Chapter 6
Assessment of Cumulative Effects

This chapter describes the likely effects of future nonfederal activities, including future state, tribal, local, or private actions, that are reasonably certain to occur in the project area, in combination with the Restoration Project, on federally listed, covered species. Future federal actions that are unrelated to the Restoration Project are not considered in this chapter because they require separate consultation pursuant to Section 7 of the ESA. Cumulative effects on species not federally listed (including American peregrine falcon, Cooper's hawk, golden eagle, little willow fly catcher, osprey, yellow-breasted chat, northwestern pond turtle, and foothill yellow-legged frog) are described in the draft EIS/EIR (Jones & Stokes 2003a).

Federally listed fish and wildlife that are covered under this ASIP include winter-run Chinook salmon, spring-run Chinook salmon, steelhead, bald eagle, and valley elderberry longhorn beetle. The area for analyzing cumulative effects on covered fish and wildlife (collectively referred to as biological resources in this cumulative effects analysis) was determined to be Tehama and Shasta Counties and the surrounding Battle Creek watershed. The area within these counties and the Battle Creek watershed represent the probable area in which project effects on biological resources could interact with other development and have significant cumulative effects on sensitive biological resources.

Table 6-1 describes nonfederal-related projects in Tehama and Shasta Counties and the Battle Creek watershed that may have significant cumulative effects on sensitive biological resources in combination with implementation of the Restoration Project. The following sections describe cumulative effects on covered fish and wildlife species.

Fish

Cumulative effects on fish and aquatic species associated with the Restoration Project and past, present, or reasonably foreseeable future projects would not occur in the Battle Creek watershed because no other nonfederal projects (including related projects listed in Table 6-1, with exception of the incomplete Lassen Lodge project) would contribute to the cumulative decline of fish species or the degradation of fish habitat in Battle Creek.

Table 6-1. Projects Related to the Battle Creek Salmon and Steelhead Restoration Project that are being Completed in Partnership with Non-Federal Agencies, Including Non-Federal Money

Project, Plan, or Action	Implementing Party	Summary of Activities
Projects That Could Directly Affect or Be Affected by the Restoration Project		
Battle Creek Watershed "Community" Plan	Battle Creek Watershed Conservancy	The Battle Creek Watershed Conservancy was formed in 1997 and was charged with developing a guiding "community" plan that was intended to supplement existing technical plans in the Battle Creek watershed. The plan: ■ identified important factors affecting fish habitat, ■ recommended projects to address these factors, and ■ described a monitoring program to evaluate current conditions and project results. The funding also supported: ■ monthly conservancy meetings, ■ educational tours of restoration sites, ■ development of articles for publication in local newspapers, ■ television coverage of restoration plans and activities, ■ development of public outreach materials and a watershed-wide database listing relevant contact information, and ■ the assembly of a library of published material about the watershed.
Battle Creek Watershed Community Strategy	Battle Creek Watershed Conservancy	The Community Strategy (Paquin-Gilmore 1999) is a long-term plan developed as a response to the Restoration Project. The strategy is the result of extensive public input from many community meetings and emphasizes the restoration of chinook salmon to Battle Creek and the continuation of a healthy, fully functioning watershed in the context of community issues and concerns.
Battle Creek Watershed Assessment Report	Battle Creek Watershed Conservancy	The Watershed Assessment Report is expected to be completed in 2003. It describes the ecological state of the Battle Creek watershed and the historical role it has played in the development of hydroelectric power and fish culture. Because the report contemplates a substantial reallocation of streamflow away from hydroelectric production, including the complete removal of some dams and their appurtenant facilities, it carefully spells out the steps taken to assign species priorities to each stream. It also sets out those physical actions and the monitoring and evaluation needed to achieve and sustain the restoration of salmon and steelhead in Battle Creek.

Table 6-1. Continued

Project, Plan, or Action	Implementing Party	Summary of Activities
Continued Stewardship of Battle Creek	Battle Creek Watershed Conservancy	The Conservancy has also received funding for implementing tasks essential to the stewardship of the Battle Creek watershed. These task are directed to long-term protection of the public investment in the watershed including: ■ implementation of a watershed strategy, ■ development of a workgroup to address upper watershed processes, ■ implementation of fuels management and fire defense improvements, ■ planning and implementation of conservation easements, and ■ control of noxious weeds.
Lassen Lodge Hydropower Project	Rugraw, Inc.	The Lassen Lodge Hydropower Project is a proposed 7,000-kilowatt hydroelectric generating station to be constructed on the western slopes of the Cascade Range near the town of Mineral, an unincorporated community in Tehama County, California. The proposed project is located upstream of South Diversion Dam and above Panther Creek. Anadromous fish migrate as far upstream as Angel Falls, a natural fish passage barrier above Panther Creek on South Fork Battle Creek (Synergics Energy Services, LLC 2002; DFG 2002).
Gravel Removal Agreements	PG&E and DFG	Currently, PG&E, and DFG are working to finalize gravel management agreements that will be included in the final version of the FERC license amendment for the Hydroelectric Project. The gravel management agreements have permitted PG&E to dispose of gravel and sand that has accumulated behind South, Inskip, and Coleman Diversion Dams by placing the materials downstream of the dams. No gravel is to be removed from the floodway of the stream. The intent of these agreements is to mimic natural downstream sediment movement and to enhance the spawning gravel for salmon and steelhead.
Mount Lassen Trout Farms, Inc.	Mount Lassen Trout Farms, Inc.	Mount Lassen Trout Farms, Inc., consists of nine private trout-rearing facilities located within the watershed. This operation rears rainbow and brown trout for stocking in private ponds and lakes throughout California. Although the facilities are located above the anadromous habitats of Battle Creek, some facilities are located near Hydroelectric Project canals. Concern has been expressed about possible disease transmission between the canals and these facilities.
Darrah Springs Hatchery	DFG	Darrah Springs is located on Baldwin Creek, a tributary to mainstem Battle Creek. It is a key hatchery of DFG's inland fisheries program and raises catchable trout for sport fisheries.

Project, Plan, or Action	Implementing Party	Summary of Activities
Projects that Support the Restoration Project Purpose and Need		
Investigation of Anadromous Fish Passage Alternatives in Upper Battle Creek	DWR	The objective of the study was to provide data and acceptable designs for fish passage facilities to restore the use of Battle Creek salmonid habitat. It investigated fish ladders for upstream passage of adult salmon and steelhead and fish screen facilities for downstream passage of juveniles. The resulting engineering report established a baseline from which planning could be conducted to formulate the passage elements of the Restoration Project.
Battle Creek Wildlife Area	DFG	The Battle Creek Wildlife Area contains more than 480 acres of riparian, freshwater marsh, and oak woodland wildlife habitat that were acquired by the Wildlife Conservation Board and are managed by DFG. The wildlife area includes land on both sides of lower Battle Creek and is part of a plan developed to conserve property with outstanding riparian and wetland habitats (DFG 1999).
Tehama Wildlife Area		The Tehama Wildlife Area is located approximately 3 miles south of the town of Paynes Creek and south of the Restoration Project. It includes 46,900 acres of oak woodland, grasslands, and chaparral.
Conservation Easements and Conservation Water Rights	TNC	TNC has established one conservation easement within the Battle Creek watershed and is negotiating with several landowners about possibly acquiring others. TNC hypothesizes that the purchase of conservation easements in a watershed with at-risk native species will help maintain and enhance functional riparian habitat and streambank conditions and will help minimize threats that stem from extensive human impacts, including water use.
Butte, Deer, and Mill Creek Reference Watersheds		Monitoring relevant to adaptive management o f Battle Creek is routinely conducted in the Butte, Deer, and Mill Creek reference watersheds. Population estimates of adult fall-run and spring-run chinook salmon and estimates of juvenile chinook salmon production are generated annually in each of these watershed. Data about fish populations, habitat, and water temperature and quality collected in these reference watershed will be directly compared with similar data from Battle Creek as a means of measuring attainment of several adaptive management objectives.
Potential Future Habitat Improvement Projects in the Battle Creek Watershed		
Battle Creek Spawning Gravel Study and Restoration for Winter-Run and Fall-Run Chinook salmon on Lower Battle Creek	DWR	DWR would like to place spawning-sized gravel in the lower reaches of Battle Creek to double or triple the area available for salmon spawning. Only about 3 miles of the lower part of the creek are available for fall-run chinook salmon spawning. In 1996, as many as 80,000 salmon ascended Battle Creek; however, the Coleman National Fish Hatchery could use only about 11,000. The remaining salmon either spawned in the limited riffle areas on top of other redds or died without spawning.
Gravel Introduction and Natural Barrier Modifications on Baldwin Creek	DFG	This project is in the early planning stages and includes gravel introduction and natural barrier modifications on Baldwin Creek. Specifically, it would provide for the improvement of a partial natural barrier and enhancement of existing spawning gravel supplies on a ¼-mile stretch of Baldwin Creek.

Project, Plan, or Action	Implementing Party	Summary of Activities
Related Sacramento River and Central Valley Projects and Plans		
Upper Sacramento River Fisheries and Riparian Habitat Management Plan		The Upper Sacramento River Fisheries and Riparian Habitat Management Plan (USRFRHAC 1989) singled out Battle Creek as a key watershed for restoration. Goals of this plan will be achieved with the implementation of the Restoration Project and adaptive management process.
Proposed Comprehensive Fisheries Management Plans for the Upper Sacramento River and each of its Tributaries	DFG	The objective of these plans is to take watershed-wide, fisheries management-based views of production potential and population levels of all races of anadromous salmonids in each of the tributaries. Specific goals set for each upper Sacramento River tributary will integrate the production potential of each stream and the main river from a system perspective. Perennial anadromous salmonid-producing tributaries to be addressed in these separate plans include Clear, Cow, Cottonwood, Battle, Deer, Mill, and Antelope Creeks. Other streams that occasionally produce anadromous salmonids in good water years will also be addressed. Questions regarding Battle Creek will be developed during the open planning process.
Restoring Central Valley Streams: A Plan for Action	DFG	*Restoring Central Valley Streams: A Plan for Action* (DFG 1993) focused on the potential of the following actions for restoring winter-run chinook salmon, spring-run chinook salmon, and steelhead to Battle Creek: ■ preparing and implementing a comprehensive restoration plan for anadromous fish in Battle Creek, ■ increasing instream flows, and ■ revising management of the barrier weir at the Coleman National Fish Hatchery. The planning recommendations in this plan for action have already been achieved with the development of the Restoration Plan and the MOU. Implementation of the Restoration Project and adaptive management will meet the goal of increasing instream flows found in the document.
Central Valley Salmon and Steelhead Restoration and Enhancement Plan	DFG	Developed in the early 1990s, the Central Valley Salmon and Steelhead Restoration and Enhancement Plan (DFG 1990a) called for increased instream flows and effective fish screens on Battle Creek. The implementation of the Restoration Project will meet all of the recommendations in this plan specific to Battle Creek.
Steelhead Restoration and Management Plan for California	DFG	The Steelhead Restoration and Management Plan (DFG 1996a) is a follow-up to DFG's *Restoring Central Valley Stream: A Plan for Action*, stemming from the final recommendations of the California Advisory Committee on Salmon and Steelhead Trout. The Restoration Project would implement several of the actions pertaining to the Battle Creek watershed that were identified in the plan for action.
Delta and Sacramento River Operations and Monitoring	Various water users	It is possible that diversions in the Bay-Delta and Sacramento River will continue to harm fish populations from upper Sacramento River tributaries (DFG 1990a). If that happens, salmon and steelhead restoration in Battle Creek could be adversely affected.

Upon implementation of the Restoration Project, steelhead and winter- and spring-run Chinook salmon, species listed under the ESA, are expected to increase substantially in abundance. The increased population abundance of steelhead and winter- and spring-run Chinook salmon associated with the Restoration Project is likely to increase the resistance and resilience of the populations in Battle Creek.

Additional future projects that would be beneficial to anadromous fish include DWR's proposition to place spawning-sized gravel in the lower reaches of Battle Creek to double or triple the area available for salmon spawning. DFG has also proposed enhancing existing spawning gravel supplies on a ¼-mile stretch of Baldwin Creek and improving a partial natural barrier on Baldwin Creek.

In summary, the Restoration Project and past, present, or probable future projects, including those proposed by DWR for Battle Creek and by DFG for Baldwin Creek, would substantially benefit fish populations in the Battle Creek watershed. No additional conservation measures are required beyond those proposed for each potential effect described in Chapter 4 of this ASIP.

Wildlife

Cumulative effects on federally listed wildlife species associated with the Restoration Project and past, present, or reasonably foreseeable future projects would not occur in the Battle Creek watershed because no other projects (including related projects listed in Table 6-1) would contribute to significant cumulative effects on covered wildlife species or their habitats in the Battle Creek watershed, including bald eagle, golden eagle, and valley elderberry longhorn beetle. Other proposed and ongoing projects in the Battle Creek watershed, including the Lassen Lodge Hydropower Project, may have some effect on these species; however, these effects would not result in a significant cumulative decline of covered wildlife species.

This cumulative effects analysis on these resources considered the following factors to determine whether the Restoration Project would result in significant cumulative effects on biological resources:

- historical and currently known distribution of special-status wildlife species within Tehama and Shasta Counties and statewide;
- extent of sensitive biological resources protected on public lands and current known threats to these resources on private lands (e.g., proposed development, current agricultural practices, and land management practices); and
- documented effects associated with approved or pending future projects within Tehama and Shasta Counties and the Battle Creek watershed.

Based on these evaluation criteria, the Restoration Project, in combination with past, present, or reasonably foreseeable future projects, would not have a cumulatively adverse effect on covered wildlife species that are known to occur in the Battle Creek watershed. No additional conservation measures are required beyond those proposed for each potential effect described in Chapter 4 of this ASIP.