

TECHNICAL MEMORANDUM 3-6

Special-Status Turtles – Western Pond Turtle

Yuba River Development Project FERC Project No. 2246

December 2012

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TECHNICAL MEMORANDUM 3-6 EXECUTIVE SUMMARY

In 2012, Yuba County Water Agency (YCWA) mapped potentially suitable habitat for western pond turtle (*Actinemys marmorata*), assembled information associated with incidental observations or western pond turtle (WPT) reported during various YCWA Relicensing studies, and performed surveys for basking WPT at nine sites inside the Yuba River Development Project's (Project) FERC Project Boundary and four sites on stream reaches that may be affected by the Project.

Potential nesting (i.e., oviposition) habitat around New Bullards Bar Reservoir, Our House Diversion Dam Impoundment, Log Cabin Diversion Dam Impoundment, and stream reaches was identified and mapped from available Geographic Information System data layers corresponding to attributes of WPT nest sites reported in scientific literature. YCWA used existing helicopter video and publically available aerial photography to identify and describe stream reaches according to the occurrence of habitat features pertinent to suitability for WPT.

Potentially suitable deep pools and backwaters occur to varying extent along most of the stream reaches affected by the Project, although habitat in Oregon Creek downstream of Log Cabin Diversion Dam is limited to a few deeper mid-channel pools and suitable basking areas under the dense riparian canopy are also scarce.

In the Middle Yuba River, downstream of Our House Diversion Dam, there are numerous midchannel and scour pools with adequate basking substrate, riparian vegetation, and sun exposure located throughout the reach. Downstream of Oregon Creek, suitable habitat occurred in the vicinity of Yellowjacket and Moonshine creeks, and at several other segments upstream of River Mile 0.3.

Conditions along the North Yuba River downstream of New Bullards Bar Dam are generally unsuitable for WPT. Although there are a few large, deep mid-channel pools with boulder and bedrock basking substrate, little or no potential nesting habitat or potential habitat for juvenile WPT was identified.

Along the Yuba River, habitats potentially suitable for WPT include numerous mid-channel, scour pools located upstream of Englebright Reservoir and downstream of Timbuctoo Bend.

Near shore areas on the United States Army Corps of Engineer's (USACE) Englebright Reservoir may also provide aquatic habitat in areas with suitable basking substrate and underwater hiding habitat.

Confined bedrock valley forms occurred on the Yuba River below the USACE's Englebright Dam (i.e., The Narrows), upstream of New Colgate Powerhouse, North Yuba River above the confluence with Middle Yuba River, and Middle Yuba River near Our House Dam. In these

stream reach sections, WPT likely does not occur because necessary terrestrial habitats are absent or inaccessible.

New Bullards Bar Reservoir contained relatively few areas with habitat features potentially attractive to WPT and persistent with changing water surface elevation. The presence of downed wood, shoreline vegetation, and banks that were suitable for basking and underwater hiding cover changed over the course of the summer as reservoir water surface elevation declined. Vegetated, shallow water areas necessary for juvenile WPT occurred infrequently and were limited to the mouths of some tributaries.

Potentially suitable nesting habitat at New Bullards Bar Reservoir generally occurs in small, scattered patches. Mapped nesting habitat was scarce or absent at Our House Diversion Dam, and limited to a small patch within Log Cabin Dam Impoundment. Along Project-affected reaches mapped nesting habitat was generally found in lower-gradient stream sections in relatively open valleys.

At New Bullards Bar Reservoir, a total of six sites were surveyed, each on two separate dates. One or more WPT detections were recorded at three sites, situated in Willow Cove, Tractor Cove, and Moran Cove. Nine detections occurred that included eight adults and one sub-adult. At least two of the detections represented repeat observations of the same individual. The greatest number of detections (n=5, including one incidental observation during basking platform deployment) were at Willow Cove. All of the detection locations correspond to areas where WPT were historically documented. There are also historical records of WPT near Garden Point; however, there were no detections of WPT during basking surveys at the two sites near Garden Point Campground. There were no WPT detections at the survey site in the north arm of the reservoir, where there are also no historical records of WPT.

At Our House Diversion Dam Impoundment, no WPT were detected during three basking survey visits at four sites. Two of the three surveys were conducted while the Project was diverting water through the Lohman Ridge Tunnel. The absence of WPT was consistent with previous surveys at the impoundment in 2010 (PG&E and NID 2011).

One adult WPT was detected at Log Cabin Diversion Dam Impoundment over three survey visits (two while the Project was diverting through the Camptonville Tunnel), with verifiable repeat observations of the same individual. This WPT basked at different locations ranging from 80 to 360 feet from the diversion tunnel intake during the periods when the tunnel was diverting, and 65 to 80 feet from the tunnel when the tunnel was not diverting.

A total of four sites were surveyed on stream reaches that may be affected by Project flows: one on the Middle Yuba River, Our House Diversion Dam Reach; two on the Middle Yuba River, Oregon Creek Reach; and one on the Yuba River, Middle/North Yuba River Reach. Each site was surveyed on two separate dates. A total of eight WPT detections were recorded during surveys, all on Middle Yuba River sites. There were three detections (all adult WPT) at the Oregon Creek Reach site at Yellowjacket Creek and five, including one sub-adult, on the same reach at Moonshine Creek. There were no detections at the Our House Diversion Dam Reach site or the Yuba River site. The study was conducted in conformance with the FERC-approved Special-Status Turtles – Western Pond Turtle (Study 3-6), with two variances. First, during consultation with Relicensing Participants, YCWA, California Department of Fish and Game and United States Department of Agriculture, Forest Service collaboratively agreed to add four basking survey sites on Project-affected reaches outside of the Project Boundary with a commensurate reduction in survey effort on New Bullards Bar Reservoir. Second, the FERC-approved study specified the study would be complete by the end of September 2012. The quality assurance/quality control review of study results took longer than anticipated resulting in a slight delay of study completion. The delay did not affect the study or overall Relicensing schedule.

YCWA met with Relicensing Participants on September 16, November 8, and November 14, 2012 to review available results of this study and discuss the need for and nature of additional limited scope studies. Based on these discussions, YCWA and the Forest Service, USFWS, CDFG and State Water Resources Control Board (SWRCB) collaboratively agreed that YCWA will include in its Initial Study Report, which will be filed with FERC on December 3, 2012, a new study proposal for a focused WPT study in 2013. The agencies agreed they would not make additional study requests to FERC related to WPT in response to the Initial Study Report and Initial Study Report meeting summary.

The study is complete.¹

¹ If FERC adopts YCWA's proposed 2013 focused WPT study, it would be a new study, not a modification of Study 3.6.

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TECHNICAL MEMORANDUM 3-6 SPECIAL-STATUS TURTLES – WESTERN POND TURTLE²

Yuba County Water Agency (YCWA) continued operation and maintenance (O&M) of the Yuba River Development Project, Federal Energy Regulatory Commission (FERC or Commission) Project Number 2246 (Project) may potentially have an adverse effect on western pond turtle (WPT) (*Actinemys* [formerly *Emys* or *Clemmys*] *marmorata*), which is considered a Forest Sensitive Species by the United States Department of Agriculture, Forest Service (Forest Service), and a Species of Special Concern by the California Department of Fish and Game (CDFG).

1.0 <u>Goals and Objectives</u>

The goal of the study was to develop information concerning WPT associated with the Project reservoir and impoundments, Project-affected stream reaches, and related Project recreation features or activities.

The specific objectives of the study were to collect information to meet the study goal, including: 1) identify, compile, and map known occurrences of WPT, including life history stage and associated habitat information as available. At a minimum: produce a map of known occurrences with a supplemental table that includes information on the exact location, date found, how many individuals, if available; and the source of the sighting (e.g., museum database and agency record); 2) identify habitats in the study area potentially suitable for WPT, including potential nesting habitat, and evaluate the suitability of these habitats for the species; 3) perform biological surveys in suitable habitats where there is a Project nexus; and 4) compile incidental observations of WPT and other aquatic special-status species and non-native amphibians, turtles, and crayfish from other aquatic studies.

2.0 <u>Methods</u>

2.1 Study Area

The study area for mapping consisted of aquatic habitats within the existing FERC Project Boundary³ and stream reaches affected by the Project up to 0.5 mile (mi) from the normal maximum water surface elevation (NMWSE) of Project reservoirs and normal high water line of Project-affected stream reaches (Figure 2.1-1). Stream reaches potentially affected by the

² This technical memorandum presents the results for Study 3.6, Special-Status Turtles – Western Pond Turtle, which was included in YCWA's September 8, 2011 Revised Study Plan for Relicensing of the Yuba River Development Project, and approved by FERC in its September 30, 2011 Study Plan Determination. There were two variances to Study 3.6 subsequent to FERC's September 30, 2011 Study Determination, as described below in Section 6.0.

³ The existing FERC Project Boundary is the area that YCWA uses for normal Project operations and maintenance, and is shown on Exhibits J, K, and G of the current License.

Project include: 1) the Middle Yuba River from and including Our House Diversion Dam Impoundment to the confluence with the North Yuba River; 2) Oregon Creek from and including the Log Cabin Diversion Dam Impoundment to the confluence with the Middle Yuba River; 3) the North Yuba River from and including New Bullards Bar Dam Reservoir to the confluence with the Middle Yuba River; and, 4) the Yuba River from the confluence of the North and Middle Yuba rivers to the United States Army Corps of Engineers (USACE's) Daguerre Point Dam.

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Figure 2.1-1. Study area for Study 3.6, Special-Status Turtles – Western Pond Turtle.

The FERC-approved study stipulated that WPT survey locations were to be confined to habitat inside the FERC Project Boundary. However, YCWA agreed to a request from Relicensing Participants to perform surveys at several suitable locations outside of the Project Boundary.

2.2 Study Methods

The study was conducted in four steps, each of which is described below. Prior to surveys, the appropriate CDFG scientific collection permits were obtained.

2.2.1 Map Occurrences

YCWA mapped known occurrences of WPT based on a query of the California Natural Diversity Data Base (CNDDB), the Tahoe National Forest (TNF) (Geographic Information System [GIS] data and Access database), review of on-line museum record data from California Academy of Sciences (CAS 2010) and Museum of Vertebrate Zoology (MVZ 2010), Vindum and Koo (1998), and consultation with Forest Service biologist M. Tierney. The map was supplemented with a table that included information on the exact location; date found; how many individuals, if available; and the source of the sighting.

2.2.2 Identify and Map Potential Habitat

YCWA reviewed existing and readily available sources to identify areas of potentially suitable aquatic habitat and oviposition (i.e., egg-laying or "nesting") habitat for WPT based on the description of habitat elements in the scientific literature. Data sources included Google Earth® imagery, the Project helicopter video (YCWA 2010), National Wetland Inventory maps, United States Geological Survey 1:24,000 topographic quadrangles, LANDFIRE (2010) geospatial data, and Soil Survey Staff (2012) Soil Survey Geographic Databases for the study area.

Potential WPT nesting habitat was identified and mapped in GIS, based on certain attributes associated with known WPT nest sites, including distance from aquatic habitats, percent slope, aspect, and soil type (Holland 1991, PG&E and NID 2008). The mapping criteria were defined as follows:

- Within 100 meters (m) of a Project reservoir or impoundment and other water bodies associated with the Project
- Slope of 2 to 15 degrees
- Southeast, south or southwest aspect
- Canopy cover of less than 10 percent
- Compacted soils of clay or loam

Soil type data were interpreted based on upper horizons described as sandy or loamy, but also soil types that were identified as "gravelly" or "very gravelly loam." These soils may be marginal for nesting, but were included because they sometimes also contain soils that are more

suitable for WPT oviposition. Canopy cover data were interpreted based on the LANDFIRE (2010) Existing Vegetation Cover (EVC) layer, which represents the vertically projected percent cover of the live canopy layer. EVC layers were cross checked with aerial photography of the study area to determine vegetation classes that met the mapping criterion of less than 10 percent canopy cover. Numerous areas of exposed shoreline on New Bullards Bar Reservoir were inventoried as having up to 40 percent tree cover. Thus, tree cover layers up to 40 percent were included in the nesting habitat mapping. The lower elevation limit for nesting habitat mapping around New Bullards Bar Reservoir was approximately 1,920 feet (ft), which is the mean daily reservoir water surface elevation for May 1 to July 31 from Water Year (WY) 1970 through 2009. WPT oviposition is believed to occur most often in the May through July period (Ashton et al. 1997, Holland 1994, Reese 1996).

A field reconnaissance was conducted on November 17 and 18, 2011 at specific locations on New Bullards Bar Reservoir to assess onsite habitat conditions where other data sources were not adequate to this purpose. Sixty-five locations were examined, logged by Global Positioning System (GPS), photographed from various angles, and assessed as potential basking survey sites. A habitat assessment form was completed at 13 locations which contained potential basking and underwater hiding habitats. Pertinent habitat characteristics recorded during the field reconnaissance included habitat type, hydrologic regime, vegetation types (e.g., aquatic, emergent, overhanging, and canopy), bank gradient, and aquatic substrate. Potential basking habitat and viewing locations for each location considered for designation as a survey site (see Section 2.2.3) were also noted. At Our House Diversion Dam and Log Cabin Diversion Dam impoundments, field reconnaissance to identify the more suitable survey site locations was performed on March 1, 2012.

2.2.3 Select Survey Sites

YCWA selected representative sites with potentially suitable aquatic habitat inside the FERC Project Boundary for visual surveys for basking WPT. Survey sites were designated for New Bullards Bar Reservoir, Our House Diversion Dam Impoundment, and Log Cabin Diversion Dam Impoundment. At each of the two diversion impoundments, the survey viewing locations were treated as sub-sites of a single survey site. The selection of survey sites took into account site-specific conditions, including safety, accessibility (i.e., road or trail access and topography), permission from landowners to survey on private lands, and potential impacts from Project O&M.

YCWA consulted with interested and available Relicensing Participants regarding sampling locations on May 9, 2012, and agreement was reached on all survey sites. YCWA agreed to add four survey sites on Project-affected stream reaches, with one site on the Yuba River, Middle/North Yuba River Reach; one site on the Middle Yuba River, Our House Diversion Dam Reach; and two sites on the Middle Yuba River, Oregon Creek Reach. Field reconnaissance to select viewing locations for the surveys was completed on May 22 and 23, 2012. As a result, the following 13 WPT survey sites were agreed to:

- New Bullards Bar Reservoir⁴
 - ▶ NBBR-18/19 Willow Cove (associated with mouth of Willow Creek)
 - ▶ NBBR-25 Tractor Cove
 - ▶ NBBR-26 South of Tractor Cove
 - ▶ NBBR-32 East of Garden Point
 - ➢ NBBR-33 − Garden Point
 - ➢ NBBR-56 − Alabama Bar
 - ➢ NBBR-64 − Moran Cove
- Our House Diversion Dam Impoundment: sub-sites OHDD-1, -2, -3, and -4
- Log Cabin Diversion Dam Impoundment: sub-sites LCDD-1, -2, -3, and -4
- Middle Yuba River, Our House Diversion Dam Reach: MYROHD-1 upstream of Oregon Creek
- Middle Yuba River, Oregon Creek Reach
 - ➢ MYROC-1 − near mouth of Yellow Jacket Creek
 - ➢ MYROC-2 − near mouth of Moonshine Creek
- Yuba River, Middle/North Yuba Reach : YR-1 upstream of New Colgate Powerhouse

Figure 2.2-1 shows the WPT habitat assessment and survey sites.

⁴ Site numbers retained numbering used during habitat assessment field reconnaissance.



Figure 2.2-1. WPT habitat assessment locations and basking survey sites.

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2.2.4 Conduct Surveys and Compile Incidental Observations

The distribution of WPT was evaluated by three means: 1) visual surveys for basking WPT at the 13 selected, suitable sites within the Project Boundary and Project-affected stream reaches; 2) compilation of opportunistic observations occurring incidentally during other field studies for the Relicensing (e.g., foothill yellow-legged frog surveys, instream flow study, fish surveys, and botanical surveys); and 3) WPT trapping results for Study 3-11, Entrainment.

2.2.4.1 Visual Surveys

An artificial, floating, basking platform (i.e., a rectangular wood board with floatation tubes at one end and a tethered anchor) was deployed at each of the 13 survey sites at least five days prior to the first survey to supplement existing basking substrates. The use of basking platforms is an efficient and effective technique that has been shown to substantially increase detection rates, particularly where existing basking substrates are limited (Alvarez 2006).

Two surveys were conducted at each site on New Bullards Bar Reservoir and at the four sites on Project-affected stream reaches during the weeks of May 29, June 6, and July 7, 2012. Four survey sub-sites at the Our House Diversion Dam Impoundment and the four survey sub-sites at Log Cabin Diversion Dam Impoundment were surveyed on three occasions during the weeks of May 29, June 6, and July 7, 2012, with two of the survey visits occurring when water was being diverted into the tunnels.

Surveys for basking WPT were performed at each survey site by one observer equipped with binoculars and a tripod-mounted spotting scope. Surveys were conducted under sunny conditions for a period of up to 2 hours per survey site. On most dates, the surveys were performed from two access points (i.e., four survey sites per day). The first two surveys of each field day were timed to occur in early morning, with observers arriving before potential basking substrates were sunlit, thereby increasing the likelihood of observing WPT as the turtles emerged to begin basking. The next two surveys each day were performed in the afternoon. Observers followed survey recommendations, as described by Reese (undated), to: 1) approach sites slowly and quietly; 2) assume a concealed, stationary position from which to view potential basking substrates when they are sun-exposed; and 3) observe the site with binoculars and spotting scope.

A WPT data sheet was completed for each survey. The specific information collected at each site included: date; observer; start and end time; general weather description; air and water temperature; average wind speed; estimated water velocity; description of potential basking sites (e.g., sunny rocks, open banks, fallen logs, and other); aspect (i.e., sun facing direction) of area being surveyed; potential aquatic and streamside refugia; and type(s) of adjacent upland habitat. Changes in weather conditions during surveys that could affect WPT detection (e.g., increased cloud cover or wind) were noted. In addition, the surveyor recorded the time and type of potential disturbances, such as passage of motor boats. All survey sites were photographed from multiple vantage points, and the locations of turtle sightings were marked on a sketch of the site.

For each WPT detection during a survey, the following data were collected: the species, number, estimated length, and location within the site; presence and name of exotic plant species;

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presence of exotic turtles or bullfrogs; percent overhead canopy; percent submergent and emergent vegetation; type of upland and riparian vegetation community; presence and type of potential aquatic refugia (e.g., undercut banks, submerged tree roots, woody debris, rock crevices, aquatic submerged vegetation, emergent vegetation, and floating material); and presence and type of any recent site disturbance. Survey sites were assessed for the presence of American bullfrog, an introduced species that is known predator of small WPT (Holland 1994), by listening for calls, scanning suitable areas with binoculars or spotting scope for egg masses and basking frogs, and looking in shallow edges for larvae. For surveys at Log Cabin Diversion Dam and Our House Diversion impoundments, data included noting the distance between observed WPT, if one was observed, and the diversion tunnel intake.

Active searches for juvenile WPT were conducted at suitable habitat (e.g., vegetated shallow edgewater) in and upstream of Log Cabin Diversion Dam Impoundment. Searches were performed by wading the impoundment and either using nets or visually scanning for juvenile WPT. Our House Diversion Dam Impoundment lacked suitable habitat for juvenile WPT; as such, searches were limited to traversing the shoreline and conducting visual scans for juvenile WPT.

Records of special-status species observations were submitted to the CNDDB on September 26, 2012.

2.2.4.2 Incidental Observations

YCWA compiled incidental observations of WPT noted during performance of other Relicensing studies. Data associated with these incidental observations included evidence of identification (e.g., a photograph or verified comparison to identification guides differentiating exotic turtles, such as red-eared slider [*Trachemys scripta*]), estimated size, turtle behavior (e.g., basking on log), location, time, and a brief description or photograph of the habitat. In addition, incidental observations of other aquatic special-status species and non-native amphibians and crayfish were compiled.

2.2.4.3 Trapping for Entrainment Study

Under Study 3.11, Entrainment, a total of three basking traps and four hoop-net traps baited with canned sardines and cat food were placed at locations in Log Cabin Diversion Dam Impoundment and in a pool 0.3 miles upstream of the impoundment on July 23 to July 28, 2012. Searches for juvenile WPT were also performed during the same period using dip-nets in suitable habitat (i.e., shallow, densely vegetated pools and isolated side channel pools).

3.0 <u>Results</u>

3.1 Historical and Recent WPT Records in the Project Vicinity

Historical records of WPT include the following locations: several sites near tributaries of Grizzly Gulch, a tributary of Oregon Creek; two locations about 2 mi southeast of New Bullards

Bar Dam near Little Willow Creek (tributary of Middle Yuba); several ponds in the Cherokee Diggins area (an area of historical mining, with numerous mining legacy ponds); in and near the Yuba Goldfields; and north of Jones Bar. Although some of the records lack details, most of the locations are evidently ponds. As noted in Forest Service (2011b), Forest Service Biologist A. Lind has observed WPT in Oregon Creek above the Log Cabin Diversion Dam Impoundment and Fisheries Biologist D. Teater has observed WPT at the impoundment. A summary of WPT known occurrences in the Project vicinity is provided in Table 3.1-1.

Occurrence	Location		Description and Location	
Occurrence	UTM E	UTM N	of Occurrence in Relation to Project Facilities	
	659128	4367914	3 adults, observed 6/10/90 near Tractor Cove	
	659128	4365297	1 adult, observed 6/1/01 in Moran Cove	
New Bullards Bar Reservoir ¹	662000	4366969	1 adult, observed 3/7/01 near Garden Point Campground	
	657867	4371200	2-3 turtles repeatedly seen basking on logs at Indian Creek Cove (no specific dates given)	
Little Willow Creek ¹	664006	4362085	1 adult, hand captured 6/18/02	
North of North San Juan ¹	662597	4359740	1 adult, observed 1/1/98 ⁴ on BLM land	
Peterson's Corner ¹	663155	4359243	1 adult, observed 7/1/01 on private land	
Cherokee Park ¹	670740	4359934	1 adult, observed 1/1/98 ⁴ at pond on private land	
Cherokee Diggins ¹	671922	4358691	1 adult, observed 10/1/97 in pond in mined area on private land	
Placer Diggins ¹	672205	4357828	6 adults, observed 1/1/98 ² at pond in mined area on private land	
	672342	4359582	1 adult, observed 7/30/98 at "Turtle Pond" on private land	
	672433	4359776	1 adult, observed 7/30/98 at "Blue Hole" on private land	
North Columbia	672935	4360729	3 adults, observed 6/18/98 at Old Mill Pond on private land	
	673009	4360991	9 adults, observed 8/30/98 at Mill Pond on private land	
	672368	4367847	1 adult, observed 5/1/97 on Forest Service land	
Pike ¹	675323	4367295	1 adult, net-captured 3/21/01 at "Pike Pond 2", permanent pond on private land	
	672480	4367202	1 adult, observed 3/21/01 at pond on private land	
Brandy City Pond ¹	669751	4378130	1 adult, observed 1/1/92 ⁴ at pond on Forest Service land	
Reader Ranch ¹	663150	4353440	3 adults, observed 6/25/97 at perennial pond on private land	
Sailor Flat ¹	675820	4353280	1 adult, observed 6/16/2003 at perennial pond on private land	
Scotts Flat Reservoir	679693	4349720	1 N.I., observed 9/1/2000 on reservoir	
$\mathbf{D} \in \mathbb{R}^2$	642311	4345891	1 N.I., captured 8/18/88 on State of California land	
Dry Creek	638112	4343545	3 N.I., captured 8/18/88 at Hammond Grove on Highway 20	
Englabright Pasaruair ³	649354	4349107	Fewer than 10 turtles seen each year, near Mallard Cove on reservoir (no specific dates given)	
Engleongiit Reservoir	649368	4348353	Fewer than 10 turtles seen each year, near north shore on reservoir (no specific dates given)	
0.25 mi from Yuba River ²	644259	4344357	6 adults, observed 9/9/03 on State of California land	
Yuba River ³	649457	4343699	4-8 turtles, consistently seen each year at a small dredger pond on the South bank (invisible from river) near Timbuctoo Bend (no specific dates given)	

 Table 3.1-1.
 Summary of known recorded occurrences of WPT in the vicinity of the Project and Project-affected stream reaches.

Table 3.1-1. (continued)

Occurrence	Location		Description and Location	
occurrence	UTM E	UTM N	of Occurrence in Relation to Project Facilities	
Yuba River ³	644794	4344220	Numerous turtles, seen here each year prior to 1997 flood (not observed since) at large, sluggish eddy with abundant drift wood near University of California research property (no specific dates given)	
Yuba Goldfields ²	632068	4336532	Multiple, observed 6/16/98 at isolated perennial ponds in mine tailings in southwest portion of Yuba Goldfields	

Key: BLM = United Stated Department of Interior, Bureau of Land Management

Forest Service = United States Department of Agriculture, Forest Service UTM = Universal Transverse Mercator

¹ Forest Service 2011a

² CDFG 2010

³ R. Cutter, pers. comm., 2012

⁴ Database observation date (January 1) likely an artifact of data entry (i.e., year, but no month and day)

3.2 Habitat Mapping and Surveys

Figure 3.0-1 shows locations where WPT were observed during basking surveys, as well as incidental observations during other studies, and historical and recent records. Attachment 3-6A provides a more detailed view of the 0.5-mi study area, with aerial imagery and potential nesting habitat, as broadly defined using available GIS data, indicated. Representative photographs of areas that were assessed for WPT during field habitat assessments are included in Attachment 3-6B, and photographs from basking surveys and associated with incidental observations of WPT are included in Attachment 3-6C.



Figure 3.0-1. Locations of WPT survey detections, incidental observations, and recent and historical records.

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Figure 3.0-1. (continued)

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3.2.1 New Bullards Bar Reservoir

Figure 3.0-1 shows locations where WPT were observed during basking surveys and incidentally during other studies, as well as recent and historical sighting record locations. Attachment 3-6A provides a more detailed view of the 0.5-mi study area, with aerial imagery and potential nesting habitat, as broadly defined using available GIS data, indicated. Representative photographs of areas that were assessed for WPT during field habitat assessments are included in Attachment 3-6B, and photographs from basking surveys and associated with incidental observations of WPT are included in Attachment 3-6C.

3.2.1.1 Habitat Distribution

Approximately 459 acres (ac) in the study area were identified by the mapping criteria as potentially suitable nesting habitat, including 184 ac associated with New Bullards Bar Reservoir. This 184 ac represented only about 7 percent of the 70-mile-long shoreline of New Bullards Bar Reservoir. The rest of the shoreline was not suitable for WPT nesting due to excessively steep slopes and unsuitable aspect. Soil map data show that the more common soil types surrounding New Bullards Bar Reservoir are Mariposa gravelly loam, Sites gravelly loam, Holland sandy loam, Chawakanee sandy loam, and various soil complexes associated with these soil types (Soil Survey Staff 2012). All of these soil types were assumed to be potentially suitable for WPT nesting.

Except for about 2 ac, potential WPT nesting habitat is absent from the south arm of New Bullards Bar Reservoir and the southeast shoreline of the reservoir in the vicinity of Dark Day Boat Launch (Attachment 3-6A). Patchy, narrow bands of potential nesting habitat occur along the shoreline in the vicinity of Garden Point Campground and Tractor Cove and in the northernmost arm of the reservoir. Small patches of mapped habitat occur near Willow Cove and extend upland mainly along several, associated unnamed tributaries. The largest continuous area of WPT potential nesting habitat (6 ac) is in Moran Cove and extends upland from the NMWSE. There is also a large patch (58 ac) of mapped potential habitat northeast of Garden Point campground above the NMWSE. However, in both of these areas, the available cover data classification included relatively large patches of tree cover up to 40 percent, which was included in the nesting habitat mapping-despite canopy cover greater than 10 percent-to ensure exposed shoreline on New Bullards Bar Reservoir was not excluded. Potential WPT nesting habitat below the NMWSE occurs in small, diffuse patches. New Bullards Bar Reservoir is largely surrounded by forested uplands, which limits potential nesting habitat. However, large blocks of early-successional stage cover occurred in the vicinity of Little Oregon Creek, some of which was within the area mapped for potential nesting habitat.

Potentially suitable habitats for juvenile WPT, including hatchlings (i.e., shallow water with dense submergent vegetation or short emergent vegetation), were observed at a few locations along the shoreline of New Bullards Bar Reservoir. Limited areas of submerged or emergent vegetation were observed during the November 2011 habitat assessment at the mouths of unnamed tributaries east of the Dark Day Boat Launch, near Willow Cove, Moran Cove, Tractor Cove, and in the north arm of the reservoir (i.e., near site NBBR-56). Submerged vegetation was mostly woody shrubs, especially willows; however, is not known whether such vegetation would

represent sufficiently dense hiding cover for juvenile WPT or would be continuously available due to reservoir water surface elevation changes. Emergent vegetation was observed at Site NBBR-32 during basking surveys.

Aquatic habitat at New Bullards Bar Reservoir potentially suitable for WPT is limited to near shore areas concentrated at the mouths of certain tributaries (e.g., Willow Creek, Little Oregon Creek, and unnamed tributaries at Tractor Cove) and occasionally in coves without an apparent tributary (e.g., at Garden Point). In these areas, basking substrates included fallen logs, stumps, boulders, bedrock, and/or live vegetation (e.g., willows) distributed where they would be partially exposed over a range of water surface elevations. Elsewhere, the reservoir shoreline exhibits steep slopes and deep water, scarce or absent potential underwater hiding habitat, and scarce or absent potential basking substrates favorable to WPT. Representative conditions observed during field reconnaissance habitat assessments are illustrated in Attachments 3-6B and 3-6C for survey site locations. Details of aquatic habitat at selected survey sites are also discussed below in Section 3.1.2.

3.2.1.2 Survey Results

All seven sites in New Bullards Bar Reservoir were surveyed twice. During the first survey period (May 29 through June 1, 2012), New Bullards Bar Reservoir water surface elevation was approximately 1,952 ft. During the second survey period (June 6 through 8, 2012), New Bullards Bar Reservoir water surface elevation ranged from 1,950 ft to 1,951 ft. The second survey for Sites NBBR-18/19 and NBBR-25 was completed on July 11, 2012, at which time New Bullards Bar Reservoir water surface elevation was 1,933 ft.

Four of the sites on New Bullards Bar Reservoir (NBBR-18/19, NBBR-25, NBBR-56, and NBBR-64) were associated with inlets at seasonal or perennial tributary confluences, where patches of willows (*Salix* spp.) below the NMWSE typically occurred, potentially providing both basking substrates and underwater hiding cover, depending on water surface elevation. Potential basking substrates and aquatic refugia were also sometimes associated with areas of shoreline erosion and resulting partially submerged large woody material. Other features of some suitable sites included areas of moderate or gentle slopes where relatively shallow water would occur, and being situated within coves that may minimize disturbance. Table 3.2-1 summarizes habitat conditions at survey sites.

Table 3.2-1. Descriptions of WPT basking survey sites at New Bullards Bar Reservoir in 2012.

Site Code and Leasting/	Detertial	Other				
General Characteristics of the Site	WPT Habitat	Comments				
NBBR-18/19: NEW BULLARDS BAR RESERVOIR AT WILLOW COVE (UTM E 665180, UTM N 4368951)						
Survey site located in a cove near the mouth of Willow Creek and a small unnamed tributary in the east arm of New Bullards Bar Reservoir. Banks were steep with sparse vegetation below the NMWSE. Aquatic vegetation was absent; emergent vegetation was limited to scouring rush (<i>Equisetum</i> <i>hyemale</i>) near the mouth of unnamed tributary. Dense oaks were overhanging the shoreline during first survey; shoreline was exposed at lower water elevation during second survey. Upland habitat was oak/pine forest.	First Survey: Potential basking substrate included multiple downed and floating logs and partially submerged boulders on south- facing banks. Potential aquatic refugia consisted of submerged boulders and tree branches on downed logs. <u>Second Survey</u> : Potential basking substrate mainly consisted of partially submerged boulders near the mouth of the small perennial tributary and exposed banks. Aquatic refugia consisted of submerged boulders and some submerged willows.	Recreational anglers and boaters were present during surveys.				
NBBR-25: NEW BULLARDS	BAR RESERVOIR AT TRACTOR COVE (U	UTM E 662780, UTM N 436901)				
Survey site located in Tractor Cove, near the mouth of two unnamed perennial tributaries on the north shore of New Bullards Bar Reservoir. Emergent vegetation was limited to scouring rush near the mouth of one of the small perennial tributaries. Aquatic vegetation was absent; dense Himalayan blackberry (<i>Rubus armeniacus [discolor]</i>), Pacific madrone (<i>Arbutus menziesii</i>) saplings and other shrubs overhung the shoreline during the first survey; shoreline was exposed at lower water elevation during second survey. Upland habitat was pine forest, portions of which were regenerating from a 1999 forest fire.	<u>First Survey</u> : Potential basking substrate included multiple floating logs and downed logs. Potential aquatic refugia consisted of submerged boulders, willows, and branches on downed logs. <u>Second Survey</u> : Potential basking substrate mainly consisted of exposed reservoir shoreline and some floating logs. Potential aquatic refugia consisted of submerged willows.	Recreational boaters or anglers were not present during surveys or during platform deployment.				
NBBR–26: NEW BULLARDS BAR	RESERVOIR SOUTH OF TRACTOR COV	E (UTM E 662796, UTM N 4367866)				
Survey site on east-facing shore of peninsula south of Tractor Cove. Banks were steep with sparse vegetation below the NMWSE. Aquatic and emergent vegetation were absent. Overhanging vegetation consisted of scattered Himalayan blackberry, Pacific madrone saplings and other shrubs. Upland habitat was pine forest, portions of which were regenerating from a 1999 forest fire.	Potential basking substrate included numerous floating logs and partially submerged downed logs on east-facing banks. Potential aquatic refugia consisted of submerged boulders and branches on downed logs. Site conditions during the second survey were not noticeably different from the initial conditions.	Recreational boaters or anglers were not present during surveys; however, the site is located in an area where boaters were observed at other times in 2012.				
NBBR-32: NEW BULLARDS BA	R RESERVOIR EAST OF GARDEN POINT	(UTM E 661985, UTM N 4366733)				
Survey site positioned between two small south-facing coves, east of Garden Point on the north shore of New Bullards Bar Reservoir. Aquatic vegetation was absent; emergent vegetation was limited to patches of scouring rush on the cove shorelines. Aquatic vegetation was absent; dense Himalayan blackberry was overhanging the north shorelines. Upland habitat was conifer forest.	Potential basking substrate included floating logs, exposed reservoir shoreline, and scattered downed logs. Potential aquatic refugia consisted of submerged branches on downed logs and submerged willows. Site conditions during the second survey were not noticeably different from the initial conditions.	Recreational boaters or anglers were not present during surveys or during platform deployment.				
NBBR-33 NEW BULLARDS	BAR RESERVOIR AT GARDEN POINT (UT	TM E 661421, UTM N 4366357)				
Survey site located near Garden Point on the north shore of New Bullards Bar Reservoir. Aquatic and emergent vegetation was absent; scattered patches of Himalayan blackberry were overhanging the north shoreline near campground. Upland habitat was pine forest.	Potential basking substrate included floating logs, partially submerged logs, and exposed reservoir shoreline on south-facing, open banks. Potential aquatic refugia consisted of submerged branches on downed logs and submerged willows.	Recreational boaters, anglers and campers at Garden Point were present during surveys.				

Site Code and Location/ General Characteristics of the Site	Potential WPT Habitat	Other Comments					
NBBR-56 NEW BULLARDS BA	NBBR-56 NEW BULLARDS BAR RESERVOIR NEAR ALABAMA BAR (UTM E 660908, UTM N 4376321)						
Survey site located near the mouth of an unnamed perennial tributary near Alabama Bar in the north arm of New Bullards Bar Reservoir. Emergent and aquatic vegetation was absent. Patches of dense oak and Himalayan blackberry were overhanging shoreline. Upland habitat was pine/oak forest.	Potential basking substrate included floating logs, some partially submerged logs and exposed reservoir shoreline. Potential aquatic refugia consisted of submerged branches on downed logs and submerged willows. Site conditions during the second survey were not noticeably different from the initial conditions.	Recreational boaters or anglers were not present during surveys or during platform deployment.					
NBBR-64: NEW BULLARDS BAR AT MORAN COVE, WEST SITE (UTM E 658458, UTM N 4365869)							
Survey site located near the mouth of Little Oregon Creek in the west arm of New Bullards Bar Reservoir. Emergent and aquatic vegetation was absent. Patches of oak, Pacific madrone, and Himalayan blackberry were overhanging shoreline. Upland habitat was oak/pine forest, portions of which were regenerating from a 1999 forest fire.	Potential basking substrate included floating logs, downed logs, partially submerged boulders, and areas of exposed reservoir shoreline. Potential aquatic refugia consisted of submerged branches on downed logs and submerged boulders. Site conditions during the second survey were not noticeably different from the initial conditions.	Survey site is near Moran Cove boat launch. Recreational boaters and anglers were not present during surveys.					
ey: NMWSE = normal maximum water surface elevation UTM = Universal Transverse Mercator							

WPT WPT = Western Pond Turtle

Survey results are summarized in Table 3.2-2. Historical records and incidental observations at or near the survey sites are described in Sections 3.1 and 3.5, respectively. Floating basking platforms were placed at each site prior to the first survey. During platform deployment on May 23, 2012, three WPT were observed at Sites NBBR-18/19 and one WPT was observed about 0.1 mi north of Site NBBR-26. At NBBR-18/19, one adult male WPT (estimated carapace length = 20 cm) was basking on a downed log and one sub-adult WPT (estimated carapace length = 12 cm) was basking on a partially submerged boulder. The detection north of NBBR-26 was a sub-adult WPT (estimated carapace length = 12 cm).

Date	Time ¹	Air/Water Temp. (°C) ²	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments
	NBBR-18/19: N	EW BULLAR	DS BAR RESERVOIR AT	F WILLOW COVE (UTM E 665180, UTM N 4368951)
Survey 1: 5/29/12	09:00 to 10:50	23/19	1: adult/female /15 1 ³ : adult/male /20 1: adult/N.D./ 15	Basking platform was deployed near small perennial tributary prior to surveys on May 23, 2012. The platform appeared undisturbed and functional. Survey area was in full sun throughout survey. Female WPT was basking on downed wood ~30m west of the cove in which the basking platform was deployed. Male WPT was basking on an inclined, partially submerged downed log east of the unnamed tributary. The male WPT exhibited damage on a rear vertebral and costal shield. The male WPT remained on the downed log for the majority of the survey. The third adult (undetermined sex) appeared ~1 hr. into survey basking on smaller woody material nearby. Recreational anglers approached survey area towards end of survey, causing WPT to disappear.
Survey 2: 7/11/12	11:35 to 13:40	29/26	1: adult/female / 18	Basking platform was on shoreline. Female WPT was basking on partially submerged boulder near mouth of unnamed tributary as surveyors approached site. The turtle was glistening when first detected, so likely had just emerged from the water. WPT basked for ~15 minutes, and then went back into water. WPT did not re-emerge for remainder of survey. Three motorboats passed behind survey area at beginning of survey.

 Table 3.2-2. Result of WPT basking surveys at New Bullards Bar Reservoir in 2012.

Date	Time ¹	Air/Water Temp. (°C) ²	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments			
NBBR-25: NEW BULLARDS BAR RESERVOIR AT TRACTOR COVE (UTM E 662780, UTM N 436901)							
Survey 1: 5/29/12	13:35 to 15:35	30/20	None observed	Basking platform was deployed near mouth of two small perennial tributaries prior to surveys on May 23, 2012. The platform appeared undisturbed and functional. Survey area was in full sun throughout survey.			
Survey 2: 7/11/12	08:00 to 10:15	13/25	1: adult /male/ ~17	Basking platform was on shoreline. Male WPT detected at 8:45 swimming in clump of submerged willows, swimming within \sim 5m of survey boat. WPT swam in vicinity for \sim 5 minutes, and then went underwater. The WPT did not re-appear during remainder of survey.			
NI	BBR-26: NEW B	ULLARDS BA	R RESERVOIR SOUTH	OF TRACTOR COVE (UTM E 662796, UTM N 4367866)			
Survey 1: 5/31/12	07:50 to 09:50	22/20	None observed	Basking platform was deployed on east-facing shore prior to surveys on May 23, 2012. The platform appeared undisturbed and functional. Small pontoon boat crossed in front of survey area at 09:43 and created significant wake disturbance in survey area.			
Survey 2: 6/6/12	11:10 to 13:10	24/21	None observed	Basking platform was undisturbed. Survey area was in full sun throughout survey.			
Ν	BBR-32: NEW	BULLARDS B	AR RESERVOIR EAST (OF GARDEN POINT (UTM E 661985, UTM N 4366733)			
Survey 1: 5/31/12	10:40 to 12:40	25/20	None observed	Basking platform was deployed on east-facing shore prior to surveys on May 23, 2012. Partial sun on west-facing banks until 12:00. Wakes from motor boats caused site disturbance which delayed the start of the survey until 10:40. Wakes also disturbed survey site during survey at 11:02, 11:32, 11:46, and 12:28. Reservoir depth in the northeast and northwest arms of the cove was greater than 1 m.			
Survey 2: 6/6/12	08:30 to 10:30	18/21	None observed	Basking platform was undisturbed. Survey area was in dappled sun throughout survey.			
	NBBR-33 NEW BULLARDS BAR RESERVOIR AT GARDEN POINT (UTM E 661421, UTM N 4366357)						
Survey 1: 5/31/12	10:25 to 12:25	25/20	None observed	Basking platform was deployed in south-facing cove east of campgrounds prior to surveys on May 23, 2012. Survey was conducted at Garden Point. Motor boats were passing nearby for the majority of the survey, including two that passed close to shore just before the survey began.			
Survey 2: 6/6/12	08:39 to 10:40	18/20	None observed	Basking platform was undisturbed. Survey area was in full sun throughout survey.			
	NBBR-56 NEW	BULLARDS	BAR RESERVOIR NEAF	R ALABAMA BAR (UTM E 660908, UTM N 4376321)			
Survey 1: 6/1/12	08:50 to 10:50	23/19	None observed	Basking platform was deployed near mouth of a perennial tributary prior to surveys on May 23, 2012. The platform appeared undisturbed and functional. Survey area was in full sun throughout survey.			
Survey 2: 6/8/12	11:40 to 13:40	27/21	None observed	Basking platform was overturned. Motor boat passed near survey site during last quarter of survey. Site in full sun during survey.			
	NBBR-64: N	EW BULLAR	DS BAR AT MORAN CO	VE, WEST SITE (UTM E 658458, UTM N 4365869)			
Survey 1: 6/1/12	13:10 to 15:10	30/23	None observed	Basking platform was deployed on north-facing shore east of the mouth of Little Oregon Creek prior to surveys on May 23, 2012. Survey area was in full sun throughout survey. Recreationists with dog swimming at the western trail for the first 10 minutes of the survey.			
Survey 2: 6/8/12	08:40 to 10:40	20/21	1: adult/male/ 18	Basking platform had drifted east from original deployment position. Male WPT was observed on floating log near platform in southwest corner of cove. Survey area was in full sun throughout survey.			

Table 3.2-2. (continued)

Date	Time ¹	Air/Water Temp. (°C) ²	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments
	NBBR-64: N	EW BULLAR	DS BAR AT MORAN CO	VE, EAST SITE (UTM E 658456, UTM N 4365877)
Survey 1: 6/1/12	12:50 to 14:50	30/23	None observed	Survey area was in full sun throughout survey. Bullfrog calls heard throughout the course of the survey.
Survey 2: 6/8/12	08:40 to 10:40	25/21	1 ⁴ : adult/male/ 18 1: adult/N.D/ 17-18	Male WPT was basking on floating log from 09:27 to 09:37. Other adult WPT observed swimming \sim 4 m from north shore, and then dove back in water.

Table 3.2-2. (continued)

Key: WPT = Western Pond Turtle; N.D. = sex not determined;

Length = carapace (upper shell) length in centimeters (cm), estimated from a distance.

¹ Surveys were 2 hours in length, except: Survey 1 NBBR-18/9 (1 hr 50 min), which was stopped due to activity from recreational fishermen and Survey 2 at NBBR-25 (2hr 15 min), which was extended to see if the WPT male detected at the start of the survey would re-appear.

² Temperature at start of survey period.

⁴ The basking location was the same log where a male WPT was observed basking when the platform was deployed on May 23. Both of the detected turtles exhibited the same shell damage, which strongly suggests repeat observations of the same individual WPT.

⁵ Detection of male at NBBR-64 east site was same animal detected at NBBR-64 west site.

A total of eight WPT detections occurred during the surveys, with one or more detections at Sites 18/19, NBBR-25, NBBR-64 East, and NBBR-64 West. Site 18/19 was the only survey site with detections on both survey dates. At least one of the WPT observed at Site 18/19 on May 29, 2012 was identifiable by size and carapace features as the same individual observed opportunistically basking in the same location during platform deployment on May 23. Two of eight survey detections were WPT swimming in the water, whereas the others were basking on floating downed wood (n=3); on an inclined, partly submerged fallen tree (n=1); and on the side of a partially submerged boulder (n=1). Disturbance by recreationists likely affected results of some of the surveys; however, no sites were disturbed during both surveys.

3.2.2 Our House Diversion Dam Impoundment

3.2.2.1 Habitat Distribution

Our House Diversion Dam Impoundment is located at RM 12.6 on the Middle Yuba River. The impoundment is within a portion of the Middle Yuba River reach characterized by low gradient, moderately long, mid-channel pools interspersed with low-gradient riffles/runs located within a gentle gradient, deep, confined canyon.

According to the defined mapping criteria, Our House Diversion Dam Impoundment is generally not suitable for WPT nesting habitat due to steep slopes and aspect. Soil map data show that the more common soil types surrounding Our House Diversion Dam Impoundment are Josephine-Mariposa complex and Deadwood-Rock outcrop-Hurlbut complex, which are generally comprised of gravelly loam or gravelly sandy loam in the upper horizons. All of these soil types were assumed to be potentially suitable for WPT nesting, but may be marginal substrate for oviposition, particularly where there are inclusions of near-surface or exposed bedrock.

The only significant patch of mapped nesting habitat (1 ac) occurred on the embankment of Our House Dam Road, which is moderately steep. However, this location is comprised of large boulders, and as such, is unsuitable. Potentially suitable habitat for juvenile WPT was not

observed at Our House Dam Impoundment. The nearest tributary to Our House Diversion Dam Impoundment is a high-gradient unnamed tributary approximately 1.0 mile upstream of the impoundment. Our House Diversion Dam Impoundment is surrounded by forested uplands, which limits potential nesting habitat.

Aquatic habitat potentially suitable for WPT is limited to the right bank of Our House Dam Impoundment, where dense riparian vegetation may provide both basking habitat and underwater refugia. Details of aquatic habitat at selected survey sites are also discussed below in Section 3.2.2.2.

3.2.2.2 Survey Results

Four sub-sites were selected for WPT basking surveys at Our House Dam Impoundment. The sub-sites were distributed from Our House Diversion Dam (RM 12.6) upstream to RM 12.75. Potential basking habitat and viewing locations for each site were identified during field reconnaissance on March 1, 2012.

Our House Diversion Dam Impoundment is generally characterized by moderate to steep slopes, with gentler slopes upstream. Dense riparian vegetation consisting of willows and cottonwood (*Populus* sp.) trees occurs along the right bank (looking downstream), including overhanging shrubs that might be accessible to basking WPT. A floating metal boom that crosses the channel could potentially be used by basking WPT. No fallen logs or other large woody debris potentially suitable for basking were observed. Table 3.2-3 summarizes habitat conditions in the impoundment.

Site Code and Location/	Potential	Other
General Characteristics of the Site ¹	WPT Habitat	Comments
Survey area is immediately upstream of Our House Diversion Dam in a relatively unconfined reach. The survey area included one very large, deep pool created by the impoundment of water behind the concrete arch dam. The pool spans bank-to-bank and extends ~100 m upstream of the dam. Pool depth was undetermined, but maximum depth is known to be at least 5 m. A low-gradient riffle and a shallow connected left bank side pool were located at the upstream end of the survey area. Aquatic and emergent vegetation was located mainly on the right bank, with scattered patches present on the left bank towards the dam. Adjacent upland slopes were steep and vegetated by oak-conifer forest.	Best available potential basking substrate consisted of an exposed 0.6 m diameter, ~60 m long floating metal boom that spans the deep pool. Exposed gravel bars on the left bank may also be suitable for basking. Potential streamside refugia comprised of dense riparian vegetation primarily on the right bank of the impoundment, some root wads and undercut banks located mainly on the right bank of the impoundment. Potential streamside refugia near the left bank were limited to small patches of overhanging riparian vegetation; aquatic refugia were absent.	Sunbathers were present during a portion of the first survey; a small metal boat present during the second and third surveys suggests that recreational angling may sometimes occur in the impoundment.
Kev: $m = mile$ MYR = Middle	e Yuba River RM = River Mile	WPT = Western Pond Turtle

Table 3.2-3. Description of WPT basking habitat at Our House Diversion Dam Impoundment.

Survey results are summarized in Table 3.2-4; no WPT were observed. Two floating basking platforms were placed on May 2, 2012 on the right bank of the impoundment near exposed boulders and dense willows. All sub-sites were surveyed three times with the exception of

OHDD-3, where Survey 2 was abandoned due to lack of sun exposure at the survey site (the sun was obscured by the south hillside) on the afternoon of June 6, 2012. There were no WPT detections at any of the survey sub-sites. There have also been no reported incidental sightings at or in the vicinity of the impoundment, and no turtles were observed here during two surveys performed in 2010 for Nevada Irrigation District (NID)'s Yuba-Bear Hydroelectric Project and PG&E's Drum-Spaulding Project (PG&E and NID 2011).

Date ¹	Time ²	Air/Water Temp. (°C) ³	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments	
	UNDMENT (MIDDLE YUBA RIVER RM 12.6) TM N 4364369)				
Survey 1: 5/22/12	11:05 to 13:05	21/14	None observed	Surveyed area on metal boom and right bank near intake tunnel was in partial shade until mid-morning, but was in full sun during survey.	
Survey 2: 6/7/12	13:40 to 15:40	25/4	None observed	Surveyed area at boom and right bank near intake tunnel was in full sun throughout survey.	
Survey 3: 7/13/12	10:40 to 12:40	25/21	None observed	Surveyed area on boom and right bank near intake tunnel was in partial shade until mid-morning, but was in full sun throughout survey.	
	OHDD-2:	OUR HOUSE	DIVERSION DAM IMPO (UTM E 672412, U	UNDMENT (MIDDLE YUBA RIVER RM 12.6) JTM N 4364363)	
Survey 1: 5/22/12	11:05 to 13:15	25/15	None observed	Surveyed area on metal boom and left and right banks near the dam stayed in partial to full shade until mid-morning. Right bank was in full sun during survey; left bank was in dappled sun.	
Survey 2: 6/7/12	13:35 to 15:35	25/5	None observed	Surveyed area on boom and right bank near intake tunnel was in full sun throughout survey; left bank near the dam started to go into shade at \sim 15:00 hr.	
Survey 3: 7/13/12	08:13 to 10:15	25/21	None observed	Surveyed area on right bank near intake tunnel was in full sun throughout survey; boom was in partial shade at start of survey; left bank was in shade throughout most of survey.	
	OHDD-3: OUR HOUSE DIVERSION DAM IMPOUNDMENT (MIDDLE YUBA RIVER RM 12.75) (UTM E 672470, UTM N 4364474)				
Survey 1: 5/22/12	09:00 to 10:55	25/14	None observed	Survey area on left bank had dappled sun throughout survey. Water depth of backwater pool was ~1-2 m and the edge water on the left bank was at least 2 m. Recreationists approached cobble bar at upstream end of impoundment during last half hour of the survey and stayed for duration of survey.	
Survey 2: 6/7/12	N/A	N/A	N/A	Survey area was in full shade after 15:30 hr; survey abandoned at this site.	
Survey 3: 7/13/12	10:24 to 12:24	35/23	None observed	Survey area on left bank was in shade until mid-morning; area had dappled sun throughout survey.	
	OHDD-4: OUR HOUSE DIVERSION DAM IMPOUNDMENT (MIDDLE YUBA RIVER RM 12.75) (UTM E 672521, UTM N 4364426)				
Survey 1: 5/22/12	09:00 to 10:55	23/13	None observed	Surveyed areas on right bank and upstream portion of boom were in full sun at start of survey. Two artificial basking platforms deployed near right bank on May 3, 2012 were visible from this site and appeared undisturbed. Water depth of backwater pool water on the right bank was at least 2 m. Sunbathers approached cobble bar at upstream end of impoundment during last half hour of the survey and stayed for duration of survey.	
Survey 2: 6/7/12	13:40 to 15:40	25/4	None observed	Survey area was scanned in conjunction with Site 1. One artificial basking platform appeared to be submerged; the other basking platform was undisturbed. Survey area was in full sun throughout survey.	

 Table 3.2-4. Result of WPT basking surveys at Our House Diversion Dam Impoundment in 2012.

I ubic 012		icu)		
Date ¹	Time ²	Air/Water Temp. (°C) ³	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments
OHDD-4: OUR HOUSE DIVERSION DAM IMPOUNDMENT (MIDDLE YUBA RIVER RM 12.75)				
			(UTM E 672521, UTM N	4364426) (continued)
Survey 3: 7/13/12	08:25 to 10:25	22/21	None observed	Survey area on right bank was in full sun throughout survey; boom was in partial shade at start of survey. Artificial basking platforms had been vandalized and removed from deployment site
Key: m = me	Key: m = meters RM = River Mile WPT = Western Pond Turtle: Size = carapace (upper shell) length in centimeters (cm), estimate			
from a dis	from a distance. UTM = Universal Transverse Mercator			

Table 3.2-4. (continued)

¹ All of the diversion impoundment sites were surveyed on three dates, the first two of which occurred while the tunnels were diverting.

² Surveys were 2 hours in length, except: Survey 1 OHDD-2 (2 hr 10 min), which was extended due to periods of shade on survey areas at beginning of survey; and Survey 1 OHDD-4 (1hr 55 min) which stopped due to sunbather activity at the end of survey; Survey 2 at OHDD-3, which was abandoned due to lack of sun on survey site.

³ Temperature at start of survey period.

⁴ Water temperature was not recorded at the Our House Diversion Dam survey sites on 6/7/2012

3.2.3 Log Cabin Diversion Dam Impoundment

3.2.3.1 Habitat Distribution

Log Cabin Diversion Dam Impoundment is located at RM 4.3 on Oregon Creek. The impoundment is within a portion of Oregon Creek characterized by mid-channel pools and low-gradient riffles interspersed amongst steeper sections with high-gradient riffles and cascades further upstream.

According to the defined mapping criteria, most of the Log Cabin Diversion Dam Impoundment is not suitable for WPT nesting habitat, mainly due to unsuitable aspect, particularly on the left bank, and vegetation cover. Soil map data show that the most common soil type surrounding Log Cabin Diversion Dam Impoundment is Deadwood-Rock Outcrop-Hurlbut complex. This soil type may be marginal substrate for oviposition, particularly in areas of near-surface or exposed bedrock.

A small patch of potential nesting habitat (0.01 ac) was mapped near the right bank of the impoundment across from the dam. Along the right bank of the impoundment, there are several areas of moderately-sloped sandy banks that may provide suitable substrate for oviposition. Portions of these banks are still inundated in May, but become more exposed during lower flows in the summer months. Log Cabin Diversion Dam Impoundment is surrounded by forested uplands, which limits potential nesting habitat.

Patches of waterweed (*Elodea* sp.) in the downstream portion of the impoundment may provide suitable habitat for juvenile WPT, particularly as water depths become shallower over the summer. The nearest tributary to Log Cabin Diversion Dam Impoundment is Grizzly Gulch - a low-gradient perennial tributary located approximately 0.1 mile upstream of the impoundment.

Aquatic habitat potentially suitable for WPT is mainly located on the right bank of the impoundment, where dense willows and cottonwoods may provide both basking habitat and

underwater refugia. Details of aquatic habitat at selected survey sites are discussed below in Section 3.2.3.2.

3.2.3.2 Survey Results

Four sub-sites were selected for WPT basking surveys in Log Cabin Dam Diversion Impoundment. Because of a bend in Oregon Creek, multiple vantage points were necessary to view most of the potential basking areas along the impoundment. Sub-site LCDD-1 provided views of the upstream portion of the impoundment at the Camptonville Tunnel outlet. Sub-sites LCDD-2 and -3 provided views of the steep left bank where there is exposed bedrock and overhanging vegetation is generally absent. Sub-site LCDD-4 provided a view of both the left and right banks and the boom near the dam. Over-hanging vegetation, some of which may be periodically partially submerged or at the water line, occurs along a portion of the right bank. Table 3.2-5 summarizes habitat conditions in the impoundment. All sub-sites were surveyed three times.

Table 2.2.5	Decorintian of WD'	r hadzing habitat at I	og Cohin Divorcion	Dom Impoundment
1 able 3.2-3.	Description of wr	l Dasking naditat at L	Ne Cabili Diversion	Dam impoundment.

Site Code and Location/	Potential	Other
General Characteristics of the Site ¹	WPT Habitat	Comments
Survey area is immediately upstream of Log Cabin Diversion Dam in a relatively confined reach. The survey area included one very large, deep pool created by the impoundment of water behind the concrete arch dam. The pool spans bank-to-bank and extends ~200 m upstream of the dam during high flows. Bank full width ranges from about 15 to 33 m, with a maximum bank full depth of about 4 to 5 m. Low-gradient riffles and small backwater pools were in the upstream portion of the survey area. Patches of submerged waterweed (<i>Elodea</i> sp.) were present in the downstream portion of the impoundment; patches of sedges (<i>Carex</i> sp.) were along the bedrock-dominated portions of the left bank. Overhanging riparian vegetation was located mainly on the right bank, both at the upstream end near the intake tunnel. Overhanging riparian vegetation was generally absent on the left bank. Adjacent upland slopes were steep and vegetated by oak-conifer forest.	Best available potential basking substrate consists of an exposed 0.6 m diameter, ~35 m long floating metal boom that spans the deep pool. Exposed boulders on the left bank upstream of the dam received morning sun. The upstream portion of the survey area was largely in shade during the day. Potential streamside refugia were comprised of dense riparian vegetation, some root wads and undercut banks located mainly on the right bank of the impoundment near the intake tunnel. Potential streamside refugia near the left bank were limited to small patches of sedges. Pockets of settled sediments in the downstream portion of the impoundment may provide hiding areas for WPT.	No recreationists were present during surveys; the dam is not accessible to the public from Log Cabin Dam Road. YCWA staff was present during surveys and frequently visit the dam throughout the year.
Key: $m = meters$ RM = river mile WP	T = Western Pond Turtle YCWA = Yuba C	ounty Water Agency

Survey results are summarized in Table 3.2-6. Historical records and incidental observations at or near survey sites are discussed in Sections 3.1 and 3.5, respectively. Two floating basking platforms were deployed on May 2, 2012 on the right bank of the impoundment - one in a connected side pool and one near dense willows upstream of the intake. One adult male WPT was detected during all three survey efforts. The animal's basking behavior and carapace features strongly suggest that all WPT study detections at the impoundment were of the same individual. A juvenile WPT was also found in a puddle in the Log Cabin Dam Road near the impoundment during a 2011 field reconnaissance for YCWA's Study 3.4 (Section 3.3).

Date ¹	Time ²	Air/Water Temp. (°C) ³	WPT: Lifestage/Sex/ Length	Basking Survey Comments
LCDD	LCDD-1: LOG CABIN DIVERSION DAM IMPOUNDMENT (OREGON CREEK RM 4.3) (UTM E 667177, UTM N 436732			
Survey 1: 5/24/12	08:50 to 10:20	22/14	None observed	Survey area was in full sun throughout survey.
Survey 2: 6/7/12	08:30 to 10:30	29/13	None observed	Most of survey area on left bank was in full sun throughout survey; some dappled sun in downstream portion of survey area on left bank.
Survey 3: 7/12/12	10:10 to 12:10	35/20	None observed	Dappled sun on left streambank throughout survey.
LCDD	-2: LOG CABIN	DIVERSION	DAM IMPOUNDMENT (OREGON CREEK RM 4.3) (UTM E 667121, UTM N 4367395)
Survey 1: 5/24/12	8:30 to 10:15	22/14	1: adult/male/ ≥15	Artificial basking platform was deployed in a backwater pool on right bank prior to surveys on May 3, 2012. The platform appeared undisturbed and functional. Survey area was in full sun throughout survey. One WPT was basking on bedrock on left bank when survey began and remained for the first hour of the survey. WPT entered water in response to surveyor activity at survey site. WPT swam downstream approximately 20 m and re-emerged on exposed streambank (left bank) and basked 10 minutes towards the end of the survey. WPT subsequently swam downstream towards boom, out of line of sight in survey area. Survey was stopped in order to move to downstream survey sites to continue observation of WPT activity. One adult river otter was also observed swimming in impoundment near end of survey.
Survey 2: 6/7/12	08:30 to 10:30	14/13	1: adult/male/ ≥ 15	Artificial basking platform was undisturbed, but water levels had dropped so the platform was no longer floating. Survey area was in full sun throughout survey. One WPT was basking on exposed left bank when survey began. The individual moved <0.5 m upslope and downslope along the bank for the duration of the survey to maintain sun exposure.
Survey 3: 7/12/12	07:45 to 09:53	13/20	None observed	Survey area was in full sun throughout survey.
LCDD	-3: LOG CABIN	DIVERSION	DAM IMPOUNDMENT (OREGON CREEK RM 4.3) (UTM E 667047, UTM N 4367464)
Survey 1: 5/24/12	10:25 to 11:50	22/14	1: adult/male/ \geq 15	Survey area was scanned in conjunction with Site 4 in order to monitor WPT activity. See Site 4 Survey 1 comments.
Survey 2: 6/7/12	10:38 to 12:38	26/13	1: adult/male/ \geq 15	Survey area was in full sun throughout survey. One WPT detected in same area on left bank as Site 2 at 12:12. WPT left basking location at 12:26 and did not re-appear.
Survey 3: 7/12/12	08:40 to 10:50	18/20	1: adult/male/ \geq 15	One WPT detected swimming in water at 9:25. Disappeared then re- emerged basking on logs near boom at 10:10. WPT basked on log for remainder of survey. YCWA staff approached survey area at 10:30, left at ~10:45.
LCDD	LCDD-4: LOG CABIN DIVERSION DAM IMPOUNDMENT (OREGON CREEK RM 4.3) (UTM E 667049, UTM N 4367439)			
Survey 1: 5/24/12	10:25 to 11:50	22/14	1: adult/male/ \geq 15	Artificial basking platform was deployed near right bank willow canopy on May 3, 2012. The platform appeared undisturbed and functional at the time of the survey. One WPT basking on metal boom towards the right bank of the impoundment for the duration of the survey. The individual likely was the same WPT observed during Site LCDD-2 survey. Artificial basking platform was undisturbed.
Survey 2: 6/7/12	10:35 to 12:35	29/13	None observed	Survey area in full sun throughout survey. The artificial platform appeared undisturbed and functional at the time of the survey.

Table 3.2-6.Result of WPT basking survey observations at Log Cabin Diversion DamImpoundment in 2012.

Date ¹	Time ²	Air/Water Temp.	WPT: Lifestage/Sex/	Basking Survey
		(°C) ³	Length	Comments
LCDD-4: LOG CABIN DIVERSION DAM IMPOUNDMENT (OREGON CREEK RM 4.3) (UTM E 667049, UTM N 4367439) (continued)				
Survey 3: 7/12/12	10:55 to 12:55	31/21	1: adult/male/ \geq 15	One WPT basking on metal boom. Same individual as one detected at Site LCDD-3 survey location. WPT basked until 11:00, swam then re-emerged on logs at 11:05. WPT went back into water at 11:25; swam for approximately 5 minutes at the surface then disappeared into deeper area of impoundment.
Key: WPT = Western Pond Turtle; Length = carapace (upper shell) length in centimeters (cm), estimated from a distance.				

RM = river mile UTM = Universal Transverse Mercator

¹ All of the diversion impoundment sites were surveyed on three dates, the first two of which occurred while the tunnels were diverting.

² Surveys were 2 hours in length, except: Survey 1 at LCDD-1 (1 hr 30 min) and LCDD-2 (1 hr 45min), which were stopped to re-locate to downstream survey sites to view WPT behavior; LCDD-3 and LCDD-4 (1h 25 min), which were stopped due to overlap in surveyors' observations of same WPT activity; and Survey 3 at LCDD-2 (2 hr 8 min) at LCDD-3 (2 hr 10min) which were extended due to short break in survey.

³ Temperature at start of survey period.

⁴ All WPT observations at Log Cabin Diversion Dam impoundment appear to have been the same individual based on comparison of survey photographs (see Figures 9-13)

3.2.4 Stream Reaches

3.2.4.1 Middle Yuba River

The Middle Yuba River is a relatively large stream comprised of two Project-affected reaches. Our House Diversion Dam Reach extends from Our House Diversion Dam downstream to the confluence with Oregon Creek, a distance of 7.5 miles. The Oregon Creek Reach extends another 4.5 miles downstream from the confluence of the Middle Yuba with Oregon Creek to the North Yuba River confluence.

Based on channel classification and habitat mapping performed for YCWA's Pre-Application Document (YCWA 2010), the Middle Yuba River flows through a variety of parent materials, most notably resistant granitic rocks. The overall gradient is 1.2 percent, with one gradient break at the Big Bend/Wolf Fault, with a gradient of 2.5 percent below the fault and 1.1 percent above the fault. There are numerous lower gradient sections in which sinuosity never exceeds 1.1 (i.e., valley length and channel length through the valley are approximately equal). Six tributaries are distributed along Our House Diversion Dam Reach (one is perennial: Grizzly Creek), and five tributaries contribute to flow in the Oregon Creek Reach (four are perennial: Oregon Creek, Moonshine Creek, Clear Creek and Mary's Ravine/Yellowjacket Creek).

Stream habitat in Our House Diversion Dam Reach mainly consists of mid-channel pools; step runs/step pools, and runs at the upstream and downstream sections of the reach; and runs, low-gradient riffles, and lateral pools in the midsection of the reach. Boulders and cobbles are dominant substrates. Emergent and aquatic vegetation generally is sparse; margin vegetation consists of patchy grasses/forbs and shrubs/saplings. Overhanging vegetation is moderately dense deciduous shrubs and saplings.

Stream habitat in the Oregon Creek Reach mainly consists of mid-channel pool, pocket water, step-runs/step pools and cascades in the lower portion of the reach (RM ~0.4). Bedrock is the predominant stream and bank substrate. Overhanging and emergent vegetation is negligible in the lower portion of the reach. Tributaries do not occur along this section. The mid-and upstream portions of the Oregon Creek Reach are boulder/bedrock to cobble-dominated. Predominant stream habitat includes mid-channel pools, lateral pools, and low-gradient riffles. Margin and overhanging vegetation ranges from sparse shrub cover in bedrock-confined areas to dense/moderately dense shrub cover at splits and cobble bars. Four tributaries occur along the upstream section of this reach.

Aquatic habitats potentially suitable for WPT are mainly located in the larger mid-channel and scour pools with adequate riparian vegetation, and open valleys with good sun exposure. Near the downstream end of Middle Yuba River, where the river is higher-gradient and bedrock dominated, potential basking substrate mainly consists of partially exposed boulders and bedrock. Low-gradient portions of the river with cobble bars, point bars, and riparian vegetation have potential basking substrate such as partially exposed fallen logs, stumps, boulders, and/or live vegetation (e.g., willows). In addition to portions of Oregon Creek Reach at Yellowjacket and Moonshine creeks, there are several other segments upstream of RM 0.3 that appear to have these habitat features. Our House Diversion Dam Reach also has numerous mid-channel or scour pools with adequate basking substrate, riparian vegetation, and sun exposure located throughout the reach. Representative conditions observed during basking surveys are illustrated in Attachment 3-6B. Details of aquatic habitat at selected survey sites are also discussed below.

According to the defined mapping criteria, few areas suitable for WPT nesting habitat occurred along the Middle Yuba River (Attachment 3-6A) due to excessively steep slopes, particularly in bedrock-confined portions of the river, unsuitable aspect, and excessive canopy cover. Soil map data show that the more common soil types are Josephine-Mariposa complex, and Deadwood-Rock Outcrop-Hurlbut complex; Hoda Sandy Loam, Chaix-Rock Outcrop and Chawanakee-Chaix-Hotaw Complex, Hoda-Rock Outcrop complex, which are generally comprised of loam to coarse sandy loam in the upper horizons; and Sites-Jocal-Mariposa Complex, which is comprised of loam, clay loam and gravelly loam. All of these soil types were assumed to be potentially suitable for WPT nesting; however, some may be marginal substrate for oviposition, particularly in areas that have inclusions of shallow or exposed bedrock.

On the Our House Diversion Dam Reach, two large contiguous patches of mapped habitat (approximately 12.5 ac) are located just below Our House Diversion Dam and at RM 10.0, and extend upland from the bankfull width of the river. Small, narrow patches of habitat are scattered along Oregon Creek Reach and do not extend upslope from the river bankfull edge. One larger contiguous patch (4 ac) was mapped near RM 0.3. Based on basking survey observations, shoreline and surrounding uplands in the vicinity of Moonshine and Yellowjacket creeks may have suitable nesting habitat as evidenced by low-gradient banks and adjoining uplands, as well as sandy to loamy soils and patches with less than 10 percent canopy cover. Forested uplands surround the Middle Yuba River, which limits potential nesting habitat.

Potentially suitable habitats for juvenile WPT were observed at Moonshine and Yellowjacket creeks, which had patches of submerged and emergent vegetation in shallower areas of pools and

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runs. Other potentially suitable habitat may occur at the other low-gradient tributaries on Oregon Creek and Our House Diversion Dam Reach.

Survey sites on the Oregon Creek Reach were designated as MYR OC-1 and MYR OC-2, each with an upstream and downstream sub-site, and the site on the Our House Diversion Dam Reach was MYR OHD-1, also with an upstream and downstream sub-site. The sites were all within portions of the Middle Yuba River characterized by low gradient, moderately long, deep, mid-channel pools interspersed with low-gradient riffles/runs within relatively unconfined valleys. MYR OC-1 and MYR OC-2 were located at the mouth of Yellowjacket and Moonshine Creeks, respectively. Site habitat descriptions are presented in Table 3.1-1. Representative photos of the sites can be found in Attachment 3-14B.

Survey results are summarized in Table 3.2-7. Historical records and incidental observations at or near the survey sites are described in Sections 3.1 and 3.5, respectively. One artificial basking platform was placed in a mid-channel pool in each survey area on May 22, 2012. Two adult WPT (one male and one female) were detected during the first survey at and one adult WPT (female) was detected during the second survey at MYR OC-1. The female WPT detected during the second survey may be the same female detected during the first survey; however, carapace marks could not be distinguished for comparison. At MYR OC-2, one adult WPT (female) was detected during the first survey and four adults (2 females, one male, and one unknown) were detected during the second survey. WPT detections did not occur at MYR OHD-1.

Site Code and Location/	Potential	Other
General Characteristics of the Site ¹	WPT Habitat	Comments
MYR OC-1 (MIDE	DLE YUBA RIVER RM 1.4) (UTM E 661333	, UTM N 4360676)
Survey area located upstream of the mouth of Yellowjacket Creek in a relatively unconfined river valley. The site contained a long, deep, mid-channel pool between the upstream and downstream survey sub-sites, and spanned approximately 180 m. A right bank scour pool located downstream of the survey area was approximately 61 m in length. Pool depths ranged from 1 to 2 m. Stream velocities in this reach were almost imperceptible. The right bank mainly consisted of sandy to boulder- dominated banks; the left bank was boulder/cobble point bar. Patches of submerged waterweed were present in the main mid-channel pool; patches of sedges were along the boulder-dominated left bank. Overhanging riparian vegetation on the left bank consisted of dense willow and alder (<i>Alnus</i> sp.); right bank had moderately dense patches of willow and alder in the upstream survey area; the downstream survey area had little to no riparian vegetation. Adjacent upland slopes were steep and vegetated by oak- conifer forest.	Potential basking substrate consisted of several large boulders in and large downed logs in the main mid-channel pool. Dense, overhanging vegetation (including branches extending into the water), and gravel bars downstream of the site may also be suitable for basking. Potential streamside refugia comprised of dense riparian vegetation and root wads; aquatic refugia are comprised of submerged boulders and woody debris and aquatic vegetation.	The right bank of the survey site near the upstream mid-channel pool is a private beach that is used by the landowner for recreation. No recreationists were at the site at the time of the surveys; however, landowner frequently uses the beach in the summertime.

Table 3.2-7. Descriptions of WPT basking survey sites at Middle Yuba River.

Table 3.2.7 (continued)

Site Code and Location/	Potential	Other
General Characteristics of the Site ¹	WPT Habitat	Comments
MVR OC-2 (MIDD	I E VIIBA RIVER RM 3 5) (IITM E 663896	UTM N 4361473)
Survey area located upstream and downstream of the mouth of Moonshine Creek in a relatively unconfined river valley. The site contained a deep mid-channel pool of moderate length near the upstream survey site and a long right bank scour pool at the downstream survey site. The upstream mid-channel pool was approximately 55 m long and up to 2 m deep. The scour pool was approximately 37 m long and up to 1m deep. Stream velocities in the mid-channel pool were almost imperceptible; the scour pool had velocities of up to ~0.25m/s. The upstream portion of the right bank mainly consisted of sand-dominated banks, the downstream right bank was bedrock and boulder-dominated. The left bank was boulder/cobble point bar. Patches of submerged waterweed were present in the mid- channel pool; patches of sedges are located along the right bank. Overhanging riparian vegetation on the left bank consisted of dense willow and alder; right bank overhanging vegetation consisted of patches of Himalayan blackberry and oak trees near the mid-channel pool, transitioning to dense willow/alder downstream. Adjacent upland slopes were steep and vegetated by oak-conifer forest.	Potential basking substrate consists of several large boulders, exposed bedrock and woody debris mainly along the right bank. Dense, overhanging vegetation (including branches extending into the water) may also be suitable for basking. Potential streamside refugia comprised of dense riparian vegetation, and root wads; aquatic refugia are comprised of submerged boulders/bedrock and woody debris, and aquatic vegetation.	The right bank of the survey site near the upstream mid-channel pool is a private beach that is used by the landowner for recreation. No recreationists were at the site at the time of the surveys; however, landowner frequently uses the beach in the summertime.
MYR OHD-1 (MID	DLE YUBA RIVER RM 4.9) (UTM E 66521	7, UTM N 4362103)
Survey area located ~ 0.2 RM upstream of the mouth of Oregon Creek in a relatively unconfined river valley. The site contained two long, deep, mid-channel pools. The upstream and downstream pools were approximately 33 and 43 m long, respectively, and pool depths ranged from 1 to 2 m. Stream velocities in the mid-channel pools were up to ~0.25 m/s. The right bank mainly consisted of boulder/bedrock-dominated banks; the left bank consisted of boulder/cobble banks in the downstream portion. Aquatic and emergent vegetation was absent. Overhanging riparian vegetation on both banks consisted of scattered patches of willow and alder. Adjacent upland slopes were steep and vegetated by oak-conifer forest.	Potential basking substrate consisted of exposed bedrock and large boulders in the mid-channel pools and on the streambanks. Potential streamside refugia limited to scattered patches of willows/alders and some boulder crevices. Aquatic refugia comprised of submerged boulders and bedrock.	The survey area is upstream of Oregon Creek Day Use area; numerous swimmers, sunbathers, and recreational miners are frequently present in the survey area throughout the spring/summer.

UTM = Universal Transverse Mercator

Survey results are summarized in Table 3.2-8. Historical records and incidental observations at or near the survey sites are described in Sections 3.1 and 3.5, respectively. One artificial basking platform was placed in a mid-channel pool in each survey area on May 22, 2012. Two adult WPT (one male and one female) were detected during the first survey at and one adult WPT (female) was detected during the second survey at MYR OC-1. The female WPT detected during the second survey may be the same female detected during the first survey; however, carapace marks could not be distinguished for comparison. At MYR OC-2, one adult WPT (female) was detected during the first survey and four adults (2 females, 1 male, and 1 sex not

determined) were detected during the second survey. There were no WPT detections at MYR OHD-1.

Date	Time ¹	Air/Water Temp. (°C) ²	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments
MYR OC-1 DOWNSTREAM (MIDDLE YUBA RIVER RM 1.4) (UTM E 661333, UTM N 4360676)				IVER RM 1.4) (UTM E 661333, UTM N 4360676)
Survey 1: 5/30/12	08:30 to 10:30	18/15	1: adult/female/ 18 1: adult/male/ 18	Artificial basking platform was deployed in mid-channel of deep pool prior to surveys on May 22, 2012. The platform appeared undisturbed and functional. Survey area was in full sun throughout survey. Female WPT basking on midstream boulder. WPT entered water in response to surveyor activity at survey site soon after initial sighting, and then returned to the same boulder at 09:15, left again at 09:45, and returned around 10:15. Male WPT basking on downed log on the downstream part of the north bank.
Survey 2: 7/12/2012	16:44 to 17:45	35/25	1: adult/female/ 15	WPT was basking on boulder by Left Bank (LB) at the upstream end of survey area observed within the first 10 minutes of the survey. The WPT was basking on the same boulder. The hind end of the turtle was partially in the water. It went into the water and disappeared at \sim 17:34. Numerous bullfrog tadpoles (\sim 20mm, no legs) detected at point bar.
	MYR OO	C-1 UPSTREA	M (MIDDLE YUBA RIVI	ER RM 1.45) (UTM E 661424, UTM N 4360655)
Survey 1: 5/30/12	09:00 to 11:00	18/15	None observed	Survey area was in full sun throughout survey. Numerous bullfrog tadpoles observed in mid-channel pool.
Survey 2: 7/12/2012	16:30 to 17:40	37/25	None observed	Survey area was in full sun throughout survey. Numerous bullfrog tadpoles observed in mid-channel pool.
	MYR OC-	2 DOWNSTR	EAM (MIDDLE YUBA R	IVER RM 3.5) (UTM E 663896, UTM N 4361473)
Survey 1: 6/6/2012	14:50 to 16:40	23/20	1: adult/female/ 15	Artificial basking platform was deployed near dense blackberry on right bank of deep pool prior to surveys on May 22, 2012. WPT was seen basking on the artificial platform when surveyors approached, then it immediately dove into the water. At 15:34, a USFS crew surveying for FYLF entered the basking survey area. The crew returned again at 16:18. At 16:20 the entire west bank became shaded. This is the same animal that was detected at MYR OC-2 upstream.
Survey 2: 7/10/2012	7:40 to 10:15	12/19	1: adult/male/ 18 1: adult/female/ 13	The male WPT was basking on a small boulder on LB at 8:15. The head profile was indicative of a male (light chin, no maxilla markings). It basked for <5 minutes then swam upstream and downstream, remaining in the water. The female WPT emerged in the downstream end of the survey area. Its head was heavily mottled with maxilla markings indicating it was likely a female. It was observed mostly in the water for ~10 minutes, and then emerged on to a partially shaded boulder to bask for around 15 minutes before disappearing.
	MYR OG	C-2 UPSTREA	M (MIDDLE YUBA RIVI	ER RM 3.55) (UTM E 663934, UTM N 4361498)
Survey 1: 6/6/2012	14:50 to 16:41	23/20	1 ³ : adult/female/ 18	WPT observed basking in dappled sun at 15:24 on downed willow branches near right bank upstream of turtle platform.
Survey 2: 7/10/2012	7:32 to 10:06	14/20	1: sub-adult/N.D./ 13 1: female (18 cm)	The smaller WPT swam out from LB area into the deep pool at 8:45 opposite to the surveyor, where it submerged and disappeared from view. This turtle did not re-appear during the remainder of the survey. The female WPT was basking on rocks at the top of the riffle tail-out at the downstream edge of the survey area. The WPT entered the water at 9:35 then re-emerged on the same rock at 9:50 ten went back into the water again at 10:06.
	MYR OHD	–1 DOWNSTI	REAM (MIDDLE YUBA F	RIVER RM 4.9) (UTM E 665217, UTM N 4362103)
Survey 1: 5/30/12	14:40 to 16:40	26/20	None observed	Survey area was in full sun throughout survey. Numerous bullfrog tadpoles and bass observed in mid-channel pool.
Survey 2: 7/9/2012	7:35 to 9:36	14/21	None observed	Survey area was in full sun throughout survey. Numerous bullfrog tadpoles and bass observed in mid-channel pool.

 Table 3.2-8.
 WPT basking survey observations at Middle Yuba River sites.

Date	Time ¹	Air/Water Temp. (°C) ²	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments
MYR OHD-1 UPSTREAM (MIDDLE YUBA RIVER RM 4.95) (UTM E 665300, UTM N 4362205)				
Survey 1: 5/30/12	14:30 to 16:30	26/20	None observed	The artificial basking platform deployed near left bank of mid- channel of deep pool prior to surveys was missing from study site. Numerous bass observed in mid-channel pool.
Survey 2: 7/9/2012	7:40 to 9:40	15/20	None observed	Partial sun at downstream end on LB at the start of the survey. The RB was in shade until ~8:00. Numerous bass observed in mid- channel pool.

Table 3.2-8. (continued)

Key: mm = millimeter WPT = Western Pond Turtle N.D. = sex not determined

Length = carapace (upper shell) length in centimeters (cm), estimated from a distance.

OC = Middle Yuba River, Oregon Creek Reach OHD = Middle Yuba River, Our House Diversion Dam Reach

RM = river mile WPT = Western Pond Turtle UTM = Universal Transverse Mercator

¹ Surveys were 2 hours in length, except: Survey 2 MYR OC-1 (1hr to 1 hr 10 min), which was stopped early in order to mobilize for WPT trapping for Entrainment Study 3.11; Survey 1 at MYR OC-2 (1 hr 50 min), which was stopped early due to USFS survey crew activity and shading of survey site; and Survey 2 at MYR OC-2 (2hr 30 min) which was extended to continue observation of WPT behavior and confirm 4 unique animals were detected.

² Temperature at start of survey period.

³ Detection of female at MYR-OC2 downstream was same animal detected at MYR-OC2 upstream.

3.2.4.2 Oregon Creek

The Project-affected reach of Oregon Creek, Log Cabin Diversion Dam Reach, is 4.1 miles long from the confluence with the Middle Yuba River to the Log Cabin Diversion Dam. Based on channel classification and habitat mapping performed for YCWA's Pre-Application Document (YCWA 2010), the Log Cabin Diversion Dam Reach can be divided into sections. Relatively steep (3-8% gradient), confined channel type occurs near the downstream end of the reach (approximately 1.0 mi) and below Log Cabin Diversion Dam at the upstream end of the reach (0.5 mi), designated here as Section 3. In between these steeper sections, a lower gradient (1-3%), confined section (2.6 mi) occurs through Celestial Valley. There is a short 4.6 percent gradient section just above the confluence with the Middle Yuba River, and a 3.7 percent gradient section upstream of Celestial Valley. Celestial Valley appears to be a long-term depositional area and has an overall gradient of 1.6 percent. The Celestial Valley area is highly modified by human settlement, and channel location has been modified by roads, grazing, berms, and suburban development; the riparian zone is also heavily vegetated with blackberry vines. The stream reach is confined throughout between either terraces or steep valley walls. The steeper sections are dominated by cascades, falls, and plunge pools, whereas the Celestial Valley section is dominated by long planar runs and low gradient riffles, with little three-dimensional heterogeneity. In total, 11 seasonal/intermittent tributaries are located along the reach, five of which occur between RM 1.9 and RM 3.0.

From RM 0.0 to 1.0, the predominant stream habitat types are mid-channel pool, pocket water, and cascades. From RM 1.0 to 3.6, habitat is predominantly low-gradient riffles and mid-channel pools, and runs to a lesser extent. Predominant stream habitat types are mid-channel pool, pocket water, and low-gradient riffles from RM 3.6 to Log Cabin Diversion Dam. Bankfull width throughout the creek ranges from 5 to 15 m. Boulders and cobbles are dominant substrates, with bedrock predominant in higher-gradient sections of the creek. Emergent and

aquatic vegetation generally is sparse; margin vegetation consists of patchy grasses/forbs and shrubs/saplings. Margin vegetation consists of patchy grasses/forbs.

Aquatic habitat potentially suitable for WPT is limited to stream habitat at some deeper midchannel pools; however, suitable basking habitat is limited by a dense riparian canopy.

According to the defined mapping criteria, most of Log Cabin Diversion Dam Reach is not suitable for WPT nesting due to dense riparian canopy and unsuitable aspects within a confined stream valley. Soil map data show that the more common soil types along the reach are Mariposa-Jocal Complex, Deadwood-Rock Outcrop-Hurlbut complex and Chawanakee-Chaix-Hotaw Complex. All of these soil types were assumed to be potentially suitable for WPT nesting; however, some may be marginal substrate for oviposition, particularly in areas that have inclusions of near-surface or exposed bedrock.

A few small patches of potential WPT nesting habitat were mapped in Celestial Valley; and very small, scattered patches were mapped near the downstream and upstream end of the reach, in total representing about 2 ac. None of the mapped habitat extends substantially upslope from the stream. Based on observations from other YCWA studies, the upland area, particularly in Celestial Valley, may have suitable slope and soil conditions for oviposition. However, very dense riparian vegetation likely precludes use. The surrounding uplands are forested.

Potentially suitable habitats for juvenile WPT are scarce or absent in this reach because of little or no submergent vegetation and scant emergent vegetation, and channel confinement in Celestial Valley. Tributaries are limited to the reach upstream of Celestial Valley.

3.2.4.3 North Yuba River

In the North Yuba River, New Bullards Bar Dam Reach is 2.3 miles long and extends from the confluence with the Middle Yuba River to the New Bullards Bar Dam. Based on channel classification and habitat mapping performed for YCWA's Pre-Application Document (YCWA 2010), the channel is dominated by gradients below 3 percent (average gradient of 2%). There is one short section of river where the gradient is greater than 3 percent and one short section that is above 5 percent. Just above the 5 percent section, the gradient flattens to less than 1 percent. Most of the reach is composed of bedrock and house-sized boulders that separate large mid-channel pools. There are very short and infrequent areas of cobble-size deposits, but most of the substrate is large and immobile. There is no apparent floodplain or terrace development. Substrate in the North Yuba River is mainly dominated large boulders that often cover the channel, and large, deep pools bounded by bedrock. Pocket-water and mid-channel pool habitat types dominate.

Aquatic habitat potentially suitable for WPT includes a few large, deep mid-channel pools with boulder/bedrock basking substrate and limited riparian canopy.

Most of the New Bullards Bar Dam Reach is not suitable for WPT nesting, mainly due to excessively steep slopes. Soil map data show that the more common soil types are Mariposa-Jocal Complex and Deadwood-Rock Outcrop-Hurlbut complex, both of these soil types were

assumed to be potentially suitable for WPT nesting; however, some may be marginal substrate for oviposition, particularly in areas that have inclusions of exposed bedrock.

Potential WPT nesting habitat along the North Yuba River is concentrated near the confluence with the Middle Yuba River. Very small patches were mapped downstream of New Bullards Bar Dam and in the mid-section of the reach. None of the mapped habitat extends substantially upslope of the North Yuba River. Based on observations from other YCWA's studies, the North Yuba River is generally boulder and bedrock confined, and appears to lack substantial areas of suitable substrate for oviposition. The surrounding uplands are forested, with small patches regenerating from forest fires.

Potentially suitable habitats for juvenile WPT is limited, as minimal emergent or submergent vegetation has been observed in North Yuba River. There is one seasonal, high-gradient tributary on the North Yuba River reach.

3.2.4.4 Yuba River

The Yuba River within the study area consisted of: 1) the Narrows 2 Powerhouse Reach from the NMWSE of Englebright Reservoir to the Narrows 2 Powerhouse at the base of Englebright Dam at RM 24.2); 2) Englebright Reservoir from Englebright Dam at RM 24.3 to the NMWSE of Englebright Reservoir at RM 32.7; 3) the New Colgate Powerhouse Reach from the NMWSE of Englebright Reservoir at RM 32.7 to the New Colgate Powerhouse at RM 34.2; and 4) the Middle/North Yuba River Reach from New Colgate Powerhouse at RM 34.2 to the confluence of the North Yuba River with the Middle Yuba River at RM 40.0.

The Narrows 2 Powerhouse Reach has an extensive history of impacts to channel morphology resulting from hydraulic mining activities in the Yuba River watershed (YCWA 2012). From the Narrows 2 Powerhouse downstream for approximately 2.0 RM, the river corridor is confined in a steep-walled bedrock canyon (referred to as the Narrows); transitions first into a wider bedrock valley; and finally into a wide, alluvial valley downstream from approximately RM 19.3 (Wyrick and Pasternack 2012). The average bed channel slope of the thalweg from the upstream end of Timbuctoo Bend (downstream extent of the Narrows) to the confluence with the Feather River is 0.16 percent, while the average bed channel slope between the Narrows and Englebright Dam is 0.31 percent (Wyrick and Pasternack 2012). Pools are the dominant in-channel morphological unit in the upstream portion of the reach, whereas riffles, glides and slackwater are dominant in the downstream portions of the reach (Wyrick and Pasternack 2012).

Englebright Reservoir is a relatively deep reservoir, with still or slow-moving water, and moderate to steeply sloped banks. YCWA's Pre-Application Document (YCWA 2010) indicates that Englebright Reservoir supports numerous game fish species comparable to those in New Bullards Bar Reservoir and also has a comparable history of fish stocking by California Fish and Game (CDFG).

The Middle/North Yuba River and New Colgate Powerhouse reaches are mostly bedrockcontrolled, with only very short boulder/cobble sections (YCWA 2010). The channel is laterally and vertically stable due to dominant bedrock control. Sinuosity is very low as there are no plan and profile sections strongly influenced by alluvial deposition. Pools are large and deep, and separated by long sections of pocket-water that runs through and under very large boulders. Though not very steep, according to the mapped gradient of 1.8 percent, high gradient riffles dominate the gradient "steps." The river flows through bedrock canyons, and the vertical walls inhibit ground access. The only location that was ground-mapped was the area just above and below New Colgate Powerhouse (25% of the reach). Habitat is dominated by mid-channel pools and pocket-water formed between large boulders.

Aquatic habitat potentially suitable for WPT includes numerous mid-channel scour pools located upstream of Englebright Reservoir and downstream of Timbuctoo Bend. Near shore on Englebright Reservoir may also provide aquatic habitat in areas with suitable basking substrate and underwater hiding habitat.

Potential nesting habitat along the Yuba River occurs from Englebright Reservoir downstream to Daguerre Point Dam. Other areas are generally not suitable for WPT nesting due to excessively steep slopes, particularly in bedrock-confined portions of the river, and unsuitable aspect. Soil map data show that the more common soil types in the Yuba River, from upstream to downstream are Boomer-Rock Outcrop complex, which contains loam in the upper horizon; Flanly Sandy Loam, Flanly-Rock Outcrop Complex, and Hoda Sandy Loam; Deadwood-Rock Outcrop-Hurlbut complex; and Auburn-Sobrante Rock Outcrop complex, Sobrante-Timbuctoo complex, and Redding-Corning complex, three complexes which contain gravelly loam in the upper horizons. All of these soil types were assumed to be potentially suitable for WPT nesting; however, some may be marginal substrate for oviposition, particularly in areas that have inclusions of near-surface or exposed bedrock.

Mapped WPT nesting habitat is largely absent from the left banks of the Yuba River. The most extensive patches, covering about 19 ac, occur in the area of the Yuba Goldfields; these patches extend well upslope of the bankfull margin of the Yuba River. Other potential nesting habitat occurs near the east and west shores of Englebright Reservoir and extend well upslope of the reservoir. Upstream of Englebright, the most extensive mapped habitat occurs upstream of New Colgate Powerhouse from RM 35.1 to RM 36.1. Vegetation surrounding Yuba River below the Narrows 2 Powerhouse includes areas classified by CALVEG (2010) as Annual Grasses and Forbs, which may be more suitable than forested areas as potential WPT nesting habitat. Above Narrows 2 Powerhouse, uplands surrounding the stream reach are forested.

Potentially suitable habitats for juvenile WPT are generally absent from the Yuba River reaches that contain confined steep-walled bedrock canyons and high-gradient tributaries. Areas of shallow water and emergent vegetation occur mainly in lower-gradient portions of the Yuba River, particularly in some side channels of the Yuba River and associated low-gradient tributaries downstream of Timbuctoo Bend (See maps in Attachment 3-6A). Dense emergent and aquatic vegetation was observed in a deep pool at Site YR-1 during basking surveys; however, American bullfrog adults and abundant tadpoles, as well as numerous bass, were observed at this site.

One survey site in the Yuba River, Middle/North Yuba Reach at RM 32.35-32.4 was designated as YR-1, with an upstream and downstream sub-site. Site YR-1 was within a portion of the river

reach characterized by low gradient, long mid-channel pools interspersed with low-gradient riffles/runs. Site habitat description is presented in Table 3.2-9. Representative photos of the sites can be found in Attachment 3-6B.

Site Code and Location/	Potential	Other			
General Characteristics of the Site ¹	WPT Habitat	Comments			
YR-1: YUBA RIVER NEAR NEW COLGATE POWERHOUSE (~ RM 34.3)					
Survey area located just upstream of the New Colgate Powerhouse in a relatively unconfined river valley. The site contained a long, deep, mid-channel pool. Pool depths ranged from 1m towards the shoreline to 2 m in the thalweg. Stream velocities in this reach were almost imperceptible. The right bank was mainly boulder-dominated, whereas the left bank was boulder/bedrock. Dense waterweed and pondweed (<i>Potamogeton</i> sp.) was growing on the right bank; scattered patches of waterweed were present on right bank. Overhanging riparian vegetation on both banks consisted of patches of dense willow and alder. Adjacent upland slopes were steep and vegetated by oak-conifer forest.	Potential basking substrate consisted of exposed bedrock and large boulders in the mid-channel pools and stream banks. Potential streamside refugia consisted of patches of dense willows/alders and some boulder crevices. Potential aquatic refugia comprised of submerged boulders and bedrock and submerged aquatic vegetation	The survey area is nearby New Colgate Powerhouse, which has frequent construction and vehicular activity. Recreational swimmers were observed in the area during surveys.			

Table 3.2-9.	Descriptions of	f WPT	basking surve	y site at	Yuba River.
	1			/	

Key: RM = river mile WPT = Western Pond Turtle

Survey results are summarized in Table 3.2-10. One artificial basking platform was placed in a mid-channel pool at the survey area on May 23, 2012. No WPT were detected.

Date	Time ¹	Air/Water Temp. (°C) ²	WPT: Lifestage/Sex/ Length (cm)	Basking Survey Comments		
	YR-1 UPSTREAM (YUBA RIVER RM 34.4) (UTM E 656184, UTM N 4355053)					
Survey 1: 6/5/2012	8:23 to 11:37	16/18	None observed	At 08:51, the sun was obscured by clouds. Light rain occurred from 09:30 to 10:04, and then sun returned at 10:05. Intermittent construction noises coming from powerhouse. Numerous bullfrog tadpoles were observed in mid-channel pool.		
Survey 2: 7/10/2012	12:05 to 14:05	34/24	None observed	Survey area was in full sun throughout survey. Air and water temperatures very high. Two adult bullfrogs were observed basking in left bank aquatic vegetation. Numerous bass were observed in mid-channel pool.		
YR-1 DOWNSTREAM (YUBA RIVER RM 34.3) (UTM E 656123, UTM N 4355051)						
Survey 1: 6/5/2012	8:10 to 11:35	16/18	None observed	At around 08:30, hammering, drilling, and sawing construction noise began at the powerhouse and continued on and off through the duration of the survey. At 08:55, sun obscured by clouds and it rained from 09:30 to 09:40 and sun returned at 10:05. Numerous bullfrog tadpoles were observed in mid-channel pool, and one adult bullfrog was observed basking in left bank aquatic vegetation.		
Survey 2: 7/10/2012	11:58 to 14:00	35/25	None observed	Survey area was in full sun throughout survey. Air and water temperatures very high.		

 Table 3.2-10. Result of WPT basking survey observations at Yuba River sites in 2012.

Key: WPT = Western Pond Turtle; Length = carapace (upper shell) length in centimeters (cm), estimated from a distance.

RM = river mile UTM = Universal Transverse Mercator

¹ Surveys were 2 hours in length, except: Survey 1 (3 hr), which was extended due to cloudy conditions and disturbance from nearby construction.

² Temperature at start of survey period.

3.3 Incidental Observations of WPT and Entrainment Trapping

Incidental observations of WPT are summarized in Table 3.3-1. The table also includes two WPT documented by trapping in Oregon Creek upstream of Log Cabin Diversion Dam Impoundment and observations of one WPT repeatedly observed in Log Cabin Diversion Dam Impoundment for Study 3-11, Entrainment, the same turtle observed during earlier basking surveys. The locations of all these observations are depicted in Attachment 3-6A. Photographs of WPT and locations where turtles were observed are presented in Attachment 3-3B, Part 3.

_	No./Lifestage/Sex/	Loc	ation	Description of	3
Date	Length (cm) ¹	UTM E	UTM N	Location and Turtle Behavior ²	Study ³
6/15/11	1: juvenile/ N.D./ 5	667208	4367400	Adjacent to Oregon Creek ~0.1 RM upstream of Log Cabin Diversion Dam, in puddle on Log Cabin Dam access road. The turtle was safely relocated off the road.	FYLF
4/18/12	1: adult/N.D./ ≥14	663896	4361482	Middle Yuba River at Moonshine Creek confluence. Turtle was basking on shoreline.	IFU
4/23/12	1: N.D./N.D/ N.D.	662482	4368336	New Bullards Bar Reservoir in Tractor Cove. Turtle was basking on partially submerged log ~15 feet from shoreline	В
5/16/12	1: N.D./N.D/ N.D	665115	4362260	Middle Yuba River upstream of Oregon Creek (~0.1 RM). Turtle was basking on rocks near water temperature logger.	WT
5/17/12	1: adult/N.D./ 13 ³	666650	4361980	Middle Yuba River upstream of Oregon Creek (~1 RM), in very large pool 15-25 ft deep, 130 ft long, 25 ft wide. Steep bedrock slopes both banks. Turtle was basking on bedrock.	CMU
6/6/12	2: adult/N.D./~15	661359	4360633	Middle Yuba River upstream of Yellowjacket Creek. One WPT basking on same boulder where WPT female was subsequently (7/12/12) detected during basking surveys, and one WPT basking on same downed log where WPT male was earlier (5/30/12) detected during basking surveys.	FYLF
7/23/12	1 adult/female/~16	661359	4360633	Middle Yuba River upstream of Yellowjacket Creek, basking on boulder where WPT female detected during basking surveys	FYLF
7/24/12	1: adult/male/ 17	660725	4359372	Middle Yuba River ~0.1 RM upstream of confluence with North Yuba River. WPT was basking on right bank bedrock adjoining a high-gradient riffle.	FYLF
7/23-28/12	1: adult/male	667048	4367428	Log Cabin Diversion Dam Impoundment, basking or swimming approximately 65 to 80 ft from diversion intake tunnel. WPT was observed once or more each day.	EN
7/25/12 7/26/12	1: adult/female 1: adult/male	667142	4367590	Oregon Creek ~0.3 RM upstream of Log Cabin Diversion Dam Impoundment. Female captured 7/25 and male captured 7/26 in hoop- net trap placed immediately upstream of a long mid-channel pool. Both were released after PIT-tags were affixed to carapace.	EN

 Table 3.3-1. Incidental observations of WPT recorded during performance of various Relicensing studies and WPT documented during YCWA's Entrainment Study.

Key: ft = feet RM = river mile WPT = Western Pond Turtle

¹ No. = number; N.D. = lifestage, sex, or length undetermined; Length = carapace length in centimeters (cm), unless otherwise noted.

² Relicensing Study that was the source of observation. B = Botanical studies (CESA-Listed Plants, ESA-Listed Plants, Special-Status Plants, ESA-Listed Wildlife – Valley Elderberry Longhorn Beetle); FYLF = Special-Status Amphibians – Foothill Yellow Legged Frog; CMU = Channel Morphology Upstream Englebright Reservoir; WT = Water Temperature Monitoring; IFU = Instream Flow Upstream of Englebright Reservoir; EN = Entrainment

³ Length = plastron length in cm

3.4 Other Incidental Observations

Incidental observations of species recorded during field work for this study included native amphibians and the exotic American bullfrog (*Lithobates catesbeianus*), aquatic garter snakes,

and crayfish. Adult American bullfrogs are known predators of juvenile WPT and were documented during WPT basking surveys at the site on the Yuba River (YR-1) and New Bullards Bar Reservoir at Moran Cove (NBBR-64). American bullfrog tadpoles were also observed at sites YR-1, MYR-OC1 (Middle Yuba River at Yellowjacket Creek) and MYR-OHD-1 (Middle Yuba River upstream of Oregon Creek). A complete list of incidental species observations including crayfish, American bullfrog, Sierra Treefrog, and aquatic garter snakes recorded during performance of YCWA's Study 3-4, Special-Status Amphibians – Foothill Yellow-legged Frog Surveys and other studies may be found in Technical Memorandum 3-4 (YCWA 2012a).

4.0 <u>Discussion</u>

4.1 Western Pond Turtle Life History Information⁵



WPT occurs in a wide variety of aquatic habitats, including permanent ponds, lakes, and low-flow regions of rivers. Adults may also use seasonal streams or ponds when available. To attain suitable body temperature ("thermoregulate"), individuals engage in basking behavior upon emergent large woody debris, overhanging vegetation, rock outcrops, or mats of submergent vegetation. Factors limiting population distribution and abundance may be the availability of terrestrial areas suitable for oviposition, aquatic habitats suitable for

hatchlings (i.e., warm, shallow water with ample hiding cover in the form of dense submergent or short emergent vegetation), and basking sites for juveniles and adults (Jennings and Hayes 1994, Buskirk 2002). Population recruitment may be low at some sites because of low hatching success and survivorship of juveniles. WPT is reportedly rare in reservoirs (Hays et al. 1999) where predation by introduced centrarchid fishes (especially large-mouth bass) and American bullfrog upon hatchlings may be high (Holland 1991).

4.2 Known Occurrences or Suitable Habitat of Western Pond Turtle in Relation to Project Facilities

Based on survey results, incidental observations, and existing records, WPT is known to occur at several locations at New Bullards Bar Reservoir, at Log Cabin Diversion Dam Impoundment, and in Oregon Creek upstream of the dam. Verified locations of WPT occurrence generally correspond well to the distribution of suitable habitat in these areas. Habitat conditions are less suitable at Our House Diversion Dam Impoundment, where WPT has not been found. Along stream reaches that may be affected by Project flows, WPT is verified to occur at several locations in the Middle Yuba River downstream of Our House Diversion Dam and at some low gradient sections of the Yuba River and Englebright Reservoir.

⁵ Photo source: L. Danielski, HDR, Inc.

4.2.1 New Bullards Bar Reservoir

New Bullards Bar Reservoir is a storage reservoir on the North Yuba River formed by New Bullards Bar Dam. At NMWSE (1,956 ft), New Bullards Bar Reservoir extends about 8.5 mi upstream, has an estimated storage capacity of 966,103 ac-ft, a surface area of 4,790 acres, a shoreline of about 71.9 mi, and a drainage area of 488.6 mi².

Although the specific hydrology of each year can vary widely, YCWA typically operates New Bullards Bar Reservoir by capturing winter and spring runoff from rain and snowmelt. The North Yuba River inflow to New Bullards Bar Reservoir is augmented by diversions from the Middle Yuba River to Oregon Creek through the Lohman Ridge Tunnel, and by diversions from Oregon Creek into the reservoir through the Camptonville Tunnel. Consequently, New Bullards Bar Reservoir normally reaches its peak storage at the end of the spring runoff season, and then is gradually drawn down until its lowest elevation in early to mid-winter. The reservoir does not undergo significant daily changes in elevation.

Observations of WPT - all adults - occurred at Moran Cove, Willow Cove, and Tractor Cove during this study; and there are earlier recorded observations from Garden Point. Whereas other parts of the reservoir were characterized by deep, open water, steep banks, and a scarcity of basking areas except for steep shorelines, these three coves contain slopes that are less steep and more numerous potential basking sites associated with large woody debris and live shrubs. Other unfavorable features of New Bullards Bar Reservoir are abundant introduced predatory fish and the presence of American bullfrog. These conditions are tolerable for adult and sub-adult WPT; however, they are far less suited for hatchling WPT and growing juveniles until they attain size sufficient to escape predation. Suitable habitats for juvenile WPT consist of vegetated shallow water which is limited in extent at New Bullards Bar Reservoir and may not be persistent as reservoir water levels gradually change. Possibly, juvenile WPT reside in other habitats (e.g., seepage-fed wetlands in the Oregon Creek area) and do not move into the reservoir until they are larger. However, if not, WPT population recruitment at New Bullards Bar Reservoir and may not be persistent as larger. However, if not, WPT population recruitment at New Bullards Bar Reservoir at the presence in other habitats (e.g., seepage-fed wetlands in the Oregon Creek area) and do not move into the reservoir until they are larger. However, if not, WPT population recruitment at New Bullards Bar Reservoir may be low.

Potential WPT nesting habitat at New Bullards Bar Reservoir occurs along the shoreline in all of the areas where WPT has been documented (i.e., Moran Cove, Willow Cove, Tractor Cove, and Garden Point), although usually in only small patches. This mapped habitat extends further upland at Willow Cove and Moran Cove, but may be limited by excessive canopy cover in both areas.

WPT typically oviposits between May and July. At New Bullards Bar Reservoir peak water surface elevation generally occurs in May or June, and water surface elevation is lower in July and substantially lower in August (Figure 4.2-1). This suggests that relatively little suitable nesting habitat below NMWSE would be exposed during most of the egg-laying season or during the 90-120 day incubation period.



Figure 4.2-1. Water surface elevation exceedance curve for New Bullards Bar Reservoir for the individual months of May through August and the period of May-July (principal WPT nesting period) during the period of record as modeled for current Project operations. Normal maximum water surface elevation = 1,956 ft.

4.2.2 Our House Diversion Dam Impoundment

Our House Diversion Dam is a 130 foot-radius, double curvature, concrete arch dam located on the Middle Yuba River 12.0 miles upstream of its confluence with the North Yuba River. The dam is 70 ft high with a crest length of 368 ft, a crest elevation of 2,049 ft, and a drainage area of 144.8 square miles (sq mi). The dam has a capacity of 280 ac-ft, but storage and water levels do not fluctuate under Project operations. The diversion dam has two outlets: 1) a 5-foot diameter steel pipe controlled by a slide gate on the upstream face of the dam and with a maximum capacity of 800 cubic feet per second (cfs) (the outlet centerline is at elevation 1,990 ft, and the gate is operated by use of a portable motor); and 2) a 24-inch diameter release pipe, with a maximum capacity of 60 cfs located just above the low-level outlet and controlled by a downstream gate valve operated by hand. The diversion dam has a spillway capacity, and flows in excess of the diverted flows are spilled.

Our House Diversion Dam and its associated Lohman Ridge Diversion Tunnel can divert about 810 cfs of water from the Middle Yuba River to Oregon Creek (YCWA 2010). The diversion pool fluctuates passively (i.e., storage is not actively exercised by the operator, but depends on the balance between diversion and inflow) from a minimum pool when natural inflows are at or below the downstream minimum flow requirement and no diversion is occurring, to a maximum pool size of approximately 280 ac-ft when inflows are greater than diversion capacity and the facility is spilling. YCWA operates the Lohman Ridge Diversion Tunnel to Oregon Creek and the Camptonville Diversion Tunnel from Log Cabin Diversion Dam Impoundment to New Bullards Bar Reservoir primarily in the winter and spring during high flow periods.

There are no historical records of WPT at Our House Diversion Dam Impoundment and no WPT were detected during surveys for this study (three surveys at four viewing sites) or in the 2010 Yuba-Bear Hydroelectric Project relicensing study (two surveys at one viewing site) performed for Nevada Irrigation District (PG&E and NID 2011). The nearest known observations of WPT were 3.4 RM upstream of Our House Diversion Dam (PG&E and NID 2011). Potential basking habitat at the impoundment is limited to steep shorelines and shrubs that are at times partially submerged or overhanging the right bank. Large woody debris suitable for basking was not observed. A floating metal boom that crosses the channel could potentially be used by basking WPT. Areas potentially suitable for WPT nesting are scarce or absent and suitable habitat for juvenile WPT was not observed at Our House Dam Impoundment. The results suggest that WPT does not occur or only occurs irregularly and thus there is little or no potential for WPT to be affected by Project O&M at this facility.

4.2.3 Log Cabin Dam Impoundment

The Log Cabin Diversion Dam is a 105-foot radius, concrete arch dam located on Oregon Creek 4.3 RM upstream of its confluence with Middle Yuba River. The dam has a drainage area of 29.1 sq mi and a maximum spillway capacity of 12,000 cfs. The dam has a storage capacity of 90 ac-ft, but storage and water levels do not fluctuate under Project operations.

The diversion dam has two outlets to Oregon Creek in addition to the uncontrolled spillway. The first is a 5-foot diameter steel pipe acting as a low-level outlet and controlled by a slide gate on the upstream face of the dam with a maximum capacity of 800 cfs. The outlet centerline is at elevation 1,938 ft, and the gate is operated by use of a portable motor. The second is an 18-inch diameter release pipe with a maximum capacity of 13 cfs located just above the low-level outlet. A downstream gate valve operated by hand controls this outlet. The 18 in diameter Log Cabin Diversion Dam low-level intake is almost always in the fully open position to meet instream flow requirements; the five-foot diameter auxiliary low-level intake is used in emergencies or if otherwise needed (e.g., during repairs of the low-level intake, or infrequent major outages).

YCWA operates the Camptonville Diversion Tunnel from Log Cabin Diversion Dam Impoundment to New Bullards Bar Reservoir primarily in the winter and spring during high flow periods. The Camptonville Diversion Tunnel has the capacity to convey 1,100 cfs of water to New Bullards Bar Reservoir. The diversion pool fluctuates passively from a minimum pool when natural inflows are at or below the downstream minimum flow requirement and no diversion is occurring, to a maximum pool size of approximately 90 ac-ft when inflows are greater than diversion capacity and the facility is spilling.

Survey results at Log Cabin Diversion Dam Impoundment indicated the presence of one adult WPT repeatedly observed in 2012 at locations 60-360 ft upstream of the Camptonville Diversion Tunnel intake. Two adult WPT were also trapped ~0.4 RM upstream of the Impoundment during efforts conducted under Entrainment (Study 3.11). Combined with historical sightings by Forest Service employees (Forest Service 2011), and an incidental observation of a juvenile WPT in a puddle near the impoundment, this information suggests that small numbers of WPT may occur with regularity in the vicinity of the impoundment. Project maintenance activities could disrupt basking behavior near the dam; however, the one WPT observed in the impoundment in 2012 basked while service personnel were present on several dates. Individual WPT might occasionally be at risk to service vehicles on the access road. For example, the juvenile WPT observed in 2011 was in a puddle on the road, although the puddle was situated beyond the tunnel intake, where there is less vehicular traffic. The animal was safely relocated off the road after being observed.

There is a potential for entrainment in the low-level intakes at the Log Cabin Diversion Dam or into the Camptonville Diversion Tunnel intake. The tunnel intake is located in the deepest part of the impoundment and is not immediately adjacent to habitat features that were observed to be used by WPT for basking or hiding. Basking survey results while the tunnel was operating indicated use of basking sites 80-360 ft from the intake.

4.2.4 Stream Reaches That May Be Affected By Project Flows

4.2.4.1 Middle Yuba River, Our House Diversion Dam and Oregon Creek Reaches

The Middle Yuba River originates at an elevation of approximately 7,200 ft along the northern side of Meadow Lake Hill, and flows westerly for about 41.4 miles to the Project's Our House Diversion Dam located at RM 12.6 (YCWA 2010). Middle Yuba River flows upstream of the Project are reduced by upstream water projects. NID's Jackson Meadows Reservoir (RM 47.0) and Milton Diversion Dam (RM 44.8), both parts of NID's Yuba-Bear Hydroelectric Project (FERC Project No. 2266), affect flows entering the Project. Peak flows generally occur January through May and are associated with storm precipitation and snow melt.

Our House Diversion Dam and its associated Lohman Ridge Diversion Tunnel can divert about 810 cfs of water from the Middle Yuba River to Oregon Creek (YCWA 2010). Flows on the Middle Yuba River below Our House Diversion Dam have been measured since 1970 by the United States Geological Survey gage 11408880. An exceedance curve of mean daily flows in the Middle Yuba River below Our House Diversion Dam indicates that only 10 percent of mean daily flows during the period of record (1969-2008) exceed 102 cfs (YCWA 2010). Fifty percent of mean daily flows exceed 36 cfs, and mean daily flows exceed 27 cfs on 90 percent of days. Peak flows below Our House Diversion Dam occur when flows exceed the capacity of the Lohman Ridge Diversion Tunnel (YCWA 2010). Storm flows that exceed the diversion capacity are spilled. Review of the period of record (1968-2008) indicates that spills as late as May occurred in 12 of the 40 years (1971, 1974, 1975, 1978, 1979, 1980, 1993, 1996, 1998, 1999,

2003, and 2005); these spills occurred as late as June in seven of those years (1971, 1974, 1975, 1978, 1993, 1998, and 2003) and as late as July in one year (1975). Spills represented relatively abrupt changes in flow of varying magnitude.

Observations of WPT during basking surveys and incidental observations during other YCWA studies occurred mainly downstream of Oregon Creek, with one detection about 1 mile upstream of Oregon Creek.

4.2.4.2 Oregon Creek, Log Cabin Diversion Dam Reach

One Project facility is located on Oregon Creek, Log Cabin Diversion Dam at RM 4.3. The dam and its associated Camptonville Diversion Tunnel can divert about 1,100 cfs of water from Oregon Creek to New Bullards Bar Reservoir. The dam has no appreciable storage capacity. Storm flows that exceed the diversion capacity are spilled. As such, spills generally occur only during the wet season and rarely occur after early April. During the period of record (1968-2998), spills occurred as late as May in only three years (1995, 1998, and 2005).

There are no historical records of WPT at Oregon Creek below Log Cabin Diversion Dam, and there have been no incidental observations of WPT during YCWA's surveys. The nearest known observations of WPT were in the Log Cabin Diversion Dam Impoundment at RM 4.3. Potential nesting and basking habitat on Oregon Creek is limited due to dense riparian canopy and unsuitable aspects. The results suggest that WPT does not occur or only occurs irregularly within the Project-affected reach.

4.2.4.3 North Yuba River, New Bullards Bar Dam Reach

The North Yuba River originates at Yuba Pass at an elevation of 6,701 ft near State Highway 49 in Sierra County. The highway follows the river downstream from the community of Downieville for about 14 miles, where the river departs from the road and flows westward to where it enters the Project's New Bullards Bar Reservoir.

In the 2-mile-long reach of the North Yuba River below New Bullards Bar Dam, flow can come from any one or various combinations of three sources: releases from the New Bullards Bar Minimum Flow Powerhouse, releases from the New Bullards Bar Hollow Jet Valve, or spills from New Bullards Bar Dam spillway (YCWA 2010). The New Bullards Bar Minimum Flow Powerhouse constantly releases about 6 cfs to meet the required 5 cfs minimum flow below New Bullards Bar Dam. The Hollow Jet Valve is used infrequently, generally when outages preclude releases to the New Colgate Powerhouse. Spills, while relatively infrequent, are a notable contributor to flows in the North Yuba River below New Bullards Bar Dam when they occur. Flows below New Bullards Bar Dam have historically been maintained at or above the minimum required flow throughout the period of record. Spills from New Bullards Bar Dam typically occur between December and May, with some rare spills in June. Historically, the largest spills have occurred in late-December through mid-February, with the greatest mean daily spill of 53,633 cfs occurring on January 2, 1997. Review of the period of record (1966-2004) indicates that spills as late as May occurred in eight of the 38 years (1969, 1971, 1982, 1983, 1995, 1996, 1998, and 2003); spills occurred as late as July in three of those years. Spills, which were

sometimes prolonged or repeated in short intervals, closely corresponded with high flows on the North Yuba upstream of the reservoir.

There are no historical records of WPT in the North Yuba River, New Bullards Bar Dam Reach, and no incidental observations of WPT occurred during YCWA's studies. The nearest known occurrence is an incidental observation in the Middle Yuba River, Oregon Creek Reach. Although New Bullards Bar Dam Reach supports some aquatic habitat potentially suitable for WPT, potential nesting and juvenile rearing habitat in this area is scarce. The results suggest that WPT does not occur or only occurs irregularly within the Project-affected reach.

4.2.4.4 Yuba River

From the confluence of the North Yuba River and the Middle Yuba River, the Yuba River flows southwest about 40 miles to its confluence with the Feather River in Marysville, California, at an elevation of approximately 60 ft. The total drainage area of the Yuba River downstream of the confluence of the North Yuba River and Middle Yuba River is 95 sq mi. Two Project facilities are located on the mainstem Yuba River: 1) New Colgate Powerhouse (RM 34.2) located at the north side of the river about 1.7 miles upstream of USACE's Englebright Reservoir; and 2) Narrows 2 Powerhouse (RM 24.2), located at the north side of the river about 0.1 mile downstream of USACE's Englebright Dam. PG&E's Narrows 1 Powerhouse, part of PG&E's Narrows Project (FERC Project No. 1403) is located on the opposite side of the Yuba River, just downstream of the Narrows 2 Powerhouse.

Flow in the Yuba River at the confluence of the North and Middle Yuba rivers consists primarily of flows from the North Yuba River that are releases and spills from New Bullards Bar Dam plus accretion, releases and spills below Our House Dam on the Middle Yuba River plus accretion, releases and spills below Log Cabin Dam on Oregon Creek. Stream gage information is available for the upper reach of the Yuba River between the head of the Yuba River at the confluence of the North and Middle Yuba rivers and the New Colgate Powerhouse (YCWA 2010).

There were no detections of WPT during basking surveys, or incidental observations during other YCWA Relicensing studies on the Yuba River. Historical records of WPT at Englebright Reservoir and Yuba River generally correspond to protected reservoir coves and slack-water side channels. Potential nesting and juvenile rearing habitat is most likely to occur in the reach of Yuba River downstream of Englebright Dam.

5.0 <u>Study-Specific Consultation</u>

The FERC-approved study required two study-specific consultation/collaboration activities, each of which is described below.

5.1 Consultation Regarding Study Sites

Step 3 of the FERC-approved study requires:

Licensee will consult with interested and available Relicensing Participants regarding sampling locations. Licensee will make a good faith effort to schedule the consultation on a day or days convenient to Licensee and interested Relicensing Participants, and will provide an email notice at least 14 days in advance of the meeting or site visit. If collaborative agreement is not reached on sites, Licensee will note the disagreements in its final report, including why Licensee did not adopt the recommendation.

YCWA met this obligation by notifying Relicensing Participants of the Site Selection Information Package (YCWA 2012b) by e-mail distribution on March 13, 2012, in advance of final site selection. Relicensing Participants subsequently requested that basking surveys include stream site locations. During a Relicensing Participants meeting on May 9, 2012, YCWA and interested and available Relicensing Participants from CDFG and Forest Service collaboratively agreed to survey sites, adding four basking survey sites on stream reaches outside of the FERC Project Boundary, with a commensurate reduction in survey effort on New Bullards Bar Reservoir.

5.2 Collaborate Regarding Need and Scope of Focused Studies in Second Year

Step 5 of the FERC-approved study requires:

Licensee will meet with interested and available Relicensing Participants no later 6 weeks prior to the date that Licensee's Initial Study Report is scheduled to be filed with FERC to review data available from the study at that time and discuss the need for and scope of additional limited scope WPT studies. If Licensee and Relicensing Participants collaboratively agree focused studies are needed in the second year of studies, Licensee and Relicensing Participants will collaboratively develop a new study proposal and Licensee will file it with FERC prior to or at the time the Initial Study Report is filed, and implement the study as directed by FERC. It is understood that the result of this collaboration could be an agreement to disagree, which would also complete this task.

YCWA met this obligation by meeting with interested and available Relicensing Participants on September 16, November 8, and November 14, 2012 to review available results of this study and discuss the need for and nature of additional limited scope studies. Based on these discussions, YCWA and the Forest Service, USFWS, CDFG and State Water Resources Control Board (SWRCB) agreed that YCWA will include in its Initial Study Report, which will be filed with FERC on December 3, 2012, a new study proposal for a focused WPT study in 2013 as described below.

• YCWA will conduct surveys for WPT using a snorkeling search method in the upstream end of Our House Diversion Dam Impoundment and in pools upstream of the impoundment on the Middle Yuba River. Surveys will employ one or two snorkelers examining potential underwater hiding areas. It is anticipated that surveys will encompass at least the first two suitable pools upstream of the impoundment, or as many as can be surveyed within 1 day of field work. Snorkeling surveys will be performed twice under safe conditions, with one survey during the period of May or June 2013 when YCWA is operating the diversion at the Lohman Ridge Diversion Tunnel Intake. The second survey will be performed under lower flow conditions in July or August 2013. Any WPT found during the surveys will be documented as described in Study 3-6.

• YCWA will implement the new study as directed by FERC.

If the new study proposal is approved by FERC, YCWA anticipates the new study will be completed by September 30, 2013.

As part of this agreement, the Forest Service, USFWS, CDFG and SWRCB agreed that they would not make additional study requests to FERC related to WPT in response to the Initial Study Report and Initial Study Report meeting summary.

6.0 Variances from FERC-Approved Study

The study was conducted according to Study 3.6, Special-Status Turtles – Western Pond Turtle, and FERC's Study Determination, with two variances. First, during consultation with Relicensing Participants in Step 3 (see Section 5.1, above), YCWA and Relicensing Participants from CDFG and Forest Service collaboratively agreed to add four basking survey sites on stream reaches outside of the Project Boundary, with a commensurate reduction in survey effort on New Bullards Bar Reservoir.

Second, the FERC-approved study specified the study would be complete by the end of September 2012. The quality assurance/quality control review of study results took longer than anticipated resulting in a slight delay of study completion. The delay did not affect the study or overall Relicensing schedule.

7.0 <u>Attachments to This Technical Memorandum</u>

Attachment 3-6A	Habitat Mapping Results and Survey Site Maps [4 Adobe pdf files.]
	Part 1 of 4: 20 MB; 4 pages formatted to print double-sided on 8 $\frac{1}{2}$ by 11 paper and 26 pages formatted to print double-sided on 11 by 17 paper.
	Part 2 of 4: 27.5 MB; 4 pages formatted to print double-sided on 8 $\frac{1}{2}$ by 11 paper and 26 pages formatted to print double-sided on 11 by 17 paper.
	Part 3 of 4: 30 MB; 4 pages formatted to print double-sided on 8 ¹ / ₂ by 11 paper and 26 pages formatted to print double-sided on 11 by 17 paper.

	Part 4 of 4: 36 MB; 4 pages formatted to print double-sided on 8 ¹ / ₂ by 11 paper and 34 pages formatted to print double-sided on 11 by 17 paper.
Attachment 3-6B	Selected Habitat Assessment Field Photographs [1 Adobe pdf file: 11.5 MB; 44 pages formatted to print double sided on 8 $\frac{1}{2}$ by 11 paper
Attachment 3-6C	Selected Basking Survey Field Photographs [1 Adobe pdf file: 20 MB; 80 pages formatted to print double sided on 8 ½ by 11 paper]

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