
State of California
The Resources Agency
Department of Water Resources

**SP-T2 PROJECT EFFECTS ON
SPECIAL STATUS WILDLIFE SPECIES
DRAFT FINAL REPORT**

**Oroville Facilities Relicensing
FERC Project No. 2100**



JANUARY 2004

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January 23, 2004

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REPORT SUMMARY

Twelve wildlife species protected under the State or Federal Endangered Species acts may occur in the project vicinity. Potentially suitable habitat for all of these species is present within the study area. Breeding populations of peregrine falcon, bank swallow, bald eagle, valley elderberry longhorn beetle, and Swainson's hawk were documented within the study area. No habitat use by wintering greater sandhill cranes was observed. However, minor amounts of marginally suitable wintering habitat were identified within the study area. Potentially suitable habitat was also identified within the study area for western yellow-billed cuckoo, California red-legged frog, giant garter snake, Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

During the course of the relicensing studies potential project related impacts were identified related to bank swallow and bald eagle. These potential impacts required consultation under the State and/or Federal Endangered Species acts and modification of current and future actions to minimize or avoid impacts. Further, opportunities for improved habitat management related to peregrine falcon, valley elderberry longhorn beetle, Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp were identified. These opportunities are being explored through the informal consultation process and may result in modification of maintenance practices or recreational use under the current FERC license.

This study provides the information necessary to evaluate the potential impacts associated with relicensing Resource Actions on State or federally "listed" species within the biological and environmental assessment processes.

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1.0 INTRODUCTION

1.1 Background Information

This study provides

- information for Endangered Species Act consultations with the US Fish and Wildlife Service (USFWS) and California Department of Fish and Game (DFG)
- information for federal agencies review of the project under Section 4(e) of the Federal Power Act
- a description of existing conditions for and potential project effects on special status species as required by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

Numerous special status species have the potential to occur within the immediate project vicinity (Table 1.1.1). These species include animals classified as threatened or endangered under the State or Federal Endangered Species acts, U.S. Forest Service (USFS) sensitive species, U. S. Bureau of Land Management (BLM) sensitive species, State and Federal Species of Concern, federal migratory non-game birds of management concern, and State fully protected species.

Several State and/or Federally “listed” species have historically been documented within the project boundary including bald eagle, peregrine falcon, greater sandhill crane, and valley elderberry longhorn beetle. Other “listed” species are known to occur in the project vicinity including bank swallow, western yellow-billed cuckoo, Swainson’s hawk, California red-legged frog, giant garter snake, and vernal pool fairy shrimp.

This Draft Final Report summarizes the evaluation of potential project affects on special status species. Specifically covered are the results related to

- Task 1 Bank Swallow Habitat and Population Surveys
- Task 2 Greater Sandhill Crane Habitat and Population Surveys
- Task 3 Peregrine Falcon Habitat and Population Surveys
- Task 4 Swainson’s Hawk Habitat and Population Surveys
- Task 5 Western Yellow-Billed Cuckoo Habitat and Population Surveys
- Task 6 Valley Elderberry Longhorn Beetle Habitat Survey
- Task 7 California Red-Legged Frog Habitat Survey
- Task 8 Giant Garter Snake Habitat Survey
- Task 9 Bald Eagle Habitat and Population Surveys

Table 1.1.1 Special Status Wildlife Species With The Potential to Occur In The Immediate Project Vicinity

Species	Status	Species	Status
American bittern	MN	white-faced ibis	CS, MN
American peregrine falcon	SE, MN, FP	yellow-breasted chat	CS, MN
American white pelican	CS	California red-legged frog	FT, CS, P
bank swallow	ST	foothill yellow-legged frog	CS, FC, FS, P
Barrow's goldeneye	CS	western spadefoot toad	CS, FC, BS, P
Bell's sage sparrow	CS, MN	California horned lizard	CS, FC, BS, P
black swift	CS, MN	giant garter snake	FT, ST, P
black tern	CS, MN	northwestern pond turtle	CS, FC, FS, P
black-crowned night heron	BS	western mastiff bat	CS, FC, BS
black-shouldered kite	MN, FP	fringed myotis bat	FC, BS
Brewer's sparrow	MN	long-eared myotis bat	CS, FC,
California gull	CS	long-legged myotis bat	FC, BS
California horned lark	CS	Marysville kangaroo rat	CS, FC, BS
California spotted owl	CS, FS, BS	Occult little brown bat	CS, FC, BS
common loon	CS, MN	pale big-eared bat	CS, FC, FS, BS
Cooper's hawk	CS	pallid bat	CS, FS, BS
double-crested cormorant	CS	river otter	FS
ferruginous hawk	CS, MN, BS	San Joaquin pocket mouse	CS, FC, BS
golden eagle	CS, FP	small-footed myotis bat	FC, BS
grasshopper sparrow	MN	spotted bat	CS, FC, BS
greater sandhill crane	ST, FP	Townsend's western big-eared bat	CS, FC, FS, BS
Lawrence's goldfinch	MN	western red bat	FS
loggerhead shrike	CS, MN	Yuma myotis bat	FC, BS
long-billed curlew	CS, MN	amphibious caddisfly	FC
long-eared owl	CS	Conservancy fairy shrimp	FE
merlin	CS	longhorn fairy shrimp	FE
northern goshawk	CS, MN, FS	Sacramento anthicid beetle	FC
northern harrier	CS	Sacramento valley tiger beetle	FC
osprey	CS	valley elderberry longhorn beetle	FT
prairie falcon	CS	vernal pool fairy shrimp	FT
purple marten	CS	vernal pool tadpole shrimp	FE
sharp-shinned hawk	CS	KEY	
short-eared owl	CS, MN	SE=State Endangered	
snowy egret	CS	ST=State Threatened	
southern bald eagle	SE, FT, FP	FE=Federal Endangered	
Swainson's hawk	ST	FT=Federal Threatened	
tricolored blackbird	CS, MN, BS	P=California Protected	
Vaux's swift	CS, MN	FS=Forest Service Sensitive	
western burrowing owl	CS, MN, BS	FP=California Fully Protected Species	
western least bittern	CS, MN	BS=Bureau of Land Management Sensitive	
willow flycatcher	SE, FS	CS=California Species of Special Concern	
yellow warbler	CS	FC=Federal Species of Concern	
western yellow-billed cuckoo	SE, MN	MN=Migratory Non-game Bird of Management Concern	

- Task 11 State and Federal Species of Concern
- Task 12 Vernal Pool Invertebrates Habitat Surveys

This Study Plan Report differs from most other relicensing reports in that potential impacts to species protected under the State and Federal Endangered Species acts require prompt reporting and consultation with the appropriate regulatory agency (DFG, USFWS, or both). Potential impacts under the State or Federal Endangered Species acts are current license issues rather than relicensing issues.

Public release of specific location information related to species protected under the State and Federal Endangered Species acts can result in increased risk to the species (disturbance, harassment, shooting, and illegal collection). For this reason, location information is treated in a general rather than a specific manner in this report.

1.1.1 Statutory/Regulatory Requirements

The Federal Endangered Species Act (FESA) requires evaluation and consultation to avoid take of listed species or adverse modification of their habitats. The California Endangered Species Act (CESA) also requires assessment of the proposed project's impact on listed species. Both CEQA and NEPA require assessment of a project's impacts on State and federally listed species and their habitats. In addition, CEQA requires an evaluation of species that have not been listed under the FESA or CESA, but meet the definition of threatened and endangered as listed in the CESA. CEQA requires evaluation of project impacts on State and Federal Species of Concern. Both federal land management agencies have an obligation to insure that project operations do not adversely affect sensitive species on federal lands. NEPA procedures and the policies of the BLM and USFS require that information about any sensitive species regardless of status is available to public officials and citizens before decisions are made and before actions are taken.

1.2 DESCRIPTION OF FACILITIES

The Oroville Facilities were developed as part of the State Water Project (SWP), a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. The main purpose of the SWP is to store and distribute water to supplement the needs of urban and agricultural water users in northern California, the San Francisco Bay area, the San Joaquin Valley, and southern California. The Oroville Facilities are also operated for flood management, power generation, to improve water quality in the Delta, provide recreation, and enhance fish and wildlife.

FERC Project No. 2100 encompasses 41,100 acres and includes Oroville Dam and Reservoir, three power plants (Hyatt Pumping-Generating Plant, Thermalito Diversion Dam Power Plant, and Thermalito Pumping-Generating Plant), Thermalito Diversion Dam, the Feather River Fish Hatchery and Fish Barrier Dam, Thermalito Power Canal,

Oroville Wildlife Area (OWA), Thermalito Forebay and Forebay Dam, Thermalito Afterbay and Afterbay Dam, and transmission lines, as well as a number of recreational facilities. An overview of these facilities is provided on Figure 1.2-1. The Oroville Dam, along with two small saddle dams, impounds Lake Oroville, a 3.5-million-acre-feet (maf) capacity storage reservoir with a surface area of 15,810 acres at its normal maximum operating level.

The hydroelectric facilities have a combined licensed generating capacity of about 762 megawatts (MW). The Hyatt Pumping-Generating Plant is the largest of the three power plants with a capacity of 645 MW. Water from the six-unit underground power plant (three conventional generating and three pumping-generating units) is discharged through two tunnels into the Feather River just downstream of Oroville Dam. The plant has a generating and pumping flow capacity of 16,950 cfs and 5,610 cfs, respectively. Other generation facilities include the 3-MW Thermalito Diversion Dam Power Plant and the 114-MW Thermalito Pumping-Generating Plant.

Thermalito Diversion Dam, four miles downstream of the Oroville Dam, creates a tail water pool for the Hyatt Pumping-Generating Plant and is used to divert water to the Thermalito Power Canal. The Thermalito Diversion Dam Power Plant is a 3-MW power plant located on the left abutment of the Diversion Dam. The power plant releases a maximum of 615 cubic feet per second (cfs) of water into the river.

The Power Canal is a 10,000-foot-long channel designed to convey generating flows of 16,900 cfs to the Thermalito Forebay and pump-back flows to the Hyatt Pumping-Generating Plant. The Thermalito Forebay is an off-stream regulating reservoir for the 114-MW Thermalito Pumping-Generating Plant. The Thermalito Pumping-Generating Plant is designed to operate in tandem with the Hyatt Pumping-Generating Plant and has generating and pump-back flow capacities of 17,400 cfs and 9,120 cfs, respectively. When in generating mode, the Thermalito Pumping-Generating Plant discharges into the Thermalito Afterbay, which is contained by a 42,000-foot-long earth-fill dam. The Afterbay is used to release water into the Feather River downstream of the Oroville Facilities, helps regulate the power system, provides storage for pump-back operations, and provides recreational opportunities. Several local irrigation districts receive water from the Afterbay.

The Feather River Fish Barrier Dam is downstream of the Thermalito Diversion Dam and immediately upstream of the Feather River Fish Hatchery. The flow over the dam maintains fish habitat in the low-flow channel of the Feather River between the dam and the Afterbay outlet, and provides attraction flow for the hatchery. The hatchery was intended to compensate for spawning grounds lost to returning salmon and steelhead trout from the construction of Oroville Dam. The hatchery can accommodate 15,000 to 20,000 adult fish annually.

The Oroville Facilities support a wide variety of recreational opportunities. They include: boating (several types), fishing (several types), fully developed and primitive camping (including boat-in and floating sites), picnicking, swimming, horseback riding, hiking, off-road bicycle riding, wildlife watching, hunting, and visitor information sites with cultural and informational displays about the developed facilities and the natural environment. There are major recreation facilities at Loafer Creek, Bidwell Canyon, the Spillway, North and South Thermalito Forebay, and Lime Saddle. Lake Oroville has two full-service marinas, five car-top boat launch ramps, ten floating campsites, and seven dispersed floating toilets. There are also recreation facilities at the Visitor Center and the OWA.

The OWA comprises approximately 11,000-acres west of Oroville that is managed for wildlife habitat and recreational activities. It includes the Thermalito Afterbay and surrounding lands (approximately 6,000 acres) along with 5,000 acres adjoining the Feather River. The 5,000 acre area straddles 12 miles of the Feather River, which includes willow and cottonwood lined ponds, islands, and channels. Recreation areas include dispersed recreation (hunting, fishing, and bird watching), plus recreation at developed sites, including Monument Hill day use area, model airplane grounds, three boat launches on the Afterbay and two on the river, and two primitive camping areas. DFG's habitat enhancement program includes a wood duck nest-box program and dry land farming for nesting cover and improved wildlife forage. Limited gravel extraction also occurs in a number of locations.

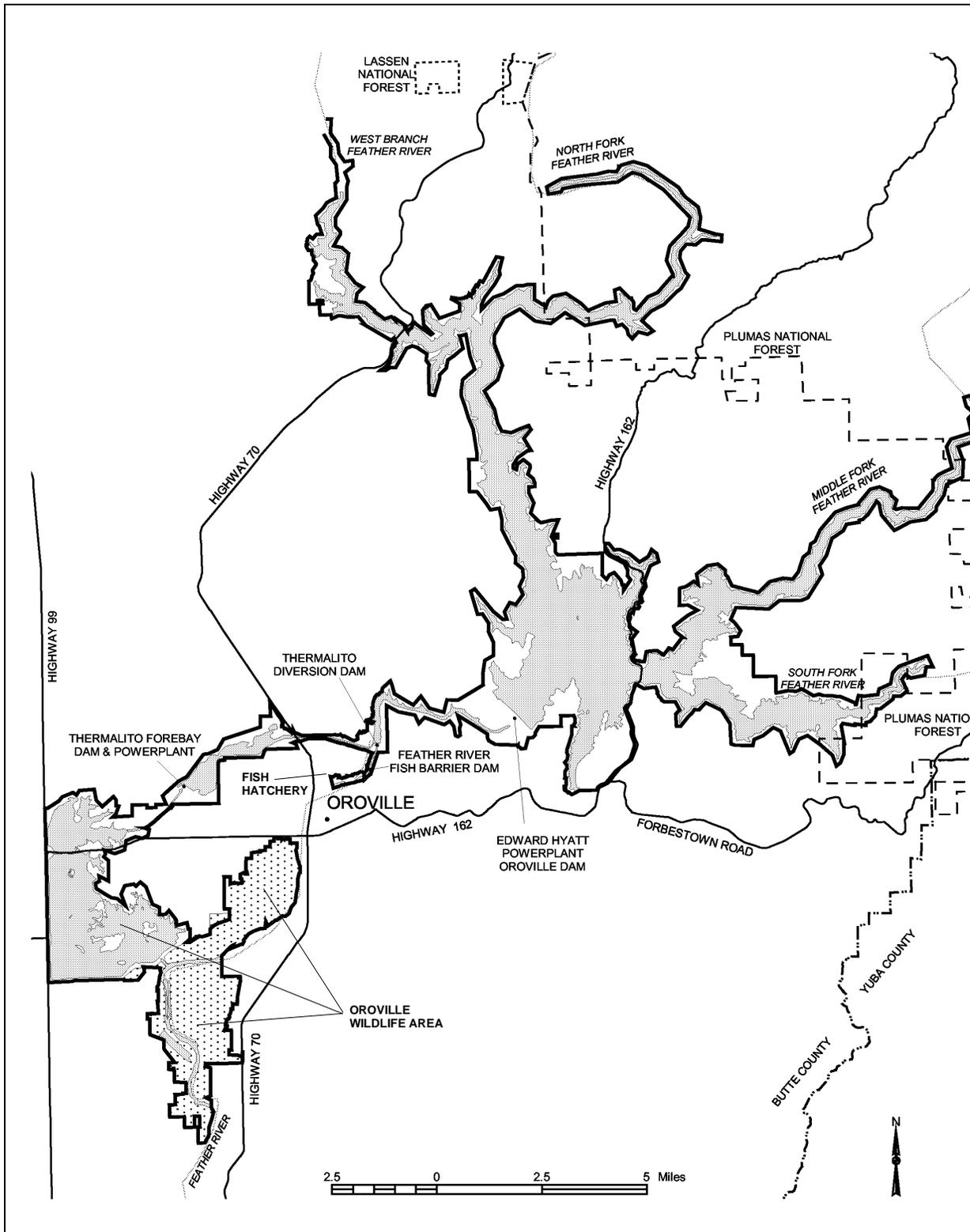


Figure 1.2-1. Oroville Facilities FERC Project Boundary

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1.3 CURRENT OPERATIONAL CONSTRAINTS

Operation of the Oroville Facilities varies seasonally, weekly and hourly, depending on hydrology and the objectives DWR is trying to meet. Typically, releases to the Feather River are managed to conserve water while meeting a variety of water delivery requirements, including flow, temperature, fisheries, recreation, diversion and water quality. Lake Oroville stores winter and spring runoff for release to the Feather River as necessary for project purposes. Meeting the water supply objectives of the SWP has always been the primary consideration for determining Oroville Facilities operation (within the regulatory constraints specified for flood control, in-stream fisheries, and downstream uses). Power production is scheduled within the boundaries specified by the water operations criteria noted above. Annual operations planning are conducted for multi-year carry over. The current methodology is to retain half of the Lake Oroville storage above a specific level for subsequent years. Currently, that level has been established at 1,000,000 acre-feet (af); however, this does not limit draw down of the reservoir below that level. If hydrology is drier than expected or requirements greater than expected, additional water would be released from Lake Oroville. The operations plan is updated regularly to reflect changes in hydrology and downstream operations. Typically, Lake Oroville is filled to its maximum annual level of up to 900 feet above mean sea level (msl) in June and then can be lowered as necessary to meet downstream requirements, to its minimum level in December or January. During drier years, the lake may be drawn down more and may not fill to the desired levels the following spring. Project operations are directly constrained by downstream operational constraints and flood management criteria as described below.

1.3.1 Downstream Operation

An August 1983 agreement between DWR and DFG entitled, "Agreement Concerning the Operation of the Oroville Division of the State Water Project for Management of Fish & Wildlife," sets criteria and objectives for flow and temperatures in the low flow channel and the reach of the Feather River between Thermalito Afterbay and Verona. This agreement: (1) establishes minimum flows between Thermalito Afterbay Outlet and Verona which vary by water year type; (2) requires flow changes under 2,500 cfs to be reduced by no more than 200 cfs during any 24-hour period, except for flood management, failures, etc.; (3) requires flow stability during the peak of the fall-run Chinook spawning season; and (4) sets an objective of suitable temperature conditions during the fall months for salmon and during the later spring/summer for shad and striped bass.

1.3.1.1 Instream Flow Requirements

The Oroville Facilities are operated to meet minimum flows in the Lower Feather River as established by the 1983 agreement (see above). The agreement specifies that Oroville Facilities release a minimum of 600 cfs into the Feather River from the

Thermalito Diversion Dam for fisheries purposes. This is the total volume of flows from the diversion dam outlet, diversion dam power plant, and the Feather River Fish Hatchery pipeline.

Generally, the instream flow requirements below Thermalito Afterbay are 1,700 cfs from October through March, and 1,000 cfs from April through September. However, if runoff for the previous April through July period is less than 1,942,000 af (i.e., the 1911-1960 mean unimpaired runoff near Oroville), the minimum flow can be reduced to 1,200 cfs from October to February, and 1,000 cfs for March. A maximum flow of 2,500 cfs is maintained from October 15 through November 30 to prevent spawning in overbank areas that might become de-watered.

1.3.1.2 Temperature Requirements

The Diversion Pool provides the water supply for the Feather River Fish Hatchery. The hatchery objectives are 52°F for September, 51°F for October and November, 55°F for December through March, 51°F for April through May 15, 55°F for last half of May, 56°F for June 1-15, 60°F for June 16 through August 15, and 58°F for August 16-31. A temperature range of plus or minus 4°F is allowed for objectives, April through November.

There are several temperature objectives for the Feather River downstream of the Afterbay Outlet. During the fall months, after September 15, the temperatures must be suitable for fall-run Chinook. From May through August, they must be suitable for shad, striped bass, and other warmwater fish.

NOAA Fisheries has also established an explicit criterion for steelhead trout and spring-run Chinook salmon. Memorialized in a biological opinion on the effects of the Central Valley Project and SWP on Central Valley spring-run Chinook and steelhead as a reasonable and prudent measure; DWR is required to control water temperature at Feather River mile 61.6 (Robinson's Riffle in the low-flow channel) from June 1 through September 30. This measure requires water temperatures less than or equal to 65°F on a daily average. The requirement is not intended to preclude pump-back operations at the Oroville Facilities needed to assist the State of California with supplying energy during periods when the California Independent System Operator (ISO) anticipates a Stage 2 or higher alert.

The hatchery and river water temperature objectives sometimes conflict with temperatures desired by agricultural diverters. Under existing agreements, DWR provides water for the Feather River Service Area (FRSA) contractors. The contractors claim a need for warmer water during spring and summer for rice germination and growth (i.e., 65°F from approximately April through mid May, and 59°F during the remainder of the growing season). There is no obligation for DWR to meet the rice

water temperature goals. However, to the extent practical, DWR does use its operational flexibility to accommodate the FRSA contractor's temperature goals.

1.3.1.3 Water Diversions

Monthly irrigation diversions of up to 190,000 af (July 2002) are made from the Thermalito Complex during the May through August irrigation season. Total annual entitlement of the Butte and Sutter County agricultural users is approximately 1 maf. After meeting these local demands, flows into the lower Feather River continue into the Sacramento River and into the Sacramento-San Joaquin Delta. In the northwestern portion of the Delta, water is pumped into the North Bay Aqueduct. In the south Delta, water is diverted into Clifton Court Forebay where the water is stored until it is pumped into the California Aqueduct.

1.3.1.4 Water Quality

Flows through the Delta are maintained to meet Bay-Delta water quality standards arising from DWR's water rights permits. These standards are designed to meet several water quality objectives such as salinity, Delta outflow, river flows, and export limits. The purpose of these objectives is to attain the highest water quality, which is reasonable, considering all demands being made on the Bay-Delta waters. In particular, they protect a wide range of fish and wildlife including Chinook salmon, Delta smelt, striped bass, and the habitat of estuarine-dependent species.

1.3.2 Flood Management

The Oroville Facilities are an integral component of the flood management system for the Sacramento Valley. During the wintertime, the Oroville Facilities are operated under flood control requirements specified by the U.S. Army Corps of Engineers (USACE). Under these requirements, Lake Oroville is operated to maintain up to 750,000 af of storage space to allow for the capture of significant inflows. Flood control releases are based on the release schedule in the flood control diagram or the emergency spillway release diagram prepared by the USACE, whichever requires the greater release. Decisions regarding such releases are made in consultation with the USACE.

The flood control requirements are designed for multiple use of reservoir space. During times when flood management space is not required to accomplish flood management objectives, the reservoir space can be used for storing water. From October through March, the maximum allowable storage limit (point at which specific flood release would have to be made) varies from about 2.8 to 3.2 maf to ensure adequate space in Lake Oroville to handle flood flows. The actual encroachment demarcation is based on a wetness index, computed from accumulated basin precipitation. This allows higher levels in the reservoir when the prevailing hydrology is dry while maintaining adequate flood protection. When the wetness index is high in the basin (i.e., wetness in the

watershed above Lake Oroville), the flood management space required is at its greatest amount to provide the necessary flood protection. From April through June, the maximum allowable storage limit is increased as the flooding potential decreases, which allows capture of the higher spring flows for use later in the year. During September, the maximum allowable storage decreases again to prepare for the next flood season. During flood events, actual storage may encroach into the flood reservation zone to prevent or minimize downstream flooding along the Feather River.

2.0 NEED FOR STUDY

This study is needed to comply with State and federal regulations. FESA requires evaluation and consultation to avoid take of listed species or adverse modification of their habitats. CESA also requires assessment of the proposed project's impact on listed species. CEQA and NEPA require assessment of a project's impacts on State and federally listed species and their habitats. In addition CEQA requires an evaluation of species that have not been listed under the FESA or CESA, but meet the definition of threatened and endangered as listed in the CESA. CEQA requires evaluation of project impacts on State and Federal Species of Concern. Both federal land management agencies have an obligation to insure that project operations do not adversely affect sensitive species on federal lands. NEPA procedures and the policies of the BLMt and USFS require that information about any sensitive species is available to public officials and citizens before decisions are made and before actions are taken.

With the exception of bald eagle and peregrine falcon, relatively little was known about the occurrence or distribution of State and federally listed species within the project vicinity prior to the current study. These study results are needed to provide sufficient information for these consultations and CEQA/NEPA documentation.

3.0 STUDY OBJECTIVE(S)

The objective of this Study Plan is to:

- Provide information on special status species occurrence and distribution within the study area
- Provide information on potential project effects to special status species for use in the environmental assessment process including the consultation processes with State and federal wildlife management agencies
- Provide information that can be used to identify opportunities for habitat protection and enhancement for special status species

3.1. **Settlement Agreement**

Protection, mitigation, and enhancement measures related to species formally listed under the State or Federal Endangered Species acts are current license issues rather than relicensing issues. However, this study does provide information which could be used to develop Resource Actions for the enhancement of habitats of California species of special concern, Federal Species of Concern, California fully protected species, California protected species, sensitive species, USFS sensitive species, and federal migratory non-game birds of management concern.

4.0 STUDY AREA

The study area for this investigation includes the FERC Project Boundary and the lower Feather River downstream from the Fish Barrier Dam to the Sacramento River. The scope of study for each species focused on areas of suitable habitat within the study area that may be affected by project activities. The study area extends beyond the FERC boundary for evaluation of effects related to the analysis of project operations.

Scope of surveys for BLM and USFS sensitive and USFS special interest species included federal lands within the study area, adjacent federal lands outside the study area, and State lands within the study area adjacent to federal lands.

Study scope related to federal and State species of concern will be restricted to the FERC boundary and downstream along the Feather River floodplain from the Fish Barrier Dam to the confluence with the Sacramento River. Information related to project impacts on these species was collected during the course of other relicensing survey efforts.

5.0 BANK SWALLOW HABITAT AND POPULATION SURVEYS

5.1 INTRODUCTION

The State of California listed the bank swallow as a threatened species during March 1989. This species is not federally listed.

Bank swallows historically bred in suitable habitat throughout lowland California (Grinnell and Miller 1944). The bank swallow's range in California has decreased significantly with only four known populations south of San Francisco Bay and about 70 percent of the statewide population currently occurs along the Sacramento and Feather rivers (DFG 1992b).

Bank swallows occur in riverine habitat and require a sandy or silty vertical bluff or riverbank for nesting (Zeiner and others 1990a). Floods or very high flows are required to create and maintain the eroded banks favored by this migratory, colonial species. The principal threat to bank swallows is bank protection projects (Remsen 1978). Over 133 miles of rip-rap bank protection have been installed along the Sacramento River since 1960 (Jones and Stokes Associates 1987).

5.2 METHODS

All potential bank swallow habitat within the project boundary was surveyed during the breeding season during both 2002 and 2003. A primarily boat-based survey of the Feather River between Oroville Dam and Verona was completed during June 2002 and again during June 2003. All active and inactive colonies were mapped and the total number of burrows in each colony was tabulated. Further, the distance from the waterline to the lowest active burrow in each colony was estimated during 2003. These data were used to model potential flow related impacts within the breeding season.

Survey results were presented to DFG for preliminary review and comment upon survey and modeling completion. Other spot locations of potential habitat were also evaluated on Lake Oroville and within the Oroville Wildlife Area (away from the Feather River channel). All colony locations detected were mapped using GPS technology. Only burrows at least 6 inches in depth with dark entrances as viewed from distances of 10 to 30 yards were included in the census.

5.3 RESULTS

2002 survey results indicate that eight active bank swallow colonies were present on the Feather River between Oroville Dam and Verona totaling 2,274 burrows (Table 5.3.1). An additional six inactive colonies were also identified within the same survey area totaling 813 burrows. None of the potential habitat identified on Lake Oroville or within the Oroville Wildlife Area was occupied during the 2002 breeding season. No occupied bank swallow habitat was identified within the project boundary (Figure 5.3.1 and 5.3.2).

Table 5.3.1 Bank swallow occurrence on the Feather River below Oroville Dam during 2002 and 2003.

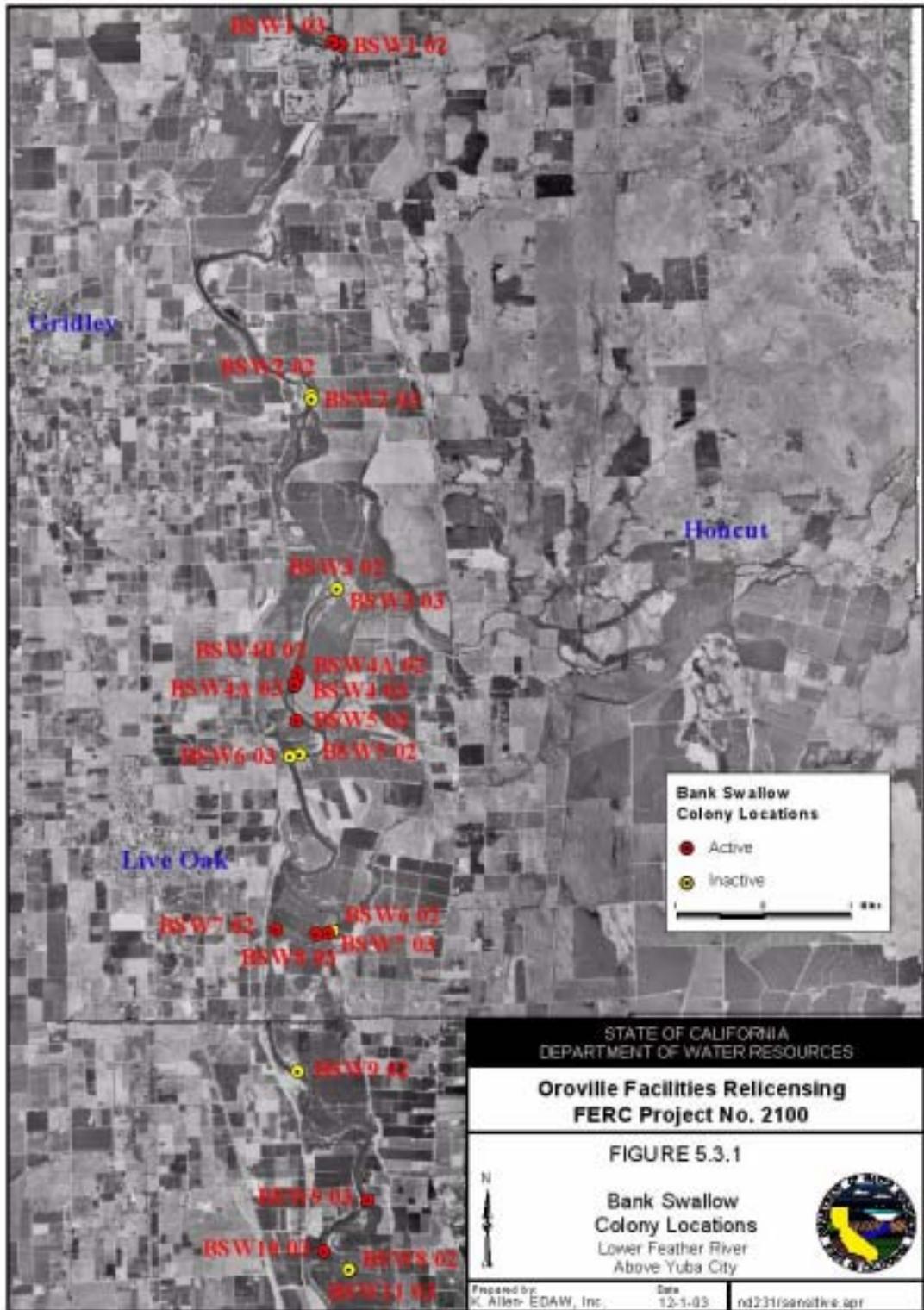
Category	2002	2003
# of colonies	14	18
# of active colonies	8	15
Total # of burrows	3,087	4,179
Total # of active burrows	2,274	3,594

The 2003 survey results documented the presence fifteen bank swallow colonies on the Feather River between Oroville Dam and Verona totaling 3,594 burrows (Figure 5.3.2). Three inactive colonies were identified totally 585 burrows. None of the potential habitat identified on Lake Oroville or within the Oroville Wildlife Area was occupied during the 2003 breeding season.

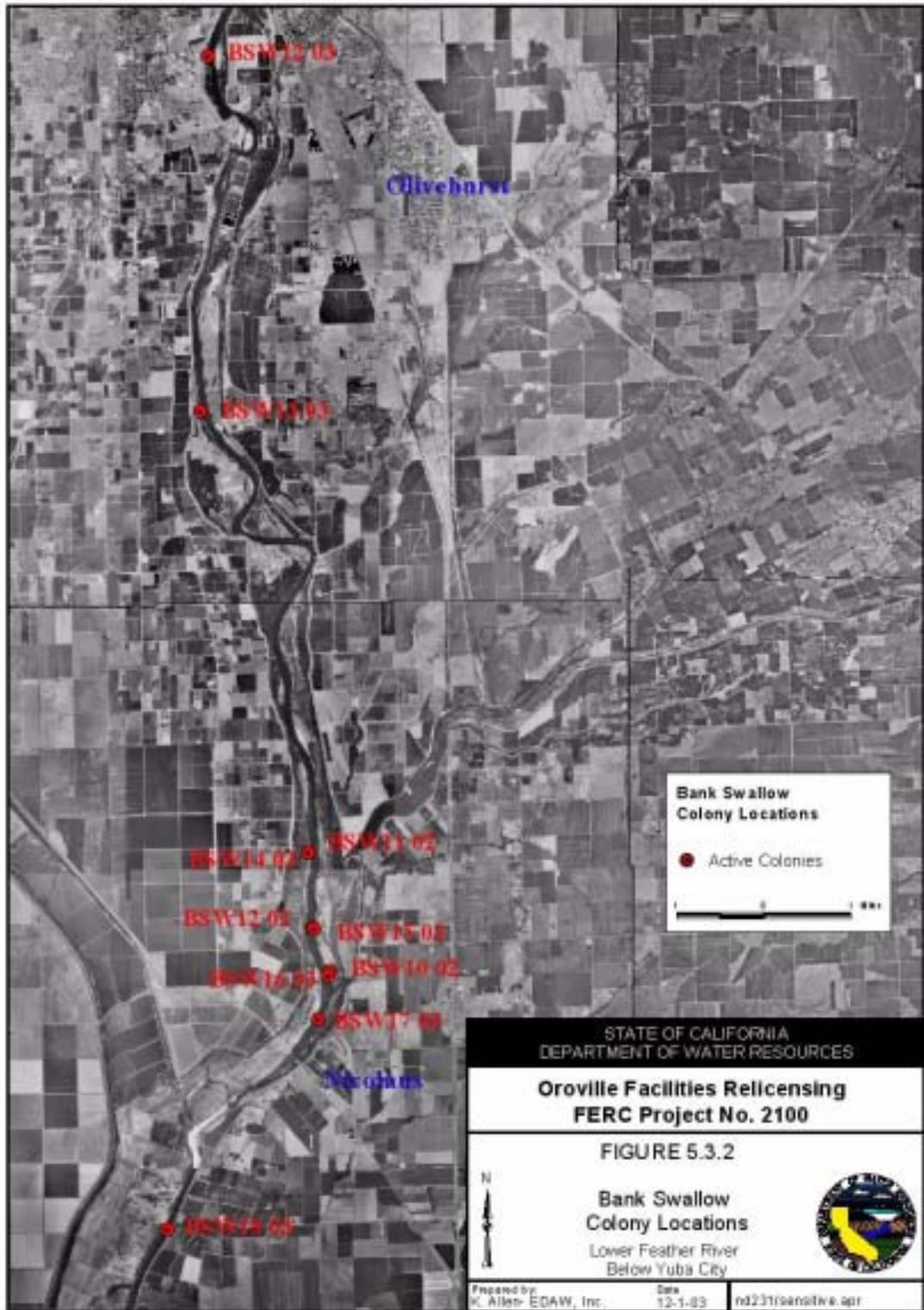
In 2003, inactive colony size ranged from 43 to 375 burrows. Active colony size ranged from 18 burrows to 1,164 burrows. An occupancy rate of 47 percent was applied to the number of burrows in active colonies yielding an adult population estimate of 1,056 pairs in 2002 and 1,689 pairs in 2003. No bank swallow colonies were identified within the project boundary.

During 2002, five colonies were identified between the downstream project boundary and Marysville with an estimated population of 890 pairs. An additional three colonies were present between Marysville and Verona with an estimated adult population of 166 pairs. In 2003, nine colonies were present between the project boundary and Marysville with an estimated adult population of 1,411 pairs. Six additional colonies were present downstream from Marysville with an estimated adult population of 278 pairs.

No estimate of productivity was included as part of this study. Comparison with historic nest survey information indicate that the 2002 and 2003 bank swallow nesting populations on the Feather River is substantially lower than those collected in 1987 which identified seven colonies ranging in size from 140 to 2,000 burrows (Humphrey and Garrison 1987). During the 1988 survey, 18 colonies containing a total of 6,592 burrows were recorded (Laymon and others 1988). The 1987 and 1988 DFG surveys are the most recent previous complete surveys of the entire Feather River.



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5.4 EVALUATION OF PROJECT EFFECTS

No bank swallow nesting was observed within the project boundary during 2002 or 2003. Limited potential may exist to create bank swallow nesting habitat within portions of the project boundary. As no bank swallows were present in the project boundary, evaluation of project effects are restricted to project related alteration to the timing and magnitude of streamflow on the Feather River below the project boundary.

Bank swallows are dependent upon vertical eroded banks of a proper friable soil composition. High flows and associated bank erosion can result in both positive and negative impacts on this species. Flooding causes bank erosion and soil deposition. Flooding produces the vertical banks, while soil deposition is the source of the friable soils needed for burrow construction. Lack of high flows results in decreased slope of eroded banks and subsequent abandonment by nesting bank swallows. However, bank erosion resulting from flooding can also result in the need for managed flows, bank protection, and channelization which reduce the quantity and quality of bank swallow habitat.

Bank erosion does occur at certain locations on the Feather River at flows as low as 10,000 cfs. However, major flows in the 20,000 to 30,000 cfs range are generally required to create and maintain significant amounts of bank swallow nesting habitat. Data analyses indicate that flows > 20,000 cfs have occurred post-project on the average at 2.3 year return intervals (Gridley Gage data). Further, data analyses indicate that flows greater than 20,000 cfs occurred pre-project on the average of 11 times per year (Oroville gage data). Project related flood control activities have substantially altered the reoccurrence interval of flows in the 20,000 cfs range. Further, the reoccurrence interval of major flows (>than 50,000 cfs) have also been substantially reduced from a 1.9 year return interval pre-project (Oroville gage data) to a 3.1 year return interval post-project (Gridley gage data). These channel forming events can create extensive amounts of high quality bank swallow habitat for a period of time.

Streamflow is not the only factor controlling bank erosion rates. Bank saturation, length of the period of high flow, bank vegetative cover, channel geometry, soil composition, geologic structure, and bank protection measures can also influence erosion rates. Bank protection measures are currently in place along 11.2 percent of the Feather River channel below the Thermalito Outfall (preliminary data SP-G2). In general, these bank protection measures prevent bank erosion at flows up to bank full events. Both bank protection measures and project related flood control activities serve to limit/restrict the quantity and quality of bank swallow habitat created and maintained. To date, DWR has not proposed to alter water supply or power generation operations from current baseline operations and must operate the facilities in accordance with the rules and regulations outlined by the USACE during flood control events. Any future Resource Actions which alter the timing, magnitude, or duration of project releases from current baseline conditions will be evaluated as to affects on bank swallows. This evaluation

will include any streamflow-related fisheries improvement actions required for ESA compliance.

The project also has the potential to impact bank swallow production through water supply operations. Bank swallows are a migratory species and begin to arrive back on the Feather River in late March and early April, with the bulk of the birds arriving in late April and early May (Garrison 2001). Juveniles begin to disperse from the nest colonies around mid-June and early July and are absent from the nest colonies by mid-July (Garrison 2001). Excluding uncommon spring emergency flood releases, project operations historically have resulted in relatively low flows (<2500 cfs releases) during April, May and June. However, water supply deliveries frequently result in much higher releases during July (>9,000 cfs). Historic data indicate that July pre-project flows of 9,000 cfs did not occur. However, pre-project flows in this range occurred about 14 percent of the time during June.

To evaluate the potential for project-related inundation of pre-fledged nestlings, stage discharge relationships were modeled for each 2003 active colony locations. These stage/discharge relationships were compared to the elevation of the lowest burrow in each colony with a 1-foot buffer (Figures 5.4.1 through 5.4.15). This modeling indicates that current project operations during early July have the potential to inundate at least a portion of nine of the fifteen active colonies while pre-fledged young are potentially present within the nest burrows. However, it is currently unknown if any of the potentially inundated burrows contained nestlings at the time of inundation. This modeling does not take into account potential losses related to flow induced bank collapse or saturation which could also potentially induce losses of adults and pre-fledged young. Based on these modeling results, DWR initiated consultation with DFG to further evaluate potential losses and develop avoidance measures.

Figure 5.4.1. Stage/Discharge Relationship at Bank Swallow Colony 1 - RM 54.95

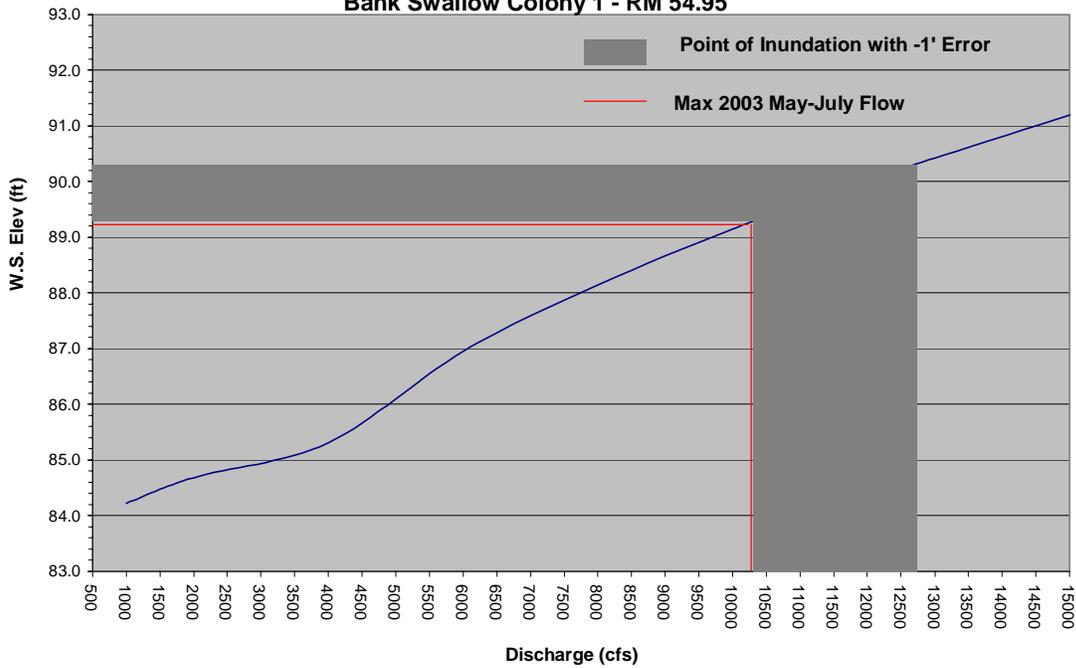


Figure 5.4.2 Stage/Discharge Relationship at Bank Swallow Colony 4- RM 45.05

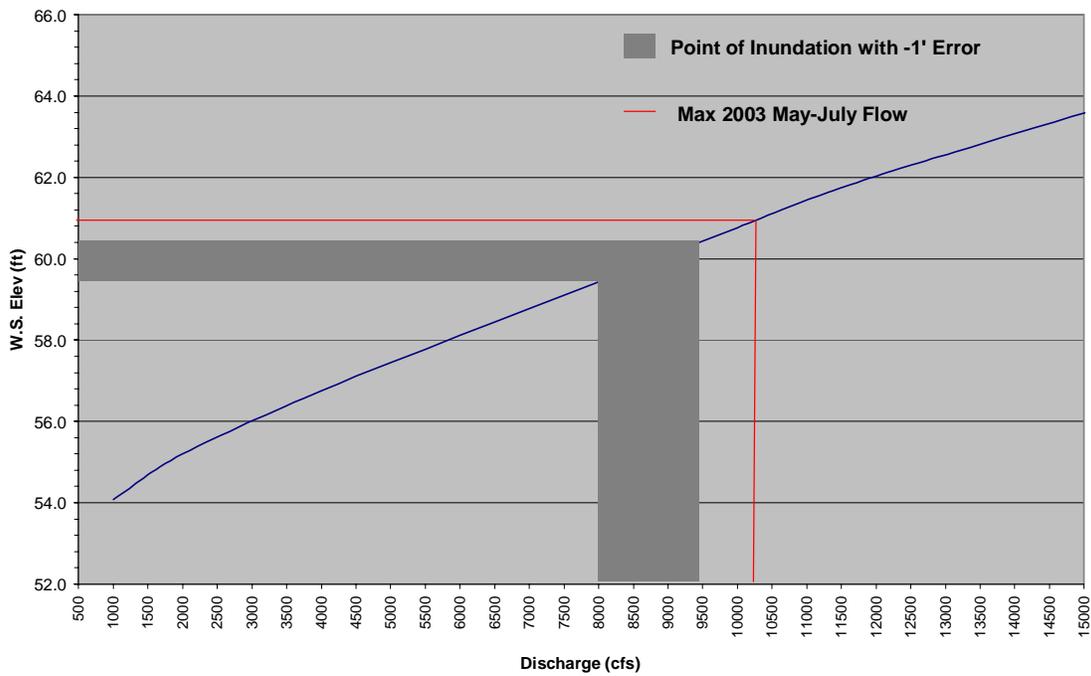


Figure 5.4.3 Stage/Discharge Relationship at Bank Swallow Colony 5 - RM 44.5

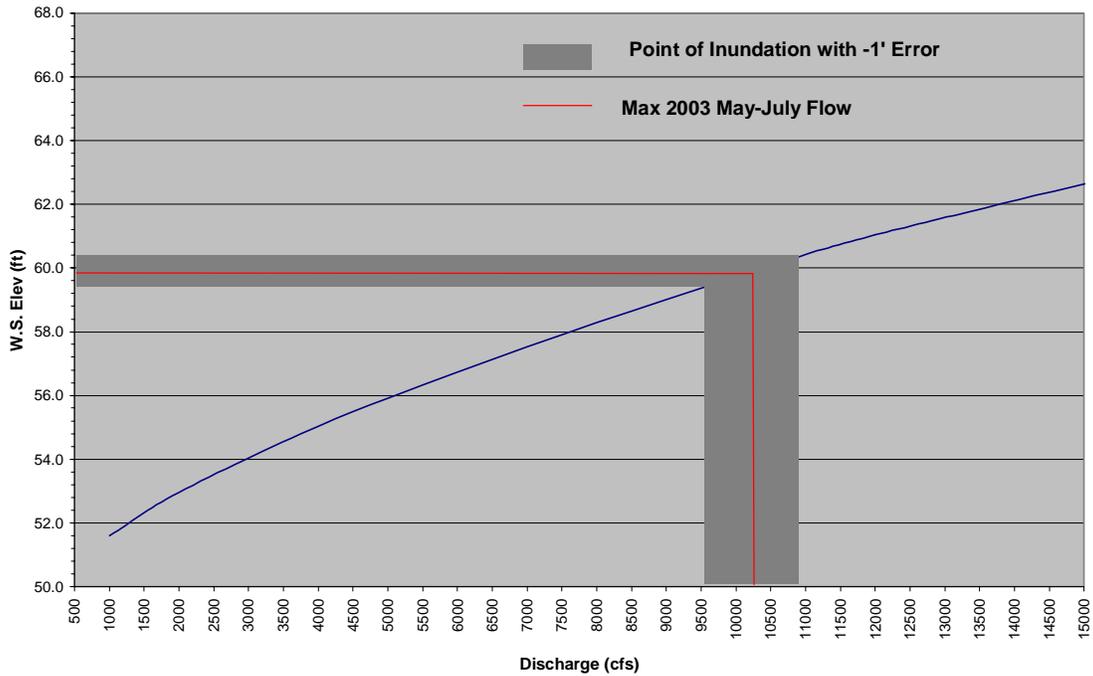


Figure 5.4.4 Stage/Discharge Relationship at Bank Swallow Colony 7 - RM 40.5

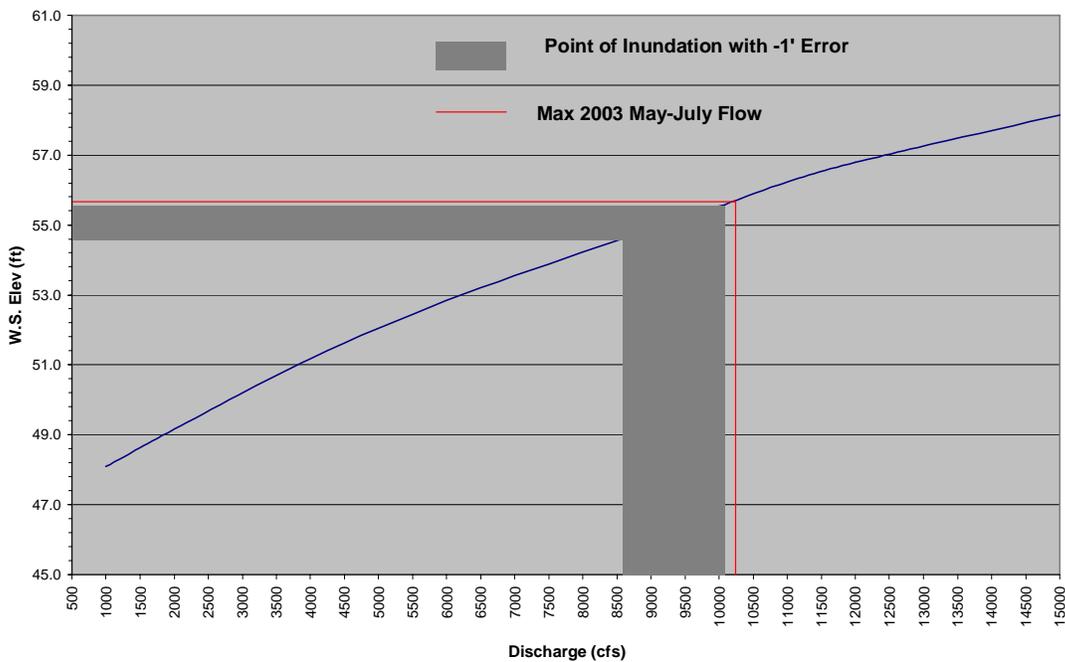


Figure 5.4.5 Stage/Discharge Relationship at Bank Swallow Colony 8- RM 40.4

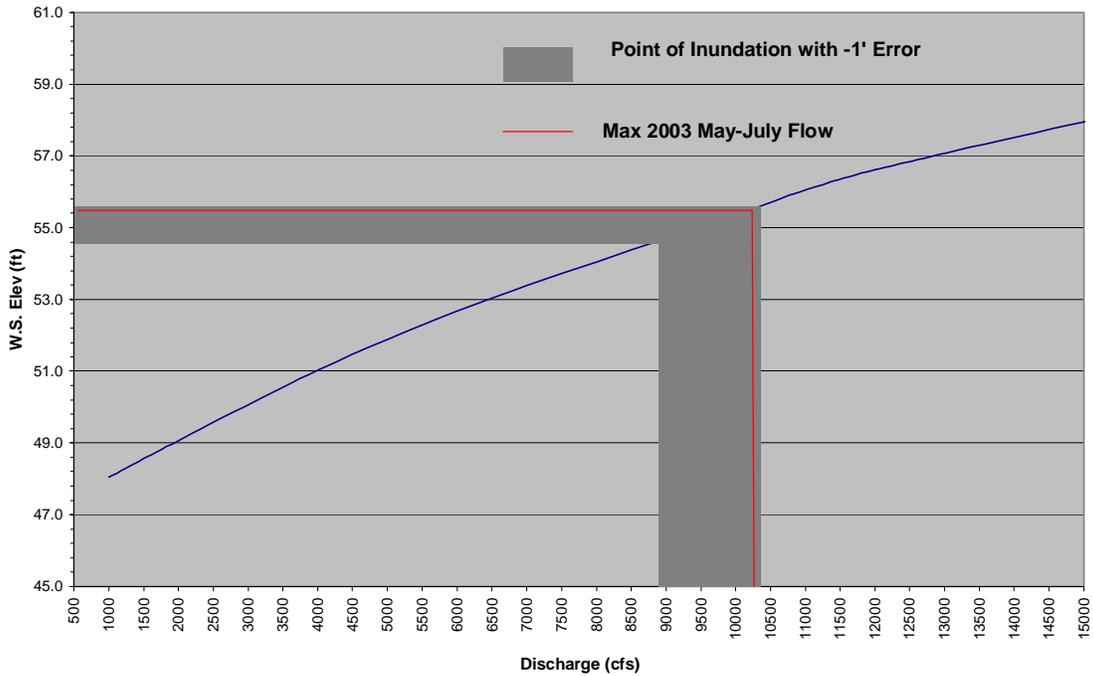


Figure 5.4.6 Stage/Discharge Relationship at Bank Swallow Colony 9 - RM 35.6

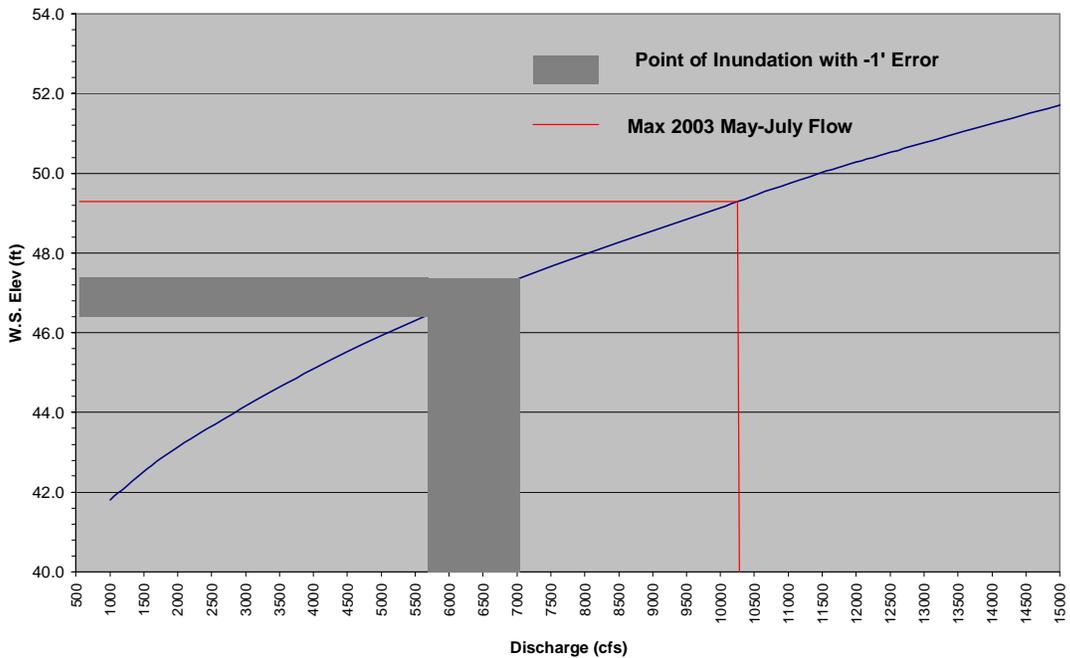


Figure 5.4.7 Stage/Discharge Relationship at Bank Swallow Colony 10- RM 34.5

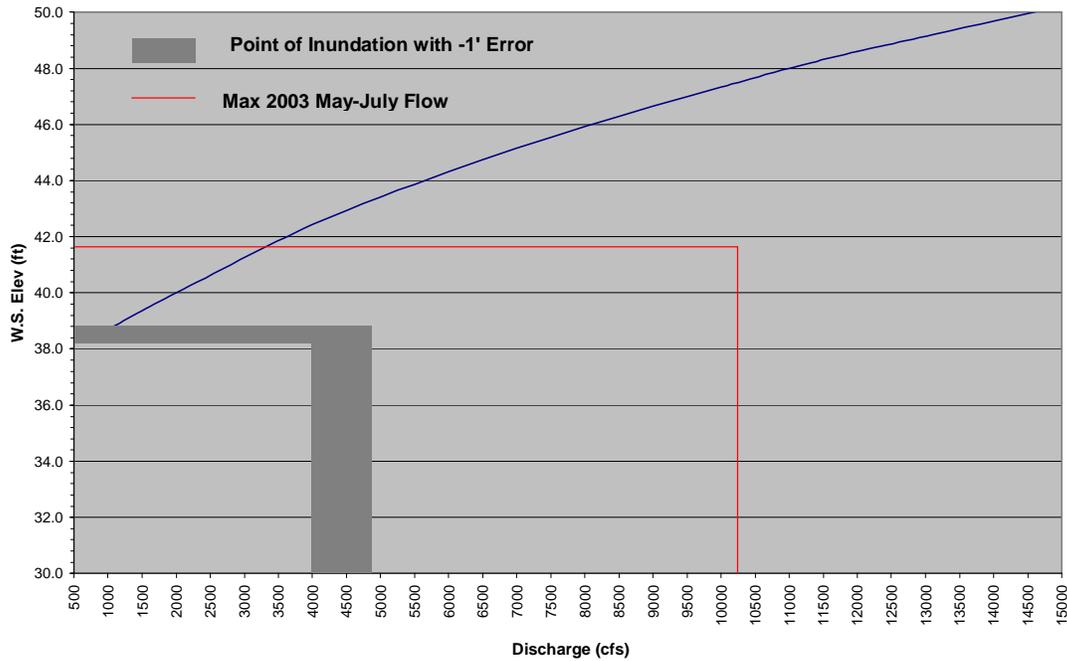


Figure 5.4.8 Stage/Discharge Relationship at Bank Swallow Colony 11 - RM 34.15

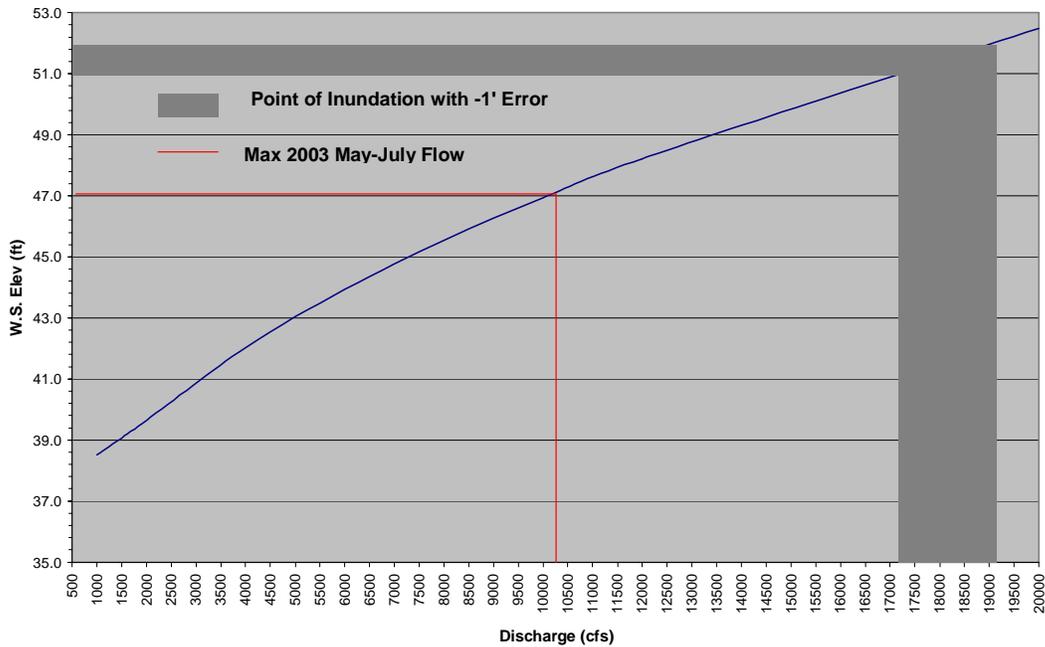


Figure 5.4.9 Stage/Discharge Relationship at Bank Swallow Colony 12 - RM 26.1

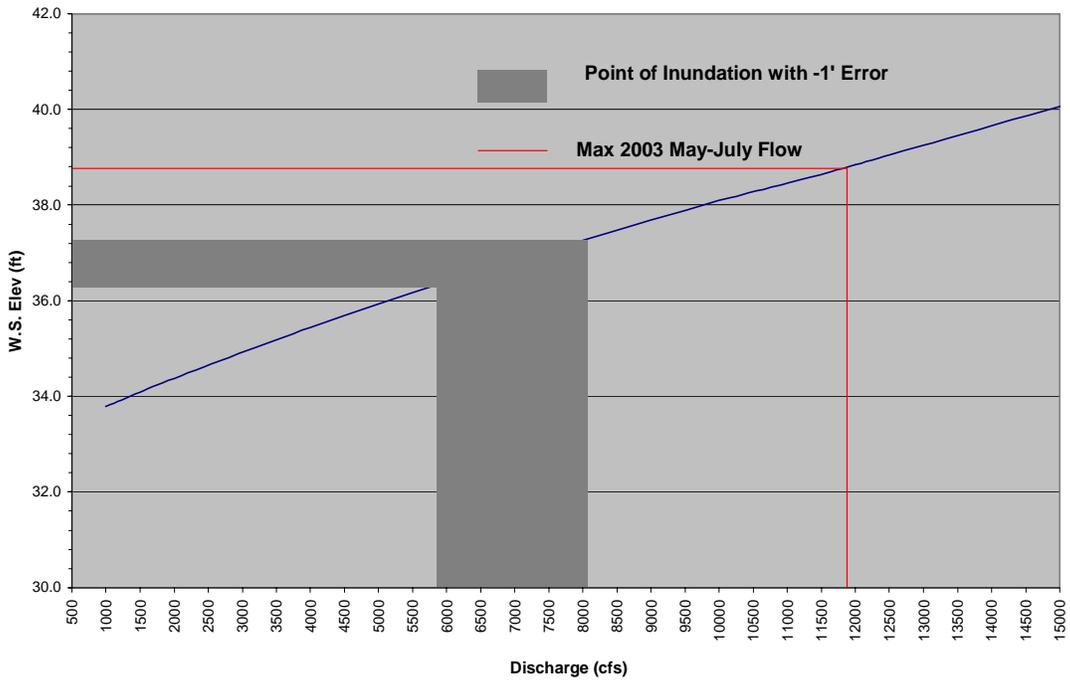


Figure 5.4.10 Stage/Discharge Relationship at Bank Swallow Colony 13 - RM 20.45

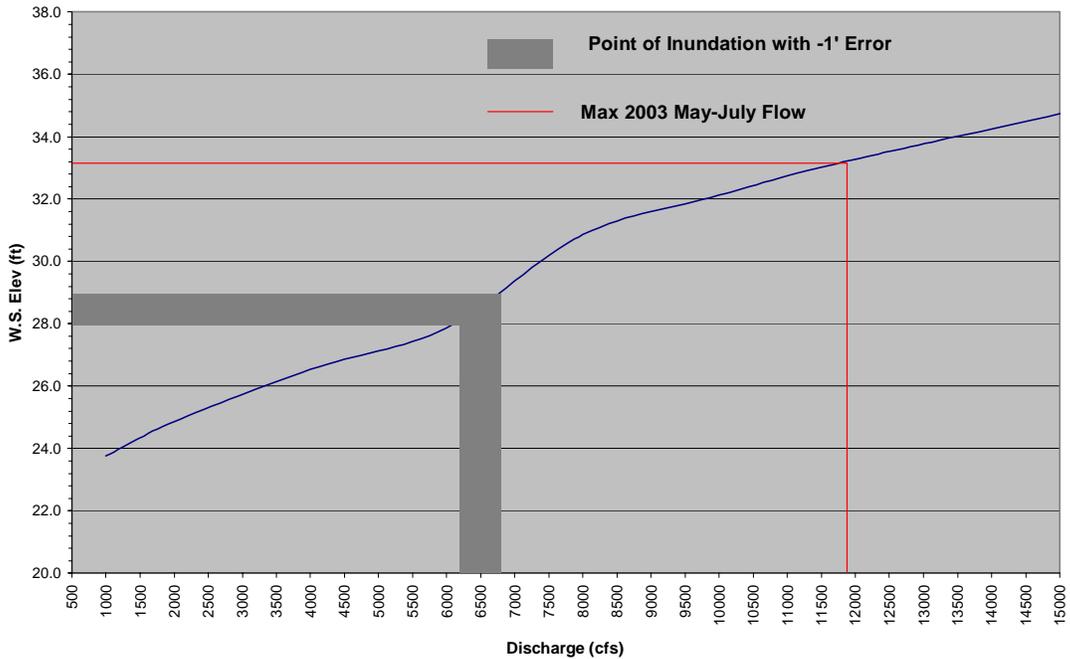


Figure 5.4.11 Stage/Discharge Relationship at
Bank Swallow Colony 14 - RM 12.3

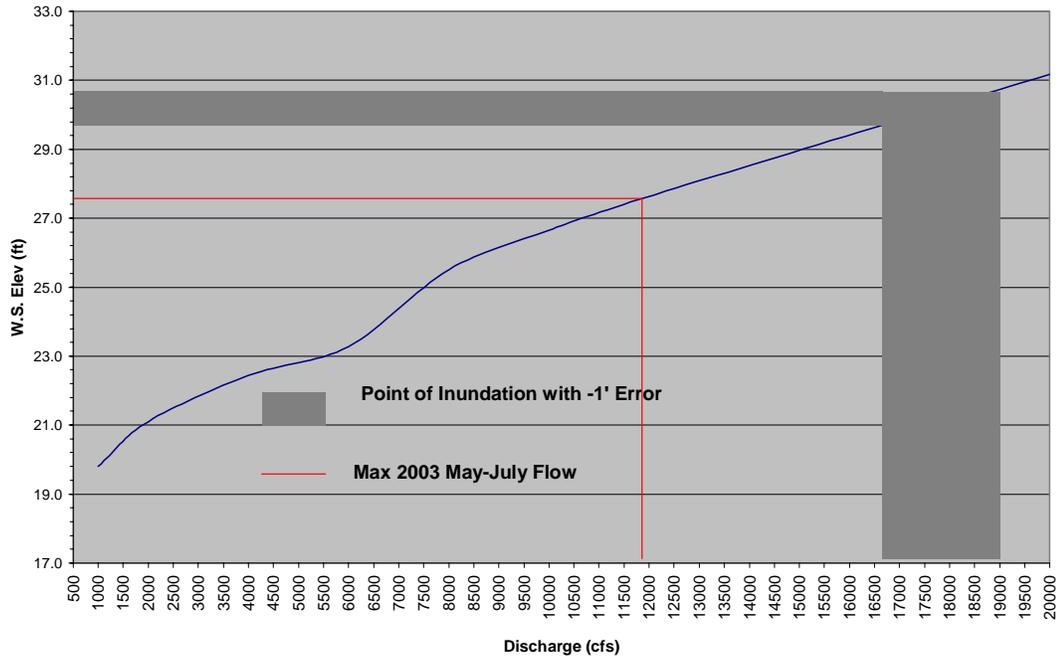


Figure 5.4.12 Stage Discharge Relationship at
Bank Swallow Colony 15 - RM 11.2

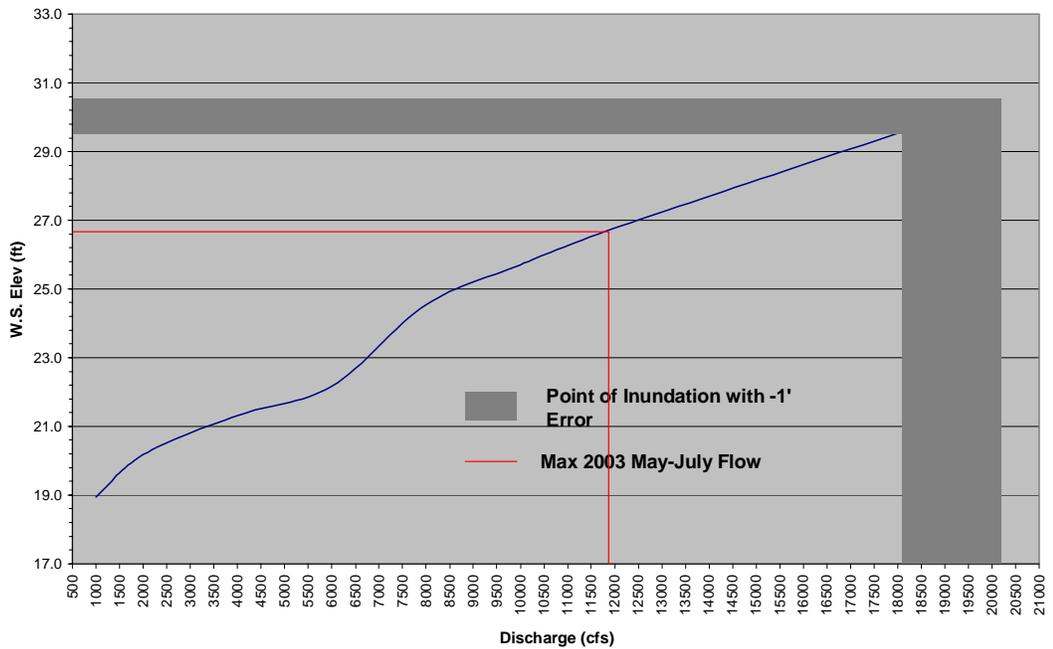


Figure 5.4.13 Stage/Discharge Relationship at
Bank Swallow Colony 16 - RM 10.5

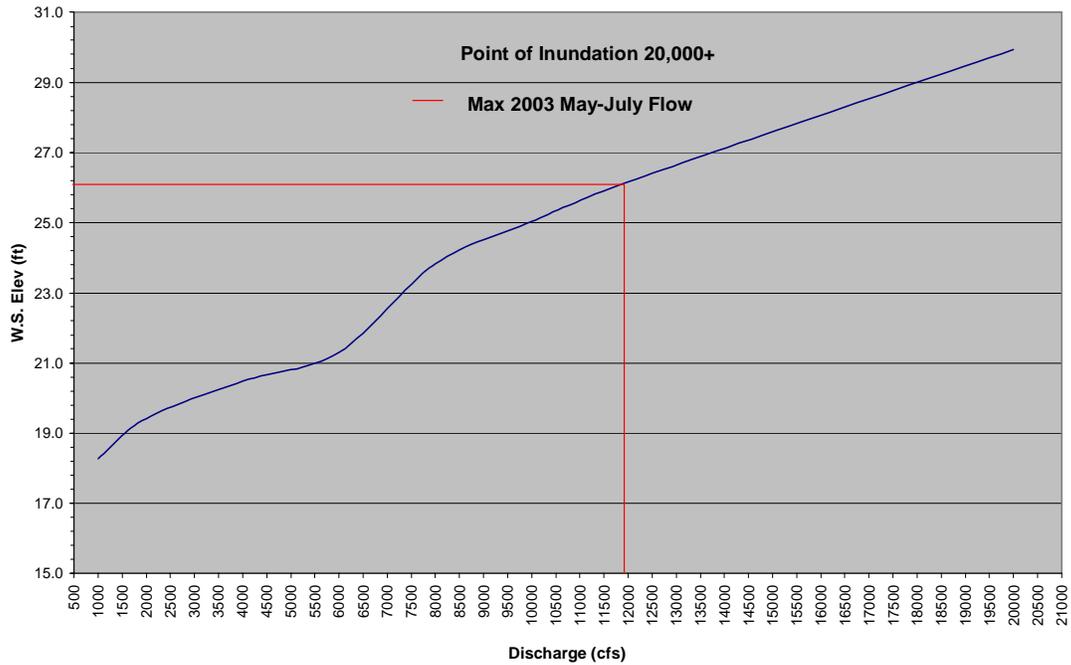
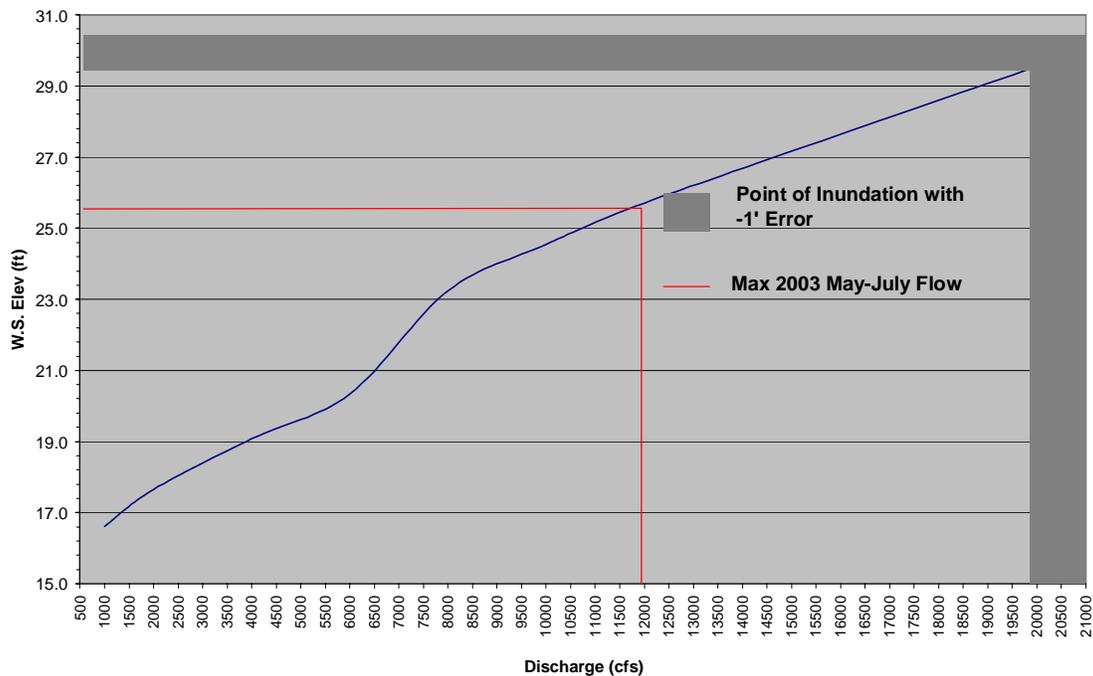
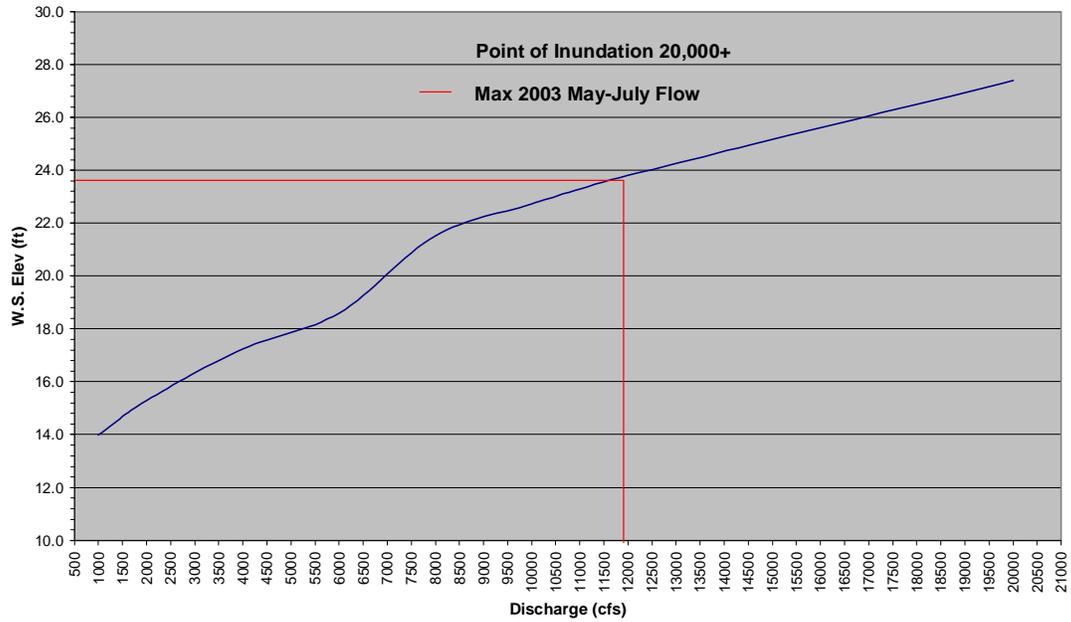


Figure 5.4.14 Stage/Discharge Relationship at Bank Swallow Colony 17 - RM
9.9



**Figure 5.4.15 Stage/Discharge Relationship at
Bank Swallow Colony 18 - RM 5.95**



6.0 GREATER SANDHILL CRANE HABITAT AND POPULATION SURVEYS

6.1 INTRODUCTION

Both the lesser and greater subspecies of sandhill crane winter in the Central Valley of California. The greater sandhill crane subspecies is classified as a State threatened species. This species is not federally listed but is considered a sensitive species by Region 5 of USFS.

The greater sandhill crane breeds in North-eastern California and South-central Oregon and winters in California's Central Valley (Littlefield 1982). The California wintering population was estimated at 3,400 to 6,000 individuals in 1988 (CDFG 1992a). The California breeding population is believed to be less than 300 pairs. In addition to greater sandhill cranes, approximately 25,000 lesser sandhill cranes migrate to and winter in California's Central Valley (CDFG 1992a).

Wintering crane habitat consists of an open expanse of shallow water for communal roosting, rice or corn fields for foraging, and irrigated pasture for loafing (CDFG 1992a). No nesting sandhill cranes occur within the study area. Wintering sandhill cranes (unknown sub-species) are frequently observed in the rice/corn growing area of the Butte Basin west of the Thermalito Afterbay and infrequently in flight over the study area. DFG records indicate that greater sandhill cranes may be present in grassland habitats near the Thermalito Afterbay on rare occasions.

6.2 METHODS

All potentially suitable sandhill crane habitats within the project boundary and within one-half mile of the project boundary were surveyed weekly during the first three to four weeks of September during both 2002 and 2003. All sandhill cranes observed were recorded and mapped. The survey period (early to mid-September) was selected as previous Sacramento Valley studies indicate that only greater sandhill cranes are present during this period. Lesser sandhill cranes (non-listed) begin to arrive during late September or October.

6.3 RESULTS

Two adult sandhill cranes were observed circling and calling at high altitude over a large waterfowl brood pond adjacent to the Thermalito Afterbay on September 27, 2003. This observation occurred late enough in the year that sandhill crane subspecies identification cannot be confirmed. No habitat use was observed or reported throughout the course of the surveys for either greater or lesser sandhill cranes. Minor amounts of marginally suitable foraging and loafing habitat are present adjacent to the Thermalito Afterbay.

6.4 EVALUATION OF PROJECT EFFECTS

Survey data indicate that a limited amount of marginally suitable wintering habitat is present within the project boundary. Further, survey results indicate that greater

sandhill crane use of the project boundary and adjacent agricultural habitats is at best uncommon. No direct project related effects have been identified or are likely based on the current absence of use.

7.0 AMERICAN PEREGRINE FALCON HABITAT AND POPULATION SURVEYS

7.1 INTRODUCTION

The American peregrine falcon was federally listed as an endangered species in 1970 and subsequently listed as endangered by the State of California (Figure 7.1.1). The USFWS recently delisted peregrine falcons but they remain State listed. The breeding population of peregrine falcons in California has increased from two known active nest locations in 1970 to over 120 nesting pairs in 1999.

Within California this uncommon breeding resident is found from the southern coast range north to the Oregon border and throughout the Cascade and Sierra Nevada mountain ranges (Zeiner et al. 1990b). Peregrine falcons nest on a variety of substrates throughout their range including river cut banks, hollows in large old trees, old raptor nests, bridges, skyscrapers, and cliffs. However, cliffs or cliff-like structures are the most common nest sites. Suitable cliffs are generally extremely high, frequently overlook water, and permit an expansive view of the surrounding countryside (Hickey 1942). In California, wintering peregrine falcons typically remain in the vicinity of their breeding territory (Jurek 1989).

Figure 7.1.1 Adult Peregrine Falcon



7.2 METHODS

Pre-survey planning included a GIS analysis, which identified the locations of all, slopes over 65 percent. All mapped areas of steep slopes within the project boundary and within one mile of the project boundary were examined during the 2002 or 2003 nesting season. Peregrine falcons are also known to utilize cliff-like human structures for nesting. Selected human structures were also surveyed during the breeding season to determine occupancy. All

potential nest sites were inspected at a minimum of once a month throughout the breeding season (February through July). Active nest territories were surveyed more frequently.

Nest locations where adult peregrines were present during the nesting season were considered active. Nest locations where incubation behavior was observed were considered occupied (whether or not any young were produced).

7.3 RESULTS

Several historically active peregrine falcon nest territories are present in Butte County. Three active peregrine nest locations were identified within the study area during 2002

breeding season and four active territories were present in 2003 (Table 7.3.1). Two of these locations had been used historically. Two additional new or previously unknown nest territories were identified during the course of the surveys. During both 2002 and 2003, the same two nest territories were occupied and fledged a collective minimum of three young per year. One pre-fledgling was salvaged by DFG after it fell or flew from the nest site in 2003. This chick later fledged at another location and is not included in the production data. The two newly documented nest territories were the only territories where incubation behavior was not observed in 2002 and 2003. This production of 1.0 young per active nest and 1.5 young per occupied nest compare favorably with statewide production data collected between 1975 and 1988 which averaged 0.83 young per active nest and 1.04 young per occupied nest (Jurek 1989). However, the Federal Pacific Coast Recovery Plan goal of 1.5 young per pair was not met during either 2002 or 2003. (USFWS 1982).

Table 7.3.1 Peregrine falcon production within the project boundary during 2002 and 2003

Category	2002	2003
# of active territories	3	4
# of occupied territories	2	2
Production/active territory	1.0	0.75
Production/occupied territory	1.5	1.5

Forage locations were identified by following adult falcons. Virtually all nesting season foraging locations identified during the 2002 and 2003 breeding season were within 0.6 miles of the nest location. Winter observations were infrequently observed up to 1.1 miles from the nest site. All peregrine falcon observations were recorded in GIS format. No attempt was made to identify prey species as part of this study. However, peregrine falcons are known to prey on at least 80 avian species in Northern California (Monk and Harlow 1983). Prey remains were collected at one territory and forwarded to the Santa Cruz Predatory Bird Group for analyses and addition to the statewide database. At least three bands from racing/homing pigeons were included in these prey remains.

7.4 EVALUATION OF PROJECT EFFECTS

No direct project related impacts were identified during the course of this investigation. Because of the cliff or cliff-like nest locations these falcons generally have an excellent buffer near the nest site from human disturbance.

Primary management concerns related to peregrine falcons within the project boundary include site confidentiality, site security, future habitat modifications, and the potential impacts of maintenance activities. DWR is informally consulting with DFG (under the State Endangered Species Act) to explore opportunities for improved management. These opportunities as well as other management concerns are addressed in the site specific territory management plans which may (depending on the outcome of informal consultation) be incorporated as license conditions under the existing license.

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8.0 SWAINSON'S HAWK HABITAT AND POPULATION SURVEYS

8.1 INTRODUCTION

The Swainson's hawk was listed as a threatened species by the State in 1983. This species is not federally listed. By 1993, it was estimated that this migratory species had experienced a 91 percent population decline in California (Bloom 1980). The Statewide population was estimated at 375 pairs in 1980.

Swainson's hawks were historically found throughout most of lowland California (Grinnell and Miller 1944). Current distribution is limited to northeast California (primarily Modoc, Siskiyou and Lassen counties) and the Central Valley. This species decline is believed to be related to agricultural and urban land conversions (Estep 1989).

Swainson's hawks use a variety of agricultural crops for foraging including alfalfa, fallow fields, beet, tomato, irrigated pasture, rice (non-flooded), and cereal grains.

8.2 METHODS

All potential nest trees within or adjacent to cropland or annual grassland habitats within or adjacent to the study area were examined prior to the emergence of spring foliage. All large stick nests were mapped and subject to examination during the breeding season (March through July). Swainson's hawk surveys also included identification and following of foraging adults in an effort to locate nest locations. All areas surveyed and all potentially suitable nesting habitats were downstream from Oroville Dam. Swainson's hawk nest surveys were not conducted on the Feather River downstream of the project boundary. However, locations of foraging and nesting Swainson's hawks were recorded during the course of Feather River bank swallow surveys.

8.3 RESULTS

No historic nesting within or adjacent to the study area had been previously documented. A nesting pair of Swainson's hawks was discovered during the course of the surveys (Table 8.3.1). A pair of Swainson's hawks nested in a thin strip of mature riparian habitat within the Oroville Wildlife Area adjacent to the Feather River during 2002 and 2003. This nest produced two young during both breeding seasons. Foraging activity occurred primarily in a young walnut orchard adjacent to the project boundary. No other sightings of adult Swainson's hawks were made at any other location within the project boundary.

Table 8.3.1 Swainson's hawk production within the project boundary during 2002 and 2003

Category	2002	2003
# of active territories	1	1
# of occupied territories	1	1
Production/active territory	2.0	2.0

Production/occupied territory	2.0	2.0
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8.4 EVALUATION OF PROJECT EFFECTS

The primary threat to the Swainson's hawk nest territory will be loss of foraging habitat as the two-year old walnut orchard matures. This orchard was used extensively by foraging Swainson's hawks. The orchard located outside the project boundary, was poorly maintained and tall, dense herbaceous cover was present within the orchard especially early in the nesting season. As the canopy within the orchard closes, or maintenance improves, its value to foraging Swainson's hawks will steadily decrease. Other foraging habitat of poorer quality is present at greater distances from the nest territory.

The nest location is within 200 feet of active gravel mining and less than 150 feet from a gravel bar which serves as a river access point. Current types, levels, and timing of recreation use and mining do not appear to have adversely impacted production. No significant project related adverse impacts to Swainson's hawks or their habitat have been identified.

No changes in operations or downstream flow regimes have been identified. Future changes from baseline conditions could affect the quantity and quality of Swainson's hawk nesting habitat downstream along the Feather River corridor in either a positive or negative manner. Preliminary data analyses related to SP-T3/5 indicate that opportunities may exist to increase the recruitment or retention of riparian habitat downstream from the project boundary.

9.0 WESTERN YELLOW-BILLED CUCKOO HABITAT AND POPULATION SURVEYS

9.1 INTRODUCTION

The western yellow-billed cuckoo was listed as a State threatened species in 1971. This species status was reclassified to endangered in 1987.

Historic records indicate that this species was widespread and locally common in California. Today its distribution is limited to several small isolated areas of the State. The two largest remaining populations in the State are near the Colorado and Sacramento rivers. The 1977 statewide population was estimated at between 122 and 163 pairs (Gaines and Laymon 1984). A subsequent statewide survey in 1988 estimated that only 31 to 33 pairs remained (Laymon and Halterman 1988). Loss of riparian habitat accounts for most of the population decline (Laymon 1980).

Suitable cuckoo nesting habitat is described as deciduous riparian thickets or forests with dense low understory near slow moving waterways (Ziener et al 1990a). These thickets or woodlands are generally at least 25 acres in size and 300 feet in width.

Potential cuckoo habitat within the study area and adjacent lands is restricted to riparian habitat within the Oroville Wildlife Area. Very few blocks of suitable habitat (dense low understory) greater than 25 acres and 300 feet in width occur within this area. Most of the areas within the Oroville Wildlife Area dominated by riparian vegetation are historic dredger tailings. Dense low understory occurs in small blocks where the topography is such that willows and other riparian shrubs can root to groundwater.

9.2 METHODS

Surveys for nesting cuckoos were conducted using pre-recorded cuckoo calls. All survey work was conducted during July 2002 and 2003. A portable tape player was used to broadcast cuckoo calls. In between calls the tape was stopped to listen for response calls and to observe adjacent vegetation for cuckoos. Several call/listen cycles were repeated at a 100 yard calling distance within each block of potentially suitable nesting habitat. Minimum habitat block size surveyed was 10 acres.

9.3 RESULTS

No western yellow-billed cuckoos were detected during the 2002 or 2003 breeding season. Small blocks of potentially suitable habitat are present within the project boundary. However, habitat blocks of adequate size are currently lacking within the project boundary.

9.4 EVALUATION OF PROJECT EFFECTS

Cuckoos are currently absent from the project boundary. Commercial gravel harvest adjacent to existing habitat may be the best long-term cuckoo habitat improvement option within the project boundary. These piles of gravel and cobble prevent riparian (or any other) vegetation from becoming established. The juxtaposition of the dredger

tailings limit the sizes of otherwise potentially suitable habitat blocks. Removal of barren dredger tailings in a planned process could allow for increase of habitat block size and prepare the sites for establishment of riparian shrub understory. However, the depth of gravel removal will have to be carefully considered and practiced to obtain the desired vegetative condition.

No changes in operations or downstream flow regimes have been identified. Future changes from baseline conditions could affect the quantity and quality of western yellow-billed cuckoo nesting habitat downstream along the Feather River corridor in either a positive or negative manner. Preliminary data analyses related to SP-T3/5 indicate that opportunities may exist to increase the recruitment or retention of riparian habitat downstream from the project boundary.

10.0 VALLEY ELDERBERRY LONGHORN BEETLE HABITAT AND POPULATION SURVEYS

10.1 INTRODUCTION

The valley elderberry longhorn beetle (VELB) was listed as a federal threatened species during August 1980. The known distribution of this species has greatly increased through additional survey efforts since the time of its initial listing. The USFWS now identifies the species range as throughout the Central Valley and up to 3,000 feet in elevation on the eastern edge of the valley and to the Coast Range watershed divide along the western side of the valley (USFWS 1984).

The beetle is primarily restricted to riparian habitat and adjacent uplands. The VELB is dependent upon its host plant the elderberry (*Sambucus* sp.) throughout its life cycle. The VELB spends most of its two-year life cycle boring within the stem in a larval stage. The beetles emerge from the stem March through June as adults to lay eggs, completing the life cycle (Barr 1991).

Elderberry bushes containing VELB emergence holes have historically been identified at several locations within the study area. Elderberry bushes are one of the most common shrub species in high terrace habitats within the portion of the Oroville Wildlife Area bordering the Feather River.

10.2 METHODS

Elderberry bushes were mapped and surveyed per USFWS protocol within 100 feet of all project features within the project boundary including roads levees, campgrounds, and trails. However, per a study plan change submitted and approved at the August 2003 Environmental Work Group meeting, no protocol level surveys were conducted within the portion of the Oroville Wildlife Area bordering the Feather River and downstream along the Feather River. In these areas elderberry shrubs were mapped and VELB presence was assumed based on prior sampling.

10.3 RESULTS

10.3.1 Lake Oroville-Elderberry bushes are extremely uncommon within the Lake Oroville portion of the project boundary. Only two elderberry shrubs were identified at Lake Oroville (Canyon Creek watershed) during boat-based shoreline surveys conducted during the blooming period (Figure 10.3.1). Both of these elderberry shrubs are further than 100 feet from a project feature (Lake Oroville) and were mapped for future avoidance but not surveyed per USFWS protocol. No elderberry shrubs were detected within 100 feet of roads, campgrounds, trails or other project facilities at Lake Oroville.

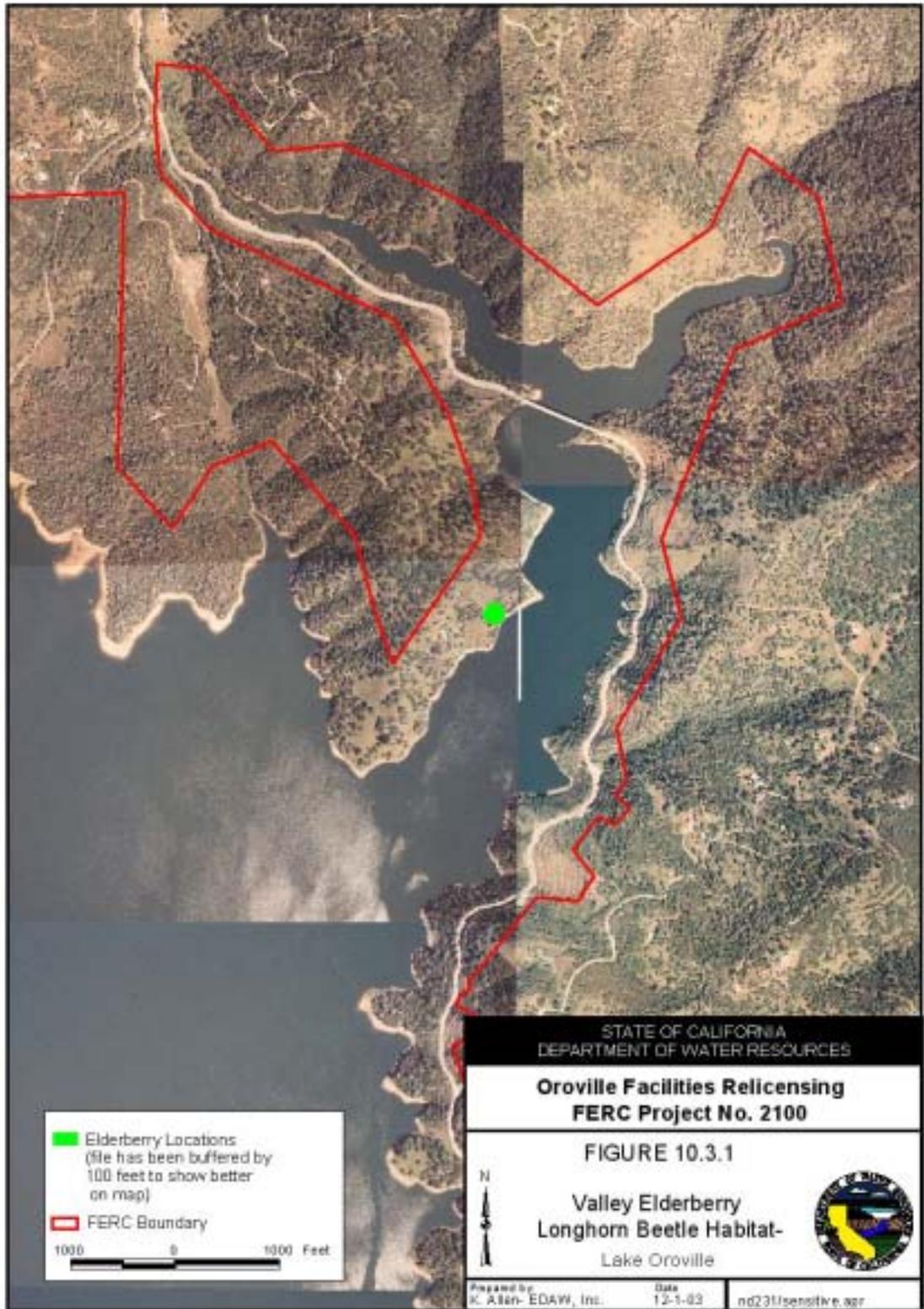
10.3.2 Oroville Dam to Table Mountain Boulevard-Elderberry shrubs become increasing more common within the Feather River corridor between Oroville Dam and the Fish Diversion Pool, and along the Power Canal (Figure 10.3.2). Within this area 45 elderberry stems greater than 1 inch diameter (at ground level) were identified (Table

10.3.1). No VELB emergence holes were present on any of the stems. All elderberry shrubs in this area are within 100 feet of project features including roads, trails, day use recreation areas, Power Canal, Diversion Dam, and the Fish Barrier Dam.

10.3.3 Thermalito Forebay and Afterbay-Elderberry shrubs are generally absent from the Thermalito Forebay and Afterbay areas. One elderberry shrub was recently identified on a spoil pile near the Butte College shooting range

Table 10.3.1. VELB Survey Data

Number	Latitude	Longitude	Stems 1"- 3"	# of exit holes	Stems >3"-<5"	# of exit holes	Stems 5" +	# of exit holes	Riparian?
1	N39.51789	W121.54767	5	0	0	0	0	0	No
2	N39.51787	W121.54768	1	0	0	0	0	0	No
3	N39.51791	W121.54770	1	0	0	0	0	0	No
4	N39.51786	W121.54765	2	0	0	0	0	0	No
5	N39.51782	W121.54767	0	0	1	0	0	0	No
6	N39.51786	W121.54760	1	0	0	0	0	0	No
7	N39.52070	W121.54685	1	0	0	0	1	0	No
8	N39.52120	W121.54630	18	0	0	0	0	0	No
9	N39.52660	W121.54371	0	0	0	0	1	0	Yes
10	N39.52700	W121.54322	1	0	0	0	0	0	No
11	N39.52652	W121.54350	1	0	4	0	1	0	Yes
12	N39.52982	W121.56223	1	0	0	0	0	0	No
13	N39.52982	W121.56223	3	0	2	0			No
Totals			35	0	7	0	3	0	



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10.3.4 Oroville Wildlife Area-Virtually all of the existing levees within the portion of the Oroville Wildlife Area bordering the Feather River contain exceptionally high densities of elderberry shrubs (Figures 10.3.3 and 10.3.4). Further, previous survey efforts in this area indicate that VELB emergence holes are common in larger shrubs (> 5 inch diameter) and that elderberry plants containing larger stems comprise a significant percentage of the total shrubs in the area. The existing levee system provides good connectivity between subpopulations and should allow ready dispersal of adult VELB breeders. Observations indicate that elderberry shrubs are uncommon or absent from lower elevation areas of the Oroville Wildlife Area (off levees) where ground water levels are higher. The exceptional densities of elderberry stems associated with the levees and the need to maintain both levees and associated roads has been a long-term maintenance issue.

10.3.5 Feather River below the Project Boundary-All elderberry shrubs visible during boat based botanical surveys along the Feather River below the project boundary were mapped (Figures 10.3.5 and 10.3.6). In general, the same pattern was observed along this portion of the Feather River as that observed within the Oroville Wildlife area with elderberry shrubs uncommon or absent from the lower portion of levees or other areas subject to a high water table. Generally, observations along the Feather River indicate that elderberry shrub densities are lower and far more disjunctive than those present within the Oroville Wildlife Area.

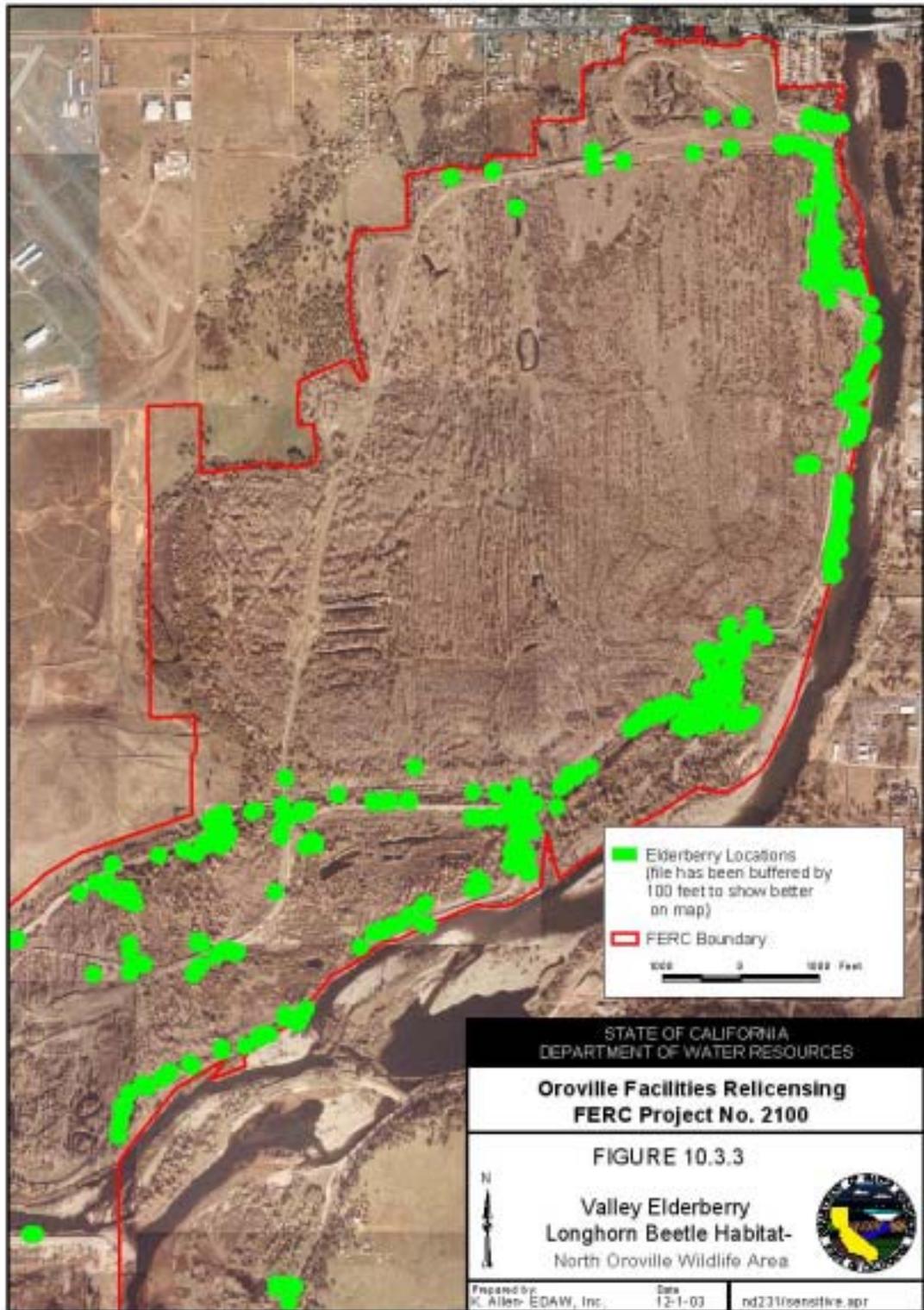
10.4 EVALUATION OF PROJECT AFFECTS

Avoidance of potential VELB habitat is the most effective management tool for protection of VELB. All mapped elderberry locations were provided to the primary land management agencies within the project boundary including Oroville Field Division, DFG, and DPR to allow project and maintenance planning and avoidance.

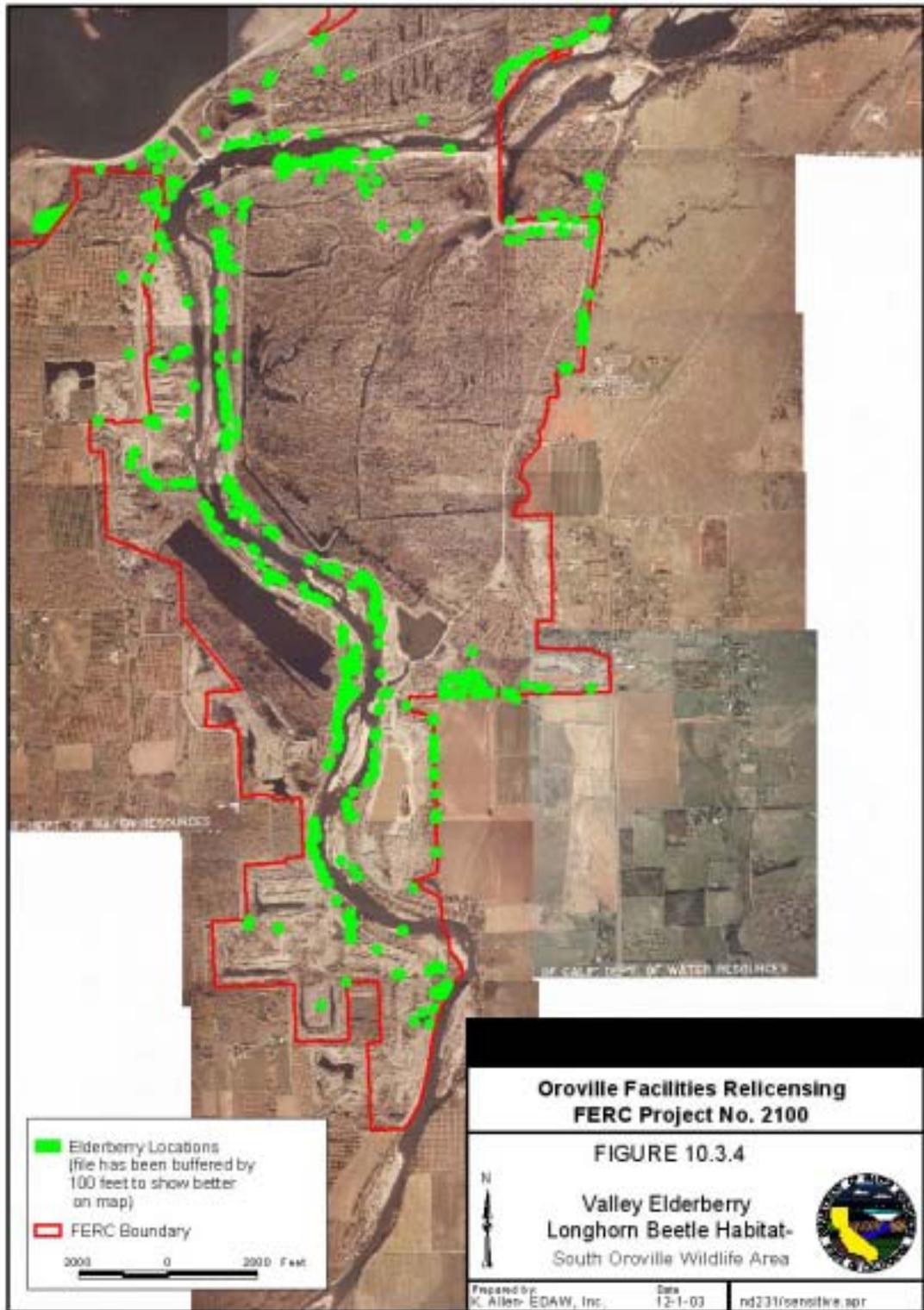
10.4.1 Lake Oroville-Both of these elderberry shrubs in this area are multi-stemmed and are located on steep upland slopes in an area which currently receives no recreation use or maintenance activities. Further, the existing terrain and location probably preclude any future development in this area. However, all Resource Actions will be evaluated to identify impacts to these mapped shrubs. No current or future impacts to this habitat have been identified.

10.4.2 Oroville Dam to Table Mountain Boulevard-Several potential project related effects to VELB were identified within this area including

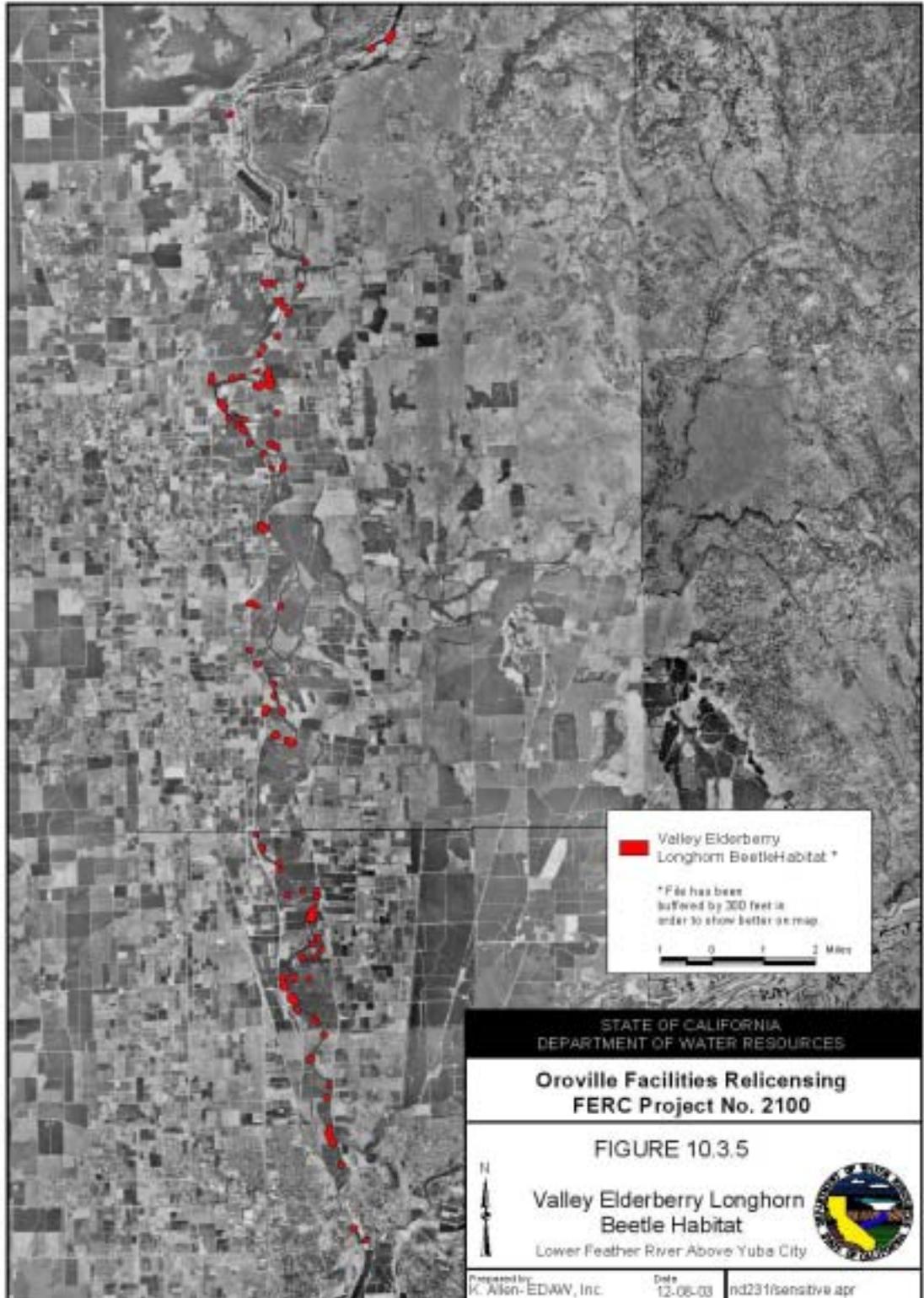
- Off-road vehicle use
- Pesticide use
- Grading for roads and fuelbreaks
- Materials storage
- Additional recreation development



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All of these elderberry bushes are located in areas where off-road vehicle use is either controlled (Power Canal) or in steep or rocky areas where ORV use does not occur (downstream from the Diversion Dam). Pesticide use does currently occur in the vicinity of all of these shrubs as part of routine project maintenance. Maintenance practices have been modified to insure that no herbicide use occurs within 100 feet of mapped elderberry stems. All Resource Actions in this area will be evaluated to identify potential impacts to VELB habitat.

10.4.3 Thermalito Forebay and Afterbay-Elderberry shrubs are generally absent from the Thermalito Forebay and Afterbay areas. Further, edaphic factors limit the potential establishment of elderberries within these areas.

10.4.4 Oroville Wildlife Area-The levees are the dominant VELB habitat within this area. Levee and associated road maintenance activities can conflict with the protection of VELB habitat. Some examples of these potential conflicts within this area include;

- Road grading within 25 feet of the drip-line of elderberry shrubs
- Mosquito abatement practices (fogging from levee roads)
- Emergency levee repairs related to flood damage
- Herbicide use on levees
- Pruning of elderberry shrubs overhanging roads
- Off road vehicle use
- Eradication/control of non-native plant species
- Additional recreation development (boat ramps, campgrounds, roads, parking areas)

Virtually all of the maintained roads within this portion of the OWA are graveled levee roads. These roads require periodic (annual) grading to remain passable for maintenance and recreational users. OFD Civil Maintenance staff has traditionally assumed road maintenance responsibility within the OWA. To comply with VELB recommended conservation measures they have generally avoided all soil disturbance (grading) within 25 feet of the dripline of elderberry shrubs. Further, maintenance crews have avoided pruning of elderberry shrubs overhanging roads and have practiced dust abatement during grading. However, implementation of these conservation measures have over time resulted in decreased public safety in a few localized areas. Within these localized areas, potholes deep enough to affect vehicle control are present. Further, elderberry overgrowth of roads has resulted in blind corners and diminished road width. Both factors result in reduced public safety. DWR proposes to explore options to maintain VELB habitat while providing for improved maintenance and public safety within the Section 7 Federal Endangered Species Act consultation with USFWS.

Neither DWR, DPR, nor DFG have any control over the mosquito abatement methods currently practiced by Butte County Mosquito Abatement within the project boundary. The pesticide used, concentration, timing of application, and method of application are all factors which should be evaluated related to their potential effects on VELB.

Extensive levee repairs related to flood flows have been required within the OWA on at least three occasions since 1986. The presence of elderberry shrubs on portions of the levees requiring repair have limited the engineering options for repair and increased cost. Opportunities for establishment of a DWR VELB mitigation area within the OWA will be explored within the Section 7 consultation process along with other potential protection/enhancement options including transplanting shrubs to reconnect dispersal corridors.

DWR routinely uses herbicides along roads, parking areas, other project facilities to reduce the fire hazard associated with vehicle exhaust systems and tall, dry herbaceous material. Further, DWR uses herbicides on Afterbay and Forebay dams to facilitate visual inspection of the dam integrity. DWR currently restricts herbicide use on roads and levees within the OWA to protect VELB habitat.

Off road vehicle use damage to VELB habitat within the OWA remains an uncommon, sporadic occurrence. The steep levee slopes and loose slope material generally serve to limit off road vehicle use associated with levees. However, sporadic damage to VELB habitat occurs near some high recreation use areas like the areas near the Thermalito Outfall to the Feather River. DFG has proposed an alternative to contain recreational use including vehicular use at this location.

Control or eradication of non-native pest plant species within the OWA has been identified as a potential Resource Action. Two of the upland species targeted under this Resource Action are *Ailanthus sp.* and *Arundo sp.* Both of these species grow in dense concentration in associations with elderberry shrubs within the OWA. This Resource Action has the potential to improve VELB habitat over the long term. However, identification of pest control methods which do not impacts VELB habitat during the short-term are needed. Impact avoidance associated with this potential Resource Action (and all Resource Actions implemented under this relicensing) will be evaluated under the Section 7 consultation process.

10.4.5 Feather River below the Project Boundary

No changes in operations or downstream flow regimes have been identified. Future changes from baseline conditions could affect the quantity and quality of VELB habitat downstream along the Feather River corridor in either a positive or negative manner. Preliminary data analyses related to SP-T3/5 indicate that opportunities may exist to increase the recruitment or retention of riparian habitat downstream from the project boundary including elderberry shrubs.

11.0 CALIFORNIA RED-LEGGED FROG HABITAT SURVEY

11.1 INTRODUCTION

The California red-legged frog (CRLF) was listed as a federal threatened species during June 1996. This species is considered a species of special concern by the State. The California red-legged frog has been extirpated from approximately 70 percent of its former range with only two known populations remaining east of the coast range.

The California red-legged frog can occur from sea level up to approximately 5,000 feet elevation with most known populations below 3,500 feet. This species uses a variety of aquatic habitats for reproduction including streams, deep pools, backwaters, ponds, marshes, sag ponds, dune ponds, and lagoons (USFWS 2000). Breeding adults are generally associated with deep (greater than two feet) slow moving water bordered by dense low riparian or emergent vegetation (USFWS 2000). Upland areas near breeding locations can also be used extensively during the summer (USFWS 2000). Several reasons for the population decline have been identified including habitat loss (alteration, degradation, and fragmentation), urbanization, agricultural practices, water management activities, mining, livestock practices, recreational impacts, timber harvest practices, exploitation (as food), disease, introduced species (e.g., bullfrog, mosquitofish, largemouth bass), drought and contaminants (USFWS 2000).

California red-legged frogs are not currently known to exist within the project boundary. However, the largest remaining population within the Sierra Nevada mountain range is within one mile of the project boundary in the North Fork Feather River drainage.

The red-legged frog survey protocol recommends three steps; 1) identification of area of potential project effects, 2) habitat suitability surveys within areas of potential project effects, and 3) population surveys in areas of suitable habitat and potential project effects.

11.2 METHODS

A formal survey form utilized by the USFWS for aquatic and CRLF surveys was utilized to log site details and habitat characteristics during habitat surveys. Habitat surveys were conducted during the weeks of August 6 and August 19, 2002. GIS data and maps were utilized to locate each wetland area. Visual surveys were conducted throughout all wetland areas delineated within the GIS maps. All accessible wetland areas within the Oroville Facilities boundary were surveyed. Wetland areas located within the 1-mile FERC boundary, and areas on private lands where access was not approved, were surveyed as best as possible using binoculars and a spotting scope. In areas that could not be completely surveyed on foot or by vehicle, a canoe was utilized. The canoe was used to survey the edges of large ponds as well as to provide silent access to otherwise inaccessible portions of the study area. A small motorized fishing boat was used to survey the Lake Oroville perimeter. Visual surveys were conducted along the lake perimeter. Where incoming streams were located, the boat was docked and surveys were conducted on foot up to 1-mile upstream.

11.3 HABITAT SURVEY RESULTS

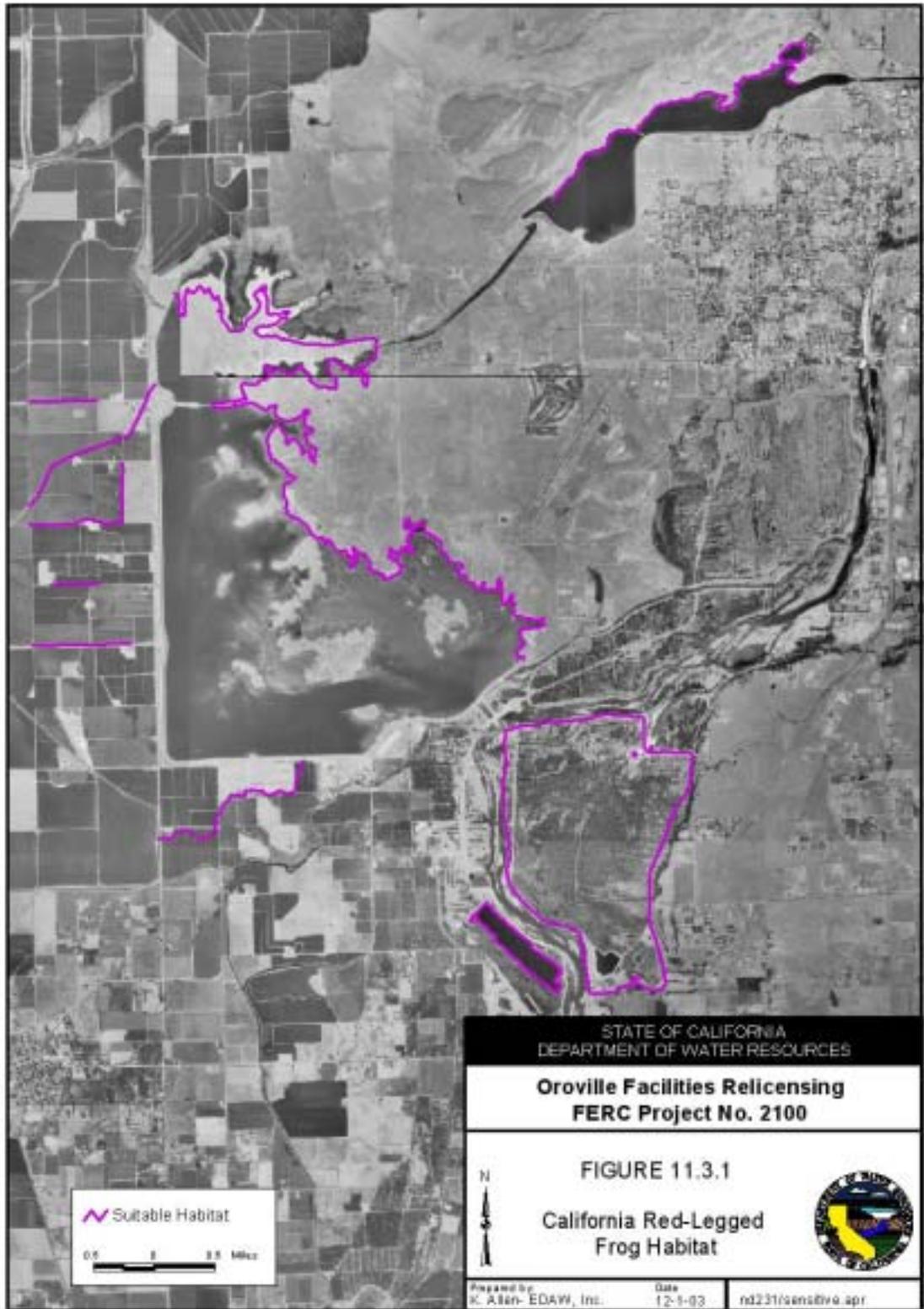
Preliminary assessment of areas of potential project effects was completed during July 2002. Habitat suitability surveys were initiated during August and completed by December 2002. No CRLFs were identified during the course of the CRLF habitat surveys or other relicensing field data collection efforts. Areas within the project boundary of potential red-legged frog habitat are identified in Figure 11.3.1.

Small areas of backwater along the Feather River could provide potentially suitable habitat for CRLF. However, they are too small to support a CRLF population and too isolated from other areas of potential habitat conditions along the Feather River to be conducive to CRLF establishment. Additionally, because of the inherent characteristics, many such areas are affected by obviously heavy recreation use.

The shoreline of Lake Oroville is generally an exposed soil-line that lacks emergent vegetation due to continued wave action and lake level fluctuations related to water storage and flood control operations. Soils in many areas along the lake have been eroded and are currently exposed bedrock or dirt that lacks developed soils. The reservoir banks below the water line, for the most part, are steep and prevent the formation of a littoral zone. The upland slopes above the shoreline are generally steep and the water is far below the upland vegetation. These conditions do not provide habitat conditions for CRLF.

Small areas near stream inlets with shallower water have a few established plants. However, the plants were too few, and in many cases, were annual species. These conditions do not provide littoral zone habitats or habitat conditions for the CRLF. All incoming streams were also surveyed for potential habitat, and all lacked one or more of the necessary habitat requirements for CRLF. Most have limited flows and steep gradients. Additionally, where the outlet of in-put streams is relatively shallow, quiet waters, or back-bay areas, considerable recreation use was observed. These recreational activities are not conducive to establishment of suitable habitat for these species. Therefore, there is no potential habitat within the Lake Oroville area to support

The eastern and southern edges of the Thermalito Forebay consist of relatively steep rip-rap edges with little or no emergent vegetation that can be used for cover. These constructed edges also do not have the needed upland habitat. The western edges of the Forebay have suitable emergent vegetation but receive recreational pressures from boating ramps, picnic areas and fishing. There are shallow water areas along the western edges where emergent vegetation contributes to suitable habitat conditions. There is potential for CRLF to inhabit the more publicly inaccessible areas around the Forebay, but the likelihood is limited and the presence of predatory fish contributes to this limitation.



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Habitat conditions around the Afterbay are similar to that of the Forebay. Much of the western edge and the southern edge of the reservoir are of constructed rock embankments that lack requisite emergent vegetation, riparian vegetation, upland vegetation, gentle upland slopes. The eastern and a portion of the northeastern shore provide habitat conditions potentially inhabitable by CRLF. Five waterfowl brood ponds are located along the eastern edge of the Thermalito Afterbay. These brood ponds contain the same habitat as the Afterbay however; they are not subject to the spring water level fluctuations which can occur within the Afterbay.

Potential CRLF habitat was identified within portions of the Oroville Wildlife Area bordering the Feather River. Dredger pond sites within these areas provide suitable habitat for CRLF. Ponds within this portion of the wildlife area provide adequate upland foraging and escape habitat and abundant basking sites for CRLF. Although no sightings were made, there is potential for these species to be currently present, or through dispersal, present in the future. Potentially negative factors for establishment of the CRLF are the presences of introduced predators such as bass and bullfrogs.

The results of these survey efforts were submitted to USFWS for review and comment. During this review and informal consultation, the USFWS suggested that documentation of potential habitat was adequate for impact assessment. However, protocol level population surveys remain an option if a proposed Resource Action has the potential to impact potential habitat.

11.4 EVALUATION OF PROJECT EFFECTS

Potentially suitable CRLF habitat is present within the project boundary. However, several factors may serve to limit CRLF use of these habitats including

- active management for or future stocking of non-native predatory fish
- high populations of bullfrog (direct competitor and predator)
- high water surface elevation fluctuations within the Thermalito Afterbay increasing the distance from cover to water for this highly aquatic species, subjecting CRLF to predation by herons, egrets, and other predators
- unseasonably cold water in the Thermalito Forebay requiring increased basking to maintain body temperature (basking frogs are exposed to predation)
- habitat fragmentation (little habitat connectivity between areas of potential habitat within the project boundary or between known populations and the project boundary)
- seasonably high recreation use (disturbance/displacement, habitat degradation and loss)

The following types of Resource Actions would serve to improve CRLF habitat within the project boundary.

- limit the introduction or spread of non-native predators and plant communities

- provide increased habitat areas with less extreme water surface elevation fluctuations
- increase water temperatures in the Thermalito Forebay
- improve connectivity of areas of suitable habitat
- seasonally restrict recreational activity within areas of potential habitat from March through October
- restrict future recreational developments within potentially suitable habitat
- restore barren or degraded habitats (gravel piles in OWA) to suitable CRLF habitat
- create/improve sidechannel, and backwater habitats

12.0 GIANT GARTER SNAKE HABITAT SURVEY

12.1 INTRODUCTION

The giant garter snake (GGS) was listed as a threatened species under the Federal Endangered Species Act during October 1993. It has also been listed as threatened under the California Endangered Species Act since 1971.

The giant garter snake is endemic to the wetlands of the Central Valley of California. Historic range is believed to include valley floor wetlands from the vicinity of Butte County south to near Bakersfield. Historically, giant garter snakes were found in natural wetlands associated with flood basins.

Thirteen sub-populations of giant garter snake have been identified. Population information is generally lacking. The northern extent of the current range of this species is described as Sacramento and Contra Costa counties (Fox 1951), to near Gridley (Hansen and Brode 1980), to the vicinity of Chico (Rossman and Stewart 1987). In addition to natural wetlands, giant garter snakes are now found in agricultural wetlands (rice), managed wetlands (duck clubs and State and federal refuges) agricultural drains, ponds, and other artificial waterways.

The Giant Garter Snake Recovery Plan (Miller and Hornaday, 1999) describes the essential habitat components for this aquatic reptile as (1) adequate water during the snakes active season (early spring through mid-fall) to support dense populations of prey; (2) presence of emergent herbaceous cover (cattails and tules) for escape cover and foraging habitat; (3) grassy upland habitat adjacent to waterways for basking; and (4) higher elevation upland habitat for flood flow refuge. This species is absent from larger rivers, riparian woodlands, and wetlands with sand, rock, or gravel substrates (Miller and Hornaday 1999).

Giant garter snakes have not been identified within the project boundary. However, this species has been reported in the Cherokee Canal near Richvale (approximately 2 miles west of the Thermalito Afterbay). Rice fields and associated irrigation/drainage canals are present along the western project boundary along State Highway 99.

12.2 METHODS

Giant garter snakes can be difficult to accurately census using observation-based protocols. For this reason, habitat surveys were conducted within portions of the project boundary and adjacent areas. Habitat surveys were limited to evaluation of habitats within areas of potential project affects including areas near recreation developments and other project facilities.

Preliminary assessment of areas of potential project effects was completed during July 2002. Habitat suitability surveys were completed by December 2002. The initial habitat/vegetative community mapping products (SP-T4) were used as screening tools prior to initiation of field surveys.

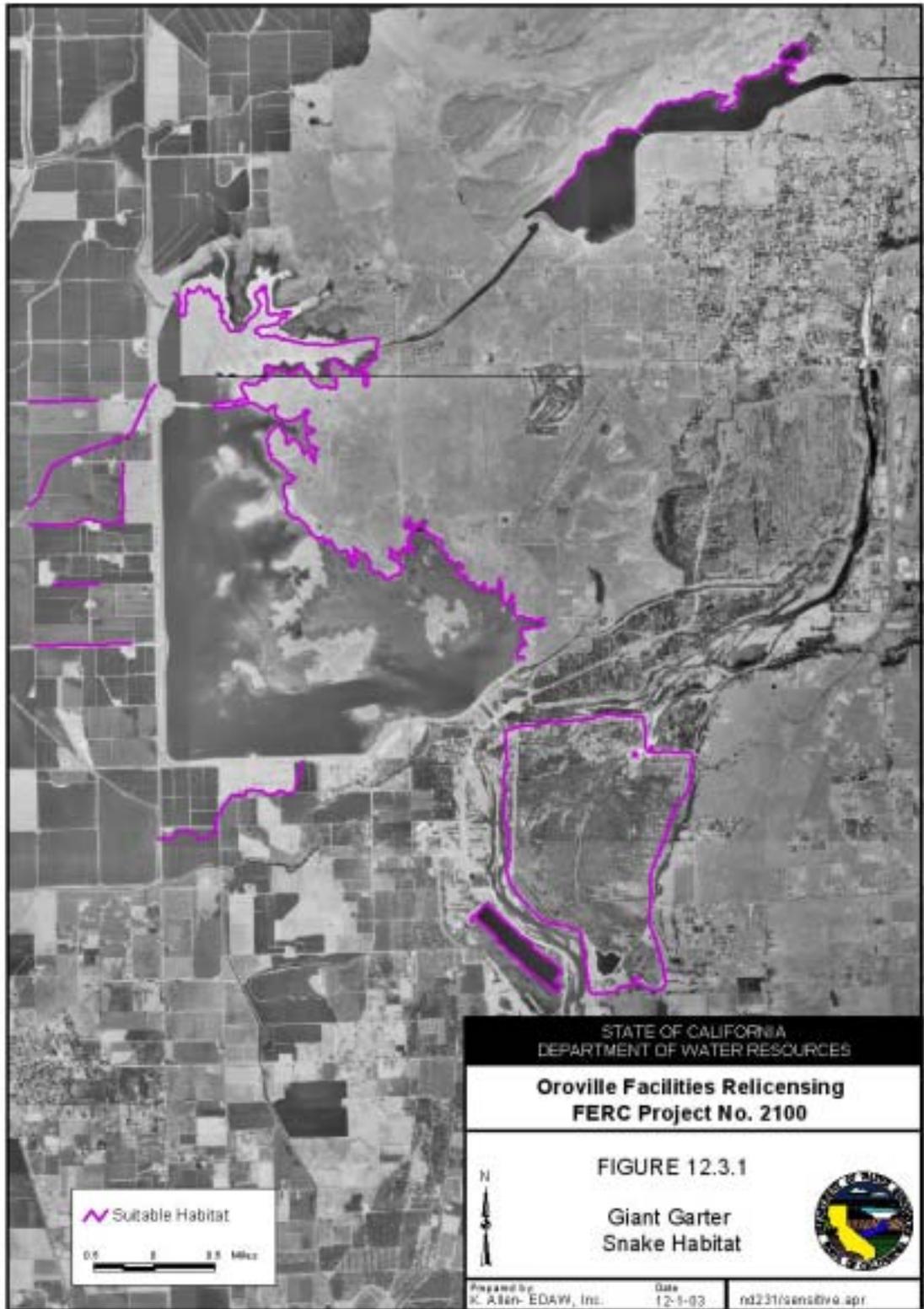
Criteria used in habitat surveys were the presence of the four essential components to GGS habitat: 1) adequate water during the snake's active period, spring through mid-fall; 2) emergent, herbaceous wetland vegetation, such as cattails and bulrushes for escape cover and foraging habitat; 3) upland habitat for basking, cover, and retreat sites; and 4) higher elevation uplands for cover and refuge from flood waters (Miller and Hornaday 1999).

Surveys were conducted during the weeks of August 6 and August 19, 2002. GIS data and maps were utilized to locate each wetland area. Visual surveys were conducted throughout all wetland areas delineated within the GIS maps. All accessible wetland areas within the Oroville Facilities boundary were surveyed. Wetland areas located within the 1-mile FERC boundary and areas on private lands where access was not approved were surveyed as best as possible using binoculars and a spotting scope. In areas that could not be completely surveyed on foot or by vehicle, a canoe was utilized. The canoe was used to survey the edges of large ponds as well as to provide silent access to otherwise inaccessible portions of the study area. A small fishing boat with motor was used to survey the Lake Oroville perimeter. Visual surveys were conducted along the lake perimeter. Where incoming streams were located, the boat was docked and surveys were conducted on foot up to 1-mile upstream.

12.3 RESULTS

Suitable giant garter snake habitat was identified within portions of the Thermalito Forebay, Afterbay, Oroville Wildlife Area, and lands subject to rice agriculture adjacent to the Thermalito Afterbay (Figure 12.3.1). No giant garter snakes were observed during the course of the relicensing studies. However, unconfirmed sightings of this species have been received historically from biologists working near Robinson's Pond (adjacent to the project boundary), Cherokee Canal (2-miles west of the Thermalito Afterbay), and within the Thermalito Afterbay.

There are a number of relatively small, isolated areas along the Feather River that provide potentially suitable habitat for GGS. However, their size and isolation by large, dense stands of riparian woodland and by the swift flow of the Feather River probably



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precludes them from inhabitation by GGS. Additionally, because of the inherent characteristics, many such areas are affected by obviously heavy recreation use.

The shoreline of Lake Oroville is generally an exposed soil-line that lacks emergent vegetation due to continued wave action. Soils in many areas along the lake have been eroded and are currently exposed bedrock or dirt that lacks developed soils. The reservoir banks below the water line, for the most part, are steep and prevent the formation of a littoral zone. The upland slopes above the shoreline are generally steep and the water is far below the upland vegetation. These conditions do not provide habitat conditions for GGS. Small areas near stream inlets with shallower water have a few established plants. However, the plants were too few, and in many cases, were annual species. These conditions do not provide littoral zone habitats or habitat conditions for either the GGS. All incoming streams were also surveyed for potential habitat, and all lacked one or more of the necessary habitat requirements for GGS and CRLF. Most have limited flows and steep gradients. Therefore, there is no potential habitat within the Lake Oroville area to support populations of GGS.

The western and southern edges of the Forebay and Afterbay consist of relatively steep rip-rap edges with little or no emergent vegetation that can be used for cover. These man-made edges also do not have the needed upland habitat for escape or hibernacula (i.e., animal burrows) for GGS. The eastern edges of the Forebay have suitable emergent vegetation but receive recreational pressures from boating ramps, picnic areas and fishing. There are shallow water areas along the eastern edges where water temperatures are likely to warm and where emergent vegetation contributes to suitable habitat conditions. There is potential for GGS to inhabit the more publicly inaccessible areas around the Forebay, but the likelihood is limited and the presence of predatory fish contributes to this limitation.

Habitat conditions around the Afterbay are similar to that of the Forebay. Much of the western edge and the southern edge of the reservoir are of man-made rock embankments that lack requisite emergent vegetation, riparian vegetation, upland vegetation, gentle upland slopes or animal burrows. The eastern and a portion of the northeastern shore provide habitat conditions potentially inhabitable by GGS as do the five waterfowl brood ponds associated with the Afterbay. These ponds are designed and operated to maintain a relatively stable water surface elevation which allows establishment of emergent and aquatic habitat in close proximity to adjacent upland cover.

The rice fields and canals along the western border of the Afterbay have suitable habitat for GGS. These canals are primarily on private property outside of the project boundary. Rice fields and agricultural ditches provide habitat for most of the current populations of GGS (USFWS, 1997), and these areas are expected to have populations of GGS. Further, these canals offer dispersal channels for GGS to eventually move into the OWA waters that have potentially suitable habitat. However, Highway 99 serves as at least a partial barrier to this dispersal habitat.

12.4 EVALUATION OF PROJECT EFFECTS

Potentially suitable GGS habitat is present within the project boundary. However, several factors may serve to limit GGS use of these habitats including

- active management and stocking of non-native predatory fish
- high populations of bullfrog (food item for adults and a predator of young)
- high water surface elevation fluctuations within the Thermalito Afterbay increasing the distance from cover to water for this highly aquatic species, subjecting GGS to predation by herons, egrets, and other predators
- unseasonably cold water in the Thermalito Forebay requiring increased basking to maintain body temperature (basking snakes are exposed to predation)
- habitat fragmentation (little habitat connectivity between areas of potential habitat)
- seasonably high recreation use (disturbance/displacement, habitat degradation and loss)

Resource Actions which limit the introduction or spread of non-native predators and plant communities, provide increased habitat areas with less extreme water surface elevation fluctuations, improve water temperature regimes in the Thermalito Forebay, improve connectivity of areas of suitable habitat, seasonally restrict recreational activity within areas of potential habitat from mid-March through October, restrict future recreational developments within potentially suitable habitat, restore barren or degraded habitats (gravel piles in OWA) to suitable GGS habitat, and create/improve sidechannel habitats would all serve to improve GGS habitat within the project boundary.

13.0 BALD EAGLE HABITAT AND POPULATION SURVEYS

13.1 INTRODUCTION

The USFWS listed the southern bald eagle as an endangered species in March 1967. After a federal status review they were down-listed to threatened in 1995. They are currently proposed for federal delisting (USFWS 1999). This species is currently State listed as endangered.

Bald eagles historically nested throughout California near seacoasts, major rivers, and lakes. Over 160 pairs currently nest in California (up from 28 pair in 1978) while hundreds of additional bald eagles migrate into California during the winter.

Nesting habitat is described as old-growth trees and snags in remote mixed stands near water (Zeiner et al. 1990a). In a 1979 survey of 95 bald eagle nest sites in northern California, 87 percent were in dominant or co-dominant ponderosa pine or sugar pine (Lehman 1979). Associated stands were generally open (less than 40 percent canopy cover), and within one mile of a water body. Approximately one third of the nest sites were within 0.1 miles of a water body and 85 percent of the nests had an unobstructed view of the water body. Seventy percent of the nests were associated with reservoirs.

At least five bald eagle nest territories have been historically documented within the project vicinity. Plumas National Forest, California Department of Parks and Recreation, and Pacific Gas and Electric Company manage the lands occupied by these territories and monitor nest occupancy and success.

13.2 METHODS

The 2002 and 2003 breeding season surveys were conducted on Lake Oroville, Diversion Pool, Thermalito Forebay, Thermalito Afterbay, and along the Feather River within the study area. Surveys were primarily boat based, but both foot and trucks transport was employed in some areas. Surveys involved inspection of potentially suitable nest trees for nests, observation and mapping of areas where adult eagles were present, and following adult eagles to locate nest and determine foraging areas. Repeated visits to areas of regular bald eagle activity occurred whether or not a nest had been identified. All active nest territories were visited at least once per month during the breeding season. A January 2003 midwinter bald eagle census was conducted within the project boundary in coordination with the statewide effort on the same date.

13.3 RESULTS

Three bald eagle nest territories were active (adult bald eagles present during the breeding season) during the 2002 and 2003 breeding season (Table 12.3.1). All three active nest territories were on Lake Oroville. Two historic territories were abandoned. During 2002 all three of the active nest territories had a pair of adult bald eagles present on the nest tree during February. One territory was occupied (adult bald eagles present with incubation behavior observed) in 2002 and produced two fledglings. Two territories

were occupied in 2003 producing a total of four young. No incubation behavior was detected during either survey year at the active territories. However, adult bald eagles continued to be observed sporadically within the vicinity of these territories throughout the breeding season. All of the 2002 fledgling production occurred at a new or previously unknown nest territory.

Table 13.3.1 Bald eagle production within the project boundary during 2002 and 2003

Category	2002	2003
# of active territories	3	3
# of occupied territories	1	2
Production/active territory	0.7	1.3
Production/occupied territory	2.0	2.0

The 2002 bald eagle production was 0.66 fledglings per active nest and 2.0 per occupied nest. During 2003, 1.3 young were produced per active nest and 2.0 per occupied nest. The 2002 level of production is less than recovery plan goals (1.0 per active nest) identified for active nests in the Pacific Recovery Plan (USFWS 1986). Between 1990 and 1997, only three fledglings were documented from nest territories within the study area (Jurek 1997). However, during this period neither searches for new territories or monitoring of production from known territories occurred on a consistent basis.

Several bald eagle nest territories have become established along the Sacramento River below Lake Shasta in the last decade. No nests are known from the Feather River below Lake Oroville. Bank swallow survey crews evaluated potential bald eagle nesting habitat downstream of the study area during the course of the bank swallow population surveys. No large stick nests of adult bald eagles were observed during the course of these surveys.

Bald eagles can be intolerant of human activity during the breeding season. However, tolerance to human activity varies from pair to pair. Human activity can result in nest abandonment and subsequent loss of production (Detrich 1980, Bogener 1980, Lehman 1983). In some cases breeding bald eagles have relocated their nest in response to human activity (Thelander 1973). For these reasons human activity (including Oroville Facilities Relicensing recreation and cultural resources survey efforts) were restricted in the vicinity of all active nest territories during the 2002 and 2003 breeding season.

Winter bald eagle survey data indicate that Lake Oroville receives extensive wintering use by both adult and immature eagles (21 total). Relatively minor bald eagle winter use was recorded at other aquatic habitats within the project boundary.

13.4 EVALUATION OF PROJECT EFFECTS

The identification of a new bald eagle territory on Lake Oroville during the 2002 breeding season required a prompt evaluation of potential impacts for State and Federal

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Endangered Species Act compliance. Both USFWS and DFG were notified concerning the location of the new or previously unknown nest territory. DWR and Department of Parks and Recreation (DPR) jointly evaluated potential impacts to the nest territory. To avoid potential impacts, a primary zone was delineated wherein human activity was restricted during the breeding season. The size and shape of the primary zone was based on observed eagle use, nest location, screening vegetation, and physical topography. Further protection was provided through a shoreline recreation closure, relocation of recreation facilities, and avoidance of new recreational development. USFWS and DFG staffs were informally consulted during the development of protective measures. Further, USFWS staff visited all active nest territories to evaluate the adequacy of previously developed territory management plans. Their recommendations were incorporated into both new and existing territory management plans. These territory management plans are required for State and Federal Endangered Species act compliance and will be submitted as amendments to the current FERC license.

14.0 STATE AND FEDERAL SPECIES OF CONCERN

14.1 INTRODUCTION

Study Plan T2 Task 11 directs that location information be recorded related to all observations of State and Federal Species of Concern (including USFS and BLM sensitive species).

14.2 METHODS

During the course of other Oroville Facilities Relicensing surveys, all observations of State and Federal Species of Concern were mapped. Data collection includes areas within, adjacent, and downstream from the project boundary. Additional information including number of individuals, age, activity, features, and date were recorded in the field and transferred to a GIS database at the end of each field day. It is important to note that no surveys were conducted for special status species (other than those protected under the State and Federal Endangered Species Acts). All sightings recorded were made incidental to other relicensing studies.

14.3 RESULTS

Per USFS request, all observations of special status species on or adjacent to federal lands were mapped. Further, during the course of habitat mapping and field validation on federal lands all observations of habitat elements were recorded. These data are included within Appendix B.

Between February 21, 2002 and September 19, 2003, 1,470 observations of 26 species of State or Federal Species of Concern were added to the GIS database. Species occurrences in order of decreasing number of observations are:

- American white pelican (597)
- double-crested cormorant (300)
- osprey (180)
- black tern (82)
- Northern harrier (72)
- white-faced ibis (42)
- snowy egret (32)
- white-tailed kite (30)
- golden eagle (28)
- loggerhead shrike (20)
- lark sparrow (15)
- Cooper's hawk (13)
- tricolored blackbird (10)
- California gull (10)
- American bittern (9)
- Western pond turtle (6)
- black-crowned night heron (6)

- sharp-shinned hawk (6)
- common loon (4)
- prairie falcon (2)
- yellow-breasted chat (2)
- yellow warbler (2)
- short-eared owl (1)
- ringtail (1)
- burrowing owl (1)
- Barrow's goldeneye (1)

A brief description of the status, habitat requirements, and temporal and spatial distribution of special status species follows. Maps identifying the distribution of each species are presented in Appendix A.

14.3.1 American White Pelican (*Pelecanus erythrorhynchos*) The American white pelican (AWP) is a California Species of Special Concern (Figure 14.3.1). Habitats include rivers, natural lakes, reservoirs, and larger farm ponds containing fish. Historically, white pelicans nested on large lakes throughout California (Grinnell and Miller 1944). This species may travel long distances between forage and resting areas. These pelicans are gregarious, and flocks can contain large numbers of individuals. American white pelicans were observed within the project boundary only on Lake Oroville and the Feather River during the relicensing studies. No observations were recorded on other potentially suitable habitat including the Thermalito Afterbay, Forebay, or Diversion Pool. All pelican observations were recorded during the period from March through July. AWP use was restricted on Lake Oroville to the more open water areas including the main body of the lake, lower South Fork Arm and lower Middle Fork Arm. Large assemblages of AWP were frequently observed on gravel bars along the length of the Feather River during June.

Figure 14.3.1. American White Pelicans



14.3.2 Double-Crested Cormorant (*Phalacrocorax auritus*). The double-crested cormorant, (DCC) a California Species of Special Concern, occurs year-round in the Sacramento Valley and surrounding foothill areas (Figure 14.3.2). This species uses natural lakes, rivers, and reservoirs where fish prey species are present. Snags, unvegetated islands, cliffs, jetties, booms, buoys, and transmission lines are used as perches. Summer use within Sacramento Valley foothill reservoirs is common.

Figure 14.3.2. Double-Crested Cormorant



DCCs were widely distributed within the project boundary in suitable habitat including Lake Oroville, Diversion Pool, Forebay, Afterbay, and along the Feather River above Marysville. DCCs were not detected during December or January at any location. Several communal roost sites were identified along the Feather River and one potential breeding colony location was mapped within the Oroville Wildlife Area.

14.3.3 Osprey (*Pandion haliaetus*). Osprey is a California Species of Special Concern. Ospreys are found on larger lakes, reservoirs, and river systems throughout most of Northern California during spring, summer, and early fall. Suitable nesting habitat requires large, clear, fish-bearing waters with nearby snags, open crown, or dead-topped live trees (Figure 14.3.3).

Figure 14.3.3. Adult Osprey



Ospreys were observed foraging over virtually all the aquatic habitat within the project boundary including several relatively small dredger ponds within the Oroville Wildlife Area. Nesting was observed on the main body of Lake Oroville and along the lower portion of each of the arms of the lake. The highest nesting densities detected were at the Diversion Pool where at least three nests were active during 2002. Nesting along the Feather River was uncommon with two or fewer nests detected each year between the Thermalito Outfall and the mouth. Suitable nesting sites are lacking at both the Thermalito Afterbay and Forebay although ospreys were regularly observed foraging over these project features.

14.3.4 Black Tern (*Chlidonias niger*). Black tern is a State and Federal Species of Concern and a Federal Migratory Nongame Bird of Management Concern. This migratory species occurs in the Central Valley portion of Butte County. Black terns use lakes, ponds, rivers, wetlands, moist grassland, and agricultural habitats. It is unknown if this species currently breeds within the Sacramento Valley.

Black terns were observed in small numbers on the Thermalito Afterbay and Forebay. Larger numbers of individuals were detected foraging over the Feather River near one-mile pond. All black tern observations were during April, May and June. No nesting, attempted nesting, or reproduction was noted within the project boundary.

14.3.5 Northern Harrier (*Circus cyaneus*). The northern harrier, a California Species of Special Concern, is a common year-round resident that uses a variety of open habitats including meadows, wetlands, annual and perennial grasslands. This species seldom uses forest or woodland habitats, although some forest/grassland edge habitats are used. Agricultural habitats that mimic tall dense grasslands or fresh water emergent vegetation types are also used as foraging habitats.

Northern harriers were observed throughout the year within the lower elevations of the project boundary. Highest densities occurred during the winter. Northern harriers were observed only within the more open habitats downstream from the Diversion Pool. Highest use was near the Forebay and Afterbay including extensive winter use of adjacent agricultural habitats. A single foraging harrier was recorded along the Feather River below Marysville. Reproduction was observed along the wetland margin of the Afterbay (Figure 14.3.).

14.3.6 White-faced Ibis (*Plegadis chihi*). The white-faced ibis is classified as a State and Federal Species of Concern (Figure 14.3.4).

This species distribution in California is extremely limited. However, this species is relatively common in the rice-growing regions of the Sacramento Valley. Habitats used include freshwater emergent wetlands, wet meadows, shallow lacustrine, and irrigated or flooded pastures, and croplands. Use of vernal pool habitats is not documented. This species requires extensive tall marsh vegetation for nesting.

Figure 14.3.6. White-Faced Ibis



White-faced ibis were observed infrequently during winter and spring in agricultural fields (rice) west and south of the Thermalito Afterbay and along the Feather River within the project boundary. Neither the Afterbay nor Forebay appear to provide suitable habitat for this species based on observed use.

14.3.7 Snowy Egret (*Egretta thula*). Snowy egret was recently classified as a Federal Species of Concern (Figure 14.3.5). This egret occurs throughout the Central Valley including Butte County. Snowy egrets prefer emergent wetlands, ponds, rivers, lakes, irrigation ditches, and areas of saturated soil including rice fields.

Snowy egrets were observed throughout the year in limited numbers within the project boundary. The highest number of observations occurred in the rice fields west of the Afterbay, the Afterbay, and along the Feather River below the Thermalito Outfall. Snowy egret rookeries were observed at two locations within the portion of the Oroville Wildlife Area bordering the Feather River.

Figure 14.3.7. Snowy Egret



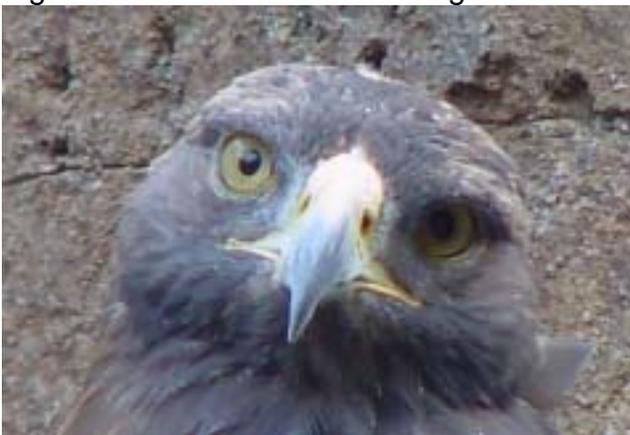
14.3.8 White-tailed kite (*Elanus leucurus*). White-tailed kites are classified as a Federal Species of Concern, Migratory Nongame Bird of Management Concern by the USFWS, and as a Fully Protected Species by the DFG. White-tailed kites are found year-round throughout the Sacramento Valley and adjacent foothill areas. Habitat preference includes open or herbaceous stages of most low-elevation vegetative types primarily grasslands, meadows, farmland, and emergent wetlands. However, white-tailed kites are frequently associated with agricultural areas. Dense stands of trees are used as communal night roost sites.

White-tailed kites were observed throughout the year within the project boundary. Observations of kites were limited to the areas adjacent to the Thermalito Afterbay, Forebay, and Power Canal with one observation of a foraging kite near Robinson's Pond. Successful reproduction was observed at nest locations near both the Forebay and Afterbay during both 2002 and 2003. Although kites utilize open stands of blue oak woodland habitat, no observations were recorded within this habitat type during the course of relicensing studies.

14.3.9 Golden Eagle (*Aquila chrysaetos*). The golden eagle is a California Species of Special Concern and a State Fully Protected Species and also falls under the protection of the Federal Eagle Protection Act (Figure 14.3.9). This large raptor nests throughout Northern California except in the Sacramento Valley or within the dense forests along the North Coast. Extensive wintering use of the Sacramento Valley can occur. This species forages in open habitats including grasslands, savannas, and early seral stages of open shrub and tree habitats.

Golden eagles were observed throughout the year in a variety of upland habitats around Lake Oroville. Golden eagle use was generally concentrated at four locations on Lake Oroville including Canyon Creek, upper Middle Fork Arm, upper North Fork Arm, and the West Branch Arm. Successful reproduction was identified during 2002 at a cliff nest site on the upper Middle Fork Arm.

Figure 14.3.9. Adult Golden Eagle



14.3.10 Loggerhead Shrike (*Lanius ludovicianus*). The loggerhead shrike is a State and Federal Species of Concern and a Federal Migratory Nongame Bird of Management Concern. This shrike occurs in open habitats with infrequent perch sites (trees, shrubs, fences, and power lines). Loggerhead shrikes forage over open, sparse, low herbaceous cover. This territorial species occurs yearlong in Butte County with both resident and migrants present during the winter.

Loggerhead shrikes were observed in small numbers throughout the year near the Forebay and the northern half of the Afterbay. Successful reproduction was detected at both locations during 2003.

14.3.11 Lark Sparrow (*Chondestes grammacus*). The lark sparrow is a Federal Species of Concern and a Federal Migratory Nongame Bird of Management Concern. This species is one of the more common breeding birds within open blue oak habitats. However, a variety of open habitats are used by this year-round resident including grasslands and open riparian habitats.

Surprisingly few lark sparrows were observed during the course of the studies. This species frequently occurs in high densities in open oak habitats. However, the few lark sparrows observed were found in open grassland habitats around the Afterbay during September.

14.3.12 Cooper's Hawk (*Accipiter cooperii*). Cooper's hawk is a California Species of Special Concern. This year-round resident frequents forest edge habitats. However, a variety of nonforest habitats (including agricultural and open grassland habitats) can be used by wintering birds.

Cooper's hawks were occasionally observed in upland habitats along the more narrow portions of Lake Oroville and along the Feather River. Most observations were of wintering or spring use.

14.3.13 Tricolored Blackbird (*Agelaius tricolor*). The tricolored blackbird is a State and Federal Species of Concern and a Federal Migratory Nongame Bird of Management Concern. This colonial, year-round resident of the Sacramento Valley uses freshwater emergent wetland habitats (primarily cattail and tules) for nesting. This blackbird forages on the ground in a variety of habitats including grasslands, croplands, and seasonally flooded areas. Tricolored blackbirds may travel many miles between nesting and foraging areas.

Tricolored blackbirds were detected on only one occasion at one location in grassland habitat near the Thermalito Afterbay. No nesting or attempted nesting was identified. However, portions of the wetland margin at the Afterbay could provide potentially suitable nesting habitat.

14.3.14 California Gull (*Larus californicus*). The California gull is a California Species of Special Concern. This species is abundant within the Sacramento Valley during the nonbreeding season where it frequents lacustrine, riverine, croplands, and landfill sites. California gull breeding occurs only on the east side of the Sierra and Cascades. There is some speculation that this species may have bred historically within the Sacramento Valley. Low-elevation reservoirs near foraging areas are used extensively by wintering California gulls.

California gulls were detected in limited numbers during winter, spring, and summer on Lake Oroville and at the North Forebay. However, gulls are difficult to identify to species without careful and close observations. It is likely that California gulls also occur at all major water bodies within the project boundary including the Feather River, Diversion Pool, and Afterbay.

14.3.15 American Bittern (*Botaurus lentiginosus*). The American bittern is classified as a Migratory Nongame Bird of Management Concern by USFWS (Figure 14.3.15). This species uses emergent wetland habitats and occurs year-round in Butte County.

American bitterns were observed infrequently along the wetland margin of the Thermalito Afterbay, within waterfowl nest cover plantings, and in dense, tall emergent wetland habitat along the Feather River. Observations indicate that bitterns may utilize waterfowl nest cover enhancement areas for breeding.

Figure 14.3.15. American Bittern



Figure 14.3.16. Western Pond Turtle



14.3.16 Western pond turtle (*Clemmys marmorata*) is a California Species of Special Concern and a USFS Sensitive Species. Western pond turtles occur year round in a variety of habitats where permanent or near permanent water are present (Figure 14.3.16).

Western pond turtles were observed only within the portion of the Oroville Wildlife Area bordering the Feather River. A limited number of observations were recorded in dredger ponds. Although no pond turtles were observed in Lake Oroville, infrequent unconfirmed reports by recreational users on

the lake indicate that pond turtles may occasionally be present.

14.3.17 Sharp-shinned Hawk (*Accipiter striatus*). The sharp-shinned hawk is a California Species of Special Concern with a widespread winter distribution in Northern California. Nesting is restricted to a variety of moderate-to-dense, even-aged, single-layered forest habitats including hardwood habitats (black oak and foothill riparian). Proximity to water and northern exposures are attributes preferred for the nest location.

Sharp-shinned hawks were observed in low numbers during spring and fall at several locations within the project boundary. These locations include the Diversion Pool, the South Fork Arm of Lake Oroville, and within the riparian habitat bordering the Feather River.

14.3.18 Black-crowned night heron (*Nycticorax nycticorax*). Black-crowned night herons are a BLM Sensitive Species. This species is a fairly common year round resident within the Sacramento Valley and adjacent foothills (Figure 14.3.18).

Black-crowned night herons forage in aquatic and freshwater emergent wetland habitats. This species is primarily nocturnal forming large aggregations in day roost sites.

This species was infrequently observed at several locations within the project boundary including the Feather River and Oroville Wildlife Area during spring and summer. A large communal roost site was identified in Cherokee Canal approximately two miles west of the Thermalito Afterbay.

Figure 14.3.18. Black-Crowned Night Heron



14.3.19 Common Loon (*Gavia immer*). Common loon is classified as a State and Federal Species of Concern and as a Migratory Nongame Bird of Management Concern. The inland distribution of this species is extremely irregular and associated with large natural lakes and some reservoirs, generally above 5,000 feet elevation. This uncommon wintering species requires deep freshwater lakes with adequate small food fish.

A small number of common loons were observed during the course of relicensing studies during both winter and spring. Habitat use was observed at the Diversion Pool, South Forebay, and South Afterbay. A pair of adult loons was observed foraging together in the South Forebay during May 2003. These birds were not observed subsequently and presumably represent spring migrants rather than nesting birds.

14.3.20 Prairie Falcon (*Falco mexicanus*). The prairie falcon, a California Species of Special Concern, nests in inland portions of the northern Coast Range and winters in this area as well as within the Sacramento Valley. Preferred nesting habitat is a variety of open habitats (primarily perennial grasslands, savannas, rangeland, or open agricultural types) with a nearby sheltered cliff ledge. Winter migrants use a variety of open habitats.

Two winter observations of foraging prairie falcons were recorded along the Power Canal between the Thermalito Powerplant and the Afterbay. This species had previously been documented to nest on cliffs near Lime Saddle. No observations of this falcon in the Lime Saddle area occurred during relicensing studies.

14.3.21 Yellow-breasted Chat (*Icteria virens*). This uncommon warbler is classified as a California Species of Special Concern and a Federal Migratory Nongame Bird of Management Concern. This migratory species arrives in California during April and departs by October. Nesting habitats consist of dense riparian understory and other

dense shrub habitats near water. Both willow and blackberry patches are used extensively.

Two summer observations of yellow-breasted chat occurred while conducting yellow-billed cuckoo population surveys within dense riparian/shrub habitat within the Oroville Wildlife Area.

14.3.22 Yellow Warbler (*Dendroica petechia brewsteri*). The yellow warbler is a California Species of Special Concern. This migratory warbler occurs in a variety of woodland and forest habitats in Northern California during the breeding season (April through September). This species prefers open to moderate density forests or woodlands with a dense shrub understory. Yellow warblers are most common in open canopy riparian deciduous habitat.

Two yellow warblers were identified during September in a narrow strip of willows bordering the South Forebay.

14.3.23 Short-eared Owl (*Asio flammeus*). The short-eared owl is a California Species of Special Concern and a Federal Migratory Nongame Bird of Management Concern. Short-eared owls occur in open habitats including perennial grasslands, irrigated pasture, and wetlands. Forest and woodland areas are avoided.

A single adult short-eared owl was flushed from a small dense patch of emergent wetland habitat during waterfowl nest surveys. The Afterbay margin and surrounding agricultural habitats provide potentially suitable nesting and wintering habitat.

14.3.24 Burrowing Owl (*Athene cunicularia*). The burrowing owl is a State and Federal Species of Concern and a Federal Migratory Nongame Bird of Management Concern (Figure 14.3.24). This semi colonial, year-round resident uses grassland habitats and a variety of early successional stages of open shrub and forest vegetative types where suitable burrows and perches are present.

No burrowing owls were detected within the project boundary. A single observation was made about 450 feet north of the Thermalito Afterbay fence line on private grazed lands. A small colony of burrowing owls had historically been recorded in this area. Individual burrowing owls have also been detected historically south of the South Forebay on private lands.

Figure 14.3.24. Burrowing Owl



14.3.25 Barrow's Goldeneye (*Bucephala islandica*). Barrow's goldeneye, a California Species of Special Concern, is an uncommon winter visitor to California. No breeding by this secondary cavity nester has been documented within California for many years. Nesting habitat is near alkaline lakes or slow moving rivers with abundant submerged aquatic vegetation and open water. Wintering habitats are riverine and lacustrine waters with rocky bottoms.

A single adult male Barrow's goldeneye was observed in the Foreman Creek area of Lake Oroville during May 2003. Presumably this sighting represents a spring migrant moving through the area on its way to higher elevations.

14.3.26 Ringtail (*Bassariscus astutus*). Ringtail, a State Fully Protected Species, is a common resident species in riparian, early seral stages of forest habitats, and shrub habitats. Suitable ringtail habitat is described as mixture of forest and shrub habitats near rocky areas or riparian habitats (Zeiner and others 1990c).

Only one sighting of this nocturnal mammal occurred during the course of field studies. This sighting was a road killed individual within the Feather River Canyon below Oroville Dam. Suitable ringtail habitat exists throughout the project boundary excluding the more open grassland habitats near the Thermalito Afterbay and Forebay.

15.0 VERNAL POOL INVERTEBRATE HABITAT ASSESSMENT

15.1 INTRODUCTION

The study area is known to be within the range of three federally listed eubranchiopod species, the vernal pool fairy shrimp *Branchinecta lynchi* (Threatened), the Conservancy shrimp *Branchinecta conservatio* (Endangered), and the vernal pool tadpole shrimp *Lepidurus packardii* (Endangered).

DWR performed this assessment to identify the potential impacts to the habitat for listed and unlisted vernal pool crustaceans (Figure 1.4.1). The intent of this assessment is not to perform protocol-level surveys for listed species of vernal pool crustaceans (as per USFWS 1996 "Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods.") throughout the relicensing study area. Rather, any issues related to the presence or absence of any listed species of vernal pool crustaceans would be dealt with on an individual project-level basis.

The tadpole shrimp *Lepidurus packardii* is federally listed as an endangered species. This tadpole shrimp species is found in vernal pools throughout the Sacramento Valley, and is reported to occur in Butte County (Christopher Rogers, pers. comm.). Typically *Lepidurus packardii* is green in color, but may be mottled with brown in highly turbid water. *Lepidurus packardii* is omnivorous and generally forages on the bottoms of pools in dense vegetation. Tadpole shrimp tend to be slow growing and are usually collected after the vernal pool has been ponded for 30 days.

The Conservancy shrimp *Branchinecta conservatio* is federally listed as an endangered species. This species is reported from large (> 1.2 acres) and deep (> 6 inches) turbid alkaline pools. This species of fairy shrimp has an extremely disjunct distribution; *Branchinecta conservatio* is known from Tehama and Butte counties, in the northern part of the Sacramento Valley, Solano County at the Jepson Prairie, Merced County, in the San Joaquin Valley near Haystack Mountain, and an isolated occurrence from northeastern Ventura County (Eriksen and Belk 1999).

The vernal pool fairy shrimp *Branchinecta lynchi* is federally listed as a threatened species. This shrimp species is found in vernal pools throughout the Central Valley and western Riverside County in California, and near Medford, Oregon (Eriksen and Belk 1999). This fairy shrimp species occurs in neutral to slightly alkaline vernal pools throughout the California Central Valley, and in rock outcrop pools along the Interior Coast Ranges, south of the Sacramento River Delta.

Typical habitat for fairy shrimp and tadpole shrimp in California include vernal pools, ponded areas within vernal swales, rock outcrop ephemeral pools, playas, alkali flats, and salt lakes (Eng et al. 1990). Pool volume is important in determining potential shrimp habitat because deeper pools with a large surface area can more easily maintain

their dissolved oxygen levels. Similarly, deep pools will pond long enough to allow the shrimp to complete their life cycle.

Figure 15.1.1. Typical Vernal Pool Habitat



15.2 METHODS

The initial phase of the assessment of the vernal pools included checking for known occurrences of listed eubranchiopods within or adjacent to the project boundary. The USFWS Endangered Species Office and other professionals were contacted for possible past surveys within or near the study area. The DFG California Natural Diversity Database (2000) was checked for reported occurrences.

The USFWS National Wetland Inventory was checked for recorded wetlands within the study area. Since aerial photographs were not yet available at the time, the survey consisted of walking in a 10-meter grid pattern through most areas. Some of the vernal pools (75 percent) were initially mapped in the summer and fall of 2001. In spring of 2002, the previously mapped pools were checked and verified. Those that did not have evidence of vernal pool vegetation or prolonged pooling were dropped from consideration. The remaining 25 percent of pools were found during this survey.

Each pool was located with the GPS and mapped in ArcView GIS. Outlines of pools were digitized on rectified aerial photographs in ArcView for acreage amounts. Only areas within the project boundary or immediately adjacent areas where project effects to individual pools are possible were considered in this assessment.

15.3 RESULTS

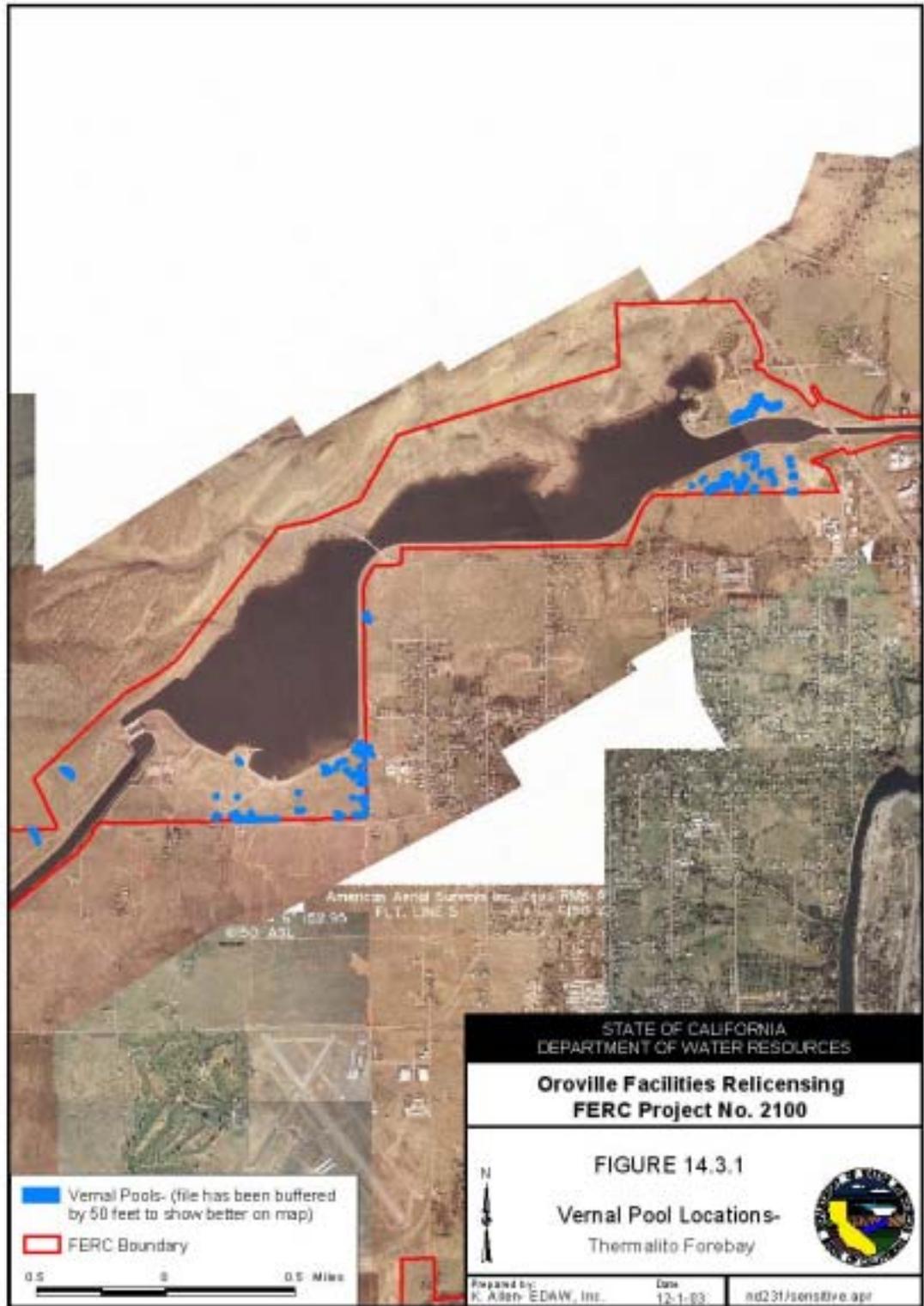
Within the project boundary, there are 230 vernal pools totaling 17.2 acres, ranging from 0.002 to 3.9 acres in size (Figure 15.3.1). One-hundred and sixty-seven of these pools are around the Thermalito Afterbay, with the remaining sixty-three pools around the Forebay. Approximately 80 percent of the pools within the study area are formed by the interruption of natural runoff flow patterns by some artificial structure, such as a road,

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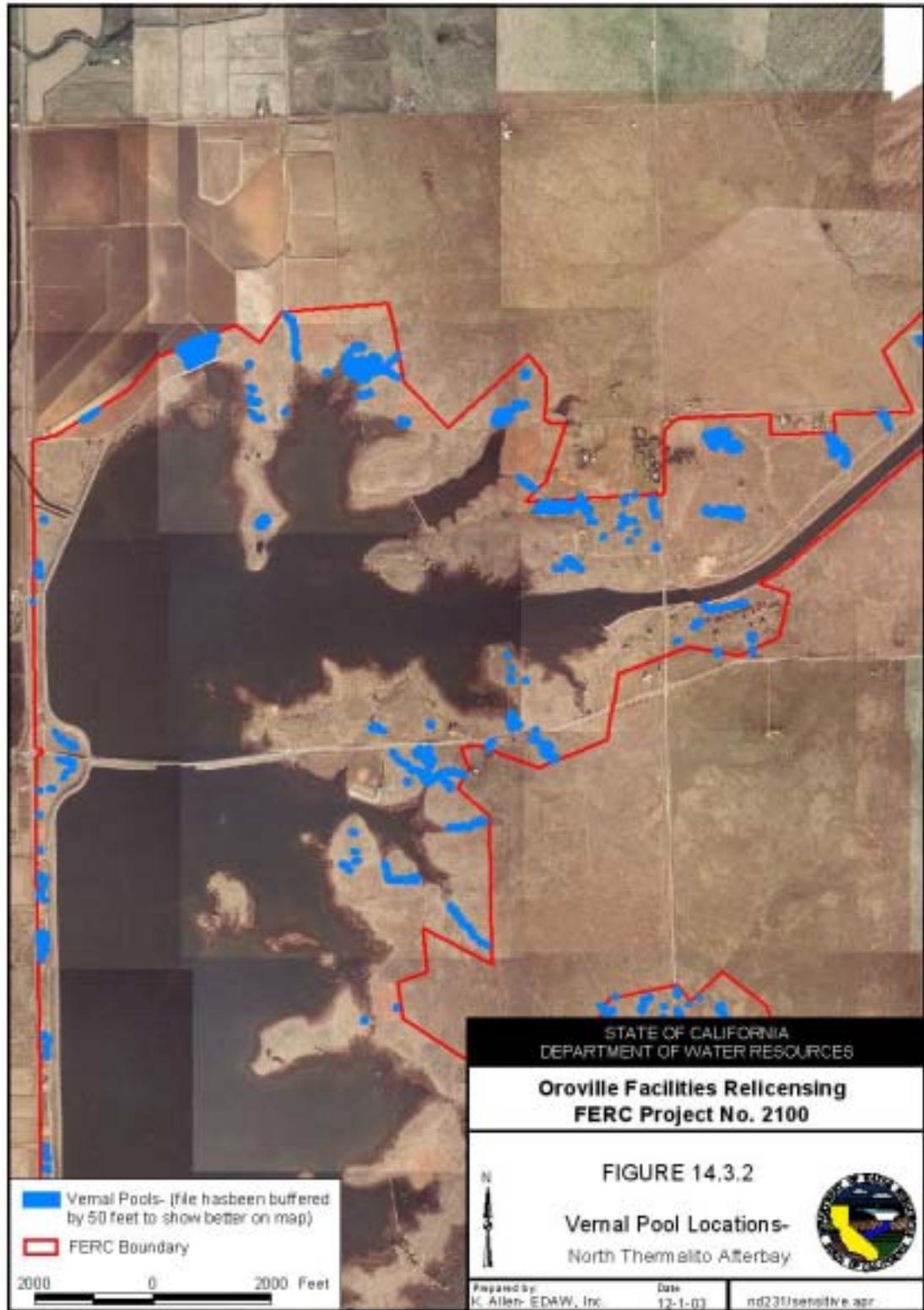
berm, weir, or levee. Approximately 60 percent of the pools occur in two clusters, the south end of Wilbur Road (with 83 pools) and the South Forebay boat ramp area (with 47 pools).

15.4 EVALUATION OF PROJECT AFFECTS

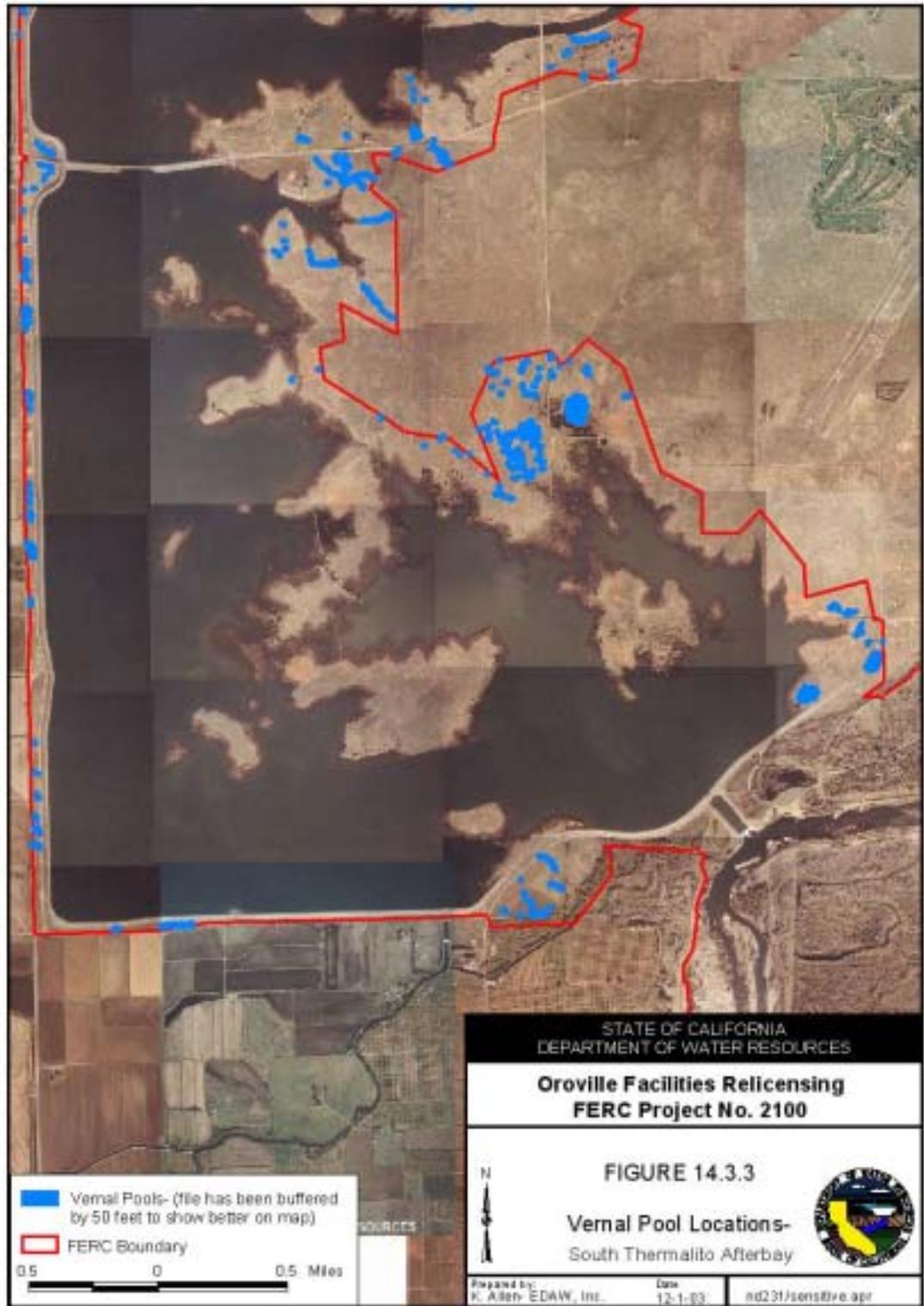
Vernal pool specialists evaluated each vernal pool to identify potential project related impacts. Opportunities for modification of current maintenance practices, land use, and recreational use were identified. Per the Study Plan, DWR developed a management plan for areas containing vernal pools. Development of this plan was coordinated with other agencies including DPR, DFG-Oroville Wildlife Area staff, and CALTRANS. Butte County Mosquito Abatement chose not to comment on or review the plan. The goal of this plan is to insure that areas containing vernal pools are managed in a coordinated fashion to protect, maintain, or enhance vernal pool habitats. USFWS was informally consulted during the development of this plan. The final Vernal Pool Land Management Plan will be submitted to USFWS and contains modification of existing maintenance and land use practices in areas adjacent to vernal pool habitats including changes to reduce or eliminate potential impacts resulting from sedimentation, earth moving, disking, off-road vehicle use, and pesticides.



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15-4



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15-6

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APPENDICES

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APPENDIX A. DISTRIBUTION OF SPECIAL STATUS SPECIES OBSERVATIONS
WITHIN THE PROJECT BOUNDARY

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APPENDIX B. FEDERAL LANDS INVENTORY (SPECIAL STATUS SPECIES
DISTRIBUTION RELATIVE TO FEDERAL LANDS AND CWHR HABITAT ELEMENTS
CHECKLIST BY FEDERAL PARCEL)

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