presented below.

5.2 Methods

KRRC biologists conducted surveys for special status plants with the potential to occur in the project area. Prior to the surveys, KRRC biologists compiled a list of special-status plant species with potential to occur within the limits of work based on documented occurrences and the presence of suitable habitat, as shown in Table 5-1. Surveys were timed to coincide with the bloom time for each species, and the surveys for each species were based on an understanding of the potential habitat suitability in the Project area. The entire limits of work were surveyed for special status plants; however, a focused floristic survey was conducted in areas where there would be construction disturbance. Focused floristic surveys were also conducted where habitat conditions are expected to change due to reservoir drawdown and there were also suitable habitat and locations of known and potential occurrences of special-status plants.

The focused surveys followed the CDFW "Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities" (CDFW 2018). In areas along reservoir shorelines, where changes in hydrology and geomorphology could occur due to the Project, surveys were focused on the locations of known and potential occurrences of special-status plants documented during surveys conducted by PacifiCorp (2004) and data obtained from a desktop review of existing databases (CNDDB, ORBIC, and CNPS).

Following the CDFW protocol, KRRC biologists conducted detailed floristic surveys that entailed identification of every plant taxon observed, to the taxonomic level necessary to determine rarity and listing status. The construction areas include proposed disposal sites (including those considered alternative disposal sites), staging areas, utility line corridors, facility removal areas, and locations where clearing could occur for road modifications such as road widening, turnouts, equipment/material storage, and bridge replacement. In these areas, biologists walked parallel transects generally spaced 5 to 10 meters apart and recorded plant species observed. Biologists also used a boat to survey reservoir shorelines, focusing on areas of suitable habitat and locations of known and potential occurrences of special-status plants. GPS coordinates were recorded for all observed special-status plants, along with descriptions of habitat conditions and proximity to proposed work activities or other notable features.

In consideration of the various peak bloom times of the focal species listed in Table 5-1, the KRRC biologists planned three surveys: early season (April), mid-season (May), and late season (July). The mid-season and part of the late season surveys were conducted in 2018, as described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a). The April early season survey was not conducted in 2018, due to lack of access to PacifiCorp lands. A July 2018 wildfire in the California portion of the study area restricted the late-season survey to the J.C. Boyle Reservoir study area. Therefore, KRRC planned follow-up surveys in 2019 to include the April early-season survey and the July late-season survey (California only). Additionally, any areas that were insufficiently surveyed during 2018 were surveyed in 2019. This included the proposed Fall Creek Hatchery area and river reach between Copco and Iron Gate Reservoirs. Lastly, biologists visited the locations of unconfirmed, historical sightings during the appropriate bloom times to confirm the occurrences of specific species.

Photograph 5-2 Bristly Sedge (*Carex comosa*)

The April 2019 special-status plant survey was specifically scheduled to coincide with the bloom time of Gentner's fritillary. During survey planning, KRRC biologists obtained information from CDFW and USFS botanists on the 2019 phenology at known reference populations to confirm the appropriate timing of the survey in the Project area. Biologists visited a reference population of Gentner's fritillary in Jacksonville, Oregon on April 21, 2019 to confirm that the species was blooming. Biologists took this opportunity to familiarize themselves with the morphological and habitat characteristics of the species to aid in differentiating it from the more common fritillary species, scarlet fritillary (*Fritillaria recurva*), which is very similar in appearance and occupies the same habitat.

The July 2019 special-status plant survey was scheduled to coincide with the late-blooming species shown in Table 5-1, including Greene's mariposa-lily, Bolander's sunflower, Howell's yampah, fleshy sage, and pendulous bulrush. KRRC biologists conducted the survey in the vicinity of Iron Gate Reservoir and Copco Lake from July 15 through July 19, 2019. In addition, during the week of July 22 through July 26, 2019, an AECOM biologist visited the locations of special-status plant observations from the July 2018 survey in the vicinity of J.C. Boyle Reservoir.

5.3 Findings

As shown on Figures 5-1 through 5-3 and presented in Table 5-2 below, biologists identified eight special-status plant species in the Project area during the 2018 and 2019 surveys, as follows:

Photograph 5-3 Greene's Mariposa-lily (*Calochortus greeni*)

- Greene's mariposa-lily (*Calochortus greenei*): KRRC biologists observed numerous *Calochortus* plants in construction areas in the Project area, including at the Iron Gate alternative upland disposal site and along utility corridors in the vicinity of Iron Gate Reservoir and Copco Lake during surveys completed in April 2019. Although plants were not in bloom when first observed in April 2019; the species designation was confirmed as *Calochortus greenei* when sites were revisited in July 2019.
- Detling's silverpuffs (*Microseris laciniata* ssp. *detlingi*). KRRC biologists confirmed a previously documented CNDDB occurrence at the Iron Gate alternative upland disposal site. New occurrences were also observed and mapped along utility corridors along the southeastern side of the Iron Gate Reservoir and south of the Copco No. 2 bypass reach.
- Bristly sedge (*Carex comosa*): In July 2019, KRRC biologists observed and mapped plants throughout the wetland complex along the eastern shore of the J.C. Boyle Reservoir. The location of a historical occurrence south of the Highway 66 bridge was visited during the field surveys and *Carex* was present, but because the plants were not in flower, the species is unconfirmed south of the bridge.
- Bolander's sunflower (*Helianthus bolanderi*): In July 2019, KRRC biologists observed and mapped plants in utility corridors along the northern side of Iron Gate Reservoir and between Iron Gate Reservoir and Copco Lake. Biologists also observed and mapped one occurrence along the eastern side of the J.C. Boyle Reservoir in July 2019.

Table 5-2 Special-Status Plant Observations by Reservoir

Species	Observation Location		
	Iron Gate Reservoir	Copco Lake	J.C. Boyle Reservoir
Greene's mariposa-lily (*Calochortus greenei*)	Several locations in the vicinity of the Iron Gate Reservoir, including within the footprint of the Iron Gate alternative upland disposal site	Along utility corridors between the Copco No. 1 and Copco No. 2 Dams, and between Copco No. 2 Dam and Daggett Road bridge	
Detling's silverpuffs (*Microseris laciniata* ssp. *detlingii)*	Present in the Iron Gate alternative upland disposal site; also along utility corridor on the southeastern side of the reservoir	Along the utility corridor between Copco No. 2 Dam and Daggett Road Bridge	
Bolander's sunflower (*Helianthus bolanderi*)	Present in the Iron Gate disposal area east of the dam; present in the transmission line corridor to west of Jenny Creek confluence	Observed in the transmission line corridor northwest of the reservoir	A large group was observed on the eastern shore in Klamath Sportsman's Park
Fleshy Sage (*Salvia dorrii* var. *incana*)	Two locations near Iron Gate Reservoir; both in proximity to but outside of the construction footprint for removal of utility poles		
Western Yampah (*Perideridia erythrorhiza*)			North of the J.C. Boyle Dam in a dry meadow; will likely be outside the area of impact from the drawdown of the reservoir
Bristly Sedge (*Carex comosa*)			Observed in three locations in Klamath Sportsman Park wetlands on the eastern shore north of the Highway 66 bridge
Greene's Four O'clock (*Mirabilis greenei*)	Observed in the utility corridor on the northeastern side of the reservoir	Observed in four locations along the northern side of the Klamath River, downstream of the Copco No. 2 Dam	
Purple-flowered Washington Lily (*Lilium washingtonianum* ssp. *Purpurascens*)	Near the Fall Creek diversion	Along the northern side of Copco Lake; several observations in mountain seep-associated wetlands along the northwestern shore of the reservoir	
Strapleaf willow (Salix ligulifolia)			Observed along the river just downstream of the J.C. Boyle Dam

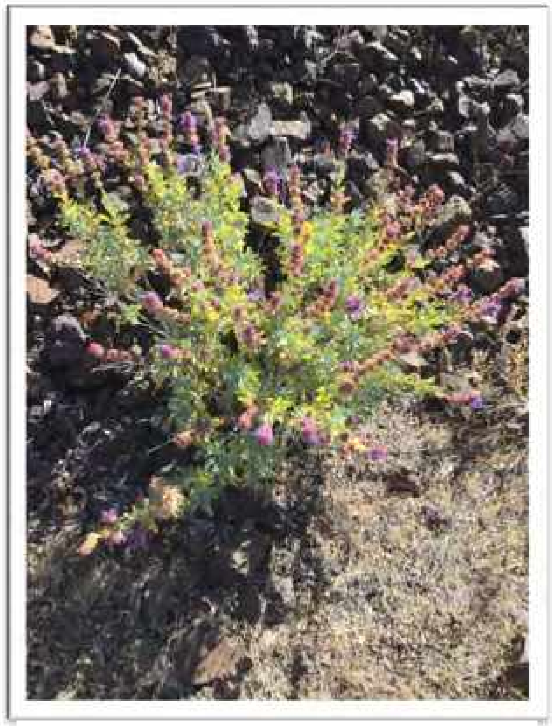
- Purple-flowered Washington lily (*Lilium washingtonianum* ssp. *purpurascens*): Biologists recorded a potential observation at one location near the Fall Creek diversion in July 2019. The plant was not in bloom; however, the location is consistent with a confirmed observation of the species in 2018. In July 2019, KRRC biologists observed several plants in bloom, enabling a positive identification, along Copco Road on the northern side of Copco Lake and coinciding with a series of hillside seeps.

- Greene's four o'clock (*Mirabilis greenei*): In April and July 2019, KRRC biologists observed this species in two locations where disturbances resulting from utility pole removal may occur: 1) near the location of the fleshy sage described below, and 2) north of the Klamath River approximately 0.3 mile west of the intersection of Copco Road and Daggett Road.

- Western yampah (*Perideridia erythrorhiza*): In July 2019, KRRC biologists verified a previously documented population north of the J.C. Boyle Dam. The plants were in a dry meadow and would likely be outside of the area impacted by drawdown of the reservoir.

- Fleshy sage (*Salvia dorrii* var. *incana*): In July 2019, KRRC biologists confirmed a previously documented CNDDB occurrence and mapped a population near a culvert along the southeastern side of the Iron Gate Reservoir. Several plant locations along utility corridors on the northern side of Iron Gate Reservoir were also recorded.

- Strapleaf willow (*Salix ligulifolia*): In July 2019, KRRC biologists confirmed a previously documented ORBIC occurrence along the river just below the J.C. Boyle Dam.



Photograph 5-4 Fleshy Sage (*Salvia dorrii* var. *incana*)

5.4 Conclusions

In summary, the KRRC biologists documented special-status plants in the Project area, including at locations that will potentially be disturbed during construction. These findings are consistent with findings of previous surveys conducted in 2018.

Special-status plant surveys have been completed in accordance with the survey work plan (see Appendix J of the Definite Plan [KRRC 2018]). KRRC is not planning additional surveys.

Chapter 6 Wetlands

6. WETLANDS

6.1 Introduction

Wetland and riparian habitats occur throughout the Project area wherever persistent surface water features occur (e.g., streams, seeps, springs, Project reservoirs, or other sources of hydrology). Wetlands are regulated at both the state and federal levels by resource agencies including the United States Army Corps of Engineers (USACE), CDFW, and the Oregon Department of State Lands (ODSL); riparian habitats are only subject to jurisdiction by California agencies (i.e., CDFW and the State Water Resources Control Board). Restoration of the historical Klamath River channel following dam removal is expected to result in a net increase of wetland and riparian acreage; however, some areas may experience a reduction or a loss of associated water sources resulting from reservoir drawdown. This could result in the temporary or permanent loss of some wetlands or riparian areas that primarily depend on reservoir waters for hydrology. Consequently, KRRC developed wetland investigation methodologies in close coordination with USACE, ODSL, and CDFW to characterize existing conditions for wetlands and other waters (including riparian habitats in California). The methodology included determining the primary hydrology source maintaining each assessment area. The results of the wetland delineation work are provided in detail in the separate *2019 Wetland Investigation Summary Report* (KRRC 2020).

Photograph 6-1 Wetland along Shoreline of Copco Lake

To evaluate potential direct impacts on existing habitats, KRRC wetland scientists delineated wetlands in the portions of the Project area where ground-disturbing activities are anticipated to occur (e.g., disposal sites). KRRC wetland scientists also mapped wetlands along the reservoir margins, stream-associated wetlands, and non-wetland riparian vegetation outside of direct construction areas that may experience changes in hydrological conditions resulting from reservoir drawdown or the removal of other dam infrastructure.

6.2 Methods

Prior to the field investigations, KRRC scientists identified wetland investigation sites through a review of previous vegetation and wetland surveys and pertinent agency databases. This included PacifiCorp surveys conducted in 2002 (as reported in PacifiCorp 2004), 2018 KRRC vegetation community mapping (KRRC 2019a), high-resolution aerial imagery, the USFWS National Wetlands Inventory (USFWS 2019), and the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey (NRCS 2019).

KRRC wetland scientists conducted wetland delineation and mapping field surveys from May 6 through May 17, 2019, and from July 15 through July 25, 2019. KRRC wetland scientists delineated wetlands in accordance with the 1987 United States Army Corps of Engineers Wetland Delineation Manual and the Western Mountains, Valleys, and Coast Region Regional Supplement. In the Oregon portion of the Project, scientists applied the Oregon Rapid Wetland Assessment Protocol (ORWAP) to assess functional values of wetlands in construction areas, as described in Section 6.2.2.

The May 2019 investigations focused primarily on areas where ground-disturbing activities are planned to occur (e.g., disposal areas, staging areas, or bridge replacements) and where hydrology sources were identified to be independent of the Klamath River or Project reservoirs. The July 2019 investigations focused on mapping wetlands along and adjacent to reservoir shorelines and sections of the Klamath River within the limits of work, and on confirming preliminary findings by revisiting areas where problematic conditions were encountered in May 2019. Survey teams mapped non-wetland riparian areas on the California side of the Project in both May and July. Non-wetland riparian areas were not mapped in Oregon; however, the vegetation community mapping does identify willow-dominated communities that are often indicators of riparian conditions (see Section 7 for an update to willow vegetation community mapping provided in the 2018 annual report [KRRC 2019a]).

6.2.1 Wetland Delineation

In accordance with the USACE methodology, KRRC scientists first identified areas that exhibited potential wetland characteristics (e.g., hydrophytic vegetation) and then conducted evaluations of representative wetland determination plots to determine whether the area met the requirements for hydrophytic vegetation, hydric soils, and wetland hydrology. Field crews selected determination plots in areas with conditions that were representative of the entire wetland area. Figures 6-1, 6-2, and 6-3 depict the areas investigated for wetlands in the vicinity of Iron Gate Reservoir, Copco Lake, and J.C. Boyle Reservoir, respectively. In addition to the areas shown on the figures, the entire reservoir margin was also surveyed.

When the presence of a wetland was confirmed, field teams mapped the wetland boundary to submeter accuracy using a handheld GPS device (Trimble Geo 7X). For sites containing a defined stream channel, wetland scientists mapped the ordinary high-water mark (OHWM) and the riparian corridor boundary (RCB) to delineate the extent of federal (e.g., OHWM constitutes waters of the United States) and state jurisdictional boundaries (e.g., RCB constitutes waters of the State under CDFW jurisdiction). In areas where private property or safety concerns prevented access to wetlands or riparian vegetation, surveyors used an alternative mapping approach. This consisted of using ArcGIS Collector, a mobile data collection application that provides a map-driven interface that allows the user to capture spatial data from a distance. Collector was only used to map study areas where line of sight was unimpeded and mapped points could be corroborated with visual observations and aerial imagery.

In several cases, multiple wetlands exhibited sufficiently similar soil, vegetation, and hydrological conditions that they could be appropriately characterized by a single set of paired wetland and upland USACE determination plots recorded for a single representative wetland. For example, wetlands dominated by hardstem bulrush (*Schoenoplectus acutus*) occurring intermittently along the shoreline of each reservoir consistently exhibited very similar characteristics in terms of vegetation, hydrology, and soils. Given their similarity, these wetlands were characterized by at least one representative determination plot at each reservoir. Using this approach, at least one representative set of paired wetland and upland determination plots was evaluated for each wetland type observed at each reservoir.

6.2.2 Oregon Rapid Wetland Assessment Protocol

Based on direction from ODSL, KRRC wetland scientists conducted an additional wetland functions and values assessment in the Oregon portion of the Project area using the ORWAP. ORWAP consists of a series of field and desktop evaluations that provide a standardized, regionally tailored, rapid procedure for estimating the functions and values of wetlands occurring in the state of Oregon (Adamus et al. 2016). ORWAP was conducted in areas where the hydrology is independent from the Klamath River or J.C. Boyle Reservoir (e.g., J.C. Boyle alternative upland disposal site).

Photograph 6-2 Wetland with Hydrology Independent of the Reservoirs

6.2.3 Riparian Vegetation Mapping

Photograph 6-3 Riparian Vegetation at Jenny Creek

CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses, and can extend to habitats adjacent to watercourses. Wetlands and riparian vegetation near watercourses would be considered "habitats adjacent to watercourses" and are thus subject to jurisdiction by the CDFW under Sections 1600 through 1616 of the California Fish and Game Code. To delineate CDFW jurisdictional boundaries, KRRC wetland scientists mapped riparian areas associated with relatively permanent (e.g., reservoir, river, perennial stream, spring, or pond) and semi-permanent (e.g., ephemeral channels) water bodies within the limits of work. Riparian areas generally had hydrophytic vegetation but failed to meet one or more of the remaining wetland parameters (i.e., hydrology and hydric soils), and thus were classified as non-wetland, riparian habitat. KRRC wetland scientists determined the upslope edge of riparian areas by mapping the line where vegetation transitioned from hydrophytic vegetation to vegetation more representative of dry, upland areas in terms of species composition and density. Upland habitat typically consisted of sparsely vegetated, rocky hillslopes. The riparian boundary was mapped to submeter accuracy using a handheld GPS device or ArcGIS Collector, as previously described for wetland delineations.

Riparian delineation methods were informed by definitions and procedures described in the California Riparian Habitat Joint Venture's 2006 Comparison of Methods to Map California Riparian Areas (Collins et al. 2006).

6.2.4 Determination of Hydrology Source

KRRC wetland scientists evaluated the primary source of hydrology for each wetland and riparian area to determine whether the hydrology was mainly dependent on reservoir waters or on other sources. Hydrology was characterized according to the following classifications:

Photograph 6-4 Wetlands along Spencer Creek

- Reservoir-dependent: the primary hydrology is associated with one of the Project reservoirs.
- Infrastructure-dependent: the primary hydrology is associated with infrastructure related to operation of the dams that will be removed as part of the Project (e.g., the Copco wood-stave penstock).
- Non-reservoir-dependent: the primary hydrology is associated with the Klamath River, a stream or seep, precipitation, or another source.

6.3 Findings

A summary of survey findings organized by reservoir area is provided in the following sections. Total wetland and riparian acreages by reservoir are presented in Table 6-1 and described below.

Table 6-1 Summary of 2018-2019 Wetland Investigation Findings

	Location		
	Iron Gate Reservoir	Copco Lake	J.C. Boyle Reservoir
Total Wetlands	**21.2 acres**	**12.9 acres**	**40.0 acres**
Reservoir-Dependent[1] Wetlands	9.6 acres	9.4 acres	38.1 acres
Non-Reservoir-Dependent Wetlands	11.6 acres	3.5 acres	1.9 acres
Total Riparian Vegetation[2]	**40.8 acres**	**32.2 acres**	**n/a**
Reservoir-Dependent Vegetation	10.2 acres	5.3 acres	n/a
Non-Reservoir-Dependent Riparian Vegetation	30.6 acres	26.9 acres	n/a

Notes:

1 This total also includes acreage for areas that are dependent on dam-related infrastructure to support wetland hydrology.
2 Riparian areas not mapped in Oregon.

6.3.1 Iron Gate Reservoir Area

KRRC wetland scientists characterized 134 individual wetlands and 122 riparian zones in the Iron Gate Reservoir area. This area comprised the following 17 general assessment areas between the proposed Fall Creek fish hatchery and the western extent of the proposed limits of work (Figure 6-1):

- Dry Creek Bridge
- Lakeview Road Bridge
- Iron Gate Disposal Area
- Long Gulch Cove
- Iron Gate Culvert 1
- Iron Gate Culverts 2 and 3
- Mirror Cove South Culvert
- Mirror Cove North Culvert
- Juniper Point Culvert
- Scotch Creek
- Camp Creek
- Wanaka Springs Recreation Site
- Jenny Creek Bridge and Cove
- Reservoir Margin
- Yreka Water Supply Pipeline Crossing Area
- Fall Creek Confluence, Daggett Road Bridge, and Staging Areas
- Fall Creek Bridge and Fish Hatchery

These assessment areas correspond to areas where direct impacts resulting from ground-disturbing activities may occur, such as culvert/bridge replacement and upgrades (e.g., Scotch Creek, Dutch Creek, Camp Creek, and Lakeview Road Bridge), recreation site restoration (e.g., Wanaka Springs Recreation Site), and infrastructure improvements (e.g., Fall Creek Hatchery and Yreka Water Supply Pipeline Crossing Area). In addition, these locations represent areas where hydrological changes are expected to affect existing wetlands (e.g., Jenny Creek and Reservoir Margin). Additional sites were evaluated along access routes to characterize existing conditions in the event that future plans require road modifications (e.g., Mirror Cove North and South and Iron Gate Culverts 1 through 3). As noted in Table 6-1, KRRC wetland scientists mapped 21.2 acres of wetlands and 40.8 acres of non-wetland riparian vegetation for areas associated with Iron Gate Reservoir. In all, 9.6 acres of wetland and 10.2 acres of riparian area were classified as dependent on reservoir hydrology.

6.3.2 Copco Lake Area

KRRC wetland scientists characterized 110 individual wetlands and 52 riparian zones in the Copco Lake area. This area comprised the following 14 general assessment areas between the Copco powerhouse and the eastern extent of the limits of work in California, east of the Copco Road Bridge (Figure 6-2):

- Copco No. 2 Wooden Penstock
- Transmission Corridor Pasture
- Copco Borrow Site, Staging Area, and Disposal Area
- Northern Shore Seeps
- Northern Shore Cove #1
- Beaver Creek Confluence and Culvert
- Patricia Road Culverts
- Raymond Gulch
- Northern Shore Cove #2
- Mallard Cove
- Northern Shore Cove #3
- Northern Shore Cove #4
- Shoreline East of Copco Road Bridge
- Reservoir Margin

These assessment areas can be broadly categorized as either areas where ground-disturbing work is anticipated to occur (e.g., Copco Borrow Site, Staging Area and Disposal Area, Copco No. 2 Wooden Penstock, Raymond Gulch, and Beaver Creek Confluence and Culvert) or areas where changes in hydrological conditions resulting from reservoir drawdown are anticipated (e.g., Mallard Cove and Reservoir Margin). As previously noted, some additional sites were evaluated in the event that future road modifications are required (e.g., North Shore Seeps, Northern Shore Cove 1 to 4, and Patricia Road Culverts). As noted in Table 6-1, wetland scientists mapped 12.9 acres of wetlands and 32.2 acres of riparian vegetation in the Copco Lake area. In all, 9.4 acres of wetland and 5.3 acres of riparian area were classified as reservoir-dependent or infrastructure-dependent.

6.3.3 J.C. Boyle Reservoir Area

KRRC wetland scientists characterized 46 individual wetlands in the J.C. Boyle Reservoir area. This area comprised the following 16 general assessment areas, encompassing the extent of the proposed limits of work in the state of Oregon (Figure 6-3):

- Powerhouse and Tailrace
- Access Road South of Scour Hole
- J.C. Boyle Power Canal and Access Road
- Power Canal Exit Ramp
- Rafter Access Point
- Base of J.C. Boyle Dam
- J.C. Boyle Alternative Upland Disposal Site
- Southwest Cove
- Topsy Campground Cove
- Ephemeral Stream – Western Shore
- Ephemeral Drainage – Eastern Shore
- Pioneer Park Day Use Area
- Klamath Sportsman's Park
- Northwestern Shore
- Spencer Creek Cove and Northern Shore
- Reservoir Margin

Several assessment areas correspond with areas where deconstruction activities will take place (e.g., Powerhouse and tailrace, J.C. Boyle Power Canal and access road, Power Canal exit ramp, and Access road south of scour hole) and areas where road improvements may occur (e.g., northwestern shore and ephemeral stream east), while others represent sites where wetland impacts associated with reservoir drawdown are anticipated (e.g., Klamath Sportsman's Park, Spencer Creek Cove and northern shore, and reservoir margins). As noted in Table 6-1, wetland scientists mapped 40.0 acres of wetlands in the J.C. Boyle Reservoir area. In all, 38.1 acres of wetland were classified as dependent on reservoir hydrology. Non-wetland riparian areas were not mapped at J.C. Boyle.

6.4 Conclusions

KRRC wetland scientists conducted field investigations in May and July of 2019 to characterize and delineate wetlands and riparian zones in the Project area. These efforts were carried out to describe existing environmental conditions and inform the ongoing Project design and regulatory permit processes. The wetland and riparian area delineations are described in detail in a Wetland Delineation Report.

Chapter 7 Errata: 2018 Vegetation Community Mapping

7. ERRATA: 2018 VEGETATION COMMUNITY MAPPING

This section outlines revisions made to the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a) subsequent to its distribution as a final report.

During vegetation community mapping in 2018, sandbar willow (*Salix exigua*) was misidentified as Geyer willow (*Salix geyeriana*) in wetlands around the margins of Iron Gate Reservoir and Copco Lake. In addition to correcting the species identification, these errata clarify that Geyer willow thickets, considered a sensitive natural community by CDFW, are not present in the California portion of the Project area. Similarly, bitterbrush scrub, a sensitive natural community in California, is not present in the California portion of the Project area.

The following tables list all revisions to the 2018 report. Table 7-1 lists the changes that apply to the text and Table 7-2 lists changes to the figures in Appendix A of the 2018 report (KRRC 2019a). The corrected figures (Figures 3 and 11) are included in Appendix B of this 2019 survey report.

Table 7-1 Text Errata from 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a)

Previous Text	Revised Text	Page Number	Chapter or Section Number
Geyer	Sandbar	19	2.2.2 Willow Flycatcher
Bitterbrush scrub	Bitterbrush scrub (found only in Oregon portion of the study area)	64	Table 8-1: Vegetation Alliances Recorded in the Study Area
Not applicable (revised text indicates a new row in Table 8-1)	*Salix exigua*; Sandbar willow thicket; Shrub; S4.2; G5	64	Table 8-1: Vegetation Alliances Recorded in the Study Area
Geyer willow thicket	Geyer willow thicket (found only in Oregon portion of the study area)	64	Table 8-1: Vegetation Alliances Recorded in the Study Area
Biologists identified the following sensitive natural communities in the study area: • Oregon ash groves • Bigleaf maple forest • Oregon white oak woodland • Bitterbrush scrub • Chokecherry thicket • Shining willow grove • Geyer willow thicket	Biologists identified the following sensitive natural communities in the California portion of the study area: • Oregon ash groves • Bigleaf maple forest • Oregon white oak woodland • Chokecherry thicket • Shining willow grove	64 and 65	8.3 Conclusions

Table 7-2 Figure Errata from 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a, Appendix A)

Previous Text	Revised Text	Figure Numbers
Geyer willow thicket	Sandbar willow thicket	Figures 3-1 through 3-3; 2018 Willow Flycatcher Habitat and Observations
Geyer willow thicket	Sandbar willow thicket	Figures 11-1 through 11-16 Vegetation Communities

Chapter 8 References

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Chapter 9 List of Preparers

9. LIST OF PREPARERS

Table 8-1 List of Preparers

Name	Education	Qualifications
Emma Argiroff	Master of Urban Planning; B.A. Environmental Science; B.A. Art and Design	2.5 years of experience in regulatory compliance, NEPA/CEQA, land use, and transportation planning.
Don Ashton	M.A. Biodiversity; B.S. Biology	25 years of experience as a professional herpetologist (amphibians and reptiles) researching freshwater ecosystems and seeking multi-disciplinary ecosystem-based approaches to complex stakeholder issues regarding flow management and rehabilitation of regulated rivers in California and Oregon.
Sam Bankston	B.S. Aquatic Biology	7 years of experience in fisheries and wildlife science, stream assessment, threatened and endangered species surveys, biological/water quality sampling, wetland delineation, data analysis using R statistical software, and GIS support.
Kacey Bates	Master of Geospatial Information Science and Technology; B.S. Environmental Science	3 years of experience in GIS, geospatial analysis, task automation (Python), data management, cartographic design, water resources, watershed delineation, floodplain delineation, and development of field data collection forms (Collector for ArcGIS, Survey123).
Laura Burbage	M.S. Ecology; Master of Landscape Architecture; B.A. Biology	18 years of experience in wetland science, plant species identification, wetland soils, restoration design – wetland, stream, and upland habitats, nature park design, permitting, NEPA, aesthetic analysis – USACE methodology, and pre-remedial site assessment.
Joe Broberg	B.A. Environmental Studies	9 years of experience and training in botany with a focus on floristic surveys, special-status plants, ecological data collection, tree surveys, wetland delineations, wildlife surveys, and construction monitoring.
Wilson Fogler	B.A. Forestry (Wildlife Habitat Management and Conservation); B.A. Business Management	3.5 years of experience in wetland delineation, wetland monitoring, biological assessments, threatened and endangered species surveys, water resource planning, and GIS support.

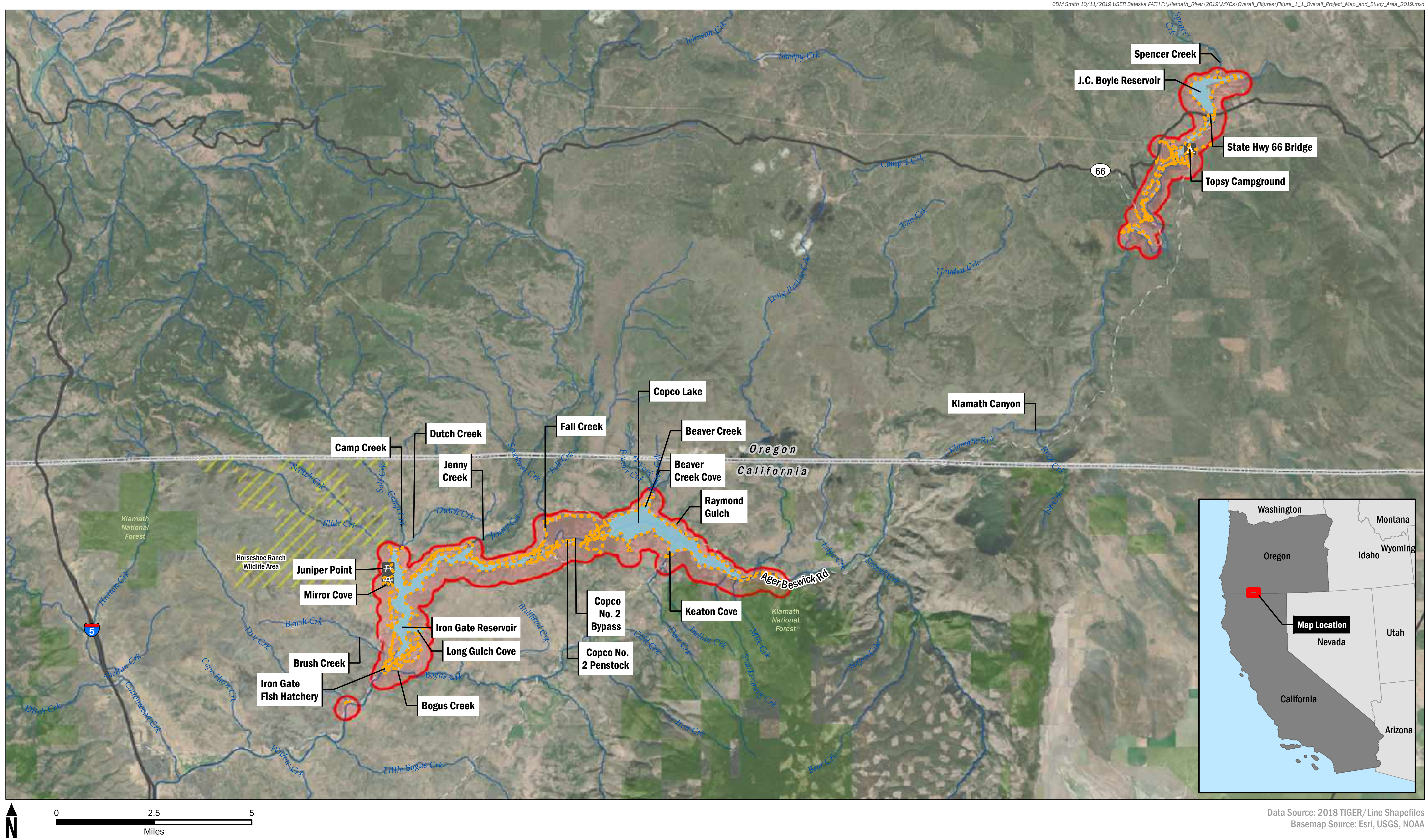
Name	Education	Qualifications
Jennifer Jones	M.S. Environmental Science; B.A. Biology Certified Ecologist – Ecological Society of America	20 years of experience in wildlife and fisheries science, regulatory compliance and permitting, NEPA/CEQA, ecological restoration, wetland delineation, threatened and endangered species surveys, site assessment and remediation, and biological/water quality/soil and sediment sampling.
Christina Kelleher	M.S. Ecology; B.S. Biology; B.A. Sociology 40 Hour Hazwoper Training	5 years of experience in wildlife science, special-status species surveys and monitoring; holds USFWS Recovery Permit and CDFW Scientific Collecting Permit.
Adam Khalaf	M.S. Biological Engineering; B.S. Ecological Engineering	2 years of experience in stream and wetland restoration design, NEPA, and plant and wildlife surveys.
Kate Moran	M.En.- Master of Environmental Science; B.S. Biology; B.A. Sustainability	3 years of experience in wetland science, water resources management, fisheries management and sturgeon research, restoration monitoring, regulatory compliance, and GIS support.
Mandi McElroy	M.S. Wildlife Ecology and Conservation; B.S. Wildlife Biology 40 Hour Hazwoper Training	17 years of experience in wildlife biology with an emphasis on Northern California special status species, habitat assessments, construction monitoring, protocol-level surveys, and impact analyses for regulatory compliance.
Sean O'Hare	B.S. – Biological Science 40 Hour OSHA Hazwoper Training; Methodology of Wetland Delineation Certificate; 30-Hour OSHA Construction	12 years of experience in leading technical field investigations, ecological characterizations, wetland delineations, plant inspection and oversight of planting, stream assessments, water quality assessment, plant surveys, wildlife surveys, and biological assessments; extensive sampling experience.
Matt Petty, PWS, PMP	M.S. Environmental Studies; B.A. Zoology; Environmental Science Professional Wetland Scientist – Society of Wetland Scientists; Certified Ecologist – Ecological Society of America; Project Management Professional – Project Management Institute	14 years of experience in project management, wildlife and fisheries science, regulatory compliance and permitting, NEPA, ecological and stream restoration, wetland delineation, stream and lake assessment, threatened and endangered species surveys, biological/water quality/sediment sampling, and GIS support.
Jonathan Stead	M.S. Ecology, B.S. Biology (Ecology, Behavior, and Evolution)	More than 20 years of experience in ecology and biology, with expertise in environmental permitting and compliance, dam removal, fish passage, stream restoration, and water infrastructure projects.

Name	Education	Qualifications
Kate Stenberg	Ph.D. Wildlife and Fisheries Science and Regional Planning; Master of Administration in Land Use Planning; B.A. Biology-Environmental Studies	35 years of experience in wildlife and fisheries science, regulatory compliance, and NEPA/CEQA.
Conor Veeneman	Professional Science Master, Environmental Science; B.A. Environmental Science; Wetland Professional in Training – Society of Wetland Scientists	4.5 years of experience in wetland delineation, regulatory compliance and permitting, NEPA, stream and wetland restoration design and monitoring, habitat evaluations, threatened and endangered species surveys, biological/water quality/sediment sampling, and GIS support.
Suzanne Wilkins, AICP, ENV SP	B.S. Business Administration	30 years of experience in environmental planning, CEQA/NEPA; regulatory permitting and compliance, and sustainable infrastructure planning.

Notes:
CEQA = California Environmental Quality Act
GIS = Geographic Information System
NEPA = National Environmental Policy Act
OSHA – Occupational Safety and Health Administration
USACE = United States Army Corps of Engineers

Appendix A Figures

CDM Smith 10/11/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Overall_Figures\Figure_1_1_Overall_Project_Map_and_Study_Area_2019.mxd

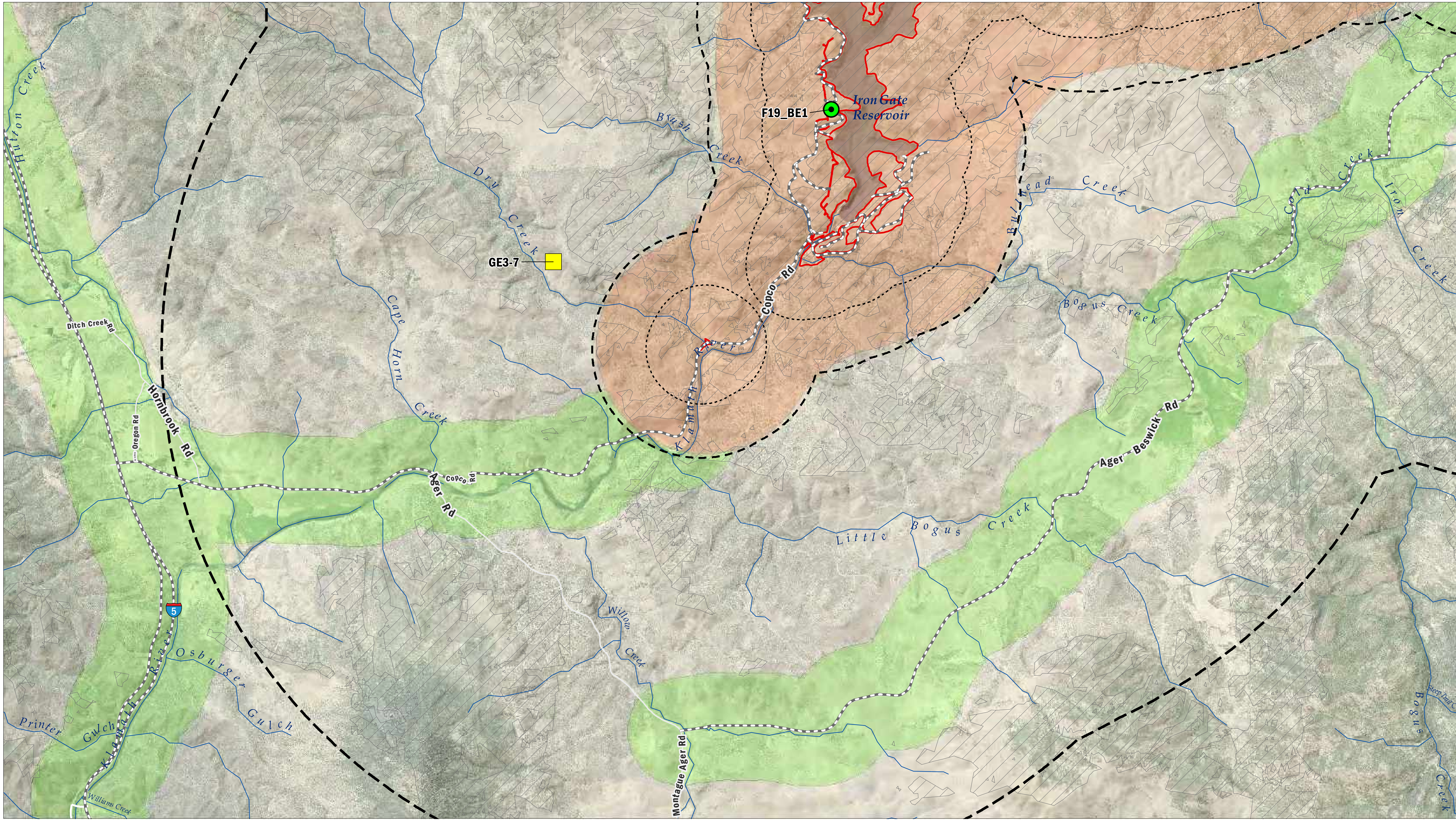


Data Source: 2018 TIGER/Line Shapefiles
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

Legend
- Limits of Work
- Primary Road
- Access Route
- Stream
- Water Body
- State
- County
- 0.25 Mile Study Area Buffer
- National Forest
- Wildlife Area

FIGURE 1-1
Overall Project Map and Terrestrial Resources Study Area

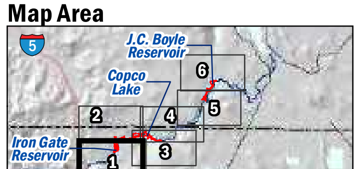


AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes

Limits of Work

Viewshed from Limits of Work

Low Impact Area

High Impact Area

Project LOW Buffers

0.5 Miles

1 mile

5 miles

10 miles

Eagle Survey Points

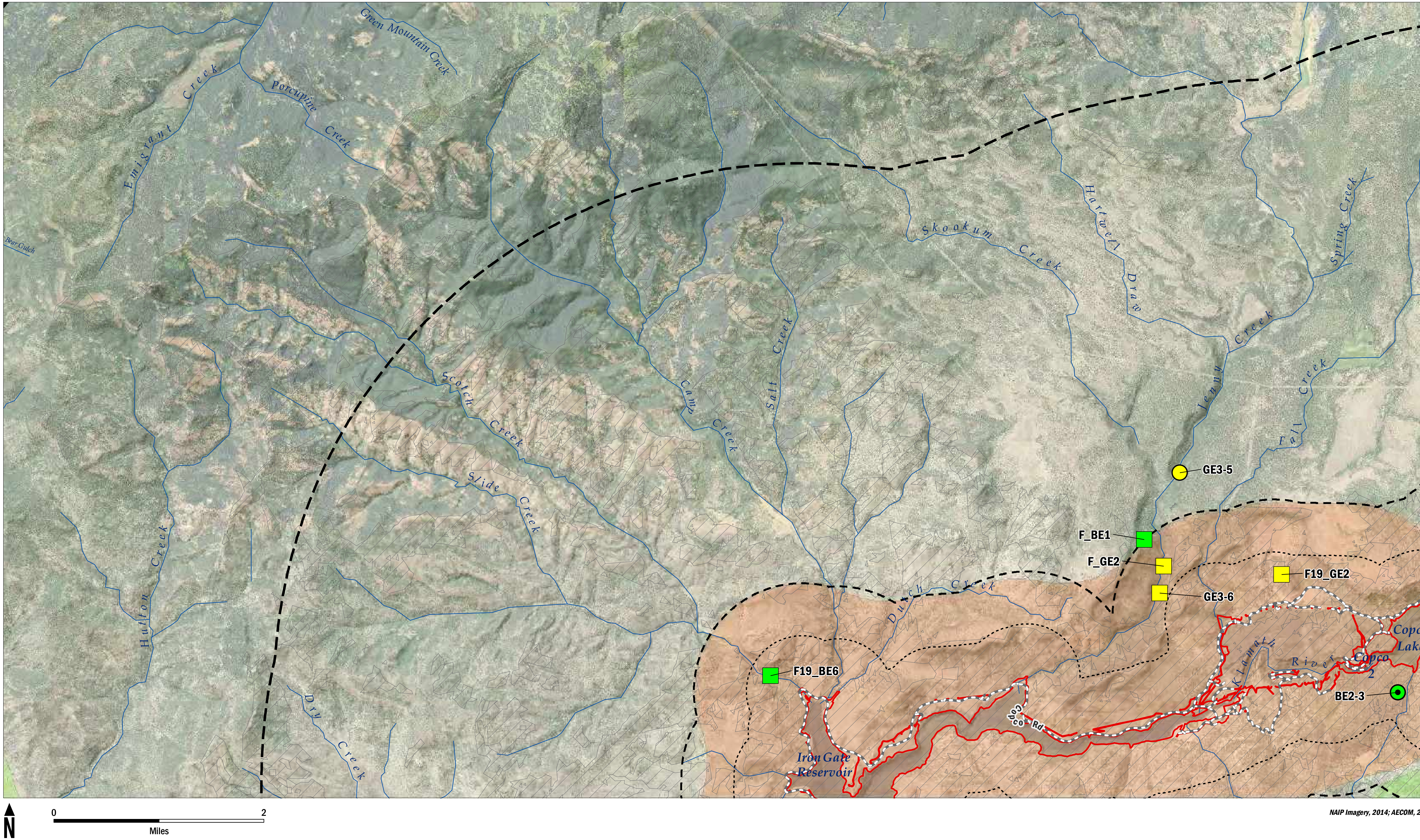
Active in 2019, Bald Eagle

Inactive, Golden Eagle

FIGURE 2 - 1

Eagle Nest Surveys 2019

AECOM Oakland CA 2/26/2020 USER sally.shatford PATH \\Oakland.na.aecomnet.com\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\EagleSurveys_AECOM2017-2019_CDM.mxd



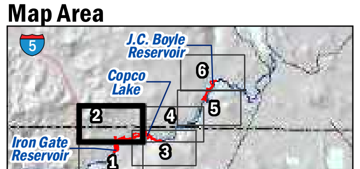
NAIP Imagery, 2014; AECOM, 2019

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



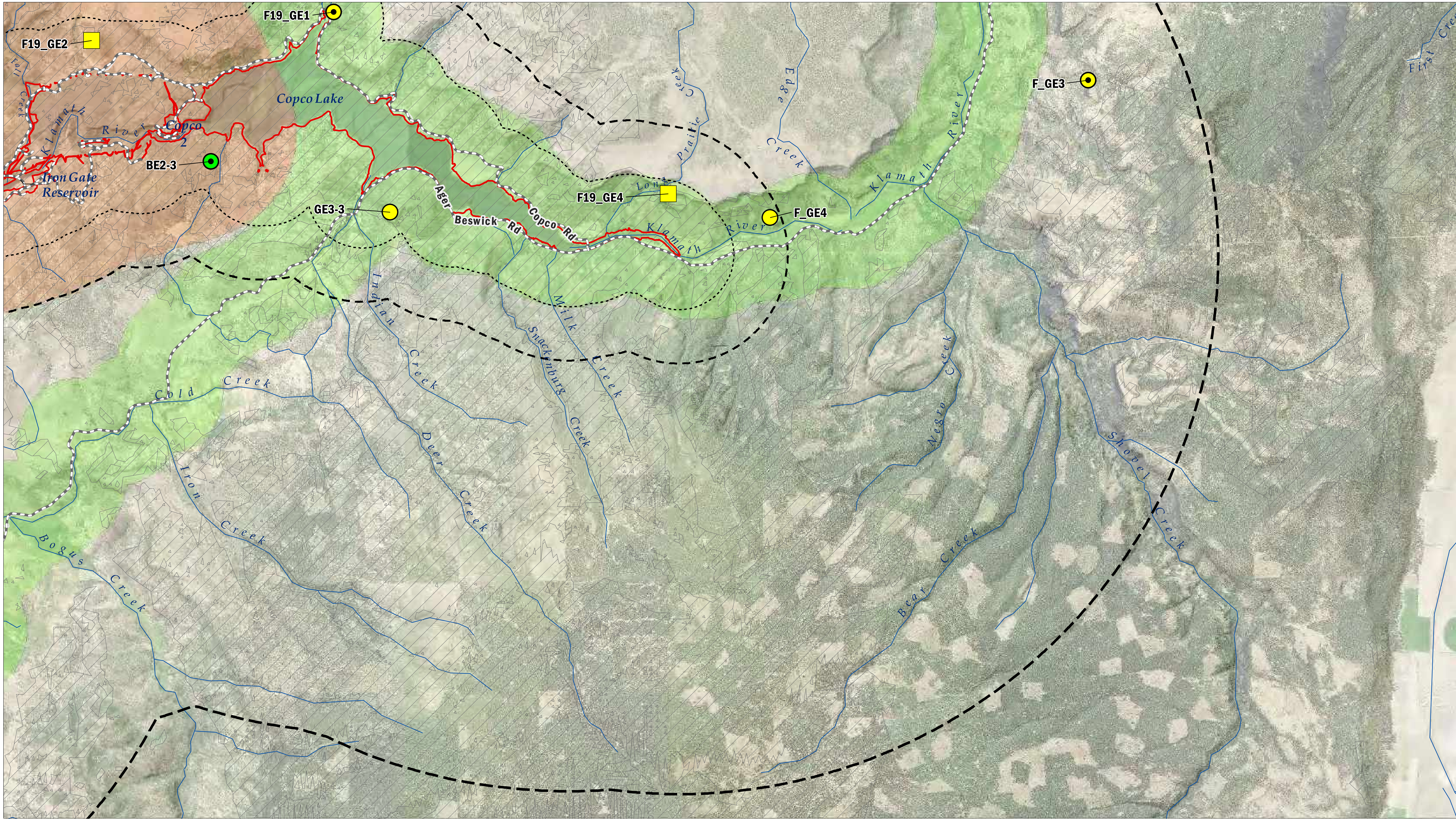
- Access Routes
- Limits of Work
- Viewshed from Limits of Work
- Low Impact Area
- High Impact Area

Project LOW Buffers
- 0.5 Miles
- 1 mile
- 5 miles
- 10 miles

Eagle Survey Points
- Active in 2018, Golden Eagle
- Active in 2019, Bald Eagle
- Inactive, Bald Eagle
- Inactive, Golden Eagle

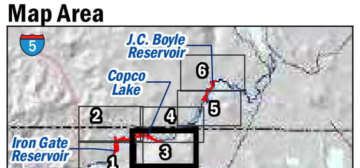
FIGURE 2 - 2

Eagle Nest Surveys 2019



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area

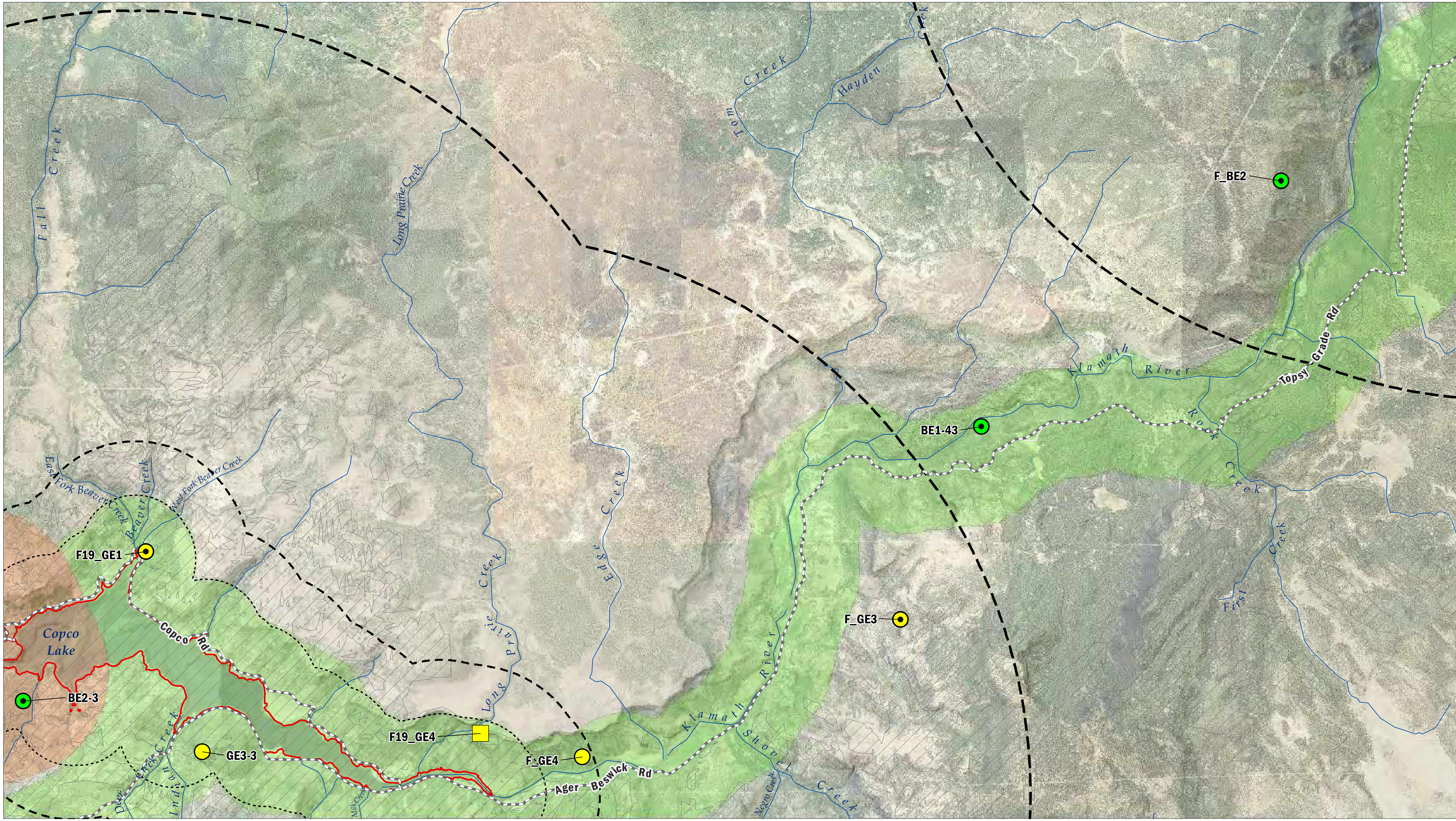


Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Golden Eagle
Active in 2019, Bald Eagle
Active in 2019, Golden Eagle
Inactive, Golden Eagle

FIGURE 2 - 3
Eagle Nest Surveys 2019



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area

J.C. Boyle Reservoir
Copco Lake
Iron Gate Reservoir

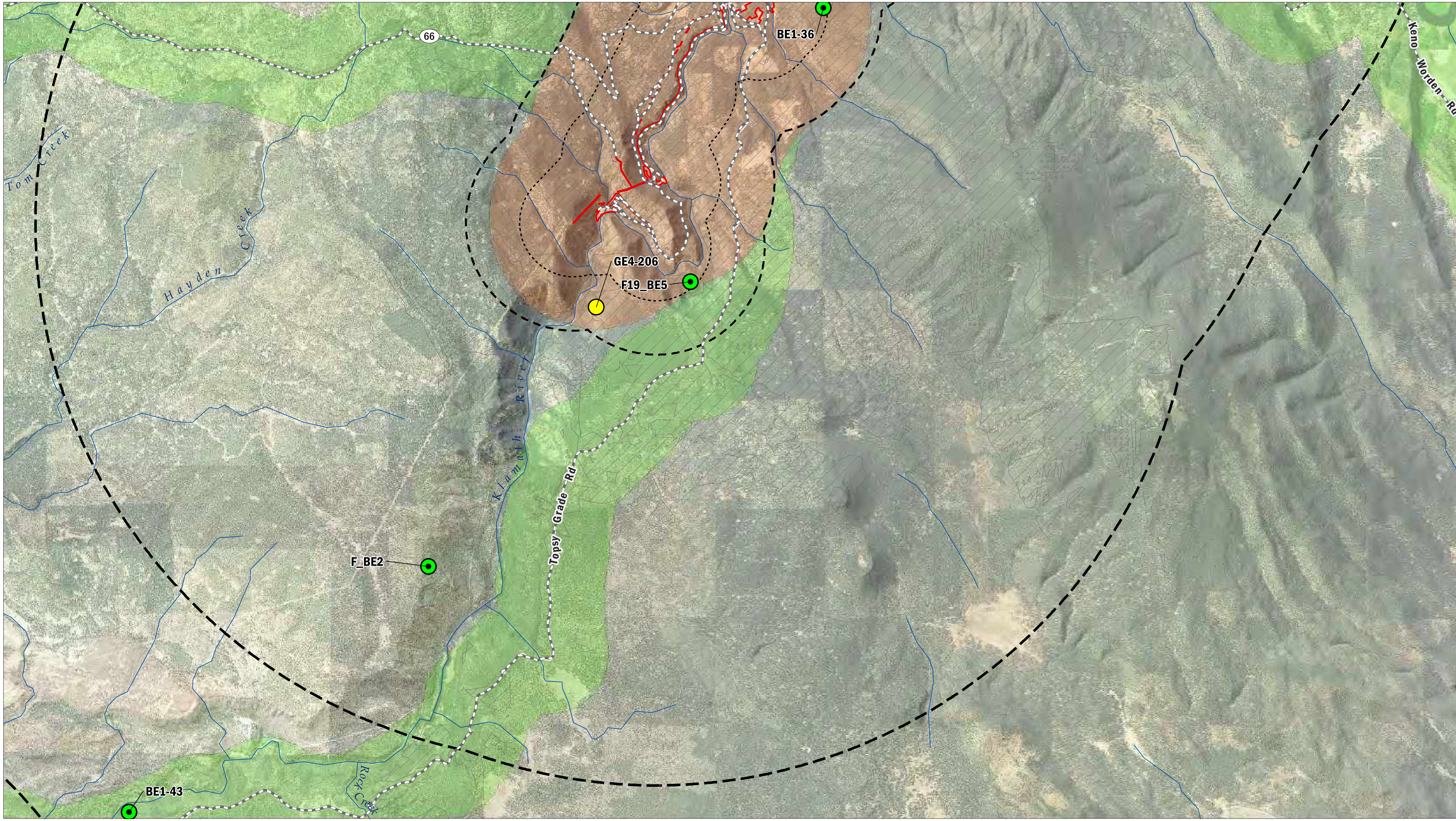
Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Golden Eagle
Active in 2019, Bald Eagle
Active in 2019, Golden Eagle
Inactive, Golden Eagle

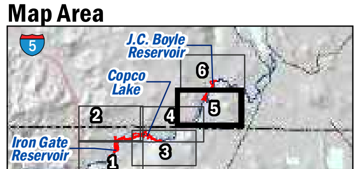
FIGURE 2 - 4
Eagle Nest Surveys 2019

AECOM Oakland CA 2/26/2020 USER saily.shatford PATH \\Oakland.na.aecomnet.com\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\EagleSurveys_AECOM2017-2019_CDM.mxd



NAIP Imagery, 2014; AECOM, 2019

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

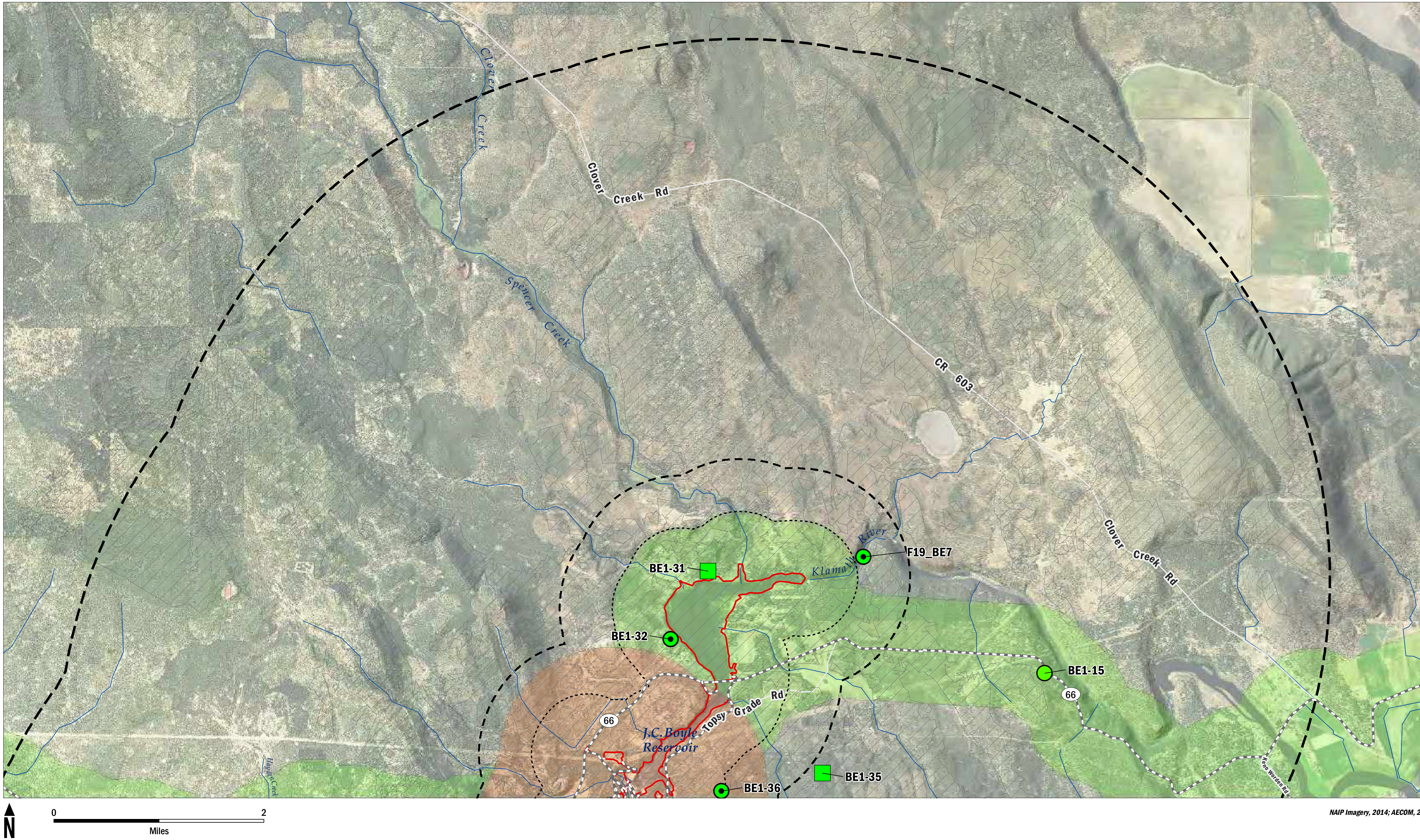


Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Golden Eagle
Active in 2019, Bald Eagle

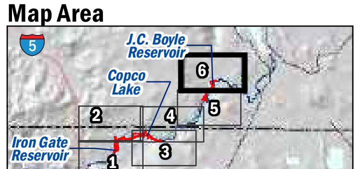
FIGURE 2 - 5
Eagle Nest Surveys 2019



NAIP Imagery, 2014; AECOM, 2019

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



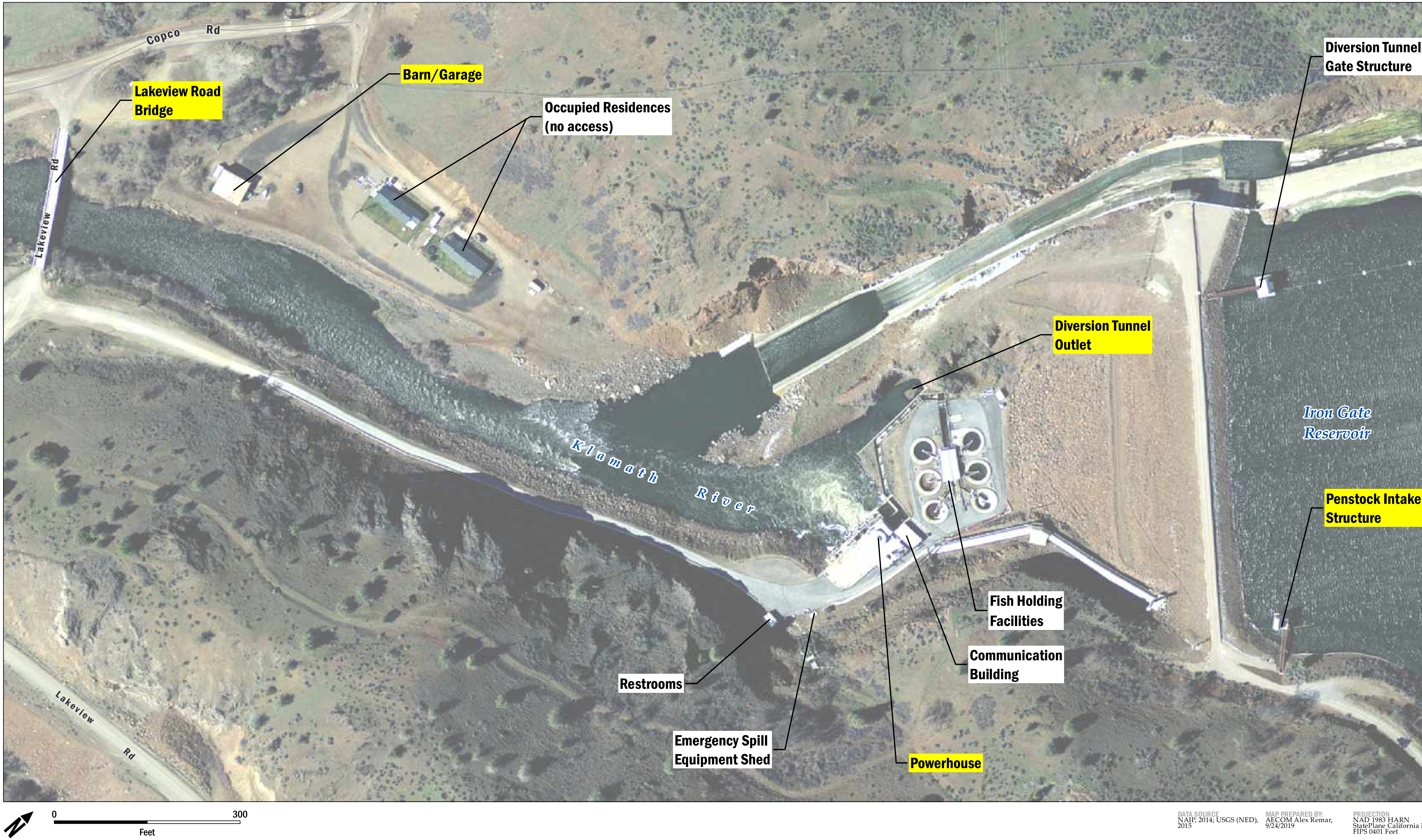
Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Bald Eagle
Active in 2019, Bald Eagle
Inactive, Bald Eagle

FIGURE 2 - 6
Eagle Nest Surveys 2019

AECOM Oakland CA 9/24/2019 USER sally.shatford PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2019\Figure 7-1 Iron Gate.mxd

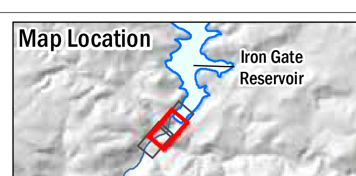


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

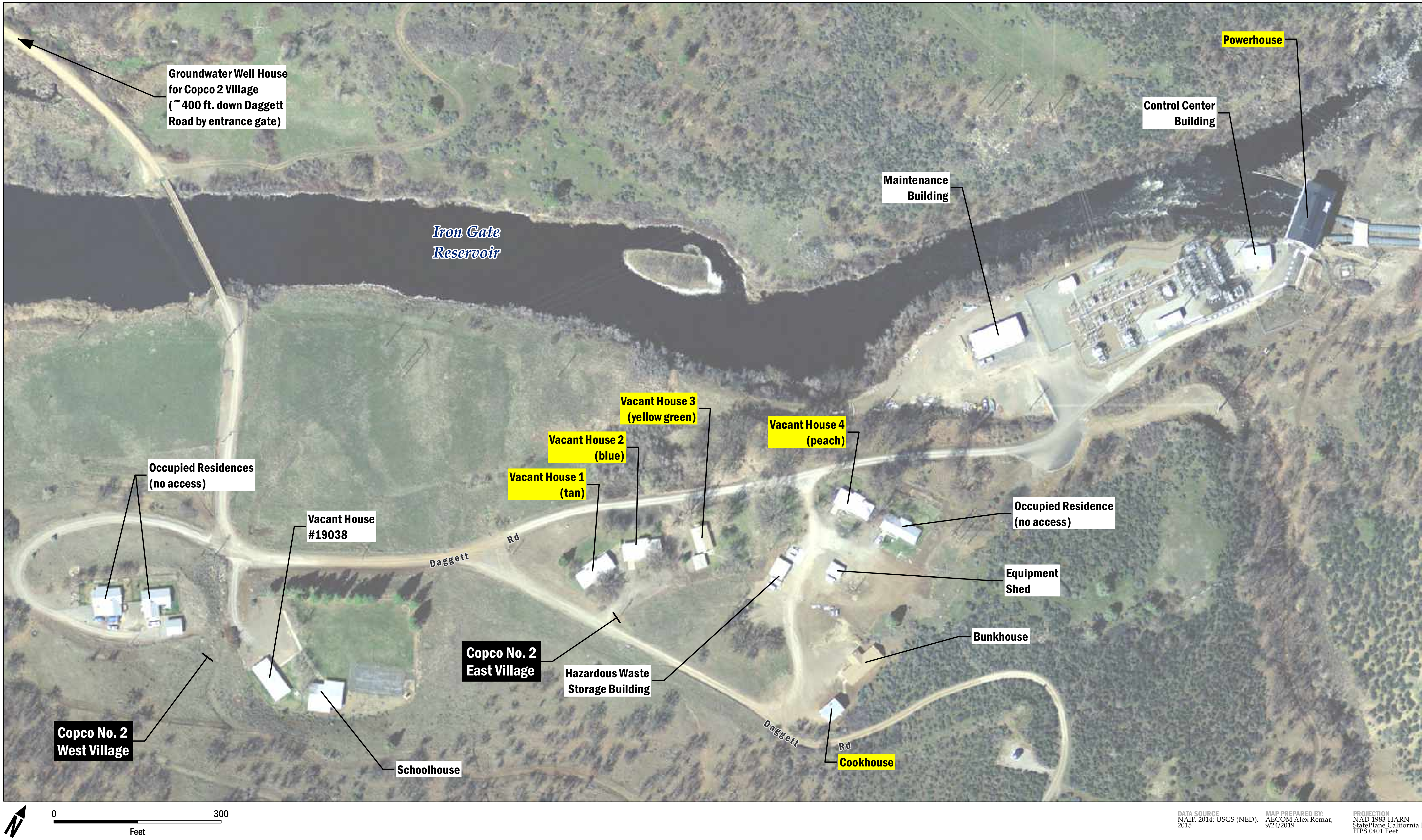
AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels
- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 3-1
2017-2019 Bat Surveys
Iron Gate Dam Area

AECOM Oakland CA 9/24/2019 USER sally.shatford PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2019\Figure 7-2 Copco.mxd



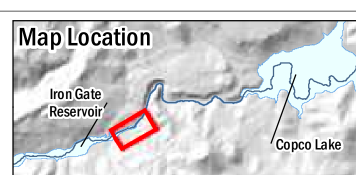
DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Location



Labels

- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 3-2

2017-2019 Bat Surveys
Copco No. 2 Powerhouse Area

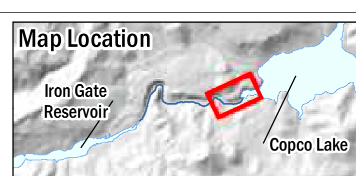
AECOM Oakland CA 9/24/2019 USER sally.shatford PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2019\Figure 7-3 Copco.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 3-3

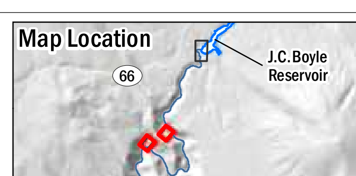
2017-2019 Bat Surveys
Copco No. 1 Dam Area and
Copco No. 2 Dam Area

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



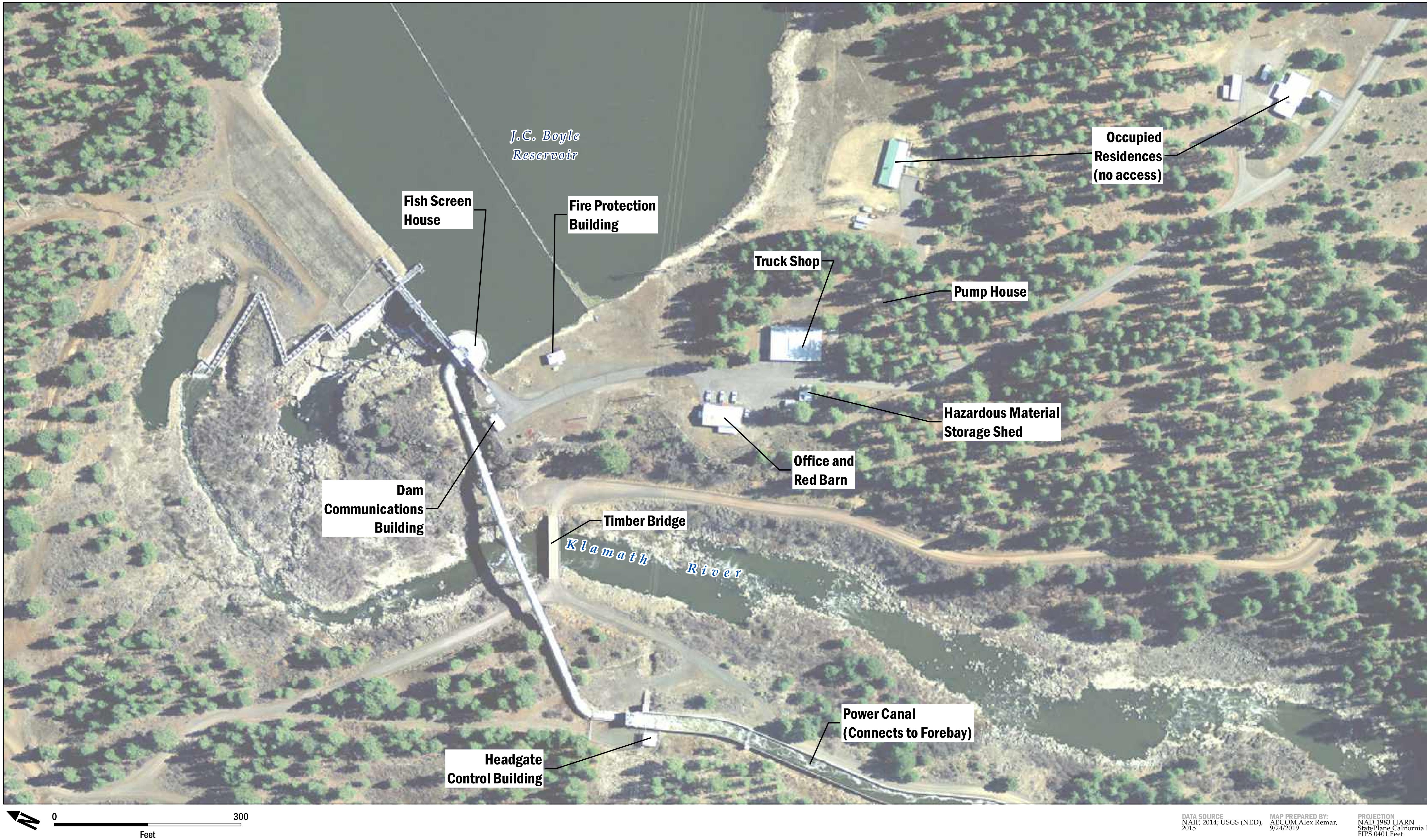
Labels

Active Bat Roost Confirmed

Roosting Bats Not Found

FIGURE 3-4

2017-2019 Bat Surveys
J.C. Boyle Forebay and Spillway Area,
Penstocks and Powerhouse Area



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
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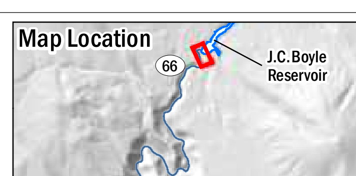
AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

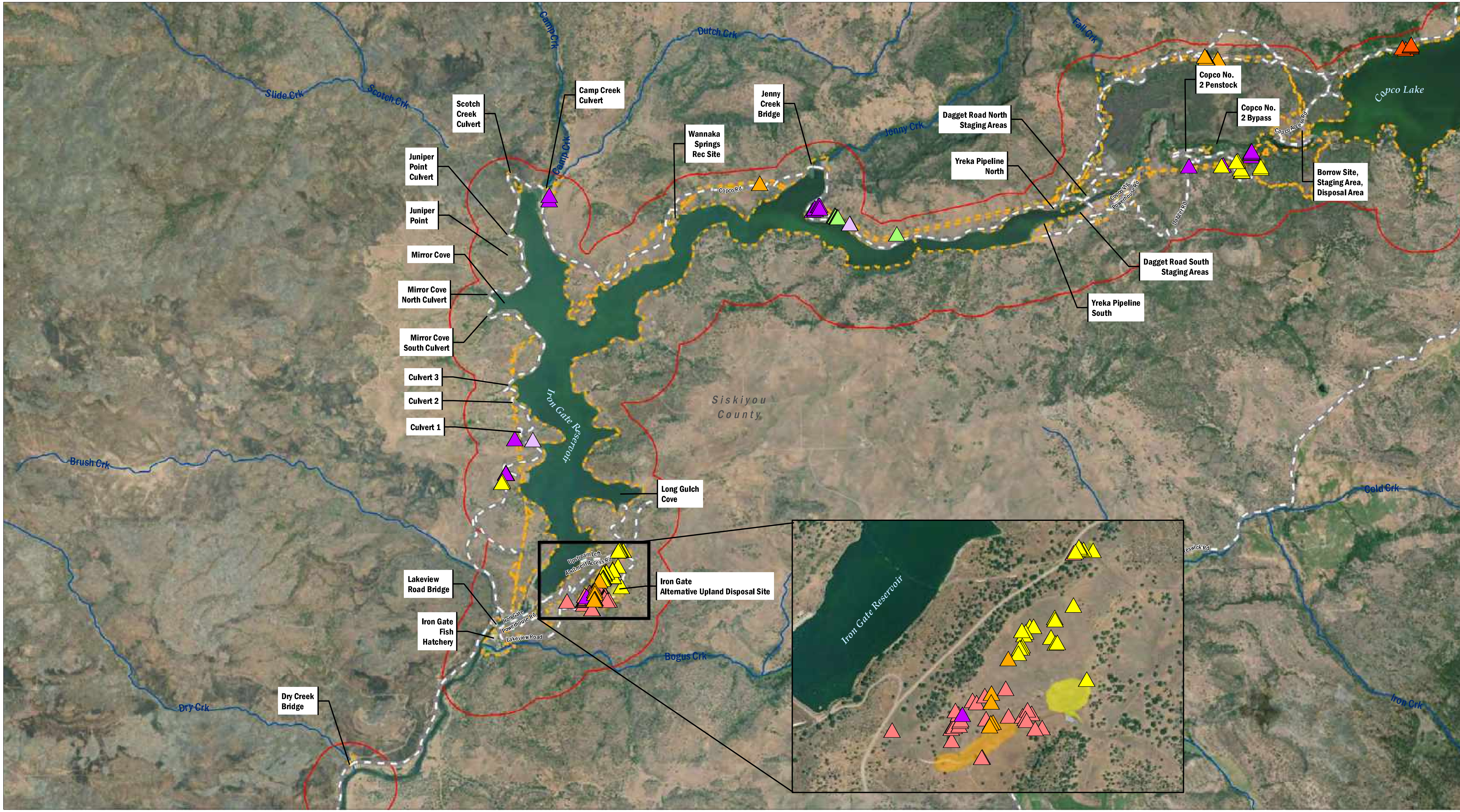


Labels

Roosting Bats Not Found

FIGURE 3-5

2017-2019 Bat Surveys
J.C. Boyle Dam Area



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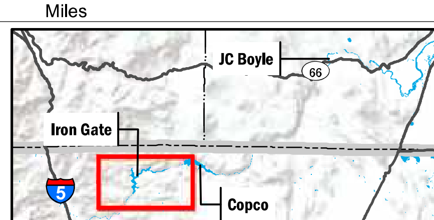
0 1 2

Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Legend

- Limits of Work
- 0.25 Mile Study Area Buffer
- Access Route

Special Status Plants (Points)

- Bolander's sunflower
- Bristly sedge
- Calochortus sp.
- Detling's silverpuffs
- Fleshy sage
- Greene's four o'clock
- Greene's mariposa-lily
- Purple-flowered Washington lily

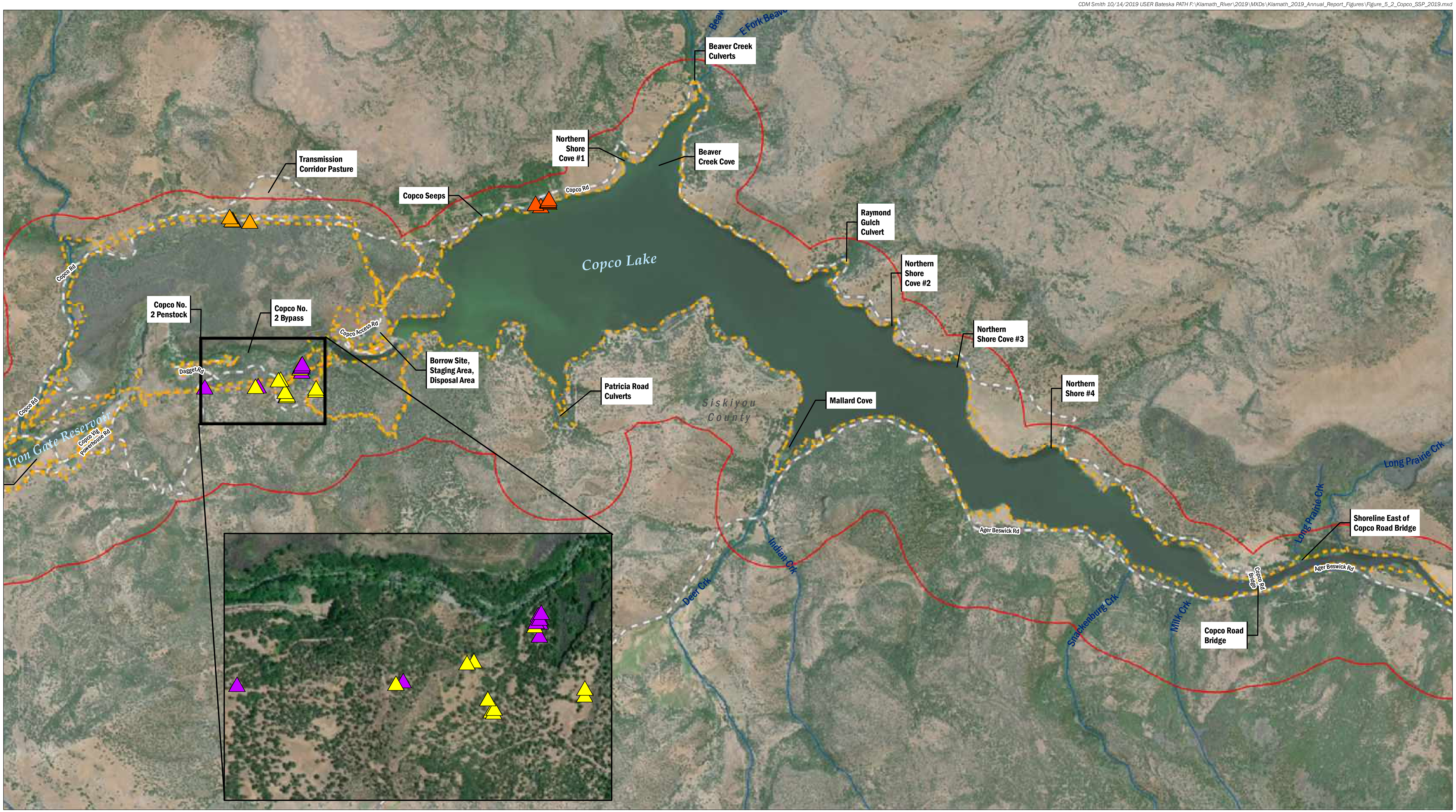
Special Status Plants (Polygons)

- Bolander's Sunflower
- Bristly Sedge
- Calochortus sp.
- Detling's Silverpuffs
- Fleshy Sage
- Greene's mariposa-lily
- Western Yampah

FIGURE 5-1

2019 Special Status Plants
Iron Gate Reservoir

CDM Smith 10/14/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Klamath_2019_Annual_Report_Figures\Figure_5_2_Copco_SSP_2019.mxd

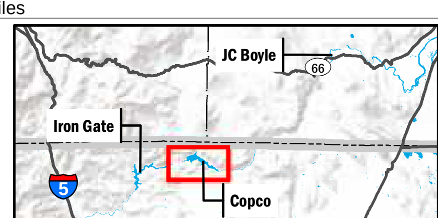


N

0 0.5 1
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



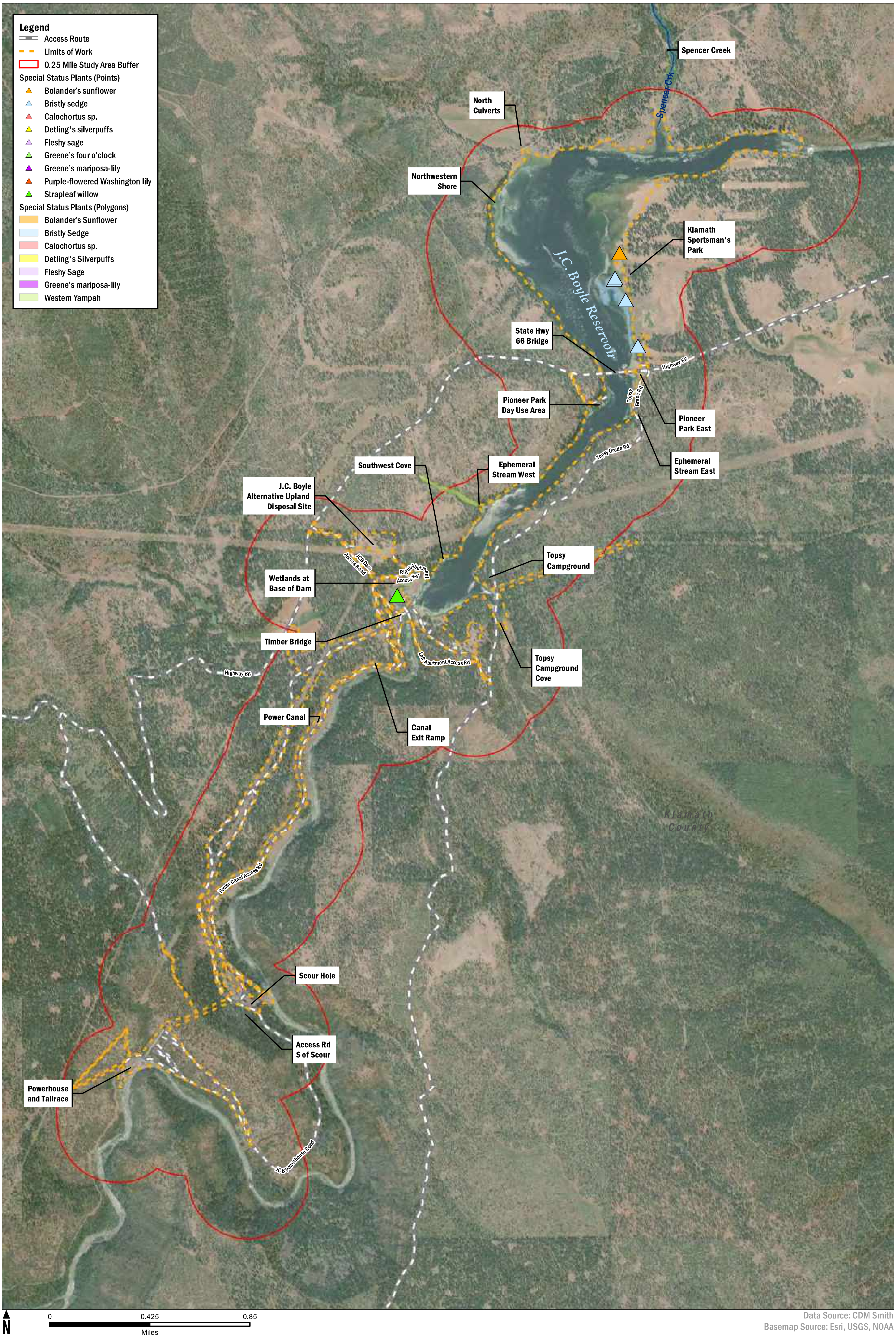
Legend
- Limits of Work
- Access Route
- 0.25 Mile Study Area Buffer

Special Status Plants (Points)
- Bolander's sunflower
- Bristly sedge
- Calochortus sp.
- Detling's silverpuffs
- Fleshy sage
- Greene's four o'clock
- Greene's mariposa-lily
- Purple-flowered Washington lily

Special Status Plants (Polygons)
- Bolander's Sunflower
- Bristly Sedge
- Calochortus sp.
- Detling's Silverpuffs
- Fleshy Sage
- Greene's mariposa-lily
- Western Yampah

FIGURE 5-2
2019 Special Status Plants
Copco Lake

CDM Smith 2/19/2020 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Klamath_2019_Annual_Report_Figures\Figure_5_3_SSP_2019_SB021920.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

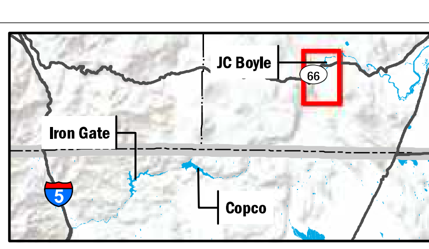
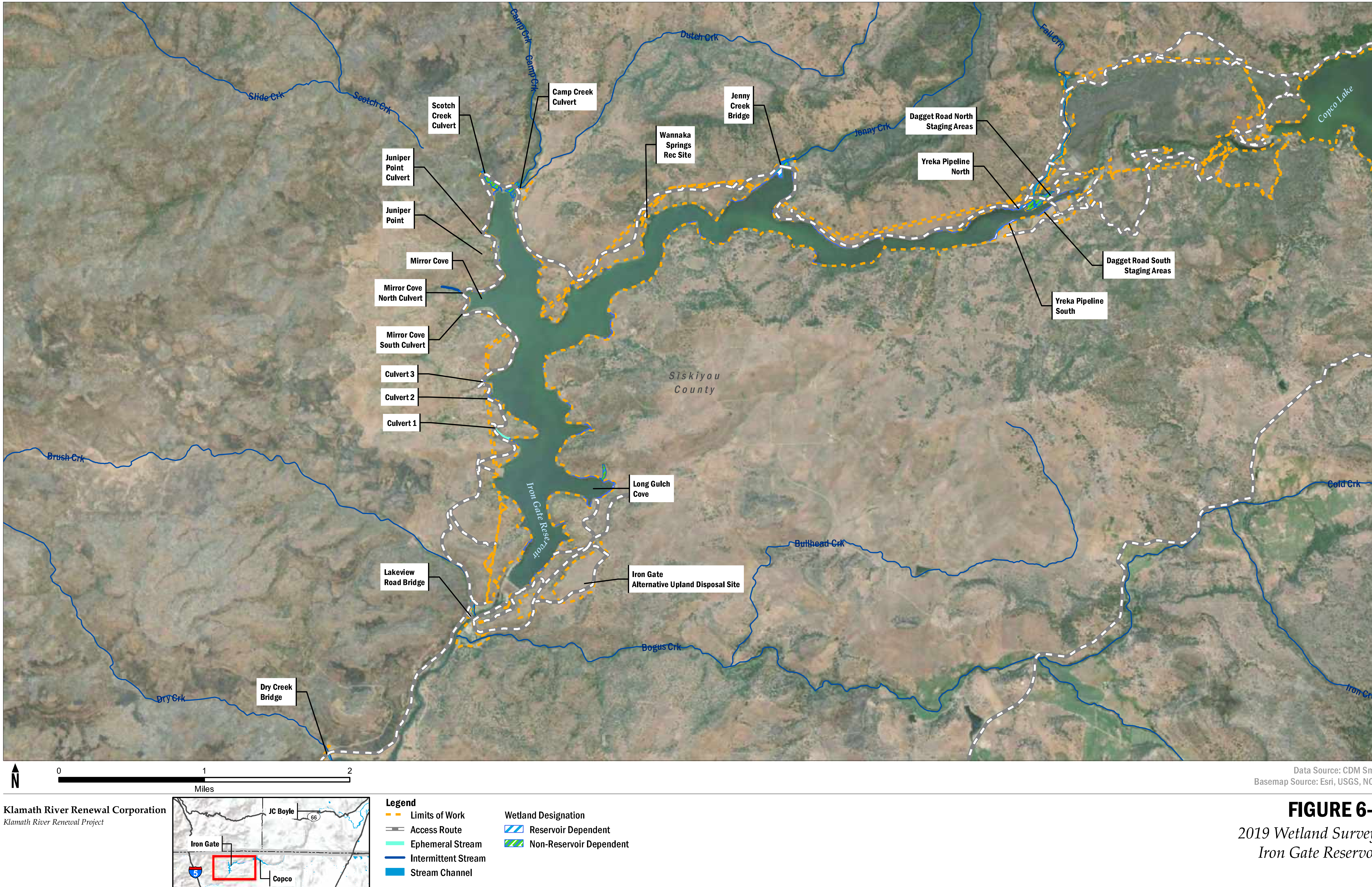


FIGURE 5-3
2019 Special Status Plants
J.C. Boyle Reservoir



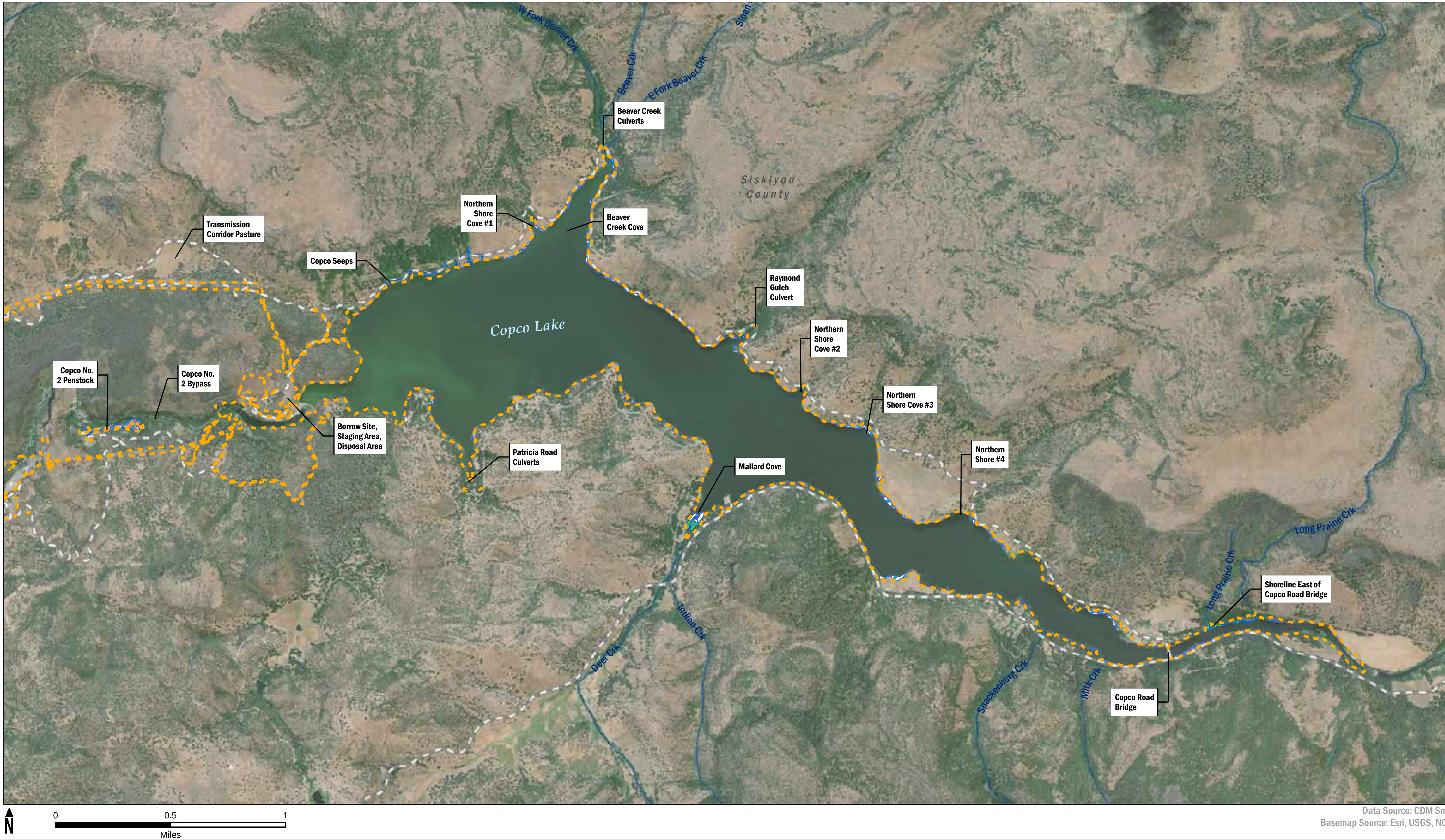
Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

Legend
- Limits of Work
- Access Route
- Ephemeral Stream
- Intermittent Stream
- Stream Channel

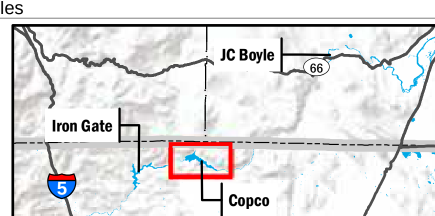
Wetland Designation
- Reservoir Dependent
- Non-Reservoir Dependent

FIGURE 6-1
2019 Wetland Surveys
Iron Gate Reservoir



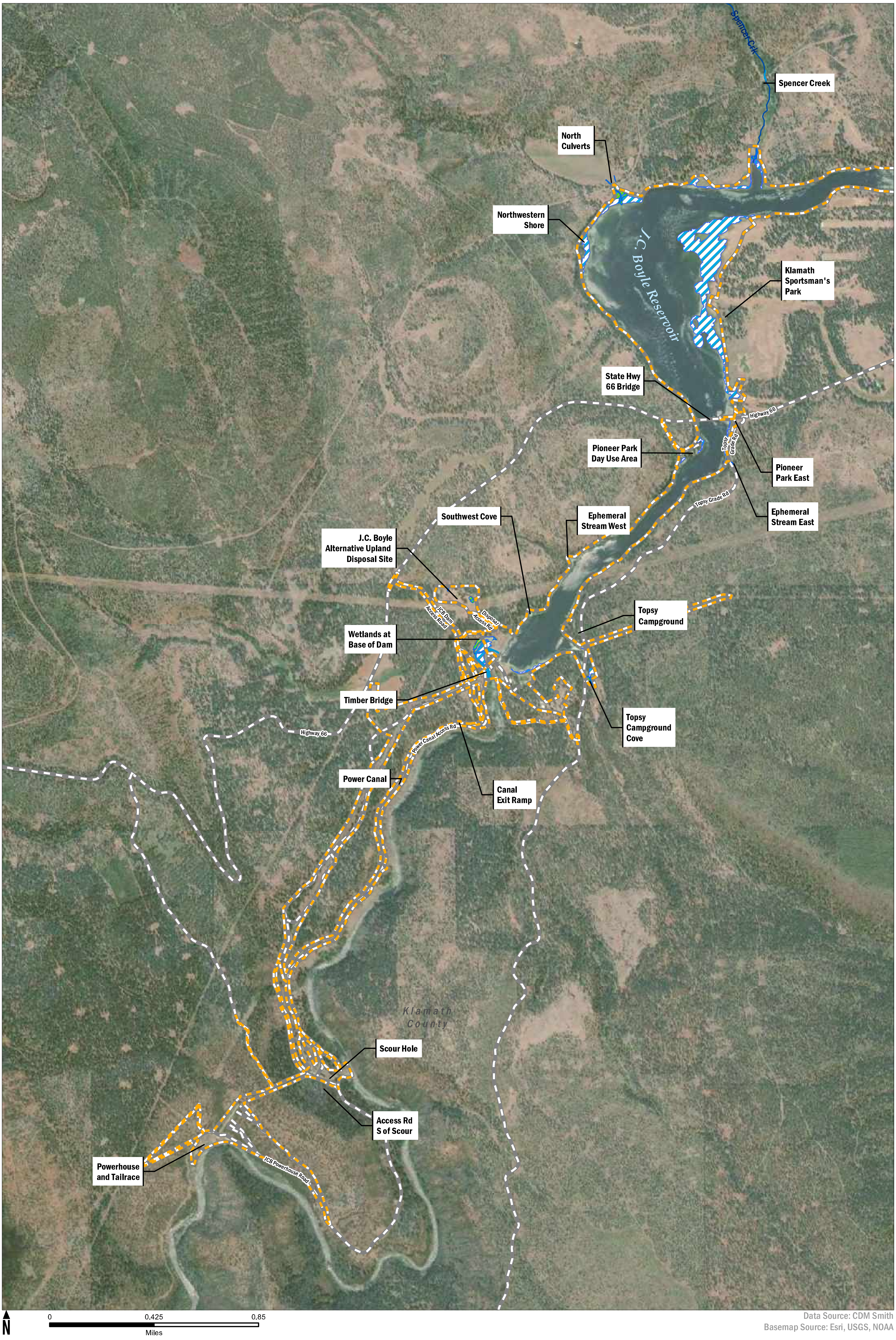
Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

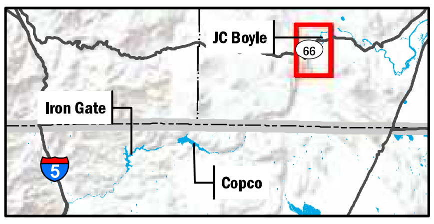


Legend
Access Route
Wetland Designation
Reservoir Dependent
Non-Reservoir Dependent
Infrastructure Dependent

FIGURE 6-2
2019 Wetland Surveys
Copco Lake



Klamath River Renewal Corporation
Klamath River Renewal Project

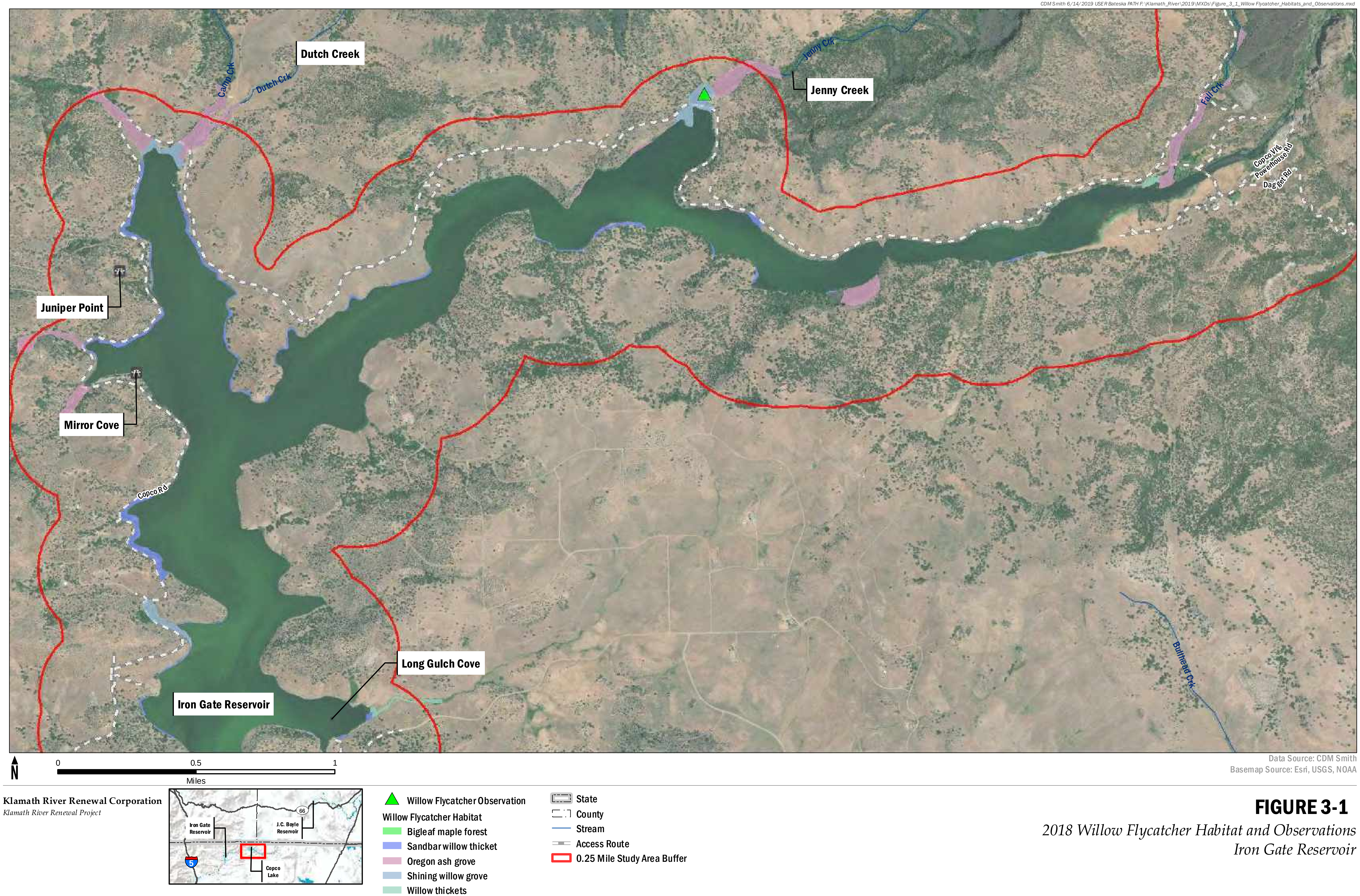


Legend
- Access Route
- Stream Channel
- Limits of Work

Wetland Designation
- Reservoir Dependent
- Non-Reservoir Dependent

FIGURE 6-3
2019 Wetland Surveys
J.C. Boyle Reservoir

Appendix B Revised Figures from 2018 Report

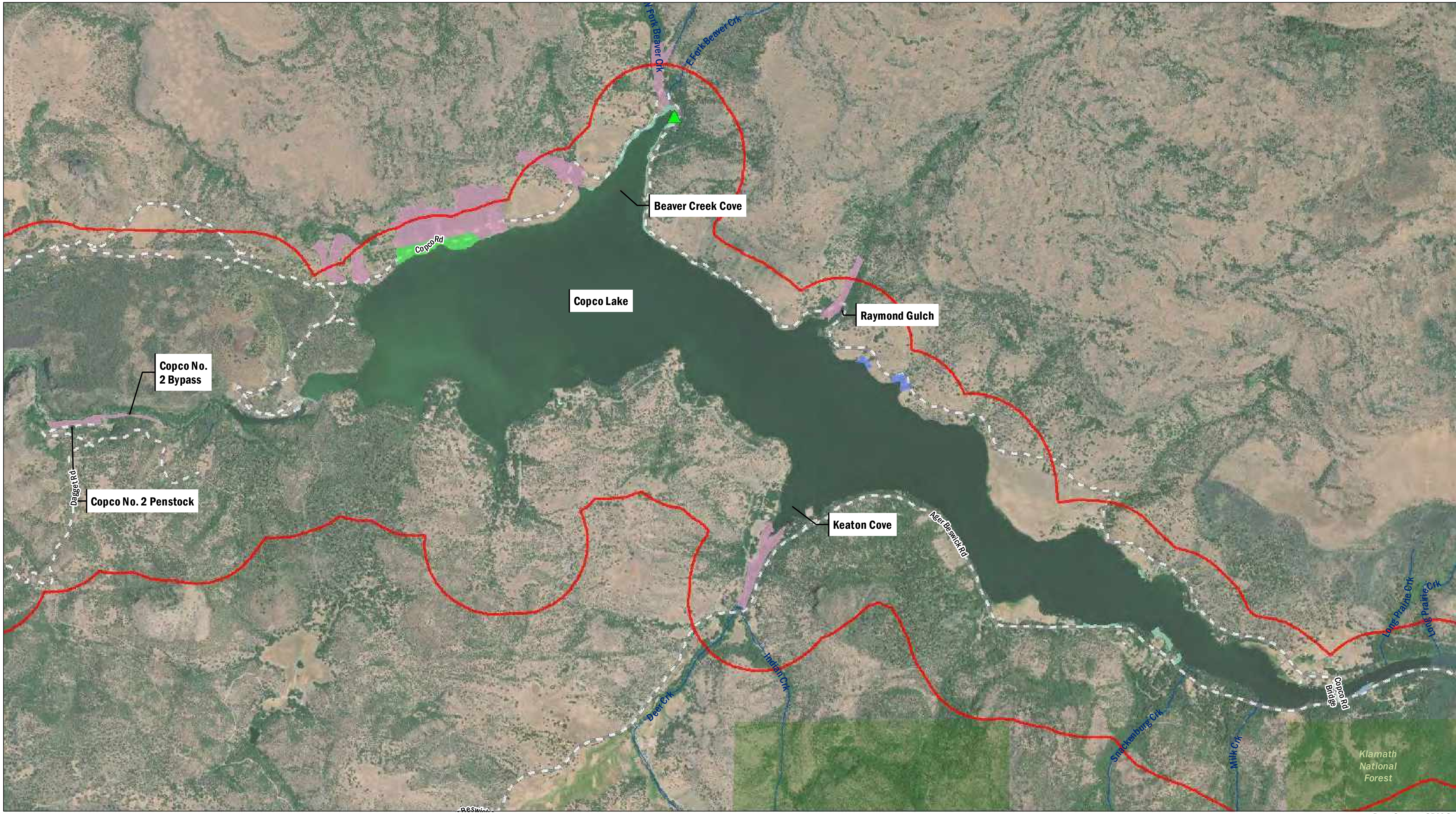


Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 3-1
2018 Willow Flycatcher Habitat and Observations
Iron Gate Reservoir

CDM Smith 6/14/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Figure_3_2_Willow Flycatcher_Habitats_and_Observations.mxd



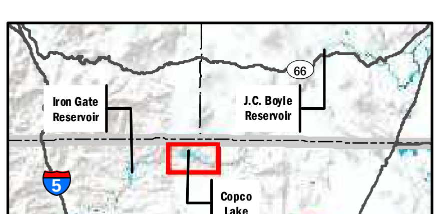
N

0 0.5 1

Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Willow Flycatcher Observation

Willow Flycatcher Habitat

- Bigleaf maple forest
- Sandbar willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 3-2

2018 Willow Flycatcher Habitat and Observations
Copco Lake

AECOM Oakland CA 6/13/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Figure_3_3_Willow Flycatcher_Habitats_and_Observations.mxd

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

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Klamath River Renewal Project

Willow Flycatcher Observation
Willow Flycatcher Habitat
Bigleaf maple forest
Sandbar willow thicket
Oregon ash grove
Shining willow grove
Willow thickets

State
County
Stream
0.25 Mile Study Area Buffer
Access Route

FIGURE 3-3
2018 Willow Flycatcher Habitat and Observations
J.C. Boyle Reservoir and Canal

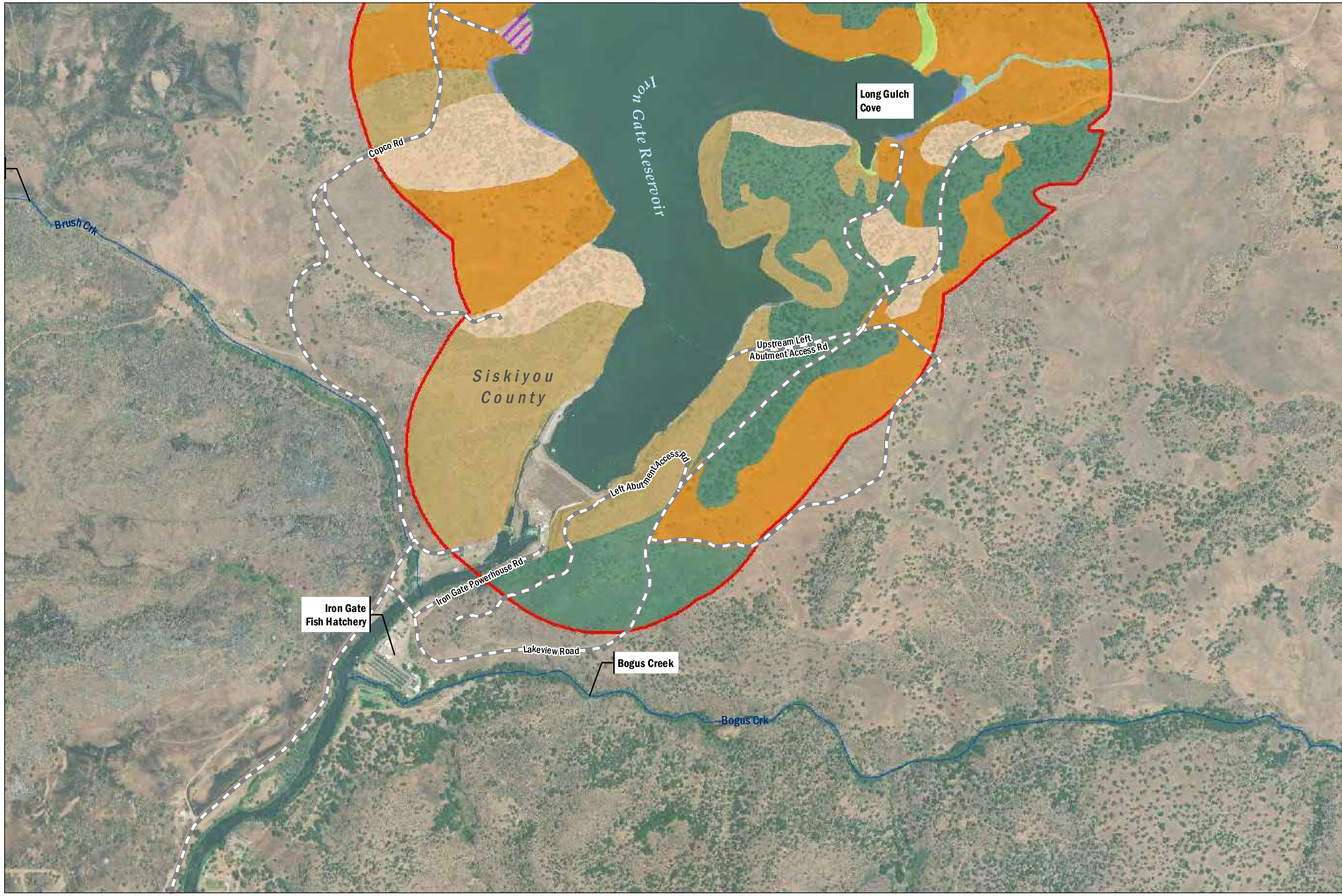
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



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Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

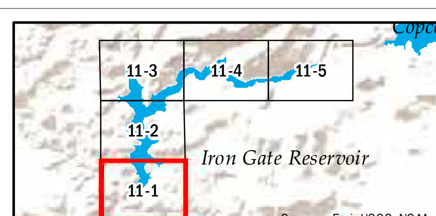
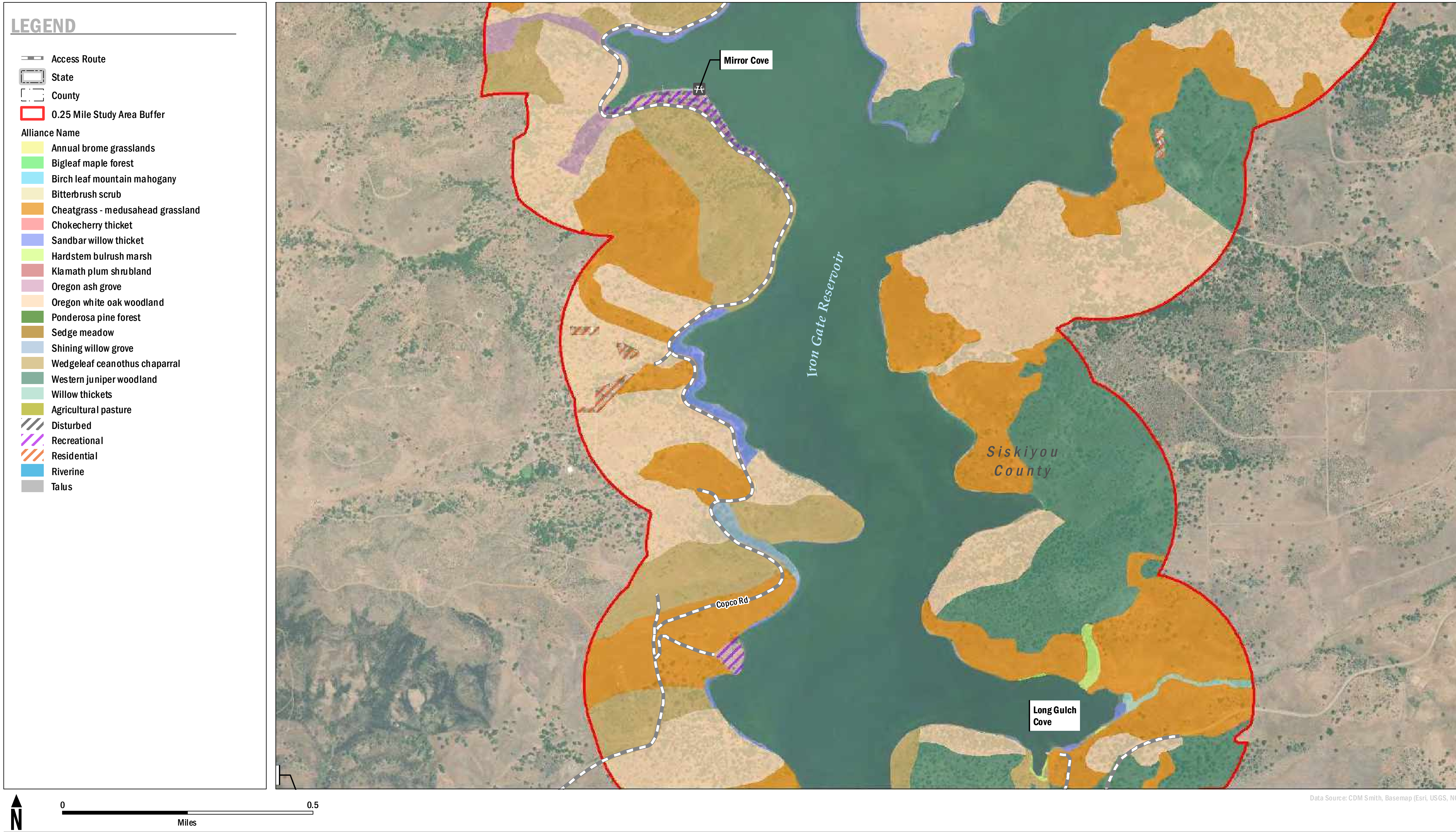


FIGURE 11-1

Vegetation Communities
Iron Gate Reservoir

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Iron_Gate_Vegetation_Communities.mxd



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

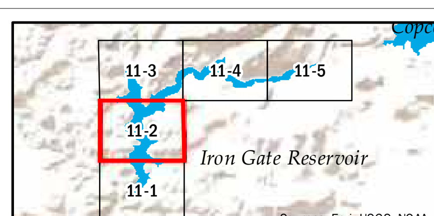
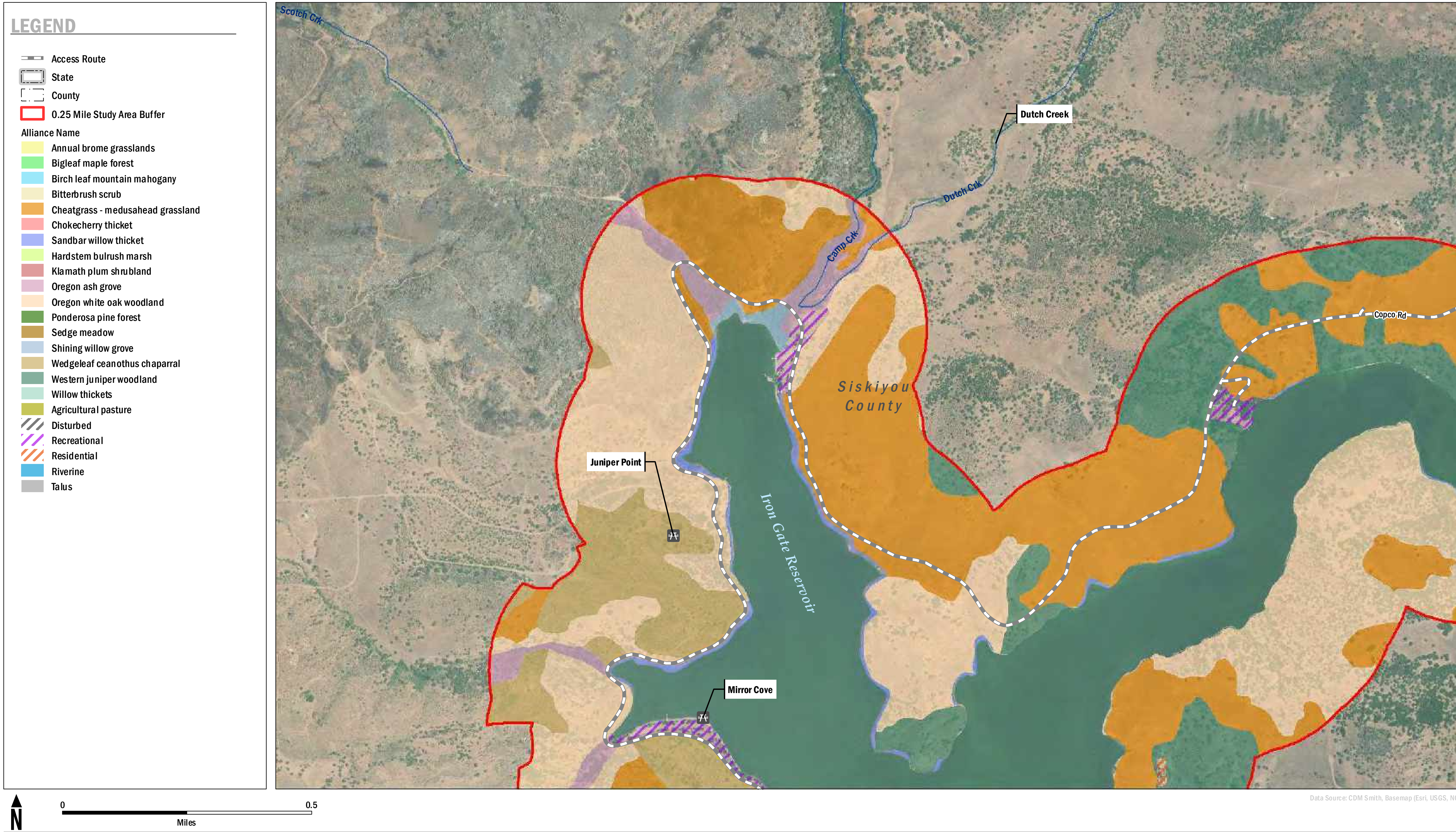


FIGURE 11-2

Vegetation Communities

Iron Gate Reservoir

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Iron_Gate_Vegetation_Communities.mxd



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

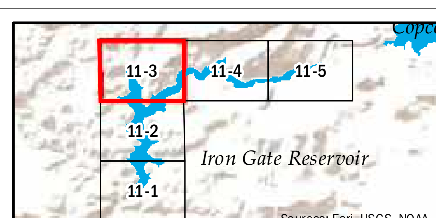


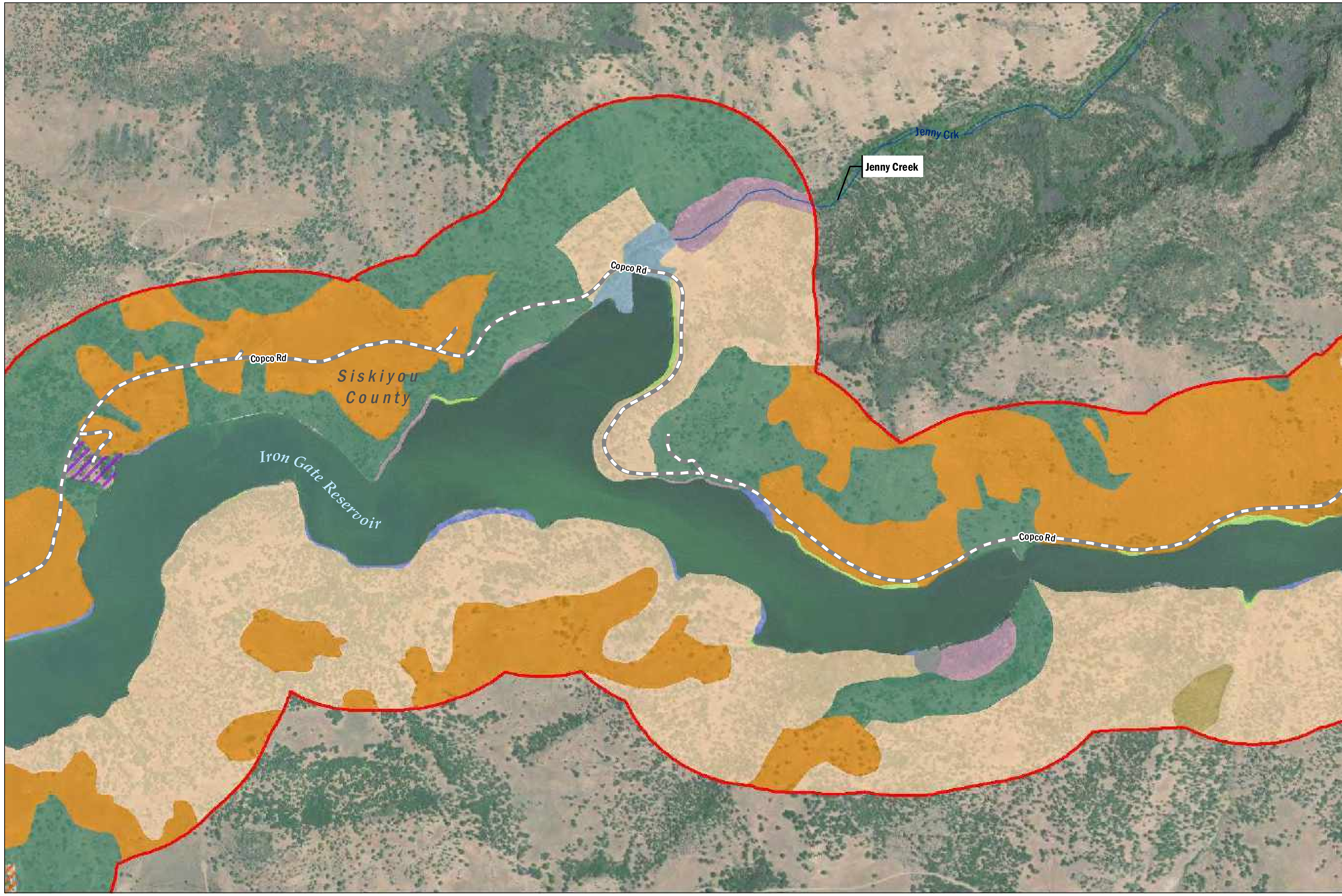
FIGURE 11-3
Vegetation Communities
Iron Gate Reservoir

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

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Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

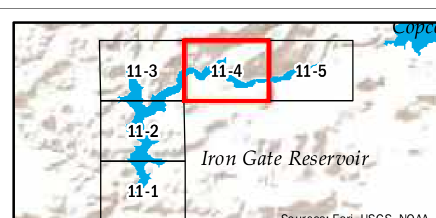


FIGURE 11-4

Vegetation Communities
Iron Gate Reservoir

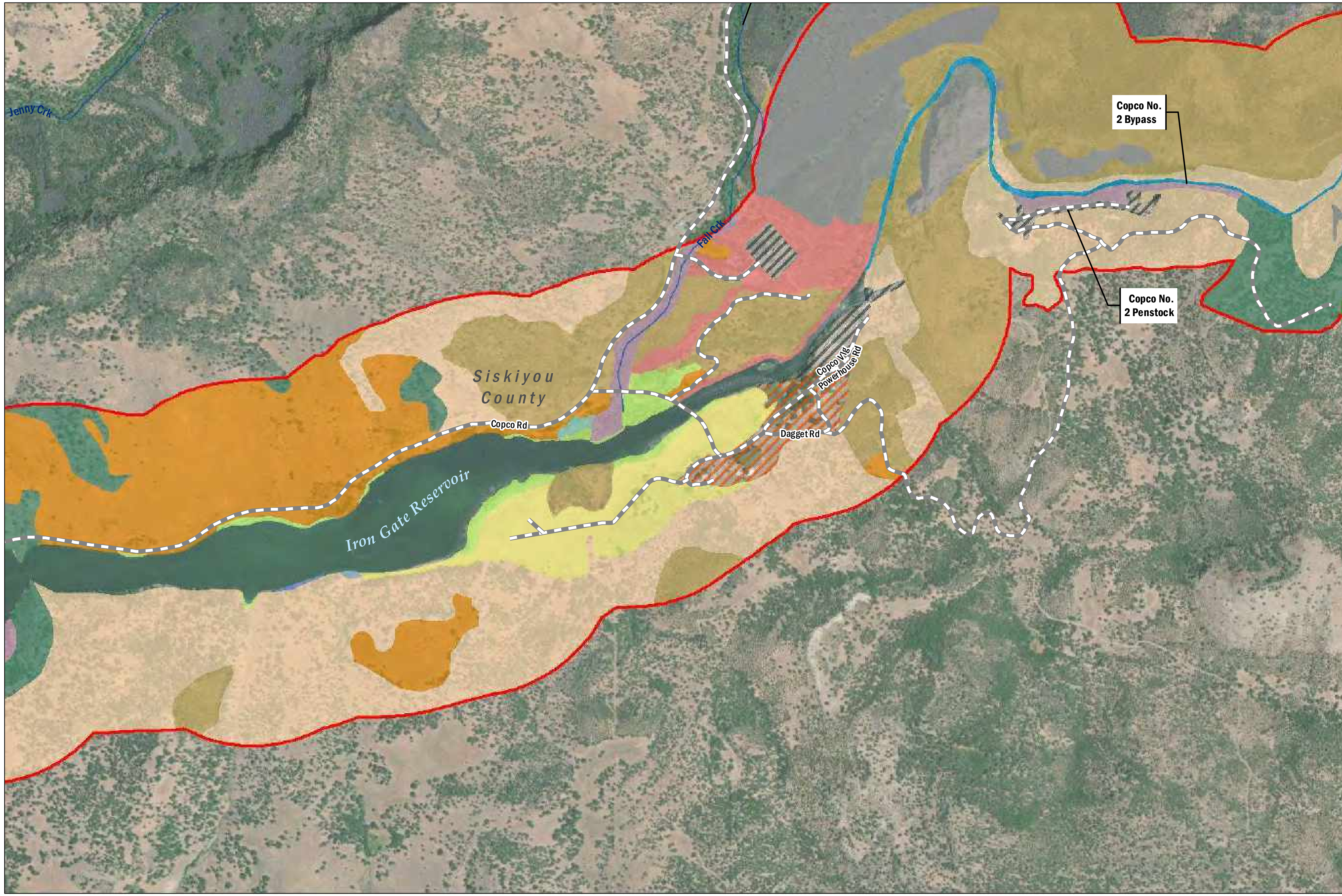
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

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Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

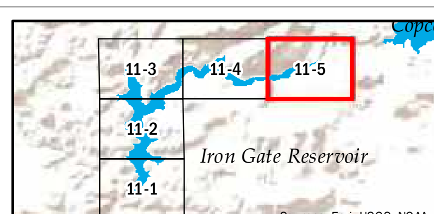


FIGURE 11-5

Vegetation Communities

Iron Gate Reservoir

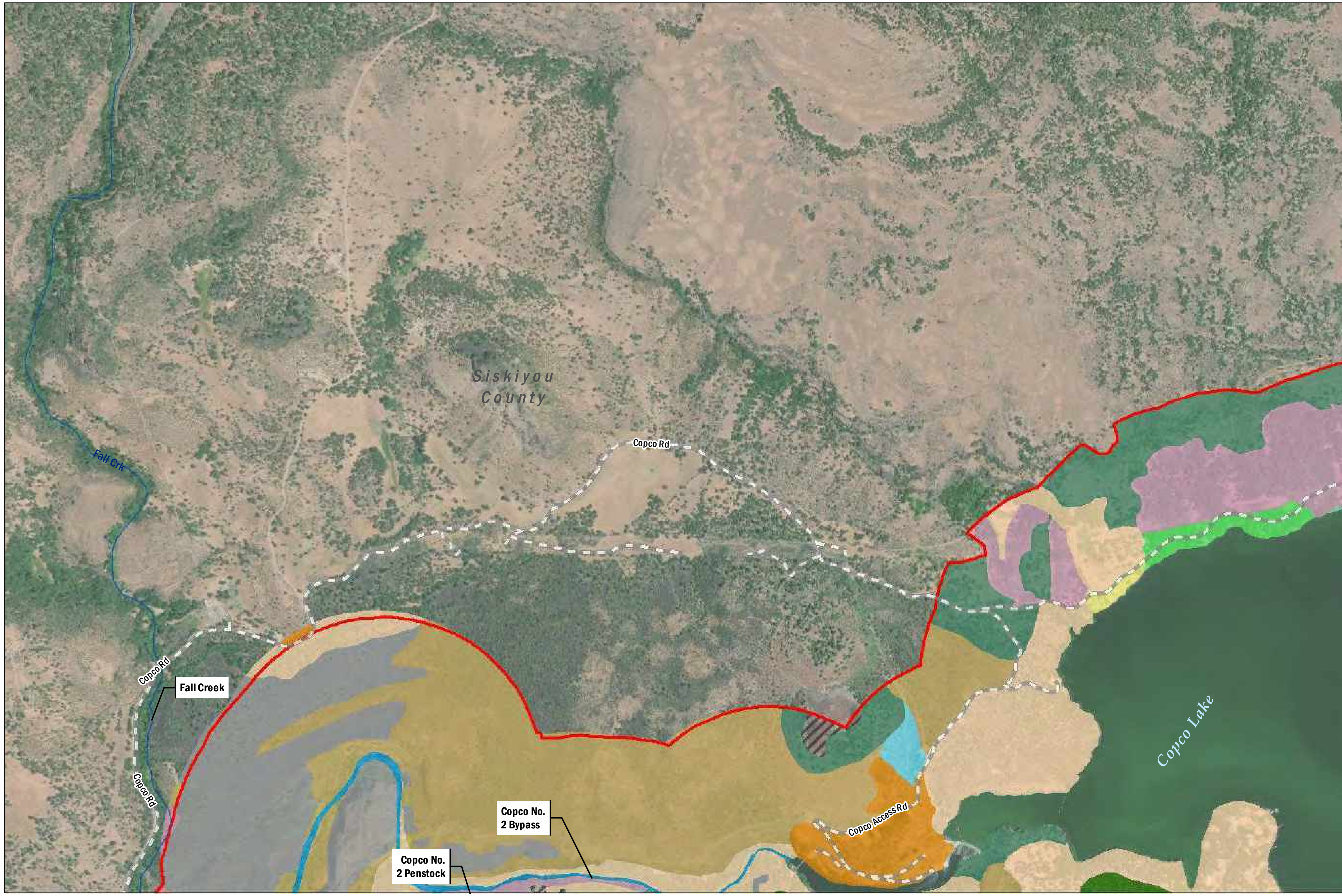
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

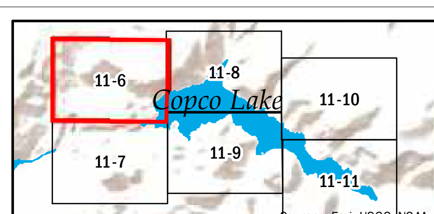
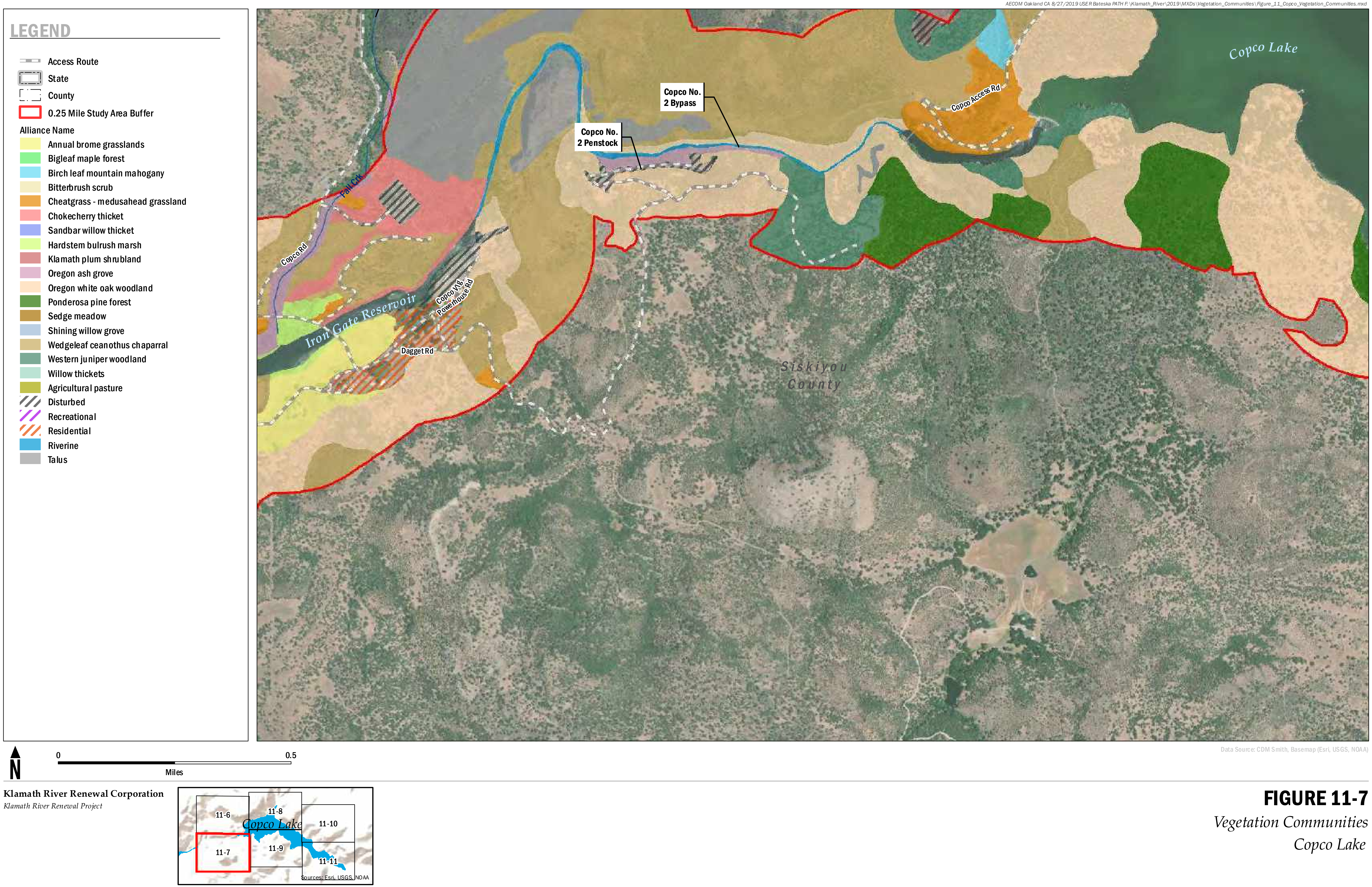


FIGURE 11-6
Vegetation Communities
Copco Lake



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Klamath River Renewal Project

FIGURE 11-7

Vegetation Communities

Copco Lake

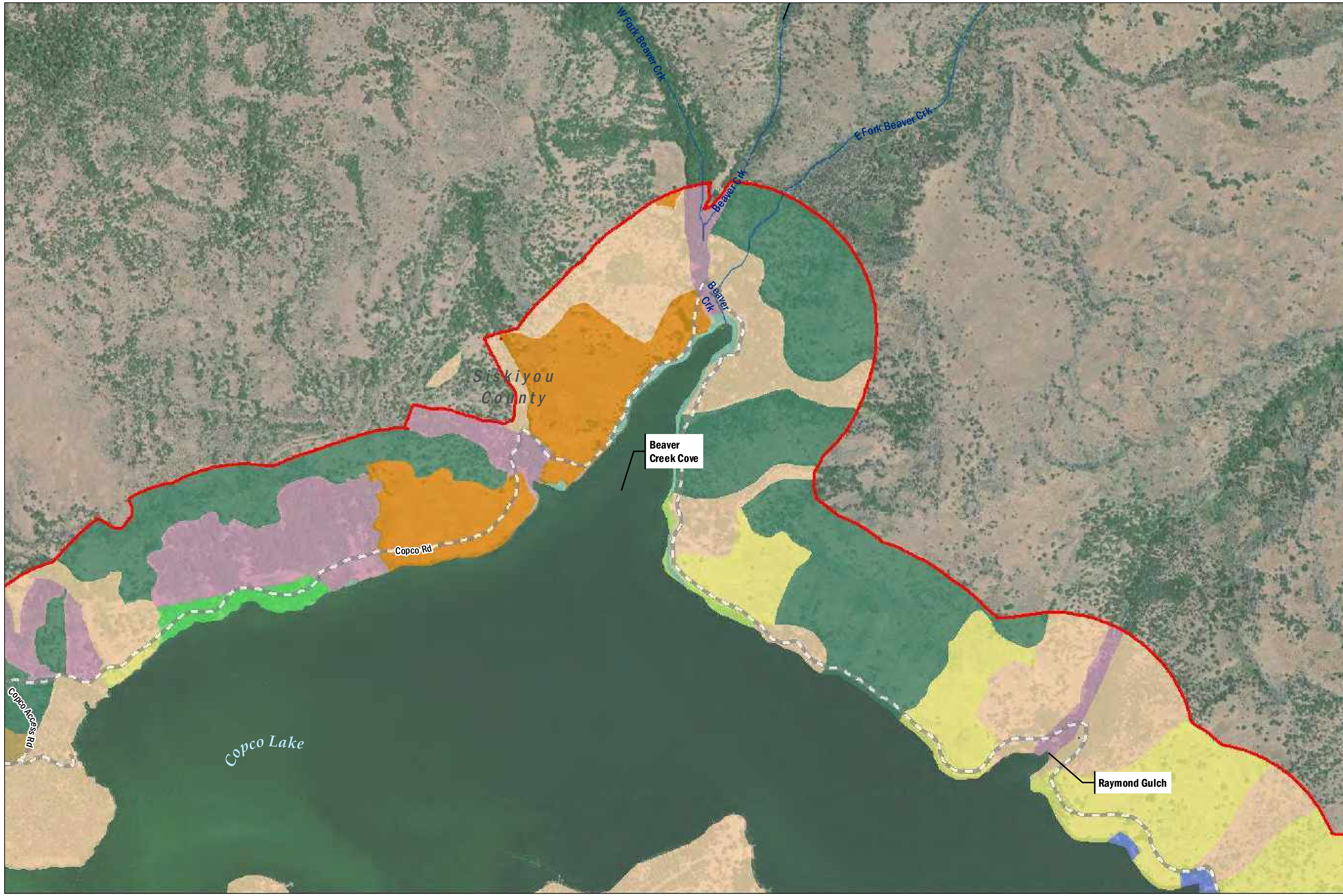
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

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Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

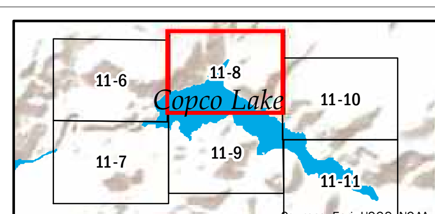

FIGURE 11-8

Vegetation Communities

Copco Lake

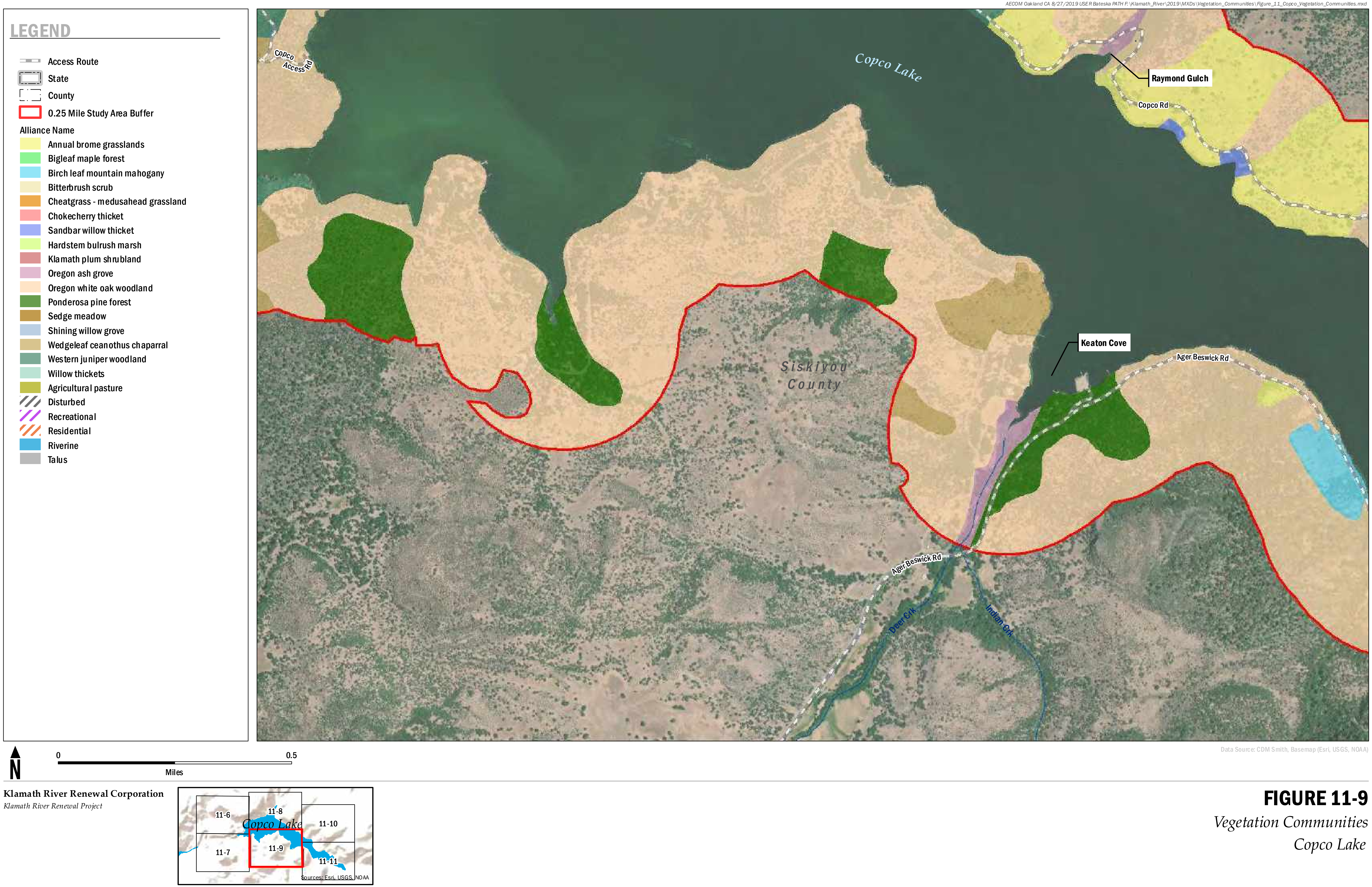

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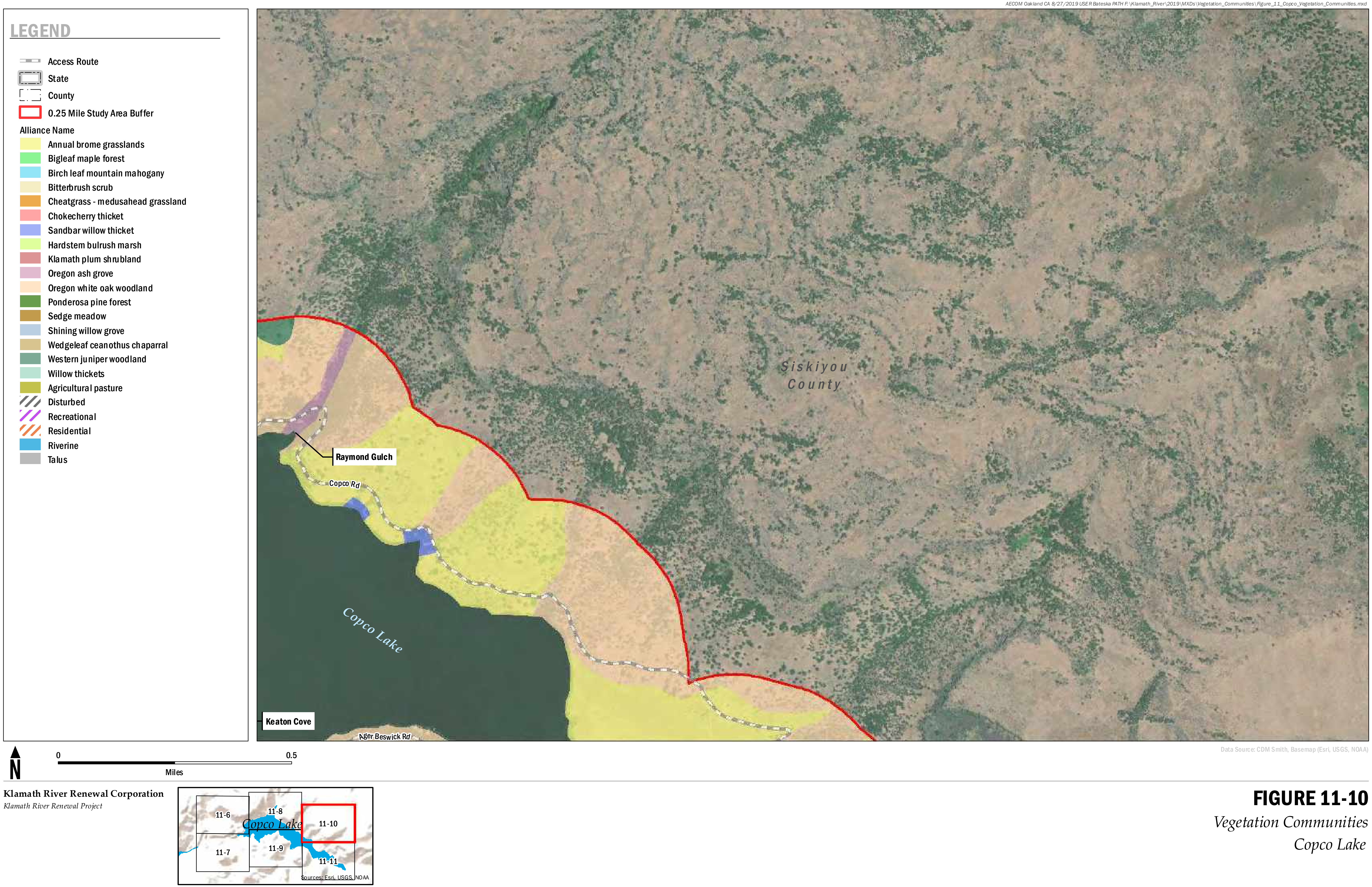
FIGURE 11-9

Vegetation Communities

Copco Lake



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Klamath River Renewal Project

FIGURE 11-10

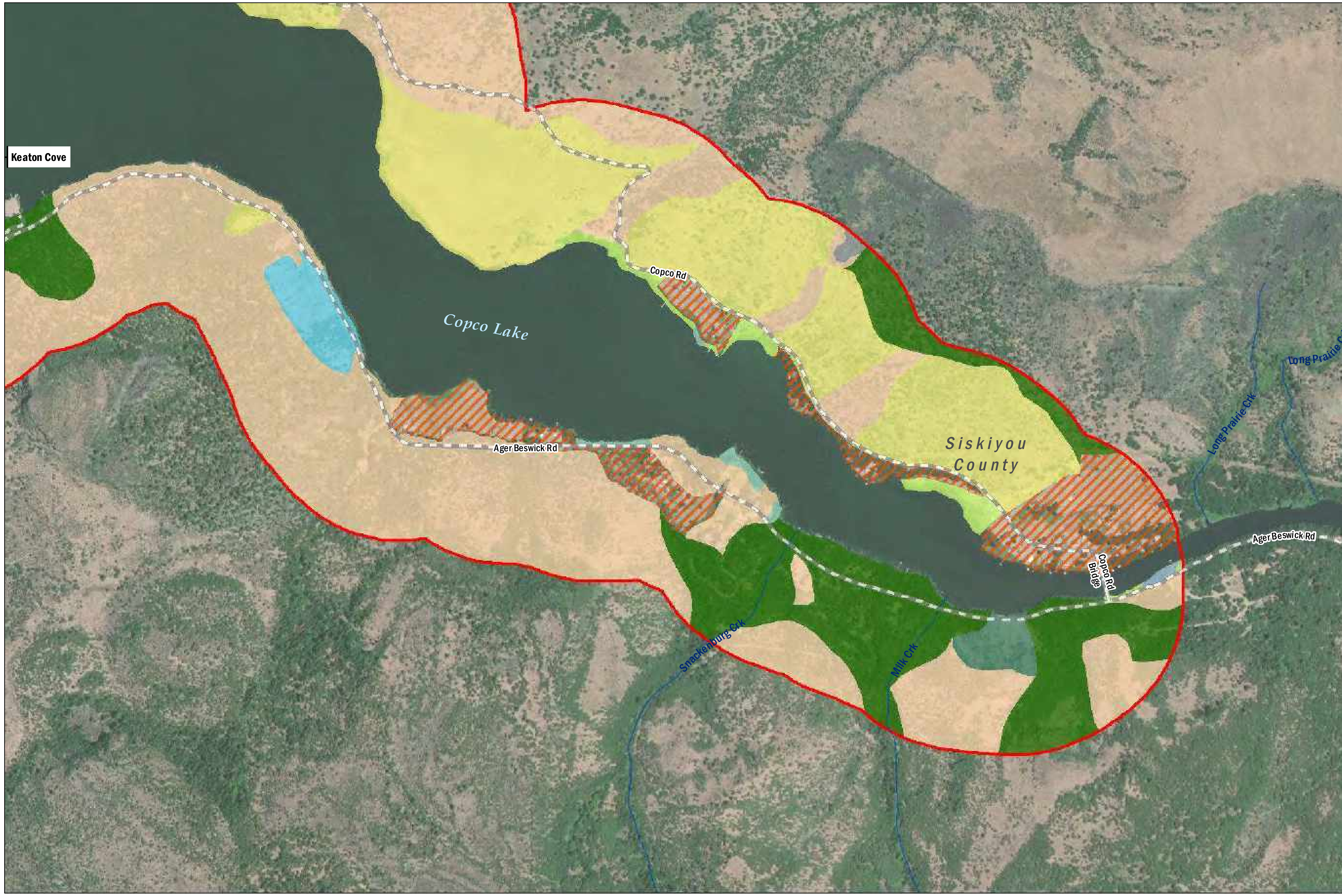
Vegetation Communities
Copco Lake

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

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Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

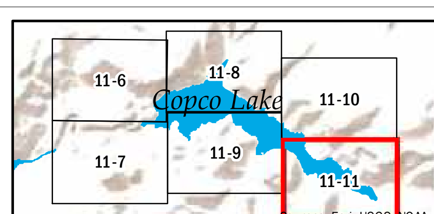


FIGURE 11-11

Vegetation Communities

Copco Lake

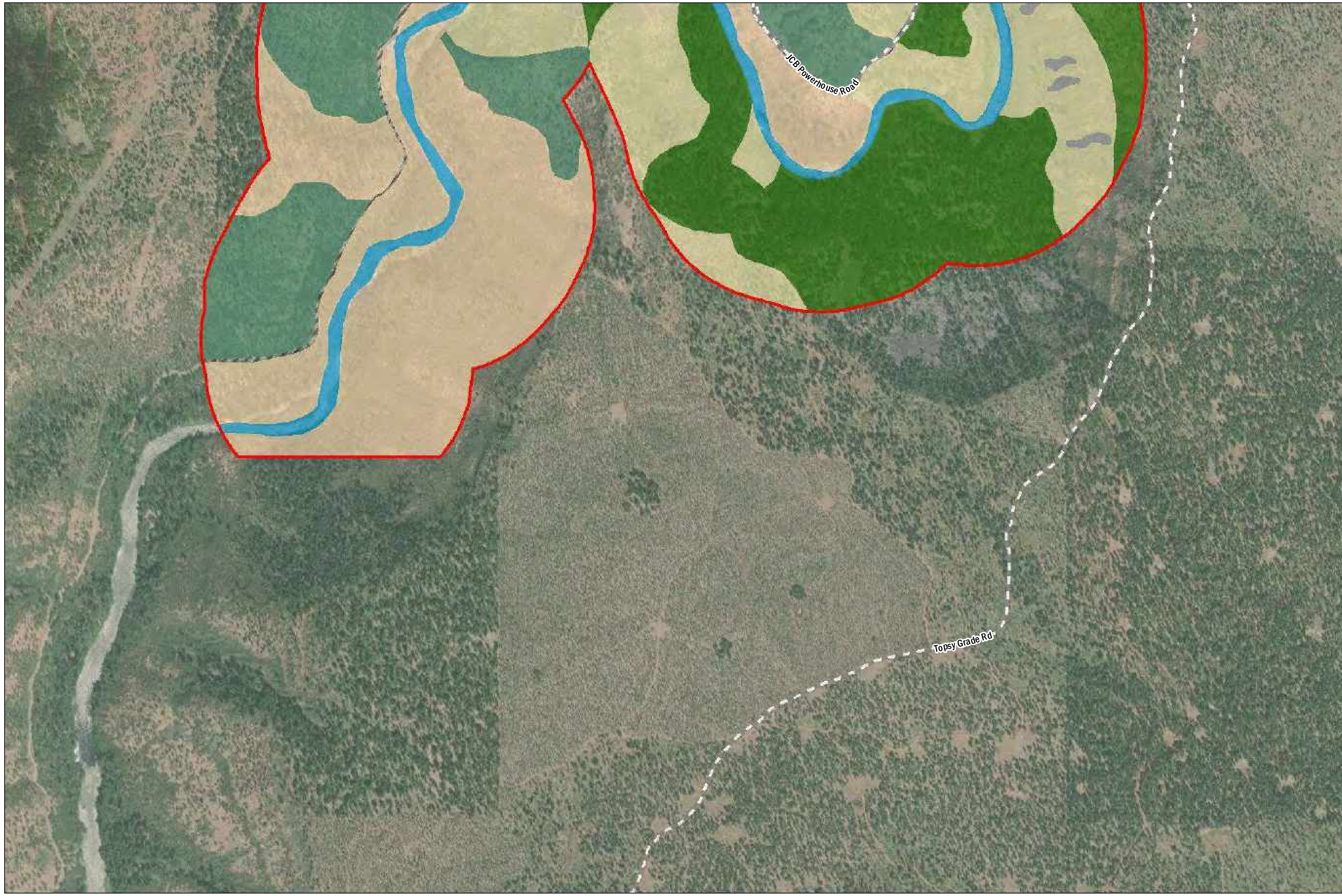
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

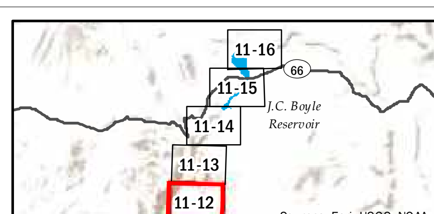


FIGURE 11-12

Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

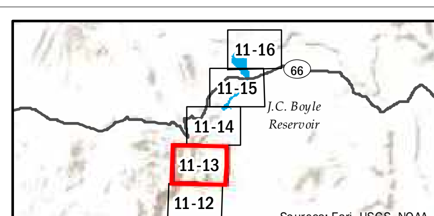


FIGURE 11-13

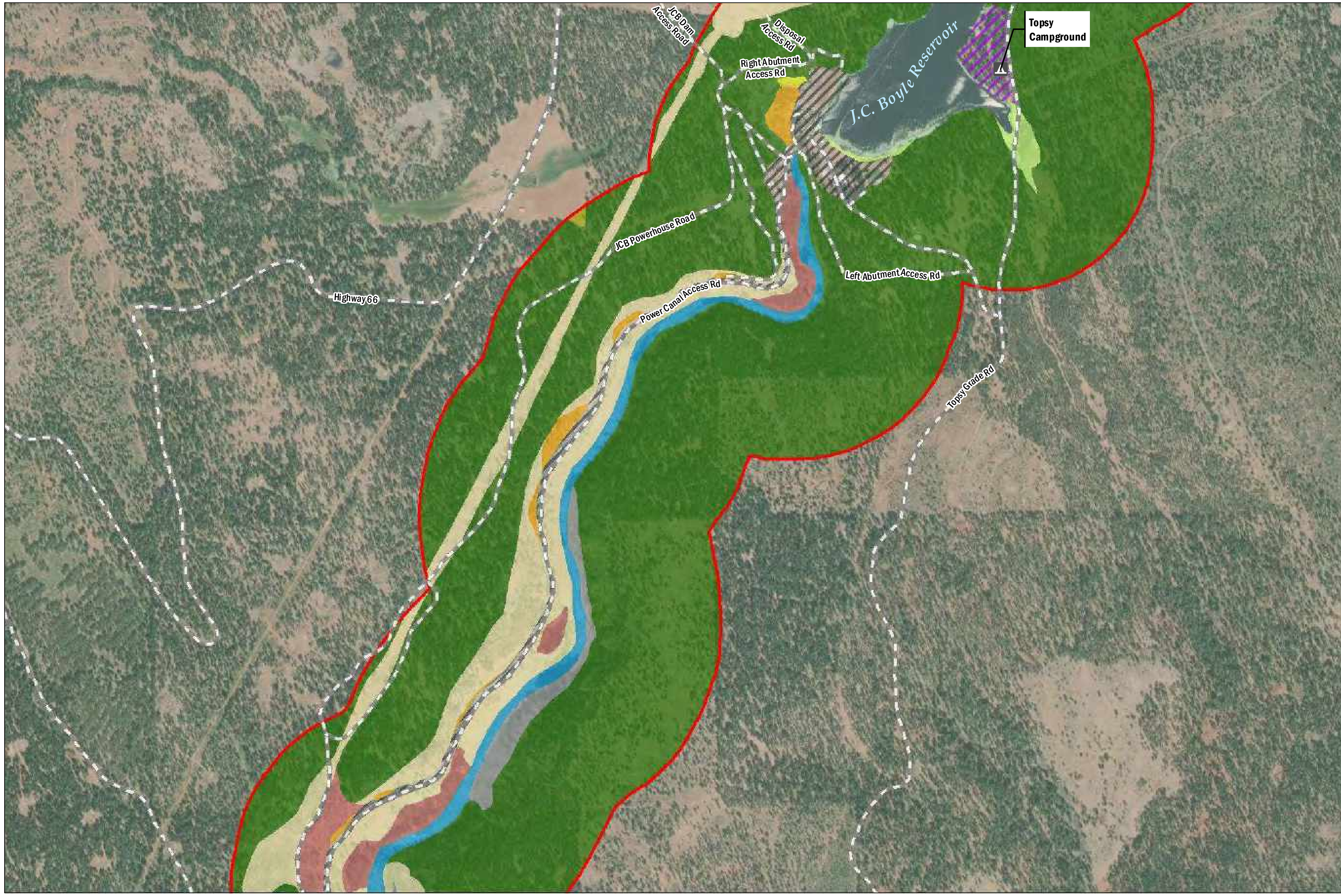
Vegetation Communities
JC Boyle Reservoir

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

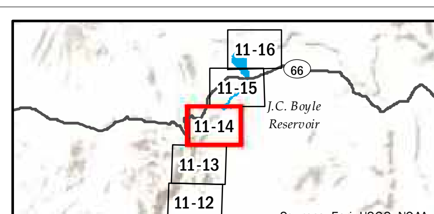


FIGURE 11-14

Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

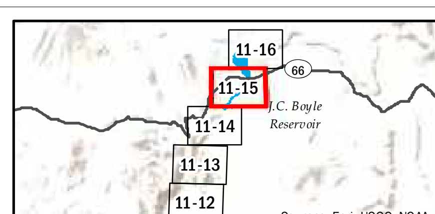
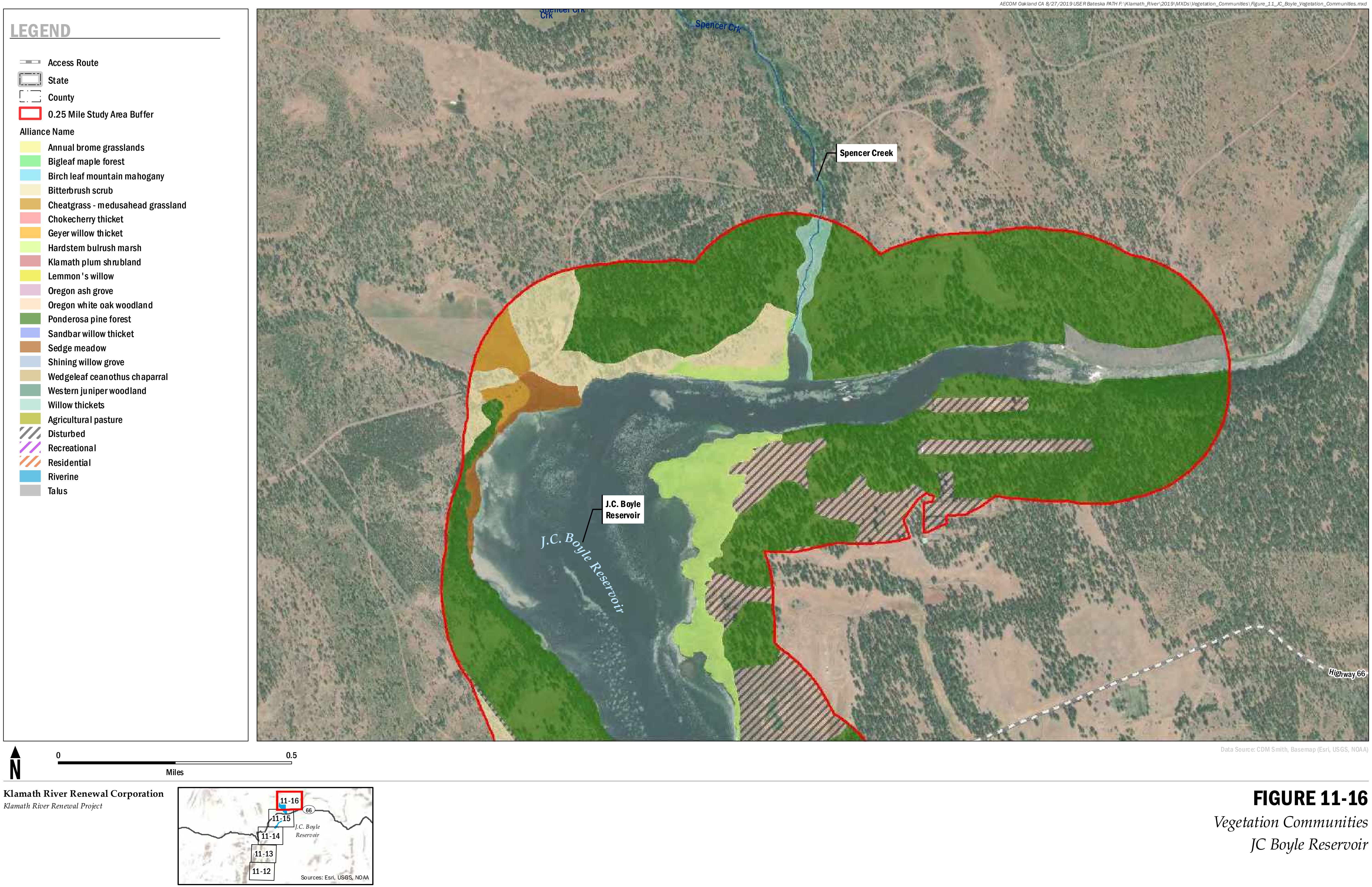


FIGURE 11-15

Vegetation Communities

JC Boyle Reservoir



Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 11-16

Vegetation Communities
JC Boyle Reservoir

Appendix C Species Observed during Field Studies

Appendix C
Species Observed During Field Studies

Plant Species Observed

J.C. Boyle Project Area

Scientific Name	Common Name
Achillea millefolium	yarrow
Acmispon americanus	american bird's foot trefoil
Agoseris grandiflora	giant mountain dandelion
Alnus rhombifolia	white alder
Amelanchier alnifolia	service berry
Angelica sp.	angelica
Antennaria argentea	silvery everlasting
Apocynum androsaemifolium	spreading dogbane
Artemesia tridentata	Big sagebrush
Artemisia douglasiana	mugwort
Artemisia tridentata	common sagebrush
Bromus tectorum	cheat grass, downy chess
Carex comosa	bristly sedge
Carex nebrascensis	nebraska sedge
Carex sp.	sedge
Castilleja applegatei	wavy leaf paintbrush
Castilleja miniata	great red paintbrush
Ceanothus prostratus	mahala mats
Cercocarpus betuloides	birch leaf mountain mahogany
Chrysothamnus viscidiflorus	green rabbitbrush
Cirsium vulgare	bullthistle
Clarkia rhomboidea	tongue clarkia
Collinsia parviflora	Maiden blue-eyed Mary
Collomia grandiflora	large flowered collomia
Collomia tinctoria	Yellow-staining Collomia
Convolvulus arvensis	bindweed, orchard morning-glory
Dieteria canescens	hoary aster
Dipsacus fullonum	wild teasel
Drymocallis glandulosa	sticky cinquefoil

Scientific Name	Common Name
Eleocharis sp.	spikerush
Elymus elymoides	squirreltail
Elymus glaucus	blue wildrye
Elymus repens	Common couch grass
Epilobium brachycarpum	willow herb
Epilobium ciliatum	slender willow herb
Ericameria bloomeri	Goldenbush
Ericameria nauseosa	rubber rabbitbrush
Erigeron inornatus	rayless fleabane
Erigeron philadelphicus	philadelphia fleabane
Eriogonum umbellatum	sulphur buckwheat
Eriophyllum lanatum	common woolly sunflower
Erodium cicutarium	Starksbill
Erythranthe guttata	yellow monkey flower
Festuca bromoides	brome fescue
Festuca myuros	rattail sixweeks grass
Fragaria sp.	wild strawberry
Galium boreale	Northern bedstraw
Grindelia sp.	gumweed
Helianthus bolanderi	bolander's sunflower
Holosteum umbellatum	jagged chickweed
Hordeum brachyantherum	meadow barley
Hordeum spp.	Barley
Hypericum perforatum	klamathweed
Iris chrysophylla	Yellow-leaf iris
Iris missouriensis	western blue flag
Juncus balticus	wire rush
Juncus occidentalis	slender juncus
Juncus sp.	rush
Juniperus occidentalis	western juniper
Lathyrus sp.	pea
Lemna sp.	duckweed
Lithospermum ruderale	western gromwell
Lonicera hispidula	pink honeysuckle
Lotus corniculatus	bird's-foot trefoil
Lupinus argenteus	silvery lupine
Madia glomerata	Mountain tarweed
Madia sp.	tarweed
Mahonia aquifolium	Hollyleaved barberry
Mentha pulegium	pennyroyal
Mimulus guttatus	Common monkeyflower
Monardella odoratissima	mountain monardella

Scientific Name	Common Name
Navarettia sp.	navarettia
Oemleria cerasiformis	oso berry
Osmorhiza berteroi	sweetcicely
Penstemon deustus	hot-rock penstemon
Perideridia erythrorhiza	Western yampah
Persicaria sp.	smartweed
Phalaris arundinacea	reed canary grass
Phleum pratense	cultivated timothy
Pinus ponderosa	Ponderosa pine
Plagiobothrys sp.	popcorn flower
Plagiobothyris mollis	Popcorn flower
Plantago lanceolata	english plantain
Poa bulbosa	bulbous blue grass
Poa pratensis	kentucky blue grass
Poa secunda	pine bluegrass
Polygonum aviculare	knotweed, knotgrass
Potentilla anserina ssp. anserina	silver weed cinquefoil
Potentilla glandulosa	Sticky cinquefoil
Potentilla gracilis	Five-finger cinquefoil
Prunella vulgaris var. lanceolata	mountain selfheal
Prunus emarginata	Bittercherry
Prunus subcordata	pacific plum, sierra plum
Prunus virginiana	Chokecherry
Pseudotsuga menziesii	douglas fir
Purshia tridentata	antelope bush
Quercus garryana	oregon oak
Ranunculus occidentalis	Western buttercup
Ribes aureum	Golden currant
Ribes velutinum	Desert gooseberry
Rosa sp.	rose
Rosa woodsii	Woods rose
Rubus parviflorus	thimbleberry
Rumex acetosella	sheep sorrel
Rumex crispus	curly dock
Salix exigua	narrowleaf willow
Salix geyeriana	geyer's willow
Salix lasiandra	pacific willow
Salix lemmonii	lemmon's willow
Salix ligulifolia	strapleaf willow
Scirpus microcarpus	mountain bog bulrush
Senecio hydrophilus	alkali marsh ragwort
Sidalcea sp.	checker mallow

Scientific Name	Common Name
Sisymbrium altissimum	tumble mustard
Sparganium eurycarpum	broadfruit bur reed
Spheonoplectus acutus	Tule bulrush
Spiraea douglasii	douglas spiraea
Stellaria longipes	Long-stalked Starwort
Stipa sp.	needlegrass
Symphiotrichum sp.	aster
Symphoricarpos albus	snowberry
Taraxacum officinale	common dandelion
Tragopogon dubius	yellow salsify
Trifolium repens	white clover
Triteleia hyacinthina	wild hyacinth
Typha latifolia	Broad-leaved cattail
Verbascum blattaria	moth mullein
Verbascum thapsus	woolly mullein
Veronica anagallis-aquatica	water speedwell

Copco Project Area

Scientific Name	Common Name
Acer macrophyllum	big leaf maple
Achillea millefolium	yarrow
Achnatherum occidentale	Western needleglass
Agoseris grandiflora	giant mountain dandelion
Agoseris heterophylla	Mountain dandelion
Alnus rhombifolia	white alder
Alyssum desertorum	desert madwort
Amelanchier alnifolia	service berry
Amsinckia menziesii	common fiddleneck, small-flowered fiddleneck
Amsinckia retrorsa	rigid fiddleneck
Angelica californica	California angelica
Angelica sp.	angelica
Antennaria dimorpha	gray cushion pussytoes
Anthemis cotula	dog fennel
Antirrhinum vexillocalyculatum	wiry snapdragon
Apocynum androsaemifolium	spreading dogbane
Arctium minus	common burdock
Arctostaphylos patula	greenleaf manzanita
Artemesia tridentata	Big sagebrush
Asclepias cordifolia	purple milkweed
Asclepias fascicularis	narrow leaf milkweed

Scientific Name	Common Name
Asclepias speciosa	showy milkweed
Astragalus filipes	basalt milkvetch
Astragalus lentiginosus	Freckled milkvetch
Balsamorhiza sagittata	arrow leaved balsamroot
Berberis aquifolium	mountain grape
Bidens frondosa	sticktight
Bidens spp.	
Blepharipappus scaber	blepharipappus
Boechera sp.	rockcress
Bromus diandrus	ripgut grass
Bromus hordeaceus	Soft brome
Bromus tectorum	cheat grass, downy chess
Calocedrus decurrens	incense cedar
Calochortus greenei	Greene's mariposa lily
Calochortus greenei	Greene's mariposa lily
Calochortus tolmiei	hairy star tulip
Cardamine oligosperma	idaho bittercress
Carex multicaulis	stick sedge
Carex sp.	sedge
Castilleja attenuata	valley tassels
Castilleja tenuis	Indian paintbrush
Ceanothus cuneatus	buck brush
Ceanothus integerrimus	deer brush
Centaurea cyanus	batchelor's button
Centaurea solstitialis	yellow star-thistle
Cerastium glomeratum	sticky mouse-ear chickweed
Cercocarpus betuloides	birch leaf mountain mahogany
Chenopodium sp.	lamb's quarters
Chrysothamnus viscidiflorus	Yellow rabbitbrush
Cichorium intybus	chicory
Cirsium arvense	canada thistle
Cirsium occidentale var. candidissimum	snowy thistle
Cirsium vulgare	bullthistle
Clarkia rhomboidea	tongue clarkia
Clarkia sp.	clarkia
Claytonia perfoliata	miner's lettuce
Claytonia rubra	red stemmed spring beauty
Collinsia parviflora	blue-eyed mary
Collomia grandiflora	large flowered collomia
Conium maculatum	poison hemlock
Convolvulus arvensis	bindweed, orchard morning-glory

Scientific Name	Common Name
Crepis occidentalis	western hawk's beard
Crocidium multicaule	spring gold
Cryptantha	cryptantha
Descurainia sophia	herb sophia
Dichelostemma capitatum	blue dicks
Dipsacus fullonum	wild teasel
Draba verna	whitlow grass
Dysphania botrys	jerusalem oak goosefoot
Echinochloa crus-galli	barnyard grass
Elymus caput-medusae	medusa head
Elymus elymoides	squirreltail
Elymus ponticus	tall wheat grass
Epilobium brachycarpum	willow herb
Epilobium ciliatum	slender willow herb
Epilobium densiflorum	willow herb
Equisetum arvense	common horsetail
Equisetum hyemale	scouringrush horsetail
Ericameria nauseosa	rubber rabbitbrush
Erigeron inornatus	rayless fleabane
Eriogonum nudum var. pubiflorum	hairy flowered buckwheat
Eriogonum vimineum	wicker-stem wild buckwheat
Eriophyllum lanatum	common woolly sunflower
Erodium cicutarium	redstem filaree
Eryngium cf. articulatum	coyote thistle
Erythranthe guttata	yellow monkey flower
Eschscholzia californica	california poppy
Eschsholzia californica	California poppy
Festuca idahoensis	idaho fescue, blue bunchgrass
Fraxinus latifolia	oregon ash
Fritillaria recurva	scarlet fritillary
Galium aparine	cleavers
Garrya fremontii	fremont's silk tassel
Grindelia camporum	gumweed
Helianthus bolanderi	bolander's sunflower
Heracleum maximum	common cowparsnip
Holosteum umbellatum	jagged chickweed
Hordeum jubatum	fox tail barley
Hordeum murinum	wall barley
Hosackia crassifolia	broad leaved lotus
Juncus balticus	wire rush
Juncus occidentalis	slender juncus
Juniperus occidentalis	western juniper

Scientific Name	Common Name
Kickxia elatine	sharp point fluellin
Lactuca serriola	prickly lettuce
Lactuca virosa	poison wild lettuce
Lagophylla ramosissima	common hareleaf
Lamium amplexicaule	henbit
Lathyrus nevadensis	purple peavine
Lemna minor	duckweed
Lemna sp.	duckweed
Lilium pardalinum	california tiger lily
Lilium washingtonianum ssp. purpurascens	purple flowered washington lily
Lilium washingtonianum ssp. purpurascens	purple flowered Washington lily
Lithophragma sp.	woodland stars
Lomatium californicum	celery weed
Lomatium cf. utriculatum	hog fennel
Lomatium dissectum	fern leaved lomatium
Lomatium nudicaule	pestle lomatium
Lomatium triternatum	lewis's lomatium
Lonicera ciliosa	Orange honeysuckle
Lonicera hispidula	pink honeysuckle
Lotus corniculatus	bird's-foot trefoil
Lupinus argenteus	silvery lupine
Lupinus bicolor	miniature lupine
Luzula comosa	Wood rush
Lythrum hyssopifolia	hyssop loosestrife
Madia glomerata	Mountain tarweed
Malva parviflora	cheeseweed, little mallow
Matricaria discoidea	Pineapple weed
Melilotus albus	white sweetclover
Mentzelia laevicaulis	giant blazingstar
Microseris laciniata ssp. detlingii	detling's silverpuffs
Microsteris gracilis	slender phlox
Mimulus guttatus	yellow monkey flower
Muscari botryoides	common grape hyacinth
Nasturtium officinale	watercress
Penstemon deustus	hot-rock penstemon
Penstemon humilis	Low beardtongue
Perideridia	yampah
Persicaria sp.	smartweed
Phacelia heterophylla	varileaf phacelia
Phacelia ramosissima	branching phacelia

Scientific Name	Common Name
Phalaris arundinacea	reed canary grass
Philadelphus lewisii	wild mock orange
Phleum pratense	cultivated timothy
Phlox speciosa	showy phlox
Phoradendron sp.	mistletoe
Pinus ponderosa	ponderosa pine, western yellow pine
Plagiobothrys hispidus	Cascade popcorn flower
Plagiobothrys sp.	popcorn flower
Plantago lanceolata	english plantain
Plantago major	Common plantain
Plectritis macrocera	plectritis
Poa bulbosa	bulbous blue grass
Poa pratensis	kentucky blue grass
Poa secunda	Sandberg bluegrass
Prunus emarginata	bitter cherry
Prunus subcordata	pacific plum, sierra plum
Prunus virginiana	chokecherry
Pseudotsuga menziesii	douglas fir
Quercus garryana	oregon oak
Quercus kelloggii	california black oak
Ranunculus occidentalis	western buttercup
Ranunculus testiculatus	Curveseed butterwort
Rhus aromatica	fragrant sumac
Rhus trilobata	Skunkbush
Ribes sp.	gooseberry
Ribes velutinum	desert gooseberry
Rubus armeniacus	himalayan blackberry
Rubus ursinus	california blackberry
Rumex crispus	curly dock
Rumex salicifolius	willow leaved dock
Salix exigua	narrowleaf willow
Salix lasiandra	pacific willow
Salix scouleriana	scouler's willow
Sambucus nigra ssp. caerulea	blue elderberry
Schoenoplectus acutus var. occidentalis	tule
Sequoiadendron giganteum	redwood
Sisymbrium altissimum	tumble mustard
Sisymbrium altiussimum	Tall tumblemustard
Solidago velutina	threenerve goldenrod
Stellaria media	common chickweed

Scientific Name	Common Name
Symphoricarpos albus	snowberry
Symphoricarpos mollis	Creeping snowberry
Taraxacum officinale	common dandelion
Torilis arvensis	tall sock-destroyer
Toxicodendron diversilobum	western poison oak
Tragopogon dubius	yellow salsify
Tribulus terrestris	puncture vine
Trifolium dubium	Suckling clover
Trifolium hirtum	Rose clover
Urtica dioica	stinging nettle
Verbascum blattaria	moth mullein
Verbascum thapsus	woolly mullein
Verbascum Thapsus	Woolly mullein
Veronica americana	American speedwell
Veronica anagallis-aquatica	water speedwell
Veronica persica	persian speedwell
Vitis californica	california wild grape
Wyethia angustifolia	narrow leaved mule ears

Iron Gate Project Area

Scientific Name	Common Name
Achillea millefolium	yarrow
Acmispon americanus	american bird's foot trefoil
Agoseris grandiflora	giant mountain dandelion
Alnus rhombifolia	white alder
Alyssum desertorum	desert alyssum
Amaranthus blitoides	prostrate pigweed
Amsinckia menziesii	common fiddleneck, small-flowered fiddleneck
Anthemis cotula	dog fennel
Apocynum androsaemifolium	spreading dogbane
Asclepias fascicularis	narrow leaf milkweed
Astragalus filipes	basalt milkvetch
Blepharipappus scaber	blepharipappus
Bromus carinatus	california bromegrass
Bromus laevipes	narrow flowered brome
Bromus tectorum	cheat grass, downy chess
Calochortus greenei	Greene's mariposa lily
Capsella bursa-pastoris	shepherd's purse
Castilleja attenuata	valley tassels
Ceanothus cuneatus	buck brush

Scientific Name	Common Name
Centaurea solstitialis	yellow star-thistle
Cichorium intybus	chicory
Cirsium cymosum var. canovirens	gray-green thistle
Cirsium occidentale var. candidissimum	snowy thistle
Cirsium vulgare	bullthistle
Claytonia perfoliata	miner's lettuce
Collinsia parviflora	blue-eyed mary
Collomia grandiflora	large flowered collomia
Convolvulus arvensis	bindweed, orchard morning-glory
Cornus sericea	american dogwood
Crepis occidentalis	western hawk's beard
Croton setiger	turkey-mullein
Cryptantha	cryptantha
Cuscuta sp.	Dodder
Descurainia sophia	herb sophia
Dichelostemma capitatum	blue dicks
Dieteria canescens	hoary aster
Draba verna	whitlow grass
Eleocharis sp.	spikerush
Elymus caput-medusae	medusa head
Elymus spicatus	blue bunch wheat grass
Epilobium brachycarpum	willow herb
Equisetum hyemale	scouringrush horsetail
Ericameria nauseosa	rubber rabbitbrush
Erigeron sp.	horseweed
Eriodictyon californicum	yerba santa
Eriogonum luteolum var. luteolum	golden buckwheat
Eriogonum nudum var. pubiflorum	hairy flowered buckwheat
Eriogonum umbellatum	sulphur buckwheat
Erodium cicutarium	redstem filaree
Festuca myuros	rattail sixweeks grass
Frasera albicaulis	whitestem frasera
Galium aparine	cleavers
Geum triflorum	old man's beard
Helianthus bolanderi	bolander's sunflower
Hirschfeldia incana	mustard
Holosteum umbellatum	jagged chickweed
Hordeum murinum	wall barley
Hypericum perforatum	klamathweed
Juniperus occidentalis	western juniper
Lagophylla ramosissima	common hareleaf

Scientific Name	Common Name
Leptosiphon sp.	babystars
Lomatium cf. utriculatum	hog fennel
Lomatium triternatum	lewis's lomatium
Lupinus argenteus	silvery lupine
Lupinus microcarpus var. microcarpus	chick lupine
Matricaria discoidea	pineapple weed
Melilotus albus	white sweetclover
Mentha pulegium	pennyroyal
Mentzelia laevicaulis	giant blazingstar
Microseris laciniata ssp. detlingii	detling's silverpuffs
Microsteris gracilis	slender phlox
Mirabilis greenei	Greene's four o'clock
Monardella odoratissima	mountain monardella
Penstemon sp.	penstemon
Perideridia	yampah
Persicaria sp.	smartweed
Phalaris arundinacea	reed canary grass
Phlox speciosa	showy phlox
Phoradendron sp.	mistletoe
Plagiobothrys sp.	popcorn flower
Poa bulbosa	bulbous blue grass
Polygonum aviculare	knotweed, knotgrass
Portulaca oleracea	common purslane
Quercus garryana	oregon oak
Ranunculus testiculatus	tubercled crowfoot
Rhus aromatica	fragrant sumac
Ribes sp.	gooseberry
Salvia dorrii var. incana	fleshy sage
Scutellaria antirrhinoides	snapdragon skullcap
Sisymbrium altissimum	tumble mustard
Symphiotrichum sp.	aster
Symphoricarpos albus	snowberry
Tragopogon dubius	yellow salsify
Trichostema lanceolatum	vinegarweed
Verbascum thapsus	woolly mullein
Veronica persica	persian speedwell
Vitis californica	california wild grape
Xanthium strumarium	cocklebur

Wildlife Species Observed

Common Name	Scientific Name
Birds	
Canada Goose	*Branta canadensis*
Wood Duck	*Aix sponsa*
Gadwall	*Mareca strepera*
Mallard	*Anas platyrhynchos*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Bufflehead	*Bucephala albeola*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*
Mountain Quail	*Oreortyx pictus*
California Quail	*Callipepla californica*
Sooty Grouse	*Dendragapus fuliginosus*
Wild Turkey	*Meleagris gallopavo*
Pied-billed Grebe	*Podilymbus podiceps*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*
Common loon	*Gavia immer*
Rock Pigeon	*Columba livia*
Eurasian Collared-Dove	*Streptopelia decaocto*
Mourning Dove	*Zenaida macroura*
Common Nighthawk	*Chordeiles minor*
Common Poorwill	*Phalaenoptilus nuttallii*
White-throated Swift	*Aeronautes saxatalis*
Vaux's Swift	*Chaetura vauxi*
Anna's Hummingbird	*Calypte anna*
Allen's Hummingbird	*Selasphorus sasin*
Common Gallinule	*Gallinula galeata*
American Coot	*Fulica americana*
Sandhill Crane	*Antigone canadensis*
Killdeer	*Charadrius vociferus*
Least Sandpiper	*Calidris minutilla*
Spotted Sandpiper	*Actitis macularius*
Greater Yellowlegs	*Tringa melanoleuca*
Western Gull	*Larus occidentalis*
California Gull	*Larus californicus*
Franklin's Gull	*Leucophaeus pipixcan*
Caspian Tern	*Hydroprogne caspia*

Common Name	Scientific Name
Forster's Tern	*Sterna forsteri*
Double-crested Cormorant	*Phalacrocorax auritus*
American White Pelican	*Pelecanus erythrorhynchos*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Green Heron	*Butorides virescens*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Golden Eagle	*Aquila chrysaetos*
Northern Harrier	*Circus hudsonius*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Ferruginous Hawk	*Buteo regalis*
Great Horned Owl	*Bubo virginianus*
Belted Kingfisher	*Megaceryle alcyon*
Lewis's Woodpecker	*Melanerpes lewis*
Acorn Woodpecker	*Melanerpes formicivorus*
Red-breasted Sapsucker	*Sphyrapicus ruber*
Pileated woodpecker	*Drycopus pileatus*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*
Olive-sided Flycatcher	*Contopus cooperi*
Willow Flycatcher	*Empidonax traillii*
Western Wood-Pewee	*Contopus sordidulus*
Dusky Flycatcher	*Empidonax oberholseri*
Pacific-slope Flycatcher	*Empidonax difficilis*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
Hutton's Vireo	*Vireo huttoni*
Cassin's Vireo	*Vireo cassinii*

Common Name	Scientific Name
Warbling Vireo	*Vireo gilvus*
Steller's Jay	*Cyanocitta stelleri*
California Scrub-Jay	*Aphelocoma californica*
Clark's Nutcracker	*Nucifraga columbiana*
Black-billed Magpie	*Pica hudsonia*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Purple martin	*Progne subis*
Black-capped Chickadee	*Poecile atricapillus*
Mountain Chickadee	*Poecile gambeli*
Chestnut-backed Chickadee	*Poecile rufescens*
Oak Titmouse	*Baeolophus inornatus*
Bushtit	*Psaltriparus minimus*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
Pygmy Nuthatch	*Sitta pygmaea*
Brown Creeper	*Certhia americana*
Rock Wren	*Salpinctes obsoletus*
Canyon Wren	*Catherpes mexicanus*
House Wren	*Troglodytes aedon*
Bewick's Wren	*Thryomanes bewickii*
American Dipper	*Cinclus mexicanus*
Ruby-crowned Kinglet	*Regulus calendula*
Western Bluebird	*Sialia mexicana*
Mountain Bluebird	*Sialia currucoides*
Townsend's Solitaire	*Myadestes townsendi*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
Northern Mockingbird	*Mimus polyglottos*
European Starling	*Sturnus vulgaris*
Cedar Waxwing	*Bombycilla cedrorum*
Pine Siskin	*Spinus pinus*

Common Name	Scientific Name
House Finch	*Haemorhous mexicanus*
Purple Finch	*Haemorhous purpureus*
Lesser Goldfinch	*Spinus psaltria*
American Goldfinch	*Spinus tristis*
Spotted Towhee	*Pipilo maculatus*
California Towhee	*Melozone crissalis*
Green-tailed Towhee	*Pipilo chlorurus*
Chipping Sparrow	*Spizella passerina*
Lark Sparrow	*Chondestes grammacus*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Vesper Sparrow	*Pooecetes gramineus*
Dark-eyed Junco	*Junco hyemalis*
Slate-colored Junco	*Junco h. hyemalis*
Western Meadowlark	*Sturnella neglecta*
Bullock's Oriole	*Icterus bullockii*
Red-winged Blackbird	*Agelaius phoeniceus*
Tricolored Blackbird	*Agelaius tricolor*
Brown-headed Cowbird	*Molothrus ater*
Brewer's Blackbird	*Euphagus cyanocephalus*
Great-tailed Grackle	*Quiscalus mexicanus*
Orange-crowned Warbler	*Oreothlypis celata*
Nashville Warbler	*Oreothlypis ruficapilla*
Common Yellowthroat	*Geothlypis trichas*
Yellow Warbler	*Setophaga petechia*
Yellow-breasted Chat	*Icteria virens*
Black-throated Blue Warbler	*Setophaga caerulescens*
Yellow-rumped Warbler	*Setophaga coronata*
Wilson's Warbler	*Cardellina pusilla*
Western Tanager	*Piranga ludoviciana*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Mammals	
California kangaroo rat	*Dipodomys californicus*
California ground squirrel	*Otospermophilus beecheyi*
Golden-mantled ground squirrel	*Callospermophilus lateralis*
Yellow-pine chipmunk	*Tamias amoenus*
Allen's chipmunk	*Neotamias senex*

Common Name	Scientific Name
Antelope squirrel	*Ammospermophilus* sp.
Douglas' squirrel	*Tamiasciurus douglasii*
Western gray squirrel	*Sciurus griseus*
Black-tailed jackrabbit	*Lepus californicus*
Opossum	*Didelphimorphia* sp.
Raccoon	*Procyon lotor*
Yuma myotis	*Myotis yumanensis*
Myotis sp.	*Myotis* sp.
Townsend's western big-eared bat	*Corynorhinus townsendii townsendii*
Coyote	*Canis latrans*
Black-tailed deer	*Odocoileus hemionus*
big-horned sheep	*Ovis canadensis*
Black bear	*Ursus americanus*
Bobcat	*linx rufus*
Mountain lion	*Puma concolor*
American mink	*Neovison vison*
North American beaver	*Castor canadensis*
River otter	*Lontra canadensis*
Feral horse	*Equus ferus*
Cow	*Bos taurus*
Reptiles	
Western pond turtle	*Actinemys marmorata*
Western fence lizard	*Sceloporus occidentalis*
Sagebrush lizard	*Sceloporus graciousus*
California alligator lizard	*Elgaria multicarinata*
California red-sided garter snake	*Thamnophis sirtalis infernalis*
Garter snake	*Thamnophis* sp.
Western yellow-bellied racer	*Coluber constrictor mormon*
Western rattlesnake	*Crotalus oreganus*
California mountain kingsnake	*Lampropeltis zonata*
California kingsnake	*Lampropeltis getula californiae*
Amphibians	
Northern tree frog	*Hyla versicolor*
Sierran treefrog	*Pseudacris sierra*
Western toad	*Anaxyrus boreas*
American bullfrog	*Lithobates catesbeianus*

Appendix B

Oregon Terrestrial and Wildlife Management Plan

Lower Klamath Project
FERC Project No. 14803

Oregon Terrestrial and Wildlife Management Plan

Klamath River Renewal Corporation
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1.0 Introduction

This Oregon Terrestrial and Wildlife Management Plan is one of three sub-plans of the Terrestrial and Wildlife Management Plan to be implemented as part of the Proposed Action for the Lower Klamath Project (Proposed Action). The geographic area that encompasses dam removal-related activities associated with the Proposed Action is referred to as the Limits of Work. The Renewal Corporation will implement the management measures described herein within the portions of the Limits of Work that are within the State of Oregon, including any associated buffers for specific species as described in the following sections (together, the Oregon Terrestrial and Wildlife Management Plan Boundary).

For purposes of this Oregon Terrestrial and Wildlife Management Plan, Year 1 refers to the year before drawdown, Year 2 refers to the drawdown year, and Year 3 refers to the year following the drawdown year.

1.1 Purpose of Terrestrial and Wildlife Management Plan

The purpose of the Oregon Terrestrial and Wildlife Management Plan is to state the measures the Renewal Corporation will implement to avoid and minimize impacts to terrestrial and wildlife species (excluding bald and golden eagles) within the Oregon Terrestrial and Wildlife Management Plan Boundary from the Proposed Action. Avoidance and minimization measures for bald and golden eagles are provided in the Bald and Golden Eagle Management Plan, a subplan of the Terrestrial and Wildlife Management Plan.

The impacts from the Proposed Action are set forth in the *Amended Application for Surrender of License for Major Project and Removal of Project Works,* FERC Project Nos. 14803-001 & 2082-063 (KRRC and PacifiCorp, 2020). The Oregon Department of Environmental Quality (ODEQ) found that the Proposed Action will have long-term beneficial impacts, in part due to implementation of the proposed measures set forth in the Oregon Terrestrial and Wildlife Management Plan and the Bald and Golden Eagle Management Plan (ODEQ 2018). In particular, the Renewal Corporation anticipates that approximately 2,000 acres of terrestrial habitat will be created as a result of the Proposed Action, including dry uplands, riparian and wetland habitat. See Table 6-17 in the Reservoir Area Management Plan.

1.2 Relationship to Other Management Plans

The Oregon Terrestrial and Wildlife Management Plan supports elements of all construction-related management plans. So as not to duplicate information, elements from those management plans are not repeated herein but are, where appropriate, referred to in this Oregon Terrestrial and Wildlife Management Plan.

2.0 Designated Biologist(s)

The Renewal Corporation will use designated biologists (DB) with appropriate species-related qualifications to undertake the management measures described herein. DB qualifications will vary depending on the species-specific management measure. The Renewal Corporation will coordinate and review the DB qualifications with ODFW at least 60 days prior to starting any work activities that will require the implementation of any of the management measures described herein.

2.1 Construction Crew Training

Before any ground-disturbing work (including vegetation clearing and grading) begins within the Oregon Terrestrial and Wildlife Management Plan Boundary, a DB will conduct mandatory biological resources awareness training for all for all site superintendents and construction foremen. The training will teach the construction crews to identify special status species that could be on site and to support the Renewal Corporation's implementation of the Oregon Terrestrial and Wildlife Management Plan. The training will include a discussion of:

- Species identification,
- Habitat requirements,
- Protection status,
- Management measures,
- Necessary response actions if a crew member identifies a special status species or any of the non-special status species listed on Table 3-2 within the Oregon Terrestrial and Wildlife Management Plan Boundary during construction activities, and
- What to do if an injured species is found.

Upon completing the training, all employees will sign an acknowledgment form stating that they attended the training and understand the applicable management measures. The Renewal Corporation will give similar training to any new personnel and updated training to all personnel if there is a change in the status of a special status species. The Renewal Corporation will also issue species identification cards for the species identified in Table 3-1 to site superintendents and construction foremen. These cards will have photos and descriptions of the applicable species and will describe the actions that will be taken if the special status species is identified during construction.

3.0 Management Measures

Proposed Action work activities during the pre-drawdown, drawdown and restoration phases have the potential to impact special and non-special status species within the Oregon Terrestrial and Wildlife Management Plan Boundary. For purposes of the Oregon Terrestrial and Wildlife Management Plan, "drawdown phase" refers to the calendar year in which drawdown occurs. "Pre-drawdown phase" refers to the period of time from the commencement of pre-drawdown activities until the beginning of the drawdown phase. "Restoration phase" refers to the period of time from the end of the drawdown phase until completion of the restoration activities under the Reservoir Area Management Plan. Table 3-2 below summarizes the management measures the Renewal Corporation will implement within the Oregon Terrestrial and Wildlife Management Plan Boundary to avoid and minimize impacts to terrestrial and wildlife species, including the special status species specifically identified on Table 3-1 below. Sections 3.1 - 3.6 provide a full description of the management measures summarized in Table 3-2. Appendix A - Figures contains all figures referenced in Section 3.

In addition, this plan includes information relating to herbicide application guidelines and the establishment of wetland buffers within the Oregon Terrestrial and Wildlife Management Plan Boundary.

Table 3-1. Special Status Species Covered in the Oregon Terrestrial and Wildlife Management Plan

COMMON NAME	SCIENTIFIC NAME	OREGON STATE LISTING	FEDERAL STATUS
Western Pond Turtle	*Actinemys marmorata*	Sensitive	Under Review[1]
Willow Flycatcher	*Empidonax traillii*	Sensitive	Not Listed
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened	Threatened
1. The western pond turtle's status is under review for possible listing as threatened or endangered under the federal Endangered Species Act.			

Table 3-2. Species Specific Management Measures

SPECIES IMPACTED	MANAGEMENT MEASURES	PHASE(S)	RESPONSIBLE PARTY
Western Pond Turtle (WPT)	Visual Encounter Surveys (VES surveys, as defined below in Section 3.1.1) prior to construction	Pre-Drawdown and Drawdown	ODFW
	VES surveys during the J.C. Boyle reservoir drawdown	Drawdown	ODFW
	VES surveys promptly following the J.C. Boyle reservoir drawdown	Drawdown	ODFW
	Rescue and relocation	Pre-Drawdown and Drawdown	ODFW
	Entrapment prevention and exclusion	Pre-Drawdown and Drawdown	Renewal Corporation
Non-listed Reptiles and Amphibians	VES surveys prior to use of heavy equipment	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation

SPECIES IMPACTED	MANAGEMENT MEASURES	PHASE(S)	RESPONSIBLE PARTY
	Rescue and relocation	Pre-Drawdown, Drawdown and Restoration	ODFW and Renewal Corporation
	Entrapment prevention and exclusion	Pre-Drawdown and Drawdown	Renewal Corporation
Nesting Birds (including Cliff Swallow and Osprey)	VES surveys if tree removal or vegetation clearing activities will occur during the primary nesting period of April - August	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Limit vegetation clearing to areas where maintenance activities are necessary or construction or restoration actions (ground disturbance) will occur	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Limit vegetation clearing (other than willow cutting and harvesting) to September - March (i.e., outside the nesting season)	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Limit willow cutting and harvesting to September – January during the pre-drawdown and drawdown phases	Pre-Drawdown and Drawdown	Renewal Corporation
	Avoid willow cutting and harvesting in June and July (i.e., the willow flycatcher nesting season) during the restoration phase	Restoration	Renewal Corporation
	Leave transmission/distribution poles with active osprey nests in place	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	With respect to transmission/distribution poles without active osprey nests in place, install nest deterrents or remove nesting platforms prior to osprey nesting season (March – September)	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Establish a set-back for construction actions and/or alter timing of construction, if required to avoid disturbing an active nest	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation

SPECIES IMPACTED	MANAGEMENT MEASURES	PHASE(S)	RESPONSIBLE PARTY
	Outside of the cliff swallow nesting season, remove unoccupied cliff swallow nests from structures scheduled to be modified or removed	Drawdown	Renewal Corporation
Willow Flycatcher	Limit vegetation clearing to areas where maintenance activities are necessary or construction actions (ground disturbance) will occur	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Limit vegetation clearing (other than willow cutting and harvesting) to September - March (i.e., outside the nesting season)	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Limit willow cutting and harvesting to September – January during the pre-drawdown and drawdown phases	Pre-Drawdown and Drawdown	Renewal Corporation
	Avoid willow cutting and harvesting in June and July (i.e., the willow flycatcher nesting season) during the restoration phase	Restoration	Renewal Corporation
	Establish a set-back for construction actions and/or alter timing of construction, if required to avoid disturbing an active nest	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
Northern Spotted Owl	Implement access road realignment and vegetation clearing activities in accordance with the USFWS's Biological Opinion	Pre-Drawdown and Drawdown	Renewal Corporation
Gray Wolves	Contact ODFW and potentially implement management measures	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
	Determine best management measures in coordination with ODFW	Pre-Drawdown, Drawdown and Restoration	Renewal Corporation
Bats	Visual surveys prior to structure and tree removal	Pre-Drawdown and Drawdown	Renewal Corporation

SPECIES IMPACTED	MANAGEMENT MEASURES	PHASE(S)	RESPONSIBLE PARTY
	Remove structures within designated seasonal timeframes (i.e., March 1 to April 15 and September 1 to October 15)	Pre-Drawdown and Drawdown	Renewal Corporation
	Phased removal of structures and trees	Pre-Drawdown and Drawdown	Renewal Corporation
	With respect to remaining structures, permanently close and barricade after evicting bats	Pre-Drawdown	Renewal Corporation
	Install bat boxes and/or bat condos provided by USFWS	Pre-Drawdown	Renewal Corporation

3.1 Western Pond Turtle Management Measures

Previous surveys have documented western pond turtle (WPT) presence throughout the Oregon Terrestrial and Wildlife Management Plan Boundary (PacifiCorp 2004b; AECOM 2019) as described in Appendix C. WPT utilization of habitat within the Oregon Terrestrial and Wildlife Management Plan Boundary includes nesting, over-wintering, foraging, and basking and is fully described in the WPT study report (AECOM 2019).

Pre-drawdown, drawdown, and restoration work activities may impact WPT located in the Oregon Terrestrial and Wildlife Management Plan Boundary. ODFW is expected to implement a number of management measures, including pre-construction surveys, drawdown surveys, and rescue and relocation, all as described in more detail in this Section 3.1. In addition, the Renewal Corporation will implement the management measures for entrapment prevention and exclusion set forth in Section 3.8.

The structure and contents of the WPT database will be developed and agreed by CDFW, ODFW and the Renewal Corporation no later than three (3) months prior to the start of pre-drawdown activities. The Renewal Corporation will then create the WPT database and provide ODFW with access to the WPT database prior to the start of pre-drawdown activities. The WPT database will include a map of previously identified overwintering sites (AECOM 2019) as well as maps that depict the project disturbance limits, access roads, other project features, and potential suitable nesting habitat within 500 meters of the J.C. Boyle reservoir shoreline. In addition, the WPT database will contain a master schedule and map of all “in-water” activities with the potential to disturb WPT that might occur in the vicinity of the WPT overwintering sites identified in the WPT study report (AECOM 2019). For purposes of the master schedule, work activities that take place below the ordinary high-water mark will be considered “in-water” work.

To ensure that the Renewal Corporation can keep the WPT database and maps up-to-date and accurate, ODFW is expected to regularly update the WPT database with the field data collected during the VES surveys (as defined below in Section 3.1.1) and rescue and relocation efforts conducted by ODFW. To facilitate the Renewal Corporation’s preparation of the monthly reports described in Section 4.1, the data input by ODFW is expected to include, at a minimum, WPT survey conditions and results, including WPT observations, weather conditions during surveys, frequency, and duration of survey efforts, actions taken to rescue/relocate WPT (including the number of WPT relocated and which relocation area they were released at) and data collected on handled individuals as identified in Section 3.1.4.

Other than management measures related to entrapment prevention and exclusion, ODFW is expected to lead and be responsible for all WPT-related management measures, including VES surveys, rescue and relocation efforts, and any other WPT-related management measures undertaken in connection with the Proposed Action. The Renewal Corporation will cooperate with ODFW regarding the performance of these measures. In addition, the Renewal Corporation will notify ODFW if WPT are observed in or in proximity to an active work area between the start of reservoir drawdown and the completion of priority tributary restoration work. The Renewal Corporation expects all work performed by ODFW to be performed by qualified individuals, as determined by ODFW, pursuant to the WPT checklist developed by CDFW, ODFW and the Renewal Corporation no later than three (3) months prior to the start of pre-drawdown activities (VES Checklist).

3.1.1 Pre-construction VES Surveys

The Renewal Corporation will notify ODFW no later than seven (7) days prior to the start of any construction or other potentially disturbing work activities in WPT habitat areas (see Appendix A – Figure 1). An ODFW biologist is expected to perform VES surveys of the immediate work zone and adjacent work areas prior to in-water work activities. "VES surveys" means surveys completed using the VES Checklist. VES surveys will consist of visual observations for potential dens, burrows, or WPT in the Oregon Terrestrial and Wildlife Management Plan Boundary. If a WPT is observed during a VES survey, an ODFW biologist will be expected to capture and relocate the individual, as deemed appropriate by ODFW, in accordance with the VES Checklist.

3.1.2 J.C. Boyle Reservoir Drawdown VES Surveys

During the J.C. Boyle reservoir drawdown, an ODFW biologist is expected to conduct VES surveys for stranded or otherwise affected WPT in the areas identified as WPT habitat in Appendix A – Figure 1. Upon discovery of WPT, an ODFW biologist will be expected to capture and relocate the individual, as deemed appropriate by ODFW, in accordance with the VES Checklist.

3.1.3 J.C. Boyle Post Drawdown VES Surveys

Promptly upon completion of the J.C. Boyle reservoir drawdown, an ODFW biologist is expected to conduct VES surveys for stranded or otherwise affected WPT in the J.C. Boyle Reservoir area. The ODFW biologist is expected to conduct such surveys by foot and/or unmanned aerial vehicle in accordance with the VES Checklist. The survey area will include suitable WPT nesting areas within 500 meters of the reservoir shoreline, as shown in Appendix A – Figure 1. The definition of suitable nesting habitats will be based on topographic considerations and other relevant factors as described in the VES Checklist. Upon discovery of WPT, an ODFW biologist will be expected to capture and relocate the individual, as deemed appropriate by ODFW, in accordance with the VES Checklist.

3.1.4 Rescue and Relocation plan

ODFW is expected to relocate individuals captured prior to construction, during reservoir drawdown and following reservoir drawdown in accordance with the VES Checklist to previously identified WPT habitat on public land outside of the Oregon Terrestrial and Wildlife Management Plan Boundary, as determined by ODFW. This relocation area may be subject to management by ODFW. WPT may be subject to a temporary holding zone as deemed appropriate by ODFW. Upon capture, and prior to being relocated, the ODFW biologist is expected to collect and record biological data for the captured individual. The specifics of the biological information to be collected will include the information set forth in Section 4.2.1 and will be further defined in the VES Checklist.

3.2 Amphibian and Reptile Management Measures

3.2.1 VES Surveys

Prior to the start of any work activities that require the use of heavy equipment, the Renewal Corporation will conduct a VES survey for non-listed reptiles and amphibians in the relevant construction area. The Renewal Corporation may, if requested by ODFW, be supported by a qualified ODFW biologist or trained staff during VES surveys for non-listed reptiles and amphibians in the Oregon Terrestrial and Wildlife Management Plan Boundary. Construction personnel will be trained on avoidance and minimization measures during the mandatory biological resources awareness training described in Section 2.1.

3.2.2 Rescue and Relocation

If the Renewal Corporation observes native non-listed reptiles or amphibians in the Oregon Terrestrial and Wildlife Management Plan Boundary during a VES survey or during construction activities, the reptile or amphibian will be avoided and encouraged to leave the area on their own volition. If the amphibian or reptile is not capable of leaving the work area of its own volition or does not promptly leave the work area, an ODFW biologist (if there is one on-site) or the Renewal Corporation will attempt to relocate the individual outside the work area, to the extent practicable. In addition, the Renewal Corporation will implement the management measures for entrapment prevention and exclusion in accordance with Section 3.8. Avoidance, rescue, relocation, entrapment prevention and exclusion measures will be undertaken in coordination with construction activities to avoid delays to construction. The Renewal Corporation will have no obligation to relocate reptiles or amphibians that are non-native and/or invasive.

3.3 Nesting Birds – Management Measures

Previous surveys of the Oregon Terrestrial and Wildlife Management Plan Boundary have identified nesting bird utilization (AECOM 2019; 2020), as described in Appendix C. During these surveys, species identified included great blue heron (*Ardea herodias*), cliff swallow (*Petrochelidon pyrrhonota*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos),* and willow flycatcher (*Empidonax traillii*). Proposed Action work activities may affect these species. To avoid and minimize these impacts, the Renewal Corporation will implement the following management measures with respect to all nesting birds during the Proposed Action work activities. See the Bald and Golden Eagle Management Plan for additional management measures for bald eagles and golden eagles. Additional provisions for the cliff swallow, willow flycatcher and northern spotted owl are described below.

3.3.1 VES Surveys

A DB or a trained member of the construction crew under the guidance of a DB will conduct VES surveys for native nesting birds if tree removal and/or material vegetation clearing activities will occur during the primary nesting period of April 1-August 31. For purposes of the Oregon Terrestrial and Wildlife Management Plan, clearing activity does not include activities related to invasive exotic vegetation (IEV) management. The VES surveys will focus on identifying active and inactive nests as well as potential nesting habitats located within areas where construction and/or restoration crews will remove trees or clear vegetation. The VES surveys will determine if any nesting birds may potentially be affected by the tree removal and/or vegetation clearing activities.

To maximize visual survey coverage, the VES surveys will consist of walking evenly spaced transects within the disturbance area. The boundaries of the disturbance area shall be determined by the DB based on the nature of the work, species of nesting birds, topography and habitat type. The Renewal Corporation will conduct these VES surveys in the morning after sunrise no more than one week prior to the tree removal and vegetation clearing. The Renewal Corporation will visually inspect brush, grassland, and canopy for nests and avian nesting behavior. Duration of the survey will be sufficient (in the professional judgment of the surveyor) to ensure coverage of the area to be surveyed. If the Renewal Corporation observes a nest during the nesting period, subsequent VES surveys may occur prior to construction to monitor the nest for activity or to further determine its status (e.g., eggs have hatched, nestlings present). A nest with eggs, chicks, or nestlings will be considered “active”.

3.3.2 Nesting Bird Disturbance Avoidance

To avoid disturbance to nesting birds, the Renewal Corporation will implement the following management measures, in each case to the extent practicable given, among other things, the construction schedule and nature of construction:

- The Renewal Corporation will limit material vegetation clearing to areas where maintenance activities are necessary or construction or restoration actions (i.e., ground disturbance) will occur based on 100 percent (%) design drawings.
- The Renewal Corporation will limit material vegetation clearing (other than willow cutting and harvesting) to September 1st to March 31st (i.e., outside the nesting season).
- The Renewal Corporation will limit willow cutting and harvesting to September 1st to January 31st.

- The Renewal Corporation will leave transmission/distribution poles with active osprey nests in place.
- With respect to transmission/distribution poles without active osprey nests in place, the Renewal Corporation will install nest deterrents or remove nesting platforms prior to osprey nesting season (March 1st – September 30th).
- If construction activities are expected to disturb an active nest identified during a VES survey, the Renewal Corporation will establish a set-back for construction actions.
- If it is not practicable to establish a set-back that will avoid disturbing the active nest, the Renewal Corporation will attempt to alter the timing of construction activity.
- If it is not practicable to either establish a set-back that will avoid disturbing the active nest or alter the timing of construction activity, a site superintendent or foreman trained and supported by a DB will observe active nests of special status species and species protected under the Migratory Bird Treaty Act (MBTA) during construction to determine if any nesting birds are exhibiting stress behaviors, including visual displays, human interactions, and other visual behavioral indicative of agitation *(Cornell Ornithology 2019).* If special status birds or species protected under the MBTA are exhibiting stress behaviors, the Renewal Corporation will promptly contact ODFW and discuss a potential resolution that will not delay construction.

In certain circumstances, tree removal and/or material vegetation clearing may occur during nesting season (e.g., unanticipated construction activities due to schedule changes, vegetation re-grew during the growing season or removal of vegetation to remediate fish passage barriers). If so, the Renewal Corporation will conduct a VES survey prior to tree removal and/or vegetation clearing as required under Section 3.3.1 and follow the avoidance measures described above to limit impacts on active nests.

During the drawdown and restoration phases, the Renewal Corporation may, to the extent permissible under applicable law, remove nests that are deemed inactive. The purpose of removing inactive nests is to decrease the likelihood that nesting birds will return or reuse nests located in trees or vegetation scheduled to be removed or cleared.

If an active nest is observed in an area that needs to be cleared to facilitate construction and the avoidance measures described above are not practical (e.g., it is not feasible to delay construction), the Renewal Corporation will promptly inform ODFW and discuss a potential resolution that will not delay construction.

Specific avoidance measures for cliff swallows, northern spotted owl and willow flycatcher are described below.

3.3.2.1 Cliff Swallow

The J.C. Boyle dam crest facilities have known, or the potential for, cliff swallow nests. The DB will survey these facilities between October of Year 1 and February of Year 2 (i.e., non-nesting season) prior to the removal of the J.C. Boyle dam crest facilities and remove all unoccupied nests from structures that are scheduled to be modified or removed. The purpose of removing the nests is to decrease the likelihood that cliff swallows will return or reuse nests in the structures that are scheduled to be modified or removed.

3.3.2.2 Willow Flycatcher

Pre-Drawdown and Drawdown Phases: Tree removal and vegetation clearing may occur in willow flycatcher habitat (see Appendix A – Figure 2) during the pre-drawdown and drawdown phases of the Proposed Action. Such clearing may be necessary for a number of reasons, including staging area accommodation, equipment storage, and road realignment. If tree removal or vegetation clearing is required in willow flycatcher habitat, the Renewal Corporation will follow the avoidance measures described in Section 3.3.2.

Restoration Phase: After Year 2, restoration activities may require the removal and/or clearing of a minimal amount of trees and vegetation suitable as willow flycatcher habitat. During the restoration phase, the Renewal Corporation will follow the avoidance measures described in Section 3.3.2, including avoiding removal of willow flycatcher suitable habitat (see Appendix A – Figure 2) during the willow flycatcher nesting season (June 1 – July 31), except as required for IEV management and fish passage barrier remediation.[1]

Because the restoration phase will extend several years, there may be newly established riparian vegetation that needs to be cleared to prevent volitional fish passage barriers from forming or to remove newly formed barriers to volitional fish passage. Because (1) newly established riparian patches would not likely provide habitat for willow flycatcher due to their early growth state, patch size, and overall lack of structural complexity and (2) the actions will be temporary and minimal in scale, VES surveys will not be conducted before removing newly established riparian vegetation.

If the Renewal Corporation documents an active willow flycatcher nest within an active construction disturbance area or a willow flycatcher pair nesting within the Oregon Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will follow the avoidance disturbance actions described above in Section 3.3.2. The Renewal Corporation will coordinate with ODFW personnel for guidance, as necessary.

3.4 Northern Spotted Owl

There is United States Fish and Wildlife Service (USFWS)-designated northern spotted owl critical habitat within one mile of the J.C. Boyle Dam (USFWS 2012). The J.C. Boyle powerhouse access road realignment and construction-related vegetation clearing activities will be implemented in compliance with the USFWS's Biological Opinion.

If northern spotted owls are observed within the Oregon Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will determine, in coordination with ODFW and USFWS, the best management measures, which may include disturbance buffers and

[1] These dates were established in consultation with CDFW.

avoidance of key areas. Such measures will be coordinated so as not to unduly interfere with the dam removal construction and restoration schedule.

3.5 Gray Wolf

While Gray wolves do not, to the Renewal Corporation's knowledge, currently rendezvous or den in the Oregon Terrestrial and Wildlife Management Plan Boundary; previous observations have documented wolves in the surrounding counties. The Renewal Corporation will contact the ODFW staff identified in Appendix B - Agency Contacts prior to construction activities to determine if there is potential wolf activity in the area where construction will occur. During Proposed Action work activities, ODFW is expected to provide the Renewal Corporation with all relevant information regarding gray wolves' status. If the Renewal Corporation observes any gray wolves within one mile of the Oregon Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will immediately contact ODFW.

If gray wolves, rendezvous sites, or denning sites are observed within the Oregon Terrestrial and Wildlife Management Plan Boundary, the Renewal Corporation will determine, in coordination with ODFW's wolf biologist, the best management measures, which may include reduced driving speeds, signage on haul roads, limited operating periods, disturbance buffers, and avoidance of key areas. Such measures will be coordinated so as not to unduly interfere with the dam removal construction and restoration schedule.

3.6 Bats

The Renewal Corporation conducted bat occupancy surveys at facilities impacted by the Proposed Action. During these surveys, surveyors assessed potential bat roosting features (e.g., buildings, bridges, trees) for bat utilization. A total of three structures were confirmed to have evidence of bat use and/or bat roosting, as shown in Table 3-3, Appendix A – Figure 3.

Table 3-3. Bat Roosting Locations

PROJECT FEATURE	STRUCTURE	HABITAT FEATURES AND ENTRY POINTS
J.C. Boyle	Spillway Control Center Building and Fire Protection Building	Cavities in the interior of the building; crevices behind the roof fascia and under corrugated metal siding; and entry gaps at eaves, roof, and ridge cap.
	Staging area trees	Snag pine with cavity; crevices in exfoliating bark in snag pine and potentially beneath exfoliating bark and snag pine; and canopy that is potential spring/summer/fall habitat for obligate, tree-roosting bat species.
	Office/Red Barn	Unknown due to access constraints.

As described below, the Renewal Corporation's management measures include seasonal considerations with respect to structure removal, visual surveys prior to structure and tree removal, phased removal, barricading remaining structures to exclude bats, and building replacement habitat, all as described below.

The Renewal Corporation will implement structure removal activities with consideration of seasonal bat behavior. This will minimize potential impacts to bats in their maternity state, bat pups, and hibernating bats. The following time periods represent the preferred dates for structure removal:

- March 1 to April 15 and
- September 1 to October 15 (SWRCB 2020a).

If bat-containing building removal cannot occur during these time periods, removal will occur at such other time as is determined in consultation with ODFW.

Prior to structure and tree removal construction activities, the Renewal Corporation's DB will conduct visual surveys at the appropriate time of day or night for bats or signs of recent use to determine if the facility and/or tree removal is subject to the time period restrictions set forth above.

If the Renewal Corporation detects bats in a fabricated structure, removal will occur in two phases.

> **Phase 1:** Construction crew will remove windows and doors from the structure to alter the temperature, ambient light, and natural airflow. Construction crew may also remove a limited portion of the roof and siding/walls of the structure, as necessary. The structure will then be left undisturbed overnight to allow bats to vacate. If warranted, the Renewal Corporation will install acoustic disrupter units and/or high-intensity LED floodlights to repel bats. To the extent practicable, the removal activity referenced above shall take place in the evening to minimize the likelihood that bats are flushed from the structure during daylight hours. Prior to implementation, the Renewal Corporation will coordinate with the ODFW regarding the partial removal and bat exclusion activities described in this paragraph.
>
> **Phase 2:** Construction crew will perform the final demolition of the structure within ten (10) days.

Likewise, if the Renewal Corporation detects bats in trees designated for removal, construction crew will remove these trees in two phases. Construction crew will remove tree branches in the initial phase. The tree will then be left undisturbed overnight to allow bats to vacate the tree. Construction crew will fell the tree on the following day. An alternative phased tree removal method involves allowing a felled tree to remain in place for 24-hours prior to chipping or removal. Construction crew will carry out one of these phased tree removal methods when practicable. To the extent practicable, branch and tree removal shall take place in the evening to minimize the likelihood that bats are flushed from the tree during daylight hours.

Structures that will remain intact include portal outlets, tunnels, and other water conveyance structures. These structures will be permanently closed and barricaded with concrete rubble, earth fill, and/or steel plates. To the extent practicable, the Renewal Corporation will attempt to evict all bats from the remaining structure prior to barricading them.

Finally, the Renewal Corporation has concluded that the Proposed Action will not have an adverse impact on native bat species within the Oregon Terrestrial and Wildlife Management Plan Boundary, given the abundance of natural habitat. Nonetheless, in recognition that the Proposed Action will result in the loss of some artificial habitat currently found within structures that will be fully or partially demolished in connection with the Proposed Action, the Renewal Corporation will install (as a discretionary enhancement measure) bat boxes and/or condos, pursuant to subsequent agreement with state and federal agencies. The Renewal Corporation expects the bat boxes and/or condos to be provided and installed at least three months prior to full or partial structure demolition.

3.7 Other Special Status Species

3.7.1 Wildlife

Special status species that were not identified during the pre-construction wildlife monitoring but have the potential to occur in the Oregon Terrestrial and Wildlife Management Plan Boundary include the foothill yellow-legged frog (*Rana boylii*) and Oregon spotted frog (*Rana pretiosa*) (AECOM 2019; 2020). The conservation status of these special status frogs is set forth below in Table 3-4. While the Renewal Corporation will not perform any formal surveys for these species, observations of these species during VES surveys for WPT and other species will be noted and reported by the Renewal Corporation to the Commission, USFWS, ODEQ and ODFW in its monthly status reports (Section 4.1). If a foothill yellow-legged frog or an Oregon spotted frog is observed in or near a construction area during a VES survey, the Renewal Corporation will determine, in coordination with ODFW, the best management measures to minimize impact on the species. If ODFW recommends that individuals be relocated, such relocations will be conducted pursuant to the guidelines developed in coordination with ODFW.

Table 3-4. Special Status Wildlife Species' Conservation Status

COMMON NAME	SCIENTIFIC NAME	OREGON CONSERVATION STATUS[1]
Foothill yellow legged frog[2]	*Rana boylii*	S2 – Imperiled
Oregon spotted frog	*Rana pretiosa*	S1 – Critically imperiled
[1]Conservation status as reported by NatureServe Explorer (NatureServe 2021)		

[2] The foothill yellow-legged frog's status is under review for possible listing as threatened or endangered under the federal Endangered Species Act.

3.7.2 Plants

The Renewal Corporation commissioned special status plant species surveys in and around the Oregon Terrestrial and Wildlife Management Plan Boundary in 2018 and 2019 (AECOM 2019; 2020) as described in Appendix C. Surveyors did not identify any federally or state-listed plant species during these surveys. The special status plants identified during the 2018 and 2019 plant species surveys are set forth below in Table 3-5. Known occurrences of special status plant populations will be avoided to the extent practicable.

Table 3-5. Special Status Plants' Conservation Status

COMMON NAME	SCIENTIFIC NAME	OREGON CONSERVATION STATUS[1]
Bristly sedge	*Carex comosa*	S1 – Critically imperiled
Serpentine sunflower	*Helianthus bolanderi*	S2 - Imperiled
Red-root yampa	*Perideridia erythrorhiza*	S2 - Imperiled
Strapleaf willow	*Salix ligulifolia*	S3 – Vulnerable
[1]Conservation status as reported by NatureServe Explorer (NatureServe 2021)		

3.8 Entrapment Prevention and Exclusion

The Renewal Corporation will fence construction areas such as trenches or pipes that could entrap small mammals, large mammals, amphibians or reptiles, when feasible. The Renewal Corporation will implement additional exclusion fencing or other appropriate measures determined by the Renewal Corporation in consultation with ODFW to be necessary to reduce the likelihood that special status species access construction work areas within the Oregon Terrestrial and Wildlife Management Plan Boundary. The Renewal Corporation will make daily observations of the fenced construction areas for any entrapped species.

In addition, construction crews will either cover or place escape ramps in any material open hole or trench left open overnight. The escape ramps can be in the form of a 2" x 6" board. All constructed holes and trenches that are open will be inspected daily for entrapped wildlife throughout the construction period and prior to fill. Any wildlife discovered will first be allowed to escape voluntarily. If an entrapped individual will not voluntarily escape, the Renewal Corporation will use its best professional judgment in removing and relocating the entrapped individual.

3.9 Herbicide Application

The Renewal Corporation may apply herbicides approved by BLM, EPA and the Oregon Department of Pesticide Regulation to control the spread of IEV in the Oregon Terrestrial and Wildlife Management Plan Boundary, as needed. The Renewal Corporation will comply with all requirements set forth in both the USFWS and National Marine Fisheries Service Biological Opinions regarding the application of herbicides and will apply all BLM, EPA and the Oregon Department of Pesticide Regulation approved herbicides according to labeling directions. The Reservoir Area Management Plan identifies the management measures related to herbicide application that will be undertaken by the Renewal Corporation to avoid impacts to special status species. Please see Appendix C of the Reservoir Area Management Plan for a list of the BMPs related to Herbicide Application that will be implemented by the Renewal Corporation.

3.10 Wetland Buffer

Non-dam removal construction activities (e.g., staging areas, temporary spoils and construction trailer sites) may occur near wetland habitats. The Renewal Corporation will review construction designs and delineated wetland locations within the Oregon Terrestrial and Wildlife Management Plan Boundary to determine if any temporary construction sites are near existing non-reservoir dependent wetlands, see Appendix A – Figure 4. If temporary construction sites are near non-reservoir dependent wetlands, the Renewal Corporation will establish wetland buffers that meet all applicable legal requirements prior to the start of construction activities. Independent of the legal requirements, the wetland buffer established by the Renewal Corporation will be a minimum of 20 feet in order to minimize unnecessary impacts to wetlands. The Renewal Corporation will demarcate the wetland buffer with flagging or fencing, as needed.

4.0 Reporting

The Renewal Corporation will report the activities outlined in the Oregon Terrestrial and Wildlife Management Plan as described below. In addition, the Renewal Corporation will promptly notify USFWS if it observes a species listed under the Endangered Species Act of 1973 within the Oregon Terrestrial and Wildlife Management Plan Boundary. The Renewal Corporation will also promptly notify ODFW and USFWS if it finds an injured special status species that needs to be transported to an appropriate wildlife rehabilitation center for care.

4.1 Monthly Reports

The Renewal Corporation will provide monthly status reports to the Commission, USFWS, ODEQ and ODFW no later than ten (10) days after the end of each month. Monthly reports will be provided during Year 1, Year 2, and Year 3. Reporting after Year 3 will only occur for months in which the management measures identified by the Oregon Terrestrial and Wildlife Management Plan are required in connection with construction activities that have the potential to disturb the special status species listed in the Oregon Terrestrial and Wildlife Management Plan.

Monthly status reports will include a summary of the following:

1. WPT VES survey methods, conditions and results, including WPT observations, weather conditions during surveys, frequency, and duration of survey efforts, actions taken to rescue/relocate WPT (including the number of WPT relocated and which relocation area they were released at) and data collected on handled individuals as identified in Section 3.1.4. This will be in addition to the WPT reporting described in Section 4.2.1.
2. Avian nesting VES survey methods, conditions and results, including weather conditions during surveys, survey efforts, duration of surveys, any active or inactive nests encountered, any ODFW coordination to date and measures implemented.
3. Bat visual survey results, including weather conditions during surveys, measures taken to exclude bats from facilities prior to removal and removal activities.
4. Special status species observations made during VES surveys.
5. Location of wetland buffers established pursuant to Section 3.10.
6. Crew training completed since the last monthly status report.

4.2 Annual Reporting

The Renewal Corporation will provide annual status reports by April 1 of every year to the USFWS, ODEQ and ODFW, detailing the application of management measures, construction status, and agency consultation. The Renewal Corporation will prepare annual reports beginning Year 1 and ending the year that license surrender is effective.

The Renewal Corporation shall prepare and submit to ODEQ an Annual Compliance Report by April 1 for the preceding year that presents the results of mitigation efforts undertaken pursuant to the WPT Rescue and Relocation Plan in accordance with Condition 11(e) of the section 401 water quality certification.

4.2.1 Western Pond Turtle Reporting

The Renewal Corporation will cooperate with ODFW in its preparation of the final WPT compliance report. This report will contain a list of all activities that took place in connection with pre-construction, drawdown and post-drawdown VES surveys for WPT, including the following information:

- Survey timing (which covers multiple life stages),
- Survey frequency,
- Survey locations,
- Relocation areas with suitable habitat,
- Survey methodology,
- All individuals handled during rescue and relocation,
- Location, date, time, and duration of the handling,
- Enumeration of species handled,
- Identification of individual life stage and health,
- Identification of capture personnel,
- Stream, transport, and receiving water temperatures, and
- Location, date, and time of release.

ODFW will provide the Renewal Corporation with a copy of the final WPT compliance report within 30 days of Proposed Action completion. Once received from ODFW, the Renewal Corporation will promptly review and submit the final WPT compliance report to the Commission, ODEQ and USFWS.

5.0 References

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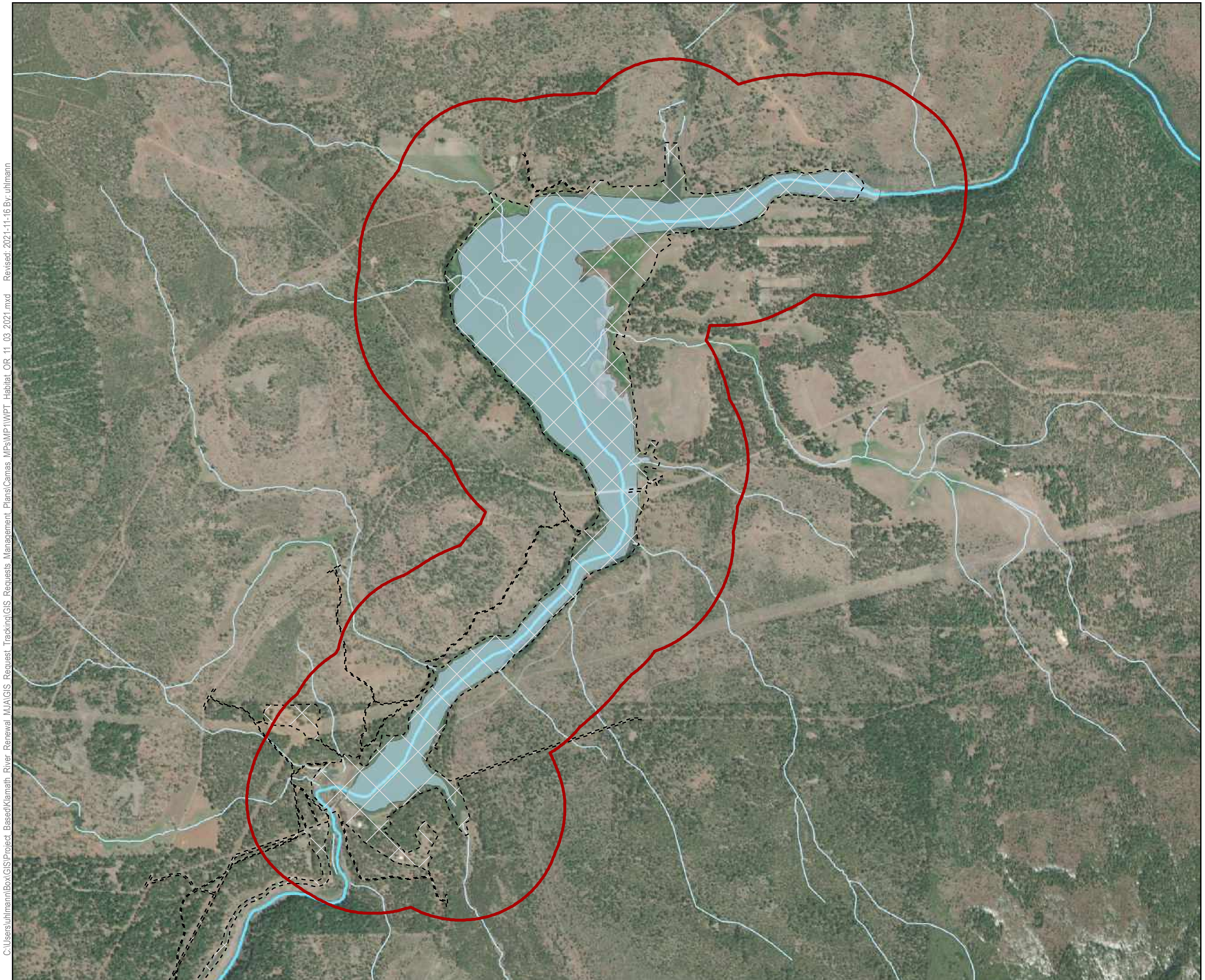
Appendix A

Figures



KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey in Oregon

November, 2021

JC Boyle Dam

(At original document size of 11x17)
1:19,910

N

0 0.25 0.5 Miles

PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

Survey prior to construction activity
Limits of Work
Reservoir Area
Streams
Klamath River

Notes
1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*
2. *Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Pond Turtle Habitat: Pacificorp and EDAW; Limot of Work: 90% Design Draft (6/19/20) Knight Piesold*
3. *Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

Sheet 1 of 2

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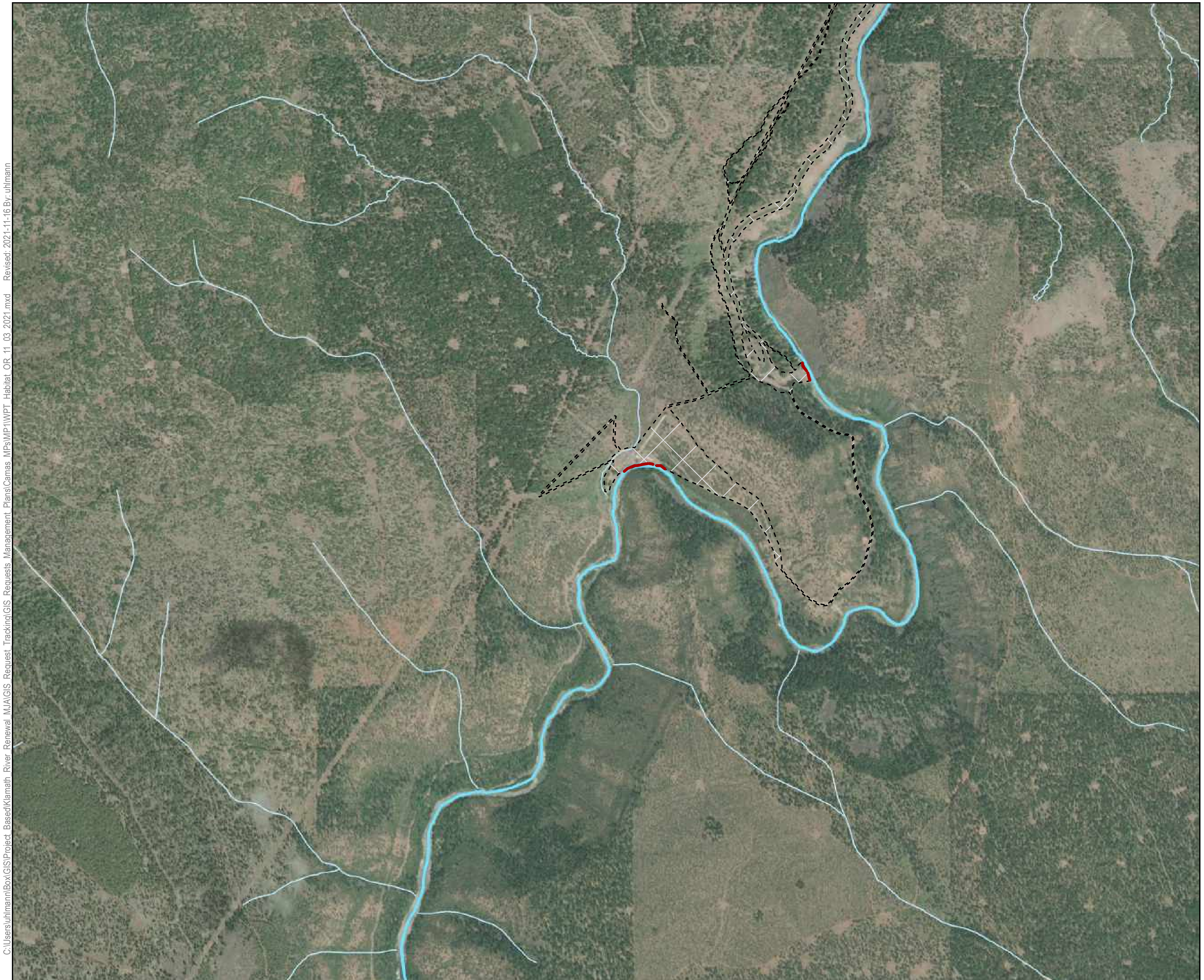

Lower Klamath Project

Figure 1. Western Pond Turtle Pre-construction Survey in Oregon

November, 2021

Kalamath River

(At original document size of 11x17)
1:19,910

N

0 0.25 0.5 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Survey prior to construction activity
Limits of Work
Streams
Klamath River

Notes

1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*
2. *Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Pond Turtle Habitat: Pacificorp and EDAW; Limot of Work: 90% Design Draft (6/19/20) Knight Piesold*
3. *Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 2. Willow Flycatcher Habitat

JC Boyle

February, 2021

N

(At original document size of 11x17) 1:22,270

0 0.25 0.5 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Limits of Work

Willow Flycatcher Habitat

Access Routes

Reservoir Area

Klamath River

Streams

Notes

1. Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US

2. Data Sources: Limits of Work: Knight Piesold 100 Design Draft; Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html
National Hydrography Dataset; Willow Fly Catcher: CDM Smith Field-collected Survey Data; Access Routes: AECOM.

3. Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. McMillen Jacobs Associates has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. McMillen Jacobs Associates assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

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KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 3. Structures with Potential Bat Roosts, Oregon

January, 2021

(At original document size of 11x17)
1:3,620

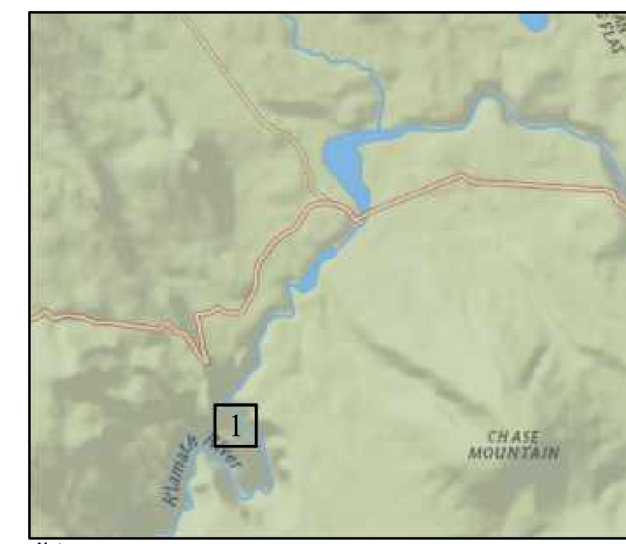
N

0 0.1 Miles

PRELIMINARY DESIGN (NOT FOR CONSTRUCTION)

Structures with Potential Bat Roosts

- 1 Spillway Control Center Building
- Limits of Work
- Klamath River



Notes
1. *Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere*
2. *Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Bat Roosts: Shannon Leonard AECOM 2019; Access Routes: AECOM; Limits of Work; Knight Piesold 90 Design Draft*
3. *Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

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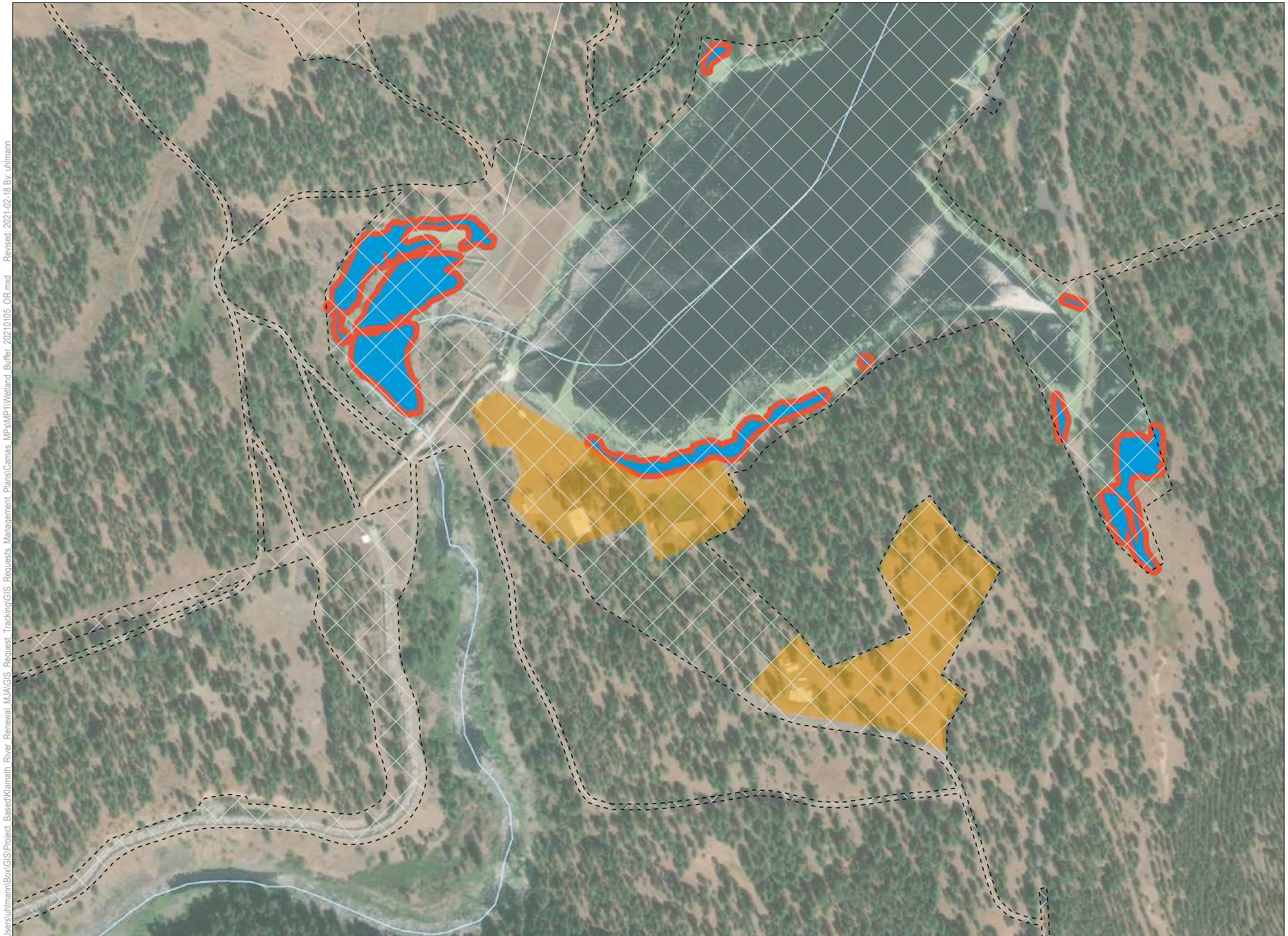


KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project

Figure 4. Wetland Buffers

JC Boyle

February, 2021

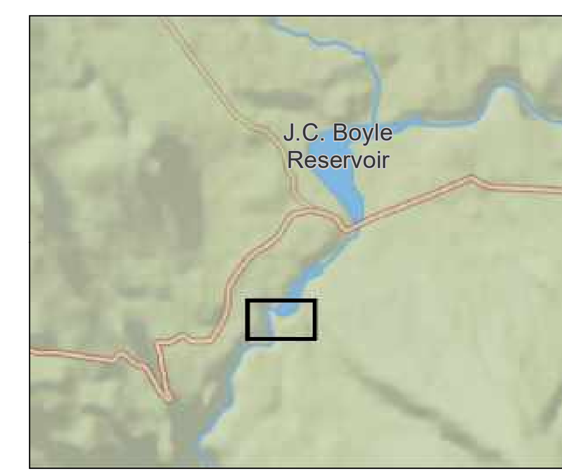
N

(At original document size of 11x17)
1:3,820

0 200 400 600 Feet

PRELIMINARY DESIGN
(NOT FOR CONSTRUCTION)

- Wetlands
- 20 ft buffer
- Staging Areas
- Limits of Work
- Klamath River



Notes

1. *Coordinate System: NAD 1983 2011 StatePlane California I FIPS 0401 Ft US*
2. *Data Sources: Klamath River Hydrology: Developed by AECOM with https://nhd.usgs.gov/NHD_High_Resolution.html National Hydrography Dataset; Wetlands: JonesJM@cdmsmith.com, field survey data May 2019; Staging and Limits of Work: Knight Piesold 100 Design Draft.*
3. *Background: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community National Geographic, Esri, Garmin, HERE, UNEP-WCMC, USGS, NASA, ESA, METI, NRCAN, GEBCO, NOAA, increment P Corp.*

Appendix B

Agency Contacts

Western Pond Turtle

Oregon Department of Fish and Wildlife: [NAME][EMAIL][PHONE]

Willow Flycatcher

Oregon Department of Fish and Wildlife: [NAME][EMAIL][PHONE]

Non-special Status Nesting Birds

Oregon Department of Fish and Wildlife: [NAME][EMAIL][PHONE]

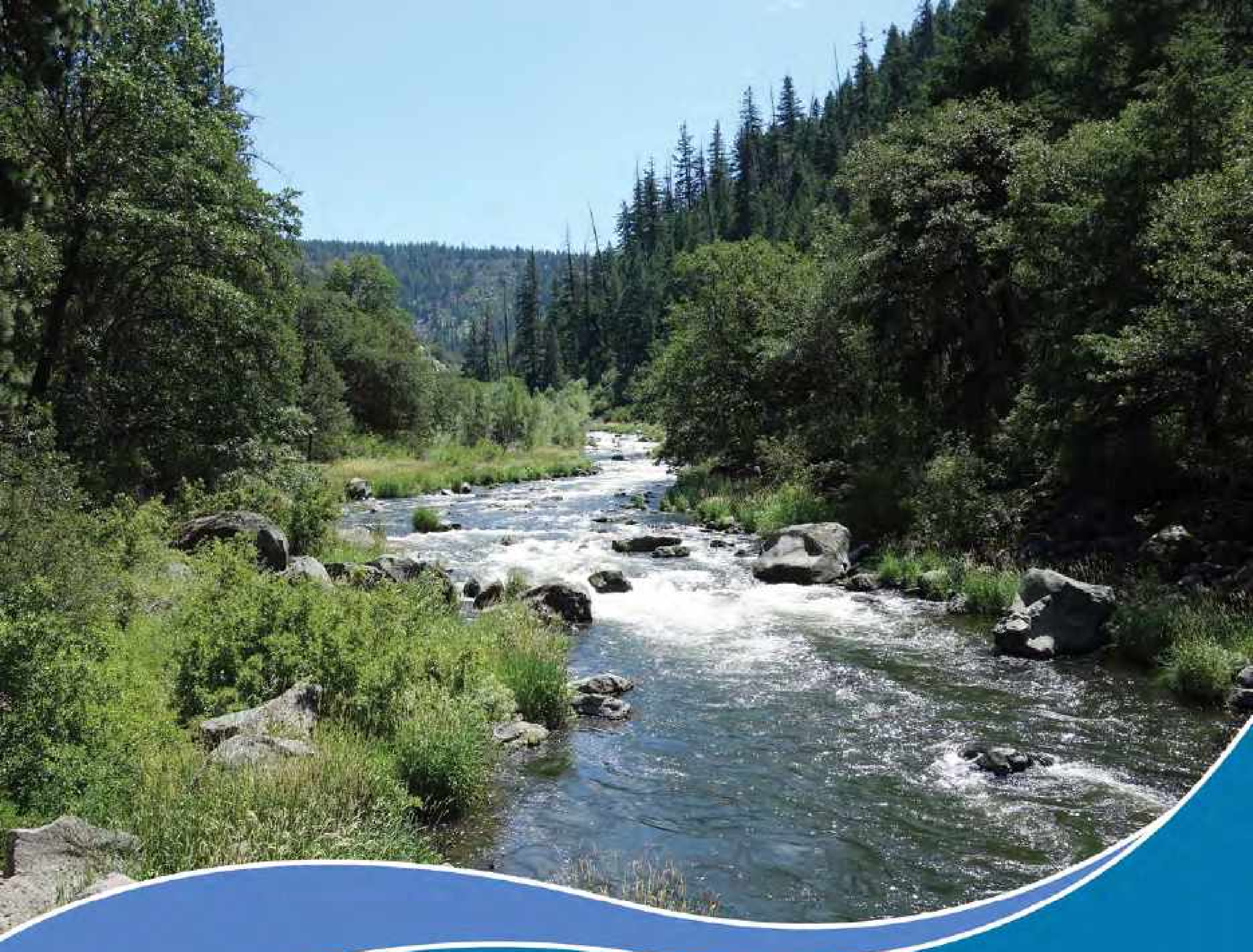
Gray Wolf

Oregon Department of Fish and Wildlife: Klamath Office, [EMAIL],

(541) 883-5732

Appendix C

Terrestrial Resources Technical Report



Klamath River Renewal Project

2018 Annual Terrestrial Resources Survey Report

April 2019

KLAMATH RIVER RENEWAL CORPORATION

Prepared for:

Klamath River Renewal Corporation

Prepared by:

KRRC Technical Representative:

AECOM Technical Services, Inc.
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Oakland, CA 94612

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1220 SW Morrison Street, Suite 200
Portland, OR 97205

KLAMATH RIVER RENEWAL CORPORATION

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Acronyms and Abbreviations

BLM	Bureau of Land Management
Cal-IPC	California Invasive Plant Council
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CE	California Endangered
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COTO	Corynorhinus townsendii (Townsend's big-eared bat)
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
°F	degrees Fahrenheit
FE	Federal Endangered
FSC	Federal Species of Concern
GNR	Global not reported
GPS	Global Positioning System
IEV	invasive exotic vegetation
IPaC	USFWS Information for Planning and Consultation database
KCBC	Klamath County Board of Commissioners
KNF	Klamath National Forest
KRRC	Klamath River Renewal Corporation
MYYU	Myotis yumanensis (Yuma myotis)
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
NSO	Northern Spotted Owl
OC	Candidate listing by Oregon Department of Agriculture
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ONHP	Oregon Natural Heritage Program
ORBIC	Oregon Biodiversity Information Center
Project	Klamath River Renewal Project
SDA	Siskiyou Department of Agriculture
SNR	State not reported
USBR	United States Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

Chapter 1 Introduction

1. INTRODUCTION

This report summarizes the terrestrial resources surveys conducted in 2018 for the Klamath River Renewal Project (Project). The Klamath River Renewal Corporation (KRRC) and its consultants carried out field investigations to collect existing condition information on the following terrestrial resources:

- Special-status wildlife
- Northern spotted owl
- Bald and golden eagles
- Bats
- Western pond turtle
- Special-status plants
- Vegetation communities
- Invasive exotic vegetation

1.1 Purpose of the Terrestrial Resources Surveys

The KRRC and project stakeholders require information on the existing condition of terrestrial resources to inform the ongoing Project design and regulatory permit processes, as described in previous studies and regulatory compliance documents, including the 2012 Environmental Impact Statement/Environmental Impact Report (EIS/EIR) (USBR and CDFW 2012) and the Joint Preliminary Biological Opinion (NMFS and USFWS 2012). As described in the Definite Plan, Appendix J (KRRC 2018), the KRRC has incorporated terrestrial resources surveys and avoidance and minimization measures into the Project as Terrestrial Resources Measures. These measures include the 2018 surveys described in this annual report. This report provides the findings of the surveys, along with conclusions based on an analysis of the information collected with regard to its suitability for informing the design and meeting regulatory requirements.

1.2 Study Area

This report describes the methods followed during field investigations for each resource listed above, which were based on survey work plans developed in close coordination with federal and state resource agencies, including the United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and Oregon Department of Fish and Wildlife (ODFW). Unless otherwise noted, surveys were conducted by KRRC biologists within a specific buffer around the limits of work (hereinafter referred to as study areas) for each resource. The KRRC developed these study areas in cooperation with the resource agencies listed above during development of the survey work plans (Appendix J of the Definite Plan [KRRC 2018]). Each of the following sections of this report focuses on a different terrestrial resource; the study area for each resource is described in the corresponding section. The limits of work (or Project area) include the dams and structures to be removed, the disposal sites, the haul and access roads that may undergo improvements, and the reservoirs, and are defined in the Definite Plan (KRRC 2018). The limits of work represent the physical extent of on-the-ground construction activities, including demolition, removal, and restoration activities proposed as a part of this Project, as well as the extent of the J.C. Boyle Reservoir, Iron Gate Reservoir, and Copco Lake (see Figure 5.1-1 of the Definite Plan [KRRC 2018]). The 0.25-mile buffer shown in the overall Project map (Figure 1-1, Appendix A) represents the study area applied to general wildlife surveys and vegetation community surveys, as detailed in Sections 2 and 8, respectively. Surveys for osprey, northern spotted owl, eagles, and bats used different study areas, which are described in their respective sections and specified in related figures.

Figures cited in the text of this report are provided in Appendix A.

Chapter 2 Special-Status Wildlife

2. SPECIAL-STATUS WILDLIFE

The KRRC identified special-status wildlife species with potential to occur in or near the Project area from a variety of sources. PacifiCorp identified several special-status wildlife species as occurring in or near the Project area (PacifiCorp 2004), and the United States Bureau of Reclamation and CDFW compiled this in the 2012 EIS/EIR (USBR and CDFW 2012). The KRRC also obtained information on the occurrences of special-status wildlife from USFWS, CDFW, ODFW, the Bureau of Land Management (BLM), and the United States Forest Service (USFS) from sources that include the Oregon Biodiversity Information Center (ORBIC), the California Natural Diversity Database (CNDDB), and the USFWS Information for Planning and Consultation (IPaC) database. Special-status wildlife species that were considered during survey planning included those that are federal and/or state threatened, endangered, proposed, or candidate species, California Species of Special Concern, Oregon Natural Heritage Program (ONHP) List 1 and 2 species, and Oregon Sensitive species. BLM and USFS Sensitive Species, Assessment Species, Tracking Species, and Survey and Manage species were also considered, where BLM and USFS lands occur in the study area; however, not all of these species trigger a regulatory concern.

Most of the special-status species are birds; some are year-round residents while others are migratory, using the study area either for nesting or for overwintering. In addition, a small number of special-status invertebrate, amphibian, reptile, and mammal species have the potential to occur in or near the Project area. A comprehensive list of special-status species with potential to occur in or near the Project area is provided in Appendix J of the definite plan (KRRC 2018); this document focuses more narrowly on presenting the results of 2018 field surveys.

The primary objective of the 2018 surveys for special-status wildlife was to collect baseline information on the species using the study area and on the habitats present that have potential to support special-status wildlife. This information is needed to identify potential impacts on species and/or habitats from Project activities, identify federal and state permit requirements, and develop measures needed to avoid or minimize potential impacts on species and habitats. The KRRC applied a 0.25-mile buffer around the Project area to generate the study area for the special -status wildlife surveys. The rationale for this study area is described in more detail in Section 2.1. Based on input from USFWS, CDFW, and ODFW, the KRRC did not conduct focused surveys requiring trapping or other invasive methods, with the exception of surveys for western pond turtle (see Section 6). Rather, field surveys focused on identifying suitable habitats for these species, to determine whether and to what extent suitable habitat exists in the study area and where it may be modified, affected, or destroyed by Project activities.

Northern spotted owls, bald eagles, golden eagles, bats, western pond turtle, and special-status plants are discussed in separate sections of this document.

2.1 Methods

KRRC biologists conducted general wildlife surveys from May 14 through 24 and June 11 through 15, 2018. Biologists established transects to cover the 0.25-mile study area described in Section 1.2. The KRRC developed the 0.25-mile study area in cooperation with the resource agencies during development of the survey work plans, which are provided in Appendix J of the Definite Plan (KRRC 2018). Biologists walked the length of each transect, recording all wildlife observations, including direct visual and auditory observations, scat, and other signs of presence. Field teams recorded wildlife behaviors, particularly breeding activity. In addition to land-based transects, biologists surveyed reservoir shorelines and open water by boat to record observations of aquatic and semi-aquatic species (e.g., western pond turtle, waterfowl, etc.). Biologists noted all special-status species seen or heard, and their approximate number, location, and behavior (e.g., roosting, loafing, foraging, courtship, mating, incubating eggs, or feeding young).

The following special-status species received additional focus:

- Osprey (Pandion haliaetus): There are several osprey nest platforms within 0.25 mile of the limits of work that may be removed or disturbed during construction. Biologists surveyed all nest platforms, transmission line towers, and reservoir and river shorelines within a slightly larger 0.75-mile study area for osprey nests.
- Willow flycatcher (Empidonax traillii): Because willow flycatcher is a California endangered species, its habitat is protected. Biologists noted and mapped willow flycatcher habitat during wildlife and vegetation surveys.
- Nesting great blue heron (Ardea herodias): Nesting bird colonies are protected under California and Oregon state laws. Biologists visually surveyed the study area for great blue heron colonies during wildlife surveys.
- Peregrine falcon (Falco peregrinus): Peregrine falcons may use the same nest for multiple years, and these nest sites are protected under state laws. Biologists visually surveyed the study area for nesting peregrine falcon during wildlife surveys.
- Greater sandhill crane (Grus canadensis tabida): Sandhill crane is a California threatened species, and nest sites are protected. Biologists visually surveyed the study area for nesting sandhill crane during wildlife surveys.
- Tricolored blackbird (Agelaius tricolor): Tricolored blackbird is a California threatened species, and nesting colonies are protected. Biologists visually surveyed the study area for tricolored blackbird colonies during wildlife surveys.

2.2 Findings

Biologists observed a total of 32 special-status wildlife species in the study area during the special-status wildlife surveys conducted in May and June 2018 (Table 2-1). For the purposes of this report, species observations were organized in association with the three Project reservoirs closest to the observation (i.e., if a species was observed in a tributary to the Iron Gate Reservoir, it was grouped with other species observed in the vicinity of the Iron Gate Reservoir). Some species were found at all three reservoirs, while others were only observed at one or two reservoirs. Of the 33 special-status wildlife species observed, there were 3 reptile species, 29 bird species, and 1 mammal species.

Table 2-1: Special-Status Species Observed in the Study Area during 2018 Surveys

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Reptiles			
Western Pond Turtle Actinemys marmorata	Observed throughout reservoir shorelines; noted in Mirror Cove and near Camp and Jenny Creeks. Observed in Jenny Creek near the Copco Road bridge.	Observed throughout reservoir shorelines, typically within coves.	Observed throughout reservoir shorelines; occurring in higher numbers at the southernmost portion of the reservoir on top of the boom near the dam.
Northern Sagebrush Lizard Sceloporus graciosus	Observed throughout the reservoir area. Noted near the fish hatchery, Long Gulch Cove shoreline, Jenny Creek shorelines, and recreational areas.	Observed throughout the reservoir area, particularly on dry, rocky slopes. Noted in rocky areas to the east of Fall Creek.	Observed throughout the reservoir area on dry, rocky slopes. Noted in the dam spillway area.
California Mountain Kingsnake Lampropeltis zonata			Observed on a rocky outcrop below the dam.
Birds			
Bufflehead Bucephala albeola	Observed throughout reservoir in mixed rafts with other waterfowl.	Observed throughout the reservoir in mixed rafts with other waterfowl.	Observed in the northern portion of reservoir.
Mountain Quail Oreotyx pictus		Observed throughout the reservoir area; a large covey was observed just east of Beaver Creek cove.	Observed throughout the reservoir area; noted along the utility line corridor west of the canal and at the Topsy Campground near the Highway 66 bridge.
Vaux's Swift Chaetura vauxi			Observed flying over the eastern shore of the reservoir.
Greater Sandhill Crane Grus canadensis tabida			Active nest observed on the northwestern shore of reservoir; adults also heard calling from the emergent wetlands along the northeastern shore.
Caspian Tern Sterna caspia	Observed throughout the reservoir, flying overhead and foraging.	Observed throughout the reservoir, flying overhead and foraging.	Observed throughout the reservoir, flying overhead and foraging.
Forster's Tern Sterna forsteri		Observed throughout the reservoir.	Observed in the southern portions of the reservoir.

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Common Loon Gavia immer		Observed throughout the reservoir; noted in Keaton Cove.	
Double-crested Cormorant Phalacrocorax auritus	Observed throughout the reservoir; noted in Long Gulch Cove, Camp Creek, and on the boom near the dam.	Observed throughout the reservoir; most often flying overhead or foraging/resting in the northern coves.	Observed throughout the reservoir; noted along the northeastern shore, and on the boom near the dam.
American White Pelican Pelecanus erthorhynchos	Observed throughout the reservoir; noted in Mirror Cove, Juniper Point, and the upstream extent of the reservoir, as well as on the boom near the dam.	Observed throughout the reservoir; noted near the dam and in Keaton Cove.	Observed throughout the reservoir; noted in the vicinity of the Highway 66 bridge and on the boom near the dam.
Great Blue Heron Ardea herodias	Observed throughout the reservoir; noted in Mirror Cove, Jenny Creek, and Bogus Creek.	Observed throughout the reservoir area; noted perching atop the canyon along the Copco Bypass Reach. Active nesting colony observed in the riparian area near the Copco No. 2 penstock.	Observed throughout the reservoir area; noted near Spencer Creek, along the northeastern shore, and near Topsy Campground.
Great Egret Casmerodius albius	Observed along the Klamath River immediately downstream of the fish hatchery.	Observed throughout the reservoir area.	
Osprey Pandion haliaetus	Observed throughout the reservoir. Several active nests observed on platforms atop utility poles.	Observed throughout the reservoir. Several active nests observed on platforms atop utility poles.	Observed throughout the reservoir. Several active nests observed on platforms atop utility poles.
Golden Eagle Aquila chrysaetos	A pair observed along the southern shoreline of the upstream extent of the reservoir.	Observed perched on a slope above the northern shoreline of the reservoir. A pair was also observed near a northern cove; one bathing in the shallow water.	
Northern Harrier Circus hudsonius	Observed along the northern shoreline in the northeast portion of the reservoir and just downstream of the dam.		
Cooper's Hawk Accipiter cooperii	Observed along the northern shoreline of the reservoir. A potential nest was observed near the confluence of Camp and Dutch Creek.	Observed throughout the reservoir area; noted in the forested seep area along the northern shoreline of the reservoir.	Observed throughout the reservoir; noted on the southeastern side of the reservoir in the dense mixed woodlands just north of the dam spillway.
Bald Eagle Haliaeetus leucocephalus	Observed throughout the reservoir area; noted flying over Long Gulch Cove, along the southeastern side of reservoir, and near the dam.	Observed throughout the reservoir area; noted flying overhead near Keaton Cove.	Observed throughout the reservoir area; most frequently observed flying overhead or perched in pines in the vicinity of the Highway 66 bridge.
Lewis Woodpecker Melanerpes lewis	Observed throughout the reservoir area; noted at the fish hatchery.	Observed throughout the reservoir area; noted along the northern shoreline at Beaver Creek cove.	Observed along the eastern shoreline of the reservoir.

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Acorn Woodpecker Melanerpes formicivorus	Observed along the eastern shoreline of the reservoir, southwest of Horseshoe Ranch Wildlife Area, and near the fish hatchery.	Observed throughout the reservoir area in relatively dense oak and mixed forests.	
Pileated Woodpecker Drycopus pileatus			Observed throughout the reservoir area in densely forested habitats.
American Peregrine Falcon Falco peregrinus anatum	An active nest was observed on the northeastern side of the reservoir in a rocky outcrop above Copco Road.		An active nest was reported by BLM on a cliff along the eastern side of the Klamath River Canyon, less than 1 mile southeast of the end of the canal.
Olive-sided Flycatcher Contopus cooperi		Observed in riparian woodlands along the northern shoreline, particularly at Beaver Creek cove.	Observed throughout the reservoir area.
Willow Flycatcher Empidonax traillii	Observed in willow riparian habitat at Jenny Creek near the confluence with the reservoir.	Observed in reservoir fringe willow habitat at the confluence of Beaver Creek.	
Purple Martin Progne subis	Observed on a utility pole just west of reservoir; possibly nesting there.	Nesting activity observed in a cavity in a utility pole near the intersection of Copco Road and dam access road. Also observed nesting in a utility pole along the Copco No. 2 bypass reach.	
Bank Swallow Riparia riparia		One individual observed among a group of tree and cliff swallows near the dam.	
Black-capped Chickadee Parus atricapillus			Observed throughout the reservoir area.
Pygmy Nuthatch Sitta pygmaea	Observed in a few locations around the reservoir, including in the woodland south of Jenny Creek.	Observed throughout the reservoir area, including in forested areas near the dam and near the upstream extent of the reservoir.	Observed throughout the reservoir area in ponderosa pine forests.
Yellow-breasted Chat Icteria virens	Observed in a northern cove of the reservoir near Camp Creek and Horseshoe Ranch Wildlife Area. Also observed near the fish hatchery.	Observed in riparian habitats throughout the reservoir, mostly along the southern shoreline east of Keaton Cove. Also observed along Fall Creek.	Observed in dense riparian areas; noted near the proposed staging area in the southeastern corner of the reservoir.
Tricolored Blackbird Agelaius tricolor	One individual observed just downstream of the Copco No. 2 powerhouse along the north bank of the River.		
Yellow Warbler Dendroica petechial	Observed throughout the reservoir area near tributaries including Brush Creek, Camp Creek, and Jenny Creek, and at the fish hatchery.	Observed throughout the reservoir area, typically in riparian woodlands and the hillside seep area.	Observed throughout the reservoir area; noted nesting in the willow riparian area near the dam spillway.

Species	Iron Gate Reservoir Area	Copco Lake Area	J.C. Boyle Reservoir Area
Mammals			
Western Gray Squirrel *Sciurus griseus*	Observed in densely forested habitats associated with tributaries to the reservoir.	Observed in densely forested habitats; noted near the falls at Fall Creek, along the northern shoreline in the seep area, and along the southern shoreline near Ager Beswick Road.	Observed throughout the reservoir in forested stands with dense canopies, including near the disposal area. An individual and a nest were observed in the staging area just east of the dam.

Note:

BLM = Bureau of Land Management

2.2.1 Osprey

KRRC biologists observed osprey throughout the study area for osprey (i.e., within 0.75 mile of the limits of work; see Figures 2-1 through 2-4), and found a total of 17 active osprey nests. Active nests were those with adults and/or chicks observed at the nest. Biologists also observed several inactive nests. All nests were on utility poles, typically but not always on platforms installed on the pole to provide for osprey nesting.

Biologists observed three active osprey nests in the vicinity of the Iron Gate Reservoir (Figures 2-1 and 2-2). Of these, one was on a utility pole in the staging area west of the Iron Gate Dam (Photograph 2-1); one was on a utility pole along the western side of the Iron Gate Reservoir; and one was on a utility pole along Copco Road where it turns north at the upstream end of the Iron Gate Reservoir. In addition, biologists observed four active osprey nests along the Klamath River downstream of Iron Gate Dam (excluding the one described above near the dam itself). These four nests were on utility poles along Copco Road between Iron Gate Dam and Interstate 5 (Figure 2-1).

Photograph 2-1: Active Osprey Nest on a Utility Pole in the Staging Area West of the Iron Gate Dam

Biologists observed a total of five active nests in the vicinity of Copco Lake (Figure 2-3). Of these, one was on a utility pole in the parking area for the Copco No. 1 powerhouse and a second was on a utility pole along the eastern side of the Copco No. 1 Reservoir, directly upslope from the Copco No. 1 Dam. The three other active nests are atop utility poles along Copco Road along the northern side of Copco Lake. Biologists observed one inactive osprey nest atop a utility pole upslope from the Copco No. 2 Dam on the southern side of the river.

Biologists observed a total of five active osprey nests in the vicinity of the J.C. Boyle Reservoir (Figure 2-4). Of these, one nest was on a utility pole along the Klamath River just south of the J.C. Boyle Dam, and two others were atop utility poles along the southern end of the J.C. Boyle Reservoir east of the dam. Biologists observed an additional inactive nest on a utility pole in that vicinity. Biologists observed an active nest along the southeastern side of the J.C. Boyle Reservoir and an active nest atop a utility pole in the proposed J.C. Boyle disposal site.

2.2.2 Willow Flycatcher

Biologists observed a single willow flycatcher at two locations: in willow riparian habitat at the confluence of Jenny Creek and Iron Gate Reservoir (Figure 3-1) and along the northern shoreline of Copco Lake just south of the confluence with Beaver Creek (Figure 3-2). Willow flycatcher nesting habitat typically consists of dense riparian vegetation (e.g., Geyer and Shining willow thickets), with foraging taking place in these areas or in other riparian habitats (e.g., bigleaf maple or Oregon ash groves). The locations of these willow flycatcher habitat types are shown on Figures 3-1 through 3-3. Biologists found these habitats along the shoreline of Iron Gate Reservoir, most notably at the larger stream confluences (e.g., Scotch Creek, Camp/Dutch Creek, and Jenny Creek). Biologists also noted patches of willows along the shoreline of Copco Lake, particularly at the confluences with Beaver Creek, Raymond Gulch, and at Mallard Cove. In addition, willow flycatcher habitat is present along Fall Creek. Suitable habitat is also present just below the J.C. Boyle Dam and patches of willows occur along portions of the J.C. Boyle power canal.

2.2.3 Nesting Great Blue Heron

During helicopter surveys for eagles (see Section 4) biologists observed a great blue heron colony along the Klamath River in the Copco No. 2 bypass reach (Figure 4-1). Biologists noted at least 12 nests during the helicopter survey, and herons were heard vocalizing in this area by ground crews. This colony is located in riparian habitat approximately 100 feet north of the Copco No. 2 penstock (Photograph 2-2).

Photograph 2-2: Active Great Blue Heron Colony near the Copco No. 2 Penstock

2.2.4 Peregrine Falcon

Biologists observed a peregrine falcon nest in a rocky outcrop north of Iron Gate Reservoir, east of Jenny Creek (Figure 4-1). A second peregrine falcon nest is known by BLM to be located on a cliff along the eastern side of the Klamath River canyon below J.C. Boyle (Hayner 2018) (Figure 4-2). BLM also provided the general location of a prairie falcon (Falco mexicanus) nest approximately 1 mile upstream, also along the eastern side of the canyon (Hayner 2018). Although prairie falcon is not a sensitive species in Oregon, it is protected along with nearly all other bird species under the Migratory Bird Treaty Act, and nest disturbance must be avoided.

2.2.5 Sandhill Crane

KRRC biologists observed an active sandhill crane nest along the northwestern shore of the J.C. Boyle Reservoir (Figure 4-3). In May 2018, the nest was occupied by two adults brooding three eggs. Biologists also heard sandhill cranes vocalizing from the dense bulrush habitat along the northeastern shore of the J.C. Boyle Reservoir, where the cranes were likely nesting.

2.2.6 Tricolored Blackbird

The KRRC biologists did not observe tricolored blackbird colonies in the study area. However, in June 2018, biologists observed a flock of 25 tricolored blackbirds in an agricultural field along the Yreka-Ager Road, approximately 12 miles southwest of the Iron Gate Dam. In addition, biologists observed a single male tricolored blackbird in June 2018 among a flock of red-winged blackbirds in the bulrush habitat near the confluence of Fall Creek and the Klamath River, within the limits of work along Daggett Road.

2.3 Conclusions

KRRC biologists observed several special-status wildlife species in the study area during 2018 surveys, as listed in Table 2-1. Of the 33 special-status species observed, three were reptiles, 29 were birds, and one was mammalian.

Biologists observed 15 active osprey nests in the osprey study area (i.e., within 0.75 mile of proposed limits of work) (Figures 2-1 through 2-4). This number is consistent with previous PacifiCorp surveys that noted 16 active nests in the hydroelectric reach (PacifiCorp 2004). All osprey nests were on utility poles or towers, typically on platforms installed for that purpose. These osprey nests have the potential to be disturbed during proposed construction activities. Biologists will evaluate each nest site to determine the potential for disturbance; relocation or removal of some nests and nesting platforms may be needed. During the 2019 breeding season, additional nest surveys will be conducted to confirm the locations of active nests, collect additional information to determine the potential for nest disturbance during construction, and develop a plan for nest removal, exclusion, or relocation and monitoring activities.

KRRC biologists observed willow flycatchers on two occasions during the 2018 surveys. Both detections were of individual birds in willow riparian habitat. Biologists observed suitable willow flycatcher habitat most often around the Iron Gate Reservoir, but also along Copco Lake (Figures 3-1 and 3-2). Habitat was primarily associated with the confluences of larger streams, but patches of willow thickets were also found along reservoir shorelines away from streams or other apparent surface water sources. Some proposed Project activities overlap with these locations, such as bridge improvements and reservoir drawdown. As construction plans are developed, avoidance and minimization measures will be developed, if necessary. Wetland investigations in 2019 will focus on mapping and quantifying suitable willow flycatcher habitat along with other wetland habitats (e.g., tule/bulrush communities).

KRRC biologists observed several other special-status bird species during the 2018 surveys, and many are assumed to be breeding in the study area. During 2019 surveys, biologists will confirm specific nest sites and further evaluate them for potential impacts from Project activities, including:

- Great blue heron colony near the Copco No. 2 penstock – potential for disturbance from demolition activities
- Peregrine falcon nest above Iron Gate Reservoir near Copco Road – potential for disturbance from truck traffic and hauling activities
- Peregrine and prairie falcon nests in the Klamath River Canyon – potential for disturbance from demolition of J.C. Boyle power canal and/or powerhouse

KRRC biologists will continue to coordinate with CDFW, ODFW, and USFWS to obtain any new information on special-status wildlife use of the study area. One such species is the gray wolf (Canis lupus). Gray wolves may occur transiently in the study area. In Oregon, the Rogue pack uses the Wood River Valley more than 10 miles northeast of Upper Klamath Lake (ODFW 2017). In California, the only currently known gray wolf pack is the Lassen Pack, which inhabits portions of Lassen and Plumas counties to the southeast of the study area (CDFW 2018a).

Chapter 3 Northern Spotted Owl

3. NORTHERN SPOTTED OWL

Northern spotted owl (NSO) (Strix occidentalis), a federally threatened species, has the potential to occur in or near the Project area. If an NSO activity center (i.e., an area of concentrated activity of either a pair of NSO or a single territorial NSO) is located within established disturbance distances from proposed construction activities, there could be an adverse effect, such as nest abandonment. Based on USFWS guidelines, established disturbance distances are as follows: 1 mile from blasting (e.g., at the dams), 0.5 mile from helicopter use (e.g., at the reservoirs during restoration work), and 0.25 mile from heavy equipment use, rock crushing, and hauling (USFWS 2006).

The 2012 Joint Preliminary Biological Opinion included several measures specifically addressing potential effects on NSO (measures NSO 1 through 4) (NMFS and USFWS 2012). These measures included protocol-level surveys to identify any NSO activity centers (including any nesting sites) that are near proposed construction and disposal areas, to avoid or minimize the potential for disturbance during NSO nesting, roosting, or foraging activities. The KRRC developed the NSO survey plan in coordination with USFWS to outline protocol surveys to be conducted during the 2018 breeding season, as described below.

3.1 Methods

Based on a desktop evaluation and field reconnaissance conducted in 2017 with USFWS, the KRRC determined that NSO protocol surveys would focus on suitable habitat around J.C. Boyle Dam and associated facilities, the disposal site, and haul and access roads. Facilities associated with Copco No. 1 Dam, Copco No. 2 Dam, and Iron Gate Dam and associated reservoirs were not included based on the lack of suitable habitat for NSO. Because the Project is not anticipated to result in modification of NSO habitat, the KRRC conducted protocol surveys for noise-only disturbance following the 2012 USFWS NSO Survey Protocol (USFWS 2012).

Biologists confirmed calling routes and stations in the field to achieve complete coverage of all habitat in the survey area, allowing biologists to hear responding owls within the entire survey area. The spacing of calling stations was determined by the topography and acoustical characteristics of the area (e.g., background noise such as creeks); stations were spaced between 0.25 and 0.5 mile apart. Eighteen calling stations were initially identified, as shown on Figures 5-1 and 5-2. One calling station (Number 2) was subsequently determined to be on inaccessible private property and was therefore eliminated from the survey route.

During the 2018 breeding season, KRRC biologists conducted six NSO protocol surveys at eighteen calling stations. Field teams conducted visits in April, May, June, July (two visits), and August 2018. As required by the 2012 USFWS NSO Survey Protocol, teams of two, led by a biologist with experience conducting NSO protocol surveys, conducted all surveys. Beginning in June, field teams conducted calling at an additional location near the J.C. Boyle forebay at the end of the power canal. The new location is along the west access road, approximately 800 feet north of the junction with the east access road. The lead biologist (as defined in the USFWS protocol) recommended calling at this location due to the presence of large conifers on the slope up toward the west from the access road.

Field teams initiated NSO surveys approximately one-half hour following sunset, and recorded weather conditions, including wind, precipitation, cloud cover, and moon phase. Surveys were not conducted under inclement weather, including rain, heavy fog, or high (> 12-mile-per-hour) winds. At each calling station, field teams used a calling device to broadcast NSO calls. Calls were broadcast for approximately 1 minute, and then biologists listened for responses for approximately 1 minute, alternating this for a total of 10 minutes at each station. Following the calling session at each station, field teams used high-intensity flashlights to briefly scan nearby trees for the presence of owls. Teams noted observations of other wildlife, including visual observations and vocalizations. Field teams also noted noises from the river or other sources (e.g., vehicles on nearby roads).

3.2 Findings

Field teams did not note any calling responses or visual identifications of NSO during the 2018 NSO protocol surveys. Biologists heard and saw great horned owls during several visits, and one follow-up daytime stand search confirmed the presence of a great horned owl fledgling in the vicinity of an NSO calling station. Field data sheets are provided in Appendix B.

3.3 Conclusions

Field teams did not detect northern spotted owls, NSO nests, or activity centers during the 2018 NSO surveys. KRRC biologists conducted surveys consistent with the 2012 USFWS NSO Survey Protocol (USFWS 2012), with six visits spaced out over the 2018 breeding season.

USFWS has the authority to determine whether additional follow up surveys are warranted in 2019. Based on the findings of the 2018 surveys, the KRRC does not propose additional NSO surveys for the Project. If the proposed construction locations are changed in such a way that suitable habitat would be modified, or if additional information on the presence of NSO in the study area is obtained, additional NSO surveys may be warranted in 2019.

Chapter 4 Eagles

4. EAGLES

Bald eagles (Haliaeetus leucocephalus) and golden eagles (Aquila chrysaetos) are protected under the Bald and Golden Eagle Protection Act (16 Code of Federal Regulations 668) and the Migratory Bird Treaty Act (16 United States Code §§ 701-12), and are fully protected under California law. Bald eagles are listed as Endangered under the California Endangered Species Act but are not listed in the State of Oregon. The Upper Klamath Basin provides suitable habitat for and is known to support bald eagle and golden eagle populations.

The 2012 EIS/EIR (USBR and CDFW 2012) describes measures to reduce Project impacts on bald and golden eagles. The objective of the eagle surveys was to identify, document, and confirm eagle presence and eagle use of areas that may be directly or indirectly disturbed by Project construction.

4.1 Existing Information

4.1.1 Bald Eagle

The upper Klamath Basin provides extensive bald eagle nesting and foraging habitat and supports the largest wintering population of bald eagles in the coterminous United States (Shuford et al. 2004). In some years, as many as 117 bald eagle pairs nest and 1,100 individuals winter in the Klamath Basin (PacifiCorp 2004). Shorelines provide a rough approximation of bald eagle habitat extent as they breed, forage, and roost near water (Isaacs and Anthony 2011). Bald eagles often nest in large trees with a line of sight to water; however, nests have also been documented on rocky outcrops, on the ground, on cliffs, and on artificial structures such as power poles (USFWS 2007). Bald eagles often use the same nests for multiple years, and nesting sites are known to exist in the vicinity of the Project area.

The Oregon Cooperative Fish and Wildlife Research Unit conducted bald eagle nest surveys in the Klamath River area on March 27, 2002, and May 29, 2002 (PacifiCorp 2004). Surveyors recorded six known nests within a 10-mile buffer of the Project area, with distances to the nearest facility ranging from approximately 0.7 mile to 7.1 miles (two near J.C. Boyle Reservoir, three near the J.C. Boyle peaking reach, and one near Copco Lake). Aerial surveys conducted in 2003 found another nest approximately 540 feet southeast of Copco No. 1 Dam.

PacifiCorp (2004) documented additional bald eagle observations at the Iron Gate Reservoir, Copco Lake, and J.C. Boyle Reservoir, and at other locations along the middle and lower Klamath River. Targeted avian surveys recorded at least 37 individual sightings of bald eagles in flight, perched, or foraging in 2002, and numerous incidental sightings occurred during general wildlife surveys, facility surveys, and other field studies (PacifiCorp 2004). These data were used to establish the presence of historical nesting and foraging habitat throughout the limits of work and the surrounding area. By agency request, exact nesting locations were not published in the PacifiCorp 2004 report.

4.1.2 Golden Eagle

Golden eagles occur throughout northern California and Oregon, preferring open and semi-open habitats. Nesting habitat includes cliffs and trees large enough to support nest structures (e.g., pine juniper and oak trees). Foraging and nesting habitats occur throughout the vicinity of the Project area. Though natural densities for this species in southern Oregon and northern California are low, historical records indicate the presence of nesting activity on cliffs from the J.C. Boyle bypass reach to Iron Gate Reservoir (USBR and CDFW 2012). During PacifiCorp surveys, biologists observed golden eagles in several locations, including Copco Lake, Iron Gate Reservoir, and near J.C. Boyle powerhouse, but no nests were found (PacifiCorp 2004).

4.2 Methods

Prior to initiating field surveys, KRRC biologists reviewed existing databases (CNDDB and ORBIC) and reports on bald and golden eagles to locate historically known nests and territories. During 2017, the USFWS and the BLM provided an updated dataset of bald and golden eagle nests and territories that have been monitored in the region (Willy 2017 and Hayner 2017). In addition, the KRRC obtained data from previous aerial helicopter surveys conducted in the Klamath Basin by Frank Isaacs of the Oregon Eagle Foundation (Isaacs 2017; Willy 2017).

Biologists conducted a viewshed analysis to identify the potential impact area. Using ArcGIS (ESRI, Version 10.4.1), biologists generated visibility extents using a 30-foot resolution National Elevation Dataset topographic surface and observer points derived from the limits of work (see Survey Area section below).

In defining the study area for the eagle surveys, KRRC biologists considered the viewshed analysis and the nature, timing, and location of proposed construction activities. The study area included areas of high and low potential impact

- High-Impact Areas: High-impact areas include a 0.5-mile buffer surrounding the limits of work, as well as those access roads that are anticipated to have an increase in traffic and movement of heavy equipment. High-impact activities include proposed construction and demolition activities associated with the decommissioning of the dams and facilities and creation of disposal sites.
- Low-Impact Areas: Low-impact areas include a 2-mile buffer surrounding the limits of work, excluding the extent of each reservoir where minimal or no work will occur.

The study area encompassed the extent of the viewshed in these high- and low-impact areas and represents the portion of the habitat that may be affected by Project activities. In the 2018 surveys, biologists also opportunistically surveyed beyond the study area boundaries to account for the wide-ranging nature of the eagle species and to gain a general understanding of eagle use and occupancy in the study area.

Biologists conducted concurrent bald and golden eagle surveys. The surveys focused on areas with suitable nesting, roosting, or foraging habitat for bald and golden eagles, as well as known nest locations. The survey goals were to identify nest site locations, characterize baseline eagle nesting activity, and document other key habitat features. Field surveys employed a variety of techniques and multiple temporal windows to capture dynamic seasonal activity. All survey data were digitally recorded through Collector for ArcGIS, using iPads (Apple, Inc.), which preserve the location and survey time for each observation. The KRRC biologists conducted field reconnaissance surveys from July 24 to 26, 2017, and from November 6 to 8, 2017. Surveyors assessed habitats in the study area, noted bird activity, and attempted to locate all previously identified nests. Additionally, because the viewshed analysis considered bare earth topography (i.e., it did not account for existing vegetation), biologists used the reconnaissance surveys to ground-truth the results of the viewshed analysis to determine where trees further limited the viewshed. Biologists spent 1 day at each dam and associated facilities and reservoir.

The 2018 bald and golden eagle survey protocol was informed by the review of existing data, information obtained during the 2017 reconnaissance surveys, discussions with the wildlife agencies, and established protocols including:

- Bald Eagle Nest Survey and Reporting Guide: Reporting Observations at Nest Sites in Oregon (Isaacs 2009),
- Protocol for Evaluating Bald Eagle Habitat and Populations in California (Jackman and Jenkins 2004), and
- Interim Golden Eagle Inventory and Monitoring Protocols (Pagel et al. 2010).

Field teams collected data using a combination of ground-based and aerial surveys (via a helicopter). Field surveys emphasized microhabitats that could support nesting eagles (e.g., rocky cliffs for golden eagles and large conifers for bald eagles). Survey efforts included:

1. Two breeding season surveys (late January through July 2018).
    a. An initial nest search was conducted early in the breeding season (i.e., from January 29 to February 1, 2018) to determine occupancy. Two biologists conducted ground-based observations from vehicles and on foot, spending 1 day at each reservoir and corresponding dam. Surveys included observing historical nests and recording all eagle detections. For this early-breeding season survey, the survey area included all known golden eagle nests within 10 miles of the limits of work, and bald eagle nests within 2 miles. Survey distances were established in coordination with USFWS.
    b. Two teams of two biologists conducted a second survey from June 4 to 7, 2018, to observe eagle behavior and mid-season nesting activity, and to determine the number of active nests and nestlings in the survey area. One team conducted ground-based surveys, spending 1 day at each reservoir. The second team conducted aerial helicopter surveys for 2 days, covering all reservoirs, and a ground-based survey for 1 day. All historical and newly discovered nests and locations where eagle pairs or territorial behavior had been previously observed were revisited from the ground and helicopter.
2. To identify adult and sub-adult habitat use, one additional survey was conducted from August 20 to 22, 2018, after the young had fledged. Three teams of two biologists each conducted ground-based surveys.

4.3 Findings

Observations of bald and golden eagles are summarized in Table 4-1. Results are summarized by location, date, species, and age. The status of each nest site observed is summarized in Table 4-2, including the proximity of the nest to the Project area and noting whether the nest was determined to be active or inactive in 2018. The number of nestlings observed at active nests is summarized in Table 4-3 by species. Observations and behavioral notes not captured in the tables are noted in the following sections.

Reconnaissance Surveys 2017

- During the July 2017 survey, biologists located three of the four known nests within a 0.5-mile radius of the Project area (nests BE1-36, BE1-31, and BE1-32). Biologists observed one sub-adult bald eagle near nest BE1-36. This nest was presumed active for this year because substantial whitewash and prey remains (fish bones) were found under the nest. The other two nests did not exhibit conspicuous indications of activity; no whitewash, prey remains, or sub-adults were observed.

- During the November 2017 survey, biologists located one golden eagle nest and three bald eagle nests. Bald eagle nest BE1-36 contained abundant whitewash and there were prey remains at the nest site. The other two nests (BE1-31 and BE1-32) did not have signs of recent activity but were in good structural condition. The assumed golden eagle nest (GE4-206) was notably small and did not appear to be recently active. Biologists observed two nests that were not included in historical data and had the potential to be active eagle nests. Biologists attempted to view 14 historic nests that were either inaccessible or were not found.

January – February 2018

Eagle Activity

- Observers recorded approximately 50 eagles, including 30 bald eagles and 20 golden eagles; however, some may have been resightings of the same individuals. Both species of eagles appeared to prefer certain perches, and surveyors noted the use of these same perches during different survey times and dates.

- Common bald eagle behavior included:
  - perching on trees and utility poles close to and within sight of the reservoirs, with several adult bald eagle pairs perched together;.
  - soaring on thermals with other bald eagles and golden eagles, usually near the reservoirs but also over the Klamath River;
  - foraging in Iron Gate Reservoir; and
  - vocalizing from a perch at Copco Lake.

Table 4-1: Total Number of Eagle Observations by Site,[1] Survey, Species, and Age

Iron Gate Reservoir						
Survey Date	Golden Eagle Adults	Golden Eagle Sub-Adults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Sub-Adults	Bald Eagle Young of the Year
July 2017	0	0	0	0	0	0
November 2017	0	0	0	0	0	0
January – February 2018[2]	12	0	0	6	1	0
June 2018	8	0	2	18	5	0
August 2018	0	0	0	2	0	0
Total	**20**	**0**	**2**	**26**	**6**	**0**
Copco Lake						
Survey Date	Golden Eagle Adults	Golden Eagle Sub-Adults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Sub-Adults	Bald Eagle Young of the Year
July 2017	0	0	0	0	0	0
November 2017	1	0	0	1	2	0
January – February 2018[2]	8	0	0	6	10	0
June 2018	10	2	3	4	2	2
August 2018	0	0	4	5	0	1
Total	**19**	**2**	**7**	**16**	**13**	**3**
J.C. Boyle Reservoir						
Survey Date	Golden Eagle Adults	Golden Eagle Sub-Adults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Sub-Adults	Bald Eagle Young of the Year
July 2017	0	0	0	0	1	0
November 2017	1[3]	0	0	0	1	0
January – February 2018[2]	0	0	0	6	1	0
June 2018	1	0	1	6	2	5
August 2018	2	1	0	3	1	0
Total	4	1	1	15	6	5

Notes:

1 The number of eagles observed is influenced by the visibility at each site and should not be interpreted as relative abundance across sites. Visibility at J.C. Boyle Reservoir is poorer than at Copco Lake and Iron Gate Reservoir.

2 The number of eagles detected during the winter survey period is likely to include wintering and migratory individuals.

3 Species identification unconfirmed.

Table 4-2: Active and Inactive Bald and Golden Eagle Nests Observed in 2018 Field Surveys

Nest Name	Golden Eagle		Bald Eagle		Bald or Golden Eagle – Species not Confirmed
Nest Status in 2018	Active	Inactive	Active	Inactive	Inactive
Within 0.5 mile of Project area	1	0	1	3	2
Between 0.5 and 2 miles from Project area	2	3	0	3	0
Total Nests within 2 Miles	**3**	**3**	**1**	**6**	**2**
Outside of 2-mile buffer surrounding Project area, but within 0.5 mile of haul roads	2	0	3	0	0

Table 4-3: Number of Nestlings Observed at Each Active Nest in 2018

Nest Name	Golden Eagle Nestlings	Bald Eagle Nestlings
BE1-32	–	2
BE1-15	–	1
GE4-206	1	–
BE1-43	–	2
F_GE3	2	–
GE3-3	1	–
GE3-5	2	–
F_GE4	2	–
F_BE2 (outside of survey area)	–	2
Total Number of Nestlings	**8**	**7**

Notes:
BE = Bald eagle nest
GE = Golden eagle nest
F_GE = New golden eagle nest found during these 2017 – 2018 surveys, not included in historically active data
F_BE = New bald eagle nest found during these 2017 – 2018 surveys, not included in historically active data

- Golden eagle activity included:
  - perching on trees and cliffs that were not typically near or within sight of the reservoirs;
  - foraging on the ground;
  - soaring on thermals with other eagles;
  - flying in pairs; and
  - performing undulating flight behavior (i.e., breeding behavior).
- Biologists identified three potential golden eagle territories around Iron Gate Reservoir, one of which was in the 0.5-mile high-impact area. Territories were identified by observations of high levels of

golden eagle activity and/or undulating flight behavior, and observations of birds perching for long periods. At Iron Gate Reservoir, field teams identified two potential bald eagle territories, where they observed pairs of bald eagles perched. At Copco Lake, biologists identified two potential golden and bald eagle territories, based on high golden and bald eagle activity.

- Although biologists observed substantial eagle activity during the early 2018 surveys, it is difficult to determine how many of the observed birds represented resident birds, due to the potential presence of wintering and migratory birds.
- At J.C. Boyle Reservoir, there was notably less eagle activity observed than at the other two sites; however, this may have been due to low visibility at J.C. Boyle Reservoir, due to the high density of trees and limited road access. Biologists were unable to define areas of high eagle activity at J.C. Boyle Reservoir during the survey period.

Eagle Nests

- Biologists were unable to access 26 historically active nests due to poor visibility resulting from dense tree cover, limited access through private property, or poor road conditions. Observers were able to survey the area around 15 other historical nests, including six historically active nests. The conditions of the nests varied. Some appeared old and unused, while others appeared to have been recently active.
- At J.C. Boyle Reservoir, biologists found a pair of bald eagle adults less than 100 feet from the known nest BE1-15, which was visibly in good condition. Field teams found a sub-adult bald eagle perched near what was likely an active nest, BE1-36 (based on July 2017 survey information). In a few cases where a nest was likely active and could not be observed from a distance, biologists did not approach the nest, so as not to disturb the eagles. This occurred often at J.C. Boyle due to low visibility and dense tree cover. Figures 6-1 through 6-7 present the eagle nest survey results for the 2018 survey season.

June 2018

Eagle Activity

- With the exception of nestlings, some of the observations noted in Table 4-1 may have been resightings of the same eagle.
- Observed eagle activities were similar to those described above. More golden eagles were observed in the vicinity of the reservoirs during this survey than during previous surveys. Golden eagles also exhibited territorial behavior toward bald eagles and were observed vocalizing.
- Bald eagles exhibited territorial behavior toward other eagles and raptors. Most bald eagle observations were close to the reservoirs; however, there were some observations near the Klamath River or over ridgelines.

Eagle Nests

- At J.C. Boyle Reservoir, biologists observed three bald eagle nests and one golden eagle nest, with one to two chicks observed per nest. At both Copco Lake and Iron Gate Reservoir, biologists observed three active golden eagle nests, with one to two nestlings per nest.
- Biologists estimated golden eagle nestlings to be 5 to 8 weeks old, and bald eagle nestlings to be 8 to 11 weeks old at the time of the survey. Biologists often observed adults perched or flying near these nests and occasionally visiting the nests to feed nestlings. Field teams also found several inactive nests, as well as many potential alternate nests. One of the active golden eagle nests identified was not previously recorded as an active nest. Additionally, there were several historically active nests that no longer exist. This may be a result of the nest being abandoned, the nest structure falling, the tree or surrounding forest being disturbed or logged, or the effects of a wildfire.

August 2018

Due to several fires in the surrounding areas, conditions during the August 2018 surveys were smoky, and visibility became especially poor in the afternoon, making long-distance observations difficult.

Eagle Activity

- Biologists observed two young-of-the-year golden eagles flying over a nest that was classified as active during the June 2018 surveys (F_GE3). Additionally, field teams observed two young-of-the-year golden eagles flying over a new nest that was not found during previous surveys (F_GE4). This suggests that young-of-the-year golden eagles stayed near their territories following fledging for at least a few weeks and can be detected by post-fledging surveys.
- Biologists did not observe any young-of-the-year bald eagles near their nest territories during these surveys; however, one young-of-the-year bald eagle was observed begging food from an adult bald eagle, indicating that young-of-the-year bald eagles and their parents had moved farther from their nest territories to forage elsewhere at the time of the August 2018 surveys.

Eagle Nests

- Golden eagle nest (F_GE4) was located on a cliff face that was surveyed by helicopter in June 2018. The nest was apparently missed at that time, although an adult golden eagle was observed nearby. The nest structure was found during the ground-based survey in August 2018, and there were two fledged eaglets in close proximity.

4.4 Conclusions

Biologists observed a total of nine active nests surrounding Copco Lake, Iron Gate Reservoir, and J.C. Boyle Reservoir in 2018 (Table 4-2). Five of these were golden eagle nests and four were bald eagle nests. Of the nine active nests, seven were within 0.5 mile of the Project area or more than 2 miles from the Project area but within 0.5 mile of a haul road (high-impact areas), and two were between 0.5 mile and 2 miles from the Project area (low-impact area).

Additionally, biologists observed a total of nine inactive nests within 2 miles of the Project area (Table 4-2). It is not uncommon for eagles to suspend breeding in some years or use alternative nest sites (USFWS 2004); therefore, these inactive nests will continue to be surveyed in 2019.

Project activities (e.g., site preparation) are scheduled to begin in early 2020. Biologists will conduct three bald and golden eagle surveys in 2019 to determine nest occupancy, and to gather more information on baseline eagle activity immediately prior to construction. If the start of construction is delayed, this field schedule will be reevaluated.

Similar to the field surveys conducted in 2018, a synthesized field survey to encompass bald and golden eagle nesting habitat will include:

1. One courtship/early-breeding season survey between late January and late February. Biologists will conduct ground-based surveys on foot and in vehicles when eagles are most likely to be found near nest sites and displaying courtship behavior, to determine territory occupancy.

2. One mid-nesting season survey will be conducted between late April and early May. Biologists will conduct ground-based surveys on foot and in vehicles, and aerial surveys from a helicopter. This survey will be conducted at a time when the number and age of nestlings at each active nest, as determined from previous surveys, can be estimated.

3. One late-nesting season survey will be conducted between late June and early July. Biologists will conduct ground-based surveys on foot and in vehicles, and aerial surveys from a helicopter. This survey will be conducted at a time when the number of fledglings can be estimated, and behavior and habitat use following fledging can be observed.

Chapter 5 Bats

5. BATS

Based on a review of California and Oregon occurrence records, presence of suitable habitat, species range overlap, and previous survey results, eight bat species have potential to occur in the Project area. Yuma myotis have been previously documented at structures in the Project area (PacifiCorp 2004). Townsend's big-eared bat and Yuma myotis have been previously documented in the Klamath Basin outside of the Project area, in maternity roosts at Hoover Ranch and Salt Caves (approximately 6 miles east of Copco Lake and 9 miles downstream from the J.C. Boyle powerhouse) (Cross et al. 1998; PacifiCorp 2004).

Oregon and California state regulations provide protection for bats through general wildlife protection policies. TER-6 of the 2012 EIS/EIR (USBR and CDFW 2012) describes measures to reduce Project impacts on bats. The 2012 EIS/EIR recommended surveys to identify the locations of active bat roosts in facilities that may be affected by the dam removal. KRRC has incorporated this measure into the Project. Structures with the potential to support bats include all built structures in the Project area, bridges, and diversion tunnels. All of these features were included in the surveys.

5.1 Methods

The KRRC biologists conducted surveys for all bat species with potential to occur at Project structures. The objectives of the surveys were to identify which species occupy the habitat throughout the year, understand how the habitat is used throughout the year, and quantify habitat usage. A reconnaissance-level assessment was conducted from July 24 to 26, 2017. The KRRC planned a follow-up visit during the 2017 maternity season to conduct emergence surveys, but the survey was canceled due to lack of right-of-entry to PacifiCorp property for the specific survey task.

Biologists conducted four focused, seasonal bat surveys in 2018: one in late winter, two in summer, and one in fall. The 2018 seasonal bat roost surveys assessed habitat suitability and determined roosting activity at Project structures. Additionally, a biologist accompanied interior inspections of the Iron Gate and Copco diversion tunnels in February 2018.

During all surveys, KRRC biologists conducted daytime visual inspections of the interior and exterior of each facility proposed for removal or modification for indications of bat use (e.g., occupancy, guano, staining, smells, or sounds). Dead specimens were identified in the field using a dichotomous key. When live bats were found, species were identified visually to the extent possible, using night vision when needed to minimize disturbance. All surveys were conducted cautiously to avoid disturbing bats at potential roost sites. Because interior access to human-occupied houses was prohibited, those structures were assessed from the exterior only.

5.1.1 Winter 2018

On February 13 and 14, 2018, a KRRC biologist participated in inspections inside the Iron Gate and Copco diversion tunnels to assess the interior habitat features. Both tunnels were accessed by a small inflatable boat, and inspections were attended by one engineer and one safety/confined space entry specialist, in addition to the KRRC biologist.

On March 1, 2018, two KRRC biologists conducted interior and exterior inspections of structures at Copco No. 1 and Copco No. 2. These winter bat surveys were originally planned for late January/early February but were delayed and were ultimately limited to the Copco No. 1 and Copco No. 2 dams due to access constraints. Care was taken to target areas where guano and staining had been seen during the 2017 survey and to minimize the potential for disturbance of hibernating bats.

5.1.2 Summer 2018

A team of three KRRC biologists conducted surveys from May 14 through 18, 2018, and a team of four biologists conducted surveys from June 16 through 22, 2018. In addition to interior/exterior inspections, summer efforts included dusk emergence surveys and acoustic detection at structures known to house roosting bats, and at structures where suitable roosting habitat or sign was found but occupancy was uncertain based on previous surveys. Night vision was used during all emergence surveys, and an infrared camera was used to capture images of an emergence at the Copco No. 1 C-12 gatehouse. Points of egress were documented during all emergence surveys. Two iPads (Apple, Inc.) running Echo Meter Touch 2 Pro (Wildlife Acoustics) and one Dell laptop running Sonobat software (Version 4) with a Binary Acoustics ultrasonic microphone (Binary Acoustic Technology, LLC) were deployed during all emergence surveys. Field teams conducted emergence surveys when weather conditions were suitable for the evening emergence of bats (e.g., warm temperatures and minimal rain and wind).

In May, biologists placed drop cloths around significant roost locations and inspected them during the June visits to passively assess bat activity levels. Field teams installed long-term temperature and humidity data loggers in structures with significant roosts. Biologists discussed maintenance routines, bat observations, and previous bat management techniques with PacifiCorp staff. Bridges in the Project area that are scheduled for removal or modification were also inspected.

5.1.3 Fall 2018

Two KRRC biologists conducted surveys from October 29 through November 1, 2018, to support the development of the Project Bat Management Plan (currently in draft). The team inspected the interior and exterior of all buildings being used by bats, and other structures that may be removed and that provide suitable roosting habitat (such as buildings that contain suitable crevices and cavities without evidence of recent bat use, bridges, and trees). Previously installed temperature data loggers were checked for maintenance and continued operation. Detailed photographs and notes were taken at each structure to document specific locations for exclusion, and to record other structural characteristics such as roofing and other building construction materials.

5.2 Findings

Bat survey findings are summarized in Table 5-1. Summaries of the results from the winter, summer, and fall 2018 surveys follow the table. Bat roosts were confirmed in ten buildings at Copco No. 1 and Copco No. 2, the diversion tunnel at Copco No. 1, three buildings and the diversion tunnel at Iron Gate, and one building at J.C. Boyle (Figures 7-1 through 7-5). Photographs 5-1 through 5-5 depict the exterior view of some of the structures with large roosts. Photographs 5-6 and 5-7 show the interior conditions of the diversion tunnels.

Table 5-1: 2017-2018 Bat Findings

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Copco No. 1 and Copco No. 2						
Vacant House 1 (tan)	high	Yes	Yes – small numbers of bats present under exterior side panels in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House 2 (blue)	high	Yes	Yes – small numbers of bats present under exterior side panels in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House 3 (yellow-green)[2]	high	Yes	Yes – large colony in garage behind wood window framing and under rotting wood panels. Present in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House 4 (peach)	high	Yes	Yes – present between flashing and fascia board all around roof edge in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	None
Vacant House #21601 (light yellow)[2]	high	Yes	Yes – 200 to 300 bats roosting in attic in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, May and June 2018, October through November 2018	Temperature/humidity data logger installed.
C-11 Gatehouse (at Copco No. 1)	high	Yes	About 20 Myotis clustered in exposed roof apex (interior) in fall. Not found in summer. Not surveyed in winter.	MYYU (visual)	July 2017, June 2018, October through November 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
C-12 Gatehouse (at Copco No. 1) [2]	high	Yes	Yes – 2,000 to 3,000 bats present in summer. Several dozen present in fall. Not surveyed in winter.	MYYU (visual, acoustic)	July 2017, June 2018, October through November 2018	Temperature/humidity data logger installed. Infrared images of emergence.
Copco No. 1 powerhouse	high	Yes	Yes – several dozen bats clustered on walls in transformer bays and small numbers in lower level in summer. Absent in fall and winter.	MYYU (visual, acoustic)	July 2017, February 2018, June 2018, October through November 2018	Abundant staining/guano on lower level but no large roosts found. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
Diversion Tunnel Outlet[2]	high	Yes – via emergence only.	Yes – ~100 bats emerged in summer, absent in winter.	MYYU (visual, acoustic)	February 2018 inspection, June 2018 emergence.	Small number of COTO detected acoustically on summer emergence, but not confirmed to be present inside tunnel. Highly suitable habitat.
Copco No. 2 powerhouse	high	Yes	Yes – not found during interior inspections, but confirmed summer use by evening emergence of ~50 bats.	MYYU (visual, acoustic)	July 2017, February 2018, June 2018, October through November 2018	Six dead Myotis adults and pups found on ground level and lower level in summer. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
House 19038 (next to schoolhouse)	high	Yes – abundant guano in garage.	No	NA	July 2017, February 2018, June 2018, October through November 2018	Potential entry points noted.
Maintenance Building (next to switchyard)	high	Yes – guano and staining in garage.	No	NA	July 2017, June 2018, October through November 2018	Potential entry points noted.

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Bunkhouse	mod	No	No	NA	July 2017, February 2018, June 2018, October through November 2018	Potential entry points noted.
Cookhouse	mod	Yes	Yes – small number of bats present in awning over side door outside in summer. Absent in fall and winter.	MYYU (visual)	July 2017, February 2018, May and June 2018, October through November 2018	No signs of interior use. Potential entry points noted.
Vacant House (light blue) on Access Road	mod	No	No	NA	July 2017	None
Occupied House next to Vacant House 4	mod	Unknown	Unknown	NA	July 2017 exterior only.	No interior survey access to occupied residences. Resident stated he is not aware of any bats in the attic.
Schoolhouse	low-mod	No	No	NA	July 2017	None
Haz Waste Storage/Wood Shop	low-mod	No	No	NA	July 2017, February 2018, June 2018	None
Groundwater Well House (at entrance to Copco Village)	low-mod	No	No	NA	July 2017, October through November 2018	Small amount of guano on roof indicates bat use of rock crevices above/behind the structure.
Maintenance Building (next to Copco No. 2 powerhouse)	low	No	No	NA	July 2017, June 2018	None
Equipment Shed (in front of bunkhouse/cookhouse)	low	No	No	NA	July 2017, February 2018, June 2018	None
Copco No. 2 Dam (concrete dam and associated structures)	low	No	No	NA	July 2017	None

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Tin Pumphouse (across from light blue house on Access Road)	low	No	No	NA	July 2017	None
Control Center at Copco No. 2 powerhouse	low	No	No	NA	July 2017, February 2018, June 2018	None
Iron Gate						
Diversion Tunnel Outlet[2]	high	Yes – via summer evening emergence only.	Yes – several hundred bats emerged during May and June 2018 surveys. Absent in winter.	MYYU (visual, acoustic)	February 2018 inspection, May 2018 emergence, June 2018 emergence	Small number of COTO detected acoustically on summer emergence, but not confirmed to be roosting inside tunnel. Highly suitable habitat.
Penstock Intake Structure[2]	high	Yes	Yes – several hundred bats roosting inside at top of structure in summer. Absent in fall.	MYYU (visual, acoustic)	July 2017, June 2018, October through November 2018	Temperature/humidity data logger installed.
Communication Building/ Powerhouse	high	Yes	Yes – several hundred bats emerged from concrete shaft in lower portion of powerhouse in summer. Heavy guano/staining.	MYYU (visual, acoustic)	July 2017, May and June 2018, October through November 2018	Temperature/humidity data logger installed. Lowest, subterranean level of powerhouse not accessed due to confined space entry restriction.
Barn/Garage at Iron Gate Village	high	Yes	Yes – bats present in rafters/ ceiling in summer, abundant guano. Absent in fall.	MYYU (visual, acoustic)	July 2017, May and June 2018, October through November 2018	Temperature/humidity data logger installed.
Residence 1 (occupied) blue/gray	mod-high (attic)	Unknown	Unknown	NA	June 2017 exterior only	No interior survey access to occupied residences.
Residence 2 (occupied) tan with green roof	mod-high (attic)	Yes	Yes – ~15 bats huddled behind clock on back porch. Potential attic access through loose screen over vent.	MYYU (visual, acoustic)	July 2017 exterior only	No interior survey access to occupied residences.

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Fish Holding Facilities	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Diversion Tunnel Gate Structure	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Restrooms (near powerhouse)	low-mod	No	No	NA	July 2017, June 2018	None
Emergency Spill Equipment shed	low	No	No	NA	July 2018	None
J.C. Boyle						
Spillway Control Center[2]	high	Yes	Yes – several hundred bats present in summer. Absent in fall.	MYYU (visual)	July 2017, May and June 2018, October through November 2018	Temperature/humidity data logger installed.
Office/Red Barn	high	Yes – abundant guano in attic.	No	MYYU (visual – dead specimen)	July 2017, May and June 2018, October through November 2018	Found two dead Myotis sp. adults inside the attic – desiccated.
Fish Screen House	mod-high	No	No	NA	July 2017, June 2018, October through November 2018	None
Fire Protection Building	mod	Yes	Yes – outside only, a few bats in exterior crevice near roof edges (western side and eastern side) in summer. Absent in fall.	MYYU (visual)	July 2017, June 2018, October through November 2018	

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes
Dam Communications	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
J.C. Boyle powerhouse	mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Maintenance Building (next to powerhouse)	low-mod	No	No	NA	July 2017, June 2018, October through November 2018	None
Truck Shop	low-mod	No	No	NA	July 2017, May 2018 and June 2018, October through November 2018	Maintenance staff have found a few dead bats inside over the years, but no roosting. No sign found inside. Multiple potential access points along roof at the covered parking area.
Headgate Control	low-mod	No	No	NA	July 2017, June 2018	None
Gate Control and Communications	low-mod	No	No	NA	July 2017, October through November 2018	None
Power Canal/Spillway	low	No	No	NA	July 2017, June 2018	None
HazMat Storage Shed	low	No	No	NA	July 2017	None
Pump House	low	No	No	NA	July 2017	None
Two occupied residences	Unknown	Unknown	Unknown	NA	NA	No interior survey access to occupied residences.

Building Name	Suitability[1]	Evidence of Bat Use?	Live Bats Present?	Species Confirmed	Survey Dates	Additional Notes

Notes:

[1] "High" suitability was assigned to structures with bats present and/or where signs of heavy bat use were found, or to structures that showed little or no sign of use or could not be accessed but contain external or internal features generally preferred by roosting bats, such as attics/roof spaces, soffits, fascias, weather boarding, spaces between roof felt/membrane and tiles/slates, window frames, cave/cavity walls, flashing, and the like. "Moderate" suitability was assigned to structures where no bats or very few bats were found, with little or no sign of bat use, that contain points of entry/exit and limited internal and external features preferred by roosting bats. "Low" suitability for roosting was assigned to well-sealed structures with no points of entry/exit, and generally lacking cavities, crevices, and other features generally preferred by roosting bats.

[2] Photograph included in report

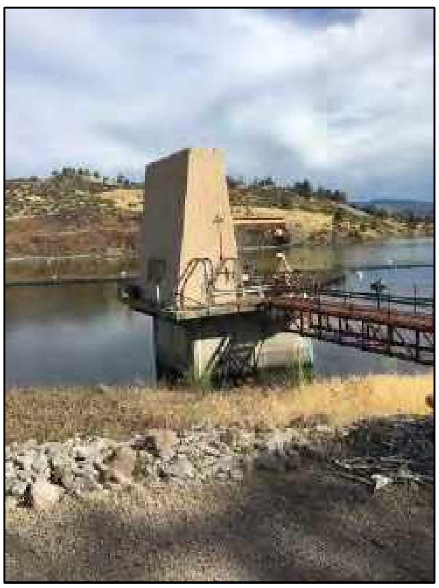
NA = Not Applicable

MYYU = Myotis yumanensis (Yuma myotis)

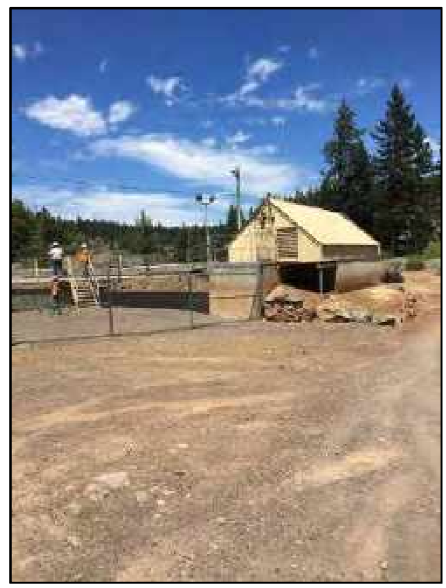
COTO = Corynorhinus townsendii (Townsend's big-eared bat)

Photograph 5-1: Garage of Vacant House 3, Copco Village

Photograph 5-2: Vacant House #21601, Copco Access Road



Photograph 5-3: Penstock Intake, Iron Gate



Photograph 5-4: Spillway Control Center, J.C. Boyle

Photograph 5-5: C-12 Gatehouse, Copco No. 1

Although there is potential for other bat species to be present, the only species confirmed to be roosting in structures were Yuma myotis (Myotis yumanensis) (Table 5-1). The Lakeview Road Bridge at Iron Gate contains expansion joints that indicate bat use, and emergence surveys at this bridge are planned for summer 2019. The KRRC biologists did not detect any roosting bats or signs of bat use at any other Project bridges where removal or modifications are planned.

5.2.1 Winter 2018

On February 13, 2018, conditions were sunny and clear. Air temperatures outside the Iron Gate tunnel were 48 degrees Fahrenheit (°F) at 12:50 P.M. Inside the tunnel, temperatures were 67°F at the entrance (1:35 P.M.) and 52°F at the terminus (1:51 P.M.). Most of the Iron Gate tunnel is rock, except for the entrance and just before the closure gate, where it is lined with reinforced concrete (25 feet at the entrance and 120 feet leading to the closure gate) (Photograph 5-6). Water depths in the tunnel ranged from 2.7 feet to 5.5 feet. The full length of the accessible portion of the tunnel—approximately 500 feet in length from the entrance to the closure gate, of which approximately 354 feet is unlined, exposed rock— was surveyed. Cliff swallow nests were observed just inside the tunnel entrance. Pigeons were present at various locations throughout the tunnel. No bats or signs of bat use were found; however, both the rock- and concrete-lined portions of the tunnel provide interior spaces and/or irregular rock surfaces suitable for use by roosting bats.

Photograph 5-6: Iron Gate Diversion Tunnel Interior Section of Unlined Rock, February 13, 2018

On February 14, 2018, conditions were sunny and clear. Air temperatures outside the Copco tunnel were 41°F at 10:15 A.M. Inside the tunnel, temperatures were 48°F at the entrance (10:20 A.M.) and 44°F at the terminus (10:30 A.M.). The entire length of the Copco tunnel is unlined, exposed rock (~160 feet) (Photograph 5-7). Water depths in the tunnel ranged from 1.1 feet to 3.2 feet. The full length of the accessible portion of the tunnel was surveyed, from the entrance to the closure gate. Cliff swallow nests and a few pigeons were observed in the tunnel. No bats or signs of bat use were found; however, the tunnel provides suitable habitat.

Photograph 5-7: Copco Diversion Tunnel Interior Substrate and Cliff Swallow Nests, February 14, 2018

On March 1, 2018, the midday outdoor temperature was 45°F. No bats were observed in any structures at Copco No. 1 and Copco No. 2, and no new signs of bat activity were found at these sites.

5.2.2 Summer 2018

During the May surveys, the average high daytime outdoor temperature was 74°F. In June, the average high during the day was 83°F. Biologists observed evening emergences of several hundred bats from both the Copco and Iron Gate diversion tunnels and an attic at Copco "Vacant House #21601." More than 2,000 Myotis spp. emerged from the Copco No. 1 C-12 gatehouse, the interior of which had not previously been inspected due to access constraints.

Field teams heard small numbers of Townsend's big-eared bats (Corynorhinus townsendii) during acoustic surveys outside the diversion tunnel outlets and the Copco No. 1 and Copco No. 2 powerhouses; however, it is not certain that these bats came from inside the structures or tunnels. Particularly at the Copco diversion tunnel, access limitations prohibit targeted placement of recording equipment at or near the mouth of the tunnel. Only small numbers of roosting bats have been observed emerging from the Copco powerhouses during summer surveys, despite abundant sign of previous bat use in these structures. Maintenance staff reported that sonic deterrents (Bird-X Transonic Pro) and mothballs and other naphthalene products were used in the past few years in these powerhouses in an attempt to deter bats, but that these efforts were not effective.

5.2.3 Fall 2018

During the week of October 29, 2018, the average high daytime outdoor temperature was 63°F. Bats were only present in two structures: the C-11 and C-12 gatehouses at Copco No. 1. Several dozen bats were counted in the attic at C-12, and about a dozen were seen in the open, at the roof apex inside C-11.

5.3 Conclusions

Significant bat roosts are present in many structures across the Project area. The KRRC biologists will continue coordinating with Project engineers on plans for structure retention, modification, and removal. Sufficient information was collected to provide recommendations for take avoidance, humane exclusion, and compensatory roosting habitat for each structure. The KRRC will provide these site-specific details in a Bat Management Plan. Seasonal surveys in 2019 will focus on structures that will require exclusion, modification, and/or replacement.

The KRRC will develop and finalize a Bat Management Plan in 2019, prior to commencement of any Project activities that could disturb roosting bats. According to the current Project timeline, site preparation is scheduled to begin in early to mid-2020, which will include work in the diversion tunnels. Therefore, humane exclusion in these locations is anticipated to occur in fall-winter 2019. Building removal is currently scheduled to occur after reservoir drawdown, in March 2021. Therefore, exclusion and installation of replacement habitat in these locations is anticipated to occur in 2020.

The KRRC will assess significant roosting habitat outside of buildings as Project activities such as tree removal are further refined. Although no roosting trees have yet been identified, the KRRC will provide general recommendations for removal of potential tree-roosting habitat in the Bat Management Plan. The KRRC will evaluate significant roosting habitat in the vicinity of major Project disturbances for its potential to be affected by noise or vibrations during ongoing survey efforts, or as otherwise dictated by the Project schedule.

Chapter 6 Western Pond Turtle

6. WESTERN POND TURTLE

Western pond turtles are known to occur at Project reservoirs. The United States Geological Survey conducted visual surveys of basking turtles at J.C. Boyle Reservoir in the mid- to late-1990s and recorded turtle use (Wray 2017). The 2001-2003 PacifiCorp surveys also noted the presence of western pond turtles and suitable basking and nesting habitat at Project reservoirs (PacifiCorp 2004), as shown on Figure 8-1 through 8-3.

The western pond turtle is listed on the Oregon Sensitive Species List and is a species of special concern in California. A petition for listing under the federal Endangered Species Act is currently being considered by USFWS, with a decision regarding listing expected by 2021. In light of its special status, the KRRC conducted an evaluation of potential risks to western pond turtles during drawdown when turtles would be hibernating. In coordination with ODFW, CDFW, and USFWS, the KRRC concluded that there is potential for impacts, including mortality, to western pond turtles from the effects of drawdown and other components of the proposed action. Based on this evaluation, it was determined that the following additional investigations were warranted:

- Conduct surveys of Project reservoirs for basking western pond turtles during special-status wildlife surveys. Document turtle observations and map suitable habitat.
- Conduct a mark/recapture survey and tracking study at J.C. Boyle Reservoir to a) estimate the abundance of western pond turtles in the J.C. Boyle Reservoir area and b) obtain data on western pond turtle overwintering locations and behaviors. The methodology for the study was developed in coordination with ODFW, as described further below.

6.1 Methods

6.1.1 Western Pond Turtle Surveys and Habitat

The KRRC biologists noted observations of western pond turtles in the 0.25-mile study area during general wildlife surveys. Biologists recorded the number of turtles, behavior, and other observations. Surveyors observed habitat along reservoir shorelines via boat.

6.1.2 Western Pond Turtle Tracking Study at J.C. Boyle Reservoir

The western pond turtle tracking study was led by the KRRC, with assistance from ODFW biologists. The study was initiated during late summer, when turtles would have finished breeding but would still be active prior to the hibernation season. In coordination with ODFW, two primary objectives were identified:

1. Capture enough western pond turtles (30+) for a mark-recapture study, to produce a population estimate for the J.C. Boyle Reservoir.

2. Capture 14 western pond turtles (8 females and 6 males) and attach radio transmitters and temperature data loggers to them for a telemetry tracking study. The purpose of the telemetry study was to determine the timing and locations of western pond turtle overwintering in the J.C. Boyle Reservoir.

Field teams conducted initial trapping in August 2018, with an additional capture effort conducted in September 2018.

Trap locations are shown on Figures 9-1 and 9-2. During the August trapping event (August 6 through 12, 2018), field teams focused trapping in areas of J.C. Boyle Reservoir where turtles had been observed in the greatest numbers during previous visual surveys, including those conducted by the KRRC biologists in 2018 and historical PacifiCorp surveys (PacifiCorp 2004). This included along the western shore of the reservoir, north of the Highway 66 bridge (referred to as the “west” site, as shown on Figure 9-2); and the southeastern cove near Topsy Campground and the southwestern cove behind the floating log barrier immediately upstream of the dam (referred to together as the “south” site, as shown on Figure 9-1). During the September trapping event (September 4 through 7, 2018), field teams also deployed traps in other areas around the reservoir, including the western and eastern shores south of the bridge, the northernmost shore of the reservoir, and the mouth of Spencer Creek.

The August trapping event consisted of six nights of trapping. Field teams deployed traps in the south or west sites on alternating nights. On the first night of trapping (August 6, 2018), field teams deployed 12 traps in the south site. Due to the low capture rate, teams deployed 20 traps on each subsequent trapping night. Field teams deployed traps in the evenings between approximately 7:00 and 9:00 P.M. and collected them the next morning between approximately 7:30 and 9:30 A.M. Overnight traps were deployed for at least 12 hours each.

Due to the low capture rate, the trapping strategy was altered during the September trapping event to include day trapping, longer trap deployment, and trapping in areas outside the south and west sites. Field teams deployed traps overnight as described above for three nights (September 4 through September 6, 2018), and also deployed traps during the day on September 5 and September 6, 2018. Some of the day traps were deployed around 8:00 A.M. and retrieved in the afternoon approximately 8 hours later; others were left in place, rebaited, and allowed to run another night. In addition, field teams used hand nets to attempt to catch turtles from kayaks and during snorkeling.

The primary trapping method employed commercial opera house-style crab traps baited with canned sardines, diced clams, or cat food. Field teams placed traps near downed trees, snags, and other refugia where turtles tend to forage, and placed traps away from the shore so that terrestrial predators could not easily reach the bait. Field teams also employed hand capture, dip nets, and seine nets as secondary trapping methods. Inflatable kayaks were used to access trap sites around the reservoir.

When caught, turtles were collected in tubs and taken to land for processing in accordance with the methods described in Bury et al. (2012). Processing included recording morphometric data (e.g., size, weight, age, and gender), taking photographs, and making qualitative observations about turtle morphology and health. Biologists took photographs of each turtle to document size, coloration, growth rings, plastron patterns, and other identifying features. Notches were filed into the marginal shields according to the notching code described by Holland (1994), to provide identifying marks for future studies.

For the telemetry study, biologists affixed suitably sized turtles with a radio transmitter (Holohil Ltd. Model RI-2B, up to 12-month battery life) and temperature logger (Thermochron Model DS1922L). A two-part epoxy was used to affix the transmitter and temperature logger to a suitably sized costal scute toward the back of the turtle. The epoxy was nonexothermic and did not produce heat that could harm the turtle. Application of epoxy to scute sutures (where carapace growth occurs) was avoided. The epoxy was colored black with printer toner to improve camouflage. The epoxy was allowed to dry and harden before releasing the turtle back to the site where it was caught. Field teams confirmed the functionality of the radio transmitter prior to deployment. The transmitter, temperature logger, and epoxy were allowed to make up a maximum of 5 percent of total turtle body weight; smaller turtles were not considered suitable for tracking.

In accordance with the permit restrictions, the KRRC biologists turned over live bycatch of any nonnative, nonfish animals, which included only American bullfrogs (Lithobates catesbeianus), to ODFW for euthanization. Live bycatch of fishes included three nonnative species identified by ODFW staff as goldfish, largemouth bass, and pumpkinseed. On three occasions, small fish were found dead in traps; these all appeared to be the same species and were later identified as goldfish.

To provide environmental baseline temperature data, teams attached temperature data loggers to 250-foot cables which were deployed along a transect in the south and west trapping areas during the August event (Figures 9-1 and 9-2). Along each transect, three temperature loggers were deployed in the upland area in suitable terrestrial overwintering habitat, one data logger was placed on shore, and three were deployed in the reservoir along the weighted cable to provide information about the temperature gradient across potential in-water overwintering habitats.

6.2 Findings

Biologists observed western pond turtles in all three Project reservoirs during the 2018 wildlife surveys in May and June (Figures 8-1 through 8-3). Observations of turtle habitat generally agreed well with historical PacifiCorp turtle habitat mapping.

Western pond turtles were observed in the following numbers at each reservoir:

- Iron Gate Reservoir: 8
- Copco Lake: 42
- J.C. Boyle Reservoir: 46

The KRRC did not conduct formal basking surveys, so these numbers do not represent a population estimate.

During the August 2018 trapping event at J.C. Boyle, field teams deployed 112 traps over the six nights of trapping. Biologists captured a total of five individuals (three at the west site and two at the south site), for a capture rate of 4.5 percent. All turtles were caught within the first three nights of trapping. Traps with each of the three baits (sardines, clams, and cat food) resulted in captures. Attempts to capture turtles via hand capture and seine nets were unsuccessful, mainly due to the abundance of aquatic vegetation on and below the water surface. No turtles were recaptured during this event. Preliminary radio telemetry indicated that the two turtles caught and tagged at the north site had moved south of the bridge (approximately 0.5 river mile from where they were released) over the course of 2 days.

Only four of the five turtles captured during the August event were tagged with radio transmitters and temperature data loggers. One female turtle exhibited signs of an unknown shell disorder; her vertebral scutes were detaching from the carapace. The costal scutes appeared intact, but there was concern that the shell integrity would continue to deteriorate, so the team did not affix a transmitter or temperature logger to this animal.

During the September trapping event, the team deployed an equivalent of 89 traps (i.e., 89 trap deployments lasting 12 hours) over 3 days and nights of trapping. Biologists caught five turtles in traps, four of which were tagged with radio transmitters and temperature loggers. One juvenile turtle caught with a hand net was too small for a radio transmitter.

In summary, biologists outfitted a total of eight western pond turtles with transmitters and temperature loggers during the two 2018 trapping events. Trap locations and successful capture sites are shown on Figures 9-1 and 9-2. Trapping effort details and photographs are provided in Appendix C.

The trapping study did not include a formal visual survey; however, biologists observed western pond turtles throughout the J.C. Boyle Reservoir in numbers comparable to those observed in previous visual surveys. Areas of concentrated turtle use were identified by field teams near the dam and along the western shore north of the Highway 66 bridge. In addition to these areas, biologists observed 5 to 10 turtles in the large southeastern cove, and groups of 3 to 6 turtles in smaller coves around the reservoir. Biologists most commonly observed turtles basking on logs or stumps, or basking aquatically at the water surface.

6.3 Conclusions

Biologists observed western pond turtles in all three Project reservoirs during 2018 wildlife surveys in May and June. Field teams observed the highest number of turtles in the J.C. Boyle Reservoir.

The number of turtles caught during the two trapping events at the J.C. Boyle Reservoir (11 caught in total, eight tagged with tracking equipment) was below the targets set for the telemetry study (14 turtles) and population study (30+ turtles). Possible explanations for the low capture rate include:

- Other prey sources (aquatic snails, tadpoles, small fish, and various invertebrates) were already abundant throughout the reservoir, so turtles were not attracted to the bait. The unusually fast growth rate and large average size of western pond turtles noted in J.C. Boyle Reservoir indicated a consistently high availability of food sources.

- Successful trapping with baited traps has been widely reported during fall months, but baited traps are generally more successful in the spring. Western pond turtles typically feed less as the summer goes on because they cannot digest food while overwintering. If the J.C. Boyle Reservoir population typically initiates overwintering in late summer, then they would likely have reduced their feeding rates and been less prone to capture in baited traps.

As part of the tracking study, the KRRC biologists are conducting winter field visits to the J.C. Boyle Reservoir to locate radio-tagged turtles. The locations of turtles will be determined to the extent feasible from shore; however, if turtles are found to be overwintering in deeper waters far from shore and more precise locations are desired, a boat may be used. The locations of overwintering radio-tagged turtles will help determine whether western pond turtles at J.C. Boyle Reservoir tend to overwinter on land or in reservoir sediments. If turtles are found overwintering in shallow sediments, the specific locations of those turtles in the reservoir will aid in determining whether they could be affected by erosion and other potential effects during drawdown.

In spring 2019, the KRRC biologists will conduct additional trapping for approximately six nights, to attempt to capture enough turtles to enable a population estimate and to recover data loggers. As with the initial trapping effort, traps will be set by inflatable kayak or by shore to the extent possible. Radio-transmitters will be used to locate the radio-tagged turtles and set traps nearby. If trapping efforts are insufficient to capture enough additional untagged turtles for a population estimate, additional efforts such as snorkeling may be used.

Biologists will also retrieve environmental data loggers measuring ambient air and water temperatures in spring 2019. Thermographs from environmental data loggers will be compared to those carried by turtles, to aid in determining whether turtles are overwintering on land or in water (and potentially at what depth in the water/sediment), and if they remain stationary or are active for part of the winter.

Chapter 7 Special-Status Plants

7. SPECIAL-STATUS PLANTS

Several special-status plant species have been identified as occurring in the Project area. PacifiCorp (2004) documented several special-status plant species during extensive surveys in 2002 and 2003. In addition, the KRRC biologists identified occurrences of special-status plant species through state and federal databases (ORBIC 2017; CNDDB 2018; IPaC 2018); the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California (CNPS 2018a); and information obtained from USFWS (Yreka), BLM (Klamath Falls), and USFS (Klamath National Forest).

For the purposes of the surveys, special-status plants were defined to include those species with federal status (federally listed as threatened, endangered, or proposed for listing), state threatened or endangered species, species included in ONHP Lists 1 and 2, and species listed as California Rare Plant Rank 1 and 2. Where BLM and USFS lands occur in the study area, BLM and USFS Sensitive Species are also considered.

The objective of the surveys was to identify any special-status plants that are present 1) in the study area (i.e., within a 0.25-mile buffer around the Project area) and/or 2) in areas such as reservoir shorelines that may be affected by the Project.

7.1 Methods

Based on documented occurrences and the presence of suitable habitat, the KRRC biologists developed a focused list of special-status plant species, as shown in Table 7-1.

Table 7-1: Special-Status Plants with Potential to Occur in or near the Project Area

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Survey Effort
Greene's mariposa-lily Calochortus greenei	FSC, BLM, OC, ONHP List 1, CNPS List 1B	Occurs primarily in annual grassland, wedgeleaf ceanothus chaparral, and oak and oak-juniper woodlands	Several locations around Iron Gate Reservoir	May through July	Within the limits of work in suitable habitat
Bristly Sedge Carex comosa	ONHP List 2	Marshes, lake shore, and wet meadows	Eastern shore of J.C. Boyle Reservoir in two locations (east of dam and south of Highway 66); also, west of dam	May through September	Along reservoir margins and within the limits of work in suitable habitat
Mountain Lady's Slipper Cypripedium montanum	ONHP List 4, CNPS List 4	Dry, open conifer forests, more often in moist riparian habitats	J.C. Boyle peaking reach (location details unknown)	March through August	Within the limits of work in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Survey Effort
Gentner's fritillary Fritillaria gentneri	FE, CNPS List 1B	Cismontane woodland, chaparral; mixed hardwood-conifer vegetation dominated by Oregon oak	Habitat present in the reach along Copco Lake and Iron Gate Reservoir; no known locations	Late March to early April; April and May at higher elevations	Within the limits of work in suitable habitat
Bolander's sunflower Helianthus bolanderi	BLM, ONHP List 3	Occurs in yellow pine forest, foothill oak woodland, chaparral, and occasionally in serpentine substrates or wet habitats.	South of Iron Gate Reservoir near proposed disposal site; J.C. Boyle peaking reach (location details unknown)	June through October	Within the limits of work in suitable habitat
Bellinger's meadow-foam Limnanthes floccosa ssp. bellingerana	FSC, BLM, OC, ONHP List 1, CNPS List 1B	High elevation vernal pools in shallow soiled rocky meadows in spots that are at least partially shaded in the spring	J.C. Boyle peaking reach (location details unknown)	April through June	Within the limits of work in suitable habitat
Detling's silverpuffs Microseris laciniata ssp. detlingii	CNPS List 2	Chaparral and grassy openings among Oregon white oak trees	One location on the western side of Iron Gate Reservoir	May through June	Within the limits of work in suitable habitat
Egg Lake monkeyflower Mimulus pygmaeus	FSC, CNPS List 4	Occurs in damp areas or vernally moist conditions in meadows and open woods	East of J.C. Boyle Reservoir in two locations (north of Highway 66 and southeast of dam); west of dam in two locations in damp mudflats; also west of canal near access road in one location	May through August	Along reservoir margins and within the limits of work in suitable habitat
Holzinger's orthotrichum moss Orthotrichum holzingeri	CNPS List 1B.3	Found on vertical calcareous rock surfaces and at the bases of Salix bushes just above rock that is frequently inundated by seasonally high water in dry coniferous forests	Just upstream of Iron Gate Reservoir on Jenny Creek		Where in-stream work could occur at Jenny Creek at bridge
Western yampah Perideridia erythrorhiza	FSC, BLM, OC, ONHP List 1	Occurs in moist prairies, pastureland, seasonally wet meadows, and oak or pine woodlands, often in dark wetland soils and clay depressions	Along three drainages into the western side of J.C. Boyle Reservoir and in two locations west of canal near access road	Mid July through August	Along reservoir margins and within the limits of work in suitable habitat
Howell's yampah (Howell's false caraway) Perideridia howelii	ONHP List 4	Moist meadows, stream banks	One location along the drainage southeast of J.C. Boyle Reservoir; one location along the northern side of Copco Lake north of the road	July and August	Along reservoir margins and within the limits of work in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Survey Effort
Yreka phlox Phlox hirsuta	FE, CE, CNPS List 1B	Open areas on dry serpentine soils, found at elevations ranging from 2,500 to 4,400 feet.	Not known to occur near the limits of work; no suitable ultramafic soils occur within 0.5 mile of the limits of work (NRCS 2017)	March and April	None – suitable soils not present within the limits of work
Strapleaf willow Salix ligulifolia	ONHP List 3	Riverbanks, wetlands, floodplains	One location west of J.C. Boyle Dam in a boulder flood channel in the dam release zone	March through June	Along reservoir margins and within the limits of work in suitable habitat
Fleshy sage Salvia dorrii var. incana	CNPS List 3	Occurs in silty to rocky soils in great basin scrub, pinyon, and juniper woodland	Three locations around Iron Gate Reservoir	May through July	Within the limits of work in suitable habitat
Pendulous bulrush Scirpus pendulus	BLM, ONHP List 2, CNPS List 2	Occurs along streambanks and in wet meadows	One location along Fall Creek	June through August	Along reservoir margins and within the limits of work in suitable habitat
Lemmon's silene lemmonii	ONHP List 3	Open pine woodlands	J.C. Boyle peaking reach to J.C. Boyle Reservoir (location details unknown)	Spring and summer	Within the limits of work in suitable habitat
Western yellow cedar Callitropsis nootkatensis	Petitioned for federal listing, CNPS List 4.3	Wet to moist sites, from the coastal rainforests to rocky ridgetops near the timberline in the mountains	Not documented during PacifiCorp surveys or listed on CNDDB or ORBIC for the Project area; may occur based on information from USFWS Yreka office (May 23, 2017)		Within the limits of work in suitable habitat

Key:

BLM: Bureau of Land Management sensitive species—species that could easily become endangered or extinct
CE: California Endangered
CNDDB: California Natural Diversity Database
CNPS List 1A: California Native Plant Society (CNPS)—presumed extinct in California
CNPS List 1B: rare, threatened, or endangered in California and elsewhere
CNPS List 2: rare, threatened, or endangered in California, but more common elsewhere
CNPS List 3: on the review list—more information needed
CNPS List 4: on the watch list—limited distribution
FE: Federal Endangered
FSC: Federal Species of Concern
OC: Candidate listing by Oregon Department of Agriculture
ONHP List 1: Oregon Natural Heritage Program (ONHP) threatened with extinction or presumed to be extinct throughout their entire range
ONHP List 2: threatened with extirpation or presumed to be extirpated from the State of Oregon
ONHP List 3: more information is needed before status can be determined, but may be threatened or endangered in Oregon or throughout their range
ONHP List 4: of conservation concern but not currently threatened or endangered
ORBIC: Oregon Biodiversity Information Center
USFWS: United States Fish and Wildlife Service

In consideration of the various peak bloom times of the species listed in Table 7-1, the KRRC biologists planned three surveys: early season (April), mid-season (May), and late season (July). The mid-season and part of the late season surveys were conducted in 2018. The early season survey was not conducted, due to lack of access to PacifiCorp lands. A wildfire in the California portion of the study area in July restricted the late season survey to the J.C. Boyle Reservoir study area.

The KRRC biologists conducted focused surveys for special-status plants in the areas where construction would occur. These focused surveys followed the CDFW "Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities" (CDFW 2018b). In areas along reservoir shorelines, where changes in hydrology and geomorphology could occur due to the Project, biologists focused surveys on the locations of known and potential occurrences of special-status plants documented during surveys conducted by PacifiCorp (2004) and data obtained from a desktop review of existing databases (CNDDB, ORBIC, and CNPS).

In accordance with the CDFW protocol, detailed floristic surveys conducted in areas where construction would occur entailed identification of every plant taxon observed, to the taxonomic level necessary to determine rarity and listing status. These planned construction areas include proposed disposal sites, staging areas, utility line corridors, facility removal areas, and locations where clearing could occur for road modifications such as road widening, turnouts, equipment and material storage, and bridge replacement or modification. In these areas, biologists walked parallel transects generally spaced 5 to 10 meters apart and recorded plant species observed. Biologists also surveyed reservoir shorelines from a boat, focusing on areas of suitable habitat and locations of known and potential occurrences of special-status plants. Biologists recorded Global Positioning System (GPS) coordinates for all special-status plants found, along with descriptions of habitat conditions and proximity to proposed work activities or other notable features.

7.2 Findings

As shown on Figures 10-1 through 10-3, the KRRC biologists identified seven special-status plant species (including one potential observation) in the study area, as follows:

- Calochortus greenei (Greene's mariposa-lily) was observed in several locations in the vicinity of the Iron Gate Reservoir, including in the footprint of the Iron Gate disposal site. The species was also observed along utility corridors between the Copco No. 1 and Copco No. 2 Dams. A Calochortus species was observed along the southeastern side of Copco Lake in two locations, which will be revisited to confirm species identification in future surveys during the appropriate bloom time. In addition, there is one known historical observation of the species northeast of the staging areas for the Copco No. 1 Dam; however, this area could not be accessed during the 2018 surveys and will be visited in 2019.

- Salvia dorrii var. incana (fleshy sage) was observed in two locations near Iron Gate Reservoir; both locations are in proximity to but outside of the potential disturbance area associated with proposed removal of utility poles.

- A previously documented population of Perideridia erythrorhiza (western yampah) north of the J.C. Boyle Dam was verified. The plants are in a dry meadow and will likely be outside the area of impact from the drawdown of the reservoir.

- Carex comosa (bristly sedge) was observed along the J.C. Boyle Reservoir at the location of a previously documented occurrence. The plants were not in bloom during the survey, so that area will be revisited during future surveys to confirm species identification.

In addition to the species with known potential to occur discussed above, the KRRC botanists observed three other rare plant species in the study area:

- Mirabilis greenei (Greene’s four o’clock), CNPS 4.2, was observed in four locations along the northern side of the Klamath River, downstream of the Copco No. 2 Dam.
- Iris longipetala (coast iris), CNPS 4.2, was observed in one location along the northwestern shoreline of the J.C. Boyle Reservoir.
- Lilium washingtonianum ssp. purpurascens (purple-flowered Washington lily), CNPS 4.3, was observed in two locations: near the Fall Creek diversion and along the northern side of Copco Lake.

7.3 Conclusions

The KRRC biologists documented special-status plants in the study area, including some locations near or in the Project area, as shown on Figures 10-1 through 10-3. Additional special-status plant surveys will be conducted in 2019 to complete surveys within the early (April) and the late (July) bloom times. In addition, biologists will visit the locations of unconfirmed sightings during the appropriate bloom times to confirm occurrences of specific species (e.g., Carex comosa). Additional areas insufficiently surveyed during 2018 will be covered, including the proposed Fall Creek hatchery area and bypass river reaches.

Chapter 8 Vegetation Communities

8. VEGETATION COMMUNITIES

The KRRC biologists classified and mapped vegetation communities to identify the location of sensitive natural communities that may be affected by the Project.

8.1 Methods

PacifiCorp mapped existing vegetation cover types/wildlife habitat in a primary study area of 0.25 mile surrounding the reservoirs, facilities, and river reaches (PacifiCorp 2004). The intent of the 2018 vegetation community mapping conducted by the KRRC was to verify the general extent of vegetation communities and classify them to the alliance level in accordance with the Manual of California Vegetation (CNPS 2018b). An alliance is a floristically defined vegetation type identified by its dominant and/or characteristic species.

In June 2018, the KRRC biologists conducted vegetation community mapping in the 0.25-mile study area. During mapping efforts, the KRRC biologists walked the length of proposed construction areas and visually classified the vegetation communities into similar (or dissimilar) groups. The team mapped polygons to delineate each area where vegetation communities and percent cover were internally consistent. In each polygon, the dominant and characteristic plant species were recorded, and the percent cover for the ground, understory, and canopy layers was noted. A list of all identified species was compiled for each polygon. Upon encountering an area with different dominant species and/or percent coverage, a new polygon, denoting a new alliance, was established. Vegetation community and coverage data were then used to classify each area by alliance in accordance with CNPS methods.

8.2 Findings

Biologists recorded 17 alliances in the 0.25-mile study area (Table 8-1). Vegetation communities (as alliances) are depicted on Figures 11-1 through 11-16.

Table 8-1: Vegetation Community Alliances Recorded in the Study Area

Alliance Scientific Name	Alliance Common Name	Lifeform	California Rarity	Global Rarity
Pinus ponderosa	Ponderosa pine forest	Tree	S4	G5
Fraxinus latifolia	Oregon ash groves	Tree	S3.2	G4
Acer macrophyllum	Bigleaf maple forest	Tree	S3	G4
Quercus garryana	Oregon white oak woodland	Tree	S3	G4
Juniperus occidentalis	Western juniper woodland	Tree	S4	G5
Ceanothus cuneatus	Wedgeleaf ceanothus chaparral	Shrub	S4	G4
Cercocarpus montanus	Birchleaf mountain mahogany chaparral	Shrub	S4	G5
Purshia tridentata	Bitterbrush scrub	Shrub	S3	G4
Prunus subcordata	Klamath plum shrubland	Shrub	NA	NA
Prunus virginiana	Chokecherry thicket	Shrub	S2	G4
Salix lucida	Shining willow grove	Tree	S3.2	G4
Salix geyeriana	Geyer willow thicket	Shrub	S2	G4
Salix sp.	Willow thicket	Tree/Shrub	NA	NA
Schoenoplectus acutus	Hardstem bulrush marsh	Herb	S4	G5
Carex sp.	Sedge meadow	Herb	NA	NA
Bromus tectorum – Taeniatherum caput-medusae	Cheatgrass – medusahead grassland	Herb	SNR	GNR
Bromus (diandrus, hordeaceus)	Annual brome grassland	Herb	SNR	GNR

Key

California Rarity/Global Rarity
S1/G1: Statewide/Worldwide <6 viable occurrences and/or <518 hectares
S2/G2: 6 to 20 occurrences and/or 518 to 2,590 hectares
S3/G3: 21 to 100 occurrences and/or 2,590 to 12,950 hectares
S4/G4: >100 occurrences and/or > 12,950 hectares
S5/G5: Demonstrably secure because of its worldwide abundance
SNR – State not reported
GNR –Global not reported
NA – Alliance not identified by CNPS

8.3 Conclusions

CDFW has ranked natural communities according to their rarity in the state of California. Natural Communities with ranks of S1-S3 are considered Sensitive Natural Communities (CDFW 2018c). Biologists identified the following sensitive natural communities in the study area:

- Oregon ash groves
- Bigleaf maple forest
- Oregon white oak woodland

- Bitterbrush scrub
- Chokecherry thicket
- Shining willow grove
- Geyer willow thicket

The KRRC did not conduct wetland surveys or focused delineations during the 2018 field season. Biologists mapped emergent wetlands along the fringes of the reservoirs and riparian habitat primarily associated with streams and drainages that flow into the reservoirs. Additional sensitive vegetation communities may be identified during wetland investigations to be carried out in 2019.

In 2019, the KRRC will delineate wetlands in the Project area in accordance with the 1987 United States Army Corps of Engineers Wetland Delineation Manual and applicable Regional Supplements (i.e., Western Mountains, Valleys, and Coast Region and Arid West). Additionally, the KRRC will use the Oregon Rapid Wetland Assessment Protocol to assess functional values of wetlands, as applicable to areas in Oregon. In addition, the KRRC will conduct additional mapping of wetlands and riparian habitats adjacent to reservoirs and/or associated with streams but outside the direct limits of work.

Chapter 9 Invasive Exotic Vegetation

9. INVASIVE EXOTIC VEGETATION

After a close review of invasive exotic vegetation (IEV) survey findings for the Project area documented by PacifiCorp in 2002-2003 (PacifiCorp 2004), the KRRC determined that surveys reflecting current IEV conditions were required. Information on IEV locations and extent are needed to effectively plan for control of IEV in the Project area, to support restoration success.

9.1 Methods

In 2017 and 2018, KRRC biologists conducted surveys of invasive exotic plant species targeted by federal, state, and county agencies. The timing of these surveys corresponded to when IEV were positively identifiable (by leaf or flower) (Table 9-1). The study area included uplands around the reservoir edges and other areas within the limits of work.

Biologists conducted a partial survey in late fall of 2017, between November 10 and December 8. At that time, 15 to 20 percent of the shoreline at each reservoir was surveyed on foot. A principal survey was conducted between May 19 and June 22, 2018, in a study area that included all areas where construction activities are planned and along reservoir shorelines. Early spring surveys were planned but not executed because access was not granted by PacifiCorp.

The November 2017 surveys were conducted by two biologists, but the 2018 surveys were conducted by three to four biologists at a time. Biologists surveyed approximately 566 acres in total, which included the Project acreage above the water surface (uplands). When feasible, biologists divided into teams of two. A two-person team allowed for a fast, systematic survey of Project shorelines with one biologist walking near the shoreline below riparian vegetation and the second biologist walking in parallel along the upper portion of the bank, closer to the boundary of the Project area. Biologists kept in constant communication to ensure that each invasive species of concern was recorded accurately, and that no data were repeated or skipped.

The KRRC developed a prioritized list of invasive species (Table 9-1) based on historical data and on lists of IEV species with a potential to occur in the Project area derived from data available from the California Department of Food and Agriculture, Oregon Department of Agriculture, California Invasive Plant Council, Klamath and Siskiyou County Departments of Agriculture, and the Klamath National Forest. Biologists logged the presence of high- and medium-priority invasive species (as designated in Table 9-1, last column) with either a point representing an 8-foot-diameter circle for smaller populations, or a polygon representing a larger IEV population. If multiple species were present in the same area, they were all included in the GPS data of either the point or polygon. Because areas of invasive vegetation can serve as seed banks for the Project site, areas of dense invasive coverage outside the limit of work were also recorded. These areas will be used to inform the invasive species removal plan but were not used to calculate the area of IEV coverage.

Table 9-1: Prioritized List of IEV Species

Scientific Name	Common Name	CDFA[1]	ODA[2]	Cal-IPC[3]	Klamath County[4]	Siskiyou County[5]	Klamath NF[6]	# of Agencies[7]	Priority[8]
Chondrilla juncea	skeleton weed	AW	B & T	Moderate	A	CA-A	High	5	High
Centaurea diffusa	diffuse knapweed	AW	B	Moderate	A	CA-A	High	4	High
Centaurea virgata ssp. squar.	squarrose knapweed	NR	A & T	Moderate	A	CA-A	High	4	High
Euphorbia esula	leafy spurge	AW	B & T	NR	B	CA-A	High	4	High
Onopordum acanthium	Scotch thistle	AW	B	High	B	CA-A	High	4	High
Acroptilon repens	Russian knapweed	BW	NR	Moderate	A	CA-A	High	3	High
Carduus acanthoides	plumeless thistle	AW	NR	limited	A	NR	High	3	High
Centaurea stoebe ssp. micr.	spotted knapweed	NR	B	High	B	CA-A	High	3	High
Cytisus scoparius	Scotch broom	BW	B	High	A	CA-C	High	3	High
Lepidium latifolium	perennial pepperweed	BW	B & T	High	B	NR	High	3	High
Lythrum salicaria	purple loosetrife	BW	B	High	A	NR	High	3	High
Carduus nutans	musk thistle	AW	B	Moderate	B	CA-A	High	2	High
Fallopia japonica	Japanese knotweed	BW	NR	Moderate	A	NR	High	2	High
Linaria dalmatica	Dalmatian toadflax	NR	B	Moderate	B	CA-A	High	2	High
Onopordum tauricum	Taurian thistle	AW	A	NR	NR	NR	High	2	High
Sonchus arvensis	field sowthistle	AW	NR	NR	NR	NR	High	2	High
Tamarix parviflora	small flower tamarisk	NR	NR	High	NR	NR	High	2	High
Anchusa officinalis	alkanet	NR	B & T	NR	NR	NR	NR	1	Medium
Bromus madritensis ssp. rubens	foxtail brome	NR	NR	High	NR	NR	NR	1	Medium
Bromus tectorum	cheatgrass	NR	NR	High	NR	NR	NR	1	Medium
Centaurea solstitialis	yellow starthistle	CW	B	High	B	CA-C	Moderate	1	Medium
Cirsium ochrocentrum	Beaumont thistle	AW	NR	NR	NR	NR	NR	1	Medium
Convolvulus arvensis	field bindweed	CW	B & T	NR	NR	NR	NR	1	Medium
Crupina vulgaris	bearded creeper	AW,Q	B	Limited	NR	NR	NR	1	Medium
Dipsacus fullonum	teasel	NR	B	Moderate	A	NR	NR	1	Medium
Elymus caput-medusae	medusahead	CW	B	High	C	NR	NR	1	Medium
Foeniculum vulgare	fennel	NR	NR	Moderate	NR	NR	High	1	Medium

Scientific Name	Common Name	CDFA[1]	ODA[2]	Cal-IPC[3]	Klamath County[4]	Siskiyou County[5]	Klamath NF[6]	# of Agencies[7]	Priority[8]
Halogeton glomeratus	saltlover	AW	B	Moderate	NR	NR	NR	1	Medium
Isatis tinctoria	dyer's woad	BW	B	Moderate	A	CA-B	Moderate	1	Medium
Linaria vulgaris	butter and eggs	NR	B	Moderate	A	NR	NR	1	Medium
Phalaris arundinacea	reed canary grass	NR	B & T	Not Listed	NR	NR	NR	1	Medium
Rubus armeniacus	Himalayan blackberry	NR	B	High	NR	NR	NR	1	Medium
Salvia aethiops	Mediterranean sage	BW	B	Limited	B	NR	High	1	Medium
Tribulus terrestris	puncture vine	CW	B	Limited	B	NR	High	1	Medium
Xanthium spinosum	spiny clotbur	NR	B	None	A	NR	NR	1	Medium
Aegilops cylindrica	goatgrass	BW	B	Watch	NR	NR	NR	0	Low
Avena barbata	slender oat	NR	NR	Moderate	NR	NR	NR	0	Low
Brassica nigra	black mustard	NR	NR	Moderate	NR	NR	NR	0	Low
Bromus diandrus	ripgut grass	NR	NR	Moderate	NR	NR	NR	0	Low
Cirsium arvense	Canada thistle	BW	B	Moderate	B	CA-B	Moderate	0	Low
Cirsium vulgare	bull thistle	NR	B	Moderate	C	CA-C	Low	0	Low
Conium maculatum	poison hemlock	NR	B	Moderate	B	NR	Low	0	Low
Festuca arundinacea	tall fescue	NR	NR	Moderate	NR	NR	NR	0	Low
Hirschfeldia incana	summer mustard	NR	NR	Moderate	NR	NR	NR	0	Low
Hordeum murinum	foxtail barley	NR	NR	Moderate	NR	NR	NR	0	Low
Hypericum perforatum	Klamath weed	CW	B	Limited	B	NR	Low	0	Low
Lepidium draba	hoary cress	BW	NR	Moderate	B	NR	Moderate	0	Low
Leucanthemum vulgare	oxeye daisy	NR	NR	Moderate	NR	NR	NR	0	Low
Marrubium vulgare	white horehound	NR	B	Limited	NR	NR	NR	0	Low
Mentha pulegium	pennyroyal	NR	NR	Moderate	NR	NR	NR	0	Low
Persicaria wallichii	Himalayan knotweed	BW	NR	Watch	NR	NR	NR	0	Low
Rumex acetosella	common sheep sorrel	NR	NR	Moderate	NR	NR	NR	0	Low
Torilis arvensis	field hedge parsley	NR	NR	Moderate	NR	NR	NR	0	Low

Notes: (Lighter cells indicate a high priority to the corresponding agency)

1. CDFA: California Noxious Weed List (CDFA 2018); Ratings descriptions as follows:	
"A"	A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. If found entering or established in the state, A-rated pests are subject to state (or commissioner when acting as a state agent) enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.
"B"	A pest of known economic or environmental detriment and, if present in California, it is of limited distribution. At the discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action.
"C"	A pest of known economic or environmental detriment and, if present in California, it is usually widespread. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness.
"Q"	An organism or disorder suspected to be of economic or environmental detriment, but whose status is uncertain because of incomplete identification or inadequate information.
"W"	This notation indicates that a plant is included in the CCR Section 4500 list of California State Noxious Weeds.
2. ODA Noxious Weed Policy and Classification System (ODA 2018). (Equivalent to the Pacific Northwest Invasive Plant Council (PNW-IPC). Ratings descriptions as follows:	
A	A weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states make future occurrence in Oregon seem imminent. Recommended action: Infestations are subject to eradication or intensive control when and where found.
B	A weed of economic importance which is regionally abundant, but which may have limited distribution in some counties. Recommended action: Limited to intensive control at the state, county or regional level as determined on a site specific, case-by-case basis. Where implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the primary control method.
T	A designated group of weed species that are selected and will be the focus for prevention and control by the Noxious Weed Control Program. Action against these weeds will receive priority.
3. Cal-IPC. The Cal-IPC Plant Inventory (Cal-IPC 2018). Ratings descriptions as follows:	
High	These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment.
Moderate	These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance.
Limited	These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Alert	An Alert is listed on species with High or Moderate impacts that have limited distribution in California, but may have the potential to spread much further.
Watch	These species have been assessed as posing a high risk of becoming invasive in the future in California.

4. KCBC. Noxious Weeds in Klamath County for the year 2019 (KCBC 2019). Ratings descriptions as follows:

A	A weed of known economic importance which occurs in the county in small enough infestations to make eradication/containment possible, or if not known to occur, but its presence in neighboring counties make future occurrence in Klamath County seem imminent.
B	A weed of economic importance which in some parts of the county is abundant but may have limited distribution in other parts of the county. Where implementation of a fully integrated county wide management plan is infeasible, biological control shall be the main control approach.
C	A weed which in most parts of the county is abundant. While not subject to enforcement regulations, these species can cause similar economic and ecological impacts as other noxious weed species. Education and control recommendations will be the main approach.

5. SDA. Identification and Characteristics of Invasive Noxious Weed Infestations. (SDA 2015). Ratings:

A	"A" Rated: A pest of known economic or environmental detriment and is either not known to be established in California or it is present in a limited distribution that allows for the possibility of eradication or successful containment. A-rated pests are prohibited from entering the state. A-rated pests are subject to state (or commissioner) enforced action involving eradication, quarantine regulation, containment, rejection, or other holding action.
B	"B" Rated: A pest of known economic or environmental detriment and it is of limited distribution. Subject to state endorsed holding action and eradication to provide for containment. At the discretion of the individual county agricultural commissioner they are subject to eradication, containment, suppression, control, or other holding action.
C	"C" Rated: A pest of known economic or environmental detriment and is usually widespread. They are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness.

6. USFS-KNF: KNF Noxious Weed and Non-native Invasive Plant List (USFS 2013). Ratings descriptions as follows:

High	These species are currently either limited in distribution, highly invasive, or not present on the KNF. Treatment may vary by location.
Moderate	These species are generally common and are treated on a case by case basis depending on location (Wilderness and Research Natural Area (RNA) increase the priority for treatment).
Low	These species are either widespread throughout the KNF or are not considered to be highly invasive in our area. Usually not treated unless located in a high priority area, such as Wilderness or RNA.

7. Number of Agencies Considering Plant a High Priority for Eradication

8. IEV Survey and Control Priority

Cal-IPC = California Invasive Plant Council
CDFA = California Department of Food and Agriculture
IEV = Invasive Exotic Vegetation
KCBC = Klamath County Board of Commissioners
KNF = Klamath National Forest
ODA = Oregon Department of Agriculture
SDA = Siskiyou Department of Agriculture
USFS = United States Forest Service

The majority of the study area was accessible by foot, except for the southern end of J.C. Boyle Reservoir and the southeastern side of Iron Gate Reservoir. South of Highway 66, J.C. Boyle Reservoir narrows between two rock face cliffs for approximately 0.75 mile. The majority of the southeastern side of Iron Gate is inaccessible because there are no roads, and steep cliffs border the reservoir. For these areas, biologists surveyed from a boat, landing along the shoreline to walk selected accessible areas. For areas too steep to survey by foot, biologists carefully maneuvered the boat to the shoreline and used a pair of binoculars to identify plants.

Ninety percent of the area surrounding Copco Lake is privately owned; consequently, access from the landside was not permitted in most areas. However, during the summer survey in 2018, the water levels in the reservoir were 10 to 15 feet lower than the high water mark, and the biologists were able to use this extended shoreline area to walk along the reservoir without trespassing on any private land.

9.2 Findings

Tables 9-2, 9-3, and 9-4 list the IEV species found in the areas surrounding the J.C. Boyle Reservoir, Copco Lake, and Iron Gate Reservoir, respectively. The area values were calculated as the area where each species was dominant in the survey area. Percent cover represents the area of the dominant species in the study area, divided by the total area of the study area (excluding the reservoir footprints themselves). Figures 12-1 through 12-26 depict the IEV vegetation communities, based on the dominant species, as shown in the tables. Although the figures show invasive species recorded beyond the Project boundary, only areas of invasive species within the limits of work were used to calculate the extent of each species.

Table 9-2: Invasive Exotic Vegetation Extent in the J.C. Boyle Reservoir Uplands

Scientific Name	Common Name	Area (square feet)	Area (acres)	Percent Cover
Bromus tectorum	cheatgrass	288,780	6.629	4.29%
Dipsacus fullonum	teasel	209,250	4.804	3.11%
Phalaris arundinacea	reed canarygrass	206,210	4.734	3.07%
Elymus caput-medusae	medusa head	190,960	4.384	2.84%
Centaurea solstitialis	yellowstar thistle	61,690	1.416	0.92%
Cirsium vulgare	bull thistle	49,260	1.131	0.73%
Lepidium draba	whitetop	46,510	1.068	0.69%
Mentha pulegium	pennyroyal	17,040	0.391	0.25%
Onopordum acanthium	Scotch thistle	13,620	0.313	0.20%
Rumex acetosella	sheep sorrel	6,370	0.146	0.09%
Convolvulus arvensis	field bindweed	1,670	0.038	0.02%
Linaria dalmatica	Dalmatian toadflax	1,530	0.035	0.02%
Rubus armeniacus	Himalayan blackberry	1,330	0.030	0.02%
Acroptilon repens	Russian knapweed	990	0.023	0.01%
	Total	**1,095,210**	**25.142**	**16.26%**

Table 9-3: Invasive Exotic Vegetation Extent in Copco Lake Uplands

Scientific Name	Common Name	Area (square feet)	Area (acres)	Percent Cover
Centaurea solstitialis	yellowstar thistle	262,320	6.022	4.42%
Elymus caput-medusae	medusa head	237,180	5.445	4.00%
Rubus armeniacus	Himalayan blackberry	234,590	5.385	3.96%
Phalaris arundinacea	reed canarygrass	199,440	4.578	3.36%
Dipsacus fullonum	teasel	91,680	2.105	1.55%
Bromus tectorum	cheatgrass	56,790	1.304	0.96%
Lepidium draba	whitetop	8,010	0.184	0.14%
Mentha pulegium	pennyroyal	6,680	0.153	0.11%
Cirsium vulgare	bull thistle	2,210	0.051	0.04%
Conium maculatum	poison hemlock	1,260	0.029	0.02%
Tribulus terrestris	puncture vine	730	0.017	0.01%
Bromus madritensis ssp. rubens	foxtail chess	240	0.006	0.00%
Carduus nutans	musk thistle	100	0.002	0.00%
	Total	**1,101,230**	**25.281**	**18.57%**

Table 9-4: Invasive Exotic Vegetation Extent in the Iron Gate Reservoir Uplands

Scientific Name	Common Name	Area (square feet)	Area (acres)	Percent Cover
Centaurea solstitialis	yellowstar thistle	4,331,510	99.438	36.13%
Elymus caput-medusae	Medusa head	3,631,210	83.361	30.29%
Dipsacus fullonum	teasel	321,720	7.386	2.68%
Bromus tectorum	cheatgrass	318,740	7.317	2.66%
Rubus armeniacus	Himalayan blackberry	179,260	4.115	1.50%
Convolvulus arvensis	field bindweed	64,500	1.481	0.54%
Phalaris arundinacea	reed canarygrass	43,300	0.994	0.36%
Conium maculatum	poison hemlock	29,730	0.682	0.25%
Xanthium spinosum	spiny cocklebur	16,040	0.368	0.13%
Tribulus terrestris	puncture vine	9,200	0.211	0.08%
Isatis tinctoria	dyers woad	3,230	0.074	0.03%
Lepidium draba	whitetop	2,860	0.066	0.02%
Mentha pulegium	pennyroyal	150	0.003	0.00%
Linaria vulgaris	butter and eggs	50	0.001	0.00%
Cirsium vulgare	bull thistle	50	0.001	0.00%
	Total	**8,951,550**	**205.498**	**74.67%**

9.3 Conclusions

Yellowstar thistle (106.88 acres and 18.89 percent cover of Project uplands) and medusa head (93.19 acres and 16.47 percent cover of Project uplands) were dominant throughout the entire Project area. Cheatgrass, teasel, reed canary grass, and Himalayan blackberry each cover between 9 and 16 acres (i.e., 1 to 3 percent) of the total Project upland area. IEV species present in the upland areas of the Project having less than 2 acres of coverage each include field bindweed, whitetop, bull thistle, poison hemlock, pennyroyal, spiny cocklebur, Scotch thistle, puncture vine, sheep sorrel, dyer's woad, Dalmatian toadflax, Russian knapweed, foxtail chess, musk thistle, and butter and eggs.

At J.C. Boyle Reservoir, the dominant IEV species differ from those identified throughout the rest of the study area. The reason for this may be J.C. Boyle Reservoir's higher elevation, closed canopy forest coverage, and gradual slopes. Cheatgrass, teasel, reed canarygrass, and medusa head make up the dominant species at the J.C. Boyle Reservoir area.

The dominant IEV species at the Copco Lake area are yellowstar thistle, medusa head, and Himalayan blackberry. In comparison to the landscape surrounding the J.C. Boyle Reservoir, uplands surrounding Copco Lake are drier due to their lower elevation, lack of overstory cover, and higher evapotranspiration rate.

The dominant IEV species at the Iron Gate Reservoir are yellowstar thistle, medusa head, and teasel. The upland areas at this reservoir are the driest of all due to their low elevation, openness, and high evapotranspiration rate.

The findings and conclusions of the IEV surveys are being used to inform the Reservoir Area Management Plan, including selecting methods for IEV eradication and control during Project implementation.

Chapter 10 References

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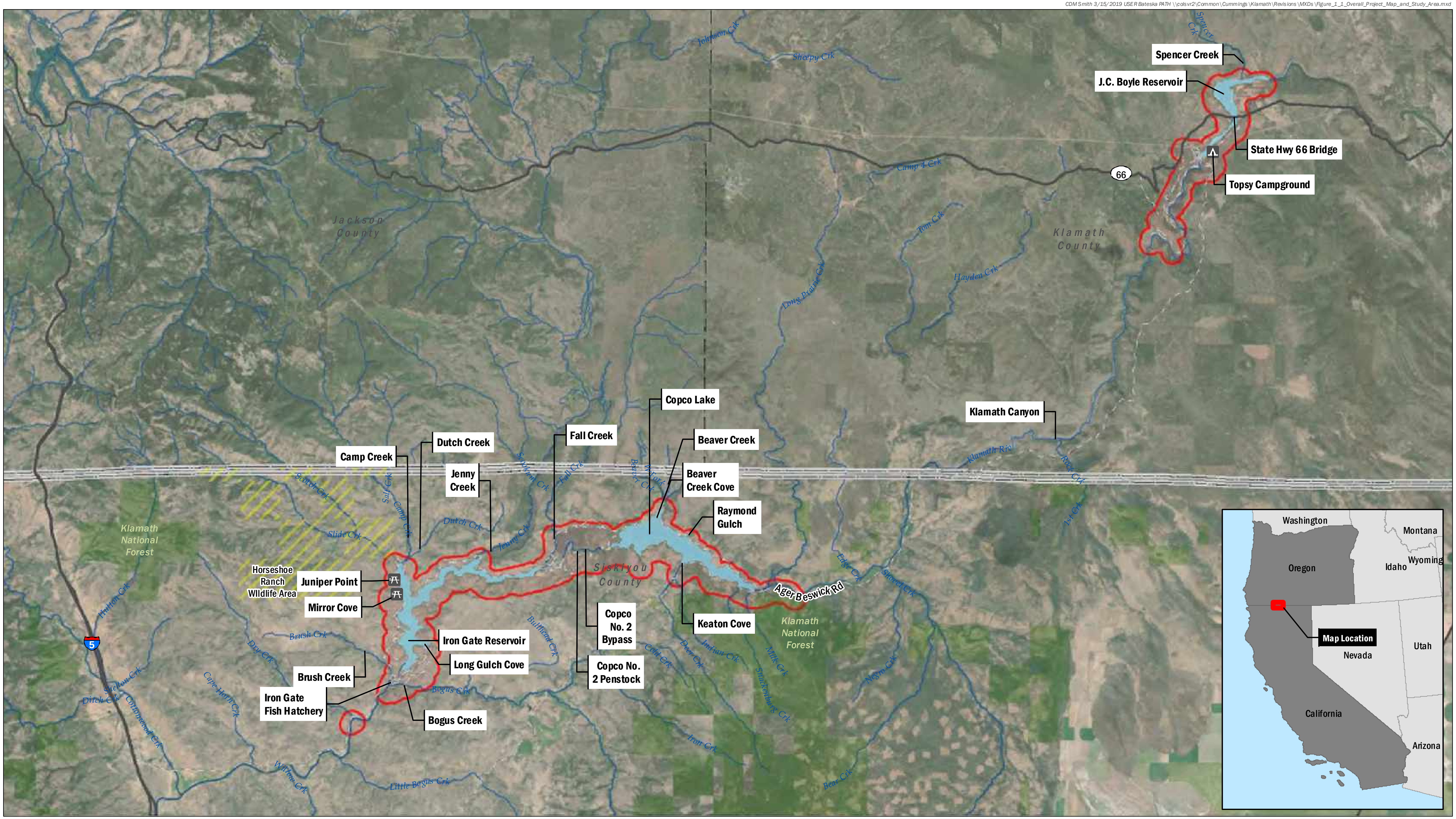
Appendix A Figures

CDM Smith 3/15/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_1_1_Overall_Project_Map_and_Study_Area.mxd



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0 2.5 5
Miles

Data Source: 2018 TIGER/Line Shapefiles
Basemap Source: Esri, USGS, NOAA

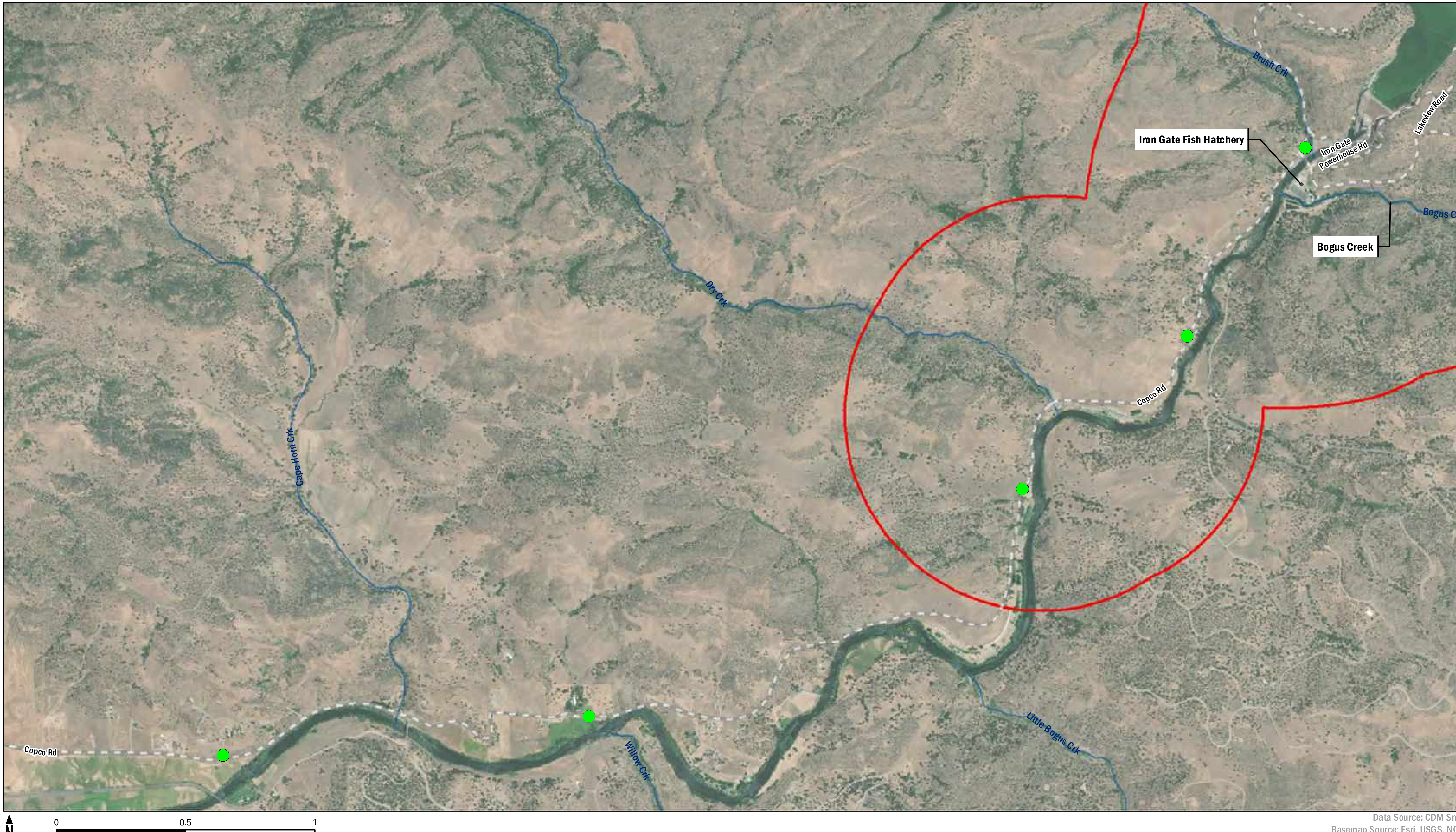
Klamath River Renewal Corporation
Klamath River Renewal Project

- Primary Road
- Access Route
- Stream
- Water Body
- State
- County
- National Forest
- Wildlife Area
- 0.25 Mile Study Area Buffer

FIGURE 1-1

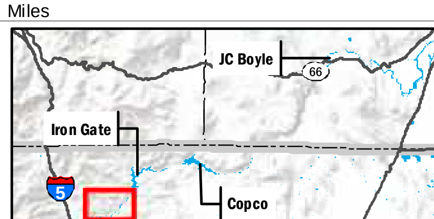
Overall Project Map and Terrestrial Resources Study Area

CDM Smith 3/15/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_2_1_Osprey_Observations_and_Nest_Locations.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

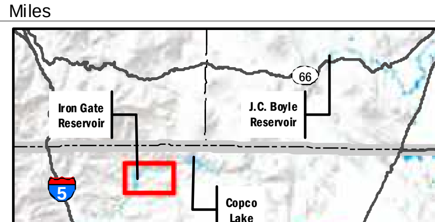
- State
- County
- Stream
- Access Route
- 0.75 Mile Study Area Buffer

FIGURE 2-1

Osprey (Pandion haliaetus)
Observations and Nest Locations
Klamath River (Below Iron Gate Dam)

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

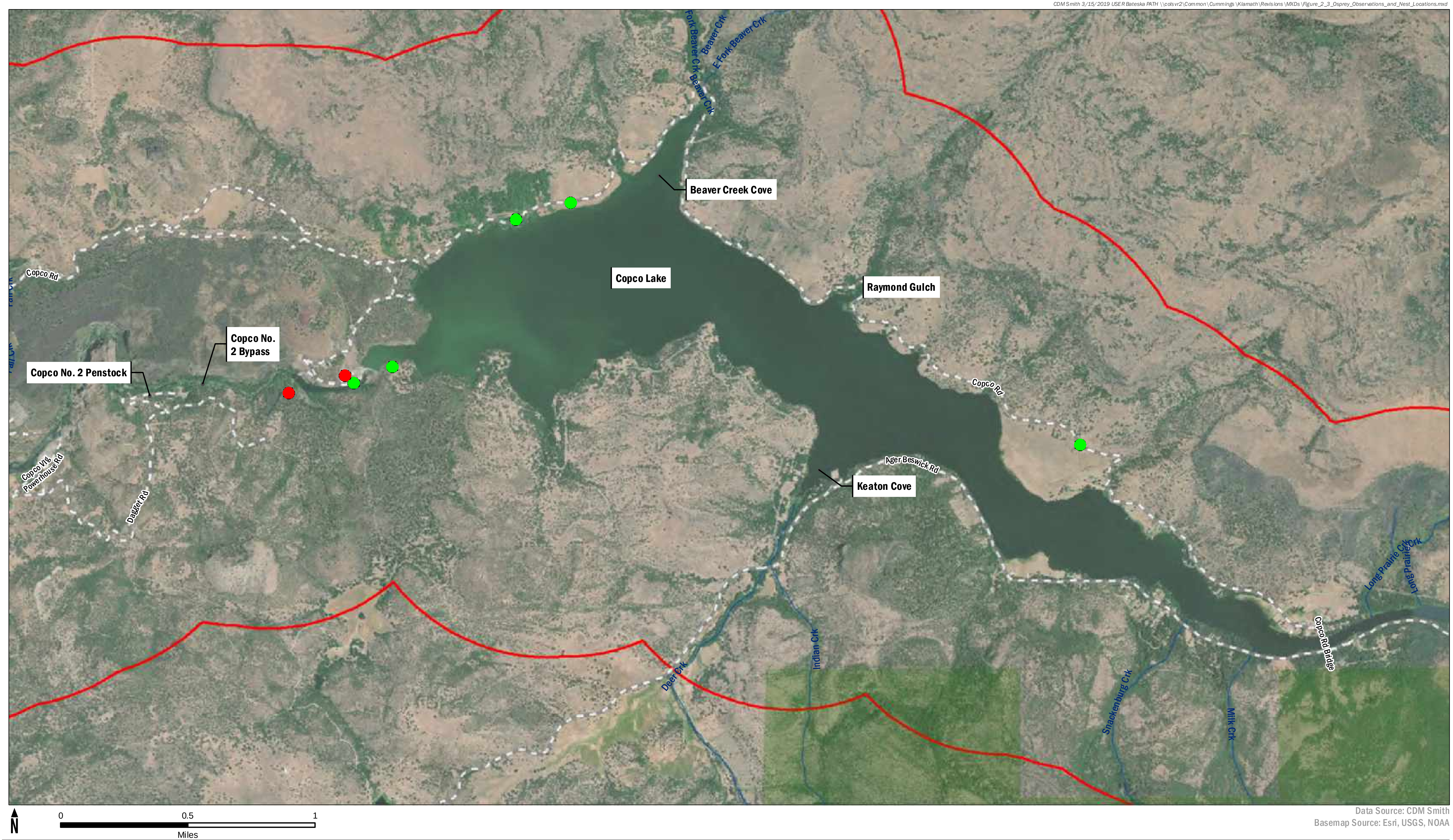


Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

- State
- County
- Access Route
- Stream
- 0.75 Mile Study Area Buffer

FIGURE 2-2

Osprey (Pandion haliaetus) Observations and Nest Locations Iron Gate Reservoir



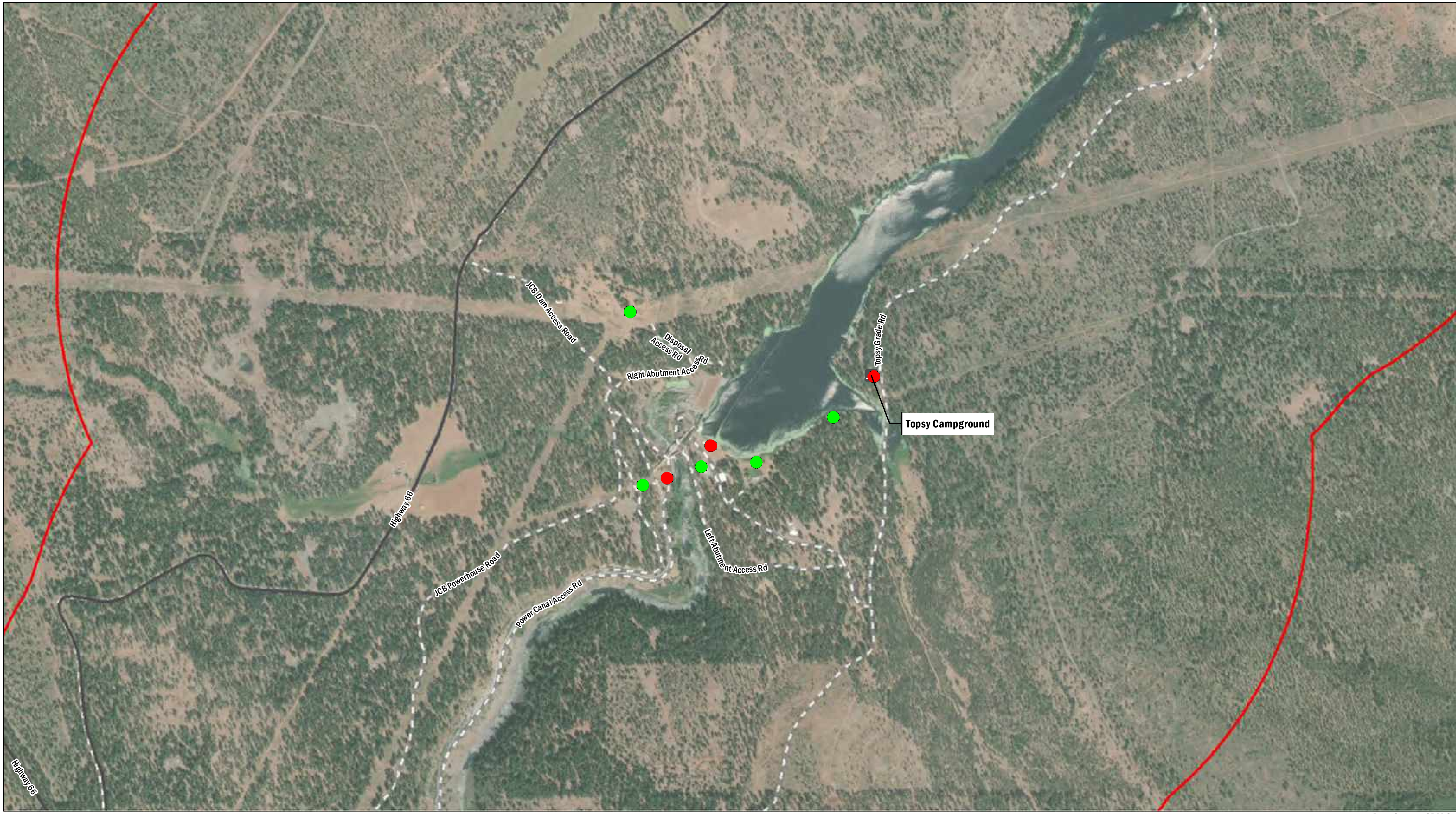
Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

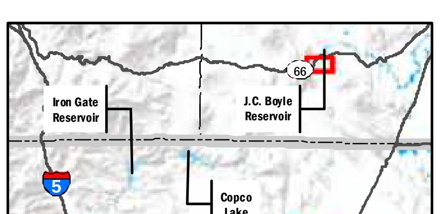
Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

- State
- County
- Stream
- Access Route
- 0.75 Mile Study Area Buffer

FIGURE 2-3
Osprey (Pandion haliaetus) Observations and Nest Locations Copco Lake



Klamath River Renewal Corporation
Klamath River Renewal Project



Osprey Nest Active Status
- Active, Osprey
- Inactive, Osprey

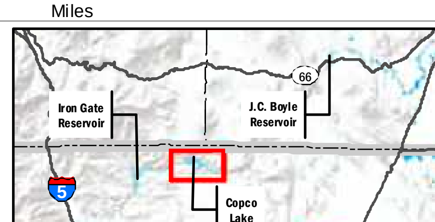
- State
- County
- Primary Road
- Access Route
- 0.75 Mile Study Area Buffer

FIGURE 2-4

Osprey (Pandion haliaetus) Observations and Nest Locations J.C. Boyle Reservoir

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

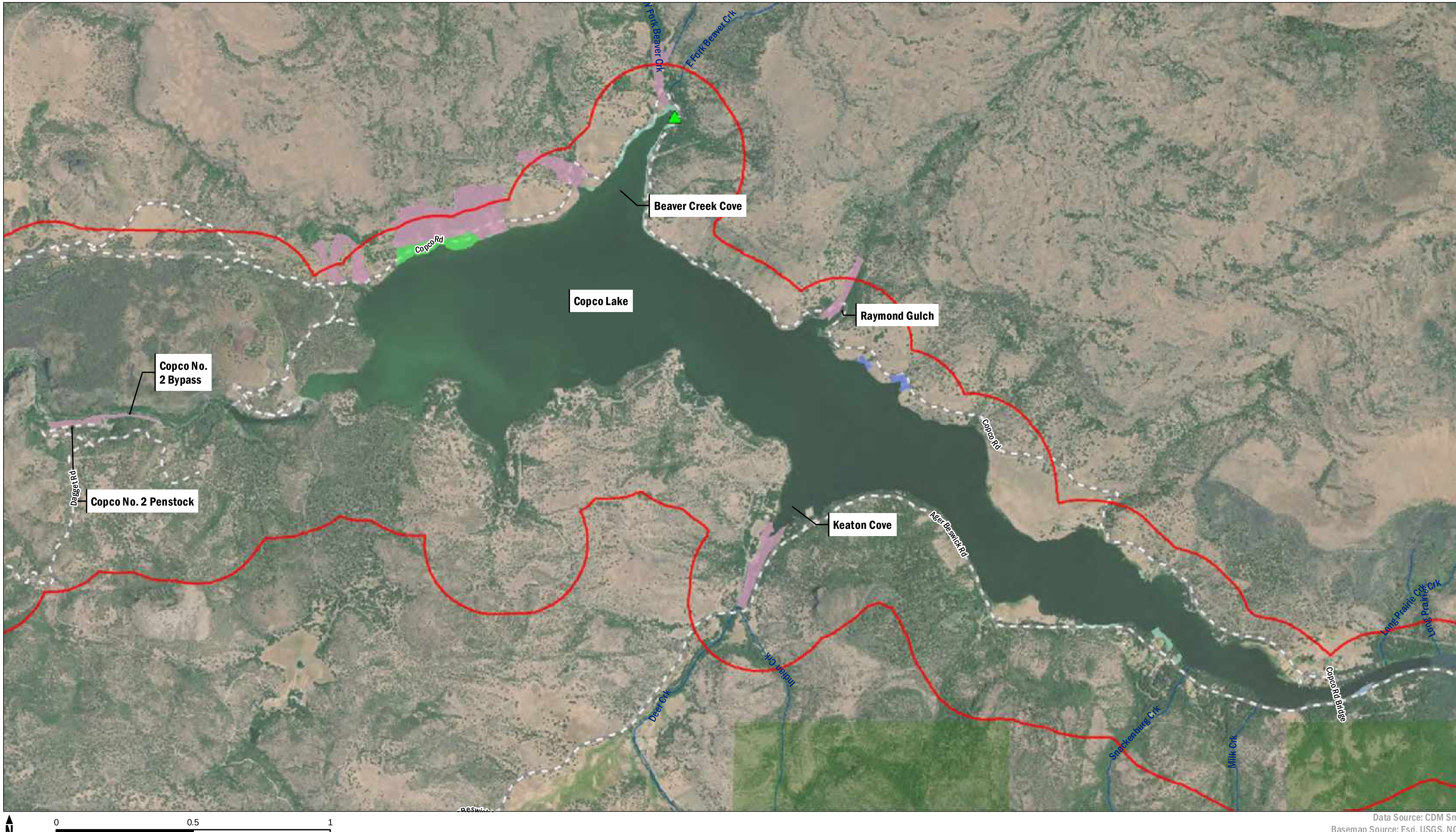


Willow Flycatcher Observation
Willow Flycatcher Habitat
Bigleaf maple forest
Geyer willow thicket
Oregon ash grove
Shining willow grove
Willow thickets

State
County
Stream
Access Route
0.25 Mile Study Area Buffer

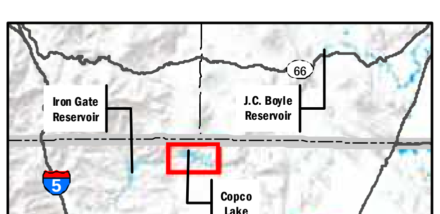
FIGURE 3-1
2018 Willow Flycatcher Habitat and Observations
Iron Gate Reservoir

CDM Smith 3/15/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_3_2_Willow Flycatcher_Habitats_and_Observations.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Geyer willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 3-2
2018 Willow Flycatcher Habitat and Observations
Copco Lake

AECOM Oakland CA 3/15/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_3_3_Willow Flycatcher_Habitats_and_Observations.mxd

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

- Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Geyer willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- 0.25 Mile Study Area Buffer
- Access Route

FIGURE 3-3

2018 Willow Flycatcher Habitat and Observations
J.C. Boyle Reservoir and Canal

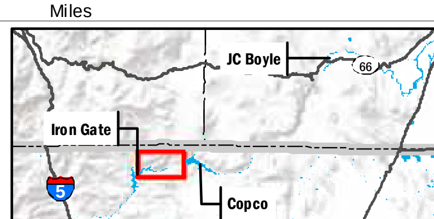
CDM Smith 3/15/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_4_1_Other_Special_Status_Wildlife_Observations.mxd

N

0 0.5 1
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



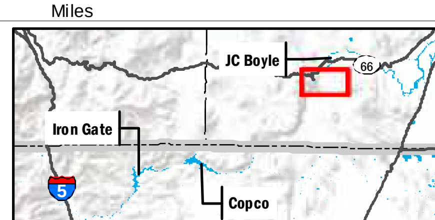
Great Blue Heron Colony
Sand Hill Crane Nest
Peregrine Falcon Nest

State
County
Stream
Access Route
0.25 Mile Study Area Buffer

FIGURE 4-1
Other Special Status Wildlife Observations
Iron Gate Reservoir

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

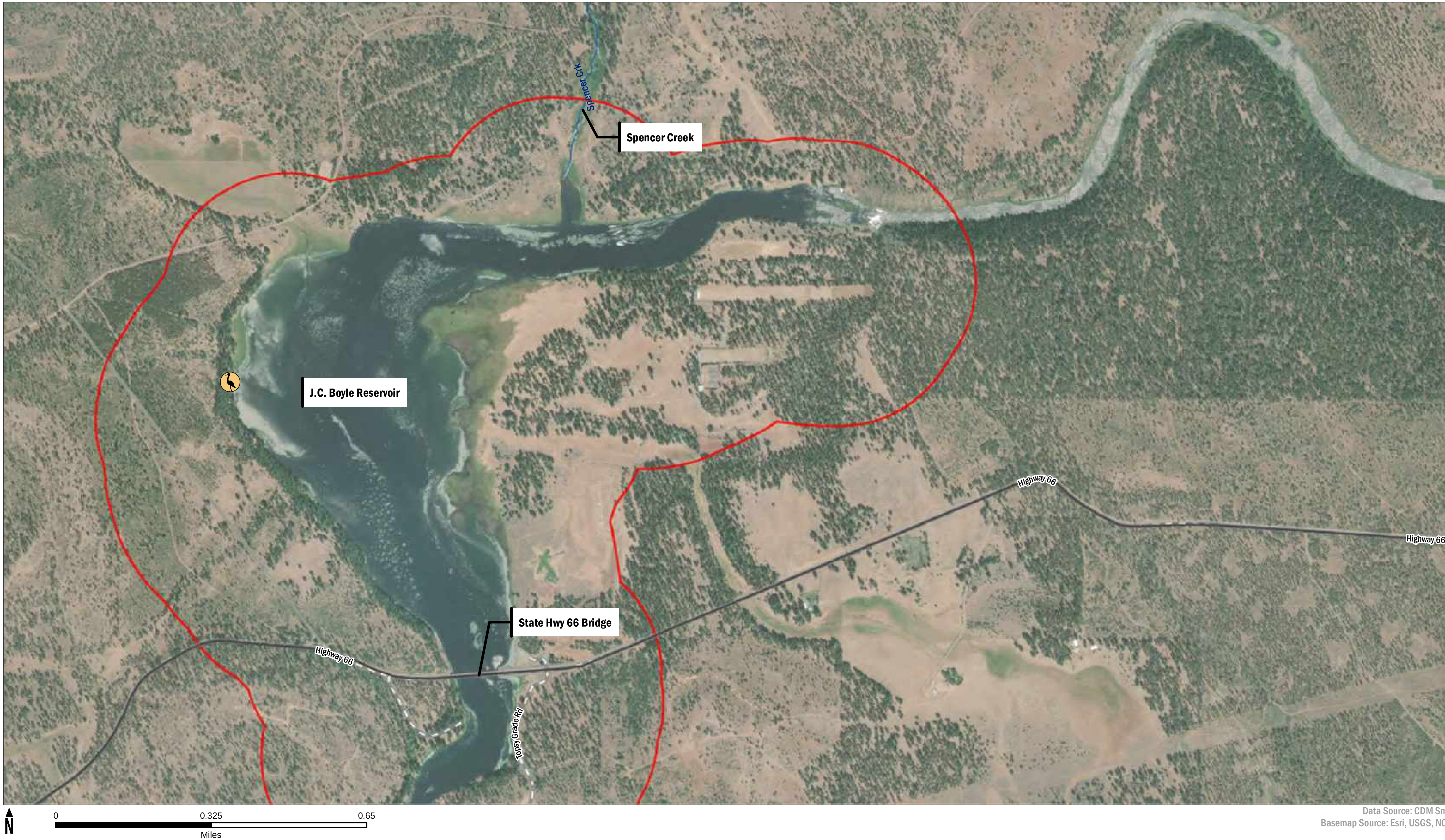


Great Blue Heron Colony
Sand Hill Crane Nest
Peregrine Falcon Nest

State
County
Primary Road
Access Route
0.25 Mile Study Area Buffer

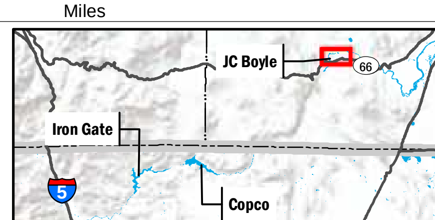
FIGURE 4-2
Other Special-Status Wildlife Observations
Klamath River (Below J.C. Boyle Dam)

CDM Smith 3/18/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_4_3_Other_Special_Status_Wildlife_Observations.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

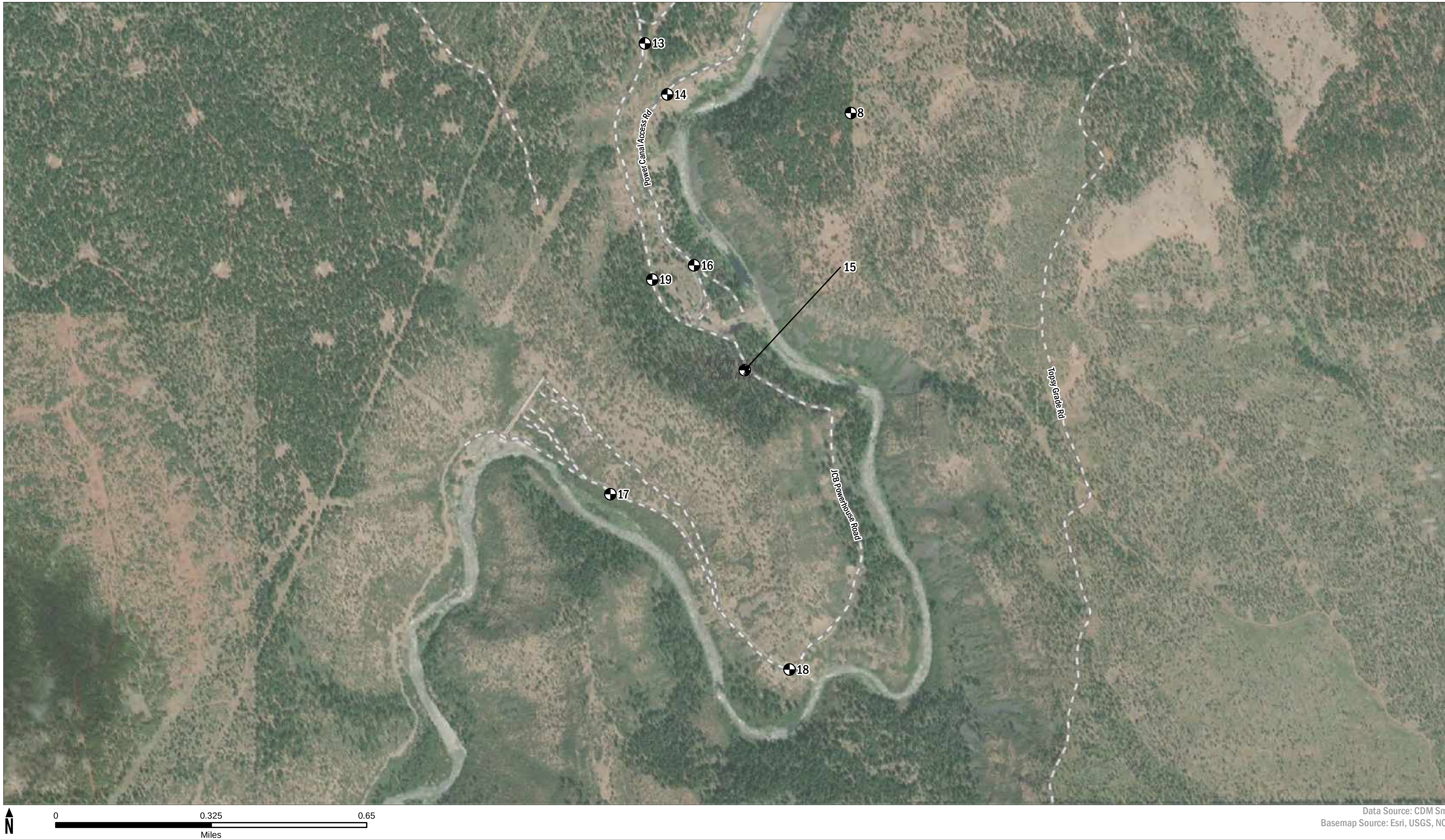


- Great Blue Heron Colony
- Sand Hill Crane Nest
- Peregrine Falcon Nest

- State
- County
- Stream
- Primary Road
- Access Route
- 0.25 Mile Study Area Buffer

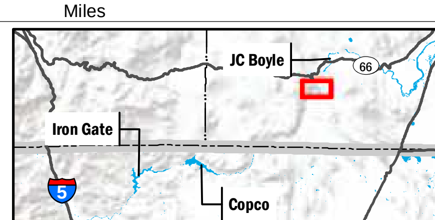
FIGURE 4-3
Other Special Status Wildlife Observations
J.C. Boyle Reservoir

CDM Smith 3/18/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_5_2_Nothern_Spotted_Owl_Calling_Stations.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



NSO Calling Station

State
County
Secondary Road
Access Route

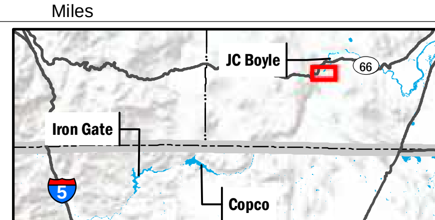
FIGURE 5-1

Northern Spotted Owl (NSO) Calling Stations
J.C. Boyle Lower Stations

CDM Smith 3/18/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_5_1_Nothern_Spotted_Owl_Calling_Stations.mxd

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



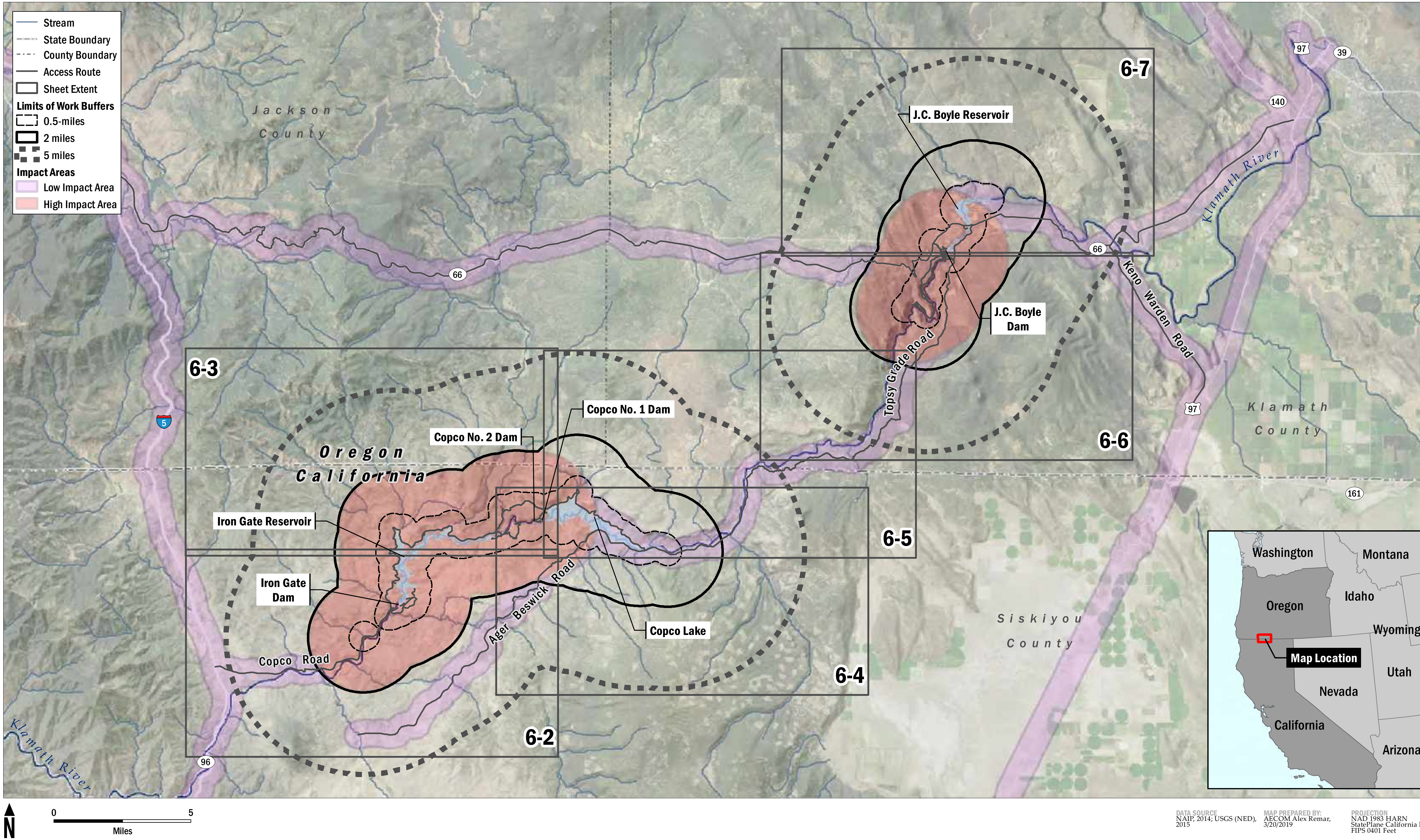
NSO Calling Station

State
County
Stream
Primary Road
Access Route

FIGURE 5-2

Northern Spotted Owl (NSO) Calling Stations
J.C. Boyle Upper Stations

AECOM Oakland CA 3/20/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\Figure_6-1_EagleNests_Overview.mxd



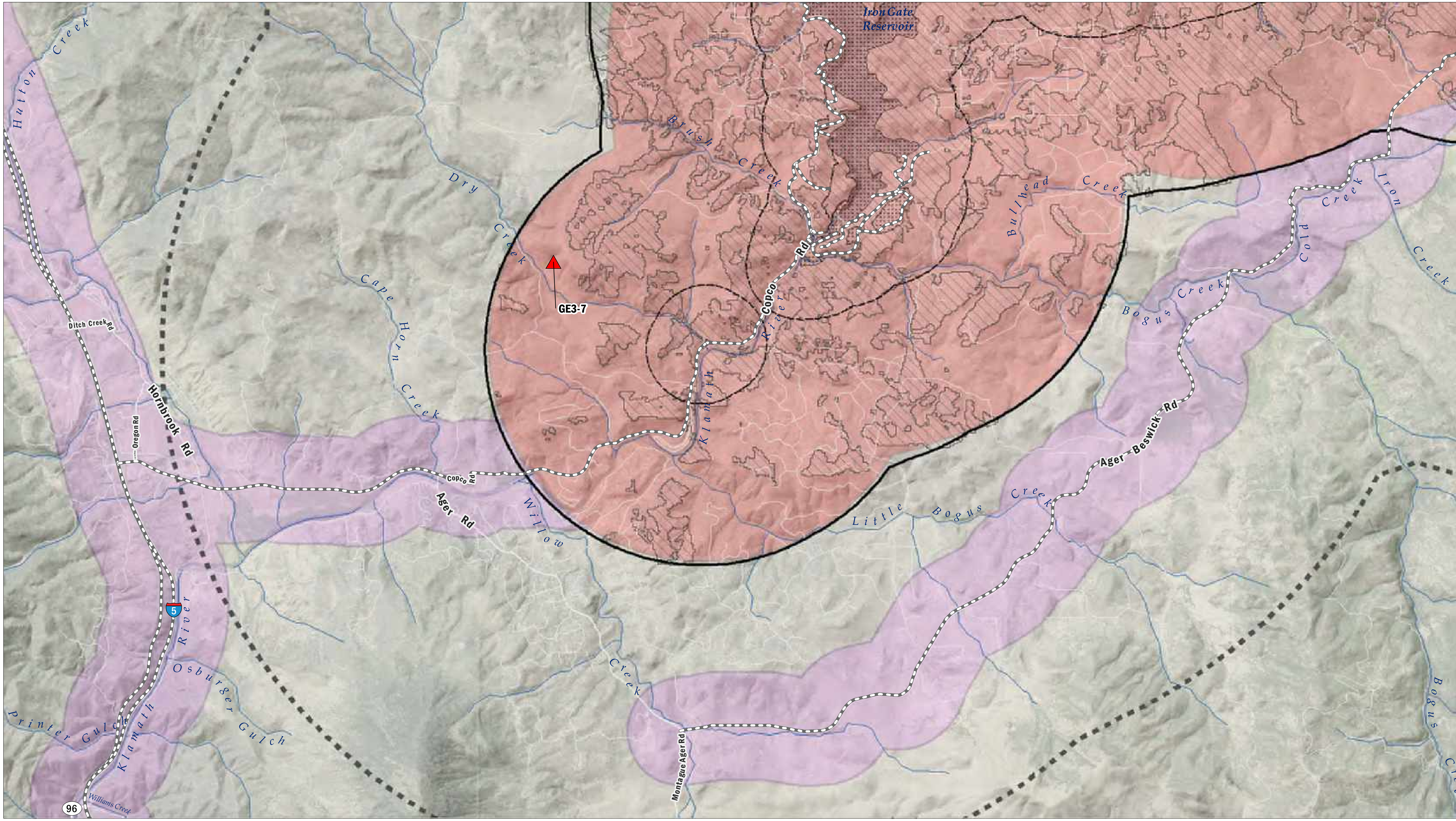
DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

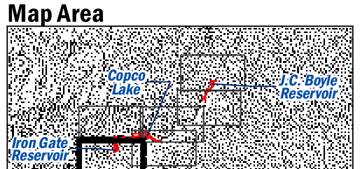
AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 6-1
2018 Eagle Nest Survey Results Overview



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



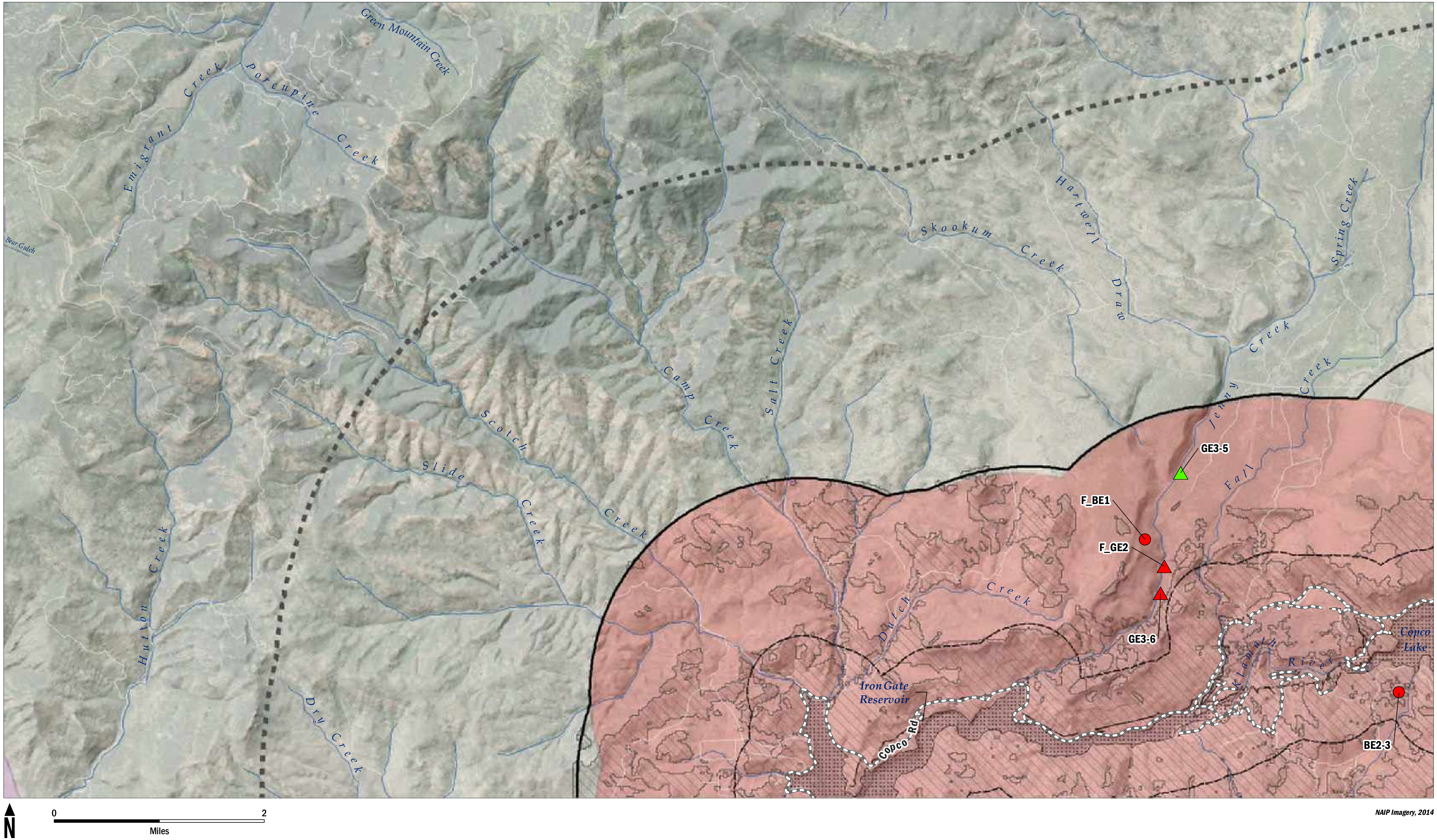
- Access Routes
- Limits of Work
- 2-Mile Viewshed from Limits of Work

Impact Areas
- Low Impact Area
- High Impact Area

Eagle Nest Active Status
- Inactive, Golden Eagle

Limits of Work Buffers
- 0.5-miles
- 2 miles
- 5 miles

FIGURE 6-2
2018 Eagle Nest Survey Results
Sheet 1 of 6



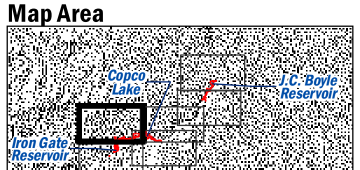
NAIP Imagery, 2014

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

Impact Areas
Low Impact Area
High Impact Area

Eagle Nest Active Status
Active, Golden Eagle
Inactive, Bald Eagle
Inactive, Golden Eagle

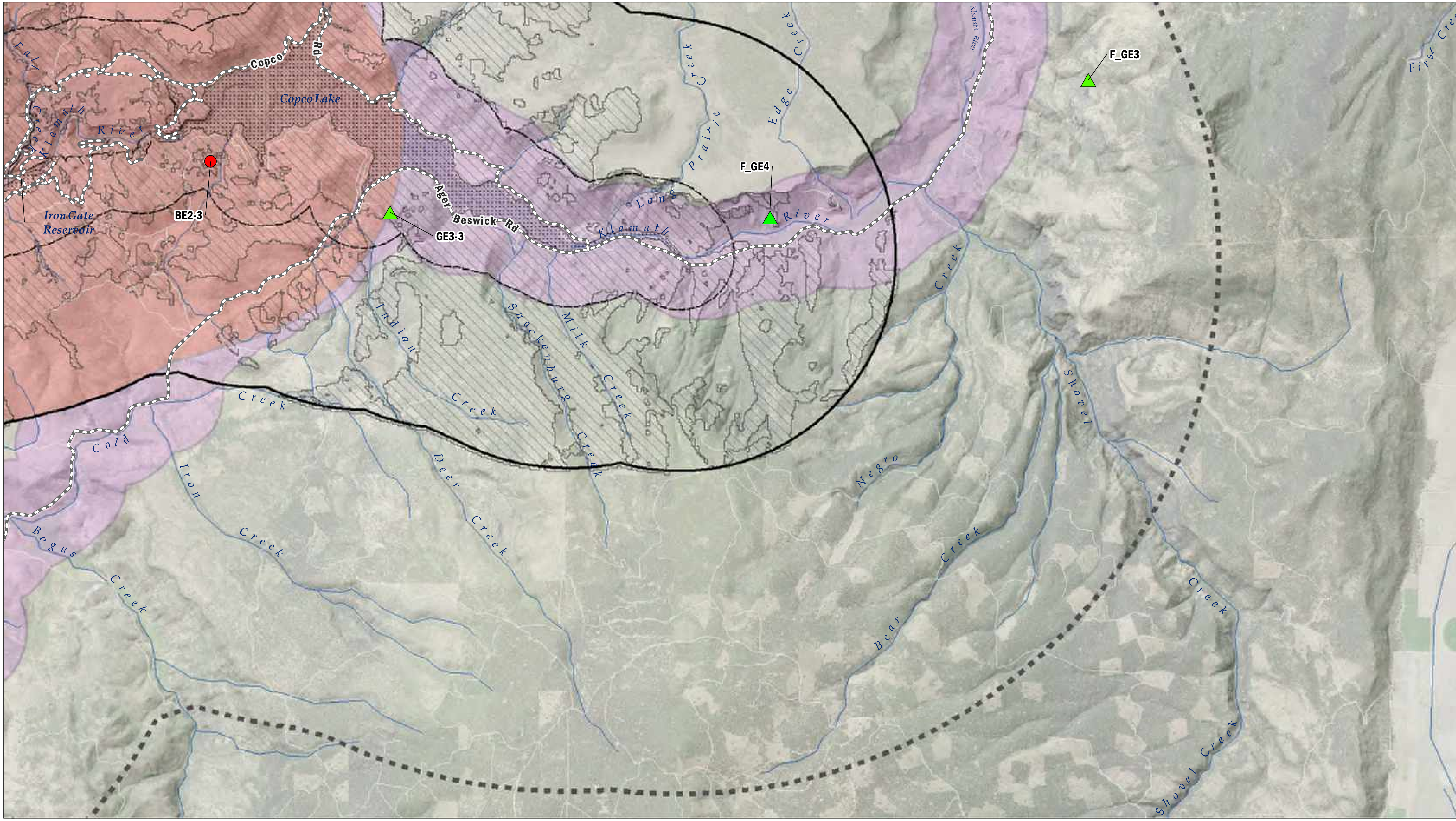
Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-3

2018 Eagle Nest Survey Results

Sheet 2 of 6

AECOM Oakland CA 12/4/2018 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\Figure_5-2-7_EagleNests_Mapbook.mxd



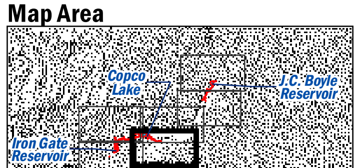
N

0 2
Miles

NAIP Imagery, 2014

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



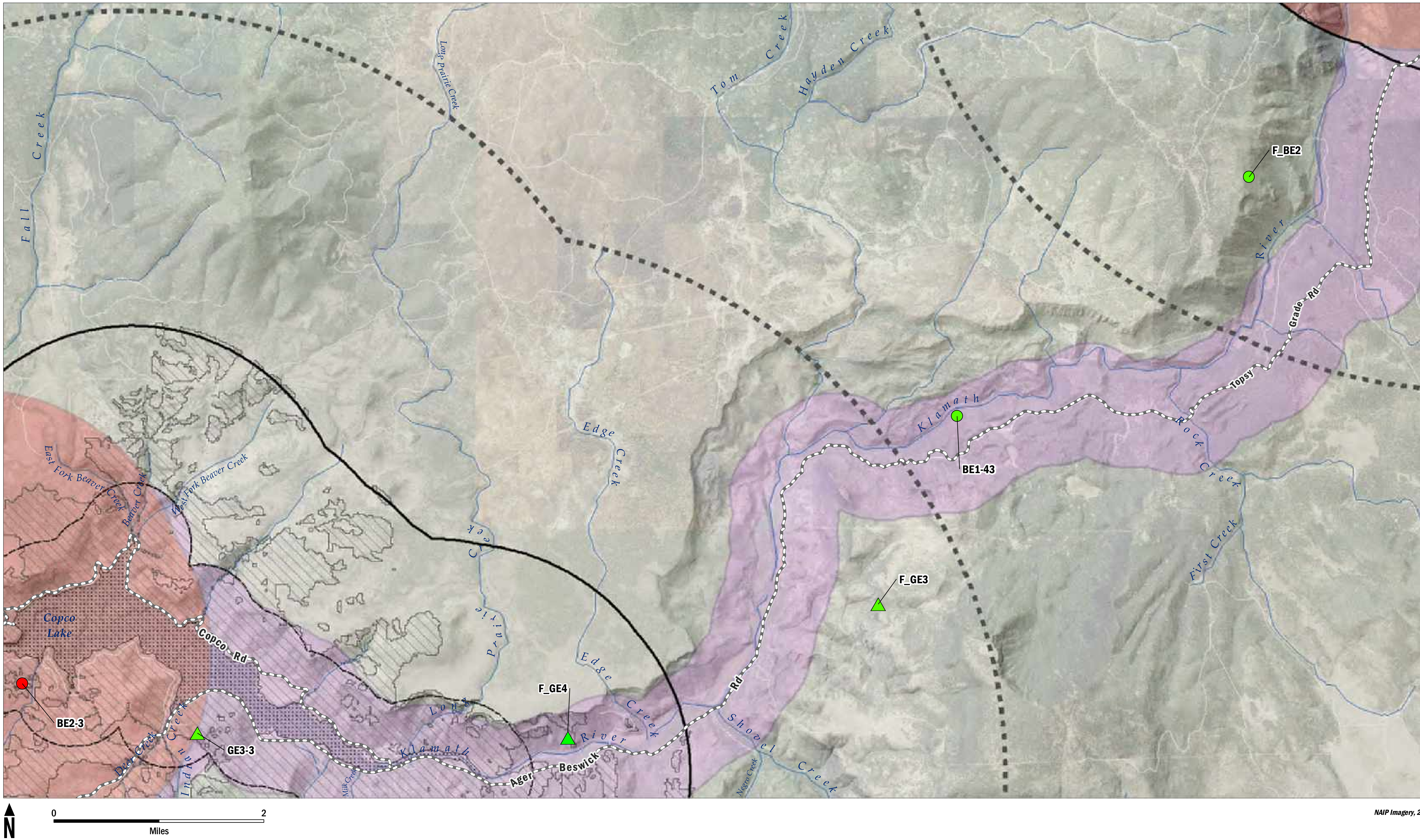
Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

Impact Areas
Low Impact Area
High Impact Area

Eagle Nest Active Status
Active, Golden Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-4
2018 Eagle Nest Survey Results
Sheet 3 of 6



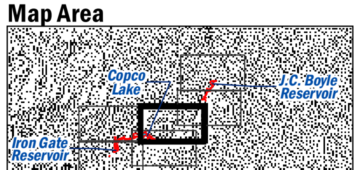
NAIP Imagery, 2014

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

Impact Areas
Low Impact Area
High Impact Area

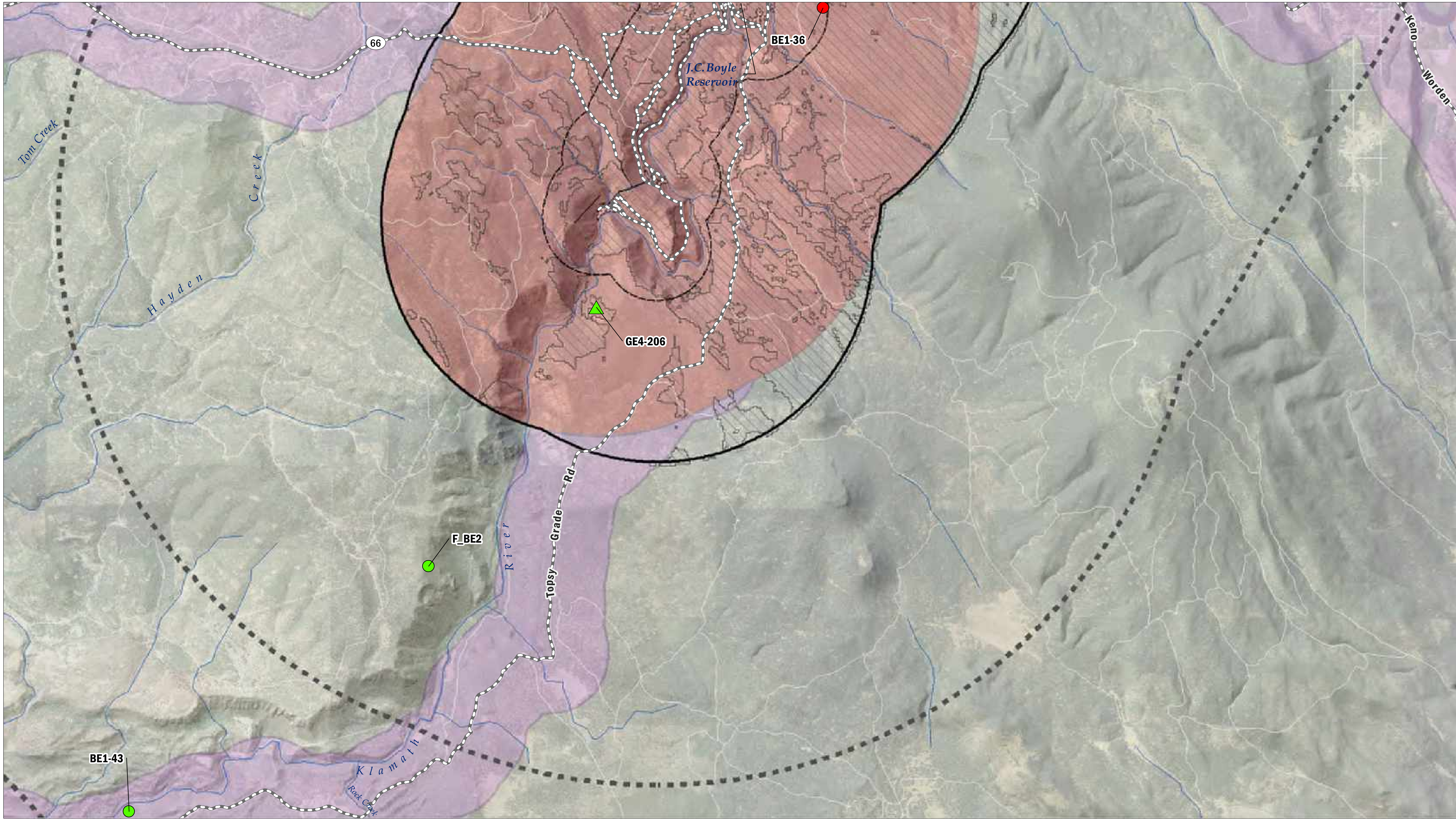
Eagle Nest Active Status
Active, Bald Eagle
Active, Golden Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-5

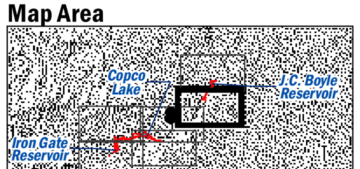
2018 Eagle Nest Survey Results

Sheet 4 of 6



AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

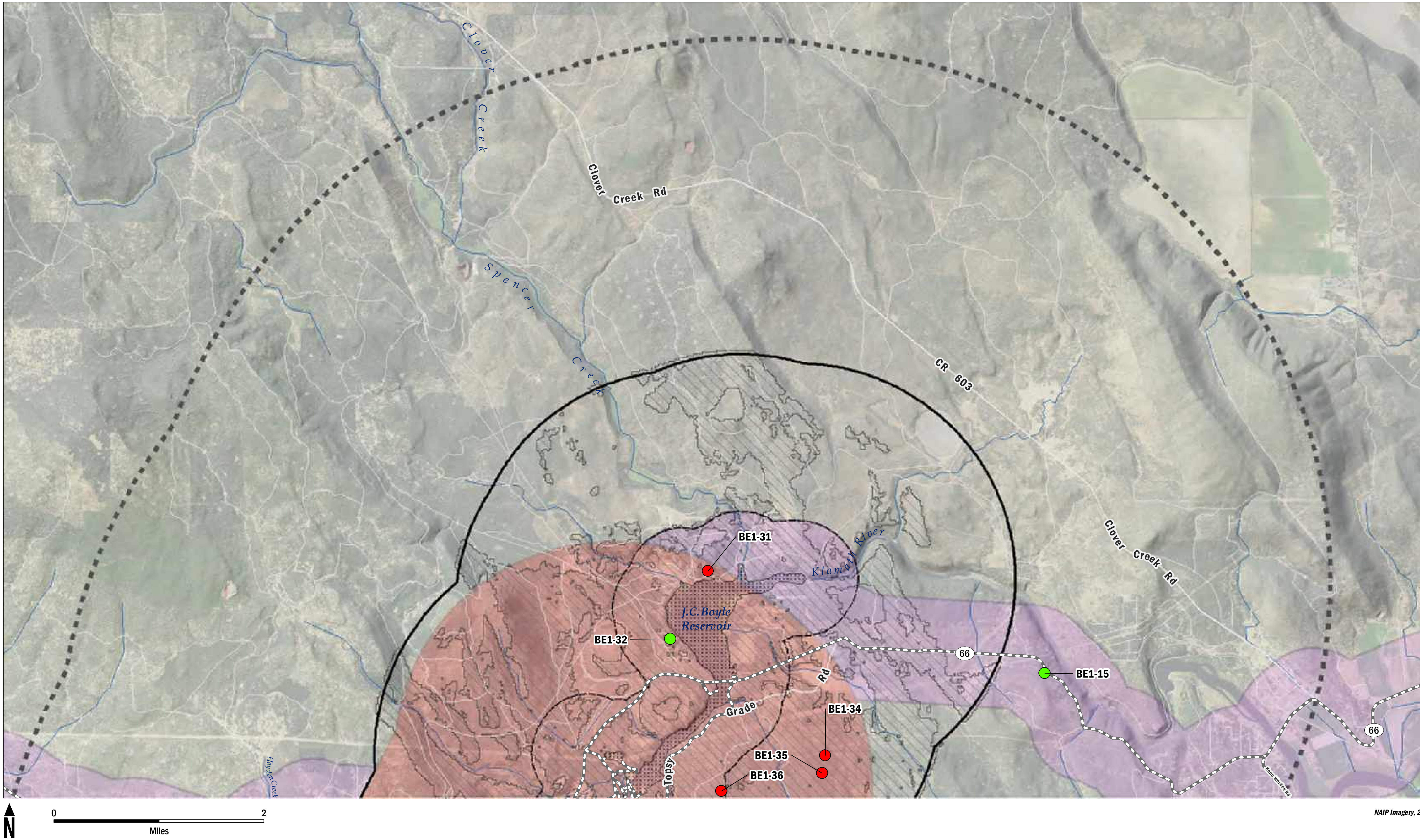
Impact Areas
Low Impact Area
High Impact Area

Eagle Nest Active Status
Active, Bald Eagle
Active, Golden Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-6
2018 Eagle Nest Survey Results
Sheet 5 of 6

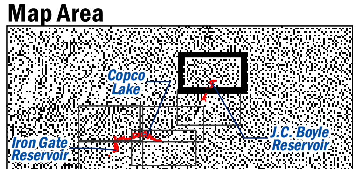
AECOM Oakland CA 12/4/2018 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\EagleNests_ActivieStatus_TEMP.mxd



NAIP Imagery, 2014

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area



Access Routes
Limits of Work
2-Mile Viewshed from Limits of Work

Impact Areas
Low Impact Area
High Impact Area

Eagle Nest Active Status
Active, Bald Eagle
Inactive, Bald Eagle

Limits of Work Buffers
0.5-miles
2 miles
5 miles

FIGURE 6-7

2018 Eagle Nest Survey Results
Sheet 6 of 6

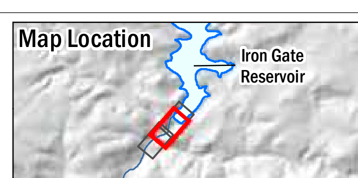
AECOM Oakland CA 2/28/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2018\Figure 6-5 2017-2018 Bat Surveys.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

Active Bat Roost Confirmed

Roosting Bats Not Found

FIGURE 7-1

2017-2018 Bat Surveys
Iron Gate Dam Area

AECOM Oakland CA 2/28/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2018\Figure 6-4 2017-2018 Bat Surveys.mxd

(I) FOREBAY AND SPILLWAY

(II) PENSTOCKS AND POWERHOUSE

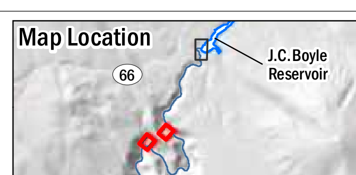
0 300
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

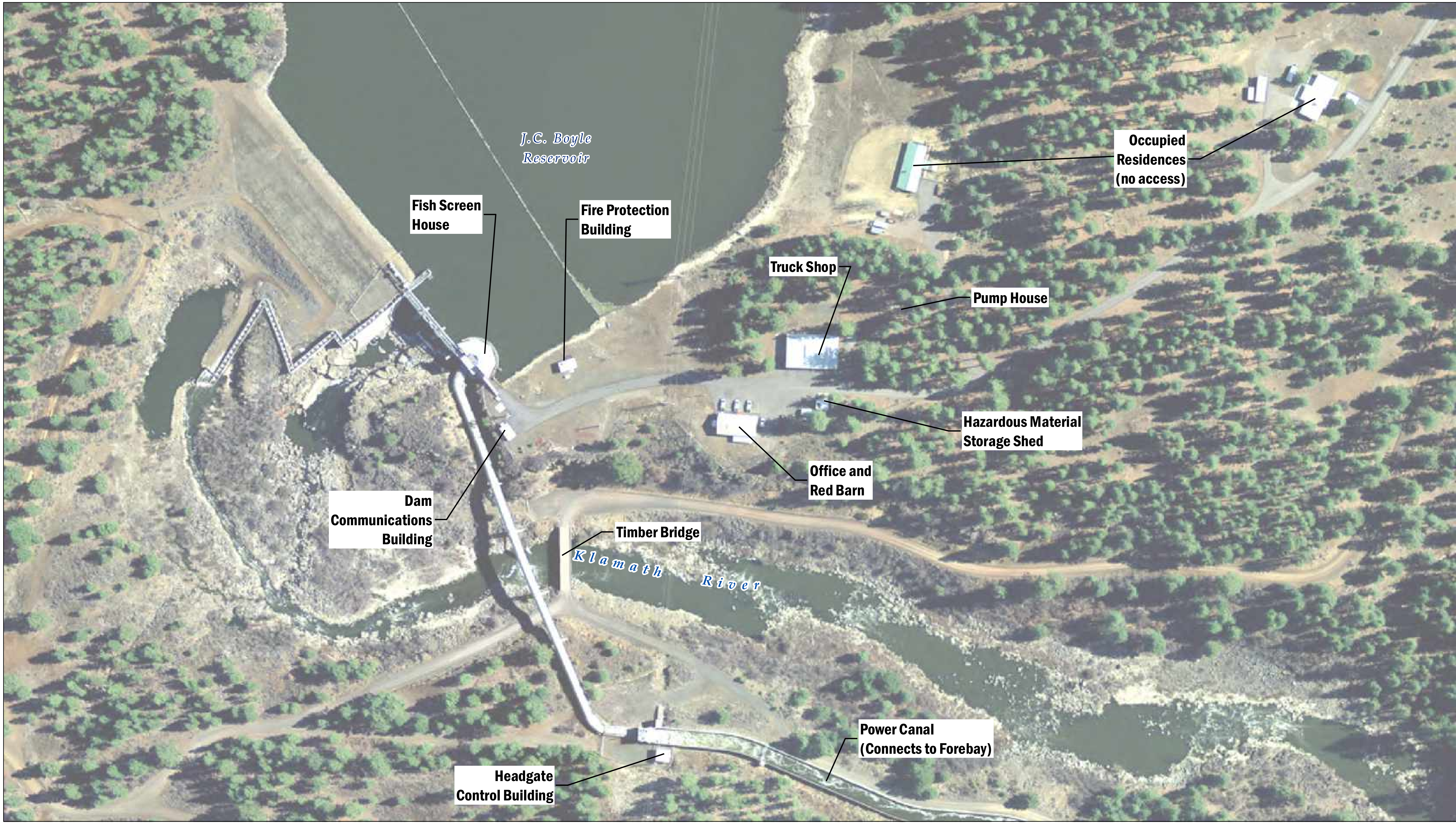
AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels
Active Bat Roost Confirmed
Roosting Bats Not Found

FIGURE 7-2

2017-2018 Bat Surveys
J.C. Boyle Forebay and Spillway Area, Penstocks and Powerhouse Area



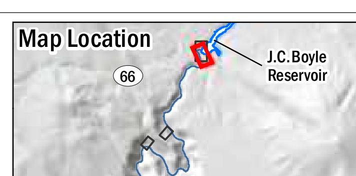
0 300
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



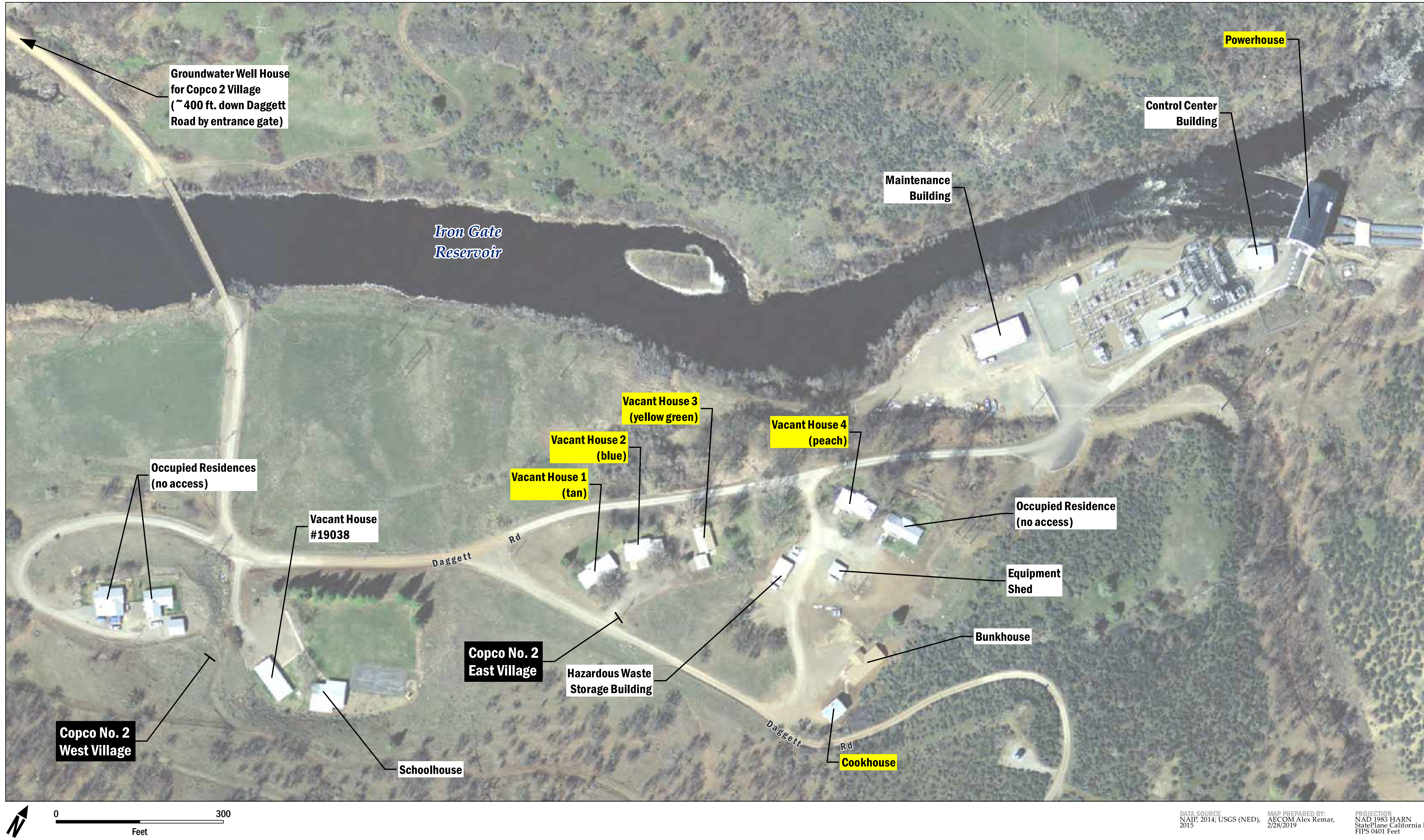
Labels

Roosting Bats Not Found

FIGURE 7-3

2017-2018 Bat Surveys
J.C. Boyle Dam Area

AECOM Oakland CA 2/28/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2018\Figure 6-2 2017-2018 Bat Surveys.mxd

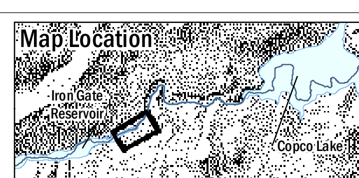


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

(yellow)	Active Bat Roost Confirmed
(white)	Roosting Bats Not Found

FIGURE 7-4
2017-2018 Bat Surveys
Copco No. 2 Powerhouse Area

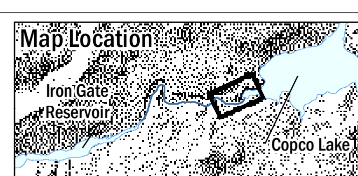
AECOM Oakland CA 2/28/2019 USER alexander.remar PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2018\Figure 6-1 2017-2018 Bat Surveys.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 2/28/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



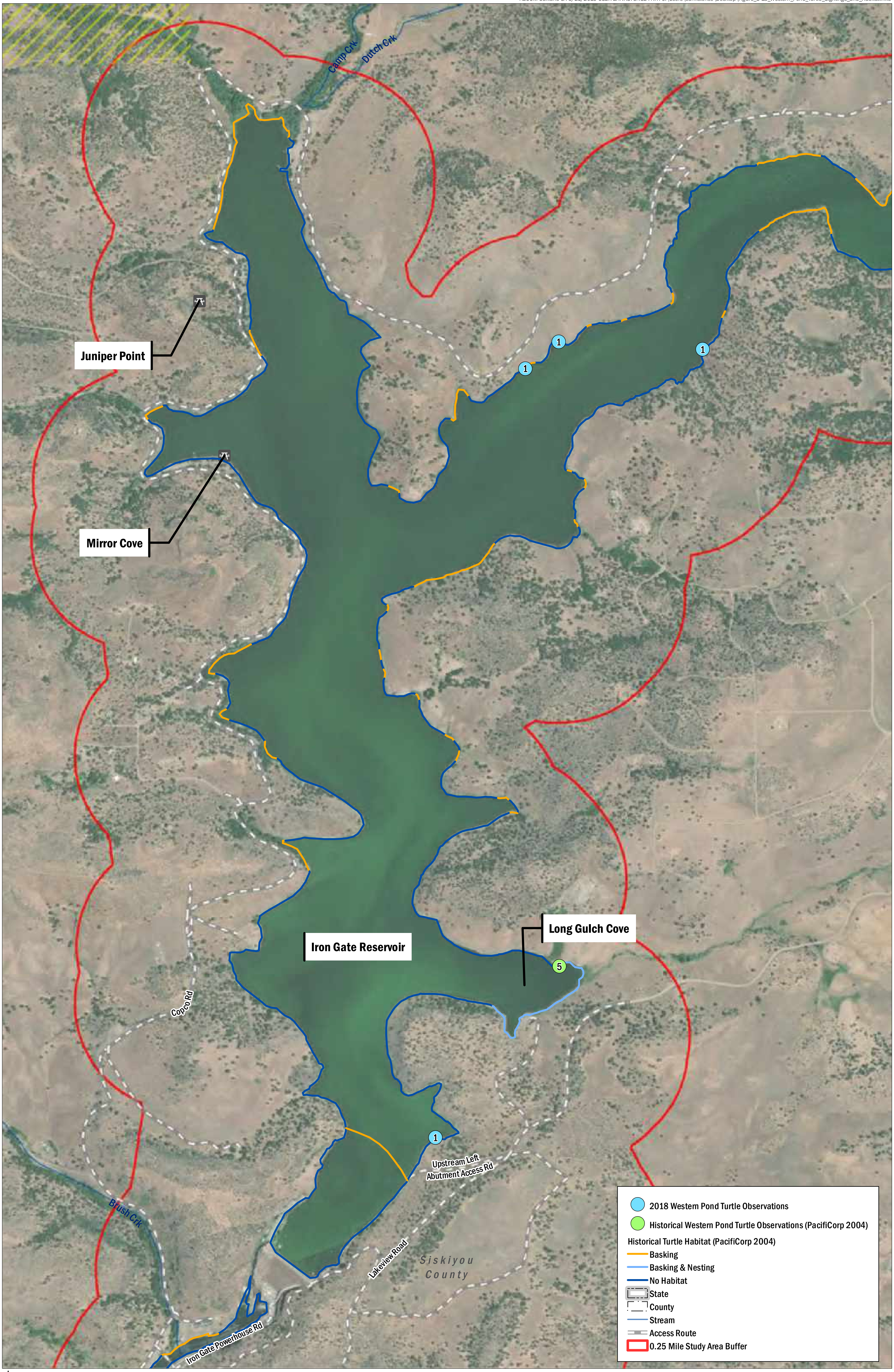
Labels

- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 7-5

2017-2018 Bat Surveys
Copco No. 1 Dam Area and
Copco No. 2 Dam Area

AECOM Oakland CA 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-1a_Western_Pond_Turtle_Sightings_and_Habitat.mxd



N

0 0.5

Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

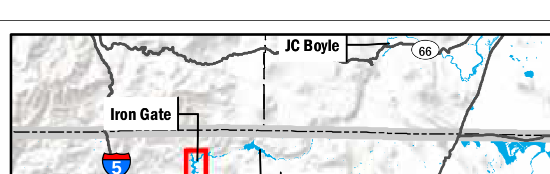
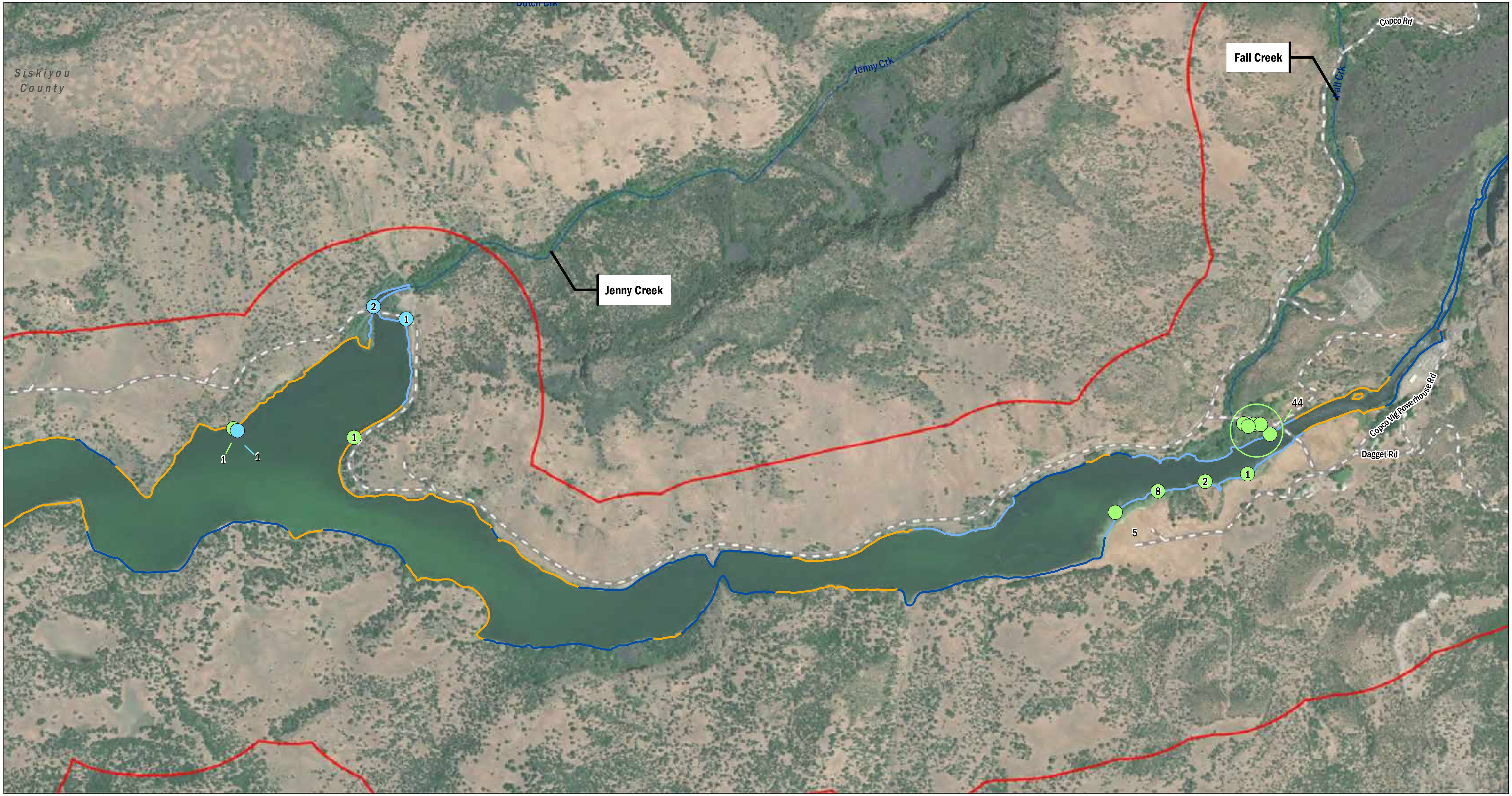


FIGURE 8-1A

Western Pond Turtle Sightings and Habitat
Iron Gate Reservoir



N
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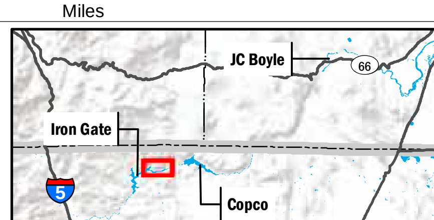
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



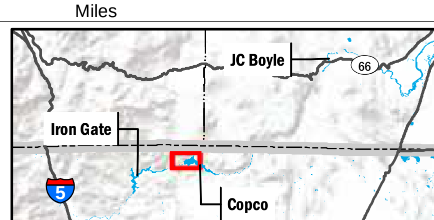
2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
- Basking
- Basking & Nesting
- No Habitat
- Not Surveyed

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 8-1B
Western Pond Turtle Sightings and Habitat
Iron Gate Reservoir

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifiCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
- Basking
- Basking & Nesting
- No Habitat
- Not Surveyed

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 8-2A
Western Pond Turtle Sightings and Habitat
Copco Lake

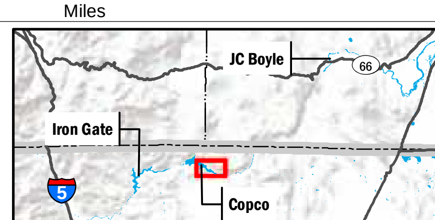
CDM Smith 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-2b_Western_Pond_Turtle_Sightings_and_Habitat.mxd

N

0 0.325 0.65
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

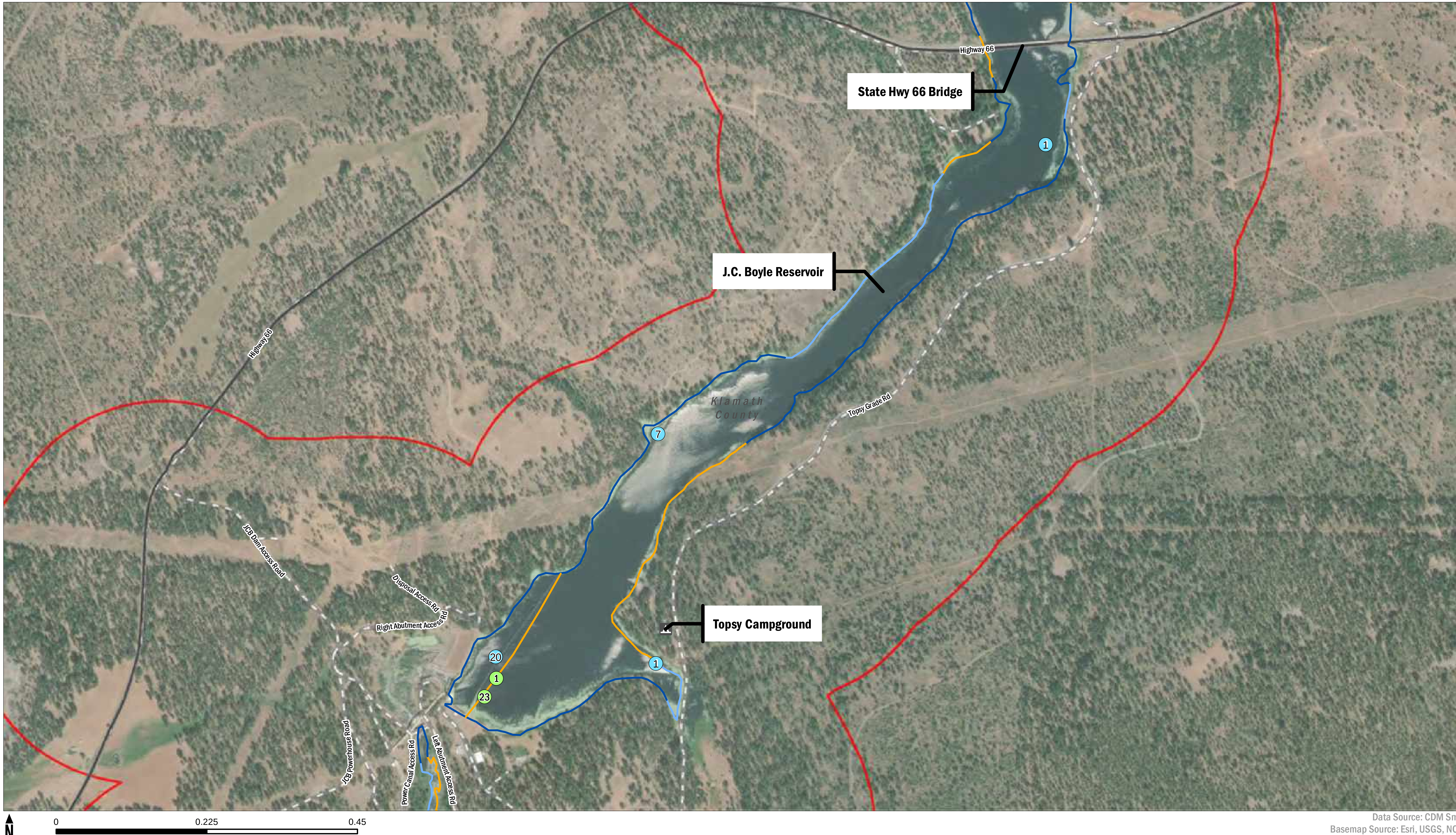


2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifiCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
Basking
Basking & Nesting
No Habitat
Not Surveyed

State
County
Stream
Access Route
0.25 Mile Study Area Buffer

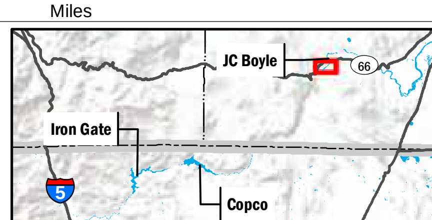
FIGURE 8-2B
Western Pond Turtle Sightings and Habitat
Copco Lake

CDM Smith 3/21/2019 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Figure_8-3a_Western_Pond_Turtle_Sightings_and_Habitat.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



2018 Western Pond Turtle Observations
Historical Western Pond Turtle Observations (PacifiCorp 2004)
Historical Turtle Habitat (PacifiCorp 2004)
- Basking
- Basking & Nesting
- No Habitat
- Not Surveyed

- State
- County
- Primary Road
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 8-3A
Western Pond Turtle Sightings and Habitat
J.C. Boyle Reservoir

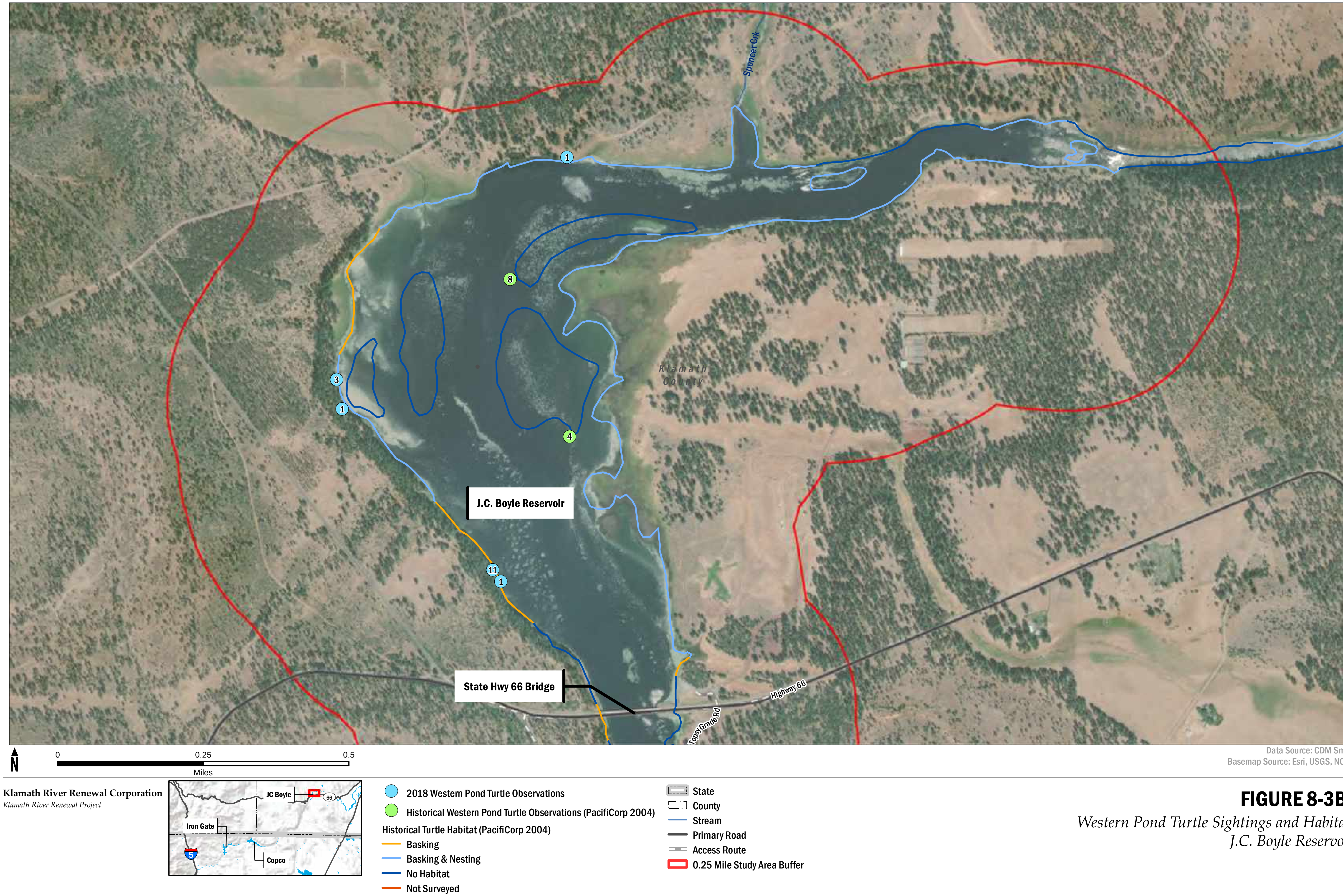


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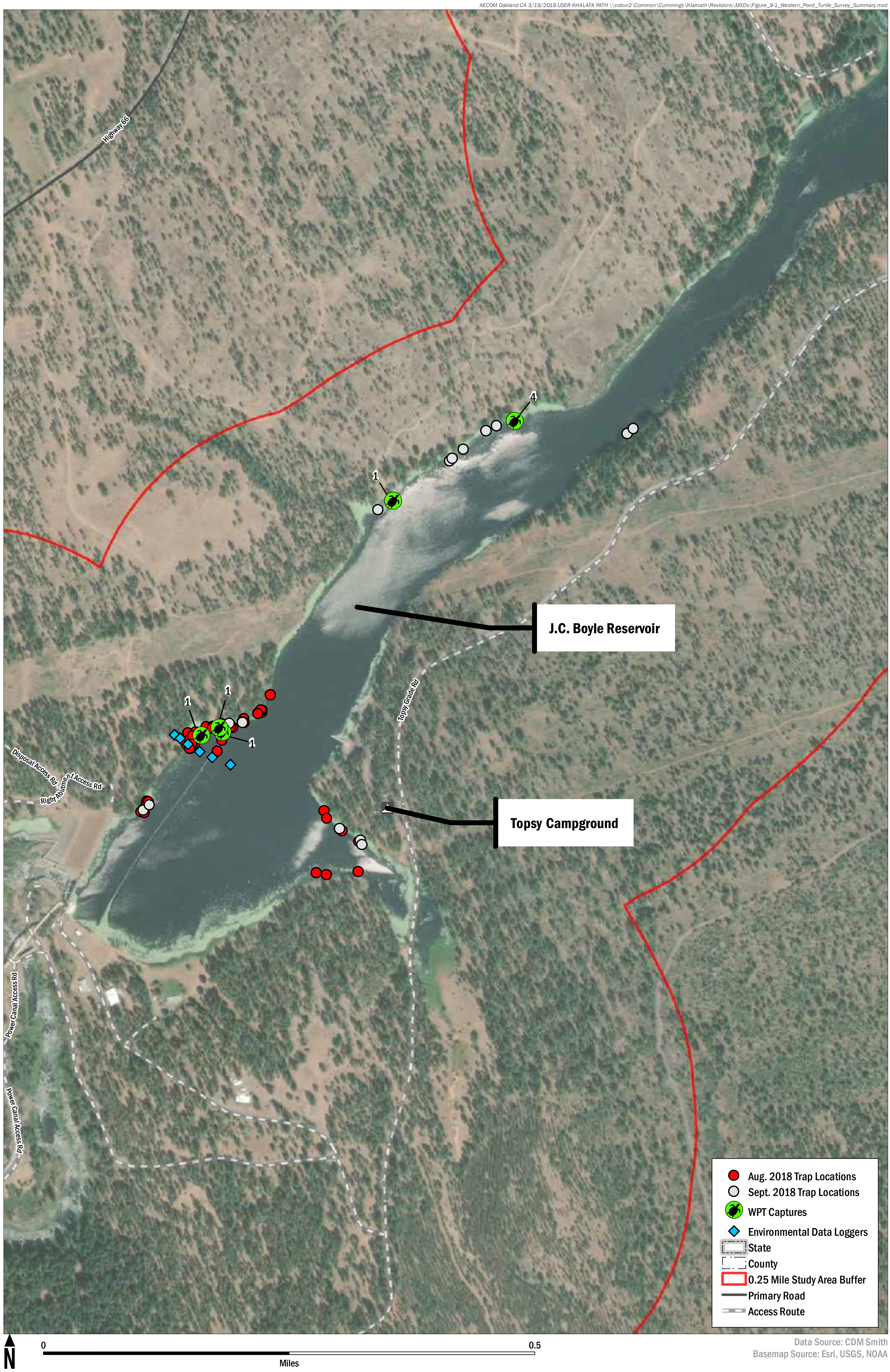
FIGURE 8-3B

Western Pond Turtle Sightings and Habitat
J.C. Boyle Reservoir

AECOM Oakland CA 3/19/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_9-1_Western_Pond_Turtle_Survey_Summary.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

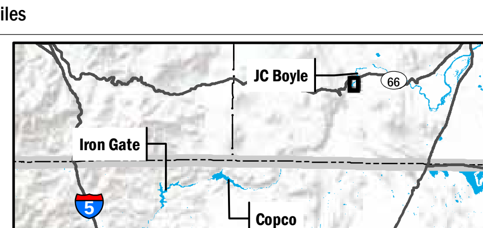
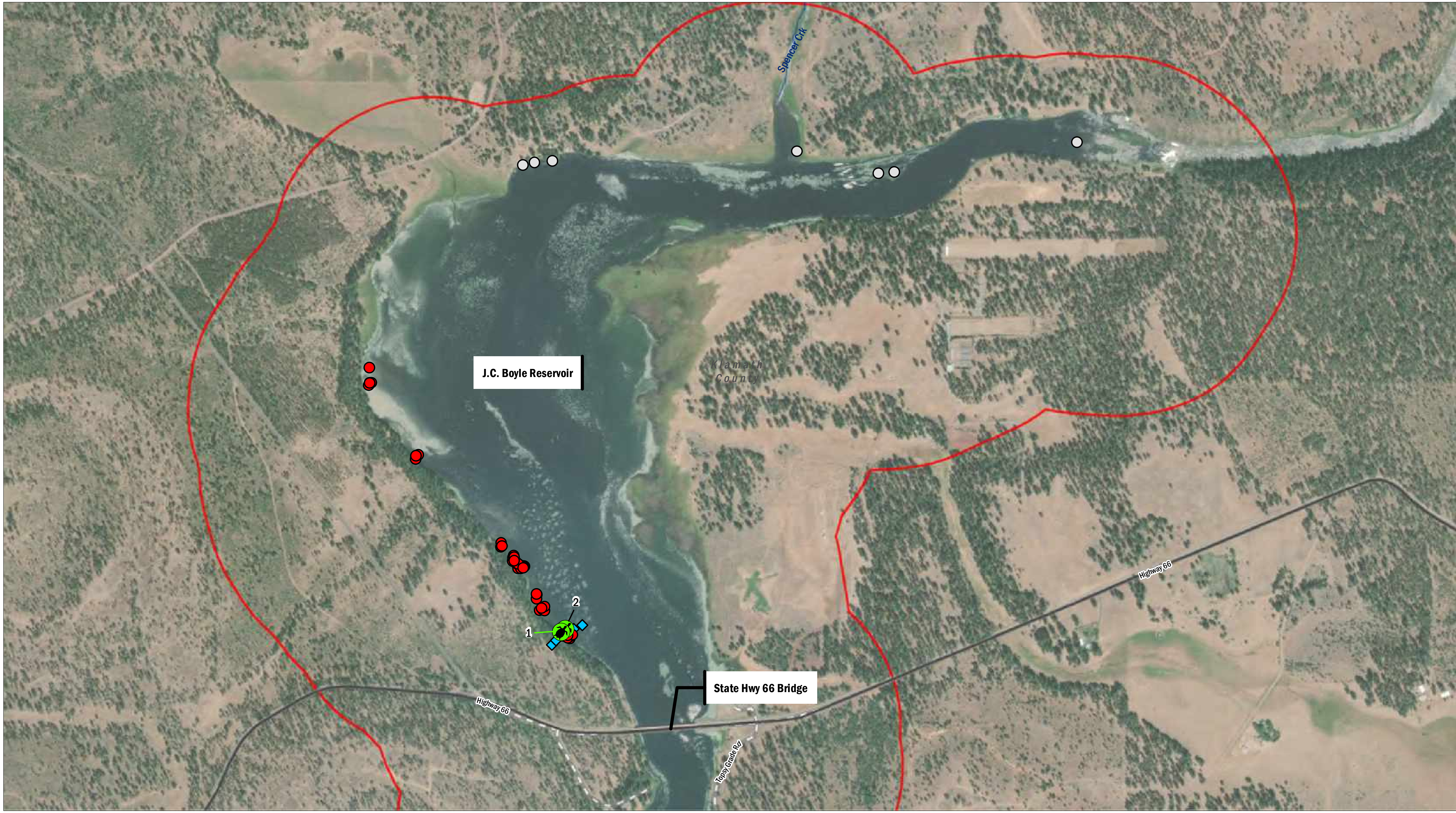


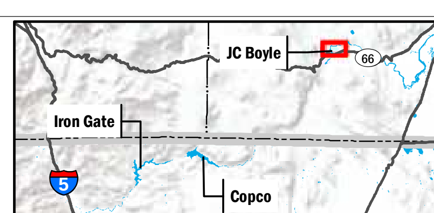
FIGURE 9-1

2018 Western Pond Turtle Survey Summary
J.C. Boyle Reservoir - South



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

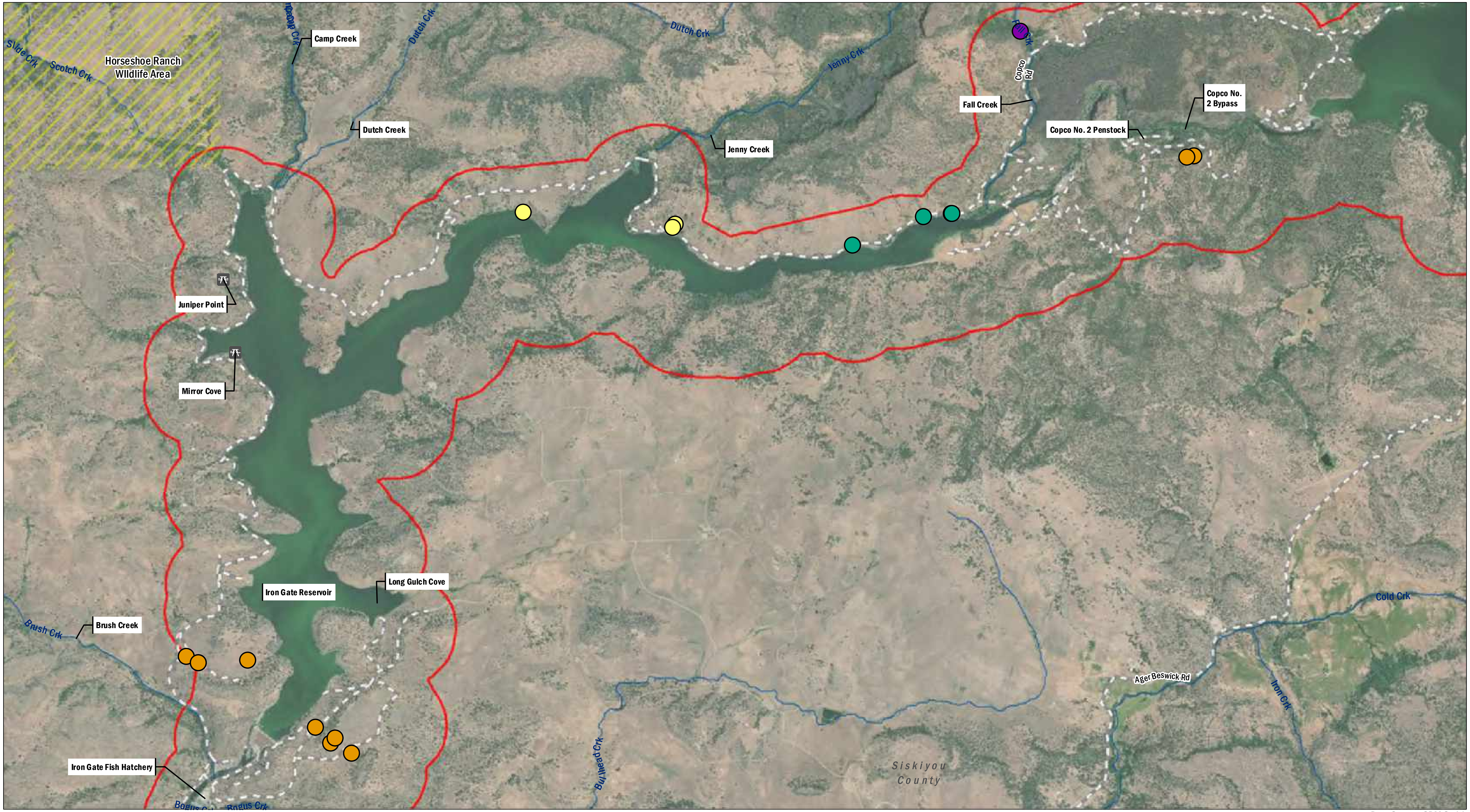
Klamath River Renewal Corporation
Klamath River Renewal Project



- Aug. 2018 Trap Locations
- Sept. 2018 Trap Locations
- WPT Captures
- Environmental Data Loggers
- State
- County
- Stream
- Primary Road
- Secondary Road
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 9-2

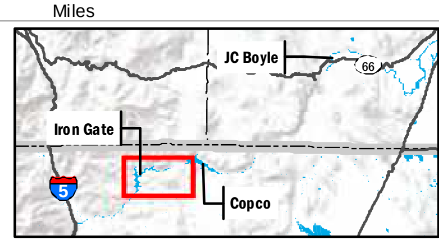
2018 Western Pond Turtle Survey Summary
J.C. Boyle Reservoir - North



0 0.75 1.5
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

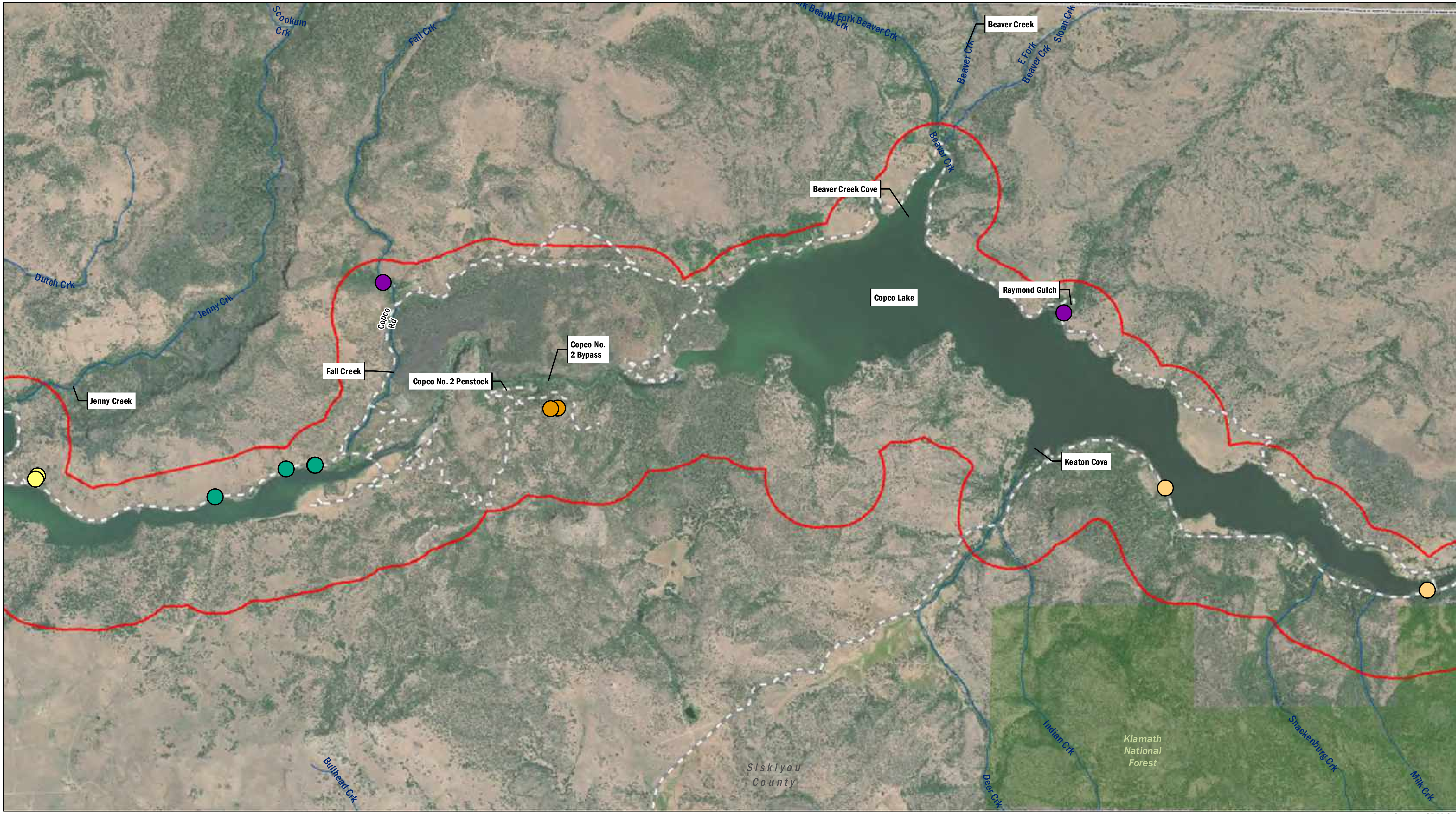


2018 Special Status Plants Observations
- Greene's Mariposa Lily (Calochortus greenei)
- Washingotn Lily (Lilium washingtonianum ssp. purpurascens)
- Greene's Four O'Clock (Mirabilis greenei)
- Fleshy Sage (Salvia dorii)

- Primary Road
- Access Route
- Stream
- 0.25 Mile Study Area Buffer

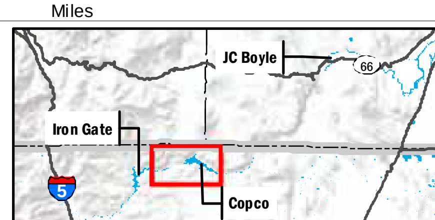
FIGURE 10-1
2018 Special-Status Plant Surveys
Iron Gate Reservoir

CDM Smith 3/15/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_10_2_Special_Status_Plants.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

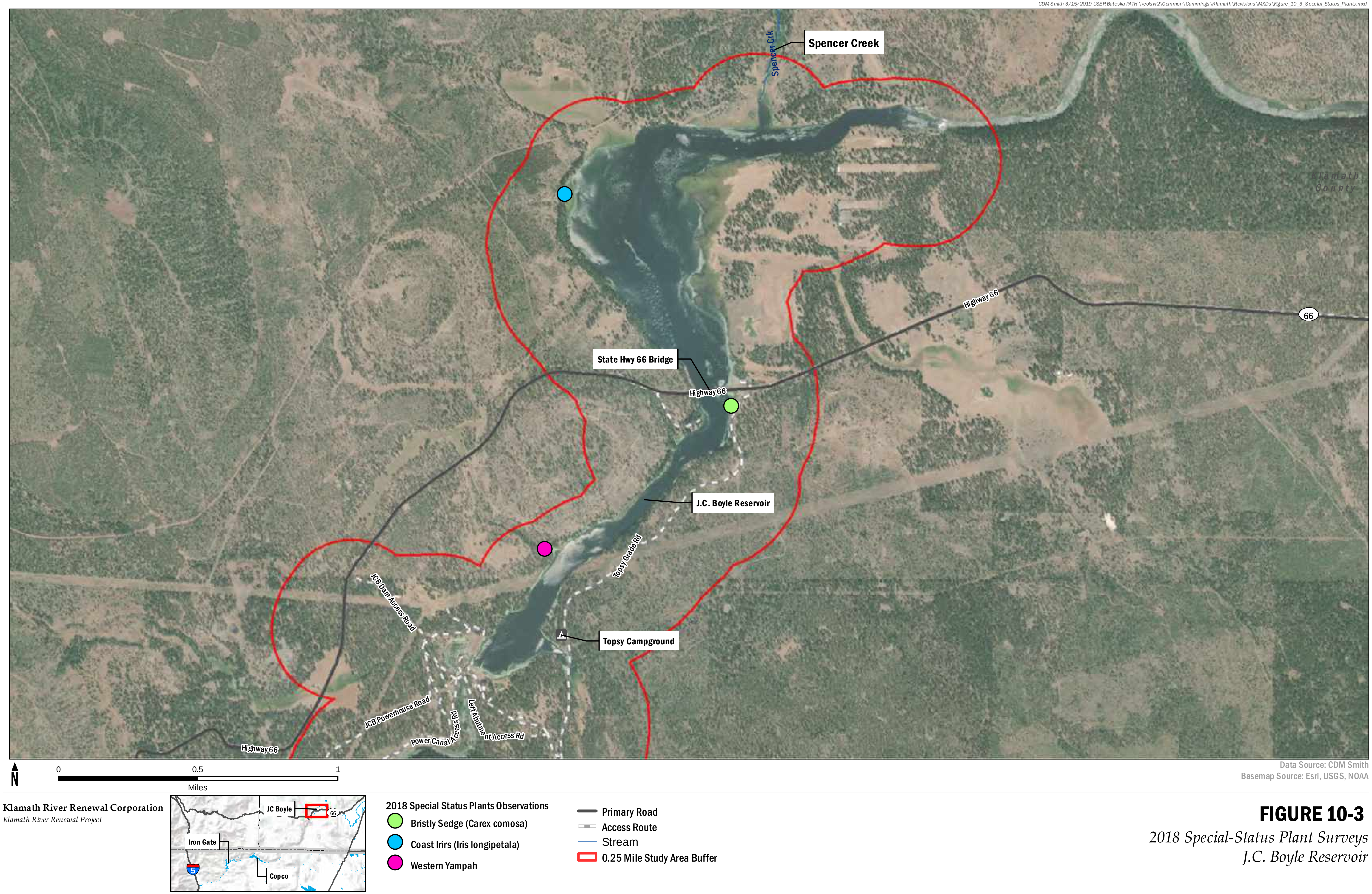
Klamath River Renewal Corporation
Klamath River Renewal Project



2018 Special Status Plants Observations
- Greene's Mariposa Lily (Calochortus greenei)
- Calochortus sp.
- Washigotn Lily (Lilium washingtonianum ssp. purpurascens)
- Greene's Four O'Clock (Mirabilis greenei)
- Fleshy Sage (Salvia dorii)

- 0.25 Mile Study Area Buffer
- State
- County
- Stream
- Access Route

FIGURE 10-2
2018 Special-Status Plant Surveys
Copco Lake



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

2018 Special Status Plants Observations
- Bristly Sedge (Carex comosa)
- Coast Irirs (Iris longipetala)
- Western Yampah

- Primary Road
- Access Route
- Stream
- 0.25 Mile Study Area Buffer

FIGURE 10-3
2018 Special-Status Plant Surveys
J.C. Boyle Reservoir

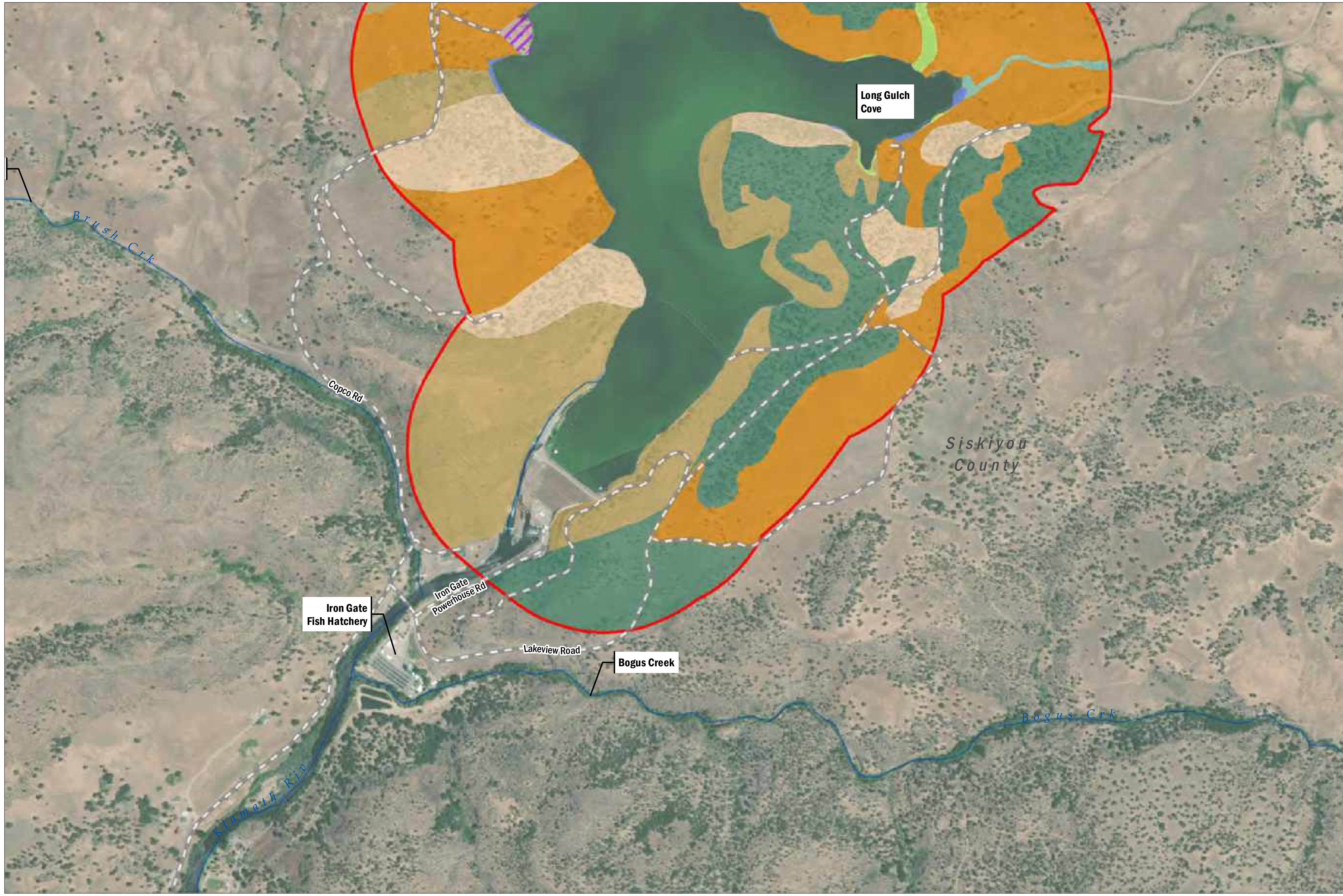
AECOM Oakland CA 3/20/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

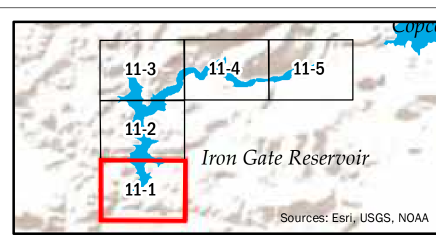
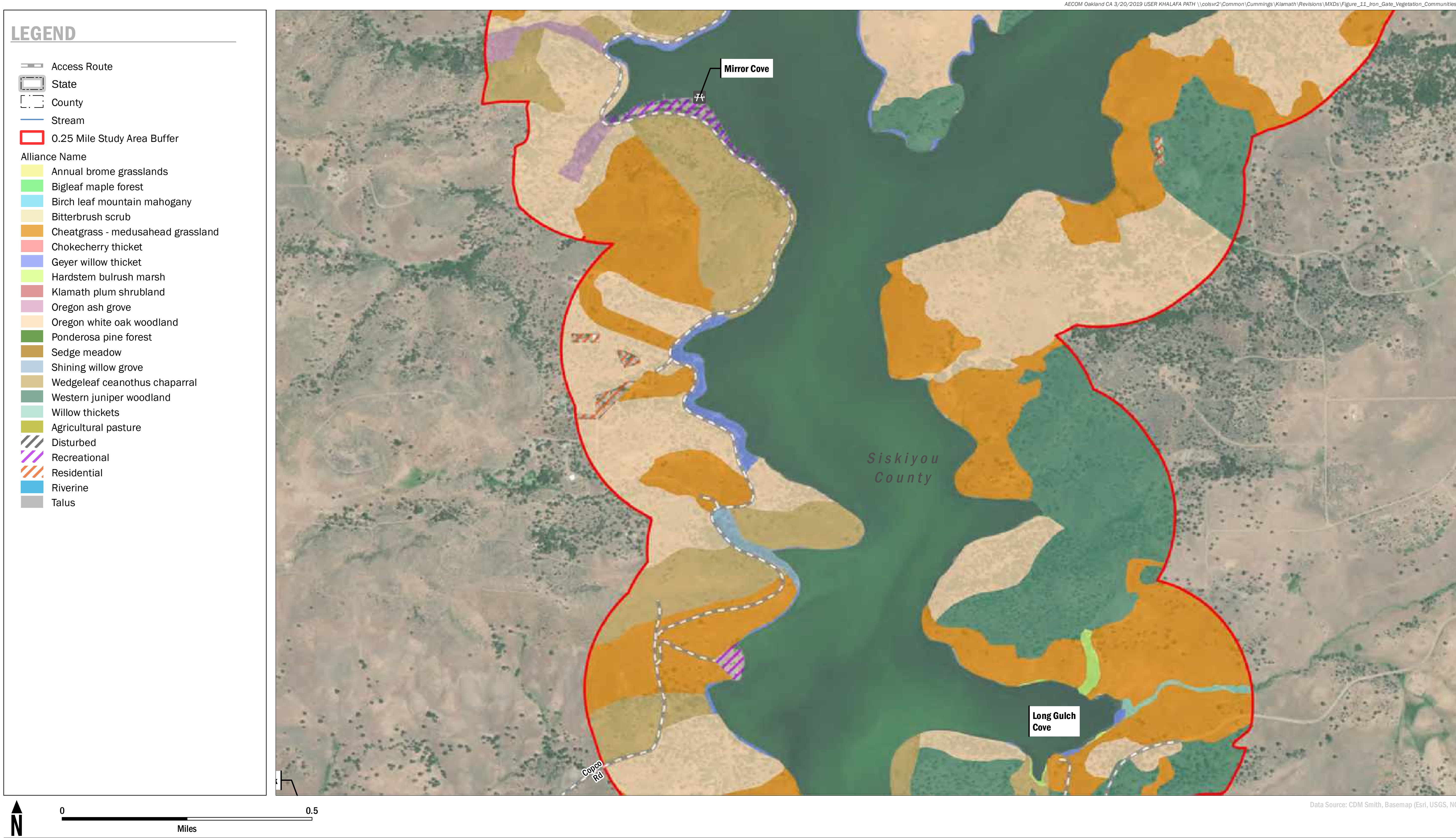


FIGURE 11-1

Vegetation Communities
Iron Gate Reservoir



Klamath River Renewal Corporation
Klamath River Renewal Project

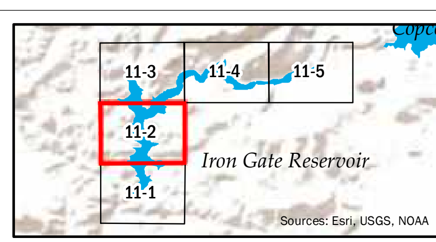


FIGURE 11-2
Vegetation Communities
Iron Gate Reservoir

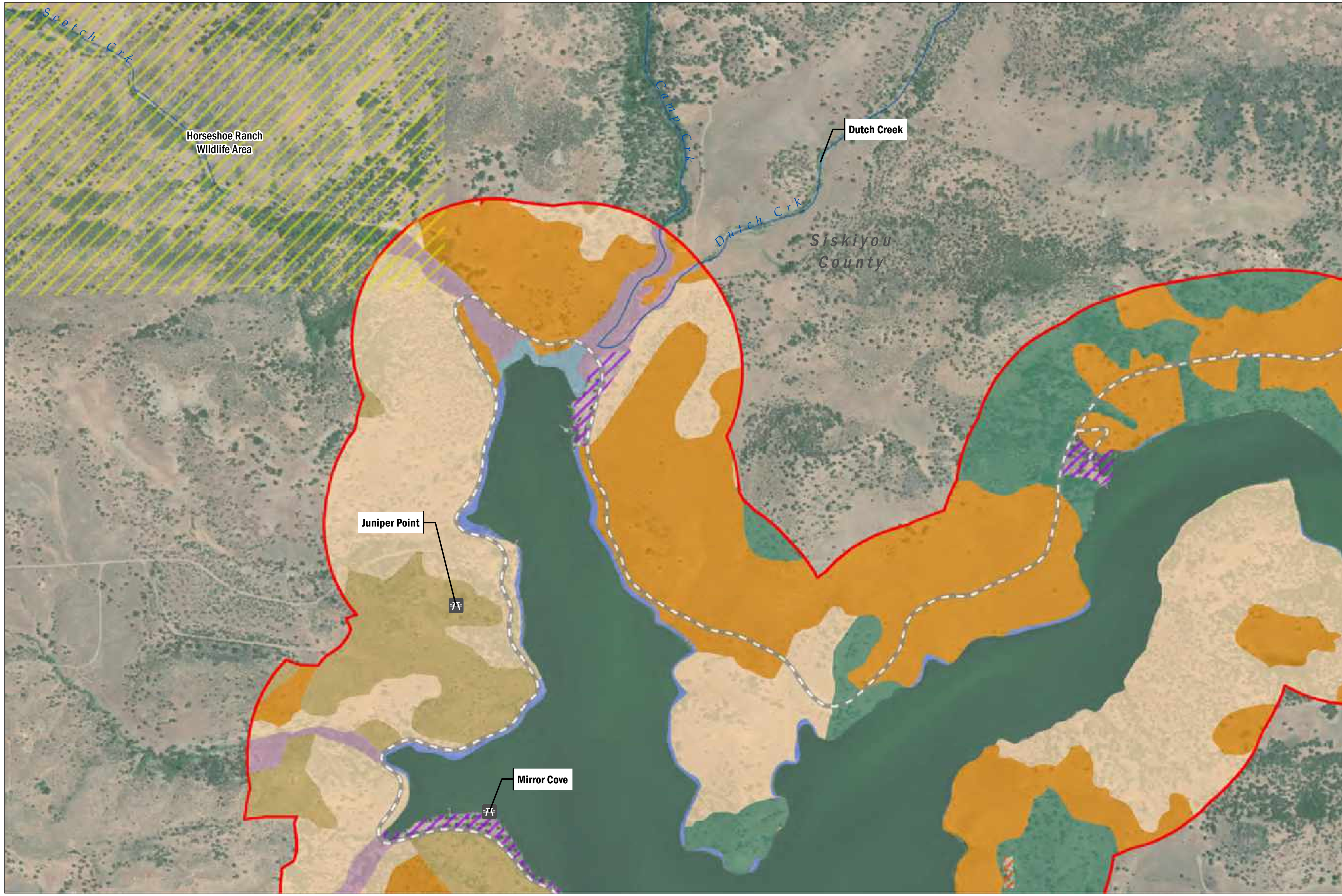
AECOM Oakland CA 3/20/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

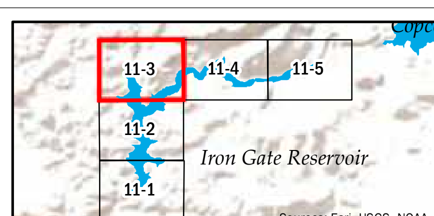


FIGURE 11-3
Vegetation Communities
Iron Gate Reservoir

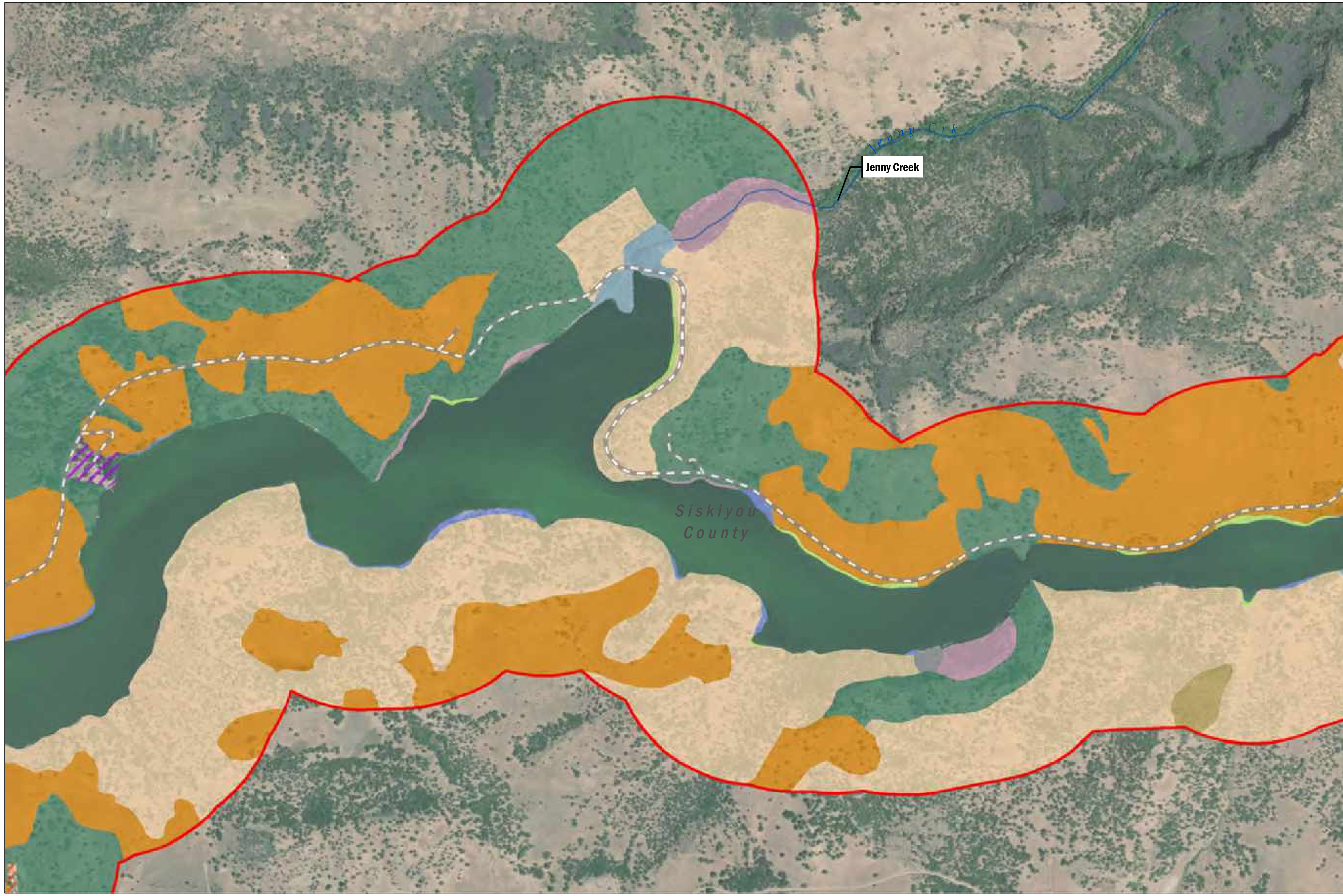
AECOM Oakland CA 3/20/2019 USER KHALAFA PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

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Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

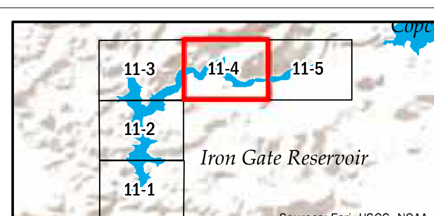


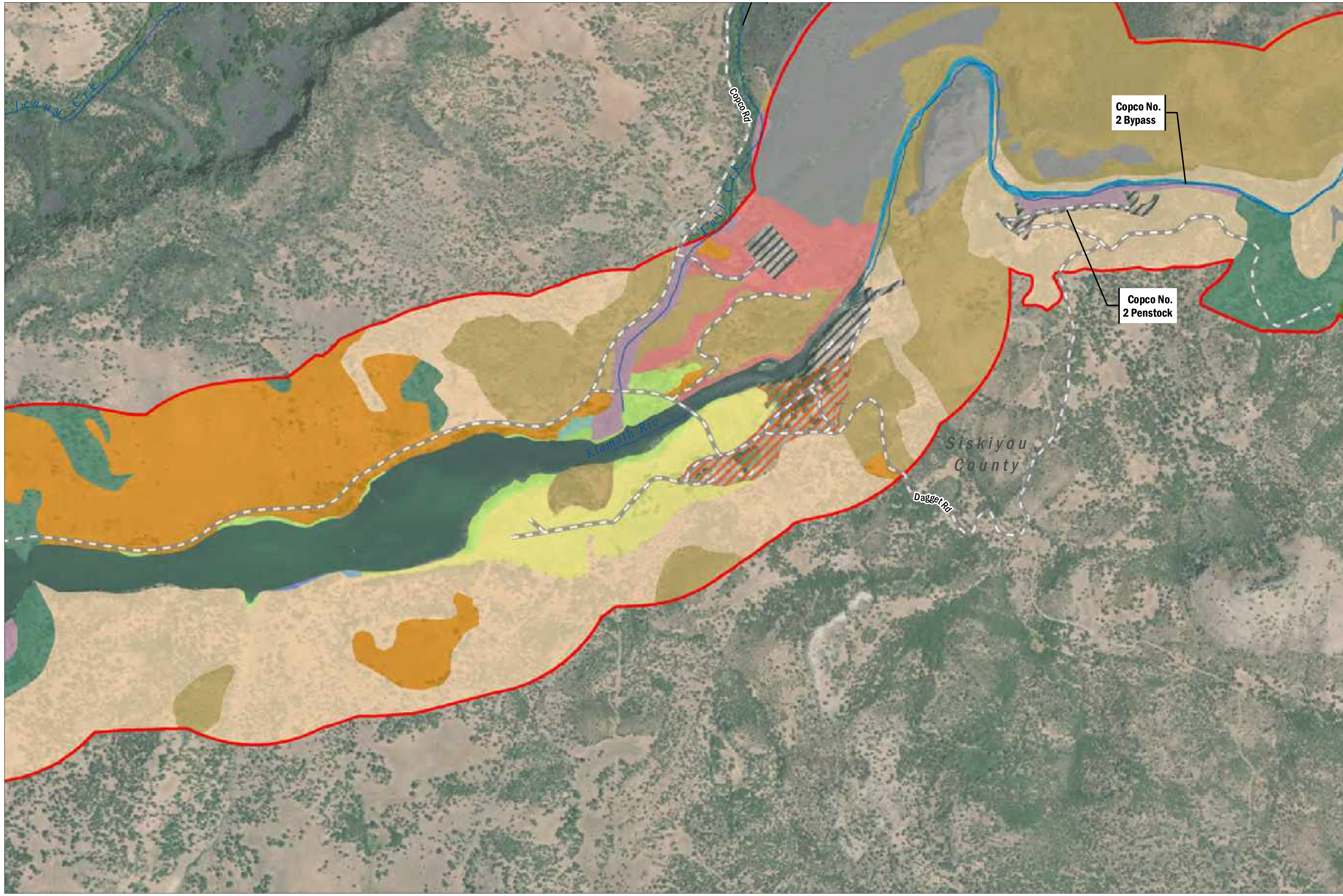
FIGURE 11-4
Vegetation Communities
Iron Gate Reservoir

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

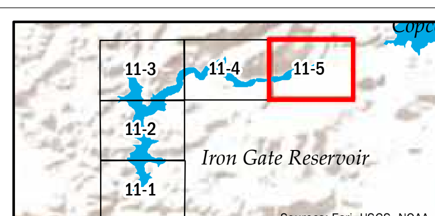


FIGURE 11-5

Vegetation Communities

Iron Gate Reservoir

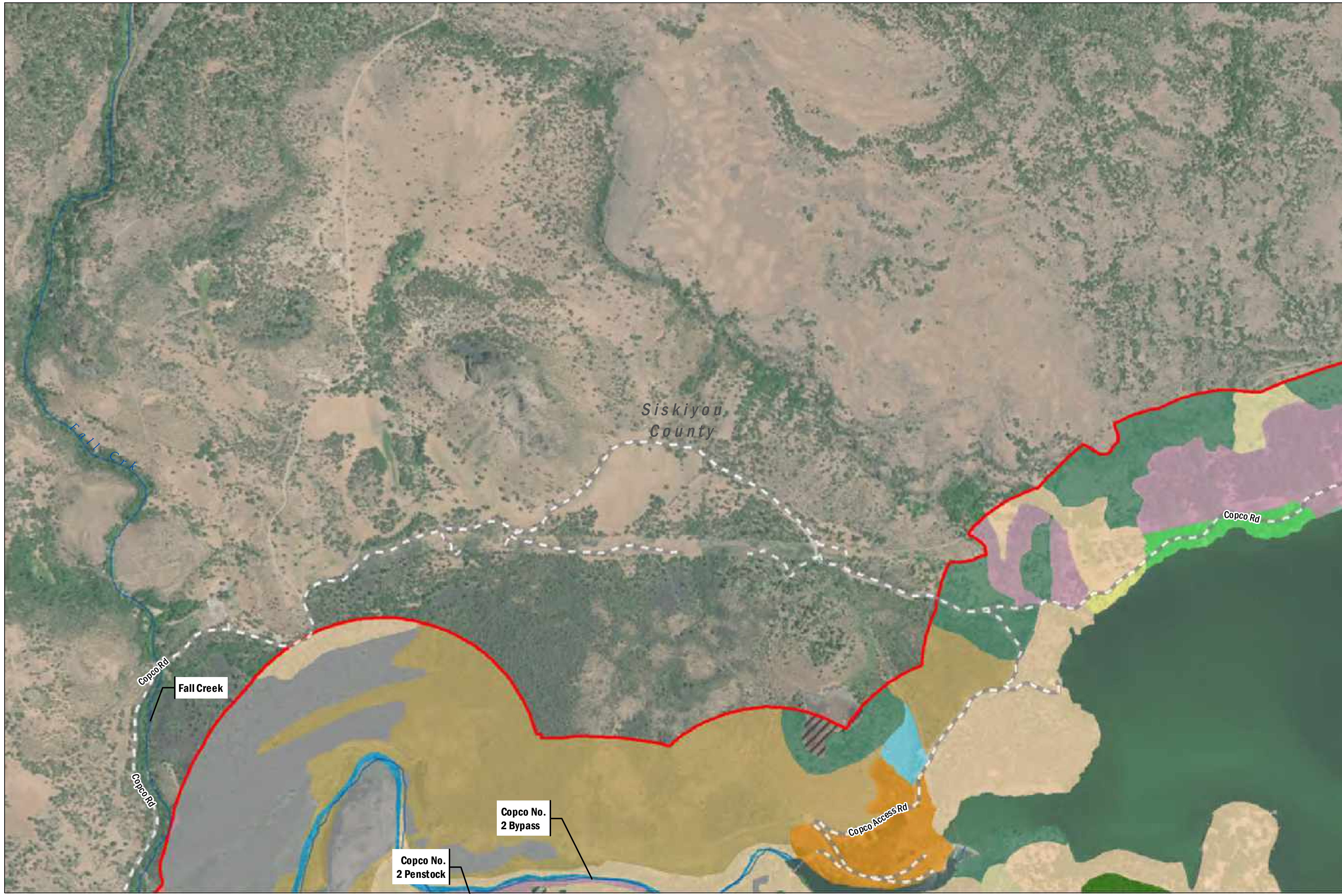
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\cdsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N
0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

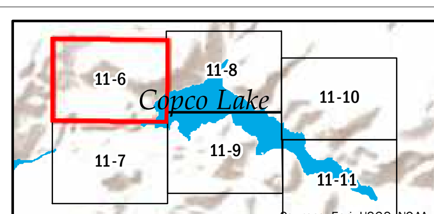
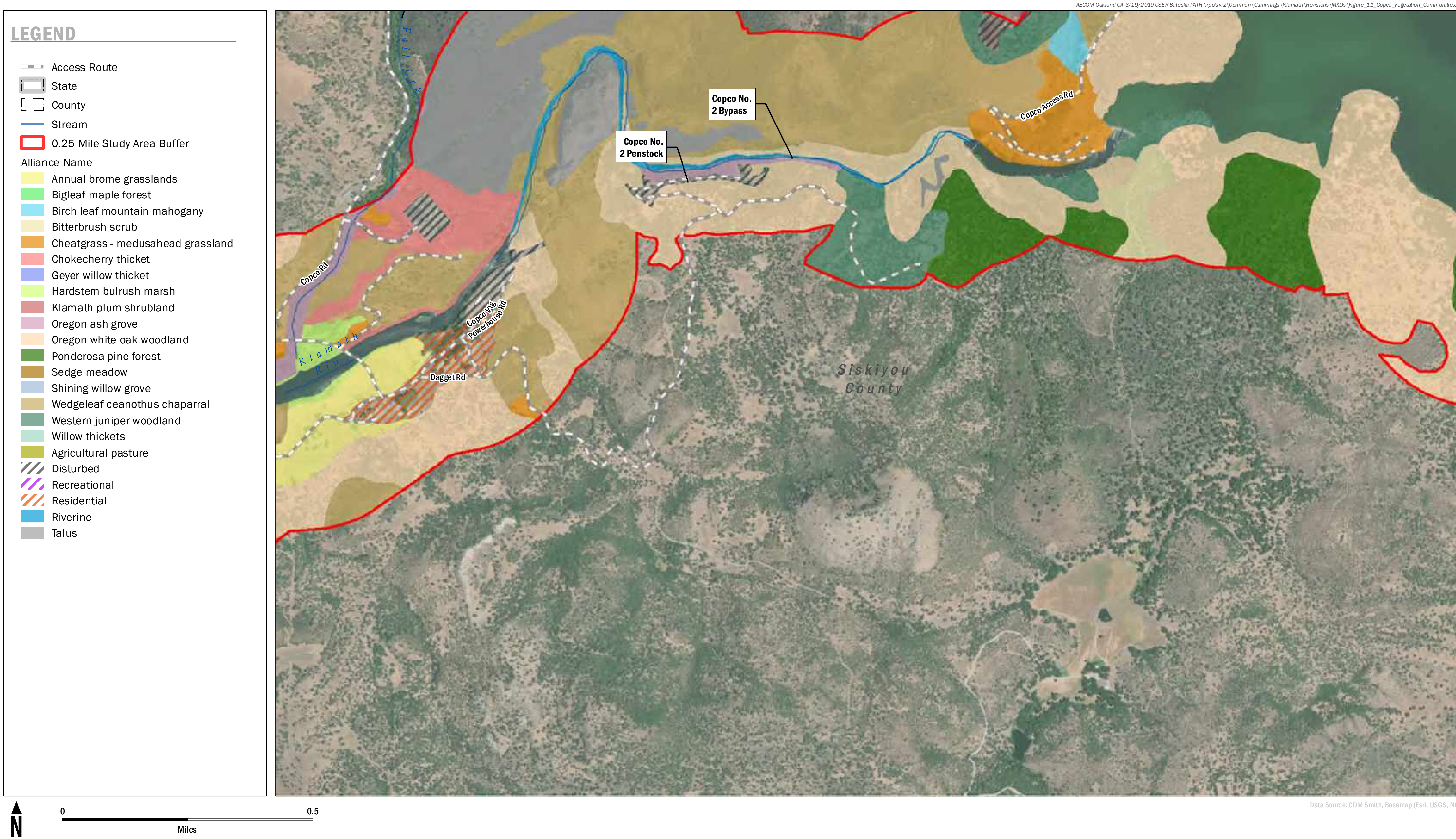


FIGURE 11-6

Vegetation Communities
Copco Lake



Klamath River Renewal Corporation
Klamath River Renewal Project

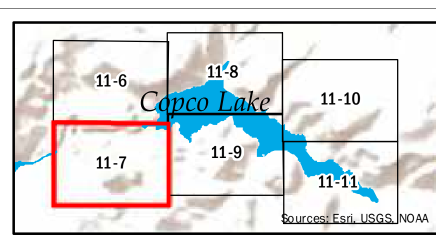


FIGURE 11-7
Vegetation Communities
Copco Lake

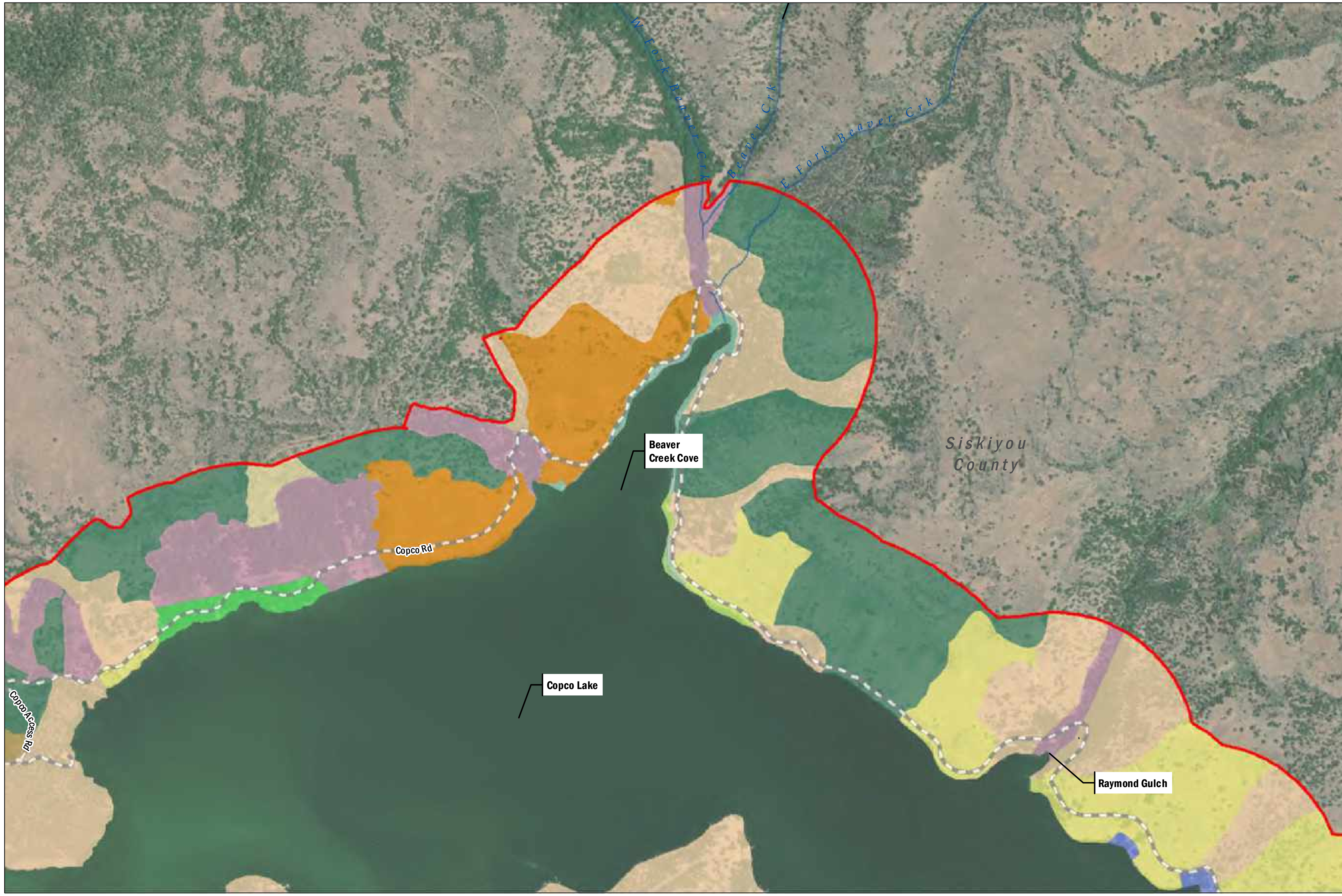
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

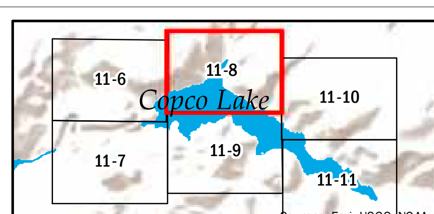


FIGURE 11-8
Vegetation Communities
Copco Lake

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

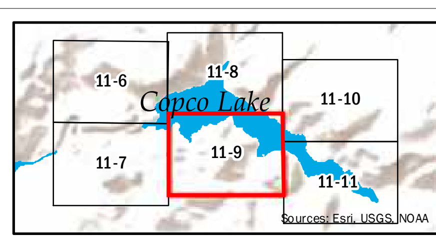


FIGURE 11-9

Vegetation Communities

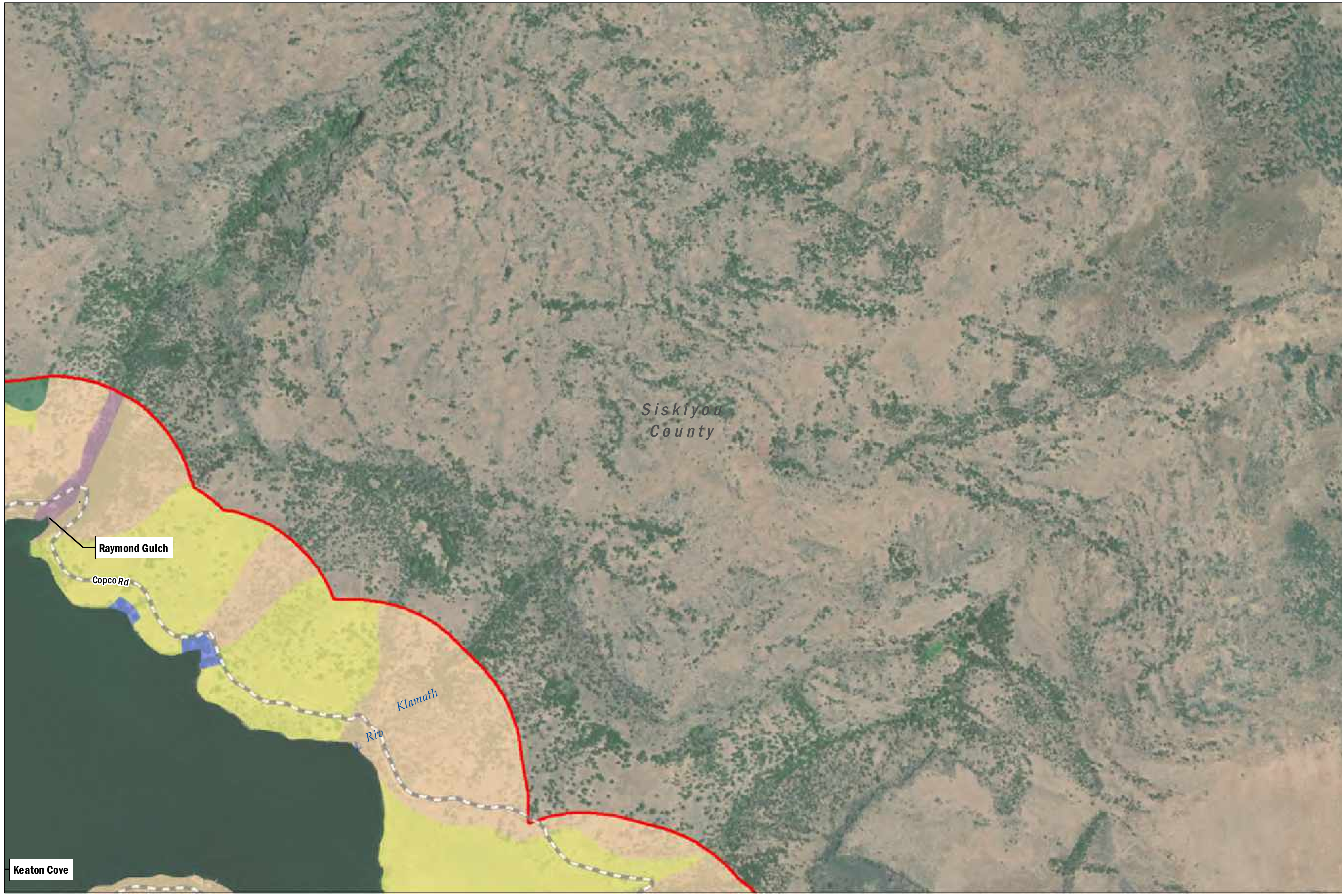
Copco Lake

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

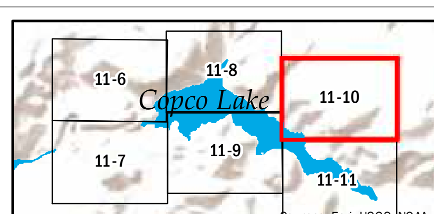


FIGURE 11-10

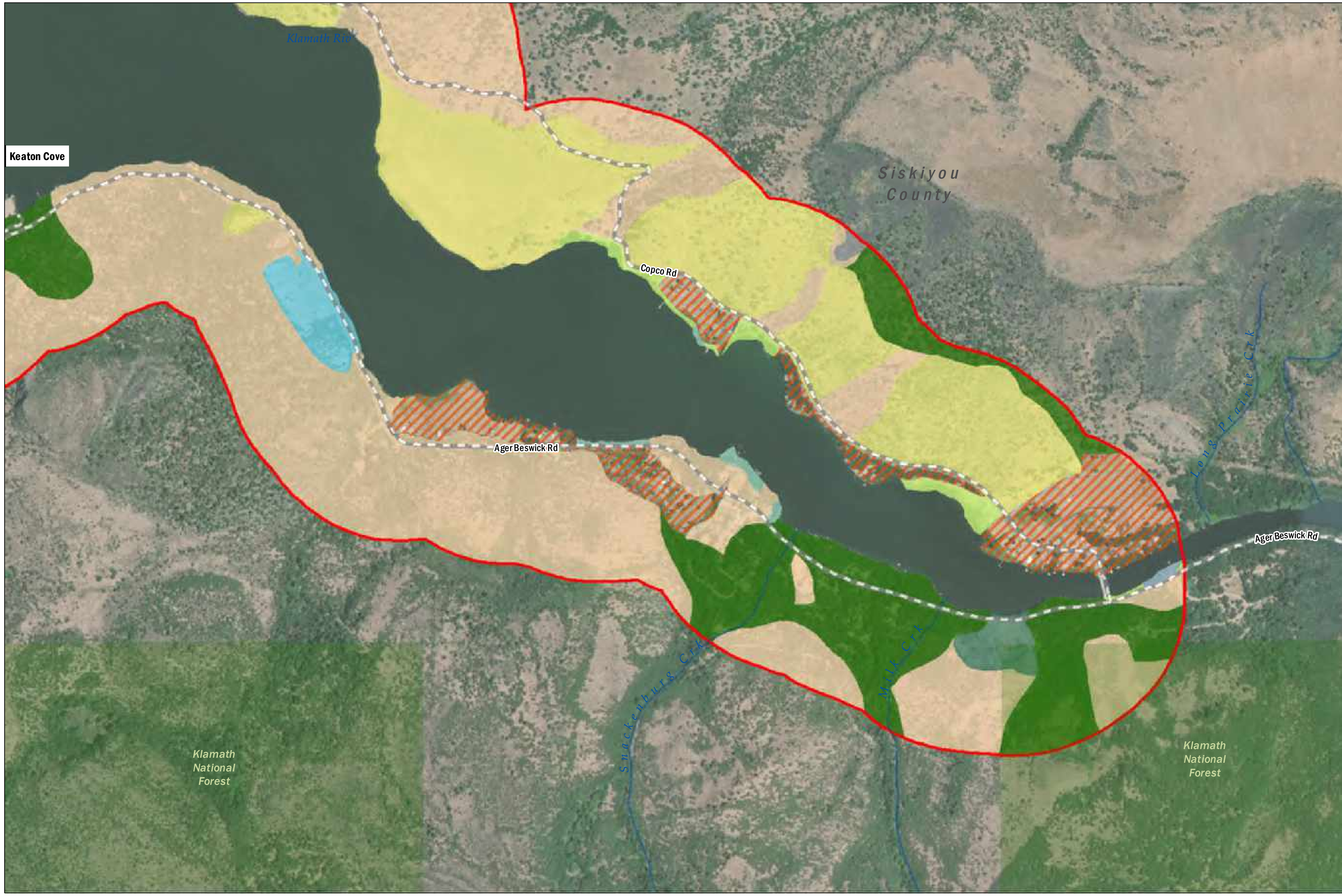
Vegetation Communities
Copco Lake

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

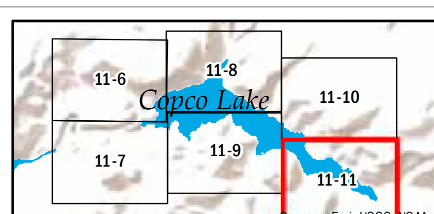


Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles



Klamath River Renewal Corporation

Klamath River Renewal Project

FIGURE 11-11

Vegetation Communities

Copco Lake

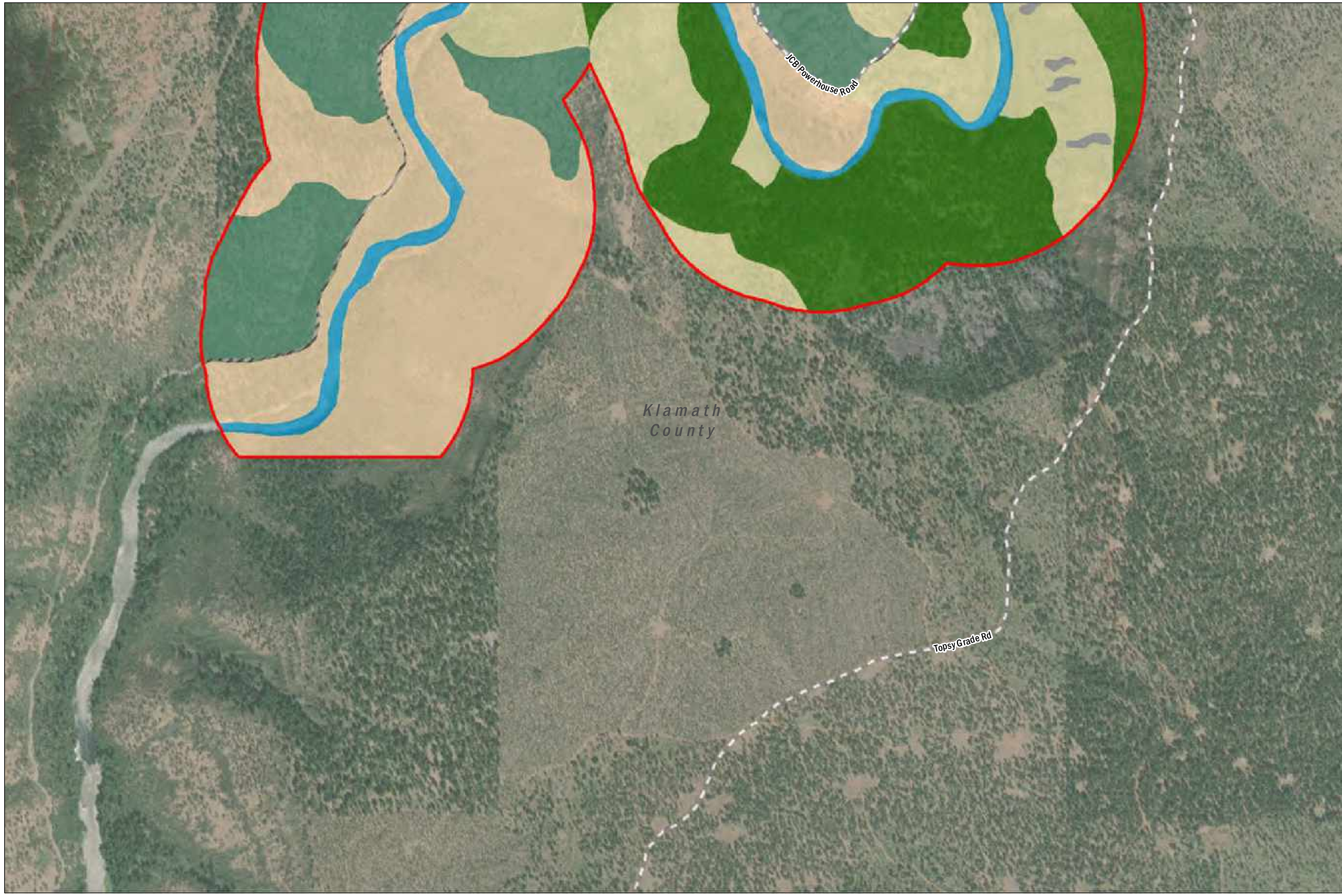
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5

Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

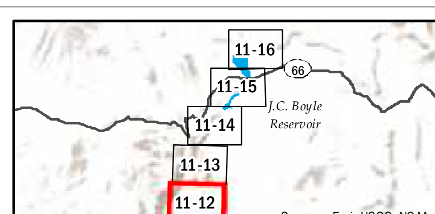


FIGURE 11-12

Vegetation Communities

JC Boyle Reservoir

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

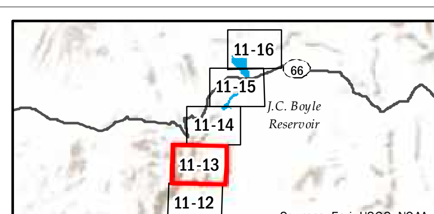


FIGURE 11-13

Vegetation Communities

JC Boyle Reservoir

AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

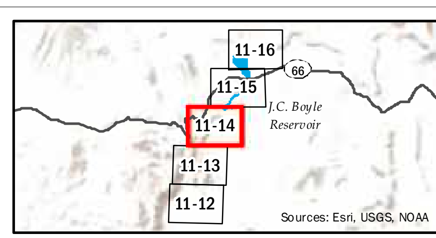


FIGURE 11-14

Vegetation Communities

JC Boyle Reservoir

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

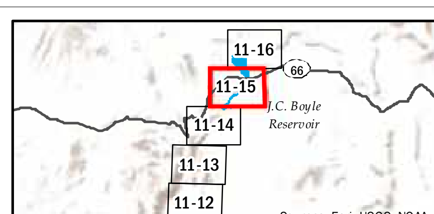


FIGURE 11-15

Vegetation Communities
JC Boyle Reservoir

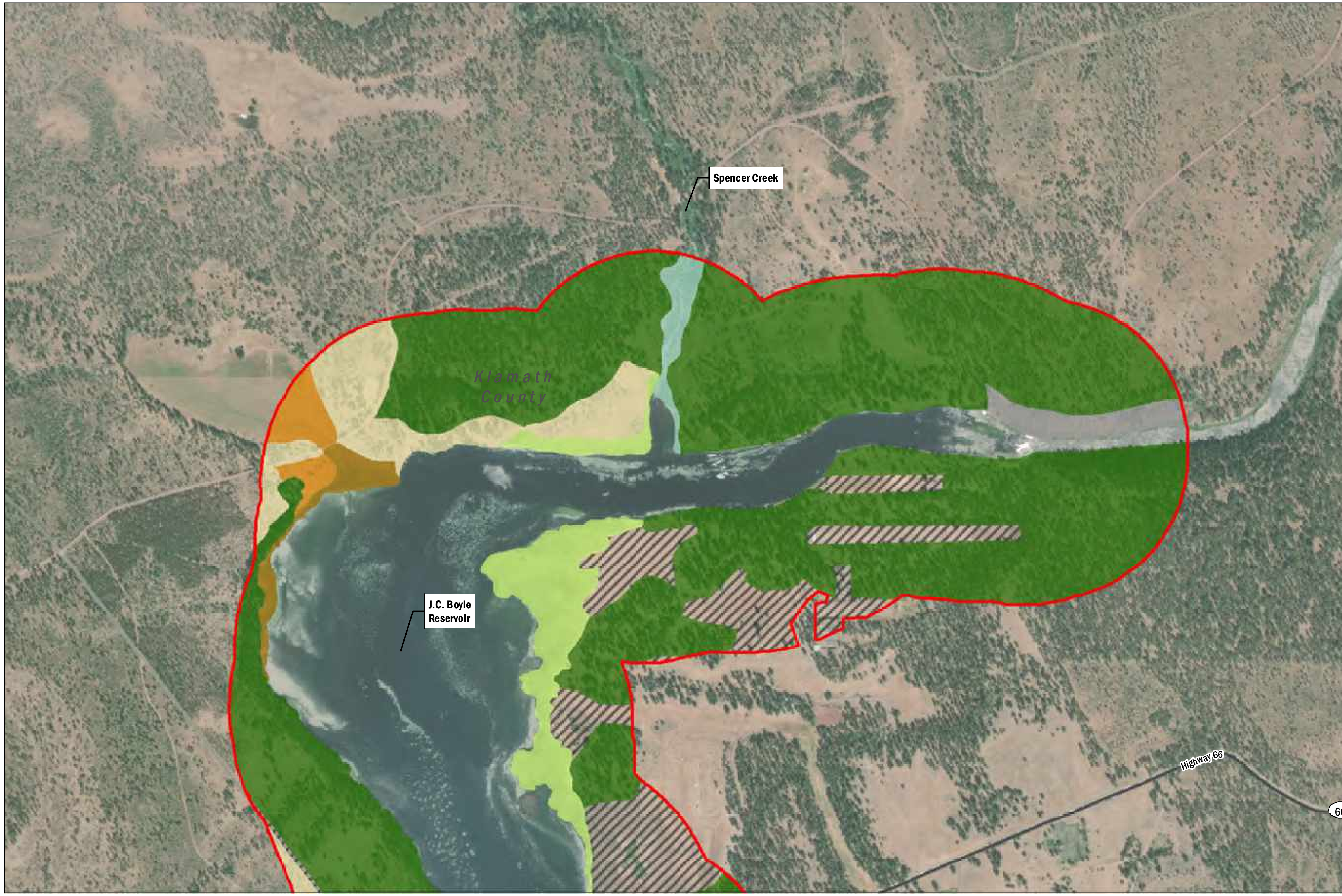
AECOM Oakland CA 3/19/2019 USER Bateska PATH \\colsvr2\Common\Cummings\Klamath\Revisions\MXDs\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- Stream
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N
0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

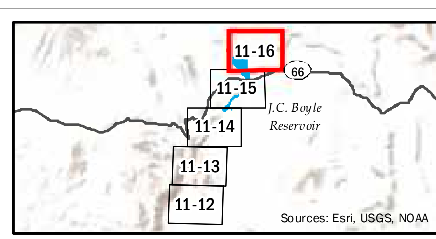
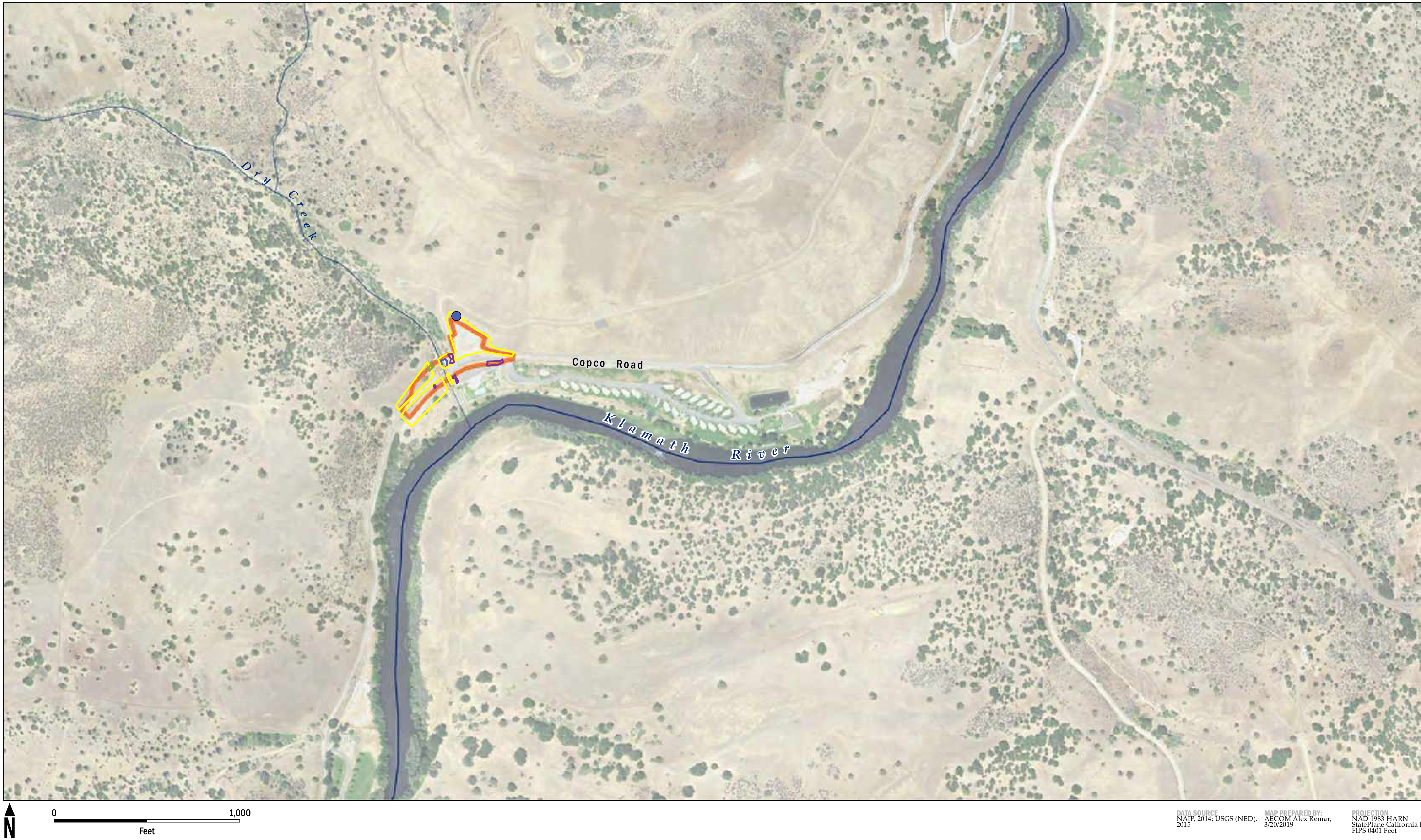


FIGURE 11-16
Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

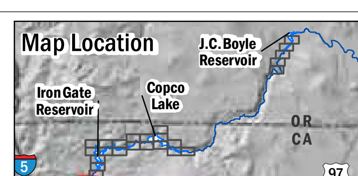


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

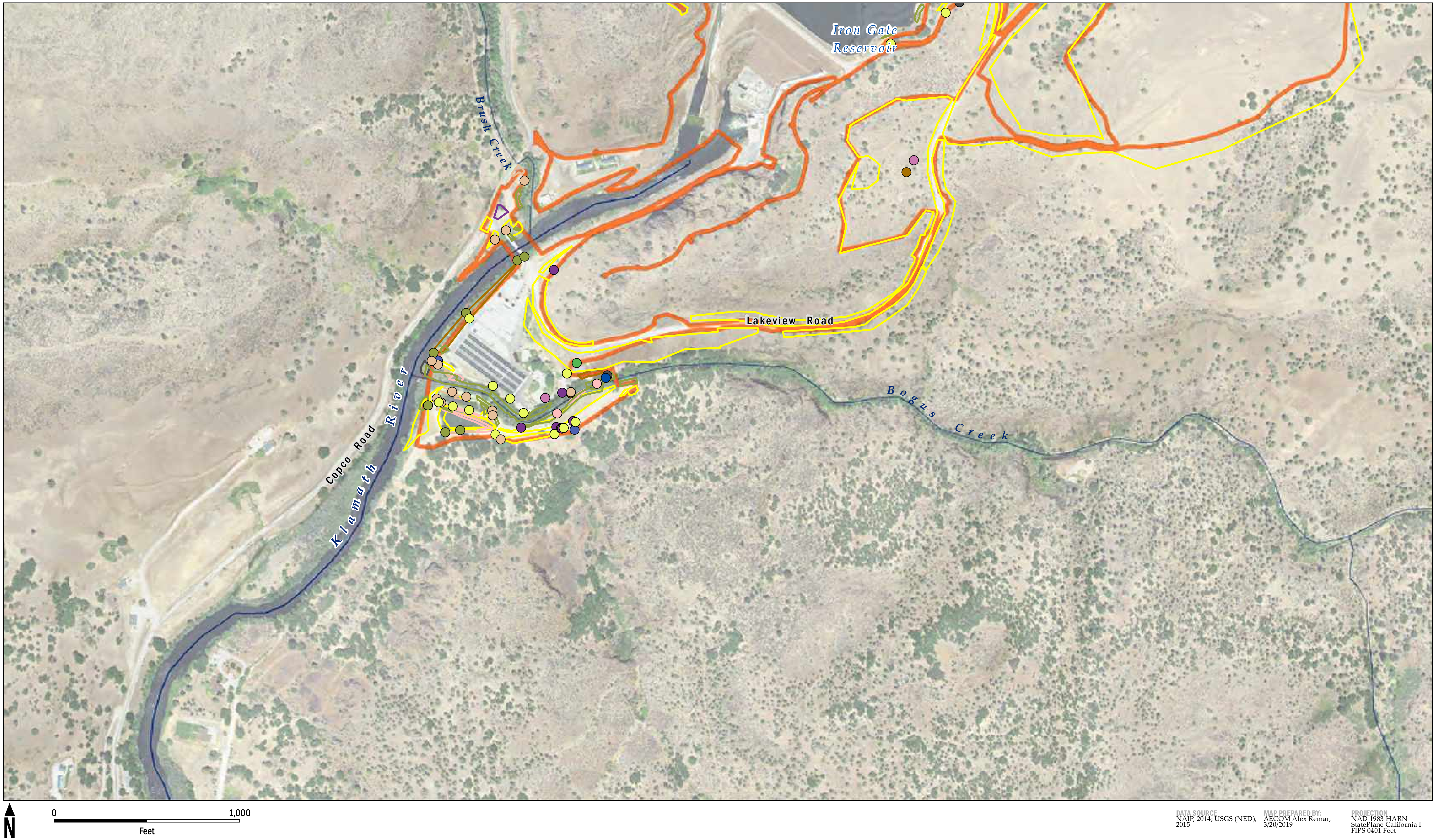


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Convolvulus arvensis

Species - Surveyed Polygon
Centaurea solstitialis
Convolvulus arvensis
Dipsacus fullonum
Rubus armeniacus
Tribulus terrestris

FIGURE 12-1
Invasive Exotic Vegetation Observations

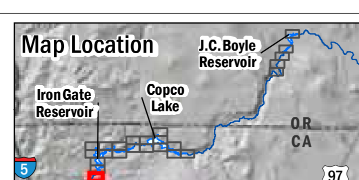


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

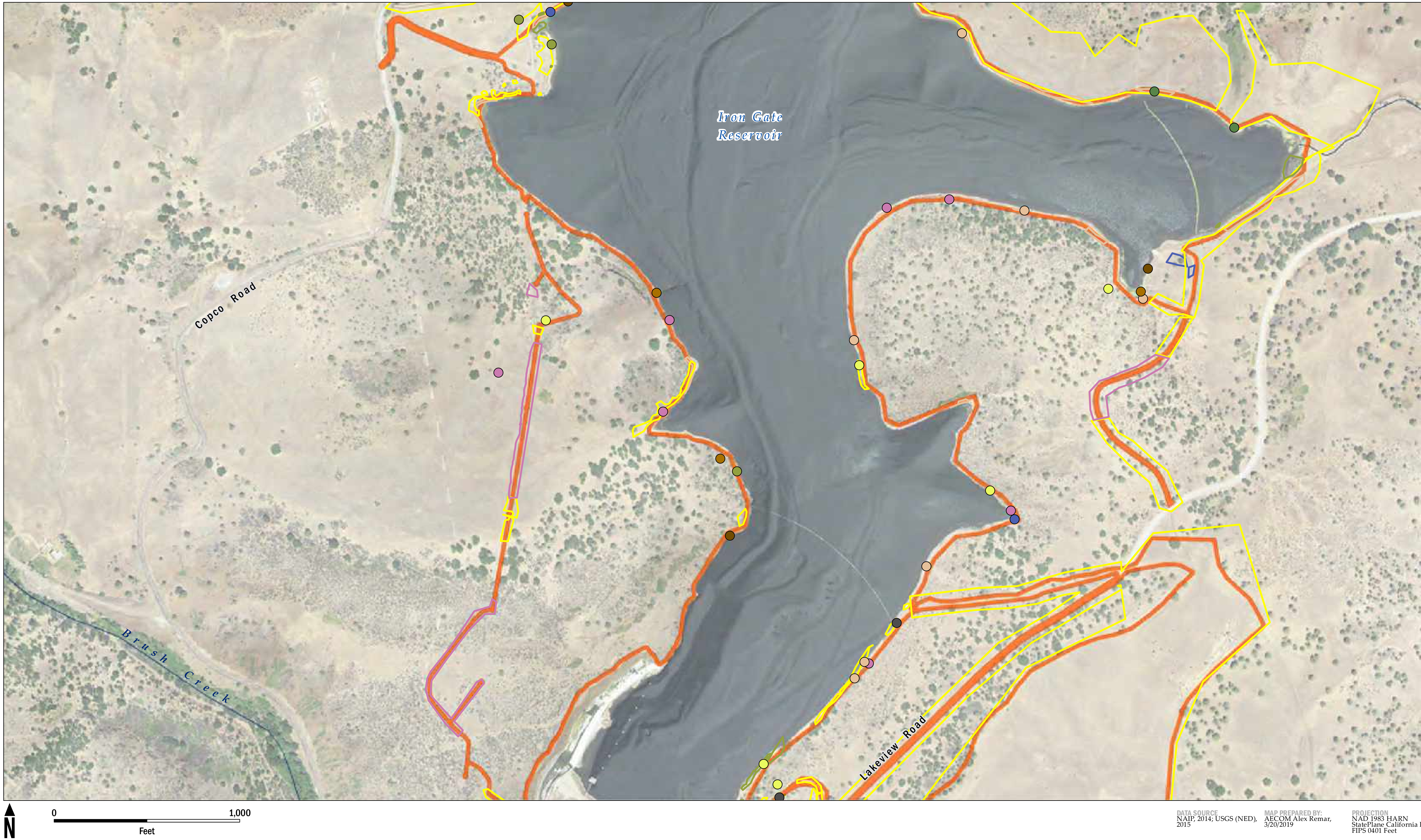


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Centaurea solstitialis
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Isatis tinctoria
Phalaris arundinacea
Rubus armeniacus
Tribulus terrestris
Cirsium vulgare
Conium maculatum
Lepidium draba

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Rubus armeniacus
Tribulus terrestris
Conium maculatum
Lepidium draba

FIGURE 12-2
Invasive Exotic Vegetation Observations



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Location
J.C. Boyle Reservoir
Iron Gate Reservoir
Copco Lake
OR
CA

Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Centaurea solstitialis
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Lepidium draba
Mentha pulegium

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Rubus armeniacus

FIGURE 12-3
Invasive Exotic Vegetation Observations

N

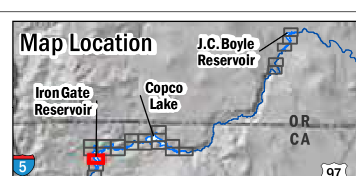
0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

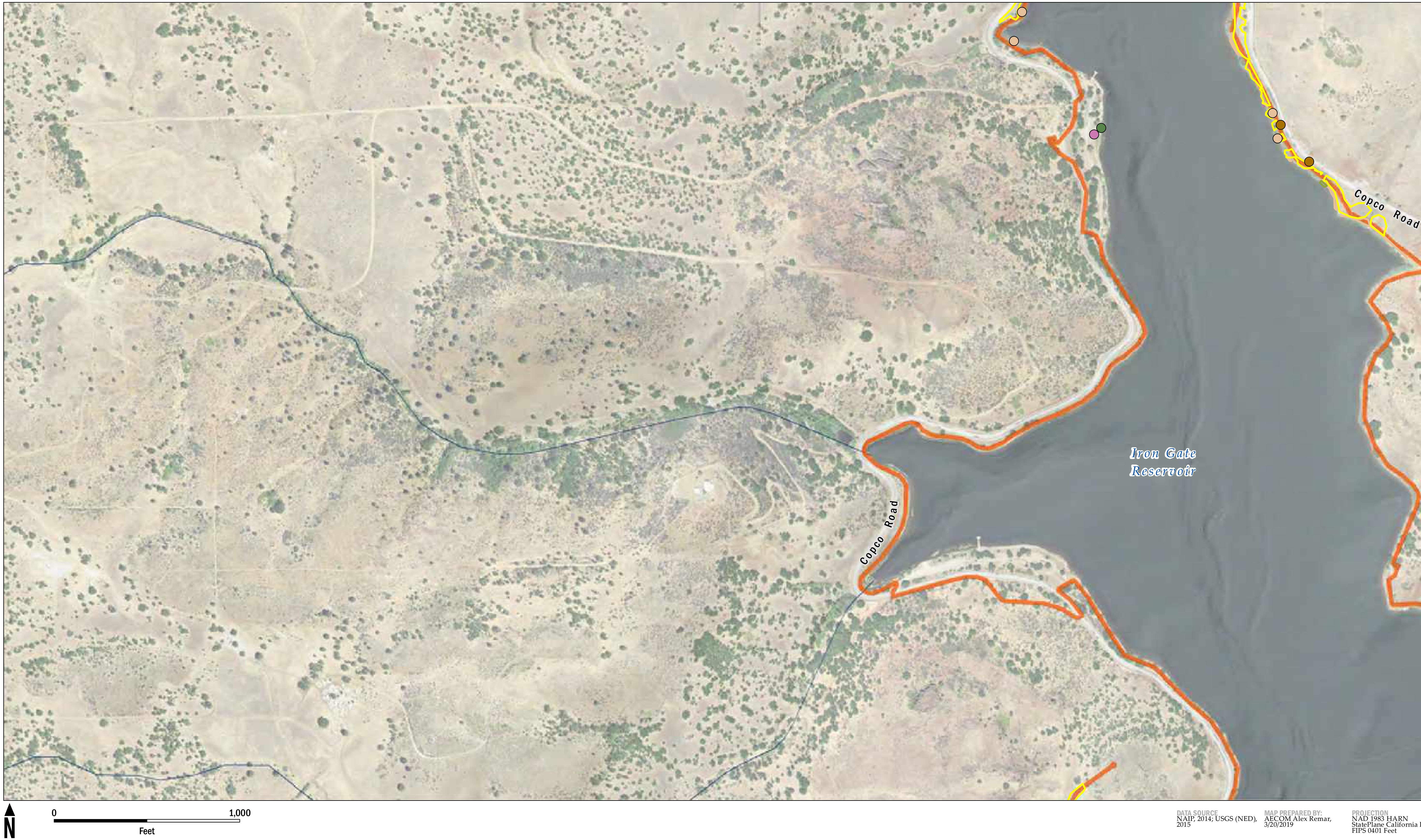


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Isatis tinctoria
Linaria vulgaris
Phalaris arundinacea
Rubus armeniacus
Xanthium spinosum

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Isatis tinctoria
Phalaris arundinacea
Rubus armeniacus
Xanthium spinosum

FIGURE 12-4
Invasive Exotic Vegetation Observations

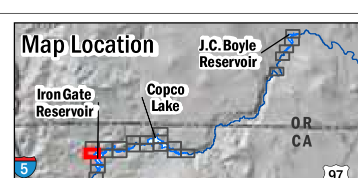


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Dipsacus fullonum
Elymus caput-medusae
Mentha pulegium

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Rubus armeniacus

FIGURE 12-5
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 12-6

Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

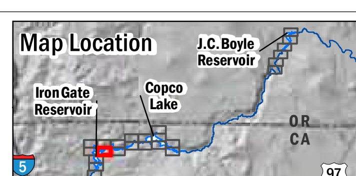
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Centaurea solstitialis
Phalaris arundinacea
Rubus armeniacus

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus
Xanthium spinosum

FIGURE 12-7

Invasive Exotic Vegetation Observations

N

0 1,000

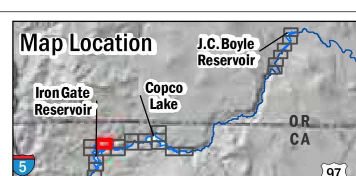
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Centaurea solstitialis
- Dipsacus fullonum
- Isatis tinctoria
- Phalaris arundinacea

Species - Surveyed Polygon
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea

FIGURE 12-8

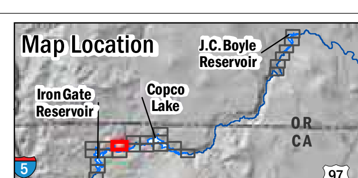
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Phalaris arundinacea

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus

FIGURE 12-9

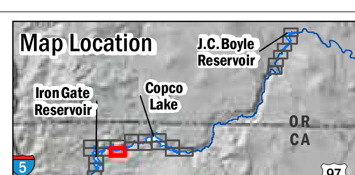
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

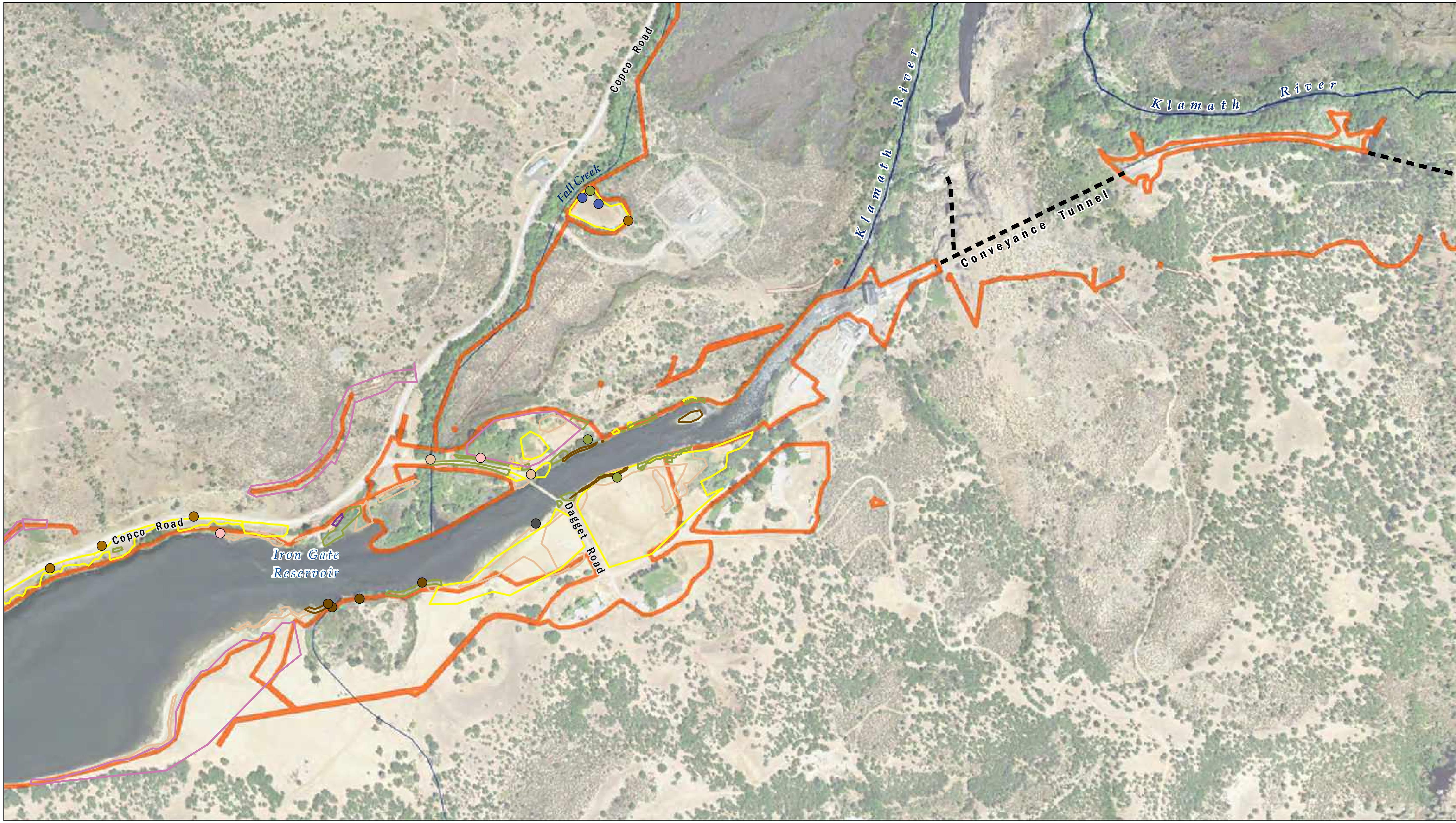


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Lepidium draba

Species - Surveyed Polygon
Centaurea solstitialis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Rubus armeniacus

FIGURE 12-10
Invasive Exotic Vegetation Observations



N

0 1,000

Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

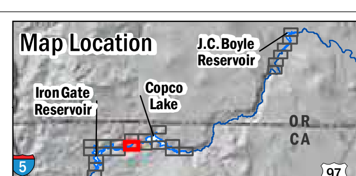
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River

Streams

Limits of Work

Species - Surveyed Point

- Bromus tectorum
- Convolvulus arvensis
- Dipsacus fullonum
- Phalaris arundinacea
- Rubus armeniacus
- Conium maculatum
- Lepidium draba

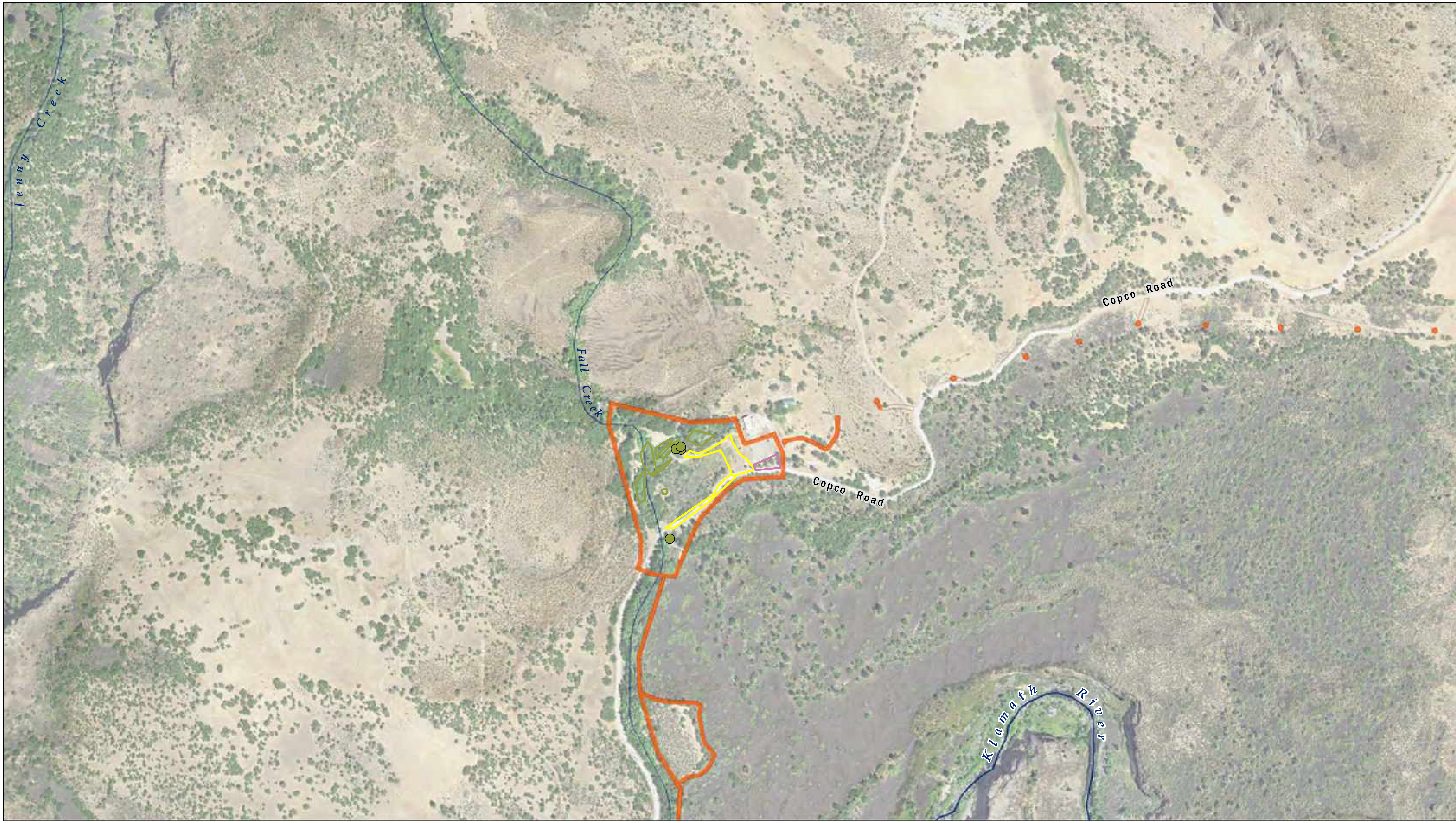
Species - Surveyed Polygon

- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Tribulus terrestris
- Conium maculatum

FIGURE 12-11

Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd



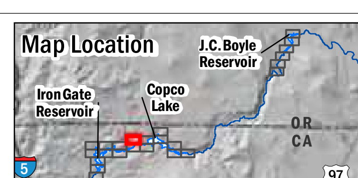
N
0
1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Rubus armeniacus

Species - Surveyed Polygon
Centaurea solstitialis
Elymus caput-medusae
Rubus armeniacus

FIGURE 12-12

Invasive Exotic Vegetation Observations

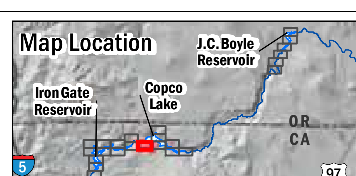
AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Cirsium vulgare

Species - Surveyed Polygon
- Dipsacus fullonum
- Elymus caput-medusae
- Rubus armeniacus

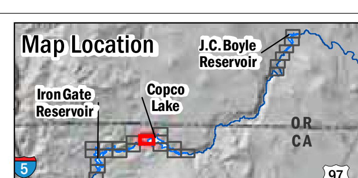
FIGURE 12-13
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Phalaris arundinacea
Rubus armeniacus
Cirsium vulgare

Species - Surveyed Polygon
Bromus tectorum
Centaurea solstitialis
Dipsacus fullonum
Rubus armeniacus

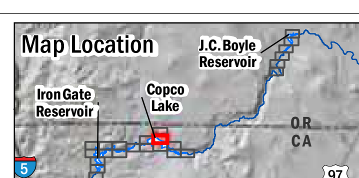
FIGURE 12-14
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

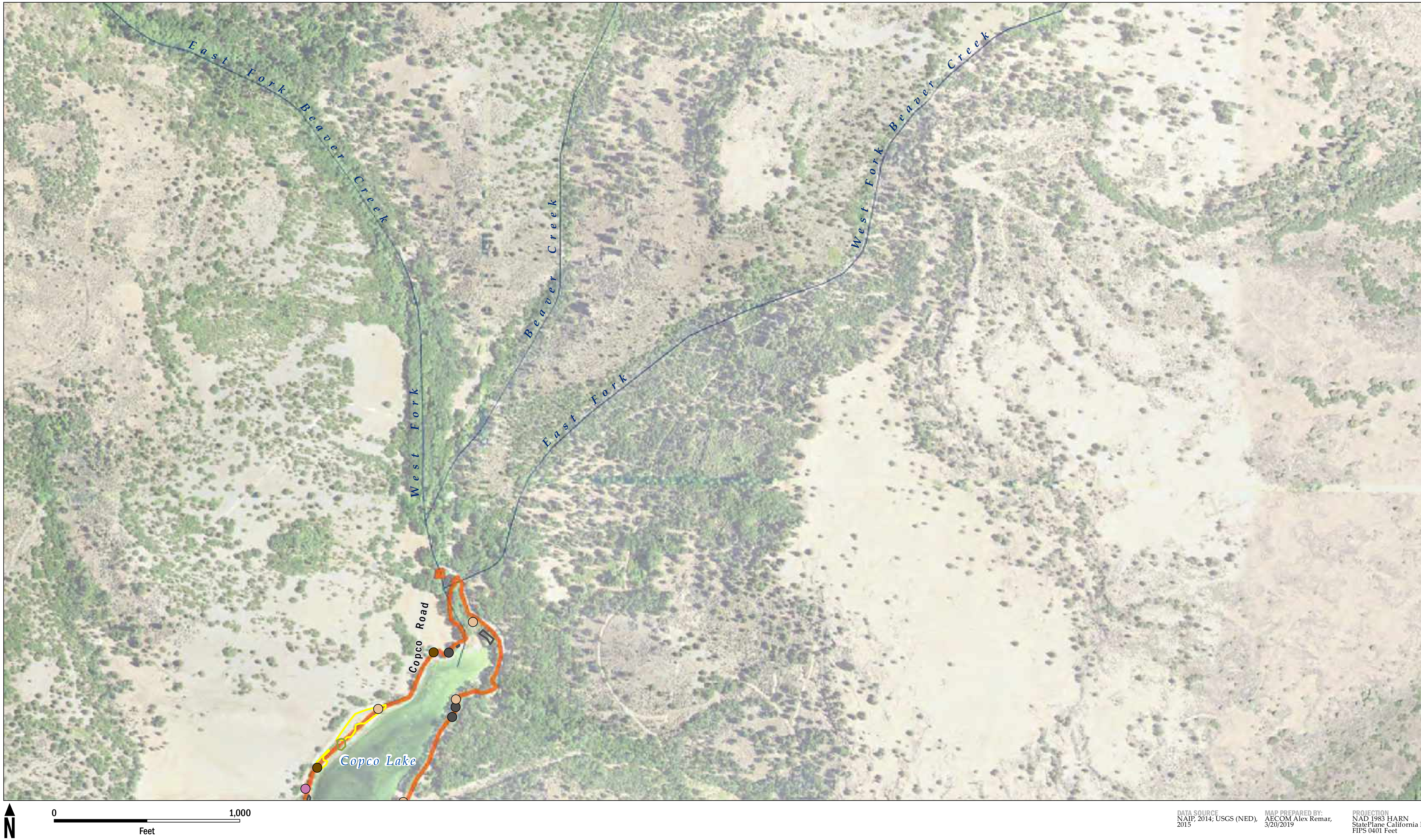


- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba

Species - Surveyed Polygon
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba

FIGURE 12-15
Invasive Exotic Vegetation Observations



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
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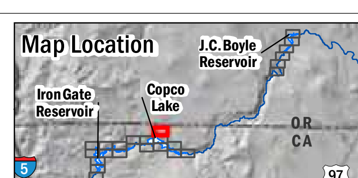


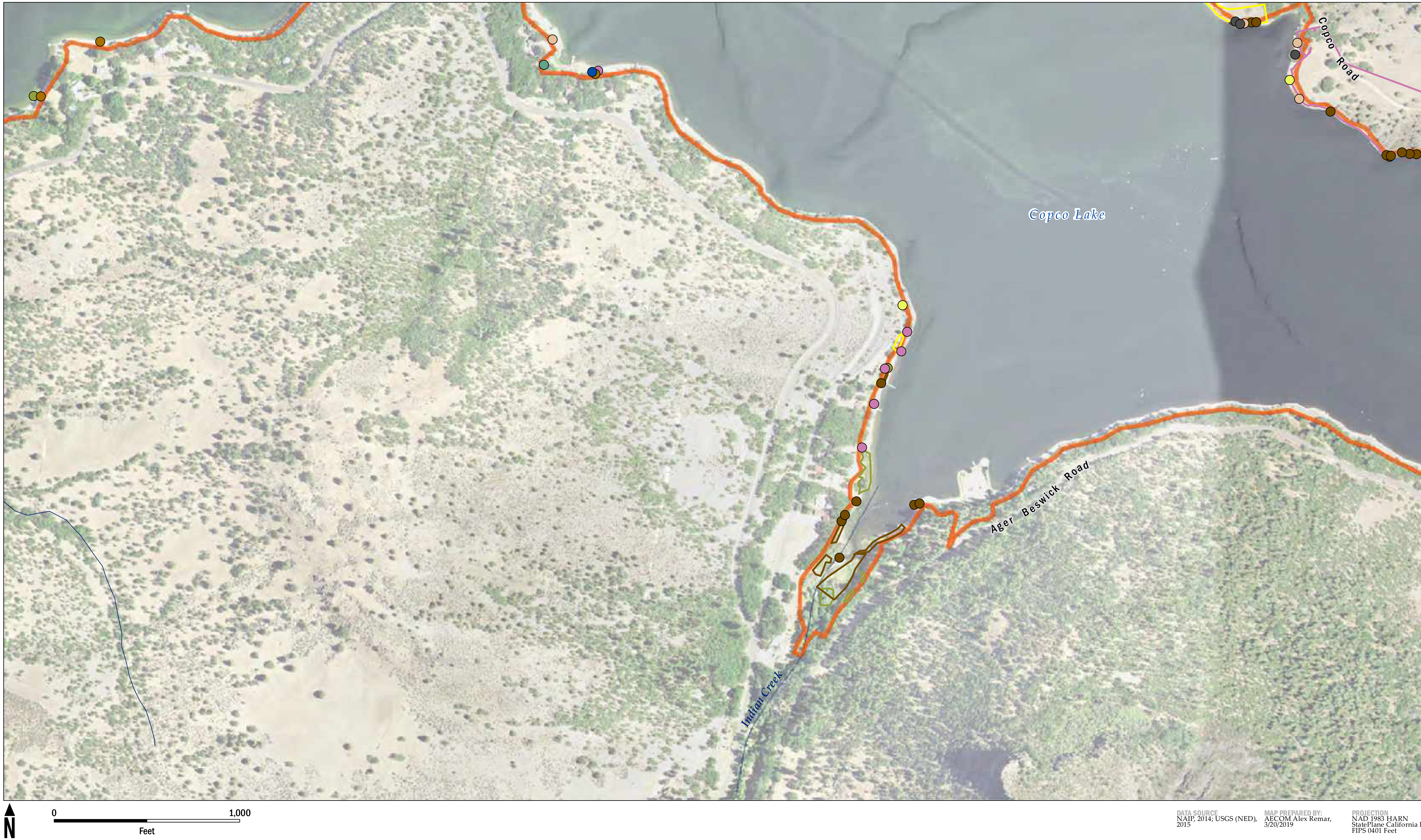
Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Lepidium draba

Species - Surveyed Polygon
- Centaurea solstitialis
- Dipsacus fullonum
- Rubus armeniacus
- Lepidium draba

FIGURE 12-16
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

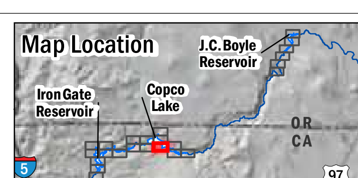


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



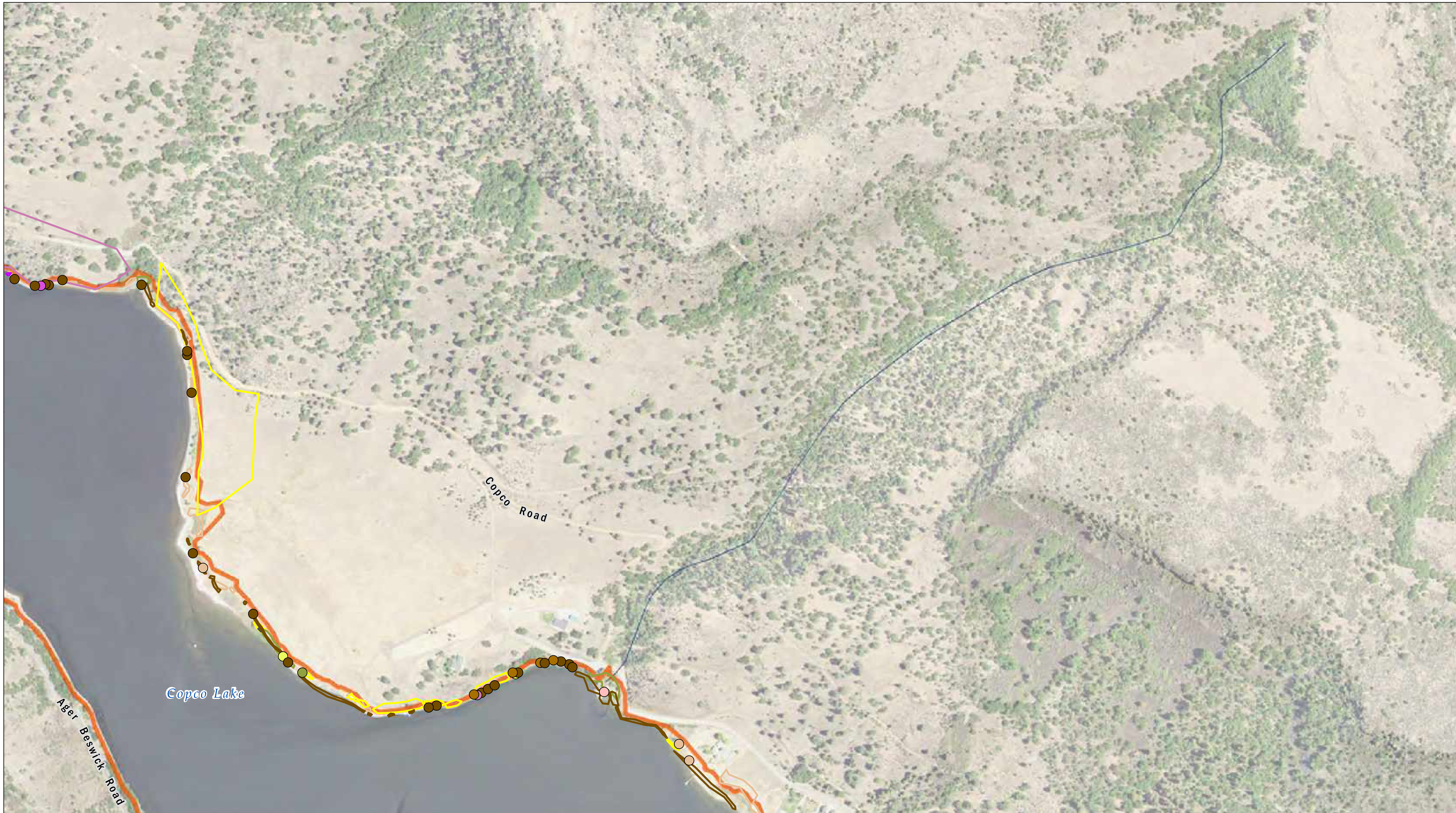
- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Carduus nutans
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Cirsium vulgare
- Lepidium draba

Species - Surveyed Polygon
- Bromus madritensis ssp. rubens
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba

FIGURE 12-17
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd



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Feet

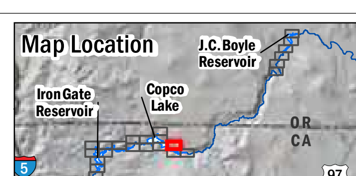
DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Location



Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Bromus madritensis ssp. rubens
- Bromus tectorum
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Conium maculatum

Species - Surveyed Polygon
- Bromus madritensis ssp. rubens
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Lepidium draba

FIGURE 12-18
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

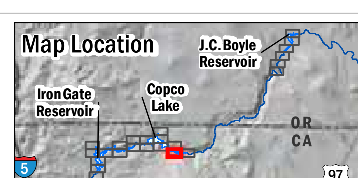
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



- Klamath River
- Streams
- Limits of Work

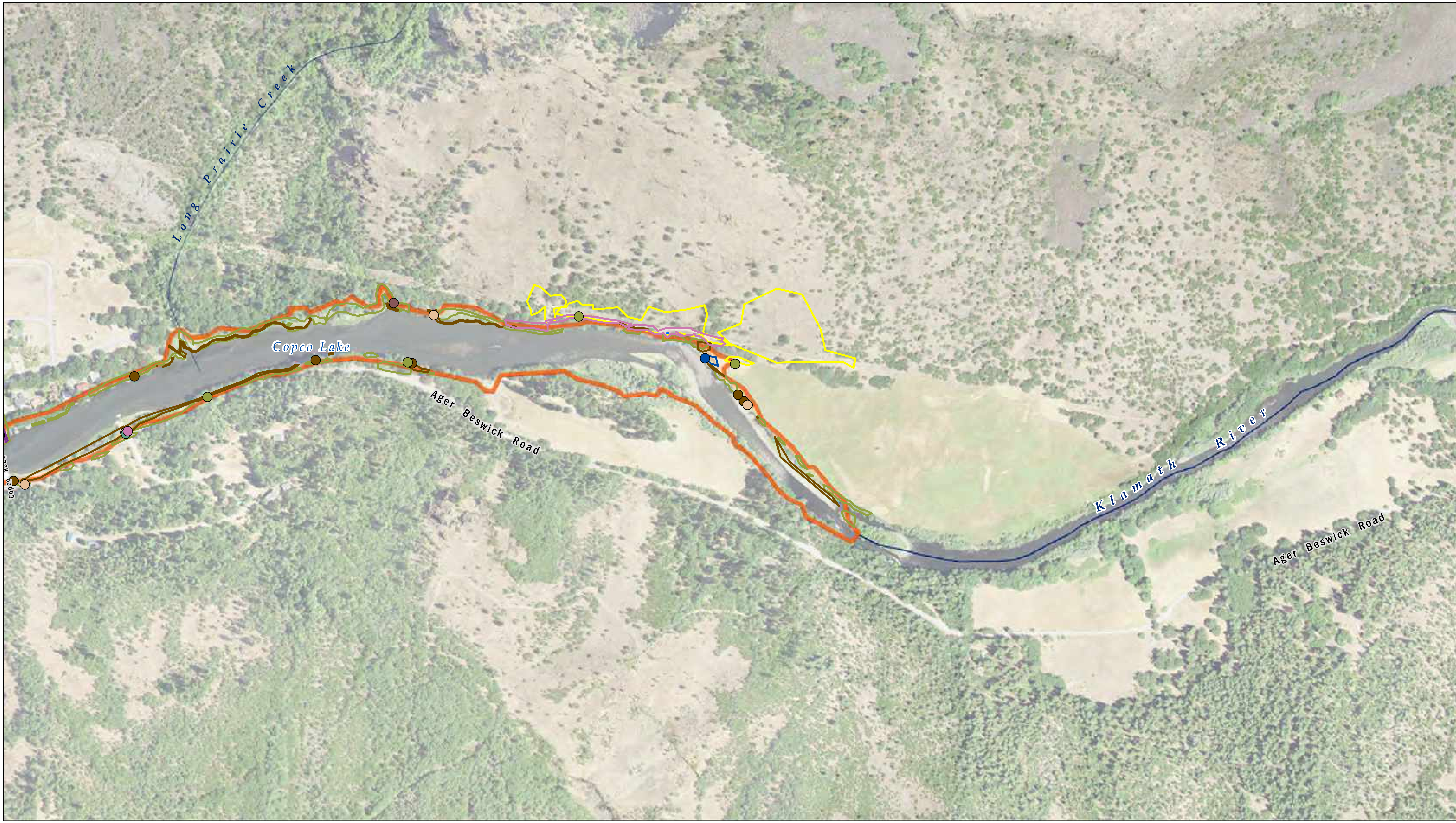
Species - Surveyed Point
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Bromus diandrus
- Conium maculatum
- Marrubium vulgare

Species - Surveyed Polygon
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Tribulus terrestris
- Conium maculatum

FIGURE 12-19

Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd



N

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Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

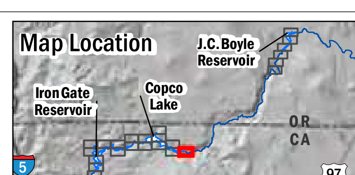
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River

Streams

Limits of Work

Species - Surveyed Point
- Carduus nutans
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Bromus diandrus
- Cirsium vulgare
- Conium maculatum
- Marrubium vulgare

Species - Surveyed Polygon
- Centaurea solstitialis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Rubus armeniacus
- Tribulus terrestris
- Aegilops cylindrica
- Cirsium vulgare

FIGURE 12-20

Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd

N

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Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

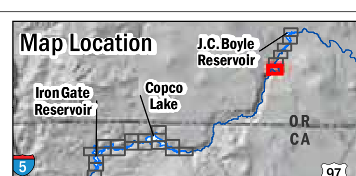
MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Klamath River

Streams

Limits of Work

Species - Surveyed Point

Centaurea solstitialis

Species - Surveyed Polygon

Bromus tectorum

Centaurea solstitialis

Elymus caput-medusae

Phalaris arundinacea

FIGURE 12-21

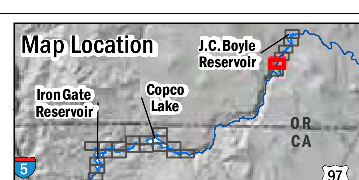
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

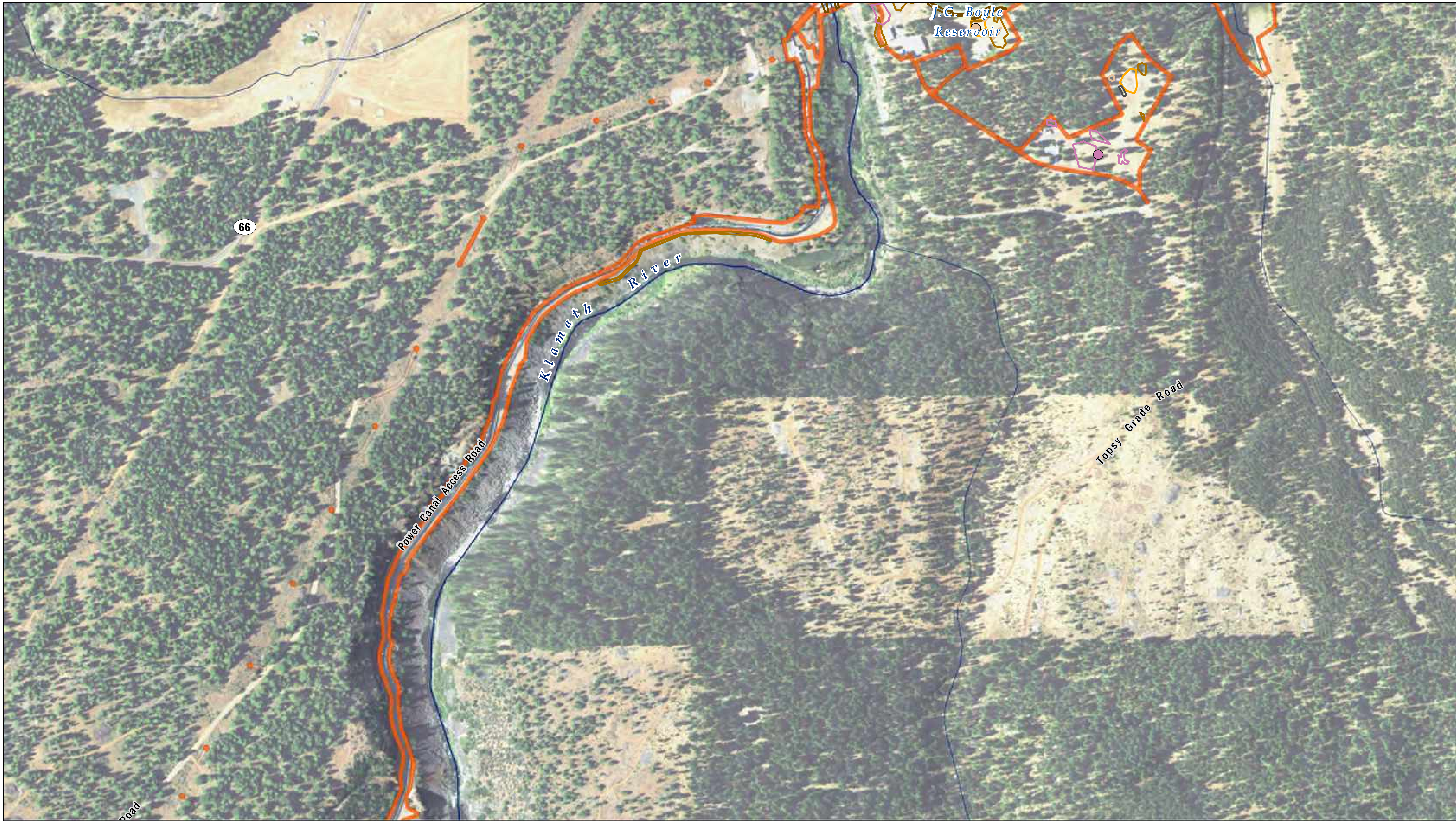


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Bromus tectorum
Species - Surveyed Polygon
Bromus tectorum

FIGURE 12-22
Invasive Exotic Vegetation Observations

AECOM Oakland CA 3/20/2019 USER jessica.parteno PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\SeedCollection_and_ReferenceSites\InvasiveVegetation_2018AnnualReport\Figure X EIV 2018 Annual Report Mapbook.mxd



N

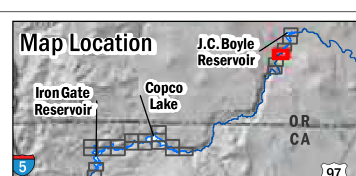
0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

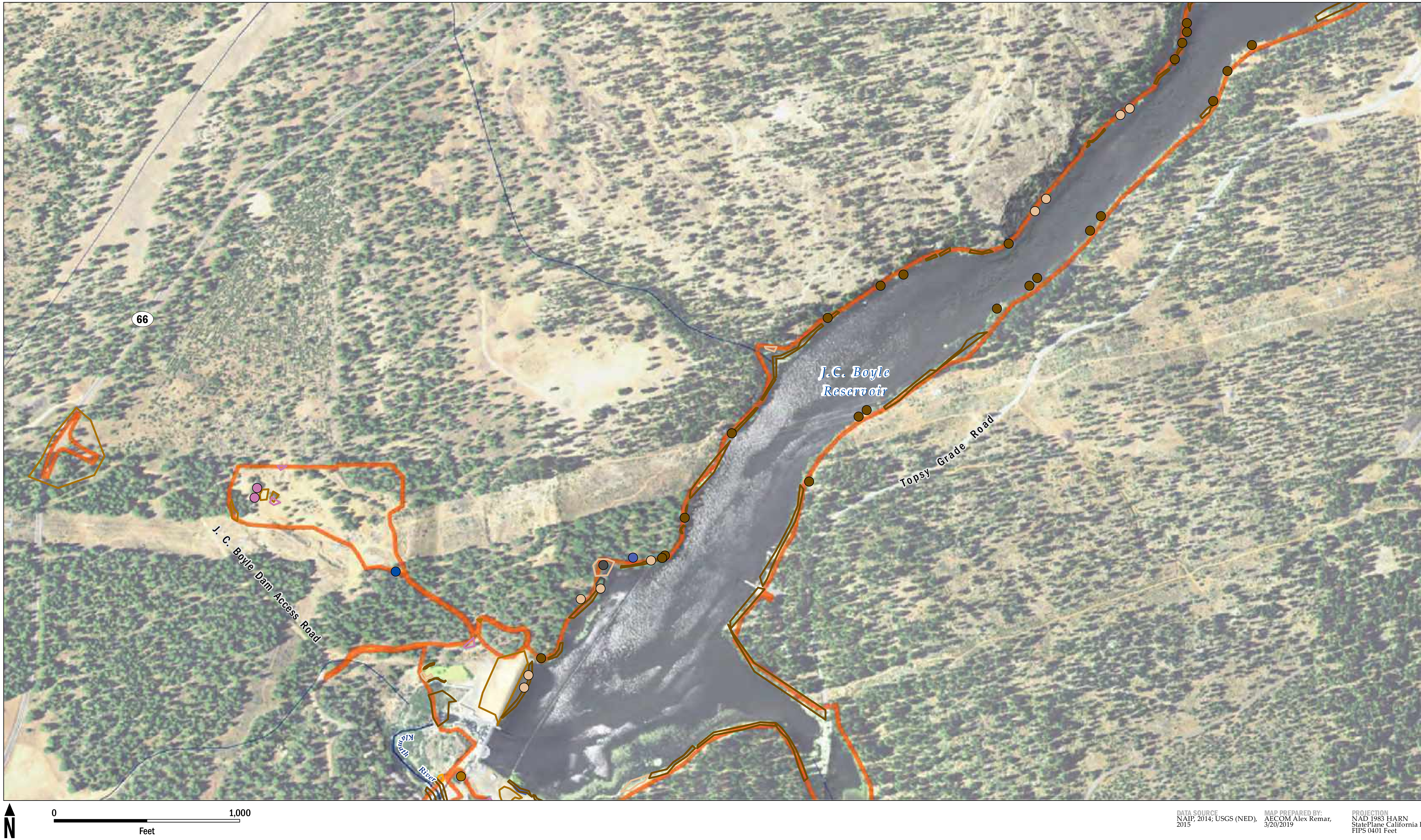


Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Elymus caput-medusae

Species - Surveyed Polygon
Onopordum acanthium
Bromus tectorum
Convolvulus arvensis
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Lepidium draba

FIGURE 12-23
Invasive Exotic Vegetation Observations



DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
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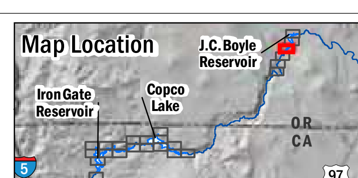


- Klamath River
- Streams
- Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Cirsium vulgare
- Lepidium draba

Species - Surveyed Polygon
- Onopordum acanthium
- Bromus tectorum
- Convolvulus arvensis
- Dipsacus fullonum
- Elymus caput-medusae
- Phalaris arundinacea
- Lepidium draba

FIGURE 12-24
Invasive Exotic Vegetation Observations

N

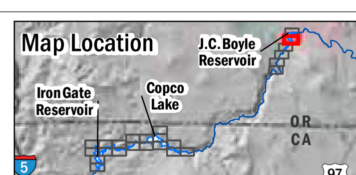
0 1,000
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
- Bromus tectorum
- Dipsacus fullonum
- Phalaris arundinacea
- Cirsium vulgare
- Lepidium draba

Species - Surveyed Polygon
- Bromus tectorum
- Dipsacus fullonum
- Phalaris arundinacea
- Rubus armeniacus

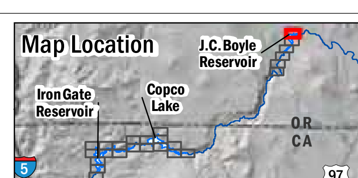
FIGURE 12-25
Invasive Exotic Vegetation Observations

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 3/20/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Klamath River
Streams
Limits of Work

Species - Surveyed Point
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Cirsium vulgare
Hypericum perforatum
Lepidium draba

Species - Surveyed Polygon
Dipsacus fullonum
Elymus caput-medusae
Phalaris arundinacea
Cirsium vulgare
Lepidium draba

FIGURE 12-26
Invasive Exotic Vegetation Observations

Appendix B Northern Spotted Owl Survey Data Sheets

Visit 1: April 24-25, 2018

Surveyor(s): Lidia D'Amico, AECOM; Jennifer Jones, CDM Smith

4/24/2018 Klamath Dam NSO Detection Surveys Weather: 68 F, partly cloudy, 0-5mph wind NE				
Station	Begin Time	End Time	NSO Detection	Notes
5	20:43	20:53	No	Canada Geese heard calling from reservoir
4	21:15	21:25	No	
7	21:40	21:50	No	
14	22:00	22:10	No	Bats heard
16	22:19	22:30	No	Heard frogs and bats
15	22:36	22:46	No	Bat species flyover
18	22:52	23:02	No	
17	23:10	23:20	No	Site adjacent to the Klamath River, ambient noise from river

4/25/2018 Klamath Dam NSO Detection Surveys Weather: 64 F, clear, 0-4 mph wind WNW				
Station	Begin Time	End Time	NSO Detection	Notes
8	20:35	20:45	No	Bat species flyover
12	21:00	21:10	No	Surveyed from edge of stand, walked into area approximately 260 feet from access road.
6	21:25	21:35	No	Site adjacent to off-site recreation area; bonfire pit.
10	21:40	21:50	No	Performed outside of Pacificorp Property; stood at edge of boundary. Saw raccoons
11	22:02	22:12	No	Great-horn owl detected
9	22:35	22:45	No	
13	22:55	23:05	No	

Note: Did not survey stations located on PacifiCorp property (Stations 1 and 3) due to lack of access agreement. Unable to access proposed Station 2 (west of dam); station is behind fence on private property.

NSO Detection?	Y	$\boxed{N}$
BAOW Detection:	Y	$\boxed{N}$

NSO Survey Data Sheet

Date: _5/29/2018__ **Site Name:** J.C. Boyle Dam
Surveyor(s): Jennifer Jones, Kent Barnes **Visit #:** __2_ **Outing #**__1___
Weather *(circle one)*: Precipitation: *None* *$\boxed{\text{Trace}}$* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *$\boxed{\text{Partly/Cloudy}}$* *Overcast* *Fog*
Moon phase: *$\boxed{\text{Full}}$* *Half* *Quarter* *None*
Wind: $\boxed{0}$ 1 2 3 4 5 Temp:__54____ Rain In prior 24hrs: YES $\boxed{\text{NO}}$
Type of Survey: ACS $\boxed{\text{SC}}$ CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit. AV=Additional Visit. OPP=Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
17	2107	2119	Chorus Frogs	NR
18	2128	2140	Quiet	NR
15	2150	2200		NR
16	2210	2221	Chorus Frogs	NR
14	2229	2241	Crickets	NR
7	2250	2303	Unidentified Raptor call	NR
11	2318	2334	Great Horned Owl very distant Coyote vocalizations toward reservoir	NR
10	2341	2358	Second group of coyote vocalizations off toward the East	NR
5	2410	2421		NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date: 5/30/2018 **Site Name:** J.C. Boyle Dam Site

Surveyor(s): Jennifer Jones, Kent Barnes **Visit #:** 2 **Outing #** 2

Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*

Moon phase: *Full* *Half* *Quarter* *None*

Wind: 0 1 2 3 4 5 Temp: 55 Rain In prior 24hrs: YES NO

Type of Survey: ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
12	2106	2127	Great horned owl call before survey started—Quiet during	NR
8	2133	2146		NR
6			Did not call teenagers having campfire at survey station	NR
1	2222	2236	Human noise from campground across reservoir	NR
4	2250	2302	Fighter jet noise from base in Kfalls,	NR
9	2312	2325		NR
13	2331	2341		NR
3	2352	2403		NR

NSO Survey Data Sheet

NSO Detection? Y N
BAOW Detection: Y N

Date: 6/11/2018 **Site Name:** J. C. Boyle Dam
Surveyor(s): Kent Barnes, Jennifer Jones **Visit #:** 3 **Outing #** 1

Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*
Moon phase: *Waning Crescent*
Wind: 0 1 2 3 4 5 Temp: 62 f Rain In prior 24hrs: YES NO

Type of Survey: ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	**Response**
17	2116	2128	River noise	NR
18	2138	2149	Crickets and River noise	NR
15	2201	2212		NR
19	2220	2232	This is new point added on this date. Chorus frogs below us by weir.	NR
13	2240	2250	Quiet	NR
9	2258	2309	Quiet	NR
4	2319	2329	Great horned owl very distant, from the north- no bearing taken	NR
3	2341	2351	Quiet	NR
1	2400	2412	Great horned owls calling still distant but closer than before, possible pair. No bearing taken	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date: 6/12/2018   Site Name: J. C. Boyle Dam

Surveyor(s): Kent Barnes, Jennifer Jones   Visit #: 3   Outing # 2

Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*

Moon phase: *Waning Crescent*

Wind: 0 1 2 3 4 5   Temp: 60 f   Rain In prior 24hrs: YES NO

Type of Survey: ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
8	2115	2127	Nighthawks calling and diving prior to and throughout survey. Osprey call from cliffs over the Klamath River just after survey ended	NR
12	2142	2152	Quiet	NR
6	2205	2219	Quiet	NR
10	2227	2239	Unknown owl contact call (not *strix*) Possible great horned owl. Bearing 300°. Follow up survey should occur.	NR
11	2255	2306	Quiet	NR
7	2322	2333	River noise	NR
14	2342	2352	Crickets	NR
16	2402	2415	Chorus frogs	NR
5	2434	2446	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_6/13/2018__ Site Name: _J. C. Boyle Dam_____________

Surveyor(s):__Kent Barnes, Jennifer Jones______________________ Visit #:__3___ Outing #__2___

Weather *(circle one)*: Precipitation: *None* *Trace* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*

Moon phase: *New*

Wind: 0 1 2 3 4 5 Temp:______ Rain In prior 24hrs: YES NO

Type of Survey:_____ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	**Response**
10	1015	1115	Research indicated that our detection the evening before most likely had been a female great horned owl protecting a nest. This follow up survey was conducted to search for this nest. We proceeded from call station 10 and headed Northwest in the general direction of the owl call from the previous night. We used NSO electronic calls in an attempt to solicit a response. We called with 2-3 minute duration approximately every 10 minutes. While conducting our stand search we found no structure, whitewash, feathers, or pellets indicative of nesting owls. While returning to our vehicles Jennifer visually located a fledgling great horned owl. Downy feathers were still visible but the fledgling appeared to have flight capabilities.	

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7/13/18__ Site Name: _J. C. Boyle Dam______________
Surveyor(s):__Mathew Petty, Kent Barnes______________________ Visit #:__4___ Outing #__1___
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Thunder Storms in Area
Moon phase: *Full* *Half* *Quarter* *None* New Moon
Wind: 0 1 2 3 4 5 Temp: _82 f_____ Rain In prior 24hrs: YES NO
Type of Survey:_____ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
10	2050	2102	Mourning doves in trees above station, great horned owl call	NR
6	2115	2128	Multiple bats	NR
12	2146	2156	Car noise on access road- no visual	NR
8	2215	2225	Osprey call very agitated by NSO calls, possible nest	NR
11	2243	2253		NR
5	2317	2329	Audible bat wing beats, truck noise	NR
3	2343	2354	Quiet	NR
1	2412	2423	Deer near call station, at least gave alarm call (snort)	NR
4	2444	2454	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7/14/18__ Site Name: _J. C. Boyle Dam_____________
Surveyor(s):__Mathew Petty, Kent Barnes_____________________ Visit #:__4___ Outing #__2___
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog*
Moon phase: *Full* *Half* *Quarter* *None* Waxing Crescent
Wind: 0 1 2 3 4 5 Temp: 82 f_____ Rain In prior 24hrs: YES NO
Type of Survey:_____ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
17	2058	2110	Bats observed, river noise	NR
18	2122	2134	Quiet	NR
15	2146	2158	Quiet	NR
19	2212	2224	Matt heard movement in canopy, source unidentified	NR
13	2235	2247	Wood rat in bushes (visual)	NR
9	2254	2307	Motorcycles on Route 66, unidentified chirp after end of NSO calling (once)	NR
16	2316	2328	River noise	NR
14	2336	2347	Crickets	NR
17	2404	2415	Bull Frogs	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7/21/18__ Site Name: _J. C. Boyle Dam______________

Surveyor(s):__Mathew Petty, Kent Barnes_______________________ Visit #:__4___ Outing #__2___

Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*

Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Hazy Smoke

Moon phase: *Full* *Half* *Quarter* *None* Saxing gibbous

Wind: 0 1 2 3 4 5 Temp: 75 f______ Rain In prior 24hrs: YES NO

Type of Survey:_____ ACS SC CC FO RV AV OPP

ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit. AV=Additional Visit. OPP=Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	**Response**
17	2108	2119	One bat observation	NR
18	2127	2138	Quiet, night hawk call as finishing NSO calls	NR
15	2154	2206	Quiet	NR
19	2212	2223	Cricket Noise	NR
13	2229	2240	Electrical noise in overhead power lines	NR
9	2248	2259	Quiet	NR
4	2308	2319	Car stopped on Route 66, no visual	NR
3	2330	2340	Quiet	NR
1	2348	2358	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_7-22-18__ Site Name: _J. C. Boyle Dam_____________
Surveyor(s):__Jennifer Jones, Kent Barnes____________________ Visit #:__5___ Outing #__2___
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Thunder Storms in Area
Moon phase: *Full* *Half* *Quarter* *None* Waxing Gubbous
Wind: 0 1 2 3 4 5 Temp:______ Rain In prior 24hrs: YES NO
Type of Survey:_____ ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit. AV=Additional Visit. OPP=Opportunistic Sitting*

Call Point	**Start Time**	**End Time**	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	**Response**
16	2101	2112	Bats observed, crickets	NR
14	2122	2133	Bats observed (one larger than others- big brown bat?)	NR
7	2145	2157	Quiet	NR
10	2208	2218	Quiet (No GHOW response)	NR
8	2235	2247	Osprey called back- less agitated than previous encounter at this location	NR
12	2304	2314	Quiet	NR
6	2330	2341	Quiet	NR
11	2354	2405	Quiet	NR
5	2421	2435	Coyotes, Bull Frogs, Unknown avian call- not strix	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date: 8/8/2018 Site Name: J. C. Boyle Dam
Surveyor(s): Jennifer Jones, Kent Barnes Visit #: 6 Outing # 1
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Smokey conditions- low visibility
Moon phase: *Full* *Half* *Quarter* *None* Wanning Crescent
Wind: 0 1 2 3 4 5 Temp: 77 Rain In prior 24hrs: YES NO
Type of Survey: ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit*. AV=*Additional Visit*. OPP=*Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
5	2026	2038	Cattle lowing, nighthawks overhead, motorcycles on road, mule deer at call station, unknown raptor call.	NR
			While in-route from station 5 to station 7, we made visual encounter of owl flying across the road. We stopped and used NSO call to try and solicit a response, I heard one call from GHOW very distant, this was not confirmed by Jennifer. Call duration was about 5 minutes.	NR
7	2109	2120	Crickets, Quiet	NR
14	1933	1951	Batteries in the digital caller died mid-way through survey. Extended survey to compensate. Quiet.	NR
16	2200	2211	Very dark, smoke blocking stars, low visibility.	NR
15	2217	2228	River noise	NR
18	2237	2248	Quiet, river noise	NR
17	2258	2309	Quiet	NR
19	2319	2330	Crickets	NR
13	2337	2347	Powerline buzz	NR
9	2355	245	Quiet	NR

NSO Detection?	Y	N
BAOW Detection:	Y	N

NSO Survey Data Sheet

Date:_8/9/2018__ Site Name: _J. C. Boyle Dam_____________
Surveyor(s):__Jennifer Jones, Kent Barnes______________________ Visit #:__6___ Outing #__2___
Weather *(circle one)*: Precipitation: *None* *T race* *Drizzle* *Light* *Heavy* *Snow*
Cloud cover: *Clear* *Partly/Cloudy* *Overcast* *Fog* Smoky, low visibility
Moon phase: *Full* *Half* *Quarter* *None* Wanning gibbour
Wind: 0 1 2 3 4 5 Temp:___85___ Rain In prior 24hrs: YES NO
Type of Survey:_____ACS SC CC FO RV AV OPP
ACS=*Activity Center Search*. SC=*Station calling*. CC=*Continuous Calling*. FO=*Follow Up Outing*. RV=*Reproductive Visit. AV=Additional Visit. OPP=Opportunistic Sitting*

Call Point	Start Time	End Time	**Results:** *spp., Sex, Direction from Surveyor, UTM's, waypoint name.*	Response
4	2030	2041	Cattle lowing to north, vehicles on HWY 66, Robin Call	NR
3	2050	2101	Quiet, one visual-small boat	NR
1	2113	2126	Cattle lowing, motorcycles on HWY 66, single hoot non-strix possible GHOW	NR
	2143	2150	Turtle crews notified us of an incidental owl detection they made north of the Topsy campground, possible strix. We stopped and used the digital caller, with both NSO and BDOW calls, we heard no response.	NR
11	2201	2213	Cattle lowing, visual detection of GHOW, flew in and sat on branch approximately 20 meters from the call station. It made no calls.	NR
8	2235	2247	Quiet, Crickets	NR
12	2305	2316	Crickets	NR
6	2333	2345	Quiet	NR
10	2355	2404	Quiet	NR

Appendix C Western Pond Turtle Trapping Study Summary Data and Photographs

Summary of 2018 J.C. Boyle Western Pond Turtle Trapping Events

Date	Night	Site	# of traps	# of traps that caught turtles	# turtles captured	# transmitters applied
8/6	1	S	12	1	1	1
8/7	2	W	20	2	3	2
8/8	3	S	20	1	1	1
8/9	4	W	20	0	0	0
8/10	5	S	20	0	0	0
8/11	6	W	20	0	0	0
9/4	7	W, S, O	10	0	0	0
9/5	8	W, S, O	37*	2	5	4
9/6	9	W, S, O	42*	0	1**	0
	TOTALS		**201**	**4**	**11**	**8**

S – South

W – West

O – Other

*includes day and night trapping

**turtle caught by hand capture

Photo 1. Commercial opera-style crab trap used for turtle trapping

Photo 2. Side view of trap

Photo 3. Deployment of trap near fallen tree, South site

Photo 4. Deployment of trap near rock face, South site

Photo 5. Deployment of trap near fallen tree, West site

Photo 6. Western pond turtle (WPT), male, captured 8/7 at South site.

Photo 7. Weight measurement using spring scale

Photo 8. Radio transmitter and temperature logger attached to WPT.

Photo 9. WPT, female, caught 8/8 at West site.

Photo 10. Checking female WPT for eggs

Photo 11. Vertebral scutes of female WPT detaching from carapace, indicating unknown shell disease

Photo 12. WPT, male, caught 8/8 at West site.

Photo 13. Morphometric measurements using calipers

Photo 12. WPT, male, caught 8/8 at West site.

Photo 13. Shell height measurement

Photo 14. Plastron of male WPT showing growth rings (used to estimate age) and unique plastron pattern

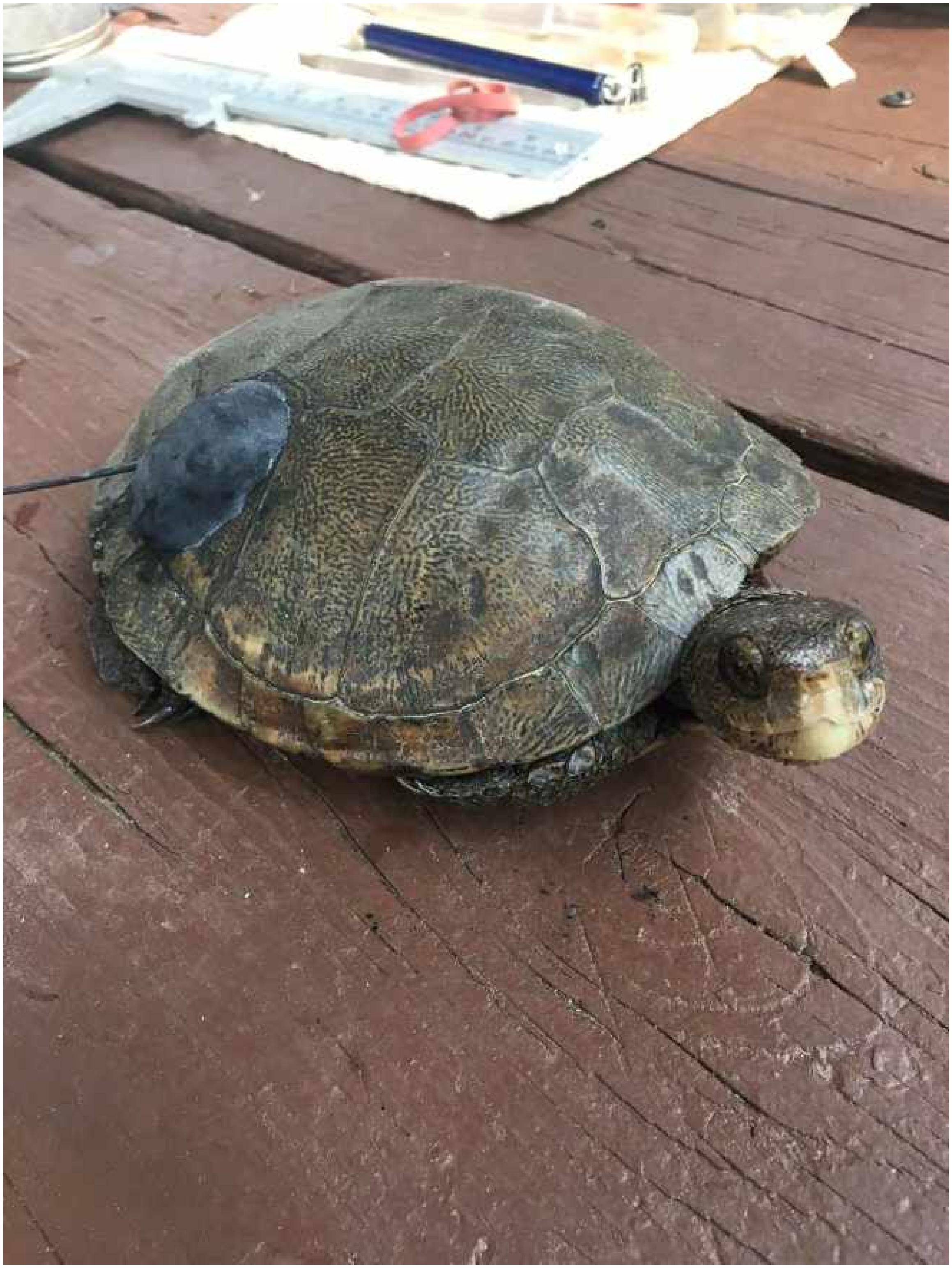


Photo 15. WPT, female, caught 8/9 at South site. With radio tracker and temperature logger attached.

Photo 16. Filing identification mark into marginal shields

Photo 17. WPT with identification notches on marginal shields. Note notches at front and rear shields.

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
100	8/7/2018	1	M	>10	20+	163.0	159.5	117.7	149.4	143.5	82.9	53.4	552

100

Transmitter

Freq **151.790**

Photo 18. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
101	8/8/2018	1	F	13	20+	182.2	176.3	138.5	176.9	168.0	96.2	68.1	662

101

Peeling verbal shields,
No transmitter applied

Photo 19. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
102	8/8/2018	1	M	99	99	187.7	186.1	140.1	166.1	159.5	97.3	64.8	905

102

- Transmitter
  Freq **151.701**

Photo 20. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
103	9/5/2018	1	F	3	4	121.3	117.0	97.3	112.2	110.2	63.4	44.0	258

103

- Juvenile
- No Transmitter

Photo 21. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
104	9/5/2018	1	M	99	99	180.9	175.1	131.8	165.0	153.5	89.6	60.0	782

104

- Transmitter

  Freq **151.750**

Photo 22. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
105	9/5/2018	1	F	20	20+	166.3	164.0	119.4	156.0	150.0	186.9	61.5	718

105

- Transmitter

  Freq **151.760**

Photo 23. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
106	9/5/2018	1	F	20	20+	170.7	167.4	126.4	157.5	151.1	90.6	65.0	765

106

- Transmitter

  Freq **151.729**

Photo 24. WPT morphology data

MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
107	9/5/2018	1	M	99	99	188.8	186.9	141.0	170.9	163.0	195.5	62.5	865

107

- Transmitter
  Freq **151.770**

Photo 25. WPT morphology data




MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
108	9/6/2018	1	J	2	2	97.3	94.5	81.2	92.7	89.7	52.4	36.0	144



108

- No Transmitter

Photo 26. WPT morphology data

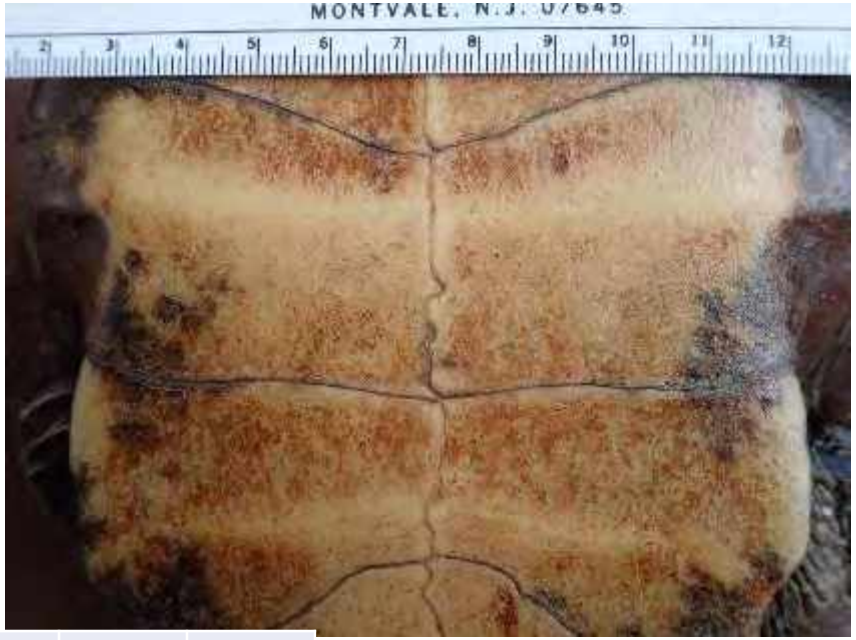
MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
119	8/8/2018	1	M	9	10	163.0	160.1	123.6	151.8	148.2	87.7	54.3	600

119

- Transmitter
  Freq **151.919**

Photo 27. WPT morphology data



MARK	DATE	CapHist	SEX	AGE	AGE+	CL	cl	cw	PL	pl	pw	Ht	Wt
120	8/9/2018	1	F	99	99	178.8	176.4	143.0	171.7	164.2	100.5	71.5	975

120

- Transmitter

  Freq **151.820**

Photo 28. WPT morphology data

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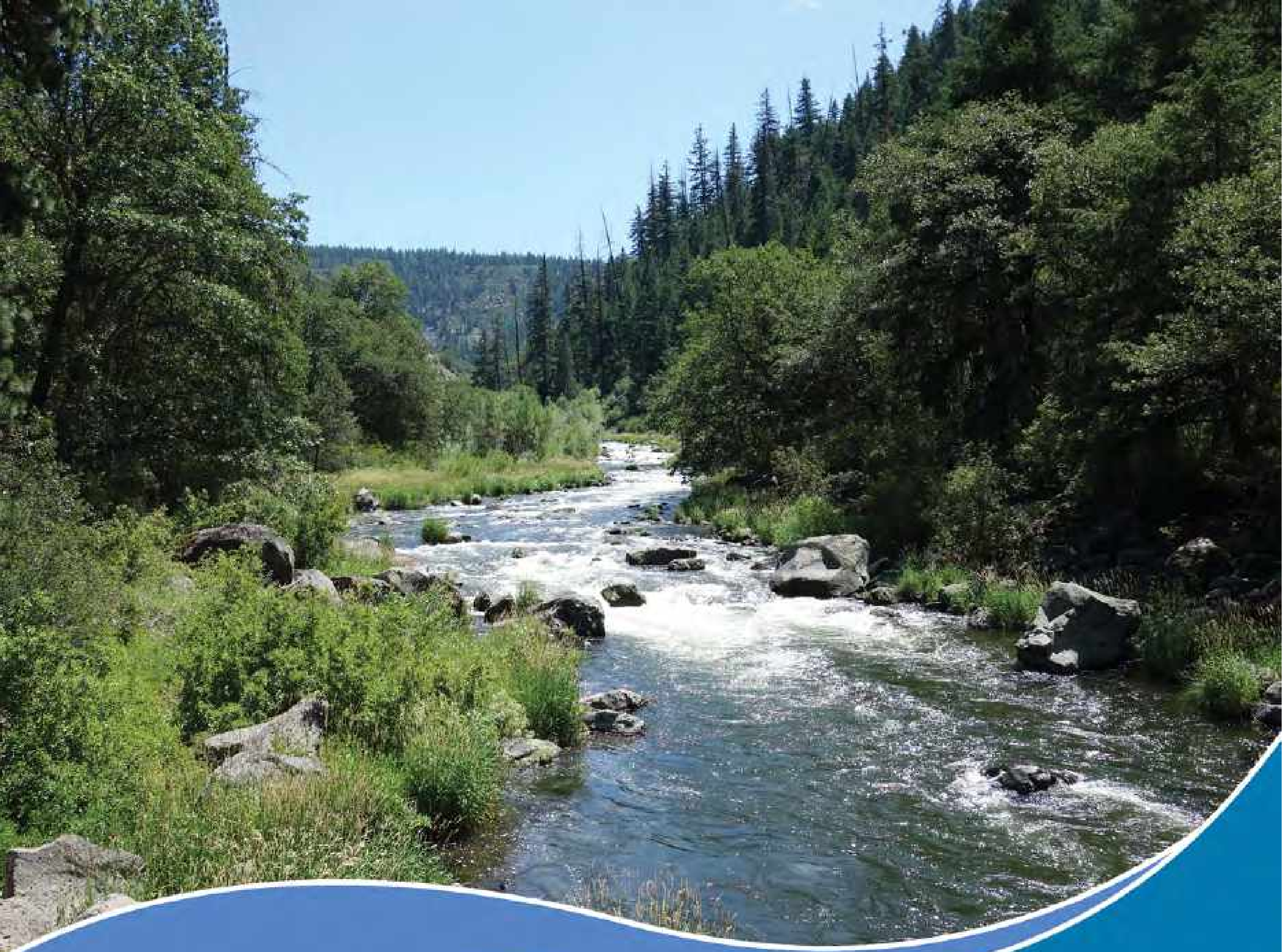

Klamath River Renewal Project

2019 Annual Terrestrial Resources Survey Report

March 2020

KLAMATH RIVER RENEWAL CORPORATION

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Acronyms and Abbreviations

BLM	Bureau of Land Management
CDFW	California Department of Fish and Wildlife
CE	California Endangered
CEQA	California Environmental Quality Act
CMR	capture-mark-recapture
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
COTO	*Corynorhinus townsendii* (Townsend's big-eared bat)
FE	Federal Endangered
FSC	Federal Species of Concern
GIS	Geographic Information System
GPS	Global Positioning System
IPaC	USFWS Information for Planning and Consultation Database
KRRC	Klamath River Renewal Corporation
MYYU	*Myotis yumanensis* (Yuma myotis)
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resources Conservation Service
OC	Candidate listing by Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ODSL	Oregon Department of State Lands
OHWM	ordinary high-water mark
ONHP	Oregon Natural Heritage Program
ORBIC	Oregon Biodiversity Information Center
ORWAP	Oregon Rapid Wetland Assessment Protocol
OSHA	Occupational Safety and Health Administration
Project	Klamath River Renewal Project
RCB	riparian corridor boundary
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WPT	western pond turtle

Chapter 1 Introduction

1. INTRODUCTION

This report summarizes the terrestrial resources surveys conducted in 2019 for the Klamath River Renewal Project (Project). The Klamath River Renewal Corporation (KRRC) and its consultants carried out field investigations to collect existing condition information on the following terrestrial resources:

- Bald and golden eagles
- Bats
- Western pond turtles (WPTs)
- Special-status plants
- Wetlands

KRRC initiated several of these surveys in 2018. This report provides a summary of both 2018 and 2019 findings for the resources listed above. KRRC completed surveys for other terrestrial resources in 2018, as described in the 2018 Annual Terrestrial Resource Survey Report (KRRC 2019a). Section 7 provides a correction to the willow community data previously reported in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a).

1.1 Purpose of the Terrestrial Resources Surveys

Information on the existing condition of terrestrial resources in the Project area is needed to inform the ongoing Project design and regulatory permit processes. Early Project planning identified information gaps, as described in previous studies and regulatory compliance documents, including the 2012 Environmental Impact Statement/Environmental Impact Report (USBR and CDFW 2012) and the Joint Preliminary Biological Opinion (NMFS and USFWS 2012).

1.2 Study Area

For each resource listed above, this report describes the methods followed during field investigations. Methods were based on survey work plans developed in close coordination with federal and state resource agencies, including the United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and Oregon Department of Fish and Wildlife (ODFW). The survey work plans are available in Appendix J of the Definite Plan (KRRC 2018).

Unless otherwise noted, surveys were conducted within 0.25 mile of dams and structures to be removed, disposal sites, and haul and access roads (collectively referred to as the study area). The 0.25-mile study area is shown in Figure 1-1 and was developed in cooperation with the resource agencies listed above during development of the survey work plans. Surveys for eagles and bats used different study areas, which are described in the respective sections of this report. This report summarizes the findings of the surveys. Figures cited in the text of this report are provided in Appendix A, and figures updated from the 2018 Annual

Terrestrial Resources Survey Report (KRRC 2019a) are provided in Appendix B. Appendix C provides a list of all plant and wildlife species observed during field investigations.

Chapter 2 Eagles

2. EAGLES

Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act (16 Code of Federal Regulations 668) and the Migratory Bird Treaty Act (16 United States Code §§ 701-12), and are fully protected under California law. Bald eagles are listed as endangered under the California Endangered Species Act, but do not have listing status in the State of Oregon. The upper Klamath Basin provides suitable habitat for and is known to support bald eagle and golden eagle populations. Existing information on bald and golden eagles in the Klamath Basin and results from the 2017-2018 eagle surveys can be found in the Klamath River Renewal Project 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a).

2.1 Methods

KRRC developed the approach to the 2019 field surveys based on previous work, including a desktop review of historical and current nest data; a Geographic Information System (GIS) viewshed analysis conducted in 2017 and 2018 that helped define the study area; development of a survey plan in coordination with state and federal agencies; and results of previous eagle surveys (PacifiCorp 2004, KRRC 2018, KRRC 2019a).

2.1.1 Study Area

KRRC defined the study area by the viewshed analysis (KRRC 2019a) and the nature, timing, and location of proposed construction activities. The terms used to describe the study area are defined below.

- The limits of work are those defined in the Definite Plan for the Lower Klamath Project (KRRC 2018).
- High-impact areas include a 1-mile buffer surrounding the limits of work anticipated to have high-impact activities (excluding the extent of the reservoir where no work will occur). High-impact activities include proposed construction and demolition activities associated with the decommissioning of the dams and facilities, and creation of disposal sites.
- Low-impact areas include a 0.5-mile buffer surrounding the limits of work, as well as those access roads that are anticipated to have an increase in traffic and movement of heavy equipment.

The study area encompassed the extent of the viewshed in the high impact areas and low impact areas. The study area defined here is intended to represent the portion of habitat that may be affected by Project activities. In 2019, KRRC biologists surveyed beyond this defined area to account for potential future changes to the Project area and activities and to gain a general understanding of eagle use and occupancy surrounding the Project area.

2.1.2 Field Surveys

Qualified KRRC avian biologists conducted bald eagle and golden eagle surveys concurrently. The surveys focused on areas with suitable nesting, roosting, or foraging habitat for bald and golden eagles, as well as known nest locations. The goal of the surveys was to determine nest site locations in the study area and to determine baseline eagle use and other key habitat features. Additionally, by monitoring eagle behavior at nests prior to construction, it will be easier to identify changes in behavior that may occur during construction. Field surveys employed a variety of techniques and multiple temporal windows to capture seasonal activity. Biologists recorded all survey data digitally through Collector for ArcGIS, using iPads (Apple, Inc.) which preserve the location and time of the observation. Table 2-1 summarizes the 2019 survey date and type.

Table 2-1 Eagle Survey Types and Dates

Survey Type	Survey Date
Ground-based early breeding season survey	February 18 , 2019
Ground-based and helicopter mid-breeding season survey	May 21 through 23, 2019
Ground-based and helicopter late-breeding season survey	June 13 through 19, 2019

2019 Surveys

KRRC biologists used binoculars and spotting scopes when surveying for nest occupancy. Teams were able to view the entire study area using a combination of ground-based surveys on foot and in vehicles, and aerial surveys from a helicopter. In the field, biologists emphasized surveys on microhabitats that could support nesting eagles (e.g., rocky cliffs for golden eagles, large conifers for bald eagles). Biologists surveyed all nests that were historically active. Biologists recorded detailed data based on the guidelines and datasheets provided in the protocols (see field survey protocol in KRRC 2019a). The surveys included three breeding season surveys (February through June 2019), as follows:

1. To determine occupancy, biologists conducted an initial nest search early in the breeding season, from February 18 through 20, 2019, when eagles were most likely to be found near nest sites. The timing of this survey was informed by findings from the 2018 surveys. By estimating the age of chicks in May 2018, biologists were able to determine what winter survey timing would capture the most eagle activity at nests. In this survey, six biologists conducted ground-based observations from vehicles and on foot for 3 days, spending 1 day at each reservoir and corresponding dams. Biologists conducted this first inventory and monitoring survey during courtship, when the adults were mobile and conspicuous. Surveys included observing historical nests and recording all eagle detections in the study area. Biologists also documented courtship behavior and areas of high eagle activity to follow up on during the May and June 2019 surveys. For this early-breeding season survey, biologists extended the study area to include observations at all golden eagle nests within 10 miles of the limits of work, and bald eagle nests within 2 miles. Biologists established survey distances in coordination with wildlife agencies.

2. Biologists conducted a second survey from May 21 through 23, 2019, to observe eagle behavior and mid-season nesting activity, and to determine the number of active nests and nestlings in the study area. Biologists based the survey timing on the results of the 2018 surveys to observe nests when they contained nestlings and to avoid disturbing nests when they were most vulnerable. Three teams of two biologists conducted this survey. Two teams conducted ground-based surveys for 3 days, spending 1 day at each reservoir. The second team conducted aerial helicopter surveys for 2 days, covering all reservoirs; and a ground-based survey for 1 day. Biologists thoroughly surveyed locations where eagle pairs or territorial behavior were observed during previous surveys from the ground and during helicopter surveys. Additionally, biologists surveyed all historical and newly discovered nests from the helicopter and from the ground when accessible.

3. Biologists conducted a late breeding season survey from June 13 through 19, 2019, when the nestlings were near fledging age. One team of three biologists conducted ground-based surveys for 7 days at all reservoirs, and one team of two biologists conducted helicopter surveys for 1 day, covering all reservoirs.

2.2 Findings

2.2.1 Field Surveys

February 2019

Eagle Activity

Biologists observed approximately 117 eagles in the study area, of which 78 were bald eagles and 39 were golden eagles; however, many of these could have been resightings of the same individuals. Common bald eagle behavior observed included subadults and adults perching on trees and utility poles near and in sight of the reservoirs. Biologists observed several adult bald eagle pairs perched together, and exhibiting courtship behavior, acting territorial, vocalizing, performing undulating flight (breeding behavior), visiting nests, and nest-building. Biologists observed bald eagles soaring on thermals with other bald eagles and golden eagles, usually near the reservoirs but also over the Klamath River. Biologists also observed bald eagles foraging in the reservoirs. Biologists observed golden eagles perching on trees and cliffs that were not typically near the reservoirs. Biologists also observed golden eagles foraging on the ground, soaring on thermals with other eagles, flying in pairs, and performing undulating (breeding behavior) flight. Both species of eagles appeared to prefer certain perches and were observed using these same perches during different survey times and days.

At Iron Gate Reservoir and Copco Lake, biologists were able to discern areas of high eagle activity, which had the potential to include nest sites. Biologists observed thirteen potential bald and golden eagle territories surrounding Iron Gate Reservoir. In these areas, biologists observed high eagle activity, undulating flight, or pairs of adult eagles perching for long periods. Additionally, biologists identified five potential golden and bald eagle territories around Copco Lake with high golden and bald eagle activity. Biologists thoroughly surveyed these areas during subsequent field surveys in May and June of 2019.

At J.C. Boyle Reservoir, there was significantly less eagle activity observed than at the other two sites, with only seven eagles observed. However, this may have been due to the lower visibility at J.C. Boyle, resulting from the high density of trees and limited road access surrounding the reservoir. Biologists noted three potential bald eagle territories where high eagle activity or courtship behavior was observed. Biologists thoroughly surveyed these areas during subsequent field surveys in May and June of 2019. Due to the presence of potential wintering and migratory birds in the area, it is difficult to determine how many of the observed birds represented resident birds. Table 2-2 presents the number, age, and species of eagles observed at each reservoir.

Table 2-2 Total Number of Eagle Observations by Site, Survey, Species, and Age

Iron Gate Reservoir[1]						
Survey Date	Golden Eagle Adults	Golden Eagle Subadults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Subadults	Bald Eagle Young of the Year
February 2019[2]	18	1	0	19	1	0
May 2019	2	0	0	12	6	2
June 2019	2	0	0	6	0	2
Total	**22**	**1**	**0**	**37**	**7**	**4**
Copco Lake[1]						
Survey Date	Golden Eagle Adults	Golden Eagle Subadults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Subadults	Bald Eagle Young of the Year
February 2019[2]	19	0	0	15	28	0
May 2019	17	0	3	13	10	3
June 2019	6	1	2	2	4	3
Total	**42**	**1**	**5**	**30**	**42**	**6**
J.C. Boyle Reservoir[1]						
Survey Date	Golden Eagle Adults	Golden Eagle Subadults	Golden Eagle Young of the Year	Bald Eagle Adults	Bald Eagle Subadults	Bald Eagle Young of the Year
February 2019[2]	0	1	0	13	2	0
May 2019	2	0	0	8	0	5
June 2019	0	0	0	3	0	7
Total	**2**	**1**	**0**	**24**	**2**	**12**

Notes:

1 The number of eagles observed is influenced by the visibility at each site and should not be interpreted as relative abundance across sites. Visibility at J.C. Boyle Reservoir is poorer than at Copco and Iron Gate Reservoirs.

2 The number of eagles detected during the winter survey period is likely to include wintering and migratory individuals.

Eagle Nests

Biologists were unable to access 26 historically active nests because of poor visibility, resulting from dense tree cover, limited access through private property, or poor road conditions. In the case of the 19 remaining nests where access was not limited, observers were able to survey the area and look for eagle activity. Biologists observed bald eagles visiting three historically active nests, and one new nest. Biologists also observed golden eagles visiting three historically active nests, and one new nest. Out of the 26 inaccessible historically active nests, biologists observed bald eagles in the vicinity of four bald eagle nests and golden eagles in the vicinity of five golden eagle nests. This suggested that the inaccessible nests could be active. The conditions of the accessible nests varied. Some nests appeared to be old and unused, while other nests appeared to have been recently active. Biologists also located several observation points that provided exceptional visibility, allowing survey of historically active areas for eagle activity and occupancy. Details of the nest observations are provided in the following paragraphs, and nest locations are shown on Figures 2-1 through 2-6. Historically active nests that were not observed in the 2017-2019 KRRC surveys are excluded from the figures. All nests that were active in 2019, active in 2018, or found to be inactive are depicted on the figures.

At Iron Gate Reservoir, biologists observed a bald eagle pair nest-building at one new bald eagle nest location that had not been historically documented (F19_BE1). No other nests at Iron Gate were accessible by car; however, biologists were able to observe adult bald and golden eagle pairs in the vicinity of each historically active nest (four golden eagle nests and one bald eagle nest: GE3-7, GE3-5, F_GE2, GE3-6, and F_BE1).

At Copco Lake, biologists observed a golden eagle pair perching near and landing in one new golden eagle nest location (F19_GE1) that had not been historically documented. Additionally, biologists observed nest building at one historically active golden eagle nest (GE3-3) within 0.5 mile of the limits of work. Biologists observed a golden eagle pair visiting an existing golden eagle nest (F_GE4) and a bald eagle pair visiting an existing bald eagle nest (BE1-43) outside of the 0.5-mile buffer, but within 0.5 mile of access roads between Copco and J.C. Boyle reservoirs. Several nests were not accessible from the ground (five golden eagle nests and four bald eagle nests); however, biologists observed an adult golden eagle in the vicinity of one historically active nest (GE3-8).

Biologists observed bald eagle adults visiting two existing bald eagle nests (BE1-31, BE1-32) at J.C. Boyle Reservoir. Additionally, biologists observed adult bald eagle activity in the vicinity of two other historically active bald eagle nests (BE1-34, BE1-35), but these nests were not accessible from the ground. Most existing nests at J.C. Boyle were inaccessible due to snowy and icy road conditions.

May 2019

Eagle Activity

Biologists observed several adult bald and golden eagles at all reservoirs, some subadults, and nestlings in active nests. Biologists observed an estimated 21 adult golden eagles, in addition to 3 nestlings described below. Except for the nestlings, some of these observations may have been resightings of the same eagle. Golden eagle activity included perching near, flying around, and visiting active nests, often in pairs. Biologists also observed golden eagles foraging over land and flying over ridgelines and the reservoirs. Golden eagles exhibited territorial behavior toward bald eagles and other birds.

Photograph 2-1 Two Bald Eagle Nestlings at Nest F19_BE1

Biologists observed an estimated 33 bald eagle adults and 16 subadults, in addition to the 10 nestlings described below. Except for the nestlings, some of these may have been resightings of the same individual. Bald eagle activity included perching near, flying around, defending, and visiting active nests; and feeding chicks. Bald eagles exhibited territorial behavior toward other eagles and raptors and were observed perching and flying around the reservoirs. Bald eagles were also observed soaring on thermals, vocalizing, engaging in courtship behavior, foraging, and flying in pairs. Most bald eagle observations were close to the reservoirs; however, there were some observations near the Klamath River or over ridgelines. Table 2-2 presents the number, age, and species of eagles observed at each reservoir; nest locations are shown on Figures 2-1 through 2-6.

Eagle Nests

Biologists observed a total of seven active bald eagle nests, each with one or two nestlings present; and two golden eagle nests, each with one or two nestlings present. Biologists found one new active bald eagle nest within 0.5 mile of the limits of work (F19_BE5).

At Iron Gate Reservoir, biologists observed one active bald eagle nest (F19_BE1) immediately adjacent to Copco Road and the reservoir. There were two chicks about 6 to 8 weeks old in the nest, often with one or both bald eagle adults perched nearby. Biologists observed one inactive bald eagle nest (F_BE1), which was also inactive in 2018, within 2 miles of the limits of work. Biologists observed two inactive golden eagle nests (GE3-6, F_GE2) within 2 miles of the limits of work, both of which were also inactive in 2018. Biologists observed one inactive golden eagle nest, which was also inactive in 2018, within 2 miles of the limits of work (GE3-7). Biologists were unable to locate the nest structure of one golden eagle nest that was active in 2018 (GE3-6), within 2 miles of the limits of work.

At Copco Lake, biologists observed two active bald eagle nests at Copco Lake. One of these nests (BE2-3) was within 0.5 mile of the limits of work and contained two nestlings about 8 weeks old, with an adult perched nearby. The other nest (BE1-43) was within 0.5 mile of an access road but more than 2 miles from the limits of work and contained one large chick about 9 weeks old, with an adult perching and flying nearby. The only active golden eagle nests for the 2019 surveys were at Copco Lake. Biologists observed one nest (F19_GE1) that was newly discovered in February 2019 and was within 0.5 mile of the limits of work; this nest contained two 1.5- to 2-week-old nestlings, with an adult perched and flying nearby. The other nest (F_GE3) was within 5 miles of the limits of work and contained one unattended nestling, about 4 to 5 weeks old. Biologists observed two inactive golden eagle nests at Copco Lake. Both nests (GE3-3, and F_GE4) were active in 2018, and biologists observed nest-building activity at these nests during the February 2019 surveys. Biologists observed three subadult bald eagles flying in the territory of nest GE3-3, with no golden eagles defending the nest territory, and therefore confirmed that this nest was inactive in 2019.

Biologists observed four active bald eagle nests around J.C. Boyle Reservoir, including one nest that had not been observed in previous surveys (F19_BE5). Three of these nests (F19_BE5, BE1-36, and BE1-32) were within 0.5 mile of the limits of work, and one of these nests (F_BE2) was within 5 miles of the limits of work. Nest F19_BE5 had a large nest structure in good condition, with 2 adults perched nearby, exhibiting territorial behavior. Based on the behavior of the adults, biologists assumed that this nest was active and that a chick was nearby; however, the nest was empty. Nests BE1-36 and BE1-32 both contained two nestlings approximately 8 weeks old. Nest F_BE2 contained one nestling approximately 9 weeks old. Biologists observed two inactive bald eagle nests. One of these nests (BE1-31) was within 0.5 mile of the limits of work; the other (BE1-15), which was active in 2018, was within 2 miles of the limits of work and within 0.5 mile of an access road. Biologists could not find the nest structure of one bald eagle nest that was inactive in 2018 (BE1-35). Biologists observed one inactive golden eagle nest (GE4-206), which had been active in 2018, within 2 miles of the limits of work.

June 2019

Eagle Activity

Biologists observed an estimated 11 adult bald eagles, four subadult bald eagles, and 12 nestlings. Except for the nestlings, some of these observations may have been resightings of the same eagle. Bald eagle adults were perching by reservoirs and in or near nests; foraging; feeding chicks; and flying over nests, reservoirs, and ridgelines. Subadult bald eagles were flying, perching by reservoirs, and foraging.

Biologists observed approximately eight adult golden eagles, one subadult golden eagle, and two nestlings during the June 2019 survey. Except for the nestlings, some of these observations may have been resightings of the same eagle. Biologists observed golden eagles flying over ridgelines and flying around, perching near, and visiting nests. Biologists also observed golden eagle adults flying in pairs and vocalizing near nests. Table 2-2 presents the number, age, and species of eagles observed at each reservoir.

Eagle Nests

Biologists observed ten active nests during the June 2019 survey: eight bald eagle nests, each with one or two nestlings present; and two golden eagle nests, each with one or two nestlings present. Biologists found one new active bald eagle nest (F19_BE7) containing two nestlings near the 0.5-mile buffer of the limits of work at J.C. Boyle Reservoir in proximity to a historical nest. Biologists found one new inactive bald eagle nest north of Iron Gate Reservoir, within 0.5 mile of the limits of work; one new inactive golden eagle nest that was in good condition, on a cliff face north of the Copco No. 2 Dam, within 0.5 mile of the limits of work (F19_GE2); and a cavity in a cliff face that could be suitable golden eagle nest habitat, at the northeastern edge of Copco Lake where it meets the Klamath River (F19_GE4).

At Iron Gate Reservoir, biologists observed one active bald eagle nest (F19_BE1) immediately adjacent to Copco Road at Iron Gate Reservoir, within 0.5 mile of the limits of work. This nest contained two large nestlings approximately 11 weeks old, and an adult was observed feeding these chicks. Biologists found one new inactive bald eagle nest, north of Iron Gate Reservoir within 0.5 mile of the limits of work (F19_BE6). Biologists observed one inactive golden eagle nest (GE3-7) within 2 miles of the limits of work, which was inactive in 2018. Additionally, three golden eagle nests (GE3-5, GE3-6, and F_GE2) observed to be active or inactive during 2018 surveys were not found during aerial surveys.

At Copco Lake, biologists observed two active bald eagle nests. Nest BE2-3 was within 0.5 mile of the limits of work and contained two large nestlings about 11 weeks old, with one adult perched nearby. Nest BE1-43 was within 0.5 mile of an access road, but more than 2 miles from the limits of work and contained one large nestling about 12 weeks old. Biologists observed two active golden eagle nests at Copco Lake. One of these nests (F19_GE1) was within 0.5 mile of the limits of work; the other (F_GE3) was within 5 miles of the limits of work. Due to the survey angle from the ground and the adult obscuring the view from the helicopter, biologists could only confirm one nestling in nest F19_GE1, which had two nestlings in May 2019. At nest F_GE3, biologists observed one chick approximately 7 weeks old in the cliff nest, and an adult visiting the nest. Biologists observed two inactive golden eagle nests at Copco Lake. One of these nests (F_GE4) was active in 2018, with breeding activity observed near nest F_GE4 during the February 2019 surveys, but was confirmed empty through both aerial surveys (May and June 2019). The second inactive golden eagle nest (GE3-3) was confirmed inactive during the May 2019 survey and was therefore not surveyed during the June 2019. Biologists found an empty cliff cavity that could be suitable golden eagle nest habitat (F19_GE4) and should be surveyed during future eagle surveys. This potential nest site is categorized as inactive on Figures 2-1 through 2-6, but is not included in Table 2-3.

Table 2-3 Active and Inactive Bald and Golden Eagle Nests Observed in 2019 Field Surveys

Nest Name	Golden Eagle		Bald Eagle	
Nest Status in 2019	Active	Inactive	Active	Inactive
Within 0.5 mile of Project footprint	1	2	5	2
Between 0.5 and 2 miles from Project footprint	0	4	1	2
Total Nests within 2 Miles	**1**	**6**	**6**	**4**
Outside of 2-mile buffer surrounding Project footprint, but within 0.5 mile of haul roads	0	0	2	1

At J.C. Boyle Reservoir, biologists observed five active bald eagle nests, one of which was a new nest (F19_BE7) observed during the June 2019 survey. Four of these nests (F19_BE5, BE1-36, BE1-32, and F19_BE7) were within 0.5 mile of the limits of work, and one of these nests (F_BE2) was within 5 miles of the limits of work. At nest F19_BE5, biologists were able to confirm one nestling in the nest, about 8 to 9 weeks old. This nest appeared empty in the May 2019 survey. Nest BE1-36 had one chick about 10 weeks old and one adult perched nearby. This nest contained two nestlings in May 2019. Nest F_BE2 contained one chick about 11 weeks old. Nests BE1-32 and F19_BE7 each contained two chicks approximately 10 to 11 weeks old. Biologists observed two inactive bald eagle nests. One of these nests (BE1-31) was within 0.5 mile of the limits of work; the other (BE1-15), which was active in 2018, was within 0.5 mile of an access road. One bald eagle nest found inactive in 2018 was not found in 2019 (BE1-35). One golden eagle nest (GE4-206) which had been active in 2018 was inactive in 2019, within 1 mile of the limits of work. Biologists searched the surrounding trees for alternate nests for GE4-206, because this nest is in a dead tree and is therefore less suitable for nesting; the search was unsuccessful.

2.3 Conclusions

Biologists observed a total of ten active nests at Copco, Iron Gate, and J.C. Boyle Reservoirs in 2019. Two are golden eagle nests and eight are bald eagle nests. Nine of these nests are within 2 miles of the limits of work or within 0.5 mile of haul roads (Table 2-3).

Additionally, biologists observed eleven inactive nests within 2 miles of the limits of work or within 0.5 mile of haul roads. Five of these are presumed bald eagle nests and six are presumed golden eagle nests, based on historical use data and 2018 surveys. Biologists also observed one potential golden eagle nest site within 0.5 mile of the limits of work. It is not uncommon for eagles to suspend breeding in some years or use alternative nest sites (USFWS 2004); therefore, these inactive nests will continue to be surveyed in the future.

The 2019 survey results showed a higher number of successful bald eagle nests than golden eagle nests in the study area (Table 2-4). However, in 2018, there were more successful golden eagle nests than bald eagle nests in the study area. Several nests that were active in 2018 were not active in 2019, demonstrating that eagles could be suspending breeding in some years in the study area. There are more bald eagle nests surrounding J.C. Boyle Reservoir than there are surrounding Copco and Iron Gate Reservoirs, and there are more golden eagle nests surrounding Copco and Iron Gate Reservoirs than surrounding J.C. Boyle Reservoir. Trends in eagle activity cannot be compared across reservoirs due to different levels of visibility and access.

Table 2-4 Summary of Active and Inactive Eagle Nests from 2017 through 2019 Surveys

Species	Nest Name	Nest Status	Number of Nestlings in 2018 or 2019
Bald Eagle	BE1-15	Active in 2018	1
Bald Eagle	BE1-31	Inactive	0
Bald Eagle	BE1-32	Active in 2019	2
Bald Eagle	BE1-35	Inactive	0
Bald Eagle	BE1-36[1]	Active in 2019	2
Bald Eagle	BE1-43	Active in 2019	1
Bald Eagle	BE2-3	Active in 2019	2
Bald Eagle	F_BE1	Inactive	0
Bald Eagle	F_BE2	Active in 2019	1
Bald Eagle	F19_BE1	Active in 2019	2
Bald Eagle	F19_BE5	Active in 2019	1
Bald Eagle	F19_BE6	Inactive	0
Bald Eagle	F19_BE7	Active in 2019	2
Golden Eagle	F_GE2	Inactive	0
Golden Eagle	F_GE3	Active in 2019	1
Golden Eagle	F_GE4	Active in 2018	2
Golden Eagle	F19_GE1[1]	Active in 2019	2
Golden Eagle	F19_GE2	Inactive	0
Golden Eagle	GE3-3	Active in 2018	1
Golden Eagle	GE3-5	Active in 2018	2
Golden Eagle	GE3-6	Inactive	0
Golden Eagle	GE3-7	Inactive	0
Golden Eagle	GE4-206	Active in 2018	1
Golden Eagle	F19_GE4	Potential Future Nest Site	0

Notes:
BE = Bald eagle nest
GE = Golden eagle nest
F19_GE = New golden eagle nest found during the 2019 surveys, not included in historically active data or the 2017-2018 surveys
F19_BE = New bald eagle nest found during the 2019 surveys, not included in historically active data or the 2017-2018 surveys
[1] For some nests, the number of nestlings decreased by one from May to June 2019. This table reflects the highest number of nestlings observed at each nest.

Chapter 3 Bats

3. BATS

In 2019, KRRC biologists conducted targeted surveys at structures where either 1) additional data were sought to supplement previous summer surveys (2017-2018) for bats; or 2) evidence of bat use had been found during previous inspections, but summer roosting had not been confirmed. The 2017-2018 survey methods and results are described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a).

3.1 Methods

A team of four KRRC biologists conducted evening emergence and acoustic surveys for bats from June 12 through 15, 2019, at structures at J.C. Boyle, Iron Gate, and Copco. KRRC biologists targeted the following structures where additional data were sought to supplement previous summer surveys (2017-2018); or where evidence of bat use had been found during previous inspections, but summer roosting had not been confirmed:

- J.C. Boyle red barn
- Iron Gate diversion tunnel outlet
- Iron Gate powerhouse
- Lakeview Road bridge (at Iron Gate entrance)
- Maintenance Building on Copco Access Road
- Copco No. 1 gatehouse C-12
- Copco No. 1 diversion tunnel outlet

KRRC biologists used night vision during all emergence surveys and documented points of egress. During all emergence surveys, KRRC biologist used iPads (Apple, Inc.) running Echo Meter Touch 2 Pro (Wildlife Acoustics) and a laptop running Sonobat software (Version 4) with a Binary Acoustics ultrasonic microphone (Binary Acoustic Technology, LLC). Field teams conducted emergence surveys when weather conditions were suitable for the evening emergence of bats (e.g., warm temperatures and minimal rain and wind).

3.2 Findings

All bat survey findings from 2017 through 2019 are summarized in Table 3-1; the structures surveyed in 2019 are indicated by green rows. A summary of the 2019 survey results follows the table.

Table 3-1 2017-2019 Bat Survey Findings

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Iron Gate						
Lakeview Road Bridge	High	Yes	Yes – 200 bats estimated during summer emergence.	MYYU	October 2018, June 2019	First emergence survey in June 2019.
Diversion Tunnel Outlet	High	Yes	Yes – 200 bats estimated during summer emergence. Absent in winter.	MYYU	February 2018 (interior), May-June 2018 (emergence only), June 2019 (emergence only)	None
Powerhouse	High	Yes	Yes – 400 bats estimated during summer emergence.	MYYU	July 2017, May and June 2018, October 2018, June 2019	None
Penstock Intake Structure	High	Yes	Yes – several hundred bats roosting inside at top of structure in summer.	MYYU	July 2017, June 2018, October 2018	None
Barn/Garage at Iron Gate Village	High	Yes	Yes – bats present in rafters/ceiling in summer.	MYYU	July 2017, May and June 2018, October 2018	None
Residence 1 (occupied) blue/gray	Mod-high (attic)	Unknown	Unknown	NA	June 2017 (exterior only)	No interior survey access to occupied residences.
Residence 2 (occupied) tan with green roof	Mod-high (attic)	Yes	Yes – 15 (estimated) bats found huddled behind clock on back porch in summer. Potential attic access through loose screen over vent.	MYYU	July 2017 (exterior only)	No interior survey access to occupied residences.
Fish Holding Facilities	Mod	No	No	NA	July 2017, June 2018, October 2018	None
Restrooms (near powerhouse)	Low - mod	No	No	NA	July 2017, June 2018	None
Emergency Spill Equipment shed	Low	No	No	NA	July 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Copco No. 1 Diversion Tunnel Outlet	High	Yes	Yes – 100 bats estimated during summer emergence.	None	February 2018 inspection, June 2018 emergence	Access limitations prohibit safe, targeted placement of acoustic recording equipment at or near the mouth of the tunnel.
C-12 Gatehouse at Copco No. 1	High	Yes	Yes – 2,000 to 3,000 bats estimated during summer emergence. Several dozen present in late October.	MYYU	July 2017, June 2018, October-November 2018, June 2019	Maternity roost; largest roost found on Project site. Gatehouses C-11 and C-12 are the only Project structures found to have bats present in late October/early November.
C-11 Gatehouse at Copco No. 1	High	Yes	Yes – 100 bats estimated during summer emergence. Approximately 20 bats clustered in interior roof apex in late October.	MYYU	July 2017, June 2018, October-November 2018	Gatehouses C-11 and C-12 are the only Project structures found to have bats present in late October/early November.
Copco No. 1 powerhouse	High	Yes	Yes – several dozen bats clustered on walls in transformer bays and small numbers in lower level in summer.	MYYU	July 2017, February 2018, June 2018, October through November 2018	Abundant staining/guano on lower level but no large roosts found. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
Vacant House (light blue) on Copco Access Road	Mod	No	No	NA	July 2017	None
Maintenance Building (next to switchyard on Copco Access Road)	High	Yes	Yes – 30 bats estimated on summer emergence.	*Myotis* spp.	July 2017, June 2018, October-November 2018, June 2019	First emergence survey in June 2019. One COTO call detected on emergence.
Tin Pumphouse (across from light blue house on Copco Access Road)	Low	No	No	NA	July 2017	None
Groundwater Well House (at entrance to Copco Village)	Low - mod	No	No	NA	July 2017, October-November 2018	None
Vacant House 1 (tan)	High	Yes	Yes – small numbers of bats present under exterior side panels in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Vacant House 2 (blue)	High	Yes	Yes – small numbers of bats present under exterior side panels in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Vacant House 3 (yellow-green)	High	Yes	Yes – large colony present in summer, in garage behind wood window framing and under rotting wood panels.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Vacant House 4 (peach)	High	Yes	Yes – present between flashing and fascia board all around roof edge in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Vacant House #21601 (light yellow)	High	Yes	Yes – 300 bats estimated during summer emergence.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	Presumed maternity roost.
Occupied House next to Vacant House 4	Mod	Unknown	Unknown	NA	July 2017 exterior only.	No interior survey access to occupied residences. Resident stated he is not aware of any bats in the attic.
House 19038 (next to schoolhouse)	High	Yes	No	NA	July 2017, February 2018, June 2018, October November 2018	None
Bunkhouse	Mod	No	No	NA	July 2017, February 2018, June 2018, October-November 2018	None
Cookhouse	Mod	Yes	Yes – small number of bats present in awning over side door outside in summer.	MYYU	July 2017, February 2018, May and June 2018, October-November 2018	None
Equipment Shed (in front of bunkhouse/cookhouse)	Low	No	No	NA	July 2017, February 2018, June 2018	None
Schoolhouse	Low - mod	No	No	NA	July 2017	None
Hazardous Waste Storage/Wood Shop	Low - mod	No	No	NA	July 2017, February 2018, June 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
Copco No. 2 powerhouse	High	Yes	Yes – 50 bats estimated during summer emergence.	MYYU	July 2017, February 2018, June 2018, October-November 2018	Six dead Myotis adults and pups found on ground level and lower level in summer. Small number of COTO detected acoustically during summer emergence, but not confirmed to be present in the powerhouse.
Maintenance Building (next to Copco No. 2 powerhouse)	Low	No	No	NA	July 2017, June 2018	None
Copco No. 2 Dam (concrete dam and associated structures)	Low	No	No	NA	July 2017	None
Control Center at Copco No. 2 powerhouse	Low	No	No	NA	July 2017, February 2018, June 2018	None
J. C. Boyle						
Office/Red Barn	High	Yes	No	None	July 2017, May and June 2018, October 2018, June 2019	June 2019 survey conducted from outside of perimeter fence due to gate access constraint. Two desiccated dead MYYU found in attic in 2017. No live bats found to-date.
Spillway Control Center	High	Yes	Yes – several hundred bats present in summer.	MYYU	July 2017, May and June 2018, October 2018	Presumed maternity roost.
Fish Screen House	Mod-high	No	No	NA	July 2017, June 2018, October 2018	None
Fire Protection Building	Mod	Yes	Yes – outside only, a few bats day roosting in exterior crevices near roof edges (western side and eastern side) in summer.	MYYU	July 2017, June 2018, October 2018	None
Dam Communications	Mod	No	No	NA	July 2017, June 2018, October 2018	None

Building Name	Suitability[1]	Evidence of Bat Use?	Bat Roosting Confirmed?	Species Confirmed	Survey Dates (all years)	Additional Notes
J.C. Boyle powerhouse	Mod	No	No	NA	July 2017, June 2018, October 2018	None
Maintenance Building (next to powerhouse)	Low - mod	No	No	NA	July 2017, June 2018, October 2018	None
Truck Shop	Low - mod	No	No	NA	July 2017, May 2018 and June 2018, October 2018	None
Headgate Control	Low - mod	No	No	NA	July 2017, June 2018	None
Gate Control and Communications	Low - mod	No	No	NA	July 2017, October 2018	None
Power Canal/Spillway	Low	No	No	NA	July 2017, June 2018	None
HazMat Storage Shed	Low	No	No	NA	July 2017	None
Pump House	Low	No	No	NA	July 2017	None
Two occupied residences	Unknown	Unknown	Unknown	NA	NA	No interior survey access to occupied residences.

Notes:

1 "High" suitability was assigned to structures with bats present and/or where signs of heavy bat use were found, or to structures that showed little or no sign of use or could not be accessed but contain external or internal features generally preferred by roosting bats, such as attics/roof spaces, soffits, fascias, weather boarding, spaces between roof felt/membrane and tiles/slates, window frames, cave/cavity walls, flashing, and the like. "Moderate" suitability was assigned to structures where no bats or very few bats were found, with little or no sign of bat use, that contain points of entry/exit and limited internal and external features preferred by roosting bats. "Low" suitability for roosting was assigned to well-sealed structures with no points of entry/exit, and generally lacking cavities, crevices, and other features generally preferred by roosting bats.

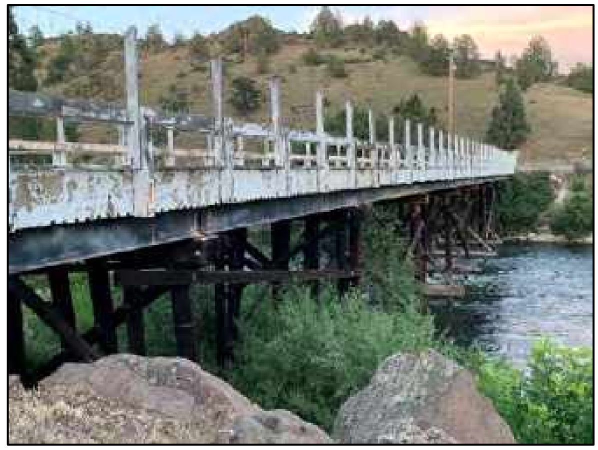
2 Photograph included in report

NA = Not Applicable

MYYU = *Myotis yumanensis* (Yuma myotis)

COTO = *Corynorhinus townsendii* (Townsend's big-eared bat)

Photograph 3-1 Maintenance Building on Copco Access Road, June 15, 2019



Photograph 3-2 Lakeview Road Bridge, June 12, 2019

During the June 2019 surveys, bat emergences occurred when the average evening outdoor temperature was 75 degrees Fahrenheit. KRRC biologist confirmed bat roosts in six of the seven structures surveyed. Figures 3-1 through 3-5 show all structures across the Project area where active bat roosts have been confirmed during surveys from 2017-2019. Photographs 3-1 and 3-2 depict the exterior view of the Maintenance Building and Lakeview Road Bridge prior to emergence surveys.

Biologists observed evening emergences of approximately 100 bats from the Copco diversion tunnel and approximately 200 bats from the Iron Gate diversion tunnel. More than 2,000 *Myotis* spp. emerged from the Copco No. 1 C-12 gatehouse. As before, more than 400 bats emerged from the below-grade draft pipe channels at the Iron Gate powerhouse. At the J.C. Boyle red barn, no bats were seen emerging from the structure. Big brown bat (*Eptesicus fuscus*) and hoary bat (*Lasiurus cinereus*) were identified acoustically in small numbers in flight nearby. The results of the June 2019 surveys at these five structures are consistent with the emergence and acoustic surveys conducted at these same locations in 2018.

Biologists surveyed the Lakeview Road Bridge and Maintenance Building for emergence and acoustic detections for the first time in June 2019. At the Lakeview Road bridge, biologists observed bats emerging from three discrete locations underneath the bridge. Most of the acoustic detections at this location were not definitively classified; however, a small number of Yuma myotis were confirmed. At the Maintenance Building, most of the calls showed characteristics of *Myotis* spp. These were primarily auto-classified as Yuma myotis and California myotis (*Myotis californicus*), with a small number of long-legged myotis (*Myotis volans*) and/or western small-footed myotis (*Myotis ciliolabrum*). Because these species are difficult to distinguish acoustically, the species detected at this structure are collectively reported as *Myotis* spp. One call at the Maintenance Building was auto-classified as Townsend's big-eared bat (*Corynorhinus townsendii*) and later confirmed by manual vetting. KRRC biologist observed many bats circling around the open area at the back of the building and foraging among the trees behind the building; therefore, the Townsend's big-eared bat call confirmed the species presence in the vicinity but did not confirm the species to be roosting inside of the structure.

Additionally, during meetings with the design-build contractor in September 2019, KRRC biologists were informed that an engineering team observed one bat in a cavity in a historic concrete gate control structure on the upstream side of the Copco No. 1 dam (Figure 3-3) in March 2018. This structure has not been inspected by KRRC biologists to-date for potential bat roosting.

3.3 Conclusions

Surveys conducted from 2017-2019 confirmed that significant bat roosts are present in many structures across the Project area.

Chapter 4 Western Pond Turtle

4. WESTERN POND TURTLE

4.1 Introduction

KRRC biologists completed general wildlife surveys and noted observations of WPTs in the 0.25-mile study area in 2018, as described in the 2018 Annual Report (KRRC 2019a). In accordance with condition 4.c of the Clean Water Act Section 401 Certification issued by the Oregon Department of Environmental Quality, KRRC conducted a study of WPTs at J.C. Boyle Reservoir. This study was conducted by KRRC biologists in partnership with ODFW from August 2018 through April 2019. This study was implemented to inform key knowledge gaps about native turtles. This study had two primary objectives: 1) to estimate the WPT population size and 2) to determine the timing and locations of WPT overwintering behavior. The results of the study are summarized here. For more detail, figures, and data, please see the full report, Western Pond Turtle Study Report, J.C. Boyle Reservoir (KRRC 2019b).

To assess the population size, KRRC biologists conducted capture-mark-recapture (CMR) in areas known to be used by turtles. In addition, biologists conducted a springtime basking survey to provide a rough estimate of relative abundance. It should be noted that visual surveys do not provide rigorous estimates of population size or density.

Biologists used radio telemetry to track adult turtles through the winter and determine the overwinter timing and location of refugia for WPTs in J.C. Boyle Reservoir. Biologists used temperature data loggers, some attached to radio-tagged turtles and some installed along a transect from upland to deeper waters, to compare temperatures associated with turtle locations with the baseline environmental temperatures. This comparison required the recapture of radio-tagged animals in spring 2019 to retrieve transmitters and recover temperature data.

As described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a), KRRC biologists carried out trapping events and installed environmental temperature loggers in August and September of 2018. Radios and temperature loggers were affixed to eight turtles.

Additional field efforts completed by KRRC biologists in 2019 included:

- Monthly radio-telemetry surveys to identify overwintering habitat and characterize seasonal movement patterns
- Trapping for CMR and for recovery of telemetry equipment and temperature data loggers
- A springtime basking survey to provide a rough estimate of relative abundance
- Retrieval of environmental data loggers to collect baseline temperature data

The WPT Study Report, J.C. Boyle Reservoir (KRRC 2019b) provides additional details of the methods and findings of the study.

4.2 Methods

4.2.1 Fall 2018 – Winter 2019

Telemetry Surveys

Field teams completed telemetry surveys during monthly site visits from November 2018 through April 2019 to ascertain the overwintering habits (timing and location) of the eight radio-tagged WPT. KRRC tested all equipment and found that telemetry receiver accuracy was consistently under 6.5 feet (2 meters). The equipment typically provided locations that were within the margins of error for handheld Global Positioning System (GPS). Locations were recorded using a handheld GPS (Garmin Map78s), with error typically between 10 to 16 feet (3 and 5 meters).

4.2.2 Spring 2019

Trapping and Recovery of Data Loggers

KRRC biologists conducted trapping for CMR and for recovery of telemetry equipment and temperature data loggers in spring of 2019, with site visits on April 3 through 5 and April 23 through 29. Considering the low trap capture success in 2018, the team chose to focus the spring trapping on recapture of radio-tagged WPT to recover the transmitters and temperature data loggers. Trapping was therefore targeted in areas where radio-tagged WPT were found to be present based on telemetry. All eight turtles were successfully radio-located prior to trap deployment in April.


Photograph 4-1 Deployment of Turtle Trap near Large Woody Debris

Biologists placed twenty traps around the reservoir near large woody debris, rock crevices, and other refugia near where radio-tagged turtles were detected. Traps were left in place near radio-tagged turtles and were checked one or more times each day. Bait was replaced as necessary. If telemetry indicated that radio-tagged turtles were no longer in the area, traps were repositioned near the radio-tagged turtle's new location and rebaited.

On April 27, 2019, KRRC retrieved the environmental data loggers that had been placed along land-to-water transects in the summer of 2018 to collect baseline environmental temperature data.

Basking Surveys

Biologists completed formal basking surveys from April 23 through 29, 2019. These surveys consisted of visually inspecting various basking habitats, such as rock faces, exposed stumps, and downed trees throughout the study area. Biologists recorded the locations of all basking turtles using a handheld GPS unit.

4.3 Findings

4.3.1 Telemetry Study

All eight radio-tagged animals were located via telemetry during each site visit, with the two exceptions noted below. KRRC biologists tracked the approximate travel paths based on monthly telemetry checks for each individual turtle. The telemetry results from the end of summer, through fall and winter and into early spring, are summarized below:

- On September 7, 2018, biologists successfully radio-located seven of the eight turtles. One turtle (#701) only had a faint signal that could not be accurately triangulated.
- On November 14, 2018, biologists located all eight turtles at the reservoir shoreline, apparently inside bank cavities or under large woody debris at the water's edge. Although no radio-tagged turtles were visible, cavities in the bank, crevices, and root wads were visible. Based on telemetry signals, some radio-tagged turtles appeared to be fewer than 3 feet into the bank. Some radio-tagged turtles were located under root wads of standing trees or stumps. Openings to these refugia were often just below the water surface but were completely exposed when the water level was low. Turtles were in the zone exposed to regular fluctuations of reservoir water levels.
- On December 10, 2018, seven of the eight turtles appeared to be in the same locations recorded on the previous visit in November. One turtle had moved, apparently to avoid ice pack.
- On January 29, 2019, there were no recorded movements for any of the turtles; all eight animals appeared to be in the same locations as in December.
- On February 22, 2019, four of the eight turtles had moved short distances (<5 meters) from their overwinter sites, while the other four appeared to be in the same locations reported in December and January.
- On March 5, 2019, most radio-tagged turtles exhibited short distance movements, and by March 13, 2019, telemetry information indicated that turtles were becoming more active.

- From April 3 through 5, 2019, radio-tagged turtles were actively moving throughout the reservoir. Biologists observed some turtles basking. By April 23 through 29, 2019, basking turtles were abundant, and radio-tagged turtles were frequently moving over long distances.

4.3.2 Spring Recapture Efforts

In early April (April 3 through 5), telemetry data indicated that turtles had left overwinter refugia and were actively moving throughout the J.C. Boyle Reservoir. No turtles were caught in baited traps, but two turtles were hand-captured with a dip net. Biologists observed turtles basking on the first day, but observations declined dramatically over the 3-day visit as a large winter storm advanced.

During a second visit in April (April 23 through 29, 2019), weather conditions were more favorable, and biologists regularly observed basking turtles. It appeared that most radio-tagged turtles were moving away from overwinter sites (i.e., shoreline refugia) to more typical spring/summer-use microhabitats during the day (i.e., areas with aerial basking perches, such as woody debris, emergent rocks, and the floating log boom near the dam).

Photograph 4-2 Releasing a Captured Western Pond Turtle

Biologists captured several turtles during the first few days of trapping, but the capture rate declined after the first day. Turtles, including radio-tagged individuals, were consistently observed near trap locations, but the capture rate remained low. Eleven new turtles were caught in traps in 2019, but no recaptures occurred. One radio transmitter (radio #919) was recovered from a trap, but it was no longer attached to the turtle, indicating that the radio-tagged turtle had entered the trap and later escaped. A few turtles were caught by dip net; however, seine netting, snorkeling, and a drift fence trap did not capture any turtles. Due to extremely low underwater visibility and high water levels, active methods of turtle capture were not effective.

Due to the lower-than-required number of captures and recaptures, the CMR data were insufficient to calculate a valid population estimate A larger sample size and higher proportion of recaptures would be required to produce a valid population estimate.

4.3.3 Basking Observations

During basking surveys, KRRC biologists observed a maximum of 35 turtles in 1 day. As observed in previous surveys, WPT used a variety of basking habitats, including exposed rock features and large woody debris. Biologists consistently observed the greatest numbers of basking turtles at the northern end of the floating log boom near the J.C. Boyle Dam; more than a dozen turtles were observed here at one time on several occasions.

4.3.4 Temperature Monitoring

Biologists successfully recovered environmental temperature data from 9 of the 16 environmental temperature loggers. Thermographs from a land-to-water transect reveal distinct signatures between land and water sensors. Based on the environmental thermographs, the greatest temperature fluctuations occurred at the shoreline sensor, which was nearest to where radio-tagged turtles in this study overwintered. However, temperatures in turtle refugia are unknown because no functional temperature loggers were recovered from the study animals. Only one data logger was recovered from a turtle, but the data were not recoverable due to water damage.

4.4 Conclusions

The study of WPTs occupying the J.C. Boyle Reservoir area had two primary objectives: to generate a population estimate for WPTs at the J.C. Boyle Reservoir and to gain information about their overwintering habits. The number of turtles captured and recaptured was insufficient to produce a statistically valid population estimate, but visual surveys confirmed that WPTs are common in the reservoir. Frequent observations of juveniles indicated that the reservoir supports a reproducing population of turtles.

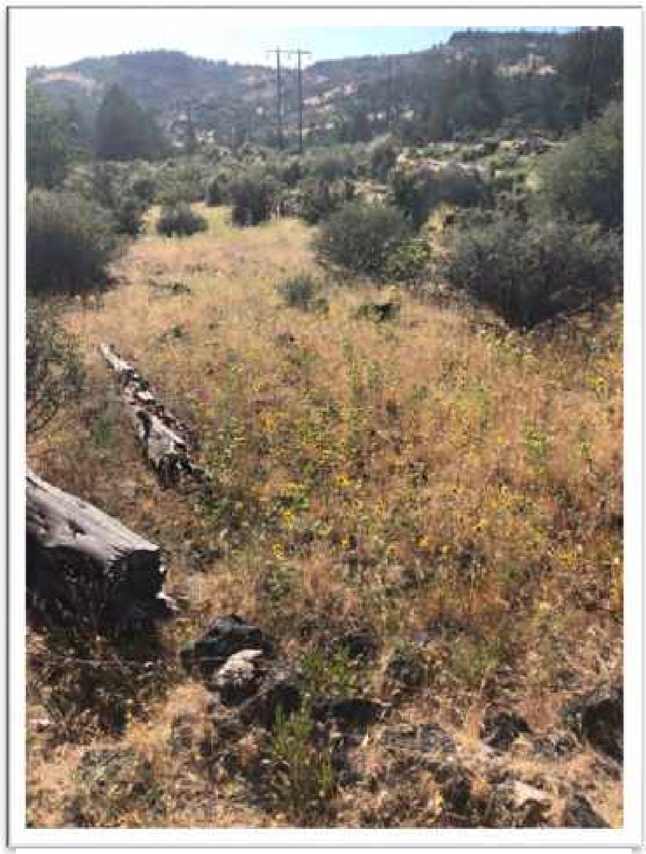
The telemetry study determined that all eight radio-tagged animals overwintered in refugia at the reservoir shoreline. It must be noted that this study was limited in scope and describes the behavior of a subset of turtles at J.C. Boyle Reservoir. Literature on WPT overwinter habits demonstrate that turtles in different systems often behave differently. The findings of this study should be cautiously applied to turtles in the other Project reservoirs. Additional information of WPT life cycle and habitat requirements can be found in previous Project documents (AECOM and CDM Smith 2017).

Chapter 5 Special-Status Plants

5. SPECIAL-STATUS PLANTS

5.1 Introduction

KRRC defined special-status plants to include those species with federal status (federally listed as threatened, endangered, or proposed for listing); state threatened or endangered species, and species on the Oregon Natural Heritage Program Lists 1 to 4 and California Rare Plant Rank 1 to 4. BLM and USFS Sensitive Species are also considered where BLM and USFS lands occur in the study area. The list of special status species in Oregon and California was refined to those with the potential to occur in the project area based on available habitat types and historical records. The species with potential to occur are listed in Table 5-1.



Photograph 5-1 Survey Transect near Copco No. 1 Dam

KRRC biologists identified special-status plant species with the potential to occur in the Project area, based on historical records and review of plant databases. PacifiCorp (2004) documented several special-status plant species during extensive surveys in 2002 and 2003. In addition, KRRC biologists identified documented occurrences of special-status plant species through reviews of state and federal databases, including the Oregon Biodiversity Information Center (ORBIC), the California Natural Diversity Database (CNDDB), and the USFWS Information for Planning and Consultation database (ORBIC 2017, IPaC 2018, CNDDB 2018). Other sources of information on special-status plant species in the Project area include the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California, USFWS – Yreka, the Bureau of Land Management (BLM) – Klamath Falls, and the United States Forest Service (USFS) – Klamath National Forest. Table 5-1 shows the documented occurrences for each species with the potential to occur in the project area. If a special status species was previously documented (e.g., on ORBIC, CNDDB) within the project area, it was included in the list of species with the potential to occur even if available habitat did not appear to be present.

Table 5-1 Preliminary List of Special-Status Plants with Potential to Occur

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Proposed Survey Effort
Western yellow cedar *(Callitropsis nootkatensis)*	Petitioned for federal listing, CNPS List 4.3	Wet to moist sites, from the coastal rainforests to rocky ridgetops near the timberline in the mountains	Not documented during PacifiCorp surveys or listed on CNDDB or ORBIC for the Project area; may occur based on information from USFWS Yreka office (May 23, 2017)	NA	In construction areas in suitable habitat
Greene's mariposa-lily *(Calochortus greenei)*	FSC, BLM, OC, ONHP List 1, CNPS List 1B	Occurs primarily in annual grassland, wedgeleaf ceanothus chaparral, and oak and oak-juniper woodlands	Several locations around Iron Gate Reservoir (PacifiCorp 2004; CNDDB 2018)	May through July	In construction areas in suitable habitat
Bristly Sedge *(Carex comosa)*	ONHP List 2	Marshes, lake shore, and wet meadows	East Shore of J.C. Boyle Reservoir in two locations (east of Dam and south of Highway 66); also, west of dam (ORBIC 2017)	May through September	Along reservoir margins and in construction areas in suitable habitat
Mountain Lady's Slipper *(Cypripedium montanum)*	ONHP List 4, CNPS List 4	Dry, open conifer forests, more often in moist riparian habitats	J.C. Boyle peaking reach (location details unknown) (PacifiCorp 2004)	March through August	In construction areas in suitable habitat
Gentner's fritillary *(Fritillaria gentneri)*	FE, CNPS List 1B	Cismontane woodland, chaparral and mixed hardwood-conifer vegetation dominated by Oregon oak	Habitat present in the reach along Copco and Iron Gate Reservoirs; no known locations	Late March to early April; April and May at higher elevations	In construction areas in suitable habitat
Bolander's sunflower *(Helianthus bolanderi)*	BLM, ONHP List 3	Occurs in yellow pine forest, foothill oak woodland, and chaparral, and occasionally in serpentine substrates or wet habitats	South of Iron Gate Reservoir near alternative disposal site, J.C. Boyle peaking reach (location details unknown) (PacifiCorp 2004)	June through October	In construction areas in suitable habitat
Washington lily *(Lilium washingtonianum* ssp. *purpurascens)*	CNPS List 4	Forest openings, chaparral, burned clearcuts, and roadsides	Several locations around Copco Lake, including near Copco Road along the seep area (KRRC 2019a)	June through August	Within the limits of work in suitable habitat
Bellinger's meadow-foam *(Limnanthes floccosa* ssp. *Bellingerana)*	FSC, BLM, OC, ONHP List 1, CNPS List 1B	High elevation vernal pools in shallow soiled rocky meadows in spots that are at least partially shaded in the spring	J.C. Boyle peaking reach (location details unknown) (PacifiCorp 2004)	April through June	In construction areas in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Proposed Survey Effort
Detling's silverpuffs (*Microseris laciniata* ssp. *detlingii)*	CNPS List 2	Chaparral and grassy openings among Oregon white oak trees	One location on the western side of Iron Gate Reservoir (CNDDB 2018)	May and June	In construction areas in suitable habitat
Egg Lake monkeyflower *(Mimulus pygmaeus)*	FSC, CNPS List 4	Occurs in damp areas or vernally moist conditions in meadows and open woods	East of J.C. Boyle Reservoir in two locations (north of Highway 66 and southeast of Dam); west of Dam in two locations in damp mudflats; also west of canal near access road in one location (PacifiCorp 2004)	May through August	Along reservoir margins and in construction areas in suitable habitat
Greene's four o-clock *Mirabilis greenei*	CNPS List 4	Dry slopes and flats among juniper and foothill woodlands, and grasslands	Along the western side of the Iron Gate Reservoir (KRRC 2019a)	May and June	Within the limits of work in suitable habitat
Holzinger's orthotrichum moss *(Orthotrichum holzingeri)*	CNPS List 1B.3	Found on vertical calcareous rock surfaces and at the bases of Salix bushes just above rock that is frequently inundated by seasonally high water in dry coniferous forests	Just upstream of Iron Gate Reservoir on Jenny Creek (CNDDB 2018)	N/A	Where in-stream work could occur at Jenny Creek at bridge
Western yampah *(Perideridia erythrorhiza)*	FSC, BLM, OC, ONHP List 1	Occurs in moist prairies, pastureland, seasonally wet meadows, and oak or pine woodlands, often in dark wetland soils and clay depressions	Along three drainages into the western side of J.C. Boyle Reservoir, and in two locations west of the canal near the access road (PacifiCorp 2004)	Mid July and August	Along reservoir margins and in construction areas in suitable habitat
Howell's yampah (Howell's false caraway) *(Perideridia howelii)*	ONHP List 4	Moist meadows and stream banks	One location along the drainage southeast of J.C. Boyle Reservoir; one location along the northern side of Copco Lake north of the road (PacifiCorp 2004)	July and August	Along reservoir margins and in construction areas in suitable habitat
Yreka phlox *(Phlox hirsuta)*	FE, CE, CNPS List 1B	Open areas on dry serpentine soils and at elevations ranging from 2,500 to 4,400 feet	Not known to occur near construction areas; no suitable ultramafic soils occur within 0.5 mile of construction areas (NRCS 2017)	March and April	None – suitable soils not present in construction areas
Strapleaf willow *(Salix ligulifolia)*	ONHP List 3	Riverbanks, wetlands, and floodplains	One location west of J.C. Boyle Dam in a boulder flood channel in the dam release zone (ORBIC 2017)	March through June	Along reservoir margins and in construction areas in suitable habitat

Species	Status	Habitat	Location of Documented Occurrence(s)	Bloom Time	Proposed Survey Effort
Fleshy sage *(Salvia dorrii* var. *incana)*	CNPS List 3	Occurs in silty to rocky soils in great basin scrub, pinyon, and juniper woodland	Three locations around Iron Gate Reservoir (PacifiCorp 2004)	May through July	In construction areas in suitable habitat
Lemmon's silene *(Silene lemmonii)*	ONHP List 3	Open pine woodlands	J.C. Boyle peaking reach to J.C. Boyle Reservoir (location details unknown) (PacifiCorp 2004)	Spring and Summer	In construction areas in suitable habitat

Key:

BLM: Bureau of Land Management sensitive species -species that could easily become endangered or extinct.
CE: California Endangered
CNDDB: California Natural Diversity Database
CNPS List 1A: California Native Plant Society (CNPS)-Presumed extinct in California
CNPS List 1B: rare, threatened, or endangered in California and elsewhere
CNPS List 2: rare, threatened, or endangered in California, but more common elsewhere
CNPS List 3: on the review list – more information needed
CNPS List 4: on the watch list – limited distribution
FE: Federal Endangered
FSC: Federal Species of Concern
OC: Candidate listing by Oregon Department of Agriculture
ONHP List 1: Oregon Natural Heritage Program threatened with extinction or presumed to be extinct throughout their entire range
ONHP List 2: threatened with extirpation or presumed to be extirpated from the State of Oregon
ONHP List 3: more information is needed before status can be determined, but may be threatened or endangered in Oregon or throughout their range
ONHP List 4: of conservation concern but not currently threatened or endangered
ORBIC: Oregon Biodiversity Information Center
USFWS: United States Fish and Wildlife Service

As described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a), KRRC began conducting special-status plant surveys in 2018 to identify any special-status plants that are currently present 1) within a 0.25-mile buffer around the Project area, defined as the dams and structures to be removed, the disposal sites, the haul and access roads that may undergo improvements, and the reservoirs; and/or 2) in areas such as reservoir shorelines that may be affected by the Project. Findings of KRRC surveys in 2018 and 2019 are presented below.

5.2 Methods

KRRC biologists conducted surveys for special status plants with the potential to occur in the project area. Prior to the surveys, KRRC biologists compiled a list of special-status plant species with potential to occur within the limits of work based on documented occurrences and the presence of suitable habitat, as shown in Table 5-1. Surveys were timed to coincide with the bloom time for each species, and the surveys for each species were based on an understanding of the potential habitat suitability in the Project area. The entire limits of work were surveyed for special status plants; however, a focused floristic survey was conducted in areas where there would be construction disturbance. Focused floristic surveys were also conducted where habitat conditions are expected to change due to reservoir drawdown and there were also suitable habitat and locations of known and potential occurrences of special-status plants.

The focused surveys followed the CDFW "Protocols for Surveying and Evaluating Impacts to Special-Status Native Plant Populations and Sensitive Natural Communities" (CDFW 2018). In areas along reservoir shorelines, where changes in hydrology and geomorphology could occur due to the Project, surveys were focused on the locations of known and potential occurrences of special-status plants documented during surveys conducted by PacifiCorp (2004) and data obtained from a desktop review of existing databases (CNDDB, ORBIC, and CNPS).

Following the CDFW protocol, KRRC biologists conducted detailed floristic surveys that entailed identification of every plant taxon observed, to the taxonomic level necessary to determine rarity and listing status. The construction areas include proposed disposal sites (including those considered alternative disposal sites), staging areas, utility line corridors, facility removal areas, and locations where clearing could occur for road modifications such as road widening, turnouts, equipment/material storage, and bridge replacement. In these areas, biologists walked parallel transects generally spaced 5 to 10 meters apart and recorded plant species observed. Biologists also used a boat to survey reservoir shorelines, focusing on areas of suitable habitat and locations of known and potential occurrences of special-status plants. GPS coordinates were recorded for all observed special-status plants, along with descriptions of habitat conditions and proximity to proposed work activities or other notable features.

In consideration of the various peak bloom times of the focal species listed in Table 5-1, the KRRC biologists planned three surveys: early season (April), mid-season (May), and late season (July). The mid-season and part of the late season surveys were conducted in 2018, as described in the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a). The April early season survey was not conducted in 2018, due to lack of access to PacifiCorp lands. A July 2018 wildfire in the California portion of the study area restricted the late-season survey to the J.C. Boyle Reservoir study area. Therefore, KRRC planned follow-up surveys in 2019 to include the April early-season survey and the July late-season survey (California only). Additionally, any areas that were insufficiently surveyed during 2018 were surveyed in 2019. This included the proposed Fall Creek Hatchery area and river reach between Copco and Iron Gate Reservoirs. Lastly, biologists visited the locations of unconfirmed, historical sightings during the appropriate bloom times to confirm the occurrences of specific species.

Photograph 5-2 Bristly Sedge (*Carex comosa*)

The April 2019 special-status plant survey was specifically scheduled to coincide with the bloom time of Gentner's fritillary. During survey planning, KRRC biologists obtained information from CDFW and USFS botanists on the 2019 phenology at known reference populations to confirm the appropriate timing of the survey in the Project area. Biologists visited a reference population of Gentner's fritillary in Jacksonville, Oregon on April 21, 2019 to confirm that the species was blooming. Biologists took this opportunity to familiarize themselves with the morphological and habitat characteristics of the species to aid in differentiating it from the more common fritillary species, scarlet fritillary (*Fritillaria recurva*), which is very similar in appearance and occupies the same habitat.

The July 2019 special-status plant survey was scheduled to coincide with the late-blooming species shown in Table 5-1, including Greene's mariposa-lily, Bolander's sunflower, Howell's yampah, fleshy sage, and pendulous bulrush. KRRC biologists conducted the survey in the vicinity of Iron Gate Reservoir and Copco Lake from July 15 through July 19, 2019. In addition, during the week of July 22 through July 26, 2019, an AECOM biologist visited the locations of special-status plant observations from the July 2018 survey in the vicinity of J.C. Boyle Reservoir.

5.3 Findings

As shown on Figures 5-1 through 5-3 and presented in Table 5-2 below, biologists identified eight special-status plant species in the Project area during the 2018 and 2019 surveys, as follows:

Photograph 5-3 Greene's Mariposa-lily (*Calochortus greeni*)

- Greene's mariposa-lily (*Calochortus greenei*): KRRC biologists observed numerous *Calochortus* plants in construction areas in the Project area, including at the Iron Gate alternative upland disposal site and along utility corridors in the vicinity of Iron Gate Reservoir and Copco Lake during surveys completed in April 2019. Although plants were not in bloom when first observed in April 2019; the species designation was confirmed as *Calochortus greenei* when sites were revisited in July 2019.

- Detling's silverpuffs (*Microseris laciniata* ssp. *detlingi*). KRRC biologists confirmed a previously documented CNDDB occurrence at the Iron Gate alternative upland disposal site. New occurrences were also observed and mapped along utility corridors along the southeastern side of the Iron Gate Reservoir and south of the Copco No. 2 bypass reach.

- Bristly sedge (*Carex comosa*): In July 2019, KRRC biologists observed and mapped plants throughout the wetland complex along the eastern shore of the J.C. Boyle Reservoir. The location of a historical occurrence south of the Highway 66 bridge was visited during the field surveys and *Carex* was present, but because the plants were not in flower, the species is unconfirmed south of the bridge.

- Bolander's sunflower (*Helianthus bolanderi*): In July 2019, KRRC biologists observed and mapped plants in utility corridors along the northern side of Iron Gate Reservoir and between Iron Gate Reservoir and Copco Lake. Biologists also observed and mapped one occurrence along the eastern side of the J.C. Boyle Reservoir in July 2019.

Table 5-2 Special-Status Plant Observations by Reservoir

Species	Observation Location		
	Iron Gate Reservoir	Copco Lake	J.C. Boyle Reservoir
Greene's mariposa-lily (*Calochortus greenei*)	Several locations in the vicinity of the Iron Gate Reservoir, including within the footprint of the Iron Gate alternative upland disposal site	Along utility corridors between the Copco No. 1 and Copco No. 2 Dams, and between Copco No. 2 Dam and Daggett Road bridge	
Detling's silverpuffs (*Microseris laciniata* ssp. *detlingii)*	Present in the Iron Gate alternative upland disposal site; also along utility corridor on the southeastern side of the reservoir	Along the utility corridor between Copco No. 2 Dam and Daggett Road Bridge	
Bolander's sunflower (*Helianthus bolanderi*)	Present in the Iron Gate disposal area east of the dam; present in the transmission line corridor to west of Jenny Creek confluence	Observed in the transmission line corridor northwest of the reservoir	A large group was observed on the eastern shore in Klamath Sportsman's Park
Fleshy Sage (*Salvia dorrii* var. *incana*)	Two locations near Iron Gate Reservoir; both in proximity to but outside of the construction footprint for removal of utility poles		
Western Yampah (*Perideridia erythrorhiza*)			North of the J.C. Boyle Dam in a dry meadow; will likely be outside the area of impact from the drawdown of the reservoir
Bristly Sedge (*Carex comosa*)			Observed in three locations in Klamath Sportsman Park wetlands on the eastern shore north of the Highway 66 bridge
Greene's Four O'clock (*Mirabilis greenei*)	Observed in the utility corridor on the northeastern side of the reservoir	Observed in four locations along the northern side of the Klamath River, downstream of the Copco No. 2 Dam	
Purple-flowered Washington Lily (*Lilium washingtonianum* ssp. *Purpurascens*)	Near the Fall Creek diversion	Along the northern side of Copco Lake; several observations in mountain seep-associated wetlands along the northwestern shore of the reservoir	
Strapleaf willow (Salix ligulifolia)			Observed along the river just downstream of the J.C. Boyle Dam

- Purple-flowered Washington lily (*Lilium washingtonianum* ssp. *purpurascens*): Biologists recorded a potential observation at one location near the Fall Creek diversion in July 2019. The plant was not in bloom; however, the location is consistent with a confirmed observation of the species in 2018. In July 2019, KRRC biologists observed several plants in bloom, enabling a positive identification, along Copco Road on the northern side of Copco Lake and coinciding with a series of hillside seeps.

- Greene's four o'clock (*Mirabilis greenei*): In April and July 2019, KRRC biologists observed this species in two locations where disturbances resulting from utility pole removal may occur: 1) near the location of the fleshy sage described below, and 2) north of the Klamath River approximately 0.3 mile west of the intersection of Copco Road and Daggett Road.

- Western yampah (*Perideridia erythrorhiza*): In July 2019, KRRC biologists verified a previously documented population north of the J.C. Boyle Dam. The plants were in a dry meadow and would likely be outside of the area impacted by drawdown of the reservoir.

- Fleshy sage (*Salvia dorrii* var. *incana*): In July 2019, KRRC biologists confirmed a previously documented CNDDB occurrence and mapped a population near a culvert along the southeastern side of the Iron Gate Reservoir. Several plant locations along utility corridors on the northern side of Iron Gate Reservoir were also recorded.

- Strapleaf willow (*Salix ligulifolia*): In July 2019, KRRC biologists confirmed a previously documented ORBIC occurrence along the river just below the J.C. Boyle Dam.

Photograph 5-4 Fleshy Sage (*Salvia dorrii* var. *incana*)

5.4 Conclusions

In summary, the KRRC biologists documented special-status plants in the Project area, including at locations that will potentially be disturbed during construction. These findings are consistent with findings of previous surveys conducted in 2018.

Special-status plant surveys have been completed in accordance with the survey work plan (see Appendix J of the Definite Plan [KRRC 2018]). KRRC is not planning additional surveys.

Chapter 6 Wetlands

6. WETLANDS

6.1 Introduction

Wetland and riparian habitats occur throughout the Project area wherever persistent surface water features occur (e.g., streams, seeps, springs, Project reservoirs, or other sources of hydrology). Wetlands are regulated at both the state and federal levels by resource agencies including the United States Army Corps of Engineers (USACE), CDFW, and the Oregon Department of State Lands (ODSL); riparian habitats are only subject to jurisdiction by California agencies (i.e., CDFW and the State Water Resources Control Board). Restoration of the historical Klamath River channel following dam removal is expected to result in a net increase of wetland and riparian acreage; however, some areas may experience a reduction or a loss of associated water sources resulting from reservoir drawdown. This could result in the temporary or permanent loss of some wetlands or riparian areas that primarily depend on reservoir waters for hydrology. Consequently, KRRC developed wetland investigation methodologies in close coordination with USACE, ODSL, and CDFW to characterize existing conditions for wetlands and other waters (including riparian habitats in California). The methodology included determining the primary hydrology source maintaining each assessment area. The results of the wetland delineation work are provided in detail in the separate *2019 Wetland Investigation Summary Report* (KRRC 2020).

Photograph 6-1 Wetland along Shoreline of Copco Lake

To evaluate potential direct impacts on existing habitats, KRRC wetland scientists delineated wetlands in the portions of the Project area where ground-disturbing activities are anticipated to occur (e.g., disposal sites). KRRC wetland scientists also mapped wetlands along the reservoir margins, stream-associated wetlands, and non-wetland riparian vegetation outside of direct construction areas that may experience changes in hydrological conditions resulting from reservoir drawdown or the removal of other dam infrastructure.

6.2 Methods

Prior to the field investigations, KRRC scientists identified wetland investigation sites through a review of previous vegetation and wetland surveys and pertinent agency databases. This included PacifiCorp surveys conducted in 2002 (as reported in PacifiCorp 2004), 2018 KRRC vegetation community mapping (KRRC 2019a), high-resolution aerial imagery, the USFWS National Wetlands Inventory (USFWS 2019), and the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey (NRCS 2019).

KRRC wetland scientists conducted wetland delineation and mapping field surveys from May 6 through May 17, 2019, and from July 15 through July 25, 2019. KRRC wetland scientists delineated wetlands in accordance with the 1987 United States Army Corps of Engineers Wetland Delineation Manual and the Western Mountains, Valleys, and Coast Region Regional Supplement. In the Oregon portion of the Project, scientists applied the Oregon Rapid Wetland Assessment Protocol (ORWAP) to assess functional values of wetlands in construction areas, as described in Section 6.2.2.

The May 2019 investigations focused primarily on areas where ground-disturbing activities are planned to occur (e.g., disposal areas, staging areas, or bridge replacements) and where hydrology sources were identified to be independent of the Klamath River or Project reservoirs. The July 2019 investigations focused on mapping wetlands along and adjacent to reservoir shorelines and sections of the Klamath River within the limits of work, and on confirming preliminary findings by revisiting areas where problematic conditions were encountered in May 2019. Survey teams mapped non-wetland riparian areas on the California side of the Project in both May and July. Non-wetland riparian areas were not mapped in Oregon; however, the vegetation community mapping does identify willow-dominated communities that are often indicators of riparian conditions (see Section 7 for an update to willow vegetation community mapping provided in the 2018 annual report [KRRC 2019a]).

6.2.1 Wetland Delineation

In accordance with the USACE methodology, KRRC scientists first identified areas that exhibited potential wetland characteristics (e.g., hydrophytic vegetation) and then conducted evaluations of representative wetland determination plots to determine whether the area met the requirements for hydrophytic vegetation, hydric soils, and wetland hydrology. Field crews selected determination plots in areas with conditions that were representative of the entire wetland area. Figures 6-1, 6-2, and 6-3 depict the areas investigated for wetlands in the vicinity of Iron Gate Reservoir, Copco Lake, and J.C. Boyle Reservoir, respectively. In addition to the areas shown on the figures, the entire reservoir margin was also surveyed.

When the presence of a wetland was confirmed, field teams mapped the wetland boundary to submeter accuracy using a handheld GPS device (Trimble Geo 7X). For sites containing a defined stream channel, wetland scientists mapped the ordinary high-water mark (OHWM) and the riparian corridor boundary (RCB) to delineate the extent of federal (e.g., OHWM constitutes waters of the United States) and state jurisdictional boundaries (e.g., RCB constitutes waters of the State under CDFW jurisdiction). In areas where private property or safety concerns prevented access to wetlands or riparian vegetation, surveyors used an alternative mapping approach. This consisted of using ArcGIS Collector, a mobile data collection application that provides a map-driven interface that allows the user to capture spatial data from a distance. Collector was only used to map study areas where line of sight was unimpeded and mapped points could be corroborated with visual observations and aerial imagery.

In several cases, multiple wetlands exhibited sufficiently similar soil, vegetation, and hydrological conditions that they could be appropriately characterized by a single set of paired wetland and upland USACE determination plots recorded for a single representative wetland. For example, wetlands dominated by hardstem bulrush (*Schoenoplectus acutus*) occurring intermittently along the shoreline of each reservoir consistently exhibited very similar characteristics in terms of vegetation, hydrology, and soils. Given their similarity, these wetlands were characterized by at least one representative determination plot at each reservoir. Using this approach, at least one representative set of paired wetland and upland determination plots was evaluated for each wetland type observed at each reservoir.

6.2.2 Oregon Rapid Wetland Assessment Protocol

Based on direction from ODSL, KRRC wetland scientists conducted an additional wetland functions and values assessment in the Oregon portion of the Project area using the ORWAP. ORWAP consists of a series of field and desktop evaluations that provide a standardized, regionally tailored, rapid procedure for estimating the functions and values of wetlands occurring in the state of Oregon (Adamus et al. 2016). ORWAP was conducted in areas where the hydrology is independent from the Klamath River or J.C. Boyle Reservoir (e.g., J.C. Boyle alternative upland disposal site).

Photograph 6-2 Wetland with Hydrology Independent of the Reservoirs

6.2.3 Riparian Vegetation Mapping

Photograph 6-3 Riparian Vegetation at Jenny Creek

CDFW jurisdiction includes ephemeral, intermittent, and perennial watercourses, and can extend to habitats adjacent to watercourses. Wetlands and riparian vegetation near watercourses would be considered "habitats adjacent to watercourses" and are thus subject to jurisdiction by the CDFW under Sections 1600 through 1616 of the California Fish and Game Code. To delineate CDFW jurisdictional boundaries, KRRC wetland scientists mapped riparian areas associated with relatively permanent (e.g., reservoir, river, perennial stream, spring, or pond) and semi-permanent (e.g., ephemeral channels) water bodies within the limits of work. Riparian areas generally had hydrophytic vegetation but failed to meet one or more of the remaining wetland parameters (i.e., hydrology and hydric soils), and thus were classified as non-wetland, riparian habitat. KRRC wetland scientists determined the upslope edge of riparian areas by mapping the line where vegetation transitioned from hydrophytic vegetation to vegetation more representative of dry, upland areas in terms of species composition and density. Upland habitat typically consisted of sparsely vegetated, rocky hillslopes. The riparian boundary was mapped to submeter accuracy using a handheld GPS device or ArcGIS Collector, as previously described for wetland delineations.

Riparian delineation methods were informed by definitions and procedures described in the California Riparian Habitat Joint Venture's 2006 Comparison of Methods to Map California Riparian Areas (Collins et al. 2006).

6.2.4 Determination of Hydrology Source

KRRC wetland scientists evaluated the primary source of hydrology for each wetland and riparian area to determine whether the hydrology was mainly dependent on reservoir waters or on other sources. Hydrology was characterized according to the following classifications:

Photograph 6-4 Wetlands along Spencer Creek

- Reservoir-dependent: the primary hydrology is associated with one of the Project reservoirs.
- Infrastructure-dependent: the primary hydrology is associated with infrastructure related to operation of the dams that will be removed as part of the Project (e.g., the Copco wood-stave penstock).
- Non-reservoir-dependent: the primary hydrology is associated with the Klamath River, a stream or seep, precipitation, or another source.

6.3 Findings

A summary of survey findings organized by reservoir area is provided in the following sections. Total wetland and riparian acreages by reservoir are presented in Table 6-1 and described below.

Table 6-1 Summary of 2018-2019 Wetland Investigation Findings

	Location		
	Iron Gate Reservoir	Copco Lake	J.C. Boyle Reservoir
Total Wetlands	**21.2 acres**	**12.9 acres**	**40.0 acres**
Reservoir-Dependent[1] Wetlands	9.6 acres	9.4 acres	38.1 acres
Non-Reservoir-Dependent Wetlands	11.6 acres	3.5 acres	1.9 acres
Total Riparian Vegetation[2]	**40.8 acres**	**32.2 acres**	**n/a**
Reservoir-Dependent Vegetation	10.2 acres	5.3 acres	n/a
Non-Reservoir-Dependent Riparian Vegetation	30.6 acres	26.9 acres	n/a

Notes:

1 This total also includes acreage for areas that are dependent on dam-related infrastructure to support wetland hydrology.
2 Riparian areas not mapped in Oregon.

6.3.1 Iron Gate Reservoir Area

KRRC wetland scientists characterized 134 individual wetlands and 122 riparian zones in the Iron Gate Reservoir area. This area comprised the following 17 general assessment areas between the proposed Fall Creek fish hatchery and the western extent of the proposed limits of work (Figure 6-1):

- Dry Creek Bridge
- Lakeview Road Bridge
- Iron Gate Disposal Area
- Long Gulch Cove
- Iron Gate Culvert 1
- Iron Gate Culverts 2 and 3
- Mirror Cove South Culvert
- Mirror Cove North Culvert
- Juniper Point Culvert
- Scotch Creek
- Camp Creek
- Wanaka Springs Recreation Site
- Jenny Creek Bridge and Cove
- Reservoir Margin
- Yreka Water Supply Pipeline Crossing Area
- Fall Creek Confluence, Daggett Road Bridge, and Staging Areas
- Fall Creek Bridge and Fish Hatchery

These assessment areas correspond to areas where direct impacts resulting from ground-disturbing activities may occur, such as culvert/bridge replacement and upgrades (e.g., Scotch Creek, Dutch Creek, Camp Creek, and Lakeview Road Bridge), recreation site restoration (e.g., Wanaka Springs Recreation Site), and infrastructure improvements (e.g., Fall Creek Hatchery and Yreka Water Supply Pipeline Crossing Area). In addition, these locations represent areas where hydrological changes are expected to affect existing wetlands (e.g., Jenny Creek and Reservoir Margin). Additional sites were evaluated along access routes to characterize existing conditions in the event that future plans require road modifications (e.g., Mirror Cove North and South and Iron Gate Culverts 1 through 3). As noted in Table 6-1, KRRC wetland scientists mapped 21.2 acres of wetlands and 40.8 acres of non-wetland riparian vegetation for areas associated with Iron Gate Reservoir. In all, 9.6 acres of wetland and 10.2 acres of riparian area were classified as dependent on reservoir hydrology.

6.3.2 Copco Lake Area

KRRC wetland scientists characterized 110 individual wetlands and 52 riparian zones in the Copco Lake area. This area comprised the following 14 general assessment areas between the Copco powerhouse and the eastern extent of the limits of work in California, east of the Copco Road Bridge (Figure 6-2):

- Copco No. 2 Wooden Penstock
- Transmission Corridor Pasture
- Copco Borrow Site, Staging Area, and Disposal Area
- Northern Shore Seeps
- Northern Shore Cove #1
- Beaver Creek Confluence and Culvert
- Patricia Road Culverts
- Raymond Gulch
- Northern Shore Cove #2
- Mallard Cove
- Northern Shore Cove #3
- Northern Shore Cove #4
- Shoreline East of Copco Road Bridge
- Reservoir Margin

These assessment areas can be broadly categorized as either areas where ground-disturbing work is anticipated to occur (e.g., Copco Borrow Site, Staging Area and Disposal Area, Copco No. 2 Wooden Penstock, Raymond Gulch, and Beaver Creek Confluence and Culvert) or areas where changes in hydrological conditions resulting from reservoir drawdown are anticipated (e.g., Mallard Cove and Reservoir Margin). As previously noted, some additional sites were evaluated in the event that future road modifications are required (e.g., North Shore Seeps, Northern Shore Cove 1 to 4, and Patricia Road Culverts). As noted in Table 6-1, wetland scientists mapped 12.9 acres of wetlands and 32.2 acres of riparian vegetation in the Copco Lake area. In all, 9.4 acres of wetland and 5.3 acres of riparian area were classified as reservoir-dependent or infrastructure-dependent.

6.3.3 J.C. Boyle Reservoir Area

KRRC wetland scientists characterized 46 individual wetlands in the J.C. Boyle Reservoir area. This area comprised the following 16 general assessment areas, encompassing the extent of the proposed limits of work in the state of Oregon (Figure 6-3):

- Powerhouse and Tailrace
- Access Road South of Scour Hole
- J.C. Boyle Power Canal and Access Road
- Power Canal Exit Ramp
- Rafter Access Point
- Base of J.C. Boyle Dam
- J.C. Boyle Alternative Upland Disposal Site
- Southwest Cove
- Topsy Campground Cove
- Ephemeral Stream – Western Shore
- Ephemeral Drainage – Eastern Shore
- Pioneer Park Day Use Area
- Klamath Sportsman’s Park
- Northwestern Shore
- Spencer Creek Cove and Northern Shore
- Reservoir Margin

Several assessment areas correspond with areas where deconstruction activities will take place (e.g., Powerhouse and tailrace, J.C. Boyle Power Canal and access road, Power Canal exit ramp, and Access road south of scour hole) and areas where road improvements may occur (e.g., northwestern shore and ephemeral stream east), while others represent sites where wetland impacts associated with reservoir drawdown are anticipated (e.g., Klamath Sportsman’s Park, Spencer Creek Cove and northern shore, and reservoir margins). As noted in Table 6-1, wetland scientists mapped 40.0 acres of wetlands in the J.C. Boyle Reservoir area. In all, 38.1 acres of wetland were classified as dependent on reservoir hydrology. Non-wetland riparian areas were not mapped at J.C. Boyle.

6.4 Conclusions

KRRC wetland scientists conducted field investigations in May and July of 2019 to characterize and delineate wetlands and riparian zones in the Project area. These efforts were carried out to describe existing environmental conditions and inform the ongoing Project design and regulatory permit processes. The wetland and riparian area delineations are described in detail in a Wetland Delineation Report.

Chapter 7 Errata: 2018 Vegetation Community Mapping

7. ERRATA: 2018 VEGETATION COMMUNITY MAPPING

This section outlines revisions made to the 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a) subsequent to its distribution as a final report.

During vegetation community mapping in 2018, sandbar willow (*Salix exigua*) was misidentified as Geyer willow (*Salix geyeriana*) in wetlands around the margins of Iron Gate Reservoir and Copco Lake. In addition to correcting the species identification, these errata clarify that Geyer willow thickets, considered a sensitive natural community by CDFW, are not present in the California portion of the Project area. Similarly, bitterbrush scrub, a sensitive natural community in California, is not present in the California portion of the Project area.

The following tables list all revisions to the 2018 report. Table 7-1 lists the changes that apply to the text and Table 7-2 lists changes to the figures in Appendix A of the 2018 report (KRRC 2019a). The corrected figures (Figures 3 and 11) are included in Appendix B of this 2019 survey report.

Table 7-1 Text Errata from 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a)

Previous Text	Revised Text	Page Number	Chapter or Section Number
Geyer	Sandbar	19	2.2.2 Willow Flycatcher
Bitterbrush scrub	Bitterbrush scrub (found only in Oregon portion of the study area)	64	Table 8-1: Vegetation Alliances Recorded in the Study Area
Not applicable (revised text indicates a new row in Table 8-1)	*Salix exigua*; Sandbar willow thicket; Shrub; S4.2; G5	64	Table 8-1: Vegetation Alliances Recorded in the Study Area
Geyer willow thicket	Geyer willow thicket (found only in Oregon portion of the study area)	64	Table 8-1: Vegetation Alliances Recorded in the Study Area
Biologists identified the following sensitive natural communities in the study area: • Oregon ash groves • Bigleaf maple forest • Oregon white oak woodland • Bitterbrush scrub • Chokecherry thicket • Shining willow grove • Geyer willow thicket	Biologists identified the following sensitive natural communities in the California portion of the study area: • Oregon ash groves • Bigleaf maple forest • Oregon white oak woodland • Chokecherry thicket • Shining willow grove	64 and 65	8.3 Conclusions

Table 7-2 Figure Errata from 2018 Annual Terrestrial Resources Survey Report (KRRC 2019a, Appendix A)

Previous Text	Revised Text	Figure Numbers
Geyer willow thicket	Sandbar willow thicket	Figures 3-1 through 3-3; 2018 Willow Flycatcher Habitat and Observations
Geyer willow thicket	Sandbar willow thicket	Figures 11-1 through 11-16 Vegetation Communities

Chapter 8 References

8. REFERENCES

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Chapter 9 List of Preparers

9. LIST OF PREPARERS

Table 8-1 List of Preparers

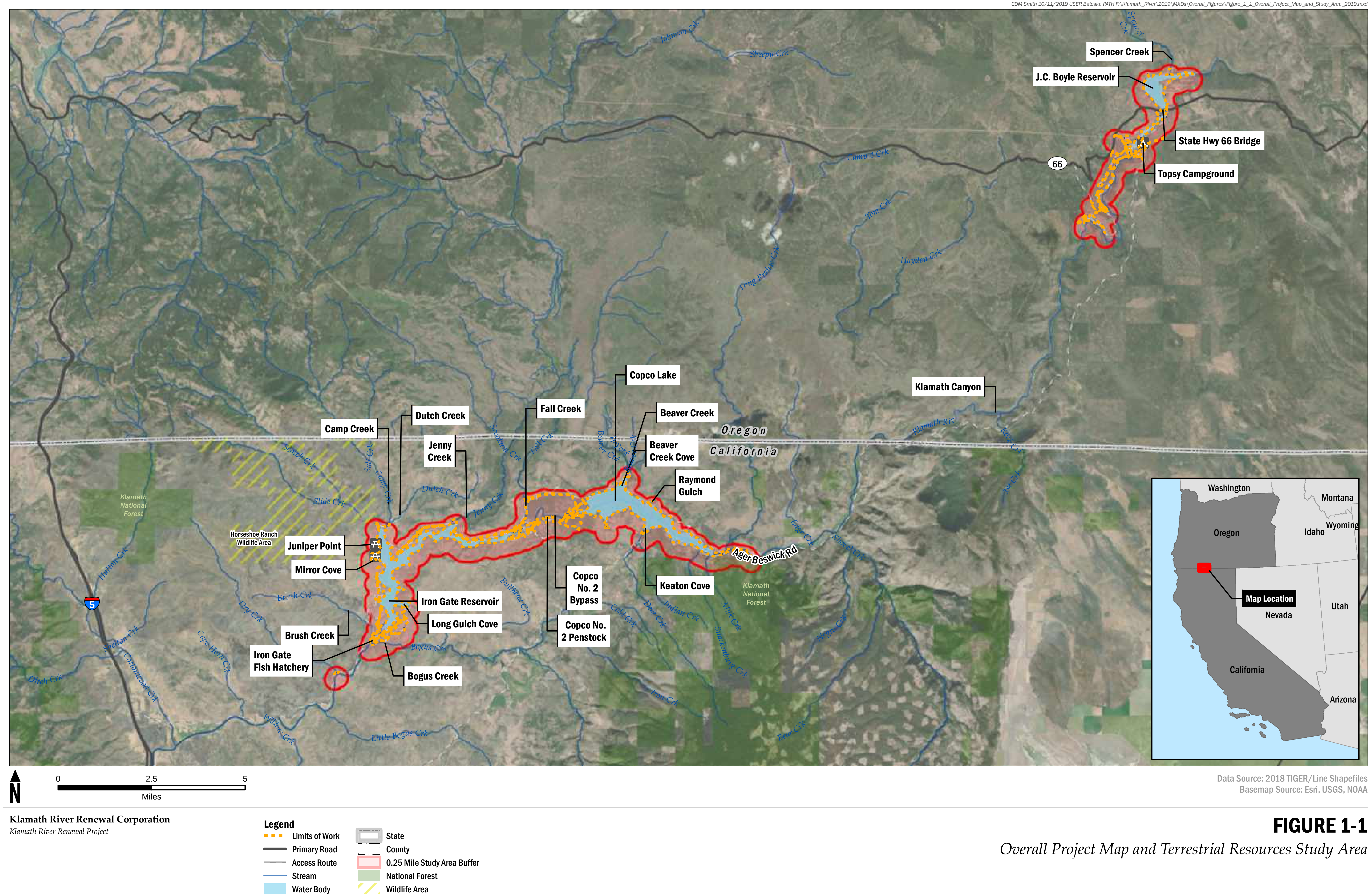
Name	Education	Qualifications
Emma Argiroff	Master of Urban Planning; B.A. Environmental Science; B.A. Art and Design	2.5 years of experience in regulatory compliance, NEPA/CEQA, land use, and transportation planning.
Don Ashton	M.A. Biodiversity; B.S. Biology	25 years of experience as a professional herpetologist (amphibians and reptiles) researching freshwater ecosystems and seeking multi-disciplinary ecosystem-based approaches to complex stakeholder issues regarding flow management and rehabilitation of regulated rivers in California and Oregon.
Sam Bankston	B.S. Aquatic Biology	7 years of experience in fisheries and wildlife science, stream assessment, threatened and endangered species surveys, biological/water quality sampling, wetland delineation, data analysis using R statistical software, and GIS support.
Kacey Bates	Master of Geospatial Information Science and Technology; B.S. Environmental Science	3 years of experience in GIS, geospatial analysis, task automation (Python), data management, cartographic design, water resources, watershed delineation, floodplain delineation, and development of field data collection forms (Collector for ArcGIS, Survey123).
Laura Burbage	M.S. Ecology; Master of Landscape Architecture; B.A. Biology	18 years of experience in wetland science, plant species identification, wetland soils, restoration design – wetland, stream, and upland habitats, nature park design, permitting, NEPA, aesthetic analysis – USACE methodology, and pre-remedial site assessment.
Joe Broberg	B.A. Environmental Studies	9 years of experience and training in botany with a focus on floristic surveys, special-status plants, ecological data collection, tree surveys, wetland delineations, wildlife surveys, and construction monitoring.
Wilson Fogler	B.A. Forestry (Wildlife Habitat Management and Conservation); B.A. Business Management	3.5 years of experience in wetland delineation, wetland monitoring, biological assessments, threatened and endangered species surveys, water resource planning, and GIS support.

Name	Education	Qualifications
Jennifer Jones	M.S. Environmental Science; B.A. Biology Certified Ecologist – Ecological Society of America	20 years of experience in wildlife and fisheries science, regulatory compliance and permitting, NEPA/CEQA, ecological restoration, wetland delineation, threatened and endangered species surveys, site assessment and remediation, and biological/water quality/soil and sediment sampling.
Christina Kelleher	M.S. Ecology; B.S. Biology; B.A. Sociology 40 Hour Hazwoper Training	5 years of experience in wildlife science, special-status species surveys and monitoring; holds USFWS Recovery Permit and CDFW Scientific Collecting Permit.
Adam Khalaf	M.S. Biological Engineering; B.S. Ecological Engineering	2 years of experience in stream and wetland restoration design, NEPA, and plant and wildlife surveys.
Kate Moran	M.En.- Master of Environmental Science; B.S. Biology; B.A. Sustainability	3 years of experience in wetland science, water resources management, fisheries management and sturgeon research, restoration monitoring, regulatory compliance, and GIS support.
Mandi McElroy	M.S. Wildlife Ecology and Conservation; B.S. Wildlife Biology 40 Hour Hazwoper Training	17 years of experience in wildlife biology with an emphasis on Northern California special status species, habitat assessments, construction monitoring, protocol-level surveys, and impact analyses for regulatory compliance.
Sean O'Hare	B.S. – Biological Science 40 Hour OSHA Hazwoper Training; Methodology of Wetland Delineation Certificate; 30-Hour OSHA Construction	12 years of experience in leading technical field investigations, ecological characterizations, wetland delineations, plant inspection and oversight of planting, stream assessments, water quality assessment, plant surveys, wildlife surveys, and biological assessments; extensive sampling experience.
Matt Petty, PWS, PMP	M.S. Environmental Studies; B.A. Zoology; Environmental Science Professional Wetland Scientist – Society of Wetland Scientists; Certified Ecologist – Ecological Society of America; Project Management Professional – Project Management Institute	14 years of experience in project management, wildlife and fisheries science, regulatory compliance and permitting, NEPA, ecological and stream restoration, wetland delineation, stream and lake assessment, threatened and endangered species surveys, biological/water quality/sediment sampling, and GIS support.
Jonathan Stead	M.S. Ecology, B.S. Biology (Ecology, Behavior, and Evolution)	More than 20 years of experience in ecology and biology, with expertise in environmental permitting and compliance, dam removal, fish passage, stream restoration, and water infrastructure projects.

Name	Education	Qualifications
Kate Stenberg	Ph.D. Wildlife and Fisheries Science and Regional Planning; Master of Administration in Land Use Planning; B.A. Biology-Environmental Studies	35 years of experience in wildlife and fisheries science, regulatory compliance, and NEPA/CEQA.
Conor Veeneman	Professional Science Master, Environmental Science; B.A. Environmental Science; Wetland Professional in Training – Society of Wetland Scientists	4.5 years of experience in wetland delineation, regulatory compliance and permitting, NEPA, stream and wetland restoration design and monitoring, habitat evaluations, threatened and endangered species surveys, biological/water quality/sediment sampling, and GIS support.
Suzanne Wilkins, AICP, ENV SP	B.S. Business Administration	30 years of experience in environmental planning, CEQA/NEPA; regulatory permitting and compliance, and sustainable infrastructure planning.

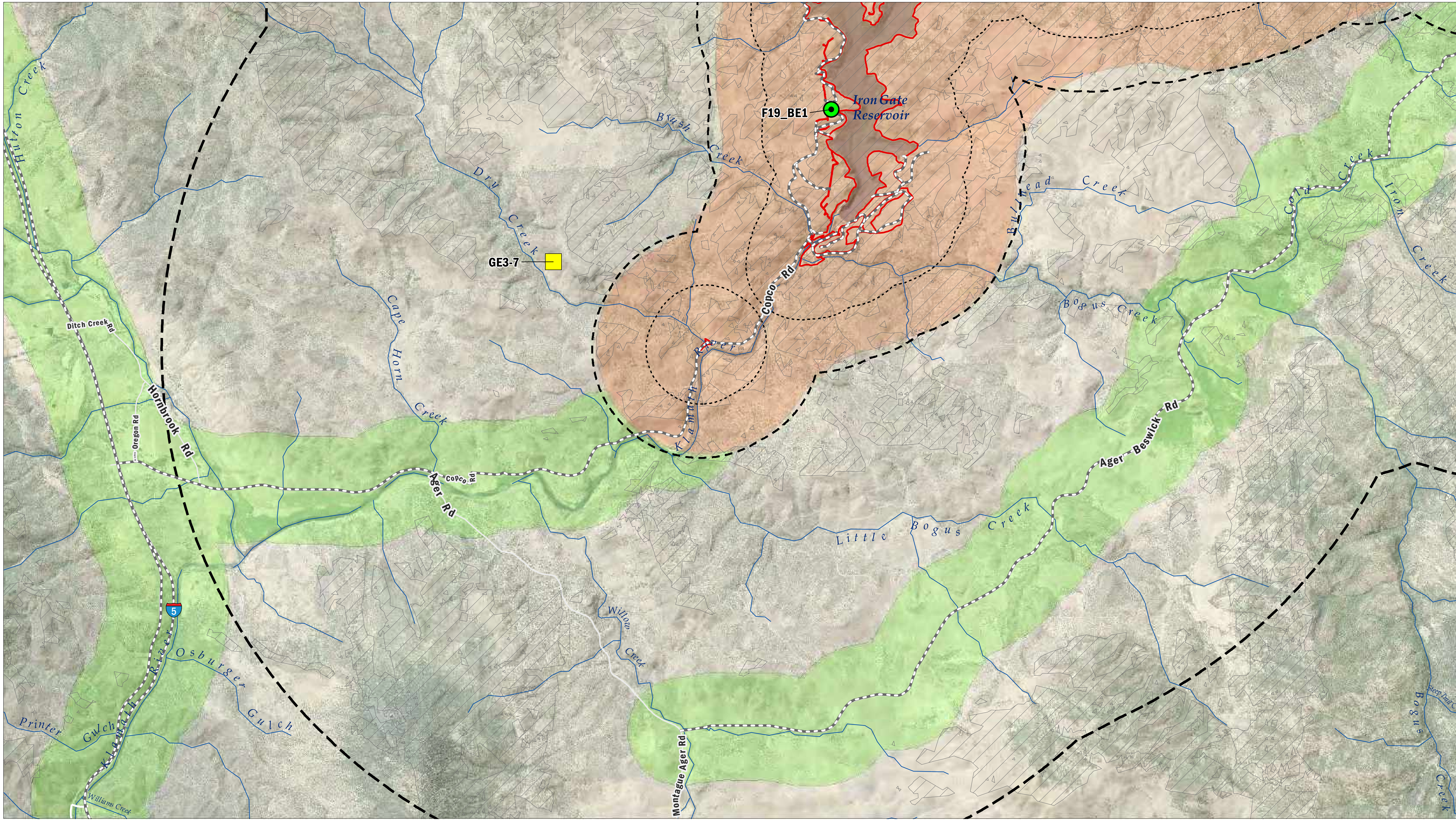
Notes:
CEQA = California Environmental Quality Act
GIS = Geographic Information System
NEPA = National Environmental Policy Act
OSHA – Occupational Safety and Health Administration
USACE = United States Army Corps of Engineers

Appendix A Figures



Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 1-1
Overall Project Map and Terrestrial Resources Study Area

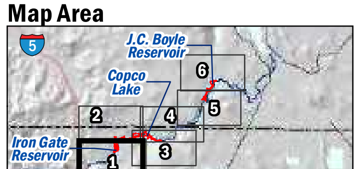


AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes

Limits of Work

Viewshed from Limits of Work

Low Impact Area

High Impact Area

Project LOW Buffers

0.5 Miles

1 mile

5 miles

10 miles

Eagle Survey Points

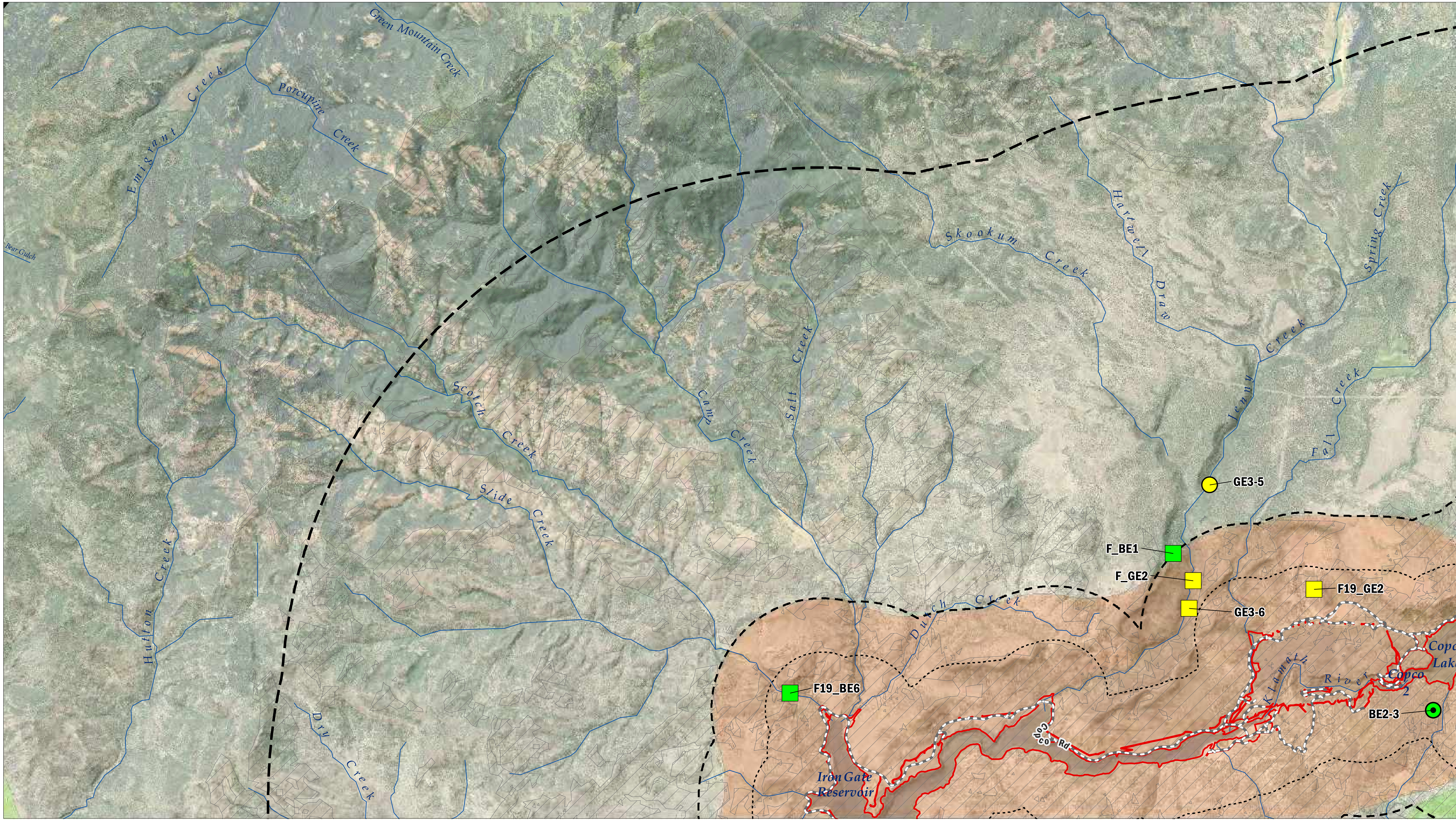
Active in 2019, Bald Eagle

Inactive, Golden Eagle

FIGURE 2 - 1

Eagle Nest Surveys 2019

AECOM Oakland CA 2/26/2020 USER sally.shatford PATH \\Oakland.na.aecomnet.com\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Eagles\EagleSurveys_AECOM2017-2019_CDM.mxd



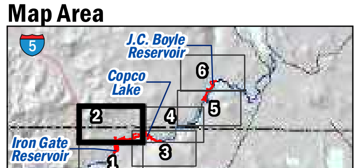
NAIP Imagery, 2014; AECOM, 2019

AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project

Map Area



Access Routes

Limits of Work

Viewshed from Limits of Work

Low Impact Area

High Impact Area

Project LOW Buffers

0.5 Miles

1 mile

5 miles

10 miles

Eagle Survey Points

Active in 2018, Golden Eagle

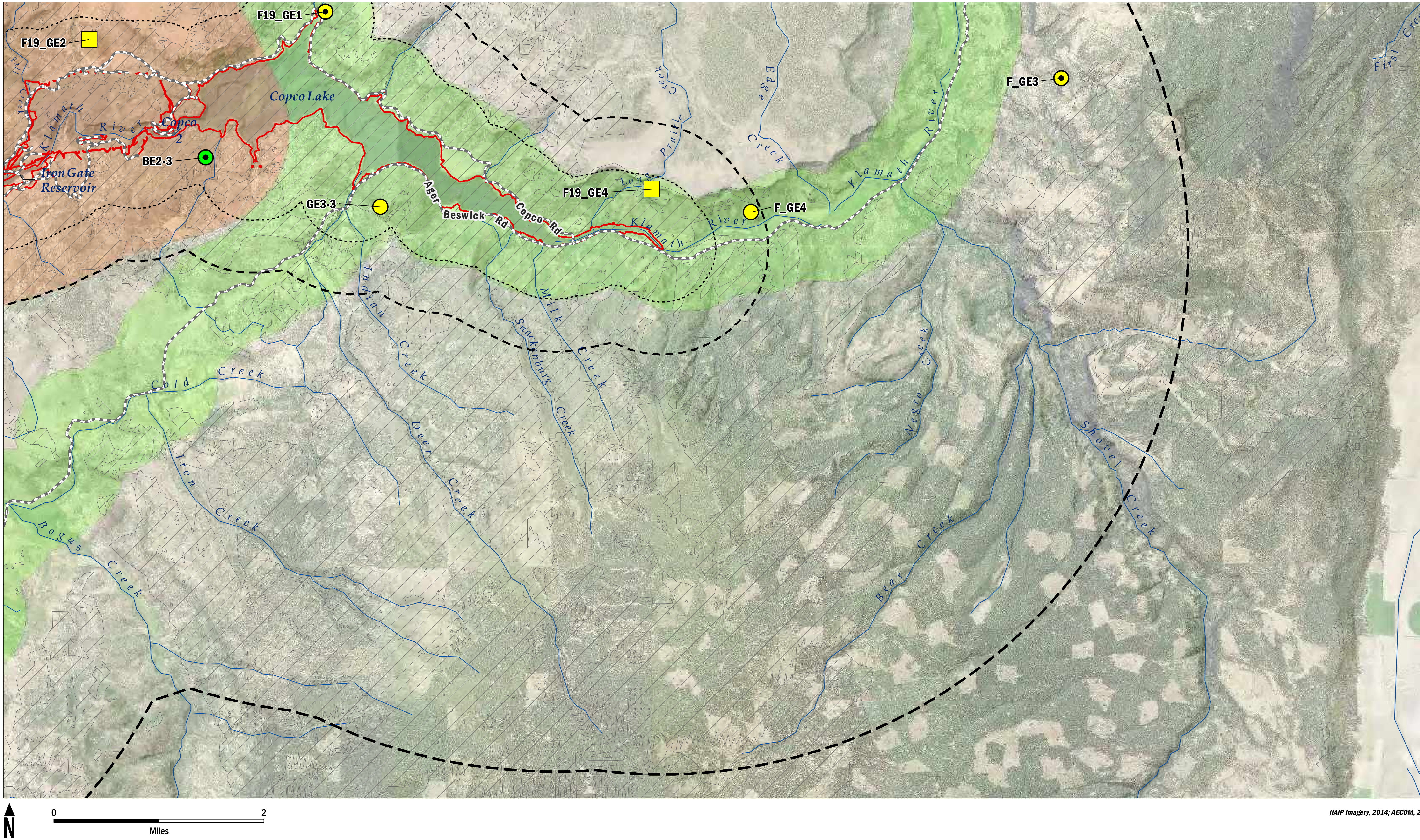
Active in 2019, Bald Eagle

Inactive, Bald Eagle

Inactive, Golden Eagle

FIGURE 2 - 2

Eagle Nest Surveys 2019



NAIP Imagery, 2014; AECOM, 2019

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

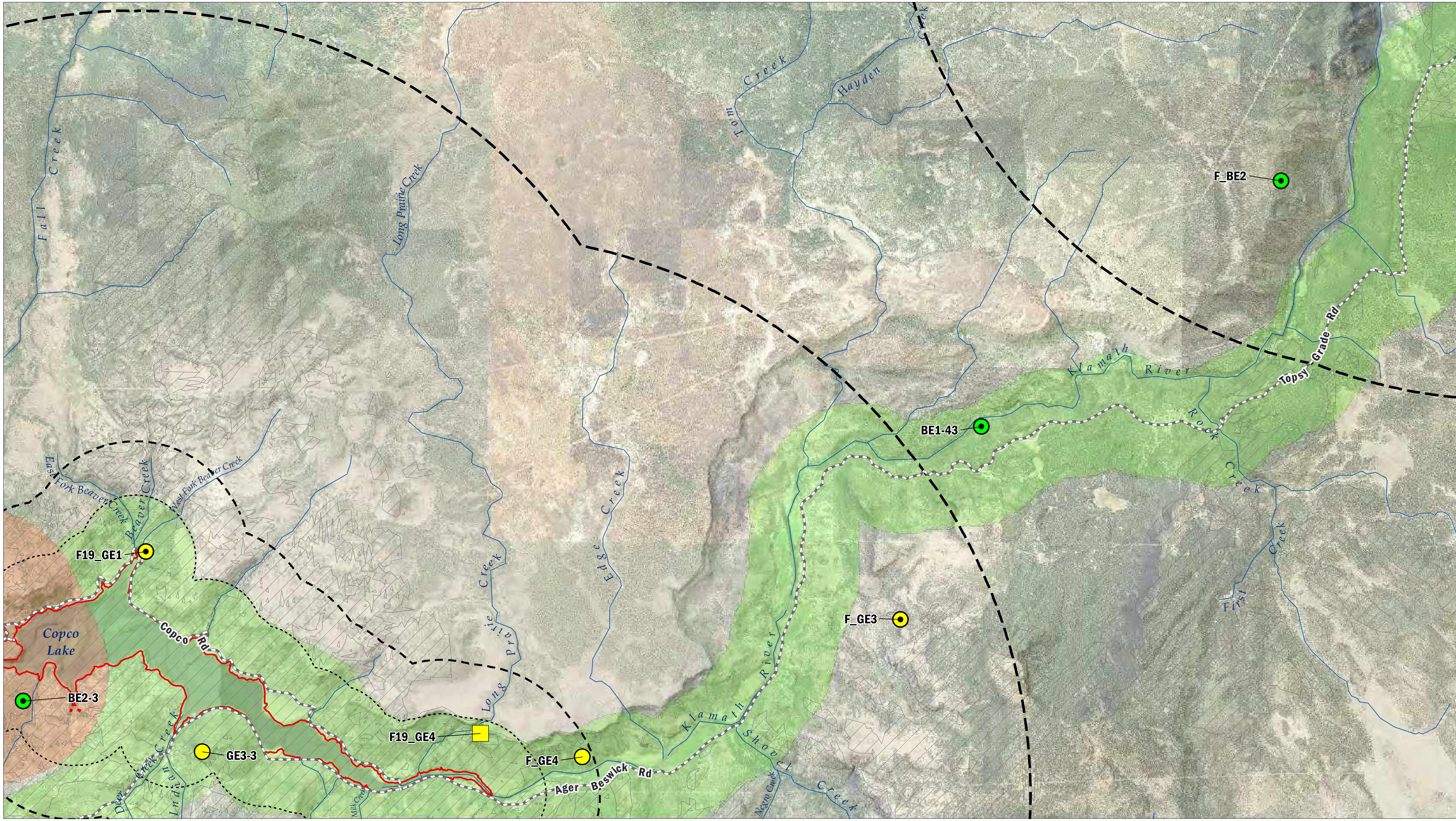
Map Area

Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Golden Eagle
Active in 2019, Bald Eagle
Active in 2019, Golden Eagle
Inactive, Golden Eagle

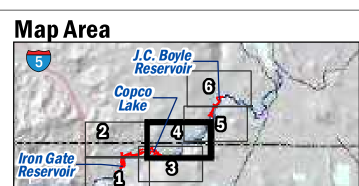
FIGURE 2 - 3
Eagle Nest Surveys 2019



AECOM

Klamath River Renewal Corporation

Klamath River Renewal Project



Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Golden Eagle
Active in 2019, Bald Eagle
Active in 2019, Golden Eagle
Inactive, Golden Eagle

FIGURE 2 - 4

Eagle Nest Surveys 2019

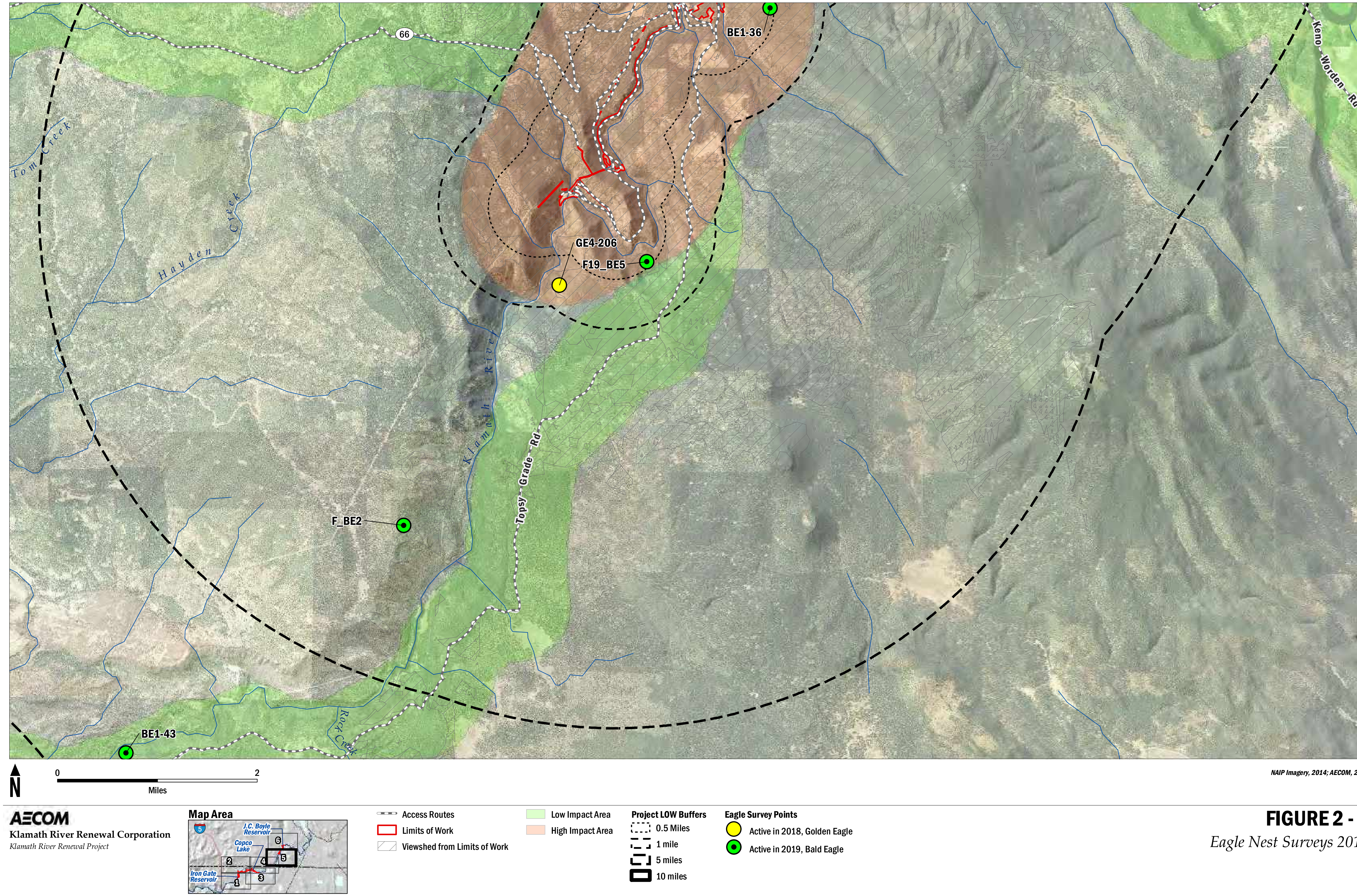


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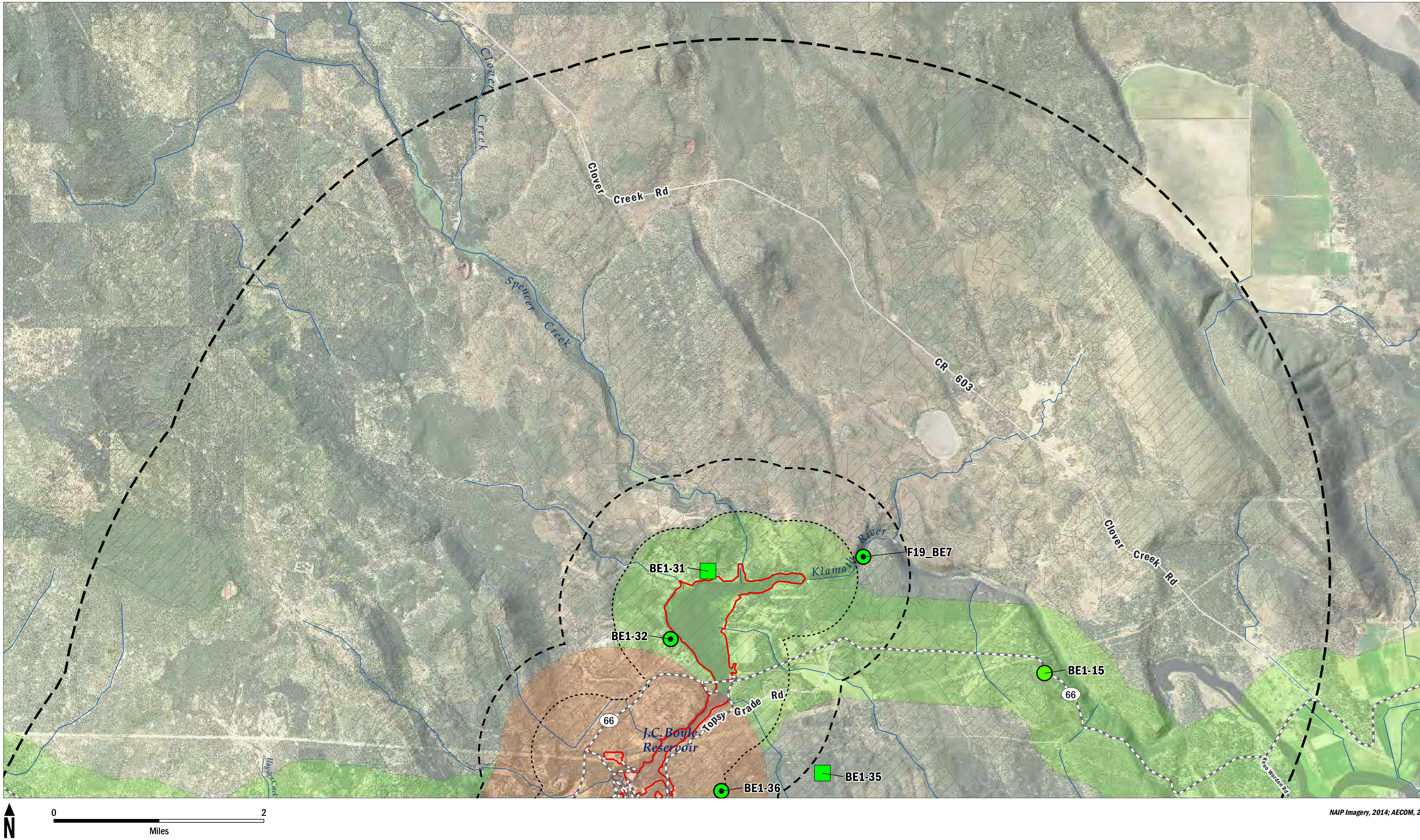
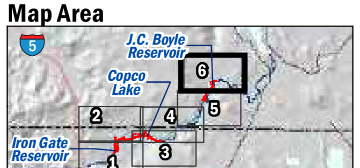
FIGURE 2 - 5
Eagle Nest Surveys 2019



NAIP Imagery, 2014; AECOM, 2019

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Area

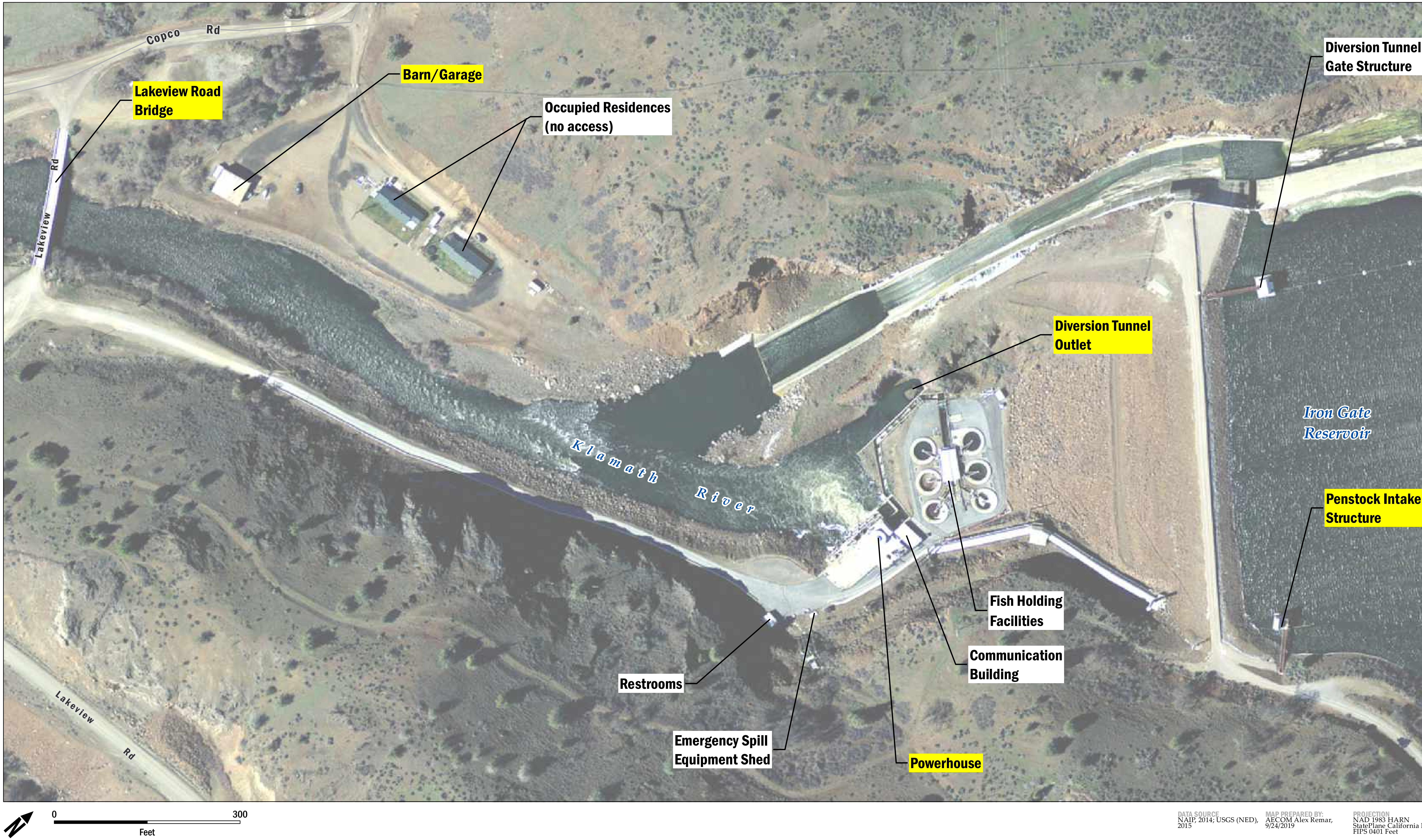


Access Routes
Limits of Work
Viewshed from Limits of Work
Low Impact Area
High Impact Area

Project LOW Buffers
0.5 Miles
1 mile
5 miles
10 miles

Eagle Survey Points
Active in 2018, Bald Eagle
Active in 2019, Bald Eagle
Inactive, Bald Eagle

FIGURE 2 - 6
Eagle Nest Surveys 2019

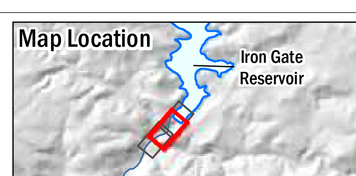


DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

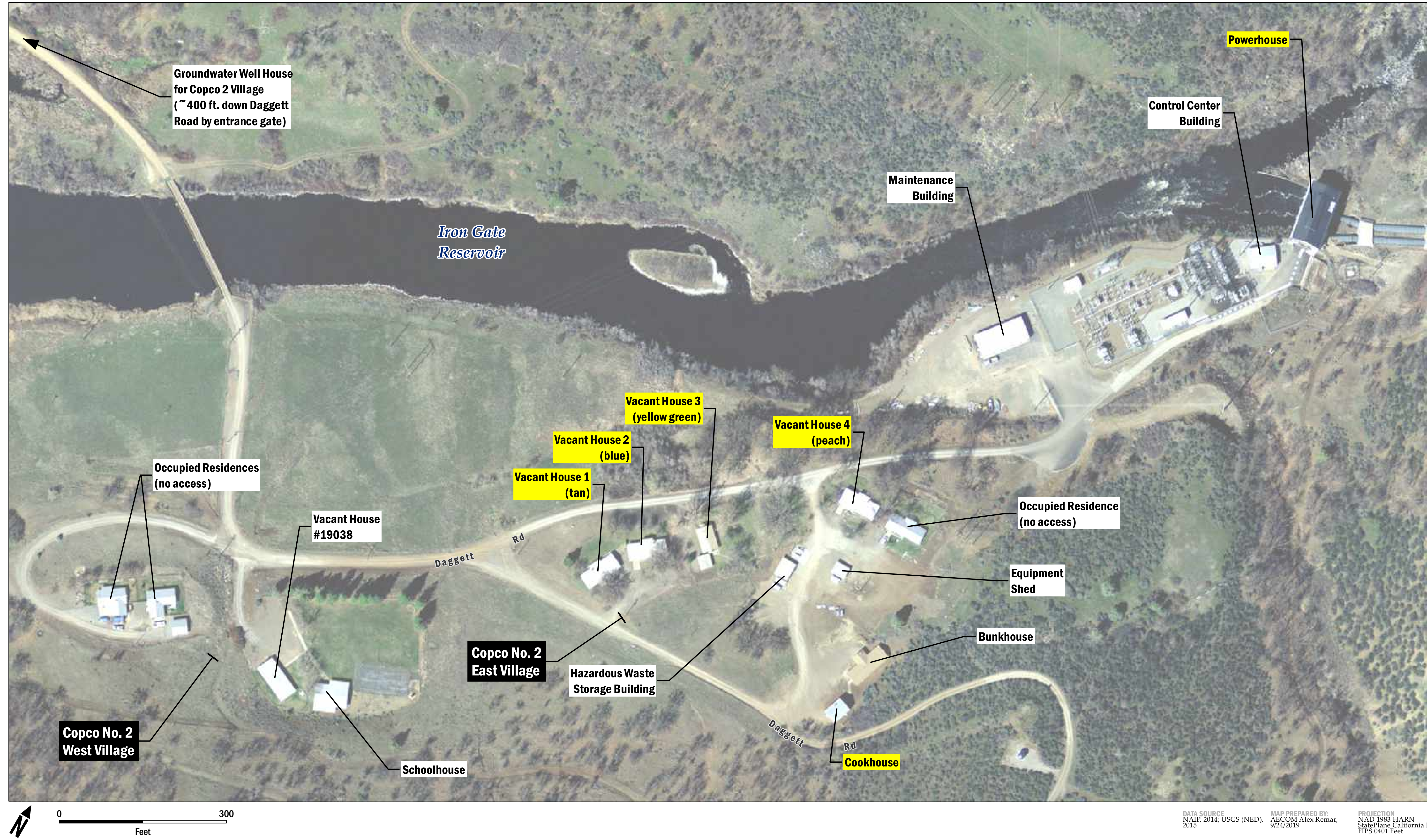
Active Bat Roost Confirmed

Roosting Bats Not Found

FIGURE 3-1

2017-2019 Bat Surveys
Iron Gate Dam Area

AECOM Oakland CA 9/24/2019 USER sally.shatford PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2019\Figure 7-2 Copco.mxd



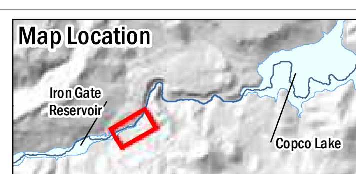
DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN
StatePlane California I
FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project

Map Location



Labels

- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 3-2

2017-2019 Bat Surveys
Copco No. 2 Powerhouse Area

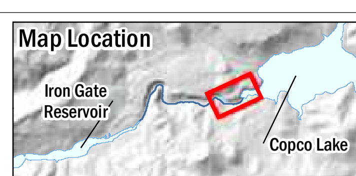
AECOM Oakland CA 9/24/2019 USER sally.shatford PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2019\Figure 7-3 Copco.mxd

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

- Active Bat Roost Confirmed
- Roosting Bats Not Found

FIGURE 3-3

2017-2019 Bat Surveys
Copco No. 1 Dam Area and
Copco No. 2 Dam Area

(I) FOREBAY AND SPILLWAY

(II) PENSTOCKS AND POWERHOUSE

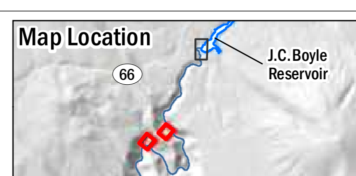
0 300
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
Klamath River Renewal Project



Labels

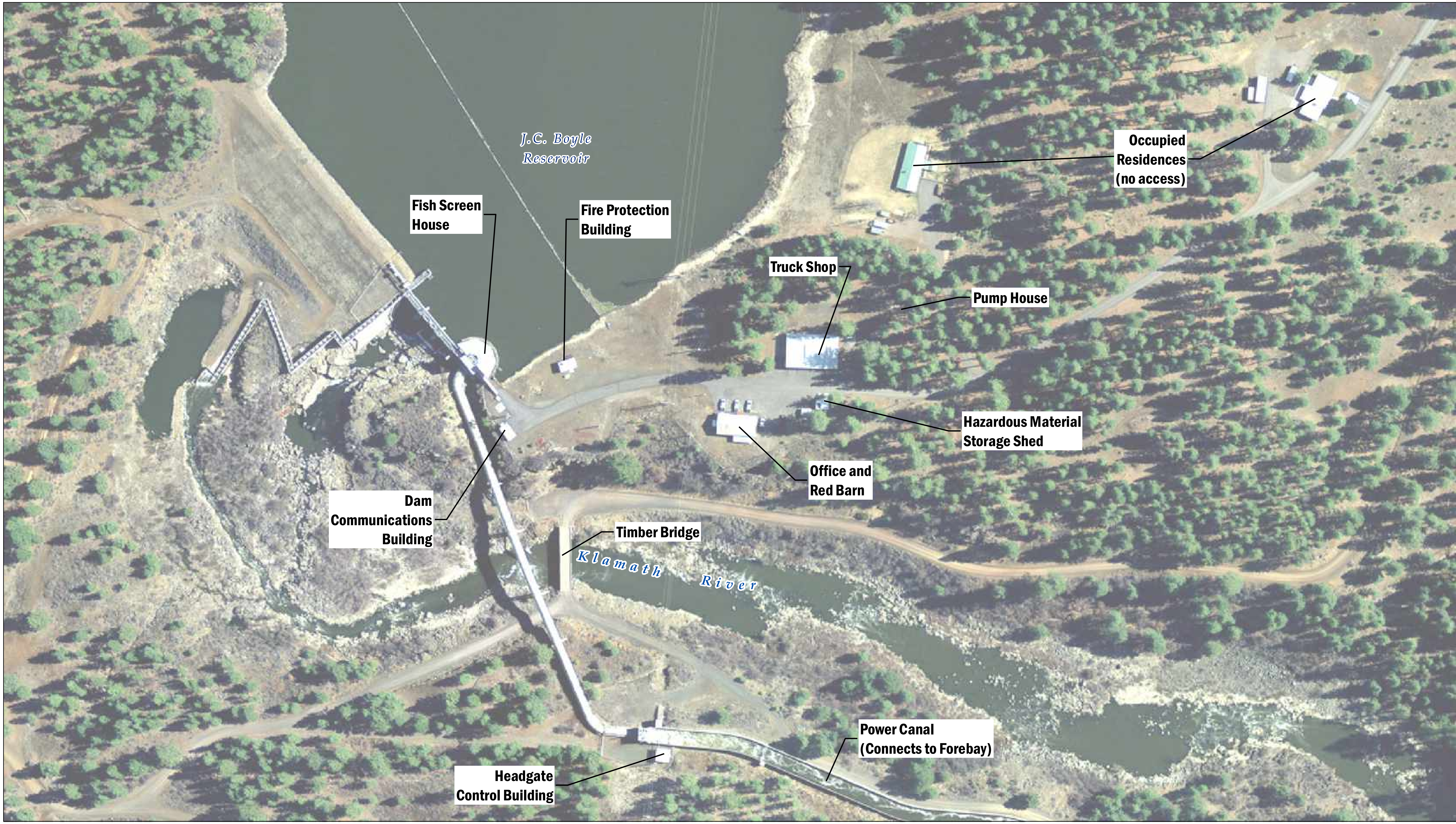
Active Bat Roost Confirmed

Roosting Bats Not Found

FIGURE 3-4

2017-2019 Bat Surveys
J.C. Boyle Forebay and Spillway Area,
Penstocks and Powerhouse Area

AECOM Oakland CA 9/24/2019 USER sally.shatford PATH \\Oakland\Oakland\Projects\Secure\Water\Klamath Dam\400-Technical\440 GIS\02_Maps\02_Map_Production_and_Reports\Biology\Bats\BatSurveys_2017-2019\Figure 7-5 JC Boyle.mxd



0 300
Feet

DATA SOURCE
NAIP, 2014; USGS (NED), 2015

MAP PREPARED BY:
AECOM Alex Remar, 9/24/2019

PROJECTION
NAD 1983 HARN StatePlane California I FIPS 0401 Feet

AECOM
Klamath River Renewal Corporation
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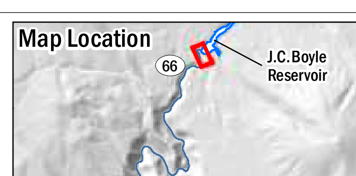


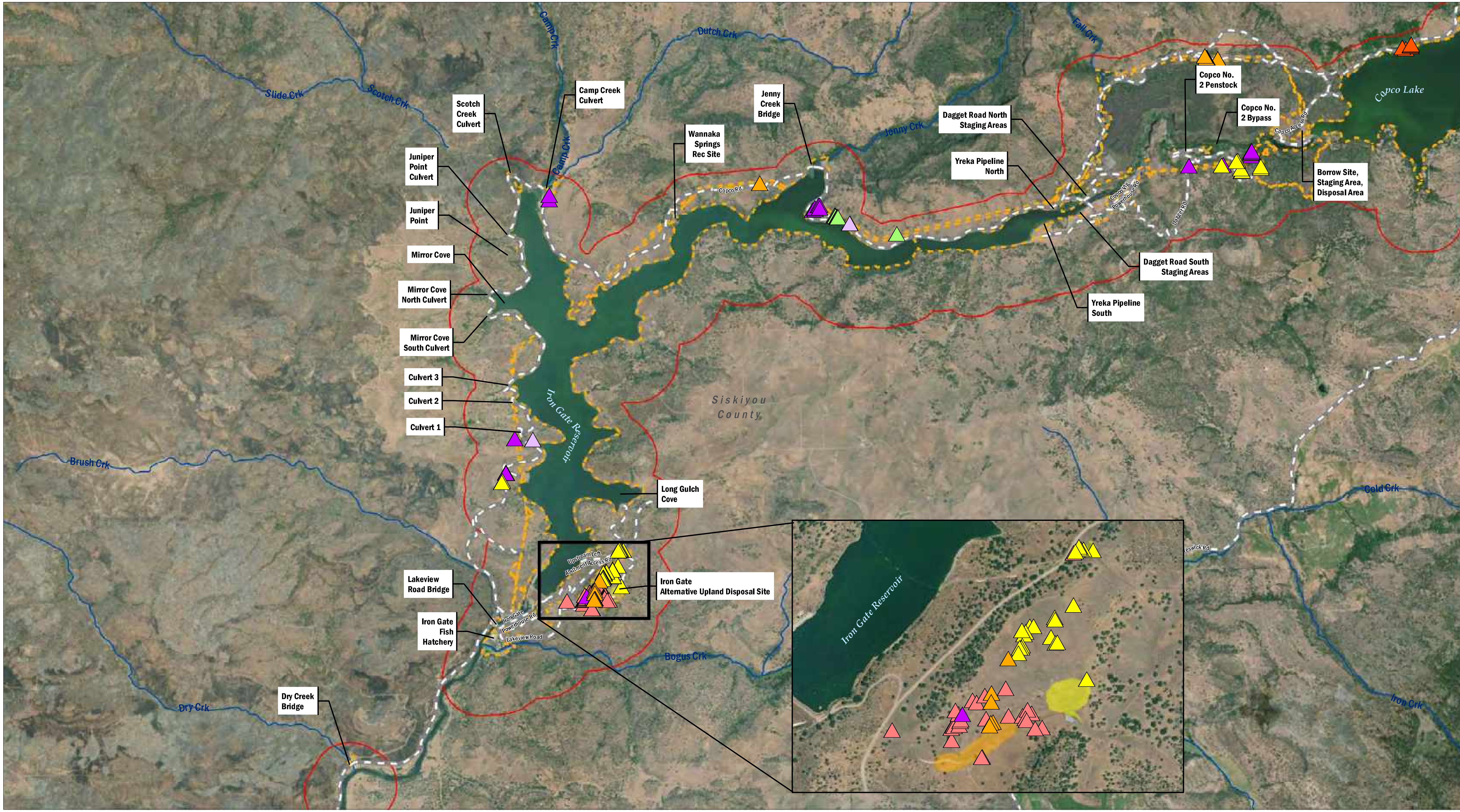
Labels

Roosting Bats Not Found

FIGURE 3-5

2017-2019 Bat Surveys
J.C. Boyle Dam Area

CDM Smith 2/19/2020 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Klamath_2019_Annual_Report_Figures\Figure_5_1_Iron_Gate_SSP_2019_SB021920.mxd



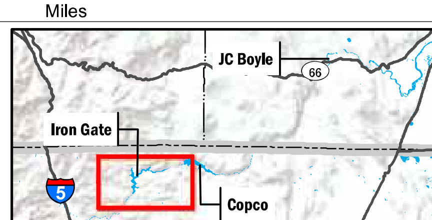
N

0 1 2

Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Legend

- Limits of Work
- 0.25 Mile Study Area Buffer
- Access Route

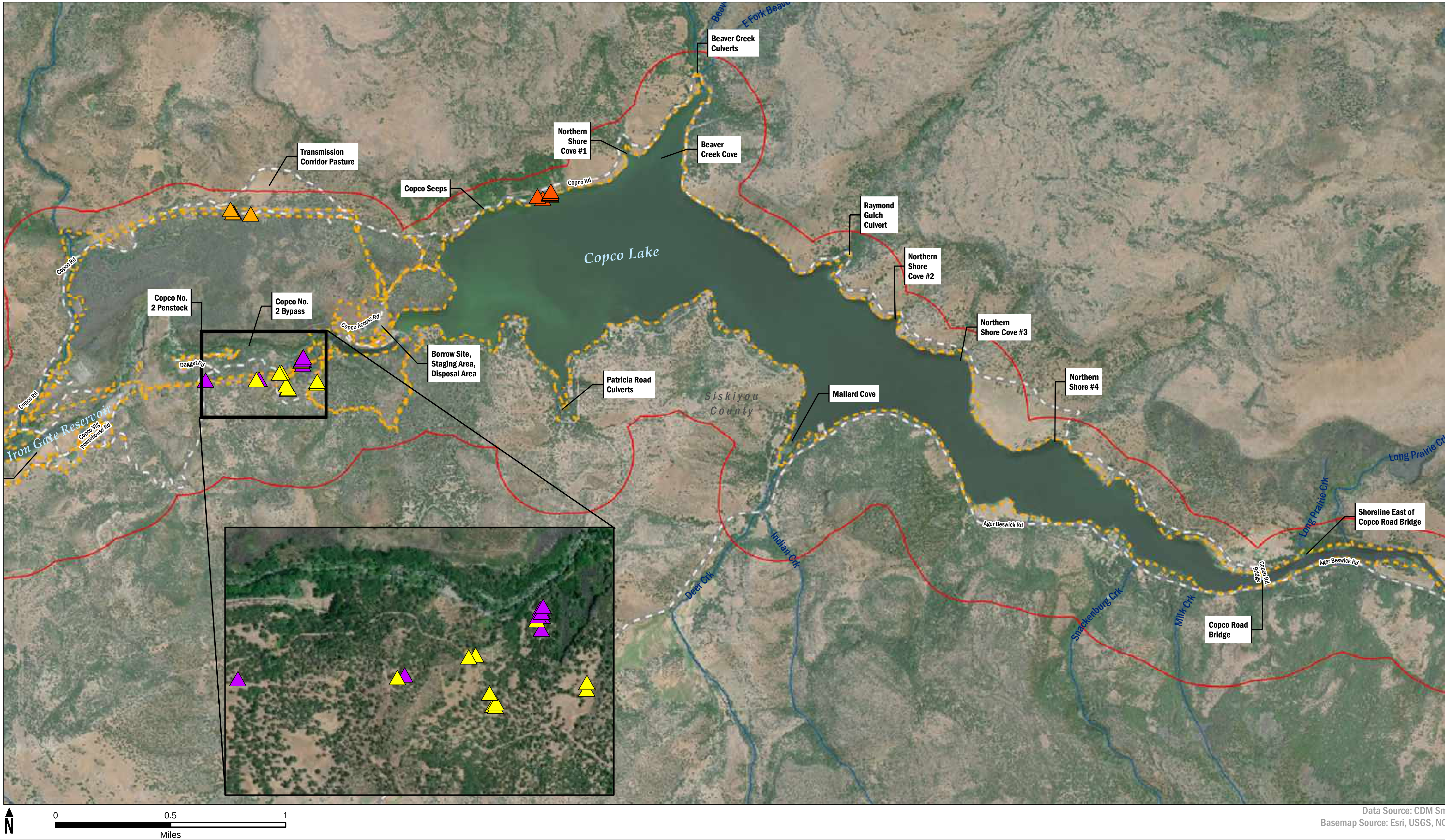
Special Status Plants (Points)
- Bolander's sunflower
- Bristly sedge
- Calochortus sp.
- Detling's silverpuffs
- Fleshy sage
- Greene's four o'clock
- Greene's mariposa-lily
- Purple-flowered Washington lily

Special Status Plants (Polygons)
- Bolander's Sunflower
- Bristly Sedge
- Calochortus sp.
- Detling's Silverpuffs
- Fleshy Sage
- Greene's mariposa-lily
- Western Yampah

FIGURE 5-1

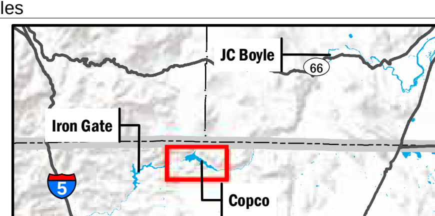
2019 Special Status Plants
Iron Gate Reservoir

CDM Smith 10/14/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Klamath_2019_Annual_Report_Figures\Figure_5_2_Copco_SSP_2019.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Legend

- Limits of Work
- Access Route
- 0.25 Mile Study Area Buffer

Special Status Plants (Points)

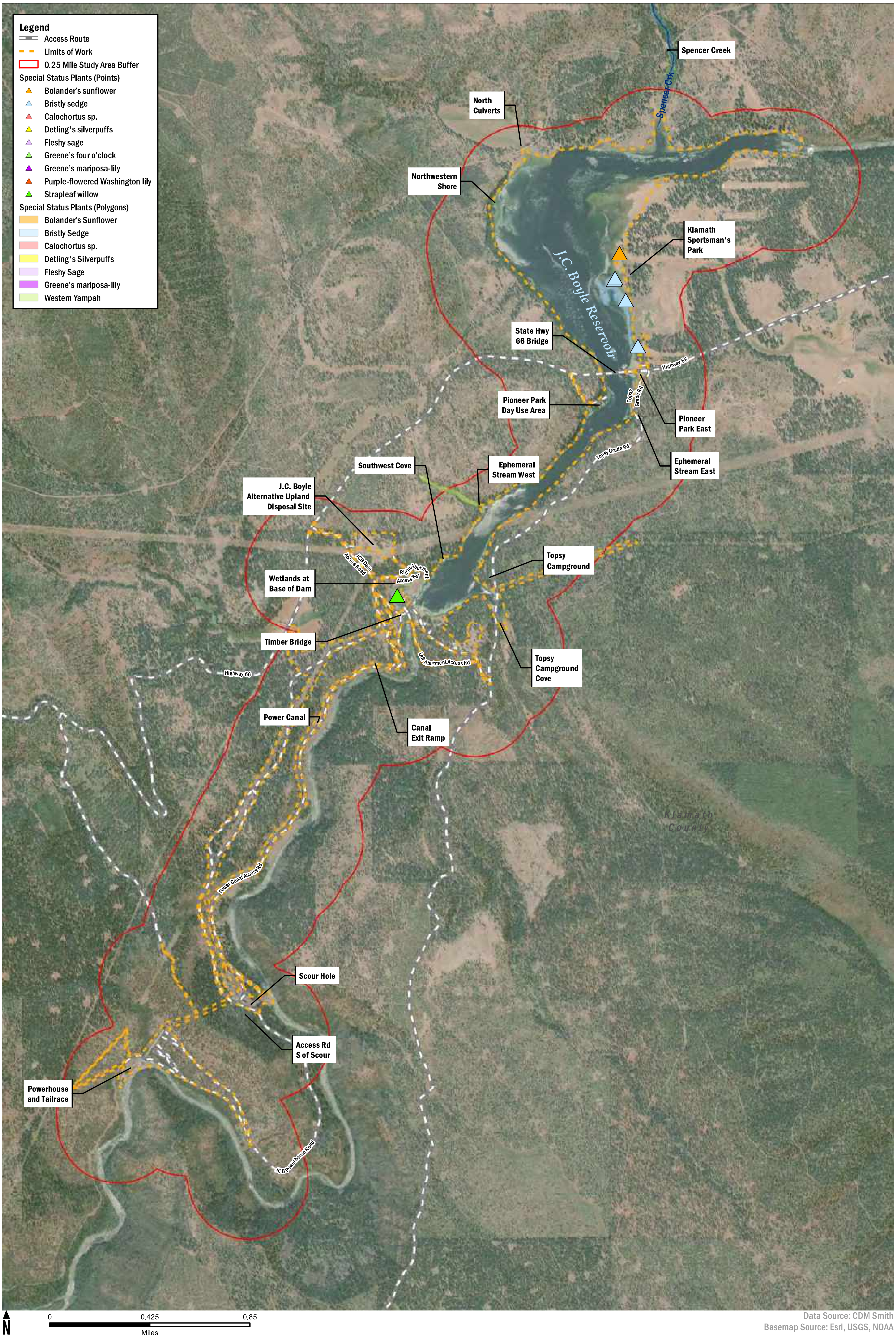
- Bolander's sunflower
- Bristly sedge
- Calochortus sp.
- Detling's silverpuffs
- Fleshy sage
- Greene's four o'clock
- Greene's mariposa-lily
- Purple-flowered Washington lily

Special Status Plants (Polygons)

- Bolander's Sunflower
- Bristly Sedge
- Calochortus sp.
- Detling's Silverpuffs
- Fleshy Sage
- Greene's mariposa-lily
- Western Yampah

FIGURE 5-2

2019 Special Status Plants
Copco Lake



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

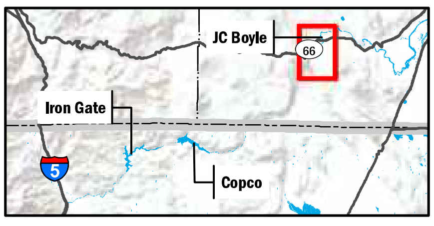
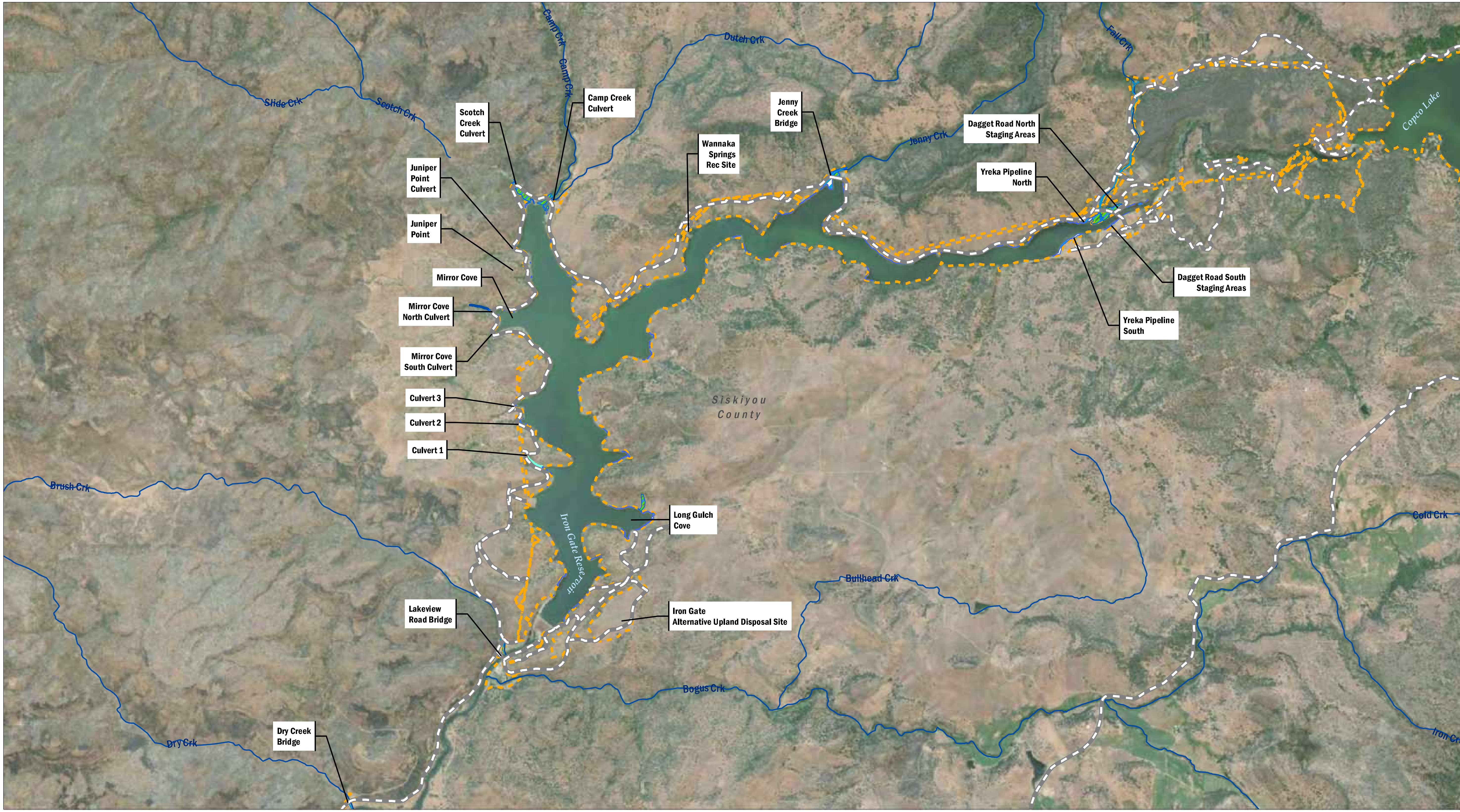


FIGURE 5-3
2019 Special Status Plants
J.C. Boyle Reservoir

CDM Smith 2/19/2020 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Klamath_2019_Annual_Report_Figures\Figure_6_1_Iron_Gate_Wetlands_2019_SB021920.mxd



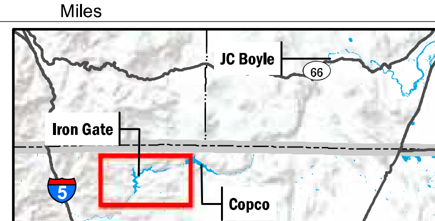
N

0 1 2

Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Legend

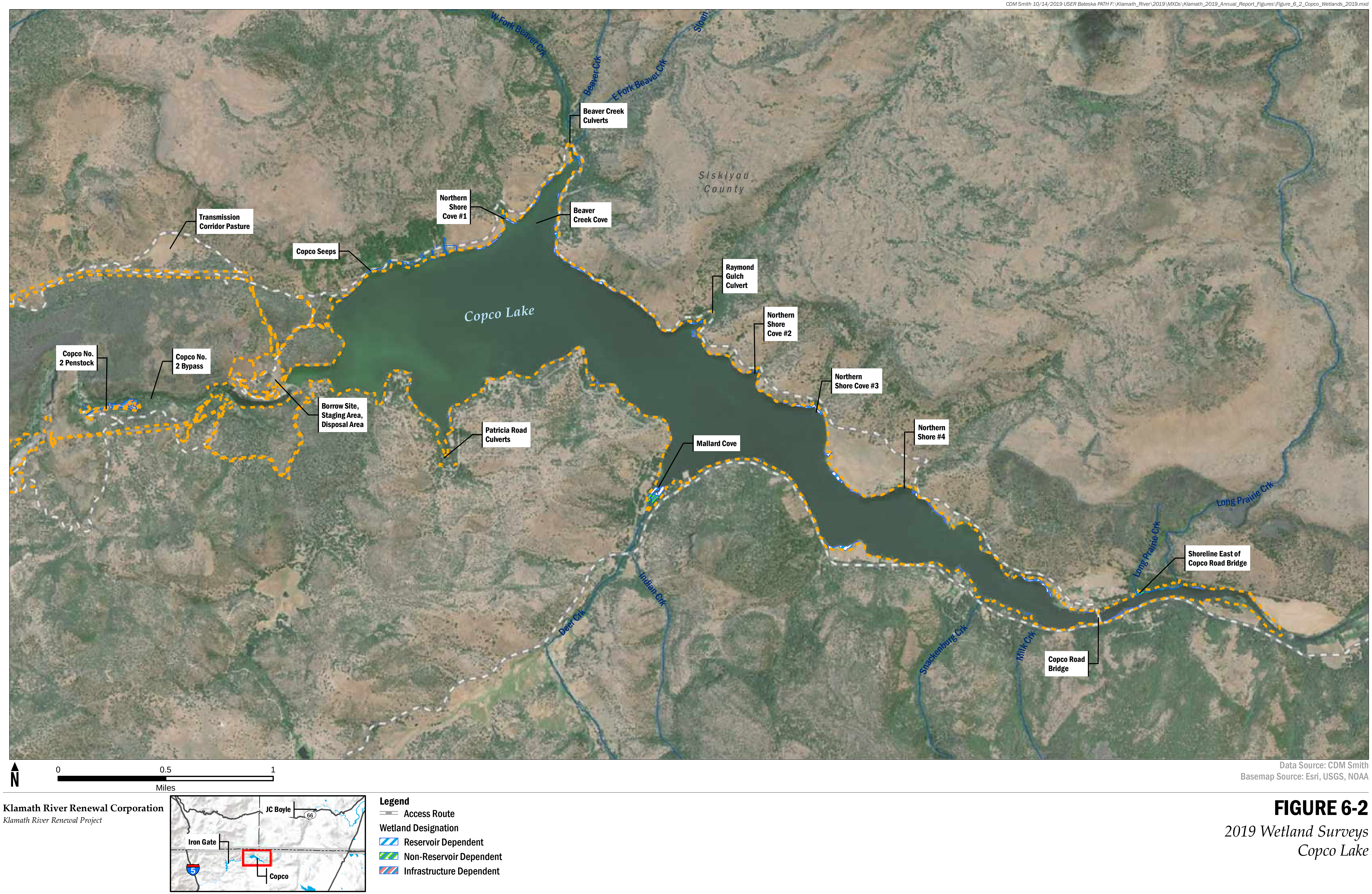
- Limits of Work
- Access Route
- Ephemeral Stream
- Intermittent Stream
- Stream Channel

Wetland Designation

- Reservoir Dependent
- Non-Reservoir Dependent

FIGURE 6-1

2019 Wetland Surveys
Iron Gate Reservoir



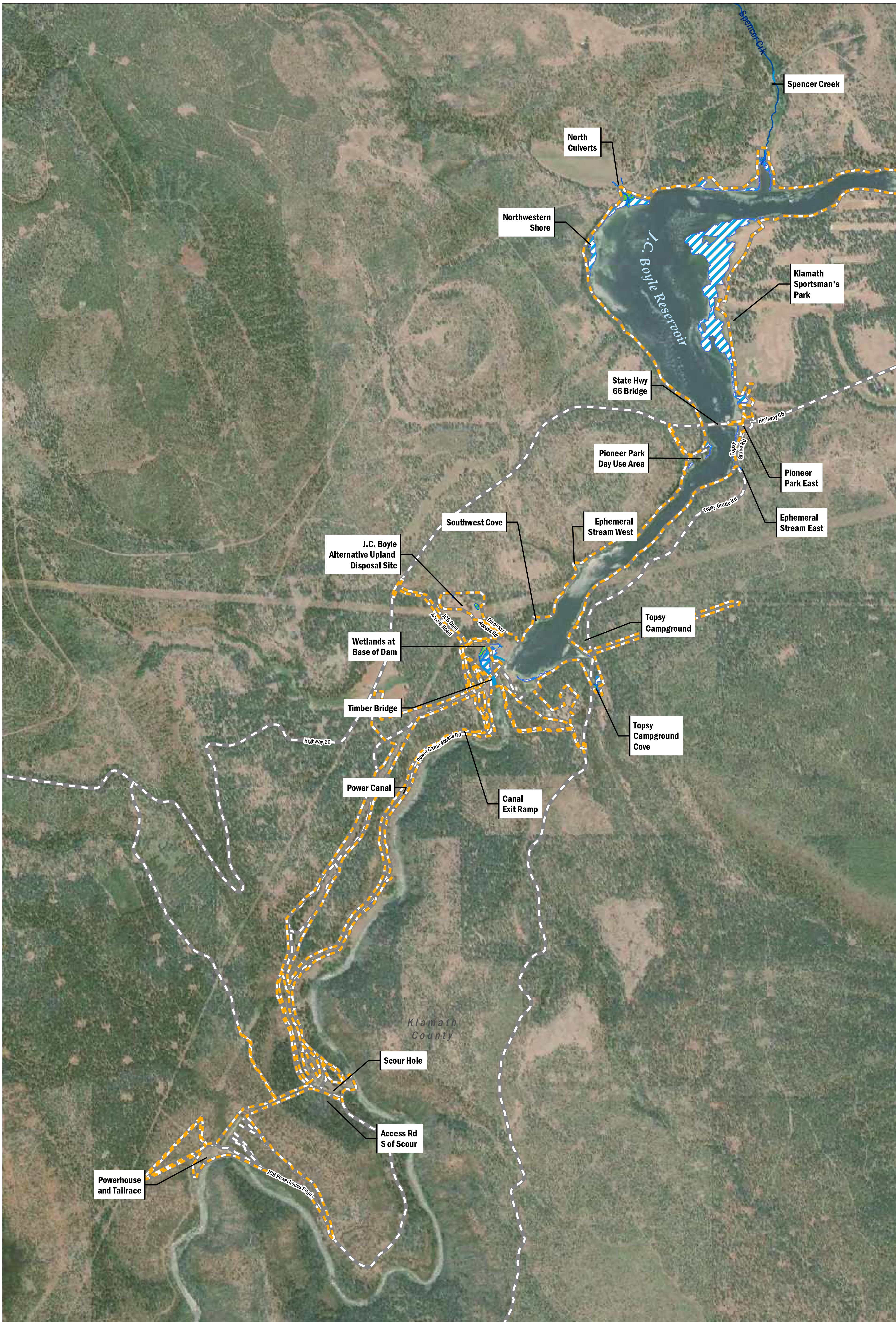
Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

FIGURE 6-2

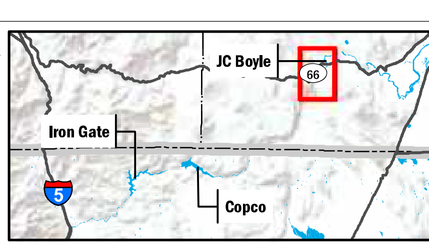
2019 Wetland Surveys
Copco Lake

CDM Smith 2/19/2020 USER BANKSTONSE PATH C:\Users\bankstonse\Desktop\Klamath_2019_Annual_Report_Figures\Figure_6_3_JC_Boyle_Wetlands_2019_SB021920.mxd



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Legend

- Access Route
- Stream Channel
- Limits of Work

Wetland Designation

- Reservoir Dependent
- Non-Reservoir Dependent

FIGURE 6-3

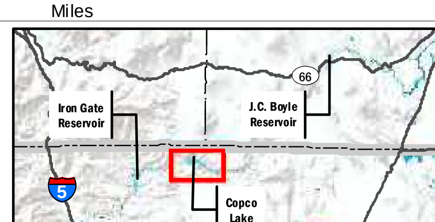
2019 Wetland Surveys
J.C. Boyle Reservoir

Appendix B Revised Figures from 2018 Report

CDM Smith 6/14/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Figure_3_1_Willow Flycatcher_Habitats_and_Observations.mxd

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



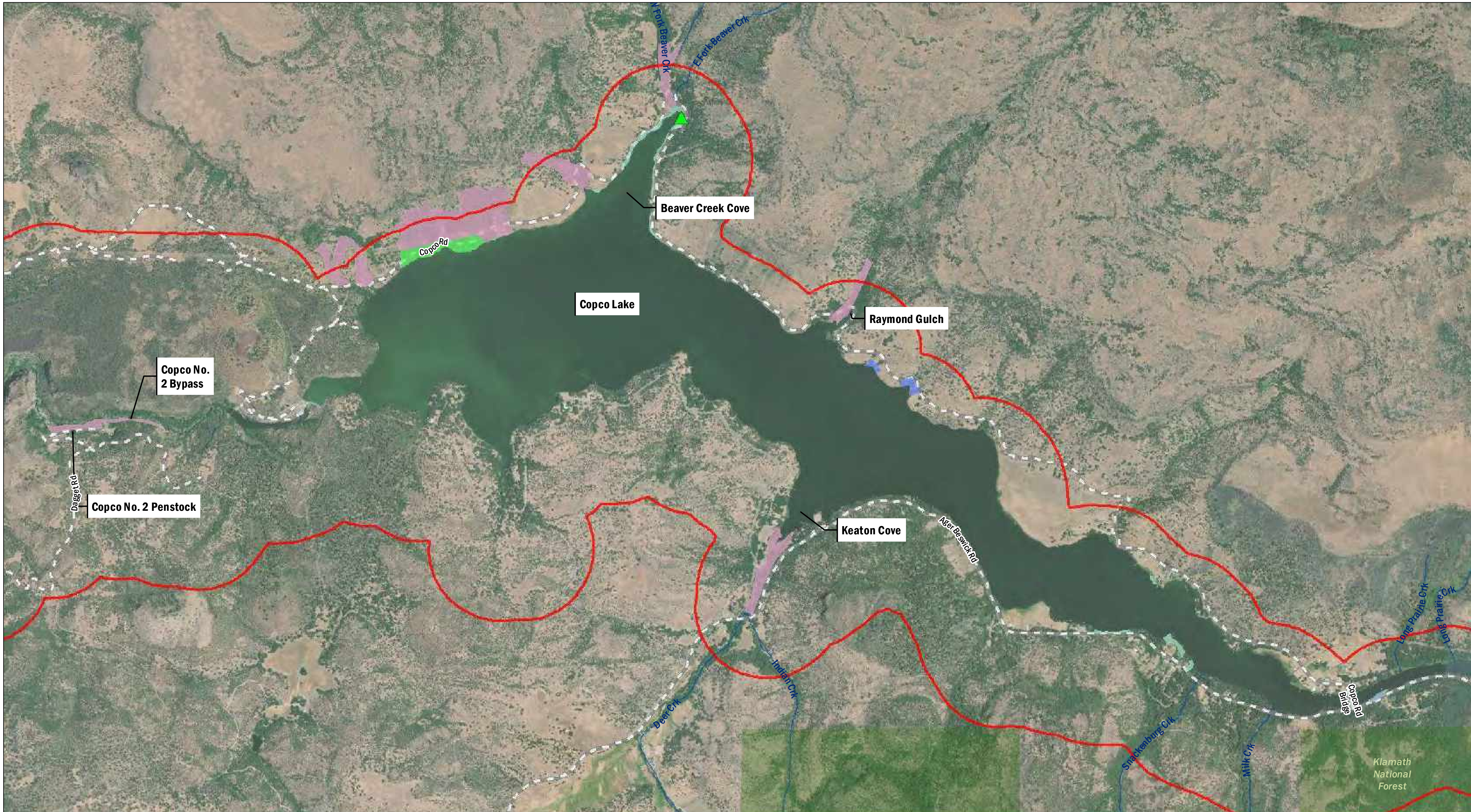
Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Sandbar willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

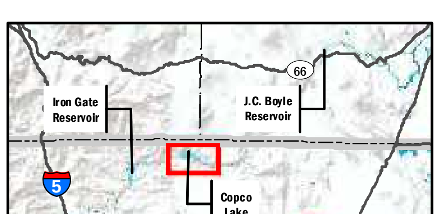
FIGURE 3-1

2018 Willow Flycatcher Habitat and Observations
Iron Gate Reservoir



Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project



Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Sandbar willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- Access Route
- 0.25 Mile Study Area Buffer

FIGURE 3-2

2018 Willow Flycatcher Habitat and Observations
Copco Lake

AECOM Oakland CA 6/13/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Figure_3_3_Willow Flycatcher_Habitats_and_Observations.mxd

N

0 0.5
Miles

Data Source: CDM Smith
Basemap Source: Esri, USGS, NOAA

Klamath River Renewal Corporation
Klamath River Renewal Project

- Willow Flycatcher Observation

Willow Flycatcher Habitat
- Bigleaf maple forest
- Sandbar willow thicket
- Oregon ash grove
- Shining willow grove
- Willow thickets

- State
- County
- Stream
- 0.25 Mile Study Area Buffer
- Access Route

FIGURE 3-3

2018 Willow Flycatcher Habitat and Observations
J.C. Boyle Reservoir and Canal

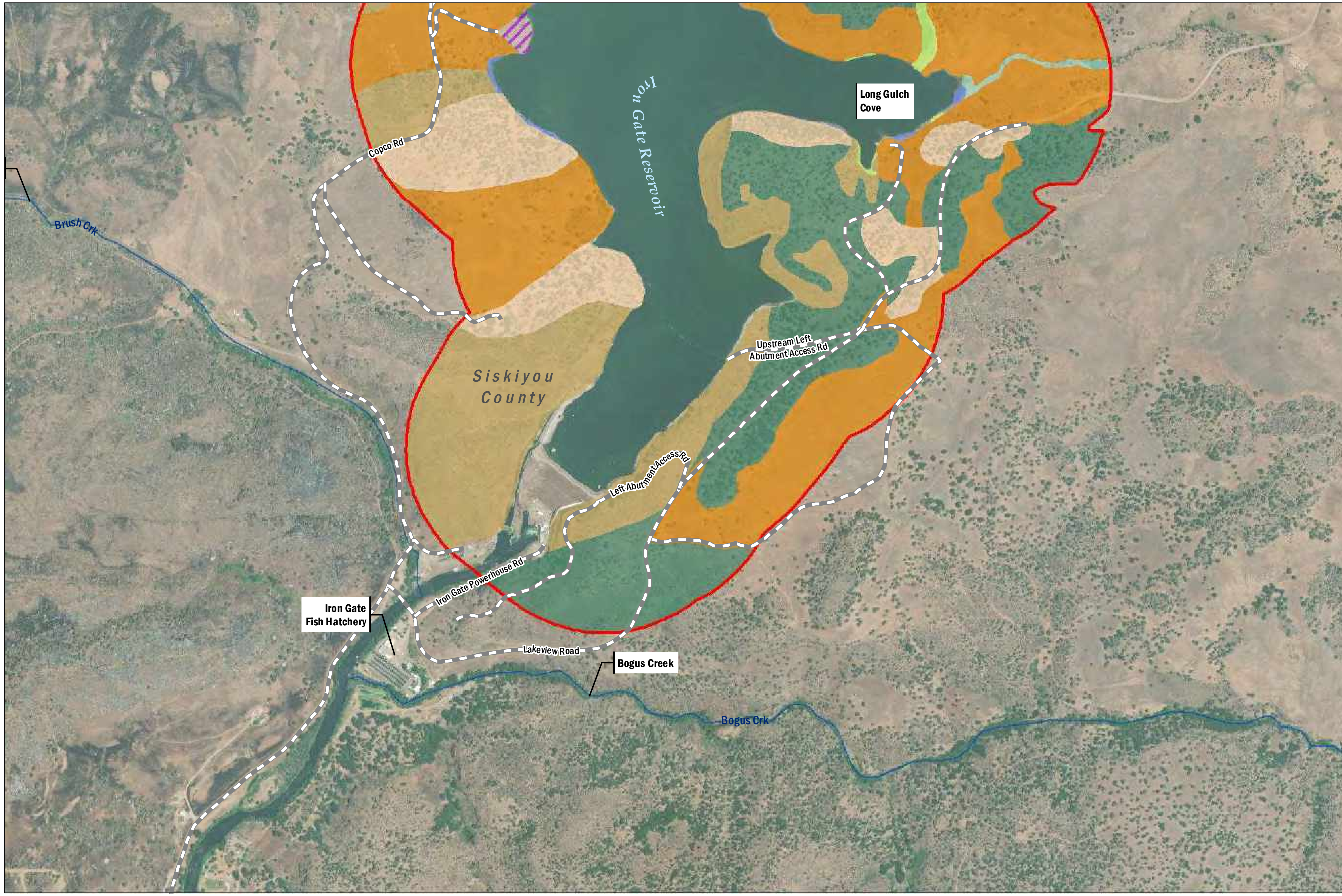
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5

Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

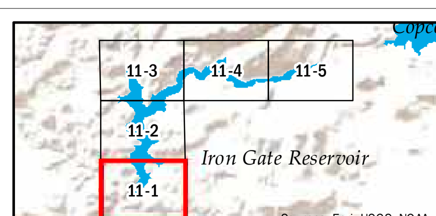


FIGURE 11-1

Vegetation Communities

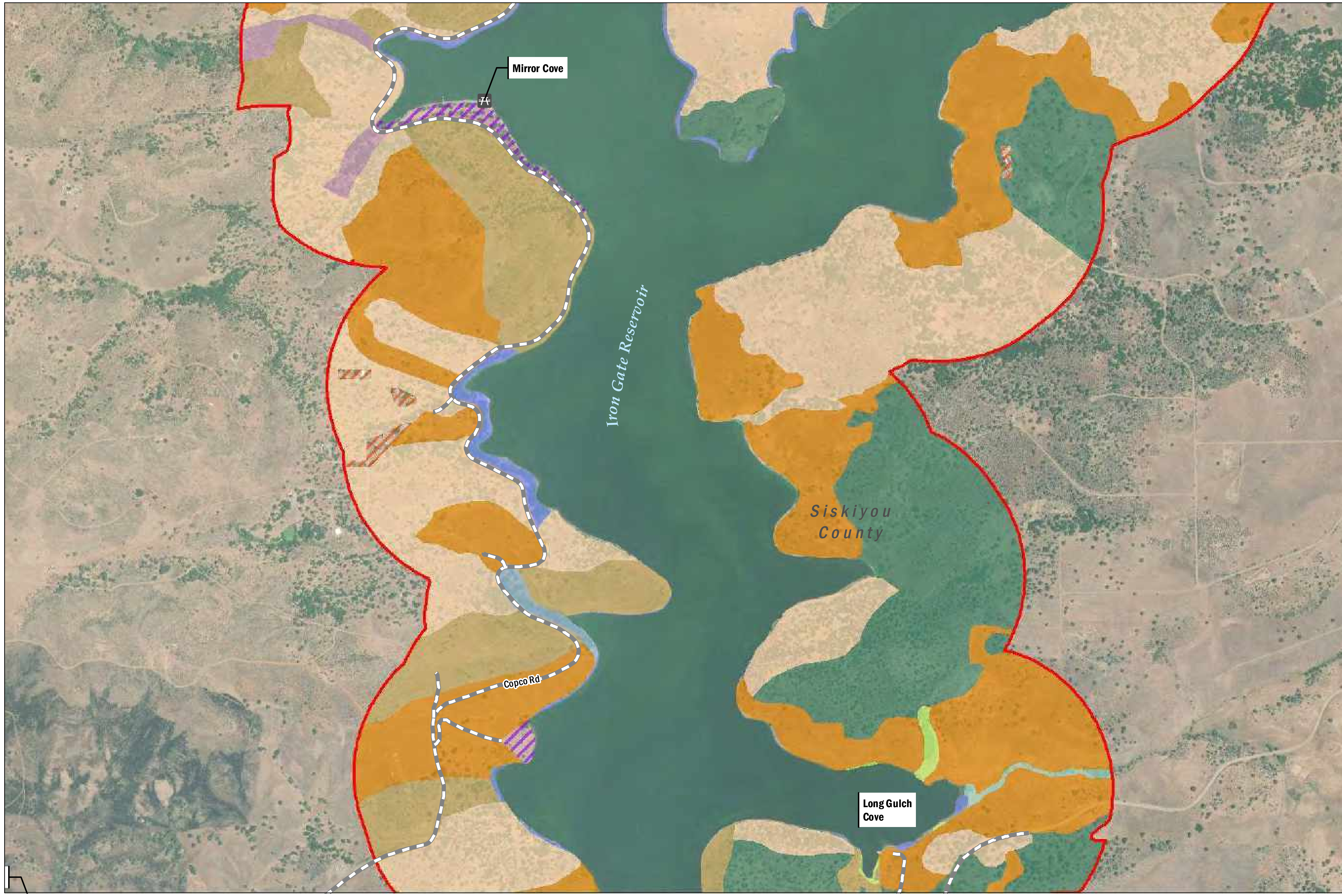
Iron Gate Reservoir

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

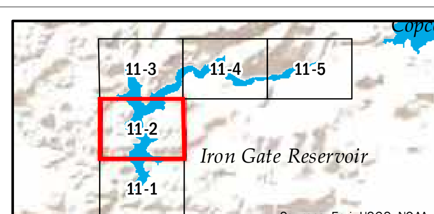


FIGURE 11-2
Vegetation Communities
Iron Gate Reservoir

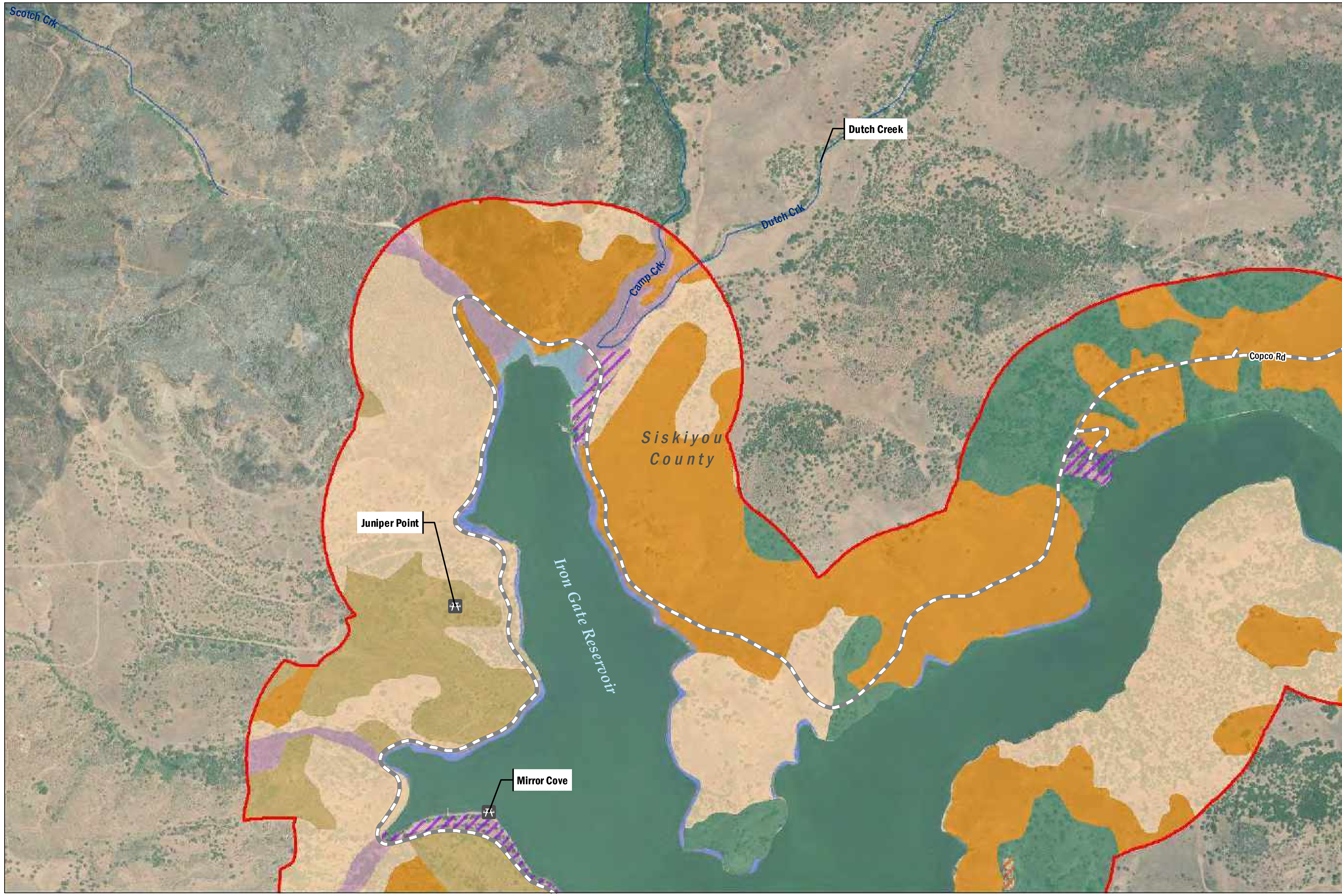
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Iron_Gate_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

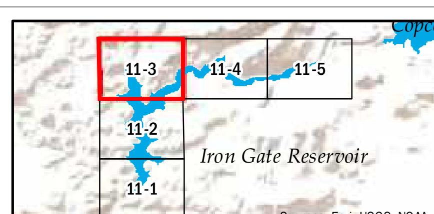


FIGURE 11-3

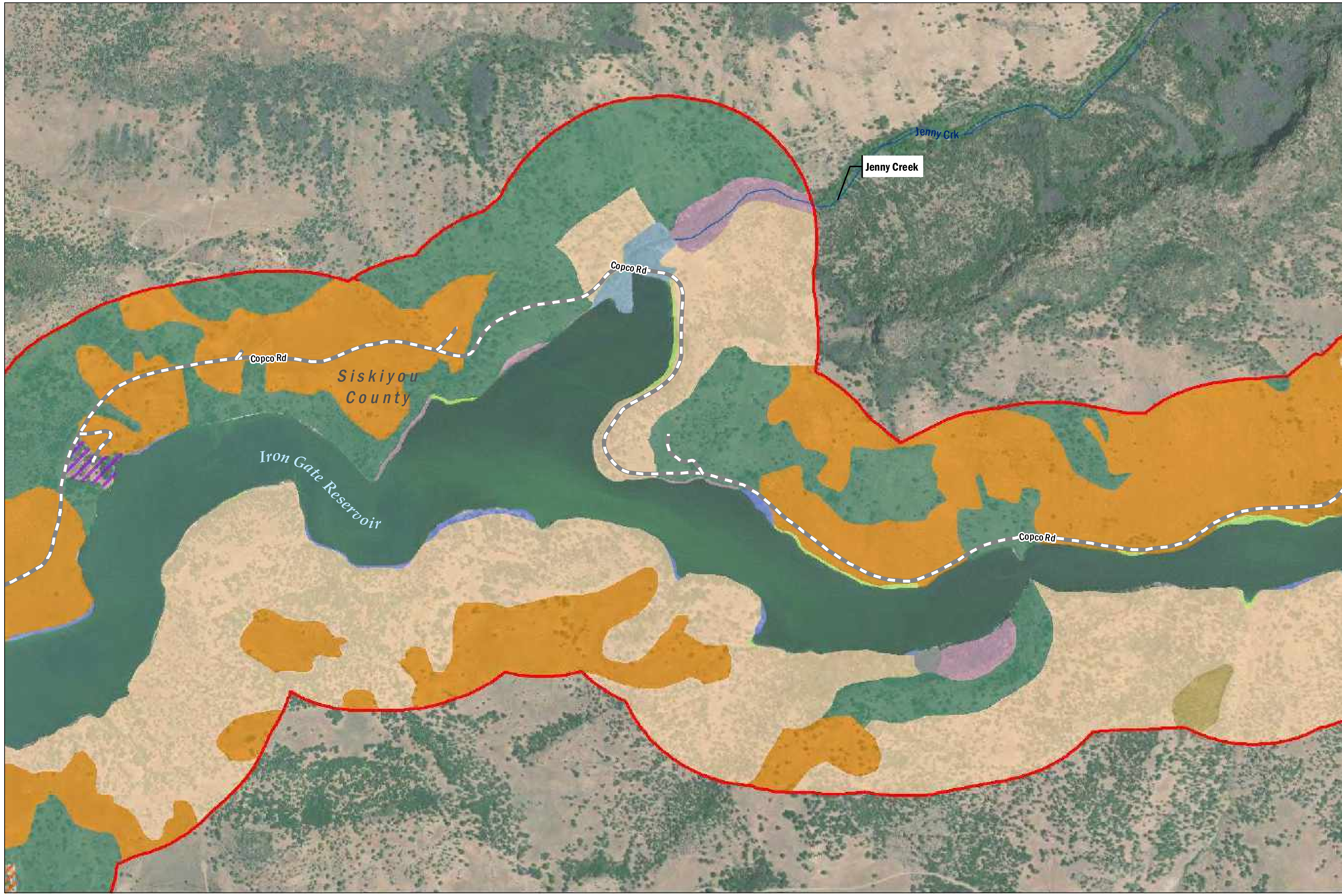
Vegetation Communities
Iron Gate Reservoir

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

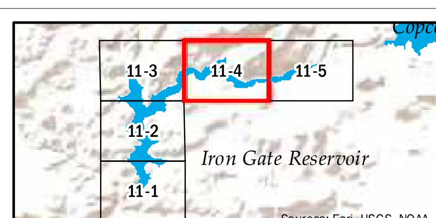
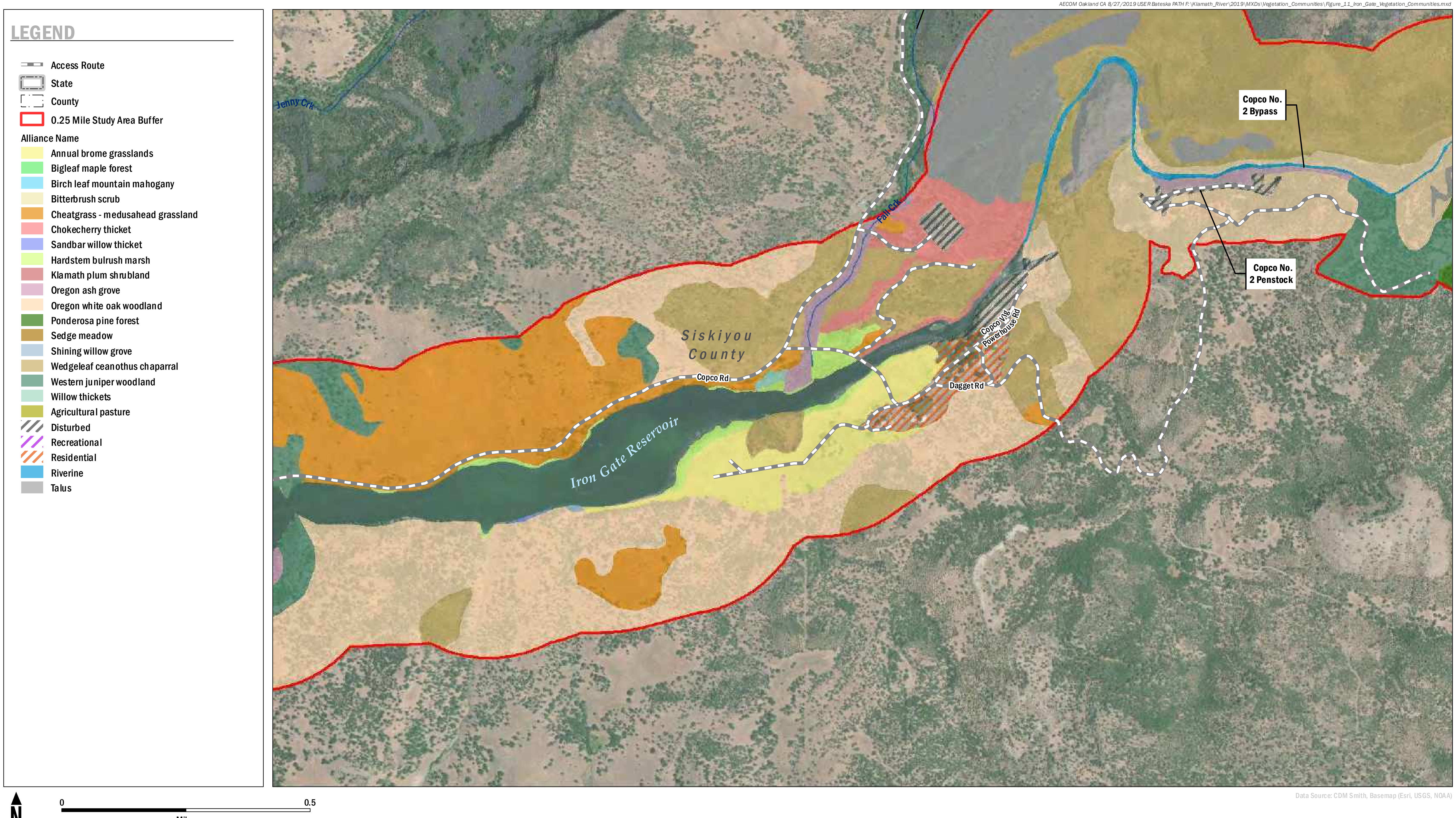


FIGURE 11-4
Vegetation Communities
Iron Gate Reservoir



Klamath River Renewal Corporation

Klamath River Renewal Project

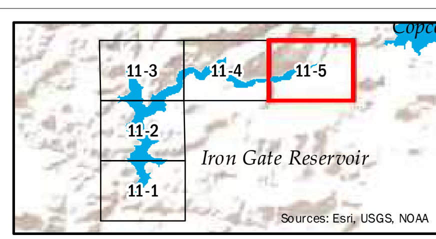
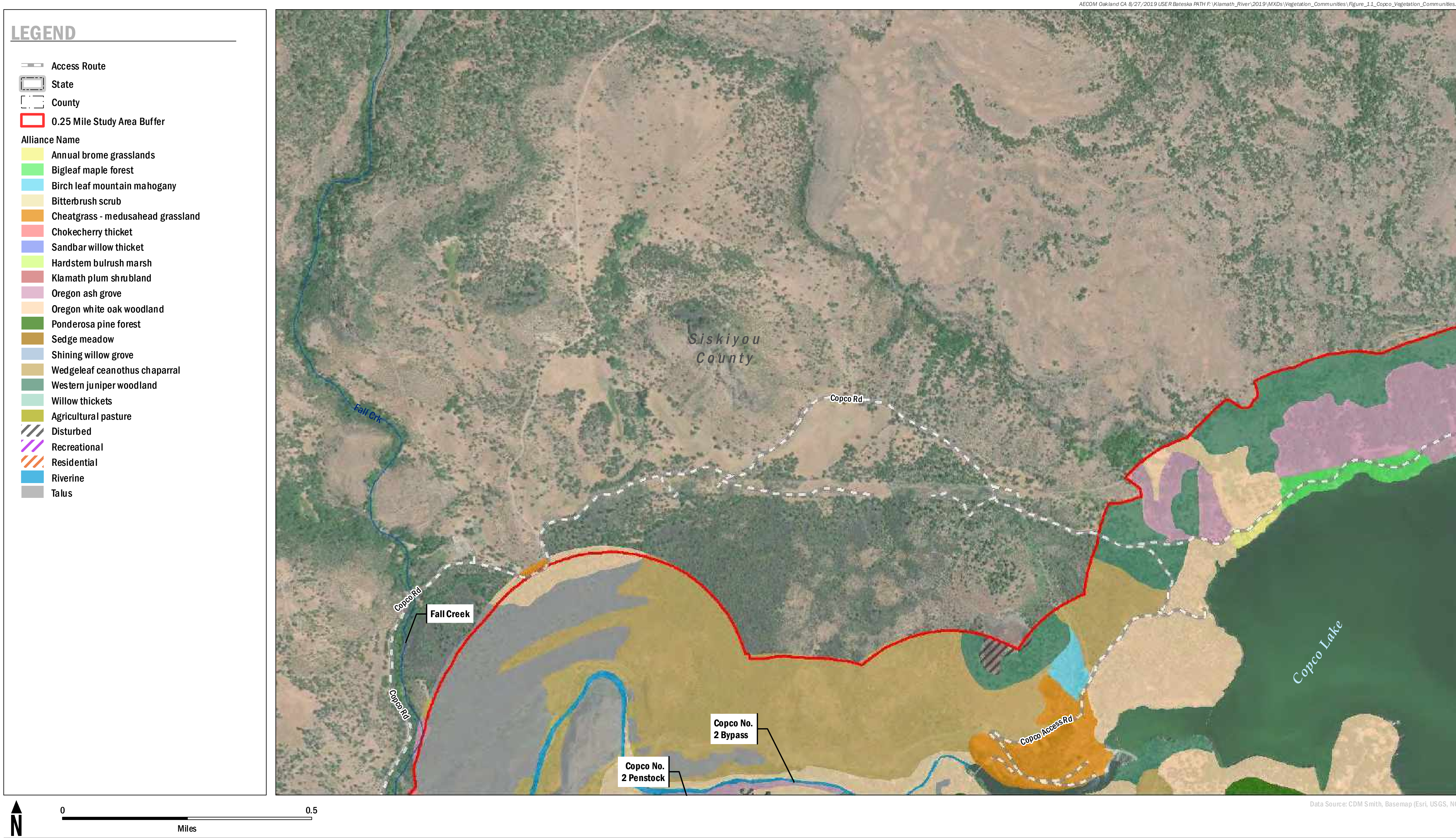


FIGURE 11-5

Vegetation Communities

Iron Gate Reservoir



Klamath River Renewal Corporation
Klamath River Renewal Project

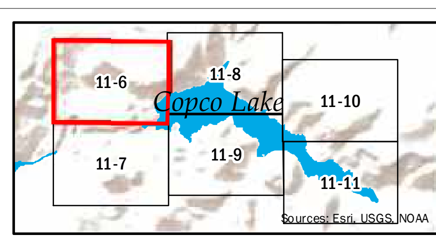


FIGURE 11-6
Vegetation Communities
Copco Lake

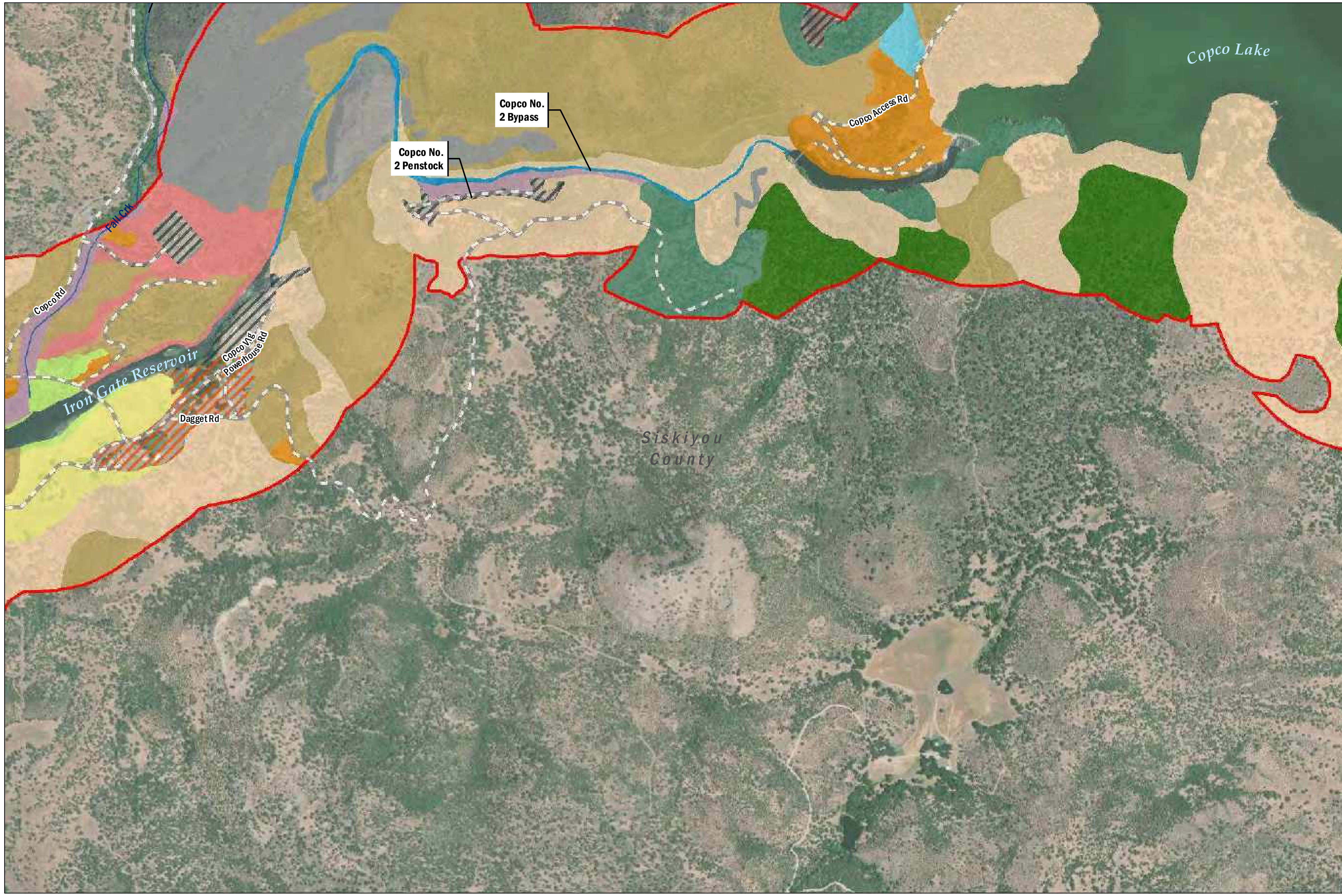
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5 Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

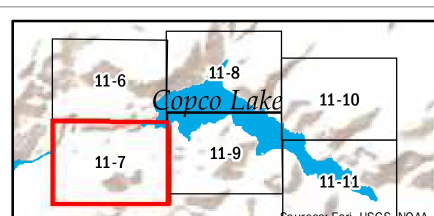


FIGURE 11-7

Vegetation Communities

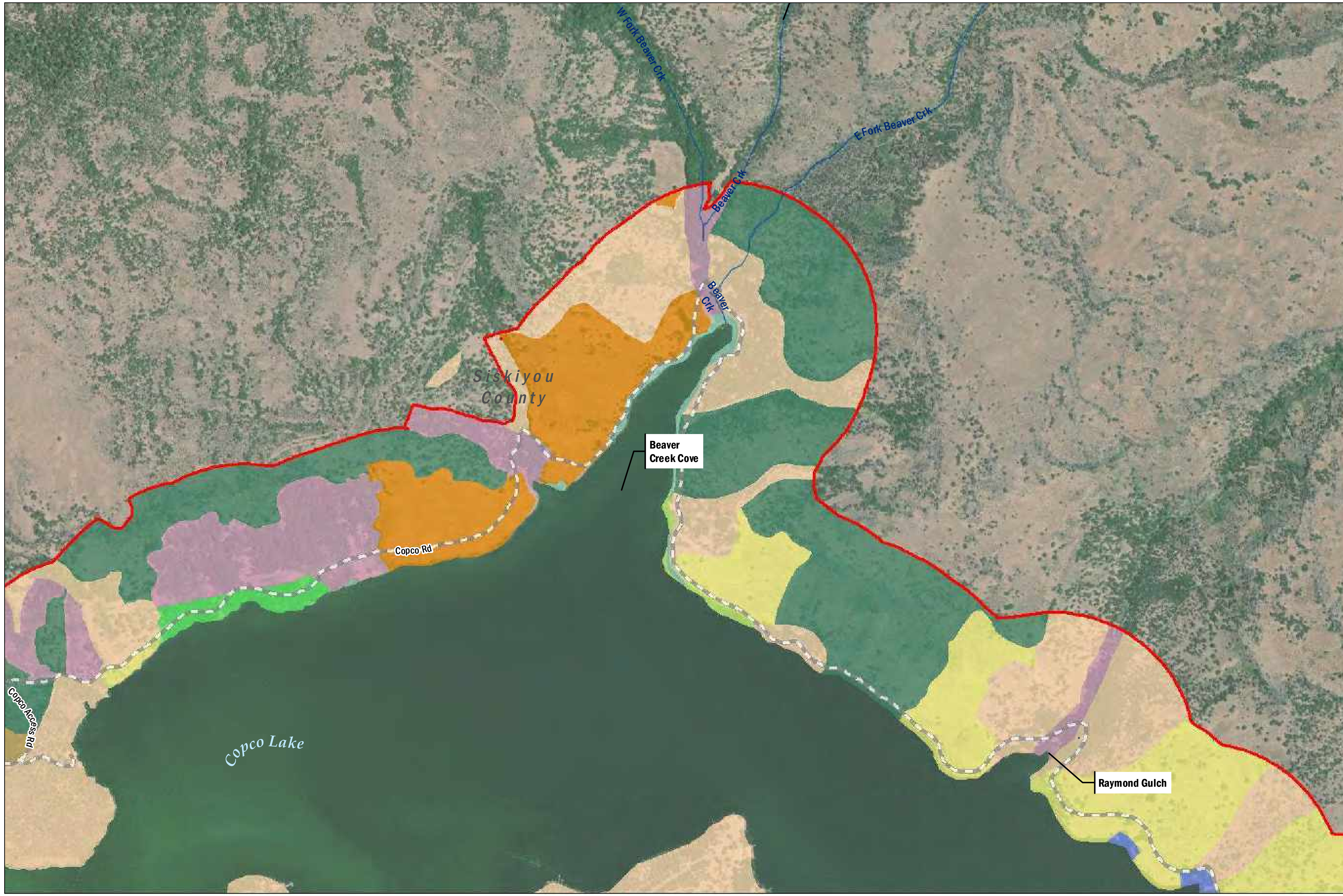
Copco Lake

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name
- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

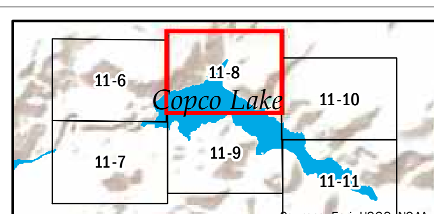


FIGURE 11-8

Vegetation Communities
Copco Lake

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

N

0 0.5

Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation

Klamath River Renewal Project

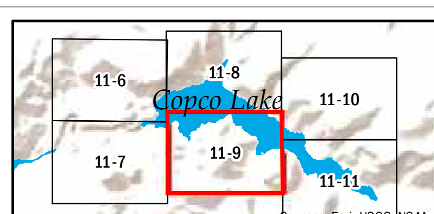


FIGURE 11-9

Vegetation Communities

Copco Lake

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

N

0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

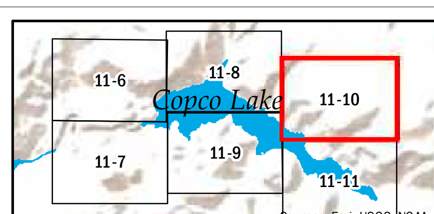


FIGURE 11-10

Vegetation Communities

Copco Lake

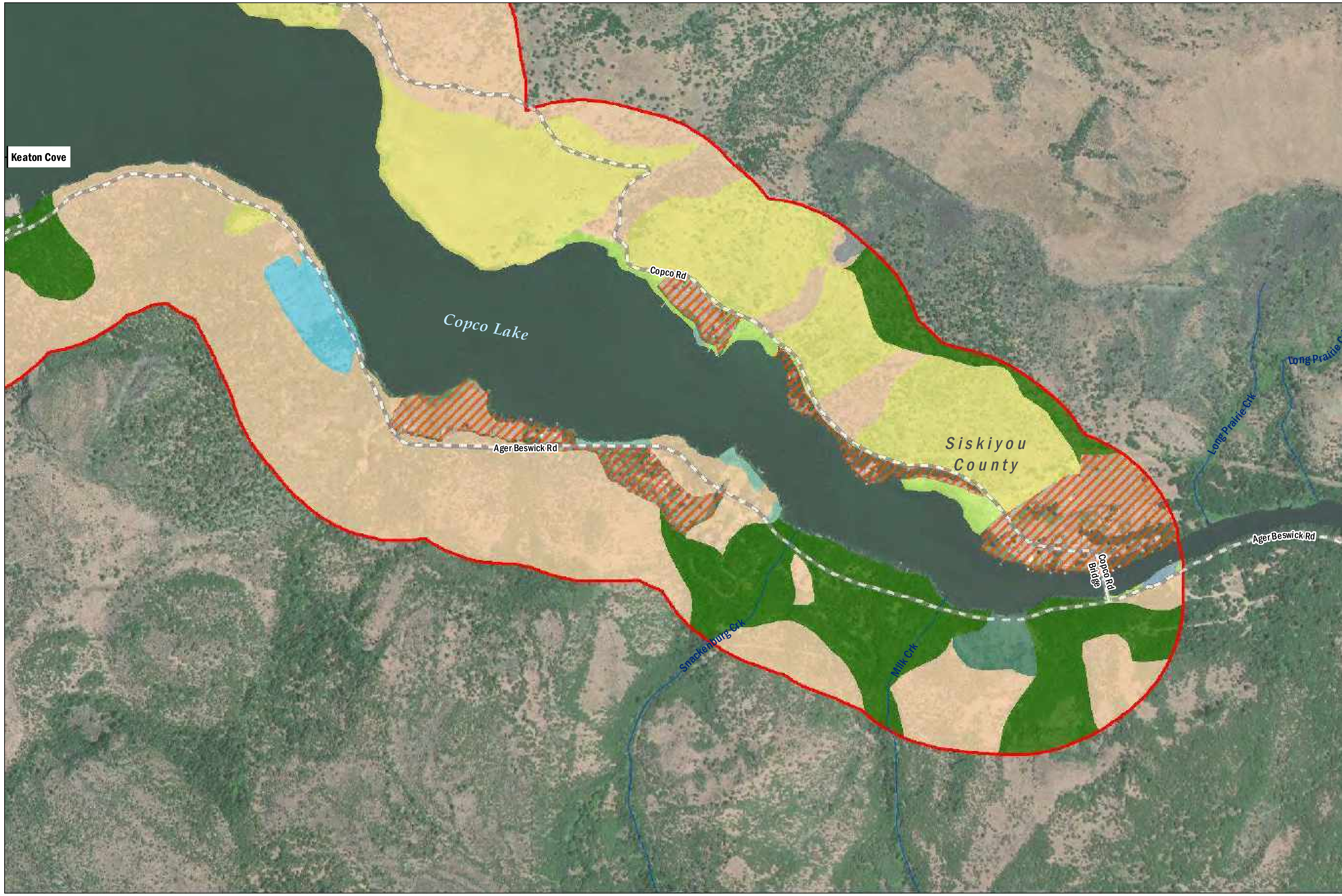
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_Copco_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Sandbar willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5

Miles

Klamath River Renewal Corporation

Klamath River Renewal Project

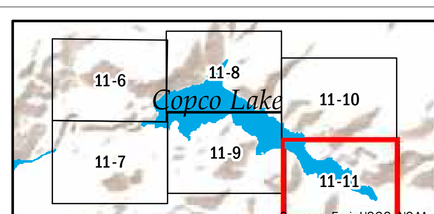


FIGURE 11-11

Vegetation Communities

Copco Lake

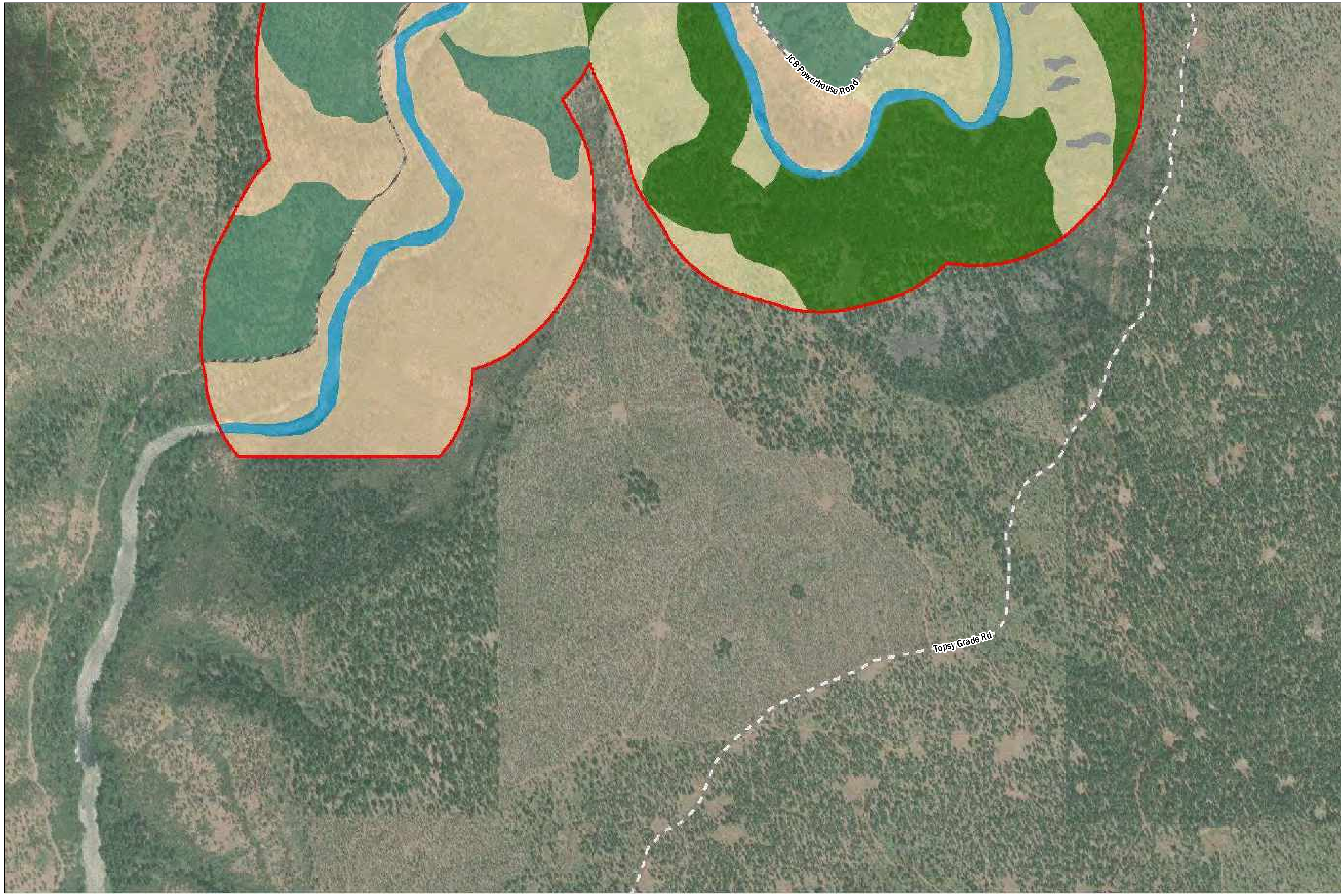
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

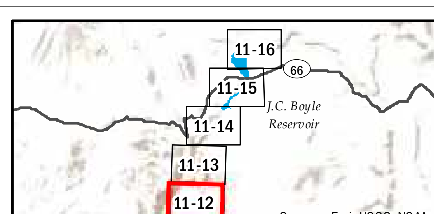


FIGURE 11-12

Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

N

0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

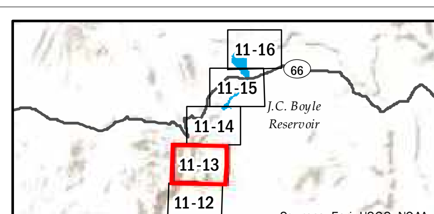


FIGURE 11-13

Vegetation Communities
JC Boyle Reservoir

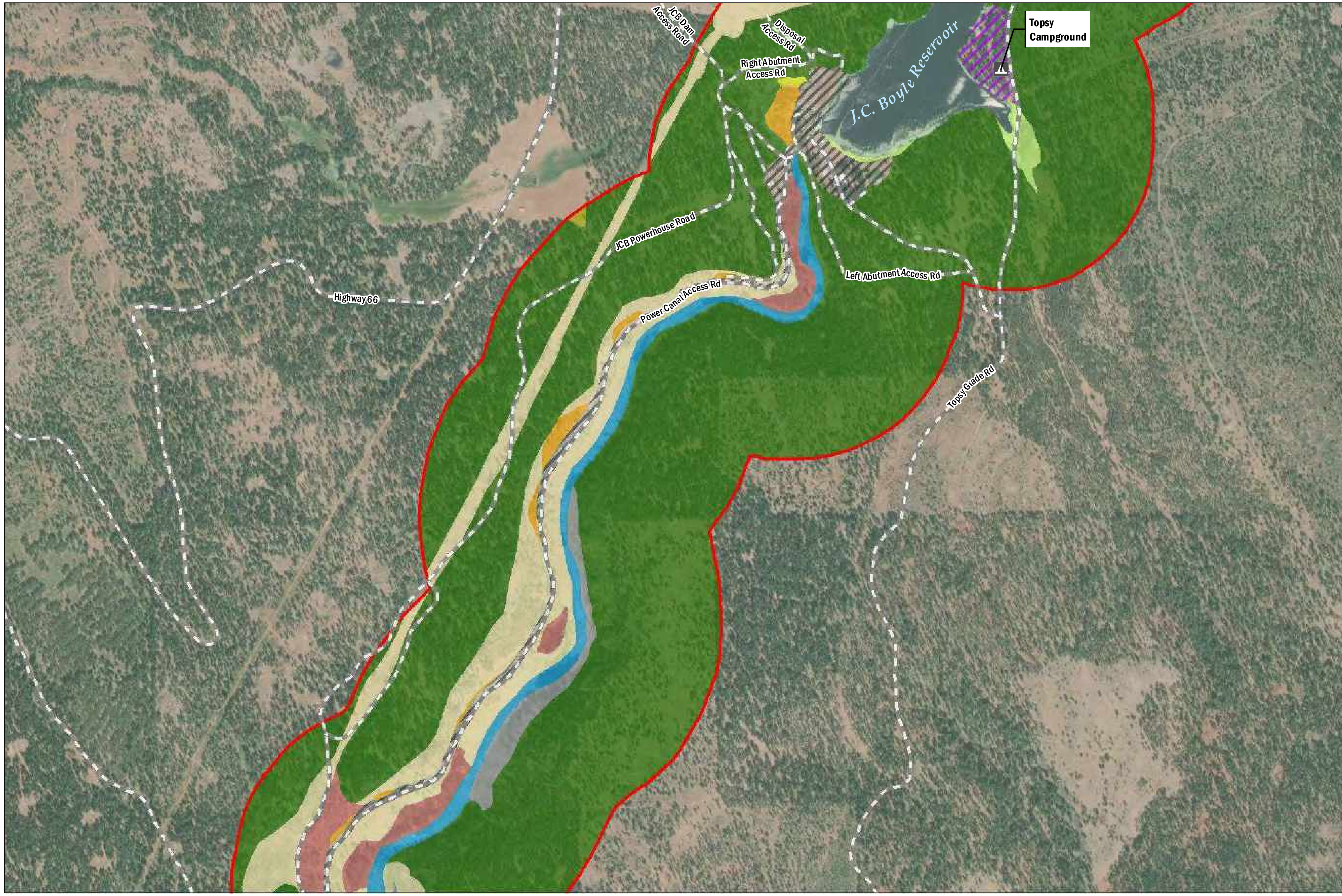
AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

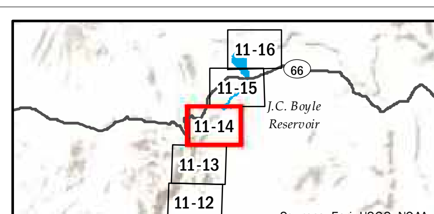


FIGURE 11-14

Vegetation Communities
JC Boyle Reservoir

AECOM Oakland CA 8/27/2019 USER Bateska PATH F:\Klamath_River\2019\MXDs\Vegetation_Communities\Figure_11_JC_Boyle_Vegetation_Communities.mxd

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

N

0 0.5
Miles

Klamath River Renewal Corporation
Klamath River Renewal Project

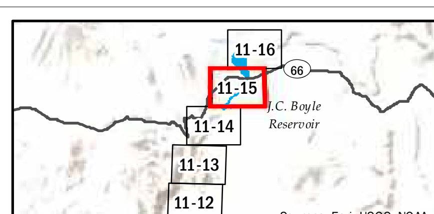


FIGURE 11-15

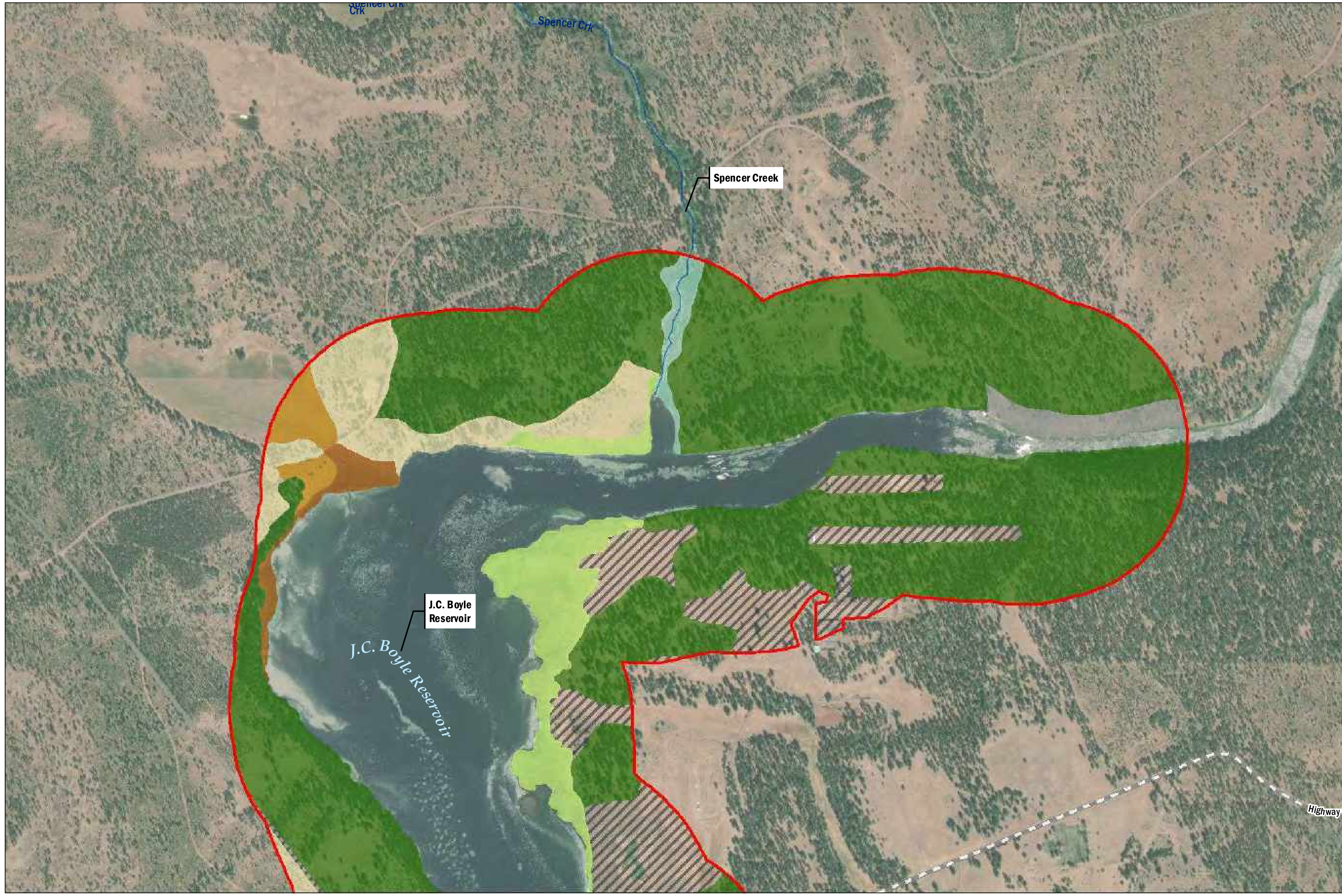
Vegetation Communities
JC Boyle Reservoir

LEGEND

- Access Route
- State
- County
- 0.25 Mile Study Area Buffer

Alliance Name

- Annual brome grasslands
- Bigleaf maple forest
- Birch leaf mountain mahogany
- Bitterbrush scrub
- Cheatgrass - medusahead grassland
- Chokecherry thicket
- Geyer willow thicket
- Hardstem bulrush marsh
- Klamath plum shrubland
- Lemmon's willow
- Oregon ash grove
- Oregon white oak woodland
- Ponderosa pine forest
- Sandbar willow thicket
- Sedge meadow
- Shining willow grove
- Wedgeleaf ceanothus chaparral
- Western juniper woodland
- Willow thickets
- Agricultural pasture
- Disturbed
- Recreational
- Residential
- Riverine
- Talus



N

0 0.5
Miles

Data Source: CDM Smith, Basemap (Esri, USGS, NOAA)

Klamath River Renewal Corporation
Klamath River Renewal Project

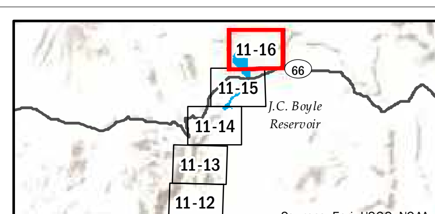


FIGURE 11-16

Vegetation Communities
JC Boyle Reservoir

Appendix C Species Observed during Field Studies

Appendix C
Species Observed During Field Studies

Plant Species Observed

J.C. Boyle Project Area

Scientific Name	Common Name
Achillea millefolium	yarrow
Acmispon americanus	american bird's foot trefoil
Agoseris grandiflora	giant mountain dandelion
Alnus rhombifolia	white alder
Amelanchier alnifolia	service berry
Angelica sp.	angelica
Antennaria argentea	silvery everlasting
Apocynum androsaemifolium	spreading dogbane
Artemesia tridentata	Big sagebrush
Artemisia douglasiana	mugwort
Artemisia tridentata	common sagebrush
Bromus tectorum	cheat grass, downy chess
Carex comosa	bristly sedge
Carex nebrascensis	nebraska sedge
Carex sp.	sedge
Castilleja applegatei	wavy leaf paintbrush
Castilleja miniata	great red paintbrush
Ceanothus prostratus	mahala mats
Cercocarpus betuloides	birch leaf mountain mahogany
Chrysothamnus viscidiflorus	green rabbitbrush
Cirsium vulgare	bullthistle
Clarkia rhomboidea	tongue clarkia
Collinsia parviflora	Maiden blue-eyed Mary
Collomia grandiflora	large flowered collomia
Collomia tinctoria	Yellow-staining Collomia
Convolvulus arvensis	bindweed, orchard morning-glory
Dieteria canescens	hoary aster
Dipsacus fullonum	wild teasel
Drymocallis glandulosa	sticky cinquefoil

Scientific Name	Common Name
Eleocharis sp.	spikerush
Elymus elymoides	squirreltail
Elymus glaucus	blue wildrye
Elymus repens	Common couch grass
Epilobium brachycarpum	willow herb
Epilobium ciliatum	slender willow herb
Ericameria bloomeri	Goldenbush
Ericameria nauseosa	rubber rabbitbrush
Erigeron inornatus	rayless fleabane
Erigeron philadelphicus	philadelphia fleabane
Eriogonum umbellatum	sulphur buckwheat
Eriophyllum lanatum	common woolly sunflower
Erodium cicutarium	Starksbill
Erythranthe guttata	yellow monkey flower
Festuca bromoides	brome fescue
Festuca myuros	rattail sixweeks grass
Fragaria sp.	wild strawberry
Galium boreale	Northern bedstraw
Grindelia sp.	gumweed
Helianthus bolanderi	bolander's sunflower
Holosteum umbellatum	jagged chickweed
Hordeum brachyantherum	meadow barley
Hordeum spp.	Barley
Hypericum perforatum	klamathweed
Iris chrysophylla	Yellow-leaf iris
Iris missouriensis	western blue flag
Juncus balticus	wire rush
Juncus occidentalis	slender juncus
Juncus sp.	rush
Juniperus occidentalis	western juniper
Lathyrus sp.	pea
Lemna sp.	duckweed
Lithospermum ruderale	western gromwell
Lonicera hispidula	pink honeysuckle
Lotus corniculatus	bird's-foot trefoil
Lupinus argenteus	silvery lupine
Madia glomerata	Mountain tarweed
Madia sp.	tarweed
Mahonia aquifolium	Hollyleaved barberry
Mentha pulegium	pennyroyal
Mimulus guttatus	Common monkeyflower
Monardella odoratissima	mountain monardella

Scientific Name	Common Name
Navarettia sp.	navarettia
Oemleria cerasiformis	oso berry
Osmorhiza berteroi	sweetcicely
Penstemon deustus	hot-rock penstemon
Perideridia erythrorhiza	Western yampah
Persicaria sp.	smartweed
Phalaris arundinacea	reed canary grass
Phleum pratense	cultivated timothy
Pinus ponderosa	Ponderosa pine
Plagiobothrys sp.	popcorn flower
Plagiobothyris mollis	Popcorn flower
Plantago lanceolata	english plantain
Poa bulbosa	bulbous blue grass
Poa pratensis	kentucky blue grass
Poa secunda	pine bluegrass
Polygonum aviculare	knotweed, knotgrass
Potentilla anserina ssp. anserina	silver weed cinquefoil
Potentilla glandulosa	Sticky cinquefoil
Potentilla gracilis	Five-finger cinquefoil
Prunella vulgaris var. lanceolata	mountain selfheal
Prunus emarginata	Bittercherry
Prunus subcordata	pacific plum, sierra plum
Prunus virginiana	Chokecherry
Pseudotsuga menziesii	douglas fir
Purshia tridentata	antelope bush
Quercus garryana	oregon oak
Ranunculus occidentalis	Western buttercup
Ribes aureum	Golden currant
Ribes velutinum	Desert gooseberry
Rosa sp.	rose
Rosa woodsii	Woods rose
Rubus parviflorus	thimbleberry
Rumex acetosella	sheep sorrel
Rumex crispus	curly dock
Salix exigua	narrowleaf willow
Salix geyeriana	geyer's willow
Salix lasiandra	pacific willow
Salix lemmonii	lemmon's willow
Salix ligulifolia	strapleaf willow
Scirpus microcarpus	mountain bog bulrush
Senecio hydrophilus	alkali marsh ragwort
Sidalcea sp.	checker mallow

Scientific Name	Common Name
Sisymbrium altissimum	tumble mustard
Sparganium eurycarpum	broadfruit bur reed
Spheonoplectus acutus	Tule bulrush
Spiraea douglasii	douglas spiraea
Stellaria longipes	Long-stalked Starwort
Stipa sp.	needlegrass
Symphiotrichum sp.	aster
Symphoricarpos albus	snowberry
Taraxacum officinale	common dandelion
Tragopogon dubius	yellow salsify
Trifolium repens	white clover
Triteleia hyacinthina	wild hyacinth
Typha latifolia	Broad-leaved cattail
Verbascum blattaria	moth mullein
Verbascum thapsus	woolly mullein
Veronica anagallis-aquatica	water speedwell

Copco Project Area

Scientific Name	Common Name
Acer macrophyllum	big leaf maple
Achillea millefolium	yarrow
Achnatherum occidentale	Western needleglass
Agoseris grandiflora	giant mountain dandelion
Agoseris heterophylla	Mountain dandelion
Alnus rhombifolia	white alder
Alyssum desertorum	desert madwort
Amelanchier alnifolia	service berry
Amsinckia menziesii	common fiddleneck, small-flowered fiddleneck
Amsinckia retrorsa	rigid fiddleneck
Angelica californica	California angelica
Angelica sp.	angelica
Antennaria dimorpha	gray cushion pussytoes
Anthemis cotula	dog fennel
Antirrhinum vexillocalyculatum	wiry snapdragon
Apocynum androsaemifolium	spreading dogbane
Arctium minus	common burdock
Arctostaphylos patula	greenleaf manzanita
Artemesia tridentata	Big sagebrush
Asclepias cordifolia	purple milkweed
Asclepias fascicularis	narrow leaf milkweed

Scientific Name	Common Name
Asclepias speciosa	showy milkweed
Astragalus filipes	basalt milkvetch
Astragalus lentiginosus	Freckled milkvetch
Balsamorhiza sagittata	arrow leaved balsamroot
Berberis aquifolium	mountain grape
Bidens frondosa	sticktight
Bidens spp.	
Blepharipappus scaber	blepharipappus
Boechera sp.	rockcress
Bromus diandrus	ripgut grass
Bromus hordeaceus	Soft brome
Bromus tectorum	cheat grass, downy chess
Calocedrus decurrens	incense cedar
Calochortus greenei	Greene's mariposa lily
Calochortus greenei	Greene's mariposa lily
Calochortus tolmiei	hairy star tulip
Cardamine oligosperma	idaho bittercress
Carex multicaulis	stick sedge
Carex sp.	sedge
Castilleja attenuata	valley tassels
Castilleja tenuis	Indian paintbrush
Ceanothus cuneatus	buck brush
Ceanothus integerrimus	deer brush
Centaurea cyanus	batchelor's button
Centaurea solstitialis	yellow star-thistle
Cerastium glomeratum	sticky mouse-ear chickweed
Cercocarpus betuloides	birch leaf mountain mahogany
Chenopodium sp.	lamb's quarters
Chrysothamnus viscidiflorus	Yellow rabbitbrush
Cichorium intybus	chicory
Cirsium arvense	canada thistle
Cirsium occidentale var. candidissimum	snowy thistle
Cirsium vulgare	bullthistle
Clarkia rhomboidea	tongue clarkia
Clarkia sp.	clarkia
Claytonia perfoliata	miner's lettuce
Claytonia rubra	red stemmed spring beauty
Collinsia parviflora	blue-eyed mary
Collomia grandiflora	large flowered collomia
Conium maculatum	poison hemlock
Convolvulus arvensis	bindweed, orchard morning-glory

Scientific Name	Common Name
Crepis occidentalis	western hawk's beard
Crocidium multicaule	spring gold
Cryptantha	cryptantha
Descurainia sophia	herb sophia
Dichelostemma capitatum	blue dicks
Dipsacus fullonum	wild teasel
Draba verna	whitlow grass
Dysphania botrys	jerusalem oak goosefoot
Echinochloa crus-galli	barnyard grass
Elymus caput-medusae	medusa head
Elymus elymoides	squirreltail
Elymus ponticus	tall wheat grass
Epilobium brachycarpum	willow herb
Epilobium ciliatum	slender willow herb
Epilobium densiflorum	willow herb
Equisetum arvense	common horsetail
Equisetum hyemale	scouringrush horsetail
Ericameria nauseosa	rubber rabbitbrush
Erigeron inornatus	rayless fleabane
Eriogonum nudum var. pubiflorum	hairy flowered buckwheat
Eriogonum vimineum	wicker-stem wild buckwheat
Eriophyllum lanatum	common woolly sunflower
Erodium cicutarium	redstem filaree
Eryngium cf. articulatum	coyote thistle
Erythranthe guttata	yellow monkey flower
Eschscholzia californica	california poppy
Eschsholzia californica	California poppy
Festuca idahoensis	idaho fescue, blue bunchgrass
Fraxinus latifolia	oregon ash
Fritillaria recurva	scarlet fritillary
Galium aparine	cleavers
Garrya fremontii	fremont's silk tassel
Grindelia camporum	gumweed
Helianthus bolanderi	bolander's sunflower
Heracleum maximum	common cowparsnip
Holosteum umbellatum	jagged chickweed
Hordeum jubatum	fox tail barley
Hordeum murinum	wall barley
Hosackia crassifolia	broad leaved lotus
Juncus balticus	wire rush
Juncus occidentalis	slender juncus
Juniperus occidentalis	western juniper

Scientific Name	Common Name
Kickxia elatine	sharp point fluellin
Lactuca serriola	prickly lettuce
Lactuca virosa	poison wild lettuce
Lagophylla ramosissima	common hareleaf
Lamium amplexicaule	henbit
Lathyrus nevadensis	purple peavine
Lemna minor	duckweed
Lemna sp.	duckweed
Lilium pardalinum	california tiger lily
Lilium washingtonianum ssp. purpurascens	purple flowered washington lily
Lilium washingtonianum ssp. purpurascens	purple flowered Washington lily
Lithophragma sp.	woodland stars
Lomatium californicum	celery weed
Lomatium cf. utriculatum	hog fennel
Lomatium dissectum	fern leaved lomatium
Lomatium nudicaule	pestle lomatium
Lomatium triternatum	lewis's lomatium
Lonicera ciliosa	Orange honeysuckle
Lonicera hispidula	pink honeysuckle
Lotus corniculatus	bird's-foot trefoil
Lupinus argenteus	silvery lupine
Lupinus bicolor	miniature lupine
Luzula comosa	Wood rush
Lythrum hyssopifolia	hyssop loosestrife
Madia glomerata	Mountain tarweed
Malva parviflora	cheeseweed, little mallow
Matricaria discoidea	Pineapple weed
Melilotus albus	white sweetclover
Mentzelia laevicaulis	giant blazingstar
Microseris laciniata ssp. detlingii	detling's silverpuffs
Microsteris gracilis	slender phlox
Mimulus guttatus	yellow monkey flower
Muscari botryoides	common grape hyacinth
Nasturtium officinale	watercress
Penstemon deustus	hot-rock penstemon
Penstemon humilis	Low beardtongue
Perideridia	yampah
Persicaria sp.	smartweed
Phacelia heterophylla	varileaf phacelia
Phacelia ramosissima	branching phacelia

Scientific Name	Common Name
Phalaris arundinacea	reed canary grass
Philadelphus lewisii	wild mock orange
Phleum pratense	cultivated timothy
Phlox speciosa	showy phlox
Phoradendron sp.	mistletoe
Pinus ponderosa	ponderosa pine, western yellow pine
Plagiobothrys hispidus	Cascade popcorn flower
Plagiobothrys sp.	popcorn flower
Plantago lanceolata	english plantain
Plantago major	Common plantain
Plectritis macrocera	plectritis
Poa bulbosa	bulbous blue grass
Poa pratensis	kentucky blue grass
Poa secunda	Sandberg bluegrass
Prunus emarginata	bitter cherry
Prunus subcordata	pacific plum, sierra plum
Prunus virginiana	chokecherry
Pseudotsuga menziesii	douglas fir
Quercus garryana	oregon oak
Quercus kelloggii	california black oak
Ranunculus occidentalis	western buttercup
Ranunculus testiculatus	Curveseed butterwort
Rhus aromatica	fragrant sumac
Rhus trilobata	Skunkbush
Ribes sp.	gooseberry
Ribes velutinum	desert gooseberry
Rubus armeniacus	himalayan blackberry
Rubus ursinus	california blackberry
Rumex crispus	curly dock
Rumex salicifolius	willow leaved dock
Salix exigua	narrowleaf willow
Salix lasiandra	pacific willow
Salix scouleriana	scouler's willow
Sambucus nigra ssp. caerulea	blue elderberry
Schoenoplectus acutus var. occidentalis	tule
Sequoiadendron giganteum	redwood
Sisymbrium altissimum	tumble mustard
Sisymbrium altiussimum	Tall tumblemustard
Solidago velutina	threenerve goldenrod
Stellaria media	common chickweed

Scientific Name	Common Name
Symphoricarpos albus	snowberry
Symphoricarpos mollis	Creeping snowberry
Taraxacum officinale	common dandelion
Torilis arvensis	tall sock-destroyer
Toxicodendron diversilobum	western poison oak
Tragopogon dubius	yellow salsify
Tribulus terrestris	puncture vine
Trifolium dubium	Suckling clover
Trifolium hirtum	Rose clover
Urtica dioica	stinging nettle
Verbascum blattaria	moth mullein
Verbascum thapsus	woolly mullein
Verbascum Thapsus	Woolly mullein
Veronica americana	American speedwell
Veronica anagallis-aquatica	water speedwell
Veronica persica	persian speedwell
Vitis californica	california wild grape
Wyethia angustifolia	narrow leaved mule ears

Iron Gate Project Area

Scientific Name	Common Name
Achillea millefolium	yarrow
Acmispon americanus	american bird's foot trefoil
Agoseris grandiflora	giant mountain dandelion
Alnus rhombifolia	white alder
Alyssum desertorum	desert alyssum
Amaranthus blitoides	prostrate pigweed
Amsinckia menziesii	common fiddleneck, small-flowered fiddleneck
Anthemis cotula	dog fennel
Apocynum androsaemifolium	spreading dogbane
Asclepias fascicularis	narrow leaf milkweed
Astragalus filipes	basalt milkvetch
Blepharipappus scaber	blepharipappus
Bromus carinatus	california bromegrass
Bromus laevipes	narrow flowered brome
Bromus tectorum	cheat grass, downy chess
Calochortus greenei	Greene's mariposa lily
Capsella bursa-pastoris	shepherd's purse
Castilleja attenuata	valley tassels
Ceanothus cuneatus	buck brush

Scientific Name	Common Name
Centaurea solstitialis	yellow star-thistle
Cichorium intybus	chicory
Cirsium cymosum var. canovirens	gray-green thistle
Cirsium occidentale var. candidissimum	snowy thistle
Cirsium vulgare	bullthistle
Claytonia perfoliata	miner's lettuce
Collinsia parviflora	blue-eyed mary
Collomia grandiflora	large flowered collomia
Convolvulus arvensis	bindweed, orchard morning-glory
Cornus sericea	american dogwood
Crepis occidentalis	western hawk's beard
Croton setiger	turkey-mullein
Cryptantha	cryptantha
Cuscuta sp.	Dodder
Descurainia sophia	herb sophia
Dichelostemma capitatum	blue dicks
Dieteria canescens	hoary aster
Draba verna	whitlow grass
Eleocharis sp.	spikerush
Elymus caput-medusae	medusa head
Elymus spicatus	blue bunch wheat grass
Epilobium brachycarpum	willow herb
Equisetum hyemale	scouringrush horsetail
Ericameria nauseosa	rubber rabbitbrush
Erigeron sp.	horseweed
Eriodictyon californicum	yerba santa
Eriogonum luteolum var. luteolum	golden buckwheat
Eriogonum nudum var. pubiflorum	hairy flowered buckwheat
Eriogonum umbellatum	sulphur buckwheat
Erodium cicutarium	redstem filaree
Festuca myuros	rattail sixweeks grass
Frasera albicaulis	whitestem frasera
Galium aparine	cleavers
Geum triflorum	old man's beard
Helianthus bolanderi	bolander's sunflower
Hirschfeldia incana	mustard
Holosteum umbellatum	jagged chickweed
Hordeum murinum	wall barley
Hypericum perforatum	klamathweed
Juniperus occidentalis	western juniper
Lagophylla ramosissima	common hareleaf

Scientific Name	Common Name
Leptosiphon sp.	babystars
Lomatium cf. utriculatum	hog fennel
Lomatium triternatum	lewis's lomatium
Lupinus argenteus	silvery lupine
Lupinus microcarpus var. microcarpus	chick lupine
Matricaria discoidea	pineapple weed
Melilotus albus	white sweetclover
Mentha pulegium	pennyroyal
Mentzelia laevicaulis	giant blazingstar
Microseris laciniata ssp. detlingii	detling's silverpuffs
Microsteris gracilis	slender phlox
Mirabilis greenei	Greene's four o'clock
Monardella odoratissima	mountain monardella
Penstemon sp.	penstemon
Perideridia	yampah
Persicaria sp.	smartweed
Phalaris arundinacea	reed canary grass
Phlox speciosa	showy phlox
Phoradendron sp.	mistletoe
Plagiobothrys sp.	popcorn flower
Poa bulbosa	bulbous blue grass
Polygonum aviculare	knotweed, knotgrass
Portulaca oleracea	common purslane
Quercus garryana	oregon oak
Ranunculus testiculatus	tubercled crowfoot
Rhus aromatica	fragrant sumac
Ribes sp.	gooseberry
Salvia dorrii var. incana	fleshy sage
Scutellaria antirrhinoides	snapdragon skullcap
Sisymbrium altissimum	tumble mustard
Symphiotrichum sp.	aster
Symphoricarpos albus	snowberry
Tragopogon dubius	yellow salsify
Trichostema lanceolatum	vinegarweed
Verbascum thapsus	woolly mullein
Veronica persica	persian speedwell
Vitis californica	california wild grape
Xanthium strumarium	cocklebur

Wildlife Species Observed

Common Name	Scientific Name
Birds	
Canada Goose	*Branta canadensis*
Wood Duck	*Aix sponsa*
Gadwall	*Mareca strepera*
Mallard	*Anas platyrhynchos*
Ring-necked Duck	*Aythya collaris*
Lesser Scaup	*Aythya affinis*
Bufflehead	*Bucephala albeola*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Ruddy Duck	*Oxyura jamaicensis*
Mountain Quail	*Oreortyx pictus*
California Quail	*Callipepla californica*
Sooty Grouse	*Dendragapus fuliginosus*
Wild Turkey	*Meleagris gallopavo*
Pied-billed Grebe	*Podilymbus podiceps*
Western Grebe	*Aechmophorus occidentalis*
Clark's Grebe	*Aechmophorus clarkii*
Common loon	*Gavia immer*
Rock Pigeon	*Columba livia*
Eurasian Collared-Dove	*Streptopelia decaocto*
Mourning Dove	*Zenaida macroura*
Common Nighthawk	*Chordeiles minor*
Common Poorwill	*Phalaenoptilus nuttallii*
White-throated Swift	*Aeronautes saxatalis*
Vaux's Swift	*Chaetura vauxi*
Anna's Hummingbird	*Calypte anna*
Allen's Hummingbird	*Selasphorus sasin*
Common Gallinule	*Gallinula galeata*
American Coot	*Fulica americana*
Sandhill Crane	*Antigone canadensis*
Killdeer	*Charadrius vociferus*
Least Sandpiper	*Calidris minutilla*
Spotted Sandpiper	*Actitis macularius*
Greater Yellowlegs	*Tringa melanoleuca*
Western Gull	*Larus occidentalis*
California Gull	*Larus californicus*
Franklin's Gull	*Leucophaeus pipixcan*
Caspian Tern	*Hydroprogne caspia*

Common Name	Scientific Name
Forster's Tern	*Sterna forsteri*
Double-crested Cormorant	*Phalacrocorax auritus*
American White Pelican	*Pelecanus erythrorhynchos*
Great Blue Heron	*Ardea herodias*
Great Egret	*Ardea alba*
Snowy Egret	*Egretta thula*
Green Heron	*Butorides virescens*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Golden Eagle	*Aquila chrysaetos*
Northern Harrier	*Circus hudsonius*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Ferruginous Hawk	*Buteo regalis*
Great Horned Owl	*Bubo virginianus*
Belted Kingfisher	*Megaceryle alcyon*
Lewis's Woodpecker	*Melanerpes lewis*
Acorn Woodpecker	*Melanerpes formicivorus*
Red-breasted Sapsucker	*Sphyrapicus ruber*
Pileated woodpecker	*Drycopus pileatus*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*
Olive-sided Flycatcher	*Contopus cooperi*
Willow Flycatcher	*Empidonax traillii*
Western Wood-Pewee	*Contopus sordidulus*
Dusky Flycatcher	*Empidonax oberholseri*
Pacific-slope Flycatcher	*Empidonax difficilis*
Black Phoebe	*Sayornis nigricans*
Say's Phoebe	*Sayornis saya*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
Hutton's Vireo	*Vireo huttoni*
Cassin's Vireo	*Vireo cassinii*

Common Name	Scientific Name
Warbling Vireo	*Vireo gilvus*
Steller's Jay	*Cyanocitta stelleri*
California Scrub-Jay	*Aphelocoma californica*
Clark's Nutcracker	*Nucifraga columbiana*
Black-billed Magpie	*Pica hudsonia*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Purple martin	*Progne subis*
Black-capped Chickadee	*Poecile atricapillus*
Mountain Chickadee	*Poecile gambeli*
Chestnut-backed Chickadee	*Poecile rufescens*
Oak Titmouse	*Baeolophus inornatus*
Bushtit	*Psaltriparus minimus*
Red-breasted Nuthatch	*Sitta canadensis*
White-breasted Nuthatch	*Sitta carolinensis*
Pygmy Nuthatch	*Sitta pygmaea*
Brown Creeper	*Certhia americana*
Rock Wren	*Salpinctes obsoletus*
Canyon Wren	*Catherpes mexicanus*
House Wren	*Troglodytes aedon*
Bewick's Wren	*Thryomanes bewickii*
American Dipper	*Cinclus mexicanus*
Ruby-crowned Kinglet	*Regulus calendula*
Western Bluebird	*Sialia mexicana*
Mountain Bluebird	*Sialia currucoides*
Townsend's Solitaire	*Myadestes townsendi*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
Northern Mockingbird	*Mimus polyglottos*
European Starling	*Sturnus vulgaris*
Cedar Waxwing	*Bombycilla cedrorum*
Pine Siskin	*Spinus pinus*

Common Name	Scientific Name
House Finch	*Haemorhous mexicanus*
Purple Finch	*Haemorhous purpureus*
Lesser Goldfinch	*Spinus psaltria*
American Goldfinch	*Spinus tristis*
Spotted Towhee	*Pipilo maculatus*
California Towhee	*Melozone crissalis*
Green-tailed Towhee	*Pipilo chlorurus*
Chipping Sparrow	*Spizella passerina*
Lark Sparrow	*Chondestes grammacus*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
Lincoln's Sparrow	*Melospiza lincolnii*
Vesper Sparrow	*Pooecetes gramineus*
Dark-eyed Junco	*Junco hyemalis*
Slate-colored Junco	*Junco h. hyemalis*
Western Meadowlark	*Sturnella neglecta*
Bullock's Oriole	*Icterus bullockii*
Red-winged Blackbird	*Agelaius phoeniceus*
Tricolored Blackbird	*Agelaius tricolor*
Brown-headed Cowbird	*Molothrus ater*
Brewer's Blackbird	*Euphagus cyanocephalus*
Great-tailed Grackle	*Quiscalus mexicanus*
Orange-crowned Warbler	*Oreothlypis celata*
Nashville Warbler	*Oreothlypis ruficapilla*
Common Yellowthroat	*Geothlypis trichas*
Yellow Warbler	*Setophaga petechia*
Yellow-breasted Chat	*Icteria virens*
Black-throated Blue Warbler	*Setophaga caerulescens*
Yellow-rumped Warbler	*Setophaga coronata*
Wilson's Warbler	*Cardellina pusilla*
Western Tanager	*Piranga ludoviciana*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Lazuli Bunting	*Passerina amoena*
Mammals	
California kangaroo rat	*Dipodomys californicus*
California ground squirrel	*Otospermophilus beecheyi*
Golden-mantled ground squirrel	*Callospermophilus lateralis*
Yellow-pine chipmunk	*Tamias amoenus*
Allen's chipmunk	*Neotamias senex*

Common Name	Scientific Name
Antelope squirrel	*Ammospermophilus* sp.
Douglas' squirrel	*Tamiasciurus douglasii*
Western gray squirrel	*Sciurus griseus*
Black-tailed jackrabbit	*Lepus californicus*
Opossum	*Didelphimorphia* sp.
Raccoon	*Procyon lotor*
Yuma myotis	*Myotis yumanensis*
Myotis sp.	*Myotis* sp.
Townsend's western big-eared bat	*Corynorhinus townsendii townsendii*
Coyote	*Canis latrans*
Black-tailed deer	*Odocoileus hemionus*
big-horned sheep	*Ovis canadensis*
Black bear	*Ursus americanus*
Bobcat	*linx rufus*
Mountain lion	*Puma concolor*
American mink	*Neovison vison*
North American beaver	*Castor canadensis*
River otter	*Lontra canadensis*
Feral horse	*Equus ferus*
Cow	*Bos taurus*
Reptiles	
Western pond turtle	*Actinemys marmorata*
Western fence lizard	*Sceloporus occidentalis*
Sagebrush lizard	*Sceloporus graciousus*
California alligator lizard	*Elgaria multicarinata*
California red-sided garter snake	*Thamnophis sirtalis infernalis*
Garter snake	*Thamnophis* sp.
Western yellow-bellied racer	*Coluber constrictor mormon*
Western rattlesnake	*Crotalus oreganus*
California mountain kingsnake	*Lampropeltis zonata*
California kingsnake	*Lampropeltis getula californiae*
Amphibians	
Northern tree frog	*Hyla versicolor*
Sierran treefrog	*Pseudacris sierra*
Western toad	*Anaxyrus boreas*
American bullfrog	*Lithobates catesbeianus*

Appendix C

Bald and Golden Eagle Management Plan Status Update

KLAMATH RIVER RENEWAL CORPORATION

Lower Klamath Project
FERC Project No. 14803

Eagle Conservation Plan Status Update

Klamath River Renewal Corporation
2001 Addison Street, Suite 317
Berkeley, CA 94704

December 2021

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Table of Contents

1.0 Introduction

This Eagle Conservation Plan Status Report is an update on the Renewal Corporation's development of an Eagle Conservation Plan in support of an Eagle Act Permit package submittal to the U.S. Fish and Wildlife Service.

2.0 Context

The Lower Klamath Project (FERC No. 14803) consists of four hydroelectric developments on the Klamath River: J.C. Boyle, Copco No. 1, Copco No. 2, and Iron Gate. Specifically, the reach between J.C. Boyle dam and Iron Gate dam is known as the Hydroelectric Reach. In September of 2016, the Klamath River Renewal Corporation (Renewal Corporation) filed an *Application for Surrender of License for Major Project and Removal of Project Works,* FERC Project Nos. 2082-063 & 14803-001 (License Surrender). The Renewal Corporation filed the License Surrender Application as the dam removal entity for the purpose of implementing the Klamath River Hydroelectric Settlement (KHSA). In November of 2020, the Renewal Corporation filed its Definite Decommissioning Plan (DDP) as Exhibits A-1 and A-2 to its Amended License Surrender Application (ALSA). The DDP is the Renewal Corporation's comprehensive plan to physically remove the Lower Klamath Project and achieve a free-flowing condition and volitional fish passage, site remediation and restoration, and avoidance of adverse downstream impacts (Proposed Action). The Limits of Work is a geographic area that encompasses dam removal and restoration related activities associated with the Proposed Action. The Limits of Work may extend beyond the Federal Energy Regulatory Commission (Commission) boundary associated with the Lower Klamath Project where specifically noted.

The Proposed Action includes the deconstruction of the J.C. Boyle Dam and Powerhouse, Copco No. 1 Dam and Powerhouse, Copco No. 2 Dam and Powerhouse, and Iron Gate Dam and Powerhouse, as well as associated features. Associated features vary by development, but generally include powerhouse intake structures, embankments and sidewalls, penstocks and supports, decks, piers, gatehouses, fish ladders and holding facilities, pipes and pipe cradles, spillway gates and structures, diversion control structures, aprons, sills, tailrace channels, footbridges, powerhouse equipment, distribution lines, transmission lines, switchyards, original cofferdams, portions of the Iron Gate Fish Hatchery, residential facilities, and warehouses. Facility removal will be completed within an approximately 20-month period.

Since the Proposed Action may result in otherwise prohibited disturbance to bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) within the Limits of Work, the Renewal Corporation has retained the services of a number of subject matter experts to support its preparation of an Eagle Act Permit package pursuant to the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) (Eagle Act) and the regulations for nonpurposeful (incidental) take of bald and golden eagles (Title 50 part 22.26 of the Code of Federal Regulations). The subject matter experts retained by the Renewal Corporation include the Water and Power Law Group PC, Perkins Coie, Camas Environmental Regulatory Professionals

(Camas), Resource Environmental Solutions (RES) and PJD Environmental Consulting Inc. The subject matter experts retained by the Renewal Corporation have significant professional expertise and experience with respect to both bald and golden eagle natural history and the Eagle Act regulations.

2.1 Consultation

In October 2019, the Renewal Corporation held an in-person “kick-off” meeting with the USFWS, the federal agency that administers the Eagle Act. Attendees for the Renewal Corporation included RES and Camas. Attendees for the USFWS included the USFWS Regional Office leadership, Eagle Act permitting coordinators and external affairs staff. The meeting took place in Sacramento, California and focused on the Eagle Act permitting process and timeline. During the meeting, the Renewal Corporation gave a detailed summary of the Proposed Action, eagle data collected to date, and the expected process and timeline for completing the Eagle Act Permit application.

Following the kick-off meeting, the Renewal Corporation has had one in-person meeting, seven phone calls, ten Zoom meetings and one MS Teams meeting with USFWS staff and/or Department of Interior Solicitors. An Exhibit A will be included in the Eagle Conservation Plan showing a complete list of the meetings and calls between the Renewal Corporation and USFWS. The close coordination between the Renewal Corporation and the USFWS has, among other things, provided a foundation for data organization and scientific methodology that has helped facilitate the preparation of the Eagle Act Permit application.

A draft Eagle Conservation Plan (ECP), the foundational component of an Eagle Act Permit package, was submitted to the USFWS on September 14, 2021. Following the submittal, the USFWS provided comprehensive comments and guidance regarding both the ECP and completion of the Eagle Act Permit package. In addition, the USFWS held a Zoom meeting with the Renewal Corporation on November 15 and 23, 2021 to discuss impact analysis approach and overall proposed action mitigation value. As of the date of this submittal, the Renewal Corporation is incorporating the USFWS’ guidance and comments into the draft ECP and expects to submit a revised ECP and Eagle Act Permit application to the USFWS in December 2021.

Appendix D

Consultation Record

Consultation Record

Terrestrial and Wildlife Management Plan			
Sub-Plan	**Agency**	**Date of Agency Plan Submittal**	**Agency Comments Received Date**
Oregon Terrestrial and Wildlife Management Plan	Oregon Department of Environmental Quality	January 8, 2021 August 2, 2021	January 26, 2021 August 24, 2021
	Oregon Department of Fish and Wildlife	January 8, 2021 August 2, 2021	January 26, 2021 August 24, 2021
	California State Water Resource Control Board	August 2, 2021	No Comments Received
	California Department of Fish and Wildlife	August 2, 2021	August 16, 2021
	United States Fish and Wildlife Service	August 2, 2021	August 13, 2021/ August 24, 2021
	Bureau of Land Management – Klamath Falls	Unknown August 2, 2021	April 15, 2021 No Comments Received
California Terrestrial and Wildlife Management Plan	United States Fish and Wildlife Service	January 8, 2021 August 2, 2021	No Comments Received
	California State Water Resource Control Board	January 8, 2021 August 2, 2021	No Comments Received
	California Department of Fish and Wildlife	January 8, 2021 August 2, 2021	January 22, 2021 April 16, 2021 August 16 & 19, 2021
	Bureau of Land Management – Redding	August 2, 2021	No Comments Received
Eagle Conservation Plan	United States Fish and Wildlife Service	September 14, 2021	October 28, 2021