

# Oroville Facilities Relicensing

Federal Energy Regulatory Commission Project No. 2100

## Study Plan SPW1

### Project Effects on Water Quality Designated Beneficial Uses for Surface Waters



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### Study Objectives:

- evaluate the physical, chemical, and biological integrity of water quality in Lake Oroville, its tributaries, the Feather River, Diversion Pool, Thermalito Power Canal, Forebay and Afterbay, and other Project-affected surface waters
- determine whether Project-affected waters meet Basin Plan objectives and are protective of beneficial uses designated in the Basin Plan



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### General Methodology for Achieving Objectives:

- evaluate those parameters potentially affected by the Project for which the CVRWQCB has established water quality objectives in the Basin Plan:
  - physical constituents
  - pesticides
  - pathogens (bacteria)
  - toxicity
  - settleable material
  - color
  - oil and grease
  - chemical constituents
  - organic contaminants
  - biostimulatory substances
  - sediment
  - suspended material
  - floating material
  - tastes and odors
- compare data to numerical or narrative objectives to determine compliance with the water quality standards for factors controllable by the Project



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### General Methodology for Achieving Objectives:

- evaluate effects to beneficial uses identified in the Basin Plan
  - municipal and domestic supply
  - irrigation
  - power
  - contact and non-contact recreation
  - warm and cold freshwater habitat
  - warm and cold spawning
  - wildlife habitat



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## Other Factors Affecting Water Quality

- Salmon decomposition
- SCOR Outfall
- Nutrient Deprivation



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## Monitoring Stations

- tributaries upstream from Lake Oroville
- Project waters
- tributaries to Project waters downstream from Oroville Dam
- Feather River downstream from Project boundary
- Sacramento River



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## Project Effects on Designated Beneficial Uses - Municipal and Domestic Supply

- Applicable Objectives - bacteria, chemical constituents, color, pesticides, tastes and odors, and turbidity
- Results



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## Project Effects on Designated Beneficial Uses - Irrigation

- Applicable Objectives - biostimulatory substances, chemical constituents, salinity, and temperature
- Results



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## Project Effects on Designated Beneficial Uses - Power

- Applicable Objectives - (downstream fish migration, freshwater habitat, and spawning beneficial uses)
- Results



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- **Project Effects on Designated Beneficial Uses**
  - **Contact and Non-contact Recreation**
- • **Applicable Objectives - bacteria, biostimulatory substances, chemical constituents, color, floating material, oil and grease, pesticides, tastes and odors, temperature, toxicity, and turbidity**
- • **Results**



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## Project Effects on Designated Beneficial Uses - Canoeing and Rafting

- Applicable Objectives -
- Results



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## Project Effects on Designated Beneficial Uses - Warm and Cold Fish Migration

- Applicable Objectives - water temperature, dissolved oxygen, and turbidity
- Results



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## Project Effects on Designated Beneficial Uses - Warm and Cold Freshwater Habitat

- Applicable Objectives - chemical constituents, water temperature, dissolved oxygen, and turbidity
- Results



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## Project Effects on Designated Beneficial Uses - Warm and Cold Spawning

- Applicable Objectives - water temperature, dissolved oxygen, chemical constituents, pH, sediment, settleable and suspended materials, and toxicity
- Results



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## Project Effects on Designated Beneficial Uses - Wildlife Habitat

- Applicable Objectives - chemical constituents, pesticides, and toxicity
- Results



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## Other Factors Affecting Water Quality

- Salmon decomposition



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Station Name	Date	Total Nitrogen (Total NH3 + Nitrate/Nitrite)	Nitrogen Enrichment	Total P	Phosphorus Enrichment
Middle Fork near Merrimac	9/16/03	>0.001	0.00011-0.00483	0.001	0.00001-0.00048
Middle Fork near Merrimac	10/16/03		0.00011-0.00483	-	0.00001-0.00048
Middle Fork near Merrimac	11/12/03	>0.003	0.00011-0.00483	0.009	0.00001-0.00048
Middle Fork near Merrimac	12/9/03	0.042		0.044	
Middle Fork near Merrimac	1/14/04	<0.001		<0.001	
Middle Fork near Merrimac	2/18/04	0.141		0.013	
Middle Fork near Merrimac	3/15/04	>0.016		0.02	
South Fork US Ponderosa Res	9/16/03	<0.001	0.00072-0.03268	<0.001	0.00005-0.00327
South Fork US Ponderosa Res	10/16/03		0.00072-0.03268	-	0.00005-0.00327
South Fork US Ponderosa Res	11/12/03	>0.004	0.00072-0.03268	0.001	0.00005-0.00327
South Fork US Ponderosa Res	12/9/03	<0.001		0.016	
South Fork US Ponderosa Res	1/15/04	0.053		<0.001	
South Fork US Ponderosa Res	2/18/04	0.068		0.015	
South Fork US Ponderosa Res	3/15/04	0.024		0.007	
North Fork US Poe PH	9/16/03	>0.001		<0.001	
North Fork US Poe PH	10/16/03			-	
North Fork US Poe PH	11/12/03	>0.007		0.004	
North Fork US Poe PH	12/9/03	0.229		0.007	
North Fork US Poe PH	1/14/04	>0.035		<0.001	
North Fork US Poe PH	2/18/04	0.145		0.022	
North Fork US Poe PH	3/15/04	0.059		0.012	
West Branch near Paradise	9/16/03	>0.001	0.00036-0.01613	<0.001	0.00003-0.00161
West Branch near Paradise	10/16/03		0.00036-0.01613	-	0.00003-0.00161
West Branch near Paradise	11/12/03	<0.001	0.00036-0.01613	0.002	0.00003-0.00161
West Branch near Paradise	12/9/03	0.25		0.012	
West Branch near Paradise	1/14/04	>0.017		<0.001	
West Branch near Paradise	2/18/04	0.08		0.015	
West Branch near Paradise	3/15/04	0.077		0.013	



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	North Fork Feather River	Middle Fork Feather River	South Fork Feather River	West Branch Feather River	Feather River at Hwy 162 Bridge	Feather River at Robinson Riffle	Feather River US Afterbay Outlet
Taxonomic Richness	20	30	28	30	19	19	19
Cumulative Taxa	37	44	38	45	29	27	31
Percent Dominant Taxon	42	26	54	26	62	27	32
EPT Taxa	10	18	7	15	7	6	6
EPT Index (%)	39	68	18	53	26	69	55
Sensitive EPT Index (%)	1	11	0	21	1	7	0
Cumulative EPT Taxa	15	28	12	28	9	8	10
Shannon Diversity	1.9	2.5	2.0	2.6	1.5	2.1	2.0
Tolerance Value	5.4	4.3	5.6	4.0	5.6	4.7	5.2
Percent Intolerant Taxa (0-2)	1	11	2	19	1	7	0
Percent Tolerant Taxa (8-10)	1	1	2	2	2	5	8
Percent Chironomidae	28	9	54	26	62	10	15
Percent Collectors	51	51	68	52	81	62	49
Percent Filterers	36	34	15	17	10	27	40
Percent Grazers	11	10	9	23	5	5	8
Percent Predators	3	4	8	7	5	6	3
Percent Shredders	0	1	0	1	0	0	0
Average Abundance (#/ sample)	3580	6292	3435	3834	4567	16527	5084



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	Average Abundance (organisms per sample)	Cumulative Taxa
North Fork Feather River	3580	37
Middle Fork Feather River	6292	44
South Fork Feather River	3435	38
West Branch Feather River	3834	45
Feather River at Hwy 162 Bridge	4567	29
Feather River at Robinson Riffle	16527	27
Feather River US Afterbay Outlet	5084	31
Deer Creek at Upper Diversion Dam	6691	32
Deer Creek below Upper Falls	4025	51
Deer Creek at A-Line	5408	49
Mill Creek at Black Rock	4885	45
Mill Creek below Hwy 36	3262	29
Mill Creek at Hole-in-Ground	4274	36



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