

TERR 1 – Vegetation Communities and Wildlife Habitat Technical Study Plan

POTENTIAL RESOURCE ISSUE:

Protection of vegetation communities and associated wildlife habitats.

PROJECT NEXUS:

- Project maintenance activities and potential Project betterments could result in direct loss of vegetation communities and wildlife habitats including communities afforded special recognition by state and federal agencies (e.g., riparian areas and jurisdictional wetlands).
- Project maintenance activities and potential Project betterments could result in indirect effects on wildlife species by affecting vegetation communities and wildlife habitats.

POTENTIAL LICENSE CONDITION:

- Vegetation and Integrated Pest Management Plan

STUDY OBJECTIVE:

- Document vegetation communities and wildlife habitats adjacent to existing Project facilities and features, recreation facilities, and dispersed concentrated use areas.
- Document vegetation communities and wildlife habitats adjacent to potential Project betterments, including new facilities, roads, and trails; staging and disposal sites; and new inundation areas.

EXTENT OF STUDY AREA:

The study area is ¼ mile around existing Project facilities and features, recreation facilities, and dispersed concentrated use areas (see Tables TERR 1-1, TERR 1-2, and TERR 1-3). If additional Project facilities and features, recreation facilities, or dispersed concentrated use areas are identified, these areas will be surveyed consistent with this Technical Study Plan (TSP).

The study area also includes ¼ mile around potential Project betterments, including new facilities, roads, and trails; staging and disposal sites; as well as new inundation areas (see Table TERR 1-4).

STUDY APPROACH:

- Develop vegetation community maps of the study area based on the *CalVeg—A Classification System for California Vegetation* (USDA-FS 2005). CalVeg is a dynamic system used to classify existing vegetation present on federally managed forestlands based on LANDSAT color infrared satellite imagery. Data are verified using soil-vegetation maps and professional guidance from various sources statewide. The most recent CalVeg data available for the study area will be used to develop maps (USDA-FS 2000). Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).

TERR 1 – Vegetation Communities and Wildlife Habitat Technical Study Plan

- Verify the accuracy of CalVeg data and map vegetation structure (i.e., tree size and density class) using recent aerial photographs and the Project video.
- Conduct ground-truthing of 20% of vegetation communities around existing Project facilities and features, concentrating in areas where concerns about vegetation community identification or boundaries arise from review of aerial photographs and the Project video. Inaccessible areas will not be ground-truthed.
- Conduct ground-truthing around 100% of potential Project betterments to verify vegetation communities present.
- Cross-reference CalVeg vegetation communities with California Wildlife Habitat Relationship (CWHR) System wildlife habitats, using the *CalVeg-CWHR Crosswalk* (USDA-FS 2004). This crosswalk was developed by USDA-FS and CDFG as a way to determine which wildlife habitats are likely to be present based on existing vegetation communities and forest structural characteristics. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Develop a Geographic Information System (GIS) map of vegetation communities and wildlife habitats and overlay information on existing Project facilities and features, recreation facilities, and dispersed concentrated use areas.
- Overlay vegetation communities and wildlife habitats GIS information on potential Project betterments.
- Prepare draft and final technical reports describing study objectives, methodologies, and results.

SCHEDULE:

Date	Activity
August 2007	Conduct field surveys
September and October 2007	Complete data analysis and prepare draft report
November 2007	Distribute draft report to the Terrestrial TWG
December 2007 through February 2008	Terrestrial TWG review and provide comments on draft report
March and April 2008	Resolve comments and prepare final report
April 2008	Distribute final report to the Terrestrial TWG and Plenary

REFERENCES:

- Mayer, K.E., and W.F. Laudenslayer. 1988. *A Guide to Wildlife Habitats of California*. State of California, Department of Fish and Game. Sacramento, CA.
- Placer County Water Agency (PCWA). 2006. *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series*. June 2006.
- U.S. Department of Agriculture-Forest Service (USDA-FS). 2000. *CalVeg data for California Region 5*. Accessed August 2006 at <http://www.fs.fed.us/r5/rsl/projects/frdb/>.

TERR 1 – Vegetation Communities and Wildlife Habitat Technical Study Plan

USDA-FS. 2004. Calveg/CWHR Crosswalk: The Classification and Assessment with Landsat of Visible Ecological Groupings (Calveg) crosswalk to the California Wildlife Habitat Relationships System (CWHR). Accessed February 2007 at <http://www.fs.fed.us/r5/rsl/projects/classification/cwhr-cv-xwalk.html>.

TABLES

Table TERR 1-1. Existing Project Facilities and Features.

Dams, Reservoirs, and Diversion Pools
Large Dams
French Meadows Dam and Outlet Works
Hell Hole Dam and Outlet Works
Medium Dams
Middle Fork Interbay Dam
Ralston Afterbay Dam
Small Dams
Duncan Creek Diversion Dam
North Fork Long Canyon Diversion Dam
South Fork Long Canyon Diversion Dam
Large Reservoirs
French Meadows Reservoir
Hell Hole Reservoir
Medium Reservoirs
Middle Fork Interbay
Ralston Afterbay
Small Diversion Pools
Duncan Creek Diversion Pool
North Fork Long Canyon Diversion Pool
South Fork Long Canyon Diversion Pool
Water Conveyance Systems
Tunnels
Duncan Creek-Middle Fork Tunnel
French Meadows-Hell Hole Tunnel
Hell Hole - Middle Fork Tunnel
Middle Fork - Ralston Tunnel
Ralston - Oxbow Tunnel
Diversion Pipes and Drop Inlets
North Fork Long Canyon Diversion Pipe and Drop Inlet
South Fork Long Canyon Diversion Pipe and Drop Inlet
Surge Shafts and Adits
Brushy Canyon Adit
Hell Hole - Middle Fork Tunnel Surge Shaft and Tank
Middle Fork - Ralston Tunnel Surge Shaft and Tank
Removable Sections and Portals
Duncan Creek - Middle Fork Tunnel Portal
French Meadows - Hell Hole Tunnel Removable Section
Hell Hole - Middle Fork Tunnel Removable Section
Middle Fork - Ralston Tunnel Removable Section
North Fork Long Canyon Crossing Removable Section
Intakes and Gatehouses
Duncan Creek - Middle Fork Tunnel Intake
French Meadows - Hell Hole Tunnel Gatehouse
French Meadows - Hell Hole Tunnel Intake
Hell Hole - Middle Fork Tunnel Gatehouse
Hell Hole - Middle Fork Tunnel Intake
Middle Fork - Ralston Tunnel Intake and Gatehouse
Ralston - Oxbow Tunnel Intake

Table TERR 1-1. Existing Project Facilities and Features (continued).

Water Conveyance Systems (continued)	
Penstocks and Valve Houses	
French Meadows Powerhouse Penstock and Butterfly Valve House	
Middle Fork Powerhouse Penstock and Butterfly Valve House	
Ralston Powerhouse Penstock and Butterfly Valve House	
Powerhouses, Switchyards, and Substations	
French Meadows Powerhouse and Switchyard	
Hell Hole Powerhouse	
Middle Fork Powerhouse and Upper and Lower Switchyards	
Ralston Powerhouse and Switchyard	
Oxbow Powerhouse and Switchyard	
Hell Hole Substation	
Gaging Stations and Weirs	
Stream Gages and Weirs	
Duncan Creek Gage and Weir above Diversion Dam (USGS Gage and Weir No. 11427700)	
Duncan Creek Gage and Weir below Diversion Dam (USGS Gage and Weir No. 11427750)	
Middle Fork American River Gage and Weir below French Meadows Dam (USGS Gage and Weir No. 11427500)	
Middle Fork American River Gage at Interbay Dam (USGS Gage No. 11427770)	
Middle Fork American River Gage above Middle Fork Powerhouse (USGS Gage No. 11427760)	
Middle Fork American River Gage below Oxbow Powerhouse (USGS Gage No. 11433300)	
North Fork Long Canyon Gage and Weir at Diversion Dam (USGS Gage and Weir No. 11433085)	
South Fork Long Canyon Gage and Weir at Diversion Dam (USGS Gage and Weir No. 11433065)	
Rubicon River Gage and Weir below Hell Hole Dam (USGS Gage and Weir No. 11428800)	
Diversion Gages	
North Fork Long Canyon Gage at Diversion Dam (USGS Gage No. 11433080)	
South Fork Long Canyon Gage at Diversion Dam (USGS Gage No. 11433060)	
Reservoir Gages	
French Meadows Reservoir Gage (USGS Gage No. 11427400)	
French Meadows Reservoir Staff Gage	
Hell Hole Reservoir Gage (USGS Gage No. 11428700)	
Hell Hole Reservoir Staff Gage	
Middle Fork Interbay Reservoir Gage	
Ralston Afterbay Reservoir Gage	
Powerhouse Gages	
French Meadows Powerhouse Gage (USGS Gage No. 11427200)	
Middle Fork Powerhouse Gage (USGS Gage No. 11428600)	
Oxbow Powerhouse Gage (USGS Gage No. 11433212)	
Ralston Powerhouse Gage (USGS Gage No. 11427765)	
Leakage Weirs	
French Meadows Dam Leakage Weirs Nos. 1-6	
Hell Hole Dam Leakage Weir	
Project Communication Lines and Powerlines	
French Meadows Area	
French Meadows Dam Generator Building to French Meadows Dam Outlet Works Powerline	
French Meadows Dam Generator Building to French Meadows Dam Spillway Gates Powerline	

Table TERR 1-1. Existing Project Facilities and Features (continued).

Project Communication Lines and Powerlines (continued)

Hell Hole Area

French Meadows Powerhouse to French Meadows Powerhouse Penstock and Butterfly Valve House Communication Line/Powerline

French Meadows Powerhouse and Switchyard to Hell Hole - Middle Fork Tunnel Gatehouse, Dormitory Facility, Operator's Cottages, and Hell Hole Powerhouse Communication Line/Powerline

Dormitory and Cottages Water Supply Tank Powerline

Hell Hole Powerhouse to Rubicon River Gage and Weir below Hell Hole Dam Communication Line/Powerline

Middle Fork Interbay Area

Middle Fork Powerhouse to Middle Fork Powerhouse Butterfly Valve House Communication Line/Powerline

Middle Fork Powerhouse Butterfly Valve House to Radio Repeater near Hell Hole - Middle Fork Tunnel Surge Tank (underground) Communication Line/Powerline

Middle Fork Powerhouse to Middle Fork - Ralston Tunnel Intake and Gatehouse Communication Line/Powerline

Middle Fork Powerhouse to Middle Fork American River Gage above Middle Fork Powerhouse Communication Line/Powerline

Ralston - Oxbow Area

Ralston - Oxbow Tunnel Intake to Ralston Powerhouse Communication Line

Ralston Powerhouse to Ralston Powerhouse Butterfly Valve House Communication Line/Powerline

Ralston Afterbay Dam Generator Building to Ralston - Oxbow Tunnel Intake Communication Line/Powerline

Oxbow Powerhouse to Ralston Afterbay Dam Generator Building Communication Line/Powerline

Photovoltaic Poles and Powerlines

Photovoltaic Poles and Powerline to Duncan Creek Gage above Diversion Dam

Photovoltaic Pole and Powerline at Duncan Creek Gage below Diversion Dam

Photovoltaic Pole and Powerline at Middle Fork American River Gage below French Meadows Dam

Photovoltaic Pole and Powerline at Middle Fork American River Gage above Middle Fork Powerhouse

Photovoltaic Pole and Powerline at North Fork Long Canyon Gage at Diversion Dam

Photovoltaic Pole and Powerline at South Fork Long Canyon Gage at Diversion Dam

Photovoltaic Pole at Middle Fork American River Gage below Oxbow Powerhouse

Microwave Reflectors and Radio Towers

Passive Microwave Reflector Station above Middle Fork Interbay

Radio Communications Tower near French Meadows - Hell Hole Tunnel Gatehouse

Radio Communications Tower and Repeater near Hell Hole - Middle Fork Tunnel Surge Shaft and Tank

Passive Microwave Reflector Station above Ralston Afterbay

Disposal Sites

Duncan Diversion Dam Sediment Disposal Area

North Fork Long Canyon Crossing Sediment Disposal Area

Middle Fork Interbay Sediment Disposal Area

Ralston Ridge Sediment Disposal Area

Indian Bar Sediment Disposal Area

Ancillary Facilities

French Meadows Dam Generator Building

French Meadows Dam Staging Area

Dormitory Facility

Dormitory and Cottages Water Supply Tank

Table TERR 1-1. Existing Project Facilities and Features (continued).

Ancillary Facilities (continued)
Hell Hole Staging Areas
Operator Cottages and Shop
Ralston Afterbay Dam Generator Building
Storage Building at Middle Fork - Ralston Tunnel Surge Shaft and Tank
Wabena Meadows Snow Course
Miranda Cabin Snow Course
Diamond Crossing Snow Course
Talbot Camp Snow Course
Project Fences
Slope Fences
French Meadows Powerhouse Penstock Rock Fence
French Meadows Powerhouse Slope Fence
Long Canyon Crossing Slope Fence
Middle Fork Powerhouse Upper Switchyard Slope Fence
Middle Fork Interbay Dam Slope Fence
Oxbow Powerhouse Slope Fence
Ralston Powerhouse Penstock and Butterfly Valve House Slope Fences
Ralston Powerhouse Slope Fence
Public Safety Fences
Dormitory Facility Barrier Fence
Hell Hole Dam General Parking Area Barrier Fence
North Fork Long Canyon Crossing Removable Section Barrier Fence
Project Roads and Access Points
Duncan Creek Area
Duncan Creek Diversion Intake Road and Diversion Pool Access Point
Duncan Creek Diversion Dam Road
Duncan Creek Diversion Pool Road and Access Point
French Meadows Area
Duncan Creek - Middle Fork Tunnel Portal Road and Spillway Access Point
French Meadows - Hell Hole Tunnel Gatehouse Road
French Meadows Dam Outlet Works and Leakage Weirs Road
French Meadows Dam Staging Area Road
Middle Fork American River Gage and Weir below French Meadows Dam Road
Hell Hole Area
Hell Hole Dam and Powerhouse Road and Spillway Southern Access Point
Rubicon River Gage and Weir below Hell Hole Dam Road
Hell Hole Dam Leakage Weir Road
Hell Hole Dam Spillway Northern Access Point
French Meadows - Hell Hole Tunnel Portal Road
French Meadows Powerhouse Road
Hell Hole - Middle Fork Tunnel Gatehouse Road
Dormitory Facility Road
Hell Hole Dam Spillway Discharge Channel Road
Long Canyon Area
North Fork Long Canyon Diversion North Road
North Fork Long Canyon Diversion South Road
North Fork Long Canyon Diversion Drop Inlet Road

Table TERR 1-1. Existing Project Facilities and Features (continued).

Project Roads and Access Points (continued)
Long Canyon Area (continued)
South Fork Long Canyon Diversion and Drop Inlet Road
North Fork Long Canyon Crossing Removable Section North Road and Parking Area
North Fork Long Canyon Crossing Removable Section South Road
Middle Fork Interbay Area
Middle Fork Powerhouse Butterfly Valve House Road
Middle Fork Powerhouse Penstock and Butterfly Valve House Road
Middle Fork Interbay Dam and Powerhouse Road and Interbay Access Points
Middle Fork Powerhouse Upper Switchyard Road
Ralston-Oxbow Area
Brushy Canyon Adit Road
Oxbow Powerhouse Road
Ralston Powerhouse Butterfly Valve House Road
Ralston - Oxbow Tunnel Intake Road
Ralston Afterbay Road and Boat Ramp
Ralston Afterbay Dam Road and Afterbay Access Point
Ralston Afterbay Sediment Removal Access Point
Project Trails
Duncan Creek Area
Duncan Creek Diversion Dam North Trail
Duncan Creek Diversion Dam South Trail
Photovoltaic Poles and Powerline to Duncan Creek Gage above Diversion Dam Trail
Duncan Creek Gage and Weir above Diversion Trail
Duncan Creek Gage and Weir below Diversion Trail
French Meadows Area
Middle Fork American River Gage and Weir below French Meadows Dam Trail
Middle Fork Interbay Area
Middle Fork American River Gage above Middle Fork Powerhouse Trail
Passive Microwave Reflector Station above Middle Fork Interbay Trail
Ralston Afterbay Area
Passive Microwave Reflector Station above Ralston Afterbay Trail
Middle Fork American River Gage below Oxbow Powerhouse Trail

Table TERR 1-2. Project Recreation Facilities.

French Meadows Area
Ahart Campground
Coyote Group Campground
Poppy Campground
French Meadows Campground
Gates Group Campground
Lewis Campground
French Meadows Picnic Area
McGuire Picnic Area
French Meadows Boat Ramp
McGuire Boat Ramp
Dolly Creek Water Supply
French Meadows Campground Water Supply
Hell Hole Area
Big Meadows Campground
Hell Hole Campground
Upper Hell Hole Campground
Hell Hole Vista
Hell Hole General Parking Area
Hell Hole Boat Ramp Parking Area
Hell Hole Boat Ramp
Big Meadows Campground Water Supply
Ralston Afterbay Area
Ralston Picnic Area
Ralston Picnic Area Cartop Boat Ramp
Indian Bar Rafting Access and General Parking
Long Canyon Area
Middle Meadows Group Campground
Middle Meadows Group Campground Water Supply

Table TERR 1-3. Dispersed Concentrated Use Areas.

Dispersed Concentrated Use Areas

French Meadows Reservoir Area

Area near French Meadows-Hell Hole Tunnel Gatehouse

Area immediately downstream of French Meadows Dam (both sides of river)

Area located immediately northwest of French Meadows Dam

Area near bridge over the Middle Fork American River, upstream French Meadows Reservoir

Duncan Creek Diversion Dam Area

Area on north side of Duncan Creek Diversion Dam

Area near Duncan Creek Gage and Weir, upstream of Duncan Creek Diversion Dam

Area near new bridge crossing Duncan Canyon on the road to the Grizzly, etc.

Hell Hole Reservoir Area

Area on west side of Hell Hole Reservoir, between dam and Hell Hole Boat Ramp

Grey Horse Area

Long Canyon Area

Area surrounding South Fork Long Canyon Diversion Dam

Areas along South Fork Long Canyon Creek, downstream of South Fork Long Canyon Diversion Dam

Middle Fork Interbay Area

Shoreline area surrounding Middle Fork Interbay

Ralston Afterbay Area

Ralston Afterbay Sediment Disposal Area

Shoreline area surrounding Ralston Afterbay

Area along Middle Fork American River, between Ralston Picnic Area and the new gage

Area at confluence of North Fork of the Middle Fork American River and Middle Fork American River

Indian Bar, Willow Bar, and Junction Bar Areas

Table TERR 1-4. Potential Project Betterments.

Hell Hole Reservoir Seasonal Storage Increase

Hell Hole Dam
Modified Facilities
Hell Hole Dam Spillway Crest Gates
Hell Hole Dam Parapet Walls
New Facilities
Hell Hole Dam Spillway Crest Gates Control Building
Hell Hole Dam Spillway Crest Gates Control Building Powerline
Temporary Construction and Staging Areas
Hell Hole Dam Spillway Crest Gates Construction Road
Hell Hole Dam Spillway Crest Gates Construction Work Area
Hell Hole Dam Spillway Crest Gates and Control Building Construction Staging Area
Hell Hole Dam Parapet Wall Construction Staging and Work Area
Hell Hole Dam Spillway Crest Gates Control Building Construction Work Area
Hell Hole Dam Spillway Crest Gates Control Building Powerline Construction Work Area
Hell Hole Dam Spillway Crest Gates Control Building Powerline Construction Staging Area
Hell Hole-Middle Fork Tunnel Gatehouse
Modified Facilities
Hell Hole - Middle Fork Tunnel Gatehouse Parapet Wall
Temporary Construction and Staging Areas
Hell Hole-Middle Fork Tunnel Gatehouse Parapet Wall Construction Staging and Work Area
French Meadows Powerhouse
Modified Facilities
French Meadows Powerhouse Parapet Wall
Temporary Construction and Staging Areas
French Meadows Powerhouse Parapet Wall Construction Staging and Work Area
South Fork Long Canyon Diversion
Modified Facilities
South Fork Long Canyon Diversion Dam Crest Gates
New Facilities
South Fork Long Canyon Diversion Dam Crest Gates Generator Building
Temporary Construction and Staging Areas
South Fork Long Canyon Diversion Dam Crest Gates and Generator Building Construction Staging and Work Area

French Meadows Powerhouse Capacity Upgrade

French Meadows Reservoir
Modified Facilities
French Meadows - Hell Hole Tunnel Intake Trash Rack
Temporary Construction and Staging Areas
French Meadows - Hell Hole Tunnel Intake Trash Rack Construction Staging Area
French Meadows - Hell Hole Tunnel Intake Trash Rack Construction Work Area
French Meadows - Hell Hole Tunnel Intake Trash Rack Construction Road
French Meadows Powerhouse
Modified Facilities
French Meadows Powerhouse Switchyard
New Facilities
French Meadows Powerhouse

Table TERR 1-4. Potential Project Betterments (continued).

French Meadows Powerhouse Capacity Upgrade

French Meadows Powerhouse (continued)
French Meadows Powerhouse Penstock
French Meadows - Hell Hole Tunnel Surge Shaft/Tank
French Meadows - Hell Hole Tunnel Surge Pipeline
French Meadows - Hell Hole Tunnel Surge Shaft or Pipeline Road
Temporary Construction and Staging Areas
French Meadows Powerhouse/Switchyard Construction Work Area
French Meadows Powerhouse/Switchyard Construction Staging Area
French Meadows Powerhouse Penstock Construction Work Area
French Meadows Powerhouse Penstock Construction Staging Areas
French Meadows - Hell Hole Tunnel Surge Shaft/Tank or Pipeline Construction Staging Areas
French Meadows - Hell Hole Tunnel Surge Shaft/Tank Construction Work Area
French Meadows - Hell Hole Tunnel Surge Pipeline Construction Work Area
French Meadows - Hell Hole Tunnel Surge Shaft or Pipeline Road Construction Staging and Work Area
Non-Project Facilities Modified During Construction
Forest Road 14N09A
Forest Road 14N09A Construction Staging and Work Area
Middle Fork Powerhouse
Modified Facilities
Middle Fork Powerhouse Upper and Lower Switchyard

Ralston Powerhouse Capacity Upgrade

Ralston Powerhouse
Modified Facilities
Ralston Powerhouse
Temporary Construction and Staging Areas
Ralston Powerhouse Construction Staging Area

POTENTIAL RESOURCE ISSUE:

Protection of special-status plant populations.

PROJECT NEXUS:

Project operations and maintenance activities and potential Project betterments could result in removal or disturbance of special-status plant populations, including terrestrial, aquatic, and riparian plant species, and fungi and mosses.

POTENTIAL LICENSE CONDITION:

- Vegetation and Integrated Pest Management Plan
- Channel Riparian Maintenance Flows (CRMF)

STUDY OBJECTIVE:

- Document special-status plants, fungi, and mosses at existing Project facilities and features, recreation facilities, and dispersed concentrated use areas identified by stakeholders.
- Document special-status aquatic and riparian plants and mosses at quantitative geomorphic and riparian sampling sites in bypass reaches and the peaking reach.
- Document special-status plant species, fungi, and mosses at potential Project betterments, including new facilities, roads, and trails; staging and disposal sites; and new inundation areas.

EXTENT OF STUDY AREA:

The study area for terrestrial plants and fungi includes a buffer around Project facilities and features, recreation facilities, and dispersed concentrated use areas (see Tables TERR 1-1, TERR 1-2, and TERR 1-3) and potential Project betterments (see Table TERR 1-4). If additional Project facilities and features, recreation facilities, or dispersed concentrated use areas are identified, these areas will be surveyed consistent with this Technical Study Plan (TSP).

Study Area	Existing Project Facilities and Features, Recreation Facilities, and Dispersed Concentrated Use Areas Identified by Stakeholders
10 feet	<ul style="list-style-type: none"> ▪ on either side of trails
20 feet	<ul style="list-style-type: none"> ▪ around the perimeter of the large reservoirs, medium reservoirs, and diversion pools ▪ outside the perimeter fence of powerhouses, switchyards, and substations ▪ around ancillary support facilities and Project fences
30 feet	<ul style="list-style-type: none"> ▪ on either side of penstocks, valve houses, and removable sections ▪ around gaging stations and weirs ▪ on either side of communication lines, powerlines, photovoltaic poles and lines, and roads and access points
60 feet	<ul style="list-style-type: none"> ▪ around intakes, gatehouses, surge tanks, adits, portals, microwave reflectors, radio towers, and sediment disposal and drop inlets
100 feet	<ul style="list-style-type: none"> ▪ around recreation facilities and dispersed concentrated use areas
Study Area	Proposed Project Betterments
100 feet	<ul style="list-style-type: none"> ▪ around new facilities, roads, and trails; staging and disposal sites; and new inundation areas

The study area for aquatic and riparian plants and mosses includes quantitative geomorphic and riparian sampling sites in bypass streams and the peaking reach (see AQ 1 – Instream Flow TSP, Figure AQ 1-1).

STUDY APPROACH:

A special-status plant is defined as any plant species that is granted protection by a federal, State, or local agency. This includes:

- Federally listed species granted status by the U.S. Fish and Wildlife Service (USFWS) under the Federal Endangered Species Act (ESA) include threatened (FT), endangered (FE), proposed threatened or endangered (FPT, FPE), candidate (FC), or listed species proposed for delisting (FPD);
- Species included on U.S. Department of Agriculture-Forest Service (USDA-FS) lists of Forest Service Sensitive (FSS) plants for each forest;
- State of California listed plant species, which are granted status by the California Department of Fish and Game (CDFG) under the California Endangered Species Act (CESA), include threatened (CT), endangered (CE), and rare (CR), and;
- Species considered by the California Native Plant Society (CNPS) to be rare, threatened, or endangered in California (CNPS Lists 1B and 2).

The study approach for special-status terrestrial plants and fungi, as well as aquatic and riparian plants and mosses is provided below.

Special-Status Terrestrial Plants and Fungus Species

- Identify and map known occurrences of special-status terrestrial plant and fungus species within the study area, based on agency consultation and a review of existing information. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Develop a list of special-status plant species potentially occurring in the Project area based on literature review and agency consultation. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Conduct focused special-status terrestrial plant and fungus species surveys, according to the *Guidelines for Assessing the Effects of Proposed Project on Rare, Threatened, and Endangered Plants and Natural Communities* (CDFG 2000).
 - Field surveys will be conducted at the proper time of year when rare, threatened, or endangered species are both evident and identifiable. Generally, this is when the plants are flowering. Based on the blooming periods for plants known or potentially occurring within the Project vicinity, two surveys will be conducted, one in April and one in July.
 - Timing of surveys will be verified based on agency consultation and reference populations monitoring.
 - Systematic field techniques will be implemented (e.g., zigzag patterns, random meandering, and linear transects) in the study area.
 - If a special-status plant species population is identified on the perimeter of the study area, the study area will be expanded to document the extent of the population.
 - Surveys will be floristic in nature and taxonomy will be based on *The Jepson Manual* (Hickman 1993).
 - Any non-listed plant species voucher specimens collected that are of interest to resource agencies will be donated to the USDA-FS Herbarium.
 - Digital photographs, Global Positioning System (GPS) information, an estimate of the number of individuals present, and associated vegetation will be collected for each special-status plant or fungus population observed.
- Develop a Geographic Information System (GIS) map of special-status plant and fungus populations and overlay information on Project facilities and features, recreation facilities, and stakeholder dispersed concentrated use areas.
- Overlay special-status plant and fungus population GIS information on potential Project betterments.
- Prepare and submit California Native Species Field Survey Forms for all special-status plant and fungus populations recorded to California Natural Diversity Database (CNDDDB).
- Prepare draft and final technical reports describing study objectives, methodologies, and results.

Special-Status Aquatic and Riparian Plants and Mosses

- Identify and map known occurrences of special-status aquatic and riparian plants and mosses within the study area, based on agency consultation and a review of existing information. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Conduct special-status aquatic and riparian plant surveys and collect moss specimens at quantitative geomorphic and riparian sampling sites in bypass reaches and the peaking reach in accordance with *Guidelines for Assessing the Effects of Proposed Project on Rare, Threatened, and Endangered Plants and Natural Communities* (CDFG 2000). Refer to AQ 1 – Instream Flow TSP, Figure AQ 1-1 for the location of geomorphic and riparian sampling sites. All moss specimens will be labeled with the date and collection location along the quantitative transects. Moss specimens will later be identified to species by a qualified bryologist.
- Conduct special-status aquatic and riparian plant and moss surveys in potential habitat where Project betterments are proposed.
- Develop a GIS map of special-status aquatic and riparian plant populations and mosses and overlay information on bypass and peaking reach cross-sections.
- Overlay special-status aquatic and riparian plant and moss GIS information on potential Project betterments.
- Prepare and submit California Native Species Field Survey Forms for all special-status aquatic and riparian plants and mosses recorded to CNDDDB.
- Prepare draft and final technical reports describing study objectives, methodologies, and results.

SCHEDULE:

Date	Activity
March 2008	Conduct agency consultation and monitor early blooming special-status plant reference populations to verify appropriate timing for field surveys
April and May 2008	Conduct early blooming special-status plant species field surveys
June 2008	Conduct agency consultation and monitor late blooming special-status plant reference populations to verify appropriate timing for field surveys
July and August 2008	Conduct late blooming special-status plant species field surveys
September through November 2008	Analyze data and prepare draft report
November 2008	Distribute draft report to the Terrestrial TWG
December 2008 through February 2009	Terrestrial TWG review and provide comments on draft report
March and April 2009	Resolve comments and prepare final report
April 2009	Distribute final report to the Terrestrial TWG and Plenary

REFERENCES:

California Department of Fish and Game (CDFG). 2000. Guidelines for Assessing the Effects of Proposed Project on Rare, Threatened, and Endangered Plants and Natural Communities.

Hickman, J.C., ed. 1993. The Jepson Manual. University of California Press, Berkeley, California.

Placer County Water Agency (PCWA). 2006. Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series. June 2006.

TERR 3 – Noxious Weeds Technical Study Plan

POTENTIAL RESOURCE ISSUE:

Reduce the spread or introduction of noxious weeds.

PROJECT NEXUS:

Project maintenance activities and potential Project betterments could result in the spread or introduction of noxious weeds.

POTENTIAL LICENSE CONDITION:

- Vegetation and Integrated Pest Management Plan

STUDY OBJECTIVE:

- Document noxious weed populations at existing Project facilities and features, recreation facilities, and dispersed concentrated use areas.
- Document noxious weed populations at potential Project betterments, including new facilities, roads, and trails; staging and disposal sites; as well as new inundation areas.

EXTENT OF STUDY AREA:

The study area for noxious weed populations includes a buffer around Project facilities and features, recreation facilities, dispersed concentrated use areas, and Potential betterments (see Tables TERR 1-1, TERR 1-2, TERR 1-3, and TERR 1-4). If additional Project facilities and features, recreation facilities, or dispersed concentrated use areas are identified, these areas will be surveyed consistent with this Technical Study Plan (TSP).

Study Area	Existing Project Facilities and Features, Recreation Facilities, and Dispersed Concentrated Use Areas Identified by Stakeholders
10 feet	<ul style="list-style-type: none"> ▪ on either side of trails
20 feet	<ul style="list-style-type: none"> ▪ around the perimeter of the large reservoirs, medium reservoirs, and diversion pools ▪ outside the perimeter fence of powerhouses, switchyards, and substations ▪ around ancillary support facilities and Project fences
30 feet	<ul style="list-style-type: none"> ▪ on either side of penstocks, valve houses, and removable sections ▪ around gaging stations and weirs ▪ on either side of communication lines, powerlines, photovoltaic poles and lines, and roads and access points
60 feet	<ul style="list-style-type: none"> ▪ around intakes, gatehouses, surge tanks, adits, portals, microwave reflectors, radio towers, and sediment disposal and drop inlets
100 feet	<ul style="list-style-type: none"> ▪ around recreation facilities and stakeholder dispersed concentrated use areas
Study Area	Potential Project Betterments
100 feet	<ul style="list-style-type: none"> ▪ around new facilities, roads, and trails; staging and disposal sites; and new inundation areas

STUDY APPROACH:

A noxious weed is a term used by government agencies for non-native invasive plants that have been defined as pests by law or regulation (CDFA 2007). The California Invasive Plant Council (Cal-IPC) defines non-native plants as those species introduced to California after European contact and as a direct or indirect result of human activity. Invasive non-native plants are plants that: (1) are not native to, yet can spread into, wildland ecosystems; and (2) displace native species, hybridize with native species, alter biological communities, or alter ecosystem processes (Cal-IPC 2006).

- Identify and map known occurrences of noxious weeds and invasive non-native plants based on agency consultation and a review of existing information. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Develop a list of noxious weeds and invasive non-native plants of highest concern in the Eldorado and Tahoe National Forests based on agency consultation.
- Conduct focused noxious weed and invasive non-native plant surveys in conjunction with special-status plant surveys. Refer to TERR 2 – Special-Status Plant Surveys TSP for a description of survey methods.
- Collect data and report survey results consistent with Section 2083 of the *Forest Service Manual, Information and Reporting Guidelines for Noxious Weeds* (USDA-FS 1995).
 - Data collected will include species, location, and number of acres infested by noxious weeds.
 - If a noxious weed or invasive non-native plant population is identified on the perimeter of the study area, the study area will be expanded to document the extent of the population.
 - Levels of infestation will be reported as: low (<5% cover); moderate (6–25% cover), and high (>25% cover). Areas that have been surveyed and found to be weed-free will also be identified.
- Develop a GIS map of noxious weeds and invasive non-native plants and overlay information on Project facilities, roads, trails, recreation facilities, and stakeholder dispersed concentrated use areas.
- Overlay noxious weed and invasive non-native plant GIS information on potential Project betterments.
- Prepare draft and final technical reports describing study objectives, methodologies, and results.

TERR 3 – Noxious Weeds Technical Study Plan

SCHEDULE:

Date	Activity
March 2008	Consult with the agencies regarding development of the noxious weed list
April through May and July through August 2008	Conduct field surveys
September through November 2008	Analyze data and prepare draft report
November 2008	Distribute draft report to the Terrestrial TWG
December 2008 through February 2009	Terrestrial TWG review and provide comments on draft report
March and April 2009	Resolve comments and prepare final report
April 2009	Distribute final report to the Terrestrial TWG and Plenary

REFERENCES:

California Department of Food and Agriculture (CDFA). 2007. Noxious Weed Pest Ratings. Division of Plant Health and Pest Protection Services. Available at <www.cdfa.ca.gov/phpps/ipc/encycloweedia/pdfs/noxiousweed_ratings.pdf>. Accessed March 2007.

California Invasive Plant Council (Cal-IPC). 2006. California Invasive Plant Inventory. Available at <<http://www.cal-ipc.org/ip/inventory/pdf/Inventory2006.pdf>> Accessed March 2007.

Placer County Water Agency (PCWA). 2006. Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series. June 2006.

U.S. Department of Agriculture Forest Service (USDA-FS). 1995. Section 2083, Information and Reporting Guidelines for Noxious Weeds. In: Forest Service Manual, Section 2080.

POTENTIAL RESOURCE ISSUE:

Protection of special-status wildlife species and their habitats.

PROJECT NEXUS:

Project operations and maintenance activities and potential Project betterments could disturb or result in loss of habitat for special-status wildlife species.

POTENTIAL LICENSE CONDITION:

- Vegetation and Integrated Pest Management Plan.
- Special-status wildlife protection measures.

STUDY OBJECTIVE:

- Identify special-status wildlife species potentially occurring in California Wildlife Habitat Relationships (CWHR) habitats documented as part of the TERR 1 – Vegetation Communities and Wildlife Habitat Technical Study Plan (TSP).
- Determine whether Project communication lines and powerlines are consistent with Avian Power Line Interaction Committee (APLIC) Guidelines.
- Identify wildlife species use and diversity as well as habitat relationships at potential project betterments.
- Document U.S. Department of Agriculture-Forest Service (USDA-FS) land allocations and known occurrences of special-status wildlife species at Project facilities, roads, trails, recreation facilities, dispersed concentrated use areas, and bypass and peaking reaches.
- Document USDA-FS land allocations and known occurrences of special-status wildlife species at potential Project betterments.

EXTENT OF STUDY AREA:

The study area is ¼ mile around existing Project facilities and features, recreation facilities, and dispersed concentrated use areas (See Table TERR 1-1, Table TERR 1-2, and Table TERR 1-3). If additional Project facilities and features, recreation facilities, or dispersed concentrated use areas are identified following submittal of the Pre-Application Document (PAD) to FERC, these areas will be surveyed consistent with this technical study plan.

The study area also includes ¼ mile around potential Project betterments, including new facilities, roads, trails, staging and disposal sites, as well as new inundation areas (See Table TERR 1-4).

Species-specific survey areas are provided below.

STUDY APPROACH:

A special-status wildlife species is defined as any species that is granted status by a federal, state, or local agency. Federally listed species granted status by the U.S. Fish and Wildlife

Service (USFWS) under the Federal Endangered Species Act (ESA) include threatened (FT), endangered (FE), proposed threatened or endangered (FPT, FPE), candidate (FC), or listed species proposed for delisting (FPD). USDA-FS maintains lists of Forest Service Sensitive (FSS) wildlife species, and National Forest Management Indicator Species (MIS) for each forest. State of California listed wildlife species, which are granted status by the California Department of Fish and Game (CDFG) include California Fully Protected species (CFP) and species protected under the California Endangered Species Act (CESA), including threatened (ST), endangered (SE), and California Species of Special Concern (CSC).

The study approach for special-status wildlife species and their habitats is provided below.

General Approach

- Identify and map known occurrences (species presence) of special-status wildlife species within ¼ mile of Project facilities, roads, trails, recreation facilities, dispersed concentrated use areas, bypass and peaking reaches, and potential Project betterments, based on agency consultation and a review of existing information. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Identify special-status wildlife species potentially occurring within CWHR designations based on *A Guide to Wildlife Habitats of California* (Meyer and Laudenslayer 1988). Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006). (See TERR 1 – Vegetation Communities and Wildlife Habitat TSP for a summary of CWHR).
- Determine consistency of the Project communication lines and powerlines with APLIC Guidelines.
- Incidental observations of any special-status species will be documented during all field surveys completed for PCWA's Middle Fork American River Project.
- Prepare draft and final technical reports describing study objectives, methodologies, and results (including species-specific surveys described below).

Focused Betterments Survey

- Conduct general wildlife surveys within a 100-foot buffer area around potential Project betterments (i.e., new facilities, roads and trails; staging and disposal areas, and new inundation areas) to document species use and diversity as well as habitat relationships.
 - Surveys will be completed during the spring.
 - Species will be recorded as present if species-specific vocalizations are heard or if diagnostic field signs are found (e.g., scat, tracks, pellets). Some species that are known to occur at a specific betterment, or for which appropriate habitat is present, will be recorded as “expected, but not observed”.
 - Wildlife taxonomy will be based on California's Wildlife, Volumes I, II, and III (Zeiner et al. 1988-1990).
 - Survey methods will include both zigzag and linear transects depending on the survey area and terrain. Zigzag transects cover more ground and work well in larger habitat areas (e.g., mixed conifer forest) while linear transects work well in narrow habitats (e.g., riparian).

- For each special-status species observed, a CNDDDB field survey form will be completed and submitted to CDFG.

Osprey

- Conduct osprey nest surveys in conjunction with bald eagle surveys at the following locations:
 - French Meadows Reservoir;
 - Hell Hole Reservoir;
 - Middle Fork Interbay;
 - Ralston Afterbay;
 - Rubicon River from Hell Hole Reservoir to MFAR confluence;
 - MFAR and from French Meadows Reservoir to the confluence with North Fork American River (NFAR), and;
 - NFAR confluence to the Ordinary High Water Mark (OHWM) of Folsom Reservoir.
- Refer to the TERR 5 – Bald Eagle TSP for the survey methodology.
- Develop a Geographic Information System (GIS) map of osprey occurrences and nests and overlay information on Project facilities and features, recreation facilities, dispersed concentrated use areas, and bypass and peaking reaches.
- Overlay osprey GIS information on potential Project betterments.

Northern Goshawk

- Obtain USDA-FS GIS data layers of northern goshawk land allocations (i.e., protected activity centers (PACs)) and detections in the study area (USDA-FS 2004).
- Develop a GIS map of northern goshawk land allocations and known occurrences and overlay information on Project facilities and features, recreation facilities, and dispersed concentrated use areas.
- Overlay northern goshawk GIS information on potential Project betterments and proposed new recreation facilities.
- Focused northern goshawk surveys will be conducted at Project betterments and new recreation facilities that are proposed in appropriate northern goshawk habitat and could alter/remove habitat or result in disturbance.
- Surveys will be conducted in accordance with *Northern Goshawk Inventory and Monitoring Technical Guide, U.S. Forest Service* (USDA-FS 2006), using the intensive search method. The following is a brief summary of the protocol for this method.
 - Intensive Search Survey
 - Survey will be conducted for one year, late June through August.
 - Three parallel transects will be established at each survey site, spaced approximately 20 to 30 meters apart, depending on percentage canopy cover.
 - Three surveyors will walk the transects at a slow pace, scanning the ground for goshawk sign and all trees for nest structures. Sign encountered

(feathers, prey remains) will be collected in plastic bags. Visual or auditory detections will be recorded by location and detection type.

- In addition, the middle surveyor will broadcast recorded goshawk vocalizations at points every 250 meters along the transect.
- At each broadcast point, broadcast at 60 degrees from the transect line for 10 seconds, then listen and watch for 30 seconds. Repeat two more times, rotating 120 degree each time.
- Following completion of the survey, observer notes and collections will be immediately reviewed.
 - Feathers collected will be identified by comparison with reference samples to determine sex and mapped.
 - Locations of prey remains and whitewash will be mapped, based on transect location notes.
 - Locations of auditory or visual observations will be mapped, based on transect location notes.
- Follow-up Survey
 - Follow-up surveys will be conducted 1 to 2 weeks after the transect surveys within a 300-meter radius of locations where frequency of feathers, prey remains, whitewash and/or visual or auditory detections indicates likelihood of occupation by goshawks, to determine nest locations. Survey results will be provided to USDA-FS and CDFG as well as summarized in technical reports.

California Spotted Owl

- Obtain USDA-FS GIS data layers of California spotted owl land allocations (i.e., PACs and Home Range Core Areas (HRCAs)) and detections in the study area (USDA-FS 2004).
- Develop a GIS map of California spotted owl land allocations and known occurrences and overlay information on Project facilities and features, recreation facilities, and dispersed concentrated use areas.
- Overlay California spotted owl GIS information on potential Project betterments.

Willow Flycatcher

- Obtain USDA-FS data layers documenting potential willow flycatcher nesting habitat, including riparian habitats and wet meadows in the study area.
- Develop a GIS map of potential willow flycatcher nesting habitat and overlay information on Project facilities and features, recreation facilities, dispersed concentrated use areas, and bypass and peaking reaches.
- Overlay willow flycatcher GIS information on potential Project betterments.

Mesocarnivores

- Obtain a GIS map of USDA-FS land allocations (forest carnivore den sites) and detections of American marten and Pacific fisher in the study area (USDA-FS 2004).

TERR 4 – Special-Status Wildlife Technical Study Plan

- Develop a GIS map of USDA-FS mesocarnivore land allocations and known occurrences and overlay information on Project facilities and features, recreation facilities, and dispersed concentrated use areas.
- Overlay mesocarnivore GIS information on potential Project betterments.

Mule Deer

- Update the GIS map of the Blue Canyon Mule Deer Herd and Pacific Mule Deer Herd migration patterns and important habitats in the Middle Fork American River Watershed based on agency consultation. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Overlay GIS map of migration patterns and important habitats on Project facilities and features, recreation facilities, dispersed concentrated use areas, and potential Project betterments.

SCHEDULE:

Date	Activity
August through October 2007	Complete data collection and evaluate Project communication lines and powerlines
November 2007 through January 2008	Complete data analysis
February through June 2008	Conduct osprey nesting surveys
April and May 2008	Conduct wildlife surveys at potential Project betterments
Late June through August 2008	Conduct focused northern goshawk surveys at potential Project betterments.
August through October 2008	Analyze data and prepare draft report
November 2008 through January 2009	Terrestrial TWG review and provide comments on draft report
February and March 2009	Resolve comments and prepare final report
March 2009	Distribute final report to the Terrestrial TWG and Plenary
Late June through August 2009 through 2011	If appropriate, conduct focused northern goshawk surveys during the first survey window following the identification of proposed new recreation facilities.

REFERENCES:

- Mayer, K.E., and W.F. Laudenslayer. 1988. *A Guide to Wildlife Habitats of California*. State of California, Department of Fish and Game. Sacramento, CA.
- Placer County Water Agency (PCWA). 2006. *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series*. June 2006.
- Ralph, C. J., G. R. Geupel, P. Pyle, T. E. Martin and D. F. DeSante. 1993. *Handbook of field methods for monitoring birds*, Pacific Southwest Research Station, Forest Service, U. S. Department of Agriculture, Albany, CA, pp. 41.

U.S. Department of Agriculture Forest Service (USDA-FS). 2004. Sierra National Forest Plan Amendment (SNFPA) – Final Supplemental Environmental Impact Statement – Record of Decision. Pacific Southwest Region. R5-MB-046. January 2004.

USDA -FS. 2000. Survey methodology for northern goshawks in the Pacific Southwest Region. Vallejo, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Region.

Zeiner, D., W. Laudenslayer, Jr., K. Mayer, and M. White, eds. 1988-1990. California's Wildlife Volumes I, II, and III. California Department of Fish and Game, Sacramento, California.

POTENTIAL RESOURCE ISSUE:

Protection of bald eagles and their habitat.

PROJECT NEXUS:

Project operation and maintenance activities and potential Project betterments could affect bald eagles or their habitat.

POTENTIAL LICENSE CONDITION:

- Bald Eagle Management Plan

STUDY OBJECTIVE:

- Document wintering and nesting bald eagles in the vicinity of Project reservoirs and large bypass and peaking reaches.
- Determine whether Project communication lines and powerlines are consistent with Avian Power Line Interaction Committee (APLIC) Guidelines.
- Document wintering and nesting bald eagles at potential Project betterments.

EXTENT OF STUDY AREA:

The study area for bald eagle includes ½ mile around reservoirs and on either side of river reaches listed below:

- French Meadows Reservoir;
- Hell Hole Reservoir;
- Middle Fork Interbay;
- Ralston Afterbay;
- Rubicon River from Hell Hole Reservoir to MFAR confluence;
- MFAR and from French Meadows Reservoir to the confluence with North Fork American River (NFAR), and;
- NFAR confluence to the Ordinary High Water Mark (OHWM) of Folsom Reservoir.

STUDY APPROACH:

- Identify and map known occurrences of bald eagles, roosts, and nests within the study area, based on agency consultation and a review of existing information. Preliminary information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Map the location of Project communication lines and powerlines and determine if they are consistent with APLIC Guidelines (see TERR 4 – Special-Status Wildlife Technical Study Plan (TSP)).

- Conduct protocol-level bald eagle wintering and nesting surveys according to the *Protocol for Evaluating Bald Eagle Habitat and Populations in California* (Jackman and Jenkins 2004). A summary of the survey requirements is provided below.

Bald Eagle Wintering Surveys

Wintering surveys will consist of two types of surveys—wintering bird surveys and winter roost surveys.

- Wintering Bird Surveys

Single-day surveys will be conducted monthly from December through February (three surveys, at least two weeks apart). Unless weather prohibits safe surveys, the January survey will be conducted during the USFWS two-week nationwide bald eagle winter survey to allow comparisons with statewide population trends. Surveys will be completed from a helicopter or boat, depending on weather conditions and accessibility. Data will be recorded on data sheets developed by Zack et al., 1997, as modified by Jackman, et al., 2001.

- Winter Night Roost Surveys

Winter night roost surveys will be conducted once a month (December through February) in areas where wintering eagles are observed. To find potential night roost areas, bald eagles will be visually observed as they move from foraging habitat to potential night roosts in the late afternoon. The number of eagles entering the probable night roost will be recorded.

Probable night roost areas will be revisited the following morning for at least two hours beginning one-half hour before sunrise. Eagles observed returning to foraging habitat will be counted. Once a forest stand is identified as a probable night roost, a daytime survey will be conducted to look for evidence of use by bald eagles (feathers, castings) and to GPS or pinpoint the location used for roosting.

Bald Eagle Nesting Surveys

The objective of bald eagle nesting surveys is to monitor the breeding status of existing nests and to locate any new nests. The result of each survey will be reported on the CDFG Bald Eagle Nesting Territory Survey Form.

- Determine New Nests and Occupancy of Existing Nests

Conduct a survey in late February through March (as early in the season as possible, but contingent upon weather conditions) to determine whether the survey area (suitable breeding habitat) is occupied by bald eagles and if so, to determine their breeding status. The survey shall include observations of any old nests, as well as identification of any new nests in the area. Presence or apparent absence of adult bald eagles, courtship behavior, and nest construction will be recorded.

- Determine Presence of Eggs/Nestlings

Conduct a survey during the mid-nesting season, late April through May, to determine the presence of eggs/nestlings in known nests. All nesting sites documented in the initial survey will be evaluated to determine the presence of adults and number of eggs and/or nestlings.

- Determine Nest Success

Conduct a survey during the late nesting season, early June through early July, to determine nest success.

TERR 5 – Bald Eagle Technical Study Plan

- Develop a GIS map of bald eagle wintering and nesting sites.
- Overlay GIS information on Project facilities and features, recreation facilities, other dispersed concentrated use areas, bypass and peaking reaches, and potential Project betterments (see Tables TERR 1-1, TERR 1-2, TERR 1-3, and TERR 1-4).
- Prepare and submit California Native Species Field Survey Forms for all bald eagles recorded to California Natural Diversity Data Base.
- Prepare draft and final technical reports describing study objectives, methodologies, and results.

SCHEDULE:

Date	Activity
December 2007 through February 2008	Conduct winter and winter roost field surveys
Late February through early July 2008	Conduct nesting surveys
August through October 2008	Analyze data and prepare draft report
October 2008	Distribute draft report to the Terrestrial TWG
November 2008 through January 2009	Terrestrial TWG review and provide comments on draft report
February and March 2009	Resolve comments and prepare final report
March 2009	Distribute final report to the Terrestrial TWG and Plenary

REFERENCES:

- Jackman, R.E., and J.M. Jenkins. 2004. Protocol for Evaluating Bald Eagle Habitat and Populations in California.
- Placer County Water Agency (PCWA). 2006. Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series. June 2006.

POTENTIAL RESOURCE ISSUE:

Protection of special-status bat roosts.

PROJECT NEXUS:

- Project operations at diversions and reservoirs could affect riparian habitats that may be used by special-status bats for roosting or affect insect populations in potential foraging habitat.
- Project-related recreation and human activity near recreation sites may disturb special-status bat species or their habitat.
- Project vegetation maintenance activities (e.g., vegetation control, herbicide use) could potentially affect special-status bats and their habitat.
- Potential Project betterments could result in disturbance or removal of special-status bat habitat.

POTENTIAL LICENSE CONDITION:

- Special-status bat protection, mitigation, and enhancement measures

STUDY OBJECTIVE:

- Document of special-status bats and roosts at existing Project facilities, features, and recreation facilities.
- Document special-status bats and roosts at potential Project betterments.

EXTENT OF STUDY AREA:

The study area includes Project facilities and features, and recreation facilities (see Table TERR 1-1 and Table TERR 1-2). If additional Project facilities, features, and recreation facilities are identified, these areas will be surveyed consistent with this technical study plan.

The study area also includes buffer areas (100 feet) around potential Project betterments, including new facilities, roads, and trails; staging and disposal sites; as well as new inundation areas (see Table TERR 1-4).

STUDY APPROACH:

- Identify and map known occurrences of special-status bat populations based on agency consultation and a review of existing information. This information is presented in the *Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, First Series* (PCWA 2006).
- Conduct an evaluation of Project facilities and features, recreation facilities, and potential Project betterments, in consultation with the Terrestrial Working Group (TWG), to identify locations potentially supporting special-status bat roosts (i.e., areas for focused surveys).
- Use multiple survey techniques to determine the presence/absence of special-status bat species, as well as general assemblage of bats. Two types of surveys will be completed: reproductive surveys and seasonal patterns of use surveys. Sampling

methods will include acoustic sampling and mist netting. Each of these is described below.

- Prepare draft and final technical reports describing study objectives, methodologies, and results.

Reproductive Surveys

- Conduct roost surveys at locations identified through agency consultation and qualified bat expert opinion as potentially supporting special-status bats during the summer reproductive season (August through September) when maternal colonies may be present. These survey locations will be selected near potential roost sites and/or within flight corridors between roost sites and potential foraging habitat (e.g., within stream channels or adjacent to reservoirs).
- Each selected location will be searched for bats or bat sign (i.e., guano, characteristic staining, and culled insect parts). Any location where bat species cannot be determined from visual evaluations will be monitored at emergence time using mist netting and acoustic equipment.

Acoustic Sampling

- Conduct acoustic sampling (i.e., sampling of echolocation calls) during the summer reproductive season at Project facilities, features, recreation facilities, and potential Project betterments identified as potentially supporting special-status bat species.
 - Acoustic sampling will be conducted using an Anabat II bat detector system (Titley Electronics) to identify bat species. The Anabat system detects bat ultrasonic echolocation calls in the field and uses a z-caim unit to convert the detected signals into time/frequency (kilohertz (kHz)) graphs on a laptop computer. Acoustic units (Anabat bat detector, z-caim, and laptop) will be placed in appropriate settings to collect bat calls.
 - A total of ten acoustic units will be operated at sites selected by the Terrestrial Working Group (TWG) for five nights from sunset until sunrise.
 - Three additional units will be operated from August through October at sites selected in consultation with the TWG.

Mist Net Sampling

- Conduct nighttime mist net sampling at Project facilities and features, recreation facilities and potential Project betterments identified as potentially supporting special-status bat species to determine species assemblage during the reproductive season.
 - Mist nets will be set up for one night, from sunset to 1 AM, in locations where active roosts are identified.
 - Captured bats will be identified to species. Other information collected will include sex, age (juvenile or adult), reproductive status, and forearm measurements.
 - Captured bats will be released on-site and echolocation calls recorded at the time of release.

Seasonal Use Surveys

- Conduct an additional survey in October at those locations where active roosts were identified and/or within flight corridors between roost sites and potential foraging habitat to determine seasonal patterns of use. This survey will include using mist nets and acoustic equipment as described above.
- Develop a Geographic Information System (GIS) map of special-status bat roosts and overlay information on Project facilities and features, and recreation facilities, and potential Project betterments.

SCHEDULE:

Date	Activity
June and July 2007	Conduct facility, feature, and betterment survey
August 2007 through October 2007	Conduct reproductive and seasonal use surveys
November 2007 through February 2008	Analyze data and prepare draft report
February 2008	Distribute draft report to the Terrestrial TWG
March through April 2008	Terrestrial TWG review and provide comments on draft report
May through June 2008	Resolve comments and prepare final report
June 2008	Distribute final report to the Terrestrial TWG and Plenary

REFERENCES:

Placer County Water Agency (PCWA). 2006. Middle Fork American River Project (FERC No. 2079) Draft Existing Resource Information Report, *First Series*. June 2006.