Exhibit B

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

DEC 14 1998

Colonel Dorothy F. Klasse
District Engineer
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814-2922

Dear Colonel Klasse:

Thank you for your August 26, 1998, letter requesting concurrence under section 7 of the Endangered Species Act that the Napa River Flood Reduction Project is not likely to adversely affect steelhead.

My staff worked closely with you, other agencies, the citizens of Napa, and many other stakeholders to develop this project, which is an exemplary, visionary approach towards flood management. Unlike a typical flood control project, which relies almost exclusively on channelization, levee-building, and other engineering features that remove natural habitat, this project provides protection to the city and county of Napa through minimal channel modifications, floodwalls, floodplain restoration, and wetland creation, retaining and/or enhancing the natural characteristics of the river wherever feasible. I strongly support this project and commend you and your staff for your excellent work.

Even though this project is designed to protect and restore habitat and is not expected to result in any long-term loss of habitat, there are some unavoidable, short-term impacts related to construction of this project that may result in incidental take of steelhead. The attached non-jeopardy biological opinion therefore includes an incidental take statement which authorizes unavoidable incidental take of this species.

This concludes section 7(a)(2) consultation for the threatened Central California coast steelhead ESU. Should project plans change, or if additional information on the species becomes available, this determination may be reconsidered.

I look forward to working with you as this project is implemented and monitored. The coalition that was brought together to conceive this new project will need to continue to work together in order to ensure that this project is properly managed over the long-term. If you have any questions, please contact Mr. Miles Croom of my staff at (707) 575-6068.

Sincerely,

Rodney R McInnis

for William T. Hogarth, Ph.D.
Regional Administrator

Enclosure

Endangered Species Act

Section 7 ***Consultation- Biological opinion***

Agency: U.S. Army Corps of Engineers

Activity: Construct the Napa River/Napa Creek Flood Protection Project, which aims to provide flood protection by reconnecting the Napa River to its flood plain, creating wetlands through the area, maintaining fish and wildlife habitats, and retaining the natural characteristics of the river. It would provide most of the City of Napa between Trancas Street and Imola Avenue with a 100-year level of flood protection.

Consultation Conducted By:
National Marine Fisheries Service Southwest Region, Habitat Conservation Division Northern California Habitat Team

Date Issued: DEC 14 10

Background/Proposed Activity (Cozms, 1998)

The primary purpose of the Napa River/Napa Creek Flood Protection Project is to provide an economically feasible and environmentally sensitive method to protect the city and county of Napa from periodic flooding, up to the computed 100-year flood event in most of the city of Napa. No less than 27 significant floods have occurred in the city and county of Napa since 1862, including major floods in 1955 and 1986. In 1986, three people died, approximately 7,000 people were evacuated, 245 homes and 120 businesses were damaged, and 25,000 people were without electricity for several days. Napa County estimates that it sustained over $100 million in property damage in the 1986 flood. Additional flooding in 1995 and 1997 caused significant flood damage and community disruption.

The current project was authorized as a federal project by the Flood Control Act of 1965, P.L. 89-298. The first project design, developed in 1970, met with considerable resistance from local citizens and was substantially altered to alleviate ***concerns regarding*** aesthetics, recreation, and river access.

The **design proposal was modified** further in **1975, and a federal Environmental Impact** Statement was approved for the project. The 1975 proposal consisted of channel straightening, widening, and deepening. The existing oxbow was to be eliminated entirely, and most river banks were to be lined with riprap. This **project was** defeated in local referendums in 1976 and 1977.

In 1987 the project was reactivated in response to the impacts of the 1986 flood. A first Draft Supplemental General Design Memorandum and Draft Supplemental Environmental Impact Statement were released for public comment in April 1995. The 1995 proposal relied primarily on channel deepening and widening as a means of flood control, and also incorporated a "wet" bypass that would divert the Napa River from the downtown'oxbow at all times. The 1995 proposal generated numerous comments from both citizens and resource protection agencies, including the U.S. Department of the Interior, National Marine Fisheries Service, California Department of Fish and Game, California Regional Water Quality Control Board, and California State Lands Commission. NMFS' concerns for fisheries included potential project impacts to riparian habitat, water quality (salinity and oxygen content), rearing habitat, sediment loads, instream temperatures, dredging and dredge disposal problems, and fish passage. NMFS was particularly concerned with potential impacts to Central California coast steelhead, which at the time was under consideration for listing under the federal Endangered Species Act (ESA).

Because of the large amount of public and agency concern regarding the 1995 proposal, a collaborative process was initiated with the local community and resource agencies to refine and re-design the flood management project. The Community Coalition, with the assistance of outside consultants, resource agencies, city/county 'Staff, and the Corps of Engineers, developed the major concepts in the current preferred alternative to meet the dual objectives of flood damage reduction and environmental protection/enhancement. The Community Coalition process has been one of unprecedented cooperation among a large number of stakeholders and agencies, and has resulted in a preferred project that en30Ys widespread agency and public support.

At one time, the Napa River supported a **dense riparian forest,** provided significant wetland habitats **alongside the river,** and included significant spawning areas for fish **such as salmon** and steelhead. However, the pressures of urbanization, agriculture, and grazing have degraded these habitats and the quality of the natural environment around the river.

The Community Coalition agreed to pursue a "living river" strategy. As defined by the Coalition, a living Napa River would consist of a system with structure, function, and diversity. It would have physical, chemical, and biological components that function together to produce complex, diverse communities of people, plants, and animals. A living Napa River would function properly when it conveys variable flows and stores water in 'the floodplain, balances sediment input with sediment transport, provides good quality fish and wildlife habitat, maintains good water -quality, provides water supply, recreation, and aesthetic values, and generally enhances the human environment.

The Coalition's living river strategy was founded upon a recognition of the natural processes and characteristics of the river itself, following the principles of fluvial geomorphology:

- maintain the natural slope of the river- the slope should not be altered significantly by dredging or straightening; maintain the natural width of the river; maintain the natural width/depth ratio of the river;
- maintain or restore the connection of the river to its floodplain; allow the river to meander as much as possible;
- maintain channel features such as mudflats, shallows, sandbars, and a naturally uneven bottom; and
- maintain a continuous fish and riparian corridor along the river.

The proposed project has been developed to respond to the need to provide flood protection while restoring the habitat value of the

Napa River. The proposed project **differs markedly from previously identified project alternatives, which were more** traditional flood control projects. The **proposed** project includes the following:

Dike lowering or removal south of Imola Avenue, which will allow the Napa River to flow in a wider area, thereby increasing conveyance capacity and reducing upstream water surface elevations.

Channel modifications to create flood terraces, which will create additional flood capacity along the river and lower water surface elevations, while also providing valuable wetland and upland habitat. Channel widening has been proposed as an alternative to the previously proposed channel deepening.

Develop ment of a "dry" bypass channel to bridge the Napa River Oxbow. This bypass will allow low water flows to remain in the oxbow, thereby maintaining the oxbow's natural characteristics, but it will divert flood flows out of the oxbow and on a more direct route through Central Napa.

New dikes, levees, and floodwalls will be constructed in certain areas to help contain 100-year flood flows.

Pump stations will remove water from behind floodwalls and levees, and pump the water back to the Napa River.

A number of bridges in downtown Napa will be replaced with bridges designed to have higher clearances that better pass flood flows.

The preferred alternative would be implemented along approximately 6.9 miles of the Napa River, from the Highway 29/121 bridge near Horshoe Bend north to Trancas Street.

Additionally, the preferred alternative includes approximately 0.66 miles of channel modification on Napa Creek between the Napa River and Jefferson Street. Flood management features proposed on Napa Creek include-installation of a dry bypass culvert between Jefferson and Seminary Streets, creation of a flood terrace through one-side overbank excavation between Seminary and

Clinton Streets, installation of a new dry bypass culvert between Pearl and Main Streets, bank erosion control, and removal of several existing bridges.

The project also includes one grade control structure on Napa Creek. To prevent stream degradation upstream of the project on Napa Creek, a grade control structure would be installed just below Jefferson Street. The structure would be designed so that it is not a barrier to fish passage (with review and approval by NMFS fish passage engineers) and it would have the appearance of a pool and riffle environment. Large boulders and rootwads would be incorporated into the design to improve aquatic habitat values in the grade control structure's footprint area.

Finally, the preferred project will lead to implementation of the conceptual Napa River Enhancement Plan, which will be funded and cost-shared separately from the flood protection project. The Enhancement Plan would restore physical processes and enhance ecologic functions in the South Wetlands Opportunity Area, which extends from the Newport North Marina to the Highway 29 bridge on the west side of the river. The Enhancement Plan calls for restoring 282 acres of intertidal marsh; 219 acres of high marsh; 350 acres of upland in historic alluvial floodplains; and restoring or preserving 176 acres of seasonal wetlands.

Listed Species and Critical Habitat

For general background information on the status of the threatened Central California coast steelhead, please refer to Attachment 1.

Central California coast steelhead primarily use the lower Napa River as a migration corridor from December to May to reach spawning and rearing grounds in Tulocay, Napa, Redwood, Miiliken, Dry, and Bell Canyon creeks (Corps, 1998). Napa Creek can provide year-round rearing conditions for juvenile steelhead, but there are no spawning areas within the project area. Steelhead are not normally found in the Napa River from June through November. The total steelhead population in the Napa River watershed system has declined from historical estimates of 6,000 annual spawners to current estimates of a few hundred annual adult spawners (USFWS, 1997).

Historically, large runs of coho salmon also utilized the Napa River watershed system. Coho salmon, now listed as threatened throughout their range in California, have been extirpated from the Napa system (USFWS, 1997).

Juvenile chinook salmon runs may use the estuarine portions of the lower Napa River for rearing during their outmigration period, but are expected to remain below the project area. Therefore, this project is not expected to affect any listed or proposed chinook salmon runs, including the endangered winter-run chinook salmon, the proposed-threatened Southern Oregon/California Coastal fall-run chinook salmon ESU, the proposed-endangered Central Valley spring-run chinook salmon, or the proposed-threatened Central Valley fall/late-fall chinook salmon. Threatened Central Valley steelhead are also not expected to move upstream beyond the lower, estuarine portions of the Napa River.

Assessment of Impacts

Direct impacts can be divided into three categories: construction-related impacts, short-term habitat impacts (before mitigation), and long-term habitat impacts (post-mitigation). Construction-related impacts potentially include 1) turbidity/sedimentation impacts, 2) displacement and disturbance of rearing animals in construction zones, and 3) other water quality impacts, such as fuel spills from construction equipment. Habitat components important to steelhead which are potentially affected by this project over the short-term and long-term include instream aquatic habitat (pools/riffles/fish passage), tidal marsh, tidal mudflats, and shaded riverine aquatic cover (that portion of riparian habitat along the stream that directly affects the live stream ecosystem).

Construction-Related Impacts Steelhead may avoid utilization of areas affected by increased turbidity during construction. To avoid this impact, in-water construction in the Napa River and Napa Creek will be limited to between June 1 and October 15. Silt curtains will be deployed around areas of bridge removal, bridge construction, and construction of culvert inlets and outlets to minimize the dispersion of suspended sediment. During the construction period, it is likely that juvenile steelhead would only be found in the Napa Creek portion of the project. The turbidity management measures should minimize impacts to rearing juveniles in construction areas; however, it may be prudent to capture and relocate juvenile steelhead that are in areas which will be significantly disturbed by construction activities.

Instream Aauatic Habitat Impacts Juvenile steelhead could potentially be stranded in the dry bypass or Napa Creek bypass after a flood event. Fish passage could be affected by the instream grade control structure on Napa Creek. Final design of the bypasses and grade control structure will be reviewed and approved by NMFS to ensure that the all designs are adequate to minimize the risk of fish stranding and allow for fish passage under seasonal streamflow patterns.

Short-Term and Long-Term Habitat Impacts Construction of the project will result in initial losses of riparian habitat, shaded riverine aquatic cover (SRA) , emergent marsh, and other habitat elements that may contribute to steelhead rearing habitat. Habitat impacts before and after mitigation, excluding habitat creation associated with the Napa River Enhancement Plan are summarized in the following table, (Corps, 1998):

Habitat Type	**Acres Impacted**	**Acres Created**	**Net Change in Acres**
Riparian Forest above oxbow	1.92	1.56	-0.3
Riparian forest below oxbow	2.55	15.15	+12.6
Riparian forest Napa Creek	0.97	0.97	0.00
Riparian scrub-shrub	1.80	10.68	+8.88
Low Value Woodlands	11.24	0.00	-11.24
High Value Woodlands	0.99	11.07	+10.08
Brackish emergent marsh	7.32	31.43	+24.11
Seasonal wetlands	44.18	45.00	+0.82
Tidal mudflats	0.61	27.50	+26.89
Shaded Riverine Aquatic Cover	0.19	2.57	+2.38

Table 1. Post -construction and post-mitigation habitat impacts, from Corps (1998), page 3.4-27, excluding the habitat created by the Napa River Enhancement Plan.

As can be seen from the above table, there should be a net increase in habitat values for steelhead over the life of the project. The Napa River Enhancement Plan would create an additional 110.9 acres of high-value woodlands, and an additional 104.3 acres of brackish emergent marsh.

However, there could be short-term impacts during the period after original loss of habitat from project constructiony and before the establishment of mitigation plantings.

Concern regarding the degradation of anadromous fish habitat as a result of shade losses from limited tree removal and grading on the north bank of Napa Creek prompted modeling to determine pote ntial thermal impacts (Corps, 1998) . Results of the shade simulation model indicate that construction of a flood terrace along the north bank, and removal of all north bank vegetation, will reduce total stream shading from 25 to 3016.

These assumptions are more extreme than **the conditions proposed** under the project, which would retain **some trees and provide** for replanting of trees between the proposed bank and terrace. Approximately 2 acres of riparian vegetation will be planted to compensate for the loss of approximately % acre of non-native riparian loss between Seminary and Pearl streets. A riparian strip will be established along the terrace to provide shading for the low flow channel, and existing vegetation below the streambank terrace will be left in place. A new riparian strip, three feet in width, will be planted on the excavated terrace. The combination of existing vegetation and newly planted vegetation should result 'in a . riparian strip with a combined width of 9 to 14 feet, depending on existing bank slopes.

However, even with these worst-case assumptions, the model analysis determined that implementation of the north streambank flood "terrace would not have a significant effect on stream temperatures (Corps, 199 8b) . The Corps will provide status reports of planted vegetation growth during the 3-year vegetation establishment period (Corps, 1998b).

Napa Creek has limited water conveyance capacity; even after project construction, large woody debris that could form log jams will be removed from the channel to avoid loss of flood conveyance. However, the project proposal states that smaller woody debris will be left in the channel (Corps, 1998b).

Disturbance of bank habitat could promote rapid colonization by non-native invasive plant species, such as Arundo donax. However, the project includes preparation of a detailed Vegetation Establishment and Monitoring Plan (VEMP). The VEMP will restrict all plantings to native species; define site preparation and revegetation procedures, planting design, implementation schedule, and funding sources to ensure long-term management of the overall wetland and riparian revegeta tion effort; and provide for the initial and future control of invasive exotics during monitoring of the revegetation effort; and include performance criteria, survival rates, establishment rates and periods, long-term objectives, and contingency measures if performance standards and mitigation objectives are not met (Corps, 1998) .

The project includes bank **stabilization near bridges, culvert and bypass entrances/exits** from the live channel, in the Napa River oxbow, and at other high-energy locations subject to active erosion. Riprap rock protection will be utilized in the areas with the highest expected erosion potential. However, the project designers are committed to using biotechnical methods to the extent feasible (Corps 1998b). Riparian pole plantings will be installed in riprapped areas at bypass culvert exits (Corps 1998b). Even with the expected riprap installations, the project is expected to result in a net increase in habitat as detailed in Table 1 above.

Over the long-term, the dramatic increases in tidal mudflats and brackish emergent marsh from habitat restoration activities should increase the available rearing habitat and food supply for steelhead.

Cumulative Effects Most actions affecting steelhead or their habitat within the mean high water line of the Napa River and its major tributaries should be subject to federal section 7 consultation with.the Corps of Engineers prior to issuance of a Section 404 Clean Water Act permit. This includes new dredging, maintenance dredging of the Napa River navigation channel, fill activities, dock construction, and shoreline repair/revetment activities. New point discharges would be subject to regulation under the Environmental Protection Agency's NPDES permit program, and would therefore also be subject to section 7 consultation.

New, non-federal actions which are reasonably certain to occur in the action area during the term of this biological opinion, and which do not fall under section 7 consultation through either EPA or the Corps of Engineers include small-scale modifications to local infrastructure, such as new housing developments, minor changes to local water'project operations, and minor changes to sewage treatment operations. None of these actions are expected to result in significant adverse impacts to Central California Coast steelhead within the Napa River watershed system. Nor are these actions expected to significantly degrade the existing environmental baseline.

Environmental Baseline

Central California coast steelhead primarily use the lower Napa River as a migration corridor from December to May to reach spawning and rearing grounds in Tulocay, **Napa, Redwood, Miiliken, Dry,** and Bell Canyon creeks (Corps, 1998). **Napa Creek can** provide year-round rearing conditions for juvenile steelhead, but there are no spawning areas within the project area. Steelhead are not normally found in the Napa River from June through November. The total steelhead population in the Napa River watershed system has declined from historical estimates of 6,000 annual spawners to current estimates of a few hundred annual adult spawners (USFWS, 1997).

The causes of this decline are described in Attachment 1. In general, riparian habitat loss and degradation, water quality degradation (from agricultural and urban development), construction of dams in spawning tributaries (e.g. Milliken Reservoir, Conn Dam, Rector Reservoir, Kimball Canyon Dam, Bell Canyon Reservoir), culverts and other barriers, and water diversions have contributed to the decline of steelhead production in the Napa River watershed.

No data are currently available to quantitatively assess the extent to which these impacts have increased or decreased within the Napa River watershed, or in other watersheds of the ESU, since the original listing of the ESU in 1997. In general, it is believed that these activities have probably resulted in limited additional cumulative impacts to steelhead and their habitat since the original listing, but that steelhead populations are at levels similar to those that occurred at the time of the listing. Some of these impacts may have been partially offset by various activities, such as the restoration of tidal wetland habitat in northern San Pablo Bay. Also, local steelhead populations may have recovered slightly since the end of the early-1990's drought.

Conclusion

Based on the best available scientific and commercial information and the analysis in this opinion, NMFS concludes that implementation of the Napa River/Napa Creek Flood Reduction Project is not likely to jeopardize the continued existence of the threatened Central California Coast steelhead ESU. Adverse effects are expected to be limited to short-term construction-related impacts and initial habitat losses. Incidental take of steelhead is expected to be limited to displacement, relocation, and de minimis incidental mortality of juvenile steelhead from construction areas in Napa **Creek during the construction period.** However, the Napa Creek construction area constitutes a small fraction of available rearing habitat within the watershed system. over the long-term, the project should result in a net increase in available habitat for the ESU within the Napa River watershed system, thereby contributing to recovery of the ESU.

,Conservation Recommendations

section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. These "conservation recommendations" include discretionary measures that the Corps of Engineers can take to minimize or avoid adverse effects of a proposed action on a listed species or critical habitat or regarding the development of information. In addition to the terms and conditions in the incidental Take Statement, NMFS provides the following conservation recommendations that would reduce or avoid adverse impacts to steelhead:

(1) The Corps and local project sponsors should use biotechnical bank stabilization methods on an aggressive, adaptive management basis. Experienced consultants and designers should be used to develop biotechnical designs on a location-specific basis. Potential methods include cabling of logs and rootwads, cribwalls, planted gabion terraces, and other "fish-friendly" designs (Riley, 1998) . If these approaches fail, then more traditional bank stabilization methods, such as riprap, can be considered on an adaptive management basis. However, riparian features should be incorporated into all bank stabilization designs to the maximum extent feasible, such as for projects proposed by the Corps on the Lower American River (USFWS, 1998).

(2) Prior to construction in the Napa Creek project reaches, the Corps of Engineers should conduct juvenile steelhead surveys in the project area to determine their location in rearing pools and riffles. Juvenile steelhead rearing in areas that cannot be adequately protected by turbidity control measures and other impact minimization measures should be relocated to other suitable rearing habitat before construction.

(3) The Corps of Engineers and **other project partners and** stakeholders should develop and implement a fish and wildlife population monitoring plan to assess the short-term impacts and long-term benefits of the project's habitat enhancements to fish and wildlife populations.

(4) The Corps of Engineers should provide technical and financial assistance to help ensure successful implementation of the Napa River Enhancement Plan. Specifically, the additional 104.3 acres of brackish emergent marsh that would be restored by the Enhancement Plan would provide a significant benefit to Central California coast steelhead.

Reinitiation of Consultation

Reinit-iation of formal consultation is required if (1) the amount or extent of incidental taking in any incidental take statement is exceeded; (2) new information reveals effects of the action may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

Incidental Take Statement

Section 7 (b) (4) of the ESA provides for the issuance of an incidental take statement for the agency action if the biological opinion concludes that the proposed action is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of critical habitat. In such a situation, NMFS will issue an incidental take statement specifying the impact of any incidental taking of endangered or threatened species, providing for reasonable and prudent measures that are necessary to minimize impacts, and setting forth the terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures. Incidental takings resulting from the agency action, including incidental takings caused by activities authorized by the agency, are authorized under the incidental take statement only if those takings are in **compliance with the specified terms and** conditions.

This statement authorizes minimal incidental take of threatened Central California Coast steelhead. It is expected that incidental take, if any, should be minimal- less than a few hundred juveniles per year, for all listed and unlisted salmonid ESU's. If incidental mortality of juvenile steelhead exceeds more than 100 juveniles per year, the Corps of Engineers shall re-initiate section 7 consultation, so that impact avoidance and minimization measures can be reviewed and modified as necessary.

Reasonable and Prudent Measures

(1) The Corps of Engineers will actively manage the Napa River/Napa Creek Flood Reduction Program, along'with the Napa County Flood Control and Water Conservation District (NCFCWCD) , other resource agencies, and the citizens of Napa, to minimize impacts to steelhead and their habitat, and to maximize habitat enhancement and restoration.

(2) The Corps of Engineers shall annually report to NMFS the status of project -activities and any take of Central California coast steelhead resulting from construction or operation of the project.

(3) All bank stabilization designs shall be reviewed and approved by NMFS.

(4) The habitat creation goals listed in Table 1 above for tidal mudflat, brackish emergent marsh, shaded riverine aquatic cover, and riparian habitat shall all be achieved by the project.

(5) The Corps of Engineers shall avoid stranding juvenile steelhead and minimize fish passage impacts from the instream grade control structure on Napa Creek.

Terms and Conditions

The de minimis level of incidental take identified above is authorized provided that the Corps of Engineers ensures compliance with the following terms and conditions, which are non-discretionary:

(1) The Corps of **Engineers will actively manage the Napa River/Napa Creek Flood Reduction Program, along with the Napa** County Flood Control and Water Conservation District (NCFCWCD), other resource agencies, and the citizens of **Napa.** Active management shall include implementation of all proposed mitigation, including habitat creation, seasonal construction windows, and construction impact minimization measures, as detailed in Corps (1998) and Corps (1998b).

(a) The Corps of Engineers shall prepare a compilation of the annual, cumulative effects of the program, and shall provide this report *to NMFS by December 3131 of each year.

(b) All projects shall adhere to all impact mitigation and seasonal construction window commitments described in Corps (1998) and Corps (1998b) . No deviations from these commitments shall occur without the prior notification and approval of NMFS. NMFS-approved deviations should be reflected in subsequent Flood Reduction and VEMP Management Plan revisions.

(2) NMFS will be given an annual report summarizing all flood reduction, bank stabilization, and habitat mitigation/restoration activities conducted pursuant to the project, by December 31st. This report shall include an estimate of all incidental take of steelhead resulting from disturbance, relocation, or incidental mortality. This report shall also include a summary of all planned activities for the upcoming year.

(3) Biotechnical, "fish-friendly" bank stabilization designs shall be used to the maximum extent practicable. NMFS shall be given at least 60 days to review and comment on all bank stabilization plans and designs prior to their construction. If these biotechnical approaches fail, then more traditional bank stabilization methods, such as riprap, can be considered on an adaptive management basis. However, riparian features should be incorporated into all bank stabilization designs to the maximum extent feasible, such as in proposals by the Corps on the Lower American River (USFWS, 1998).

(4) The U.S. Fish and Wildlife Service's HEP (Habitat Evaluation Protocol) model shall be used to ensure that there is no net loss of tidal mudflat, brackish emergent marsh, shaded riverine

aquatic cover, or riparian habitat types over the life of the project. If it becomes apparent that the habitat creation goals listed in Table 1 above may not be met, the Corps of Engineers shall promptly propose project amendments designed to meet these goals and submit these amendments to NMFS for approval.

(5) Final design of the bypasses and Napa Creek grade control structure must be reviewed and approved by NMFS to ensure that the all designs are adequate to minimize the risk of fish stranding and allow for fish passage under seasonal streamflow patterns.

(a) Qualified fishery biologists approved by CDFG or NMFS shall relocate juvenile steelhead in the Napa Creek project area to minimize impacts from project construction. The numbers and disposition of fish handled and relocated by project personnel shall be reported in the annual project report to NMFS.

<u>References</u>

Corps. 1998. Napa River/Napa Creek Flood Reduction Project- *Final Supplemental Environmental impact StatementlEnvironmental Impact Report.* October 1998, U.S. Army Corps of Engineers Sacramento District.

Corps. 1998b. August 26, 1998 letter from Walter Yep, U.S. Army Corps of Engineers Sacramento District, to Dr. William T. Hogarth, National Marine Fisheries Service, requesting section 7 consultation under the federal Endangered Species Act.

Riley, Ann L. 1998. Restoring Streams in Cities: A Guide for Policy Makers, and Citizens Island Press, Washington D.C./Covelo, California, 423 pp.

USFWS. 1998. Fish and Wildlife Coordination Act Report for the Sacramento Bank Protection Project, Lower American River Sites 1, 2, and 4. Prepared by U.S. Fish and Wildlife Service Sacramento Fish and Wildlife Office, for U.S. Army Corps of Engineers, Sacramento District, June, 1998.

USFWS. 1997. Revised Draft Fish and Wildlife Coordination Act Report for the Napa River Flood Damage Reduction Project. Prepared by the U.S. Fish and Wildlife Service Sacramento Fish and Wildlife Office, for U.S. Army Corps of Engineers, Sacramento District, December, 1997.

Attachment 1

Species Lif e History, Biological Requirements, and Population Trends- Steelhead Trout

General life history information for steelhead *(oncorhynchus* mykiss) is summarized below, followed by more detailed information on the Central California coast steelhead ESU, including any unique life history traits as well as population trends. Further detailed information on this and other steelhead ESUs is available in the NMFS Status Review of west coast steelhead from Washington, Idaho Oregon, and California (Busby et al. 1996), the NMFS proposed rule for listing steelhead (61 FR 41541), the NMFS Status Review for Klamath Mountains Province Steelhead (Busby et al. 1994), and the NMFS final rule listing the Southern California Coast steelhead ESU, South Central California Coast steelhead ESU, and the Central California Coast steelhead ESU (62 FR 43937).

Adult freshwater migration and spawning. The most widespread run type of steelhead is the winter (ocean-maturing) steelhead, while summer (stream-maturing) steelhead (including spring and fall steelhead in southern Oregon and northern California) are less common. There is a high degree of overlap in spawn timing between populations, regardless of run-type. California steelhead generally spawn earlier than steelhead in northern areas. Both summer and winter steelhead in California generally begin spawning in December, whereas most populations in Washington begin spawning in February or March. Among inland steelhead populations, Columbia River populations from tributaries upstream of the Yakima River spawn later than most downstream populations.

The stream-maturing type enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type enters fresh water with well-developed gonads and spawns shortly thereafter (Barnhart 1986).

Steelhead may spawn more than once before dying, in contrast to other species of the *Oncorhynchus* genus. It is relatively uncommon for steelhead populations north of Oregon to have repeat spawning, and more than two spawning migrations is rare. In

Oregon and California, the frequency of two spawning migrations is higher, but more than two is unusual.

Juvenile rearing and outmigration. Juvenile steelhead live in freshwater between one and four years (usually one to two years in the Pacific Southwest) and then become smolts and migrate to the sea from November through May with peaks in March,- April, and May. The smolts can range from 14 to 21 cm in length. Steelhead spend between one and four years in the ocean (usually two years in the Pacific Southwest) (Barnhart 1986). Fish size appears to be positively correlated with water velocity and depth (Chapman and Bjornn 1969, Everest 'and Chapman 1972).

Ocean Migration. North American steelhead typically spend 2 years in the ocean before entering freshwater to spawn. The distribution of steelhead in the ocean is not well known. CWT recoveries indicate that most steelhead tend to migrate north and south along the Continental Shelf (Barnhart 1986) Steelhead stocks from the Klamath and Rogue rivers probably mix together in a nearshore ocean staging area along the northern California before they migrate upriver.(Everest 1973).

Biological Requirements. The timing of upstream migration is correlated with higher flow events, such as freshets or sand bar breaches, and associated lower water temperatures. Unusual . stream temperatures during spawning migration periods can alter or delay migration timing, accelerate or retard mutations, and increase fish susceptibility to diseases. The minimum stream depth necessary for successful upstream migration is 18 cm (Thompson 1972) . Reiser and Bjornn (1979) indicated that steelhead preferred a depth of 24 cm or more. The maximum velocity, beyond which upstream migration is not likely to occur, of 2.4 m/second (Thompson 1972).

Steelhead spawn in cool, clear streams featuring suitable gravel size, depth, and current velocity. Intermittent streams may be used for spawning (Barnhart 1986; Everest 1973) . Reiser and 13jornn (1979) found that gravels of 1.3 cm to 11.7 cm in diameter and flows of approximately 40-90 cm/second (Smith 1973) were preferred by steelhead. The survival of embryos is reduced when fines of less than 6.4 mm comprise 20 - 25% of the substrate. Studies have shown a higher survival of embryos when intragravel velocities exceed 20 cm/hour (Phillips and Campbell 1961, Coble

1961) . The number of days required for steelhead eggs to hatch varies from about 19 days at an average temperature of 600 F to about 80 days at an average of 420 F. Fry typically emerge from the gravel two to three weeks after hatching (Barnhart 1986).

After emergence, steelhead fry usually inhabit shallow water along perennial stream banks. older fry establish territories which they defend. Streamside vegetation and cover are essential. Steelhead juveniles are usually associated with the bottom of the stream. In smaller California streams, the water levels may drop so low during the summer that pools are the only viable rearing habitat. No passage between pools can occur until river levels rise with the onset of the rainy season. Therefore, juvenile steelhead rearing in isolated summer pools are extremely vulnerable to disturbance or water quality impacts. Daytime temperatures in summer rearing pools may also be near lethal levels; riparian shading and the presence of sub-surface, cold water seeps are often essential to maintain pool temperatures at tolerable levels. In winter, they become inactive and hide in any available cover, including gravel or woody debris.

The majority of steelhead in their first year of life occupy riffles, although some larger fish inhabit pools or deeper runs. Juvenile steelhead feed on a wide variety of aquatic and terrestrial insects, and emerging fry are sometimes preyed upon by older juveniles. Water temperatures influence the growth rate, population density, swimming ability, ability to capture and metabolize food, and ability to withstand disease of these rearing juveniles. Rearing steelhead juveniles prefer water temperatures of 450 to 580 F and have an upper lethal limit of 750 F.

Dissolved oxygen (DO) levels of 6.5 to 7.0 mg/L affected the migration and swimming, performance of steelhead juveniles at all temperatures (Davis et. al. 1963). Reiser and Bjornn (1979) recommended that DO concentrations remain at or near saturation levels with temporary reductions no lower than 5.0 mg/L for successful rearing of juvenile steelhead. Low DO levels decrease the rate of metabolism, swimming speed, growth rate, food consumption rate, efficiency of food utilization, behavior, and ultimately the survival of the juveniles.

During rearing, suspended and deposited fine sediments can directly affect salmonids by abrading and clogging gills, and indirectly cause reduced feeding, avoidance reactions, destruction of food supplies, reduced egg and alevin survival, and changed rearing habitat (Reiser and Bjornn 1979). Bell (1973) found that silt loads of less than 25 mg/L permit good rearing conditions for juvenile salmonids.

1. Central California Coast steelhead ESU - Threatened

only winter steelhead are found in this ESU and those to the south. The relationship between anadromous and non-anadromous 0. mykiss, including possibly residualized fish upstream from dams, is unclear.

Only two estimates of historical (pre-1960s) abundance specific to this ESU are available: an average of about 500 adults in Waddell Creek in the 1930s and early 1940s (Shapovalov and Taft 1954), and 20,000 steelhead in the San Lorenzo River before 1965 (Johnson 1964). In the mid-1960s, 94,000 steelhead adults were estimated to spawn in the rivers of this ESU, including 50,000 and 19,000 fish in the Russian and San Lorenzo rivers, respectively (CDFG 1965). Recent estimates indicate an abundance of about 7,000 fish in the Russian River (including hatchery steelhead) and about 500 fish in the San Lorenzo River. These estimates suggest that recent total abundanceof steelhead in these two rivers is less than 15 percent of their abundance 30 years ago. Recent estimates for several other streams (Lagunitas Creek, Waddell Creek, Scott Creek, San Vincente Creek, Soquel Creek, and Aptos Creek) indicate individual run sizes of 500 fish or less. Steelhead in most tributaries to San Francisco and San Pablo bays have been virtually extirpated (McEwan and Jackson 1996). Fair to good runs of steelhead still apparently occur in coastal Marin County tributaries. In a 1994 to 1997 survey of 30 San Francisco Bay watersheds, steelhead occurred in small numbers at 41 percent of the sites, including the Guadelupe River, San Lorenzo Creek, Corte Madera Creek, and Walnut Creek (Leidy 1997)

Little information is available regarding the contribution of hatchery fish to natural spawning, and little information on present run sizes or trends for this ESU exists. However, given the substantial rates of declines for stocks where data do exist, the majority of natural production in this ESU is likely not self-sustaining.

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