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8.1 ANALYTICAL APPROACH

Evaluation of potential environmental effects from implementation of the Proposed Action compared to the No-Action Alternative involved a three step process (Figure 8.1-1). The first step was to identify changes in Middle Fork American River Project (MFP or Project) operations, maintenance, non-routine recreation facility activities, and facilities under the Proposed Action (Table 8.1-1). These elements are summarized in Figure 8.1-1 and described in Section 4.0 – Proposed Action.

The second step in the evaluation process was to identify the effect of these changes under the Proposed Action on the physical, biological, cultural, and economic environment (resulting conditions). Examples of resulting conditions include modified instream flows and reservoir water surface elevations, changes in habitat/physical environment, loss or disturbance of resources, changes in facility footprint, or increases in Project activities.

The third step was to determine potential effects on individual resources from the resulting conditions. In this analysis, potential short-term and long-term effects on individual resources were identified. Table 8.1-2 identifies these potential effects by resource area. The final effects determination for each resource area considers avoidance, protection, and enhancement measures included in management and monitoring plans (Supporting Document [SD] A) and described in construction activities and concept designs (Appendix A).

The following effects determinations are used in the analysis:

- **No Effect** – Changes in the resulting conditions under the Proposed Action will have no effect to a resource. When appropriate, these effects are further defined as:
    - **Protect** – Implementation of measures under the Proposed Action result in additional protection of a resource compared to the No-Action Alternative.
    - **Maintain** – Implementation of the Proposed Action maintains the existing resource condition consistent with the No-Action Alternative.
- **Negligible Effect** – Changes in the resulting conditions under the Proposed Action have a minor effect to a resource that is further reduced through implementation of avoidance and protection (AP) measures or other measures.
- **Adverse Effect** – Changes in the resulting conditions under the Proposed Action have a significant effect to a resource that may be reduced, but not to a negligible level, through implementation of AP measures or other mitigation measures.
- **Beneficial Effect (Enhancement)** – Changes in the resulting conditions under the Proposed Action, including implementation of AP measures, improves the resource condition compared to the No-Action Alternative.

The analysis of potential effects to resources from changes in Project operations under the Proposed Action required detailed modeling. The following describes the modeling analytical approach.

Changes in Project operations may affect stream flow in the bypass and peaking reaches, water surface elevations in Project reservoirs, current and future consumptive water supply deliveries, and hydroelectric power generation. To analyze these combined effects, Placer County Water Agency (PCWA) developed the Middle Fork Project Operations Simulation Model (Model) (Appendix C1). The Model was developed by PCWA in close coordination with the MFP Model Technical Team Subgroup, which was composed of representatives from the California Department of Fish and Game (CDFG), the California State Water Resources Control Board (State Water Board), and the United States Department of Agriculture-Forest Service (USDA-FS). The Model includes a daily time step for analyzing water surface elevations in Project reservoirs, stream flows in the bypass and peaking reaches, and power generation. In addition, the Model includes an hourly time step for the peaking reach to more accurately analyze effects of daily peaking operations.

The Model uses inflow data over a 33-year period from 1975 to 2007, which encompasses the wettest and driest years on record in the Middle Fork American River Watershed (Watershed). The inflow data were calculated based on historic hydrology records. The Rubicon River Watershed inflow includes flows impaired by the Sacramento Municipal Utility District (SMUD) Upper American River Project (UARP) diversions. The Model accounts for accretion flows along the bypass and peaking reaches allowing for detailed longitudinal comparison of resulting flows. The model run outputs (results) and the historic empirical hydrology were used to compare resource effects between the No-Action Alternative and the Proposed Action.

The hydrology used to represent the No-Action Alternative in almost all the effects analyses was the historical impaired hydrology in the bypass and peaking reaches and reservoirs (1975 to 2007). This is referred to as the No-Action Alternative or the No-Action Alternative – Impaired Hydrology. The No-Action Alternative includes continued operations of the MFP with the existing Project facilities; existing Federal Energy Regulatory Commission (FERC) license conditions, operating agreements, and water rights; and current consumptive water demand (42,000 acre-feet [ac-ft]).

Historic MFP operations, however, have changed over time (1975 to 2007) based on changes in consumptive water demand, power demands, facility upgrades, and routine maintenance activities. Therefore, in some locations the historical empirical hydrology does not accurately represent current operations of the MFP under the current license conditions. For example: (1) historic reservoir elevations were the result of much lower water demand than exists currently; and (2) historic diversions in the small streams were reduced due to debris build-up at the intakes or to prevent turbine damage from rocks during high-flow events. Planned screen/intake modifications will alleviate the small diversion issues in the future under the No-Action Alternative allowing unimpeded (full) diversion up to the existing water rights and FERC license conditions.

An additional model run was developed to more accurately reflect current and future operations of the MFP under the No-Action Alternative (existing FERC license conditions) in Hell Hole and French Meadows reservoirs (water surface elevations) and in the bypass reaches downstream of the small diversion dams. This model run is referred to as the No-Action Alternative – Existing License Conditions (ELC). The model run included unimpeded diversion rates at the small diversion and uses modeling parameters in the reservoirs that approximate current operations (e.g., total reservoir carryover target of 142,000 ac-ft on December 31, approximate water balancing between reservoirs, 30-day annual maintenance outage period in October).

The hydrology used to represent the Proposed Action in almost all the effects analyses includes an operations model run of the MFP with modified/new Project facilities; new instream flow and reservoir minimum pool measures; existing operating agreements and contracts; an additional water right (i.e., Hell Hole Reservoir Seasonal Storage Increase Improvement requires a new non-consumptive water right); and existing consumptive water demand (42,000 ac-ft/year). This model run is referred to as Proposed Action – Existing Demand.

A second model run of the Proposed Action was also developed that incorporates operations of the MFP with future consumptive water demand under full build-out (120,000 ac-ft/year). This model run is referred to as Proposed Action – Future Demand. The two Proposed Action model runs are very similar (almost indistinguishable) in terms of instream flows in the different water years in the bypass reaches. The primary difference of consequence between these model runs is the water surface elevation in Hell Hole and French Meadows reservoirs in some water years. In the Proposed Action – Future Demand run, reservoir water levels are lower due to increased water deliveries compared to the Proposed Action – Existing Demand. In the effects analysis, reservoir elevations at Hell Hole and French Meadows reservoirs under the No-Action Alternative – Existing License Conditions is compared to Proposed Action – Future Demand.

TABLES

Table 8.1-1. Proposed Action-Changed Elements (Overview).

Changes in Project Operations

- Instream Flow Releases
  - Minimum Instream Flows
  - Pulse Flows
  - Down Ramp of Spill Flows
  - Operations of Oxbow Powerhouse
  - Recreation Flows
- Reservoir Minimum Pool Requirements
- Hell Hole Reservoir Seasonal Storage Increase Improvement
- Small Diversion Modifications

Changes in Routine Maintenance at Project Facilities and Features

- Inspections and Maintenance
  - Hell Hole Dam Spillway Gate Testing
- Vegetation Management
  - Trimming by Hand
  - Trimming with Equipment
  - Herbicide and Surfactant Use
- Noxious Weed Management
- Rodent Control
  - Physical Rodent Control
  - Over-the-Counter Rodenticide Use
  - Rodenticide Use – Fumigants
- Sediment Management at Small Diversions
  - Physical Removal with Equipment
  - Interim Sediment Management
  - Contingency Sediment Management
- Sediment Management at Medium Diversions
  - Sediment Augmentation
  - Sediment Disposal
- Debris Management
  - Log Booms
- Facility Painting
- Pole Replacement/Retrofit

Table 8.1-1. Proposed Action-Changed Elements (Overview) (continued).

Changes in Routine Maintenance at Project Recreation Facilities

- Annual Maintenance
- Heavy Maintenance

Changes in Routine Maintenance at Project Roads and Project Recreation Facility Access Roads

- Annual Maintenance
- Periodic Maintenance

Changes in Routine Maintenance at Project Trails

- Annual Maintenance
- Periodic Maintenance

Non-Routine Recreation Facility Activities

- Removal, Reduction, and Consolidation of Recreation Facilities
  - Upper Hell Hole Campground (Removal)
  - Hell Hole Campground (Reduction)
  - Poppy Campground (Reduction)
  - Ralston Afterbay Picnic Area (Reduction)
  - McGuire Boat Ramp and Associated Parking (Consolidation)
- Conversion of Facilities to Accommodate Group Use
  - McGuire Picnic Area and Beach (Conversion)
  - McGuire Group Campground (New)
- Enhancement of Recreation Facilities
  - Ahart Campground
  - Indian Bar Rafting Access and General Parking
  - Hell Hole Boat Ramp (Extension)
  - French Meadows Boat Ramp (Extension)
- Improvements to Dispersed Concentrated Use Areas
  - Duncan Creek Diversion Primitive Recreation Site (Development)
  - Ralston Afterbay Sediment Removal Access Point Boat Ramp

Table 8.1-1. Proposed Action-Changed Elements (Overview) (continued).

Modification of Existing or Construction of New Project Facilities

- Hell Hole Reservoir Seasonal Storage Increase Improvement
- Modification of Small Diversions
  - Duncan Creek Diversion Dam
  - North Fork Long Canyon Creek Diversion Dam
  - South Fork Long Canyon Creek Diversion Dam
- Modification of Outlet Works
  - French Meadows Dam Outlet Works
  - Hell Hole Dam Outlet Works
  - Middle Fork Interbay Dam Outlet Works

Table 8.1-2. Potential Effects on Resources from Implementation of the Proposed Action.

Proposed Action	Potential Resulting Condition	Resources Potentially Affected													
		Geology and Soils	Water Use	Water Quality	Fish and Aquatic Resources	Botanical and Wildlife Resources	Riparian Resources	Geomorphology	Recreation Resources	Land Use	Aesthetic Resources	Socioeconomics Conditions	Air Quality	Cultural Resources	Tribal Resources
Project Operations (long-term)	Change in flows in bypass and peaking reaches		X	X	X	X	X	X	X						
	Modified reservoir water surface elevations		X	X	X	X	X	X	X		X			X	
	Modified diversion pools		X	X	X	X	X	X	X						
	Modified habitat/physical environment			X	X	X	X	X	X		X			X	
	Change in generation		X									X	X		
Project Maintenance (long-term)	Modified habitat/physical environment	X		X	X	X	X	X	X		X			X	
	Direct loss or disturbance of resource				X	X	X		X					X	X
	Change in level or location of maintenance	X		X	X	X	X		X	X		X	X		
Project Recreation Facilities (non-routine recreation facility activities) (short-term or long-term)	Modified habitat/physical environment	X				X			X		X			X	
	Direct loss or disturbance of resource					X			X					X	
	Change in facility footprint and/or FERC Project boundary								X	X	X				
	Change in designed use								X						
	Increase in Project activities					X			X			X	X		
Project Facilities (modified or new) (short-term or long-term)	Modified habitat/physical environment	X		X	X	X	X	X	X		X			X	
	Direct loss or disturbance of resource				X	X	X		X					X	
	Change in facility footprint and/or FERC Project boundary								X	X	X				
	Increase in Project activities			X		X			X			X	X		

FIGURES

Figure 8.1-1. Potential Effects on Resources from Implementation of the Proposed Action.