ORIGINAL

SWEETWATER SPRINGS WATER DISTRICT

TO: Board of Directors **AGENDA NO. V-A**

FROM: Steve Mack, General Manager

Meeting Date: December 4, 2008

Subject: RUSSIAN RIVER BIOLOGICAL OPINION FLOWS

RECOMMENDED ACTION: Receive a presentation on flow changes associated with the Russian River Biological Opinion by Pam Jeane, Deputy Chief Engineer-Operations, Sonoma County Water Agency.

FISCAL IMPACT: none

DISCUSSION:

The Sonoma County Water Agency is working with the U.S. Army Corps of Engineers (COE) and the National Marine Fisheries Service to implement a Biological Opinion for threatened and endangered salmonids (Coho and Chinook Salmon and Steelhead) on operations of the COE projects in the Russian River. Part of the BO recommendations affect flows in the lower Russian River. Pam Jeane, Deputy Chief Engineer-Operations, will be here to give a presentation on the changes to flows in the river and to answer questions.

RRIFR

Russian River Instream Flow and Restoration

The Biological Opinion: Frequently Asked Questions

What is a "biological opinion"?

A biological opinion is a determination made by a federal agency—in this case the National Marine Fisheries Service (NMFS)—to help restore threatened or endangered species. Biological opinions are prepared when federal government agencies consult with other federal agencies in a process spelled out in Section 7 of the Endangered Species Act.

In essence, biological opinions summarize the studies done during the Section 7 consultation process, analyze the impact of a specific project, and determine whether the project is likely to harm the survival and the recovery of the species. If the biological opinion finds that the species are likely to be harmed by the project, it includes "reasonable and prudent alternatives" that must be implemented. In this case the project is the Russian River Instream Flow and Restoration Project as operated by the U.S. Army Corps of Engineers (Corps) on behalf of the Sonoma County Water Agency (SCWA) and the Mendocino County Russian River Flood Control and Water Conservation Improvement District.

What problem is the Russian River biological opinion trying to solve?

The Russian River and its major tributaries are home to three species of fish that are threatened or endangered: steelhead, coho salmon, and Chinook salmon.

There are many reasons for the decline of these species, including historic overfishing, gravel mining, development near the river and its tributaries, increased sedimentation from logging and historic agricultural practices, and changing climate and ocean conditions. The reasons also include flood control and water supply projects in the river and in Dry Creek. These projects are the sole focus of the biological opinion.

Essentially, the biological opinion addresses the following questions:

Do the flood control projects operated by the Corps and the water supply and flood control projects operated by SCWA threaten to jeopardize the continued existence of steelhead, coho, and Chinook?

If the answer is yes, how can these projects or operations be changed to enable the survival and the recovery of the species? SECT I, P 1

What does this biological opinion find?

After more than 10 years of studies (many conducted and paid for by SCWA), NMFS finds that some aspects of flood control and water supply operations threaten to jeopardize steelhead and coho but not Chinook.

SONOMA COUNTY WATER AGENCY

(continued) →

This jeopardy opinion means that SCWA and the Corps must change operations. There are three areas of particular concern:

1. **High summertime flows in the Russian River and Dry Creek** Contrary to what biologists believed in 1986, when the State Water Resources Control Board set minimum summertime Russian River flows in a ruling referred to as Decision 1610, biologists have concluded that fast-moving water in the river and Dry Creek make it difficult for juvenile steelhead, coho, and Chinook to grow and thrive. Reducing flows in the river and improving habitat in Dry Creek for these fish is a major component of the biological opinion. SECT IV, PP 164–84; SECT X, PP 243–48
2. **The high velocity of water in Dry Creek in the summer** Fourteen-mile-long Dry Creek is the means by which water from Lake Sonoma gets to the Russian River. As described above, the fast-moving water makes it difficult for young fish to thrive. The biological opinion requires that, over a 15-year period, there be habitat restoration and changes in the configuration of the channel to create slow-moving pools along 6 miles of the creek. SECT IV, PP 172–77; SECT X, PP 260–67
3. **The current practice of "breaching" the sandbar at the estuary** Federal biologists believe that breaching negatively affects the estuary (the mouth of the river) by allowing more saltwater than is natural to flow into it and by keeping the amount of freshwater artificially low. The biological opinion requires SCWA to adopt "adaptive management" practices in the estuary, with the goal of keeping the sandbar closed in the summer months to create a freshwater lagoon in which young steelhead can grow. SECT IV, PP 184–98; SECT X, PP 248–60

What is a reasonable and prudent alternative?

When a biological opinion finds that current or proposed activities could threaten the continued existence of a threatened or endangered species, it includes steps for public agencies to take to avoid further problems. These steps are called "reasonable and prudent alternatives."

In the case of the Russian River biological opinion, some reasonable and prudent alternatives include the following:

- Reducing summertime flows in the river SECT X, PP 243–48
- Restoring 6 miles of habitat in Dry Creek SECT X, PP 260–66
- Creating a freshwater lagoon in the estuary during the summer months SECT X, PP 248–60
- Carefully monitoring both habitat and fish in Dry Creek, the estuary, and the river SECT X, PP 258–60, 264–65
- Eliminating impediments to fish spawning or improving habitat in several streams SECT X, PP 267–72
- Enhancing the existing coho broodstock program SECT X, PP 273–74

Who is involved?

The National Marine Fisheries Service, the Sonoma County Water Agency, the U.S. Army Corps of Engineers, the Mendocino County Russian River Flood Control and Water Conservation Improvement District, and the California Department of Fish and Game are the agencies involved, with SCWA and the Corps responsible for implementing many of the reasonable and prudent alternatives.

How long will this biological opinion be in effect?

The Russian River biological opinion is a 15-year recovery plan.

What happens if SCWA fails to implement the biological opinion?

SCWA is committed to carrying out the biological opinion, but many of the projects envisioned in later years could change as data becomes available from projects implemented earlier and from the extensive studies and monitoring involved. Think of the biological opinion as a blueprint that can be adjusted by agreement as the situation evolves and new information becomes available.

How much will it cost?

Only a handful of items in the biological opinion include dollar amounts. SCWA and the Corps are calculating the costs of the vast array of projects and are developing a financial plan and a budget for the implementation of the biological opinion. At this point we estimate that the habitat restoration, monitoring, and studies required of SCWA and the Corps will cost up to $100 million over 15 years. SECT X, PP 267–72, 278

Who will pay for it?

Funding will likely come from a variety of sources, including ratepayers, state and federal grants, and existing tax revenues that can be designated for this purpose.

Who will make sure it's implemented?

The biological opinion requires that SCWA conduct extensive monitoring and reporting. The data will be provided to NMFS and the California Department of Fish and Game, which will monitor the work.

How can the public get involved?

There are several ways the public can get involved:

- One or more environmental impact reports (EIRs) will be required to change Decision 1610, the ruling that established minimum summer flows. The EIR process includes many public meetings and the opportunity for people to comment.
- The nonprofit Center for Collaborative Policy will interview dozens of community members to determine how changes in river flows, in Dry Creek, and in the estuary could affect them.
- SCWA will hold community meetings to keep residents and businesses updated and to answer questions.

If you are interested in more information about these opportunities, please visit ***www.sonomacountywater.org*** and click the RRIFR link.

What is an estuary? And why is it important to steelhead, coho, and Chinook?

An estuary is where a river meets the sea. The convergence of freshwater from the river and saltwater from the sea creates a dynamic environment that supports a broad diversity of fish, wildlife, and invertebrate and plant species. Estuaries play an important role in the life history of steelhead, coho, and Chinook. Salmon use estuaries to adapt to saline conditions prior to entering the ocean and to adapt to freshwater before migrating upstream to the spawning grounds. Some species, particularly steelhead, spend extended periods of time in estuaries, where the rich availability of invertebrates helps them grow quickly before entering the ocean.

I thought fish need lots of water, so why does the biological opinion require less water in the Russian River?

Biologists have concluded that current flow releases into the Russian River are much higher during the summer than under historic conditions and are too high for optimal habitat for young steelhead, coho, and Chinook. SECT IV, PP 164–84

Reducing summer flows in the Russian River would provide better habitat by reducing velocity, would eliminate the need to artificially breach the sandbar at the estuary, and may improve summer habitat in the estuary by allowing the formation of a freshwater lagoon.

Reducing summer flows in the upper Russian River from Lake Mendocino would also retain a greater amount of the cold-water pool behind Coyote Valley Dam, which would be available to be released in the late summer and the early fall, benefiting adult fish returning to the river to spawn.

What is the process for changing the summertime flows in the Russian River?

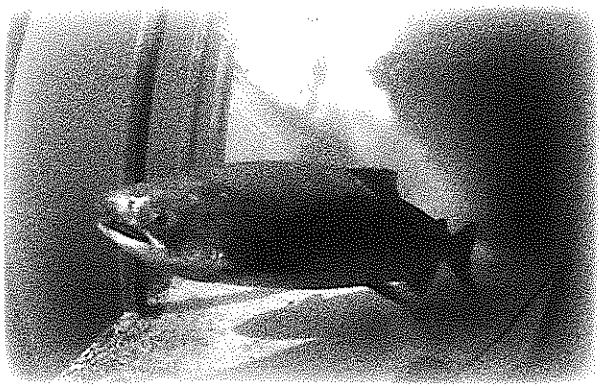
Summertime flows are controlled by Decision 1610, the ruling that requires minimum flow levels at specified areas of the Russian River and Dry Creek. The minimum flow levels vary, depending on whether the year is "normal," "dry," or "critically dry." (Decision 1610 requires that SCWA release water from Lake Mendocino and Lake Sonoma to maintain these flows regardless of the amount of water that others take from the river and the creek.) SECT III, PP 15–19

The biological opinion requires that summertime flows be permanently reduced to replicate river conditions in dry years (although the biological opinion does acknowledge the complexity of operating the system and allows flows to vary). SECT X, PP 244–48

To change the flow requirements, SCWA must ask the State Water Resources Control Board to alter Decision 1610. This will require a comprehensive EIR, which could take several years. The state water board will weigh the information provided in the EIR with other factors when making the ultimate decision on summertime flows. In addition, because the biological opinion requires lower flows beginning in 2010, an interim change to Decision 1610 will be necessary; this may require a focused, less comprehensive environmental document. SECT X, PP 247–48

Because Dry Creek is the conduit to get Lake Sonoma water to the Russian River, if there is less water in the creek, won't that mean less water for people?

The reasonable and prudent alternatives provide for habitat restoration in Dry Creek. The goal is to naturalize the creek in a way that allows water to continue to flow to meet the current demands of people while creating slow-moving pools and shady areas for young steelhead and coho to grow. SECT X, PP 260–67



A threatened Chinook salmon migrating up the Russian River

If less water is needed in the river, would the diversion of Eel River water end?

Pacific Gas & Electric's diversion of Eel River water through the Potter Valley Project is regulated by the Federal Energy Regulatory Commission. These diversions from the Eel River are not controlled by SCWA and will not change as a result of the biological opinion.

Does the biological opinion require a pipeline to be built from Lake Sonoma to the Russian River?

No. The biological opinion does not require the construction of a pipeline. It does require a pipeline feasibility study; and, if habitat restoration projects in Dry Creek are determined to be unsuccessful, in year 10 (2018), the biological opinion requires a change in approach, which could result in additional pipeline studies.

SECT X, PP 264, 272

How will less water in the river affect summertime recreation?

Canoeists, kayakers, swimmers, and people who just like to float down the river in inner tubes—all are an important part of the river culture. The EIR will include in-depth analyses of how lower flows might affect recreation on the river.

What problem in the estuary does the biological opinion attempt to address?

Tidal action builds a sandbar at the mouth of the Russian River that periodically closes the estuary. River water behind the sandbar rises high enough to threaten low-lying property in Jenner and further inland. SCWA holds permits to breach the sandbar to minimize the flooding risk and allow the river to flow freely into the ocean.

Based on studies of coastal lagoons elsewhere in California, some biologists believe that keeping the Russian River estuary closed in the summer would create better conditions for young salmon, particularly steelhead, to grow and thrive.

The biological opinion requires that SCWA adopt adaptive management practices that would keep the estuary closed in the summertime unless flooding is imminent. In the later years of the biological opinion, if the sandbar is repeatedly breached to avoid flooding, SCWA will be required to study alternative solutions to adaptively manage the sandbar, including modifying the existing jetty and elevating homes and other structures in the area to prevent them from flooding. The plan also requires extensive biological, physical, and water-quality monitoring to help determine whether a closed summertime lagoon is better for salmon.

SECT X, PP 248–60

Why doesn't the biological opinion assess impacts on humans?

Under the federal Endangered Species Act, biological opinions must assess the impacts of projects on threatened species, not on humans. The EIR that is required to change minimum summertime flows in the Russian River, however, will assess the impacts on humans, including potential recreational and economic effects.

Shouldn't the biological opinion address all the problems in the watershed?

The purpose of the biological opinion isn't to address *all* problems in the watershed but to address those problems related to specific SCWA and Corps operations.

How does the biological opinion address likely impacts of climate change in our area?

The biological opinion assumes that local impacts from global climate change will be limited and difficult to predict in the next 15 years. The effects of climate change as it relates to lowering the flows in the Russian River will be addressed in the environmental impact report. SECT I, P 5

What is an "incidental take statement"?

The federal Endangered Species Act prohibits the "take" (in essence, the killing, harassment, or harm) of threatened species. Agencies can be exempted from take by the regulating agency (in this case NMFS) if species are harmed *incidentally* as an unintentional result of lawful operations. The biological opinion includes an incidental take statement that exempts SCWA and the Corps from take that could result from specified lawful operations and from changes in operations as a result of the biological opinion so long as the terms and conditions of the statement are met. SECT XI, PP 296–332

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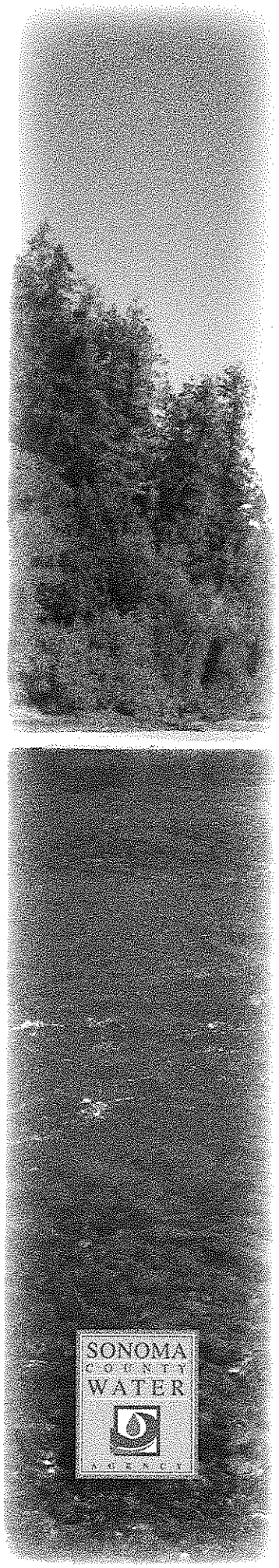
Russian River Instream Flow and Restoration



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Russian River Instream Flow and Restoration

Proposed Changes to Russian River Flows

Unlike many urban water systems that rely on underground wells or reservoirs, the Sonoma County Water Agency (SCWA) meets the majority of its customers' needs by collecting Russian River water from pipes buried deep below the riverbed. The water is naturally filtered through rocks, gravel, and sand and then collected and treated with a minimal amount of chlorine (as required by state law) before it is delivered to customers.

In the summer this innovative and relatively inexpensive collection system relies on water released from Lake Sonoma and Lake Mendocino, which are owned by the U.S. Army Corps of Engineers and operated to meet SCWA water supply needs.

The Problem A 1986 ruling (referred to as Decision 1610) by the State Water Resources Control Board (State Water Board) requires minimum summertime flows at specified areas of the Russian River and Dry Creek. These minimum flow requirements were set to meet recreation needs and what were understood at the time to be the needs of the fishery. The minimum flow levels vary, depending on whether the year is "normal," "dry," or "critically dry." For example, at Hacienda Bridge in Guerneville, in normal years the average flow must be 125 cubic feet per second (cfs); in dry years the average flow must be 85 cfs.

Biologists with the National Marine Fisheries Service (NMFS) have concluded that current flow levels in the Russian River and Dry Creek during the summer are too high for young coho salmon and steelhead.

The Solution NMFS biologists believe that reducing summertime flows in the Russian River and Dry Creek would provide better fishery habitat by reducing velocity, would minimize the need to artificially breach the sandbar at the river mouth, and may improve estuary conditions for steelhead by allowing the formation of a freshwater lagoon. The NMFS has issued a biological opinion that requires SCWA to ask the State Water Board for permission to reduce summertime flows to approximately 85 cfs at Hacienda Bridge in both normal and dry years.

Reducing summertime flows in the upper Russian River from Lake Mendocino would also retain more of the cold-water pool behind Coyote Valley Dam so that it is available for release in the late summer and the early fall—benefiting adult fish returning to the river to spawn. The biological opinion requires SCWA to ask the State Water Board to reduce summertime flows in the upper river to 125 cfs (current flows range from 185 to 150 cfs).

The Implementation To change the flow requirements, SCWA must ask the State Water Board to alter Decision 1610. This will require a comprehensive environmental impact report (EIR), which will take several years to complete. The EIR will include analyses of the proposed changes to recreation, wildlife habitat, water quality, and the local economy. The EIR will also include other components of the biological opinion, such as changes in estuary management. The process will include multiple opportunities for public comment.

The State Water Board will weigh the information provided in the EIR along with public input when making the ultimate decision about summertime flows. In addition, because the biological opinion requires lower flows beginning in 2010, SCWA must ask the State Water Board for interim changes to Decision 1610. This request will also require an environmental analysis of the proposed changes.

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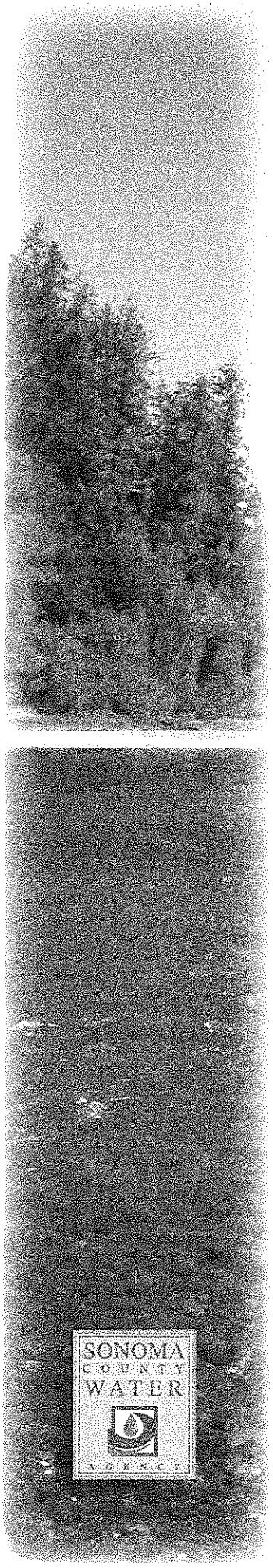

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Russian River Instream Flow and Restoration

Russian River Estuary Adaptive Management

An estuary is where a river meets the ocean. The mix of freshwater from the river and saltwater from the sea creates a dynamic environment that supports a broad array of fish, wildlife, and invertebrate and plant species. Salmon and steelhead use estuaries to adapt to saline conditions prior to entering the ocean and to adapt to freshwater before migrating upstream to their spawning grounds.

The Problem During the summer, tidal action forms a sandbar at the mouth of the Russian River near the town of Jenner. The sandbar often becomes high enough to prevent the river from entering the sea. The result is a lagoon that occasionally threatens to flood low-lying properties from Jenner to Duncans Mills.

For many years private citizens would breach the sandbar, enabling the river to flow into the ocean and eliminating the threat of flooding. In the early 1950s, the Sonoma County Public Works Department took over the job, using heavy equipment to breach the sandbar. In the mid-1990s, the task was turned over to the Sonoma County Water Agency (SCWA) during a county reorganization. (For current breaching practices, see the reverse side.)

Scientists with the National Marine Fisheries Service (NMFS) believe that the large volume of saltwater that enters the estuary when the sandbar is opened creates a less-than-optimal environment for young steelhead to grow before entering the ocean.

The Solution NMFS biologists believe that a summertime freshwater lagoon would create a healthier nursery for young steelhead. They point to other rivers in California, where the formation of similar "perched" lagoons has improved conditions for steelhead during the summer months.

The Implementation The biological opinion outlines a two-pronged strategy for creating a summertime freshwater lagoon.

Part one of the strategy is to reduce the flow of water in the Russian River during the summer. Less water in the river reduces the likelihood of the lagoon's flooding nearby properties. Please see the "Proposed Changes to Russian River Flows" document for details on reducing summertime flows.

Part two of the strategy requires SCWA to adopt "adaptive management" practices in the estuary that involve the following:

- Annually creating an outlet channel, cut diagonally to the northwest, to allow river water to flow out while preventing ocean water from entering the lagoon
- Considering artificially closing the sandbar if it hasn't closed on its own by mid-June
- If the new method of creating a perched lagoon isn't successful, studying the effects on the estuary of the jetty at Goat Rock State Beach and evaluating alternatives that include removing or notching the jetty
- If the new method of creating a perched lagoon isn't successful in reducing flood risks, evaluating the possibility of elevating structures in the area

The plan also requires extensive biological, physical, and water-quality monitoring to help determine whether a closed summertime lagoon is better for salmon.

SONOMA COUNTY WATER AGENCY

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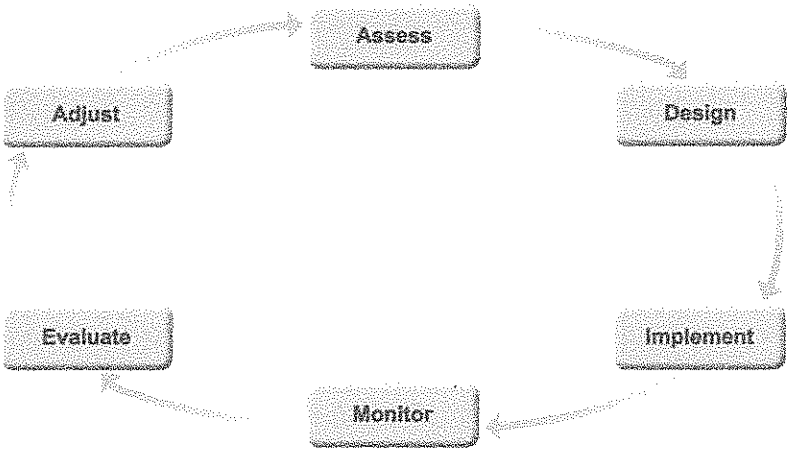
Current Sandbar Breaching Program

The Sonoma County Water Agency mechanically breaches the sandbar to alleviate potential flooding of low-lying shoreline properties near Jenner. Breaching is performed when the water surface level in the estuary is between 4½ and 7 feet as determined by the gauge at the Jenner Visitors' Center, in accordance with the *Russian River Estuary Study 1992–1993*. Breaching when water surface levels in the estuary are at or below 7 feet prevents flooding of Willow Creek marsh as well as potential water-quality effects related to draining floodwaters from the marsh.

To breach the sandbar, a bulldozer or similar equipment is offloaded at the parking lot at Goat Rock State Beach and driven onto the beach via an existing access point. A "pilot channel" is cut at a depth that allows river flows to begin carrying sand into the ocean. The sand is mechanically moved onto the beach adjacent to the pilot channel. After the pilot channel is dug, the last upstream portion of the sandbar is removed, allowing river water to flow into the sea. The size of the pilot channel varies, depending on the height of the sandbar, the level of the tide, and the surface level of water in the estuary. A typical channel would be approximately 100 feet long, 25 feet wide, and 6 feet deep. The amount of sand moved ranges from less than 100 cubic yards to approximately 1,000 cubic yards.

Within 24 hours prior to breaching, SCWA contacts state parks lifeguards and posts signs and barriers to minimize potential hazards to beach visitors.

Adaptive Management



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RRIFR
Russian River Instream Flow and Restoration

Endangered Species Act
Section 7 Consultation

BIOLOGICAL OPINION

for

Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River watershed

PCTS Tracking Number: F/SWR/2006/07316

Action Agency: U.S. Army Corps of Engineers, San Francisco District

Consultation Conducted By: National Marine Fisheries Service, Southwest Region

Date Issued: September 24, 2008

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Ac-ft	acre-feet
BA	Biological Assessment
CDFG	California Dept. Fish & Game
CESA	California Endangered Species Act
CHART	Critical Habitat Analytical Review Team
CIE	Center for Independent Experts
Corps	U.S. Army Corps of Engineers
CVD	Coyote Valley Dam
CVFF	Coyote Valley Fish Facility
D1610	SWRCB Water Right Decision 1610
DCFH	Don Clausen Fish Hatchery
DPS	Distinct Population Segment
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
EWSL	Emergency water supply line
FMEP	Fishery Management & Evaluation Plan
HGMP	Hatchery and Genetic Management Plan
LMHPP	Lake Mendocino Hydroelectric Power Plant
LWD	Large woody debris
MCRRFCD	Mendocino County Russian River Flood Control and Water Conservation Improvement District
MOU	Memorandum Of Understanding
NCPA	Northern California Power Agency- (member: *City of Ukiah*)
NCRWQCB	North Coast Regional Water Quality Control Board
NMFS	National Marine Fisheries Service
PCE	Primary Constituent Element (*of critical habitat*)
ppm	parts per million
ppt	parts per thousand
RCD	Resource Conservation District
RPA	Reasonable and Prudent Alternative
RRCSCBP	Russian River Coho Salmon Captive Broodstock Program
SCWA	Sonoma County Water Agency
SWRCB	State Water Resources Control Board
TRT	Technical Recovery Team (*for listed species Recovery Plans*)
VSP	Viable Salmon Population
WSD	Warm Springs Dam
WWTP	Wastewater Treatment Plants
YOY	Young-of-Year (*i.e.*, age 0+ fish)

EXECUTIVE SUMMARY

Pursuant to Section 7(a)(2) of the Federal Endangered Species Act (ESA), NOAA's National Marine Fisheries Service (NMFS) consulted with the U.S. Army Corps of Engineers (Corps) regarding its operations of Warm Springs Dam (WSD) and Coyote Valley Dam (CVD) and a suite of activities that are authorized by the Corps and undertaken by the Sonoma County Water Agency (SCWA) and the Mendocino County Russian River Flood Control and Water Conservation Improvement District (MCRRFCD). The Corps, the SCWA, and the MCRRFCD have proposed to implement, for an additional 15 years, ongoing practices and operations at WSD and CVD and activities related to flood control, water diversion and storage, regulation of flows in the Russian River and Dry Creek, estuary management, hydroelectric power generation, channel maintenance, and fish hatchery production.

These actions likely affect Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*), CCC coho salmon (*O. kisutch*), and California Coastal (CC) Chinook salmon (*O. tshawytscha*), each of which is protected as threatened or endangered under the ESA. The proposed actions also likely affect designated critical habitat for these species. The purpose of this consultation is to provide a determination regarding whether the Corps has insured that the proposed project is not likely to jeopardize one or more of these species or destroy or adversely modify their designated critical habitat. If a project is found to jeopardize a species or adversely modify its critical habitat, NMFS must develop a Reasonable and Prudent Alternative (RPA) to the proposed project in coordination with the federal action agency and any applicant. If the project is also expected to result in the incidental take of listed species, NMFS must also provide reasonable and prudent measures (RPM's) to minimize and monitor the impact of the incidental take of listed species.

In this document, we present our analysis and conclusions in the conventional format for biological opinions as described in the Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and NMFS 1998). This biological opinion includes reviews of the *Consultation History*, a *Description of the Proposed Action*, the *Status of the Species and Critical Habitat*, and the *Environmental Baseline*. Following those reviews we provide an analysis of the *Effects of the Proposed Action*, *Cumulative Effects*, and an *Integration and Synthesis* section in which we analyze the effects of the project in the context of the species status and environmental baseline. This biological opinion concludes with NMFS' determination regarding the impacts of this proposed project on the species' likelihood of survival and recovery, and on the value of the species' critical habitat. Because we have determined that this proposed project is likely to jeopardize the continued existence of some of the salmonid species affected by the proposed project, and adversely modify their critical habitats, we have provided a *Reasonable and Prudent Alternative* (RPA) to the proposed action that 1) avoids jeopardy to the species and adverse modification of critical habitat, 2) can be implemented in a manner consistent with the intended purpose of the action, 3) is economically and technically feasible, and 4) is within the legal authorities of the Corps, SCWA, and MCRRFCD.

The Proposed Action

NMFS analyzed the effects of continued operation of the Russian River Water Supply and Flood Control Project (Project) for a 15 year period on ESA-listed threatened and endangered salmonid species within the Russian River watershed. The Project includes operation of two dams and appurtenant facilities in the Russian River watershed. Together, these facilities are operated to control flooding within the watershed, to supply water to users within and outside the watershed, and to generate hydroelectric power. The altered flow regimes caused by the Project change the natural hydrology of the Russian River estuary, and artificial breaching of a barrier beach at the mouth of the river is often required to prevent flooding adjacent to the estuary. In addition, the Project includes channel maintenance activities that keep the water delivery system functional and reduce the impacts of flooding in the mainstem and some tributaries of the Russian River. The Project also includes operation of two fish hatchery facilities, the Don Clausen Fish Hatchery (DCFH) located at WSD and the Coyote Valley Fish Facility (CVFF) at CVD. SCWA's scope of maintenance responsibilities covered under this Biological Opinion includes maintenance of stream channels and small reservoirs throughout most of an area that SCWA terms Zone 1A, which consists of the Laguna de Santa Rosa watershed, as well as maintenance activities on the Russian River main stem and the segment of Dry Creek downstream from WSD. The Corps' maintenance activities include safety inspections at the two dams. In addition, MCRRFCD conducts channel maintenance activities related to the CVD in the Mendocino County portion of the Russian River. Channel maintenance by both counties is related to Federal sites and inspection of levees under Public Law 84-99 (non Federal sites), but this consultation does not include implementation of the current Corps Operations and Maintenance manual for channel maintenance in the Russian River watershed. Instead, NMFS is consulting on channel maintenance practices as described in Section III.B and referenced to the Corps and SCWA's Biological Assessment where appropriate.

In the initial draft of this Biological Opinion, dated July 11, 2007, NMFS analyzed the implementation of ongoing project operations for ten years, because SCWA and the Corps were contemplating potential complex, future changes in project flow release schedules associated with new water rights and other avenues for increasing reservoir water supplies. Such changes were likely to take at least ten years to accomplish. We were unable to fully analyze both short-term ongoing and future water supply scenarios because of the uncertainties and limited available information about those future scenarios. Originally, the Corps, SCWA, and NMFS agreed that it was prudent to evaluate project effects for the next ten year period because future changes in water supply operations contemplated by SCWA would likely take ten years to fully analyze and develop the permits and water rights agreements/decisions that may yield additional water rights and water supply that would affect flows and habitat in the Russian River and Dry Creek.

During work on the RPA, the Corps, SCWA, and NMFS determined that a major component of the RPA would take up to fifteen years to complete. The remediation of project impacts to designated critical habitat in Dry Creek would take 12 to 15 years to accomplish. NMFS transmitted a working draft biological opinion to the Corps and SCWA on August 1, 2008, and indicated that the timeframe for analysis of the original proposed project would need to be changed from ten years to fifteen years (NMFS 2008b). NMFS also indicated in transmitting the

working draft that the RPA did not ensure that resulting project operations would not likely jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Because the project's impact on critical habitat could not be fully addressed in a ten year period, NMFS, the Corps, and SCWA agreed to amend the period of the proposed project from ten to fifteen years (Russian River Project Executive Committee Meeting August 4, 2008). The RPA's approaches to addressing impacts to critical habitat were also discussed between SCWA and NMFS and modified subsequent to the August 1, 2008 working draft.

The water supply and flood control elements of the Project involve the regulation of flood flows to control flooding in properties adjacent to the Russian River, and the storage of water in two reservoirs to be released for water supply in Sonoma, Mendocino, and Marin counties during the spring, summer, and fall. The water supply is released from the reservoirs and flows down the main stem Russian River and Dry Creek to diversion points downstream of the dams. Part of the water stays in the river channel and flows to the Pacific Ocean at the river's mouth near Jenner. The diverted water is delivered to end-users for municipal, industrial, agricultural, and domestic uses.

The keystone elements of the project are CVD, on the East Branch headwaters of the Russian River, and WSD on Dry Creek, a main tributary of the Russian. Russian River water is released from Lake Mendocino (the reservoir formed by CVD) for flood control, and, under the requirements of the State Water Resources Control Board's (SWRCB) Decision 1610 (D1610) for water supply. The Coyote Valley Fish Facility (CVFF) was constructed in 1992 at the base of CVD to mitigate for the loss of salmonid habitat and natural salmonid production upstream of CVD. Water released from Lake Sonoma (the reservoir formed by the WSD) is also released for flood control and water supply. The Don Clausen Fish Hatchery (DCFH) was built at the base of WSD to mitigate for the loss of fish habitat and anadromous salmonid production in the upper Dry Creek watershed. The operation and programmatic purpose of the hatchery has changed to a more adaptive program since its inception. There have been operational changes towards salmonid conservation and recovery to further mitigation goals and to fulfill the Corps' obligation under Section 7 (a)(1) of the ESA. D1610 establishes minimum flow requirements for both Dry Creek and the Russian River. Minimum stream flows under D1610 are specified for four different reaches in the Russian River watershed, assuring high enough summer flows to meet the diversion requirements as well as river-based recreational uses.

In addition to the two major dams in the Russian River watershed, there are several small storage reservoirs, levees, temporary dams, and other elements of the system that contribute to accomplishing the water supply and flood control goals of the Project and are discussed in subsequent sections of this consultation.

Status of the Species and Critical Habitat

In this opinion, NMFS assessed the condition of each of the three listed salmonid species relative to their extinction risk; we also describe the function and role of their respective critical habitats for species conservation. The CCC coho salmon includes coastal populations in rivers entering the ocean along the coasts of Mendocino, Sonoma, Marin, San Mateo and Santa Cruz counties.

The CCC steelhead includes populations ranging from those in the Russian River south to streams in Santa Cruz County, plus populations in streams entering San Francisco Bay (*e.g.*, Sonoma Creek, Napa River, Alameda Creek). CC Chinook salmon include populations of this species in coastal streams ranging from the Russian River north to Humboldt County's Redwood Creek. Our assessment of the status of these species examined the viability (per the framework described by McElhany *et al.* 2000) of populations in four to five distinct geographic areas (termed diversity strata) that constitute each species. For this, we used the diversity strata identified by Spence *et al.* (2008).

Our assessment of extinction risk focuses on the viability of individual populations in each diversity strata in order to appropriately apply the ESU viability criteria provided by Spence *et al.* (2008), which is the current definitive source for ESU viability evaluation. Spence *et al.* (2008) report that for an ESU or DPS to be viable, "representative", "redundancy", and "connectivity" criteria must be met.

CCC coho salmon, which is listed as Endangered, faces the highest risk of extinction of the three salmonid species considered in this opinion. This is evidenced by their precipitous decline in abundance during the last several decades and poor status of population viability metrics (abundance, population growth rates, spatial structure, and genetic diversity). Wild populations of this species were extirpated in the nearby Salmon and Walker Creek watersheds; their distribution has been very highly reduced in the Gualala watershed. The cause of this decline is likely the widespread degradation of habitat, particularly those habitat attributes that support freshwater rearing life stages. The loss of this habitat and the concurrent extirpation of local populations have resulted in a high degree of isolation for the remaining populations.

CCC steelhead is listed as a Threatened Species. Its habitat is degraded throughout the Distinct Population Segment, especially in the two diversity strata with streams bordering San Francisco Bay. However, the diverse life-history strategies of steelhead have helped reduce this species' extinction risk overall. For example, the highly variable time of instream residence (one year to several years) and spawning age allow for effective temporal dispersal within a population. Also individuals within this species are able to spawn in multiple years, unlike coho and Chinook salmon which die shortly after spawning. CCC steelhead appears to be doing best in the more coastal environments and seems more challenged, but persistent in the more inland and urbanized areas. The overall extinction risk of this species is moderate.

The extinction risk for CC Chinook salmon, which is listed as a Threatened Species, is likely intermediate between that of CCC coho salmon and CCC steelhead. Their habitat condition is somewhat better than for the other species mainly because their range lies well north of San Francisco Bay and they do not occupy rearing habitats throughout the summer when stream flows can be very low or negligible. However, habitat degradation is still widespread and is particularly an issue in the upper Eel River. Excluding the reduced returns in 2007, the resurgence in abundance in the Russian River and in other southerly watersheds of this ESU suggests favorable conditions not entirely explained by freshwater habitat analysis. In any case, the more restricted life-history strategy compared to steelhead, relative spatial isolation of the Russian River population, and habitat condition in the Eel River make the extinction risk for CCC Chinook salmon higher than for CCC steelhead.

Environmental Baseline

The environmental baseline section provides the reference point for the listed species and their habitats within the action area to which NMFS adds the effects of the proposed action. The action area includes the Russian River and its tributaries downstream of WSD and CVD. This large action area is necessary because of the need to address the impacts of straying hatchery fish in the watershed. However apart from that issue, our effects analysis was primarily focused on: 1) the East Branch Russian River below CVD and the main stem Russian River from the confluence of the East Branch to the river's mouth at Jenner, 2) Dry Creek downstream of WSD, and 3) areas of the Mark West Creek watershed that do not contain coho salmon, including Santa Rosa Creek and its tributaries, and the Laguna de Santa Rosa. Because channel maintenance activities in Zone 1A and other project actions were not proposed for portions of the Mark West Creek watershed upstream of its largest tributary the Laguna de Santa Rosa, it was unnecessary to focus on that portion of Zone 1A.

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal Projects that have already undergone consultation under Section 7 of the ESA, and the impact of State or private actions which are contemporaneous with the consultation process. By establishing the historical and current condition of the species and their habitat in the action area, we describe those conditions to which the effects of the project under consultation are added in our analysis of the project. Our ability to understand factors contributing to the baseline condition is also important for predicting future baseline conditions and likely responses of salmonids to the effects of the proposed action.

Urban, residential, and agricultural developments, timber harvest, road construction, water supply and flood control management activities have had a collective adverse effect on the quality and quantity of spawning, rearing, and migratory habitats for steelhead, coho salmon, and Chinook salmon in the Russian River watershed. Prior to the construction in 1908 of the Potter Valley Hydroelectric Project, which conveys water from the upper Eel River to the upper Russian River, late summer flows in the Russian River were in the vicinity of 20 to 30 cfs. Now with that project, the construction of Scott Dam on the Eel River, CVD, and WSD, the Russian River sustains flows over 185 cfs throughout much of the mainstem and at least 125 cfs flows to the ocean in most summers. Prior to these projects, the river's estuary likely closed during summer months with a barrier beach that formed a large freshwater lagoon providing high quality rearing habitat for steelhead and coho salmon.

Prior to European settlement, the mainstem Russian River was a dynamic meandering river which migrated across its floodplain creating ox-bows and side sloughs. Most of the 110 miles of mainstem and many hundreds of more miles in the tributaries were likely historically available to salmonids for spawning and juvenile rearing (SEC 1996). Both the mainstem and tributaries very likely had an abundance of large woody debris in the form of root wads and fallen logs that created scour pools and provided cover and foraging sites for rearing salmonids (SEC 1996). Summer flows were much lower in the mainstem; however, numerous deep pools likely stratified and contained lower cooler layers. Stream channelization, road construction along stream

margins, bank stabilization, and water diversions in tributaries have significantly degraded stream habitats throughout the watershed by simplifying stream channels, isolating them from their flood plains, greatly increasing sedimentation, blocking fish migrations, and reducing or eliminating flow and cover.

Effects of the Proposed Action

Listed salmonids are adversely affected by operations for flood control at the two project dams, by project flow releases for water supply, by the management of estuary water levels, by the project related hatchery operations, and by channel maintenance activities in both the mainstem and Russian River tributaries. We did not find significant impacts specific to the operations of the small hydroelectric facilities at CVD and WSD.

Flood control releases at CVD have increased the duration of high flows that scour stream substrates and salmonid spawning habitats in the segment of the mainstem Russian River immediately downstream of the East Branch. In addition, the project's proposed rates of flow ramp down of 250 cfs/hr (when flows are 250-1000 cfs) and 1000 cfs/hr (when flows exceed 1000 cfs) likely cause both CC Chinook salmon and CCC steelhead fry and juveniles to be stranded in isolated pools or beached in dewatered areas. The stranded fry and juveniles are likely to experience higher rates of predation. Some fry and juveniles are likely to be stranded in disconnected pool areas that may not become reconnected depending on flow regime, resulting in the death of these fish. Pre-flood and five-year periodic inspections at CVD, which are conducted during late summer, adversely affect juvenile steelhead because the Corps shuts off stream flow at CVD for about two hours with resulting loss of salmonid rearing habitat in the East Branch and stranding of juvenile steelhead in the remaining isolated pools. CVD is also known to release highly turbid water for extended periods well after turbidity levels have diminished upstream of the mainstem's confluence with the East Branch and elsewhere in the river's unregulated tributaries.

Flood operations at WSD likely cause minor scouring of spawning habitat in Dry Creek in the three mile segment immediately below the dam. We estimate that 5 to 10% of the salmonid redds constructed in this segment are likely to be scoured (*i.e.*, lost) when WSD releases are 5000 cfs or greater. The proposed rates of ramp down for WSD flood control operations, which are the same as above for CVD, are expected to cause stranding of fry and juvenile salmon and steelhead in the three mile segment immediately below the dam. However, the steep banks and lack of side channels in this segment are generally not conducive to high stranding rates. The continuous 25 cfs minimum bypass flow at WSD will likely avoid stranding and beaching of juvenile steelhead or coho salmon during annual pre-flood and five-year periodic inspections.

Flood control operations at the dams will affect stream flows in Dry Creek and the main stem during and shortly after heavy precipitation and runoff in winter or early spring. These operations limit peak flows by storing water in the reservoirs, after which the Corps releases those waters downstream during an extended period when flood risk has abated.

During winter and early spring, the dams generally have a relatively modest influence on stream flow in the Russian River and Dry Creek because of the substantial, unregulated inflow from numerous tributaries. However, during the low flow season (approximately late May through October) releases from WSD and CVD for water supply significantly affect stream flow and available rearing habitat for steelhead and coho salmon, which rear in freshwater habitats throughout the summer months. The project's proposed flow management at WSD and CVD during late spring, summer, and fall has a clear adverse effect on the availability of rearing habitat for steelhead in the14.1 mile segment of Dry Creek, in 34 miles of the upper Russian River, and in the river's estuary. The project's proposed flow management also adversely affects the quality and quantity of rearing habitat and survival of juvenile coho salmon in Dry Creek. Although the upper main stem Russian River and Dry Creek support good quality spawning habitat for listed salmonid species, salmonid fry that emerge from the gravels of Dry Creek and the upper Russian River will encounter limited suitable quality rearing habitats because much of the stream areas have excessive current velocities. This will lead to increased mortality of juvenile steelhead and coho salmon. The proposed flow regime will also affect the survival of juvenile salmonids that emigrate downstream from tributaries into Dry Creek or the upper Russian River. Juvenile Chinook salmon rear in freshwater only until late spring or early summer when they then enter the ocean environment. For that reason, regulation of late spring and summer flows has much less effect on rearing juvenile Chinook than the other two species.

Proposed project operations will likely have significant adverse effects on the Russian River's estuarine rearing habitat for each salmonid species. The proposed project will sustain high, artificial inflows to the estuary during the low flow season and it will entail detrimental sandbar breaching activities at the mouth that will significantly affect water quality in the lowermost segment of the river. The artificial breaching creates a near marine environment, with shallow depths and high salinity throughout most of the water column; in some areas salinity stratification contributes to low dissolved oxygen at the bottom. The combination of artificially high flows entering the estuary during summer months and the proposed plan for breaching the estuary mouth is likely to result in the loss of productive rearing habitat for small juvenile salmonids at the mouth of the Russian River. This habitat is lost because the Russian River estuary will not remain closed long enough to form a freshwater lagoon during the low flow season in most years. This degradation of estuarine habitat will contribute to reduced survival of juvenile salmonids that emigrate to the estuary.

SCWA and MCRRFCD propose to continue bank protection, including repair or replacement of riprap, gravel bar grading, and vegetation maintenance on the main stem Russian River. Over the course of the 15 year project, no more than 30,000 lineal feet of the Russian River will be affected by channel maintenance activities. This represents about 6% of the entire Russian River mainstem. Each county may work as much as 2000 feet of main stem channel per year, but neither county may work on more than 15,000 feet of channel over the course of the 15 year project. Sonoma County will also conduct channel maintenance within constructed flood control channels and portions of natural waterways within Zone 1A (largely the Laguna de Santa Rosa and Santa Rosa Creek watersheds). We conclude that channel maintenance in the Russian River mainstem and Zone 1A will not appreciably degrade the value of critical habitat for listed salmonid species. However, we estimate numbers of juvenile steelhead that will likely perish

each year due to this maintenance activity. We also find that anticipated erosion control practices along the banks of Dry Creek are likely to degrade rearing habitats for salmonids.

The Corps' fish hatchery operations are required as mitigation for the loss of wild salmon and steelhead production due to construction of WSD and CVD. The hatchery program is currently operated to rear and stock coho salmon and steelhead trout. The DCFH coho salmon mitigation and enhancement program began in 1980; however, coho production at the facility was stopped entirely in 1996, after failing to meet mitigation goals. In 2001, the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) was initiated at DCFH to prevent extirpation of coho salmon in the Russian River basin, preserve genetic, ecological, and behavioral attributes of Russian River coho salmon while minimizing potential effects to other stocks and species, and to reestablish self-sustaining runs of coho salmon in tributary streams within the Russian River basin.

The RRCSCBP involves the collection of wild, juvenile coho salmon from Russian River tributaries. The wild juveniles are reared to reproductive maturity and then artificially spawned according to a genetic spawning matrix to maximize genetic diversity and avoid inbreeding. Juvenile coho salmon produced from the captive broodstock are then released into several Russian River tributaries as fry, where they rear, over-winter, migrate to the ocean, and then return as adults to spawn naturally in the streams. Each year since 2001, the program has reared and stocked coho salmon with lineage to wild juvenile coho salmon collected in Russian River tributaries. The RRCSCBP also includes an evaluation component, in which the survival of stocked juvenile coho salmon and the subsequent adult returns to tributary streams are monitored. At present, the genetics management and evaluation components (field monitoring) of this program do not have long term funding commitments.

The proposed continuation of the captive broodstock program will have objectives and methods similar to the existing RRCSCBP. The RRCSCBP is currently authorized under an ESA section 10(a)(1)(A) enhancement permit issued to CDFG, which acts as a contractor to the Corps for this hatchery requirement. Since the effects of the RRCSCBP have already been evaluated and covered by a permit, this program is not evaluated as part of the proposed action in this biological opinion, but it is included in the Environmental Baseline of this biological opinion. The lack of committed funding for the annual genetics management and field monitoring for the program threatens the viability of this program. The lack of an emergency water supply line to the DCFH also poses a significant threat to the RRCSCBP.

The steelhead hatchery program was not previously authorized under the ESA. That program involves the spawning of several hundred adults, the rearing of fry and juveniles, and the annual stocking of a combined total of about 500,000 steelhead smolts into Dry Creek and the upper Russian River. Recent genetic information on Russian River steelhead indicates that there are no substantial genetic differences between wild and hatchery propagated steelhead in the basin. Continued exclusion of wild steelhead from hatchery spawning stock could result in a divergent hatchery population with reduced genetic diversity and increased inbreeding. The stocking of hatchery smolts may have some adverse effects to wild populations through their predation or competition with wild fish. However, we believe those effects are relatively minor, because hatchery fish are stocked only into Dry Creek and the East Branch (near the confluence with the

upper main stem Russian River) when they are in a migratory stage and not acclimated to survival in the wild, and most migrate within a few weeks to the ocean. The hatchery program also promotes a fishery for marked adult hatchery fish in the mainstem Russian River; that fishery results in the capture (with barbless hooks) and release of wild steelhead, coho salmon, and Chinook salmon.

The principal effect of the water diversion facility at Mirabel Wohler is the loss of juvenile salmonids that may become entrained through or impinged on the water intake screens. Some minor loss of salmonids may also be caused by higher rates of predation from fishes (*e.g.*, pike minnow, smallmouth bass) in the Wohler impoundment or from stranding when the inflatable dam is inflated or deflated.

Integration and Synthesis

Project Effects on Critical Habitat

Because adult fall run CC Chinook salmon primarily migrate to spawning habitats during mid to late fall and the resulting progeny migrate downstream to the ocean during the following spring, flow management at WSD and CVD does not have significant adverse consequences for this species. Migrations of adult Chinook salmon appear to actually benefit from the elevated regulated flows during fall months, and rearing juveniles do not contend with the artificially high summer flows that limit available rearing habitat for the other Federally listed salmonid species. Although channel maintenance activities will likely have some adverse effect on spawning and rearing habitats for Chinook salmon, these effects will probably be minor because each year, channel maintenance will affect only a small portion (less than 1 mile) of the 94 mile long main stem Russian River. This 94 mile segment effectively supports rearing habitat for juvenile Chinook salmon along its entire length and spawning habitat at riffles along the approximately 58 mile segment upstream from Healdsburg. Ongoing channel maintenance activities in Dry Creek will likely diminish available rearing habitat for Chinook salmon; however, the extent of habitat loss for rearing Chinook salmon in Dry Creek due to ongoing channel maintenance activities is likely minor given the availability of rearing habitat for this species throughout the main stem Russian River. We conclude that, if the proposed project is implemented, critical habitat for Chinook salmon would remain functional to serve the intended conservation role for this species.

In contrast to the findings for Chinook salmon, the proposed project will likely have significant adverse effects on the critical habitat of steelhead and coho salmon. Because of these adverse effects, critical habitat for steelhead and coho salmon would not be functional to serve the intended conservation role for these species. Proposed flow releases from WSD and CVD during the approximately six-month long, low flow season will create excessively high current velocities that will greatly limit the value of 14 miles of Dry Creek and 34 miles of the upper Russian River as rearing habitat for steelhead. Flow management at the project's reservoirs and breaching of the estuary's bar will also adversely affect the value of steelhead rearing habitat in and near the vicinity of the estuary. Flow releases from WSD during summer and fall months will be so high that available habitat for rearing juvenile coho in Dry Creek will be minimal. Proposed continued channel maintenance activities in Dry Creek will contribute to armoring the

stream banks, reducing velocity refuge areas for fishes during high flows, and simplifying stream channel morphology with potential degradation of both summer and winter rearing habitats for steelhead and coho salmon. The significance of these impacts to critical habitat for rearing steelhead and coho salmon becomes apparent when the status of critical habitat for these species is considered.

Our review of the status of populations of CCC steelhead in the Russian River indicate that freshwater rearing habitat is one of the two primary types of critical habitat that are most degraded. In the Russian River watershed and nearby watersheds, degradation of steelhead rearing habitat is due to channel modifications, chronic deposition of fine sediments, and intensive diversions of surface flow in tributaries. The restoration of viable populations of steelhead within these watersheds will depend upon the restoration of good quality freshwater rearing habitats, including ecologically diverse habitats such as freshwater lagoons and deep main stem habitats for older age 1+ and 2+ fish. The restoration of viable populations of Russian River steelhead would substantially improve the chances for the recovery of the CCC steelhead DPS. However, as proposed, the project's flow management plan (*i.e.*, conformance with D1610, water supply releases, and water elevation management in the estuary) will hamper efforts to recover this species by degrading and, in some cases, eliminating important freshwater habitats in the Russian River.

Likewise, the availability of rearing habitat for coho salmon has been greatly reduced in the Russian River watershed and elsewhere as the result of numerous developmental activities. Coho salmon require especially cold water in which to rear, and developmental activities have undoubtedly limited the availability of such coldwater habitats. As discussed in the Effects Section, approximately 13 miles of Dry Creek provide temperatures that sustain rearing coho salmon; however, high flow releases from WSD during summer and fall months greatly limit the value of the PCE of critical habitat for rearing coho salmon. The proposed project operations appreciably degrade the value of Dry Creek's critical habitat for CCC coho salmon. Successful recovery of this species will very likely require protection, restoration, and enhancement of existing rearing habitats for this species. Given that the Russian River is the largest watershed occupied by CCC coho salmon and that it is centrally located in this ESU, it is unlikely that the CCC coho can be recovered without a successful restoration of coho salmon habitat and runs in the Russian River.

Project Effects on Species Survival and Recovery

We conclude that the proposed project operations are not likely to appreciably reduce the likelihood of CC Chinook salmon survival and recovery in the Russian River. We conclude this because the project is unlikely to reduce the abundance of spawners, the growth rate, spatial structure, or genetic diversity of the Russian River population of Chinook salmon. We base this finding on the following facts: 1) the population has experienced a generally positive growth over the past ten years, 2) the project does not cause significant adverse effects to the species' habitat, 3) the project will maintain the same freshwater conditions that have supported the recent growth of the Chinook salmon population, and 4) the action does not impact the species in such a way as to make it more vulnerable to other factors and environmental variation that are outside the control of the action.

Unlike the situation for Chinook salmon, the proposed project will likely have substantial adverse effects on both the coho salmon population and several steelhead populations in the Russian River watershed. The proposed flow management plan for CVD and WSD, the water level management plan for the river's estuary, and the ongoing channel maintenance activities in Dry Creek substantially influence the abundance, growth rate, and spatial structure of populations of steelhead and coho salmon in the Russian River. As proposed, the flow management plan will perpetuate status quo flows that strongly influence habitat suitability while the steelhead populations in the watershed experience negative growth trends due to other diverse developmental activities throughout the watershed. Elevated inflows to the estuary, the upper mainstem, and Dry Creek during the low flow season, and channel maintenance activities will continue to suppress populations of steelhead in the basin and impair recovery processes; instead populations of steelhead will likely continue to decline through degradation of habitats stemming from status quo project operations and diverse non-project related activities. Given that the Russian River supports nine steelhead populations, including one functionally independent population and six potentially independent steelhead populations, and that the river's populations span two of the five diversity strata (*i.e.*, major groups of populations) within the CCC steelhead, the survival and recovery of this DPS will likely depend on successful efforts to increase the abundance, spatial structure, diversity, and growth rates of Russian River steelhead populations. Likewise, given the central location of the Russian River in the range of CCC coho and that the watershed represents a third of the ESU by area, the survival and recovery of CCC coho salmon will likely depend on a substantial positive trend in the growth rate and abundance of coho salmon in the Russian River. The coho population is appreciably affected by the continued loss of juvenile coho that are likely displaced from Dry Creek due to high summer flows that limit habitat availability and by the continued channel maintenance practices that prohibit natural channel processes that create suitable rearing habitats for the species.

Conclusions

After reviewing the best available scientific and commercial data, the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the continued operations of CVD and WSD for a fifteen year period in a manner similar to recent historic practices together with SCWA's proposed ongoing water diversions from the Russian River and its proposed stream channel maintenance activities, estuary management, and hydroelectric project operations at CVD and WSD are not likely to jeopardize the continued existence of threatened CC Chinook Salmon. However, we find that the continued operations of CVD and WSD in a manner similar to recent historic practices together with proposed Dry Creek stream channel maintenance activities and estuary management are likely to jeopardize the continued existence of threatened CCC steelhead and endangered CCC coho salmon.

After reviewing the best available scientific and commercial data, the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS biological opinion that the continued operations of CVD and WSD for a fifteen year period in a manner similar to recent historic practices together with

SCWA's proposed stream channel maintenance activities and estuary management are likely to adversely modify critical habitat for CCC coho salmon and CCC steelhead. It is NMFS opinion that the proposed project is not likely to adversely modify critical habitat for CC Chinook salmon.

Reasonable and Prudent Alternative

To avoid the likelihood of jeopardy to the species and adverse modification of critical habitat, NMFS has collaborated with the Corps and SCWA in developing a Reasonable and Prudent Alternative (RPA) for this project that is consistent with the intended purpose of the action, can be implemented consistent with the legal authority and jurisdictions of the Corps and SCWA, is economically and technologically feasible, and would avoid the likelihood of jeopardizing the continued existence of listed species or the destruction or adverse modification of critical habitat. This RPA involves implementation of the project as described in Section III of this biological opinion, with modifications and additional actions as described in Section X.A of this opinion. In summary, new or modified actions that will be part of the Russian River Water Supply and Flood Control Project will include:

1. SCWA will petition the SWRCB to change minimum bypass flows identified in D1610 for the mainstem Russian River and Dry Creek. SCWA will also complete all necessary environmental documentation and other activities within its jurisdiction to promote changes to D1610 minimum flow standards as identified in Section X.A.1
2. SCWA will collaborate with NMFS and modify their estuary water level management in order to reduce marine influence (*i.e.*, high salinity and tidal inflow) in the estuary and promote a higher water surface elevation in the estuary for purposes of enhancing the quality of rearing habitat for age 0+ and 1+ steelhead. A program of potential incremental steps is described to address this issue. These include adaptive management of the outlet channel, investigation and possible elimination of impacts of the jetty at the river's mouth on lagoon formation, and alternative approaches to flood risk reduction (e.g., elevating structures or other methods). SCWA will monitor the response of water quality, invertebrate production, and salmonids in and near the estuary to water surface elevation management in the estuary-lagoon system.
3. The Corps and SCWA will implement and monitor on-the-ground enhancements of rearing habitat that will avoid adverse modification of critical habitat and appreciably increase the survival of juvenile salmonids in Dry Creek during both summer and winter months. To do this, SCWA will enhance the quality and quantity of pool habitat along the 14 mile segment of Dry Creek and install boulder clusters to improve rearing habitat for steelhead and coho salmon in Dry Creek. These enhancements, which will ameliorate habitat conditions adversely affected by high summer flow releases, will be distributed at several locations along Dry Creek and the timing of their installation will be staggered to begin by Year 5 and be completed by Year 12. Because the initial design, permitting, and construction of this work will take up to five years to complete, SCWA will also restore or otherwise enhance rearing habitat for salmonids in tributaries that enter Dry Creek downstream of WSD or other Russian River tributaries supporting coho salmon and steelhead by the end of Year 3 covered by this opinion. The Corps will assist the

SCWA in promoting enhancements of winter high flow refuge habitat for rearing coho and steelhead in Dry Creek.

4. SCWA will investigate the feasibility of constructing a pipeline to deliver water from Lake Sonoma to the mainstem of the Russian River in order to reduce the adverse effects of relatively high flow releases from WSD on rearing habitat for coho salmon and steelhead. An assessment of bypass pipeline alternatives will enable SCWA to identify the best method to ensure water deliveries while meeting salmonid habitat needs in Dry Creek in the unlikely event that habitat enhancement efforts in Dry Creek are unsuccessful in supporting successful growth and survival of juvenile steelhead and coho salmon.
5. The Corps will strengthen the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) by conducting needed 1) annual genetics analysis and 2) annual monitoring of the distribution and survival of stocked juvenile salmon and the subsequent return of adult coho to the Russian River.
6. SCWA will fund the implementation of an expansion of the RRCSCBP to include the annual rearing and stocking of 10,000 coho smolts genetically managed via the wild coho broodstock program.
7. The Corps will install a new back-up water supply pipeline to the Warm Springs Hatchery, and complete construction of additional rearing facilities for the coho salmon broodstock program.
8. Consistent with recent historic monitoring efforts, SCWA will annually monitor the upstream migration of adult salmonids at the Mirabel Dam between late August and late fall, and they will annually monitor downstream migration of juvenile salmonids past the Mirabel Dam during spring and early summer for 15 years.

Incidental Take Statement

This biological opinion provides an Incidental Take Statement for the taking of listed salmonids that is likely to occur due to the implementation of the proposed action and RPA for this project. Under the terms of section 7(b)(4) and section 7(o)(2), the identified incidental take is not considered to be prohibited taking under the ESA, provided that it is in compliance with the Terms and Conditions included with the incidental take statement.

Key terms and conditions include:

1. The Corps will initiate a study, complete a feasibility report, and then construct a low flow bypass pipe at the CVD by October 1, 2013.
2. The Corps will conduct a field study to investigate potential alternative ramp down criteria for flood control releases to try and minimize stranding downstream from CVD. The Corps will adjust ramping rates to minimize impacts to fisheries if they will allow flood control to be maintained.
3. The Corps will conduct studies to investigate the effects of CVD and WSD operations on turbidity in the Russian River. If turbidity from CVD or WSD is adversely affecting listed salmonids, the Corps shall complete and begin implementation of a plan to minimize and avoid these adverse effects by no later than 2014.

4. The Corps, SCWA, MCRRFCD or their designees shall ensure that relocation of salmonids from in-channel flood control work areas is accomplished by means that minimize harm and mortalities of listed salmonids.
5. SCWA shall complete design of the new fish screen at Mirabel within three years of the issuance of this biological opinion, and replace the fish screen within three years after completion of the design. Also within three years of the issuance of this opinion, SCWA shall decommission or modify the infiltration ponds on the East side of the Russian River at the Mirabel/Wohler facility to prevent fish entrapment in these ponds during flood events.
6. For the next fifteen years, the Corps will conduct genetic management and genetic assessment of the DCFF and CVFF steelhead programs.
7. SCWA shall undertake measures to ensure that injury and mortality to listed salmonids resulting from fish monitoring at Mirabel dam, in the estuary, and in Dry Creek are low.
8. SCWA will undertake measures to ensure that harm and mortality to listed salmonids from adaptive management of the sandbar at the mouth of the Russian River are low.

Endangered Species Act
Section 7 Consultation

BIOLOGICAL OPINION

for

Water Supply, Flood Control Operations, and Channel Maintenance conducted by the U.S. Army Corps of Engineers, the Sonoma County Water Agency, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District in the Russian River watershed

PCTS Tracking Number: F/SWR/2006/07316

Action Agency: U.S. Army Corps of Engineers, San Francisco District

Consultation Conducted By: National Marine Fisheries Service, Southwest Region

Date Issued: September 24, 2008

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Table of Acronyms

Ac-ft	acre-feet
BA	Biological Assessment
CDFG	California Dept. Fish & Game
CESA	California Endangered Species Act
CHART	Critical Habitat Analytical Review Team
CIE	Center for Independent Experts
Corps	U.S. Army Corps of Engineers
CVD	Coyote Valley Dam
CVFF	Coyote Valley Fish Facility
D1610	SWRCB Water Right Decision 1610
DCFH	Don Clausen Fish Hatchery
DPS	Distinct Population Segment
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
EWSL	Emergency water supply line
FMEP	Fishery Management & Evaluation Plan
HGMP	Hatchery and Genetic Management Plan
LMHPP	Lake Mendocino Hydroelectric Power Plant
LWD	Large woody debris
MCRRFCD	Mendocino County Russian River Flood Control and Water Conservation Improvement District
MOU	Memorandum Of Understanding
NCPA	Northern California Power Agency- (member: *City of Ukiah*)
NCRWQCB	North Coast Regional Water Quality Control Board
NMFS	National Marine Fisheries Service
PCE	Primary Constituent Element (*of critical habitat*)
ppm	parts per million
ppt	parts per thousand
RCD	Resource Conservation District
RPA	Reasonable and Prudent Alternative
RRCSCBP	Russian River Coho Salmon Captive Broodstock Program
SCWA	Sonoma County Water Agency
SWRCB	State Water Resources Control Board
TRT	Technical Recovery Team (*for listed species Recovery Plans*)
VSP	Viable Salmon Population
WSD	Warm Springs Dam
WWTP	Wastewater Treatment Plants
YOY	Young-of-Year (*i.e.*, age 0+ fish)

EXECUTIVE SUMMARY

Pursuant to Section 7(a)(2) of the Federal Endangered Species Act (ESA), NOAA's National Marine Fisheries Service (NMFS) consulted with the U.S. Army Corps of Engineers (Corps) regarding its operations of Warm Springs Dam (WSD) and Coyote Valley Dam (CVD) and a suite of activities that are authorized by the Corps and undertaken by the Sonoma County Water Agency (SCWA) and the Mendocino County Russian River Flood Control and Water Conservation Improvement District (MCRRFCD). The Corps, the SCWA, and the MCRRFCD have proposed to implement, for an additional 15 years, ongoing practices and operations at WSD and CVD and activities related to flood control, water diversion and storage, regulation of flows in the Russian River and Dry Creek, estuary management, hydroelectric power generation, channel maintenance, and fish hatchery production.

These actions likely affect Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*), CCC coho salmon (*O. kisutch*), and California Coastal (CC) Chinook salmon (*O. tshawytscha*), each of which is protected as threatened or endangered under the ESA. The proposed actions also likely affect designated critical habitat for these species. The purpose of this consultation is to provide a determination regarding whether the Corps has insured that the proposed project is not likely to jeopardize one or more of these species or destroy or adversely modify their designated critical habitat. If a project is found to jeopardize a species or adversely modify its critical habitat, NMFS must develop a Reasonable and Prudent Alternative (RPA) to the proposed project in coordination with the federal action agency and any applicant. If the project is also expected to result in the incidental take of listed species, NMFS must also provide reasonable and prudent measures (RPM's) to minimize and monitor the impact of the incidental take of listed species.

In this document, we present our analysis and conclusions in the conventional format for biological opinions as described in the Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and NMFS 1998). This biological opinion includes reviews of the *Consultation History*, a *Description of the Proposed Action*, the *Status of the Species and Critical Habitat*, and the *Environmental Baseline*. Following those reviews we provide an analysis of the *Effects of the Proposed Action*, *Cumulative Effects*, and an *Integration and Synthesis* section in which we analyze the effects of the project in the context of the species status and environmental baseline. This biological opinion concludes with NMFS' determination regarding the impacts of this proposed project on the species' likelihood of survival and recovery, and on the value of the species' critical habitat. Because we have determined that this proposed project is likely to jeopardize the continued existence of some of the salmonid species affected by the proposed project, and adversely modify their critical habitats, we have provided a *Reasonable and Prudent Alternative* (RPA) to the proposed action that 1) avoids jeopardy to the species and adverse modification of critical habitat, 2) can be implemented in a manner consistent with the intended purpose of the action, 3) is economically and technically feasible, and 4) is within the legal authorities of the Corps, SCWA, and MCRRFCD.

The Proposed Action

NMFS analyzed the effects of continued operation of the Russian River Water Supply and Flood Control Project (Project) for a 15 year period on ESA-listed threatened and endangered salmonid species within the Russian River watershed. The Project includes operation of two dams and appurtenant facilities in the Russian River watershed. Together, these facilities are operated to control flooding within the watershed, to supply water to users within and outside the watershed, and to generate hydroelectric power. The altered flow regimes caused by the Project change the natural hydrology of the Russian River estuary, and artificial breaching of a barrier beach at the mouth of the river is often required to prevent flooding adjacent to the estuary. In addition, the Project includes channel maintenance activities that keep the water delivery system functional and reduce the impacts of flooding in the mainstem and some tributaries of the Russian River. The Project also includes operation of two fish hatchery facilities, the Don Clausen Fish Hatchery (DCFH) located at WSD and the Coyote Valley Fish Facility (CVFF) at CVD. SCWA's scope of maintenance responsibilities covered under this Biological Opinion includes maintenance of stream channels and small reservoirs throughout most of an area that SCWA terms Zone 1A, which consists of the Laguna de Santa Rosa watershed, as well as maintenance activities on the Russian River main stem and the segment of Dry Creek downstream from WSD. The Corps' maintenance activities include safety inspections at the two dams. In addition, MCRRFCD conducts channel maintenance activities related to the CVD in the Mendocino County portion of the Russian River. Channel maintenance by both counties is related to Federal sites and inspection of levees under Public Law 84-99 (non Federal sites), but this consultation does not include implementation of the current Corps Operations and Maintenance manual for channel maintenance in the Russian River watershed. Instead, NMFS is consulting on channel maintenance practices as described in Section III.B and referenced to the Corps and SCWA's Biological Assessment where appropriate.

In the initial draft of this Biological Opinion, dated July 11, 2007, NMFS analyzed the implementation of ongoing project operations for ten years, because SCWA and the Corps were contemplating potential complex, future changes in project flow release schedules associated with new water rights and other avenues for increasing reservoir water supplies. Such changes were likely to take at least ten years to accomplish. We were unable to fully analyze both short-term ongoing and future water supply scenarios because of the uncertainties and limited available information about those future scenarios. Originally, the Corps, SCWA, and NMFS agreed that it was prudent to evaluate project effects for the next ten year period because future changes in water supply operations contemplated by SCWA would likely take ten years to fully analyze and develop the permits and water rights agreements/decisions that may yield additional water rights and water supply that would affect flows and habitat in the Russian River and Dry Creek.

During work on the RPA, the Corps, SCWA, and NMFS determined that a major component of the RPA would take up to fifteen years to complete. The remediation of project impacts to designated critical habitat in Dry Creek would take 12 to 15 years to accomplish. NMFS transmitted a working draft biological opinion to the Corps and SCWA on August 1, 2008, and indicated that the timeframe for analysis of the original proposed project would need to be changed from ten years to fifteen years (NMFS 2008b). NMFS also indicated in transmitting the

working draft that the RPA did not ensure that resulting project operations would not likely jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Because the project's impact on critical habitat could not be fully addressed in a ten year period, NMFS, the Corps, and SCWA agreed to amend the period of the proposed project from ten to fifteen years (Russian River Project Executive Committee Meeting August 4, 2008). The RPA's approaches to addressing impacts to critical habitat were also discussed between SCWA and NMFS and modified subsequent to the August 1, 2008 working draft.

The water supply and flood control elements of the Project involve the regulation of flood flows to control flooding in properties adjacent to the Russian River, and the storage of water in two reservoirs to be released for water supply in Sonoma, Mendocino, and Marin counties during the spring, summer, and fall. The water supply is released from the reservoirs and flows down the main stem Russian River and Dry Creek to diversion points downstream of the dams. Part of the water stays in the river channel and flows to the Pacific Ocean at the river's mouth near Jenner. The diverted water is delivered to end-users for municipal, industrial, agricultural, and domestic uses.

The keystone elements of the project are CVD, on the East Branch headwaters of the Russian River, and WSD on Dry Creek, a main tributary of the Russian. Russian River water is released from Lake Mendocino (the reservoir formed by CVD) for flood control, and, under the requirements of the State Water Resources Control Board's (SWRCB) Decision 1610 (D1610) for water supply. The Coyote Valley Fish Facility (CVFF) was constructed in 1992 at the base of CVD to mitigate for the loss of salmonid habitat and natural salmonid production upstream of CVD. Water released from Lake Sonoma (the reservoir formed by the WSD) is also released for flood control and water supply. The Don Clausen Fish Hatchery (DCFH) was built at the base of WSD to mitigate for the loss of fish habitat and anadromous salmonid production in the upper Dry Creek watershed. The operation and programmatic purpose of the hatchery has changed to a more adaptive program since its inception. There have been operational changes towards salmonid conservation and recovery to further mitigation goals and to fulfill the Corps' obligation under Section 7 (a)(1) of the ESA. D1610 establishes minimum flow requirements for both Dry Creek and the Russian River. Minimum stream flows under D1610 are specified for four different reaches in the Russian River watershed, assuring high enough summer flows to meet the diversion requirements as well as river-based recreational uses.

In addition to the two major dams in the Russian River watershed, there are several small storage reservoirs, levees, temporary dams, and other elements of the system that contribute to accomplishing the water supply and flood control goals of the Project and are discussed in subsequent sections of this consultation.

Status of the Species and Critical Habitat

In this opinion, NMFS assessed the condition of each of the three listed salmonid species relative to their extinction risk; we also describe the function and role of their respective critical habitats for species conservation. The CCC coho salmon includes coastal populations in rivers entering the ocean along the coasts of Mendocino, Sonoma, Marin, San Mateo and Santa Cruz counties.

The CCC steelhead includes populations ranging from those in the Russian River south to streams in Santa Cruz County, plus populations in streams entering San Francisco Bay (*e.g.*, Sonoma Creek, Napa River, Alameda Creek). CC Chinook salmon include populations of this species in coastal streams ranging from the Russian River north to Humboldt County's Redwood Creek. Our assessment of the status of these species examined the viability (per the framework described by McElhany *et al.* 2000) of populations in four to five distinct geographic areas (termed diversity strata) that constitute each species. For this, we used the diversity strata identified by Spence *et al.* (2008).

Our assessment of extinction risk focuses on the viability of individual populations in each diversity strata in order to appropriately apply the ESU viability criteria provided by Spence *et al.* (2008), which is the current definitive source for ESU viability evaluation. Spence *et al.* (2008) report that for an ESU or DPS to be viable, "representative", "redundancy", and "connectivity" criteria must be met.

CCC coho salmon, which is listed as Endangered, faces the highest risk of extinction of the three salmonid species considered in this opinion. This is evidenced by their precipitous decline in abundance during the last several decades and poor status of population viability metrics (abundance, population growth rates, spatial structure, and genetic diversity). Wild populations of this species were extirpated in the nearby Salmon and Walker Creek watersheds; their distribution has been very highly reduced in the Gualala watershed. The cause of this decline is likely the widespread degradation of habitat, particularly those habitat attributes that support freshwater rearing life stages. The loss of this habitat and the concurrent extirpation of local populations have resulted in a high degree of isolation for the remaining populations.

CCC steelhead is listed as a Threatened Species. Its habitat is degraded throughout the Distinct Population Segment, especially in the two diversity strata with streams bordering San Francisco Bay. However, the diverse life-history strategies of steelhead have helped reduce this species' extinction risk overall. For example, the highly variable time of instream residence (one year to several years) and spawning age allow for effective temporal dispersal within a population. Also individuals within this species are able to spawn in multiple years, unlike coho and Chinook salmon which die shortly after spawning. CCC steelhead appears to be doing best in the more coastal environments and seems more challenged, but persistent in the more inland and urbanized areas. The overall extinction risk of this species is moderate.

The extinction risk for CC Chinook salmon, which is listed as a Threatened Species, is likely intermediate between that of CCC coho salmon and CCC steelhead. Their habitat condition is somewhat better than for the other species mainly because their range lies well north of San Francisco Bay and they do not occupy rearing habitats throughout the summer when stream flows can be very low or negligible. However, habitat degradation is still widespread and is particularly an issue in the upper Eel River. Excluding the reduced returns in 2007, the resurgence in abundance in the Russian River and in other southerly watersheds of this ESU suggests favorable conditions not entirely explained by freshwater habitat analysis. In any case, the more restricted life-history strategy compared to steelhead, relative spatial isolation of the Russian River population, and habitat condition in the Eel River make the extinction risk for CCC Chinook salmon higher than for CCC steelhead.

Environmental Baseline

The environmental baseline section provides the reference point for the listed species and their habitats within the action area to which NMFS adds the effects of the proposed action. The action area includes the Russian River and its tributaries downstream of WSD and CVD. This large action area is necessary because of the need to address the impacts of straying hatchery fish in the watershed. However apart from that issue, our effects analysis was primarily focused on: 1) the East Branch Russian River below CVD and the main stem Russian River from the confluence of the East Branch to the river's mouth at Jenner, 2) Dry Creek downstream of WSD, and 3) areas of the Mark West Creek watershed that do not contain coho salmon, including Santa Rosa Creek and its tributaries, and the Laguna de Santa Rosa. Because channel maintenance activities in Zone 1A and other project actions were not proposed for portions of the Mark West Creek watershed upstream of its largest tributary the Laguna de Santa Rosa, it was unnecessary to focus on that portion of Zone 1A.

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal Projects that have already undergone consultation under Section 7 of the ESA, and the impact of State or private actions which are contemporaneous with the consultation process. By establishing the historical and current condition of the species and their habitat in the action area, we describe those conditions to which the effects of the project under consultation are added in our analysis of the project. Our ability to understand factors contributing to the baseline condition is also important for predicting future baseline conditions and likely responses of salmonids to the effects of the proposed action.

Urban, residential, and agricultural developments, timber harvest, road construction, water supply and flood control management activities have had a collective adverse effect on the quality and quantity of spawning, rearing, and migratory habitats for steelhead, coho salmon, and Chinook salmon in the Russian River watershed. Prior to the construction in 1908 of the Potter Valley Hydroelectric Project, which conveys water from the upper Eel River to the upper Russian River, late summer flows in the Russian River were in the vicinity of 20 to 30 cfs. Now with that project, the construction of Scott Dam on the Eel River, CVD, and WSD, the Russian River sustains flows over 185 cfs throughout much of the mainstem and at least 125 cfs flows to the ocean in most summers. Prior to these projects, the river's estuary likely closed during summer months with a barrier beach that formed a large freshwater lagoon providing high quality rearing habitat for steelhead and coho salmon.

Prior to European settlement, the mainstem Russian River was a dynamic meandering river which migrated across its floodplain creating ox-bows and side sloughs. Most of the 110 miles of mainstem and many hundreds of more miles in the tributaries were likely historically available to salmonids for spawning and juvenile rearing (SEC 1996). Both the mainstem and tributaries very likely had an abundance of large woody debris in the form of root wads and fallen logs that created scour pools and provided cover and foraging sites for rearing salmonids (SEC 1996). Summer flows were much lower in the mainstem; however, numerous deep pools likely stratified and contained lower cooler layers. Stream channelization, road construction along stream

margins, bank stabilization, and water diversions in tributaries have significantly degraded stream habitats throughout the watershed by simplifying stream channels, isolating them from their flood plains, greatly increasing sedimentation, blocking fish migrations, and reducing or eliminating flow and cover.

Effects of the Proposed Action

Listed salmonids are adversely affected by operations for flood control at the two project dams, by project flow releases for water supply, by the management of estuary water levels, by the project related hatchery operations, and by channel maintenance activities in both the mainstem and Russian River tributaries. We did not find significant impacts specific to the operations of the small hydroelectric facilities at CVD and WSD.

Flood control releases at CVD have increased the duration of high flows that scour stream substrates and salmonid spawning habitats in the segment of the mainstem Russian River immediately downstream of the East Branch. In addition, the project's proposed rates of flow ramp down of 250 cfs/hr (when flows are 250-1000 cfs) and 1000 cfs/hr (when flows exceed 1000 cfs) likely cause both CC Chinook salmon and CCC steelhead fry and juveniles to be stranded in isolated pools or beached in dewatered areas. The stranded fry and juveniles are likely to experience higher rates of predation. Some fry and juveniles are likely to be stranded in disconnected pool areas that may not become reconnected depending on flow regime, resulting in the death of these fish. Pre-flood and five-year periodic inspections at CVD, which are conducted during late summer, adversely affect juvenile steelhead because the Corps shuts off stream flow at CVD for about two hours with resulting loss of salmonid rearing habitat in the East Branch and stranding of juvenile steelhead in the remaining isolated pools. CVD is also known to release highly turbid water for extended periods well after turbidity levels have diminished upstream of the mainstem's confluence with the East Branch and elsewhere in the river's unregulated tributaries.

Flood operations at WSD likely cause minor scouring of spawning habitat in Dry Creek in the three mile segment immediately below the dam. We estimate that 5 to 10% of the salmonid redds constructed in this segment are likely to be scoured (*i.e.*, lost) when WSD releases are 5000 cfs or greater. The proposed rates of ramp down for WSD flood control operations, which are the same as above for CVD, are expected to cause stranding of fry and juvenile salmon and steelhead in the three mile segment immediately below the dam. However, the steep banks and lack of side channels in this segment are generally not conducive to high stranding rates. The continuous 25 cfs minimum bypass flow at WSD will likely avoid stranding and beaching of juvenile steelhead or coho salmon during annual pre-flood and five-year periodic inspections.

Flood control operations at the dams will affect stream flows in Dry Creek and the main stem during and shortly after heavy precipitation and runoff in winter or early spring. These operations limit peak flows by storing water in the reservoirs, after which the Corps releases those waters downstream during an extended period when flood risk has abated.

During winter and early spring, the dams generally have a relatively modest influence on stream flow in the Russian River and Dry Creek because of the substantial, unregulated inflow from numerous tributaries. However, during the low flow season (approximately late May through October) releases from WSD and CVD for water supply significantly affect stream flow and available rearing habitat for steelhead and coho salmon, which rear in freshwater habitats throughout the summer months. The project's proposed flow management at WSD and CVD during late spring, summer, and fall has a clear adverse effect on the availability of rearing habitat for steelhead in the14.1 mile segment of Dry Creek, in 34 miles of the upper Russian River, and in the river's estuary. The project's proposed flow management also adversely affects the quality and quantity of rearing habitat and survival of juvenile coho salmon in Dry Creek. Although the upper main stem Russian River and Dry Creek support good quality spawning habitat for listed salmonid species, salmonid fry that emerge from the gravels of Dry Creek and the upper Russian River will encounter limited suitable quality rearing habitats because much of the stream areas have excessive current velocities. This will lead to increased mortality of juvenile steelhead and coho salmon. The proposed flow regime will also affect the survival of juvenile salmonids that emigrate downstream from tributaries into Dry Creek or the upper Russian River. Juvenile Chinook salmon rear in freshwater only until late spring or early summer when they then enter the ocean environment. For that reason, regulation of late spring and summer flows has much less effect on rearing juvenile Chinook than the other two species.

Proposed project operations will likely have significant adverse effects on the Russian River's estuarine rearing habitat for each salmonid species. The proposed project will sustain high, artificial inflows to the estuary during the low flow season and it will entail detrimental sandbar breaching activities at the mouth that will significantly affect water quality in the lowermost segment of the river. The artificial breaching creates a near marine environment, with shallow depths and high salinity throughout most of the water column; in some areas salinity stratification contributes to low dissolved oxygen at the bottom. The combination of artificially high flows entering the estuary during summer months and the proposed plan for breaching the estuary mouth is likely to result in the loss of productive rearing habitat for small juvenile salmonids at the mouth of the Russian River. This habitat is lost because the Russian River estuary will not remain closed long enough to form a freshwater lagoon during the low flow season in most years. This degradation of estuarine habitat will contribute to reduced survival of juvenile salmonids that emigrate to the estuary.

SCWA and MCRRFCD propose to continue bank protection, including repair or replacement of riprap, gravel bar grading, and vegetation maintenance on the main stem Russian River. Over the course of the 15 year project, no more than 30,000 lineal feet of the Russian River will be affected by channel maintenance activities. This represents about 6% of the entire Russian River mainstem. Each county may work as much as 2000 feet of main stem channel per year, but neither county may work on more than 15,000 feet of channel over the course of the 15 year project. Sonoma County will also conduct channel maintenance within constructed flood control channels and portions of natural waterways within Zone 1A (largely the Laguna de Santa Rosa and Santa Rosa Creek watersheds). We conclude that channel maintenance in the Russian River mainstem and Zone 1A will not appreciably degrade the value of critical habitat for listed salmonid species. However, we estimate numbers of juvenile steelhead that will likely perish

each year due to this maintenance activity. We also find that anticipated erosion control practices along the banks of Dry Creek are likely to degrade rearing habitats for salmonids.

The Corps' fish hatchery operations are required as mitigation for the loss of wild salmon and steelhead production due to construction of WSD and CVD. The hatchery program is currently operated to rear and stock coho salmon and steelhead trout. The DCFH coho salmon mitigation and enhancement program began in 1980; however, coho production at the facility was stopped entirely in 1996, after failing to meet mitigation goals. In 2001, the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) was initiated at DCFH to prevent extirpation of coho salmon in the Russian River basin, preserve genetic, ecological, and behavioral attributes of Russian River coho salmon while minimizing potential effects to other stocks and species, and to reestablish self-sustaining runs of coho salmon in tributary streams within the Russian River basin.

The RRCSCBP involves the collection of wild, juvenile coho salmon from Russian River tributaries. The wild juveniles are reared to reproductive maturity and then artificially spawned according to a genetic spawning matrix to maximize genetic diversity and avoid inbreeding. Juvenile coho salmon produced from the captive broodstock are then released into several Russian River tributaries as fry, where they rear, over-winter, migrate to the ocean, and then return as adults to spawn naturally in the streams. Each year since 2001, the program has reared and stocked coho salmon with lineage to wild juvenile coho salmon collected in Russian River tributaries. The RRCSCBP also includes an evaluation component, in which the survival of stocked juvenile coho salmon and the subsequent adult returns to tributary streams are monitored. At present, the genetics management and evaluation components (field monitoring) of this program do not have long term funding commitments.

The proposed continuation of the captive broodstock program will have objectives and methods similar to the existing RRCSCBP. The RRCSCBP is currently authorized under an ESA section 10(a)(1)(A) enhancement permit issued to CDFG, which acts as a contractor to the Corps for this hatchery requirement. Since the effects of the RRCSCBP have already been evaluated and covered by a permit, this program is not evaluated as part of the proposed action in this biological opinion, but it is included in the Environmental Baseline of this biological opinion. The lack of committed funding for the annual genetics management and field monitoring for the program threatens the viability of this program. The lack of an emergency water supply line to the DCFH also poses a significant threat to the RRCSCBP.

The steelhead hatchery program was not previously authorized under the ESA. That program involves the spawning of several hundred adults, the rearing of fry and juveniles, and the annual stocking of a combined total of about 500,000 steelhead smolts into Dry Creek and the upper Russian River. Recent genetic information on Russian River steelhead indicates that there are no substantial genetic differences between wild and hatchery propagated steelhead in the basin. Continued exclusion of wild steelhead from hatchery spawning stock could result in a divergent hatchery population with reduced genetic diversity and increased inbreeding. The stocking of hatchery smolts may have some adverse effects to wild populations through their predation or competition with wild fish. However, we believe those effects are relatively minor, because hatchery fish are stocked only into Dry Creek and the East Branch (near the confluence with the

upper main stem Russian River) when they are in a migratory stage and not acclimated to survival in the wild, and most migrate within a few weeks to the ocean. The hatchery program also promotes a fishery for marked adult hatchery fish in the mainstem Russian River; that fishery results in the capture (with barbless hooks) and release of wild steelhead, coho salmon, and Chinook salmon.

The principal effect of the water diversion facility at Mirabel Wohler is the loss of juvenile salmonids that may become entrained through or impinged on the water intake screens. Some minor loss of salmonids may also be caused by higher rates of predation from fishes (*e.g.*, pike minnow, smallmouth bass) in the Wohler impoundment or from stranding when the inflatable dam is inflated or deflated.

Integration and Synthesis

Project Effects on Critical Habitat

Because adult fall run CC Chinook salmon primarily migrate to spawning habitats during mid to late fall and the resulting progeny migrate downstream to the ocean during the following spring, flow management at WSD and CVD does not have significant adverse consequences for this species. Migrations of adult Chinook salmon appear to actually benefit from the elevated regulated flows during fall months, and rearing juveniles do not contend with the artificially high summer flows that limit available rearing habitat for the other Federally listed salmonid species. Although channel maintenance activities will likely have some adverse effect on spawning and rearing habitats for Chinook salmon, these effects will probably be minor because each year, channel maintenance will affect only a small portion (less than 1 mile) of the 94 mile long main stem Russian River. This 94 mile segment effectively supports rearing habitat for juvenile Chinook salmon along its entire length and spawning habitat at riffles along the approximately 58 mile segment upstream from Healdsburg. Ongoing channel maintenance activities in Dry Creek will likely diminish available rearing habitat for Chinook salmon; however, the extent of habitat loss for rearing Chinook salmon in Dry Creek due to ongoing channel maintenance activities is likely minor given the availability of rearing habitat for this species throughout the main stem Russian River. We conclude that, if the proposed project is implemented, critical habitat for Chinook salmon would remain functional to serve the intended conservation role for this species.

In contrast to the findings for Chinook salmon, the proposed project will likely have significant adverse effects on the critical habitat of steelhead and coho salmon. Because of these adverse effects, critical habitat for steelhead and coho salmon would not be functional to serve the intended conservation role for these species. Proposed flow releases from WSD and CVD during the approximately six-month long, low flow season will create excessively high current velocities that will greatly limit the value of 14 miles of Dry Creek and 34 miles of the upper Russian River as rearing habitat for steelhead. Flow management at the project's reservoirs and breaching of the estuary's bar will also adversely affect the value of steelhead rearing habitat in and near the vicinity of the estuary. Flow releases from WSD during summer and fall months will be so high that available habitat for rearing juvenile coho in Dry Creek will be minimal. Proposed continued channel maintenance activities in Dry Creek will contribute to armoring the

stream banks, reducing velocity refuge areas for fishes during high flows, and simplifying stream channel morphology with potential degradation of both summer and winter rearing habitats for steelhead and coho salmon. The significance of these impacts to critical habitat for rearing steelhead and coho salmon becomes apparent when the status of critical habitat for these species is considered.

Our review of the status of populations of CCC steelhead in the Russian River indicate that freshwater rearing habitat is one of the two primary types of critical habitat that are most degraded. In the Russian River watershed and nearby watersheds, degradation of steelhead rearing habitat is due to channel modifications, chronic deposition of fine sediments, and intensive diversions of surface flow in tributaries. The restoration of viable populations of steelhead within these watersheds will depend upon the restoration of good quality freshwater rearing habitats, including ecologically diverse habitats such as freshwater lagoons and deep main stem habitats for older age 1+ and 2+ fish. The restoration of viable populations of Russian River steelhead would substantially improve the chances for the recovery of the CCC steelhead DPS. However, as proposed, the project's flow management plan (*i.e.*, conformance with D1610, water supply releases, and water elevation management in the estuary) will hamper efforts to recover this species by degrading and, in some cases, eliminating important freshwater habitats in the Russian River.

Likewise, the availability of rearing habitat for coho salmon has been greatly reduced in the Russian River watershed and elsewhere as the result of numerous developmental activities. Coho salmon require especially cold water in which to rear, and developmental activities have undoubtedly limited the availability of such coldwater habitats. As discussed in the Effects Section, approximately 13 miles of Dry Creek provide temperatures that sustain rearing coho salmon; however, high flow releases from WSD during summer and fall months greatly limit the value of the PCE of critical habitat for rearing coho salmon. The proposed project operations appreciably degrade the value of Dry Creek's critical habitat for CCC coho salmon. Successful recovery of this species will very likely require protection, restoration, and enhancement of existing rearing habitats for this species. Given that the Russian River is the largest watershed occupied by CCC coho salmon and that it is centrally located in this ESU, it is unlikely that the CCC coho can be recovered without a successful restoration of coho salmon habitat and runs in the Russian River.

Project Effects on Species Survival and Recovery

We conclude that the proposed project operations are not likely to appreciably reduce the likelihood of CC Chinook salmon survival and recovery in the Russian River. We conclude this because the project is unlikely to reduce the abundance of spawners, the growth rate, spatial structure, or genetic diversity of the Russian River population of Chinook salmon. We base this finding on the following facts: 1) the population has experienced a generally positive growth over the past ten years, 2) the project does not cause significant adverse effects to the species' habitat, 3) the project will maintain the same freshwater conditions that have supported the recent growth of the Chinook salmon population, and 4) the action does not impact the species in such a way as to make it more vulnerable to other factors and environmental variation that are outside the control of the action.

Unlike the situation for Chinook salmon, the proposed project will likely have substantial adverse effects on both the coho salmon population and several steelhead populations in the Russian River watershed. The proposed flow management plan for CVD and WSD, the water level management plan for the river's estuary, and the ongoing channel maintenance activities in Dry Creek substantially influence the abundance, growth rate, and spatial structure of populations of steelhead and coho salmon in the Russian River. As proposed, the flow management plan will perpetuate status quo flows that strongly influence habitat suitability while the steelhead populations in the watershed experience negative growth trends due to other diverse developmental activities throughout the watershed. Elevated inflows to the estuary, the upper mainstem, and Dry Creek during the low flow season, and channel maintenance activities will continue to suppress populations of steelhead in the basin and impair recovery processes; instead populations of steelhead will likely continue to decline through degradation of habitats stemming from status quo project operations and diverse non-project related activities. Given that the Russian River supports nine steelhead populations, including one functionally independent population and six potentially independent steelhead populations, and that the river's populations span two of the five diversity strata (*i.e.*, major groups of populations) within the CCC steelhead, the survival and recovery of this DPS will likely depend on successful efforts to increase the abundance, spatial structure, diversity, and growth rates of Russian River steelhead populations. Likewise, given the central location of the Russian River in the range of CCC coho and that the watershed represents a third of the ESU by area, the survival and recovery of CCC coho salmon will likely depend on a substantial positive trend in the growth rate and abundance of coho salmon in the Russian River. The coho population is appreciably affected by the continued loss of juvenile coho that are likely displaced from Dry Creek due to high summer flows that limit habitat availability and by the continued channel maintenance practices that prohibit natural channel processes that create suitable rearing habitats for the species.

Conclusions

After reviewing the best available scientific and commercial data, the current status of the species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS' biological opinion that the continued operations of CVD and WSD for a fifteen year period in a manner similar to recent historic practices together with SCWA's proposed ongoing water diversions from the Russian River and its proposed stream channel maintenance activities, estuary management, and hydroelectric project operations at CVD and WSD are not likely to jeopardize the continued existence of threatened CC Chinook Salmon. However, we find that the continued operations of CVD and WSD in a manner similar to recent historic practices together with proposed Dry Creek stream channel maintenance activities and estuary management are likely to jeopardize the continued existence of threatened CCC steelhead and endangered CCC coho salmon.

After reviewing the best available scientific and commercial data, the current status of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NMFS biological opinion that the continued operations of CVD and WSD for a fifteen year period in a manner similar to recent historic practices together with

SCWA's proposed stream channel maintenance activities and estuary management are likely to adversely modify critical habitat for CCC coho salmon and CCC steelhead. It is NMFS opinion that the proposed project is not likely to adversely modify critical habitat for CC Chinook salmon.

Reasonable and Prudent Alternative

To avoid the likelihood of jeopardy to the species and adverse modification of critical habitat, NMFS has collaborated with the Corps and SCWA in developing a Reasonable and Prudent Alternative (RPA) for this project that is consistent with the intended purpose of the action, can be implemented consistent with the legal authority and jurisdictions of the Corps and SCWA, is economically and technologically feasible, and would avoid the likelihood of jeopardizing the continued existence of listed species or the destruction or adverse modification of critical habitat. This RPA involves implementation of the project as described in Section III of this biological opinion, with modifications and additional actions as described in Section X.A of this opinion. In summary, new or modified actions that will be part of the Russian River Water Supply and Flood Control Project will include:

1. SCWA will petition the SWRCB to change minimum bypass flows identified in D1610 for the mainstem Russian River and Dry Creek. SCWA will also complete all necessary environmental documentation and other activities within its jurisdiction to promote changes to D1610 minimum flow standards as identified in Section X.A.1
2. SCWA will collaborate with NMFS and modify their estuary water level management in order to reduce marine influence (*i.e.*, high salinity and tidal inflow) in the estuary and promote a higher water surface elevation in the estuary for purposes of enhancing the quality of rearing habitat for age 0+ and 1+ steelhead. A program of potential incremental steps is described to address this issue. These include adaptive management of the outlet channel, investigation and possible elimination of impacts of the jetty at the river's mouth on lagoon formation, and alternative approaches to flood risk reduction (e.g., elevating structures or other methods). SCWA will monitor the response of water quality, invertebrate production, and salmonids in and near the estuary to water surface elevation management in the estuary-lagoon system.
3. The Corps and SCWA will implement and monitor on-the-ground enhancements of rearing habitat that will avoid adverse modification of critical habitat and appreciably increase the survival of juvenile salmonids in Dry Creek during both summer and winter months. To do this, SCWA will enhance the quality and quantity of pool habitat along the 14 mile segment of Dry Creek and install boulder clusters to improve rearing habitat for steelhead and coho salmon in Dry Creek. These enhancements, which will ameliorate habitat conditions adversely affected by high summer flow releases, will be distributed at several locations along Dry Creek and the timing of their installation will be staggered to begin by Year 5 and be completed by Year 12. Because the initial design, permitting, and construction of this work will take up to five years to complete, SCWA will also restore or otherwise enhance rearing habitat for salmonids in tributaries that enter Dry Creek downstream of WSD or other Russian River tributaries supporting coho salmon and steelhead by the end of Year 3 covered by this opinion. The Corps will assist the

SCWA in promoting enhancements of winter high flow refuge habitat for rearing coho and steelhead in Dry Creek.

4. SCWA will investigate the feasibility of constructing a pipeline to deliver water from Lake Sonoma to the mainstem of the Russian River in order to reduce the adverse effects of relatively high flow releases from WSD on rearing habitat for coho salmon and steelhead. An assessment of bypass pipeline alternatives will enable SCWA to identify the best method to ensure water deliveries while meeting salmonid habitat needs in Dry Creek in the unlikely event that habitat enhancement efforts in Dry Creek are unsuccessful in supporting successful growth and survival of juvenile steelhead and coho salmon.
5. The Corps will strengthen the Russian River Coho Salmon Captive Broodstock Program (RRCSCBP) by conducting needed 1) annual genetics analysis and 2) annual monitoring of the distribution and survival of stocked juvenile salmon and the subsequent return of adult coho to the Russian River.
6. SCWA will fund the implementation of an expansion of the RRCSCBP to include the annual rearing and stocking of 10,000 coho smolts genetically managed via the wild coho broodstock program.
7. The Corps will install a new back-up water supply pipeline to the Warm Springs Hatchery, and complete construction of additional rearing facilities for the coho salmon broodstock program.
8. Consistent with recent historic monitoring efforts, SCWA will annually monitor the upstream migration of adult salmonids at the Mirabel Dam between late August and late fall, and they will annually monitor downstream migration of juvenile salmonids past the Mirabel Dam during spring and early summer for 15 years.

Incidental Take Statement

This biological opinion provides an Incidental Take Statement for the taking of listed salmonids that is likely to occur due to the implementation of the proposed action and RPA for this project. Under the terms of section 7(b)(4) and section 7(o)(2), the identified incidental take is not considered to be prohibited taking under the ESA, provided that it is in compliance with the Terms and Conditions included with the incidental take statement.

Key terms and conditions include:

1. The Corps will initiate a study, complete a feasibility report, and then construct a low flow bypass pipe at the CVD by October 1, 2013.
2. The Corps will conduct a field study to investigate potential alternative ramp down criteria for flood control releases to try and minimize stranding downstream from CVD. The Corps will adjust ramping rates to minimize impacts to fisheries if they will allow flood control to be maintained.
3. The Corps will conduct studies to investigate the effects of CVD and WSD operations on turbidity in the Russian River. If turbidity from CVD or WSD is adversely affecting listed salmonids, the Corps shall complete and begin implementation of a plan to minimize and avoid these adverse effects by no later than 2014.

4. The Corps, SCWA, MCRRFCD or their designees shall ensure that relocation of salmonids from in-channel flood control work areas is accomplished by means that minimize harm and mortalities of listed salmonids.
5. SCWA shall complete design of the new fish screen at Mirabel within three years of the issuance of this biological opinion, and replace the fish screen within three years after completion of the design. Also within three years of the issuance of this opinion, SCWA shall decommission or modify the infiltration ponds on the East side of the Russian River at the Mirabel/Wohler facility to prevent fish entrapment in these ponds during flood events.
6. For the next fifteen years, the Corps will conduct genetic management and genetic assessment of the DCFF and CVFF steelhead programs.
7. SCWA shall undertake measures to ensure that injury and mortality to listed salmonids resulting from fish monitoring at Mirabel dam, in the estuary, and in Dry Creek are low.
8. SCWA will undertake measures to ensure that harm and mortality to listed salmonids from adaptive management of the sandbar at the mouth of the Russian River are low.