recent fishery surveys (ECORP, 2003a). The creek has a moderate gradient with riffle-run and step-run habitat contained in a well-defined stream channel approximately 30 to 50 feet wide.

Table 3-14. Species composition and relative abundance in Seneca reach, Belden reach, upper Butt Creek, and lower Butt Creek, 2000–2002. (Source: ECORP, 2003a, as modified by staff)

		Yearly Abundance (Percent of Total for Location)		
Location	**Species**	**2000**	**2001**	**2002**
Seneca Reach	Sculpin[a]	69	58	
	Riffle sculpin			47.8
	Prickly sculpin			5.8
	Rainbow trout	29	40	44.4
	Brown trout	1	<1	0.9
	Sacramento sucker	1	1	1.1
Belden Reach	Sculpin[a]	59.4	51.7	
	Riffle sculpin			55.9
	Prickly sculpin			1.9
	Rainbow trout	21.3	27.4	26.5
	Rainbow trout (hatchery)	-	-	0.7
	Sacramento sucker	19.1	20.9	13.9
	Sacramento pikeminnow	1	-	1.1
Upper Butt Creek	Sculpin[a]	47.5	46	
	Riffle sculpin			54.5
	Rainbow trout	28.5	33	29.4
	Brown trout	5	9.4	11.2
	Sacramento sucker	19	11.6	4.9
Lower Butt Creek	Sculpin[a]	65	61.3	
	Riffle sculpin			59
	Rainbow trout	35	38.7	41

[a] During 2000 and 2001 surveys sculpin were not identified to species.

Table 3-15. Total number of trout (rainbow and brown) caught by anglers in project waters surveyed in 2000, by size range. (Source: EA, 2001, as modified by staff)

	Size Range (Inches)					
	<8	**8-11**	**11-14**	**14-17**	**>17**	**Total**
Reservoirs						
Lake Almanor	53	85	159	109	99	505
Butt Valley reservoir	4	13	25	34	37	113
Rivers/Streams						
Upper Butt Creek	35	16	32	72	77	231
Lower Butt Creek	2	28	20	3	3	56
Belden Reach	55	43	18	2	4	122

Under normal operating conditions, Butt Valley reservoir fluctuates about 1 foot per day, 3 to 5 feet weekly, and 10 feet seasonally. The reservoir thermally stratifies during early summer with near surface temperatures near 20°C and temperatures less than 12°C at depths of 20 feet or deeper. The duration of thermal stratification is influenced by the operation of the Caribou No.1 unit (a deeper intake unit that drafts colder water from deeper portions of the reservoir). By mid-July and August, the volume of cold water is typically at its minimum and the reservoir is weakly stratified. The reservoir supports a trophy rainbow and brown trout fishery, with trout more than 17 inches long comprising a substantial portion, 33 percent, of angler catch (see table 3-14) (EA, 2001). The existence of this trout fishery is due in part to the forage base provided by wakasagi, which enter the reservoir due to entrainment at the Prattville intake in Lake Almanor; it is not known if wakasagi also reproduce in the Butt Valley reservoir. Other fish species present in the reservoir include Sacramento pikeminnow, Sacramento sucker, tui chub, and smallmouth bass. Available habitat for fish, especially centrarchids, in the reservoir is limited, as most of the shoreline consists of shallow water with mud or shale substrate with little or no littoral zone present. Fish habitat enhancement structures were constructed within the reservoir during 1996 and 1997 as mitigation for a dam seismic remediation project. These enhancement structures included: 63 smallmouth bass population cover/spawning modules in the reservoir and 25 boulder clusters grouped at three locations within Butt Creek, the tailrace, and the reservoir. The effectiveness of these habitat enhancement structures is unknown.

Mollusc species inhabiting Butt Valley reservoir include four native gastropods, black juga (*Juga nigrina*), Artemesian rams-horn, nugget pebblesnail (*Fluminicola seminalis*), and marsh pondsnail (*Stagnicola elodes*). Large quantities of Asian clam

shells were documented throughout the reservoir in 2001, though no live individuals were found. PG&E observes that a prolonged severe drawdown of the reservoir from early spring of 1996 through late 1997, which reduced the reservoir's volume to 5.8 percent of its normal amount, dewatered the regions of the reservoir where Asian clams were dwelling and increased the likelihood that neither the spring or fall reproductive cycles were successful for the 2 years during the drawdown period (Spring Rivers, 2002).

Belden Reservoir

The Belden reservoir is located on the NFFR downstream of the Seneca bypassed reach and has a surface area of 42 acres (see figure 1-1). The reservoir's daily water surface elevation can fluctuate between 5 and 10 feet depending on power operations. Flow into the reservoir comes from the Caribou No. 1 powerhouse, the Caribou No. 2 powerhouse, and the Seneca reach of the UNFFR.

Fish species inhabiting Belden reservoir include rainbow trout, brown trout, smallmouth bass, Sacramento sucker, and wakasagi. The presence of wakasagi is most likely due to their entrainment in the intakes of Caribou No.1 and No. 2 powerhouses located in Butt Valley reservoir. No data have been collected that suggest wakasagi reside in Belden reservoir for prolonged periods of time or reproduce there.

Two species of bivalves, the native western pearlshell mussel and the introduced Asian clam, occur within the reservoir (Spring Rivers, 2002).

Seneca Bypassed Reach

The Seneca reach of the NFFR begins at the base of Canyon dam and extends 10.8 miles to the Caribou No. 1 powerhouse at the upper end of Belden reservoir (see figure 1-1). A year-round minimum flow of 35 cfs is released into the reach from Canyon dam. Within the uppermost 0.5 mile, the reach receives additional flow from spring seepage and accretion flow. Lower Butt Creek is the only major tributary that enters the Seneca reach. The Seneca reach has an overall stream gradient of 2 percent with varying habitat composed of low gradient riffles and runs, high gradient riffle/cascades, pools, step-runs, and pocket-water. The lower 1.25 miles of the reach, extending from the confluence with lower Butt Creek to the Caribou No.1 powerhouse, contains higher quality, more complex habitat consisting of a greater number of pools, and additional flow from lower Butt Creek. PG&E estimated the distribution of rainbow trout redds within Seneca reach to be 128 redds/mile (TRPA, 2002b).

The predominant fish species found within the Seneca reach are riffle sculpin, rainbow trout, and prickly sculpin (table 3-14) (ECORP, 2003a). Less abundant fish species include Sacramento sucker and brown trout. The rainbow trout population within the Seneca reach is dominated by age 0+ and 1+ individuals (ECORP, 2003a).

Molluscs inhabiting the reach include four native gastropods, nugget pebblesnail, Artemesian rams-horn, tadpole physa, black juga, and two native bivalves, striated fingernail clam and western pearlshell mussel (Spring Rivers, 2002).

Belden Bypassed Reach

The Belden reach of the NFFR is 9.3 miles long extending from Belden dam to its confluence with Yellow Creek (see figure 1-1). A minimum flow of 140 cfs from the last Saturday in April to Labor Day and 60 cfs during the rest of the year is released from Oak Flat powerhouse, located at the base of Belden dam. To accommodate the two flow rates, the turbine has a high-flow runner and a low-flow runner that are alternated in the spring and fall to correspond with the change in minimum flow requirements. The upper section of the Belden reach starts at the base of Belden dam and extends 7 miles to its confluence with the EBNFFR. Habitat in the upper section of Belden reach is varied, with riffles, runs, pools, pocketwater, and a 0.25- to 0.5-mile-long section characterized by split channels with shallow riffles. Mosquito Creek is the largest tributary to the upper section, with flows ranging from 2 to 10 cfs from June to September.

The lower section of Belden reach extends from the confluence of the EBNFFR to the confluence with Yellow Creek. This section is substantially wider (150 to 200 feet) than the upper section and also has a much greater uncontrolled flow due to input from the EBNFFR, which is a large unregulated tributary of the NFFR. The average monthly flows in the EBNFFR are highest during January through mid-May ranging between 1,700 to 2,600 cfs, and lowest during July through September ranging between 100 to 300 cfs for the WY period 1970-1999. The habitat in this section of the Belden reach consists primarily of riffles, runs, and pocket water. The Belden powerhouse discharges into Yellow Creek just upstream of the creek's confluence with the NFFR. Upstream of the Belden powerhouse tailrace, Yellow Creek, a CDFG-designated wild trout stream, contributes flows ranging from 40 to 170 cfs during June to September.

The fish community inhabiting the Belden reach is mostly composed of riffle sculpin, rainbow trout, Sacramento sucker, and prickly sculpin (see table 3-14). PG&E estimated the distribution of rainbow trout redds within Belden reach to be 23 redds/mile (TRPA, 2002b). Other species present in lesser numbers are Sacramento pikeminnow, hatchery rainbow trout, and hardhead (FS sensitive species [FSS] and state species of concern [CSC]). Angling pressure throughout the Belden reach is high due to one private and three public campgrounds located along the reach and Caribou Road which provide easy access for anglers. To increase angling opportunities, CDFG annually stocks the reach with hatchery raised rainbow trout.

The Gansner fish barrier is located on the Belden reach 0.2 mile upstream of the confluence with EBNFFR. This 5-foot-high concrete topped rock gabion barrier extends across the river and was constructed in 1975 by PG&E at the request of CDFG, and PG&E is responsible for maintaining the structure. The barrier was designed to eliminate

spawning access to the upper NFFR by Sacramento sucker and other non-game fish species. In 1971, prior to the construction of the barrier, CDFG chemically treated the Belden reach, from Belden dam to its confluence with the EBNFFR, with antimycin (Fintrol) to control non-game fish, primarily Sacramento suckers. The chemical treatment killed approximately 46,000 pounds of suckers and 300 to 500 pounds of rainbow trout. Following the treatment, CDFG restocked 483 rainbow trout that had been removed from the reach by electrofishing prior to the treatment and also stocked 10,000 hatchery-reared sub-catchable rainbow trout in the reach. PG&E noted that during several site visits in the spring of 2001, multiple rainbow trout were observed repeatedly attempting to jump over the barrier without success.

Mollusc species that inhabit the Belden reach include three native gastropods, black juga, Artemesian rams-horn, and tadpole physa, and two bivalves; the native western pearlshell mussel and the introduced Asian clam (Spring Rivers, 2002).

Lower Butt Creek Bypassed Reach

Lower Butt Creek, located in a remote, very steep, and narrow canyon, is 1.4 miles long, extending from the Butt Valley dam to its confluence with the Seneca reach (see figure 1-1). The creek is high gradient (9.4 percent), and there are no existing minimum flow requirements for the creek. Flows in the creek range between 14 to 21 cfs, averaging 18 cfs, and are composed of coldwater spring flow accretion, seepage from the Butt Valley dam, and tributary inflow from Benner Creek. During the summer months, water temperature within the creek ranges from about 10 to 13°C. Habitat is predominantly high gradient riffle/cascade and pocket water with substantial amounts of large woody debris (LWD) present (TRPA, 2002; Entrix, 2002). The substrate found within the creek is dominated by boulder and cobble with areas of gravel. PG&E observed rainbow trout redd density of 171 redds/mile, the highest density recorded in project waters (TRPA, 2002b), indicating that these gravel areas are used by spawning rainbow trout.

Riffle sculpin and rainbow trout were the only two fish species collected in the lower Butt Creek bypassed reach in 2000 through 2002 (see table 3-14) (ECORP, 2003a). Age 0+ trout were the dominant age class collected within lower Butt Creek with juvenile and adult trout also present (ECORP, 2003a). Based on the high density of trout redds and age 0+ trout, lower Butt Creek provides substantial spawning and rearing habitat for trout that inhabit both the creek and the Seneca reach of the NFFR. Positioned across the creek, 0.2 mile upstream of the confluence with the Seneca reach, is a weir associated with an abandoned discharge gage, NF-9, which may act as a barrier to the upstream movement of juvenile and adult trout during lower flow periods.

Compared to other project waters, lower Butt Creek possesses the greatest mollusc diversity with six species (all native) found: five gastropods, black juga, Lyogyrus sp.,

nugget pebblesnail, Artemesian rams-horn, and tadpole physa (*Physella gyrina*), and one native bivalve, striated fingernail clam (Spring Rivers, 2002).

Special-status Aquatic Species

Two special-status fish species are present within the project area. Hardhead (*Mylopharodon conocephalus*), which is an FSS and SSC, has been documented in the tailrace of the Belden powerhouse. Hardhead is an omnivorous (plankton, aquatic plants, and invertebrates) species that is typically most abundant in larger middle and low elevation, well oxygenated streams where summer temperatures typically exceed 20°C. Hardhead can colonize reservoirs but persist only if exotic species, especially centrarchid basses (e.g., largemouth bass and smallmouth bass), are not present.

The Sacramento perch (*Archoplites interruptus*), an FSS and SSC, is the only centrarchid native to California that occurs in project waters. Historically the species was widespread in the Sacramento-San Joaquin, Pajaro, and Salinas rivers and in Clear Lake (Lake County) but it has been extirpated from most of its historic range. Today Sacramento perch are restricted to farm ponds or reservoirs where they have been introduced. Preferred habitat contains beds of rooted and emergent aquatic plants which are critical for food and cover for juveniles. The species was introduced by an unknown source into project waters and was most recently documented in Lake Almanor (2000) and Butt Valley reservoir (1996-1998).

3.3.2.2 Environmental Effects

Minimum Flows

PG&E proposes (in the final SA) and the FS (preliminary Section 4(e) condition 27, in its December 1, 2003, filing) and CDFG (in its November 26, 2003, filing) each recommend similar minimum flows, based on WY type, for the preservation and improvement of aquatic resources in the Seneca and Belden reaches of the NFFR (tables 3-16 and 3-17). Interior (10(j) recommendation no. 1) recommends similar, but somewhat higher, minimum flows based on WY type into the Seneca and Belden reaches (tables 3-16 and 3-17).

For all recommended instream flow regimes, flows into the Seneca reach would be released from the Canyon dam and monitored at gage NF-2. Flows into the Belden reach would be released from Belden dam and monitored at gage NF-70. Both gages are located immediately downstream of the respective dams.

Table 3-16. Recommended minimum flow releases from Canyon dam (Seneca reach) as measured at gage NF-2. (Source: SA and Interior letter, December 1, 2003, as modified by staff)

Water Year Type	Proposed/ Recommended By	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Critically dry	SA	75	75	90	90	90	80	75	60	60	60	60	70
	Interior	90	90	90	90	90	90	60	60	60	60	60	60
Dry	SA	90	100	110	110	110	110	80	70	60	60	60	75
	Interior	90	100	110	110	110	110	80	70	60	60	60	75
Normal	SA	90	100	125	125	125	125	90	80	60	60	60	75
	Interior	90	100	150	150	150	125	90	75	75	75	75	75
Wet	SA	90	100	125	150	150	150	95	80	60	60	60	75
	Interior	105	130	170	170	170	150	95	85	85	85	85	90

Table 3-17. Recommended minimum flow releases from Belden dam (Belden reach) as measured at gage NF-70. (Source: SA and Interior letter, December 1, 2003, as modified by staff)

Water Year Type	Proposed/ Recommended By	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Critically dry	SA	105	130	170	180	185	90	80	75	75	75	85	90
	Interior	130	130	150	150	150	130	100	100	100	100	100	100
Dry	SA	135	140	175	195	195	160	130	110	100	100	110	115
	Interior	135	140	175	185	195	160	130	110	110	110	110	120
Normal	SA	140	140	175	225	225	225	175	140	140	120	120	120
	Interior	140	140	175	225	225	225	170	140	120	120	120	120
Wet	SA	140	140	180	235	235	225	175	140	140	120	120	120
	Interior	140	140	225	250	250	250	175	140	140	130	130	130

In the final SA, PG&E does not propose any modification to the existing flow conditions in lower Butt Creek. In its 10(j) recommendation no. 1, Interior concurs. It suggests that PG&E make no efforts to reduce dam leakage, tunnel leakage, and spring or other natural flows that currently provide inflow to lower Butt Creek below Butt Valley dam.

Our Analysis

PG&E, in consultation with resource agencies (FWS, FS, CDFG, and SWRCB), performed instream flow studies for Seneca and Belden reaches and lower Butt Creek using the Physical Habitat Simulation (PHABSIM) technique as applied under the structural framework of the Instream Flow Incremental Methodology (IFIM) (Bovee et al., 1998; Milhous et al., 1984, 1989). The objectives of the PHABSIM study were to describe the existing habitat conditions for fish and other aquatic species and to develop the incremental relationship between streamflow and the weighted useable area (WUA) index to physical habitat for various life stages of selected fishes used for evaluation purposes. WUA is the quantitative index of habitat suitability used in PG&E's PHABSIM studies.

During the IFIM study design process, resource agencies stated that their goal was to manage the NFFR within the project area as a coldwater rainbow trout fishery through flows that are capable of sustaining a fully functional ecosystem (TRPA, 2002a). Species selected for habitat analysis were rainbow trout, Sacramento sucker, and benthic macroinvertebrates. Rainbow trout and Sacramento sucker are the dominant species, after sculpin, in the bypassed reaches (ECORP, 2003a; TRPA, 2002b), and angler catch in these reaches is dominated by rainbow trout (EA, 2001). Site-specific habitat suitability criteria (HSC) were developed from field data collected in the Seneca and Belden bypassed reaches, with a more limited effort within lower Butt Creek for the following: juvenile rainbow trout, adult rainbow trout, spawning rainbow trout, and adult Sacramento sucker. For the evaluation of macroinvertebrate habitat at modeled flows, HSC curves for macroinvertebrate community diversity were used from Gore et al. (2001).

PG&E placed transects in representative riffle, run, pocket water, and pool habitats in seven segments (49 transects) of Seneca reach, five segments (29 transects) of Belden reach, and two segments (13 transects) of lower Butt Creek. PG&E measured depths and velocities at calibration flows to model hydraulic conditions up to a maximum flow of 2000 cfs for both the Seneca and Belden reaches and 35 cfs for lower Butt Creek. PG&E presented results for riffle/run, pocket-water, and pool habitats combined for each reach.

Seneca and Belden Reaches[18]

Under current operations, PG&E releases a minimum flow of 140 cfs from the last Saturday in April to Labor Day and 60 cfs during the rest of the year into the Belden reach from Oak Flat powerhouse, located at the base of Belden dam; in the Seneca reach

[18] The IFIM study provided separate results for the upper and lower sections of the Belden reach. For our analysis of recommended flow regimes for the Belden reach, we used the IFIM study results for the upper reach because this 7-mile section of habitat is not influenced by the unregulated flow of the EBNFFR, which enters at the start of the lower Belden reach.

PG&E releases a year-round minimum flow of 35 cfs from Canyon dam. The existing instream flows maintain naturally reproducing populations of rainbow trout in both reaches (ECORP, 2003). The flow schedules proposed in the final SA and recommended by Interior (tables 3-16 and 3-17) for the Seneca and Belden reaches would be more variable than existing conditions because they are designed to mimic the seasonal variability that occurs within a natural hydrograph over an annual period, and they correspond to WY types (critically dry, dry, normal, and wet).

Adult Rainbow Trout

For adult rainbow trout, Seneca reach WUA increased rapidly up to flows of 250 cfs and then more gradually to a maximum at 800 cfs. WUA gradually declined at higher flows (see figure 3-4). In the Belden reach WUA increased steadily up to 300 cfs and then remained fairly stable at all higher flows modeled (figure 3-5).

The recommended flow regimes for the Seneca and Belden reaches would increase suitable habitat for adult rainbow trout during normal and wet water year types. In the Seneca reach, habitat suitability would increase from 39 percent of maximum WUA under existing conditions to 55 to 82 percent and 62 to 85 percent of maximum WUA under the proposed measures in the final SA and Interior's recommendations, respectively. In the Belden reach, habitat suitability would increase from 39 percent of the maximum WUA under existing conditions to 56 to 75 percent and 58 to 75 percent of maximum WUA under the proposed measures in the final SA and Interior's recommendations, respectively.

During dry and critically dry water year types the available habitat for adults would be 55 to 67 percent (final SA) and 55 to 73 percent (Interior) of the maximum WUA for the Seneca reach and 48 to 70 percent (final SA) and 52 to 70 percent (Interior) of the maximum WUA for the Belden reach. Although the increase in habitat during dry and critically dry water year types would be less than for normal and wet water year types, they represent an increase over the existing conditions, especially during the winter.

We conclude from the data that both the proposed measures in the final SA and Interior's recommendations for minimum flows would improve habitat suitability for adult rainbow trout in each reach over that which exists under current flows.

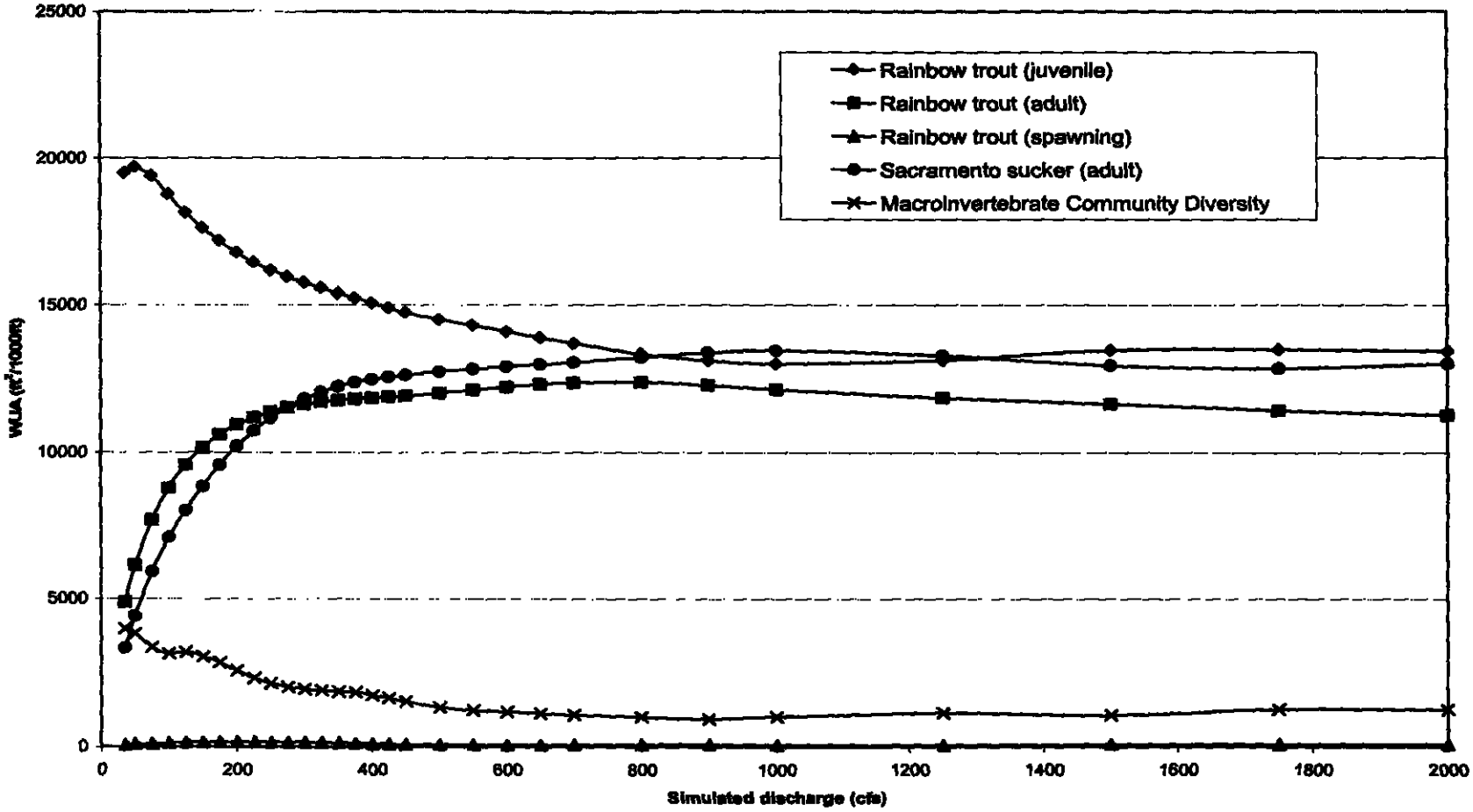

Figure 3-4. Total WUA values for species and lifestages evaluated (one velocity calibration method) in the Seneca reach. (Source: TRPA, 2002a, as modified by staff)

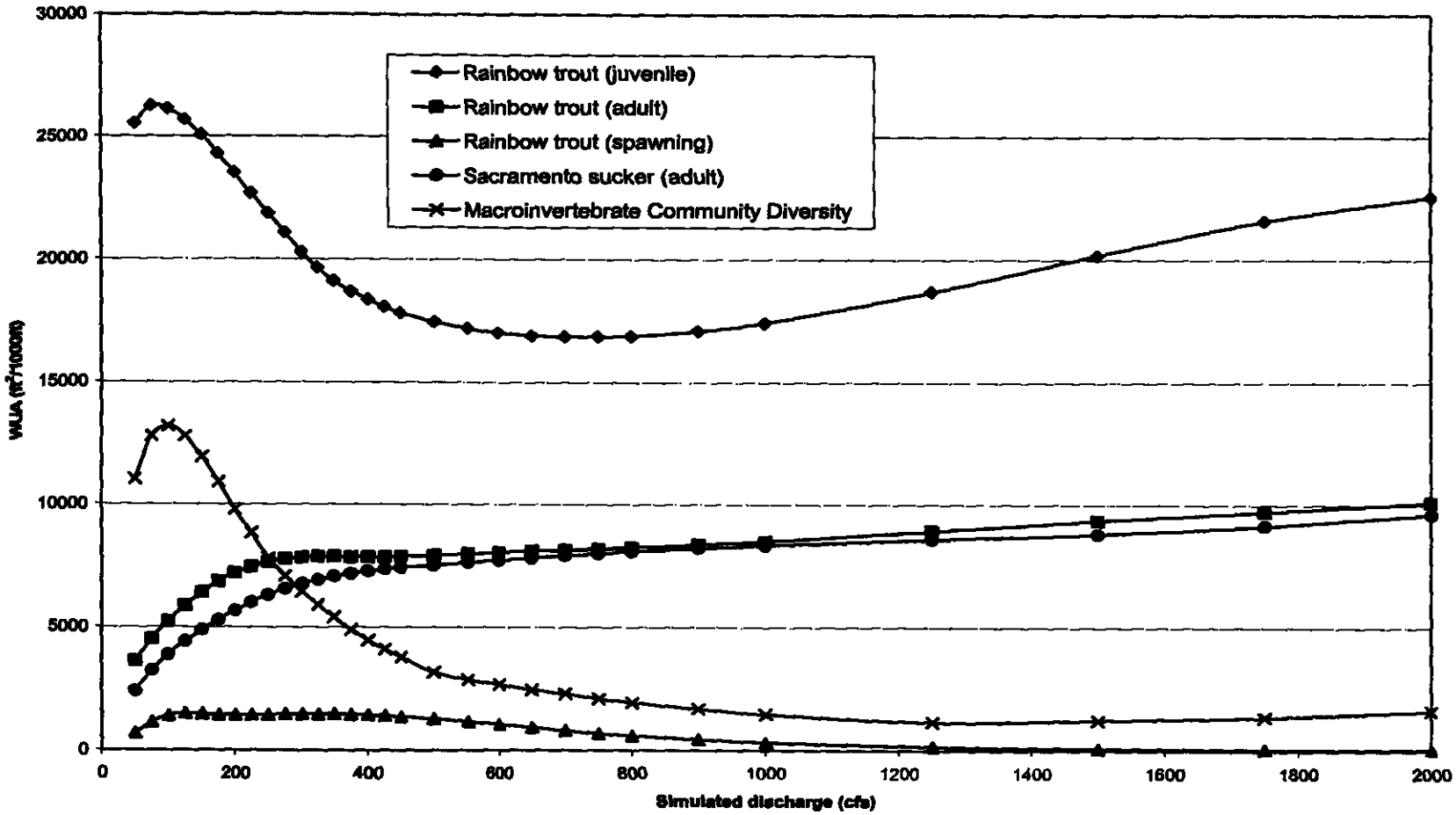

Figure 3-5. Total WUA values for species and lifestages evaluated (one velocity calibration method) in the upper Belden reach. (Source: TRPA, 2002a, as modified by staff)

Rainbow Trout Spawning

Figures 3-6 and 3-7 show that the quantity of WUA for rainbow trout spawning and incubation is less than the quantity of WUA for other lifestages at each flow. However, this is not surprising because salmonid spawning habitat is composed of unembedded gravel bars, typically found only at the tail of pools or point bar riffles. The ratio and proximity of such habitat to downstream young-of-year habitat is more important to maintaining trout populations than the total amounts of spawning WUA (Bovee, 1982).

Maximum spawning and egg incubation WUA for rainbow trout in the Seneca reach occurs at 225 cfs, rapidly declines until a flow of 600 cfs, and then fluctuates between WUA values of 57 and 92 at higher flows (figure 3-6). Spawning habitat suitability in the Belden reach achieves a plateau between 100 to 400 cfs, with a peak at 125 cfs and then steadily declines at higher flows (figure 3-7).

During wet and normal years the recommended flows in March and April[19] for the Seneca reach would provide 71 to 100 percent of the maximum WUA (final SA) and 71 to 98 percent (Interior) of maximum rainbow trout spawning WUA in the reach compared to 39 percent under existing conditions. In the Belden reach, flows in March and April would provide 95 to 96 percent (final SA) and 96 to 98 percent (Interior) of maximum rainbow trout spawning WUA in the reach, compared to 58 percent under existing conditions.

During dry and critically dry years, for the Seneca reach, proposed (final SA) and recommended (Interior) flows in March and April would provide 71 to 84 percent of the maximum spawning WUA compared to 39 percent under existing conditions. In the Belden reach, recommended flows in March and April would provide 95 to 96 percent (final SA) and 96 to 98 percent (Interior) of the maximum spawning WUA compared to 58 percent under existing conditions.

In summary, the IFIM analyses show that both the proposed (final SA) and recommended (Interior) flow regimes would provide for increases in spawning and incubation habitat in all WY types compared to existing flows. The predicted WUA increases over existing conditions are similar in the final SA and Interior recommendations.

[19] Rainbow trout spawning was documented in the Seneca and Belden reaches from late March through April (TRPA, 2002b).

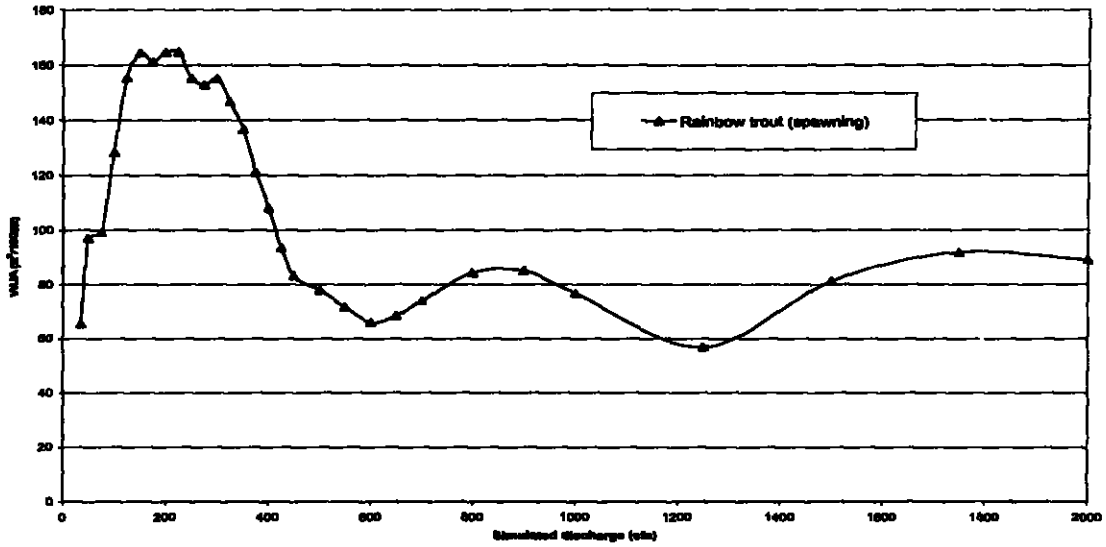

Figure 3-6. Total WUA values for rainbow trout spawning as evaluated (one velocity calibration method) in the Seneca reach. (Source: TRPA, 2002, as modified by staff)

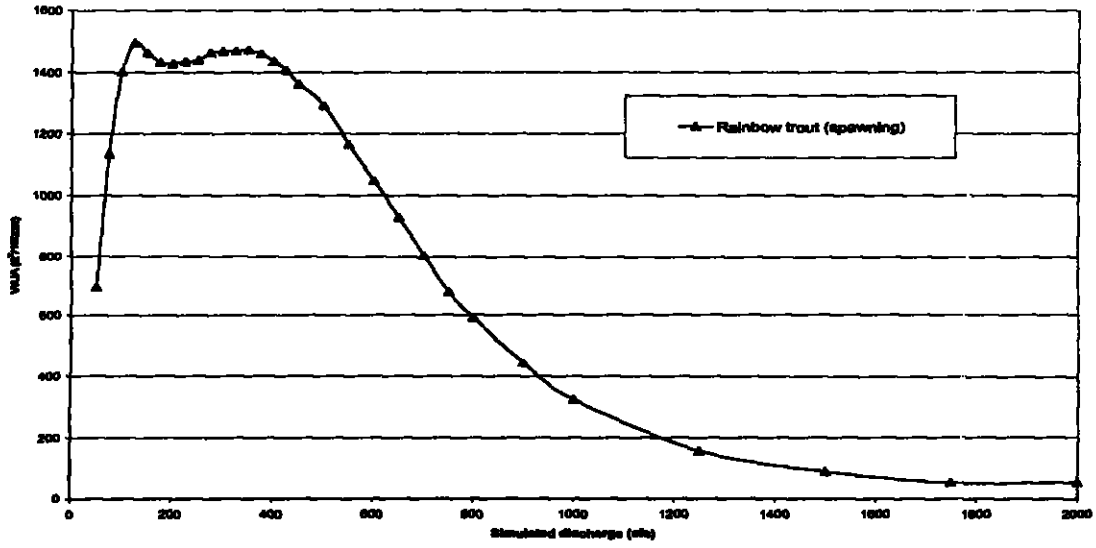

Figure 3-7. Total WUA values for rainbow trout spawning as evaluated (one velocity calibration method) in the upper Belden reach. (Source: TRPA, 2002a, as modified by staff)

Juvenile Rainbow Trout

Juvenile rainbow trout habitat suitability peaks at 50 and 75 cfs in the Seneca and Belden reaches, respectively (figures 3-4 and 3-5). After maximum WUA is attained in each of the reaches, habitat suitability rapidly declines as shallow stream margins decrease in areal extent and water velocities increase.

The existing year-round minimum flow of 35 cfs in the Seneca reach provides 99 percent of the maximum WUA for juvenile rainbow trout on an annual basis. The proposed (final SA) and Interior recommended flow regimes during the late summer/fall period (September through November) would continue to provide 99 percent and 97 to 99 percent of the maximum juvenile WUA, respectively. From December through August, the proposed (SA) and recommended (Interior) flows would provide 89 to 99 percent and 88 to 99 percent of the maximum juvenile WUA, respectively.

The existing minimum flow regime in the Belden reach provides 96 percent of the maximum juvenile WUA from the last Saturday in April to Labor Day and 99 percent the remainder of the year. For normal and wet WY types, the proposed (final SA) and recommended (Interior) flows would continue to provide substantial habitat for juvenile rainbow trout, representing 85 to 98 percent and 83 to 98 percent of the maximum juvenile WUA, respectively. During dry and critically dry WY types, the proposed flows would range between 75 to 195 cfs, providing juvenile rainbow trout with 90 to 100 percent of the maximum juvenile WUA. Interior's recommended flows ranging between 100 to 195 cfs would provide 90 to 99 percent of the maximum juvenile WUA.

In summary, the proposed (final SA) and recommended (Interior) flow regimes for all WY types would provide essentially the same juvenile rainbow trout habitat suitability as the existing flow regime.

Adult Sacramento Sucker

WUA for Sacramento sucker adults increases steadily up to a flow of 300 cfs in the Seneca reach and 350 cfs in the Belden reach, then slowly increases at higher flows for both reaches (figures 3-4 and 3-5).

Under the recommended Seneca reach flow regimes, total available suitable habitat for adult Sacramento sucker would range between 38 to 68 percent (final SA) and 38 to 72 percent (Interior) of maximum habitat suitability, compared to 26 percent under the current instream flow regime. Proposed and recommended flows in the Belden reach should provide 45 to 63 percent (final SA) and 45 to 65 percent (Interior) (normal and wet WY types) and 33 to 58 percent (final SA) and 40 to 58 percent (Interior) (critically dry and dry WY) of adult Sacramento sucker maximum habitat suitability. Current Belden reach instream flows provide 49 percent of maximum habitat suitability from the last Saturday in April to Labor Day, and 28 percent during the rest of the year.

In summary, the increases in adult Sacramento sucker habitat suitability would occur in all WY types under the proposed (final SA) and recommended (Interior) flow regimes for the Seneca and Belden reaches compared to existing flow conditions.

Macroinvertebrate Community Diversity

Habitat suitability for macroinvertebrates is maximized at 35 cfs in the Seneca reach and at 100 cfs in the Belden reach (figures 3-6 and 3-7). In each reach, habitat suitability steadily decreases as flow increases above the flow providing maximum WUA. The proposed and recommended flow regimes would provide 76 to 91 percent (final SA) and 72 to 91 percent (Interior) of maximum habitat suitability in the Seneca reach, and 64 to 97 percent (final SA) and 59 to 100 percent (Interior) in the Belden reach. Though the recommended flows would decrease habitat suitability for macroinvertebrates during the spring and early summer over existing flows, a major amount of the habitat relative to the maximum potential would still be preserved, while at the same time providing higher quality habitat for the other members of the aquatic community represented in the PHABSIM model. Further, increased wetted stream perimeter would increase the area available for epifaunal and infaunal colonization, and improve overwintering conditions by providing greater water depths, which would reduce the likelihood that ice formation would encroach on the substrate colonized by these organisms. We conclude from these data that both the proposed (final SA) and recommended (Interior) flow regimes would be benign to this component of the river ecosystem while benefiting the fish species, which is consistent with the resource agency study goals.

Hardhead

The IFIM study did not analyze the flow requirements for hardhead within the Belden reach, but focused on the fish species of interest (rainbow trout and Sacramento sucker) that were identified by PG&E, in consultation with CDFG, FWS, FS, and SWRCB. The only hardhead documented in relicensing studies were observed in the tailrace of the Belden powerhouse during the entrainment study conducted in 2001. Preferred hardhead habitat is riverine environments with deep pools (>1 m) composed of sand-gravel-boulder substrates, slow water velocities (< 40 cm sec-1), with water temperatures ranging from 17 to 28°C (Moyle, 2002). Spawning is presumed to occur in the spring in gravel riffle habitats (Moyle, 2002). The minimum flow regimes for the Belden reach proposed in the final SA and recommended by Interior would not adversely affect hardhead because the aquatic habitat characteristics would be similar to what currently exists.

Water Temperatures

As described in section 3.3.1, *Water Resources*, PG&E performed 3 years (2000 through 2002) of summer water temperature monitoring in the Seneca and Belden

reaches (see table 3-7). Daily average water temperatures ranged between 10 to 17°C in Seneca reach and 17 to 21°C in the Belden reach above Gansner Bar fish barrier. In the lower Belden reach, below the confluence with the EBNFFR, water temperatures ranged between 18 to 22°C, due to the addition of the warmer water from the EBNFFR.

Based on our review of the results of PG&E's SNTEMP model results, we evaluated water temperature changes in the Seneca and Belden reaches resulting from recommended summer flow regimes to determine effects on the fishery resource. PG&E reports water temperatures from the study as median monthly values. We compared results for existing summer flow conditions, recommended flow regimes with the existing Prattville intake, and recommended flow regimes with a modified Prattville intake (which would only affect the Belden reach).

The summer flow regimes proposed in the final SA and recommended by Interior, with the existing Prattville intake configuration, would likely cause a decrease, up to 1°C, in water temperatures in the Seneca reach during June through August and create no change in September compared to water temperatures with the existing 35 cfs year-round minimum instream flow. For all WY types modeled, the water temperatures within the reach would remain below 16°C for the recommended flow regimes.

The Belden reach water temperature-flow relationship modeling conducted by PG&E included two varying conditions: (1) flow within the Seneca reach, and (2) configuration (existing or modified) of the Prattville intake. We analyzed the results of the modeling (specifically those for the existing Prattville intake, with a flow release of 75 cfs in the Seneca reach, and a flow of 140 cfs in the Belden reach) to approximate the effects of the recommended summer flow release schedule on water temperatures within the Belden reach directly upstream of the confluence with the EBNFFR. Monthly median water temperatures for June through September for the recommended flow schedule with the existing Prattville intake configuration would be similar to existing instream flow conditions. With a modified Prattville intake configuration, the water temperature in the Belden reach would be decreased up to 4°C for the months of June through August, and remain unchanged in September, keeping the water temperature below 20°C for all months.

Rainbow trout prefer ambient temperatures between 15 to 18°C, Sacramento sucker prefer temperatures between 15 to 25°C, and hardhead prefer temperatures above 20°C (Moyle, 2002). Under the existing Prattville intake configuration, the proposed (final SA) and recommended (Interior) flow regimes would retain water temperatures within the Seneca and Belden reaches similar to existing conditions. This would retain preferred temperatures for rainbow trout and Sacramento sucker in both reaches as well as in the lower Belden reach providing temperatures at the lower end of the preferred range of hardhead. Modifications to the Prattville intake and other temperature control measures that may be implemented pursuant to the SA for the Rock Creek-Cresta Project could substantially reduce temperatures in the Belden reach during July and August. The

reduced water temperature would improve conditions for rainbow trout and Sacramento sucker but would be below the preferred temperature of hardhead. Implementation of the Rock Creek-Cresta water temperature monitoring plan would provide information necessary to assess the need for and implement corrective action.

Conclusion

The flow regime recommended by Interior, though providing somewhat higher flows during certain seasons for different WY types, would not provide for a substantial increase in habitat suitability for the evaluated species' lifestages over the flow regime proposed in the final SA. Providing the minimum flow regimes in the Seneca and Belden reaches, under the existing Prattville intake configuration, as PG&E proposes in the final SA would: (1) maintain rainbow trout juvenile habitat suitability near or at existing high levels; (2) improve adult and spawning rainbow trout and adult Sacramento sucker habitat suitability; (3) maintain significant macroinvertebrate habitat suitability; (4) maintain suitable water temperatures within both reaches for rainbow trout and Sacramento sucker; and (5) maintain water temperatures in the Belden reach that are within the preferred range of hardhead.

Lower Butt Creek

Based on the results from the instream flow study conducted in lower Butt Creek, the maximum WUA for spawning, adult, and juvenile rainbow trout is provided at 18, 23, and 16 cfs, respectively, over the range of flows that that were modeled (5 to 35 cfs) (figure 3-8). Habitat suitability changes gradually across the range of flows modeled with no distinct peaks or inflection points; a relatively wide range of flows would provide similar levels of habitat suitability for most species and lifestages modeled. The flow regime is not necessarily a limiting factor to habitat suitability in lower Butt Creek.

Flows under existing conditions range from 14 to 21 cfs and average 18 cfs. The average flow provides 100 percent of the maximum WUA for rainbow trout spawning, 98 percent of the maximum WUA for rainbow trout adults, and 99 percent of the maximum WUA for rainbow trout juveniles. In addition, the average flow provides 96 percent of the maximum WUA predicted for macroinvertebrate community diversity.

Currently, summer water temperatures in lower Butt Creek range from 10 to 13°C. The preferred temperature range for rainbow trout is 15 to 18°C (Moyle, 2002). The relatively high density of trout redds (171/mile), many of which were found below gage NF-9 (TRPA, 2002b) and young trout throughout lower Butt Creek (ECORP, 2003) indicates that, during the spring, adult trout are currently successful in moving into Butt Creek to spawn. During the summer, the relatively cool water temperature, which is actually below the preferred range for trout, may induce some percentage of juvenile and adult trout populations to move downstream into the Seneca reach, where the water is slightly warmer, ranging from about 10 to 17°C (see table 3-7), and more often in the

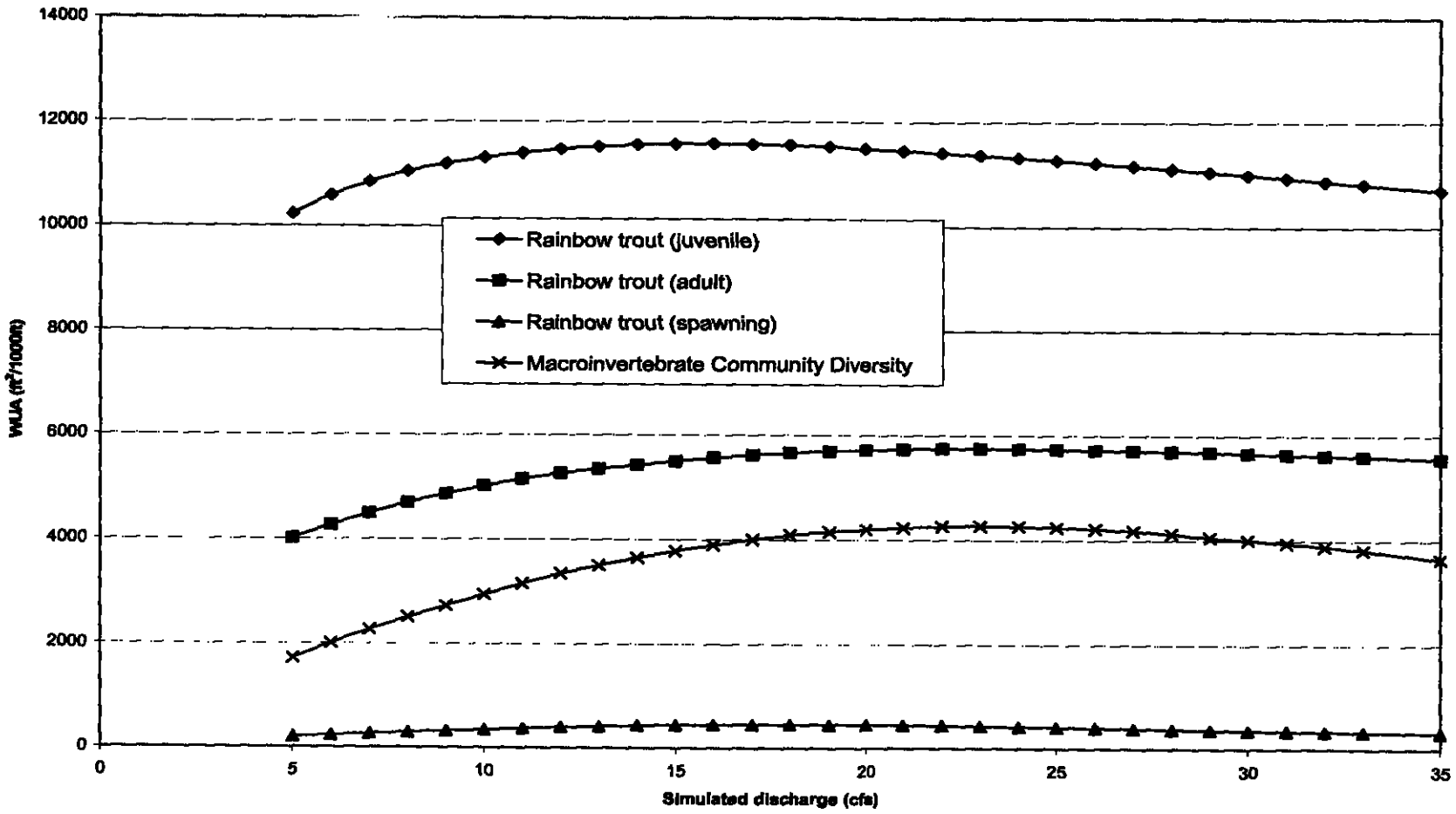

Figure 3-8. Total WUA values for species and lifestages evaluated (one velocity calibration method) in lower Butt Creek. (Source: TRPA, 2002a, as modified by staff)

preferred range for trout. Because the Seneca reach is more accessible to anglers than Butt Creek, our hypothesized movement pattern would make trout produced in lower Butt Creek more accessible to anglers.

In summary, the continuation of the current flow regime in lower Butt Creek would provide near optimal physical habitat conditions for trout and macroinvertebrates. This would maintain the native rainbow trout fishery and provide high quality spawning habitat for rainbow trout inhabiting the creek as well as for trout from the Seneca reach that might spawn in lower Butt Creek.

Pulse Flows

Within riverine systems, periods of high flow entrain, transport, and redeposit sediments, detritus, and woody debris along the stream channel, floodplain, and within tributary confluence areas. These events provide substrates that subsequently provide for spawning and rearing habitat, food items for aquatic organisms, and maintain the quality and diversity of mesohabitats. The presence of dams and the diversion of flow through powerhouses can reduce or eliminate such seasonal high flow events, which may reduce the quality of aquatic habitat in the affected bypassed reaches by allowing fine grained sediments (silt and sand), which could smother developing eggs and fry, to accumulate in gravel spawning habitat and prevent the redistribution of spawning sized gravel.

Seneca and Belden Reaches

PG&E proposes and the FS (preliminary Section 4(e) condition 27), CDFG (in its letter dated November 26, 2003), and Interior (10(j) recommendation no. 2), recommend that PG&E release pulse flows and implement a gravel monitoring program in the Seneca and Belden reaches to further assist in the preservation and improvement of aquatic conditions in the UNFFR Project area. The pulse flows would consist of flow releases from both Canyon dam (Seneca reach) and Belden dam (Belden reach) (table 3-18).

To protect trout spawning, no pulse flows would be required in March in the respective reach if two successive days of mean daily water temperature greater than 10°C are measured at gages NF-2 (Seneca reach) or NF-70 (Belden reach), or if rainbow trout spawning in the Seneca or Belden reaches is observed and reported to PG&E by either CDFG or the FS.

The typical schedule for pulse flows would be to increase the streamflow at a ramping rate of 0.5 foot per hour, to reach the peak streamflow, and then hold it for 12 hours. After the 12 hour peak streamflow is complete, streamflow would be reduced at the same ramping rate until minimum streamflow is reached. March pulse flows to the Seneca reach would be scheduled such that, after peak flow releases, flows would be reduced to 400 cfs, and held there for 6 hours between 9 a.m. and 3 p.m. on a weekend to provide recreational boating opportunities (see section 3.3.5, *Recreational Resources*), then reduced at the ramping rate until the specified minimum streamflow is reached.

Table 3-18. Recommended pulse flow releases for the Seneca and Belden reaches. (Source: SA CDFG letter dated November 27, 2003, FS, letter dated December 1, 2003, and Interior, letter filed December 1, 2003)

Water Year Type	Recommending Party	Pulse Flow Release
Wet	SA, FS, CDFG	One release per month in January (675 cfs), February (1,200 cfs), and March (1,200 cfs)
	Interior	One release per month in January, February, and March of 1,500 cfs. (2,200 acre-feet volume[a])
Normal	SA, FS, CDFG	One release per month in January (675 cfs), February (1,000 cfs), and March (1,000 cfs)
	Interior	One release per month in January, February, and March of 1,200 cfs. (1,800 acre-feet volume[a])
Dry	SA, FS, CDFG	No pulse flows
	Interior	One release in March of 700 cfs, only if no other pulse was released in January or February. (1,000 acre-feet volume[a])
Critically Dry	SA, FS, CDFG	No pulse flows
	Interior	No pulse flows

[a] Estimated volume only; each release would be 12 hours, plus period of ramping at a standard rate.

To evaluate the effects of the pulse flows on the availability, distribution, and recruitment, of substrates with emphasis on spawning-sized gravel, PG&E would develop and implement a gravel monitoring plan, in consultation with CDFG, SWRCB, the FS, and FWS. The gravel monitoring plan must be approved by the FS and filed with the Commission before implementation. If, after review of the data collected through the gravel monitoring plan, the FS, CDFG, FWS, and SWRCB determine that the specified pulse flow schedule could be improved to enhance the availability and distribution of spawning-sized gravel or enhance riparian function, the agencies may propose revisions to the magnitude, duration, and/or frequency of the scheduled pulse flows.

Interior recommends (10(j) recommendation nos. 6 and 8) different pulse flow releases for the Seneca and Belden reaches (table 3-18). In addition, Interior recommends that two monitoring plans would be developed to document changes in the reaches resulting from pulse flows. These two plans are:

(1) a coarse sediment management plan, 10(j) recommendation no. 8, which includes: (1) a program for monitoring spawning gravel quantity and quality, (2) contingency actions for improving the quality and availability of such gravels, (3) triggers for the implementation of contingency actions, and (4) a special study of pulse flows.

(2) a geomorphologic monitoring plan, 10(j) recommendation no. 6, for the monitoring of streambed cross-section, longitudinal profile, and overall dynamics, including mesohabitat dimensions, distribution, and net channel changes.

Our Analysis

We reviewed information on peak flows recorded at USGS gages in the Seneca reach (USGS gage No. 113995) and the Belden reach (USGS gage No. 11401112). Our review of the data for the 31 water years extending from 1970 through 2001 indicates that, in the Seneca and Belden reaches, peak flows exceeded 1,000 cfs in 9 years and 1 year, respectively.

PG&E conducted a sediment incipient motion study for both the Seneca and Belden reaches (WRECO, 2002). The study concluded that, for the Seneca reach, substrates with a grain size less than or equal to 10 mm are expected to move at 100 cfs, at 500 cfs for substrates with a grain size less than or equal to 25 mm, and at 1,000 cfs for substrates with a grain size less than or equal to 35 mm. For the Belden reach, substrates with a grain size less than or equal to 10 mm are expected to move at 250 cfs, and substrates with a grain size less than or equal to 25mm are expected to move at 1,200 cfs.

Median sediment size among transects ranged from 22 to 362 mm in the Seneca reach and 32 to 256 mm in the Belden reach (Entrix, 2002). Sediments are actively transported through the Seneca reach and deposited in Belden reservoir. Sediment in the reservoir has a median size of 50 mm 0.3 mile below the Caribou powerhouse tailraces, with sediments in the lower reservoir being much finer, silts to sands, having a median size ranging between 0.02 to 0.1 mm.

Several sediment sources are present in each reach that could contribute to sediment recruitment. These sources include mining sites, tributary streams, and hill-slope landslides in the Seneca reach. Along the Belden reach, sediment sources include major project spoil sites and hill-slope landslides. Boulder is the dominant substrate associated with hill-slope landslides in both reaches primarily due to a few large rockfalls. Outside of rockfalls, sand (particles 0.06 to 2 mm in diameter) is the most frequently observed dominant particle size followed by cobble (64 to 256 mm in diameter) and gravel (2 to 64 mm in diameter) in deposits adjacent to the channel within both the reaches (Entrix, 2002).

Surveys relating to the development of habitat suitability criteria for spawning rainbow trout documented 229 redds within the study sections of lower Butt Creek, Seneca reach, and Belden reach. Survey results showed that gravel used for spawning ranged from 6.4 to 76 mm (TRPA, 2002b).

The existing minimum flow in the Seneca reach (35 cfs) is sufficient to mobilize particles of up to 10 mm in diameter. This flow allows sand to remain lodged in most

spawning sized gravel degrading the quality of this habitat for rainbow trout spawning. Such particles would be flushed from the gravel with the recommended pulse flow releases, which would enhance the quality of the spawning gravel.

The existing winter (60 cfs) and summer (140 cfs) minimum flows in the Belden reach are sufficient to mobilize particles up to 4 and 7 mm in diameter, and these flows allow sand to remain lodged in most spawning sized gravel degrading the quality of this habitat for rainbow trout spawning. Such particles would be flushed from the gravel with the recommended pulse flow releases, which would enhance the quality of the spawning gravel.

The existing minimum flows and recommended minimum flow regimes specified in tables 3-16 and 3-17 are not sufficient to mobilize most gravel that would be suitable for trout spawning. Seasonal pulse flow releases sufficient to mobilize spawning gravel would enable material that is potentially available for transport by stream flow (estimated to be 880 cubic yards per mile adjacent to the Seneca reach and 3,580 cubic yards per mile adjacent to the Belden reach) to actually be transported. Some of this material would be gravel suitable for trout spawning, and would serve to replenish gravel that may be washed out of both reaches during flood events of much greater magnitude than the recommended pulse flows. Pulse flows also would enable redistribution of spawning gravel already in the reaches. This could represent a positive effect, if the surface area of gravel is increased or the gravel is more accessible to spawning by adult trout. If such gravel redistribution results in less overall surface area or gravel deposits being less accessible to adult trout, pulse flows could represent a negative effect.

The pulse flows proposed by PG&E in the final SA of up to 1,200 cfs would enable nearly all spawning-sized gravel up to 35 mm in diameter to be transported to and redistributed within the Seneca reach during wet and normal water years. Interior's recommended higher pulse flows, up to 1,500 cfs, would also achieve transport of spawning gravel (up to 40 mm) during wet and normal years. In the Belden reach, the proposed pulse flows in the final SA would enable spawning gravel up to 25 mm in diameter to be transported during wet water years and up to 20 mm in normal water years. Interior's recommended pulse flow regime would enable gravel up to 30 mm in diameter to be transported during wet water years, and gravel up to 25 mm to be transported during normal water years. We see no benefit to releasing Interior's higher pulse flows during wet and normal water years in either the Seneca or Belden reach, since the primary objective of flushing fines from and transporting spawning-sized gravel would be achieved by the lower pulse flows proposed by PG&E in the final SA.

Although some gravel transport, gravel up to 15 mm in diameter, would be achieved in the Seneca and Belden reaches during dry water years by Interior's pulse flow regime, such a flow release would be ineffective in mobilizing most spawning gravels within the reaches.

Based on our analysis of the sediment incipient motion study (WRECO, 2002) and geomorphic study (Entrix, 2002), we conclude that the Interior-recommended pulse flows, though of greater magnitude, would not provide a significant increase in entrainment or relocation of substrates over that which would occur under the pulse flow schedule proposed by PG&E in the final SA. The greater magnitude flows recommended by Interior would have the potential to move gravel out of the reaches at a rate greater than recruitment.

The approximated minimum discharge needed to mobilize the median bed material from representative sites in both the Seneca and Belden reaches would be 1,600 to 3,600 cfs (Entrix, 2002). Based on the presence of established mature vegetation on mid-channel bars at several of the study transect that were able to survive the 1997 floods of 2,160 cfs in the Seneca reach and 3,500 cfs in the Belden reach, it is likely that it would take flows of even greater magnitudes to modify mid-channel bars and to alter the mature vegetation present on these mid-channel bars. Given the magnitude of the recommended pulse flows and the particle size they would mobilize, large scale changes in geomorphology of the reaches would likely not occur and therefore Interior's geomorphological monitoring plan would not be warranted.

The proposal in the final SA that, following implementation of a pulse flow regime, gravel should be monitored to assess whether the redistribution of gravel is resulting in the expected benefits to trout spawning habitat would ensure that the effectiveness of these flows can be assessed. If the amount of gravel transported out of either the Seneca or Belden reaches is greater than the amount of gravel that enters the reaches from the material known to be available for transport adjacent to each reach, pulse releases could result in a decrease in trout spawning habitat. We consider it especially important to monitor the status of gravel within the Seneca reach because the material available for transport per mile is about a quarter of that available to the Belden reach. Although the existing density of redds in the Seneca reach is high (128 per mile), our review of figure 3-4 reveals relatively low quantities of available spawning habitat. We interpret this to mean that the trout spawning habitat in Seneca reach may be susceptible to extensive changes with the implementation of pulse flows, or other altered flow regimes. Monitoring of gravel at representative locations in both reaches would provide data to assess whether unintended consequences from pulse flows are occurring and quantify the actual benefits of pulse flow releases, and, as PG&E proposes, enable contingency actions to be developed and implemented, if needed.

We conclude that the pulse flows and the gravel monitoring plan proposed by PG&E in the final SA are likely to achieve the habitat objectives of movement of substrates within the reach including recruitment of new substrates from areas adjacent to the channel. In addition, the flushing of fine substrates from gravel beds and the redistribution of gravel within the stream channel would enhance trout spawning. Enhancement to macroinvertebrate habitat may also occur as the interstices of larger

substrates (gravel, cobble, and boulders) would be annually flushed of fines. Although the recommended pulse flows are slightly more conservative than those recommended by Interior, the plan should allow for a more aggressive (i.e., greater magnitude or more frequent) pulse flows if monitoring demonstrates that it is warranted. We would also expect such a plan to include provisions for adjusting pulse flows to lesser magnitude or less frequent releases if the expected benefits are not being realized, or unexpected adverse effects are documented. A gravel monitoring plan would allow for effects (positive, negative, or neutral), of the pulse flow releases to be documented and adaptive management to occur.

Lower Butt Creek

PG&E proposes (final SA), and the FS (preliminary Section 4(e) condition 27) and CDFG (in its letter dated November 26, 2003) recommend, that no pulse flows be released into lower Butt Creek unless it is determined to be necessary due to the results of future habitat monitoring. If pulse flows are thus required, PG&E would provide pulse flows via use of the Butt Valley Reservoir spillway or an acceptable alternative. The magnitude, ramping, and duration of the pulse flow(s) would be determined in consultation with CDFG, SWRCB, the FS, and FWS. The timing of any pulse would be coordinated and occur simultaneously with pulse flows in the Seneca reach.

Interior's 10(j) recommendation no. 3, recommends that, within 6 months of license issuance, PG&E develop a pulse flow plan for lower Butt Creek in consultation with CDFG, SWRCB, the FS, and FWS. According to Interior, the plan would include additional analysis to determine the magnitude duration, and frequency of pulse flows in lower Butt Creek, and provide for a one-season test pulse flow program to be implemented within 5 years of license issuance. Interior argues the need for a one-season test pulse flow based on "a larger than historical width/depth ratio, a higher proportion of fine to very fine sediments in surface samples, a very high density of large wood, and encroachment of vegetation onto bars, further stabilizing sediments."

Our Analysis

The geomorphic study conducted in lower Butt Creek did find a larger than historical width/depth ratio but also found that the sediment transportation ability under existing conditions is not significantly different than historic conditions (Entrix, 2002). The incipient motion analysis concluded that particles 25 mm in diameter are mobilized at a flow of 10 cfs. Existing flows within lower Butt Creek exceed 10 cfs 90 percent of the time for all months (see table 3-2). Therefore, current flows are sufficient to flush fines from larger substrates and transport gravels within the creek. As the creek had the highest density of rainbow trout redds (171 redds/mile) documented amongst the three bypassed reaches (TRPA, 2002b) it can be assumed that recruitment of gravel is of an equal or greater magnitude than gravel transport out of the creek.

Recent fishery, mollusc, habitat mapping, and IFIM studies conducted in lower Butt Creek document high quality coldwater habitat that shows no signs of impairment, and there is no evidence of a need for pulse flows (ECORP, 2003a; Spring Rivers, 2002; TRPA, 2002a, b). Pulse flow releases, even on a trial basis, have the potential to result in adverse effects, and given the existing high quality habitat for aquatic biota, there is no need to evaluate pulse flow releases. The existing aquatic community within lower Butt Creek would be protected without pulse flows unless it is determined, by the periodic monitoring of habitat discussed later in this section, that such flows are needed to maintain or improve the quality of the habitat within the creek.

Ramping Rates and Block Loading

As flows rapidly change (either up or down), areas of suitable habitat migrate back and forth across the river channel (Bovee et al., 1998). If the rate of habitat movement during upramping exceeds the ability of aquatic organisms to move into areas containing suitable velocities, the organisms may either drift downstream (e.g., fish larvae, macroinvertebrates) or die (e.g., fish eggs) as a result of displacement from a redd or nest (Vehanen et al., 2000; Bovee et al., 1998). Downramping (rapidly decreasing flows) can strand organisms when flows subside more quickly than organisms can respond. Potential impacts from stranding include desiccation, increased predation, and deteriorating water quality conditions. Non-mobile lifestages, such as fish eggs, and organisms with low-mobility (macroinvertebrates and molluscs) are typically more affected by downramping because they are either physically unable to move or unable to move fast enough in response to receding flows. As high flow releases in the bypassed reaches are typically of short duration, on the order of hours or days, only more mobile lifestages, such as juvenile and adult fish, would be able to use newly submerged habitat and potentially be subjected to possible stranding as flow recedes.

Interior's 10(j) recommendation no. 20, recommends that, within 6 months of license issuance, PG&E develop a ramping rate plan for lower Butt Creek in consultation with CDFG, SWRCB, the FS, and FWS. Interior's plan would include specified rates of release change (up and down) from project facilities, and the rationale for selection of these rates. PG&E proposes and the FS (preliminary Section 4(e) condition 27), and CDFG (in its letter dated November 26, 2003), recommend that, for the preservation and improvement of aquatic resources in the project area, PG&E would control river flows by ramping regulated streamflow releases from project dams. During periods when ramping could be controlled by the project, ramping rates would apply to releases made from Canyon and Belden dams for winter pulse flows, summer recreation flows, and all other releases from dams that PG&E makes for operational purposes. The basic ramping rate at Canyon and Belden dams would be 0.5 foot per hour in all months as measured immediately downstream of the dams (gaging stations NF-2 and NF-70, respectively). Changes in Canyon dam streamflow releases because of gate size and other factors may

exceed the ramping rate in any particular hour, but PG&E would make a good faith effort to return to the overall basic ramping rate in the next and subsequent hours.

PG&E could block load[20] Belden powerhouse to minimize: (1) the frequency of fluctuation in the river stage, and (2) help meet the required ramping rates at downstream PG&E dams, at times when the Rock Creek dam is spilling water in excess of the minimum streamflow required under the license for the Rock Creek-Cresta Project, but less than 3,000 cfs. PG&E would not be required to implement or continue this operation if the gate controls at downstream PG&E dams are shown to be able to meet the ramping rates specified in the Rock Creek-Cresta Project license without such block loading.

Our Analysis

PG&E did not directly evaluate the potential effects of upramping and downramping in its license application. We consider gradual ramping (either up or down) of flows to the Seneca and Belden bypassed reaches to be much more preferable than a non-ramping situation because the impacts associated with not ramping on non-mobile and low-mobility organisms (fish larvae, molluscs, macroinvertebrates) would be minimized. The recommended ramping rates for releases from Canyon and Belden dams would allow organisms in the Seneca and Belden reaches to more effectively relocate to suitable habitat as flows are adjusted. The block loading of Belden powerhouse would assist PG&E's downstream Rock Creek and Cresta dams in complying with their required ramping rates that were developed to allow the aquatic organisms in the Rock Creek and Cresta bypassed reaches to experience flow changes that would be similar to those occurring in the unregulated EBNFFR.

Emergency and Planned Maintenance Outage Spill Plan

The FS, preliminary Section 4(e) condition 30, recommends that PG&E develop a notification and minimization of emergency and planned outage spill plan for the purpose of minimizing the negative ecological effects of uncontrolled high flows into the project bypassed reaches resulting from emergency and planned hydropower facilities maintenance outages. The FS states that the plan should include proposed potential measures for minimizing the magnitude and duration of planned and emergency outage spills into the bypassed reaches.

Our Analysis

Uncontrolled spills into the bypassed reaches caused by project operations, such as scheduled or unscheduled outages and the initiation of spill events from increasing inflow

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[20] To block load a project means to operate the project at some desired output level for a period of time (i.e., hold generation constant). The result is a generally constant level of flow being delivered through the project turbines.

to the project, can result in adverse effects on aquatic and riparian biota, as well as to anglers and other recreationists that may be in the bypassed reaches.

At the UNFFR Project, water is very rarely spilled over project dams due to the storage potential of Lake Almanor and Butt Valley reservoir. PG&E conducts scheduled maintenance on project facilities during winter when the storage potential of both Lake Almanor and Butt Valley reservoir is at its greatest. These factors reduce, but do not eliminate, the potential for spill events to occur at project dams, especially Belden dam.

The development of a spill management plan would allow identification and implementation of feasible measures to achieve some degree of control over spill events.

Recreational Flows – Belden Reach

PG&E proposes and the FS (preliminary Section 4(e) condition 27), CDFG (in its letter dated November 26, 2003), and Interior (10(a) recommendation no. 1) recommend the same measures for the development of recreational flow releases in Belden reach (discussed in greater detail in section 3.3.5, *Recreational Resources*) (table 3-19). They recommend that PG&E establish, within 6 months of license issuance, a recreation river flow TRG for the purpose of consulting with PG&E in the design of recreation and resource river flow management and monitoring plans, review and evaluation of recreation and resource data, and in the development of possible recreation river flows in the Belden reach. The TRG would consist of representatives from CDFG, SWRCB, FWS, NPS, Plumas County, AW, and PG&E. The TRG would evaluate the existing available ecological information regarding recreation river flows and effects on aquatic resources, determine if recreation flows would negatively effect aquatic resources, and conduct test flows for a three year period. A monitoring plan to determine the effects of test flows on aquatic resources would be developed, with monitoring conducted during the test flow period. Based on the monitoring, a determination as to whether to continue recreation flow releases would be made.

AW, in a letter dated December 3, 2003, recommends recreational flow releases in the Belden reach similar to those in table 3-19, but with different trigger numbers. We discuss boater trigger numbers in section 3.3.5, *Recreational Resources*.

Our Analysis

Flow fluctuations from recreation flow releases could result in adverse effects on the Belden reach aquatic community. Recommended recreational flows of 650 or 750 cfs are of a magnitude about four to five times greater than the instream flows recommended by Interior and proposed by PG&E in the final SA for July through October. This substantial flow increase could disrupt spawning/reproduction of fish (Sacramento pikeminnow and Sacramento sucker) and amphibians, and displacement of young/larval fish and macroinvertebrates downstream.

Table 3-19. Recommended Belden reach recreational flow schedule. (Source: SA, CDFG letter dated November 27, 2003, FS, letter dated December 1, 2003, and Interior, letter dated December 1, 2003)

	Release amount (cfs)		Release Days per Month				Use Day Triggers	
Month	Dry/ Critical Dry	Normal/ Wet	Critical Dry Start	Critical Dry Cap	Dry/ Normal/ Wet Start	Dry/ Normal/ Wet Cap	Wet & Normal/Dry Up	Down
July	650	750	1 day	1 day	1 day	2 days	>100	<100
August	650	750	1 day	1 day	1 day	2 days	>100	<100
September	650	750	1 day	1 day	1 day	2 days	>100	<100
October	650	750	1 day	1 day	1 day	2 days	>100	<100

During collection of rainbow trout spawning habitat suitability criteria data in 2001, rainbow trout were observed spawning in the Belden reach from late March through April (TRPA, 2002b). During this period, water temperatures ranged between 8 to 14°C. At these water temperatures, rainbow trout eggs would hatch in 24 to 48 days (Piper et al., 1982), and fry would start appearing in the project reaches by mid to late May. During the first few months after hatching, trout require protective cover and low velocity areas (Behnke, 1992). If they would be unable to find such low-velocity areas, rainbow trout fry in the Belden reach could be washed downstream by the recreation flows during the months of July and August.

The monthly recreation flow releases during the summer could adversely affect the standing crop of macroinvertebrates at a time when food requirements of trout and other fish are at a maximum due to warmer summer water temperatures. A macroinvertebrate drift study was conducted in the fall of 2000 as a component of whitewater flow release evaluations in the Seneca and Belden reaches of the NFFR. Results of the sampling in the Belden reach did demonstrate an increase in the abundance percentage of burrower and crawler behavioral groups collected during the test flow (approximately 600 cfs) release period (ECORP, 2002b). Organisms in these macroinvertebrate behavioral groups live in the interstices of substrate and are generally considered to be non-drifting organisms.

The overall effect of recreational flows on the aquatic community currently remains largely unclear as few detailed studies have been performed on such flows. The ERC for the Rock Creek – Cresta Project recently released results of biological monitoring performed in 2003 to document the effects of recreational flow releases in the Rock Creek and Cresta reaches of the UNFFR, which are located downstream of the UNFFR Project. This on-going study will be of significance in evaluating the effects of

recreational flows in reaches throughout the UNFFR. The monitoring conducted in 2003 investigated the stranding of aquatic organisms (fish, macroinvertebrates, and foothill yellow-legged frog (FYLF)), displacement of juvenile fishes, impacts to all lifestages of FYLF, and macroinvertebrate drift. The study results demonstrated that recreational flow releases have some effects on aquatic resources within the study reaches. Stranding of benthic macroinvertebrates (n=932), fish (n=156), and FYLF tadpoles (n=2) occurred during downramping of recreational flow events with most instances of stranding occurring during the June recreational flow release (ERC, 2004). Displacement studies found that resident fish, specifically fry and juvenile lifestages, were able to avoid being displaced by the recreational flow releases by avoiding areas of high water velocities. Documented impacts to the macroinvertebrates within the Rock Creek reach, the selected study reach due to lower thresholds for sediment mobilization, included: displacement of benthic organisms from their preferred velocity regime immediately following flow events, an overall decline in the benthic community measures from June through October which is a trend contrary to what would be expected as part of natural seasonal variability, and an eventual re-equilibration (after flow releases) of the benthic community to a degraded state (fewer taxa and displacement/shift in abundance) (ERC, 2004). The results of the continuation of this recreational flow effects study at the Rock Creek – Cresta Project will aid in more fully evaluating the overall effect of recreational flows on the aquatic community within the Belden reach.

As discussed, the recommended recreational flows could have adverse effects on the aquatic resources in the Belden reach. Monitoring the effects of recreational flows on aquatic resources within the Belden reach, if the 3-year test period is conducted, utilizing information from the evaluation of recreation flows in the Rock Creek and Cresta reaches of the NFFR, and incorporating the results of other pertinent studies would provide a better understanding of how recreation flows affect substrate conditions, macroinvertebrates, amphibians, and fish populations in the reach. The adaptive approach to recreation river flow management as outlined in the SA and Interior's recommendations would allow for the identification of any potential negative impacts on the aquatic community from existing studies or literature prior to the release of the test recreation flows and provide for the adequate protection of aquatic resources if negative impacts are found to result from the release of test recreation flows.

Monitoring of Aquatic Resources in Bypassed Reaches

PG&E proposes to develop monitoring plans and monitor aquatic resources in the Seneca and Belden reaches and lower Butt Creek.

For the Seneca and Belden reaches, PG&E would develop an aquatic monitoring plan, in consultation with CDFG, SWRCB, the FS, and FWS. Habitat monitoring would be initiated between 10 and 12 years after license issuance, with sampling occurring every 2 years over a 6-year period, for a total of three sampling periods. The recommended plan would include monitoring of fish populations and benthic

macroinvertebrates (including population robustness, feeding group, and tolerance/intolerance trend monitoring) in at least three sites in each reach. Sampling could be deferred to the following year in the event of a critically dry year. Results of the monitoring would be distributed to CDFG, SWRCB, the FS, and FWS.

PG&E proposes to provide results of monitoring and any flow change recommendations to the Commission, the FS, FWS, SWRCB, CDFG and other interested parties in a draft technical report prepared by June of the year following completion of each sampling effort. PG&E would finalize the technical report by the following December. In addition to describing the results, the report would compare the results with those of previous surveys. The fish-based sampling would discuss implications regarding trends in fish abundances. The benthic macroinvertebrate sampling report would enumerate any changes over time regarding the composition of functional feeding groups, overall population heterogeneity and robustness, and pollution tolerance/intolerance trends.

At the conclusion of the monitoring program, PG&E, the FS, CDFG, FWS, SWRCB, Plumas County, and other interested parties would meet to review the results of the monitoring. If, after review of the data collected during the monitoring, the parties specified determine that aquatic species or other ecological attributes may benefit from modifications to the minimum streamflows, the parties would evaluate and determine whether such modifications: (1) can be implemented within PG&E's operational capabilities; (2) would maintain the total annual volume of water that has been allocated for minimum streamflows in any given WY; and (3) would not adversely impact other beneficial uses, including hydroelectric power generation, Lake Almanor surface water elevation, and recreation. If all parties concur and propose revised minimum streamflows that meet these criteria, PG&E would file the proposal with the Commission for its approval.

For lower Butt Creek, PG&E proposes to develop, in consultation with CDFG, SWRCB, the FS, and FWS, a plan to monitor and assess aquatic habitat quality in lower Butt Creek between Butt Valley dam and its confluence with the NFFR. Monitoring of habitat quality would occur at intervals of 3 to 5 years, depending on water year type and other appropriate factors. If the monitoring results conclude that habitat quality has degraded, PG&E, in consultation with CDFG, SWRCB, the FS, and FWS, would initiate a pulse flow program if it is concluded such a flow would provide a significant benefit.

The FS preliminary Section 4(e) condition 33, recommends that PG&E develop a fish and macroinvertebrate monitoring plan for the bypassed reaches and reservoirs. The monitoring plan should attempt to standardize the sampling protocol to ensure comparability of results. Sampling should occur at least once every 3 years during the first decade after license issuance and then at least once every 5 years thereafter. The FS also recommends that PG&E conduct quantitative fish entrainment monitoring, which we address under our discussion of *Fish Entrainment*.

Interior's 10(j) recommendation no. 10, is that a comprehensive fish monitoring plan be developed by PG&E and that it include a program to monitor the project's bypassed reaches, impoundments, impoundment tributaries, and bypassed reach tributaries to determine the species status and size composition of the fish community, assess trout spawning activity, and track fish planting information and recreational use (angler surveys). Assessments would be performed in years 1 through 3, 8 through 10, 15, 20, and 25 of the new license, with reports issued 6 months following completion of studies and distributed to CDFG, SWRCB, the FS, and FWS. Further, a macroinvertebrate monitoring plan for the bypassed reaches would be developed and surveys conducted upon license issuance and at 5-year intervals thereafter. We discuss Interior's recommendations for impoundment fish monitoring later under our discussion of *Reservoir Operations*.

Our Analysis

Seneca and Belden Reaches

New PM&E measures, such as instream flow regimes, pulse flows, recreation flows, and ramping rates, proposed by PG&E and recommended by Interior would alter conditions for aquatic resources in the Seneca and Belden reaches. We conclude that acquisition of data to document the response of the aquatic community (fish and macroinvertebrate populations) to a new flow regime specified in a new license would provide documentation that the expected benefits of the new flow regime are actually occurring and, if not, whether any adjustments to the flow regime would be appropriate.

Monitoring activities for both fish and macroinvertebrates would occur during the same years to allow for uniform sampling procedures and data comparison. Interior's recommendations for the timing of monitoring for fish and macroinvertebrate communities are not consistent with each other or the monitoring period PG&E proposes in the final SA. Adequate baseline studies of the fish populations in the Seneca and Belden reaches, under existing conditions, have been conducted by PG&E in 2000 through 2002 and they provide a reference for comparison with future monitoring results. The implementation of new flow regimes in the bypassed reaches would likely cause a state of flux within the aquatic community during the initial 2 to 3 years of the new license, as populations would have not yet adapted to the new flow regimes. Consequently, sampling during that time would likely not provide an accurate assessment of the effects of any newly instituted measures. We conclude that initiating monitoring during years 4 and 5 would allow the agencies and us to determine the biological response to any measures and to establish a new baseline for detecting biological responses to any future modifications of measures. After this 2-year monitoring period, the reduction in the frequency of surveys to every fifth year, consistent with the FS and Interior's recommendations, would allow the evaluation of the long-term responses to measures implemented in the new license and any subsequent modifications that are made.

Lower Butt Creek

The monitoring plan proposed by PG&E in the SA does not include monitoring of fish populations and macroinvertebrates in lower Butt Creek, while Interior's recommendation includes such measures. The recent baseline studies of the fish populations in lower Butt Creek conducted by PG&E in 2000 through 2002 document high density, naturally reproducing populations of riffle sculpin and rainbow trout throughout the creek (ECORP, 2003). As there are no recommendations for modifying the existing flow regime, we conclude that specific data on species composition and abundance of fish and macroinvertebrate populations would not provide any useful information. The habitat monitoring plan proposed in the SA would provide an indirect assessment of effects on the fish and macroinvertebrate communities inhabiting lower Butt Creek, by surveying available spawning gravel, embeddedness of substrates, mesohabitat characteristics, and available LWD. We conclude that habitat monitoring, every 3 to 5 years, as proposed in the SA, would provide PG&E and resource agencies a comparative dataset that would ensure that the unique aquatic habitat and its associated aquatic community are not degraded and provide a means to determine whether, at some future date, pulse flows should be required.

Woody Debris Management Plan

Interior's 10(j) recommendation no. 9 is that within 6 months of license issuance that PG&E develop, in consultation with CDFG, SWRCB, the FS, and FWS, a woody debris management plan that includes: (1) a program for monitoring bypassed reaches for LWD, (2) woody debris placement program sufficient to determine if placement is feasible, and (3) a plan for maintaining adequate amounts of woody debris throughout the bypassed reaches. PG&E should consider and test two woody debris placement options: (1) the recovery and transport of LWD around the project dams; and (2) the placement of individual pieces of LWD at selected locations. The tests should determine the residence time as a function of piece size, flow (particularly pulse flows of different magnitude), methods of introduction, and also monitor changes in mesohabitat in the vicinity of the test material. Interior recommends the management and addition of woody debris as a means to help restore missing ecosystem functions because it believes there is currently a lack of sufficient LWD within the bypassed reaches.

Our Analysis

PG&E documented the distribution and occurrence of LWD within the Seneca, Belden, and lower Butt Creek bypassed reaches in its geomorphic study (Entrix, 2002). It reported that LWD was present throughout the reaches, and there was continual recruitment from dead and dying trees along the channel margins. LWD deposits tended to be within the active channel, but above the low-flow channel in the Seneca and Belden reaches. PG&E found a total of 21 LWD occurrences, all individual logs in the Belden reach. The Seneca reach had 141 LWD occurrences (including individual pieces as well

as debris jams). At Belden dam, PG&E annually removes about four to five truckloads of LWD, mostly alder, which is subsequently burned.

Lower Butt Creek had 224 LWD occurrences, of which 47 were debris jams. LWD, in both individual and jam form, was uniformly distributed throughout lower Butt Creek, with 45 percent of the LWD features associated with the formation/maintenance of scour pools, creating areas of sediment retention, or providing bank protection. The estimated recruitment potential for LWD for all of lower Butt Creek was rated as high overall. Based on the high abundance and even distribution of LWD throughout lower Butt Creek, we conclude that there is no identified need for managing LWD within this reach.

Implementation of the woody debris management plan would allow for an increase in the abundance of LWD within the Belden reach where it is currently limited, by collecting and transporting LWD around Belden dam. The review and testing of methods and the subsequent placement of LWD within the low-flow channels of the Seneca and Belden reaches could benefit the aquatic resources by providing further habitat complexity. If placement of LWD at specific locations is implemented, safeguards, such as erosion control measures, should be implemented to reduce the impact on both the riverbed and riparian zone from construction and anchoring activities.

Adaptive Management

Interior's 10(j) recommendation no. 13 is that PG&E, in consultation with CDFG, SWRCB, the FS, and FWS, periodically review the results of monitoring and studies to facilitate adaptive management of environmental measures over the term of the license. The reviews would be conducted every 5 years for the term of the license. The review process would examine monitoring and study results to identify any unacceptable adverse effect on fish and wildlife resources or clear deficiency in resource goal attainment which is a consequence of the conditioned license measures. The review process also would seek to identify if any adverse effects could be rectified with an alternative flow schedule or lake storage level with the same annual volume of release of instream flow or pulse flow.

Our Analysis

Some of the measures that may be implemented during the next license term could affect many different resources. For example, changes in the flow regime in any of the bypassed reaches could affect water temperatures, rainbow trout, other fish species, macroinvertebrates, molluscs, amphibian populations and habitat, riparian vegetation, fishability and wading conditions, and other recreational uses and associated facilities. Although the response of individual resources would be monitored in a number of resource-specific plans, it would be beneficial to have a broader plan to guide the interpretation of monitoring results and consideration of potential effects on all resources,

if any measures are adjusted via adaptive management. Interior's recommendation of reviews occurring every 5 years would be a time period sufficient to include results from periodic monitoring plans.

We conclude that the development of an overall adaptive management plan, with reviews every 5 years, would allow for a comprehensive periodic review process that guides the interpretation of monitoring results and consideration of potential effects on all resources.

Reservoir Operations

PG&E proposes and the FS (preliminary Section 4(e) condition 29), CDFG (in its letter dated November 26, 2003), and Interior (10(j) recommendation no. 4), recommend the same measures for water level management in Lake Almanor to meet ecological and other objectives (e.g., recreational). Because no party has proposed or recommended any modification to the existing water level management regimes at the Butt Valley and Belden reservoirs, we confine our analysis to Lake Almanor. The SA and Interior recommend that PG&E operate Lake Almanor as follows:

- Wet and Normal Water Years. By May 31, the water surface elevation would be at or above 4,485.0 feet[21] (908,000 acre-feet) and from June 1 through August 31, at or above 4,485.0 feet (908,000 acre-feet).

- Dry Water Years. By May 31, the water surface elevation would be at or above 4,483.0 feet (859,000 acre-feet) and from June 1 through August 31, at or above 4,480.0 feet (787,000 acre-feet).

- Critically Dry Water Years. By May 31, the water surface elevation would be at or above 4,482.0 feet (835,000 acre-feet) and from June 1 through August 31, the water surface elevation is at or above 4,480.0 feet (787,000 acre-feet).

- Multiple Dry Water Years. In the event of multiple, sequential dry or critically dry water years, PG&E would be allowed to decrease surface water elevations below those specified above, as well as the current minimum elevations specified for the Butt Valley reservoir (4,120.0 feet from June through September and 4,115.0 feet for the rest of the year) and the Belden reservoir (2,905.0 feet).

Interior 10(j) recommendation no. 10 calls for monitoring of impoundment fish populations as a component of its overall fish monitoring plan. It also recommends a special study should be implemented within 2 years immediately following the completed

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[21] In this section the lake level is defined as the water surface elevation, expressed in PG&E datum, which is 10.2 feet lower than the USGS datum.

installation of the modified Prattville intake, if constructed, to determine the extent of change in discharge of pond smelt from the Butt Valley and Belden powerhouses, and subsequent effect on trout distribution and growth in Butt Valley and Belden reservoirs.

Our Analysis

Currently PG&E operates Lake Almanor such that, from the period January 1 through June 1, the reservoir stores water from snowmelt and spring rains. From June 1 through September 15, the water surface elevation is maintained above 4,475 feet during this time period. The year round minimum water surface elevation is 4,466.7 feet and the maximum 4,494 feet. The lake levels proposed by PG&E and recommended by Interior provide for water surface elevations from June 1 through August 31 that are 10 feet higher in wet and normal water year types and 5 feet higher in dry and critically dry water year types. Lake Almanor supports both warm and coldwater fisheries. Maintaining lake levels during the late spring/summer period at higher elevations over existing conditions would increase the lake's surface area by approximately 12 percent during wet year types and 6 percent during normal year types. This increased surface area would provide further shallow water habitat in areas of the lake which are currently not watered, providing spawning habitat for centrarchids, such as smallmouth bass, largemouth bass, and Sacramento perch, which generally prefer shallow water habitat, 1 to 10 feet deep (Moyle, 2002; Robison and Buchanan, 1988; and Mathews, 1965). It is unknown if this new shallow water habitat would provide for a net increase over the existing shallow water habitat or only replace the percentage of existing shallow water habitat that would become unsuitable for centrarchid spawning due to increased depth.

To determine any effects, specifically the depletion of the hypolimnion, on the coldwater fishery within Lake Almanor, we reviewed PG&E's MITEMP3 and SNTEMP model results of expected Lake Almanor temperature profiles. The model scenarios we evaluated were ANEB, ANMB, DNEB, and DNMB whose parameters are identified in table 3-20.

Table 3-20. Naming convention matrix for modeled scenarios in Lake Almanor. (Source: PG&E, 2002a, as modified by staff)

Lake Almanor Modeling Scenarios				
Water Year	**Meteorology**	**Prattville Intake**	**Canyon Dam Release**	**Scenario ID**
Normal	Normal	Existing	B (75 cfs)	ANEB
Normal	Normal	Modified	B (75 cfs)	ANMB
Dry	Normal	Existing	B (75 cfs)	DNEB
Dry	Normal	Modified	B (75 cfs)	DNMB

We selected a release flow of 75 cfs from Canyon dam. This flow is the closest magnitude of flow that simulates the releases proposed in the final SA from the dam into the Seneca reach during the summer months (July through September).

Scenarios ANEB and ANMB provide results during normal water year types. The hypolimnion[22] under scenario ANEB has a minimum upper limit elevation of 4,445 feet, which correlates to approximately 156,000 acre-feet during mid-June. With the modified Prattville intake, scenario ANMB, the hypolimnion's minimum upper limit elevation is approximately 4,435 feet, also occurring in mid-June, which correlates to approximately 57,000 acre-feet, a reduction of 64 percent from the existing intake configuration.

To investigate the impacts on the hypolimnion during a dry water year, we used scenarios DNEB and DNMB. The hypolimnion under scenario DNEB has a minimum upper limit elevation of 4,435 feet, which correlates to approximately 57,000 acre-feet in mid-June. With the modified Prattville intake, scenario DNMB, the hypolimnion's minimum upper limit elevation is approximately 4,430 feet also occurring in mid-June, which correlates to approximately 21,000 acre-feet, a reduction of 64 percent from the existing intake configuration.

The recommended lake elevations for Lake Almanor could provide an increase in the available habitat for spawning centrarchids during the late spring/early summer, if they create more new habitat than the amount of habitat lost as a result of becoming too deep. Under the recommended project operations with the existing Prattville intake configuration, the coldwater habitat available to wakasagi and salmonids while the lake is stratified would be similar to present conditions. In contrast, modifications, as modeled, to the Prattville intake to provide colder instream flow releases for the Belden reach, as well as the bypassed reaches of the Rock Creek-Cresta Project, would cause a substantial depletion of the hypolimnion (64 percent), which could negatively affect salmonid (rainbow trout, brown trout, and Chinook salmon) and wakasagi populations in Lake Almanor by decreasing available coldwater habitat during the summer.

This decrease in coldwater habitat would concentrate fish that prefer such habitat into a substantially smaller area. Currently, wakasagi provide forage to predacious fish in the lake and, when entrained through the Prattville intake, a substantial forage base for trout inhabiting both Butt Valley and Belden reservoirs. Any modifications to the intake that reduce the coldwater habitat could increase entrainment of wakasagi if they become more concentrated in the vicinity of the Prattville intake. This could affect salmonids in Lake Almanor, Butt Valley reservoir, and Belden reservoir, at least on a short-term basis, by increasing the available forage base.

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[22] The hypolimnion is the lower stratum of cold water, extending from the thermocline (upper limit) to the lake's bottom (lower limit), that exists during summer stratification.

If any modifications to the Prattville intake are implemented, monitoring of coldwater fish populations (including relative density and condition factor) within Lake Almanor and Butt Valley reservoir, prior to and after modifications, would enable an evaluation of the effects on the fish populations. Effects could also be evaluated on Belden reservoir and the need for corrective actions could be assessed if any downward trends in important fish species are evident.

Fish Passage

In its November 26, 2003, letter to the Commission, NOAA Fisheries conditionally prescribes, pursuant to Section 18 of the FPA, that PG&E implement downstream and upstream passage measures at both Belden and Butt Valley dams after passage of anadromous fish has been implemented at one or more unspecified dams below the project area. Fish passage measures are being recommended to allow the re-introduction of Central Valley spring-run Chinook salmon and Central Valley steelhead to historic spawning and juvenile rearing habitats. Both species are currently listed as threatened under the ESA. No specific timeframe is identified for the implementation of the passage measures other than: "This prescription shall be implemented at the cost of the Applicant 12 months after formal notification has been supplied to FERC and the Applicant." Passage facilities to be installed include pool-and-weir fish ladders at both the Belden and Butt Valley dams and positive barrier screening devices at the Belden, Caribou No.1, and Caribou No. 2 powerhouses. Additional measures that are included in the conditional prescription are the establishment of a flow release into lower Butt Creek, creation of ramping rates, and monitoring and evaluation of passage efficiency of constructed devices.

Interior, in its December 1, 2003, filing, indicates that anadromous fish are presently blocked from entering the project area by the presence of multiple downstream dams. Based on the uncertainty that fish passage would be provided at these downstream dams in the near future and the absence of adequate information to currently support the filing of a fishway prescription at this time, Interior states that it reserves its authority under Section 18 of the FPA to prescribe fishways in the future during the term of the license. The letter further states that Interior has not identified fish passage needs for resident fish within the project area.

Our Analysis

Currently, fish passage facilities (upstream and downstream) are not present at any of the six dams (Rock Creek, Cresta, Poe, Big Bend, Oroville, and Thermalito Diversion) located downstream of the UNFFR Project on the UNFFR. NOAA Fisheries provides no basis for why fish passage should be provided at Belden and Butt Valley dams after fish passage has provided at any one downstream dam. Until facilities are constructed and operational at all downstream dams, the installation of fish passage facilities at Butt

Valley and Belden dams would provide no benefit to existing runs of Central Valley spring-run Chinook salmon and Central Valley steelhead in the lower Feather River.

Fish Barriers

In the final SA, PG&E proposes to develop, in consultation with CDFG, SWRCB, the FS, and FWS, a plan to monitor and assess aquatic habitat quality as well as upstream fish passage at the NF-9 gage weir in lower Butt Creek between Butt Valley dam and its confluence with the NFFR. If it is determined during monitoring that the existing gaging weir is acting to block fish passage, then removal or modification of the weir would be undertaken.

PG&E proposes to remove the Gansner Bar fish barrier located in the lower Belden reach to allow rainbow trout from downstream waters to migrate into the upper Belden reach for spawning.

Our Analysis

Barriers, either natural or human-made, within the NFFR, Butt Creek, or associated tributaries directly affect fish by blocking or limiting movement into and use of upstream spawning or rearing habitat. Such barriers could lead to reductions in recruitment, survival, and distribution into new or enhanced habitat created by minimum instream flows and other recommended measures.

Gage NF-9 Weir

As discussed in section 3.3.1, *Water Resources*, gage NF-9 weir was historically operated and maintained by PG&E to monitor streamflow within lower Butt Creek and recommendations have been made for PG&E to rehabilitate, operate, and maintain the gage and its associated weir. The gage and weir are located in lower Butt Creek approximately 0.2 mile upstream of its confluence with the NFFR.

During the May 2003 site visit, we viewed the existing gage NF-9 weir in lower Butt Creek. Our observations were that the gaging weir design and location may potentially be a barrier to upstream rainbow trout movement, both juvenile and adult lifestages, under lower flow conditions. The concrete apron extending below the weir substantially limits fish jumping ability and the opportunity for rainbow trout to successfully ascend the structure. Rainbow trout redds and spawning adults have been documented upstream and downstream of the gage (TRPA, 2002a, b). In our review of the information contained within PG&E's license application, fishery reports, and the HSC development report, no conclusive evidence was provided that spawning rainbow trout and redds upstream of the weir were comprised of rainbow trout that reside in the Seneca reach. Impairing the ability of rainbow trout residing in the Seneca reach to ascend into 1.2 miles of stream habitat above the weir precludes the use of suitable

spawning habitat during the spring. We conclude that monitoring the ability of adult and juvenile rainbow trout to ascend upstream of the weir would provide the data necessary for PG&E to determine the need, if any, to modify the structure to improve rainbow trout upstream passage.

Gansner Bar Fish Barrier

The Gansner Bar fish barrier is located in the Belden reach of the NFFR about 0.2 miles upstream from the confluence with the EBNFFR. It was originally constructed in 1975 by PG&E under direction by CDFG to protect the upstream rainbow trout fishery by eliminating spawning access to the upper Belden reach by Sacramento sucker and other non-game fish species. PG&E noted that, during several site visits in the spring of 2001, multiple rainbow trout were observed repeatedly attempting to jump over the barrier without success. The construction of the Gansner Bar fish barrier and chemical treatment of the upper Belden reach were not effective in completely removing non-game fish from this river reach because Sacramento sucker and Sacramento pikeminnow, both species endemic species to the UNFFR, currently inhabit the reach (ECORP, 2003). The removal or appropriate modifications to the barrier would allow adult rainbow trout in lower Belden reach and Rock Creek reservoir to access the upper areas of the reach and associated tributaries to utilize suitable spawning habitat above the barrier. Additionally, juvenile rainbow trout that are either hatched downstream of the barrier or move (voluntarily or involuntarily) below the barrier would be able to regain access to habitat, forage, and coldwater refugia found in the upper reach and its associated tributaries if the barrier was removed.

A wild, naturally reproducing rainbow trout population currently exists upstream of the Gansner Bar fish barrier in the presence of non-game species. Therefore, the removal or modification of the barrier would not result in a change to the existing fish community.

Fish Entrainment

The FS recommends as a component of its preliminary Section 4(e) condition 33 that PG&E conduct quantitative fish entrainment monitoring at project powerhouses following procedures developed in consultation with the FS and other resource agencies.

Our Analysis

PG&E conducted entrainment sampling at Belden, Caribou No. 1, Caribou No. 2, and Butt Valley powerhouses in 2001 (ECORP, 2002a). Of the total 133,718 individual fish entrained and collected in the tailraces of the powerhouse, 99.9 percent were wakasagi, which are abundant within Lake Almanor and Butt Valley reservoir. The entrainment of wakasagi provides a substantial forage base to Butt Valley and Belden reservoirs, contributing to the presence of their trophy trout fisheries.

Neither hardhead nor Sacramento perch, both FSS fish species inhabiting the project area, were entrained during the sampling period. The only hardhead documented in relicensing studies were observed in the tailrace of the Belden powerhouse during the entrainment study. Sacramento perch inhabit Lake Almanor, utilizing shallow water habitats containing beds of rooted and emergent aquatic plants that are critical for food and cover for juveniles. Because hardhead have not been identified above the tailrace of Belden powerhouse, entrainment of hardhead is not likely to occur within the project. Due to the preferred habitat of Sacramento perch, shallow littoral zones, and to the location of the Prattville intake off-shore in approximately 100 feet of water, the potential for their entrainment is not substantial.

The low occurrence of other entrained species in the sampling nets at the powerhouses leads us to conclude that impacts on these populations by entrainment are minor, if they exist at all. Based on the results of PG&E's entrainment sampling, there is no need for further studies to be conducted.

Fish Pathogens

CDFG, in its letter dated, June 17, 2003, stated that *Ceratomyxa shasta* (CS), a parasite that afflicts salmonids, is endemic to the NFFR and the relationship between project operations and the occurrence of the disease should be reviewed. CDFG also stated that whirling disease (*Myxobolus cerebralis*) is not a concern in the NFFR.

Our Analysis

CS is a microscopic myxosporean protozoan parasite that infects the internal organs of affected fish. Natural transmission occurs when susceptible salmonids are exposed to water or sediments containing the infective stage, fish to fish transmissions have not been documented in either natural or laboratory environments (Bartholomew et al., 1989). Research indicates that the infection potential is enhanced when water temperatures are high, water flow is low, and/or numbers of infectious CS actinospores are relatively high (Bartholomew, 2001). There is no known treatment for reducing or eliminating CS spores in a natural environment. As CS is endemic to the NFFR, spores and actinospores likely are present within the bypassed reaches and reservoirs. High water temperatures (above 20^0C) during summer in the Belden reach and downstream waters likely increase the susceptibility of rainbow and brown trout to infection by CS. Proposed modifications to the Belden reach instream flow schedule and the coldwater releases from the intakes in Lake Almanor and Butt Valley reservoir would provide for colder temperature regimes in the Belden, Rock Creek, and Cresta bypassed reaches and could reduce but not eliminate potential infection rates of salmonids. Due to the existence of CS within the NFFR and the inability to treat the infected waters, altered project operations would not substantially reduce the occurrence or transmission of CS.

Effects of Proposed Recreation Measures on Aquatic Resources

In its June 17, 2003, letter to the Commission, The Anglers Committee against Artificial Whitewater Flows requested an evaluation of the effects of proposed recreation related activities, particularly those contemplated in the SMP, on aquatic habitats, fisheries, and angling.

Our Analysis

Recommended recreational enhancements (see section 3.3.5, *Recreational Resources*) would have minimal effects on aquatic habitat and fisheries. In the final SA, PG&E proposes dredging along the existing submerged river channel of an approximately 1,000 feet long, 50 feet wide, and 6 feet deep boat channel from the North Shore campground public boat launch to provide access to approximately 4,480 feet elevation (PG&E datum). The dredging would alter the depth and potentially the substrate type of approximately 1 acre of aquatic habitat. This represents approximately 0.003 percent of all aquatic habitat found within Lake Almanor at the maximum water surface elevation. Scheduling dredging activities during fall or winter, when the lake level is typically lower and centrarchid spawning is not occurring, would reduce potential impacts on fish utilizing habitat within the dredge zone.

The SMP, once approved by the Commission, would require PG&E to institute permitting processes that would analyze the effects of any proposed actions, such as rehabilitating swimming beaches, construction of waterside trails, and construction of fishing platforms, on aquatic and other resources.

Additionally, recreation flow releases into the Belden reach have the potential to adversely affect the aquatic community. See the detailed discussion earlier in this section under *Recreation Flows—Belden Reach.*

3.3.2.3 Cumulative Effects on Aquatic Resources

Construction of the UNFFR Project reservoirs and downstream reservoirs (Rock Creek, Cresta, Poe, and Oroville) has reduced the amount of riverine habitat in the NFFR between West Branch and Hamilton Branch from about 90 miles to about 41 miles, divided among the Seneca, Belden, Rock Creek, Cresta, and Poe bypassed reaches. Although some of these reservoirs provide suitable rearing habitat for rainbow trout, the fish communities in impounded areas have generally shifted toward warmwater species. Diversion of water for hydroelectric generation has substantially reduced flow volumes and altered temperature regimes in the bypassed reaches, but trout fisheries remain in good condition, especially in the Seneca, Belden, and lower Butt Creek reaches.

Several measures proposed by PG&E and recommended by agencies are expected to provide benefits to rainbow trout in the Seneca and Belden bypassed reaches. These include providing pulse flow releases in both bypassed reaches for gravel entrainment

and relocation to improve spawning habitat for trout; increased minimum flows in these bypassed reaches, which would increase the amount of physical habitat that is available and improve summer water temperatures in the Belden bypassed reach; and finalizing a plan for ramping spill flows to avoid rapid onset and termination of spill flows that may flush aquatic biota downstream, if sufficient opportunity to seek cover from high velocities is not provided, or strand trout and invertebrates.

PG&E's proposed minimum flows to the Seneca and Belden bypassed reaches would substantially improve conditions for rainbow trout adults and provide near-optimal conditions for rainbow trout spawning, although juvenile habitat would decrease slightly compared to existing conditions with the flow schedule proposed in the final SA (figures 3-5 and 3-6). Consequently, there would not be much of an increase in production of the number of rainbow trout in the Seneca and Belden bypassed reaches. However, because of the near-optimal flow conditions, and slight decrease in the prevailing water temperature in these reaches, the growth and condition of the rainbow trout would be expected to improve. This could result in anglers catching larger trout from the Seneca and Belden bypassed reaches downstream from Canyon and Belden dams, respectively. Monitoring fish and macroinvertebrate populations would enable determinations of trout responses to new project operations and evaluation of the need to implement adaptive management measures. Providing scheduled whitewater flows in the Belden reach, if implemented, could adversely affect trout populations by scouring algae and invertebrates from the stream channel, but ecological monitoring during any such events would enable identification of substantial effects and provide a basis for taking corrective actions.

Modifying the configuration of the Prattville intake pursuant to the Rock Creek-Cresta SA and using project operations to maintain water temperature criteria in river reaches outside the project boundary represents a cumulative effect that would likely cause a reduction in the amount of coldwater habitat in Lake Almanor, which would affect the existing coldwater fish community. Modifications, as modeled, to the Prattville intake would cause a substantial depletion of the hypolimnion (64 percent), which would negatively affect salmonid (rainbow trout, brown trout, and Chinook salmon) and wakasagi populations in Lake Almanor by decreasing available coldwater habitat during the summer. This decrease in coldwater habitat would concentrate fish that prefer such habitat into a substantially smaller area. Currently, wakasagi provide forage to predacious fish in the lake and, when entrained in the Prattville intake, a substantial forage base for trout inhabiting both Butt Valley and Belden reservoirs. Any modifications to the intake that reduce the coldwater habitat could increase entrainment of wakasagi if they become more concentrated in the vicinity of the Prattville intake. This could affect salmonids in Lake Almanor, Butt Valley reservoir, Belden reservoir, and the waters of the Rock Creek-Cresta Project, at least on a short-term basis, by increasing the available forage base.

3.3.2.4 Unavoidable Adverse Effects

Continued operation of the UNFFR Project with proposed and recommended measures would result in unavoidable adverse effects on aquatic resources, including the continued replacement of riverine with reservoir habitat, blockage of upstream fish movement by project dams, losses of fish through entrainment and turbine passage (although as discussed above, these fish are almost exclusively wakasagi, and they support trophy trout populations in Butt Valley and Belden reservoirs), and interruption of sediment transport processes. Lake Almanor and Belden reservoir would continue to inundate approximately 50 percent of the riverine habitat that existed between Hamilton Branch and the current location of the Rock Creek reservoir.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

The project area's varied elevation and geological characteristics support a diversity of vegetation types. Plant communities include mixed coniferous forest, riparian, oak woodland, chaparral, and meadow. We describe specific information on vegetation associated with the tributaries, UNFFR, reservoirs, and other project features in the following section.

The project area is situated within the California Floristic Province (Hickman, 1993) at the northern edge of the Sierra Nevada Mountains. In the Lake Almanor area, granite and metamorphic rocks of the northern end of the Sierra Nevada are buried beneath young volcanic deposits, and the topography is level to gently sloping. Vernally wet volcanic flats and wet meadows are common in the Almanor region. The upper reaches of Lake Almanor contain large, grassy meadows subject to flooding at high water levels. Vegetative cover in the vicinity of Lake Almanor and Butt Valley is generally mixed conifer forest except in populated areas where development has occurred. The project area between Butt Valley and Caribou is also generally mixed conifer forest with outcrops of serpentine in a steep, eroded landscape. Between Caribou and Belden, the vegetation varies between mixed conifer forest and chaparral. The steep, rocky slopes are dominated by canyon live oak forests. Seeps and springs are fairly common in the area around the Belden forebay, and many rare plants associated with the serpentine outcrops are present.

PG&E identified and mapped seven upland cover types and four riparian vegetation series within the project boundary (table 3-21). In general, upland vegetation in the project area can be characterized as mixed conifer forest and oak woodland. The most common species in the mixed conifer stands are Douglas fir, white fir, Jeffrey and ponderosa pine, lodgepole pine, and incense cedar. Common shrubs include several species of ceanothus and manzanita, vine maple, leather oak, and deer brush. Oak woodland species include canyon live oak and black oak with an understory of deer brush, poison oak, toyon, western mock orange, and pipevine.

Table 3-21. Vegetation series mapped within the UNFFR Project boundary. (Source: GANDA, 2000)

Vegetation Series	General Description and Dominant Species
Upland Series	
Canyon live oak	Open canopy with diverse shrub and herbaceous layers, including introduced annuals; canyon live oak, western mock orange, whiteleaf and Indian manzanita, deer brush, poison oak, and California pipevine
Mixed conifer	Densely shaded by Douglas fir, ponderosa pine, incense cedar, and white fir, poorly developed shrub and herbaceous layer of leaf litter and saprophytes
Lodgepole pine	Single species forest of lodgepole pine found at higher elevations along edges of wet montane meadows, low diversity and sparce understory
Leather oak	Leather oak and wedgeleaf ceanothus found in mixed serpentine chaparral along with whiteleaf manzanita, rubber rabbitbush, and prickly phlox
Greenleaf manzanita or montane chaparral	Dense chaparral to about 15 feet in height found often in disturbed areas; greenleaf manzanita, mountain whitethorn, Sierra gooseberry, bloomer's goldenbush, and Mahala mat
Dry montane meadow	Herb dominated community found at the periphery of Last Chance Marsh, along the north and west shore of Lake Almanor, and behind Chester Airport; Kentucky bluegrass, tufted hairgrass, common yarrow, meadow penstemon, beaked sedge, Jones' muhly, long-stalked clover, sheep sorrel, and cinquefoil
Tufted hairgrass	Herb dominated community found in a band of seasonally moist meadow at Last Chance Marsh; tufted hairgrass, bluegrass, field mint, timothy, and Baltic rush
White alder	Narrow, discontinuous montane riparian forest found throughout the NFFR corridor; white alder, some black cottonwood, arroyo willow, and redtwig dogwood

Vegetation Series	General Description and Dominant Species
Wetland Series	
Freshwater seeps	Herb dominated community associated with wet meadows or fractured serpentine on steep slopes or cliff faces, found in Last Chance Marsh and Caribou and Belden areas; native sedges and rushes, seep-spring monkeyflower, big-leaved avens, meadow barley, leopard lily, white-flowered bog orchid, and wild azalea
Freshwater marsh	Aquatic and emergent species found along the fringes of marsh habitat at Lake Almanor and Butt Valley reservoir and a disturbed site behind Chester Airport; pondweeds, water smartweed, common waterweed, inflated sedge, water sedge, common bladderwort, hairy-leaved meadow arnica, American brooklime, creeping spikerush, mountain spikerush, and mannagrass
Wet montane meadow	Highly diverse herbaceous community found at Last Chance Marsh; woolly sedge, small-fruited bulrush, mountain spikerush, water plantain buttercup, tinker's penny, Baltic rush, field mint, Nevada rush, and primrose monkeyflower

The UNFFR Project area contains abundant riverine and lacustrine open water wetlands associated with the NFFR, its tributary streams, and the project reservoirs. Palustrine scrub-shrub wetlands are found along the shoreline of the river and its tributaries and are usually dominated by deciduous shrubs like willow and alder. Persistent emergent wetlands are found to a limited extent along the west shore and causeway arm of Lake Almanor and are characterized by bull rush, cattails, and sedges. Other common riparian and wetland vegetation includes grasses, sedges, willows, rushes, alders, cottonwoods, and ferns. Freshwater seeps and wet meadow habitats also occur locally.

Special-status Plant Species

PG&E's review of information published by the FS, FWS, CDFG, and the California Native Plant Society (CNPS) indicated that 118 special-status species could potentially occur in the project area. PG&E conducted field surveys for rare plants during the spring and summer of 2000 along the NFFR corridor from Lake Almanor dam to the Belden powerhouse at the confluence with Yellow Creek. Surveys were also

conducted around Butt Valley reservoir, Lake Almanor, and associated project facilities and recreational sites. Surveyors identified and mapped 114 occurrences of 12 rare plants that are known to occur in the project vicinity or are documented within the project area (table 3-22). No federal- or state-listed threatened, endangered, or candidate plant species were documented within the project area.

Table 3-22. Special-status plant species that are known to occur within the UNFFR Project area. (Source: GANDA, 2000)

Species	Status	Habitat and Location Where Found
Geyer's sedge (*Carex geyeri*)	CNPS 4, FSI	Open mixed conifer forest. Documented during PG&E's surveys at Skinner Flat and approximately 1 mile downstream of Canyon dam.
Starry clarkia (*Clarkia stellata*)	FSS	Mixed conifer forest; road embankments or open areas. Documented during PG&E's surveys on the southeast shore of Lake Almanor and along Butt Valley reservoir Road.
California lady's slipper (*Cypripedium californicum*)	CNPS 4, FSI	Seeps and springs on serpentine rock outcrops. Documented during PG&E's surveys at Caribou No. 1 and No. 2; and at a permanent spring approximately 1 mile north of Queen Lily campground.
Round-leaved sundew (*Drosera angelica*)	FSI	Bogs and swamps, mixed conifer forest. Documented during PG&E's surveys at Last Chance Marsh.
Cantelow's lewisia (*Lewisia cantelovii*)	CNPS 1B, FSS	Broadleaf upland forest; chaparral, cismontane woodland; steep, north to northeast-facing cliffs, rocky outcrops, often mossy sites. Documented during PG&E's surveys in the Caribou area, 2 miles north of Queen Lily campground and the confluence of NFFR and EBNFFR.
Quincy lupine (*Lupinus dalesiae*)	CNPS 1B, FSS	Dry slopes in mixed conifer, often on phyllite. Lower coniferous and upper coniferous forests. Documented during PG&E's surveys at Butt

Species	Status	Habitat and Location Where Found
		Valley reservoir.
Northern bugleweed (*Lycopus uniflorus*)	CNPS 4, FSI	Lake margins, wet meadows, and floating bogs and fens. Documented during PG&E's surveys at Last Chance Marsh.
Stebbin's monardella (*Monardella stebbinsii*)	CNPS 1B, FSS	Broadleaf upland forest; chaparral, lower coniferous forest; rocky serpentine slopes and outcrops. Documented during PG&E's surveys in the Caribou area.
Marsh skullcap (*Scutellaria galericulata*)	CNPS 2, FSI	Swamps and wet places, 4,000 – 7,000 feet elevation; lower montane coniferous forest, meadows (mesic). Documented during PG&E's surveys at Last Chance Marsh.
Feather River stonecrop (*Sedum albomarginatum*)	CNPS 1B, FSS	Crevices and ledges on steep, serpentine cliff faces, partially shaded. Chaparral, lower coniferous forest. Documented during PG&E's surveys in the Caribou area.
Flat-leaf bladderwort (*Utricularia intermedia*)	CNPS 2, FSI	Shallow water; 4,000-7,500 feet elevation. Bogs and meadows, marshes, and swamps (lake margins). Documented during PG&E's surveys at Last Chance Marsh.
Cream-flowered bladderwort (*Utricularia ochreleuca*)	FSI	Shallow water; 1,435-1,440 meters elevation. Meadows (mesic); marshes, and swamps (lake margins). Documented during PG&E's surveys at Last Chance Marsh.

Notes: FSS = FS sensitive species
FSI = FS special interest
CNPS 1B = rare or endangered in California and elsewhere
CNPS 2 = rare or endangered in California, but more common elsewhere
CNPS 3 = plants for which more information is needed
CNPS 4 = plants of limited distribution

Noxious Weeds

The California Department of Food and Agriculture (CDFA) lists 135 plants as noxious weeds in California (CDFA, 2002). Based on literature review and information obtained from CDFA, the California Exotic Pest Plant Council (CalEPPC), and the FS, PG&E determined that 38 of these could potentially occur in the project area. PG&E conducted surveys for noxious weeds in the project area together with surveys for rare plants in 2000. Surveyors identified and mapped 145 occurrences of eight noxious weed species (table 3-23). A ninth species, Himalayan blackberry, was not mapped because it was found to be so widespread in the project area. Although not listed by CDFA as "noxious," it is widely accepted as an invasive exotic plant. It was found throughout the NFFR corridor from the Belden powerhouse to approximately 4,200 feet elevation at Butt Valley reservoir.

Most weed populations were observed along project access roads, around the powerhouses, and at recreational facilities, where vehicle and foot traffic serve as vectors for the spread of weed seed. However, weed infestations were also documented at low use areas, such as the northern tip of Lake Almanor, suggesting that plant fragments and seed are also spread by a combination of high flows or water levels and by recreationists.

Table 3-23. Noxious weeds documented in the UNFFR Project area. (Source: GANDA, 2000)

Species	Status	Documented Occurrences
Cheat grass (*Bromus tectorum*)	CalEPPC A-1, CDFA C	Common throughout project area, particularly on access roads and near facilities.
Hairy whitetop (*Cardaria pubescens*)	CDFA B	West side of Lake Almanor near the 4,510 elevation contour; also at the north end of Butt Valley reservoir and Belden forebay.
Spotted knapweed (*Centaurea maculosa*)	CalEPPC Red Alert, CDFA A	Highway 36 embankment on west side of bridge over Lake Almanor.
Yellow star-thistle (*Centaurea soltitialis*)	CalEPPC A-1, CDFA C	Common throughout project area along access roads and near facilities.
Canada thistle (*Cirsium arvense*)	CalEPPC B, CDFA B	Mud Creek Rim Road; east shore north end of Lake Almanor.
Klamathweed (*Hypericum perforatum*)	CalEPPC B,	Large occurrences at Butt Valley reservoir in vicinity of sensitive

Species	Status	Documented Occurrences
	CDFA C	species plants. Common along access roads, facilities, and recreation areas.
Dalmation toadflax (*Linaria genistifolia*)	CDFA A	West side of Lake Almanor; colonizing edge of montane meadow habitats.
Bouncing-bet (*Saponaria officinalis*)	CalEPPC A-2, CDFA C	Near confluence of NFFR and EBNFFR.
Himalayan blackberry (*Rubus discolor*)	CalEPPC A-1	Intermittent band of riparian vegetation on NFFR from Seneca to Belden powerhouse.

Notes:
CalEPPC List Designations:
A-1 = most invasive wildland pest, widespread
A-2 = most invasive wildland pest, regional
B = wildland pest plants of lesser invasiveness
Red Alert = pest plants with the potential to spread explosively CDFA List:
A = targeted for eradication or containment
B = more widespread, counties determine control efforts
C = very widespread, control efforts typically targeted only in nurseries or seed lots

Wildlife

The UNFFR Project area provides habitat for a variety of wildlife species that use the mixed conifer forests of varying stand ages, oak woodlands, riparian areas along the NFFR and its tributaries, and project reservoirs. The coniferous forest in the project area supports various species of upland game birds including blue grouse, California and mountain quail, ring-necked pheasant, mourning dove, and wild turkey. Mammals expected to occur include mule deer, black bear, Douglas' squirrel, snowshoe hare, western gray squirrel, raccoon, gray fox, and ermine. The most important game species in the project vicinity are deer, including black-tailed deer and California mule deer. At lower elevations, the UNFFR Project area serves as the winter range for the Bucks Mountain Herd and the summer range for the East Tehema Deer Herd.

Riparian habitats are of particular importance, because they support a greater density and diversity of wildlife than any other terrestrial habitat in California. Waterfowl such as mallard, wood duck, wigeon, common mergansers, common goldeneye, cinnamon teal, canvasback, and Canada goose occur in the project area. Great blue heron, osprey, and belted kingfisher are often observed near the project reservoirs and along the NFFR. Furbearers such as beaver, muskrat, and mink also

benefit from the project's abundant riparian habitat. Reptiles and amphibians known to occur in the vicinity of the project area include bullfrog, garter snake, treefrog, Pacific rattlesnake, western toad, and California newt.

Special-status Wildlife

A number of sensitive wildlife species are known to, or have potential to, occur in the project vicinity including several FS sensitive species. We address species that are listed as threatened or endangered under the ESA in section 3.3.4, *Threatened and Endangered Species*.

PG&E's consultation with the FS, FWS, and CDFG indicated that 18 species with special status could occur in the project area. Three additional species, the VELB, CRLF, and bald eagle, are federally listed as threatened, and are discussed in section 3.3.4, *Threatened and Endangered Species*. The amphibians, reptiles, birds, and mammals shown in table 3-24 include federal species of concern; sensitive species in FS Region 5; and state-listed threatened, endangered, or species of concern. We evaluated the likelihood of occurrence of these species in the project area based on their historical range, known occurrences, habitat associations documented in the literature, and the results of PG&E's field surveys. The current status of each species was identified after reviewing CDFG's current list of special-status animals (CDFG, 2002a).

Table 3-24. Special-status species that could occur or are documented to occur in the project vicinity. (Source: PG&E, 2002a; CDFG, 2002a).

Species	Status	Optimum Habitat
Amphibians and reptiles		
Cascades frog (*Rana cascadae*)	FSC, CSC, FSS	Breeds in ponds or bogs at elevations above 3,000 feet NGVD; associated with wet meadows, moist forests, along forested small streams or pond edges in summer
Foothill yellow-legged frog (*Rana boylii*)	FSC, FSS, CSC	Typically found close to tributaries, with cobble/boulder substrate and exposed rock for sunning; permanent foothill streams
Mountain yellow-legged frog (*Rana muscosa*)	FSC, CSC, FSS	Typically found at high elevation ponds, lakes, and streams
California red-legged frog (*Rana aurora draytonii*)	CSC, FT	Typically found in perennial ponds or pools with deep, still or slow moving water containing dense emergent or

Species	Status	Optimum Habitat
		riparian vegetation
Northern leopard frog (*Rana pipiens*)	CSC, FSS	Typically found near quiet water with emergent or submergent vegetation for breeding and overwintering
Western pond turtle (*Clemmys marmorata*)	FSC, FSS, CSC	Typically found near still or slow-moving water of ponds, marshes, streams, rivers, and reservoirs containing substrates for aerial or aquatic basking
Birds		
American peregrine falcon (*Falco peregrinus anatum*)	FSC, FSS, SE	Montane hardwood-conifer, cliff sites for nesting
California spotted owl (*Strix occidentalis occidentalis*)	FSS, CSC	Montane hardwood-conifer
Greater sandhill crane (*Grus canadensis tabida*)	FSS, ST	Wet meadows interspersed with emergent wetlands. Irrigated pastures are important for resting during migration and through the winter
Northern goshawk (*Accipiter gentilis*)	FSC, FSS, CSC	Montane hardwood-conifer, middle and higher elevations
Willow flycatcher (*Empidonax traillii*)	FSS, SE	Montane hardwood-conifer, wet meadow
Mammals		
California wolverine (*Gulo gulo luteus*)	FSC, FSS, ST	Montane hardwood-conifer, montane riparian
Pacific fisher (*Martes pennanti pacifica*)	FSC, FSS, CSC	Montane hardwood-conifer, montane riparian
Pine marten (*Martes americanus*)	FSS	Montane hardwood-conifer
Sierra Nevada red fox (*Vulpes vulpes necator*)	FSC, FSS, ST	Montane hardwood-conifer, montane riparian
Pallid bat (*Antrozous pallidus*)	FSS, FSM, CSC	Montane hardwood-conifer, montane riparian; uses caves, tunnels, abandoned mine shafts, and

Species	Status	Optimum Habitat
		sometimes buildings
Townsend's big-eared bat (*Plecotus townsendii pallescens*)	FSC, FSS, CSC	Montane hardwood-conifer, montane riparian; typically found in caves, mines, tunnels, attics and other human-made structures
Western red bat (*Lasiurus blossevillii*)	FSS, CSC	Montane hardwood-conifer, strongly associated with riparian forest, uses tree foliage for day roosting

Notes: FSC = federal species of concern
FT/FE = federally threatened or endangered
FSS = FS sensitive species, Region 5
FSM = FS survey and manage species
SE = state endangered
ST = state threatened
CSC = state species of concern

Several of the wildlife species discussed above and shown in table 3-24 as having special FS or state status are also considered FS Management Indicator Species (MIS). MIS do not necessarily have special status, but are important in representing certain habitats and other species or guilds associated with such habitats. FS uses MIS to evaluate the effects of various management actions on wildlife populations. For their analysis of the impacts of relicensing the UNFFR project, the FS selected nine wildlife MIS that were identified in the Plumas and Lassen National Forest land and resource management plans: osprey, woodpeckers (pileated and hairy), bear, deer, bufflehead duck (Lake Almanor), mallard, Canada goose, and western gray squirrel (FS, 1988; FS, 1992). Currently little or no information is available about the numbers of these species, and some occurrences within the project area likely fluctuate yearly with annual migration.

Special-status Amphibians and Reptiles

Six amphibians and aquatic reptiles were considered to have potential for occurring in the NFFR watershed (see table 3-24). Amphibian and aquatic reptile surveys, performed by Garcia and Associates in 2001, identified a range of suitable habitat for target special-status species. While the NFFR provides suitable habitat for many water- or wetland-dependent species, PG&E concludes that the UNFFR Project area does not appear to currently support populations of Cascades frog, mountain yellow-legged frog, foothill yellow-legged frog (FYLF), CRLF, or other special-status amphibians and aquatic reptiles (GANDA, 2002). Likely causes for species' absence include destruction or disruption of habitat, predation, changes in water level elevations and flow, and general low to moderate habitat suitability.

Special-status Bird Species

The FS has identified five special-status bird species as being of particular interest in the project area (PG&E, 2002a). These include the American peregrine falcon, California spotted owl, greater sandhill crane, northern goshawk, and willow flycatcher. Below, we provide additional information about these species.

American peregrine falcon (*Falco peregrinus anatum*)—The American peregrine falcon was removed from the federal list of threatened and endangered species in 1999, due to the success of recovery efforts throughout its range (64 FR 46,541-46,558). However, the peregrine continues to be protected under the Migratory Bird Treaty Act, and is considered sensitive in FS Region 5.

Peregrine falcons nest on steep and inaccessible cliffs that offer protection from predators. They prey almost exclusively on birds captured in flight. Cliffs along the NFFR reaches may provide suitable nesting habitat for peregrine falcons. One known eyrie located in the NFFR canyon on cliffs just upstream of the confluence with Ohio Creek was documented during helicopter surveys for bald eagles in 2001. No other peregrine falcon breeding areas were documented. Limited availability of suitable nest sites and other historical effects resulting from human activity due to logging, grazing, and recreation may contribute to the paucity of nesting peregrines.

California spotted owl (*Strix occidentalis occidentalis*)—The California spotted owl is a FS sensitive species and is not currently protected under provisions of either the state or federal ESA. Spotted owls typically occur in dense, old-growth, multi-layered, mixed coniferous forest and oak woodland habitats. Key habitat requirements for this species include blocks of mature forest with permanent water and dense, multi-layered canopy cover for roost seclusion. Nesting territories are often found in narrow, steep-sided canyons on north-facing slopes. Open areas are usually avoided by these owls, although they may occasionally make hunting forays into secondary forest. The largest threat facing the spotted owl is the loss of habitat from logging.

The FS maintains 300 acres of Protected Activity Centers (PACs) for the California spotted owl on Plumas National Forest lands. One PAC has been established near the Butt Valley dam and another is located adjacent to the east shore of the reservoir. PG&E used FS protocols to conduct surveys for spotted owls in the project area during the 1994 and 1995 breeding seasons. Surveyors received responses from spotted owls in the two previously identified FS PACs, but did not observe any owls or nests during a daylight follow-up survey. However, database searches and agency consultation in 1999 identified 18 area records for spotted owl within a one-mile radius of the reach between Canyon and Belden dams. The status of these sites remains unknown.

Greater sandhill crane (*Grus canadensis tabida*)—Suitable habitat for this state threatened species exists in the open water areas and shallow lakes of the project area.

Fresh emergent wetlands for nesting and open shortgrass plains, grain fields, and open water wetlands for foraging occur along and adjacent to the western shoreline of Lake Almanor. One pair of adult cranes with young was observed in 1981 during ground reconnaissance in a large meadow immediately north of Lake Almanor. Four other records exist within the project vicinity.

Northern goshawk (*Accipiter gentilis*)—The project area provides suitable habitat for the northern goshawk. The northern goshawk typically nests on the Plumas National Forest in mature or older mixed conifer stands, but uses a variety of stand ages during foraging. Nests are well built stick nests located high in a hardwood tree. The nest is often built in the crotch of the tree.

PG&E conducted northern goshawk surveys in 1994 according to FS survey protocol and conducted database searches in 1999. No goshawks were found nesting in the immediate vicinity of the project in 1994. The nearest confirmed recently active northern goshawk nesting area is located on private land south of the town of Chester and approximately 10 miles northwest of Canyon dam.

Willow flycatcher (*Empidonax traillii*)—The state endangered willow flycatcher breeds in California from Tulare County north, along the western side of the Sierra Nevada and Cascades and along the northern coast. This species is strongly associated with large wet meadow complexes that support willow or willow/alder thickets at elevations between about 2,000 to 8,000 feet, but breeding habitat may be extremely variable (RHJV, 2000).

PG&E did not document any willow flycatchers during ground reconnaissance or database searches. The nearest records found were located approximately 3 miles west of Butt Valley reservoir and 10 miles northeast of Lake Almanor. Suitable large stands of willow habitat are not found in the project area, making it unlikely that the species occurs here.

Special-status Forest Carnivores

Although the California wolverine, Pacific fisher, pine marten, and Sierra Nevada red fox have not been documented in the project area, suitable habitat is present in the vicinity, and FS has categorized them as sensitive species (PG&E, 2002a). We describe these species below.

California wolverine (*Gulo gulo luteus*)—The California wolverine occurs in mixed conifer, fir, and lodgepole forests at elevations between about 4,300 to 7,300 feet, but may also use lower elevations in areas where it is undisturbed by development and human activity (Banci, 1994). The California wolverine uses caves, hollows in cliffs or rock outcrops or ground burrows in dense forest stands for den sites, but forages in more open areas.

The current range of the California wolverine extends from Del Norte and Trinity counties through Shasta County, and south through the Sierra Nevada to Tulare County. However, no wolverines were detected during forest carnivore surveys in 1994 and 2000 or winter carnivore surveys in 1998. The presence of roads, facilities, residential development, and recreation may limit habitat potential for the California wolverine.

Pacific fisher (*Martes pennanti pacifica*)—The Pacific fisher is typically found in late-successional conifer forests and riparian areas, and avoids open, hardwood-dominated stands (Powell and Zielinski, 1994). Stand attributes that appear to be important for the Pacific fisher include a diversity of tree sizes and shapes, openings that allow for the growth of understory vegetation, abundant dead and down material, and limbs close to the ground (Powell and Zielinski, 1994). Very few dens have been found in the western United States, but fishers typically den high in cavities in large-diameter live trees or snags. In California, fishers prey on small- to medium-sized mammals, including mice, voles, shrews, moles, squirrels, birds, snowshoe hare, and porcupines, and fisher foraging habitat coincides with forested and riparian habitats where these species are abundant (Powell and Zielinski, 1994).

At one time, the range of this species extended from British Columbia to Central California, but populations declined dramatically around the turn of the last century, due to trapping and logging. In the south-central Sierra Nevada, the Pacific fisher is reported from habitats between about 3,300 to 6,600 feet NGVD; the Southern Sierra Fisher Conservation Area encompasses the known occupied range in the Sierra Nevada, which is considered to be an elevational band from 4,500 to 8,000 feet (Golightly, 1997). No fishers were detected during forest carnivore surveys conducted in 1994 and 2000 or during winter carnivore surveys conducted in 1998. As with the wolverine, presence of roads, facilities, residential development, and recreation may limit habitat potential for this species.

Pine marten (*Martes americanus*)—The pine marten is a FS sensitive species that occurs in dense fir, lodgepole pine, and mixed coniferous forest. Suitable marten habitat is present throughout the project area, particularly at the higher elevations. However, no individuals were detected during forest carnivore surveys conducted in 1994 and 2000 or during winter carnivore surveys conducted in 1998. As with the wolverine and fisher, the presence of roads, facilities, residential development, and recreation may limit habitat potential for this species.

Sierra Nevada red fox (*Vulpes vulpes necator*)—The Sierra Nevada red fox is typically found in late-successional coniferous forest interspersed with riparian and meadow habitat and in brush fields. Its range extends from the California Cascades east to the Sierra Nevada Mountains in northern California, with most sightings reported between 5,000 and 7,000 feet NGVD. Although habitat may exist in the higher elevations of the project vicinity, no Sierra Nevada red fox were detected during forest carnivore surveys in 1994 and 2000 or winter carnivore surveys in 1998. However, one

individual was sighted near the town of Chester on the west shore of Lake Almanor in 1973. As with the other forest carnivores, the presence of roads, facilities, residential development, and recreation may limit habitat potential for this species.

Special-status Bats

In addition to surveys for general forest and riparian biota, PG&E conducted specific surveys for bats in the project area in 2001. Using a variety of methods, biologists documented the presence of four different species of bats that use project features to roost. None, however, were special-status bats (i.e., pallid bat, Townsend's big-eared bat, and western red bat).

Below, we provide additional information about the three special-status species. General information about their range, distribution in California, foraging or roosting patterns is based on species accounts presented in California's Wildlife, Volume III: Mammals (Zeiner et al., 1990), with updates from CDFG's Wildlife and Habitat Data Analysis Branch website (www.dfg.ca.gov/whdab/html/cawildlife.html). Site-specific information was obtained through field studies conducted in the project vicinity in 2001 by Garcia and Associates (PG&E, 2002a). Important roost sites for non-target species bats (where several hundred bats were observed at the locations) were documented at Belden dam, Caribou No. 1 powerhouse, Caribou No. 1 and No. 2 intake towers, Caribou No. 2 valve house, Butt Valley powerhouse, upper penstock portal, and Canyon dam and Butt Valley intake towers.

Pallid bat (*Antrozous pallidus*)—The pallid bat occurs throughout California. In central California, the pallid bat occurs in a variety of habitats, including oak woodland, ponderosa pine, and mixed conifer forest at elevations below 6,000 feet. The pallid bat uses rock outcrops, caves, tree hollows, and human-made structures as day-roosts. Night roosts may be located under bridges or in caves or mines, where temperatures do not exceed 40°C (104°F). During the 2001 surveys, biologists did not detect pallid bats using project facilities or other human-made structures at the 58 project survey stations.

Townsend's big-eared bat (*Corynorhinus townsendii*)—The Townsend's big-eared bat occurs throughout California, from low desert to mid-elevation forests. It relies on caves, mines, tunnels, or attics, where it roosts in clusters on open surfaces. While this species occasionally uses human-made structures that resemble caves, none of the powerhouses, dams, or associated project features provide suitable day roosting habitat. It is most readily detected by surveying potential roost sites, but is not easily captured or acoustically recorded. During the 2001 surveys, biologists did not detect Townsend's big-eared bats using project facilities or other human-made structures at the 58 project survey stations. However, probable evidence of its presence was documented in the Caribou Clubhouse at a single site, but this facility was never confirmed as an active roost site.

Western red bat (*Lasiurus blossevillii*)—The western red bat is found throughout California at low elevations. Most occurrences of breeding females are from low elevations along major drainages in the Central Valley, but males and non-reproductive females may use elevations up to about 8,000 feet. The western red bat uses tree foliage for day-roosting and is strongly associated with riparian forest. During the 2001 acoustical surveys, biologists did not obtain any acoustic records of red bats, nor did they detect the bats using project facilities or other human-made structures.

3.3.3.2 Environmental Effects

Vegetation Management

Vegetation management at project facilities, including recreational sites, transmission line corridors, and access roads, has the potential to beneficially or adversely affect native plant communities, rare plants, and wildlife habitat. Vegetation management also may create conditions that decrease or increase the risk of establishment and spread of non-native plants and noxious weeds.

Recreational and other land use activities may adversely affect vegetation in the project area, as well. ORV traffic may cause erosion, soil compaction, and loss of vegetative cover. Vehicles, anglers, hikers, and even domestic pets can serve as vectors for the spread of weeds at both formal and dispersed recreational sites.

To address these concerns, PG&E proposes, in cooperation with interested parties, to design and implement a resource management plan that would benefit sensitive biological resources at the UNFFR Project. The plan would include measures to enhance and protect rare plants, wetlands, riparian communities, cultural resources, and sensitive wildlife habitats in the causeway area of Lake Almanor, from Last Chance campground south along the west shore of the lake to approximately the northern edge of the flood control channel south of the Chester airport. The plan would examine current land use and project-related effects and would provide enhancement opportunities to improve habitat suitability, grazing and land use practices, riparian zone revegetation, and weed control. In addition, PG&E proposes to include BMPs in the planning of all new construction activities within the project boundary to help prevent the introduction and spread of noxious weeds in the watershed.

The final SA and FS preliminary 4(e) condition no. 37 would require PG&E to develop a habitat enhancement plan within 1 year of license issuance. The plan would be developed in consultation with FS, FWS, CDFG, SWRCB, and Plumas County. This recommended plan would include the same enhancement measures proposed in PG&E's resource management plan discussed above. According to the final SA, the primary elements of the plan would include fencing and vehicle exclusion measures that would allow continued public foot access to the area. These measures would be implemented within 2 years of license issuance.

In addition to the habitat enhancement plan, FS recommends that PG&E develop a vegetation management plan prior to conducting any ground-disturbing activity on NFS lands within the project boundary, as specified in preliminary 4(e) condition no. 35. PG&E, in its January 15, 2004, response to the FS preliminary 4(e) conditions, does not object to this recommendation.

Interior's 10(j) recommendation no. 7, included in its December 1, 2003, filing, calls for PG&E to develop a comprehensive vegetation management plan to evaluate and implement actions to improve channel function during various flows, reduce the spread of exotic vegetation, and protect and monitor special-status species. Interior indicates that the plan should be developed in consultation with FS, FWS, CDFG, and SWRCB within 6 months of license issuance. The plan and results of vegetation management activities and monitoring would be described in an annual report to be submitted to the agencies for review and comment before filing with the Commission for approval.

PG&E disagrees with some of the measures included in Interior's recommended vegetation management plan, stating that there are too many highly involved tasks to be collectively included in the plan. However, some of Interior's recommended weed control measures would be addressed in the noxious weed management plan (discussed below) recommended by the FS and agreed to by PG&E.

Currently, PG&E is engaged in a long-term riparian monitoring program and BMPs for prevention of the introduction and spread of noxious weeds immediately downstream of the UNFFR Project on the Feather River as part of the license requirements of the downstream Rock Creek-Cresta Project. PG&E does not expect to see substantial changes to the riparian vegetation resulting from proposed UNFFR Project instream flows and pulse flows and therefore does not agree that additional monitoring of riparian vegetation at the UNFFR Project is needed. PG&E is currently conducting annual noxious weed surveys and monitoring all known populations of noxious weeds at the downstream Rock Creek-Cresta Project. In addition, comprehensive project area surveys for noxious weeds are repeated at three to five year intervals in order to document any new populations and update the status of populations for which control measures were not initially recommended.

PG&E opposes Interior's recommendation to mechanically excavate riparian vegetation from banks and bars as a control method. PG&E indicates that such manipulation would compromise any attempts to monitor flow-related effects by altering baseline channel conditions or could lead to the further spread of noxious weeds, such as Himalayan blackberry, to other areas of the watershed. PG&E proposes a limited program to remove and control bramble at four sites along the Belden bypassed reach to facilitate angler access, including planting alders to shade out the brambles.

PG&E also disagrees with the need to submit annual vegetation management activity and monitoring reports to the agencies, stating that quantifying and annually

reporting the results of maintenance activities associated with routine vegetation management would be burdensome, costly, and unwarranted.

FS preliminary 4(e) condition no. 36 recommends that PG&E develop a plan to control and contain the spread of noxious weeds on NFS lands within the project boundary. The noxious weed management plan would be approved by the FS and filed with the Commission within 1 year of license issuance. PG&E has agreed to address control of existing known populations of weeds as well as ensure that BMPs would be followed during all ground-disturbing activities for the prevention of new noxious weed infestations.

FS preliminary 4(e) condition no. 39 recommends that PG&E prepare a threatened, endangered, proposed for listing and sensitive species protection plan to assess the potential effects on federally proposed or listed species or FS sensitive species, of any actions to construct (including, but not limited to, proposed recreational developments), operate, or maintain project facilities, and submit it to FS for approval. This recommendation would cover plants, fish, and wildlife, and their habitats.

Our Analysis

Vegetation management encompasses a wide variety of activities, such as roadside mowing, weed control, and revegetation of eroding soils. Vegetation management can have adverse or beneficial effects, or both, on natural resources, cultural values, recreation, aesthetics, health and safety, and socioeconomics. Field surveys have identified numerous sensitive plant populations throughout the project area. In addition, numerous populations of noxious plants have been documented. For this reason, consultation with the FS, FWS, CDFG, and California Department of Parks and Recreation (CDPR) to develop and implement a plan that would include measures to enhance and protect rare plants, wetlands, riparian communities, and sensitive wildlife habitats is reasonable. In the following section, we address development of a vegetation management plan, and focus on two aspects of vegetation management having to do with terrestrial resources: protection of special-status plants and control of noxious weeds. Vegetation management at recreational sites is addressed in section 3.3.5, *Recreational Resources*.

Protection of special-status plants: During field surveys in spring and summer of 2000, biologists documented the occurrence of 12 special-status plants (GANDA, 2000). Most of these plants were found well above the high water mark, and are not threatened by project flow regimes or reservoir water level management. Although no federal- or state-listed plant species were found within the project area, special-status plants were found in the Last Chance Marsh area and could be influenced by widely fluctuating water levels. A few species could also potentially be threatened by noxious weed populations that are in close proximity and share the same habitat, such as Geyer's sedge and Klamathweed found in a recently logged area. Since these are sites that could be affected

by the spread of noxious weeds or a variety of vegetation management activities (e.g., brushing, mowing, herbicide application, replanting projects), recreation-related activities (e.g., camping, wood-cutting, ORV use), and other ground disturbances, we conclude that consultation with the FS, FWS, and CNPS to identify any measures that may be needed to protect these species is appropriate. Presently, PG&E maintains a project GIS data base that allows PG&E to map and track occurrences of special-status plants and animals in order to assist in evaluating plans for management, siting for new recreational facilities, and considering other activities that would cause ground disturbance or habitat alteration. With appropriate measures in place, relicensing the project should not adversely affect special-status plants.

The final SA measure to design and implement a wildlife habitat enhancement plan, to be developed in consultation with the FS, FWS, CDFG, SWRCB, and Plumas County, would benefit sensitive biological resources at the UNFFR Project. Such a plan should include measures to enhance and protect rare plants, wetlands, riparian communities, cultural resources, and sensitive wildlife habitats, including fencing and vehicle exclusion measures. Any plan should also examine current land use and project-related effects and provide enhancement opportunities to improve habitat suitability; grazing and land use practices, riparian zone revegetation, and weed control. Implementation of this plan would provide a reasonable level of protection to sensitive resources in the project area.

Measures that would be included in the FS-recommended threatened, endangered, proposed for listing and sensitive species protection plan would serve to protect federally listed or FS sensitive species from potential effects associated with project-related site-specific construction, operation, and maintenance activities. Having a plan in place that includes consultation would protect sensitive vegetation (as well as fish and wildlife) and should enable such activities to comply with the Northwest Forest Plan, current FS direction, and the two applicable forest land and resource management plans. However, the measures that are likely to be specified in this plan should be closely coordinated with measures specified in a wildlife habitat enhancement plan, discussed in the previous paragraph. Consideration should be given to combining the two plans into a single habitat enhancement and protection plan. A separate section within the plan could address protective measures for FS-sensitive or special interest plant species. Likewise, the sensitive plant protection portion of the sensitive species protection plan could also be included in the vegetation management plan.

Control of noxious weeds: Noxious weeds are a growing threat to California's environment, because of their potential to degrade native plant communities, outcompete rare species, and reduce wildlife habitat values. Both federal and state laws require landowners to manage noxious weeds within their ownerships. Currently, the species of greatest concern are spotted knapweed, identified as a CalEPPC "red alert" species and

designated as a Class A weed by CDFA; and Himalayan blackberry, identified as a CalEPPC Class A-1 species.

Successful weed control requires a cooperative effort by all landowners and land managers in the vicinity, since untreated weeds on adjacent lands provide a ready seed source for infestation by new species and re-infestation after treatment of existing problem weeds. Development of a noxious weed management plan as part of the vegetation management plan would facilitate an integrated approach to control effects, and is appropriate for all project lands. Implementation of weed control measures on its adjacent non-project lands would help reduce the risk of spread of weed infestations.

Any noxious weed management plan should, at a minimum, include: (1) periodic inventory and mapping of existing and new populations of noxious weeds; (2) actions/strategies to prevent and control the spread of known populations or introductions of new populations; (3) treatment of all new infestations (any class) and existing infestations of California class A and B rated weeds; (4) and monitoring of known populations of noxious weeds to evaluate the effectiveness of re-vegetation and noxious weed control measures. Eradication may be attainable for species that are currently limited in distribution, but attempts to eradicate species that are already well-established and widespread, such as Himalayan blackberry, would not be likely to succeed, except at unacceptably high cost to other resource values.

Noxious weed monitoring could be included as an element within other plans that could entail monitoring for erosion, such as the erosion and sedimentation control plan and the spoil pile management plan (both discussed in section 3.3.1, *Water Resources*), the recreation management plan (discussed in section 3.3.5, *Recreational Resources*), and the road and facilities management plan (discussed in section 3.3.6, *Land Use and Aesthetic Resources*.

Effects of Flow Releases on Riparian Habitat

The UNFFR Project contains abundant riverine and lacustrine open water wetlands associated with the NFFR, its tributary streams, and the project reservoirs. Riparian habitat in the project area occurs in narrow bands along the shorelines of project reservoirs and waterways. Under the current flow regime, riparian vegetation is encroaching into the active stream channel onto formally active gravel bar, floodplain, and bank surfaces. Higher stem densities may reduce water velocities, allowing increased sediment deposition and further encroachment of vegetation.

Measures in the final SA are intended to improve riparian habitat by providing flows that would remove vegetation that has encroached into the active channel, while promoting the establishment of vegetation on gravel bars, floodplains, and terraces. To accomplish these objectives, the final SA calls for increasing minimum instream flows

and shaping them seasonally. The final SA's proposed flow regime is described in detail in section 3.3.2, *Aquatic Resources*.

The FS and Interior recommend PG&E develop an adaptive management plan to evaluate the degree of success associated with the various flow improvements. As part of this plan, PG&E would need to evaluate the response of riparian vegetation and aquatic species to changes in the flow regime and recreational use and activity.

Interior further recommends, for the conservation and development of fish and wildlife resources, within 6 months of license issuance, PG&E develop in consultation with FWS, NPS, the FS, CDFG, and SWRCB, a recreational activities monitoring plan. The purpose of the plan would be to monitor the potential effects of recreational activities on fish and wildlife resources. Elements of the plan would include a comparison of data on recreational activities use, distribution, and expanded fisheries and raptor monitoring data. In addition, the plan would include elements to assess the effects of recreational use and facility development on local vegetation resources.

PG&E states that a similar draft RRMP, already been developed for the license, contains a monitoring program and resource integration and coordination program that addresses Interior's concerns. As part of the monitoring program, PG&E would monitor recreation activities and distribution on project lands and waters over the license period. This monitoring effort would include monitoring ecological capacity indicators such as site size, litter and debris, sanitation, erosion, vegetation damage, proximity to wetlands, and proximity to riparian vegetation, at developed and dispersed recreation sites. Additionally, if recreational river flows are provided on the Belden reach, as part of the SA, PG&E would monitor the amount of recreational boating use and impacts on other recreation and natural riverine resources. Furthermore, PG&E would conduct consultation and coordination meetings, at least annually, with the resource agencies and other stakeholders to discuss recreation monitoring results and other inter-related resource issues as part of the RRMP resource integration and coordination program.

Our Analysis

Proposed and recommended recreation flows may indirectly promote or affect riparian vegetation in the project bypassed reaches. Recreational use monitoring, as recommended by Interior, would be a means for evaluating the effects of proposed flows and associated recreational use on biological resources within the project area. A plan for avoiding or minimizing the biological effects of current and proposed project recreational facilities and related activities would provide a reasonable level of protection to biological resources in the project area. A more detailed discussion of recreation monitoring plans can be found in section 3.3.5, *Recreational Resources*.

Bypassed reach flows proposed in the final SA more accurately mimic the natural hydrograph in seasonality, although not magnitude, by allowing for larger flows in the

spring and lesser flows in the summer and fall. The increases in flows that are proposed in the UNFFR reaches would likely result in small changes in the amount of riparian vegetation growing along the river margins. Increased flows would result in the establishment of riparian vegetation along the contours of the new ordinary high water mark. The amount of vegetation that would become established would likely vary from site to site along the affected stream reaches, depending on factors such as aspect, slope, width of the floodplain, substrate, stream gradient, and existing plant community, in addition to flow volumes. However, as the areas of new riparian vegetation become established, the existing vegetation could be lost as higher flows inundate the habitat.

Higher minimum instream flows than are currently provided to project-affected reaches would have both positive and negative effects on riparian habitat. We agree that flows proposed in the SA that more closely mimic the natural hydrograph would promote more active riverine processes in terms of surface water and groundwater interactions, instream habitat complexity, and primary productivity. We also note that existing riparian vegetation supports unique plant communities and provides important habitat for wildlife.

Riparian vegetation occupies a very small proportion of the landscape, and the loss of this habitat type as a result of increased flows in the UNFFR reaches could adversely affect amphibians, reptiles, songbirds, small mammals, and aquatic furbearers that depend on riparian plant communities for forage, hiding, nesting, or denning. Loss of riparian vegetation could also reduce bank stability and increase the risk of establishment and spread of noxious weed populations on exposed soils. Riparian vegetation established as a result of the new higher flows would ultimately replace these functions and values. In considering these positive and negative effects, we conclude that long-term benefits of higher instream flows are likely to outweigh the adverse effects of short-term habitat loss and alteration. Additionally, monitoring the response of riparian vegetation to the flow regime specified in any license issued for this project, would ensure that sufficient re-establishment of riparian vegetation consistent with the new flow regime occurs to support the dependent beneficial aspects of the aquatic and wildlife communities.

Effects of Flows on Special-Status Amphibians and Reptiles

Declines in several native frog populations have been observed in California (Jennings, 1996). Reasons for decline may include habitat loss or alteration, disease, climate change, or a combination of these factors. Declines have been notable for the foothill yellow-legged frog, especially in the west slope drainages of the Sierra Nevada (Jennings, 1996). The FS maintains that habitat for the foothill yellow-legged frog has been lost as a result of reservoir inundation and lower stream flows. Additionally, the FS contends that habitat has been degraded by channel sediment, loss of edgewater habitat, and fragmentation of populations by dams and reservoirs. Changes in the flow regime in the project reaches (including increases in minimum flows, implementation of pulse

flows, restricted ramping rates, and whitewater boating releases) may also affect aquatic and riparian habitat that currently supports potential habitat of FYLF and CRLF.

To evaluate project effects on special-status amphibians, FS preliminary 4(e) condition no. 34 recommends that PG&E, within 1 year of license issuance, develop and implement an amphibian monitoring plan in consultation with other agencies, that is approved by the FS, and filed with the Commission.

Interior's 10(j) recommendation no. 12 calls for PG&E to develop an amphibian monitoring plan for the Belden and Seneca reaches in consultation with FS, FWS, CDFG, and SWRCB. This plan would be filed with the Commission within 6 months of license issuance. The plan would evaluate possible changes in amphibian numbers and diversity in response to changes in instream flow, water temperature, or other actions associated with project operations and required license conditions. Amphibian surveys would be conducted upon license issuance and at 5 year intervals thereafter.

PG&E, in its responses to the FS and Interior (letters filed with the Commission on January 15, 2004), and final SA, agreed to develop an amphibian monitoring plan. As described in the final SA, the plan would be developed in consultation with the FWS, FS, CDFG, and SWRCB, as part of the Seneca, Butt Creek, and Belden reaches biological monitoring plan. The amphibian monitoring plan would include targeted monitoring of FS sensitive and special-status amphibians, such as FYLF and CRLF, conducted at 3-year intervals beginning no later than 3 years following license issuance. If target amphibians are located in project reaches, focused annual monitoring of population health, life stages, reproductive success, and distribution would be required.

Our Analysis

Although no special-status amphibian species were documented in the project area, certain reaches in the UNFFR may provide some potential habitat for special-status species such as FYLF and CRLF. Habitat requirements and effects of flow on the threatened CRLF are discussed in section 3.3.4, *Threatened and Endangered Species*. The effects of instream flow increases on a year-round basis on amphibian habitat in the Belden reach, for instance, are expected to be minimal at the proposed flow release level. In riverine environments, breeding habitat for the foothill yellow-legged frog typically consists of low-velocity, shallow water and rocky substrates, near sparsely vegetated gravel and cobble bars (Hayes and Jennings, 1988).

The recreational boating flow study (PG&E, 2002a) included an evaluation of the effects of potential recreational releases on amphibian habitat and found that, in the Seneca reach, a release of 250 cfs did not result in a substantial change in the overall quality at potential sensitive species habitat sites. At 400 cfs, however, the depth and velocity were substantially increased, resulting in decreased overall amphibian habitat quality. In the Belden reach, the 350 cfs release resulted in a slight decrease in the

overall quality of habitat at potential sensitive species habitat sites with the exception of one site where habitat quality remained generally the same. At 600 and 850 cfs, the depth and velocity were substantially increased, resulting in decreased overall habitat quality.

Reducing rapid flow fluctuations, as proposed in the final SA, would benefit potential foothill yellow-legged frogs, and other amphibian species, since abrupt changes in water velocity and water surface elevation have the potential to reduce the abundance of the aquatic invertebrate prey base, dislodge or desiccate egg masses, and impair the development of eggs and juveniles through changes in water temperature.

We anticipate that higher minimum flows and reduction of flow fluctuation as outlined in the final SA would be adequate to maintain and possibly improve habitat for the foothill yellow-legged frog and other amphibian species, but conclude it would be reasonable to monitor the effects of changes in the flow regime, including effects of minimum flows, pulse flows, ramping rates, and whitewater boating flows. Initial surveys would be used to evaluate population abundance, distribution, and habitat use following implementation of a new flow regime. An amphibian monitoring plan would serve as a means for detection of new species in the project area and serve as a basis for adaptive management. If previously unknown populations of federally listed or special-status species are discovered during the term of the license, the adaptive management plan should specify the process by which consultation with FWS and others would be initiated. A more detailed discussion of adaptive management can be found in section 3.3.2, *Aquatic Resources*.

If PG&E develops, in consultation with FWS, FS, CDFG, and SWRCB, an amphibian monitoring plan for listed, sensitive, and special-status amphibian species in the Belden, Seneca, and Butt Creek bypassed reaches within 1 year of license issuance, the plan would serve to determine effects of the proposed changes in minimum flows, pulse flows, and other project operations on amphibian habitat. The first set of surveys are not needed until 5 years after license issuance, since extensive surveys in the project area were completed as part of project relicensing studies, and no sensitive amphibians were found. We expect that a new flow regime that may be included in a new license would enhance the quality of the habitat for amphibians, but it may take at least 5 years for populations to become established to the point where they are likely to be detected by monitoring.

Project Effects on Special-status Birds and Mammals

Existing project facilities and on-going project operations have the potential to affect some special-status birds and mammals. Proposed changes (such as construction of new recreational facilities, increases in minimum flows, and vegetation management measures) could also affect special-status birds and mammals.

As discussed under the Vegetation Management subheading, PG&E proposes to develop and implement a resource management plan that would benefit sensitive biological resources at the UNFFR Project. This plan would include measures to enhance and protect sensitive wildlife habitats.

Interior's 10(j) recommendation no. 21 calls for PG&E to develop a wildlife monitoring plan. The plan would be developed in consultation with FS, FWS, and CDFG within 6 months of license issuance and would evaluate changes in wildlife use in response to changes in flows, lake levels, implementation of the vegetation management plan, and other activities associated with project operations and required license conditions.

Interior's 10(j) recommendation no. 18 calls for PG&E to also develop a plan for the annual monitoring of active peregrine falcon eyries and suitable nesting habitat in the project area. The plan would be developed in consultation with FS, FWS, and CDFG upon issuance of a new license. Interior indicates that if new eyries are identified during the monitoring efforts, consultation with the aforementioned agencies would be appropriate to determine if protective measures are necessary. The results of the monitoring would be submitted to the agencies for review and comment prior to being filed with the Commission.

Although PG&E believes there is a need for wildlife management at the UNFFR Project, PG&E states that Interior's recommended wildlife management plan lacks definition and clarity and is poorly focused on addressing any ongoing effects of the project on wildlife populations. PG&E indicates that any wildlife monitoring that is needed at the project should be specifically focused on identifiable project effects on specific special-status wildlife species (e.g., bald eagles), groups of species (e.g., waterfowl), or their habitat.

PG&E agrees that some monitoring of existing and potential peregrine falcon nesting in the project area is appropriate and proposes to include this activity with monitoring required for the nesting bald eagle population, discussed in section 3.3.4, *Threatened and Endangered Species*.

The FS preliminary 4(e) condition no. 37 would require PG&E to develop a wildlife habitat enhancement plan within 1 year of the date of license issuance. Implementation of this plan would benefit sensitive biological resources at the UNFFR Project and would include measures to enhance and protect riparian communities and sensitive wildlife habitats. The plan would be developed in consultation with FS, FWS, CDFG and Plumas County.

No specific measures were proposed or recommended by any entity for forest carnivores such as California wolverine, Pacific fisher, pine marten, or Sierra Nevada red fox, or other mammals that may occur within the project boundary.

Our Analysis

We do not concur with Interior's recommendation for development of a wildlife management plan, as written. Hundreds of wildlife species may occur in the project area, but other than recommending special emphasis on special-status species, Interior does not identify which populations it believes PG&E should monitor or explain why monitoring is needed.

We concur with Interior that some monitoring of existing and potential peregrine falcon nesting in the project area is appropriate because some project-related activities (e.g., construction, operation, maintenance, and recreational activities) have the potential to disturb peregrines during the breeding season. We conclude that such monitoring could be combined with monitoring of the nesting bald eagle population, discussed in section 3.3.4, *Threatened and Endangered Species*, and should be consistent with the strategy FWS has outlined in its Monitoring Plan for the American Peregrine Falcon (FWS, 2003).

Implementation of the FS recommendations for wildlife habitat enhancement for special-status species that may occur in the project area and that could be affected by the project should protect such species is appropriate. Because habitat protection and enhancement measures for wildlife, vegetation, and fish are frequently inter-related, including such measures in an overall natural resource management plan, as proposed by PG&E, would facilitate coordination and cross-referencing of related measures. We conclude that any recommended enhancement and protection measures should be restricted to those species known to occur in the vicinity of the project. Suitable habitat for sensitive species of wildlife occurs in the vicinity of the project. We conclude that monitoring for the presence of those species with suitable habitat in the project should be included in a natural resource management plan, and if the presence of new sensitive species is established, consultation with FS, FWS, and CDFG should occur to determine the nature of any protective measures, if any are needed.

Relicensing the project as proposed would likely maintain habitat at current levels or close to current levels for all FS-selected wildlife MIS. These include mallard, osprey, pileated woodpecker, hairy woodpecker, deer, black bear, and gray squirrel.

Preferred habitat for forest carnivores such as California wolverine, Pacific fisher, pine marten, or Sierra Nevada red fox exists within the project area. However, the presence of roads, facilities, residential development, and recreation may limit habitat potential for these species.

3.3.3.3 Unavoidable Adverse Effects

None.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

Three federally threatened listed species of wildlife have been identified as potentially occurring within the project area: VELB (*Desmocerus californicus dimorphus*), CRLF (*Rana aurora daytoni*), and bald eagle (*Haliaeetus leucocephalus*) (letter from W.R. Taylor, Interior, to the Commission, dated December 1, 2003). FWS also indicated that the threatened slender Orcutt grass (*Orcuttia tenuis*) could also occur in the project area (letter from D.L. Harlow, FWS, to the Commission, dated June 19, 2003). However, relicensing studies indicate that there are no populations of, or suitable habitat for, this threatened grass within the UNFFR Project area (GANDA, 2000). For the purpose of consultation under the ESA, this EIS constitutes our Biological Assessment for these federally listed species. We describe each species' life history below.

Valley Elderberry Longhorn Beetle

The VELB was listed as a threatened species in 1980 (45 FR 52,803). The range of the VELB extends throughout California's Central Valley and associated foothills from generally below the 3,000-foot elevation contour on the east to the watershed boundary of the Central Valley on the west. The project features located upstream of the Belden forebay are above 3,000 feet in elevation (USGS datum), and features located below 3,000 feet include the Oak Flat and Belden powerhouses. The beetle relies entirely on its host plant, the elderberry (*Sambucus* spp.). Elderberry shrubs are a common component of riparian forests in the Central Valley, and optimal habitat is usually considered moist valley oak woodlands or hardwood stands with a large variety of species, such as cottonwood, sycamore, Oregon ash, or willow. The VELB is a wood-boring insect and lays its eggs in the stems of elderberry shrubs that are at least 1 inch in diameter at ground level. Frequently, there is no sign of the VELB except for the exit holes that the larvae create as they emerge just prior to the pupal stage. For this reason, surveys for the VELB focus on searching for elderberry shrubs.

We conducted a California Natural Diversity Database search, which indicated that to date there have been no recent documented occurrences of the VELB in the project area or in Plumas County (CDFG, 2002a). One potential host plant[23] was identified along Caribou Road south of Oak Flat powerhouse during 1999 surveys, but there was no indication of VELB presence. The project lies at the upper elevation limit of this species, and habitat suitability here is considered low. Surveys completed in 1998 for the downstream Rock Creek-Cresta Project and associated transmission lines identified a number of host plants in the vicinity of Camp Creek, north of Pulga (outside

[23] PG&E uses the term "host plant" in its application, which we assume to mean an elderberry shrub that has stems at least 1 inch in diameter at ground level.

the UNFFR project boundaries). These records are the only known records of VELB habitat in the project vicinity.

California Red-legged Frog

The CRLF is the only sensitive amphibian species federally listed as threatened within the project area. On March 13, 2001, the FWS formally designated critical habitat for this species. The NFFR and selected tributary drainages were included in critical habitat Unit 1 – North Fork Feather Unit. However, on June 8, 2001, a lawsuit challenging the designation was filed in the U.S. District Court for the District of Columbia, and on November 6, 2002, the court entered a consent decree remanding the designation to the FWS and vacating most of the 2001 designation. On April 13, 2004, the FWS proposed designating critical habitat for the CRLF identical to the configuration of the previously published final designation of critical habitat (which included the NFFR and selected tributary drainages). The FWS accepted comments on this proposal until July 14, 2004.

Critical habitat Unit 1, the North Fork Feather Unit, includes areas as far upstream as the Butt Creek confluence with the NFFR in the Seneca reach and the upper Mosquito Creek drainage east of Butt Valley reservoir (69 FR 19,619 – 19,642). Historically, CRLF populations were found at the western slope of the Sierra Nevada Mountains at elevations below 4,900 feet. The current range is greatly reduced, with a few, highly restricted populations in the Sierra Nevada, and most remaining populations occurring along the coast from Marin County to Ventura County.

The primary constituent elements of CRLF habitat include essential aquatic habitat, associated uplands, and dispersal habitat connecting essential aquatic habitat (FWS, 2001). Breeding sites are varied, including marshes, springs, permanent and semipermanent natural ponds, ponded and backwater portions of streams, as well as artificial impoundments such as stock ponds, irrigation ponds, and siltation ponds (FWS, 2001). Dense, shrubby, or emergent riparian vegetation closely associated with deep (> 2.3 feet), still or slow-moving water is needed during the November to March breeding season for attachment of egg masses and escape cover (Hayes and Jennings, 1988). Rocks, boulders, small mammal burrows, organic litter such as downed trees or logs, and leaf litter within 300 feet of riparian areas provide estivation habitat and refugia at any time of the year (FWS, 1996).

Potential habitat for CRLF was found in four locations during the 2001 herpetofauna surveys (Sites #3, #38, #45, and Lippy Lake) (GANDA, 2002). Sites #3, #38, and #45 represented good potential habitat, while Lippy Lake had a low habitat potential for CRLF. Sites #38, #45, and Lippy Lake contain trout, which limits the possibility they would successfully be used by CRLF. Site #3 is a small pond located along a small ephemeral drainage that flows northeast into Lake Almanor, near the access road into Butt Valley reservoir. This site does not appear to be hydraulically influenced

by project flows. Site #38 is located on China Bar along the NFFR about 3 miles downstream of Seneca. Site #45 is located below the surge chamber for the Butt Valley Tunnel near the beginning of the penstock that feeds the Butt Valley powerhouse. Lippy Lake is adjacent to the NFFR at the old mining town of Seneca. The field surveys were conducted using FWS protocol (FWS, 1997) with one FWS pre-approved modification. No individuals were documented within the project area during the 2001 amphibian and aquatic reptile survey, the 2001 visual encounter survey, or the 2000 recreational boating flow study (PG&E, 2002a). The nearest known occurrence of CRLF to the UNFFR project area is approximately 20 miles southwest of Belden powerhouse (GANDA, 2002).

Bald Eagle

In 1999, FWS proposed to remove the bald eagle from the list of threatened and endangered species, due to the success of recovery efforts throughout the United States (64 FR 36,453–36,464). Overall recovery goals for the bald eagle in the Pacific Region (which includes California) were met in 1990 and have been reached or exceeded in every year since. Goals for nest productivity and wintering population stability in the region also have been met or exceeded. Although the recovery goal of 800 breeding pairs has not yet been reached in California, the number of breeding pairs has increased dramatically. About 30 pairs were documented in 1977, whereas surveys in 1999 indicated the number had increased to over 150 (CDFG, 2002b). In addition to increasing in numbers, bald eagles are recolonizing their former range in California. In 1977, bald eagles were known to nest in 8 of the 58 counties in the state, and as of 1999, bald eagle nests were documented in 28 counties.

There are currently 14 known bald eagle nesting territories in the UNFFR project vicinity: 9 at Lake Almanor, 3 at Butt Valley reservoir, and 2 at Mountain Meadows reservoir (table 3-25). Of these, 12 were confirmed active in 2001. However, no bald eagle nests are located within the project boundary. Between 1988 and 2001, PG&E's reports show the number of young per occupied territory averaged 1.0, and an average of about 61 percent of the occupied territories were successful each year (table 3-25).

In California, bald eagles forage primarily on fish (Jackman et al., 1999). Studies in the project area showed that bald eagles preyed primarily on carp, brown bullhead, and Sacramento sucker. Carp accounted for 82 percent of the prey biomass for eagles in the NFFR project area. Birds were found to account for 7.4 percent of the prey biomass.

In 1988, PG&E developed bald eagle management zones for the seven nesting territories occurring at that time. Nesting territory management plans with specific protection measures have been developed and would continue to be implemented for most of the existing active nest sites within the project area.

Table 3-25. Reproduction in 14 bald eagle nesting territories in the UNFFR Project vicinity, 1988-2001. (Source: PG&E, 2002a)

Nest Territory	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	1988-2001 (yng/ occ.yr.)
Butt Valley 1	ONS	NO	1	ONS	ONS	2	1	ONS	2	1	2	ONS	ONS	ONS	(0.7)
Cool Springs	2	ONS	NO	NO	1	2	2	ONS	2	ONS	ONS	ONS	ONS	ONS	(0.8)
Butt Valley 2	2	2	2	1	OSU	2	2	ONS	2	2	1	1	1	2	(1.5)
Rocky Point	ONS	ONS	ONS	SU	ONS	NO	ONS	ONS	ONS	1	2	1	1	2	(0.6)
Switchback										2	ONS	1	2	1	(1.2)
Rock Lake									ONS	1	1	2	1	1	(1.0)
Collins Pine South	SU	OSU	NO	1	2	SU	NO	2	2	2	2	2	ONS	1	(1.6)
Collins Pine North	ONS	ONS	NO	ONS	ONS	OSU	ONS	1	ONS	NO	ONS	2	ONS	NO	(0.3)
Chester (Church)								2	2	2	NO	1	2	1	(1.7)
Mud Creek Rim	SU	1	2	1	ONS	ONS	2	NO	ONS	2	1	1	1	2	(1.1)
Catfish Beach														ONS	(0.0)
Eastside											2	2	2	1	(1.8)
Mountain Meadows West	ONS	ONS	OSU	OSU	ONS	SU	SU	ONS	1	2	1	ONS	ONS	ONS	(0.4)
Mountain Meadows East	2	OSU	SU	NO	NO	SU	SU	NO	NC	ONS	NO	NO	NO	NO	(1.0)
No. Occupied Territories of Known Outcome	7	6	4	5	7	4	6	8	10	11	11	12	12	12	115
Total Young Produced	6	3	5	3	3	6	7	5	11	15	12	13	10	11	110

Nest Territory	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	1988-2001 (yng/ occ.yr.)
Young per Occupied Territory	0.9	0.5	1.3	0.6	0.4	1.5	1.2	0.6	1.1	1.4	1.1	1.1	0.8	0.9	1.0
No. of Successful Territories	3	2	3	3	2	3	4	3	6	9	8	9	7	8	70
% Successful Occupied Territories	43%	33%	75%	60%	29%	75%	67%	38%	60%	82%	73%	75%	58%	67%	61%

ONS = Occupied, not successful
NO = Not occupied
OSU = Occupied, success unknown
SU = Success unknown
NC = Not checked

3.3.4.2 Environmental Effects

Valley Elderberry Longhorn Beetle

PG&E proposes no specific measures for protection of the VELB. Although the FS recommends no specific measures for protection of the VELB, it recommends development of a vegetation management plan as preliminary 4(e) condition no. 35 (discussed in section 3.3.3, *Terrestrial Resources*). In addition, in preliminary 4(e) condition no. 39, the FS recommends that PG&E prepare a biological evaluation (BE) in consultation with other appropriate agencies evaluating the potential impact of an action on any species listed or proposed for listing or any special-status species. Additionally, the FS recommends that PG&E perform necessary surveys prior to ground-disturbing activities in locations where current information on population occurrence for some species is lacking (e.g., VELB). The FS recommends that the BE should include: (1) developing procedures to minimize adverse effects on listed species; (2) ensuring that project-related activities meet restrictions included in site management plans for listed species; and (3) developing implementation and effectiveness monitoring of measures taken or employed to reduce effects on listed species.

Interior, in its December 1, 2003, filing with the Commission, makes a 10(j) recommendation that PG&E develop and implement a vegetation management plan that incorporates FWS' July 9, 1999, Conservation Guidelines for the Valley Elderberry Longhorn Beetle (FWS, 1999). As part of this plan, PG&E would detail the types and schedules of planned road and project-related maintenance activities that may affect vegetation resources, develop survey methods for the protection of listed species, and develop contingency measures to avoid and minimize effects on special-status species. The plan would provide environmental awareness training for employees and contractors conducting work in sensitive areas.

PG&E, in its response to Interior's December 1, 2003, 10(j) recommendation, states that it maintains a geographic information system that contains the known locations of sensitive plant and animal resources and PG&E employees are already required to take annual training on environmental laws and protection of sensitive species and habitats. PG&E feels that these measures, along with pre-activity surveys prior to construction of all new project features (e.g., recreation facilities), are adequate to provide a reasonable level of protection to sensitive species in the project area.

Additionally, PG&E states that Interior's reference to the FWS conservation guidelines is not relevant because PG&E is currently operating under an incidental take statement issued by FWS on June 27, 2003, for VELB throughout PG&E's service territory. The incidental take statement already provides for mitigation and monitoring related to O&M that could affect the VELB. PG&E feels that it is not necessary or appropriate for the Commission to consult with FWS regarding the VELB in the

relicensing proceeding, nor is it appropriate for FWS to impose conditions that differ from those set forth in the June 27, 2003, incidental take statement.

Our Analysis

Only one elderberry shrub that would be suitable as a VELB host plant was located in the project area, along Caribou Road, south of Oak Flat powerhouse, during the 1999 surveys, but there was no indication of VELB presence. We conclude that potential habitat for the VELB in the project area is extremely limited, and occurrences of this species are unlikely. A vegetation management plan that includes FWS Conservation Guidelines (1999) and addresses PG&E's management of activities affecting vegetation, including maintenance, construction, or other ground-disturbing activities, with consideration for their potential to affect elderberry shrubs, would be protective of VELB habitat at sites within the project boundary that either contain elderberry shrubs, or may not have been previously surveyed (i.e., sites where recreation facilities would be constructed). Such a plan would be consistent with FS preliminary 4(e) condition no. 39. Examples of project-related activities that could affect elderberry shrubs include: mowing, brushing, herbicide application, culvert replacement, and other road repairs; ground-clearing needed to improve or expand recreation sites; and thinning or burning for fire fuels management.

FWS (1999) specifies that complete avoidance is required to assume no adverse effects would occur. Complete avoidance is defined as protection of a 100-foot (or wider) buffer around elderberry plants containing stems measuring 1.0 inch or more in diameter at ground level. Based on available information, such a buffer would only be necessary around a single plant. Pre-construction surveys to identify the presence of previously unknown potential host plants or verify the absence of such plants, and PG&E's continuing to provide training and education for maintenance crews, would ensure that incidental observations of potential habitat for the VELB can be reported and appropriate actions can be taken that would provide additional protection to the VELB, if needed. To the extent that the existing incidental take statement measures, which have not been filed with the Commission, address provisions of a vegetation management plan, they can be incorporated into such a plan.

Our determinations regarding the three federally listed species that may occur in the vicinity of the project, including the VELB, are specified in section 5.6.5, *Endangered Species Act.*

California Red-legged Frog

Although PG&E proposes no specific measures for the protection of the CRLF, the final SA proposes an amphibian monitoring plan for FS sensitive species. The plan would include sampling within the Seneca, Butt Creek, and Belden bypassed reaches to be conducted at 3-year intervals beginning no later than 3 years following license

issuance. If target amphibians are located in project reaches, focused annual monitoring of population size, health, life stages, reproductive success, and distribution would be required.

Neither the FS nor Interior recommend specific measures for the protection of the CRLF, however, they both recommend amphibian monitoring plans. Although one of the amphibians for which presence would be monitored would be the CRLF, we discuss the amphibian monitoring plan in section 3.3.3, *Terrestrial Resources*.

Our Analysis

Although suitable habitat exists for the CRLF at the downstream end of the project, no individuals were documented within the project area during the 2001 amphibian and aquatic reptile survey, the 2001 visual encounter survey, or the 2000 recreational boating flow study (PG&E, 2002a). Bypassed reach flows proposed in the final SA more accurately mimic the natural hydrograph in seasonality, and magnitude, by allowing for larger flows in the spring and lesser flows in the summer and fall, and higher base flows throughout the year. Additionally, pulse flows proposed in the SA would be released in January, February, and March depending on the water year type (wet, normal, dry, critically dry), potentially flooding some additional pools. However, because the CRLF requires deep (> 2.3 feet), still or slow-moving water for attachment of egg masses and escape cover during the November to March breeding season (Hayes and Jennings, 1988), these flows may not increase the availability of appropriate habitat for the CRLF at the appropriate time of year, and may negatively affect the quality of the habitat by increasing velocity in the pools.

The recreational boating flow study (PG&E, 2002a) studied the effects of the recreational releases on amphibian habitat. Lippy Lake was the only potential CRLF site studied. The 250-cfs release did not result in a substantial change in the overall quality of habitat at the Lippy Lake site. At 400 cfs, however, the depth and velocity were substantially increased, resulting in decreased overall habitat quality. Site #3 does not appear to be directly hydraulically connected to the project waters, so we assume that a change in project operations would not affect its potential as CRLF habitat. Site #38 has not been studied to determine how they would be affected by recreational releases. Site #45 would not be affected by recreational flow releases. No potential CRLF habitat sites were identified in the Belden reach. However, potential habitat was only assessed under the existing flow regime. Under a new flow regime that would be specified in any license that may be issued for this project, potential CRLF habitat may develop in alternative and additional locations, especially following the adjustment of riparian vegetation to the new flow regime (which could take up to 10 years for shrubs).

The development of an amphibian monitoring plan to determine what effects the proposed changes in minimum flows, pulse flows, and other project operations have on amphibian, including CRLF, habitat in the Belden and Seneca reaches, as discussed in

section 3.3.3, *Terrestrial Resources*, would ensure long-term protection for the CRLF. The surveys included in any plan should be designed to detect the presence of the CRLF and determine how potential CRLF habitat is affected by the proposed changes in project operations. However, based on our review of PG&E's survey results, potential CRLF habitat that could be influenced by changes in the project flow regime is limited (Lippy Lake and Site #38). Consequently, we conclude that specific sites to be monitored for CRLF presence should be identified in any amphibian monitoring plan that may be developed, along with the rationale for monitoring the identified sites. Additional sites may need to be monitored besides the sites that represent potential habitat under the existing flow regime, and provisions for doing so should be included in an amphibian monitoring plan as well as how the influence of the new flow regime on this habitat would be addressed.

Bald Eagle

PG&E has previously established bald eagle protection policies and management zones in the UNFFR project vicinity for all nest sites occurring at that time (1988). These management zones provide up to a 0.5-mile buffer zone around existing nesting trees, less if sheltered by topography, to protect the nest from human disturbance and development, and to provide suitable habitat for future nesting opportunities.

Based upon its 1988 findings, PG&E proposes the following management recommendations for each bald eagle nesting territory currently found in the project vicinity:

1. Limit habitat alterations within the management zone to those that would enhance bald eagle nesting habitat and pose no hazard to eagles. For example, silvicultural practices that encourage long-term regeneration of large pines and reduction of fuel loading where necessary.
2. Between January 1 and July 31 of each year, no compatible habitat alterations would be allowed within a management zone with the exception of emergencies. If a nesting attempt fails during a certain year, this restriction may be eased at the approval of the land or wildlife manager.
3. Discourage new recreational developments or policy changes that would alter the current use of the nesting area by public users and prohibit new permanent access roads within a management zone.
4. Schedule non-emergency maintenance of power lines, such as vegetation removal or trimming operations, outside of the bald eagle nesting season.
5. Managers should consider the effects of any proposed alterations to the operation or configuration of existing water facilities on the abundance of bald eagle prey species and availability of eagle foraging habitats at Lake Almanor, Butt Valley reservoir, and Mountain Meadow reservoir.

None of the bald eagle nests in the project vicinity are located on project lands or PG&E-owned lands. The lands within the 0.5-mile buffer zone around each nest are primarily owned by United States (and managed by the FS), PG&E, and private timber companies.

FS preliminary 4(e) condition no. 38 recommends that PG&E develop a new bald eagle management plan for the project area within 2 years of license issuance. The plan would be developed in consultation with the FS, and other appropriate agencies; consultation would be initiated within 90 days of license issuance. The FS indicates that this bald eagle management plan would assist in the ongoing bald eagle recovery efforts and would be a tool for future management of all lands around these projects. At a minimum, the FS believes the plan should include: (1) periodic monitoring of human use patterns to discern human/bald eagle interaction conflicts; (2) annual monitoring of bald eagle reproduction around Lake Almanor; (3) coordination of any plans for timber harvest or mining on PG&E lands within the larger Lake Almanor area with the FS and other appropriate agencies to reach the goals and requirements of this plan; and (4) coordination of woodcutting activities on PG&E lands.

Because changes in project operations, management, and visitor use are proposed by PG&E, Interior feels that disturbance from these activities may adversely affect bald eagle productivity and survival (letter filed December 1, 2003). Although the eagles are currently doing well in the project vicinity with the current level of human interaction, the tolerance threshold is unknown. Interior makes a 10(j) recommendation that PG&E should develop an IBEMP within 6 months of license issuance in consultation with FWS, FS, and CDFG. Interior states that this plan should address land and resource management strategies to promote the conservation and recovery of bald eagles associated with Butt Valley reservoir, Mountain Meadows reservoir, and other project lands and waters.

Interior states that the IBEMP should identify steps to minimize eagle disturbance and ensure that proposed changes in project operations, management, and visitor use does not impair bald eagle productivity and survival. Interior feels this plan is necessary because the FS's September 2003 "Bald Eagle Management Plan, Lake Almanor and the Upper Feather River, Recovery Zone 26, Lake Almanor Basin Area" only applies to FS lands in the Lake Almanor area. Interior feels that the IBEMP would address management of recreation, timber harvesting, housing development, and fisheries management on project lands and waters and other private lands in the basin.

Interior also makes a 10(j) recommendation that PG&E conduct bald eagle monitoring in order to ensure that sufficient and effective protection measures are in place. Interior recommends the development of a bald eagle monitoring plan, within 180 days of license issuance, in consultation with FWS, FS, and CDFG. Interior states that this plan should include annual bald eagle surveys on project and waters, monitoring bald eagle reproductive success, eagle distribution and abundance, and human use to evaluate

eagle/human interactions. Interior adds that these annual surveys should be conducted according to protocols acceptable to the consulting agencies and submitted to the agencies for review and comment prior to being filed with the Commission.

PG&E, in its responses to the FS 4(e) conditions and Interior's 10(j) recommendations (letters filed with the Commission on January 15, 2004), agrees with the need to develop an IBEMP in the project area. PG&E would cooperate with FWS, FS, and CDFG to incorporate project-related activities into the existing FS September 2003 Bald Eagle Management Plan for Lake Almanor. PG&E believes the 2-year schedule proposed by the FS is more reasonable than the 6 month schedule proposed by Interior due to the magnitude and complexity of this plan. They agree that initial consultation regarding this plan with the appropriate agencies could occur more quickly, as proposed by FS. PG&E also feels that the monitoring requirement detailed in Interior 10(j) recommendation no. 17 should be included with the management plan and developed in cooperation with the participating agencies.

Our Analysis

Since 1995, five new bald eagle breeding territories have been established in the project vicinity for a total of 14. Overall productivity (1.0 young per occupied territory) of the nests in the project vicinity was at or near the statewide averages of 1 young per occupied territory from 1988 to 2001. The FWS bald eagle recovery plan (1986, as cited in the letter from Interior filed with the Commission on December 1, 2003) specifies a goal of 16 occupied territories for the project vicinity. Based upon this information, the bald eagle population in the project vicinity appears to be doing well under existing operating conditions. However, several changes in operating conditions and facilities are proposed in the SA, including those that are designed to enhance recreation opportunities and experiences.

Fish make up the vast majority of the bald eagles' diet in the project vicinity. Studies in the project area showed that bald eagles preyed on carp, brown bullhead, and Sacramento sucker. Carp accounted for 82 percent of the prey biomass for eagles in the NFFR project area. For this reason, proposed changes in reservoir operation or the flow regime (including implementation of higher minimum flows, pulse flows, more restrictive ramping rates, and recreation releases) that affect fish populations or foraging conditions would have the potential to affect bald eagles.

The proposed raising of lake levels during the late spring/summer period over existing conditions would provide for increases in the available habitat for spawning centrarchids, such as smallmouth bass, largemouth bass, and Sacramento perch. Carp have a propensity to flourish in most lakes and reservoirs where they have been introduced, regardless of the water level management regime that is in place. This often results in carp populations reaching nuisance proportions, which may serve to detract from the native fish populations and associated fisheries, but should continue to provide

an abundant prey source for bald eagles. Although few carp would be expected to occur in the bypassed reaches, most operating conditions (higher minimum flows, pulse flows and more restrictive ramping rates) proposed in the SA would generally enhance fish habitat for other potential fish prey species. In particular, Sacramento sucker populations in the bypassed reaches should increase, thus enhancing the prey base. Sacramento suckers are a common prey for eagles in California that reside near hydroelectric projects where carp have not yet been introduced (FERC, 2004).

Effects of implementing recreation flows, as PG&E proposes in the SA, would depend to a large extent on the timing (both time of day and time of year) of release flows. Restricting boaters to the 10:00 a.m. to 4:00 p.m. period of the day would help to avoid disturbance during prime foraging hours. Since bald eagles are thought to be less sensitive to disturbance after fledging is complete (WDFW, 2004), restricting the program to the months of August, September, and October would have a lower potential for harm than would be the case earlier in the season. Although, the timing of the proposed recreation flows would be dependent upon approval of the Recreation River Flow Technical Group (CDFG, SWRCB, FWS, NPS, Plumas County, and AW), the flows currently proposed include releases in July. These flows would be more likely to adversely affect bald eagle foraging and the latter stages of nesting.

The proposed recreational releases could have an adverse effect on aquatic resources. However, the adaptive approach to recreation river flow management, as outlined in the SA, should allow for the identification of any potential negative effects prior to the release of the test recreation flows. If negative effects are found after the release of test recreation flows, the adaptive approach should provide for the protection of aquatic resources. (Further discussion of the effects of proposed flows on fishery resources is contained in section 3.3.2, *Aquatic Resources*.) As a result, with implementation of the adaptive approach, the proposed operating conditions are unlikely to have a long-term adverse effect on bald eagle prey populations.

Bald eagles could also be affected by increases in recreational activities, because they are sensitive to disturbance. PG&E proposes a number of recreational enhancements and development throughout the project area. These include new campsites, access routes, boat launching facilities, trails, and parking areas, as well as improvements, relocations, and expansion of existing facilities. FS 4(e) condition 44 (filed with the Commission on December 1, 2003) also calls for similar recreational enhancements. Some of these recreation areas, such as Rocky Point and Almanor campgrounds, are in close proximity to bald eagle foraging areas. In these cases, the construction, maintenance, and use of the facilities could create human disturbance to eagles during the nesting season. The recommended recreation resource measures are discussed in more detail in section 3.3.5, *Recreational Resources*.

Recreational use which has the potential to disturb bald eagles is highest during the summer, when recreation use is at its highest. Boating, fishing, and hiking during

spring and early summer months would coincide with the time of year when eagles are laying eggs and feeding young at the nest. Eagles may be slightly less sensitive to disturbance during June and early July than they are earlier in the nesting stage, but forage availability and undisturbed access to forage can strongly affect rearing success (Johnsgard, 1990).

Construction projects, including improvements to roads and existing facilities and development of new facilities, could probably be timed to occur outside the breeding season to prevent disturbance to nesting birds, but several of these proposals have the potential to cause long-term disturbance to bald eagles. Special care would be needed to prevent adverse effects where proposed recreational sites overlap with areas that are known to provide important foraging opportunities for bald eagles (such as Rocky Point and Almanor campgrounds).

The bald eagle population in the project vicinity is currently being protected from recreational development by the existing PG&E bald eagle management recommendations. The development of an IBEMP, as recommended by FS and Interior, would address changes in project operations and recreational facilities and flows.

This plan would appropriately identify possible adverse effects to bald eagles resulting from changes in project operations, facilities, and human disturbance resulting from recreation use and provide a mechanism to enforce protection measures. However, we conclude that some elements of the bald eagle management plans recommended by the FS and Interior are beyond the jurisdiction of the Commission. In order for the Commission to claim jurisdiction, there must be a nexus of a measure to project purposes. The Commission would not be able to enforce measures that pertain to timber harvesting, mining, and housing development outside the project boundary, whether the land affected is owned by PG&E or private entities, unless a connection to project purposes is established. Because existing management practices are already in place on PG&E lands, and also because the FS has already developed a bald eagle management plan that PG&E can use as a guide, and PG&E has experience in developing such bald eagle management plans at some of its other hydroelectric projects (e.g., the Pit 3, 4, 5 Project [FERC No. 233]), we believe that this plan could be developed within less than 2 years of license issuance. However, consulting with many different entities to produce a plan poses significant time-related challenges, so we do not believe that development of the plan within 6 months of license issuance is realistic.

3.3.4.3 Cumulative Effects on Bald Eagles

Construction of several dams downstream of the UNFFR project, including the Cresta Dam (1949), the Rock Creek Dam (1950), the Poe Dam (1957 – 1958), the Oroville Dam (1961-1968) and the Thermalito Diversion Dam (1962-1967) blocked the upstream migration of anadromous fish that once may have provided a large, concentrated food resource for bald eagles. However, construction of the UNFFR Project

and other reservoirs in the Feather River watershed has provided a stable and abundant warmwater prey base for the bald eagle, and regulated flows in the NFFR maintain foraging opportunities in smooth, shallow water. Modest increases in flows, such as those proposed in the SA, would be likely to maintain or increase the prey base, as well as foraging opportunities, and result in a cumulative benefit to the bald eagle.

3.3.4.4 Unavoidable Adverse Effects

None.

3.3.5 Recreational Resources

3.3.5.1 Affected Environment

The UNFFR Project is located in northeastern California in a sparsely populated area composed of forest and river canyon and valley landscapes. The project lies partially within and adjacent to the Lassen National Forest and the Plumas National Forest, which both provide a variety of formal and informal recreational facilities and opportunities; much of the NFS lands are open to the public for recreation. Chester, California, a full-service community with a year-round population of 2,316 (Census, 2000), is located at the northern end of the project area (see figure 1-1).

Because the project location is remote and there are no developed winter recreation facilities, recreation use at the UNFFR Project occurs primarily during summer months. During the summer recreation season, recreationists in the region participate in walking, hiking, motor boating, fishing, canoeing, watersports, bicycling, equestrian use, camping, picnicking, wildlife viewing, off-highway vehicle use, and whitewater boating. During the fall, hunters visit the area, and during the winter season, visitors participate in snowmobiling, cross-country skiing, snowshoeing, ice skating, and ice fishing. However, because winter use is minimal, PG&E has not studied winter recreation use.

Recreation opportunities at the UNFFR Project are varied, and recreationists can access different areas around the project for different experiences and activities. Recreationists who prefer opportunities with developed recreation facilities tend to visit Lake Almanor and Butt Valley reservoir.

Three reservoirs, Lake Almanor, Butt Valley reservoir, and Belden reservoir, are located within the project area. Lake Almanor, with a surface area of 27,000 acres and approximately 52 miles of shoreline, has abundant access in the form of state highways, FS and county roads, and many privately owned lands developed with homes and businesses. Lake Almanor provides a setting for local, community-based year-round recreation activities as well as seasonal tourist-based activities. Butt Valley reservoir, which is just under 5 miles long and almost a mile wide with a surface area of 1,600 acres, is surrounded by undeveloped NFS land, and is more remote with access by county and FS roads, some of which have a dirt or gravel surface. Belden reservoir, or forebay,

is small with a surface area of 42 acres and a daily water surface elevation that can fluctuate between 5 and 10 feet, depending on power operations. There are no developed recreation facilities at the Belden reservoir.

Recreational Access and Facilities

Table 3-26 lists the developed recreation facilities for project reservoirs, and figure 3-9 shows their locations. In addition to the developed sites, PG&E documented a total of 25 dispersed recreation sites in the area of the project reservoirs: 22 sites at Lake Almanor and three sites at Butt Valley reservoir.

Lake Almanor Recreation Facilities. All public developed recreation facilities at Lake Almanor are owned and operated by either PG&E or the FS.

FS Facilities

The FS owns the Almanor campground north on the west shore of Lake Almanor. The California State University Chico Research Foundation (CSUCRF) operates and maintains the campground for the FS under a special-use permit. The campground has 49 campsites, each of which includes a picnic table and a fire ring/cooking grill; there are eight vault toilets at the campground. The Lake Almanor Recreation Trail (LART) passes through the campground and provides opportunities for walking, hiking, and bicycling. In addition there is an outdoor amphitheater that is shared with the Almanor South Campground. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor Campground North are generally in good condition with the exception of the older toilets, which should be replaced. PG&E also determined that some of the picnic tables and the amphitheater are in need of some maintenance. Through its ADA-accessibility study, PG&E determined that none of the campsites or water faucets at this facility are ADA-accessible. Each of the four toilet buildings has one accessible toilet, but they do not have accessible access routes or accessible trash receptacles.

The FS also owns the Almanor South campground, which is operated and maintained under a special-use permit issued to CSUCRF. The campground has 53 campsites, each with a picnic table and fire ring/cooking grill. Nine of the sites can be reserved, while the remaining 44 sites are available on a first-come, first-served basis. There are 12 vault toilets at this facility. The LART is adjacent to the campground on the west side and is available for walking, hiking, and bicycling. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor campground south are generally in good condition with the exception of the older toilets, which should be replaced. Through its ADA-accessibility study, PG&E determined that none of the campsites or water faucets at this facility are ADA-accessible. Only one of the vault toilets is accessible and also has an accessible access route. The trash receptacles are an accessible type, but most do not have accessible access routes.

Table 3-26. Public recreation sites on UNFFR Project reservoirs. (Source: PG&E, 2002a)

Facility	Lake Almanor	Butt Valley reservoir
Boat Ramps/Lanes	Almanor boat launch/2 Canyon dam boat launch and day-use area/3	Alder Creek day-use area and boat launch/1
Car-top Boat Access	None	None
Picnic Areas/Tables	Almanor rest area/6 Almanor scenic overlook/7 Canyon dam boat launch and day-use area/5 Canyon dam day-use area/19 Eastshore day-use area/9	Alder Creek day-use area and boat launch/3
Angler Access Sites	Almanor boat launch Almanor beach Canyon dam boat launch and day-use area Canyon dam day-use area Dyer View day-use area Eastshore day-use area Rocky Point campground	Alder Creek day-use area and boat launch Cool Springs campground
Trailheads	Dyer View day-use area Lake Almanor recreation trail	
Campgrounds/Campsites or (Bunkhouses)	Rocky Point campground (Loops 1, 2, and 3)/169 Camp Connery group camp/(5) Last Chance campground and group camp/25 Almanor campground north/49 Almanor campground south/54 Almanor group reservation camp/10 Almanor overflow camping area/40	Cool Springs campground/32
Swimming Areas	Almanor beach Canyon dam day-use area Dyer View day-use area Rocky Point campground	Alder Creek day-use area and boat launch Cool Springs campground

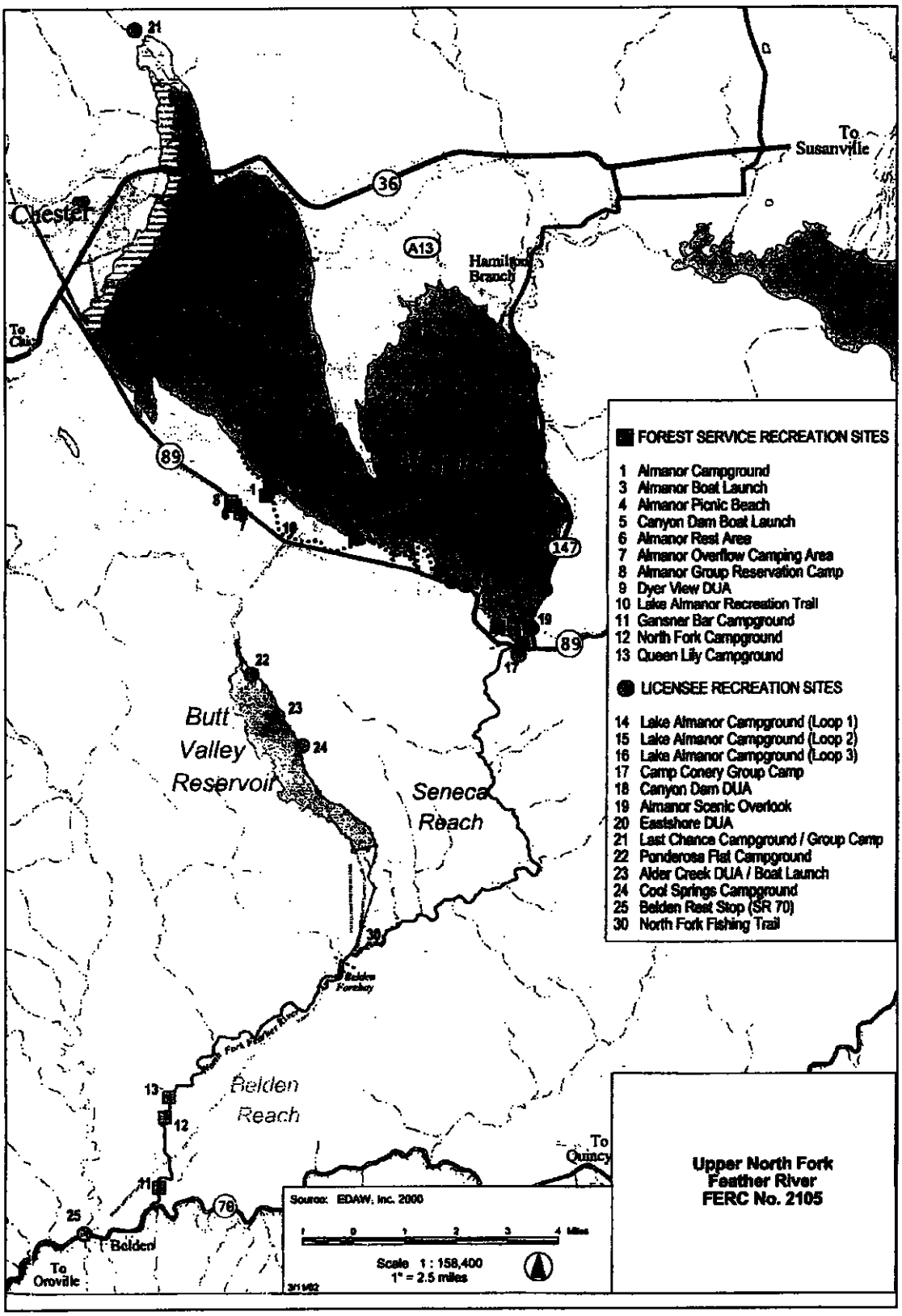

Figure 3-9. PG&E and FS public recreation sites in the UNFFR Project vicinity. (Source: PG&E, 2002a)

The Almanor Rest Area is located approximately 10 miles south of the town of Chester adjacent to SR 89 on NFS land. There are two vault toilets, a paved parking area, a picnic area with seven picnic tables and cooking grills, two interpretive signs, and an informational sign. This facility was constructed by and is operated and maintained by the FS. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor Rest Area are generally in good condition with the exception of the picnic tables and cooking grills, which need some maintenance, and the water faucet and the water pump, which need to be repaired. Through its ADA-accessibility study, PG&E determined that the two vault toilets at this facility are new and ADA-accessible. None of the other elements at this facility are ADA-accessible.

The FS owns and operates a primitive group camping area located on NFS land adjacent to the Almanor Rest Area known as the Almanor Group Reservation Camp. The site contains enough room for approximately 10 sites, each with a picnic table, and fire ring or cooking grill. There are no amenities at the site. Campers use the vault toilets at the adjacent rest area. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the Almanor Group Reservation Camp are generally in good condition with only the picnic tables and fire rings in need of maintenance. The FS plans to relocate the entire facility to a more suitable location away from the highway. Through its ADA-accessibility study, PG&E determined that none of the elements at this facility are ADA-accessible. Group campers may use the two ADA-accessible toilets at the Almanor Rest Area.

An overflow camping area is also adjacent to the Almanor Rest Area along State Route 89. The FS manages this area as overflow for RV and tent camping during peak usage in the Lake Almanor area. There are no developed campsites. Users of the area have constructed 40 fire rings and campers use the two ADA-accessible toilets in the nearby rest area. Through its ADA-accessibility study, PG&E determined that none of the elements at this facility are ADA-accessible.

The Dyer View day-use area is located on NFS land along the west shore of Lake Almanor. The FS operates and maintains this facility which has paved parking, interpretive signs, benches, and a vault toilet. The site provides views of Mount Lassen to the north and Dyer Mountain to the south and functions as a trailhead for the LART and a shoreline beach. Through its recreation facility condition inventory, PG&E determined that all of the facilities at Dyer View day-use area are generally in good condition. Through its ADA-accessibility study, PG&E determined that the new vault toilet at this facility is fully accessible and the access route to the adjacent paved portion of the LART is also accessible. There are no accessible access routes between the parking area and the primary activity areas, or to the accessible trash receptacles. The benches located at this facility are also not ADA-accessible.

The Almanor boat launch is located on the west shore of Lake Almanor adjacent to Almanor campground north on NFS land. The CSUCRF operates and maintains the

facility for the FS under a special-use permit. The facility has two concrete boat launching lanes, a wooden courtesy dock, a large paved area with space for 53 vehicles and trailers, a flush restroom, a single vault toilet, and an accessible picnic table. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor boat launch are in good condition with the exception of the access road and the parking area, which are in need of repair; the ramp, which needs to be resurfaced; and the restroom and courtesy dock, both of which need to be replaced. Through its ADA-accessibility study, PG&E determined that there is an accessible restroom with four flush toilets at this facility and a new accessible vault toilet on the road leading to the boat launch. However, there are no accessible access routes from the parking area to the primary activity areas, or to the accessible trash receptacles. None of the other elements at this facility are ADA-accessible.

Almanor beach is located on the west shore of Lake Almanor adjacent to the Almanor boat launch on NFS lands. The CSUCRF operates and maintains the facility for the FS under a special-use permit. The facility has seven picnic tables, cooking grills, a vault toilet, a flush restroom, and a large swimming beach with a buoy safety line. Through its recreation facility condition inventory, PG&E determined that most of the facilities at Almanor beach are generally in good condition with the exception of the vault toilet, which is in need of some maintenance, and the flush restroom, which is old and is not accessible. Through its ADA-accessibility study, PG&E determined there is one accessible picnic table available at this location; however, it is segregated from the rest of the facility. None of the remaining elements at this facility are ADA-accessible.

The Canyon dam boat launch/day-use area is located on the south end of Lake Almanor on NFS land. O&M of the facility is accomplished by the CSUCRF under a special-use permit from the FS. The facility has two concrete boat launching lanes, five picnic tables with cooking grills, two vault toilets, one flush restroom, and a paved parking area with 13 single vehicle spaces and 51 vehicle with trailer spaces. The site also has a paved ADA accessible trail and fishing pier near the boat launch. Through its recreation facility condition inventory, PG&E determined that some of the facilities at the Canyon dam boat launch/day-use area are in good condition while others are in need of maintenance, including the beach area, the picnic tables, and the parking area. PG&E also determined that the large informational sign at the entrance is in disrepair and should be repaired or replaced. Through its ADA-accessibility study, PG&E determined that the new shoreline fishing station is accessible and meets ADA guidelines and there is one accessible flush restroom. There are three accessible parking spaces provided at this facility but there are no accessible access routes to the picnic tables, barbecues, or the accessible trash receptacles. The water faucets and picnic tables at this facility are not accessible.

PG&E Facilities

PG&E owns and operates the Camp Connery group camp, which is a reservation-only facility located east of Canyon dam and inland from the reservoir approximately 0.25 mile. The group camp can accommodate groups of up to 50 persons and includes five bunkhouses, an indoor/outdoor central group meeting and food service facility, a large campfire area, a paved parking lot, a volleyball court and an area for basketball. RVs are allowed to park in the parking area, but there is no designated RV camping area. Through its recreation facility condition inventory, PG&E determined that all of the developed facilities at Camp Connery group camp are in good condition including the bunkhouses, the group meeting facility, the picnic tables and the restrooms. However, portions of the access road are in need of maintenance. Through its ADA-accessibility study, PG&E determined that none of the elements at this facility are ADA-accessible except for the trash receptacles, which do not have accessible access routes.

PG&E manages the Rocky Point Campground, which was previously known as the Lake Almanor Campground. The public often confused the Lake Almanor Campground with Almanor Campground, which is located just north on Highway 89, so the name was changed in 2003. This facility is located on the west shore of Lake Almanor on PG&E-owned land. The campground is comprised of three loops. Loop One, the northernmost loop, consists of 68 campsites, each with a picnic table, cooking grill, fire ring, paved spurs, a camp cupboard, and tent pads in some cases. Loop One also has 10 overflow campsites. Through its ADA-accessibility study, PG&E determined that four of the campsites in Loop 1 are ADA-accessible, but many of the elements at the four campsites are not actually accessible. All of the toilets in Loop 1 are accessible. The telephone and water faucets are not accessible and there are no accessible access routes to the host's site, the shoreline, the entry sign, the pay station, the camp library box, or to the accessible trash receptacles. Loop Two has 41 campsites with similar amenities as the campsites described for Loop One. Through its ADA-accessibility study, PG&E determined that two of the campsites in Loop 2 are ADA-accessible, but many of the elements at the two campsites are not actually accessible. All of the toilets and one water faucet in Loop 2 are accessible. The telephone is not accessible and there are no accessible access routes to the host's site, the shoreline, the entry sign, the pay station, the camp library box, or to the accessible trash receptacles. Loop Three consists of 22 campsites, with 20 overflow campsites. The LART ends on the south side of Loop Three. Through its ADA-accessibility study, PG&E determined that two of the campsites in Loop 3 are ADA-accessible, but many of the elements at the two campsites are not actually accessible. All of the toilets in Loop 3 are accessible as is one of the water faucets. The telephone is not accessible and there are no accessible access routes to the host's site, the shoreline, the entry sign, the pay stations, the camp library box, or to the accessible trash receptacles. Through its recreation facility condition inventory, PG&E determined that most of the elements at the Rocky Point Campground are generally in

good condition with the exception of many of the older Klamath stoves, which should be replaced.

The upper arm of Lake Almanor transitions from lake to lacustrine wetland and includes the Last Chance Marsh. The Last Chance Campground/group camp, is located on the edge of the Last Chance Marsh and is owned and operated by PG&E. The facility has a family campground area with 12 campsites and a group camping area with 13 campsites. Each campsite has a picnic table, camp cupboard, fire ring, cooking grill, and graveled parking spur. PG&E maintains four vault toilets in two separate buildings at the campground. In addition to the campsites, there are two horseshoe pits at the site. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the Last Chance Campground are generally in good condition with the exception of a few recreation elements within the developed campsites, including several older picnic tables, many of the older Klamath stoves, and some water faucets, only in need of maintenance. PG&E also determined that the playground area was in need of maintenance. Through its ADA-accessibility study, PG&E determined that none of the campsites at this facility are ADA-accessible. The interior design of the existing toilets does not meet draft proposed ADA guidelines, and one restroom does not have an accessible access route, even though signage indicates that they are both accessible. There are also no accessible access routes from the main access gravel roadway to the primary activity areas at this facility.

PG&E owns and operates the East Shore day-use area which is located along the eastern shore of Lake Almanor on PG&E-owned land. PG&E maintains nine picnic tables and two vault toilets. Anglers can access the shoreline via a steep, unmarked trail. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the East Shore day-use area are generally in fair condition with the exception of the picnic tables, which are in need of maintenance, the user-defined shoreline access trail, which is currently undeveloped and eroding, and the existing hand-pumped water spigot, which should be removed or replaced. Through its ADA-accessibility study, PG&E determined that one vault toilet at this facility is fully accessible. There are no accessible access routes from the parking area to the picnic area, or to the accessible trash receptacles. None of the other elements at this facility are ADA-accessible.

PG&E owns and operates the Almanor Scenic Overlook on the east shore of Lake Almanor on PG&E-owned land near Canyon dam. This facility has a paved parking area and two vault toilets. The site offers views of Canyon dam to the south and of Lake Almanor, and formerly provided a view to the north of Mt. Lassen, which has become obscured by vegetation. Through its recreation facility condition inventory, PG&E determined that the parking area at the Almanor scenic overlook is generally in good condition but the vault toilets are in need of maintenance. Through its ADA-accessibility study, PG&E determined that there is one accessible vault toilet at this facility; however,

it does not have an accessible access route. The paved parking area is accessible, but there are no designated accessible spaces.

PG&E owns and operates the Canyon dam day-use area just east of Canyon dam on the north side of SR 89. This facility has 19 picnic tables, cooking grills, an undeveloped swimming beach, two vault toilets, a circular drop-off and parking area, and a separate parking lot further upslope. Through its recreation facility condition inventory, PG&E determined that some facilities at the Canyon dam day-use area are in good condition while others are need of maintenance including the beach area, the picnic tables, and the parking area. PG&E also determined that the large informational sign at the entrance was in disrepair and should be replaced or repaired. Through its ADA-accessibility study, PG&E determined that the two vault toilets at this facility are fully accessible as are two picnic tables, which have a firm and stable access route. There are accessible access routes from the parking area to the primary activity areas. However, there are no accessible access routes to the shoreline, the informational sign at the entrance, or to the accessible trash receptacles. None of the other elements at this facility are ADA-accessible.

Other Facilities

The LART is a paved, 10 foot wide trail that is 9.5 miles long. This multi-use trail is open to walking, hiking, bicycling, and cross county skiing. Motorized use of the trail is not permitted. The trail passes through public and private property, campgrounds and near private residences. Through its recreation facility condition inventory, PG&E determined that most of the recreational elements associated with the LART are in good condition, including the trailheads and parking areas, signs, and bollards. PG&E also determined that the trail surface is in need of maintenance and repair in approximately 20 locations along the trail. Through its ADA-accessibility study, PG&E determined there is no ADA-accessible access route from the trailhead parking areas to the LART, except at the Dyer View day-use area. The LART is paved and generally accessible in most segments; however, in some areas the trail is too steep and does not include rest areas. Additionally, the informational signs at the trailheads do not provide basic accessibility information, such as maximum grade, length, width, maintenance practices, and types of surface materials.

Visitors to Lake Almanor also utilize 22 dispersed undeveloped recreation sites. Visitors at these sites enjoy fishing, relaxing, swimming, sunbathing, and camping. Fires are not permitted by county ordinance except in developed sites. Potable water and restrooms are not provided at any of these sites. These dispersed sites are located on lands owned by a variety of entities including PG&E, the FS, and private entities.

In addition to the public facilities on Lake Almanor, there are 22 privately-owned recreation facilities. These entities provide lodging, tent and RV camping, picnic

facilities, swimming beaches, stores, fishing access, boat launching, and boat slip use/rental.

Butt Valley Reservoir Recreational Facilities. All of the public developed recreation facilities at Butt Valley reservoir are owned and operated by PG&E.

PG&E owns and operates the Ponderosa Flat Campground located on PG&E-owned land at the north end of Butt Valley reservoir. The facility has 61 campsites and an overflow area with 20 campsites. Each campsite has a picnic table, fire ring, cooking grill, camp cupboard, paved spur, and some have tent pads. There are 10 vault toilets at the campground. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the main Ponderosa Flat Campground are in good condition with the exception of the water faucets and several of the older Klamath stoves, which are in need of maintenance. In the less-used overflow area of the campground, PG&E found that the older vault toilets need replacement and several other recreational elements have broken or missing components, structural damage, or are otherwise in obvious disrepair. Through its ADA-accessibility study, PG&E determined that four of the campsites in the main campground are ADA-accessible, but many of the elements at the four campsites are not actually accessible. All of the vault toilets in the main campground area are accessible. The water faucets and the shoreline area are not accessible and there are no accessible access routes to the accessible trash receptacles.

PG&E owns and operates the Cool Springs Campground located on PG&E-owned land on the east shore of Butt Valley reservoir. There are 30 campsites at this campground, each with the same amenities as listed for the Ponderosa Flat Campground. There are eight vault toilets at the site. Through its recreation facility condition inventory, PG&E determined that some of the facilities at the Cool Springs Campground are in good condition while others are in need of maintenance, including the pay station, several of the older Klamath stoves, and the water faucets. Through its ADA-accessibility study, PG&E determined that two of the campsites at this facility are ADA-accessible, but they do not have accessible water faucets. All of the vault toilets at this facility are fully accessible. The water faucets and the shoreline area are not accessible and there are no accessible access routes to the accessible trash receptacles.

PG&E owns and operates the Alder Creek day-use area/boat launch, which is located on PG&E land on the east shore of Butt Valley reservoir. There are three picnic tables, cooking grills, a single boat launching lane and a paved parking area at this site. Guests camping at the Ponderosa Flat campground must launch their boats at the Alder Creek boat launch to access Butt Valley reservoir. Through its recreation facility condition inventory, PG&E determined that most of the facilities at the Alder Creek day-use area/boat launch are in good condition. Through its ADA-accessibility study, PG&E determined that the vault toilet at this facility is accessible. The picnic tables and the shoreline at this facility are not accessible, and there are no accessible access routes to the accessible trash receptacles.

Visitors to Butt Valley reservoir also use three dispersed, undeveloped sites. These undeveloped sites are primarily used by anglers for fishing access. There are no facilities at any of the dispersed recreation sites.

Recreational Use at Project Reservoirs

The primary recreational activities occurring at the project reservoirs during the summer period include: wildlife viewing, picnicking, swimming, canoeing, motorboating, fishing, hiking, backpacking, camping, equestrian use, and sightseeing. During the winter, the primary activities include: snowshoeing, cross-country skiing, ice-skating, and ice-fishing. Since there are no facilities in the project area that have been developed exclusively for winter activities such as groomed trails or commercial ski areas, these activities all take place in a dispersed manner on unplowed roads and trails.

As a part of the FERC Form 80 recreational monitoring process, PG&E estimated that Lake Almanor receives 1,214,000 visits annually and Butt Valley reservoir receives 40,900 visits annually.

Camping

There are three developed campgrounds at Lake Almanor and two developed campgrounds at Butt Valley reservoir. PG&E studied camping use at the public campsites during 2001.

PG&E estimated total annual camping use at Lake Almanor public, developed campsites to be 53,471 recreation days (PG&E, 2001). Recreation day is defined as "each visit by a person to a development for recreational purposes during any portion of a 24 hour period." Table 3-27 includes a breakdown of the numbers by campsite and season. In addition to the total number of camping days, PG&E investigated the number of times that the campgrounds were at or above capacity. On Lake Almanor, PG&E determined that the Last Chance Campground was the only campground that reached capacity; this was noted on two occasions in 2001.

PG&E estimated total camping use in 2001 at Butt Valley reservoir public, developed campsites to be 18,970 recreation days. Table 3-27 includes a breakdown of the numbers by campsite and season. In addition to the total number of camping days, PG&E investigated the number of times that the campgrounds were at or above capacity. On Butt Valley reservoir, PG&E determined that both the Cool Springs campground and the Ponderosa campground reached capacity on eight and two occasions, respectively in 2001.

Table 3-27. Recreation visits to campgrounds at the project reservoirs in 2001. (Source: PG&E, 2002a)

Campground	Total Recreation Days	Percent of visitation during peak season	Number of days at or above capacity
Lake Almanor			
Rocky Point	34,921	80	0
Last Chance Creek	1,693	58	2
Almanor	16,857	79	0
Butt Valley Reservoir			
Cool Springs	4,180	86	8
Ponderosa Flat	14,790	82	2

Boating

Lake Almanor and Butt Valley reservoir offer a variety of boating opportunities. When Lake Almanor is at full pool (4,494 feet PG&E datum), recreationists have access to 27,092 acres of surface water for boating, fishing, swimming, waterskiing, wakeboarding, and personal watercraft use. Boating access to Lake Almanor is provided at public boat ramps, private marinas, and on private land adjacent to the project. PG&E observed boat use on the reservoir during the summer of 2001. PG&E counted the total number of boats on Lake Almanor on 14 days between May 12 and October 13, 2001. PG&E has provided information about the number of boats by type across a number of seasons. Table 3-28 contains information regarding boat use on Lake Almanor.

Table 3-28. Average daily boating use on Lake Almanor between May 12 and October 13, 2001. (Source: PG&E, 2002a)

	Boats At-One-Time					
Season	Powerboat	PWC	Canoe/Kayak	Sailboat	Float-tube	Total
Non-Peak Season	47.8	1.4	2.2	0.2	1.2	52.8
Peak Season	101.7	29.8	5.5	1.5	0.3	138.7
Peak Holiday Season	103	37.3	12.7	4.3	2	159.3

Butt Valley reservoir at full pool, 4,140 feet (PG&E datum) consists of 1,600 acres of surface water for boating, fishing, and swimming. Boating access to Butt Valley reservoir is provided at one public boat ramp located at the Alder Creek Day Use Area. Due to a requirement of the current FERC license, the reservoir contains many stumps, which are more obvious in the shallower upper end of the reservoir. Personal watercraft and water skiing are not allowed on this reservoir due to safety hazards presented by the stumps and posted regulations limit boat speeds on Butt Valley reservoir to 25 miles per hour.

PG&E observed boat use on the reservoir during the summer of 2001. PG&E counted the total number of boats on Butt Valley reservoir on 14 days from May 12 through October 13, 2001. PG&E reported that use of Butt Valley reservoir was low with counts ranging from 1 to 10 boats at one time, with the highest number of boats reported during observations conducted between 4:00 and 7:00 pm.

River Reaches

Recreational Access and Facilities

Table 3-29 contains information about the developed public recreation sites on the Belden and Seneca reaches, and figure 3-9 shows the location of these sites.

Table 3-29. Public recreation sites on UNFFR Project River reaches. (Source: PG&E, 2002a)

Facility	Seneca Reach	Belden Reach
Boat ramps/lanes	None	None
Car-top boat access	None	None
Picnic areas/tables	None	Belden rest stop/4
		Gansner Bar campground/5
Angler access sites	None	Belden rest stop
		North Fork campground
		Queen Lily campground
Trailheads	North Fork fishing trail	Belden rest stop
Campgrounds/campsites or (bunkhouses)		Gansner Bar campground/15
		North Fork campground/21
		Queen Lily campground/12
Swimming areas	None	Ponderosa Flat campground