

Study 3.6

SPECIAL-STATUS TURTLES – WESTERN POND TURTLE

November 2010

1.0 Project Nexus

Yuba County Water Agency's (YCWA or Licensee) continued operation and maintenance (O&M) of the Yuba River Development Project (Project) has a potential to affect the special-status¹ turtle (Class Chelonia), 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 Concern by the California Department of Fish and Game (CDFG).

2.0 Resource Management Goals of Agencies with Jurisdiction Over the Resource to be Studied

[Relicensing Participants - This section is a placeholder in the Pre-Application Document (PAD). Section 5.11(d)(2) of 18 CFR states that an applicant for a new license must in its proposed study "Address any known resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied." During 2010 study proposal development meetings, agencies advised Licensee that they would provide a brief written description of their jurisdiction over the resource to be addressed in this study. If provided before Licensee files its Proposed Study Plan and Licensee agrees with the description, Licensee will insert the brief description here stating the description was provided by that agency. If not, prior to issuing the Proposed Study Plan, Licensee will describe to the best of its knowledge and understanding the management goals of agencies that have jurisdiction over the resource addressed in this study. Licensee]

3.0 Study Goals and Objectives

The goal of this study is to provide information to the Relicensing Participants concerning the special-status turtle, WPT, associated with the Project reservoir, Project-affected stream reaches, and related Project recreation features or activities.

¹ Special-status reptiles are considered those species: 1) found on National Forest System land and formally listed by the United States Department of Agriculture Forest Service as a Sensitive Species or a Management Indicator Species; 2) listed under the federal Endangered Species Act (ESA) as Proposed or a Candidate for listing as endangered or threatened or proposed for delisting; 3) listed under the California Endangered Species Act (CESA) as Proposed for listing as endangered or threatened or proposed for delisting; or 5) formally listed by California Department of Fish and Game as a Species of Concern. For the purpose of this study proposal, species listed as threatened or endangered under the ESA or CESA are addressed separately.

The specific objectives of this study are to collect information to meet the goal including:

- 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 (museum database, agency record, etc.).
- Identify habitats in the study area potentially suitable for WPT, including potential nesting habitat, and evaluate the suitability of these habitats for the species.
- Perform biological surveys in suitable habitats where there is a project nexus.
- Compile incidental observations of WPT and other aquatic special-status species and non-native amphibians, turtles, and crayfish from other aquatic studies.
- Provide information that can be used to develop PM&E measures.

4.0 Existing Information and Need for Additional Information

Existing and relevant information regarding known and potentially occurring locations of WPT in the Project Vicinity² is available from California Natural Diversity Database (CNDDDB), museum records, and other sources. WPT is the only special-status turtle in the area (there are no special-status reptiles, i.e., Class Reptilia, snakes and lizards, in the area). This information and a life history description of WPT included in Section 7.3 of Licensee’s Preliminary Information Package (YCWA 2009) are useful in identifying preferred habitats and documenting where WPT has been found to date. Table 4.0-1 summarizes habitat requirements of WPT by life stage.

Table 4.0-1. Western pond turtle habitat requirements by life stage.

Eggs ¹	Hatchling Turtles ¹	Adults ¹
Upland, low gradient slopes (less than 15 degrees) with high clay or silt content in the vicinity of aquatic habitats. Eggs are deposited in a shallow excavation (“nest”) in a dry location in summer. Nests are typically located on an unshaded slope that may be partly south-facing.	Hatchlings emerge from nests in spring. Require shallow water with dense submergent vegetation or short emergent vegetation.	Permanent ponds, lakes, reservoirs, low-flow regions of rivers, river side channels, and backwater areas. Isolated occurrences in lakes and reservoirs sometimes represent deliberate releases of pets. May also use seasonal streams or ponds when these are available. The presence of basking sites is important and these may be provided by emergent large woody debris, overhanging vegetation, rock outcrops, and mats of submergent vegetation. Deep pools and undercut banks may represent overwintering refugia. Often aestivate or overwinter in terrestrial habitats, including forests and riparian thickets, where they burrow in leaf litter.

¹ Sources of information: Holland 1991, Rathbun et al. 1992, Jennings and Hayes 1994, Ashton et al. 1997, Buskirk 2002.

² For the purposes of the Relicensing, the Project Vicinity is defined as the area surrounding the Project in the order of a county or United States Geological Survey 1:24,000 topographic quadrangle.

WPT is a habitat generalist occurring in a wide variety of aquatic habitats with still- or slow-moving water up to about 6,000 feet (ft) elevation; the species is uncommon in high-gradient streams (Jennings and Hayes 1994). Adult WPT have been documented traveling long distances from perennial watercourses for both aestivation and nesting, with long range movements to aestivation sites averaging about 820 ft and nesting movements averaging about 295 ft (Rathbun et al. 2002). Reese and Welsh (1997) documented WPT away from aquatic habitats for as much as 7 months per year and suggested that terrestrial habitat use was at least in part a response to seasonal high flows.

WPT breeding activity may occur year-round in California, but egg-laying tends to peak in June and July in colder climates, when females begin to search for suitable nesting sites upslope from water. During the terrestrial period, Reese and Welsh (1997) found that radio-tracked WPT were burrowed in leaf litter.

Introduced species of turtles (e.g., red-eared sliders [*Trachemys scripta*]) may out-compete WPT for basking sites and the American bullfrog (*Lithobates catesbeianus*) [formerly *Rana catesbeiana*] is known to consume hatchling WPT.

There are numerous reports of WPT in the Project Vicinity including records at New Bullards Bar Reservoir, several locations near tributaries of Grizzly Gulch, a tributary of Oregon Creek, two locations about 2 mi SE of New Bullards Bar Dam near Little Willow Creek (tributary of Middle Yuba), and from north of Jones Bar. Most of the locations are evidently ponds. Licensee reviewed occurrences from CDFG's CNDDDB (CDFG 2003), the Tahoe National Forest (TNF) (GIS data and Access database), on-line museum record data (CAS 2010, MVZ 2010), and Vindum and Koo (1998).

In most cases, existing information is too general to meet the objectives of the study. Additional information needed includes specific and current localities of each of the species and their habitats in relation to Project facilities; and sufficient information on normal Project O&M activities that might affect populations.

5.0 Study Methods and Analysis

5.1 Study Area

The study area for mapping (Section 5.3.2) consists of aquatic habitats within the existing FERC Project Boundary and stream reaches affected by the Project up to 0.5 mile from the normal maximum water surface elevation of Project reservoirs and normal high water line of Project-affected stream reaches. Areas to be considered for WPT surveys (Section 5.3.3) will be confined to habitat inside the Project Boundary. Stream reaches potentially affected by the 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, 4) the Yuba River from the confluence of the North and Middle

Yuba rivers to the United States Army Corps of Engineer's (USACE) Dauguerre Point Dam. The mainstem of stream reaches are included in the study area.

If YCWA proposes an addition to the Project, the study area will be expanded if necessary to include areas potentially affected by the addition.

5.2 General Concepts and Procedures

The following general concepts and practices apply to the study:

- Personal safety is the most important consideration of each fieldwork team.
- Licensee will make a good faith effort to obtain permission to access private property where needed well in advance of entering the property.
- Field crews may make minor variances to the FERC-approved study in the field to accommodate actual field conditions and unforeseen problems. When minor variances are made, Licensee's field crew will follow the protocols in the FERC-approved study.
- When Licensee becomes aware of major variances to the FERC-approved study, Licensee will issue an e-mail to the Relicensing Contact List describing the variance and reason for the variance. Licensee will contact by phone the Forest Service (if the variance is on National Forest System land), USFWS, SWRCB and CDFG to provide an opportunity for input regarding how to address the variance. Licensee will issue an e-mail to the Relicensing Contact List advising them of the resolution of the variance. Licensee will summarize in the final study report all variances and resolutions.
- Licensee's performance of the study does not presume that Licensee is responsible in whole or in part for measures that may arise from the study.
- Global Positioning System (GPS) data will be collected using either a Map Grade Trimble GPS (sub-meter data collection accuracy under ideal conditions), a Recreation Grade Garmin GPS unit (3 meter data collection accuracy under ideal conditions), or similar units. GPS data will be post-processed and exported from the GPS unit into Geographic Information System (GIS) compatible file format in an appropriate coordinate system using desktop software. The resulting GIS file will then be reviewed by both field staff and Licensee's relicensing GIS analyst. Metadata will be developed for deliverable GIS data sets.
- Licensee's field crews will record incidental observations of aquatic and wildlife species observed during the performance of this study. All incidental observations will be reported in the appropriate Licensee report (e.g., incidental observations of special-status fish recorded during fieldwork for the Special-Status Turtles – Western Pond Turtle Study will be reported in Licensee's Stream Fish Populations Study report). The purpose of this effort is not to conduct a focus study (i.e., no effort in addition the specific field tasks identified for the specific study) or to make all field crews experts in identifying all species, but only to opportunistically gather data during the performance of the study.

- Field crews will be trained on and provided with materials (e.g. Quat) for decontaminating their boots, waders, and other equipment between study sites. Major concerns are amphibian chytrid fungus, and invasive invertebrates (e.g. zebra mussel, *Dreissena polymorpha*). This is of primary importance when moving: 1) between tributaries and mainstem reaches; 2) moving between basins (e.g. Middle Yuba River, Yuba River, and North Yuba River); and 3) moving between isolated wetlands or ponds and river or stream environments.

5.3 Study Methods

The study will be completed in seven steps, each of which is described below.

Prior to conducting field work, Licensee will obtain necessary CDFG scientific collection permits.

5.3.1 Step 1 – Map Occurrences

Licensee will map known occurrences of WPT based on a query of the CNDDDB, agency records, museum records, and consultation with regional experts. The map will be supplemented with a table that includes information on the exact location, date found, how many individuals (if available), and the source of the sighting (museum database, agency record, etc.).

5.3.2 Step 2 – Identify and Map Potential Habitat

Licensee will review existing and readily available sources to identify areas of potentially suitable aquatic habitat and nesting habitat for WPT based on the description of habitat elements presented in Table 4.0-1. Data sources may include aerial photographs, the Project helicopter video, National Wetland Inventory maps, United States Geological Survey (USGS) 1:24,000 topographic quadrangle, hydrologic data, and other sources of information that would allow for assessment of habitat conditions within the study area. Potential WPT nesting or oviposition habitat will be 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, pers. comm., Don Ashton, USFS). The mapping criteria are defined as follows:

- Within 100 m of the project reservoir 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 (this criterion will be used if suitable soil maps exist)

A field reconnaissance may be conducted at specific locations to assess onsite habitat conditions if other data sources are not adequate to this purpose. Sites will be logged by GPS position, photographs will be taken of each site from various angles, and a preliminary habitat assessment will be conducted. Pertinent habitat characteristics to be recorded will include habitat type, hydrologic regime, vegetation types (e.g., aquatic, emergent, overhanging, and canopy), gradient, aquatic substrate, and stream channel form.

5.3.3 Step 3 – Select Survey Sites

Based on the results of Step 2, a representative set of sites with potentially suitable aquatic habitat inside the Project Boundary will be selected for surveys. The selection of survey sites will take into account site-specific conditions, including safety, accessibility (i.e., road or trail access, topography), permission from landowners to survey on private lands, and potential impact from Project O&M. To the extent reasonable, WPT survey sites will be co-located with other relicensing study sites. 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.

5.3.4 Step 4 – Conduct Surveys and Compile Incidental Observations

The distribution of WPT will be evaluated by two means: 1) visual surveys at selected, suitable sites within the Project Boundary as described in Step 3, and 2) compilation of opportunistic observations incidental to the performance of other field studies for the relicensing (e.g., foothill yellow-legged frog surveys, California red-legged frog site assessments, fish surveys, botanical surveys, etc.). Incidental observations of turtles will include identification (i.e., WPT, exotic species, such as red-eared slider, or “unknown species”), estimated size, turtle behavior (e.g., basking on log), location, time, and a brief description or photograph of the habitat.

In general, incidental observations of WPT are most likely to occur during studies that involve quiet observation (e.g., scanning a site with binoculars), snorkeling, rafting or boat work associated with deep pools and backwaters. Turtles may also be observed when a site is first approached (WPT typically dive from basking sites when approached even at a long distance, Holland 1991, Reese, undated) or on roads when turtles make overland movements. Personnel across studies will be trained in how best to observe and capture WPT while pools are being snorkeled for fish. Field crews will also be instructed to document skeletal remains and evidence of WPT nests, such as the scrapes produced by females when digging nest-holes, signs of nests opened by predators, and remnants of hatched eggshells.

Visual surveys for WPT are adapted from USGS (2006) and will be supplemented by deployment of artificial basking platforms at survey sites where appropriate (Alvarez 2006). The use of basking platforms is an efficient and effective technique that has been shown to substantially increase detection rates (Alvarez 2006). Surveys will be conducted at a time of day and under weather conditions when turtles are likely to be basking (e.g., sunny mornings May-July). Sites will be initially searched by binoculars from a distance to identify potential basking locations, such as sunlit rocks, logs, exposed banks, and floating vegetation. If turtles are observed, the species, number, and relative size of turtles will be recorded. The observer will then slowly and quietly approach the site, assume a suitable viewing position, and continue to scan the site for at least 30 minutes, focusing on basking sites and the surrounding water. Splashes of water that may signify a turtle entering the water will be noted. The length of time devoted to scanning each site will be recorded; and the locations of turtle sightings and possible

evidence of turtles, including splashes, and locations where photographs are taken will be marked on a sketch of the site. Observers will also identify locations where the addition of artificial basking platforms may increase the likelihood of turtle detections. Artificial basking platforms will be placed at survey sites in suitable open water areas where potential basking substrates are scarce or obscured by vegetation. Each floating platform will consist of a rectangular wood board or cellular polystyrene (Styrofoam) panel covered with artificial grass (“astro-turf”); additional floatation at one end; and a tethered concrete anchor (Alvarez 2006). Platforms will be left in place for 5-7 days to allow turtles to become acclimated and adopt platforms for basking. Sites will then be surveyed again for basking turtles.

Where WPT is found, the following data will be collected: presence and name of exotic plant species; 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 (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. At the beginning of each survey the following data will be recorded: date, observer, time, general weather description, ambient air temperature, average wind speed, water temperature, and estimated water velocity. Changes in weather conditions during surveys that could affect turtle detection (*e.g.*, increased cloud cover or wind) will be noted. All survey sites will be photographed from multiple vantage points and the following information recorded: presence or absence of slow moving water and water depth ≥ 0.5 m ; quantity (none, few, or many) and types of basking sites (sunny rocks, open banks, fallen logs, and other); aquatic and streamside refugia, and upland habitat.

Survey sites for WPT will be assessed for the presence of American bullfrog 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. After a site has been surveyed for WPT from a stationary position, at least one observer will walk along the shoreline listening and scanning ahead for jumping frogs - juvenile American bullfrogs often vocalize as they jump in alarm. If site conditions warrant, aquatic funnel traps (“minnow traps”) may also be deployed to verify the presence of American bullfrog larvae.

This study is not specifically designed to trap or capture WPT or other turtles. However, when a turtle is observed during this or other studies, capture may be attempted if feasible and without injuring or unduly stressing the animal. Opportunistic capture may occur during snorkeling work, when turtles are found in shallow water, or on land. Turtles that are captured will be measured (amphibian and turtle study teams to use calipers; other study teams to use a ruler and photographed next to a ruler. Captured turtles will be categorized by sex (if determinable) and photographed in dorsal (carapace) and ventral (plastron) view alongside a ruler for later measurements and estimating age (counting scutal rings).

5.3.5 Step 5 – Prepare, Format and Quality Assurance/Quality Control Data

Following field surveys, Licensee will develop GIS maps depicting WPT occurrences, potential habitat, project facilities and features, and other information collected during the study. Field

data will then be subject to quality assurance and quality control (QA/QC) procedures, including spot-checks of transcription and comparison of GIS maps with field notes.

5.3.6 Step 6 – Collaborate Regarding Need for, and Scope of if Needed, Focused Studies in Second Year

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. For example, if the study documents potential nesting habitat and/or suitable aquatic habitats but no WPT are found, additional surveys may be needed. In addition, if available data suggest that WPT nesting sites might be affected by the Project, radio-tagging WPT might be considered. 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 result in an agreement to disagree, which would also complete this task.

5.3.7 Step 7 – Prepare Report

Licensee will prepare a report that includes the following sections: 1) Study Goals and Objectives; 2) Methods and Analysis; 3) Results; 4) Discussion; and 5) Description of Variances from the FERC-approved study proposal, if any. At a minimum, the following summaries/data presentations will be provided in the report with the supporting data (in Excel spreadsheet and GIS layers, as appropriate):

- Numbers of WPT detections by life stage (e.g., juvenile or adult) in the Project reservoir, Project-affected streams, or other study locations
- Maps of and descriptive information on the occurrence of potential WPT nesting habitat within the study area
- Maps of and descriptive information on the occurrence of potential WPT aquatic habitats within the study area

For all special-status species observations, Licensee will complete the appropriate CNDDDB form and transmit the form to the CNDDDB.

6.0 Study Proposal Consultation

Licensee will engage in the following study-specific consultation:

- 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. (Step 3.)

- 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 result in an agreement to disagree, which would also complete this task. (Step 5).

7.0 Schedule

Licensee anticipates the schedule to complete the study as follows assuming the PAD is filed on November 1, 2010, and FERC issues its Study Determination by October 4, 2011:

Identify and Map Habitat, and Select Survey Sites (Steps 1-3).....	October 2011 – April 2012
Conduct Surveys (Step 4)	May 2012 – August 2012
QA/QC (Step 5)	September 2012
Report Preparation (Step 6)	September 2012 - October 2012

8.0 Consistency of Methodology with Generally Accepted Scientific Practices

This study is generally consistent with the goals, objectives, and methods outlined for recent FERC hydroelectric relicensing efforts in California, and uses well established data from CDFG and other reputable sources for the analysis.

9.0 Level of Effort and Cost

[Relicensing Participants – Licensee will include a cost range estimate for this study in its Proposed Study Plan. Licensee]

10.0 References Cited

Alvarez, J.A. 2006. Use of artificial basking substrate to detect and monitor western pond turtles (*Emys marmorata*). Western North American Naturalist 66:129-131.

Ashton, D.T., A.J. Lind, and K.E. Schlick. 1997. Western Pond Turtle (*Clemmys marmorata*). Natural History. USDA Forest Service, Pacific Southwest Research Station, Arcata, CA.

Buskirk, J. 2002. The Western Pond Turtle, *Emys marmorata*. Radiata 11:1-30.

California Academy of Sciences (CAS). 2010. Herpetology Records. Available online: <http://www.calacademy.org/research/herpetology/catalog/Index.asp>. Accessed January 25, 2010.

California Department of Fish and Game (CDFG). 2003. Biogeographic Data Branch. California Natural Diversity Database (CNDDDB). Version 3.1.0 – Dated January 4, 2010. Online at: <http://www.dfg.ca.gov/bdb/html/cnddb.html>. Created on January 25, 2010.

Holland, D.C. 1991. A synopsis of the ecology and status of the western pond turtle (*Clemmys marmorata*) in 1991. Prepared for USFWS, National Ecology Research Center, San Simeon Field Station. 141 pp. + appendices.

Jennings, M. R., and M. P. Hayes. 1994. Amphibian and reptile species of special concern in California. Final Report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA. 225 pp.

Museum of Vertebrate Zoology (MVZ). 2010. Herpetological records for Yuba, Sierra, and Nevada, Yuba, and Sierra counties, California. University of California, Berkeley. Available online at: <http://mvzarcot.berkeley.edu/SpecimenSearch.cfm>. Accessed January 25, 2010.

Rathbun, G. B., N. J. Scott, and T. G. Murphey. 2002. Terrestrial habitat use by Pacific pond turtles in a Mediterranean climate. The Southwestern Naturalist 47:225-235.

Reese D.A. and H.H. Welsh. 1997. Use of terrestrial habitat by western pond turtles, *Clemmys marmorata*: implications for management. pp. 352-357. In: Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles. New York Turtle and Tortoise Society.

U.S. Geological Survey (USGS). 2006. USGS western pond turtle (*Emys marmorata*) visual survey protocol for the southcoast ecoregion – Draft. U. S. Geological Survey protocol. San Diego, CA. 56 pp.

Vindum, J.V. and M.S. Koo. 1998. 1998 Amphibian and reptile surveys in the Plumas and Tahoe National Forests: the result of CCSA-05-98-17-123. Department of Herpetology, California Academy of Sciences, San Francisco, CA.