

Executive Summary

Background. Steelhead, the ocean-going form of rainbow trout (*Onchorhynchus mykiss*), used to inhabit the Alameda Creek watershed in significant numbers prior to the construction of dams and other human development of the watershed. The idea of restoring a viable steelhead population to the Creek, which along with their cousins the salmon are a symbol of healthy coastal ecosystems, has been proposed periodically beginning in the 1940s. The recent identification of steelhead from Alameda Creek as genetically associated with the Central Coast stock listed as a threatened species pursuant to the Federal Endangered Species Act, and availability of various means of public and private support to fund restoration activities, have combined to focus public attention again on restoration of the population.

The Alameda Creek watershed (Plate 1) is the largest drainage in the South San Francisco Bay region, and includes portions of three counties, a number of cities and unincorporated areas, and various state, regional and local agencies responsible for water supply, flood control, fish and wildlife, and other public duties. In recognition that a feasible restoration program could only be produced by the cooperative efforts of all stakeholders, in early 1999 the Alameda Creek Fisheries Restoration Workgroup (Workgroup) was established. Led by the efforts of the Alameda County Flood Control and Water Conservation District, the Workgroup benefits from the active participation of Alameda County Water District, the San Francisco Public Utilities Commission, the East Bay Regional Park District, the California Coastal Conservancy, the City of Fremont, the California Department of Fish and Game, the Alameda Creek Alliance (a citizens group), the U.S. Army Corps of Engineers, and the National Marine Fisheries Service.

The first product of the Workgroup is this report, which assesses the potential of restoring the steelhead population in Alameda Creek, identifies actions that must be taken to begin restoration, and highlights remaining scientific and technical uncertainties facing restoration efforts. A key approach taken in the report is to consider how other public uses supported by the watershed, such as municipal water supply, flood control, and recreational fishing, could be impacted by the steelhead restoration. The report is organized by considering the full life cycle of the steelhead - migration of adults into the watershed from the ocean (December - April), spawning and rearing (juveniles spend at least one year in freshwater ecosystems), and migration of young fish back to the ocean (March - June).

Findings. Based upon limited field efforts, a review of available data, and information in the technical literature, the report makes the following findings:

1. Suitable habitat exists within the Alameda Creek watershed to support spawning and rearing of steelhead. The best potential spawning and rearing habitat in the watershed exists in upper Alameda Creek, Niles Canyon and its tributaries, and the Arroyo Mocho canyon south of Livermore. Rearing habitat is limited in most of the areas potentially supporting steelhead by low summer stream flow. Although this has been exacerbated by development, this is a natural condition characteristic of watersheds in central and southern California that support steelhead trout.

2. Genetic testing indicates that a native, locally-adapted steelhead trout stock survives in the watershed, and this stock can be considered part of the Central California stock listed as threatened by the National Marine Fisheries Service pursuant to the Federal Endangered Species Act. Resident

trout populations in Stonybrook Creek, in tributaries of Calaveras and San Antonio Reservoirs, in upper Alameda Creek, and possibly in Arroyo Mocho appear to be descended from native steelhead populations isolated behind dams or natural barriers. The adult steelhead recently captured attempting to migrate into the watershed, and the rainbow trout sampled in the upper watershed, appear to be native fish that have their closest genetic associations with other populations within the federally-threatened “Central Coast Evolutionarily Significant Unit” of steelhead. It is likely that these fish are physiologically and behaviorally adapted to this region, making them well-suited to respond to restoration actions.

3. Steelhead are currently prevented from completing their life-history cycle within Alameda Creek due to the presence of an impassable migration barrier near the bottom of the watershed, and are severely limited by several other impassable or partial migration barriers. A flow-control structure (owned by the Alameda County Flood Control District) where the BART and railroad tracks cross Alameda Creek in Fremont (“the BART weir”) represents an impassable barrier to adult steelhead, and prevents these fish from completing their life cycle in the Alameda Creek watershed. Inflatable dams in this reach of the watershed (owned and operated by the Alameda County Water District) are impassable barriers to adult steelhead when inflated, but under current operations are deflated with enough frequency to allow at least some adult fish passage into the watershed. The Calaveras and San Antonio, and Alameda Creek Diversion Dams (all owned and operated by the San Francisco Public Utilities Commission) and the Del Valle Dam (owned and operated by the California Department of Water Resources) are all impassable barriers in the upper part of the watershed. A natural gas pipeline (owned and operated by Pacific Gas and Electric Company) that crosses Alameda Creek in the Sunol Valley may also be an impassable barrier to adult steelhead except at the highest of flows. All of these facilities were built in compliance with the environmental regulations and standards in force at the time of their construction.

4. Migration of juvenile steelhead to the ocean may be limited by existing water project operations. This is particularly the case in years with low spring storm activity. Out-migration of juvenile fish is not precluded in all years, however, and this has been especially true during the last decade when there has been higher than average rainfall in May. There are currently significant periods of time under existing operations where it appears that smolts and adults have a reasonable opportunity to migrate downstream to the Bay. Migration of smolts from rearing areas in Arroyo Mocho is influenced by stream flow and groundwater management in the Livermore/Amador Valley area. It may be possible to enhance migration conditions in this and other reaches through pulse flow augmentation following storm events in April and May.

It is concluded from these findings that steelhead could complete their life-cycle in the watershed reaches below the major dams with provision of fish passage at the BART weir and the gas pipeline crossing in Sunol Valley. The viability of a steelhead run made possible by these changes would be greatly enhanced through other passage improvements related to additional structural barriers, operation of inflatable dams, provisions to prevent entrainment of juvenile fish in water diversion structures, and augmentation of stream flows in lower Alameda Creek and lower Arroyo Mocho during peak out-migratory periods.

It should be kept in mind that restoration of a viable steelhead population is contingent upon the interaction of many factors, including climate, water diversion practices, and removal of migration barriers. It is not possible to predict with certainty how steelhead/rainbow trout would respond to all of these factors.

Recommendations. Based on the above findings, this report recommends nine essential restoration actions that must be taken to provide steelhead trout the opportunity to complete their life cycle in the Alameda Creek watershed. The report also identifies five additional restoration actions to increase the likelihood of successful restoration, and seven follow-on technical investigations to reduce technical uncertainties.

Provide passage for fish around the BART weir and other barriers to in-migration of adult steelhead (see Essential Actions 1, 2, 3, 4, 5, 8 and Additional Actions 1, 2, and 3). Passage improvements at several sites (BART weir, inflatable dams, the gas pipeline crossing, Sunol Dam, Stanley Blvd. weir, Livermore National Laboratory pumping facility) are necessary to allow any access to potential habitat in Niles Canyon and its tributaries (~7 miles of potential habitat) and partial access to Alameda Creek and its tributaries up to Little Yosemite (~4 miles of potential habitat) and to Arroyo Mocho (up to 9 miles of potential habitat).

Improve migratory habitat by protection of young steelhead from entrainment in diversion structures, and augmenting spring flows if feasible (see Essential Action 4 and Additional Actions 4 and 5). Improvement of out-migration passage conditions through modification of operations at diversion facilities or by installation of fish screens, bypass channels, or other improvements at existing diversion facilities downstream of Niles Canyon would enhance out-migration success when diversions are operating. The possibility of using Arroyo Mocho rather than Vallecitos Creek to transfer State Water Project water to the ACWD should be investigated as to its predicted impacts on costs, water supply, and water quality. In addition, it is possible that water rights could be obtained through various public and private entities that would provide additional flows in the watershed to assist with out-migration in late Spring months.

Prepare an application to the U.S. Army Corps of Engineers §1135 Program (see Essential Action 6). The Workgroup should endorse the preparation of an application to the U.S. Army Corps of Engineers pursuant the §1135 of the Water Resources Development Act of 1986 for funding to improve upstream passage and reduce downstream entrainment of steelhead in the watershed.

Modification of Recreational Fisheries Management within the Watershed (see Essential Action 7). Stocking of hatchery-raised steelhead in Alameda Creek must be altered to prevent possibility of interbreeding and competition with wild stocks, and to redirect recreational fishing pressure. The planned development of the ACWD quarry lakes as an EBRPD recreational fishing venue can serve as an alternative for recreational fishers in the area, but should be developed to ensure that no fish can escape to the creek itself.

Identify Private and Public Landowners in Spawning and Rearing Habitat (see Essential Action 9). The maintenance or enhancement of spawning and rearing habitat will be most successful if attempted in conjunction with the private and public land owners who are the ultimate stewards of this resource. These individuals and organizations should be identified and contacted in a systematic fashion, possibly with assistance of the Alameda County Resource Conservation District, to inform them regarding the restoration program and encourage their support and participation.

Further Investigations There are several issues that merit further investigation as part of the planning for restoration of steelhead trout in the Alameda Creek watershed. These include (1) a critical passage analysis to allow definition, for each major migratory route, of the minimal flows

that provide out-migratory habitat for steelhead in the watershed, (2) a spring smolt survey to verify the existence of steelhead smolts and to identify sites where spawning or rearing habitat might be enhanced, (3) visitation of some areas during wet weather conditions, including barriers that might be only passable under higher flow, (4) a limited survey of the Arroyo Mocho Canyon area to observe any potential migratory barriers and resident rainbow trout populations, (5) examine the potential to “re-operate” or jointly manage the municipal water supply activities of the SFPUC, ACWD, and Zone 7 to improve conditions for fish without adversely affecting municipal water supply (6) developing operational guidelines for minimum flow requirements for steelhead during periods of prolonged drought, and (7) develop guidelines for maximizing fish passage around the upper and lower inflatable dams given the constraints of the municipal water supply needs.