

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
UPPER NORTH FORK FEATHER RIVER PROJECT

Project No. 2105-089

SECTION 4

DEVELOPMENTAL ANALYSIS

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FEIS

4.0 DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the water resources of the NFFR to generate power, estimate the economic benefits of the UNFFR Project, and estimate the cost of various environmental protection and enhancement measures and the effects of these measures on project operations.

Under its approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no consideration for potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project-generated power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

For our economic analysis of alternatives, we used the assumptions, values, and sources shown in table 4-1.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROPOSED PROJECT

As proposed by PG&E, the UNFFR Project would generate an average of 1,085,692,000 kWh of electricity annually and have an annual power value of \$69,307,500 (63.84 mills/kWh) and total annual costs of \$25,386,500 (23.38 mills/kWh), resulting in a net annual benefit of \$43,921,000 (40.46 mills/kWh).

4.2 POWER AND ECONOMIC BENEFITS OF THE STAFF-RECOMMENDED ALTERNATIVE

Resource agencies and NGOs recommended implementing a variety of measures at the project. An SA entered into by several entities included measures addressing several resource areas. Some of the parties to the SA, as well as other entities, also recommended measures addressing other issues not covered in the SA. Many of these measures not included in the SA were similar but somewhat different from each other. Staff reviewed each recommendation and determined the measures that were most appropriate for implementation.

As recommended by staff, the UNFFR Project would generate an average of 1,085,548,000 kWh of electricity annually and have an annual power value of \$69,313,700 (63.84 mills/kWh) and total annual costs of \$25,501,000 (23.49 mills/kWh), resulting in a net annual benefit of \$43,812,700 (40.35 mills/kWh).

Table 4-1. Staff assumptions for economic analysis of the UNFFR Project. (Source: PG&E as modified by staff, and staff)

Assumption	Value	Source
Energy value (2004\$) ^a	63.84 mills/kWh	PG&E
Capacity value (2004\$)	Included in energy value	
Cost of debt	6.61 percent	PG&E
Return on project equity	11.21 percent	PG&E/staff
Bond/Debt ratio	0.48	PG&E
Overall cost of money	9 percent	PG&E
Discount rate	9 percent	PG&E
State and federal income tax rate	34 percent	Staff
Local tax rate	3 percent	Staff
Insurance rate	0.25 percent of initial net investment	Staff
Term of financing	20 years	Staff
Period of analysis	30 years	Staff
Escalation rate after 2004	0 percent	Staff
Net investment (2004\$)	\$118,688,200	PG&E/staff
O&M costs (2004\$)	\$5,061,300	PG&E/staff
No-action average annual generation (kWh)	1,171,900,000	Staff
No-action installed capacity (kW)	342,600	Staff

^a Sum of energy, capacity, and ancillary benefits values from PG&E, escalated to 2004 dollars.

Table 4-2 compares power value, annual costs, and net benefits for the no-action alternative, PG&E's proposal, and PG&E's proposal with additional staff-adopted measures for the UNFFR Project. Table 4-3 shows the effect on costs and power values of individual measures proposed by PG&E and recommended by staff and others, including the additional measures that staff has adopted. In section 5.1, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the staff alternative and why the environmental benefits are worth these costs.

Table 4-2. Summary of the annual net benefits for PG&E's proposed action, PG&E's proposed action with additional staff-adopted measures, PG&E's proposed action with additional staff-adopted measures and mandatory measures, the no-action alternative, and project retirement for the UNFFR Project. (Source: Staff)

	PG&E's Proposed Action	Proposed Action with Additional Staff-adopted Measures	Proposed Action with Additional Staff- adopted Measures and Mandatory Measures	No Action	Project Retirement
Installed capacity (MW)	342.6	342.6	342.6	342.6	0
Annual generation (kWh)	1,085,692,000	1,085,548,000	1,085,521,000	1,171,900,000	0 ^a
Annual power value (\$ (mills/kWh)	69,307,500 63.84	69,313,700 63.84	69,296,600 63.84	74,810,800 63.84	74,810,800 63.84
Annual cost (\$ (mills/kWh)	25,386,500 23.38	25,501,800 23.49	27,959,200 25.76	22,326,100 19.05	74,847,000 63.87
Annual net benefit (\$ (mills/kWh)	43,921,000 40.46	43,812,700 40.35	41,337,400 38.08	52,484,700 44.79	-36,200 -0.03

^a No generation from project; energy purchased and resold at cost.

Table 4-3. Summary of capital and one-time costs, annual costs, annual energy costs, and total annualized costs of environmental measures proposed by PG&E and recommended by staff and others for the UNFFR Project. (Source: PG&E as modified by staff)

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
Water Resources Measures								
1. Maintain stream gages NF-2 (Seneca reach), NF-70 (Belden reach), NF-1 (Lake Almanor), NF-8 (Butt Valley reservoir), NF-67 (Belden forebay) (SA section 1, item 5; FS final Section 4(e) condition no. 25, paragraphs 5 and 8)	SA, FS	\$0	\$0	\$0	\$0	Yes		
2. Gaging 4 times per year in lower Butt Creek (SA section 1, item 8)	SA	\$0	\$200	\$0	\$200	Yes	a	
3. Water quality monitoring program and reporting (SA section 5)	SA	\$0	\$5,000	\$0	\$5,000	Yes		
4. Canyon dam mitigation measures evaluation (SA section 5, item 2D)	SA	\$0	\$87,300	\$0	\$87,300	No	b	
5. Canyon dam mitigation measures evaluation	Staff	\$0	\$49,300	\$0	\$49,300	Yes	c	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs		Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Energy Costs (2004\$)			
6. Cadmium and specific conductance monitoring program (SA section 5, item 2A)	SA	\$0	\$8,600	\$0	\$8,600	No	d
7. Cadmium and specific conductance monitoring program	Staff	\$0	\$12,300	\$0	\$12,300	Yes	e
8. Lake Almanor water quality monitoring program (SA section 5, item 2E)	SA	\$0	\$29,800	\$0	\$29,800	No	f
9. Lake Almanor water quality monitoring program	Staff	\$0	\$37,000	\$0	\$37,000	Yes	g
10. Fish tissue bioaccumulation screening (SA section 5, item 2C)	SA	\$0	\$11,800	\$0	\$11,800	No	h
11. Fish tissue bioaccumulation screening	Staff	\$0	\$6,600	\$0	\$6,600	Yes	i
12. Bacteriological sampling program (SA section 5, item 2B)	SA	\$0	\$13,400	\$0	\$13,400	No	j
13. Bacteriological sampling program	Staff	\$0	\$4,900	\$0	\$4,900	Yes	k
14. Augment water quality program, if needed	Plumas County	\$0	\$0	\$0	\$0	No	
15. Switch Canyon dam releases	PG&E	\$0	\$0	\$0	\$0	Yes	l

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
16. Monitor DO in Lake Almanor and Butt Valley reservoir	Staff	\$0	\$0	\$0	\$0	Yes	m	
17. Water temperature management plan, which includes funding for construction of temperature control measures beyond that provided by the Rock Creek-Cresta Project's Coldwater Habitat and Fishery Enhancement Fund)	Interior	\$50,000,000	\$20,000	\$0	\$7,293,200	No	n	
(Interior 10(j) recommendation 5)								
18. Water temperature monitoring plan	Staff	\$0	\$0	\$0	\$0	Yes	m	
19. Revise draft SMP (FS final Section 4(e) condition no. 40(H))	Plumas County, FS	\$0	\$900	\$0	\$900	Yes	o	
20. Implement SMP (SA section 8, item H; FS final Section 4(e) condition no. 40(H))	SA, FS	\$0	\$10,000	\$0	\$10,000	Yes after revision		
21. Control shoreline erosion adversely affecting other resources	Plumas County	\$0	\$0	\$0	\$0	Yes		

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
22. Erosion control as included in recreation facility development program and in land management measures (SA section 7, items 1A1b, 1A1d, 1A1j, 1A1k, 1A1n, 1A4c, and section 8, items C, G, and H)	SA	\$0	\$0	\$0	\$0	Yes		
23. Continued implementation of road maintenance agreement with Plumas National Forest (FS final Section 4(e) condition no. 42)	PG&E, FS	\$0	\$0	\$0	\$0	Yes		
24. Erosion control plan for any new construction (FS final Section 4(e) condition no. 15)	FS	\$0	\$0	\$0	\$0	Yes; partially adopted		
25. Erosion control plan for all project facilities, roads, reservoirs, and bypassed reaches (Interior Section 10(j) recommendation no. 19)	Interior	\$25,000	\$0	\$0	\$3,600	No		
26. Visual management plan (FS final Section 4(e) condition no. 40(G))	FS	\$20,000	\$0	\$0	\$2,900	Yes		

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
Aquatic Resources Measures								
27. Seneca reach, Belden reach minimum flow regime per SA (SA section 1, item 1; FS final Section 4(e) condition no. 25(1))	SA, FS	\$0	\$0	\$3,684,200	\$3,684,200	Yes	p	
28. Seneca reach, Belden reach minimum flow regime as recommended by Interior (Interior Section 10(j) recommendation no.1)	Interior	\$0	\$0	\$4,153,200	\$4,153,200	No	q	
29. Maintain existing inflows in lower Butt Creek (SA section 1, item 2; FS final Section 4(e) condition no. 25(2), Interior Section 10(j) recommendation no. 1)	SA, FS, Interior	\$0	\$0	\$0	\$0	Yes	r	
30. Pulse flows in Seneca reach as proposed in SA (SA section 1, item 3A; FS final Section 4(e) condition no. 25(3))	SA, FS	\$0	\$0	\$198,900	\$198,900	Yes	s	
31. Pulse flows in Seneca reach as recommended by Interior (Interior Section 10(j) recommendation no. 2)	Interior	\$0	\$0	\$301,800	\$301,800	No	t	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
32. Pulse flow (700 cfs in March) in Seneca reach in water years classified as dry (Interior alternative Section 10(j) recommendation no. 2)	Interior	\$0	\$0	\$7,600 (incremental cost compared to SA proposal)	\$7,600	Yes	--	
33. Pulse flows in Belden reach as proposed in SA (SA section 1, item 3A; FS final Section 4(e) condition no. 25(3))	SA, FS	\$0	\$0	\$77,300	\$77,300	Yes	u	
34. Pulse flows in Belden reach as proposed by Interior (Interior 10(j) recommendation 2)	Interior	\$0	\$0	\$114,100	\$114,100	No	v	
35. Pulse flow (700 cfs in March) in Belden reach in water years classified as dry (Interior alternative Section 10(j) recommendation no. 2)	Interior	\$0	\$0	\$3,300 (incremental cost compared to SA proposal)	\$3,300	Yes	--	
36. Pulse flows in lower Butt Creek (study-dependent) (SA section 1, item 4; FS final Section 4(e) condition no. 25(4))	SA, FS	\$0	\$0	\$0	\$0	Yes	r	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
37. Lower Butt Creek pulse flow plan + 1 year test pulse release within creek (Interior Section 10(j) recommendation no. 3)	Interior	\$20,000	\$0	\$0	\$2,900	No	r	
38. Gravel monitoring plan (SA section 1, item 3B; FS final Section 4(e) condition no. 25(3)B)	SA, FS	\$20,000	\$6,600	\$0	\$9,500	Yes	w	
39. Develop and implement a gravel enhancement plan (NOAA Fisheries Service 10(j) recommendation no. 1)	NOAA	\$20,000	\$0	\$0	\$2,900	No		
40. Coarse sediment management plan (Interior Section 10(j) recommendation no. 8)	Interior	\$20,000	\$0	\$0	\$2,900	No		
41. Geomorphological monitoring plan ⁴ (Interior Section 10(j) recommendation no. 6)	Interior	\$50,000	\$6,600	\$0	\$13,800	No	e	
42. Geomorphological monitoring plan (mid-license survey) (Interior alternative Section 10(j) recommendation no. 6)	Interior	\$12,500	\$0	\$0	\$1,800	Yes	--	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
43. Develop a ramping rate plan (Interior Section 10(j) recommendation no. 20)	Interior	\$20,000	\$0	\$0	\$2,900	No		
44. Ramping rates at Canyon dam (SA section 1, item 6A; FS final Section 4(e) condition no. 25(6)A)	SA, FS	\$0	\$0	\$0	\$0	Yes	r	
45. Ramping rates at Belden dam (SA section 1, item 6A; FS final Section 4(e) condition no. 25(6)A)	SA, FS	\$0	\$0	\$0	\$0	Yes	r	
46. Belden block loading (SA section 1, item 7; FS final Section 4(e) condition no. 25(7))	SA, FS	\$0	\$0	\$0	\$0	Yes	r	
47. Monitor the effects of recreational flow releases on aquatic biota as part of the recreational flow implementation plan and recreational activities monitoring plan (SA section 2, item 2D; Interior Section 10(j) recommendation no. 14)	SA, Interior	\$50,000	\$20,700	\$0	\$28,000	Yes	x	
48. Fish monitoring plan (Interior Section 10(j) recommendation no. 10)	Interior	\$20,000	\$21,800	\$0	\$24,700	No	y	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
49. Macroinvertebrate monitoring plan (Interior Section 10(j) recommendation no. 11)	Interior	\$20,000	\$8,400	\$0	\$11,300	No	z	
50. Seneca, Butt Valley Creek, and Belden reaches biological monitoring (fish, amphibians, and macroinvertebrates) (SA section 1, item 9; FS final Section 4(e) condition no. 26)	SA, FS	\$20,000	\$3,700	\$0	\$6,600	No	ab	
51. Seneca and Belden reaches habitat monitoring (fish and macroinvertebrates)	Staff	\$20,000	\$8,300	\$0	\$11,200	Yes	ac	
52. Development and implementation of aquatic habitat monitoring in lower Butt Creek (SA section 1, item 8; FS final Section 4(e) condition no. 26)	SA, FS	\$20,000	\$4,300	\$0	\$7,200	Yes	ad	
53. Woody debris management (plan, test program, and monitoring) (Interior Section 10(j) recommendation no. 9)	Interior	\$20,000	\$5,800	\$0	\$8,800	Yes	ae	
54. Adaptive management plan (Interior Section 10(j) recommendation no. 13)	Interior	\$10,000	\$1,700	\$0	\$3,100	Yes	af	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
55. Maintain Lake Almanor at specific water surface elevations per SA (SA section 3, item 2; FS final Section 4(e) condition no. 30(1); Interior Section 10(j) recommendation no. 4)	SA, Interior, FS	\$0	\$0	\$1,527,500	\$1,527,500	Yes	ag	
56. Maintain maximum Lake Almanor water surface elevation (SA section 3, item 9; FS final Section 4(e) condition no. 30(9))	SA, FS	\$0	\$0	\$0	\$0	Yes	r	
57. Maintain Butt Valley reservoir per SA terms (SA section 3, item 3; FS final Section 10(a) condition no. 30(3))	SA, FS	\$0	\$0	\$0	\$0	Yes		
58. Maintain Belden forebay per SA terms (SA section 3, item 4; FS final Section 4(e) condition no. 30(4))	SA, FS	\$0	\$0	\$0	\$0	Yes	r	
59. Develop and maintain water year type forecast (SA section 4; FS final Section 4(e) condition no. 27)	SA	\$0	\$0	\$0	\$0	Yes		

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
60. Design receiving facility for adult anadromous fish in the Seneca reach	NOAA	\$200,000	\$0	\$0	\$29,100	No	ar	
(NOAA Fisheries final fishway prescriptions)								
61. Construct and operate a receiving facility in the Seneca reach for adult anadromous fish transferred from the Oroville Project (P-2100)	NOAA	\$259,000	\$25,000	\$0	\$62,700	No	ar,as	
(NOAA Fisheries final fishway prescriptions)								
62. Design receiving facility for adult anadromous fish in Yellow Creek	NOAA	\$200,000	\$0	\$0	\$29,100	No	ar	
(NOAA Fisheries final fishway prescriptions)								
63. Construct and operate a receiving facility in Yellow Creek for adult anadromous fish transferred from the Oroville Project (P-2100)	NOAA	\$259,000	\$25,000	\$0	\$62,700	No	ar	
(NOAA Fisheries final fishway prescriptions)								

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs		Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)			
64. Design downstream collection facility in the Seneca reach for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	\$650,000	\$0	\$0	\$94,600	No	ar
65. Construct and operate a downstream collection facility in the Seneca reach for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	\$6,500,000	\$100,000	\$0	\$1,045,500	No	ar
66. Design downstream collection facility in Yellow Creek for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	\$455,000	\$0	\$0	\$66,200	No	ar
67. Construct and operate a downstream collection facility in Yellow Creek for outmigrating salmonids (NOAA Fisheries final fishway prescriptions)	NOAA	\$6,500,000	\$100,000	\$0	\$1,045,500	No	ar

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
68. Lower Butt Creek- monitoring of fish passage of weir (removal or modification if a barrier) (SA section 1, item 8; FS final Section 4(e) condition no. 25(8))	SA, FS	\$10,000	\$900	\$0	\$2,300	Yes	o
69. Remove Gansner Bar fish barrier	PG&E	\$35,000	\$0	\$0	\$5,100	Yes	
Terrestrial Resources Measures							
70. Wildlife monitoring plan (Interior Section 10(j) recommendation no. 21)	Interior	\$10,000	\$25,000	\$0	\$26,500	No	
71. Wildlife habitat enhancement plan (SA section 6; FS final Section 4(e) condition no. 31; Interior alternative Section 10(j) recommendation no. 21; Interior alternative Section 10(j) recommendation no. 21)	SA, FS, Interior	\$20,000	\$5,000	\$0	\$7,900	Yes	
72. Vegetation management plan as recommended by Interior (Interior Section 10(j) recommendation no. 7)	Interior	\$65,000	\$10,000	\$0	\$19,500	No	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
73. Visual and vegetation management plans as recommended by the FS (FS final Section 4(e) condition nos. 40 and 41, respectively)	FS	\$10,000	\$3,000	\$0	\$4,500	Yes	
74. Invasive weed management plan (FS final Section 4(e) condition no. 46)	FS	\$10,000	\$6,000	\$0	\$7,500	Yes	
75. T&E management plan (FS final Section 4(e) condition no. 45)	FS	\$5,000	\$2,000	\$0	\$2,700	Yes	
76. Amphibian monitoring plan (SA section 1, item 9; FS final Section 4(e) condition no. 26; Interior Section 10(j) recommendation no.12)	SA, FS, Interior	\$4,000	\$8,000	\$0	\$8,600	Yes	
77. Peregrine falcon monitoring (Interior Section 10(j) recommendation no.18)	Interior	\$4,000	\$4,500	\$0	\$5,100	Yes	
Threatened and endangered species measures							
78. Continue to comply with measures protecting bald eagles	PG&E	\$0	\$0	\$0	\$0	No	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
79. Compliance with the biological opinion, pursuant to the ESA (Interior Section 10(j) recommendation no. 15)	Interior	\$3,000	\$1,000	\$0	\$1,400	Yes,	partially adopted
80. Bald eagle management plan (FS final Section 4(e) condition no. 47)	FS	\$0	\$0	\$0	\$0	Yes	
81. Interagency bald eagle management plan (Interior Section 10(j) recommendation no. 16)	Interior	\$15,000	\$104,000	\$0	\$106,200	Yes	
82. Bald eagle monitoring (Interior Section 10(j) recommendation no. 17)	Interior	\$0	\$0	\$0	\$0	Yes	

	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
Environmental Measures							
Recreational Resources Measures							
83. Within 1 year finalize and implement the draft RRMP for the project (SA, Interior), which includes the following elements: a recreation facility development program (SA, FS), a recreation O&M program (SA, FS), an I&E program (SA, FS), a recreation monitoring program (SA, FS, Interior), a resource integration and coordination program (SA, FS, Interior), and a RRMP review and revision program (SA, FS)	See first column	\$56,700	\$31,100	\$0	\$39,400	Yes	ai,aj
(SA section 7; FS final Section 4(e) condition nos. 32, 33, 34, 35, 36, 37; Interior Section 10(j) recommendation no. 2)							
84. Recreation within 1–3 years: upgrades at Last Chance campground (SA section 7, item 1A1a; FS final Section 10(a) condition no. 32(1)A.1.a)	SA, FS	\$20,800	\$10,400	\$0	\$13,400	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
85. Recreation within 5–10 years: upgrades at Rocky Point campground and day-use area (SA section 7, item 1A1b; FS final Section 10(a) condition no. 32(1)A.1.b)	SA, FS	\$207,500	\$31,800	\$0	\$62,000	Yes	ai,ak
86. Recreation within 1–13 years: provide matching funds to the FS to improve FS-owned recreation facilities (SA section 7, item 1A1c; FS final Section 4(e) condition no. 32(1)A.1.c)	SA, FS	\$5,000,000	\$0	\$0	\$727,300	Yes	aj
87. Within 1 year assume O&M responsibility for FS facilities: Dyer View day-use area, Canyon dam boat launch and day-use area, Almanor boat launch (SA section 7, item 4; FS final Section 4(e) condition no. 33)	SA, FS	\$0	\$15,600	\$0	\$15,600	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
88. Within 13 years assume O&M responsibility for FS facilities: Almanor Family Campground, Almanor Group Campground, Almanor beach (SA section 7, item 3; FS final Section 4(e) condition no. 33)	SA, FS	\$0	\$62,300	\$0	\$62,300	Yes	ai,aj
89. Recreation within 1–3 years: convert East Shore picnic area to group camp area (SA section 7, item 1A1d; FS final Section 10(a) condition no. 32(1)A.1.d)	SA, FS	\$455,700	\$5,200	\$0	\$71,500	Yes	ai,aj
90. Recreation within 1–5 years: develop East Shore day-use area (SA section 7, item 1A1i; FS final Section 10(a) condition no. 32(1)A.1.i)	SA, FS	\$264,700	\$2,600	\$0	\$41,100	Yes	ai,aj
91. Recreation over the term of the license: develop East Shore family campground (SA section 7, item 2A2; FS final Section 10(a) condition no. 32(1)2.A.2)	SA, FS	\$5,299,000	\$37,900	\$0	\$808,700	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
92. Recreation within 3–5 years: provide North Shore public boat launch (SA section 7, item 1A1e; FS final Section 10(a) condition no. 32(1)A.1.e)	SA, FS	\$595,300	\$7,800	\$0	\$94,400	Yes	ai,al	
93. Recreation within 3–5 years: develop Stover Ranch day-use area (SA section 7, item 1A1f; FS final Section 10(a) condition no. 32(1)A.1.f)	SA, FS	\$81,600	\$2,000	\$0	\$13,800	Yes	ai,al	
94. Recreation within 1–3 years: expand and improve Marvin Alexander beach (SA section 7, item 1A1g; FS final Section 10(a) condition no. 32(1)A.1.g)	SA, FS	\$143,200	\$2,100	\$0	\$22,900	Yes	ai,aj	
95. Recreation within 1–3 years: upgrades at Canyon dam day-use area (SA section 7, item 1A1h; FS final Section 4(e) condition no. 32(1)A.1.h)	SA, FS	\$171,300	\$9,300	\$0	\$34,300	Yes	ai,aj	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
96. Recreation within 1–3 years: upgrades at Westwood beach day-use area (SA section 7, item 1A1j; FS final Section 10(a) condition no. 32(1)A.1.j)	SA, FS	\$207,100	\$2,600	\$0	\$32,700	Yes	ai,aj
97. Recreation within 1–3 years: upgrades at Stumpy beach day-use area (SA section 7, item 1A1k; FS final Section 10(a) condition no. 32(1)A.1.k)	SA, FS	\$292,200	\$2,600	\$0	\$45,100	Yes	ai,aj
98. Recreation within 3–5 years: upgrades at Catfish beach day-use area (SA section 7, item 1A1l; FS final Section 10(a) condition no. 32(1)A.1.l)	SA, FS	\$114,400	\$3,900	\$0	\$20,600	Yes	ai,al
99. Recreation within 1–5 years: improve Almanor scenic overlook (SA section 7, item 1A1m; FS final Section 10(a) condition no. 32(1)A.1.m)	SA, FS	\$11,400	\$3,100	\$0	\$4,800	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
100. Recreation within 1-5 years: develop access to SW shoreline of Lake Almanor between Prattville and Canyon dam (SA section 7, item 1A1n; FS final Section 4(e) condition no. 32(1)A.1.n)	SA, FS	\$425,600	\$10,400	\$0	\$72,300	Yes	ai,aj
101. Recreation in 1–5 years: upgrades at Camp Connery group camp (SA section 7, item 1A1o; FS final Section 10(a) condition no. 32(1)A.1.o)	SA, FS	\$48,300	\$5,200	\$0	\$12,200	Yes	ai,aj
102. Recreation over the term of the license: expand Camp Connery group camp (SA section 7, item 2A2; FS final Section 10(a) condition no. 32(1)2.A.1)	SA, FS	\$597,400	\$10,400	\$0	\$97,300	Yes	ai,aj
103. Recreation within 5–10 years: provide Butt Valley reservoir powerhouse trails (SA section 7, item 1A2a; FS final Section 10(a) condition no. 32(1)A.2.a)	SA, FS	\$56,700	\$1,300	\$0	\$9,600	Yes	ai,ak

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
104. Recreation within 5–10 years: improvements at Ponderosa Flat campground (SA section 7, item 1A2b; FS final Section 10(a) condition no. 32(1)A.2.b)	SA, FS	\$48,600	\$10,600	\$0	\$17,700	Yes	ai,ak
105. Recreation over the term of the license: expand Ponderosa Flat campground (SA section 7, item 2B1; FS final Section 10(a) condition no. 32(2)B.1)	SA, FS	\$311,400	\$5,200	\$0	\$50,500	Yes	ai,aj
106. Recreation within 5–10 years: improvements at Cool Springs campground (SA section 7, item 1A2c; FS final Section 10(a) condition no. 32(1)A.2.c)	SA, FS	\$44,600	\$6,400	\$0	\$12,800	Yes	ai,ak
107. Recreation within 5–10 years: improvements at Alder Creek boat launch (SA section 7, item 1A2d; FS final Section 10(a) condition no. 32(1)A.2.d)	SA, FS	\$239,800	\$2,600	\$0	\$37,500	Yes	ai,ak

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
108. Recreation within 5–10 years: provide Belden forebay car-top boating and trail access (SA section 7, item 1A3a; FS final Section 4(e) condition no.32(1)A.3.a)	SA, FS	\$59,700	\$300	\$0	\$8,900	Yes	ai,ak
109. Recreation within 1–3 years: improve North Fork fishing trail (SA section 7, item 1A3b; FS final Section 4(e) condition no. 32(1)A.3.b)	SA, FS	\$75,300	\$1,000	\$0	\$12,000	Yes	ai,aj
110. Prior to any recreation release flows provide river access at upstream end of Belden reach (SA section 7, item 1A4a; FS final Section 4(e) condition no. 32(1)A.4.a)	SA, FS	\$10,400	\$2,600	\$0	\$4,100	Yes	ai,aj
111. Recreation within 1–3 years: provide and maintain four trails to Belden reach shoreline (SA section 7, item 1A4b; FS final Section 4(e) condition no. 32(1)A.4.b)	SA, FS	\$51,900	\$3,900	\$0	\$11,500	Yes	ai,aj

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
112. Recreation within 3–5 years: upgrades at the Belden rest stop (SA section 7, item 1A4c; FS final Section 4(e) condition no. 32(1)A.4.c)	SA, FS	\$22,800	\$2,300	\$0	\$5,700	Yes	ai,aj	
113. If decision is made to provide recreation release flows, provide funding to the FS to construct non-project river access to the lower Belden reach (SA section 7, item 1A4d; FS final Section 4(e) condition no.32(1)A.4d)	SA, FS	\$125,000	\$0	\$0	\$18,200	Yes	aj	
114. Within 2 years develop and implement an I&E program for the project (SA section 7, item 6; FS final Section 4(e) condition no. 34)	SA, FS	\$77,800	\$10,400	\$0	\$21,700	Yes	ai,aj	
115. Within 1 year develop and provide new Lake Almanor bathymetry map (SA section 7, item 6; FS final Section 4(e) condition no. 34)	SA, FS	\$51,900	\$0	\$0	\$7,500	Yes	ai,aj	
116. Annual fish stocking (SA section 7, item 5; FS final Section 10(a) condition no. 32(4))	SA, FS	\$0	\$50,000	\$0	\$50,000	Yes	aj	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs			Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
			Including O&M (2004\$)	Annual Energy Costs (2004\$)	Annual Costs (2004\$)			
117. Within 1 year provide funding for river ranger position (SA section 7, item 10; FS final Section 4(e) condition no. 38)	SA, FS	\$0	\$25,000	\$0	\$25,000	No	ar	
118. If decision is made to provide recreation release flows, cooperatively develop a Belden interagency river recreation flow management plan (SA section 7, item 11; FS final Section 4(e) condition no. 29)	SA, FS	\$20,800	\$1,600	\$0	\$4,600	Yes	ah	
119. Within 6 months establish a recreation river flow TRG (SA section 2, item 1; FS final Section 4(e) condition no. 28(1))	SA, FS	\$10,400	\$1,000	\$0	\$2,500	Yes	ai,aj	
120. Within 6 months, implement the recreation flow implementation plan, including test flows and monitoring (SA section 2, item 2; FS final Section 4(e) condition no. 28(2))	SA, FS, CDFG	\$6,200	\$1,600	\$0	\$2,500	No		

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
121. In year 6, implement the recreation flow implementation plan, including test flows and monitoring (Interior Section 10(j) recommendation no. 22)	Interior	\$6,200	\$1,600	\$0		Yes	
122. After 3 years, implement recreational flow regime as proposed in SA	SA, FS	\$0	\$0	\$15,400	\$15,400	No	ai,an
(SA section 2, item 3; FS final Section 4(e) condition no. 28(3))							
123. Delay implementation of recreational flow release for a period of 6 years (in year 9)	Interior	\$0	\$0	\$13,700	\$13,700	Yes	
(Interior Section 10(j) recommendation no. 22)							
124. After 3 years, implement recreational flow regime as proposed by Interior	Interior, CDFG	\$0	\$0	\$15,400	\$15,400	No	ao
(Interior Section 10(a) recommendation no. 1)							
125. After 3 years, implement recreational flow regime as proposed by AW	AW	\$0	\$0	\$15,400	\$15,400	No	ao

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
126. Participate in annual planning meeting and post an annual recreation flow calendar (SA section 2, item 3A; FS final Section 4(e) condition no. 28(3))	SA, FS	\$0	\$5,200	\$0	\$5,200	Yes	ai
127. During scheduled recreation river flows, count number of boats per day (SA section 2, item 3D; FS final Section 4(e) condition no. 28(3))	SA, FS	\$0	\$21,300	\$0	\$21,300	Yes	ai
128. Develop and implement a visitor survey for up to 3 years (SA section 2, item 3D; FS final Section 4(e) condition no. 28(3))	SA, FS	\$100,000	\$24,600	\$0	\$39,200	Yes	ap
129. Annual meeting with Plumas County to discuss reservoir levels (SA section 3, item 12; FS final Section 4(e) condition no. 30(12))	SA, FS	\$0	\$1,600	\$0	\$1,600	Yes	ai

Land Use and Aesthetic Resources Measures

130. Within 1 year adjust project boundary (SA section 7, item 3; FS final Section 4(e) condition no. 32(3))	SA, FS	\$0	\$0	\$0	\$0	Yes	
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Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
131. Within 1 year prepare road traffic survey plan and implement every 6 years (SA section 7, item 12; FS final Section 4(e) condition no. 39)	SA, FS	\$10,000	\$2,700	\$0	\$4,100	Yes	aj,aq
132. Within 2 years, paint the metal siding and roof of the hoist house on the Prattville intake structure (SA section 8, item A; FS final Section 10(a) condition no. 40(A))	SA, FS	\$10,000	\$500	\$0	\$2,000	Yes	
133. Within 2 years, plant evergreen trees at the Prattville maintenance area for visual buffering and establish native plantings between the road and the Oak Flat spoil piles (SA section 8, item B; FS final Section 10(a) condition no. 40(B))	SA, FS	\$7,000	\$500	\$0	\$1,500	Yes	
134. Within 2 years, regrade the Oak Flat road debris spoil piles (SA section 8, item C; FS final Section 4(e) condition no. 40(C))	SA, FS	\$10,000	\$0	\$0	\$1,500	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
135. Within 2 years, prepare a plan to minimize dust and improve the Butt Valley-Caribou Road (SA section 8, item D; FS final Section 10(a) condition no. 40(D))	SA, FS	\$13,000	\$1,000	\$0	\$2,900	Yes	
136. Within 2 years, consult with the FS on Belden powerhouse visual upgrades (SA section 8, item E; FS final Section 10(a) condition no. 40(E))	SA, FS	\$0	\$1,000	\$0	\$1,000	Yes	
137. Within 2 years, maintain exterior and landscaping at Caribou village (SA section 8, item F; FS final Section 10(a) condition no. 40(F))	SA, FS	\$100,000	\$25,000	\$0	\$39,500	Yes	
138. Within 60 days prior to any ground-disturbing activities, prepare and file visual management plans (SA section 8, item G; FS final Section 10(a) condition no. 40(G))	SA, FS	\$5,000	\$1,000	\$0	\$1,700	Yes	
139. Participate in annual meeting with the FS and Plumas County to coordinate land management activities (SA section 8, item I; FS final Section 10(a) condition no. 40(I))	SA, FS	\$0	\$1,500	\$0	\$1,500	Yes	

Environmental Measures	Recommending Entity	Capital and One-time Costs (2004\$)	Annual Costs Including O&M (2004\$)	Annual Energy Costs (2004\$)	Total Annualized Cost (2004\$)	Adopted by Staff?	Notes
140. Within 1 year, prepare and implement fire prevention and response plan (FS final Section 4(e) condition no. 29)	FS	\$20,000	\$0	\$0	\$2,900	Yes	
141. Develop and implement a road management plan (FS final Section 4(e) condition no. 42)	FS	\$10,000	\$0	\$0	\$1,500	Yes	
Cultural Resources Measures							
142. Revised HPMP (FS final Section 4(e) condition no. 40)	PG&E, FS	\$425,000	\$40,500	\$0	\$102,300	Yes	
143. Copies of cultural resources reports	Plumas County	\$0	\$500	\$0	\$500	Yes	
144. Additional Cultural Resources Working Group meetings	Staff	\$0	\$1,000	\$0	\$1,000	Yes	

^a \$1,000/year in years 16 through 30, annualized to current cost.

^b \$200,000/year in years 1 through 6, annualized to current cost.

^c \$200,000/year in years 1, 2, and 3, annualized to current cost.

^d \$50,000/year in years 1 and 2, annualized to current cost.

^e \$50,000/year in years 1, 2, and 3, annualized to current cost.

^f \$150,000/year in years 3, 8, 13, 18, 23, and 28, annualized to current cost.

- g** \$150,000/year in years 1, 2, and 3, annualized to current cost.
- h** \$50,000/year in years 1, 6, 11, 16, 21, and 26, annualized to current cost.
- i** \$50,000/year in years 5, 10, and 15, annualized to current cost.
- j** \$20,000/year in years 1 through 5 and odd years following year 5, annualized to current cost.
- k** \$20,000/year in years 1, 2, and 3, annualized to current cost.
- l** Staff recommends that PG&E clarify its recommendation by developing a schedule for using the Canyon dam outlet upper-level gates to alleviate heavy metals and odors in late summer to fall associated with Canyon dam releases to the Seneca reach.
- m** Under the existing FERC-approved Rock Creek-Cresta Water Temperature Monitoring Plan, PG&E conducts seasonal monitoring of water temperature throughout the project area, and vertical profiles of water temperature and DO concentrations in Lake Almanor and Butt Valley reservoir.
- n** Study of the changes to the Prattville intake structure to modify water temperature is being done as part of the Rock Creek-Cresta Project license.
- o** \$10,000/year in year 1, annualized to current cost.
- P** Represents reduction in annual generation of 57.714 GWh versus no-action alternative.
- q** Represents reduction in annual generation of 65.060 GWh versus no-action alternative.
- r** No impact on generation.
- s** Represents reduction in annual generation of 3.115 GWh versus SA flow regime for Seneca and Belden reaches.
- t** Represents reduction in annual generation of 4.727 GWh versus SA flow regime for Seneca and Belden reaches.
- u** Represents reduction in annual generation of 1.211 GWh versus SA flow regime for Seneca and Belden reaches with Seneca reach pulse flows.
- v** Represents reduction in annual generation of 1.787 GWh versus SA flow regime for Seneca and Belden reaches with Seneca reach pulse flows.
- w** \$20,000/year in years 1, 3, 5, 10, 15, 20, 25, and 30, annualized to current cost.

- x \$100,000/year in years 3, 4, and 5, annualized to current cost.
- y \$50,000/year in years 1 through 3, 8 through 10, 15, 20, and 25, annualized to current cost.
- z \$50,000/year in years 5, 10, 15, 20, 25, and 30, annualized to current cost.
- aa \$100,000/year in years 3, 6, 9, 14, 19, 24, and 29, annualized to current cost.
- ab \$35,000/year in years 10, 12, and 14, annualized to current cost.
- ac \$35,000/year in years 4, 5, 10, 15, 20, 25, and 30, annualized to current cost.
- ad \$20,000/year in years 4, 8, 12, 16, 20, 24, and 28, annualized to current cost.
- ae \$40,000/year in year 2 and \$10,000/year in years 3, 5, 10, 15, 20, 25, and 30, annualized to current cost.
- af \$10,000/year in years 5, 10, 15, 20, 25, and 30, annualized to current cost.
- ag Represents reduction in annual generation of 23.928 GWh versus SA minimum and pulse flow regime.
- ah Part of Rock Creek-Cresta agreement associated with relicensing of that project; costs accounted for as part of that project.
- ai Costs escalated to 2004 dollars using Implicit Price Deflator.
- aj Assume costs begin to be incurred in year 1 of license.
- ak Assume costs begin to be incurred in year 8 of license; capital costs depreciated back to year 1 of license, and the present value of annual costs incurred during license determined.
- al Assume costs begin to be incurred in year 4 of license; capital costs depreciated back to year 1 of license, and the present value of annual costs incurred during license determined.
- am \$1,500/year in years 6, 12, 18, 24, and 30, annualized to current cost.
- an Represents reduction in annual generation of 0.241 GWh versus SA minimum and pulse flow regime and Lake Almanor and Butt Valley reservoir operation under SA.
- ao No additional loss of generation versus SA recreational flow regime.
- ap \$50,000/year in years 1 through 3, annualized to current cost.

- aq \$20,000/year annual cost in years 6, 12, 18, 24, and 30, annualized to current cost.
- ar Although staff does not recommend these measures, they are mandatory conditions.
- as The estimated costs assumes the following: (a) only two actual release sites (number of sites not specified in the prescription) and they are limited to a boat ramp access for fish transfer truck access; (b) costs do not include any fish tempering tanks or holding facilities; (c) each of the two release sites will be within 0.25 mile of a pre-existing maintained road; and (d) the roads to the release sites will be graded with gravel and allow for the excavation of a base and drainage, as necessary.

4.3 POWER AND ECONOMIC BENEFITS OF THE NO-ACTION ALTERNATIVE

Under the no-action alternative, the UNFFR Project would generate an average of 1,171,900,000 kWh of electricity annually, have an annual power value of \$74,810,800 (63.84 mills/kWh), and total annual costs of \$22,326,100 (19.05 mills/kWh), resulting in a net annual benefit of \$52,484,700 (44.79 mills/kWh).

4.4 POWER AND ECONOMIC BENEFITS OF THE PROJECT RETIREMENT ALTERNATIVE

Under the project retirement alternative, the UNFFR Project would no longer generate electricity. The cost associated with this project would represent the cost of purchasing 1,171,900,000 kWh of replacement energy, or \$74,810,800. In addition, securing powerhouses and other structures under project retirement, assuming the structures would remain in place, would require an additional capital cost of about \$250,000, which corresponds as an annualized cost of \$36,400. Since the cost of replacing this energy would be recuperated through the resale of the replacement purchased energy, the power benefit would represent the cost of purchasing this energy, or \$74,810,800, resulting in a net annual benefit under project retirement of -\$36,400.

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