Alameda Creek Fisheries Restoration Workgroup
Alternatives Subgroup

Minutes of Meeting

January 9, 2002
Alameda County Public Works Agency

Attendees

Pete Alexander	EBRPD
Kristine Atkinson	CDFG
Gordon Becker	CEMAR
Erika Cleugh	CDFG
Bill DeJager	Corps of Engineers
Ted Frink	DWR
Andy Gunther	CEMAR
Darryl Hayes	CH2MHill
George Heise	CDFG
Craig Hill	ACWD
Laura Kilgour	ACFCWCD
John Mann	NMFS
Caroline McKnight	CDFG
Jeff Miller	ACA
Jim Reynolds	ACWD
Steve Rothert	American Rivers
Jim Salerno	SFPUC
Carla Schulteis	ACFCWCD
Gary Stern	NMFS
Richard Wetzig	ACFCWCD

- The purpose of this meeting of the Alternatives Subgroup of the Alameda Creek Fisheries Restoration Workgroup was to continue the discussion of alternatives for providing passage in the federal flood control channel that was begun at the first subgroup meeting on December 12, 2001. The second meeting focused upon alternatives to the approach described in the conceptual proposal provided to the U.S. Army Corps of providing multiple fishways on ACWD inflatable dams and the BART weir as well as the placement of several fish screens on ACWD water diversion facilities.

§1135 DRAFT FISHWAY ALTERNATIVES
Developed by the Alameda Creek Fisheries Restoration Workgroup
January 9, 2002

BART Weir Fish Passage Alternatives

The Alternatives Subgroup reviewed the approach used to prepare a conceptual plan for fishways and screens in the Alameda Creek flood control channel, as summarized below. The discussion is organized according to the principles of analyzing fish passage issues typically employed by passage engineers. The Subgroup took advantage of the presence of passage engineers from CDFG (George Hiese) and NMFS (Jon Mann) by encouraging them to provide their thoughts and comments.

In general, barriers to migratory fish are believed to be mitigated by the following approaches, with the first being the most desirable:

1. remove barrier
2. modify channel bed to provide passage by reducing the required height of the barrier
3. focus upon altering barrier during the "hydrologic windows" when fish move
4. construct fishway

Remove Barrier. Removing the BART weir would involve reconstructing the BART and train supports over the Alameda Creek flood control channel. A suitable length of the channel would be determined based on hydrologic analysis for re-grading to achieve an overall slope of three percent or less that would become the project area. A low-flow channel would have to be established within the channel cross section. This approach would involve removing the ACWD middle inflatable dam and providing alternative water supply. Costs associated with this approach are unknown but are likely to be substantial based on the scale of the various elements of this alternative.

Modify Channel Bed. In the Alameda Creek flood control channel, modifying the channel bed to lower the effective height of the BART weir as a barrier could involve constructing a series of bank-to-bank steps downstream of the weir that would be capable of passing migratory fish by virtue of their low individual heights. Alternately, a longer, continuous channel slope could be constructed with a goal of three percent maximum grade. Either of these options would entail substantial cost and would present the technical difficulty of providing a low flow channel. Also, channel modification would not obviate the need for a fishway on the middle ACWD inflatable dam. Re-grading the Alameda Creek flood control channel would involve raising levee heights adjacent to the affected section to maintain flood flow carrying capacity. Hydrologic modeling would be required to determine the length of the re-graded channel section needed to achieve desired water velocities for both fish passage and flood protection.

It was noted, however, that if the channel could be re-graded, such an effort could be combined with a consolidation of ACWD diversions at the upper inflatable dam and removal of the middle inflatable dam. This would require adding additional capacity to the diversion at the upper inflatable dam, including a second (or larger) pipe to bring diverted water to the percolation ponds west of the Hayward fault. This consolidation would have the benefit of eliminating a diversion that requires screening. It includes a significant cost for the new pipe.

Modify Barrier for Passage. The BART weir cannot be modified on a seasonal basis to allow for fish passage.

Construct Fishway. The conceptual fishway design proposed to the Army Corps of Engineers represents an attempt to respond to the critical criteria of variable stream discharge conditions and fish passage efficiency. Passage efficiency is commonly adversely affected by a fishway filling with sediment or debris, or by insufficient or inadequately designed attraction flows. Fishways must be able to provide for upstream and downstream migration at high and low discharge levels for both adult fish and smolts.

Design flows for fishways are based on the flow conditions occurring in the target stream. These flows may be represented graphically by a flow-duration curve that plots stream discharge against the percentage of time flows exceed given discharge levels. For example, in a perennial stream, a level of 0 cubic feet per second discharge is exceeded 100 percent of the time, while greater flows are less commonly exceeded. Fishways are often designed to provide fish passage under conditions that are only exceeded 5 percent of the time by large flood flows (although regulatory agency policy regarding this issue is under review and tending to favor designs that incorporate fewer instances of inadequate passage provision). Flow conditions that are exceeded 50 percent of the time are typically used to indicate the low flow design criterion.

To operate efficiently, fishways must carry sufficient flow to attract fish into the (downstream) entrance. Typically, 10 percent of the total discharge of a stream is considered the minimum flow necessary to attract upstream migrating fish into a fishway. Such flows can consist of a portion or all of the instream flow directed into the fishway, or can incorporate "auxiliary" water. In the latter case, supplemental water supplies from a stream diversion or other source are introduced into the fishway for the purposes of attraction.

Attraction flows are often the limiting factor to the efficiency of fish passage through a fishway. In response to this concern, fish ladders are sometimes necessary in multiple locations in the channel cross section, such as on opposite banks or in the center of the stream. In Alameda Creek, construction of multiple fishways at the BART weir is highly problematic due to cost and loss of flood carrying capacity .

Specific fishway design criteria applicable to the BART weir and ACWD middle inflatable dam include the following:

1. the fishway must incorporate two (upstream) exits to allow for fish passage when the inflatable dam is either inflated or deflated; and
2. the fishway must carry all of the Alameda Creek flow under low flow conditions.

The fishway design included in the Army Corps submittal represents the consensus of several design engineers regarding an acceptable approach to the specific situation found at the BART weir/middle inflatable dam in the Alameda Creek flood control channel. Also, this fishway design is believed to require a maintenance schedule to alleviate fouling compatible with the operational provisions at the proposed project site. Generic terms for widely used fishway types include pool and weir, weir and orifice, vertical slot, pool and chute and Denil, and various hybrids of these designs have been developed.

A variation on the set of fishways and screens proposed in the Army Corps submittal has also been proposed. Under this scenario, fish exiting the BART weir/middle inflatable dam fishway would pass into a flume constructed to lead to the area above the upper inflatable dam. Under this approach, fish would pass the portion of the flood control channel including and upstream of the BART weir by entering one ladder system rather than two. The flume exit would need to be

designed to allow for conditions present when the upper inflatable dam was either inflated or deflated.

Another alternative proposed in the discussion was construction of a fish "elevator" at the BART weir/middle inflatable dam, based upon designs in operation at locks in the Great Lakes. The experience of fish passage engineers suggests that this type of facility is often associated with high costs due to the number of moving parts and the need to have an operator present frequently.

Other Fish Passage Issues

Hydrology. Further characterization of the hydrologic conditions in the Alameda Creek flood control channel should be undertaken to allow for the best possible design of fish passage facilities. Data is available for such an analysis and should be analyzed and presented in a manner useful to designers and the Workgroup.

Juvenile migration. It is possible that steelhead hatched from redds in or above Niles Canyon may enter the flood control channel on storm flows or otherwise and then attempt to move upstream again due to thermal or other driving forces. In the Sacramento River drainage tagged juveniles have been recaptured over 10 miles upstream from their point of release. Such a possibility suggests a number of potential responses:

- the upper ACWD inflatable dam fishway could incorporate juvenile fish passage criteria in its design;
- the upper ACWD inflatable dam could be operated in a manner to allow for movement between the flood control channel and lower Niles Canyon during a designated period;
- further characterization of migration and rearing habitat, as well as behavior of Alameda Creek steelhead, could be performed to determine the risk of juvenile "take" by late season inflation of the upper inflatable dam; or
- additional options or combinations of solutions could be proposed.

Monitoring. Measuring the success of efforts to restore steelhead in the Alameda Creek watershed and adapting management strategy will require monitoring steelhead migration in the flood control channel. Such a capability could be incorporated into the design of the current project.