

Enclosure II

**Middle Fork American River Project,
FERC No. 2079
Rationale Report for
Proposed License Conditions
And Recommendations**

4 August 2011

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Introduction

On June 7, 2011, FERC solicited motions to intervene and protests; solicited comments; and requested recommendations, terms, conditions, and prescriptions for the Middle Fork American River Project, FERC No. 2079. The existing license for the Middle Fork American River Project expires on February 28, 2013. The Middle Fork American River Project is a 224-megawatt project that consists of two major reservoirs and five powerhouses, located on the Middle Fork American and Rubicon Rivers and their tributaries.

The following resource agencies have participated in the collaborative relicensing process and development of proposed license conditions and recommendations:

- California Department of Fish and Game (CDFG)
- California State Water Resources Control Board (State Water Board)
- California State Department of Parks and Recreation (CDPR)
- USDA Forest Service (FS)
- USDI Bureau of Land Management (BLM)
- USDI National Park Service (NPS)
- USDI Bureau of Reclamation (Reclamation)

Additionally, many non-governmental organizations and individuals have participated in the collaborative process.

The relicensing participants have reached agreement on many of the proposed license conditions and recommendations in the various resource agency filings. In areas where agreement has not been reached, in most cases a substantial amount of work has been completed, and given a bit more time, it is likely the relicensing participants will reach agreement on proposed license conditions and recommendations.

This Rationale Report provides supporting documentation and the rationale used in developing the proposed license conditions and recommendations for consideration by FERC in its environmental analysis for the Middle Fork American River Project. The Rationale Report includes descriptions of the relationship between the supporting information and the resulting proposed license conditions and recommendations. However, the Rationale Report does not constitute the entire record supporting the proposed license conditions and recommendations nor does it detail every source of

information used and every consideration made in developing the proposed license conditions and recommendations. Rather, the Rationale Report should be considered in conjunction with the balance of the record supporting the application for new license.

Resource Objectives

The following resource objectives were developed from agency mandates, with consideration of licensee, and NGO goals. It is recognized that factors beyond the licensees' control could affect attainment of these objectives and that some or all of the objectives may not be achievable within the proposed license conditions and recommendations. The following objectives encompass FS's Eldorado and Tahoe National Forest Land and Resource Management Plans (Forest Plans); however, more specific existing desired conditions are described in the following sections.

General Objectives

Aquatic Biota Objectives

Populations of native aquatic biota, including fish, benthic macroinvertebrates (including aquatic mollusks), amphibians, reptiles, and riparian species are viable with adequate habitat consistent with species' needs. Maintain, enhance, or restore all life stages of native aquatic species. Meet FS Riparian Conservation Objectives from the Forest Plans.

- Maintain, recover, and restore riparian resources, channel condition, and aquatic habitat.
- Maintain, recover, and restore streamflow regime sufficient to sustain desired conditions of native riparian, aquatic, wetland, and meadow habitats.
- Protect aquatic systems to which species are uniquely adapted.

Threatened, Endangered, and Sensitive Species and Management Indicator Species Objectives

- Ensure that proposed license conditions and recommendations measures provide for well distributed, viable populations of Forest Service sensitive species and are consistent with any applicable biological opinion issued under the federal or state Endangered Species Act. Ensure that proposed license conditions and recommendations measures measures comply with the Forest Plans.
- Minimize the effects of stream diversion or other flow modifications from hydroelectric projects on threatened, endangered, or sensitive species.
- Manage sensitive species to ensure that species do not become threatened or endangered.
- Maintain and restore habitat to support viable populations of TES species.

- Avoid impact to species designated as fully protected under FGC sections 3511(b) and 4700(b).

Entrainment Objective

Minimize or avoid the entrainment effects of stream diversions or other flow modifications from hydroelectric projects on aquatic life including threatened, endangered, and sensitive species and fish. Mitigate for losses due to entrainment at tunnel intake structures and at the outlets of the reservoirs.

Macroinvertebrate Objective

Maintain high macroinvertebrate IBIs (metrics) in project streams to demonstrate healthy stream function and provide adequate prey base. Benthic aquatic invertebrates comprise the foundation of the food web critical to all aquatic carnivores, including fish. The organisms are also indicative of the overall aquatic habitat condition in which they occur because different kinds of taxa predominate in differing habitat conditions. Project bypassed reaches and reservoirs will receive increasing public visitation pressure into the foreseeable future. Watershed development adjacent to Project facilities may also occur. The prescribed benthic invertebrate sampling will be key to monitoring the status of the indicative populations that could be affected by Project-related disturbance sources. It is possible that, due to their primary role in the aquatic food web, changes to the basic composition of the aquatic invertebrate fauna over time may be evident through this sampling prior to the changes becoming evident by fish or hydrologic sampling. Ensure that proposed license conditions and recommendations measures measures provide for well distributed, viable populations of aquatic mollusks.

Large Woody Debris Objective

Ensure that the level of large woody debris in streams is within the range of natural variability in terms of frequency and distribution and is sufficient to sustain stream channel physical complexity and stability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions as needed to prevent further declines or cause an upward trend in condition. Ensure large woody debris passage beyond dams and diversions.

Natural Hydrograph Objective

- Develop and implement streamflow regimes that simulate the shape of the natural hydrograph in duration, magnitude, timing, rate of change, and frequency to the extent necessary to restore or protect applicable ecological functions.
- Ensure that seasonally-appropriate geomorphic flows occur at magnitudes and recurrence intervals necessary to maintain healthy stream processes and prevent riparian encroachment within channels that leads to channelization while allowing riparian establishment along stream banks.

- Minimize project-caused flow fluctuations uncharacteristic of the natural hydrograph to protect biota and maintain public safety.
- Manage spills from project reservoirs to simulate timing on natural hydrograph.

Channel Morphology and Sediment Transport Objectives

- Maintain or restore channel integrity.
- Maintain, improve, or restore fluvial processes to provide for balanced sediment transport, channel bed material mobilization and distribution, and channel structural stability that contribute to diverse aquatic habitat and healthy riparian habitat.
- Maintain sediment regime that addresses ecosystem values.
- Ensure delivery and transport of sediment are balanced so that stream channels are not excessively aggrading or degrading over time, and particle size distribution allows for diverse bed form within the stream channel.
- Keep sediment regimes as close as possible to those which aquatic and riparian biota evolved.

Stream Channel and Floodplain Objective

Ensure stream channels have appropriate cross-section size (width to depth) and stable stream banks, and floodplains and flood-prone areas have connectivity to the stream channel.

Riparian Habitat Objectives

- Maintain riparian vegetation in proper functioning condition.
- Maintain or restore riparian resources.
- Maintain or restore streamflow regime sufficient to sustain desired conditions of native riparian, aquatic, wetland, and meadow habitats.
- Address Riparian Conservation Objectives from Forest Plans.
- Manage streamflows so they are sufficient to sustain desired conditions of riparian plant communities.
- Manage streambanks and shorelines to minimize erosion and sustain desired riparian habitats.

- Manage riparian plant communities to maintain and improve the species composition and structural diversity.
- Manage riparian plant communities to maintain and/or improve spatial and temporal connectivity for native riparian plant species within and between watersheds to provide physically, chemically and biologically unobstructed movement for their survival, migration and reproduction.

Water Quality Objective

Ensure compliance with the water quality objectives to fully protect the beneficial uses as designated in the Central Valley Regional Water Quality Control Board Basin Plan (Basin Plan).

Water Temperature Objective

Ensure that flows are protective of the designated beneficial uses of cold freshwater habitat and warm freshwater habitat as appropriate, and do not adversely affect water temperatures for local aquatic- and riparian-dependent species assemblages.

Algae Objective

Restore natural algae species to project reaches.

Invasive Vegetation Objective

- Contain, suppress, and where possible, eradicate or reverse the spread of invasive plant species.
- Implement weed prevention practices and mitigation measures as per FS Regional strategy. Include education as an integral part of prevention.

Invasive Aquatic Species Objective

- Protect against the introduction and establishment of quagga mussels and zebra mussels through the development and implementation of a Mussel Prevention Program for project reservoirs with boating and fishing activities (FGC §2302). Protect against the introduction and establishment of New Zealand mud snails in project waters.
- Protect against the introduction and establishment of aquatic invasive plant species such as hydrilla and Eurasian water-milfoil.
- Keep project reaches free of *Didymosphenia geminata* (diatomaceous algae).

Reservoir Level Objective

Maintain reservoir levels in Project reservoirs to protect beneficial uses. Maintain reservoir levels sufficient to ensure that aesthetic, recreational, ecological, and power production needs are addressed.

Recreation Management Objective

Provide for quality day use and overnight recreation opportunities associated with the Project and ensure that other resources are not adversely impacted by this recreational use.

Recreation Design Objective

Ensure Project-related facilities meet current FS design standards and standards for accessibility.

Public Safety Objective

Provide a safe recreational experience for the public. Provide public safety information at project reservoirs and primary river recreation access points. Provide an administrative presence during the public recreation and whitewater boating season.

Project-Related Recreation

- Ensure licensee provides for and is responsible for project-related recreation, including providing facilities, long-term maintenance, and periodic heavy maintenance.
- Post appropriate signs, including interpretive signs.

Streamflow and Reservoir Level Information Objective

Provide streamflow and reservoir level information for Project-affected reaches and reservoirs that is available to the general public and is adequate for river and reservoir recreation use.

Visual Resource Objective

Ensure that visual quality meets appropriate management area direction.

Cultural Resources Objectives

- Evaluate cultural resources that may be affected by the project (including project-related activities), and protect/conservate significant resources, or mitigate effects to those resources.
- Conduct, as part of Section 106 compliance, on-going consultation with the appropriate Native American tribe(s) as defined by the FS.

- Ensure full compliance of Section 106 through a Programmatic Agreement.

Transportation and Facilities Management Objectives

- Ensure appropriate level of maintenance on Project-related roads and trails. Ensure roads and trails are operated and maintained to established FS standards and are consistent with the Forest Plans. Ensure that substandard Project Roads and Trails conditions are brought up to current standards.
- Ensure Project-related facilities are appropriately identified and maintained.
- Ensure licensee is authorized for the use and is responsible for their commensurate share of road maintenance and repairs of General Access National Forest System Roads used to access Project facilities.
- Ensure that all traffic and information signs in project facilities comply with current MUTCD and FSH 7700-15 for size, shape, message, color, symbology and maintenance and replacement.

Special-Use Authorization Objective

Ensure that Project-related special-use authorizations are up to date and address current uses.

Vegetation Management and Fire Prevention Objective

- Ensure appropriate vegetation management for Project-related activities. Minimize loss of resources from Project-related fires. Provide treatments to reduce excessive fuels in applicable drainages; this may require a separate cooperative agreement.
- Provide defensible space around project structures.

Consistency with Plans

Ensure that hydropower operations are consistent with the applicable resource agency plans (for example, Forest Plan, Basin Plan, Rubicon River Wild Trout Management Plan) and their revisions over the life of the license.

Outages Objective

Ensure outages for routine project maintenance are scheduled to occur at times that minimize adverse effects. Ensure that minimum streamflows and water temperatures in affected streams are maintained during planned and unplanned outages. Avoid flow fluctuations associated with outages through appropriate ramping rates. Ensure that

higher flows during unplanned outages do not adversely affect foothill yellow-legged frog life stages during their sensitive reproductive period.

Duncan Canyon Creek Area

Fisheries Objectives

- Maintain, enhance, or restore all life stages of native aquatic species.
- Maintain, restore, or recover favorable ecological conditions for all life stages of rainbow trout and other native fishes in their appropriate range and habitat through

Entrainment Objective

Avoid rainbow trout entrainment losses at Duncan Creek Middle Fork Tunnel intake structure. Consider diversion effects on trout fry and potential benefits of ending diversions earlier in the season.

Water Quality Objective

There may be a need to address the following in this reach: low dissolved oxygen concentration in lower Duncan Creek.

Sediment Transport Objective

Provide natural sediment pass-through rather than stockpiling it.

Recreation Objectives

- Design and construct a primitive setting campground near the bridge, gravel the parking spurs, and install sanitation facilities.
- Sign and maintain trails to project-related-facilities, including stream gages and monitoring sites as non-motorized.
- Improve the trail from the trash rack to the diversion dam FS trail to standard appropriate to its use (facility maintenance).

Transportation Objective

Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

French Meadows Reservoir Area

Large Woody Debris

There is an interest in passing through the large amount of large woody debris that is in French Meadows Reservoir to the MFAR below, where more large woody debris is needed to maintain and restore aquatic species habitat

Water Quality Objective

There may be a need to address the following:

- Elevated iron concentrations in reservoir (fall).
- Elevated manganese concentration in reservoir.

Boat Ramp Access Objective

- Maintain reservoir levels sufficient for use of boat ramps during summer and fall recreational season.
- Ensure there is access to reservoir waters for heavy equipment such as water trucks and fire engines for fire suppression purposes.
- Maintain reservoir water surface elevation as high as possible between Memorial Day until September 15 during Wet, Above Normal, and Below Normal water years, and until Labor Day Monday during Dry, Critically Dry, and Extreme Critical Dry years. This is to provide the public, particularly those camping and fishing, a positive recreation experience.

Specific Recreation Objectives

- Improve water systems to meet current standards and add additional capacity.
- Provide more group camping opportunities.
- Provide additional non-motorized trail opportunities.
- Look into improving road to Poppy Campground to facilitate facility improvements.
- Provide more group camping opportunities.

Reservoir Angling Objective

- Protect and enhance reservoir angling opportunities (shoreline and boat) at French Meadows Reservoir consistent with overall reservoir-based recreation and reservoir level goals through stocking, maintenance of structures, and access.
- Ensure fish stocking in French Meadows Reservoir is adequate for a quality angling experience; there may be a need for a cooperative agreement to meet this objective.

- Maintain reservoir levels sufficient for use of boat ramp during summer and fall recreational period.

Transportation Objectives

- North Shore Road (Lewis Campground to McGuire Boat Ramp) needs major improvements (possibly relocation) to address effects to riparian habitat. Interest in restoring riparian habitat that has been affected by road.
- There is an interest in mitigating high flows in MFAR that are eroding Mosquito Ridge Road between North Shore Road and Ahart Campground.
- There is an opportunity to reduce the amount of impacted land by unused parking and roads, and to restore those areas.

Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

Middle Fork Below French Meadows to Middle Fork Interbay Area

Riparian Objective

Ensure riparian recruitment is adequate with sufficient high flow to create barren nursery sites (1 to 5 year recurrence).

Fisheries Objectives

- Maintain, enhance, or restore all life stages of native aquatic species.
- Maintain, restore, or recover favorable ecological conditions for all life stages of rainbow trout and other native fishes in their appropriate range and habitat.

Recreational Streamflow Objective

Provide streamflow regime to address recreational opportunities, including whitewater boating, stream angling, swimming, waterplay, boating, and other recreational beneficial uses. Flows should address the following:

- Consistent with ecosystem capabilities and seasonal needs.
- Consistent with unimpaired hydrograph shape (do not fluctuate up and down on weekends, for example) and timing (not out of season).
- Minimize user and ecological conflicts.

- Maintain a high degree of user satisfaction as determined by user surveys and other means.
- Consider public safety.
- Consider reservoir levels and levels of quality reservoir-based recreation.
- May be a need for operation, maintenance, and administration personnel or funding to address increased use.

Recreation Objective

Provide reasonable access for recreational use of this segment for various forms of water-based recreation.

Middle Fork Interbay Area

Sediment Transport Objective/Stockpiling of Sediment

The spoils site is full, and there is an interest in providing sediment pass-through (rather than stockpiling all of it) and ensuring that metals and other non-desirable debris are removed prior to pass-through.

Recreation Objective

Provide reasonable access for recreational uses at this reservoir.

Middle Fork American River Below Middle Fork Interbay Dam

Sensitive Species Objective

Maintain and restore habitat to support viable populations of hardhead and foothill yellow-legged frogs, both sensitive species.

Water Temperature Objective

Ensure that flows are protective of the designated beneficial uses of cold freshwater habitat and warm freshwater habitat as appropriate, and do not adversely affect water temperatures for local aquatic- and riparian-dependent species assemblages. Ensure water temperatures maintain, enhance, or restore native sensitive species (foothill yellow-legged frogs and hardhead) populations.

Fisheries Objectives

- Maintain, enhance, or restore all life stages of native aquatic species, including hardhead, a sensitive species.

- Maintain, restore, or recover favorable ecological conditions for all life stages of rainbow trout and other native fishes and desired non-native fishes in their appropriate range and habitat.

Transportation Objectives

- Interest in licensee being responsible for winter road use since Mosquito Ridge Road is plowed to the interbay turnoff for project access. Ensure licensee is responsible for commensurate share of road maintenance (lots of road work during winter due to rock falls/safety issue).
- Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

Recreational Streamflow Objective

Provide streamflow regime to address recreational opportunities, including whitewater boating, stream angling, swimming, waterplay, boating, and other recreational beneficial uses. Flows should address the following:

- Consistent with ecosystem capabilities and seasonal needs.
- Consistent with unimpaired hydrograph shape (do not fluctuate up and down on weekends, for example) and timing (not out of season).
- Minimize user and ecological conflicts.
- Maintain a high degree of user satisfaction as determined by user surveys and other means.
- Consider public safety.
- Consider reservoir levels and levels of quality reservoir-based recreation.
- May be a need for operation, maintenance, and administration personnel or funding to address increased use.

Recreation Objectives

- Provide reasonable access for recreational use of this stream segment for various forms of water-based recreation.
- Discuss whether there is a need to address use in winter due to plowing.

Hell Hole Reservoir Area

Sensitive Plant Species Objective

Ensure that Stebbins' phacelia populations that may be affected by increasing the water surface elevation in the reservoir are addressed. Develop recreational opportunities in a manner that addresses Sensitive plant populations and habitat. Avoid impacts that may contribute to a trend towards federal listing.

Water Quality Objective

There may be a need to address the following in this reservoir:

- Slightly low dissolved oxygen (less than 7 mg/L) in some fall samples.
- Elevated mercury levels and bioaccumulation rates in resident fish.

Large Woody Debris Objective

Ensure large woody debris passage beyond Hell Hole Dam into Rubicon River.

Terrestrial Objective

Mitigate for terrestrial habitat lost through inundation as a result of increase in reservoir water surface elevation. Ensure protection of bald eagle habitat/nest.

Recreation Objectives

- To the extent possible, assure that the boat ramp is usable for a longer period into the fall.
- There is an interest in further assessing the design needs for Upper Hell Hole Campground (either at a lesser development level or in an alternative location that is more accessible through the season). Monitor use over the life of the license to determine if use increases and if changes are necessary.
- Provide more group camping opportunities.
- Provide additional non-motorized trail opportunities (consider reconstructing the trail completely around the reservoir).

Reservoir Angling Objective

- Protect and enhance reservoir angling opportunities (shoreline and boat) at Hell Hole Reservoir consistent with overall reservoir-based recreation and reservoir level goals through fish stocking, maintenance of structures, and access.
- Ensure fish stocking in Hell Hole Reservoir is adequate and consistent with goals of providing a trophy trout angling opportunity; there may be a need for a cooperative agreement to meet this objective.

- Maintain reservoir levels sufficient for use of boat ramp during summer and fall recreational period.

Streamflow and Reservoir Level Information Objective

Ensure the public is notified whether the upper portion of the reservoir is accessible by boat based on reservoir levels.

Transportation and Facilities Management Objectives

- The road to Hell Hole Reservoir may need to be improved. It is a chip-sealed road that is plowed in winter, resulting in extensive damage.
- There may be a need to improve trail access to Upper Hell Hole Campground.
- Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

Rubicon River Below Hell Hole Dam Area

Fisheries Objectives

- Maintain, enhance, or restore all life stages of native aquatic species, including hardhead, a sensitive species.
- Ensure the wild trout fishery in this reach is maintained or enhanced in accordance with the goals in CDFG's Rubicon River Wild Trout Management Plan (CDFG 1979).
- Maintain, restore, or recover favorable ecological conditions for all life stages of rainbow trout and other native fishes in their appropriate range and habitat.

Sensitive Species Objective

Ensure sensitive foothill yellow-legged frogs are protected or enhanced. Maintain and restore habitat to support viable populations of this sensitive species.

Flow Continuity Objective

Consider pass-through of required minimum streamflow released from the Upper American River Project when developing flow regime for Rubicon River.

Natural Hydrograph Objective

Determine if there are any “biological hotspots” in this bedrock dominated reach that support unique and/or more diverse aquatic and riparian communities that are dependent on unimpaired annual hydrograph components.

Flow Fluctuations Objective

Manage Hell Hole Reservoir to ameliorate out-of-season spills in this reach.

Riparian Objective

Eliminate or reduce the continuous line of vegetation within the channel downstream of dam failure.

Dam Failure Objectives

- Remove debris from dam failure that is a safety hazard. Determine if there are any opportunities to improve the area.
- Mitigate for loss of stream and riparian habitat due to dam failure.

Water Quality Objective

There may be a need to address the following in this reach:

- Dissolved copper slightly exceeded criteria in one sample immediately below dam.
- Total alkalinity is low (less than 20 mg/L at several stream locations).

Water Temperature Objective

Ensure that flows are protective of the designated beneficial uses of cold freshwater habitat and warm freshwater habitat as appropriate, and do not adversely affect water temperatures for local aquatic- and riparian-dependent species assemblages. Ensure water temperatures maintain, enhance, or restore native sensitive species (foothill yellow-legged frogs and hardhead) populations.

Wild and Scenic River Objective

Ensure outstandingly remarkable wild and scenic river values are maintained or enhanced (the value in this reach is fisheries).

Recreational Streamflow Objective

Provide streamflow regime to address recreational opportunities, including whitewater boating, stream angling, swimming, waterplay, boating, and other recreational beneficial uses. Flows should address the following:

- Consistent with ecosystem capabilities and seasonal needs.
- Consistent with unimpaired hydrograph shape (do not fluctuate up and down on weekends, for example) and timing (not out of season).
- Minimize user and ecological conflicts.
- Maintain a high degree of user satisfaction as determined by user surveys and other means.
- Consider reservoir levels and levels of quality reservoir-based recreation.
- Consider public safety.
- May be a need for operation, maintenance, and administration personnel or funding to address increased use.

Specific Recreation Objectives

- There may be a need to provide for appropriate access and parking and to harden some sites along this reach to reduce resource impacts.
- Ensure river crossing for angling at Hale’s Crossing (Deer Creek Trail) remains accessible. Maintain Ellicott’s Bridge as a main recreational access point while controlling and eliminating invasive plant species.
- Minimize riparian and aquatic ecosystem impacts associated with dispersed recreational activities along stream channel.

South Fork Long Canyon Creek Area

Fisheries Objectives

- Maintain, enhance, or restore all life stages of native aquatic species.
- Maintain, restore, or recover favorable ecological conditions for all life stages of rainbow trout and other native fishes in their appropriate range and habitat.

Entrainment Objective

Avoid rainbow trout entrainment losses at South Fork drop inlet structure. Consider diversion effects on trout fry and potential benefits of ending diversions earlier in the season.

Facilities Objective

Ensure facilities are in working order at all times; the instream flow outlet at this site frequently becomes blocked.

Recreation Management and Design Objectives

- Provide for quality day use and overnight recreation opportunities associated with the Project and ensure that other resources are not adversely impacted by this recreational use.
- Ensure Project-related facilities meet current FS design standards and standards for accessibility.
- There may be a need to provide for appropriate access and parking and to harden some sites along this reach to reduce resource impacts.

Transportation Objective

Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

Sediment Transport Objective

Allow pass-through of sediment downstream of diversion to maintain bedload continuity.

North Fork Long Canyon Creek Area

Fisheries Objectives

- Maintain, enhance, or restore all life stages of native aquatic species, including hardhead, a sensitive species.
- Maintain, restore, or recover favorable ecological conditions for all life stages of rainbow trout and other native fishes in their appropriate range and habitat through.

Entrainment Objective

Avoid rainbow trout entrainment losses at North Fork drop inlet structure. Consider effects of diversion on trout fry and potential benefits of ending diversions earlier in the season.

Water Quality Objective

There may be a need to address the following in this reach: Elevated fecal coliform bacterial concentrations downstream of diversion.

Facilities Objective

Ensure facilities are in working order at all times; the instream flow outlet at this site frequently becomes blocked, preventing minimum streamflow releases.

Sediment Transport Objective

Provide natural sediment pass-through to provide bedload continuity rather than stockpiling it.

Riparian Objective

Maintain or enhance riparian community to provide shading for thermal cover.

Recreation Objective

There may be a need to provide for appropriate access and parking and to harden some sites along this reach to reduce resource impacts.

Transportation Objective

Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

Long Canyon Creek Area

Amphibian Objective

Minimize potential project impacts to amphibians due to stage change from project upstream.

Riparian Objective

Healthy distribution of age classes based on reference streams (within range of natural variability from riparian conservation objective).

Sensitive Species Objectives

Maintain and enhance sensitive plant populations within inner gorge (e.g., saw-toothed lewisia and Stebbins' phacelia).

Should it be included as a Sensitive Species, optimize effective habitat for western pearlshell mussel (*Margaritifera falcata*).

Transportation Objective

Repair, operate, and maintain project roads and trails. Mitigate unacceptable resource damage and safety conditions as discovered in study plans.

Ralston Afterbay Area

Sensitive Species Objective

Maintain habitat to support viable hardhead population abundance, size, distribution, age class, and condition. Minimize unseasonably cold temperatures and water level fluctuations that adversely affect hardhead.

Entrainment Objective

Avoid fish entrainment, including hardhead, at the Ralston-Oxbow intake structure and dam outlet structures

Water Quality Objective

There may be a need to address the following:

- Elevated fecal coliform bacterial levels at Ralston Afterbay near Ralston Picnic Area.
- Elevated mercury bioaccumulation rates in resident fish.

Large Woody Debris

Ensure large woody debris passage beyond Ralston Afterbay

Sediment Transport Objective

Provide natural sediment pass-through or make it available to the reach downstream.

Recreation Management Objectives

- Provide for quality day use recreation opportunities associated with the Project and ensure that other resources are not adversely impacted by this recreational use. This includes boat launching and day use.
- Ensure Project-related facilities meet current FS design standards and standards for accessibility.
- Consider the following measures:
 - Improve trail access to the 5 picnic sites and convert one site to meet Forest accessibility standards.
 - Pave the parking lot.
 - Improve and pave the boat access.
 - Reconstruct the existing trail up river of the picnic area (approximately 0.5 mile).

Middle Fork American River Below Oxbow Powerhouse (Peaking Reach)

Sensitive Species Objective

Optimize effective habitat for sensitive species (foothill yellow-legged frog, western pond turtle, and hardhead) to extent possible.

Benthic Macroinvertebrate Objective

Enhance benthic macroinvertebrate community abundance, diversity and health to serve as a primary food source for fish and aquatic life. This may be achieved through maintaining or increasing wetted perimeter in the MFAR channel as well as hydraulic connectivity with tributary sources.

Freshwater Mussel Objective

Should it be included as a Sensitive Species, optimize effective habitat for western pearlshell mussel (*Margaritifera falcata*).

Recreational Streamflow Objective

Provide a streamflow regime which continues to provide for a variety of recreational opportunities along the length of the peaking reach, including whitewater boating, canoeing and down river boating, stream angling, swimming, waterplay, trail crossings, and other recreational beneficial uses.

Recreational Access Objective

- Provide safe and adequate year round access at appropriate access locations along the length of the Middle Fork and North Fork American River within the peaking reach to accommodate the variety of river-dependent and river-enhanced recreation uses. This includes adequately maintaining the existing access roads and improving other roads in order to provide adequate public access to the river in the peaking reach.
- Work with the licensee to accommodate trail crossing of the peaking reach for several existing major trail special events.

Recreation Management Objectives

- Provide for quality river related recreation opportunities in the peaking reach. River recreation access facilities will be operated and maintained to the appropriate land management agency's standards. Licensee to contribute fair share of the cost of providing for, operating and maintaining river related recreation facilities commensurate with impacts of project related flows. This includes administration of whitewater outfitter concession contract administration, river patrol, management of all river use including both commercial and non-commercial, and facility operation and maintenance.

- Remove project-related debris from the peaking reach, such as the steel and concrete bridge debris just below the Confluence, which presents a safety hazard to boaters, swimmers and other river recreation users. There may be projected related debris in other sections of the peaking reach. The sediment excavated from Ralston Afterbay and deposited downstream of Oxbow Dam may contain additional debris which may present a hazard to river recreation users in the future.
- Provide reasonable access and parking for recreational use of this segment for various forms of water-based recreation.
- There may be a need to harden some sites along this reach to reduce resource impacts.
- Consider improving the sandy beach area at Indian Bar and construct a trail to the sandy beach area.

Recreation Design Objective

Ensure project-related facilities meet the appropriate land management agency’s design standards and standards for accessibility. Additional river recreation access facilities are needed in several locations in order to adequately serve recreation use created by project related flows in the peaking reach.

Public Safety Objective

- Remove unsafe bridge debris below confluence.
- Consider need for sanitation facilities.
- Provide public information as for stream flows and outages.

Middle Fork American River Below Ralston Afterbay Dam

Fisheries Objective

Enhance survivorship of rainbow trout YOY age-class downstream of Ralston Dam. The lifestages that are most sensitive to flow fluctuations and that are most likely to limit populations are spawning, incubation, hatching, emergence, fry, and early juvenile. For example, in their paper describing a 13-year study aimed at determining population-limiting salmonid habitats in 11 Colorado streams, Nehring and Anderson (1993) state the following:

“... it became apparent after 4-5 years of study that the early life stages (spawning, incubation, hatching, emergence, and early fry) were the most vulnerable to flow induced variations in habitat. These life stages, due to a stationary nature or relative immobility, are unable to respond quickly (if at all) to flow-induced habitat variations. It is at these early life stages that the “bottleneck” habitat

theory is most valid. The loss of a year-class (in the early stages of development) due to flow-induced changes in habitat carries through for the entire potential life span of that cohort. Not only is the cohort lost from a recreational standpoint, but all of the potential progeny from the cohort are lost as well.”

Recreation Objective

Much of the Middle Fork Project is within a Federal Power Project Withdrawn area. The Withdrawn lands are “reserved from entry, location, or other disposition” per Federal Register Notice dated November 2, 1961. The objective is to inform and educate miners that the area is not open for mineral extraction; and if necessary cite individuals who do not comply with the withdrawal notice.

Rationale for Protection, Mitigation, and Enhancement Measures – Middle Fork American River Project

The following section describes the scientific information and the rationale for the specific protection, mitigation, and enhancement measures in the settlement agreement.

ECOLOGICAL RESOURCES

Existing Conditions

- The minimum streamflows are generally fixed minimums without a natural seasonal hydrograph shape. In the peaking reach, there is a ramping rate requirement that releases shall not cause vertical fluctuations greater than 3 feet per hour. In the large river bypass reaches (MFAR and Rubicon River) flows are altered year-round. Flows are typically reduced and more stable during the winter/spring as water is diverted into storage or used for power generation. During the summer and fall seasons, flows in the bypass reaches are typically equal to or greater than natural unimpaired conditions as water is released from storage to meet minimum streamflow requirements mandated in the FERC License. In the smaller stream bypass reaches (Duncan, North and South Fork Long Canyon, and Long Canyon creeks) flows typically are lower than natural flows during the winterspring season due to diversions. During the summer-fall season, the diversions are not operated because of low inflow and minimum streamflow requirements, and natural flows are present in the streams.
- In the peaking reach, flows can fluctuate substantially to meet daily power demands or to support whitewater recreation. Operations of the Project (except in the wettest of water years and/or seasons of the year) can result in daily flow fluctuations in the peaking reach from about 75 cubic feet per second (cfs) (FERC License minimum flow requirement) to the capacity of the Oxbow Powerhouse (approximately 1,025 cfs). Winter-spring season flows are often similar to natural flows due to the large amount of accretion from the North Fork of the Middle Fork American River and the North Fork American River (see below). Summer-fall season flows are typically

higher and more variable than unimpaired conditions due to releases to meet consumptive water and power demands and whitewater recreation.

- All study streams contained suitably-sized spawning material (8-64 mm) for trout. However, gravel is not overly abundant. Project reservoirs and diversion pools capture a portion of the natural gravel supply in the streams and rivers, thereby, reducing sediment supply in the bypass and peaking reaches.
- Wide corridors of riparian vegetation were relatively uncommon except in the peaking reach and on the Rubicon River immediately downstream from Hell Hole Dam.
- Dissolved oxygen concentrations in the bypass and peaking reaches ranged between 7.1 and 11.7 during the spring and fall sampling events. These measurements are consistent with the Basin Plan objective of 7.0 mg/L.
- Project operations have altered the water temperature regimes in the large bypass and peaking reaches, particularly during the summer and early fall.
- The storage of cold water in French Meadows and Hell Hole reservoirs during the spring runoff period and its subsequent release from low-level outlets and powerhouses throughout the summer and fall have substantially reduced water temperatures of the MFAR and Rubicon River by as much as 15 degrees F.
- Under existing conditions, summer water temperatures in the large rivers are reset to cooler reservoir/powerhouse release temperatures (typically about 45-55F) below French Meadows Reservoir, Hell Hole Reservoir, Middle Fork Interbay, and Ralston Afterbay. The cool water released at the top of the reaches is warmed by air temperature and solar radiation as it moves downstream. For example, the daily average water temperature in the Rubicon River warms from approximately 45 to 72F from the Hell Hole Reservoir release to Ralston Afterbay. The peaking reach has the least amount of warming during the summer along its length relative to the other reaches. The peaking reach has highest relative starting temperature and the largest amount of water; therefore, warming is relatively slow (the lower difference between air temperature and water temperature and the large thermal mass of the river reduces the rate of warming). The average temperature of the water flowing from the peaking reach into Folsom Reservoir during the summer is much cooler than it would have been under unimpaired conditions
- Stream temperatures in the smaller bypass reaches (Duncan Creek and Long Canyon creeks) during the summer and fall are unaffected by the Project because water is generally not diverted during this time period.
- In general, water temperature in the bypass and peaking reaches is ideal for coldwater species such as rainbow trout. Mean daily summer temperatures along the length of most of the reaches ranges between 7°C-20°C (45°F-68°F). The water temperatures

are consistent with the Basin Plan beneficial uses for coldwater freshwater habitat (COLD) and habitat for reproduction and early development of fish.

- Two of the river reaches have summer coldwater/warmer water transition zones and corresponding transition zones of coldwater/warmer water species (cold water trout and warmer water FYLF and hardhead). Transition zones are found in the lower portion of the Rubicon River and the lower portion of the Middle Fork American River below Middle Fork Interbay. These transition zones result from natural warming of the water along the length of the river reaches and are consistent with the beneficial uses designated for these streams in the Basin Plan.

Desired Conditions

- Ensure that sensitive aquatic species and their habitat are adequately protected, including foothill yellow-legged frog, hardhead, and western pond turtle.
- Ensure that native fish populations are protected and maintained. Improve habitat capability for native trout.
- Ensure the Project does not adversely affect water temperatures necessary for aquatic-dependent assemblages. Maintain or improve selected habitats for coldwater and warm-water species.
- Maintain water quality adequate to protect beneficial uses and meet state water quality standards.
- Ensure plant communities in riparian areas and wetlands are diverse and healthy and provide essential ecological functions.
- Maintain channels in a healthy, functioning condition.
- Prevent and eradicate populations of noxious weeds.
- Monitor to ensure objectives are met. Include consultations to discuss measures that may be implemented if objectives are not met.
- Provide habitat for healthy macroinvertebrate populations.
- Attempt to reduce flow fluctuations in the peaking reach.

Minimum Streamflows

Objectives Addressed by Minimum Streamflows

Aquatic Biota Objectives

Threatened, Endangered, and Sensitive Species and Management Indicator Species Objectives

Entrainment Objective
Macroinvertebrate Objective
Large Woody Debris Objective
Natural Hydrograph Objective
Channel Morphology and Sediment Transport Objectives
Stream Channel and Floodplain Objective
Riparian Habitat Objectives
Water Quality Objective
Water Temperature Objective
Algae Objective
Invasive Aquatic Species Objective
Reservoir Level Objective
Visual Resource Objective
Outages Objective

Information Used to Establish Minimum Streamflows

The following information was used to establish minimum streamflows:

- Instream Flow Technical Study Report (PCWA 2010a)
- Fish Population Technical Study Report (PCWA 2010g)
- Middle Fork American River Project Final License Application, Exhibit E: Water Use Affected Environment (PCWA 2011d)
- Special-Status Amphibian and Aquatic Reptile Species Technical Study Report (PCWA 2007a)
- Water Temperature Modeling Technical Study Report (PCWA 2011a)
- Dams and Downstream Aquatic Biodiversity: potential food web consequences of hydrologic and geomorphic change (Power et al. 1995)
- The Natural Flow Regime (Poff et al. 1997)
- Fish Health and Diversity: justifying flows for a California Stream (Moyle et al. 1998)
- Fish Population and Yield Estimates from California Trout Streams (Gerstung 1973)
- Flow Temperature, Solar Radiation, and Ice in Relation to Activities of Fishes in Sagehen Creek, California (Needham and Jones 1959)
- Water Quality Control Plan (Basin Plan) (CVRWQCB 1998)

Rationale for Minimum Streamflows

The approach for evaluating and developing minimum streamflows for all Project-affected stream reaches included the following steps, focused on the needs of the aquatic-dependent biota (primarily fish, amphibians, macroinvertebrates, and riparian vegetation): (a) establishment of resource objectives for each reach, (b) evaluation of ecosystem conditions under regulated and unimpaired streamflows, (c) review of the ecosystem attributes (which are based on the resource objectives for each reach) to determine which attributes are important at different times of the year and where there may be limiting factors, (d) review of study results to develop a minimum streamflow regime for the months of below normal (BN) (or average) water years supported by study results, (e) development of minimum streamflows for the remainder of the BN water year type based

on review of the natural hydrograph and study results, (f) development of streamflow regimes for other water year types using a similar process, while considering changes in precipitation/snow melt magnitude and timing, and (g) re-evaluation of the resulting minimum streamflows and adjustments to meet the interests of other parties, in particular, the hydroelectric generation interests as well as the Licensee's consumptive water delivery requirements.

Streamflow is strongly correlated with many critical physicochemical characteristics of rivers, such as channel geomorphology, water temperature, and habitat diversity, and can be considered a "master variable" that limits the distribution and abundance of riverine species (Power et al. 1996 and Poff et al. 1997). The natural, unregulated flow regime plays a critical role in sustaining native biodiversity and ecosystem integrity in rivers (Poff et al. 1997). Higher spring flows are essential for maintaining resident native fishes in good condition for spawning and rearing (Moyle et al. 1998).

The following sections describe the minimum streamflow approach with the specific process for each reach.

Evaluation of Aquatic Ecosystem Conditions Under Regulated and Unimpaired Streamflows

Aquatic ecosystem conditions under existing minimum streamflows were evaluated for each Project-affected stream reach, based on a comparison with unimpaired conditions and with conditions in similar unaffected stream reaches both within the Rubicon and MFAR Basins and elsewhere in the Sierra Nevada mountains. Knowledge of existing and historical conditions was primarily based on: (a) studies conducted related to hydrology, geomorphology, fish populations, fish habitat, amphibians, macroinvertebrates, riparian vegetation, water quality, and water temperature; (b) personal field observations; (c) pertinent literature; (d) information from other hydroelectric relicensings, and (e) professional judgment. Existing fish population data from Project-affected stream reaches were compared between sampling sites and reaches, and with existing data from similar unaffected reaches in the drainage, historical data from the same reaches, and a compilation of historical data from several Sierra Nevada mountain drainages (Gerstung 1973). Macroinvertebrate data from Project-affected stream reaches were compared between sampling sites and reaches and with data from similar unaffected reaches in the drainage.

Comparison of Regulated and Unimpaired Streamflow Data

Regulated streamflow data were compared with unimpaired streamflow data for Project-affected stream reaches over a 30-year period to determine how hydrological conditions have been affected by Project operations on a seasonal basis. The average monthly streamflow was evaluated for each stream reach. The frequency, magnitude, and duration of peak flow events were also evaluated.

Review of Ecosystem Attributes and Identification of Potential Limiting Factors

Based on review of the ecosystem attributes and hydrology data, potential limiting factors for aquatic biota (primarily fish, amphibians, and macroinvertebrates) were identified under both unimpaired and regulated streamflow conditions. Examples of limiting factors include: low summer streamflows under unimpaired conditions, water temperatures that are too warm (according to the Basin Plan) or too cold, flow fluctuations caused by Project operations, reduced winter/spring streamflows, and delayed or lack of spring runoff under Project operations. Potential improvements were identified to restore the aquatic ecosystem as close as possible to a natural condition while addressing hydroelectric generation and recreation interests. The following factors were considered while developing minimum streamflows: (a) a resource management emphasis on native species (particularly rainbow trout, foothill yellow-legged frogs, western pond turtles, and hardhead), (b) the importance of mimicking the natural hydrograph for the protection of overall ecosystem function and individual target biota (for example, amphibians and riparian vegetation), (c) maintenance of cold water and transitional habitats where appropriate, (d) maintenance of beneficial water quality conditions, (e) connectivity of flows above and below Project features, (f) preservation of geologic integrity, (g) recreational opportunities, (h) hydroelectric operations, (i) consumptive water deliveries, and (j) other resource objectives listed above.

Development of a Range of Minimum Streamflows to Protect Aquatic Resources

Minimum streamflows were developed on a seasonal and monthly basis to protect aquatic resources, recognizing that higher flows than the minimum streamflows (including natural peak flow events) may occur at times due to tributary accretion, storm runoff, fall releases, and snowmelt runoff. Results of the various studies listed above were used as tools in developing the minimum streamflows. Generally, because spring is a very important time of year for breeding, spawning, and other ecosystem processes, results of the various streamflow studies were used to establish springtime minimum streamflows. The springtime flows were usually designed to provide habitat levels from 80 to 100 percent of optimum weighted usable area (WUA) for the various life stages of rainbow trout in wetter water year types when adequate flow is available, although this varied at times due to the importance of other ecological objectives occurring within specific reaches. Once springtime flows were developed, emphasis was placed on developing streamflow regimes that mimicked the natural hydrograph as much as possible for overall protection of the aquatic ecosystem, although this was not always followed due to the importance of other ecological objectives or other objectives within specific reaches.

Streamflow regimes for drier water year types were developed following a pattern similar to that of the wetter water year types but generally providing habitat levels closer to 80 percent of optimum WUA for the various life stages of rainbow trout, and with careful consideration of flow characteristics offering protections for FYLF life stages (velocity and temperature) in those reaches which support known populations. This also varies at times due to the importance of other ecological objectives within specific reaches.

In some instances, flows vary from these patterns in an effort to meet hydroelectric generation or reservoir level objectives in specific reaches. In all cases, there may be variations in this process due to ecological objectives within a specific reach.

As streamflows were developed for each reach, strong consideration of the streamflows in the reach above and contributions from other hydroelectric projects in the basins were considered, and connectivity between streamflows above and below Project facilities was maintained wherever possible.

The following steps describe how minimum streamflows were developed for each season.

High Flow Spring Period: Primary considerations during this period included spawning rainbow trout, channel maintenance, sediment and large woody debris transport, and riparian habitat conditions. Spring is a critical time for fisheries reproduction and setting the stage for amphibian life stage activity for reproduction in late spring and early summer. During spring months it is important to have adequate flow and water temperatures for trout and hardhead spawning. Existing streamflows during non-spill periods are substantially less than unimpaired conditions, potentially affecting aquatic biota and fluvial geomorphology processes. Increased minimum streamflow levels were included in the new streamflow regimes based on providing improved rainbow trout spawning and rearing at the 80-100 percent range of optimum WUA where possible and for riparian habitat. The concept of providing pulse flow events (see Rationale for Pulse Flows) in combination with minimum streamflows and naturally occurring peak flows or spill flows to provide for channel maintenance, sediment and large woody debris transport, and riparian habitat was included .

Late Summer and Early Fall: The relatively low streamflows that naturally occur during this period create limiting factors to aquatic biota such as reduced living space and potentially warm water temperatures. In reaches with upstream storage reservoirs, existing minimum streamflows provided by the licensee vary from base flow over unimpaired conditions in most water year types. In reaches without upstream storage, new minimum streamflows will allow for a closer representation of unimpaired base flow conditions. In general, where deemed necessary, the existing minimum streamflows (or flows of at least a similar magnitude) during late summer/early fall were included in the new streamflow regimes based on overall augmentation/maintenance values relative to unimpaired conditions, rearing suitability for rainbow trout, temperature control, and metamorphosing foothill yellow-legged frog tadpoles. In reaches with foothill yellow-legged frogs, during the period from approximately June through September, it was important to maintain a fairly stable flow (without substantial fluctuations) and a temperature at or above 17°C (daily average) for tadpole rearing and successful metamorphosis.

Late Fall/Winter: The remainder of the year was considered a transition period between the low-flow late summer/early fall period and the high-flow spring period. Existing streamflows during the late fall/winter are lower than unimpaired conditions and lack the typical transition pattern provided by the natural hydrograph. Minimum streamflows for this transition period were included to bridge the gap between low-flow and high-flow periods in a step-wise fashion and thus mimic the pattern of the natural hydrograph, although there are variations in some reaches to meet other objectives. Development of minimum streamflows during the transition period also took into consideration the

occurrence of accretion flows (including peak flow events). Flows at this time are important to provide overwintering habitat for trout. Trout are known to feed in winter, and actively catch macroinvertebrates, even when water is between 32° and 33°F (Needham and Jones 1959).

Hydrology Evaluation for Minimum Streamflows

The information in hydrologic data bases provided by the Licensee (PCWA 2011d) was used as baseline information for comparison of daily average impaired and regulated streamflows for the 30-year period of record. Annual streamflow hydrographs were constructed for each Project-affected reach using the daily average streamflow data generated by the licensee. Components of the hydrograph (spring, summer, fall, and winter baseflow; fall and winter storm runoff; and ascending and descending limbs of the snowmelt hydrograph) that relate to each of the ecosystem attributes were examined for: (a) comparison of the regulated and unimpaired streamflows and (b) indications of the typical magnitude of high and low streamflows for each time of the year.

The licensee and resource agencies developed an operations model to help evaluate and understand the effects of various streamflow and reservoir elevation target alternatives. The licensee also provided detailed information on the physical features and operating criteria for each of the Project facilities. Using the model, the resource agencies and other relicensing participants were able to view the impacts of the streamflow and reservoir elevation target alternatives within the bounds of the historic natural water balance in the system.

Aquatic Ecosystem Re-Evaluation of Minimum Streamflows

Once the minimum streamflows were reviewed using the operations model, adjustments were made to individual values to address site-specific considerations at various locations and to balance the minimum streamflows with other objectives, including hydroelectric generation, consumptive water deliveries, angling opportunities, reservoir levels, and recreational streamflows.

Duncan Creek Below Duncan Diversion Dam

Ecological objectives for Duncan Creek below Duncan Diversion Dam are to provide habitat for native fish and to establish some similarity to the unimpaired hydrograph to restore ecological processes altered by the Project.

Both rainbow trout and brown trout are present in Duncan Creek. During surveys in 2007 and 2008, trout per mile ranged from 3,173-3,468, with an average of 3,346 trout per mile. Biomass of trout in Duncan Creek averaged 54 lbs/acre (ranging from 42-69 lbs/acre) (PCWA 2010g).

To establish minimum streamflows for Duncan Creek below Duncan Diversion Dam, the resource agencies determined that some similarity to an unimpaired hydrograph was important, especially during the spring spawning period.

Based on the ecosystem objectives for Duncan Creek below Duncan Diversion Dam, the period mid-March to June was determined to be important for rainbow trout spawning. This period is also when the hydrograph peaks according to the hydrology report (PCWA 2011d). To set the minimum streamflow for this period, the unimpaired hydrology was reviewed, and the peak was determined by water year type. The Instream Flow analysis was reviewed (Table M-1A, PCWA 2010a), and based on this analysis, 100 percent of the WUA for rainbow trout spawning was equal to 33 cfs, while 24 cfs will provide 97 percent of spawning WUA. To conserve water and still protect spawning habitat, an incremental adjustment to offer close to optimum spawning habitat at 97 percent of WUA was made, and the minimum flow for the spring run-off period was set at 24 cfs in the wetter water year types (Wet and AN). Summer flow in Duncan Creek diminishes under the natural hydrograph, and this decrease in minimum flow has been replicated during June. To maintain any natural wetting of the channel below Duncan Diversion Dam in mid- to late-summer, the Licensee will cease all diversions from July through September. Principles used to design Wet Year minimum flows have been applied in the development of Below Normal, Dry and Critical Dry water year minimum flow regimes, with considerations for limited hydrology under these drier conditions.

The Duncan Creek Diversion impounds water year-round, although the elevation of the pool can decrease 5 feet under low flow summer/fall conditions. When full, it is also relatively small (2.2 acres; 20 ac-ft). The licensee has proposed, in their FLA to modify the diversion dam to be a self-cleaning, stream-bottom intake. A concrete retaining wall and sloped wedge-wire screen will be constructed on the upstream side of the existing ogee dam/spillway of the diversion, and it is anticipated that sediment will fill behind the dam to restore riverine conditions. The top (crest) of the sloped wedge-wire screen will be 3.1 feet higher than the existing dam (the bottom of the slope screen will be at the elevation of the existing dam). The licensee has also proposed to continue its practice of not diverting during the summer, and there will be no diversions out of Duncan Creek during July, August, and September.

Rainbow trout and brown trout are present in Duncan Creek diversion pool. Fish sampling results for the diversion pool indicated very low numbers of fish (<15 observed) (PCWA 2010g). The physical habitat changes described above that will occur to the Duncan Creek diversion pool are not anticipated to affect fish populations in Duncan Creek compared to existing conditions due to the relatively minor changes to physical habitat relative to the total amount of habitat available to fish in these streams. The new diversion pools will become much shallower and more riverine. The area footprint of the new diversion pools will remain approximately similar to the existing diversion pools. The water surface of the new diversion pool will be 3.1 feet higher than the existing diversion pool. Once the diversion pool is aggraded, sediment moving downstream will pass over the diversion screen and downstream. The reduction in pool habitat that occurs is expected to have negligible effects because: (1) very little pool habitat currently exists under summer/fall low flow conditions; (2) abundant pool habitat exists throughout Duncan Creek; and (3) the pool habitat that was lost would be replaced with riverine habitat.

Water temperature and dissolved oxygen in the the diversion pool will be the same as the temperature and dissolved oxygen concentrations in the inflowing streams. Dissolved oxygen under existing conditions was 7.0 mg/L and greater. This is consistent with the Basin Plan objective of 7.0 mg/L (CVRWQCB 1998). The new flows and facility modifications will maintain temperature and dissolved oxygen concentrations similar to existing conditions.

Modifications to the Duncan Diversion could potentially affect entrainment of fish and fish populations in Duncan Creek and is one of the locations that could result in fish translocation or mortality through Project.

The number of days (duration) and years that the 5-year recurrence flows and the gravel initiation of motion flows occur (frequency) would be reduced when compared to the existing condition. However, the number of days/years these flow events would occur is sufficient to maintain low fine sediment content in pools and spawning gravels equivalent to the existing condition. In part, this is due to the low fine sediment supply present in the system. A Geomorphology/Riparian Monitoring Plan that is being developed will be used to document fine sediment conditions in Duncan Creek. A report summarizing the data collected each monitoring period will be prepared by the licensee and distributed to the resource agencies for review and comment. Based on the results of the monitoring and/or comments received during the review process, the licensee and the resource agencies may meet to discuss the results.

The modifications to the Duncan Diversion will enhance sediment supply and particularly gravels that will pass downstream of this facility rather than being captured.

The continued practice of not diverting during summer should result in no change in the summer/fall rearing habitat for rainbow trout adult or juveniles.

Middle Fork American River Below French Meadows Reservoir Dam

Ecological objectives for Middle Fork American River below French Meadows Reservoir Dam are to provide habitat for native fish and to establish some similarity to the unimpaired hydrograph to restore ecological processes altered by the Project.

Both rainbow trout and brown trout are present in this stretch of the Middle Fork American River. Water temperatures in the upper two-thirds of the river allow for cooler water temperatures throughout the summer from flows coming out of the dam. During surveys in 2007 and 2008, trout per mile ranged from 924-2798, with an average of 1,662 trout per mile. Biomass of trout in this reach of the Middle Fork American River averaged 29 lbs/acre (ranging from 18-42 lbs/acre).

To establish minimum streamflows for Middle Fork American River below French Meadows Reservoir Dam, the resource agencies determined that some similarity to an unimpaired hydrograph was important, especially during the spring spawning period.

Based on the ecosystem objective for Middle Fork American River below French Meadows Reservoir Dam, the period mid-March to June was determined to be important for rainbow trout spawning. This period is also when the hydrograph peaks according to the hydrology report (PCWA 2011d). To set the minimum streamflow for this period, the unimpaired hydrology was reviewed, and the peak was determined by water year type. The Instream Flow analysis was reviewed (Table M-5A, PCWA 2010a), and this analysis shows that, 100 percent of the WUA for rainbow trout spawning is provided by a 30 cfs, flow, while 20 cfs is predicted to give 95 percent of spawning WUA. With incremental reductions from the optimum, a 20 cfs discharge this was set as the minimum flow for spring months of the wetter water year types (Wet and AN). The summer hydrograph for the Middle Fork American River has a declining limb, and this decrease in minimum flow has been replicated during June, July, August and September. Winter flows in wetter years are established to maintain a wetted perimeter for support of the benthic community and to provide for greater than 50 percent WUA for adult rainbow trout holding habitat; although WUA analysis emphasizes spring/summer holding requirements, minimum thresholds to sustain biological behavior are achieved and accretion flow will contribute to this winter flow condition. Drier year (Below Normal, Dry, Critical Dry) minimum flow schedules are established using principles similar to that of the wetter years, but with recognition that precipitation and resulting hydrology is reduced and seasonal changes may occur earlier in the year.

Middle Fork American River Below Middle Fork Interbay Dam

A primary objective in Middle Fork American River below Middle Fork Interbay Dam is to provide habitat for healthy foothill yellow-legged frog and hardhead populations. Other objectives are to provide temperatures that allow for management of native fish and address FYLF breeding and rearing, and to establish some similarity to the natural hydrograph to restore ecological processes altered by the Project.

Both rainbow trout and brown trout are present in this stretch of the Middle Fork American River. Water temperatures in the upper two-thirds of the river allow for cooler water temperatures throughout the summer from flows coming out of the dams. During surveys in 2007 and 2008, trout per mile ranged from 372-456, with an average of 414 trout per mile. Biomass of trout in this reach of the Middle Fork American River averaged 11 lbs/acre (ranging from 9-14 lbs/acre).

To establish minimum streamflows for Middle Fork American River below Middle Fork Interbay Dam and to address the primary ecological objectives described above, the resource agencies determined that some similarity to an unimpaired hydrograph was important, especially during the spring spawning period. During the period from approximately June through September, it was important to maintain a fairly stable flow (without substantial fluctuations) and a temperature at or above 17°C (daily average) for foothill yellow-legged frog tadpole rearing and successful metamorphosis.

In above normal and wet years, summer minimum flows were increased to provide habitable summer water temperatures for trout in half of the water years. The upper half to two-thirds of the reach maintains cool water temperatures for trout year round in all

water years, because of the cold water coming out of the bottom of French Meadows Dam and into Interbay.

Based on the ecosystem objectives for the Middle Fork American River below Middle Fork Interbay Dam, the period mid-March to June was determined to be important for hardhead spawning and foothill yellow-legged frog breeding as well as habitat to support rainbow trout. This period is also when the hydrograph peaks according to the hydrology report (PCWA 2011d). To set the minimum streamflow for this period, the unimpaired hydrology was reviewed, and the peak was determined by water year type. . An attempt was made to replicate the shape and timing of the natural hydrograph. The Instream Flow analysis was reviewed for trout (PCWA 2010a) , and based on this analysis, 100 percent of the WUA for rainbow trout spawning was equal to 75 cfs, and 65 cfs was set as the minimum flow for this period in the wetter water year types.

Foothill yellow-legged frog habitat in this reach is limited by suitable habitat and cool water temperatures. The best suitable breeding habitat occurred primarily in the lower one-third of the reach in the boulder-protected margins of runs and cobble-dominated pool tailouts where FYLFs were observed during surveys. Foothill yellow-legged frog 2D modeling was used to determine the streamflow which provided adequate suitable habitat for reproduction. In this nine mile reach, water temperatures are cold when first coming out of Interbay, and by the time the water reaches the bottom of the reach the water warms an average of 8 degrees in June and 11 degrees in August under the current flows (PCWA 2011a) . Foothill yellow-legged frogs have been shown to begin breeding at water temperatures of 17 degrees C and warmer; therefore, water temperature modeling was used to determine the minimum streamflows needed to start breeding with at least 17 degrees C in June (or late May). For adequate tadpole maturation over the summer and successful metamorphosis, stream flows were chosen to maintain water temperatures warmer than 17 degrees C.

The new minimum flows are expected to maintain the current upstream distribution/abundance of FYLF in the Middle Fork American River below Middle Fork Interbay Dam. During CD, Dry, and BN water year types when water temperature modeling showed that changes to minimum flows could affect water temperature (PCWA 2011a), new summer minimum flows were set to approximately maintain the existing location of the 17°C water temperature transition zone in the Middle Fork American River below Middle Fork Interbay Dam. Minimal change to the summer water temperature is expected to occur. Surveys and water temperature monitoring will be used to monitor FYLF (PCWA 2011b) and (PCWA 2011c).

Flows with water temperatures suitable for foothill yellow-legged frogs also provide the best habitat for hardhead. Hardhead were found within the lower one-half mile of the reach below a natural barrier.

Rubicon River Below Hell Hole Reservoir Dam

A primary objective in Rubicon River below Hell Hole Reservoir Dam is to provide habitat for healthy foothill yellow-legged frog and hardhead populations. Other

objectives are to: provide temperatures that allow for management of healthy native fish populations in accordance with the objectives in CDFG's Rubicon River Wild Trout Management Plan and to address FYLF breeding and rearing requirements, and to establish some similarity to the natural hydrograph to restore ecological processes altered by the Project.

Rubicon River is both a rainbow and brown trout fishery. Water temperatures in the upper half of the river allow for cooler water temperatures throughout the summer from flows coming out of the bottom of Hell Hole Reservoir. During surveys in 2007 and 2008, trout per mile ranged from 204-1,944, with an average of 1,075 trout per mile. An average of 74 percent of the trout were young of the year. Biomass of trout in this reach of the Rubicon River averaged 15 lbs/acre (ranging from 7-23 lbs/acre) (PCWA 2010g).

To establish minimum streamflows for Rubicon River below Hell Hole Reservoir Dam and to address the primary ecological objectives described above, the resource agencies determined that some similarity to an unimpaired hydrograph was important, especially during the spring spawning period. During the period from approximately June through September, it was important to maintain a fairly stable flow (without substantial fluctuations) and a temperature at or above 17°C (daily average) for foothill yellow-legged frog tadpole rearing and successful metamorphosis. Water temperatures in the Rubicon River in August under unimpaired flow conditions pre-project were in the 20 degrees C range. Summer flows were designed to mimic the natural aquatic regime, and are expected to maintain between 17-20 degrees C. This foothill yellow-legged frog population on the Rubicon River is an unusually robust population for a regulated river in the Sierras, thus is very important to maintain the health of this population for the survival of this sensitive species.

Foothill yellow-legged frog sightings and habitat in this reach are found between Oxbow Reservoir and Ellicotts Bridge to River Mile 20.9 (at 3,350 feet in elevation). During surveys, the Rubicon River had the highest density of foothill yellow-legged frog egg masses in the project (19 egg masses/km in the three lower sites) (PCWA 2008a). Foothill yellow-legged frog 2D modeling was used to determine the streamflow which provided adequate suitable habitat for reproduction.

In this 30 mile reach, water temperatures are cold when first coming out of Hell Hole Dam, and by the time the water reaches the bottom of the reach the water warms an average of 6 degrees in June and 14 degrees in August under the current flows (PCWA 2011a). Foothill yellow-legged frogs have been shown to begin breeding at water temperatures of 17 degrees C and warmer; therefore, water temperature modeling was used to determine the minimum instream flows needed to start breeding with at least 17 degrees C in May to June. For adequate tadpole maturation over the summer and successful metamorphosis, stream flows were chosen to maintain water temperatures warmer than 17 degrees C. Stream reaches, such as the Rubicon River, with daily average water temperatures above 60 degrees F for at least three to four months, especially in the drier water years, provides for successful rearing and metamorphosis of tadpoles.

Hardhead, a FS sensitive species, are found from Oxbow Reservoir to River Mile 6.0 on the Rubicon (to a natural barrier). Since hardhead are a warm-water species, flows for foothill yellow-legged frog reproduction provide water within suitable temperature range for hardhead. Prescribed flows in the drier water years were specifically designed to benefit the warm-water sensitive species. Higher flows were prescribed during the above normal and wet years to allow a greater wetted perimeter for trout during these higher water years when foothill yellow-legged frog reproduction is generally not as successful.

Based on the ecosystem objectives for the Rubicon River, the period mid-March to June was determined to be important for rainbow trout spawning and May through June for foothill yellow-legged frog breeding. This period is also when the hydrograph peaks according to the hydrology report (PCWA 2011d). An attempt was made to replicate the shape and timing of the natural hydrograph. To set the minimum streamflow for this period, the unimpaired hydrology was reviewed, and the peak was determined by water year type. The Instream Flow analysis was reviewed (Table M-9A and Table M-10A, PCWA 2010a), and based on this analysis, 100 percent of the WUA for rainbow trout spawning is achieved with the release of 86 cfs, while 60 cfs will provide approximately 95 percent spawning WUA. Conservation of water and protection for other resource attributes support the use of flow that provides 95 percent of spawning WUA for rainbow trout and this was used to set the minimum flow for the spring period in the wetter water year types (Wet and Above Normal). The minimum flow hydrograph was built with a descending limb gradually decreasing summer flow from June through September to hold lower flows through fall and winter when accretion contributes to the wetted channel.

Minimum flow schedules for drier years (Below Normal, Dry, and Critical Dry) used similar principles to address fishery attributes, while emphasizing protection necessary for biologically sensitive life stages of the FYLF. Amphibian populations have been documented throughout the lower Rubicon and upstream of river mile 20 on the Rubicon River, and flow characteristics of depth, velocity and temperature have been considered in establishing minimum flows during the periods of oviposition, egg mass incubation, and tadpole maturation (June through September). Instream Flow analysis in the lower Rubicon (Tables M-10A and M-10B, PCWA 2010a), informs of FYLF egg mass and tadpole habitat WUAs based on depth and velocity, where 85 percent of egg mass WUA can be achieved with 20 cfs and approximately 71 percent WUA for tadpole habitat WUA is provided at 20 cfs. A 15 cfs flow provides approximately 90 percent WUA for egg masses and about 78 percent WUA for tadpole habitat. New minimum flows for drier water years consider the need to avoid fluctuation in monthly minimum flow during the FYLF sensitive period of June through September, and establish steady flows of 20 cfs and 15 cfs to provide WUA.

The new minimum flows are expected to maintain the current upstream distribution/abundance of FYLF in the Rubicon River. During CD, Dry, and BN water year types when water temperature modeling showed that changes to minimum flows could affect water temperature (PCWA 2011a), new summer minimum flows were set to approximately maintain the existing location of the 17°C water temperature transition zone in the Rubicon River. Minimal change to the summer water temperature is expected

to occur. Surveys and water temperature monitoring will be used to monitor FYLF and its habitat (PCWA 2011b), and (PCWA 2011c).

North Fork Long Canyon Creek Below North Fork Long Canyon Diversion Dam

Ecological objectives for North Fork Long Canyon Creek below North Fork Long Canyon Diversion Dam are to provide habitat for native fish and to establish some similarity to the unimpaired hydrograph to restore ecological processes altered by the Project.

North Fork Long Canyon is a rainbow trout fishery, as no brown trout were observed. Biomass and trout per mile were highest of any stream in the project. During surveys in 2007, trout per mile was calculated to be 4,777 (61 percent) of the trout were young of the year. Biomass of trout in the North Fork Long Canyon was 71 lbs/acre (PCWA 2010g).

To establish minimum streamflows for North Fork Long Canyon Creek below North Fork Long Canyon Creek Diversion Dam, the resource agencies determined that some similarity to an unimpaired hydrograph was important, especially during the spring spawning period.

Based on the ecosystem objectives for North Fork Long Canyon Creek below North Fork Long Canyon Creek Diversion Dam, the period mid-March to June was determined to be important for rainbow trout spawning. This period is also when the hydrograph peaks according to the hydrology report (PCWA 2011d). An attempt has been made to replicate the shape and timing of the natural hydrograph. To set the minimum streamflow for this period, the unimpaired hydrology was reviewed, and the peak was determined by water year type. The Instream Flow analysis was reviewed (Table M-2A, PCWA 2010a), and based on this analysis, 100 percent of the WUA for rainbow trout spawning was available with release of approximately 27 cfs while 80 percent spawning WUA is provided with 11-12 cfs. A spawning flow of 11 cfs was set as the minimum flow for April and May in the wetter water year types. (Wet, Above Normal. Summer flow in North Fork Long Canyon Creek diminishes under the natural hydrograph, and this decrease in minimum flow has been replicated during June. To maintain any natural wetting of the channel below North Fork Long Canyon Diversion Dam in mid- to late-summer, the Licensee will cease all diversions from July through September. Minimum flows of 2 cfs (or natural stream flow) are set for fall and winter months when precipitation provides surface flow and accretions. Principles used to design wetter year minimum flows have been applied in the development of Dry and Critical Dry water year minimum flow regimes, with considerations for limited hydrology under these drier conditions. Minimum spring spawning flows of 10 cfs are set to maintain 75 percent of spawning WUA for trout in Below Normal and Dry years and 6 cfs provides greater than 50 percent spawning WUA in the Critical Dry years.

The North Fork Long Canyon creek diversion pool under existing conditions is essentially dewatered during the summer, with the creek winding through a short section of pool bed under low flow conditions. The diversion pool is very small (<1.0 acres) when full. The licensee has proposed, in their FLA to modify the diversion dam to be a

self-cleaning, stream-bottom intake. A concrete retaining wall and sloped wedge-wire screen will be constructed on the upstream side of the existing ogee dam/spillway of the diversion. The top (crest) of the sloped wedge-wire screen will be 1.3 feet higher than the existing dam (the bottom of the slope screen will be at the elevation of the existing dam). The licensee has also proposed to continue its practice of not diverting during the summer, and there will be no diversions out of North Fork Long Canyon Creek during July, August, and September.

Rainbow trout are present in North Fork Long Canyon Creek diversion pool. Fish sampling results for the diversion pool indicated very low numbers of fish (<15 observed) (PCWA 2010g). The physical habitat changes described above that will occur to the North Fork Long Canyon Creek Diversion are not anticipated to affect fish populations in North Fork Long Canyon Creek compared to existing conditions due to the relatively minor changes to physical habitat relative to the total amount of habitat available to fish in these streams. The new diversion pools will become much shallower and more riverine. The area footprint of the new diversion pools will remain approximately similar to the existing diversion pools. The water surface of the new diversion pool will be 1.3 feet higher than the existing diversion pool. Once the diversion pool is aggraded, sediment moving downstream will pass over the diversion screen and downstream. The reduction in pool habitat that occurs is expected to have negligible effects because: (1) very little pool habitat currently exists under summer/fall low flow conditions; (2) abundant pool habitat exists throughout North Fork Long Canyon Creek; and (3) the pool habitat that was lost would be replaced with riverine habitat.

Water temperature and dissolved oxygen in the the diversion pool will be the same as the temperature and dissolved oxygen concentrations in the inflowing streams. Dissolved oxygen under existing conditions was 7.0 mg/L and greater. This is consistent with the Basin Plan objective of 7.0 mg/L (CVRWQCB 1998). The new flows and facility modifications will maintain temperature and dissolved oxygen concentrations similar to existing conditions.

Modifications to the North Fork Long Canyon Diversion could potentially affect entrainment of fish and fish populations in North Fork Long Canyon Creek and is one of the locations that could result in fish translocation or mortality through Project.

The number days and years that the 5-year recurrence flows and the gravel initiation of motion flows occur would be reduced when compared to the existing condition. However, the number of days/years these flow events would occur is sufficient to maintain low fine sediment content in pools and spawning gravels equivalent to the existing condition. In part, this is due to the low fine sediment supply present in the system. A Geomorphology/Riparian Monitoring Plan that is being developed will be used to document fine sediment conditions in North Fork Long Canyon Creek. A report summarizing the data collected each monitoring period will be prepared by the licensee and distributed to the resource agencies for review and comment. Based on the results of the monitoring and/or comments received during the review process, the licensee and the resource agencies may meet to discuss the results.

The modifications to the North Fork Long Canyon Creek Diversion will enhance sediment supply and particularly gravels that will pass downstream of this facility rather than being captured.

The continued practice of not diverting during summer should result in no change in the summer/fall rearing habitat for rainbow trout adult or juveniles.

South Fork Long Canyon Creek Below South Fork Long Canyon Diversion Dam

Ecological objectives for South Fork Long Canyon below South Fork Long Canyon Diversion Dam are to provide habitat for native fish and to establish some similarity to the unimpaired hydrograph to restore ecological processes altered by the Project.

In general, South Fork Long Canyon is considered a rainbow trout nursery with an average of 59 percent (range of 46-74 percent) of the trout being young of the year at eight surveyed locations. No brown trout were observed. During surveys in 2007-2009 trout per mile ranged from 2,189-5,035, with an average of 3,529 trout per mile. Biomass of trout in the South Fork Long Canyon averaged 54 lbs/acre (PCWA 2010g).

To establish minimum streamflows for South Fork Long Canyon Creek below South Fork Long Canyon Creek Diversion Dam, the resource agencies determined that some similarity to an unimpaired hydrograph was important, especially during the spring spawning period.

Based on the ecosystem objectives for South Fork Long Canyon Creek below South Fork Long Canyon Creek Diversion Dam, the period mid-March to June was determined to be important for rainbow trout spawning. This period is also when the hydrograph peaks according to the hydrology report (PCWA 2011d). To set the minimum streamflow for this period, the unimpaired hydrology was reviewed, and the peak was determined by water year type. The Instream Flow analysis was reviewed (Table M-3A, PCWA 2010a), and based on this analysis, 100 percent of the WUA for rainbow trout spawning can be attained with flow releases of 30-35 cfs, while 14 cfs will provide 80 percent spawning WUA. Recognizing the need to conserve water for all uses, spawning flows incrementally below optimum were set for April and May, with 14 cfs minimum flow providing 80 percent WUA in Wet and Above Normal years and 12 cfs minimum flow giving approximately 75 percent spawning WUA in Below Normal and Dry water year types. Summer flow in South Fork Long Canyon Creek diminishes under the natural hydrograph, and this decrease in minimum flow has been replicated during June. To maintain natural wetting of the channel below South Fork Long Canyon Diversion Dam in mid- to late-summer, the Licensee will cease all diversions from July through September. Minimum flows of 5 cfs (or natural stream flow) are set for fall and winter months when precipitation provides surface flow and accretions. Principles used to design the more normal-to-wet year flow regimes have been applied in the development of Critical Dry water year minimum flows, with consideration for limits of the drier hydrologic conditions.

The South Fork Long Canyon Creek diversion pool under existing conditions is essentially dewatered during the summer, with the creek winding through a short section of pool bed under low flow conditions. The diversion pool is very small (<1.0 acres) when full. The licensee has proposed, in their FLA to modify the diversion dam to be a self-cleaning, stream-bottom intake. A concrete retaining wall and sloped wedge-wire screen will be constructed on the upstream side of the existing ogee dam/spillway of the diversion. The top (crest) of the sloped wedge-wire screen will be 3.0 feet higher than the existing dam (the bottom of the slope screen will be at the elevation of the existing dam). The licensee has also proposed to continue its practice of not diverting during the summer, and there will be no diversions out of South Fork Long Canyon Creek during July, August, and September.

Rainbow trout are present in South Fork Long Canyon Creek diversion pool. Fish sampling results for the diversion pool indicated very low numbers of fish (<15 observed) (PCWA 2010g). The physical habitat changes described above that will occur to the South Fork Long Canyon Creek Diversion are not anticipated to affect fish populations in South Fork Long Canyon Creek compared to existing conditions due to the relatively minor changes to physical habitat relative to the total amount of habitat available to fish in these streams. The new diversion pools will become much shallower and more riverine. The area footprint of the new diversion pools will remain approximately similar to the existing diversion pools. The water surface of the new diversion pool will be 3.0 feet higher than the existing diversion pool. Once the diversion pool is aggraded, sediment moving downstream will pass over the diversion screen and downstream. The reduction in pool habitat that occurs is expected to have negligible effects because: (1) very little pool habitat currently exists under summer/fall low flow conditions; (2) abundant pool habitat exists throughout South Fork Long Canyon Creek; and (3) the pool habitat that was lost would be replaced with riverine habitat.

Water temperature and dissolved oxygen in the the diversion pool will be the same as the temperature and dissolved oxygen concentrations in the inflowing streams. Dissolved oxygen under existing conditions was 7.0 mg/L and greater. This is consistent with the Basin Plan objective of 7.0 mg/L (CVRWQCB 1998). The new flows and facility modifications will maintain temperature and dissolved oxygen concentrations similar to existing conditions.

Modifications to the South Fork Long Canyon Diversion could potentially affect entrainment of fish and fish populations in South Fork Long Canyon Creek and is one of the locations that could result in fish translocation or mortality through Project.

The number days and years that the 5-year recurrence flows and the gravel initiation of motion flows occur would be reduced when compared to the existing condition. However, the number of days/years these flow events would occur is sufficient to maintain low fine sediment content in pools and spawning gravels equivalent to the existing condition. In part, this is due to the low fine sediment supply present in the system. A Geomorphology/Riparian Monitoring Plan that is being developed will be used to document fine sediment conditions in South Fork Long Canyon Creek. A report summarizing the data collected each monitoring period will be prepared by the licensee

and distributed to the resource agencies for review and comment. Based on the results of the monitoring and/or comments received during the review process, the licensee and the resource agencies may meet to discuss the results.

The modifications to the South Fork Long Canyon Creek Diversion will enhance sediment supply and particularly gravels that will pass downstream of this facility rather than being captured.

The continued practice of not diverting during summer should result in no change in the summer/fall rearing habitat for rainbow trout adult or juveniles.

Middle Fork American River Below Ralston Afterbay Dam

The ecological objective for Middle Fork American River below Ralston Afterbay Dam is to provide spawning habitat and a nursery for native fish.

Middle Fork American River Below Oxbow Powerhouse

Ecological objectives for Middle Fork American River below Oxbow Powerhouse are to increase food production to improve habitat for native fish.

Both rainbow trout and brown trout are present in the Middle Fork American River below Oxbow Powerhouse. Hardhead were also found in two isolated locations in the peaking reach downstream of Ralston Afterbay. The two locations were a pool in Otter Creek at its confluence with the Middle Fork American River and an in-channel dredging pool in the Middle Fork American River at river mile 23.5 (upstream of Tunnel Chute). During surveys in 2007 and 2008, trout per mile ranged from 47-409, with an average of 217 trout per mile. Biomass of trout in this reach of the Middle Fork American River averaged 13 lbs/acre (ranging from 3-27 lbs/acre) (PCWA 2010g).

The MFP has a single peaking reach, which extends from Oxbow Powerhouse / Ralston Afterbay to the high-water mark of Folsom Reservoir. In this reach, flows fluctuate substantially to meet power demands or to support whitewater recreation.

Pulse Flows

Objectives Addressed by Pulse Flows

Aquatic Biota Objectives

Threatened, Endangered, and Sensitive Species and Management Indicator Species Objectives

Macroinvertebrate Objective

Large Woody Debris Objective

Natural Hydrograph Objective

Channel Morphology and Sediment Transport Objectives

Stream Channel and Floodplain Objective

Riparian Habitat Objectives

Water Quality Objective
 Water Temperature Objective
 Algae Objective
 Invasive Aquatic Species Objective
 Reservoir Level Objective

Information Used to Establish Pulse Flows

The following information was used to establish minimum streamflows:

- Middle Fork American River Project Final License Application Exhibit E: Water Use Affected Environment (PCWA 2011d)
- Geomorphology Technical Study Report AQ-9a (PCWA 2009a)
- Geomorphology Technical Study Report AQ-9b (PCWA 2011b)

Rationale for Pulse Flows

Scheduled pulse flows are included in May of Wet and AN water year types in all stream reaches except the Middle Fork American River below Ralston Afterbay Dam and Middle Fork American River below Oxbow Powerhouse. No pulse flows are proposed in these reaches because natural high-flow events from unimpaired river inflows (North Fork of the Middle Fork American River, North Fork American River) and accretion flows from smaller watersheds in the reach provide high-flow events in the Middle Fork American River below these facilities.

The Wet and AN water year types encompass approximately 50 percent of the water years in the 33-year period of record (1975–2007) (PCWA 2011d). The existing license does not specify pulse flows, although high spring flows have occurred historically as a result of reservoir spills or inflows exceeding the capacity of diversions. The Licensee’s proposal increases the number of years that pulse flows would occur in May by 71–300 percent (11–16 years during the period of record) compared to the existing license (4–7 years during the period of record) depending on the reach. This analysis includes the reservoir spill flows or stream flows that exceed diversion capacity in May.

Comparing unimpaired to existing regulated flow shows that the monthly median flows have been most altered from December through June in all of the reaches where pulse flows are provided. For example, in the Middle Fork American below French Meadows, the median monthly flows were often an order of magnitude different in Wet and Above Normal Water Years as shown below:

Median Monthly Flow as mean daily cfs: MFAR below French Meadows Reservoir

	AN WYs		Wet WYs	
	Unimpaired	Existing	Unimpaired	Existing
Dec	26	10	55	10
Jan	57	11	145	12
Feb	138	15	170	13
Mar	197	15	251	14

Apr	281	13	342	12
May	672	18	560	13
June	372	12	333	12

While spill events with recurrence intervals greater than 5 years still occur under regulated conditions in similar frequency and magnitude to unimpaired events, the table above shows that the daily flow regime has been greatly altered. The pulse flow events will return some of the missing moderate flow events (PCWA 2011d).

While the pulse flows in the MFAR are similar in magnitude to historic median monthly flows, in the Rubicon River below Hell Hole Reservoir, the proposed pulse events are much lower in magnitude than the median monthly flows as shown below. This is due to the constraints of the release structures associated with the dam. This also illustrates the necessity for the Rubicon Release valve testing since flows closer to 600 cfs would provide flow events closer to the historic medians than releases in the range of 200 cfs (PCWA 2011d).

Median Monthly Flow as mean daily cfs: Rubicon River below Hell Hole Reservoir

	AN WYs		Wet WYs	
	Unimpaired	Existing	Unimpaired	Existing
Dec	88	13	153	15
Jan	157	13	277	17
Feb	262	14	295	19
Mar	327	14	482	21
Apr	562	14	767	22
May	1,757	22	1,601	22
June	1,281	23	1,153	24

The Licensee has also proposed that reservoir spills be down ramped at Hell Hole Reservoir Dam and French Meadows Reservoir Dam when spill occurs in May–July. In addition, at Hell Hole Reservoir Dam some spills will be extended for 4 days and then down ramped. Based on the period of record, there would be nine years of spills that would be down ramped in the licensee’s proposal.

The shape of the down ramp for both pulse flows and reservoir spills provides a slowly declining hydrograph that provides riparian and other environmental/recreational benefits compared to the faster decline of spill flows under the existing condition. The down ramp was set at an average rate of approximately 1.6 inches of stage per day. For the spill-event down ramp, the same rate was used for Hell Hole Reservoir Dam. A faster down ramp (approximately twice as fast) was used below French Meadows Reservoir Dam in part because FYLF are not present in the Middle Fork American River below French Meadows Reservoir Dam. Also, riparian vegetation is sparsely distributed due to the coarse substrate and bedrock-dominated channel) (PCWA 2009a, PCWA 2011b).

Accretion flows along the length of the stream reaches further shape the declining limb (recession) of the pulse flows. The recession of the Wet and AN water year types were compared for the licensee’s proposal and the unimpaired hydrology. For the most part, recessions were similar or slower than the unimpaired hydrology.

Ramping Rates/Down Ramping

Objectives Addressed by Ramping Rates/Down Ramping

Aquatic Biota Objectives

Threatened, Endangered, and Sensitive Species and Management Indicator Species Objectives

Macroinvertebrate Objective

Natural Hydrograph Objective

Channel Morphology and Sediment Transport Objectives

Stream Channel and Floodplain Objective

Riparian Habitat Objectives

Water Quality Objective

Water Temperature Objective

Reservoir Level Objective

Public Safety Objective

Information Used to Establish Ramping Rates/Down Ramping

The following information was used to establish ramping rates/down ramping:

- Special-Status Amphibian and Reptile Technical Study Report (PCWA 2008a)
- Instream Flow Study Technical Report (PCWA 2010a)
- Fish Population Technical Study Report 2007-2009 (PCWA 2010g)
- Geomorphology Technical Study Report AQ-9a (PCWA 2009a)
- Geomorphology Technical Study Report AQ-9b (PCWA 2011b)
- Literature related to amphibian life cycles (Lind and Yarnell 2010, Lind 2011)
- Sierra Nevada Forest Plan Amendment Final Record of Decision (USDA 2004a)

Rationale for Ramping Rates/Down Ramping

The reaches identified to have specified ramping rates were so determined because of sensitive aquatic species, such as amphibians or spawning trout that may be affected by abrupt changes in flow. In regulated rivers, spring down-ramping rates often do not follow natural snowmelt recession patterns (Lind 2010). In the Sierra Nevada, FYLF have evolved with and are adapted to the snowmelt recession period and typically lay eggs during the middle to the tail end of that period (Lind 2011). The primary risks during the snow-melt recession period (from pulse flow or spill) are scouring and stranding. Scouring can occur if water flows increase substantially after eggs have been laid. Stranding can occur if recession rates are too fast relative to water depth and egg development time.

The proposed ramping rates will provide fish additional time over the existing conditions to move from portions of the channel that will become disconnected from the main channel or that will become dewatered. Spill flows from the reservoirs (Hell Hole and French Meadows/Middle Fork Interbay) could disrupt breeding, destroy egg masses, and

flush tadpoles of Foothill Yellow Legged Frog downstream. During the recession of spill flows tadpoles could be stranded. The proposed down ramp of spill flows will reduce potential stranding of tadpoles. Table 8.5-7 in the FLA also shows that there is a slight reduction in the number of spill events below Hell Hole Reservoir that would affect FYLF under the new license conditions compared to existing conditions.

After a spill, pulse flow or recreational flow, the flow differences between high and low are substantial so the ramping of the flow would preclude abrupt flow fluctuations that may adversely affect aquatic species or dislodge them from their preferred habitats. The differences in flow discharge between months with minimum streamflow releases are not as substantial but can affect sensitive reproductive stages of some aquatic species, such as FYLFs in reaches where they reside. The ramping rates proposed are typical for other hydropower projects in the Sierras and thus have a history of success.

Section 08-05 Fish/Aquatics Environmental Effects of the FLA provides specific information on the effects of the proposed ramping or reservoir spills below Hell Hole Dam and French Meadows Dam when spill occurs in May–July. The proposed ramping rates result in an additional nine years (in the 33-year period of record) where spills are down ramped that would not have been down ramped under existing conditions.

The shape of the down ramp for both environmental pulse flows and reservoir spills provides a slowly declining hydrograph that provides riparian and other environmental/recreational benefits compared to the faster decline of spill flows under the existing condition. The down ramp was set at an average rate of approximately 1.6 inches of stage per day. For the spill-event down ramp, the same rate was used for Hell Hole Dam; but a faster down ramp (approximately twice as fast) was used below French Meadows Dam due, in part, to the different environmental resource conditions (e.g., FYLF are not present in the river reach between French Meadows Dam and Middle Fork Interbay; riparian vegetation is sparsely distributed due to the coarse substrate and bedrock-dominated channel).

As noted in Section 08-05 of the FLA, accretion flows along the length of the bypass reaches further shape the recession of the pulse flows. The recession of the wet and above normal water unimpaired hydrographs were compared to the hydrograph resulting from the proposed ramping rate. The proposed ramp resulted in similar recessions to unimpaired recession in the downstream reaches of the Middle Fork and Rubicon Rivers.

In addition to aquatic organisms, riparian vegetation can be negatively impacted by recession limbs that are too steep. As noted in Section 08-08 Riparian Affected Environment of the FLA, literature indicates that seedlings typically survive down ramping rates that range from 0.4 to 1.6 inches per day. The proposed rate provides these conditions. On the larger bypass reaches, particularly immediately below the large dams, and in Duncan Creek, the FLA notes that the current recession rates of the spring high flow (early May to late June), were typically faster than those identified in the literature (2–3+ inches per day).

Spawning Habitat Improvement Plan for the Middle Fork American River Below Ralston Afterbay Dam

Objectives Addressed by Spawning Habitat Improvement Plan for Middle Fork American River Below Ralston Afterbay Dam

Aquatic Biota Objectives
Macroinvertebrate Objective
Water Quality Objective
Water Temperature Objective

Information Used to Establish Spawning Habitat Improvement Plan for Middle Fork American River Below Ralston Afterbay Dam

- Instream Flow Technical Study Report (PCWA 2010a)
- Fish Population Technical Study Report (PCWA 2010g)
- Middle Fork American River Project Final License Application, Exhibit E: Water Use Affected Environment (PCWA 2011d)
- Special-Status Amphibian and Aquatic Reptile Species Technical Study Report (PCWA 2007a)
- Water Temperature Modeling Technical Study Report (PCWA 2011a)
- Dams and Downstream Aquatic Biodiversity: potential food web consequences of hydrologic and geomorphic change (Power et al. 1995)
- Fish Health and Diversity: justifying flows for a California Stream (Moyle et al. 1998)
- Fish Population and Yield Estimates from California Trout Streams (Gerstung 1973)
- Water Quality Control Plan (Basin Plan) (CVRWQCB 1998)

Rationale for Spawning Habitat Improvement Plan for Middle Fork American River Below Ralston Afterbay Dam

The Middle Fork American River just below Ralston Afterbay Dam is thought to be a prime location for enhancing trout spawning during spring flow releases and an opportunity to improve the young of the year recruitment into the peaking reach downstream. This location is untouched by daily fluctuating flows for recreation because of being upstream of the powerhouse. Daily flow fluctuations are not conducive to successful rainbow trout spawning, incubation, hatching, emergence, fry, and early juvenile stages (Nehring and Anderson 1993). Table AQ 2-6 of the Licensee's fish population report (PCWA 2010g) compares percent of young-of-the-year at all the quantitative sampling sites. All of the MFAR sites surveyed downstream of Ralston Afterbay resulted with no rainbow trout young of year, except one year (2007) had just 2% young of year at one site (MF14.1). These results are strikingly depauperate of young of year compared to all the other reaches.

Wildlife and Plant Protection Measures

Objectives Addressed by Wildlife and Plant Protection Measures

Threatened, Endangered, and Sensitive Species and Management Indicator Species Objectives

Maintain and restore habitat to support viable populations of TES and MIS species. Avoid impact to species designated as fully protected under FGC sections 3511(b) and 4700(b).

Protection of bald eagle habitat.

Information Used to Establish Wildlife and Plant Protection Measures

- Bald Eagle Technical Study Report (PCWA 2009h)
- Eldorado National Forest Land and Resource Management Plan (1989)
- Tahoe National Forest Land and Resource Management Plan (1990)
- Special-Status Wildlife Technical Study Report (PCWA 2009i)
- Special-Status Plants Technical Study Report (PCWA 2009b)
- Bald Eagle Management Plan (PCWA 2011f)

Rationale For Wildlife and Plant Protection Measures

The general protection measures are necessary to comply with FS management plans.

Measures are needed to ensure that Project facilities and associated recreational use do not result in bear-human interaction problems.

Migratory birds and raptors are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Measures to ensure that Project powerlines do not result in unnecessary mortality to avian species are needed to comply with these Acts and with general objectives of the Migratory Bird Treaty Act to further the conservation of bird species of concern.

Bald eagles are protected under several existing federal laws including the Bald and Golden Eagle Protection Act and the National Migratory Bird Treaty Act. Bald eagles are also considered a Forest Service Sensitive (FSS) species by USDA-FS. Furthermore, bald eagles are protected by the state of California as a fully protected species (FGC §3511) and as an endangered species under the California Endangered Species Act (CESA). Therefore, development of this Plan is required to demonstrate measures for avoidance of adverse impact to fully protected raptor species, compliance with the USDI Fish and Wildlife Service National Bald Eagle Management Guidelines (USDI Fish and Wildlife Service 2007), and to facilitate issuance of any necessary permits.

The presence of bald eagles has been documented at Project facilities during field study conducted during 2007 and 2008. Surveys provide data on wintering habitat and nesting bald eagle territories known to be occupied in the vicinity of Hell Hole Reservoir, along the Rubicon River upstream of Hell Hole Reservoir, along the Rubicon River downstream of Hell Hole Reservoir, along New Orleans Gulch, and along the Middle Fork American River near Poverty Bar. (PCWA 2009h)

The Bald Eagle Management Plan has been developed to define appropriate measures to protect bald eagles during routine Project maintenance activities and from Project-related recreation during term of the new Project license. The Plan also provides measures to identify and reduce the risk of potential bald eagle electrocutions at Project powerlines. Periodic monitoring for nesting and roosting bald eagles and associated agency consultation are defined in the Plan and will serve to identify newly occupied territories within the Project boundaries. Monitoring will help to inform the FS, CDFG, and other agencies on reproductive success or natural recruitment rates for bald eagles into the Project area.

Monitoring Program

Objectives Addressed by Monitoring Program

Aquatic Biota

Fisheries

Macroinvertebrates

Reservoir Levels

Natural Hydrograph

Flow Fluctuations

Geomorphology

Riparian Habitat

Threatened, Endangered, and Sensitive Species and Management Indicator Species

Recreation Streamflow

Resource Protection

Hydropower Operations

Connectivity

Water Quality

Water Temperature

Sediment Management

Large Woody Debris

Recreation Management

Information Used to Establish Monitoring Program

The following information was used to establish the monitoring program and its measures:

- Recent environmental agreements (from other projects) containing adaptive management elements
- All information items listed in other sections of this Rationale Report for the conditions related to streamflows
- Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (USDA 2004)
- Water Quality Control Plan (Basin Plan) (CVRWQCB 1998)
- Didymosphenia in Western Streams (US EPA 2005)

- Dartmouth Toxic Metals Research Program (Center of Environmental Health Sciences 2005)
- Water Quality Standards; Numeric Criteria for Priority Toxic Pollutants for the State of California (USEPA 2000)
- Eldorado National Forest Land and Resource Management Plan (USDA 1989)
- Tahoe National Forest Land and Resource Management Plan (USDA 1990)
- The Natural Flow Regime (Poff et al. 1997)
- Hydrologic and Geomorphic Factors Affecting Conservation of a River-Breeding Frog (Kupferberg 1996).

Rationale for Monitoring Program

The Monitoring Program is designed to determine if the measures implemented provide the desired resource protection. It is limited to items considered to be essential for determining if the resource objectives are being met. The Monitoring Plan covers monitoring to be conducted during the term of the license. The methods and frequency of monitoring are designed to measure the response of resources to adjustments in streamflow and other conditions over the period of the license.

When dams are first built, there are first-order impacts, for example, reductions in peak flow, entrapment of sediment load, reduction in suspended sediment load, induced erosion immediately below the dam, and channel changes. These induce second-order impacts, such as changes in channels and invertebrate populations, taking place over a longer period after construction--perhaps as long as 50 years (Petts 1980). The information collected through this monitoring program will assist in gaining a better understanding of the changes to the ecosystem that are a result of the longer term impacts caused by dams and their effects on important ecological processes.

Moyle et al. (1998) and Platts and Nelson (1988) studied stream trout populations and found that they are variable in their biomass and numbers from year-to-year and within a year. Because of these fluctuations, it is important to have multiple years of monitoring data to improve confidence with the results.

Monitoring shall be conducted to determine if the applicable ecological resource objectives are achievable and being met. Adaptive management decisions shall be based on monitoring results and other scientific information and a determination that the applicable ecological resource objectives will likely not be met without application of the adaptive management measures.

Large Woody Debris

Objectives Addressed by Large Woody Debris

Large Woody Debris
 Aquatic Biota
 Macroinvertebrates
 Water Quality

Geomorphology
Riparian Habitat
Fisheries Production
Natural Hydrograph
Hydropower Operations
Flow Fluctuations
Recreational Streamflow
Threatened, Endangered, and Sensitive Species and Management Indicator Species

Information Used to Address Large Woody Debris

The following information was used to analyze large woody debris:

- Middle Fork American River Project Final License Application Exhibit E: Water Use Affected Environment (PCWA 2011d)
- Geomorphology Technical Study Report AQ-9a (PCWA 2009a)
- Geomorphology Technical Study Report AQ-9b (PCWA 2011b)
- Fish Population Technical Study Report (PCWA 2010g)
- Diversity of juvenile anadromous salmonid assemblages in coastal Oregon basins with different levels of timber harvest (Reeves et al. 1993)

Rationale for Large Woody Debris

Large trees and snags that fall into streams play an important role in forming pools, metering sediment, trapping spawning gravels, and creating a more complex stream environment. Heavier pieces require higher flows for mobilization, and longer pieces are more likely to be caught by the stream bank and its vegetation. Reeves et al. (1993) found “that wood is a primary element influencing habitat diversity and complexity in streams. Consequences of decreased amounts of wood include loss of cover (for aquatic species) and structural complexity, decreased availability and abundance of habitat units, and reduced varieties of current velocities and other hydraulic features.”

Annual Review of Ecological Conditions

Objectives Address by Annual Review of Ecological Conditions

Fisheries
Aquatic Biota
Macroinvertebrates
Large Woody Debris
Natural Hydrograph
Flow Fluctuations
Fluvial Geomorphology
Riparian Habitat
Connectivity
Water Quality
Water Temperature

Streamflow and Reservoir Storage Gaging Plan
Threatened, Endangered, and Sensitive Species and Management Indicator Species

Information Used to Address Annual Review of Ecological Conditions

See information in preceding sections.

Rationale for Annual Review of Ecological Conditions

It is the desire of the FS, CDFG, and State Water Board, along with other interested parties, to continue a level of coordination and adjustment for the Project. By having specific coordination meetings, results of surveys and other information will be reviewed. Data from ongoing monitoring will assist in making any needed changes in management of the area and in future planning. Also, because the licensees must provide an operations and maintenance plan for the year 2 weeks before this meeting, any necessary surveys or analyses for sensitive wildlife and plant and/or management indicator species can be completed.

Streamflow and Reservoir Storage Gaging

Objectives Addressed by Streamflow and Reservoir Storage Gaging

Natural Hydrograph
Flow Fluctuations
Geomorphology
Streamflow and Reservoir Storage Gaging Plan
Hydropower Operations
Recreation Streamflow
Streamflow Information
Reservoir Level
Streamflow and Reservoir Level Information

Information Used to Establish Streamflow and Reservoir Storage Gaging Condition

- Middle Fork American River Project Final License Application Exhibit E: Water Use Affected Environment (PCWA 2011d)

Rationale for Streamflow and Reservoir Storage Gaging

The Streamflow and Reservoir Storage Gaging Plan will specify how compliance with proposed license conditions and recommendations measures relating to streamflows and reservoir storage will be verified. The Streamflow and Reservoir Storage Gaging Plan will also provide useful information for interpretation of results of future monitoring efforts and will be used to determine the need for the implementation of adaptive management measures.

Preferred Penstock and Other Drainage Structure and Release Points

Objectives Addressed by Preferred Penstock and Other Drainage Structure and Release Points

Macroinvertebrates
Flow Fluctuations
Geomorphology
Riparian Habitat
Threatened, Endangered, and Sensitive Species and Management Indicator Species
Hydropower Operations
Water Quality

Information Used to Establish Preferred Canal Drainage Structure and Release Points Condition

Past leakage as described below.

Rationale for Preferred Penstock and Other Drainage Structure and Release Points

Several canals and other Project features are located on hillslopes or other unstable areas that may experience undesirable results in drainages and hillslopes below should there be a failure or release from the canals or other features. It is anticipated that developing a plan that designates preferred canal drainage structures and release points to be used for drainage during maintenance will minimize adverse impacts to water quality and aquatic biota. There has been a previous leak in a surge shaft that may have contributed to a land slide that affected a road and communication line for the Middle Fork Power House penstock valve house. The leak has been repaired.

Vegetation and Integrated Pest Management Plan

Objectives Addressed by Vegetation and Invasive Plants Management Plan

Invasive Vegetation Objective
Transportation and Facilities Management Objectives
Vegetation Management and Fire Prevention Objective
Threatened, Endangered, and Sensitive Species and Management Indicator Species Objectives
Aquatic Biota Objectives
Riparian Habitat Objectives
Water Quality Objectives
Algae Objective

Information Used to Establish Vegetation and Invasive Plants Management Plan

- Special-status Plants Technical Study Report (PCWA 2009b)
- Noxious Weed Technical Study Report (PCWA 2009c)

- *Didymosphenia geminata*... an emerging invasive species that challenges conventional views on algal bloom development (Kirkwood et al. 2007)

Rationale for Vegetation and Integrated Pest Management Plan

Vegetation management is implemented to ensure safe and effective operation of the Licensee's facilities by maintaining safe access to Project facilities including recreation facilities, protecting worker and public health and safety, and reducing fire hazards. Pest management addresses noxious weed management and rodent control. Noxious weed management complies with national, regional, and forest land management direction and contributes to ecological condition. The purpose of rodent control is to protect the structural integrity of dams, to maintain system reliability, and to protect worker and public health and safety by preventing rodent infestations in structures.

Noxious weeds occur in the Project area. Once noxious weeds colonize an area, they can be difficult and expensive to eradicate. The Sierra Nevada Forest Plan Amendment Record of Decision (USDA 2004) requires the FS to control the spread of noxious weeds by incorporating weed prevention and control measures into ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. The amendment also requires the FS to complete noxious weed inventories based on Regional protocols, evaluate treatment options relative to the risk of weed spread, and monitor noxious weed populations. The amendment also requires the FS to include weed prevention measures when amending or issuing or re-issuing permits. The noxious weed management plan condition will assist in meeting these requirements on National Forest System lands affected by the Project.

Flow regulation by dams can create a stable flow environment preferable to *Didymosphenia geminata* (Kirkwood et al. 2007). It has a preference in lower discharge velocities and less variation in discharge. Its presence can result in dense algal blooms that block sunlight and disrupt ecological processes, causing a decline in native plant and animal life. The exact pathway is unknown, but it spreads easily through contaminated boats and fishing gear.

RECREATION AND VISUAL QUALITY

Applicable Sections

Recreation Plan
Reservoir Minimum Pool Elevation and Scheduling Objectives
Recreational Streamflows
Visual Resource Management Plan

Existing Conditions

- Some of the current Project recreation facilities do not meet FS design and accessibility standards.

- Some of the Project recreation facilities are operated by a concessionaire under a special use permit that the FS must administer. These facilities provide services or opportunities for Project-related visitors.
- The licensee does not currently provide adequate assistance to address the level of project-related recreation, and the FS has not had the ability to manage all the project-related recreation in a manner that meets FS requirements.
- French Meadows and Hell Hole Reservoirs are moderately high-elevation lakes with associated recreation developments. Public visitation is primarily during the summer and fall seasons when road access is available.
- Lake levels have not always been maintained in a consistent manner, or in cases, have not provided for Project-related visitor needs and desires.
- Boat ramps serving the project reservoirs are in need of some improvements to adequately meet visitor needs and desires.
- There is inadequate streamflow information and other information available about Project-related facilities and recreation opportunities.
- There are two stream segments that are recommended for inclusion in the National Wild and Scenic Rivers System: Rubicon River between Hell Hole Reservoir and Ellicott's Bridge and Rubicon River between Ellicott's Bridge and Ralston Afterbay.
- There is a high level of recreational use in the Peaking Reach of the Middle Fork American River below Oxbow Dam, including angling, whitewater recreation, swimming and water play, and other uses.
- Angling and other forms of riparian recreation occurs along portions of all Project streams. However, there are only limited opportunities for whitewater recreation along these streams due to water diversion.
- Project facilities may not meet visual quality standards from the Forest Plans.
- Mining occasionally occurs within the Federal Power Project Withdrawn area where lands are reserved from entry, location, or other disposition.

Desired Conditions

- Ensure project-related facilities meet FS design and accessibility standards.
- Provide adequate boat launching facilities at Project reservoirs.
- Provide funding to assist the FS in administering special use permits and recreational uses that exist due to the Project.

- Determine the appropriate level of licensee responsibility for Project-related recreation, and ensure the licensee provides that level of assistance.
- Maintain lake levels to address recreation needs.
- Provide and maintain trails and trailheads at Project reservoirs.
- Provide streamflow and other Project information to the public or assist FS in providing such information.
- Ensure that existing and future development at or near the Project reservoirs meets Forest Plan direction.
- Protect the outstandingly remarkable values on the two recommended wild and scenic river segments.
- Ensure Project facilities meet visual quality standards.
- Monitor to ensure objectives are met.
- Market the recreation opportunities and provide public information.

Recreation Plan

Objectives Addressed by Recreation Plan

Recreation Management Objective

Resource Protection Objective

Recreation Design Objective

Information Used to Establish Recreation Plan

The following information was used to establish the need for a Recreation Plan:

- Middle Fork American River Project Existing Resource Information Reports (June 2006b)
- Middle Fork American River Project Description (PCWA Draft 2006a)
- Recreation Use and Facilities Technical Study Report (PCWA 2010b)
- Recreation Visitor Surveys (PCWA 2010c)
- Reservoir Recreation Opportunities (PCWA 2010d)
- Stream-based Recreation Opportunities (PCWA 2010e)
- Contingency Whitewater Boating Study (PCWA 2010f)
- Eldorado National Forest Land and Resource Management Plan (USDA 1989)
- Tahoe National Forest Land and Resource Management Plans (USDA 1990)
- Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (USDA 2004)

- Angler Focus Group Meeting Comments of Anglers (Carnozza, 2010a)
- Foothills Angler Group Facilities Project List (Carnozza, 2010b)
- Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) (USDA 2006b)
- FS Trail Accessibility Guidelines (FSTAG) (USDA 2006a)
- Feasibility Report on Middle Fork American River Project (Leeds, Hill and Jewett, 1964)
- April 11, 2008 Letter from FERC to PCWA requesting additional information (FERC 2008)
- Principles of Recreation Resource Planning (Haas 2007)
Memorandum of Understanding Between Placer County Water Agency and United States Forest Service for Administration, Operation, and Maintenance of Recreation Facilities on the Middle Fork American River Project on the Eldorado and Tahoe National Forests (PCWA 1968)

Rationale for Recreation Implementation Plan

The purpose of the Recreation Plan is to identify the Licensee's responsibilities related to the management of recreation facilities associated with the Project over the term of the new license. This plan also identifies measures that the Licensee will implement to enhance recreation opportunities in the vicinity of the Project. The Recreation Plan consists of a number of elements, including:

- Routine Operation, Maintenance and Administration
- Heavy Maintenance of Recreation Facilities
- Specific Modifications and Enhancements of Project Recreation Facilities
- Construction of New Project Recreation Facilities
- Periodic Recreation Use Monitoring, Visitor Surveys and Reporting
- Resource Protection Measures
- Measures to Enhance Project Recreation Opportunities including distribution of information
- Fish Stocking
- Implementation Scheduling
- Consultation
- Reporting

- Triggers for Future Enhancement Actions
- Process for Updating the Recreation Plan and Dispute Resolution

The following narratives describe the objectives and rationale for each of the principle sections of the Recreation Plan:

Routine Operation, Maintenance, and Administration

Objectives Addressed by Routine Operation, Maintenance, and Administration Measures

Recreation Management
Hydropower Operations

Rationale for Routine Operation, Maintenance, and Administration Measures

Within the MFAR Project, the licensee’s role in facility and infrastructure development has significantly modified the visitation within the area. As described in the Rationale for Specific Recreation Measures, below, the licensee is responsible for most of the recreation development within the MFAR Project Area or for providing the streamflows that have created or augmented the recreation opportunities. As such, providing for the operation and maintenance on these facilities and areas is a critical aspect of their recreation program.

As described in the Rationale for Specific Recreation Measures, the developed recreation facilities are either operated by a concessionaire under a permit, or directly by the FS or CDPR. There are numerous reasons for this management strategy, some of which include: (a) there are operational flexibilities attained by both the concessionaire and the respective agency by operating the facilities under the current strategy; (b) the diversity in managing authority allows for better reactions to changing budgets, personnel, and regulations; (c) the smaller facilities often cost more to operate than the revenues that can be developed at the site, making them unattractive to concessionaires (conversely, the largest facilities are operated by concessionaires because they have highest revenue earning opportunities); (d) the Service Contract Act (USDOL 1978) precludes concessionaires from operating sites where fees are not charged (and there are a number of facilities in the MFAR Project area that are deemed to be important as either free and/or low fee sites); and (e) having uniformed FS presence would be required for public contact and visitor management, regardless of the number of concession operated facilities.

Actual operation and maintenance of the various licensee developed sites is generally conducted by seasonal staff. In addition, individual facilities and adjacent use areas are “lumped” into discrete geographic areas that serve as individual “patrol” units. This provides the most efficient means of managing the recreation at and between recreation facilities along the reservoirs and river reaches. The following section has been organized to follow this management strategy, and each individual “unit” is separately described.

The total annual cost associated with the operation and maintenance of the MFAR Project related recreation is estimated to be \$410,000 as described in the summary table below.

The licensee and Agencies have tentatively reached an agreement within which funding is consolidated for FS operation, maintenance, patrol, administration, and public information. This Rationale Report displays the specific rationale separately for each of the geographic areas. The funding levels displayed in these sections total more than the amount in the settlement agreement and preliminary conditions and recommendations; however, it is believed that it is beneficial to display the rationale for each specific amount. FS believes that the funding levels in the collection agreement and/or conditions and recommendations are adequate to meet the resource objectives described above and in each of the respective sections of this Rationale Report. In the utilization of these funds for these various operation, maintenance, administration and patrol needs, FS will make efforts to be as efficient as possible, will prioritize the work to be accomplished to stay within available funding, and will look to other funding sources to accomplish the work needed to meet the recreation visitor needs and to address impacts from recreation visitors as necessary. Additionally, the Recreation Plan contains a clause that provides for review and adjustment of these funding levels in the event they are incorrect.

Summary O & M and Administration Cost Spreadsheet	
Area	Total
Hell Hole Area	\$159,436.20
Long Canyon Area	\$47,827.29
French Meadows Area	\$62,286.17
Duncan Canyon Area	\$14,094.12
Rubicon River Area	\$4,512.48
Ralston Afterbay and Indian Bar Area	\$72,375.09
Cache Rock Area	\$4,719.54
<i>Subtotal</i>	<i>\$365,250.83</i>
Administration	\$169,649.97
Total (rounded):	\$535,000

Hell Hole Recreation Area

The Hell Hole recreation facilities are operated and managed by the FS. The facilities were originally constructed by the licensee with no funds provided for operation and maintenance of these facilities. More recently, the licensee has been providing funding for necessary operation and maintenance of the recreation facilities (PCWA 2006a). The operation, maintenance, and administration costs are directly a result of the licensee’s recreation development. On-site operations and maintenance by seasonal and permanent FS staff is required to meet health and safety standards, maintenance standards, and to ensure recreation visitors are having a quality experience and not impacting resources.

Cost: The costs are to manage for the recreation use at the recreation facilities around Hell Hole Reservoir and generally within ¼ mile of the reservoir. For this area, these funds would be utilized to conduct patrols, pick up litter, provide public information, enforce rules and regulations, rehabilitate impacted areas, address sanitation, maintain day use sites (such as concentrated use areas), respond to fires and other emergencies, assist in search and rescue, conduct facility maintenance at those recreation facilities not operated by the concessionaire, and maintain the access trails to various recreation sites in order to meet existing maintenance standards. Campground Host services are needed to provide visitor information and better visitor management. The campground host will be located at Big Meadows campground, although this host may be utilized at other campgrounds around Hell Hole Reservoir or at the facilities around French Meadows Reservoir during the post-Labor Day season. The method of providing for this service (direct employment, service contract, etc.) will be determined in consultation with the licensee. There are regular costs associated with the maintenance of these facilities, as identified in the “fixed cost” portion of the spreadsheet below. In addition to the facility maintenance, there will be shoreline cleanup and resource protection measures within and immediately adjacent to the reservoirs. The following estimate shows the cost to manage for these visitors and the impacts from their visits.

Operation and Maintenance Costs				
Area: <u>Hell Hole Area</u>				
	Personnel:	Days	CTG*/Day	Total
	Recreation Technician (GS-5)	120	\$162.00	\$19,440.00
	Recreation Technician (GS-5)	120	\$162.00	\$19,440.00
	Recreation Technician (GS-4)	62	\$150.00	\$9,300.00
	Recreation Technician (GS-5)	64	\$162.00	\$10,368.00
	Recreation Technician (GS-5) (public contact, counts, fee collection, etc.)	60	\$162.00	\$9,720.00
	Maintenance Technician (GS-7)	40	\$193.00	\$7,720.00
	Recreation Manager (GS-9)	80	\$240.00	\$19,200.00
	Resource Officer (GS-11)	0	\$350.00	\$0.00
	Resource Business Manager (GS-7)	5	\$193.00	\$965.00
	Resource Specialists (GS-9)(Heritage @5 days, Botany @ 2 days, Interp @6 days)	13	\$240.00	\$3,120.00
	Resource Specialist (GS-11)(Wildlife@2 days)	2	\$350.00	\$700.00
	Campground Host	Season		Unknown

<i>Subtotal</i>				\$99,973.00
	Vehicles:	Month	miles	Total
		s		
Recreation Patrol (2848)		8	12,000	\$9,640.00
Maintenance Technician (0707)		3	6,000	\$3,456.00
Recreation Manager (5554)		3	3,000	\$2,685.00
Recreation Officer (3780)		1	1,000	\$602.00
Resource Specialists (1592)		3	1,000	\$1,224.00
<i>Subtotal</i>				\$17,607.00
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas).				
Boat replacement @\$28,000 over 10 years (not included in total costs)				\$2,800.00
Project Supplies, Materials and Contracts:				Total
Paint, supplies, cleaning supplies, tools, materials				\$4,500.00
Signs, posts, etc				\$1,000.00
uniforms				\$500.00
garbage				\$3,000.00
toilet pumping				\$2,500.00
water permits				\$1,200.00
water testing (\$18/sample 10 samples/season)				\$200.00
Equipment maintenance (power washer, generator, etc.				\$1,000.00
Boat maintenance and fuel				\$2,500.00
<i>Subtotal</i>				\$16,400.00
Sub-Total:				\$133,980.00
Overhead (19%):				\$25,456.20
Total:				\$159,436.20
CTG = Cost to Government (2010 costs)				

Long Canyon Recreation Area

The Long Canyon recreation facilities are operated and managed by the FS. These facilities consist of the Middle Meadows Group Campground and various concentrated use areas adjacent to or accessed by project roads and facilities. The facilities were originally constructed by the licensee with no funds provided for operation and maintenance of these facilities. More recently, the licensee has been providing funding for necessary operation and maintenance of the recreation facilities (PCWA 2006a). The operation, maintenance, and administration costs are directly a result of the licensee's recreation development and project development. On-site operations and maintenance by seasonal and permanent FS staff is required to meet health and safety standards, maintenance standards, and to ensure recreation visitors are having a quality experience and not impacting resources.

Cost: The costs are to manage for the recreation use at the recreation facilities in the Long Canyon Recreation area. For this area, these funds would be utilized to conduct patrols,

pick up litter, provide public information, conduct facility maintenance, enforce rules and regulations, rehabilitate impacted areas, address sanitation, maintain day use sites (such as concentrated use areas), respond to visitor-caused fires and other emergencies, and assist in search and rescue. The following estimate shows the cost to manage for these visitors and the impacts from their visits.

Operation and Maintenance Costs			
Area: Long Canyon Area (inc. Middle Meadow CG)			
Personnel:	Days	CTG*/Day	Total
Recreation Technician (GS-5) (public contact, CG maint, patrols)	100	\$162.00	\$16,200.00
Recreation Technician (GS-4)	6	\$150.00	\$900.00
Recreation Technician (GS-5)	2	\$162.00	\$324.00
Maintenance Technician (GS-7)	20	\$193.00	\$3,860.00
Recreation Manager (GS-9)	20	\$240.00	\$4,800.00
Resource Officer (GS-11)	0	\$350.00	\$0.00
<i>Subtotal</i>			<i>\$26,084.00</i>
Vehicles:	Months	miles	Total
Recreation Patrol (2848)	0	0	\$0.00
Maintenance Technician (0707)	5	9,000	\$5,310.00
Recreation Manager (5554)	1	1,000	\$895.00
Recreation Officer (3780)	1	1,000	\$602.00
Resource Specialists (1592)	0	0	\$0.00
<i>Subtotal</i>			<i>\$6,807.00</i>
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas).			
Project Supplies, Materials and Contracts:			Total
Paint, supplies, cleaning supplies, tools, materials			\$2,000.00
Signs, posts, etc			\$300.00
uniforms			\$200.00
garbage			\$2,000.00
toilet pumping			\$1,000.00
water permits			\$1,200.00
water testing (\$18/sample 10 samples/season)			\$200.00
Equipment maintenance (power washer, generator, etc.			\$400.00
<i>Subtotal</i>			<i>\$7,300.00</i>
Sub-Total:			\$40,191.00
Overhead (19%):			\$7,636.29
Total:			\$47,827.29

French Meadows Recreation Area

The French Meadows recreation facilities are managed by the FS, although most operation and maintenance of facilities are conducted by a concessionaire under FS permit. The facilities were originally constructed by the licensee with no funds provided for operation and maintenance of these facilities. More recently, the licensee has been providing funding for administration of the concessionaire permit and other necessary operation and maintenance of the recreation facilities (PCWA 2006a). The operation, maintenance, and administration costs are directly a result of the licensee's recreation development. Permanent and seasonal FS staff administers the concession permit as well as assist the permittee to meet customer service and public health and safety needs (e.g. repair water systems) and maintenance standards. The FS also ensures that if resources are impacted by recreation operations or visitors that those impacts are mitigated, that recreation visitors are having a quality experience, and other services described below.

French Meadows Campground is immediately adjacent to the reservoir, and many of the sites overlook the water; this is a unique developed site recreation setting in the Middle Fork Project area. French Meadows is a relatively shallow reservoir. The following table provides specifications:

PCWA License Application, REC-3, 2011 current reservoir specifications

	Water Surface Elevation (feet)	Operating Water Surface (Acres)	Depth (feet)	Shoreline (miles)
Maximum	5262	1433	214	10.5
Minimum	5125	392	77	5
Difference Max&Min	137 feet	73%	137	52%

Minimum recorded WSE is 5158 feet

A lower operating water surface elevation increases the exposed shoreline (and potential of motorized vehicle use of the shoreline); changes the recreation setting that people would expect when paying to camp on a reservoir; and increases the potential for exposed obstacles (stumps, boulders, land masses). The recreation surveys conducted for this relicensing indicate that 61% of the people use fishing boats at French Meadows; the lower the water surface, the smaller the reservoir pool, a greater potential for conflict (PCWA 2010d and Bosely 2005). Survey participants were asked whether their recreation experience was negatively affected by reservoir water surface level; of the people who responded 41% said that their recreation experience was negatively affected by WSE (PCWA 2010c). As such, the FS advocates that reservoir water surface elevation at French Meadows is maintained as high as possible during the primary recreation season while balancing ecological needs and other uses in the watershed and project area, between Memorial Day until September 15 during Wet, Above Normal, and Below Normal water years, and until Labor Day Monday during Dry, Critically Dry, and Extreme Critical Dry years. This is to provide the public, particularly those camping and fishing, a positive recreation experience.

Cost: The costs are to manage for the recreation use at the recreation facilities around French Meadows Reservoir and generally within ¼ mile of the reservoir. For this area, these funds would be utilized to conduct patrols, pick up litter, provide public information, enforce rules and regulations, rehabilitate impacted areas, address sanitation, maintain day use sites (such as concentrated use areas), respond to fires and other emergencies, assist in search and rescue, administer the concessionaire special use permit, and conduct facility maintenance at those recreation facilities not operated by the concessionaire to meet existing maintenance standards. There are regular costs associated with the maintenance of these facilities, as identified in the “fixed cost” portion of the spreadsheet below. In addition to the facility maintenance, there will be shoreline cleanup and resource protection measures within and immediately adjacent to the reservoirs. The following estimate shows the cost to manage for these visitors and the impacts from their visits.

Operation and Maintenance Costs			
Area: French Meadows Area			
Personnel:	Days	CTG*/Day	Total
Recreation Technician (GS-5)	20	\$150.00	\$3,000.00
Maintenance Technician (GS-9)	20	\$300.00	\$6,000.00
Recreation Officer (GS-9)	30	\$300.00	\$9,000.00
Resource Officer (GS-11)	5	\$340.00	\$1,700.00
Fire Prev Tech/Patrol (GS-7)(fire season)	14	\$314.38	\$4,401.32
Resource Specialists (GS-9)(Heritage @5 days, Botany @ 2 days, Interp @6 days)	13	\$280.00	\$3,640.00
Resource Specialist (GS-11)(Wildlife@2 days)	2	\$350.00	\$700.00
Resource Improvement Crew (i.e. maintain fuel breaks around rec areas, etc)	10	\$1,500.00	\$15,000.00
<i>Subtotal</i>			\$43,441.32
Vehicles:	Month	miles	Total
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas).			
All vehicles use and FOR addressed in Admin			
<i>Subtotal</i>			\$0.00
Project Supplies, Materials and Contracts:			Total
Bulletin boards, posters, plumbing, etc.			\$4,000.00
Signs, posts, etc			\$1,000.00
Equipment maintenance (generator for water systems)			\$1,800.00
Propane for water system generators			\$1,600.00
Concessionaire use of storage bay at Admin Site see below:			
Equipment maintenance (generator for power)			\$500.00
<i>Subtotal</i>			\$8,900.00
Sub-Total:			\$52,341.32
Overhead (19%):			\$9,944.85

Total:	\$62,286.17
CTG = Cost to Government (2010 costs)	

Duncan Canyon Area

The Duncan Canyon area is a concentrated dispersed use area that is immediately adjacent to Duncan Creek and in proximity to the Duncan Diversion pool and facilities. There are no developed recreation facilities in this area at this time, although there is public use (based on FS staff observations and comments from the public (PCWA 2010e). This area is accessed by FS road that terminates at the diversion facilities. The licensee has been providing funding for patrol and fiduciary maintenance of the area. The operation, maintenance, and administration costs are directly related to the licensee's proposed primitive setting recreation development. On-site operations and maintenance by seasonal and permanent FS staff is required to meet health and safety standards, maintenance standards, and to ensure recreation visitors are having a quality experience and not impacting resources.

Cost: The costs are to manage for the recreation use at the recreation facilities in the Duncan Canyon area. For this area, these funds would be utilized to conduct patrols, pick up litter, provide public information, conduct facility maintenance, enforce rules and regulations, rehabilitate impacted areas, address sanitation, maintain concentrated use areas, respond to visitor-caused fires and other emergencies, and assist in search and rescue. The following estimate shows the cost to manage for these visitors and the impacts from their visits.

Operation and Maintenance Costs			
Area: Duncan Canyon			
Personnel:	Days	CTG*/Day	Total
Fire Prev Tech/Patol (GS-7)	10	\$314.38	\$3,143.80
Recreation Officer (GS-9)fill in as needed, supervision of GS5	10	\$300.00	\$3,000.00
Recreation Technician (GS-5)(mid May-late Oct)	20	\$150.00	\$3,000.00
<i>est Duncan open-no snow-24 weeks/year</i>			
<i>Subtotal</i>			<i>\$9,143.80</i>
Vehicles:	Months	miles	Total
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas). All vehicles use and FOR addressed in Admin			
Project Supplies, Materials and Contracts:			Total
Bulletin boards, posters, cleaning supplies, etc.			\$1,000.00
Signs, posts, etc			\$300.00
Garbage*			
Toilet pumping			\$1,200.00

Equipment maintenance (power washer, etc)	\$200.00
Garbage* cost is lumped with Ralston and Indian Bar	
<i>Subtotal</i>	<i>\$2,700.00</i>
Sub-Total:	\$11,843.80
Overhead (19%):	\$2,250.32
Total:	\$14,094.12
CTG = Cost to Government (2010 costs)	

Rubicon River Recreation Area

The Rubicon River recreation area does not include any developed recreation facilities at this time, although there is public use at this time (based on observations by FS staff and comments from the public (PCWA 2010e). The Ellicott's Bridge River Access site provides the primary access to the Rubicon River between Hell Hole Reservoir and Ralston Afterbay. This site is used by anglers and other water-based recreationists using this bypass reach of the Rubicon River. At this time, the FS provides clean-up and visitor management at the concentrated use areas within the Rubicon River area. The operation, maintenance, and administration costs are a result of the licensee's recreation developments in the Hell Hole and French Meadows area as well as improved access to the area. In addition, the project flows have increased fish population and improved angling opportunities through higher summer flows and colder summer water temperatures, An appropriate level of on-site operations and maintenance by seasonal and permanent FS staff is required to meet health and safety standards, maintenance standards, and to ensure recreation visitors are having a quality experience and not impacting resources.

Cost: The costs are to manage for the recreation use within the concentrated use area at the Ellicott's Bridge river access point in the Rubicon River Recreation area. For this area, these funds would be utilized to conduct weekly patrols, pick up litter, provide public information, enforce rules and regulations, rehabilitate impacted areas, address sanitation, respond to visitor-caused fires and other emergencies, and assist in search and rescue. Following construction of the Ellicott's Bridge River Access facility, there will be a need to adjust the operation and maintenance costs to include the cost for toilet pumping, toilet cleaning, signboard maintenance, and other associated costs. The following estimate shows the cost to manage for these visitors and the impacts from their visits.

Operation and Maintenance Costs			
Area: Rubicon Area (including Ellicott's)			
Personnel:	Days	CTG*/Day	Total
Recreation Technician (GS-5) (public contact, site maintenance, patrols)	16	\$162.00	\$2,592.00
Recreation Manager (GS-9) fill in and respond to needs	5	\$240.00	\$1,200.00

<i>Subtotal</i>				\$3,792.00
	Vehicles:	Months	miles	Total
Vehicle costs incidental to vehicle costs for Hell Hole and Long Canyon Areas				
<i>Subtotal</i>				\$0.00
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas).				
	Project Supplies, Materials and Contracts:			Total
<i>Subtotal</i>				\$0.00
Sub-Total:				\$3,792.00
Overhead (19%):				\$720.48
Total:				\$4,512.48
CTG = Cost to Government (2010 costs)				

Ralston Afterbay Picnic Area

This area provides no-fee day use opportunities consisting of water based recreation such as angling, swimming, boating and picnicking. Facilities at this location along the Middle Fork American River are a bathroom, picnic tables, grills, and a car top boat ramp. There is also a ramp used for sediment removal upstream of the confluence of the Middle Fork American River at the afterbay, a short distance away. The licensee has been providing funding for necessary operation and maintenance of the recreation facilities (PCWA 2006a). The operation, maintenance, and administration costs are directly a result of the licensee's project development. On-site operations and maintenance by seasonal and permanent FS staff is required to meet health and safety standards, maintenance standards, and to ensure recreation visitors are having a quality experience and not impacting resources.

Cost: The costs are to manage for the recreation use at the recreation facilities in the Ralston Picnic and Afterbay area. For this area, these funds would be utilized to conduct patrols, pick up litter, provide public information, conduct facility maintenance, enforce rules and regulations, rehabilitate impacted areas, address sanitation, and maintain day use sites, respond to visitor-caused fires and other emergencies, and assist in search and rescue. The following estimate shows the cost to manage for these visitors and the impacts from their visits. Costs for the annual operation and maintenance of this site are combined with the cost for the annual operation and maintenance of the Indian Bar area totaling \$72,375.09. It is estimated that year round operation and maintenance cost at the Ralston Picnic and Afterbay area is approximately \$12,375.00.

Indian Bar River Access

This site is located on NFS land (Tahoe NF); however, CDPR largely operates and maintains the facilities, including pumping the vault toilets. This site serves as the put-in for the Tunnel Chute whitewater run. While whitewater boating is the primary use of this site, a beach area that is along the channel (3 cfs) from the dam to the confluence with the channel from the powerhouse is also attractive anglers, miners, swimmers, and

sunbathers. Since the release down this channel is controlled by the Project and is very low, this is an instance where recreational uses are a flow-dependent recreation activity.

Existing improvements and facilities at this site include:

- 5 pre-cast concrete vault toilets
- 2 parking lots (approximately 50 vehicles)
- ramp/path to river
- signs
- 3 information kiosks
- trash containers

During the primary whitewater boating season, from April through September, seasonal CDPR park aides are on site at Indian Bar six hours per day (including travel) six days per week. CDPR monitors commercial boating activity, maintain the restrooms and other facilities and manages the parking and traffic. CDPR pumps the vault toilets at Indian Bar two times during the season which involves six days of park maintenance worker time. In addition to routine cleaning and maintenance, there is extra time involved in addressing vandalism. CDRP uniformed patrol officers patrol the put in area as well as the peaking reach recreation uses. FS recreation, fire prevention, and law enforcement personnel patrol the area year round.

Costs for the annual operation and maintenance of this site are combined with the cost for the annual operation and maintenance of the Ralston area totaling \$72,375.09. It is estimated that year round operation and maintenance cost at Indian Bar is approximately \$60,000.00, 100 percent of which is attributable to flow-related recreation.

Operation and Maintenance Costs			
Area: Ralston and Indian Bar Areas			
Personnel:	Days	CTG*/Day	Total
Fire PrevTech/Patrol (GS-7)	30	\$314.38	\$9,431.40
Recreation Officer (GS-9) off season and patrol	30	\$300.00	\$9,000.00
Recreation Technician (GS-5)(mid April to mid May) <i>Ralston serviced at same time as Duncan for 20 wk/yr Days for Ralston are in addition to those for Duncan before access</i>	4	\$150.00	\$600.00
State Park Aides (Jim Micheaels input)	160	\$137.00	\$21,920.00
<i>Subtotal</i>			<i>\$40,951.40</i>
Vehicles:	Months	miles	Total
FS Rec Officer/tech mileage (30 x 34days at .45/mi)			\$510.00
State Park Ranger/LE Patrol (40miles x60 trips 2400 mi at			\$1,200.00

.50/mi)	
Maintenance (30mi x 200 trips = 6000)	\$3,000.00
FPT mileage (30x30 days at .62/mi)	558
<i>Subtotal</i>	\$5,268.00
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas). All vehicles use and FOR addressed in Admin	
Project Supplies, Materials and Contracts:	Total
Pump Ralston and Indian Bar Toilets (6 total)	\$6,000.00
Garbage* cost is lumped with Duncan - dumpster rental	\$1,500.00
Bulletin boards, posters, cleaning supplies, etc.	\$3,000.00
Signs, posts, etc	\$500.00
Equipment maintenance (power washer, etc)	\$200.00
Develop written MOU with State Parks and BLM GS-11 10 days	\$3,400.00
<i>Subtotal</i>	\$14,600.00
Sub-Total:	\$60,819.40
Overhead (19%):	\$11,555.69
Total:	\$72,375.09
CTG = Cost to Government (2010 costs)	

FS Administration

The recreational use and demand within the MFAR Project area and generated by the MFAR project facilities and operations, as described above, has also lead to the need for the various land management agencies to provide administrative oversight of the public recreation services being provided. These oversight duties include, but are not limited to such tasks as program development and oversight, planning and budgeting, hiring and supervision, relevant correspondence, prospectus development, coordination and review of reservation system input, review and coordination of recreation use monitoring efforts and results, reporting and record keeping, fee collection oversight and audits, coordination with FERC and the Licensee, etc, The following estimate shows the cost to provide for the administrative oversight associated with management of the recreation use.

Administration Cost Spreadsheet Eldorado National Forest			
Personnel:	Days	CTG*/Day	Total
Resource Officer (GS-11)	60	\$350.00	\$21,000.00
Recreation Manager (GS-9)	40	\$240.00	\$9,600.00
District Admin Support	10	\$240.00	\$2,400.00
Forest Recreation Officer (GS-12)	20	\$436.00	\$8,720.00
Landscape Architect	20	\$413.00	\$8,260.00
Admin Assistant	10	\$320.00	\$3,200.00
<i>Subtotal</i>			\$53,180.00

Vehicles:	Months	miles	Total
Recreation Patrol (2848)	0	0	\$0.00
Maintenance Technician (0707)	0	0	\$0.00
Recreation Manager (5554)			\$0.00
Recreation Officer (3780)	3	3,000	\$1,806.00
Landscape Architect (2094)	1	2,000	\$908.00
<i>Subtotal</i>			<i>\$2,714.00</i>
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas).			
Project Supplies, Materials and Contracts:			Total
Testing			\$500.00
Lump Sum Payments (seasonals)			\$2,400.00
uniforms			\$300.00
TOS (\$30,000/6 yrs)			\$5,000.00
OWCP			\$0.00
Unemployment (\$2,300/seasonal; 6 seasonals)			\$13,800.00
<i>Subtotal</i>			<i>\$22,000.00</i>
Sub-Total:			\$77,894.00
Overhead (19%):			\$14,799.86
Total:			\$92,693.86

In addition to the above, the Tahoe National Forest has identified the need for 20 days of funding for a uniformed Forest Service Law Enforcement Officer (LEO). In addition to the technical training and skills required for a LEO by FS policy, all violation notices and incident reports written by Forest Protection Officers (FPO) must be processed by a LEO within 10 days. FPOs do the majority of the patrol on NFS lands.

The Final LAND 3 Technical Study Report (PCWA 2010h) Table E-4 (Summary of 2006 and 2007 USDA FS TNF Emergency Incident Responses at Project Facilities, in the Vicinity of the Project, or in the Vicinity of the Peaking Reach) indicates 21 law enforcement responses. Table E-5 (Summary of 2006 and 2007 USDA FS TNF Emergency Incident Responses) indicates 37 law enforcement responses. Each response requires an incident report. Table E-6 indicates a total of 3 accidents. Regardless of who responds to the accident, if it occurs on National Forest System lands it requires interagency cooperation, an accident investigation conducted by the FS (most likely a LEO), and an incident report. Other tables in LAND 3 Technical Study Report (Tables E-7 and E-8) indicate Placer County Sheriff actions regarding missing persons, search and rescue, agency assists (including FS) also require interagency interaction, sometimes an investigation, and in all cases an incident report. Many violation notices written by FPOs end with a court appearance to assist the US Attorney and substantiate the government's case. This requires LEO interaction and involvement as well.

Administration Cost Spreadsheet Tahoe National Forest			
Personnel:	Days	CTG*/Day	Total
Resource Officer (GS-11)	25	\$340.00	\$8,500.00
Recreation Manager (GS-9)	45	\$300.00	\$13,500.00
District Admin Support	30	\$252.00	\$7,560.00
Forest Recreation Officer (GS-12)	10	\$436.00	\$4,360.00
Landscape Architect/Facility Engineer/COR	10	\$413.00	\$4,130.00
Admin Assistant	30	\$215.00	\$6,450.00
Law Enforcement Officer	20	\$320.00	\$6,400.00
<i>Subtotal</i>			<i>50,900.00</i>
Vehicles:	Months	miles	Total
Recreation Patrol (FPT)	1	2,000	\$1,515.00
Recreation Technician (8666)	2	3,000	\$1,854.00
Recreation Officer (1401)	5	8,000	\$4,900.00
<i>Subtotal</i>			<i>\$8,269.00</i>
Note: Fleet Vehicles require 12 months FOR (some vehicles are split between several projects/areas).			
Project Supplies, Materials and Contracts:			Total
uniforms			\$500.00
TOS (\$30,000/6 yrs)			\$5,000.00
<i>Subtotal</i>			<i>\$5,500.00</i>
Sub-Total:			\$64,669.00
Overhead (19%):			\$12,287.11
Total:			\$76,956.11

Heavy Maintenance

Objectives Addressed by Heavy Maintenance

Recreation Management Objective
 Resource Protection Objective
 Water Quality Objective
 Recreation Design Objective

Rationale for Heavy Maintenance

Heavy maintenance and rehabilitation are necessary to keep existing FS facilities in serviceable condition to meet health and safety requirements, protect resources, and meet public needs. Heavy maintenance and rehabilitation include components of recreation facilities such as water systems, traffic control barriers, roads, spurs, and associated drainage structures, grills and fire rings, picnic tables, toilets, and signboards. Long-term

and heavy maintenance includes: but is not limited to, repairing and re-surfacing paved areas, replacing culverts and other heavy maintenance along access roads, re-roofing and painting buildings, replacing picnic tables and other accessory structures, replacing the composting unit on the composting toilets, and replacing toilets and septic systems. As a part of the annual consultation and coordination meetings, necessary maintenance, rehabilitation, and reconstruction will be determined through a periodic review of the facilities by the resource agencies and licensees. These reviews will determine the necessary work, based on facility condition and other factors at the time. Data from ongoing monitoring will assist in making needed changes in the work schedule and in future planning.

Specific Modifications and Enhancements at Existing Project Recreation Facilities and Water Supply Facilities, and New Project Recreation Facilities

Objectives Addressed by Specific Modifications and Enhancements at Existing Project Recreation Facilities and Water Supply Facilities

Recreation Management Objectives
Recreation Design Objective
Resource Protection Objective

Rationale for Specific Modifications and Enhancements at Existing Project Recreation Facilities and Water Supply Facilities, and New Project Recreation Facilities

The licensee has been, and continues to be, the substantial force in recreation development within the MFAR project area. The licensee's role in facility and infrastructure development has been pervasive over the last 50 years.

Recreation facilities were planned by the licensee during the same period that initial project development occurred. In as early as the 1960's, the licensee acquired funds to build recreation facilities at Hell Hole and French Meadows Reservoirs, in the vicinity of the Long Canyon Diversions and at Ralston Afterbay. These funds, received through Davis-Grunsky Act Recreation Grants, required a feasibility report that described the need for the various recreation facilities (Leeds, Hill and Jewett, 1964). The original Agreement between the licensee and the FS for the Administration, Operation and Maintenance of Recreation Facilities on the Middle Fork American River Project on the Eldorado and Tahoe National Forests (1965) recognized that the construction by the Licensee of French Meadows and Hell Hole Reservoirs, Duncan Creek and Long Canyon Diversions, and Ralston Afterbay created mountain lakes having great potential recreational use by the public and that the Agency had a responsibility to provide such facilities as roads, parking areas, water and sanitary facilities, campgrounds, picnic areas and boat ramps and housing and support facilities.

Through the development of the MFAR reservoirs, the accompanying infrastructure development improvements to access roads, and the recreation facility development, the licensee has been and is the greatest influence within the MFAR Project area. In order

for visitors to experience quality recreation opportunities and be able to fully utilize recreation sites within the Project area, it is necessary to ensure that the appropriate infrastructure is in place, in good condition, and that the appropriate level of accessibility is provided through design standards. Ongoing maintenance and improvement efforts coordinated between the FS and the Licensee have provided for accessibility at some of the recreation facilities; however other accessibility needs have been identified by FS in the Licensee's REC-1 Technical Study Report (PCWA 2010b). FERC regulations at 18 CFR 2.8 require the licensee to "develop suitable public recreational facilities upon project lands and waters and to make provisions for adequate public access to such project facilities and waters and to include therein consideration of the needs of physically handicapped individuals in the design and construction of such project facilities and access." FS policy (USDA 1998 and USDA 2000) is to provide 100 percent barrier-free access where possible, consistent with the intent of the Region 5 (R5) "Universal Access Strategy."

User surveys conducted by the licensee indicate how important the reservoirs are to the visitors themselves. The three most popular activities for visitors to the MFAR Project are camping at developed sites, fishing and reservoir recreation. For example, 83 percent of visitors surveyed at French Meadows Reservoir indicated they intended to camp at a developed site, 48 percent said they would engage in reservoir recreation and 37 percent indicated they intend to fish. Of the people who responded to the Fishing survey at French Meadows, more than 50 percent fished from a boat (PCWA 2010c). Seventeen to 34 percent of visitors to Hell Hole indicated they had brought a boat trailer with them (PCWA 2010c). In addition, over 60 percent of visitors who participated in the survey at the Hell Hole and French Meadows Reservoir areas indicated that identified that hiking trails are important to very important as a part of their recreation visit (PCWA 2010c). This is consistent with Statewide and Regional studies of the types of recreation activities visitors participate in and desired opportunities. Although 60 percent of visitors said that hiking trails are very important or important to choosing the area to recreate at, only 34 percent of visitors said that they had or will hike or walk during their visit (PCWA 2010c). This discrepancy demonstrates the need and demand for walking and hiking opportunities within the MFAR Project.

The licensee has, through collection agreements, funded some of the recreation operations at recreation facilities within the MFAR Project. Numerous other funding sources, including Appropriated, Recreation Enhancement Funds, grants obtained from the California Department of Boating and Waterways (DBAW), Granger-Thye Act fee offset¹, and others have been used to supplement licensee funds. Even with these funds, there is still a substantial amount of deferred maintenance at the recreation facilities within the MFAR Project (PCWA 2010b).

There are a number of amenity upgrades and improvements in the specific recreation plan conditions. These have largely been developed through the analysis of the licensee's visitor survey results (PCWA 2010c), the recreation site condition survey results (PCWA 2010b), the reservoir recreation studies (PCWA 2010d), the stream-based recreation

¹ Under the authority of the Granger-Thye Act, campground concessionaires operating government facilities (campgrounds) renovate, recondition, improve and maintain the facilities in lieu of fee due to the government. This heavy maintenance work is referred to as "fee offset".

studies (PCWA 2010e), and FS knowledge of uses, trends and needs within and adjacent to the project area. These information sources highlighted needs identified by visitors for new facilities and upgrades to existing amenities at licensee-constructed facilities.

Additional specific rationale sections accompany each of the following reservoirs or areas:

French Meadows Recreation Area

The water systems for the French Meadows area were installed in the 1960's and is showing signs of age by frequently breaking and becoming unreliable. This affects customer service when water is not available for visitor use; repair costs are increasing; and when there is a leak or a break potable water quality is often compromised. Per Licensee's REC-1 Table 1-12 (PCWA 2010b) the access routes to water system facilities has rills and the remarks indicate that the erosion control structures are not effective. The road/trail shall be brought up to current FS standards to mitigate resource impacts. Use occurs in the French Meadows area all year long. The reservoir is accessed in winter and spring/early summer by vehicles such as snowmobiles, or occasionally by 4-wheel drive enthusiasts who participate in snow-play-driving to get to French Meadows reservoir to go fishing. There have been occasions when snowmobiles pull boats to the reservoir (personal communication, Ed Moore, 2010). Most recently this was evidenced in May of 2010 when Forest Road 22 was plowed to the Hell Hole turn off and tracks through the snow on the 22 road through 12 or more inches of snow gained access to French Meadows reservoir where Kiewit Pacific Corporation was initiating modification to the LL Anderson Spillway (via plowing and closure of the Mosquito Ridge Road). Several fishermen said that fishing was great at French Meadows reservoir during the spring snow melt (personal communication, Mo Tebbe, 2010). Once the area is accessible in the spring the concessionaire prepares to open the campgrounds including turning on the water system and obtaining water tests to determine potability. Snow drives out those that recreate in the area in late autumn though the concessionaire typically chooses to close most of the campgrounds and winterize the water system in mid September when use sharply declines.

Proposed license conditions and recommendations measures needed in the French Meadows area include bringing the area up to current FS policy such as FSORAG (Forest Service Outdoor Recreation Accessibility Guidelines - USDA 2006b). FSORAG provides barrier-free access where possible, consistent with the intent of the most current FS policy by:

- Replacing, resetting, or retrofitting site infrastructure (e.g. tables, fire rings, or barriers).
- Moving infrastructure to be accessible (i.e. moving food storage lockers, faucets and sumps, providing approaches to facilities consistent with the campground or use area's surface, relocating toilets closer to a road and providing a turn out on the road for the toilet).

- Grading or compact walking surfaces, in some areas steps may be necessary.
- Leveling the site and removing protrusions.
- Providing a minimum of 1,200 square feet per single site or 2,400 square feet per double site, etc.
- Reconstructing spurs to meet accessibility standards which may include resetting barriers to allow access from spurs to the unit.

There is a substantial demand from visitors to the Project area and campgrounds for hiking and walking opportunities, and a corresponding lack of these opportunities. This conclusion is reflected in the discrepancy between the number of visitors that reported hiking and walking as important to very important to their visit, in comparison to the percentage of visitors that reported participating in this activity. The feasibility report for the MFAR (Leeds, Hill and Jewett, 1964) identified the intent to provide a foot trail all the way around the reservoir.

Current accessibility standards for trails outside of developed recreation sites are different from the standards for walkways within developed sites. (USDA 2006a and USDA 2006b), and allow for departures from the guidelines when application of a technical provision would cause a change in the trail's setting or the purpose or function for which the trail is designed., An example of the difference in standards is the current standard for maximum grade of a walkway within a developed site is 5 percent, whereas the maximum grade for a trail is up to 10 percent for limited stretches.

There is continued visitor interest in trail access to the reservoir as identified in the Licensee's REC-2 Technical Study Report (PCWA 2010c). This TSR lists the most frequent responses for secondary reasons for visiting the area as "access to lake/reservoir", identified that 66 percent of visitors said hiking trails are very important or important, and that nearly 66 percent of visitors said that fishing access trails are very important or important. In contrast, only 34 percent of visitors said that they had or will hike or walk during their visit (PCWA 2010c). This discrepancy demonstrates the need for and demands for walking and hiking opportunities within the MFAR Project.

A south shore reservoir area pedestrian and bicycle trail will provide a means for visitors to access French Meadows reservoir from the French Meadows Campground. Sixty-seven percent of the visitors surveyed at this campground said that fishing trail access is very important or important. There are several existing, now vegetated old roads in the vicinity of the campground that could be improved to provide hiking and bicycling opportunities. The FS proposes opening some of these old roads, starting with the road between French Meadow Campground and the French Meadow Boat Ramp. When a recreation facility, (i.e. campground) is brought up to accessibility standards, replace, repair, or reconstruct the interior campground roads and spurs, and associated features (i.e. culverts) to remedy the issues identified in the Licensee's REC-1 TSR Tables REC 1-11 and REC 1-12 (PCWA 2010b).

When flush toilets are replaced the septic and leach systems would be evaluated for replacement.

Ahart Campground

This campground is unique in that it is the only developed project campground located on a river (Middle Fork American River upstream of French Meadows Reservoir). Ahart and the western loop of French Meadows campgrounds are the only campgrounds in this recreation area that are open to use after the concessionaire, who operates and maintains the recreation facilities under a 10-year term special use permit, has left the area in the autumn (typically mid-September). Occupancy in the autumn is a normal occurrence (Personal Communication, Ed Moore 2010) The closest potable water is available at Lewis Campground (approximately 1 mile) when the concessionaire is in the area and before the water systems are winterized. No potable water is available once the water system is winterized.

Ahart Campground is approximately 3.5 miles from the nearest boat ramp (McGuire). Visitor surveys indicate that 18 percent participate in reservoir recreation, 32 percent fish, and 12 percent participate in streamside day use. The most common response of campground visitors regarding the activities they participated in was camping in developed sites (55 percent). The most frequent secondary activity visitors identified was relaxing (42 percent) and hiking/walking (38 percent).

Upon review of the campground in 2010, the FS proposes reconstruction of the campground road and spurs and surfacing with compacted aggregate in lieu of pavement (PCWA Recreation Plan, 2011h). Construct drainage diversions around sites 1 and 8 to prevent erosion through the sites.

The Feasibility Report for the MFAR Project completed to accompany the application for Davis Grunsky Funds for construction of the MFAR recreation facilities described the Licensee's commitment to provide water at camping, picnicking and boating areas where facilities are constructed by the Agency (Leeds, Hill and Jewett, 1964). Fifty-nine percent of the people responding to the 2007 visitor survey said that drinking water was very important to important to them.

Specific measures for routine heavy maintenance items or removal/reduction of a facility are:

- Repair and pave Forest Road 96 from the end of the pavement near the 42 road intersection past campsite 10 in the Ahart campground to provide visitors with a more enjoyable opportunity through dust reduction.
- Provide a potable water source, operated by hand pump, at this campground so that water is available, on site, whenever the area is accessible.

- Replace the double unit vault bathrooms that were installed in the 1960s, that do not meet current accessibility standards and show signs of rot.
- Upon FS facility assessment in 2010 campsite 9 appeared to have no use; and in conversation with retired Recreation Officer Ed Moore, this site seldom was used. Campsite 9 is recommended for abandonment and restoration.
- Place additional barrier rock between sites 1 and 2 to limit motorized use to the spur.

French Meadows Campground

This campground is located on the south shore of the French Meadows Reservoir and is approximately 0.5 mile from the French Meadows Boat Ramp and approximately 4 miles from the McGuire Boat Ramp.

The western loop (sites 32-75) of French Meadows campground and Ahart are the only campgrounds in this recreation area that are open to use after the concessionaire, who operates and maintains the recreation facilities under a 5-year term special use permit, has left the area in the autumn (typically mid-September). Occupancy in the autumn is a normal occurrence when the concessionaire is in the area and before the water systems are winterized (Personal Communication, Ed Moore 2010). No potable water is available once the water system is winterized.

The most common response of campground visitors regarding the activities they engaged in was camping in developed sites (62 percent), followed by reservoir fishing (23 percent). The most frequent secondary activity visitors identified was oriented with water play (54 percent) (PCWA 2010b).

Specific measures for routine heavy maintenance items or enhancement, enlargement, removal, reduction of a facility are:

- Replace toilets to meet current accessibility standard as well as address deferred maintenance which includes rot in most of the buildings (FS review, 2010). Relocate toilets to meet accessibility standards: locating the toilet closer to roads, construct adjacent accessible turnouts and walkways. Furnish and install one additional single unit toilet in the west loop.
- A grant from the National Forest Foundation provided funding in 2002 for animal resistant food lockers. This was the first time that these lockers had been installed on the Tahoe National Forest, little was known about them. One season of use showed the FS that the smaller lockers were not large enough to accommodate the size of cooler typically brought by visitors.
- Campground hosts have nearly full-time presence on site from before opening to after closing the campgrounds. The special use permit has a term of 5 years with the ability to extend to 10 years. Sites 3 and 32 are dedicated hosts sites. By providing an on site holding tank the host would not need to leave the site to go to the dump

station. this would provide more time for facility operation and maintenance and customer service and provide incentive for host retention and management continuity.

- Some area visitors tend to bring vehicles that fill up the entire spur space, indicating a need for larger sites. Whereas other visitors bring and maneuver trailers or motorhomes into site spaces that are not designed to meet this type of recreational vehicle. It is noted in the Licensee's REC-1 TSR Appendix J-1 (PCWA 2010B) in the remarks column notes that many spurs are narrow. Given the topography of this campground, and to meet demand for wider and/or longer spurs a few sites can be converted to accommodate larger/more vehicles and better meet accessibility standards. As a minimum the following sites would be converted to pull through sites (61 and 62, 33 and 2, and 19 and 20), or enlarged (24, 34, 66) and in one case enlarged for a larger RV (25).
- Sites 16, 55, 65, 69 and 72 do not receive much use and would be abandoned and rehabilitated.
- Sites 6, 11, 43, 71 and 8 would be reconfigured to better optimize the area by moving site infrastructure to end of the spur (6-71) or away from the road (site 8). ‘
- Reconstruct interior campground roads to meet accessibility standards above, to widen, and to repair or replace road infrastructure issues such culverts in poor condition, buried or clogged, rusted or crushed (PCWA 2010b, Tables 11 and 12).

Lewis Campground

This campground is located on the south shore of the French Meadows Reservoir and is approximately 3.5 miles from the French Meadows boat ramp and less than a mile from the McGuire Boat Ramp.

This campground is on the north shore water system which is typically winterized first, right after the Labor Day weekend. No potable water is available once the water system is winterized.

The most common response of campground visitors regarding the activities they engaged in was camping in developed sites (62 percent), followed by reservoir fishing (23 percent). The most frequent secondary activity visitors identified was oriented with water play (54 percent) (PCWA 2010b).

Specific measures for routine heavy maintenance items or enhancement, enlargement, removal, reduction of a facility are:

- Replace toilets to meet current accessibility standard as well as address deferred maintenance which includes rot in most of the buildings. Relocate toilets to meet accessibility standards: locating the toilet closer to roads, construct adjacent accessible turnouts and walkways. Furnish and install one additional single unit toilet in the west loop.

- Campground hosts have nearly full-time presence on site from before opening to after closing the campgrounds. The special use permit has a term of 5 years with the ability to extend to 10 years. Site 1 is a dedicated host site. By providing an on site holding tank the host would not need to leave the site to go to the dump station. This would provide more time for facility operation and maintenance and customer service and provide incentive for host retention and management continuity.
- Some area visitors tend to bring vehicles that fill up the entire spur space, indicating a need for larger sites. Whereas other visitors bring and maneuver trailers or motorhomes into site spaces that are not designed to meet this type of recreational vehicle. To meet these demands several sites would be converted to pull through sites (27 and 29).
- The following are considered the minimum sites that can be enhanced to meet accessibility standards. Sites other than these listed here may be widened or lengthened: widen to 16 feet (site 37); widened to 20 feet (sites 21, 38, 39); the spur lengthened to 50 feet (site 13).
- Enlarge the living area of sites 5 and 20 to a minimum of 1200 square feet.
- Reconstruct interior campground roads to meet accessibility standards above, to widen, and to repair or replace road infrastructure issues such culverts in poor condition, buried or clogged, rusted or crushed (PCWA 2010b, Tables 11 and 12).

Poppy Campground

This campground is located on the north shore of French Meadows Reservoir and is accessible by either boat or the Western States Trail.

The most common response of campground visitors regarding the activities they engaged in was camping in developed sites (67 percent). The most frequent secondary activity visitors identified was non-motorized reservoir boating, relaxing, and reservoir oriented water play or sun bathing (100 percent) (PCWA 2010b). Since this is a boat or hike in campground, one could deduce from the primary and secondary activities that all persons arrived at Poppy via boat. This could be quite a challenge for some people since the reservoir is typically very windy.

Specific measures for routine heavy maintenance items or enhancement, enlargement, removal, reduction of a facility are similar to the Licenses' s DLA Recreation Plan Table 3 with minor revisions:

- Sites 6, 9, 11 and 12 have historically been under-used. To reduce maintenance costs remove these sites and rehabilitate/revegetate the site.

- Remove and replace the two single unit toilets with one accessible single unit toilet. The type of toilet will be determined at the time of construction and approved by the FS based on advances in technology which deals with low or no maintenance issues.
- Remove obstacles and level camp sites 1-5, 7, 8 and 10, where feasible and compact sites to a minimum of 1,200 square feet.
- Under Poppy Campground Trailhead the trailhead would be moved, and a connector trail created, see below.
- The Western States Trail is the hiking/bicycle trail used to access Poppy Campground. The WST is maintained by the FS and Western States Foundation and provides trail opportunities on the north side of the reservoir. Direction signing needs to be placed on the WST (16E10) from each trailhead (Red Star Ridge and new trailhead).

Coyote Group Campground

This Group campground consists of four group sites and is located on the east side of the French Meadows Reservoir.

While daily data has not been collected by concessionaires, there was a record of reservations kept by the previous concessionaire American Land and Leisure. It is common that each group site is reserved every weekend during the summer (Personal Communication, Ed Moore 2010). These group campgrounds are typically open for use from snow melt or Memorial Day (which ever occurs first) through the Labor Day weekend. The gates to the sites are closed when there is no reserved use; however these sites can be used if vacant without a reservation.

The most common response of campground visitors regarding the activities they engaged in was camping in developed sites (44 percent). The most frequent secondary activity visitors identified was reservoir fishing (56 percent) and relaxing and water play in the reservoir/sunbathing (45 percent) (PCWA 2010b).

In review of the Licensee's REC-1 TSR (PCWA 2010b) there appears to be a greater diversity of cultures utilizing the group campgrounds than the family campgrounds or other project recreation areas.

All four group sites: The majority recreation plan elements bring these sites up to current accessibility standard or specific routine heavy maintenance items.

There are some circumstances where the campsite can neither be leveled nor protrusions removed in order to make the site accessible due to excessive rock. Alternation of the site would adversely change the character of the setting.

Gates Group Campground

This Group campground consists of three group sites and is located on the east of the French Meadows Reservoir adjacent to the Middle Fork American River.

While daily data has not been collected by concessionaires, there was a record of reservations kept by the previous concessionaire American Land and Leisure. It is common that each group site is reserved every weekend during the summer (Personal Communication, Ed Moore 2010). These group campgrounds are typically open for use from snow melt or Memorial Day (whichever occurs first) through the Labor Day weekend. The gates to the sites are closed when there is no reserved use; however these sites can be used if vacant without a reservation.

The most common response of campground visitors regarding the activities they engaged in was camping in developed sites (70 percent) followed by stream based water play/sunbathing. The most frequent secondary activity visitors identified was both hiking/walking and stream based water play/sunbathing (59 percent) and relaxing (44 percent) (PCWA 2010b).

In review of the Licensee's REC-1 TSR (PCWA 2010b) there appears to be a greater diversity of cultures utilizing the group campgrounds than the family campgrounds. For the Gates Group in particular even though only 43 people responded to the survey question there was representation from the widest range of counties (7) in California in this group camp than anywhere else in the French Meadows area.

Like Coyote Group sites the majority recreation plan elements bring these sites up to current accessibility standard.

There are some circumstances where the campsite can neither be leveled nor protrusions removed in order to make the site accessible due to excessive rock. Alternation of the site would adversely change the character of the setting.

Many Gates group visitors participate in stream based recreation creating a network of user created trails. Formalizing one or two trails that can be accessed by any visitor to the Gates group and signing the trail would provide management of river access. User created trails that are impacting resources would be closed and rehabilitated/revegetated.

French Meadows Boat Ramp

This boat ramp is located on the south shore of the French Meadows Reservoir and encompasses the French Meadows Picnic Area and associated parking areas.

The French Meadows Boat Ramp is constructed of concrete and extends to an elevation of 5,200 feet (PCWA 2010d). This report recognizes that the reservoir water level has dropped below this elevation during the predominant recreation use season (May to September) during dry and critically dry years. Future operations will likely continue to

cause reservoir levels to drop below the bottom of the boat ram during the predominant recreation use season in the future.

The Licensee's REC-1 TSR (PCWA 2010b) identifies that overall the boat ramp is in fair condition; the concrete is spalling and cracked, and vegetation is growing in the cracks.

In addition to providing access to recreationist and fisher-people, as well as others seeking easy access to the reservoir, the boat ramp provides access to reservoir waters for other uses such as fire suppression and Licensee facility operation and maintenance (such as low level outlet repairs in the reservoir).

The boat ramp is used by the recreating public whenever snow does not prohibit its use as evidenced by FS personnel visit. As previously mentioned the concessionaire is typically on site from snowmelt or just prior to Memorial Day weekend, whichever occurs first, until mid September.

As would be anticipated the most common response given by visitors to the area about the primary activity they were engaged in was reservoir fishing (58 percent) followed by camping in a developed site (17 percent). The secondary activity identified by visitors was hiking/walking and reservoir swimming/water play/sunbathing (21 percent each).

Specific measures for routine heavy maintenance items or enhancement, enlargement, removal, reduction of this area is:

- Based on the lack of disturbance of vegetation around picnic tables and grills (Personal communication, Ed Moore 2010) it appears that the French Meadows Picnic Area is used very infrequently and would probably be used more frequently if the opportunity were located closer to toilet, water and garbage facilities. Relocate facilities from two of the picnic sites to the vegetated area southwest of the bathroom facility adjacent to the parking area on the French Meadows Boat Ramp Road. Paint traffic markings in the parking area to identify parking for the picnic sites. The remainder of the facilities in the French Meadows picnic area including waterlines, bathroom, signs, trail, etc. would be removed and the area restored, rehabilitated/revegetated. The Picnic Area parking could be left as is.
- Sign the location of the new picnic area and provide information on website and pamphlets.
- Replace the flush toilets (the buildings are displaying signs of rot) with accessible vault toilets to provide sanitation whenever the boat ramp is accessible and to lower operating costs. Construct the accessible water faucet and sump near the toilets.
- Replacing wooden barriers with suitably sized rock decreases maintenance and provides a substantial barrier to keep traffic where it is intended to be. Cable and post barriers do not comply with FS policy and present a hazard; replace post and cable with suitably sized barrier rock.

- Drainage work is needed to direct snowmelt and rainwater through reconstruction of drainage ditches.
- This boat ramp is the more frequently used boat ramp at the reservoir and as stated in the Licensee's REC-1 TSR (PCWA 2010b) is functional but contains cracking and spalling concrete with vegetation growing in the cracks. In years when the end of the boat ramp is out of the water, there is a sharp drop-off that prohibits vehicles from continued use of the boat ramp, instead boat towing vehicles drive onto the reservoir bed to access the water, disturbing the shoreline. Importantly for the FS this boat ramp is also frequently used for fire suppression activities. Water trucks (including nursetankers and fire engines) can not navigate the drop off and cannot easily or quickly negotiate obstacles on the reservoir bed or take the risk of becoming stuck on the reservoir bed. Resurfacing and the extension of the boat ramp, meeting the California Department of Boating and Waterways guidelines, which are in compliance with National guidelines meet the needs of the recreating public in dry and critically dry water years, and serve in the protection of watershed resources. More effective signing and barriers along the boat ramp would keep people from driving on the reservoir bed when the water surface is dropping.
- Reestablish road clearing limits to provide line of site for motor vehicles.

French Meadows RV Dump

The remains of the visitor center present a safety hazard and is visually unattractive and must be completely removed. This area would then be surfaced and utilized as part of the facility. Provide painted markings to direct traffic including parking spaces. Bring the site up to current FS accessibility standards.

McGuire Boat Ramp and Associated Parking Areas Including Poppy Trailhead

This trailhead and boat ramp is located on the north shore of French Meadows Reservoir and encompasses a total of three parking areas. The previous concessionaire, American Land and Leisure did not conduct any counts at these facilities. The current concessionaire, California Land Management will be collecting fees at the boat ramp via a FS purchased and installed fee tube.

As previously mentioned the concessionaire is typically on site from snow melt or just prior to Memorial Day weekend, whichever occurs first, until mid September although north shore facilities are winterized before south shore facilities.

As would be anticipated the most common response given by visitors to the area about the primary activity they were engaged in was reservoir fishing (33 percent) followed by camping in a developed site (28 percent). The secondary activity identified by visitors was reservoir swimming, water play/sunbathing (53 percent each) followed by relaxing and reservoir fishing both (42 percent). Given that there is a greater response for the second primary activity of developed camping than at the French Meadows Boat Ramp, it

could be deduced that more of the users of this boat ramp camp within the French Meadows area.

Specific measures for routine heavy maintenance items or enhancement, enlargement, removal, reduction of this area include removing the current Poppy Campground Trailhead Parking Area, road, and facilities; then restoring and revegetating the area while blocking off vehicular traffic and consolidating the facilities into one area.

- Remove post and cable barriers from the previous Poppy Trailhead parking area to facilitate restoration activities.
- There are two toilet facilities in the vicinity of the Poppy Trailhead, a 2-unit flush and 1-unit vault. The use of the area does not warrant this level of development. Remove all toilets and associated plumbing including faucets, drains, sumps and the fire hydrant and restore the area.
- Consolidate trailhead/boat ramp parking and facilities into one area at the McGuire Boat Ramp Parking SE Lot Area near the access road. To facilitate accessibility for visitors to this area pave and designate and sign six parking spaces nearest the toilet, water, garbage, fee station and information walkway.
- Construct and sign an extension trail from the new parking area to the Poppy Trail (16E10; Western States Trail).
- Sign the remainder of the McGuire SE Parking Lot as parking for boaters.
- Providing barrier rock around the McGuire Parking Lots will keep motorized traffic on existing compacted/hardened surfaces.
- The 2 access roads to the McGuire NE Parking Lot are an un-necessary impact to resources; one of these access roads can be removed and restored/revegetated.

McGuire Picnic Area and Beach

Located on the northshore of the reservoir this area contained a manmade beach. The picnic area and beach was combined with the McGuire Boat Ramp and associated parking area for visitor survey and thus the use at this location can not be differentiated from the boat ramp. However, based on frequent patrols and administration of the area the FS acknowledges that the area is not frequently used.

The previous concessionaire, American Land and Leisure, reported that the group campgrounds tended to be reserved each weekend between Memorial Day and Labor Day weekends; given this areas lack of use, and proximity to the reservoir and present infrastructure the FS proposes to develop the area into a group campground with two sites, one 25 PAOT and one 50 PAOT.

In addition to the Licensee's REC-1, Table 4 (PCWA 2010b) current FS accessibility standards shall be applied to this site utilizing as many of the existing features and facilities that are in good condition as possible (reusing bear proof food lockers, existing roads and trails, etc.)

Hell Hole Recreation Area

Hell Hole Campground

This campground is located 1.3 miles from the Hell Hole Reservoir boat ramp and yet trailers are not recommended due to limited parking space. Visitor surveys indicate that 37 percent participate in reservoir recreation and 26 percent fish. Drainage from the parking area is leading to erosion of the access path to the toilet and some camp sites (PCWA 2010b). Three campsites within this campground are located within an area of sensitive resources.

The most common response of campground visitors regarding the activities they intend to participate in was camping in developed sites (56 percent), followed by reservoir fishing (19 percent). The most frequent secondary activity visitors identified was hiking/walking (44 percent) (PCWA 2010b).

The specific measures identified are to address drainage problems associated with the parking area, to provide for access for boat trailers and larger vehicles, provide desired hiking and walking opportunities, and to protect sensitive resources in the vicinity of the campground. By eliminating some of the campsites there is a need to reconfigure the facility. As a part of reconfiguring the campground, there is an opportunity to improve utilization of the campground and better meet public need.

There are limited hiking opportunities in the vicinity of the Hell Hole Reservoir recreation facilities, and there are no trails directly linking the recreation facilities. Maintenance and reconstruction of the Hell Hole Reservoir trail will provide a recreation opportunity for visitors to the Hell Hole area. Current accessibility standards for trails outside of developed recreation sites are different from the standards for walkways within developed sites. (USDA 2006a and USDA 2006b), and allow for departures from the guidelines when application of a technical provision would cause a change in the trail's setting or the purpose or function for which the trail is designed., An example of the difference in standards is the current standard for maximum grade of a walkway within a developed site is 5 percent, whereas the maximum grade for a trail is up to 10 percent for limited stretches.

Big Meadows Campground

Portions of this campground have been reconstructed and improved over the last several years. However some of the camp units still do not meet current accessibility standards and have other deficiencies. Additionally, the campground is near an area suitable for interpretation regarding the rich cultural resources.

The most common response of campground visitors regarding the primary activities they intend to participate in was camping in developed sites (37 percent), followed by reservoir fishing (32 percent). One of the frequent secondary activities visitors identified was hiking/walking (35 percent) (PCWA 2010b).

There are limited hiking opportunities in the vicinity of the Hell Hole Reservoir recreation facilities, and there are no trails directly linking the recreation facilities. Maintenance and reconstruction of the Hell Hole Reservoir trail will provide a recreation opportunity for visitors to the Hell Hole area.

Upper Hell Hole Campground

Upper Hell Hole Campground is located on the southeast shore of Hell Hole Reservoir, about four miles from Hell Hole Boat Ramp. This site is accessed by boat and by foot travel, via the Hell Hole Reservoir Trail (FS Trail 14E02). There are sensitive resources located within or adjacent to the campground which warrants the need to remove the improvements at the campground and allow for dispersed use at the site. Future site monitoring and clean-up of the site is incorporated into the ongoing operations and maintenance. Information from future recreation surveys, along with information from monitoring of the site and assessment of impacts to sensitive resources will be used to determine whether future enhancements are needed, such as establishment of a boat-in/walk-in campground within the Upper Hell Hole area.

Hell Hole Boat Ramp and Associated Parking Areas

The Hell Hole Boat Ramp extends to an elevation of 4,530 feet (PCWA 2010d). The REC-3 TSR recognizes that the reservoir water level has dropped below this elevation during the recreation use season during dry and critically dry years. Future operations will likely continue to cause reservoir levels to drop below the bottom of the boat ramp during the recreation use season in the future.

REC-1 TSR identifies that the pavement in the upper parking area is generally in good condition, but that some segments are in poor condition and that the stripping is no longer visible (traffic markings and parking space stripping was completed in Summer 2010, however there is a need for regular repainting). The existing chain link fence is visually inappropriate at this site and needs to be replaced with fencing that meets the Licensee's needs while still maintaining the visual quality at the site.

There is a need for potable water at the Hell Hole Boat Ramp. The Feasibility Report for the MFAR Project completed to accompany the application for Davis Grunsky Funds for construction of the MFAR recreation facilities described the Licensee's commitment to provide water at camping, picnicking and boating areas where facilities are constructed by the Agency (Leeds, Hill and Jewett, 1964). 60 percent of visitors surveyed at Hell Hole Reservoir, as reported in the Licensee's REC-2 TSR (PCWA 2010c), identified that drinking water is important to very important.

Hell Hole Vista and Associated Parking Area

The Licensee's REC-1 TSR (PCWA 2010b) identifies the Hell Hole Vista Parking Area as being in poor condition and lacks an accessible parking space. These conditions were recently addressed. The REC-1 TSR (PCWA 2010b) goes on to identify that the Vista site is not accessible due to obstacles, level changes and the presence of stairs. In addition, the access trail from the parking area to the Vista and the picnic table along the trail are in poor condition and not accessible. The measures proposed for the Hell Hole Vista would address these deficiencies.

Hell Hole Administrative Station

The Hell Hole Administrative Station is in disrepair and in need of upgrading to better meet current administrative need, including adequate workspace and storage for operation and maintenance of the Hell Hole recreation facilities. This facility was identified in the 1965 MOU between the FS and the Licensee to serve as a housing and support facility to be provided by the Licensee. The facility was subsequently constructed under the Davis Grunsky funding to provide the needed administrative site for better managing and operating the campgrounds and facilities. This condition proposes to modify this facility to provide the space needed at this time for administrative workspace and storage along with providing a recreation rental to serve the visiting public that are looking for a recreation opportunity other than camping, but still in proximity to Hell Hole Reservoir. The FS has found that other recreation rentals on the Eldorado National Forest are in high demand and have high occupancy rates, indicating that there is a need for this type of recreation opportunity.

Hell Hole Reservoir Trail

As stated above, there is a substantial demand from recreation visitors to the MFAR Project area and campgrounds for hiking and walking opportunities and a lack of these opportunities. This conclusion is reflected in the discrepancy between the number of visitors that reported hiking and walking as important to very important to their visit, in comparison to the percentage of visitors that reported participating in this activity. The feasibility report for the MFAR (Leeds, Hill and Jewett, 1964) identified the intent to provide a foot trail all the way around the reservoir and addressed the need to move the trail on the south side of the reservoir due to the project (also see the memorandum of understanding between FS and the Licensee (PCWA 1968)). The Exhibit R map (PCWA 1967) shows the trail along the south side of Hell Hole Reservoir as "relocated" and shows the trail extending to the east and along a portion of the north side of the reservoir, connecting with the Hell Hole 4WD Trail. Further, PCWA obtained an easement from PG&E for the right to "construct, maintain and use trails suitable for both pedestrian and for equestrian use for the eventual use of public recreational purposes in connection with PCWA's Hell Hole Reservoir project (Grant Deed dated 2/18/1966). Additionally, Upper Hell Hole Campground is repeatedly referred to in the Recreation Feasibility Report and in the Exhibit R maps as a "Trail Camp" with both boat and trail access. There is continued visitor interest in trail access to the reservoir as identified in the Licensee's REC-2 TSR (PCWA 2010c). This TSR lists the most frequent responses for secondary

reasons for visiting the area as “access to lake/reservoir”, identified that 66 percent of visitors said hiking trails are very important or important, and that nearly 66 percent of visitors said that fishing access trails are very important or important. In contrast, only 34 percent of visitors said that they had or will hike or walk during their visit (PCWA 2010c). This discrepancy demonstrates the need for and demands for walking and hiking opportunities within the MFAR Project.

Long Canyon Recreation Area, Middle Meadows Campground

Middle Meadows Group Campground consists of two group sites which are heavily used during the summer period, particularly during weekends, as shown in the Licensee’s REC-1 TSR (PCWA 2010b). The Recreation Plan recognizes the need for monitoring of use and establishment of triggers to determine when development of an additional group camping site at this facility is needed.

Duncan Creek Diversion Area

Much of the area to the north and east of the diversion pool is utilized for dispersed recreation when snow does not limit access. The FS agrees with the Licensee’s REC -1 TSR (PCWA 2010b) and adds that the heaviest use is in the fall until the end of October, or deer hunting season.

The visitor use survey had a limited response (5 individuals) when analyzed in whole acknowledged tent camping (4 answered the length of stay question with an average 2.8 nights) was a primary activity. There seems to be a tendency towards stream based recreation as well (PCWA 2010c).

The FS agrees with the Licensee’s proposal in REC-1 Table 4 (PCWA 2010b) to install sanitation facilities and barrier the perimeter of the concentrated use area as well as to define camping sites. This area is in a wildland setting. As such continuing the rustic semi-primitive setting is appropriate for this area. An information board would be constructed and installed on which to post pertinent information (fire restrictions, etc).

Middle Fork Interbay Reservoir Area

By agreement with the relicensing participants, including the FS, no surveys were conducted in the Interbay Reservoir Area. However, since the beginning of the relicensing effort the FS has heard stakeholders report that the Middle Fork American River Interbay area is favored by anglers as a unique stream based recreational activity.

Upon visiting the Middle Fork Powerhouse area in October 2010, the FS found evidence that sanitation facilities are necessary and that upstream access is prohibited by fencing. As such the FS urges PCWA to meet with interested stakeholders to develop a way to access the upstream area while PCWA meet their security needs.

Rubicon River Recreation Area, Ellicott's Bridge River Access Area

The Ellicott's Bridge River Access site provides the primary access to the Rubicon River between Hell Hole Reservoir and Ralston Afterbay. This site is used by anglers and other water-based recreationists using this bypass reach of the Rubicon River. The Ellicott's Bridge River Access Area also serves as a trailhead for the Hunter Trail, which provides access along this segment of the Rubicon River for anglers (Carnazzo 2010a). This site is regularly used, based on observations by FS staff, in the comments submitted by representatives at the Angler Focus Group Meeting (Carnazzo 2010b), and as reported in the Licensee's REC-4 TSR (PCWA 2010e). At this time, the FS provides clean-up and visitor management at this site. The use at this site is a result of the licensee's recreation developments in the Hell Hole and French Meadows area, improved access to the area, and from project flows which have increased fish populations and improved angling opportunities through higher summer flows and colder summer water temperatures. There is a need for improved parking, sanitation facilities and access at this river access site for anglers, whitewater boaters and other water-based recreationists, as described in the Licensee's REC-4 TSR (PCWA 2010e), the comments from Foothills Angler Group (2010), comments from the Foothills Water Network (2009, as presented in the Licensee's REC-4 TSR) (PCWA 2010e), and FS staff observations.

Ralston Afterbay Sediment Removal Access Point Area

This site is identified as an access point for boaters to the afterbay and is open to the public, although it is not considered a developed recreation facility. In particular, this site serves as a launch area for trailered boats, since it is accessible from Forest Road 23, is not as steep as the Ralston Picnic Area Car Top Boat Ramp, and is not blocked by large rocks (PCWA 2010d). In order to provide reasonable access for trailered boats, this site will be improved to a limited extent. The improvements will clearly indicate the launch and limit the potential for widening or expansion of the launch from uncontrolled use.

Ralston Picnic Area and Cartop Boat Ramp

This facility is located on the Middle Fork American River just upstream of Ralston Afterbay.

The FS operates and maintains this area through funding from PCWA under the current license.

The primary activity that visitors participate in is reservoir or stream fishing. The secondary activity is reservoir swimming/waterplay/sunbathing (31 percent) or stream swimming/waterplay/sun bathing (33 percent).

Sites 1 and 5 are seldom utilized as evidenced by herbaceous vegetation that is around the site and by weekly maintenance staff and could be removed to reduce maintenance costs. The car top boat launch has several large boulders prohibiting access to the river; this was done several years ago when wheeled motorized vehicles were entering the river. A better, multi-craft entry to the afterbay is available at the sediment removal access point

less than a 0.25 mile to the southeast. There is available parking for vehicles with boat trailers at the picnic area.

There is a user-created trail, along an historic ditch, that travels upstream of the picnic area. This trail has a number of user-created sub trails accessing the MFAR. This trail also accesses a water temperature gage (designated as MF 26.0) that is under special use permit to the Licensee. Developing this trail to a standard that meets FS specification would provide protection of adjacent resources.

Middle Fork American River (Peaking Reach) Recreation Area

Indian Bar River Access Area

Located on Tahoe National Forest this area is a popular white water boating launch area as well as day use area. The Licensee's REC-1 TSR (PCWA 2010b) survey indicates that the primary use of this area was whitewater boating (43 percent) with secondary activities being picnicking, fishing, and stream based water play or sunbathing (29 percent each). When weather conditions are favorable it is common to see anglers and day users between the Ralston Afterbay dam and the Oxbow Powerhouse tailrace (boater input channel).

Facilities were constructed with California State Department of Boating and Waterways grant funding obtained by the FS. For many years California State Parks has operated and maintained these facilities during commercial white water boating season, though FS has attempted to provide a year round presence as well.

The raft launch is down a steep earthen slope to an eddy that has little space. A slide ramp would enhance the ability to launch water craft. Use figures gathered by State Parks for 2010 indicates that there were 17,262 commercial clients that put in at this launch facility. This was lower use year than five years ago when the reported usage was nearly 30,000 people. Typically the majority of commercial boating is conducted over a five-month period from May to September; the majority of this use occurs in a small time frame after arriving on site and prior to launching. Toilet facilities are overwhelmed. Modifying the existing toilets, to meet peak use will prevent sanitation issues from continuing to arise. There are issues with the toilets venting, this may be because of their location in proximity to shade. If shade is not determined to be the issue, installation of ventilation systems would improve the facility.

The area between Ralston Afterbay Dam and downstream of the Oxbow Powerhouse are popular mining areas even though the area was Withdrawn from mineral entry, location, or disposition in November 2, 1961 to facilitate the establishment of this Project. The Licensee has requested that the FS address the mining. Posting the area with appropriate regulation to notify the public that the area is not available for mining would educate the public and provide the FS the tools necessary to take enforcement action if it were necessary.

Parking and commercial rafting transportation drop-off for the site is on a sediment augmentation pile. This sediment is meant to be released downstream during high flow events. Camping tends to interfere with commercial rafting transportation and so is not tolerated during the height of rafting season. Signs need to be installed saying no overnight camping April through September. However the area is available for camping (not to exceed 14 days maximum by TNF Forest Order) October through March, and signage should represent this recreation opportunity.

There is an opportunity to utilize the Ralston Afterbay Overflow Parking area as a unique day use area and for parking. Providing shade armadas over two picnic tables would provide year round comfort on this rather hot area that overlooks the river.

Periodic Recreation Use Monitoring, Visitor Surveys and Reporting

Objectives Addressed by Periodic Recreation Use Monitoring, Visitor Surveys and Reporting

Recreation Management Objective
Resource Protection Objective
Reservoir Levels Objective

Rationale for Periodic Recreation Use Monitoring, Visitor Surveys and Reporting

As part of managing the recreation resources within or affected by the Middle Fork American River (MFAR) project, understanding the dynamic changes in recreation over the life of the license is critical. It is widely recognized that substantial changes in recreation use, activities, motivations, and other related items can happen in a short span of time. These trends are important to recognize and track so that adjustments in management strategies can be made in order to prevent the degradation of either resource conditions or recreation experiences. As an example, the Outdoor Recreation Resources Review Commission, which was largely responsible for developing use, activity, and motivation data starting in 1960, recommended completing recreation surveys on a 5-year interval (Haas 2007). The change over time of visitor attitudes, preferences, use patterns, experience, and capacity may require modifications to the management of recreation within the Project area. This form of information gathering is aimed at fully using recreation sites while mitigating Project-related impacts within and adjacent to Project-affected areas and the downstream footprint area of the project. The timing of this measure (6 years) was developed to ensure changes in recreation could be identified with sufficient time for management programs to react and to correspond with reporting requirements for recreation that FERC requires. This measure will provide the licensee and FS the ability to react to changes and provide the quality recreation opportunities in the Project area required to meet the Forest Plan, and other applicable management standards.

Fish Stocking Program

Objectives Addressed by Fish Stocking Program

Reservoir Angling Objective (Hell Hole Reservoir / French Meadows Reservoir):

- Protect and enhance reservoir angling opportunities (shoreline and boat) at Hell Hole Reservoir consistent with overall reservoir-based recreation and reservoir level goals through fish stocking, maintenance of structures, and access.
- Ensure fish stocking in Hell Hole Reservoir is adequate and consistent with goals of providing a trophy trout angling opportunity; there may be a need for a cooperative agreement to meet this objective.
- Protect and enhance reservoir angling opportunities (shoreline and boat) at French Meadows Reservoir consistent with overall reservoir-based recreation and reservoir level goals through stocking, maintenance of structures, and access.
- Ensure fish stocking in French Meadows Reservoir is adequate for a quality angling experience; there may be a need for a cooperative agreement to meet this objective.

Information Used to Establish Fish Stocking Program

The Licensee has explored and compiled historic CDFG fish stocking records for the water bodies within the MFAR watershed (PCWA 2011c, Table 6 and Table 7). Stocking management targets and annual caps, not to exceed the average fish stocking rates from years 2001 -2009, are expected to be applied to an ongoing stocking program under a new MFAR Project license.

Rationale For Fish Stocking Program

Project facilities and operation have a direct affect on the movement of fish within habitat of the Middle Fork watershed, causing isolation to those populations supported by impounded waters upstream of Project dams. The licensee is responsible for providing reservoir-based recreation, including angling opportunities at facilities developed on public lands. It is reasonable to expect that the licensee will fund 100% of future fish stocking costs at two of the three large MFAR project impoundments as enhanced recreation and ongoing mitigation for impacts to the historic fishery. The fish stocking program for French Meadows and Hell Hole Reservoirs should be fully funded through a new MFAR Project license.

Consultation and Annual Coordination Meeting

Objectives Addressed by Consultation and Annual Coordination Meeting

Visual Resources Objective
Recreation Management Objective

Recreation Design Objective
Recreational Access Objective
Resource Protection Objective

Rationale for Consultation and Annual Coordination Meeting

It is the desire of the FS, along with other interested parties, to continue a similar level of coordination and adjustment for the Project. By having specific coordination meetings, public interests including the results of surveys, resource protection measures, and other input from prior years can be reviewed. These reviews will allow for the determination of necessary maintenance, rehabilitation, construction, and reconstruction work needed, based on facility condition and other factors at the time. Data from ongoing monitoring will assist in making any needed changes in the schedule of work, and for future planning.

Specific Improvements at Dispersed Recreation Sites

Objectives Addressed by Specific Improvements at Dispersed Recreation Sites

Recreation Management Objectives
Recreation Design Objective
Resource Protection Objective

Information Used to Establish Specific Improvements at Dispersed Recreation Sites

The following information was used to establish the need for a Recreation Plan:

- Middle Fork American River Project Existing Resource Information Reports (June 2006b)
- Middle Fork American River Project Description (PCWA Draft 2006a)
- Recreation Use and Facilities (PCWA 2010b)
- Recreation Visitor Surveys (PCWA 2010c)
- Reservoir Recreation Opportunities (PCWA 2010d)
- Stream-based Recreation Opportunities (PCWA 2010e)
- Contingency Whitewater Boating Study (PCWA 2010f)
- Eldorado National Forest Land and Resource Management Plan (1989)
- Tahoe National Forest Land and Resource Management Plan (199))
- Angler Focus Group Meeting Comments of Anglers (Carnozza 2010a)
- Foothills Angler Group Facilities Project List (Carnozza 2010b)
- Forest Service Outdoor Recreation Accessibility Guidelines (FSORAG) (USDA 2006b).

Rationale for Specific Improvements at Dispersed Recreation Sites

Cache Rock River Access

The Cache Rock River Access area does not include any developed recreation facilities at this time, although there are 10 designated primitive camping areas. The area is used as a lunch stop by whitewater boaters (PCWA 2010b) and by individuals accessing the river via the 4WD access road (Forest Road 14N35A) to fish and participate in other water-based recreation activities (based on observations by FS staff and comments from the public (PCWA 2010e). At this time, there is no public right of way across the private land located south of the Cache Rock River Access Area; however the Forest Service is currently working with the private landowner to acquire public access. At this time, the FS provides clean-up and visitor management at the Cache Rock River Access Area. Sanitation facilities and safety information is needed at this location to better provide for public health and safety for recreating visitors at this site and to ensure recreation visitors are having a quality experience and not impacting resources.

Reservoir Minimum Pool Elevation and Scheduling Objectives

Objectives Addressed by Reservoir Minimum Pool Elevation and Scheduling Objectives

Recreation Management

Macroinvertebrates

Temperature

Dissolved Oxygen

Water Quality

Natural Hydrograph

Flow Fluctuations

Geomorphology

Riparian Habitat

Threatened, Endangered, and Sensitive Species and Management Indicator Species

Hydropower Operations

Information Used to Establish Reservoir Minimum Pool Elevation and Scheduling Objectives

The following information was used to establish the need for the Reservoir Minimum Pool Elevation and Scheduling Objective:

- Middle Fork American River Project Existing Resource Information Reports (PCWA 2006b)
- Middle Fork American River Project Description (PCWA Draft 2006a)
- Recreation Use and Facilities (PCWA 2010b)
- Recreation Visitor Surveys (PCWA 2010c)
- Reservoir Recreation Opportunities (PCWA 2010d)
- Eldorado National Forest Land and Resource Management Plan (1989)
- Tahoe National Forest Land and Resource Management Plan (1990)
- Feasibility Report on Middle Fork American River Project (Leeds, Hill and Jewett, 1964)

Rationale for Reservoir Minimum Pool Elevation and Scheduling Objectives

Estimated public recreational use of the two major storage Project reservoirs (French Meadows and Hell Hole Reservoirs) is displayed in the REC 1 and REC 3 Technical Study Reports (PCWA 2010b and PCWA 2010d). These reports show that these reservoirs receive recreational use during the summer and fall periods when surveys were conducted. This recreational use includes boating for pleasure, fishing, swimming and other forms of water play or shoreline use.

Reservoir level minimums and objectives have been developed to allow for continued recreational use of the Project reservoirs, and to maintain the aesthetic quality of the recreation experience, while still meeting other recreational needs, resource objectives, and hydropower generation. Factors considered in developing desired reservoir levels included (1) maintaining the functionality of facilities and improvements serving recreation visitors, such as boat ramps, picnic areas, etc., (2) maintenance of aesthetic qualities and public perceptions, (3) continuing to provide for the recreation activities visitors have come to enjoy, and meeting anticipated future uses and trends, (4) historic reservoir levels with associated uses, conflicts, and other management issues, and (5) personal observations of recreation managers from the Eldorado and Tahoe National Forests.

French Meadows Reservoir

French Meadows Reservoir provides a variety of recreation opportunities including fishing, reservoir boating for pleasure (motorized and non-motorized), swimming and water play, and other shoreline recreation. The desired condition for management of French Meadows Reservoir, from a recreation perspective, is to maintain the reservoir level as high as possible during the recreation season, to restrict encounters with physical hazards associated with stumps and other protrusions, and to maintain reasonable access to the shoreline from developed recreation facilities. The recreational use season at French Meadows Reservoir typically extends from snowmelt (often in late May to early June) through November. There are two boat ramps at French Meadows reservoir. The minimum reservoir level at which at least one of the boat ramps is useable is 5,200 feet in elevation. The reservoir elevation has historically fluctuated during the recreation season generally between 5,260 and 5,190 feet elevation, with the peak typically in late June (PCWA 2010d).

Hell Hole Reservoir

Hell Hole Reservoir provides a variety of recreation opportunities including fishing, reservoir boating for pleasure (motorized and non-motorized), and dispersed camping. Swimming, water play, and other shoreline recreation are less common due to the steep shoreline and limited access. The desired condition for management of Hell Hole Reservoir, from a recreation perspective, is to maintain the reservoir level as high as possible during the recreation season and to allow for access to the upper portion of the reservoir as late into the recreation season as feasible. The recreational use season at Hell Hole Reservoir typically extends from snowmelt (often in late May to early June) through

late October. The minimum reservoir level at which the boat ramp is useable is 4,530 feet in elevation. The upper portion of the reservoir becomes inaccessible or difficult to access when the reservoir level drops below 4,530 to 4,560 feet in elevation. The reservoir elevation has historically fluctuated during the recreation season generally between 4,630 and 4,500 feet elevation, with the peak typically in late June (PCWA 2010d).

Recreational Streamflows

Objectives Addressed by Recreational Streamflows

Recreational Streamflow Objective

Information Used to Establish Recreational Streamflows

The following information was used to establish recreational streamflows:

- Streambased Recreation Opportunities Technical Study Report (PCWA 2010e)
- Contingency Whitewater Boating Study (PCWA 2010f)
- Instream Flow Technical Study Report (PCWA 2010a)
- CDPR Whitewater Use Data, Whitewater Recreation Office, Auburn SRA (CDPR 2010a)
- Visitor Attendance Data, Auburn SRA (CDPR 2010b)
- Auburn State Recreation Area Interim Resource Management Plan (CDPR 1992)
- Draft Whitewater Management Plan North and Middle Fork, American River (CDPR 1987)
- Proposed Whitewater Management Plan for the North and Middle Fork American River, California (USDI Bureau of Reclamation and CDPR 1985)
- American River Wild and Scenic Eligibility Study (USDI Bureau of Reclamation 1993)
- American River National Recreation Area Feasibility Study (USDI Bureau of Land Management 1990)

Rationale for Recreational Streamflows

As discussed above in the portion of the Specific Recreation Measures which addresses section the Middle Fork American River (Peaking Reach) Recreation Area section, flow-dependent recreation activities occur along the peaking reach. These activities include whitewater rafting and kayaking, canoeing and fishing. The hydroelectric project results in higher flows during the summer and fall, which would not occur in the unimpaired condition. These higher flows have attracted the flow-dependent whitewater recreation use. Similarly, the project results in higher flows and colder water temperatures during the summer and fall than the unimpaired condition which sustains a cold water fishery which has attracted angling use along the peaking reach.

The unimpaired hydrograph for the peaking reach indicates that in most water type years there is insufficient flow to support the primary whitewater recreation that occurs on this

reach, the rafting on the Class IV-V Tunnel Chute run, from approximately mid-June to late November or early December. This run requires a minimum of 1,000 cfs in order to provide an acceptable recreation experience. The unimpaired hydrograph indicates that flows would drop below this level from sometime between early June to early July, depending upon water year type, and flows would not again reach this volume until late November or early December.

Whitewater use data, both private (actual reported amount) and commercial use on the Tunnel Chute and Mammoth Bar runs, from 1995 through 2009 totals 270,710 people. Of this total, 231,961 people used the river during the period from mid-June through the end of November, which is eighty six percent of the total whitewater recreation use in the peaking reach. The impaired flows from the PCWA project are responsible for 86 percent of the primary flow dependent use within the peaking reach.

Tunnel Chute Run

A key interest of the resource agencies is to maintain the current level of whitewater boating flows that have been provided for the Class IV Tunnel Chute run over the past decade or more. These recreation flows of 1,000 cfs, for 3 or 4 hours, between 8 or 9am and noon, for seven days per week from May through September in many if not most water year types.

The resource agencies believe that the flow magnitude for whitewater boating flows on the Tunnel Chute Run, should be 1,000 in all water year types. The resource agencies commented on the reports of these flow studies in an October 2009 letter, including specific comments on the identified acceptable flow ranges stated in these reports. The resource agencies have also reviewed the individual survey forms from the whitewater recreation flow studies.

The Streambased Recreation Opportunities Technical Study Report (PCWA 2010e) suggested that 800-900 cfs is an appropriate minimum acceptable flow for whitewater boating on the Tunnel Chute Run. However, the resource agencies believe that 1,000 cfs is the minimum acceptable flow to provide for whitewater boating on this run. This Class IV run has steep, rocky technical drops and the 100-200 cfs difference between 800 or 900 cfs and 1,000 cfs is significant. As noted in Appendix Q of the whitewater recreation flow study, at 1,000 cfs the rocks and boulders on the run are covered with water, there are more and better routes through the rapids and safety concerns relative to swims are reduced as compared to the lower flows. Reading the completed survey forms of the participants in the flow study for this run is also revealing. Despite marking on the form that 800 cfs would be an acceptable flow, several of these same respondents go on to note that the “rapids are much safer with more water” or note the problems of boating at 800 cfs including greater potential for wraps, pins and dangerous swims. The CDPR whitewater ranger, with more than 20 years of experience on this river and run, firmly believes that 1,000 cfs is the appropriate minimum acceptable flow. The resource agencies believe that recreation flows provided as part of license requirements should be developed closer to the low end of optimal flows particularly when optimal flows reduce safety concerns.

Mammoth Bar and Confluence Runs

The resource agencies have a strong interest in providing adequate recreation flows for the Mammoth Bar and Confluence runs earlier in the day during the primary summer season, than currently occurs. Specifically, the resource agencies are interested in the licensee providing recreation flows of a minimum of 800 cfs at the Confluence by noon to 2pm at least some weekend days in most water year types. The travel time for flows down the peaking reach varies depending on the minimum and peak flows. As noted in the Instream Flow Technical Study Report, with a base flow of 200 cfs and a peak flow of 1,000 cfs, the travel time from Oxbow to the Confluence is 9.7 hours. Over the past decade or two, the summer peak flows of approximately 1,000 cfs have not reached the Confluence until 5 or 6pm. For much of this time this wasn't an issue because the river was closed to recreation use below the Confluence due to the danger of the Auburn Dam diversion tunnel, which diverted the entire river through a half mile tunnel at the Auburn Dam site.

In 2008, the Licensee and Reclamation completed the American River Pump Station project which, in addition to constructing a pump station, closed the diversion tunnel and restored the river to its historic channel. The Confluence Run has been available for public use since that time. The China Bar run slowly gained popularity in the first two seasons of use (2008-2009) that this stretch has been available. This Class 2 run, which is accessible to a wide range of boating skill levels, is very close to the City of Auburn and highly accessible via Highway 49. The man-made bypass channel constructed as part of the Pump Station diversion was designed to be attractive to whitewater boaters. This run can serve a variety of recreational boating interests, from casual down river boaters enjoying the scenery, to whitewater play boaters who are attracted to the waves and holes on the run at certain flows. While the vast majority of the use on the Tunnel Chute is provided by commercial whitewater outfitters, the use of the Confluence run is "private" boating use. A whitewater festival was held on this run in 2010 which attracted several hundred participants and spectators. Provided adequate flows are available at appropriate times and sufficient access is provided, the resource agencies expect this run to become very popular in the future.

The Streambased Recreation Opportunities Technical Study Report (PCWA 2010e) suggested that the acceptable minimum boating flows for the Confluence Run are from 350 to 600 cfs. The flow study was based on seven survey participants at the lowest flow of 368 cfs and five participants at flows of 600, 800 and 1,000 cfs. These are not large sample sizes. A number of these participants indicated the minimum acceptable flow was 600 cfs and others made comments that more water would be better and provide greater room to maneuver. Some study participants also noted that even at flows of 800 cfs, the water level was shallow and rocky at the Pump Station Bypass channel. One participant noted that the bypass channel was nearly unnavigable at 368 cfs. It is the resource agencies' understanding that the Pump Station bypass channel was designed to accommodate recreation boating at a range of flows with a minimum flow of 600 to 800 cfs. Understanding the range of flows for which the bypass channel was designed could help inform the acceptable minimum flows for this run. The resource agencies believe

that a flow of 800 cfs may provide the best recreation opportunities for a variety of watercraft on the Confluence Run.

The limited storage capacity of Ralston Afterbay is a key constraint in the MFAR system in meeting the various flow needs and demands in the peaking reach and in retaining the licensee's desired flexibility (daily, weekly, and seasonally) in operating their system and maximizing peak power generation. Since there is limited opportunity to increase the storage capacity of Ralston Afterbay, the resource agencies believe some shifting of the timing of power generation in the Middle Fork and Ralston Powerhouses, in order to maintain appropriate reservoir levels at Ralston Afterbay, may be necessary and reasonable in order to meet the various flow demands in the peaking reach. Such shifting of the timing of generation does not necessarily result in a loss of generation but may reduce the value of a small portion of the generation.

The resource agencies also have an interest in seeing peak recreation flows reach the Mammoth Bar run at a reasonable time of day, between 10am and 1pm depending on the water year type, on some weekend days during the primary summer boating season. The put-in for this run is below Ruck-a-Chucky Rapid at the Greenwood river access site. With a base flow of 200 cfs and a peak flow of 1,000 cfs, the water travel time from Oxbow to the Confluence is about 6 hours. The early release Confluence flows also provide boatable flows for the Mammoth Bar run within the target timeframe of 10am to 1pm.

The Streambased Recreation Opportunities Technical Study Report (PCWA 2010e) suggested that 500-600 cfs is an acceptable minimum flow for the Mammoth Bar Run. Again, these flow studies were based on four or five participant surveys at the two target flows. This is not a large sample size on which to base acceptable minimum flow decisions. Again, in reviewing the four individual survey forms for the 600 cfs target flow, at least one of the four indicated 600cfs was "unacceptable." All of the participants on the flow studies for the Mammoth Bar Run were using inflatable kayaks or hard shell kayaks; none were in rafts. The resource agencies do not agree that 500-600 cfs is an acceptable minimum flow for this run in all crafts and believe that 800-1,000 cfs is a more appropriate minimum acceptable flow for this run, including rafts.

Visual Resource Management Plan

Objectives Addressed by Visual Resource Management Plan

Visual Resources Objective

Information Used to Establish Visual Resource Management Plan

The following information was used to establish this condition:

- Eldorado National Forest Land and Resource Management Plan (USDA 1989)
- Tahoe National Forest Land and Resource Management Plan (USDA 1990)
- National Forest Landscape Management Volume 1 (USDA 1973c)

- National Forest Landscape Management Volume 2, Chapter 1, The Visual Management System (USDA 1974)
- Visual Quality Assessment Technical Study Report (PCWA 2009d)
- Final Visual Resource Management Plan (PCWA 2011g)

Rationale for Visual Resource Management Plan

The Eldorado and Tahoe National Forest Land and Resource Management Plans define visual quality objectives for NFS lands in the Project areas. Some Project facilities and operations are visible on the landscape and contrast with the surrounding forested setting. Project roads, campgrounds, and facilities are obvious to the casual observer. Conditions and recommendations in this section are intended to decrease conflicts with visual management objectives of the National Forests, yet allow continued operation of the Project.

CULTURAL RESOURCES

Applicable Sections

Historic Properties Management Plan
Cultural Resource Discovery

Existing Conditions

There are current and past cultural resource management resulting from Project-related operations and activities that directly and indirectly affect cultural resource sites within the project's Area of Potential Effect (APE).

Desired Conditions

The desired condition within the APE is to mitigate impacts to eligible historic properties pursuant to the National Historic Preservation Act of 1966, as amended.

Cultural Resources and Heritage Resources Discovery

Objectives Addressed by Cultural Resources Measures

Cultural Resources Objective
Resource Protection Objective

Information Used to Establish Cultural Resources Measures

The following information was used to establish these conditions:

Cultural Resources Technical Study Reports (PCWA 2008b and PCWA 2009e)
Federal laws, regulations, policies, and procedures related to Cultural Resource Management

Rationale for Cultural Resources Measures

The licensing of the Project is a federal undertaking requiring compliance with Section 106 of the National Historic Preservation Act, which requires any Federal undertaking to consider historic properties and afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking before issuance of the license (16 U.S.C.). Sections 32 and 33 will fulfill these Federal obligations.

TRANSPORTATION MANAGEMENT

Applicable Sections

Transportation System Management Plan

Existing Conditions

The results of the Land 1 – Transportation System Technical Study Plan (PCWA 2008) and displayed in the accompanying technical memorandum shows the existing and proposed project roads and trails. The study plan also sought to determine the operation, maintenance, condition, negative environmental effects and physical characteristics of those project roads and trails and then report any deficiencies.

The licensee uses National Forest System Roads (NFSR) and Trails (NFST) for the general access to the operation and maintenance of project facilities and the public uses these roads for access to the recreation opportunities provided by the facilities. In addition to the Project Roads, they provide the sole road access to the licensee's facilities. The licensee uses all of these routes throughout the year for the operation and maintenance of their facilities. These are all National Forest System Roads under the jurisdiction of the Eldorado and Tahoe National Forests.

FS does not maintain winter access to any destinations or to other permitted activities over the general access roads nor does the Forest Service routinely remove snow. The licensee's requires year around access to portions of the project over roads and removes snow to achieve that access. They annually remove snow on roads to gain early season access to the remainder of their facilities for planned outages, repairs and modifications. Snow removal activities and wet weather use increases costs and effort associated with user generated, recurring, and deferred maintenance as well as increases surface replacement costs.

Desired Conditions

The desired condition of project roads and trails is the operation and maintenance of those facilities consistent with the Eldorado and Tahoe National Forest Land and Resource Management Plans as well as FS standards in an economical and efficient manner that provides necessary access to the project while minimizing negative environmental effects

throughout the life of the license. That desired condition includes the appropriate service level of public access to project related recreation facilities and opportunities.

The desired condition for the National Forest System Roads used to access project facilities is for an agreement authorizing the licensee's use of those roads and the licensee's commensurate share of road maintenance and repairs.

Transportation System Management Plan

Objectives Addressed by Transportation System Management Plan

The TSMP identifies the deficiencies of the project roads and trails and establishes a prioritized timetable to correct these deficiencies. The TSMP also establishes the objectives for the long term operation and maintenance of project roads and trails and the framework for the licensee and FS cooperation.

Information Used to Establish Transportation System Management Plan

The following information was used to establish this condition:

- Transportation System Technical Study Report (2009f)
- Recreation Technical Study Reports referenced in the Recreation section, above
- Eldorado National Forest Land and Resource Management Plan (USDA 1989)
- Tahoe National Forest Land and Resource Management Plan (USDA 1990)
- FS manuals and handbooks

Rationale for Transportation System Management Plan

Pursuant to 36 CFR 212.7 (d), the licensee, as a principal user of National Forest System roads is required to share in the maintenance of the road system, commensurate with their use. Project facilities must be inventoried and maintained.

Specific transportation needs were identified that are directly related to the Project or visitation and public use that is a result of the Project facilities and Project operations.

LAND MANAGEMENT

Applicable Sections

Fire Prevention, Response, and Investigation Plan
Erosion and Sediment Control and Management
Vegetation and Integrated Pest Management Plan

Existing Conditions

- Continued emphasis on hydroelectric generation can be expected.

- Licensee studies show that recreational use of the Project is increasing and is projected to continue to increase.
- Fire risk near Project reservoirs and dispersed areas is increasing.

Desired Conditions

- Promote fire prevention commensurate with resource values at risk.
- Treat natural fuels in the following order of priority: (1) public safety, (2) high-investment situations (structural improvements, powerlines, etc.), (3) known high fire occurrence areas, and (4) coordinated resource benefits, i.e., ecosystem maintenance for natural fire regimes.
- Manage, construct, and maintain buildings and administrative sites to meet applicable codes and to provide necessary facilities to support resource management.
- Inspect dams and bridges at prescribed intervals and provide maintenance necessary to keep them safe.
- Provide for continued use of hydroelectric facilities.
- Consider volcanic, seismic, flood, and slope stability hazards in the location and design of administrative and recreation facilities.

Fire Management and Response Plan

Objectives Addressed by Fire Management and Response Plan

The objectives addressed are to outline the responsibility of the Licensee and its contractor(s) for fire prevention and suppression activities, set up reporting and attach procedures in the event of a fire in the vicinity of the project, and ensure that fire prevention and suppression techniques are carried out in accordance with Federal, State, and local laws and regulations.

Information Used to Establish Fire Management and Response Plan

The following information was used to establish the Fire Management and Response Plan:

- Fire Prevention and Response Technical Study Report (PCWA 2009g)
- California Public Resource Code (PRC)
- FS manual direction, which includes a determination of potential probability of fire occurrence during any given weather scenario (currently referred to as Project Activity Level, PAL)

PAL institutes a series of prevention techniques as well as restrictions for some activities during the driest conditions and applies to all operations and maintenance activities including those conducted by FS contractors, permittees, and personnel as well as the Licensee for operation and maintenance of power generation facilities. Additionally, upon the determination of the Forest Supervisor, the FS can implement fire restrictions that limit many activities, usually excluding activities within developed recreation sites. Fire restrictions could limit the Licensee's O&M activities at project facilities; it is necessary to establish procedures so that Licensee is informed.

Rationale for Fire Management and Response Plan

The Fire Management and Response Plan outlines a series of procedures that protects resources and facilities, and provides for public (as well as PCWA personnel) safety through prevention of fires, and if needed, response to a fire. These procedures range from education about, and implementation of, PAL and fire restrictions; emergency contact information in the event of a fire in the vicinity of project facilities including recreation facilities, and outlines suppression efforts in the event of a Licensee Project caused fire as well as a fire in the vicinity of a project facility. It is important to note that contacting emergency services (e.g. 911) and taking action only within the limits of training and personal skill/knowledge in fire fighting, is extremely important. It is expected that periodic updates to the plan will be necessary.

Erosion and Sediment Control and Management Plan

Objectives Addressed by Erosion and Sediment Control and Management Plan Consistency with Plans

Information Used to Establish Erosion and Sediment Control and Management Plan

The following information was used to establish these conditions:

- Eldorado National Forest Land and Resource Management Plan (USDA 1989)
- Tahoe National Forest Land and Resource Management Plan (USDA 1990)
- Sierra Management Framework Plan Amendment (USDA 2004)
- Final Sediment Management Plan (PCWA 2011e)

Rationale for Erosion and Sediment Control and Management Plan

The Eldorado and Tahoe National Forest Land and Resource Management Plans (USDA 1989 and USDA 1990) contain various requirements addressing erosion control and water quality. In particular, applicable riparian conservation objectives described on pp. 62 through 66 in the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (USDA 2004) apply.

Rationale for Administrative FS Conditions

Objectives Addressed by Other FS Conditions

Consistency with Plans

Information Used for to Establish Other FS Conditions

The following information was used to establish these conditions:

- Eldorado National Forest Land and Resource Management Plan (USDA 1989)
- Tahoe National Forest Land and Resource Management Plan (USDA 1990)
- Sierra Management Framework Plan Amendment (USDA 2004)
- Forest Service manuals
- Various laws and regulations

Rationale for Other FS Protection, Mitigation, and Enhancement

Consultation, Approval of Changes

The Eldorado and Tahoe National Forest Land and Resource Management Plans and their amendments contain numerous requirements that must be met before construction or if changes in Project implementation are proposed. In addition, new information may become available that demonstrates that revision of the Section 4(e) conditions is necessary to accomplish protection and use of National Forest System resources. The standard conditions address these items and ensure that the Project does and will continue to meet the requirements in the Eldorado and Tahoe National Forest Land and Resource Management Plans.

Please see the General Discussion at the end of the list of other conditions.

Access

The rationale for access and road use by the government is from FS Manual 7700 (7730.1 – Authority) – Transportation System, as follows:

Authority: Authorizes the Forest Service to require users of NFS roads to maintain roads commensurate with their use and to reconstruct roads when necessary to accommodate their use. If this maintenance or reconstruction cannot be provided or would not be practical, the Forest Service may require the users to deposit sufficient funds to cover the users' share of the maintenance or reconstruction.

Operation: FS may restrict use of administrative NFS roads and public NFS roads consistent with the foregoing requirements to meet RMOs and to comply with applicable regulations (36 CFR 212.5). Commercial haulers are subject to cost recovery and are also subject to investment sharing if they are hauling non-federal forest products from land tributary to roads authorized under a road use permit.

Traffic Control on Roads Subject to a Written Authorization: Road use may be authorized by an easement, a cooperative agreement, an investment sharing agreement or easement, a special use authorization, a contract, or another written authorization. Include necessary traffic rules in these documents. Roads Covered by a License Agreement or Memorandum of Understanding. Include traffic control requirements in these documents, and designate the party responsible for implementation

Surveys, Land Corners

Both the Eldorado National Forest and Tahoe National Forest Land and Resource Management Plans require that the FS provides for maintenance of property lines (Page 4-106 of the Eldorado National Forest Land and Resource Management Plan and guideline 60 of the Tahoe National Forest Land and Resource Management Plan (USDA 1989 and USDA 1990).

Pesticide Use Restrictions on National Forest System Lands

Page 4-292 of the Eldorado National Forest Land and Resource Plan requires the FS to consult with the SWRCB regarding all pesticide projects within 100 feet of flowing streams. This requirement is also necessary to comply with EPA standards.

Modification of 4(e) Conditions After Biological Opinion or Water Quality Certification

This condition is necessary to ensure compliance with the Endangered Species Act and the Clean Water Act. In addition, the Eldorado and Tahoe National Forest Land and Resource Management Plans, as amended by the 2004 Sierra Nevada Forest Plan Amendment, provide for moving ecosystem conditions toward goals that will restore and maintain the physical, chemical and biological integrity of the region's waters as mandated by the Clean Water Act, and will support the Forest Service's mission to provide habitat for riparian and aquatic-dependent species under the National Forest Management Act, Organic Act, Safe Drinking Water Act, and Endangered Species Act. In addition, p. 4-295 of the Eldorado National Forest Land and Resource Management Plan requires the FS to coordinate with the California State Water Quality Control Board regarding streamflows related to fisheries, disturbance of riparian vegetation, water quality maintenance, and recreation needs (USDA 1989).

Signs

The rationale for signs is from FS Manual 7160, Engineering Operations, Signs and Posters, as follows: The Washington Office Director of Engineering shall approve the acquisition, installation, and use of nonstandard symbols or traffic control devices (TCDs) for use at field locations. The Regional Sign Coordinator shall approve all other deviations from standards applicable to the acquisition, design, and installation of nonstandard signs and posters.

Further rationale is found in the US Department of Transportation, Federal Highway Administration's *Manual on Uniform Traffic Control Devices* (MUTCD), which is the national standard for signs, markings, pavement markings, and other devices used to

control traffic (traffic control devices) on all roads open to public travel. The Forest Service is required by 23 CFR 655.603 to adopt each addition of the MUTCD within 2 years of that edition becoming final through publication in the *Federal Register*. Traffic control devices shall be constructed, located, installed, and maintained according to the standards contained in the MUTCD. Refer to it for guidance and specific information for all standard signs and devices. Some devices in the MUTCD have been changed, deleted, and/or added. Refer to the current edition of the MUTCD for specific guidance and target dates for compliance for these devices.

Specific MUTCD direction includes:

- Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, bikeway, or private road open to public travel (see definition in Section 1A.13) by authority of a public agency or official having jurisdiction, or, in the case of a private road, by authority of the private owner or private official having jurisdiction.
- The Manual on Uniform Traffic Control Devices (MUTCD) is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F and shall be recognized as the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel (see definition in Section 1A.13) in accordance with 23 U.S.C. 109(d) and 402(a). The policies and procedures of the Federal Highway Administration (FHA) to obtain basic uniformity of traffic control devices shall be as described in 23 CFR 655, Subpart F. 03 In accordance with 23 CFR 655.603(a), for the purposes of applicability of the MUTCD:
 - Toll roads under the jurisdiction of public agencies or authorities or public-private partnerships shall be considered to be public highways;
 - Private roads open to public travel shall be as defined in Section 1A.13; and
 - Parking areas, including the driving aisles within those parking areas, that are either publicly or privately owned shall not be considered to be “open to public travel” for purposes of MUTCD applicability.

Use of National Forest System Roads for Project Access

Pursuant to 36 CFR 212.7 (d), the licensee, as a principal user of National Forest System roads is required to share in the maintenance of the road system, commensurate with their use. Project facilities must be inventoried and maintained.

Specific transportation needs of National Forest System Roads were identified that are directly related to the Project or visitation and public use that is a result of the Project facilities and Project operations.

Crossings, Access by the United States, Road Use

The Eldorado National Forest Land and Resource Management and the Tahoe National Forest Land and Resource Management Plans as amended by their Travel Management Plans prohibit cross county motorized traffic and restrict traffic to designated routes. Such routes are designated in the TSMP.

The US Code of Federal Regulations at 36 CFR 261.54 National Forest System roads, allows for a Prohibition in Areas Designated by Order . When provided by an order, the following are prohibited: using any type of vehicle prohibited by the order and being on the road.

General Discussion for all Other FS Conditions

- Maintenance of Improvements on or Affecting National Forest System Lands
- Existing Claims
- Compliance with Regulations
- Surrender of License or Transfer of Ownership
- Protection of United States Property
- Indemnification
- Damage to Land, Property, or Interests of the United States
- Risks and Hazards on National Forest System Lands
- Protection of FS Special Status Species
- Ground Disturbing Activities

The “other” conditions include requirements that serve to address the statutory and administrative responsibilities of the FS. These conditions address the FS concerns related to maintenance of the Project improvements; existing valid claims and rights to the land occupied by the Project; compliance with Federal, State, county and municipal laws and regulations; protection of Federal property; indemnification; water pollution; risks and hazards; signs, pesticide use restrictions; access; road use; and hazardous materials. FERC is not the agency responsible for administering National Forest System lands and cannot be expected to condition the Project license relative to the Eldorado and Tahoe National Forest Land and Resource Management Plans and the numerous laws, regulations, and agency policies that pertain to this National Forest System land. Including these conditions would ensure that project operations are consistent with management direction for the Forests.

During annual consultation meetings, useful information such as the timing of moving large equipment over Forest roads, spill events, and physical changes to Project features will be addressed. The FS could use the information to minimize user conflicts, particularly in the area of recreation, and schedule Forest personnel time for administration of the ongoing project.

There is a potential concern that Project features could be responsible for damage, injury, or death if the public accesses these features. Since these features are the property of the licensee, and not the FS, a license condition to require the licensee to indemnify the FS against damage, injury, or death associated with the use and/or occupation of National Forest System lands authorized by the Project license will protect the public interest.

Project facilities and activities may pose a threat of fires or other possible destruction of habitat with resultant losses of other resource values, injury, and human life. It is appropriate that the licensee take measures to minimize the risk to federal land and human life. Including license conditions that address these hazards provides an incentive to the licensee to eliminate or minimize risks associated with Project facilities and operations and to provide protection of Forest resources by preparing a plan for responding to wildland fires.

The Surrender of License condition would require the licensee to restore National Forest System lands in the event the license is surrendered. This condition would minimize the risk of Project improvements being abandoned on the Forests.

The remaining license conditions would provide protection for public health and/or safety and Forest resources on National Forest System lands by requiring compliance with laws, regulations, and statutory requirements that guide the FS in managing the Federal land occupied by the Project.

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Acronyms

ac-ft	acre-feet
AIR	Additional Information Request
AN	Above Normal Water Year
APE	Area of Potential Effect
ASRA	Auburn State Recreation Area
BLM	Bureau of Land Management
BMPs	Best Management Practices
BN	Below Normal Water Year
BOR	Bureau of Reclamation
C	Critical Water Year
CD	Critical Dry Water Year
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CDPR	California Department of Parks and Recreation
CDUA	Concentrated Dispersed Use Area
CFR	Code of Federal Regulations
cfs	cubic feet per second
CPI	Consumer Price Index
CVRWQCB	Central Valley Regional Water Quality Control Board (aka State Water Board)
D	Dry Water Year
DLA	Draft License Application
DBAW	Department of Boating and Waterways (California State)
ENF	Eldorado National Forest
ED	Extreme Critically Dry Water Year
FERC	Federal Energy Regulatory Commission
FGC	Fish and Game Code
FHA	Federal Highway Administration
FLA	Final License Application
FPO	Forest Protection Officer
FR	Forest Route
FS	Forest Service
FSH	Forest Service Handbook
FSORAG	Forest Service Outdoor Recreation Accessibility Guidelines
FYLF	Foothill yellow-legged frog
GIS	Geographic Information System
HPMP	Historic Properties Management Plan

List of Acronyms (continued)

ILP	Integrated Licensing Process
LEO	Law Enforcement Officer
MFAR	Middle Fork American River
MFARIB	Middle Fork American River Gage and Weir below Interbay Dam
MFP	Middle Fork American River Project
MOU	Memorandum of Understanding
msl	mean sea level
MUTCD	Manual on Uniform Traffic Control Devices
NEPA	National Environmental Policy Act
NFARPS	North Fork American River Gage above American River Pump Station
NFLCC	North Fork Long Canyon Creek Gage and Weir below Diversion Dam
NFS	National Forest System
NFSR	National Forest System Road
NFST	National Forest System Trail
O&M	Operation and Maintenance
PAD	Pre-Application Document
PAOT	Persons-at-one-time
PAL	Project Activity Level
PCWA	Placer County Water Agency
PM&E	Protection, Mitigation, and Enhancement
Project	Middle Fork American River Project
PRC	Public Resource Code (California State)
Reclamation	Bureau of Reclamation
RCO	Riparian Conservation Objective
RD	Recreation Days
RP	Recreation Plan
RM	River Mile
RREB	Rubicon River Gage at Ellicott Bridge
RV	Recreational Vehicle
RVD	Recreation Visitor Day
SD	Supporting Document
SFLCC	South Fork Long Canyon Creek Gage and Weir below Diversion Dam
SMP	Sediment Management Plan
SMUD	Sacramento Municipal Utility District

List of Acronyms (continued)

SRA	State Recreation Area
TDC	Traffic Control Device
TES	Threatened, Endangered, and Sensitive
TNF	Tahoe National Forest
TSMP	Transportation System Management Plan
TSP	Technical Study Plan
TSR	Technical Study Report
TWG	Technical Working Group
USC	United States Code
USDA-FS	United States Department of Agriculture-Forest Service
USDI	United States Department of Interior
USGS	United States Geological Survey
VIPMP	Vegetation and Integrated Pest Management Plan
Wet	Wet Water Year
WSE	water surface elevation
WST	Western States Trail
WUA	Weighted Usable Area
YOY	Young of the Year