

T e c h n i c a l M e m o r a n d u m



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To: San Francisquito Creek Joint Powers Authority,
Steelhead Task Force, and Expert Advisory Panel

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Subject: San Francisquito Creek Watershed Geographic
Scope Assessment (Work Product E)

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Introduction

The Aquatic Habitat Assessment and Limiting Factors Analysis is intended to characterize channel and habitat conditions with respect to factors that limit the steelhead population in the San Francisquito Creek watershed. Information for this analysis will come both from direct data collection and analysis and from studies that have already been performed. Data collection and analysis will evaluate stressors that limit (1) aquatic habitat, (2) steelhead (*Oncorhynchus mykiss*), and (3) development of individuals in specific steelhead life history stages within the watershed. Extensive studies have already been conducted within the watershed; these can provide a base for study design, and data from these studies can be incorporated with new data for the current habitat assessment and the limiting factors analysis.

The outcome of this study will be an evaluation of the balance between stream sediment supply and transport capability and the consequent effects on aquatic habitat attributes (i.e. pool volume and filling, permeability of spawning gravels, stream bed and bank stability, streambed morphology, sediment storage, etc.), and characterization of streamflow, temperature, habitat structure, and water quality with reference to steelhead life history needs. Key questions to be answered by this study include:

- Is it valid to list San Francisquito Creek as impaired for sediment?
- Do any factors other than sediment limit steelhead habitat and productivity in the San Francisquito Creek watershed?

- What is the present status of habitat in the system?
- Where has steelhead habitat been impaired?
- What aspects of the aquatic habitat have changed and what caused those changes?
- What is the relative importance of habitat changes to steelhead?

The fundamental focus of this effort is based on the 303(d) listing of San Francisquito Creek as impaired for sediment. The basis for the listing is “*based primarily on a decline in native fish populations*”(RWQCB 2004). If this hypothesis is true, the steelhead habitat, which is sensitive to the impacts of excess turbidity and sedimentation, will also be impaired, thus leading to a decline in the Steelhead population in the watershed. While significant work has been done on sediment supply and transport within the watershed, a focused assessment of steelhead habitat for indications of biological consequences due to sediment has not been completed. This is the primary link in defining the basis and extent of sediment impairment in the watershed and will facilitate the development of future management strategies and actions within the San Francisquito Creek Watershed.

The San Francisquito watershed is approximately 45 mi² in size. Most of the watershed lies in the Santa Cruz Mountains and Bay Foothills southwest of Palo Alto; the remaining 7.5 mi² of the watershed lies on the San Francisquito alluvial fan near San Francisco Bay. The goal of this memorandum is to identify the proposed geographic scope, classify tributaries, identify a range of channel types, and identify a subset of reaches as proposed field monitoring locations. These findings are to be presented on a map of stream segments.

Geographic and Biological Considerations

The geographic scope of this study includes the lower mainstem of San Francisquito Creek and the Los Trancos Creek subwatershed within Santa Clara County (See Attachment A, Map Sheets). While the field study will only be conducted in this area (due to resource constraints), existing data from the tributaries of the upper San Francisquito Creek watershed and the Bear Creek watershed within San Mateo County will be included and qualitatively assessed in the limiting factors analysis.

Within the geographic scope of the field survey, the habitat assessment will specifically focus on stream segments where steelhead utilization has been recorded or in potential steelhead spawning and rearing reaches. Because steelhead are known to occur throughout the defined geographic scope of this project, a majority of the project area will be surveyed.

The watershed has been extensively studied for the occurrence of steelhead, rainbow trout, and other fishes (SCVWD 2004, Vogel 2002, Launer and Holtgreive 2000, DFG 1995, DFG 1976). *O. mykiss*, which includes both steelhead and rainbow trout, has been found in the project area from the mainstem of San Francisquito Creek at El Camino Real to upstream of the Felt Lake Diversion on Los Trancos Creek and that *O. mykiss* are spawning in Los Trancos Creek, upstream of the Felt Lake Diversion (SCVWD 2004). For this reason, the basic survey area will include the mainstem of San Francisquito Creek from the upstream

point of tidal influence (just upstream of Highway 101) to the confluence of San Francisquito Creek and Los Trancos Creek. Los Trancos Creek will be surveyed from the confluence with San Francisquito Creek upstream to the crossing of Arastradero Road.

Additionally, geomorphic stream classification for the San Francisquito Creek watershed (NHC and Jones & Stokes 2004) will be compared to a recent spawning and rearing habitat analysis (NHC et al. 2002) to further refine the determination of reach breaks in the watershed. These refined reach breaks will facilitate development of a random sampling methodology to identify reaches potentially utilized by steelhead. All of the streams in the watershed were classified from aerial photographs and GIS data by NHC and Jones & Stokes (2004) according to the Montgomery-Buffington (1993) stream classification system. This classification revealed that all of the mainstem reaches of San Francisquito and Los Trancos Creek in the study area are pool riffle reaches with a gradient of 1–2% and thus potential *O. mykiss* habitat suitable for surveying.

Specific selection of reaches for specific data protocols will be selected during the basic stream morphology reconnaissance. Selection criteria will be discussed in further detail under each protocol discussion. Generally, recurring monitoring points will be as close to access points as feasible for project efficiency and survey points, once selected, will not be abandoned or altered without sufficient justification and agreement among all project partners (NHC, Jones & Stokes, SCVWD, JPA, and the San Francisco RWQCB).

Reach Division and Description

All of the streams in the watershed were classified according to the Montgomery-Buffington (1993) stream classification system (NHC and Jones & Stokes 2004). This classification breakdown will also be compared to a recent spawning and rearing habitat analysis (NHC et al. 2002) in order to define reach breaks in the watershed that will facilitate a random sampling methodology of the reaches in the watershed utilized by steelhead. These defined reaches will allow the assessment to sample habitat characteristics across a range of channel types and tributary segments critical to steelhead production in the study area.

After a review of existing stream classification systems, it was determined that the Montgomery and Buffington (1993) stream classification system, referred to here as the Montgomery-Buffington method, would best characterize and classify the stream morphology of the San Francisquito Watershed. The Montgomery-Buffington method was selected over other potential classification systems because of its suitability to the project area and the project needs.

The Montgomery-Buffington method uses a process-based, watershed-scale approach to characterize changes in channel morphology, sediment transport dynamics, and response potential of streams to natural and human disturbance. A process-based approach identifies the relationship between channel morphology and transport processes, including inflowing water and sediment, hydraulic conditions, and spatial and temporal changes in local factors which affect channel form such as land use, riparian cover, or instream bedrock controls.

Locations

The project area will be surveyed in San Francisquito Creek (from 500 feet upstream of Highway 101 to the confluence with Los Trancos Creek) and in Los Trancos Creek (from the San Francisquito Creek confluence to 500 feet upstream of Arastadero Road). Specific sites will be selected for surveys of embeddedness, permeability, pool filling and spawning gravel quality. Based on the number of suitable gravel beds and pools to sample, a random subset will be selected for the more advanced analyses. Additionally, specific sites for temperature monitoring, barrier analysis, and have been selected.

Barriers

Existing mapped barriers at the following locations will be reassessed:

- weir approximately 2,700 feet upstream of 101;
- two notched weirs upstream of Sunset Magazine building'
- bonde weir at El Camino Real;
- concrete apron 600 feet downstream of Alpine Road;
- weir 800 feet upstream of Alpine Road;
- four weirs between Alpine Road and Interstate 280;
- weir under Interstate-280; and
- Felt Lake Diversion structure.

Flow

Stream flow data will be collected in San Francisquito Creek at the following locations:

- Downstream of the inlet from Felt Lake into Los Trancos Creek.
- Oak Court Apartments access point across from the tennis courts.

Additionally, flow may be measured at the following barrier locations based on the results of the initial barrier survey:

- weir approximately 2,700 feet upstream of 101'
- two notched weirs upstream of Sunset Magazine building;
- bonde weir at El Camino Real;
- concrete apron 600 feet downstream of Alpine Road;
- weir 800 feet upstream of Alpine Road;
- four weirs between Alpine Road and Interstate 280;
- weir under Interstate-280; and

- Felt Lake Diversion structure.

Temperature

Measured water temperature data will be collected at four locations in the San Francisquito Creek watershed in addition to the existing temperature gauges. Temperature loggers will be located at

- San Francisquito Creek at Newell Road;
- Oak Court Apartments access point across from the tennis courts;
- Downstream of the inlet from Felt Lake into Los Trancos Creek; and
- Los Trancos Creek at Arastadero Road.

Access

Santa Clara Valley Water District has existing access agreements that provide access along the mainstem of San Francisquito Creek, from Camino Real to the confluence with Los Trancos Creek. Access is available along Los Trancos Creek from the confluence up to just above the Felt Lake Diversion. The majority of access is provided through Stanford University and is coordinated through Stanford Property Management, The Stanford Golf Course, and Stanford Utilities, for the diversion area of Los Trancos Creek. Access is also being coordinated with Oak Creek Apartments, which the mainstem of San Francisquito Creek parallels to the east of the Sand Hill Road crossing in Palo Alto. However, these agreements end in December of 2004 and will likely have to be extended to facilitate any work done in early 2005. Any work completed within the San Mateo portion of the watershed will require new access agreements for that area. Properties accessed will be notified the week before surveys, as outlined in the access agreements.

Conclusions

Selection of study reaches will be driven by the need to describe the suitability of habitat for juvenile *O. mykiss*. In addition, sites with major tributary junctions will be selected to determine whether passage for steelhead might be compromised at these sites. These defined reaches will allow the assessment to sample habitat characteristics across a range of channel types and tributary segments critical to steelhead production in the study area. The geographic limitations of the habitat assessment and limiting factors analysis will result in an overall lack of understanding of the San Mateo County portions of the watershed, especially when compared to the breadth of data that will be collected in the Santa Clara County.

Literature Cited in the Memorandum

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Attachment A: Map Sheets