Draft Biological Assessment

San Anselmo Creek Bridge

Town of Fairfax

FEMA-1628-DR-CA, PW #2338

January 2007

FEMA

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Contract No. HSFEHQ-06-D-0489
Task Order HSFEHQ-06-J-0016

15708016.00100

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Acronyms

BA	Biological Assessment
BMPs	Best Management Practices
°F	degrees Fahrenheit
CDFG	California Department of Fish and Game
cm	centimetres
CNDDB	California Natural Diversity Database
cy	cubic yard
EFH	Essential Fish Habitat
ESA	Federal Endangered Species Act
ESUs	Evolutionarily Significant Units
FEMA	Federal Emergency Management Agency
ft/s	feet per second
mm	millimetres
NMFS	National Marine Fisheries Service
MSFCMA	Magnuson-Stevens Fisheries Conservation and Management Act
OES	Office of Emergency Services
ppt	parts per thousand
SRA	Shaded Riverine Aquatic habitat
sq ft	square feet
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

The Town of Fairfax, through the Governor's Office of Emergency Services (OES), has requested Federal Emergency Management Agency's (FEMA) Public Assistance Program funding to complete a bridge embankment repair project in the Town of Fairfax, California.

This Biological Assessment (BA) documents potential adverse effects to species listed as endangered, threatened, proposed for listing as endangered or threatened, or candidates for listing as endangered or threatened under the federal Endangered Species Act (ESA) that are regulated by the National Marine Fisheries Service (NMFS).

The action area is located in the Town of Fairfax, California, in the south east portion of Marin County approximately 4 miles northwest of the City of San Rafael and 16 miles north of the City of San Francisco (Figure 1). The proposed action consists of construction of a bridge embankment support structure, which drains into San Anselmo Creek (Figure 2). The action area, consisting of a segment of stream bed and bank within San Anselmo Creek, is located in a residential area that abuts the creek.

As a result of the field reconnaissance and background review, it was determined that the action area provides habitat suitable to support one federally listed species under NMFS's jurisdiction: the south central California coast steelhead (*Oncorhynchus mykiss irideus*), which is listed as threatened.

After a literature review, site reconnaissance, communication with individuals knowledgeable about this species and the action area, and consideration of the proposed activities, FEMA has determined that the proposed action with conservation/mitigation measures may affect the south central California coast steelhead. Conservation/mitigation measures are proposed in this document that will avoid or minimize the potential for habitat degradation and other potential adverse effects on the steelhead.

The Town of Fairfax, through the Governor's Office of Emergency Services (OES), has requested Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Program funding to complete a bridge embankment repair project in the Town of Fairfax, CA.

This Biological Assessment (BA) is organized into seven sections. The remaining portion of Section 1 describes the purpose and need for the proposed action. Section 2 describes the action area and proposed action. Section 3 describes the affected environment, including the study methods, habitat description, and the listed, proposed, or candidate species that are relevant to the proposed action. Section 4 evaluates the potential effects on the south central California coast steelhead Evolutionary Significant Unit (ESU) and presents measures to avoid and minimize for potential adverse effects on this species. Potential cumulative effects are presented in Section 5. References are listed in Section 6, and the list of preparers for this report is provided in Section 7.

FEMA has prepared this BA to evaluate potential effects of the proposed action on species that are listed, proposed, or candidate for listing under the ESA that are regulated by NMFS. Potential effects on federal listed species are evaluated in accordance with the legal requirements set forth under Section 7 of the ESA (16 U.S.C. 1536). Criteria used to determine what species were considered for this BA and potential adverse effects to those species from project activities are presented. In addition, this report proposes measures to avoid and/or minimize take or disturbance to potentially affected species. FEMA is consulting separately with the USFWS for potential adverse effects on listed, proposed, and candidate species under their jurisdiction.

1.1 PURPOSE AND NEED

Under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended and Title 44 CFR, the PA Program provides supplemental aid to states and communities to help them recover from major disasters as quickly as possible. Specifically, the program provides assistance for the removal of debris, the implementation of emergency protective measures, and the permanent restoration of public infrastructure. The program also encourages protection from future damage by providing assistance for mitigation measures during the recovery process. Therefore, the purpose of this proposed action is to provide funding to the Town of Fairfax to reduce the long-term risks associated with potential damage from natural hazards.

Heavy rains in California during the winter of 2005/2006 resulted in a Federal Disaster declaration (FEMA-1628-DR) in 30 California Counties and later severe storms, flooding, and landslides resulted in a Federal Disaster declaration (FEMA-1646-DR) in 17 California Counties, 5 of which were not included in the 1628-DR declaration. During the disaster event of December 17, 2005 through January 3, 2006, the high waters and high flow rates of San Anselmo Creek within the Town of Fairfax eroded a creek bridge embankment for approximately 130 feet. This erosion encompassed the 28-foot wide bridge and exposed 10 feet of an auxiliary bridge column that had been buried in the embankment.

2.1 ACTION AREA

The action area is located in the Town of Fairfax, California, in the southeast portion of Marin County approximately 4 miles northwest of the City of San Rafael and 16 miles north of the City of San Francisco (Figure 1). The proposed action consists of construction of a bridge embankment support structure along Creek Road, which spans San Anselmo Creek (Figure 2). The action area includes a segment of stream bed and bank within San Anselmo Creek along Creek Road within the Town of Fairfax, California.

2.2 PROPOSED ACTION

The proposed action consists of the reconstruction of a creek bridge embankment for a length of approximately 130 feet that was eroded during high stream flows. This bank erosion encompassed the 28-foot wide bridge on one side of the creek and exposed 10 feet of an auxiliary bridge column that had been buried in the embankment. The erosion also exposed approximately 50 percent of the bridge's spread footing support that had been supported in the embankment. The erosion also exposed 25 feet of a 12-inch sewer pipe that parallels the underside of the bridge, which was also supported by the embankment.

Details of the construction methods have not been worked out to date; however, exact design parameters would be developed in a specific pre-design plan, most of which would be from recommendations from a geomorphic analysis at the site (Fluvial Geomorphology Consulting, 2006). Construction of the embankment would essentially consist of the removal of a 32 cubic yards (cy) temporary rock barrier, which was placed as an emergency measure upstream of the bank erosion area in an effort to prevent further erosion damage, and erection of temporary sand bag barrier and rock riprap. The temporary sand bag barrier (140 x 4 x 5 feet) would be placed where the temporary upstream rock barrier was placed, around the base of the bridge, and to the downstream extent of the eroded embankment. This sand bag barrier would surround the embankment work area in order to divert stream flow away from the eroded bridge embankment and prevent sediment from entering the stream. The eroded embankment would then be backfilled with approximately 2,987 cy (128 x 35 x 18 feet) of fill material and compacted. Following backfill application, ¼ to ½ ton rock riprap would be placed at a 1:1 ratio from the creek bed to approximately 14 feet in height. Live willow poles would be placed above the rock riprap in order to provide additional vegetative cover to the action area. A bobcat (loader crawler) would most likely be used within the creek bed work area and a crane would be utilized from Creek Road and the creek bank to position construction materials in place.

15708016	FEMA DR-1628 PW #2338 Town of Fairfax Cascade Creek Bridge	**Vicinity Map**	Figure 1

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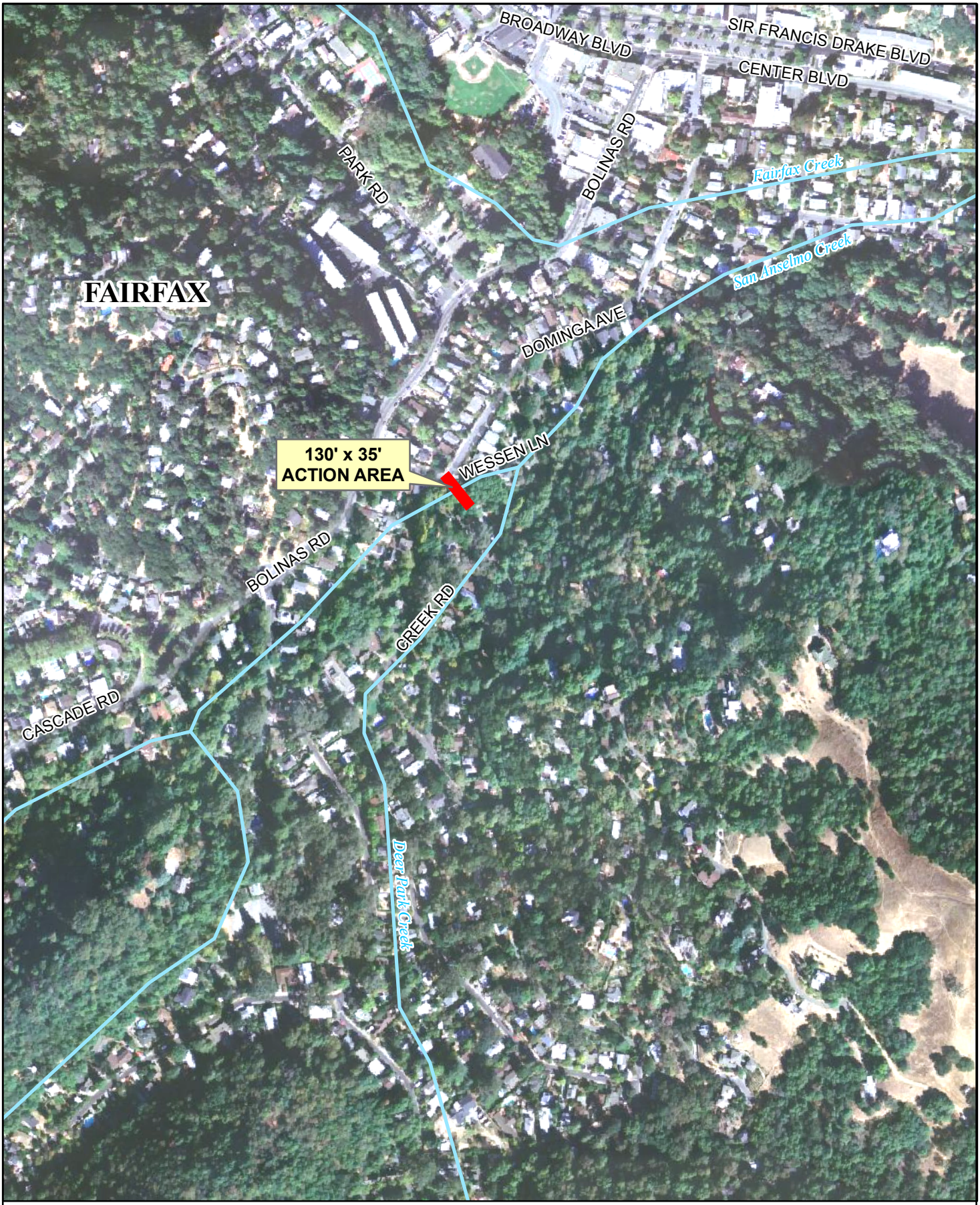

N
W E
S

0 200 400

1 inch = 400 feet

15708016	FEMA DR-1628 PW #2338 Town of Fairfax Cascade Creek Bridge	**Action Area**	Figure 2

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3.1 VEGETATION COMMUNITIES

The action area consists of a mature, closed canopy riparian woodland with native tree species, such as big-leaf maple (*Acer macrophyllum*), California bay (*Umbellularia californica*), and California walnut (*Juglans californica*); the understory is comprised mainly of California blackberry (*Rubus ursinus*). The erosion damage removed all lower creek bank vegetation and exposed native tree roots within the bank; however, erosion damage did not remove upper creek bank trees or reduce stream shading (see Appendix A site photographs). California blackberry has since colonized parts of the eroded stream bank slope.

3.2 STUDY METHODS

FEMA obtained a list of species that are listed as endangered, threatened, proposed for listing as endangered or threatened, or candidates for listing as endangered or threatened under the ESA that may occur in the action area from the following sources:

- The California Department of Fish and Game (CDFG) Natural Diversity Database (CNDDB) records within the following eight USGS 7.5-minute quadrangles that include the action area and vicinity: San Rafael, San Geronimo, Novato, Petaluma Pt., Bolinas, San Quentin, Point Bonita, and San Francisco North. (CDFG 2006).
- A species list from USFWS Sacramento Office website (USFWS 2006) was also obtained for the eight project quadrangles.

The listed wildlife species identified by these sources as having potential to occur in the vicinity of the proposed action that are regulated by NMFS under the ESA are listed in Appendix B, Table B-1. Biologist Greg Hoisington of NISTAC, FEMA's consultant, conducted a site reconnaissance survey of the action area on September 25, 2006, to ascertain the potential presence of these species. General habitat characteristics of the action area were evaluated during the reconnaissance survey and qualitative assessments of each habitat were used to determine whether each of the species identified in Appendix B, Table B-1, are likely to occur in the action area. NISTAC also reviewed available literature to identify the habitat requirements and distribution of the species included in Table B-1.

As a result of the field and background review, FEMA determined that the action area provides habitat suitable to support one federally listed species regulated by NMFS under the ESA:

- South central California coast steelhead (*Oncorhynchus mykiss irideus*)

3.3 SPECIAL STATUS SPECIES

The life history for the steelhead is provided in the following subsection.

South Central California Coast Steelhead

Steelhead (*Oncorhynchus mykiss irideus*) have been divided into Evolutionarily Significant Units (ESUs). The south central California coast steelhead ESU is listed as threatened under the ESA. Steelhead trout are rainbow trout with an anadromous life history and make spawning runs into rivers and small creeks flowing into the ocean. The south central California coast steelhead ESU

encompasses most watersheds in San Luis Obispo, Monterey, and Marin Counties. In general, adult steelhead return to rivers and creeks in the region from October to April. Spawning takes place in the rivers from December to April with most spawning activity occurring between January and March. After hatching, steelhead remain in freshwater for 1 to 4 years before they out-migrate into the open ocean during spring and early summer (Goals Project 2000). Juvenile steelhead can spend up to 7 years in freshwater before moving downstream as smolts from March to May (Busby et al. 1996). Steelhead can spend up to 3 years in saltwater before returning to freshwater to spawn (Barnhardt 1986). Since juvenile steelhead remain in the creeks year-round, adequate flows, suitable water temperatures, and an abundant food supply are necessary throughout the year in order to sustain steelhead populations. The most critical period is in the summer and early fall when these conditions become limiting.

Potential spawning areas require gravels bottoms and specific water conditions. Spawning habitat condition is strongly affected by water flow and quality, especially temperature, dissolved oxygen, and silt load, all of which can greatly affect the survival of eggs and larvae (USFWS 2004). Migratory corridors start downstream of the spawning areas and allow the upstream passage of adults and the downstream emigration of out-migrant juveniles. Migratory habitat condition is strongly affected by the presence of barriers, which can include dams, culverts, flood control structures, unscreened or poorly screened diversions, and degraded water quality (USFWS 2004).

Both spawning areas and migratory corridors comprise rearing habitat for juveniles, which feed and grow before and during their outmigration. Non-natal, intermittent tributaries also may be used for juvenile rearing. Rearing habitat condition and function may be affected by annual and seasonal flow and temperature characteristics. Specifically, the lower reaches of streams often become less suitable for juvenile rearing during the summer. Rearing habitat condition is strongly affected by habitat complexity, food supply, or presence of predators of juvenile salmonids (USFWS 2004).

Steelhead require cool, clean, well-oxygenated water and appropriate gravel for spawning. The preferred water depth of spawning ranges is from about 6 to 24 inches with an optimum around 14 inches. Steelhead spawn utilizing gravel about 0.25 to 5.0 inches in diameter. To some extent the size of gravel that can be used depends on the size of the spawning fish. Spawning and incubation gravels should contain less than 5 percent sand and silt to insure high permeability and oxygen content. While steelhead trout prefer mostly gravel-sized material for spawning, they would also use mixtures of sand and gravel, or gravel and cobble. Steelhead trout may spawn in intermittent streams, but juveniles move into perennial streams soon after hatching. Steelhead trout are generally located where water temperatures range from 50 to 59°F, and their upper sustainable temperature limit is 68°F. Steelhead trout are iteroparous, that is, an individual may survive spawning, return to the ocean and ascend streams to spawn again. However, it is unusual for steelhead trout to spawn more than twice, and it is usually the females that survive to spawn again.

Anadromous steelhead trout have two basic life histories: stream maturing (which enter freshwater with immature gonads) and ocean maturing (which enter freshwater with mature gonads). Stream maturing steelhead, also called summer steelhead, typically enter freshwater in the spring, early summer, or possibly fall. These fish move up to the headwaters of streams, hold and mature in deep pools, and spawn in late fall and winter.

Spawning migrations may be hindered by water velocities of 10 to 13 feet per second (ft/s). Spawning occurs in waters with velocities from 1 ft/s to 3.6 ft/s with an optimum around 2 ft/s. Larger steelhead can spawn at higher stream velocities.

Steelhead trout prefer main channels as opposed to small tributaries. The spawning season for steelhead extends from late December through April, although they would often move up coastal streams in the fall and then hold in deep pools until the spawning period (McGinnis 1984). Migrating fish require deep holding pools (greater than 9 feet), with cover such as underwater ledges and caverns (CDFG 1995). Coarse gravel beds in riffle areas are used for egg laying and yolk sac fry habitat once eggs have hatched.

Juvenile steelhead hatch in 19 to 80 days depending on the water temperature. Gravel emergence occurs about 2 to 3 weeks after hatching. Fry often school and occupy quiet water along the banks of a stream. Back eddies, large woody debris, undercut banks, and undercut tree roots supply good fry habitat. Secondary channel pools with good cover are often used. As the fish grow they occupy individual territories and move to deeper and swifter water with coarser habitat. Most juvenile steelhead occupy riffles. Some of the larger fish may occupy runs or pools, particularly in the absence of coho salmon. Fry require water 2 to 14 inches deep, with an optimum around 8 inches. Parr utilize water from 10 inches deep to 20 inches deep with an optimum of 10 inches. Fry and juvenile steelhead prefer a cobble/rubble sized substrate material, which is slightly larger than that preferred for spawning. Large boulder substrate is important in runs and riffles. Surface turbulence and whitewater are used for overhead cover by juvenile steelhead. Summer rearing habitat with cool water pools and extensive cover for older juvenile steelhead is often limiting on California streams. Juvenile steelhead may migrate either upstream or downstream to find suitable habitat.

Juvenile steelhead are opportunistic drift feeders. While in freshwater steelhead subsist on aquatic invertebrates and terrestrial invertebrates that fall into the water. Larger steelhead are piscivorous (fish-eating).

This section evaluates the potential effects of the proposed action to the south central California coast steelhead and proposes measures to avoid and minimize potential adverse effects.

4.1 POTENTIAL ADVERSE EFFECTS TO STEELHEAD

South central California coast steelhead make spawning runs into river and small creek habitats flowing into the ocean, such as San Anselmo Creek, which is a tributary to the larger Corte Madera watershed and San Pablo Bay. Creek habitat suitable to support the steelhead is present in the action area; San Anselmo Creek has a gravelly bottom with sandy areas and shaded riparian canopy. The riparian vegetation along San Anselmo Creek is a mature, closed canopy system that provides suitable shade cover for the steelhead. The riparian vegetation in the action area along San Anselmo Creek is mainly dominated by big-leaf maple, California bay, California walnut, and California blackberry. This riparian habitat is also intermixed with residential housing and public infrastructure abutting the creek.

South central California coast steelhead has not been previously documented in the San Anselmo Creek; however, juvenile steelhead were observed within and directly downstream from the action area during the site reconnaissance survey for this action. The steelhead is also known by local experts to occur within the creek (Elizabeth Lewis, 2006; Alice Rich, 2006; Personal Communications).

The San Anselmo Creek is designated as critical habitat for the south central California coast steelhead ESU (NMFS 2005), and is identified as Essential Fish Habitat (EFH) under the Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA). The MSFCMA, also known as the Sustainable Fisheries Act (Public Law 104-297), requires all federal agencies to consult with the Secretary of Commerce on activities or proposed activities authorized, funded, or undertaken by that agency that may adversely affect EFH of commercially managed marine and anadromous fish species. The EFH provisions of the Sustainable Fisheries Act are designed to protect fisheries habitat from being lost due to disturbance and degradation.

The Act requires implementation of measures to conserve and enhance EFH. Guidelines from the MSFCMA direct NMFS to use a coordinated process to evaluate projects that may affect EFH under Section 305(b) of the MSFCMA, with required Section 7 consultation process under the Endangered Species Act (ESA). Under existing guidelines if NMFS determines that a proposed project is not likely to adversely affect species listed under ESA that are also managed under the MSFCMA, and an informal consultation process is pursued, then no EFH conservation recommendations are necessary in most cases (NMFS 2001). The proposed action already incorporates several measures that would avoid and/or minimize impacts to EFH, and therefore, additional and specific EFH conservation recommendations would not be necessary.

Take and Disturbance

South central California coast steelhead is known to occur in San Anselmo Creek. Therefore, construction activities from the bridge embankment erosion repair measures could result in indirect and direct disturbance, injury, and/or mortality of this species. During construction of the bridge embankment repair utilizing rock riprap and permanent backfill, incidental take of juvenile steelhead could occur. Construction equipment and associated noise and vibration may also disturb steelhead in the vicinity of the action area. Adverse effects would most likely occur

within stream bed habitat in the action area where the proposed repair would take place and also directly downstream of the action area.

Erosion and Sedimentation

Steelhead could be indirectly affected by potential erosion and sedimentation during construction activities. Water quality is an important factor in maintaining habitat quality for steelhead. No post-construction impacts are anticipated because the bridge embankment would be rebuilt to approximate stream bank contours prior to the erosion damage. In addition, erosion control and minimization measures would be implemented during construction within the creek bed and along the bank of San Anselmo Creek in order to avoid or minimize sedimentation input.

Adverse Effects on Habitat

Temporary and permanent loss of stream bed and riparian vegetation within San Anselmo Creek could also affect the steelhead and its habitat. The proposed action is located within designated critical habitat for the south central California coast steelhead ESU. Table 1 presents the acreages for temporary and permanent losses of stream bank habitat from the bridge embankment repair. Riparian and stream bank habitat in the action area potentially provides foraging, breeding, and refuging habitat for steelhead.

Table 1
Loss of Stream Bed and Bank/Riparian Vegetation
Resulting from the Proposed Action

Stream Bed and Bank/ Riparian Habitat	Temporary Disturbance (sq ft)	Permanent Disturbance (sq ft)
Sand Bag Barrier (140 x 5ft)	700	0
Back Fill and rock riprap (128 x 35ft)	0	4,480
Total disturbance	700	4,480

Stream bed and bank habitat within San Anselmo Creek would be disturbed at the edge of the creek where the creek embankment would be repaired. A total of approximately 700 square feet (sq ft) of stream bed and riparian vegetation would be temporarily disturbed; only a small fraction of this disturbance, if any, would be to riparian vegetation, most of which are shrubs that have grown on the eroded creek bank following the erosion. An insignificant amount of mature riparian vegetation may also have to be removed in order for heavy construction equipment to access the bridge site; however, it is not anticipated that this vegetation removal would reduce canopy shade cover. A total of approximately 4,480 sq ft (0.1 acre) of stream bed and bank/riparian habitat would be permanently disturbed. Riparian vegetation, including mostly shrubs and root balls growing on the creek bank, would be removed or covered.

The loss of stream bed and bank and removal of stream bank shrubs along San Anselmo Creek would likely have an adverse effect on steelhead habitat. The placement of rock riprap along the creek bank would reduce sources of woody debris, gravel substrate, and invertebrate prey in the stream channel. The removal of trees and shrubs along the banks of the creek and placement of

rock rip rap could also adversely affect water hydrology and shrub colonization along the creek and reduce the survival of spawning adult steelhead and resident juveniles.

4.2 AVOIDANCE AND MINIMIZATION MEASURES FOR STEELHEAD

The Town of Fairfax would implement the following measures to avoid and minimize potential adverse effects to steelhead and associated habitats.

Take and Disturbance

- All construction and activities in or adjacent to an active stream channel will be performed only between June 15th and October 15 unless the work can be performed without in-water work.
- Disturbance to existing grades and vegetation will be limited to the actual site of the project and necessary access routes. Placement of all roads, staging areas, and other facilities shall avoid and limit disturbance to streambank or stream channel habitat. When possible, existing ingress or egress points will be used and/or work performed from the top of the creek banks. Following completion of the work, the contours of the creek bed and creek flows will be returned to pre-construction condition or better.
- If steelhead are found dead or injured during the construction period, the Town of Fairfax will contact the NMFS immediately so the NMFS can review the project activities to determine if additional protective measures are needed.

Erosion and Sedimentation

- No petroleum products such as asphalt will be used.
- Rock rip rap or other similar rubble will be free of trash or reinforcement steel.
- If anchoring and stabilizing fabrics (geotextiles, armorflex, etc.,) are used, they will be slit in appropriate locations to allow for plant root growth.
- No fill material other than clean, silt-free gravel or river rock will be allowed to enter the live stream.
- Hydrological/Geomorphological analysis will be used to ensure that the river channel is designed in a sustainable configuration that does not accelerate erosion upstream or downstream of the action area.
- Filter fabric silt fencing, straw bales, “biologs”, or other generally accepted erosion control measures will be implemented while construction occurs within San Anselmo Creek. The Town of Fairfax will implement these erosion control measures prior to construction and would keep them in place until completion of construction. The Town of Fairfax will inspect these measures periodically to ensure they are functioning properly. If the erosion control measures are found to be damaged or are not functioning properly, the Town of Fairfax will immediately cease construction and remain ceased until the erosion control measures are repaired.

- The Town of Fairfax will exercise every reasonable precaution to protect San Anselmo Creek from pollution with fuels, oils, bitumens, calcium chloride and other harmful materials.
- A plan for the emergency clean up of any spills of fuel or other material will be available.
- Equipment will be refueled and serviced at designated construction staging areas. All construction material and fill will be stored and contained in a designated area that is located away from channel areas to prevent transport of materials into adjacent streams. A silt fence will be installed to collect any discharge, and adequate materials for spill cleanup will be maintained on site.
- Construction vehicles and equipment will be maintained to prevent contamination of soil or water (from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease).
- Good housekeeping practices, use of safer alternative products, such as biodegradable hydraulic fluids, will be employed where feasible. Employees will be trained to prevent or reduce the discharge of pollutants from construction activities to waters and appropriate measures to take should a spill occur.
- In the event of a spill, work will be stopped immediately and NMFS will be notified.

Adverse Effects on Habitat

- All natural woody riparian or Shaded Riverine Aquatic (SRA) habitat will be avoided or preserved to the maximum extent practicable.
- Species chosen for replanting will reflect native species lost during project activities or native species usually found in the riparian and SRA zones of the project location.
- Plantings will be done during the optimal season for the species being planted.

Summary of Potential Adverse Effects to the Steelhead

The proposed action may affect the south central California coast steelhead and/or its critical habitat. Implementation of avoidance and minimization measures identified in this document is recommended.

Cumulative effects as defined by the ESA are those effects of future state or private activities that are reasonably certain to occur within the proposed action area (ESA, Section 402.14 (g)(4)). Cumulative effects to special status species addressed in this report would likely occur in association with other projects near San Anselmo Creek that would impact riparian habitat along this creek.

The proposed bridge embankment repair in combination with other projects in the area could contribute to cumulative effects on the south central California coast steelhead in the local area as a result of (1) the net loss of habitat and (2) runoff of sediments, nutrients, and pollutants from urban areas into San Anselmo Creek. The loss of habitat resulting from development of the proposed action would contribute on a minor, but incremental, basis to cumulative effects to the south central California coast steelhead on a regional basis.

Currently, several projects are planned to occur in the vicinity of the action area. The following projects have been proposed in the vicinity of the action area that could affect the steelhead:

- FEMA project #3034, Cascade Drive Culvert Replacement, is located approximately 2.5 miles upstream of the proposed action area within Cascade Creek, which is tributary to San Anselmo Creek. This impact would replace an impassable steelhead barrier with a steelhead-friendly culvert and would allow large debris to pass through the culvert.
- FEMA project # 3041, Peri Park Pedestrian Bridge Replacement, would replace a small pedestrian bridge within Fairfax Creek, which is approximately 2.2 miles upstream from the action area.
- FEMA project # 2224, Pastori Storm Drain, would replace a storm drain with a larger capacity storm drain approximately 0.2 miles from the action area.
- Residential stream bank refurbishment. Several residences are proposing small-scale bank stabilization projects within San Anselmo and Cascade Creeks.

The loss of stream bed and bank habitat due to the proposed action could, combined with other projects in the area, create minimal cumulative adverse effects to the south central California coast steelhead. The projects listed above, in combination with the proposed action, may reduce natural creek bed and bank habitat, riparian vegetation, and may alter the hydrology and geomorphology of San Anselmo Creek. These impacts are considered minor, however, and in some cases, may be beneficial to the steelhead. Nevertheless, sediment input and loss of natural stream bed and bank features may cumulatively affect creek habitat along San Anselmo Creek at a minimal level.

References

Barnhardt, R.A. 1986. Species Profiles: Life Histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) Steelhead. U.S. Fish and Wildlife Service Biological Report 82. (11.60), 21pp.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status Review of West Coast Steelhead From Washington, Oregon, and California. NOAA Technical Memorandum. NMFS-NWFSC-27.

California Department of Fish and Game (CDFG). 2006. Rarefind 3.1.0, a program created by the California Department of Fish and Game, allowing access to the California Natural Diversity Database (CNDDB). November 2006 version.

California Department of Fish and Game (CDFG). 1995. Fish Species of Special Concern in California, Second Edition.

Fluvial Geomorphology Consulting. 2006. Geomorphic Assessment of Town of Fairfax Project Sites, Final Report. July 31, 2006. Fluvial Geomorphology Consulting and Stetson Engineers, Inc.

Lewis, Elizabeth. 2006. County of Marin Department of Public Works Creek Specialist. Personal communication with Greg Hoisington (NISTAC).

McGinnis, Samuel. 1984. Freshwater Fishes of California. University of California Press: Berkeley, California.

Goals Project. 2000. Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements of Key Plants, Fish, and Wildlife. Prepared by the San Francisco Bay Area Wetlands Ecosystem Goals Project. P.R. Olofson, editor. San Francisco Bay Regional Water Quality Control Board, Oakland, CA.

National Marine Fisheries Service (NMFS). 2006. Website located at http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/CH-Designation-Info.cfm

National Marine Fisheries Service (NMFS). 2005. Designation of Critical Habitat for West Coast Salmon and Steelhead. Final Rule. August 2005.

Rich, Alice A, Ph.D. 2006. A.A. Rich and Associates Fisheries and Ecological Consultants. Personal Communication with Greg Hoisington (NISTAC).

U.S. Fish and Widlife Service (USFWS). 2004. Formal Section 7 Consultation on the Santa Fe Partners Concord to Sacramento Pipeline Project Contra Costa, Solano, and Yolo Counties, California, Permit Number 26449S.

USFWS. 2006. Sacramento Fish and Wildlife Office Make an Endangered Species List. Website located at: http://www.fws.gov/sacramento/es/spp_list.htm

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APPENDIX A
SITE PHOTOGRAPHS

Photograph 1
Downstream portion of the action area. The bridge and sewer line can be seen to the left.

Photograph 2
Upstream portion of the action area. The emergency-placed rock riprap and bridge can be seen to the right.

APPENDIX B
FEDERALLY LISTED, PROPOSED, AND CANDIDATE SPECIES UNDER NMFS JURISDICTION WITH POTENTIAL TO OCCUR IN THE VICINITY OF THE TOWN OF FAIRFAX

Table B-1
Federally Listed, Proposed, and Candidate Species Under NMFS Jurisdiction
With Potential To Occur in the Vicinity of the Town of Fairfax

Scientific Name	Common Name	Federal Status	Preferred Habitat	Likelihood of Occurring in the Action Area
Fish				
Oncorhynchus kisutch	Coho salmon - Central California esu	T	Requires beds of loose, silt-free, coarse gravel for spawning and also cover, cool water, and sufficient dissolved oxygen. Coho spend approximately the first half of their life cycle rearing in streams and small freshwater tributaries. The remainder of the life cycle is spent foraging in estuarine and marine waters of the Pacific Ocean prior to returning to their stream of origin to spawn and die. Most adults are three-year-old fish, however, some precocious males known as "jacks" return as two-year-old spawners.	Not likely to occur; appropriate stream hydrology habitat characteristics are not present in the action area. No records of coho salmon exist within the action area (CDFG 2006); the nearest reported occurrence is the Pacific Ocean, approximately 5 miles from the action area. The action area is not within designated Coho salmon critical habitat.
Oncorhynchus mykiss irideus	South Central California coast steelhead	T	Pacific Ocean, spawns in coastal streams and rivers, over gravel beds. Pool depth, volume, amount of cover, and proximity to gravel for spawning play key roles.	Known to occur; juvenile steelhead were observed in San Anselmo Creek at the action area in September 2006. The steelhead is known to occur throughout San Anselmo Creek, which drains into Corte Madera Creek and ultimately San Pablo Bay.
Oncorhynchus tshawytscha	California coastal Chinook salmon	T	Spend from 3 months to 2 years in freshwater before migrating to estuarine areas as smolts and then into the ocean to feed and mature. They prefer streams that are deeper and larger than those used by other Pacific salmon species.	Not likely to occur; appropriate deep, large stream hydrology habitat characteristics are not present in the action area. No records of chinook salmon exist within the action area (CDFG 2006).

Table B-1
Federally Listed, Proposed, and Candidate Species Under NMFS Jurisdiction
With Potential To Occur in the Vicinity of the Town of Fairfax

Scientific Name	Common Name	Federal Status	Preferred Habitat	Likelihood of Occurring in the Action Area
Invertebrates				
Haliotus sorenseni	White abalone	E	White abalone are generally found at depths beyond 100 feet and are extremely rare.	No potential to occur; appropriate marine habitat characteristics are not present in the action area. No occurrences exist within the vicinity of the proposed action area (CDFG 2006).

Federal Endangered Species Act

E - Endangered

T- Threatened

Source: CNDDB database and USFWS Sacramento Field Office species lists search for eight quadrangles surrounding the action area: San Rafael, San Geronimo, Novato, Petaluma Pt., Bolinas, San Quentin, Point Bonita, and San Francisco North.