APPENDIX B

COORDINATION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846

IN REPLY REFER TO:
HC-COE

June 12, 2001

District Engineer
Corps of Engineers, Sacramento District
ATTN: Chief, Planning Division
1325 J Street
Sacramento, California 95814-2922

Subject: Transmittal of final Fish and Wildlife Coordination Act Report - American River Watershed Investigation, Folsom Dam Outlet Modification Project

Dear Colonel Walsh:

Please find enclosed our Fish and Wildlife Coordination Act (FWCA) report for the proposed Folsom Dam outlet modification project. We previously issued a revised draft FWCA report to evaluate additional elements to allow surcharge up to 474 feet above mean sea level, and an operation to restrict use of the enlarged outlets to 30,000 cubic feet per second (cfs) when inflows are less than 100,000 cfs. Consistent with our recommendation in the revised draft report, the Corps of Engineers has now adopted a modified rule restriction limiting outflows to 60% of inflows when inflows are greater than 25,000 cfs, with maximum releases made when inflows exceed 150,000 cfs. The enclosed report reflects this change, and other information in the recently-published draft Environmental Assessment.

We have informally coordinated with the California Department of Fish and Game and National Marine Fisheries Service (NMFS), and received concurrence from NMFS on the initial draft FWCA report. No other comments were received.

If you have any questions, please contact Dr. Steven Schoenberg of my staff at (916) 414-6564.

Sincerely,

Dale A. Pierce

Dale A. Pierce
Acting Field Supervisor

Enclosure

cc: AES, Portland, OR
COE, Sacramento District, CA (Attn: Patricia Roberson)
NMFS, Santa Rosa, CA (Attn: James Bybee)
NMFS, Sacramento, CA (Attn: Bruce Oppenheim)
CDFG, Director, Sacramento, CA
CDFG, Region II, Rancho Cordova, CA
SAFCA, Sacramento, CA
USBR, Sacramento, CA
USBR, Folsom, CA (Attn: Rod Hall)

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

FISH AND WILDLIFE COORDINATION ACT REPORT

FOR THE

AMERICAN RIVER WATERSHED INVESTIGATION FOLSOM DAM OUTLET MODIFICATION PROJECT, CALIFORNIA

prepared by

Dr. Steven A. Schoenberg
U.S. FISH AND WILDLIFE SERVICE
HABITAT CONSERVATION DIVISION
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prepared for

U.S. ARMY CORPS OF ENGINEERS
SACRAMENTO DISTRICT
SACRAMENTO, CALIFORNIA

May 2001

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SUMMARY

Since construction of Folsom Dam, the lower American River has been subject to progressive grade and gravel loss, affecting the quality of riparian and riverine habitat. Enlargement of the existing outlets has been proposed by the Corps of Engineers (Corps) to increase the level of flood protection by enabling operators to balance outflows with inflows early in the storm hydrograph, and attain a maximum discharge of 115,000 cubic feet per second (cfs) through the enlarged outlets for the 10-year or larger event. This may have some adverse effect on chinook salmon and steelhead through loss of spawning gravels, destruction of redds and associated mortality of eggs or fry, and loss of stream edge riparian habitat. To minimize these impacts, the Corps has proposed to restrict the operation of the enlarged outlets for actual or forecast inflows below 150,000 cfs; in the 25,000-150,000 cfs inflow range, outflows would be limited to 60% of actual or forecast inflow. Relative to existing conditions, this "60% rule" increases the chance of outflows >50,000 cfs (from every 5 years to every 3.6 years), but does not alter the frequency of 115,000 cfs flows. An alternative rule restriction was also studied which would limit outflows to a fixed maximum of 30,000 cfs when inflows are less than 100,000 cfs. This "30,000 cfs rule" would increase the frequency of 115,000 cfs discharges (from every 10 years to every 6 years). In either case, the potential for higher outflows results from the infrequent combination of low creditable storage space in upstream reservoirs and moderate flood events. Other potential changes would involve a slight increase in ramping rates, and a slight reduction in cold water reserves during some spring operations.

The 30,000 cfs rule would likely reduce damage to gravels and redds, but would do so at the expense of possible benefits of variable intermediate range flows (30,000-100,000 cfs) -- seed distribution and support of riparian recruitment on high terraces, gravel replacement from bank deposits, replacement and transport of woody debris and detritus from the floodway to the river, and other functions. If one presumes that intermediate range benefits are related to the frequency distribution of peak outflows, the rule restriction setting outflow to 60% of inflow would overlap the historical operation, and presumably retain any such benefits. The 60% rule also does not alter the frequency of capacity (115,000 cfs) releases. For these reasons, the Fish and Wildlife Service concurs with adoption of the 60% rule.

Other proposed modifications associated with the project would allow surcharge to 474 feet above mean sea level (msl). In combination with the enlarged outlets, this would increase the period of inundation in the surcharge zone (470-474 feet msl) during rare large floods (181-200 year event), but eliminate this inundation during more frequent events (100-175 year event). Such exposure, with or without the project, may result in some loss of vegetation due to wave action or collapse of waterlogged soil. With surcharge, inundation would be less frequent, but of a longer duration. The cumulative inundation period in the surcharge zone would be about 23 hours per century with the project, compared to 9 hours per century without the project.

Based on the limited information available, any impacts associated with the proposed project are expected to be of a moderate and infrequent nature that could be adaptively managed. We recommend a sediment engineering model study be performed and analysis of recent grade and bank erosion surveys be completed to specifically evaluate the impacts that the enlarged outlets

could have on future river bank and gravel bed stability. We also recommend a long-term monitoring program for stream edge erosion, vegetation in the floodway and surcharge area, and spawning gravels be implemented and contingency mitigation actions be agreed to that would ensure no net loss in the quality or quantity of habitat over the life of the project. Such actions may include proactive measures such as biotechnical bank stabilization in areas at special risk and spawning gravel enhancement, as well as reactive measures such as modifying the operations of the outlets during impact-prone scenarios without compromising the flood control purpose of the project. Finally we recommend that, under certain spring conditions, use of the spillway in lieu of the enlarged outlets be evaluated as a measure to limit loss of coldwater reserves.

INTRODUCTION

This is the Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act (FWCA) report for the Corps of Engineers' (Corps) proposed Folsom Dam Modification Project as part of the American River Watershed Investigation, California. Previously, we issued a revised draft FWCA report in January 2001 to evaluate two basic changes: (a) enlargement of the lower dam outlets so as to increase their maximum discharge from 32,000 to 115,000 cubic feet per second (cfs), and (b) various structures to allow surcharge up to 474 feet above mean sea level (msl). Operational changes assumed were: a) a rule restriction that would restrict outflows to a maximum of 30,000 cfs when actual or forecast inflow is less than 100,000 cfs, and b) the emergency spillway release diagram would be revised to sustain a 160,000 cfs release up to 474 feet, rather than the current 470 feet. We also considered additional information on the frequency of inundation of upland habitat due to surcharge, and a previous rule restriction involving a fixed 30,000 cfs release. The National Marine Fisheries Service (NMFS) concurred with the findings of our draft report (Appendix 1); no other comments were received.

Through additional study and coordination with the Service, the Corps has replaced the 30,000 cfs rule restriction with a modified rule restriction that would limit outflows in the 25,000-150,000 cfs range to 60% of the actual or forecast inflow. Very recently developed information includes a draft two-dimensional model on spawning bed movement, and an analysis of the effects of outlet operation on coldwater reserves (Ayres 2001, Corps 2001). This final report incorporates the modified rule restriction as the Corps' preferred plan and this additional recent information, and supersedes our previous report.

BACKGROUND

The lower American River flows about 23 miles from Nimbus Dam to the Sacramento River, primarily through properties developed for residential, light industrial, and urban use. Since completion of Folsom Dam in 1955, several recent storms have led the Corps to revise the probability of flooding due to levee failure along the American River from the original 250-year recurrence to a chance of about 1-in-70 years. In response, the Sacramento Area Flood Control Agency (SAFCA) and U.S. Bureau of Reclamation (USBR) negotiated an interim agreement in 1994 to reoperate Folsom Dam in a way which would limit the likelihood of levee failure and flooding to about 1-in-100 years. This agreement involves increasing the amount of flood control space from the original fixed 400,000 acre-feet (ac-ft) ("fixed 400 TAF") to a variable amount between 400,000 and 670,000 ac-ft based on the availability of flood control space in upstream reservoirs ("variable 400/670 TAF"). As part of this agreement, SAFCA must reimburse USBR for the forgone hydropower and water deliveries as a result of reduced storage.

With the revised flood threat conditions, the capacity of the dam outlets has limited the ability to balance flood control and water storage purposes. Originally, the fixed 400 TAF flood control space meant that inflows exceeding the outlet capacity (32,000 cfs) could be discharged through the spillway up to the safe channel capacity of 115,000 cfs. However, with the enlarged flood control space, these discharges can only be made from the outlets. If inflows exceed 32,000 cfs,

the reservoir must be allowed to fill up to the spillway before a higher rate of discharge can occur. This reduces the time during which the maximum channel capacity can be used, leading to greater peak discharges and a reduced level of flood protection. Under certain situations, such as in 1997, the upstream reservoirs can fill and require that Folsom Lake be evacuated, but the remainder of the year may be drier so that storage that is carried over into the irrigation season is reduced.

A number of alternatives have been proposed and evaluated in the past, involving an array of structural and operational changes. In 1996, we evaluated options to construct a dry detention dam on the North Fork American River near Auburn, a Folsom stepped release plan which included various dam, levee, and floodway elements, and a Folsom modification plan, which involved structural changes of the dam and levees (USFWS 1996). In 1994, we evaluated other options, involving increased storage at either Folsom Reservoir or a new facility on Deer Creek (USFWS 1994a, b). In each case, the structural modifications were linked to operational changes at the existing facility at Folsom Dam.

In this report, we evaluate impacts of a revised Folsom Modification Plan under the existing 400/670 TAF interim operation agreement associated with: (a) structural modification of the existing outlets to allow higher discharges; (b) modification of the emergency spillway, dikes, and Mormon Island dam to allow surcharge up to 474 feet msl; and (c) two possible restriction rules. Other related actions, referred to as "common features", are being considered in a separate FWCA report.

PROPOSED PROJECT

The existing 8 outlets (two tiers at 205.5 and 275.5 feet msl) would be enlarged from the current 5 feet wide by 9 feet high to about 8-10 feet wide and 12-15 feet high. This construction is anticipated to last 5-6 years, and would be staged so that the existing release capacity would not be reduced during the construction period. The nature of the construction would involve precisely-controlled explosives and a seal on the upstream face of the dam so as to allow construction almost entirely in the dry. Staging would occur on barren or previously disturbed upland areas near the site. After completion, the total discharge capacity of the enlarged outlets together with the powerhouse outlets would be around 115,000 cfs at an elevation of 418 feet msl. Although operational criteria at lower inflows may vary, outflow must be 115,000 cfs when inflow is 150,000 cfs (10-year event) or more in order to achieve the desired level of flood protection.

For the purpose of this report, we considered two possible restriction rules for flows less than the 10-year event. In one case, outflow would not exceed 30,000 cfs until the projected or actual inflow equals 100,000 cfs, at which time outflow would be increased to 115,000 cfs ("30,000 cfs rule"). In the other case, outflow in excess of 25,000 cfs would be calculated as 60% of inflows until projected or actual inflows equals 150,000 cfs, at which time outflow would be increased to 115,000 cfs ("60% rule").

The surcharge space would be increased by 48,000 acre-feet by: (a) replacing three emergency spillway gates with Tainter gates, (b) raising the impervious core in Mormon Island dam, and Dikes 5 and 7, with slurry-wall construction, (c) raising penstock gate hoists and their hydraulic pumps, and (d) floodproofing Newcastle powerhouse. This would allow the emergency spillway release diagram to be modified, so that maximum releases of 160,000 cfs (i.e., the probable non-failure point of existing levees) could be maintained before the reservoir reaches 474 feet msl. If reservoir level is above 474 feet msl, dam outflow would be matched to inflow.

FISHERY RESOURCES

LOWER AMERICAN RIVER

There are four important recreational species in the affected study area: fall-run chinook salmon, rainbow trout (including steelhead), American shad, and striped bass. Chinook salmon are an anadromous species which enter the river in early summer, with peak abundance typically in mid-October. Although the escapement fluctuates between 10,000 and 90,000 adult fish, recent years have been particularly strong and consistent, with at least 50,000 adults returning to the river since 1995. A hatchery near the base of Nimbus Dam, which re-regulates flows from Folsom Dam, supplements the escapement by about 10,000 adults annually. The American River is one of the most important producers of fall-run chinook salmon in California, similar in magnitude to runs on the Feather River and to the hatchery on Battle Creek. On the lower American River, chinook salmon spawn almost exclusively in the upper 10 miles below Nimbus Dam, and mostly in the upper 5 miles, but recreational fishing effort spans the full river to the mouth at the peak of the run. Spawning activity peaks around mid-November in the American River. After hatching, the fry typically remain in the gravel for 6-8 weeks, emerging in mid-February through early March, and then rear in the river for several more months before migrating out to the ocean in late spring. Habitat concerns include sub-optimal flows and water temperature (in some years), a limited area of suitable spawning gravel, and various components of rearing habitat (in- and over-water object cover, run-riffle-pool composition).

Steelhead are the anadromous form of rainbow trout: adults generally enter and spawn in the American River in late winter (January through April), with the fry emerging from the gravel in 6-8 weeks, and the young remaining in the river for at least a year before moving out to the ocean. Steelhead spawning takes place on smaller gravels and is more widely distributed than is seen for chinook salmon, and may be observed anywhere from Cal Expo to Sailor Bar. As is the case throughout the Central Valley, steelhead have declined on the American River. The long rearing period renders this species particularly sensitive to high water temperatures in the summer and early fall, but they may also be affected by other habitat features such as limited availability of cover and spawning gravel. Despite the recent Federal listing of steelhead, some catch-and-release and limited sportfishing harvest (of hatchery-origin fish) is allowed on the American River. As with chinook salmon, the Nimbus Hatchery also produces steelhead trout for release into the Sacramento River. In the summer and fall of some low carryover storage years, coldwater reserves become depleted and temperatures in the American River exceed the tolerance of

ıead juveniles. As a result, the hatchery contribution in this river is larger for steelhead than ıinook salmon.

ıtroduced species, striped bass are distributed somewhat lower in the American River than ıe salmonids, generally from about the Sunrise Boulevard crossing downstream to the mouth. ; is known about its life history in the American River; it may be that there is a spring run that ıates downstream from the Sacramento River and Sacramento-San Joaquin Delta, or these ıay seasonally enter the mouth of the river to forage after having spawned upstream in the ıstem Sacramento and Feather Rivers (Rich DeHaven, U.S. Fish and Wildlife Service, ınal communication). In any case, water temperatures in the American River are often too for typical striped bass spawning at the time of these runs, and the American River is not ın as a major spawning area for this species. Recreational effort for striped bass is greatest g the spring, where some very large specimens are caught by both bait and fly fishermen, and e fishing effort can continue through early fall in some years. Striped bass are not generally in the winter months in the American River.

ıican shad is another introduced species that supports a popular catch-and-release ational fishery. These fish migrate from the Pacific Ocean into the American River in late g to early summer, apparently timed by rising water temperature. At the peak of the runs, reds of fishermen can be seen from Nimbus Dam downstream to Paradise Beach, bank and ıoat fishing for the shad using small, colorful, weighted flies or darts.

ımber of other non-game species also occur in the lower American River, such as the ımento pike minnow, Sacramento sucker, tule perch, and hardhead. The federally listed tened Sacramento splittail, which spawns beginning mid-winter, has also been found in very ıumbers in the most downstream areas of the American River, generally below the H Street e (6.5 miles from the mouth). During its spawning migration, the federally listed threatened smelt has been found on the Sacramento River as far upstream as Verona (near its uence with the Feather River). Typically, delta smelt spawn farther downstream in more y-influenced areas, with an upstream limit around Clarksburg.

American River may be divided into geomorphically-distinct reaches that differ in gradient, influence, depth, substrate and bar formation; differences which are major determinants in the and quality of habitat to fish (Snider et al. 1992). The initial 4.9 miles from the mouth to just v Paradise Beach Recreation Area is tidally-influenced, deep (due to previous dredging), and ısses a sand bottom with few gravel bars. The deep holes are used as holding water for adult ın, and the flooded adjacent lands may be used by splittail, however, this area is not likely to fluenced by the flow differences caused by the proposed project because of the more rtant effect of tides and stage of the Sacramento River. The 6.7 mile portion from Paradise h to the Gristmill Recreation Area has a few more bars, is similar in gradient and substrate to rst reach, but is not tidally influenced. As a consequence, flow fluctuations in the range of) to 22,000 cfs cause commensurate increases in the area of potential splittail habitat CA 1999). From Gristmill to Nimbus Dam, the river is high gradient with a gravel bed ıel. It is here, especially from Rossmoor Bar upstream, that the great majority of salmon

spawning occurs in several important glide and bar complexes. Although it is known that flow increases in the low range (500-2,000 cfs) increase spawning habitat and success (via reduced superimposition, *see* Snider et al. 1996), the effect of flows in the range of those caused by the dam modifications has not been studied.

FOLSOM RESERVOIR

When full (i.e., around 1 million ac-ft), Folsom Lake encompasses about 10,000 surface acres of water and 75 miles of shoreline, extending about 15 miles up the north fork and 10.5 miles up the south fork of the American River. It supports a "two-stage" fishery: with warmwater species such as bass (largemouth, smallmouth, and spotted) and panfish (crappie, bluegill, sunfish) in the upper waters, and trout and landlocked salmon (kokanee and chinook) in the deeper waters. Various common catfish can also be caught near the bottom of shallower waters. Fish habitat is present within the inundation zone in the forms of young willow riparian which grows during extended periods of drought, as well as brush piles placed there by the California Department of Fish and Game (CDFG) and sportsmen groups. Both warmwater and coldwater fisheries tend to benefit from increased peak spring water storage as this results in better coldwater reserves for the salmonid fishes as well as increased spawning and rearing area for warmwater fish. A number of fishing derbies are held on Folsom Lake, however, overall boating is greatly affected by lake level. Boats docked at the marinas must be removed for the flood season when the lake level falls below about 412 feet msl (465,000 ac-ft storage) and ramps begin to go out of service when the lake level falls below 426 feet msl (579,000 ac-ft storage), although there is one ramp at 370 feet msl (213,000 ac-ft storage) that would presumably be available under all conditions.

VEGETATION

LOWER AMERICAN RIVER

The vegetation along the river consists of oak species and elderberry at higher elevations of the floodway, and cottonwoods and willows at lower elevations of both the floodway, as well as on gravel bars and islands within the river channel. Regeneration and persistence of the cottonwood-dominated community is limited, relying on inundation-dependent germination of seeds (~5,000-13,000 cfs is necessary to inundate most low terraces and up to 50,000 cfs is needed to cover high terraces). Portions of the floodway have been developed for recreation of various kinds (bike paths, picnic lawns and kiosks), and there are some areas that are bare -- gravel bars, gravel piles remaining from former hydraulic mining of gold, and actively eroding bank. Although the immediate edge of the river is mostly vegetated with riparian trees or scrub, the character is more variable along the floodway bench. Much of the bench vegetation is non-native annual grassland and spotty riparian or scrub. In general, the vegetation at the river margin can be classified as relatively mature, but unlikely to be self-sustaining because the riverbed has been downcut so much that hydric species like cottonwoods now rest on high banks well above their normal position near the low-water edge. Patches of wetland vegetation occur in backwaters and off river ponds throughout the river, though predominantly downstream of Watt Avenue.

FOLSOM RESERVOIR

The area around Folsom Reservoir itself possesses common plant communities like chaparral, non-native annual grassland, oak woodland and savanna, with more limited riparian forest and willow scrub around various feeder creeks and farther up the forks of the American River. There is very little vegetation at all within the fluctuation zone of the lake, except for some willows which temporarily established in the early 1990s by the end of a 6-year, region-wide, drought period.

The plant community of the 157-acre proposed surcharge area (i.e., lands within 470-474 feet msl) was surveyed by boat by a Corps consultant on August 10, 2000 (Jones and Stokes Associates, Sacramento). The area was dominated by oak woodland (105 acres), with lesser areas of grassland (20 acres), chaparral (14 acres), riparian scrub (13 acres) and oak savannah (5 acres).

WILDLIFE

LOWER AMERICAN RIVER

Some of the more common larger mammals are striped skunk, raccoon, and mule deer, however others including the mountain lion, coyote, and gray fox could be present in low numbers, or at least might migrate into the area in some seasons or years. Various small mammals such as California voles, pocket gophers, and bats are abundant. Raptor species and others such as the great blue heron, wood duck, owls, and woodpeckers either build nests or use cavities in the larger cottonwood trees. Various water birds also use the backwaters and marshy areas in certain locations along the lower river, while swallows forage on emerging aquatic insects above the river. Reptiles, particularly rattlesnake, gopher snake, western pond turtle, and western fence lizard can be commonly seen in the parkway. Some of the more common amphibians are western toad, Pacific tree frog, and bullfrog. The federally listed threatened valley elderberry longhorn beetle has been documented in the project area, which includes critical habitat for this species near Cal Expo. Also, one shrub in the surcharge zone has evidence of beetle occupation (exit holes).

FOLSOM RESERVOIR

The wildlife around Folsom Reservoir are similar to that just described for the lower American River, however, the importance of wildlife associations with chaparral, grassland, and oak woodland habitats increases and those of riparian habitats declines. The co-occurrence of oaks and elderberries provides a forage base and/or nesting habitat for a variety of species: quail, turkey, woodpeckers, scrub jay, as well as mammals such as gray squirrel and mule deer. An even wider array of insectivorous birds forage in the oak canopy. Other species are dependent on chaparral, such as wrentit and California thrasher. Grasslands are used by various small mammal and lizard species, many of which provide a prey base for red-tailed hawk, gray fox, and bobcat. Yet more species occur near the water in association with the limited willow habitat, including yellow warbler, belted kingfisher, Pacific treefrog, raccoon, and striped skunk.