

Appendix B

Documentation Associated with the Interim Flow Agreement

Letter to PG&E Regarding Fish Ladder Closures, May 14, 2001

Letter to PG&E Regarding Water Diversions, March 21, 2002

Four-Agency Statement Regarding Release of Steelhead Above Coleman Dam

**Letter to PG&E Regarding Fish Ladder Closures,
May 14, 2001**



**U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825-1846**



**National Marine Fisheries Service
Protected Resources Division
650 Capitol Mall, Suite 8-300
Sacramento, California 95814-4706**



**California Department of Fish and Game
Northern California-North Coast Region
601 Locust Street
Redding, California 96001**

May 14, 2001

Ms. Angela Risdon
Senior License Coordinator
Pacific Gas and Electric Company
Mail Code N11C
P.O. Box 770000
San Francisco, California 94177

Subject: Battle Creek Hydroelectric Project No. 1121, Shasta and Tehama Counties, California. Request to Continue Fish Ladder Closures

Dear Ms. Risdon:

The U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game concur with the Pacific Gas and Electric Company's (PG&E) request to the Federal Energy Regulatory Commission to continue blocking the downstream entrances to the fish passage facilities (fish ladders) at the Eagle Canyon and Coleman diversion dams and suspending diversion flows into Wildcat Canal until the end of 2001 or until a new short-term agreement is in place, whichever comes first. It is expected that the new short-term agreement will be similar to the last agreement, including the same fish ladder closures, suspension of the Wildcat Dam diversion, and augmentation of flows.

The last short-term agreement providing for these actions was in effect from November 17, 1998 through February 28, 2001, and is now expired along with a preceding 3-year agreement. These previous short-term agreements were put in place until a long-term restoration agreement for the hydroelectric project can be implemented through the environmental regulatory process, including National Environmental Policy Act and California Environmental Quality Act compliance and a hydropower license amendment, for the Battle Creek Salmon and Steelhead Restoration Project.

Closing the fish ladders over the past four years was combined with flow augmentation, water temperature improvements, and entrainment preventions to restore anadromous and resident fish habitat in 17 miles of stream. Discontinuing that habitat restoration now would jeopardize the accumulating fishery benefits, which are a significant financial investment. The fish produced over

May 14, 2001

the last 4 years will be needed to seed 42 miles of habitat that is intended to be restored under the Battle Creek Salmon and Steelhead Restoration Memorandum of Agreement between the resource agencies and PG&E. The fish ladder closures concentrate the relatively small annual numbers of adult anadromous fish in the safest habitat that can be afforded on an interim basis. The habitat below the closed ladders is the coldest, largest amount of usable habitat that is entrainment free. Suspension of diversion flows into Wildcat Canal provides increased flows downstream of the Wildcat Diversion Dam, which results in improved water temperatures and increased habitat area to the benefit of fisheries and the overall aquatic and riparian environment.

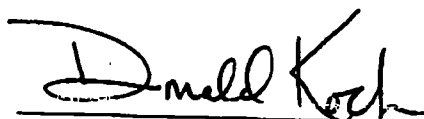
If you have any questions or comments, please contact Bart Prose of the U.S. Fish and Wildlife Service (916) 414-6600, Mike Tucker of the National Marine Fisheries Service (916) 930-3600, or Harry Rectenwald of the California Department of Fish and Game (530) 225-2300.



Wayne J. White
Field Supervisor
U.S. Fish and Wildlife Service



Mike Aceituno
Central Valley Team Leader
National Marine Fisheries Service



Donald Koch
Regional Manager
California Department of Fish and Game

cc: David P. Boergers, Federal Energy Regulatory Commission
Thomas J. LoVullo, Federal Energy Regulatory Commission
Randal S. Livingston, PG&E

**Letter to PG&E Regarding Water Diversions,
March 21, 2002**



U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
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California Department of Fish and Game
Northern California-North Coast Region
601 Locust Street
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March 21, 2002

Ms. Angela Risdon, Senior License Coordinator
Pacific Gas and Electric Company
Mail Code N11C
P.O. Box 770000
San Francisco, CA 94177

Dear Ms. Risdon:

Thank you for Pacific Gas and Electric Company's (PG&E's) continued cooperation and participation in the Battle Creek Interim Flow Agreement ("Interim Agreement") that temporarily modifies the operation of the Battle Creek Hydroelectric Project for the benefit of anadromous fish. The Bureau of Reclamation's 1998 environmental assessment titled: "Temporary Reduction in Water Diversions from Battle Creek" describes the project as it was implemented in the recent past. Now that the interim agreement supporting the project has expired, it is being revised along with its supporting environmental documentation. We appreciate PG&E's seamless continuation of the interim measures while the institutional arrangements are being completed to cover several more years of the operation under a new formal agreement.

The interim measures may include temporary reductions in water diversion at Coleman and Eagle Canyon dams and no diversion at Wildcat Dam. In addition, the diversion adjustments are coupled with temporary closures of the fish ladders at Eagle Canyon and Coleman diversion dams. These ladder closures confine the anadromous fish to the sections of habitat in Battle Creek that benefit from the reduced diversions in the Hydroelectric Project and prevent juvenile salmonids from becoming entrained into the open diversion canals above these dams. More complete descriptions of the benefits to biological resources are included in previous environmental documentation, monitoring results and agency correspondence relevant to the project. It is anticipated that the Interim Agreement will be replaced with a long-term restoration project (Battle Creek Salmon and Steelhead Restoration Project 1999) that significantly increases the quantity and quality of the habitat. However, because of the scale of the long-term

Ms. Angela Risdon
March 21, 2002
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project, it will be several years before all the necessary environmental documentation, decision making and construction activities are completed, leaving a continued need for the Interim Agreement.

The U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game concur with the need to continue the Interim Agreement including the related operation of temporarily closing the fish ladders at Coleman Dam and Eagle Canyon Dam. We look forward to continued cooperation in our joint efforts to restore salmon and steelhead habitat in Battle Creek.

If you have any questions or comments, please contact Mr. Bart Prose of the U.S. Fish and Wildlife Service at (916) 414-6606, Mr. Mike Tucker of the National Marine Fisheries Service at (916) 930-3600, or Mr. Harry Rectenwald of the California Department of Fish and Game at (530) 225-2368.

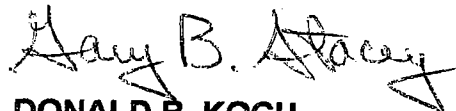
Sincerely,



for **WAYNE S. WHITE**
U.S. Fish and Wildlife



MICHAEL ACEITUNO
National Marine Fisheries Service



for **DONALD B. KOCH**
Department of Fish and Game

cc: See page three

Ms. Angela Risdon
March 21, 2002
Page Three

cc: Mr. Thomas J. Lo Vullo
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888 First Street, NE
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Mr. Bart Prose
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National Marine F Service
650 Capitol Mall
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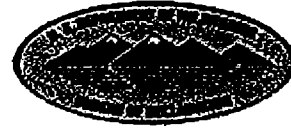
Mr. Harry Rectenwald
Department of Fish and Game
601 Locust Street
Redding, California

Mr. Dave Gore
U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, California 95814

Four-Agency Statement Regarding Release of Steelhead Above Coleman Dam



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CALIFORNIA
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NATIONAL MARINE FISHERIES SERVICE
650 Capitol Mall, Suite 8-300
Sacramento, California 95814

October 31, 2002

On September 24, 2002, a consensus decision was reached among the signatory agencies of this letter to release adult hatchery-origin steelhead above the Coleman National Fish Hatchery (NFH) during the 2002 - 2003 migration and spawning season. After reviewing available information pertaining to this issue (see Enclosure), the National Marine Fisheries Service (NMFS), U.S. Bureau of Reclamation (USBR), California Department of Fish and Game (CDFG), and U.S. Fish and Wildlife Service (USFWS) concur that all hatchery-origin steelhead surplus to spawning needs at the Coleman NFH should be released upstream of the hatchery's barrier weir to supplement natural production in upper Battle Creek.

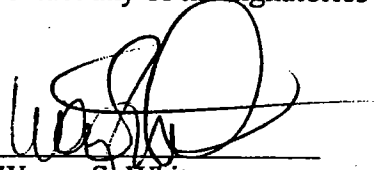
This decision was based on the fact that the potential benefits (population increases) of the action outweigh the potential (genetic) risks. Specifically, the action is expected to have a positive demographic effect by eventually increasing the number of naturally spawning steelhead in Battle Creek through utilization of currently underutilized spawning habitat above the barrier weir. With regard to genetic risks, the action of passing adult hatchery-origin steelhead above the weir is considered a low risk due to the high likelihood of genetic similarity between hatchery and natural-origin steelhead in the Battle Creek watershed (i.e., existing natural-origin steelhead in Battle Creek are likely the offspring of hatchery-origin adults passed above the weir in previous years).

During the process of passing adult steelhead above the Coleman NFH barrier weir, the current estimated spawning habitat carrying-capacity (3,700 total steelhead adults) will not be exceeded. The vast majority of

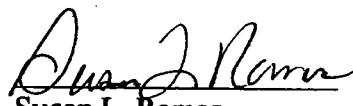
steelhead encountered at the Coleman NFH will be identifiable as hatchery-origin by the absence of an adipose fin. Since 1998, all juvenile steelhead released from Coleman NFH have been marked by removing (clipping) their adipose fin to identify them as hatchery-origin. Marked (hatchery-origin) steelhead returning to Coleman NFH that are surplus to spawning will be released above the hatchery's barrier weir to spawn naturally. Natural-origin steelhead encountered at Coleman NFH will also be released above the hatchery's barrier weir, with the exception of about 40 adults that will be spawned at the hatchery to maintain genetic diversity within the hatchery stock. In-season monitoring and reporting will assure carrying-capacity limits are not exceeded and priority will be given to the passage of natural-origin steelhead.

To address biological uncertainties associated with supplementing natural steelhead spawning in Battle Creek using hatchery steelhead from the Coleman NFH, a Monitoring and Evaluation (M&E) plan will be developed and incorporated into the Battle Creek Fishery Management Plan. The M&E plan will likely describe several facets of research and monitoring, such as: 1) investigation of ancestral relationship between hatchery and natural steelhead in Battle Creek; 2) assessment of relative fitness of hatchery and natural steelhead in Battle Creek; and 3) assessment of demographic effects of releasing large numbers of hatchery steelhead to reproduce naturally in Battle Creek. The M&E plan should also detail a strategy and time frame for phasing out the practice of releasing hatchery steelhead into upper Battle Creek. In anticipation of the plan and some of the data needs, tissue samples (fin) will be collected from all adult steelhead released upstream of the hatchery. A subset of these tissue samples will be initially be analyzed to determine ancestral relationship. Other biological data collected will include gender, length, and mark status (e.g., adipose fin clip), and scales will be collected to facilitate age determination.

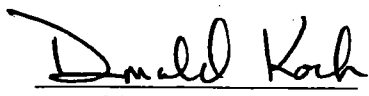
Please contact any of the signatories below with any questions related to this agreement.



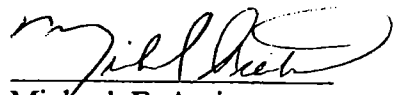
Wayne S. White
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Donald B. Koch
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California Department of Fish & Game
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Michael E. Aceituno
Sacramento Area Office Supervisor
National Marine Fisheries Service
Sacramento, California

cc:

Jim Smith, USFWS, Red Bluff
Kevin Niemela, USFWS, Red Bluff
John Scott, USFWS, Anderson
Mike Keeler, USFWS, Anderson
Dale Pierce, USFWS, Sacramento
Mary Ellen Mueller, USFWS, Sacramento
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Ken Lentz, USBR, Sacramento
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Harry Rectenwald, CDFG, Redding
Mike Berry, CDFG, Redding
Randy Benthin, CDFG, Redding
Pat Overton, CDFG, Redding
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Gary Stacey, CDFG, Redding
Mark Stopher, CDFG, Redding
Shirley Witalis, NMFS, Sacramento
Mike Tucker, NMFS, Sacramento
Carlos Garza, NMFS, ~~Tiburon~~ SANTA CRUZ
Diane Windam, NMFS, Sacramento
Battle Creek Watershed Conservancy, Manton

Enclosure:



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Coleman National Fish Hatchery Complex
24411 Coleman Fish Hatchery Road
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PH (530) 365-8622

FAX (530) 365-0913

4 September 2002

Mr. Mike Aceituno
National Marine Fisheries Service
Protected Resources Division
650 Capital Mall, Suite 8-300
Sacramento, CA 95814-4706

Dear Mr. Aceituno:

As you are aware, personnel from the California Department of Fish and Game, U.S. Bureau of Reclamation, National Marine Fisheries Service (NMFS), and U.S. Fish and Wildlife Service (Service) have been working together to develop a strategy to manage adult hatchery-origin steelhead surplus to broodstock needs at the Coleman National Fish Hatchery (NFH). In an attempt to reach a consensus decision on this issue, agency representatives have developed, discussed and evaluated twelve alternatives (one alternative to pass the adults above the Coleman NFH barrier weir in Battle Creek, and eleven alternatives that involve "non-passage" options). Although agency personnel have held highly productive meetings and have reduced the number of potential alternatives down to three (one passage and two "non-passage" alternatives), agency representatives have not reached agreement as to a final course of action.

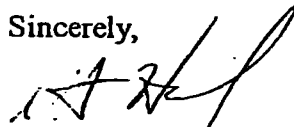
After additional discussion of this topic at a recent 4-Agency meeting (August 28, 2002), you requested that the Service submit a letter to NMFS justifying the proposal to pass the surplus hatchery-origin steelhead above the Coleman NFH barrier weir. To this end, in the enclosed document, a case is made which supports the action of passing adult surplus hatchery-origin steelhead above the Coleman NFH barrier weir. The California Department of Fish and Game and the Bureau of Reclamation are also in support of this proposed action. Following the receipt of this letter, it is hoped that the NMFS will announce a decision on the issue by mid-September 2002, thus allowing time to prepare for the implementation of a final action prior to the first week of October 2002.

As presented in the enclosed document, examination of available information suggests clear rationale does not exist to support not passing adult Coleman NFH steelhead above the barrier weir in Battle Creek. The Service and the other Resource agencies, do, however, recognize that outstanding genetic questions (e.g., domestication effects) remain in all cases where hatchery and natural-origin individuals commingle and interbreed in the natural environment. Although the passage of hatchery-origin steelhead above the Coleman NFH barrier weir in Battle Creek will likely result in the natural spawning of these adults in upper Battle Creek, available information (e.g., existing genetic information, estimates of spawning habitat carrying capacity in Battle Creek and estimates of current population levels of hatchery and natural-origin steelhead returning to Battle Creek), suggests that the potential risks associated with the action may be less substantial than the risks/outcomes assumed or inherent as a result of implementing the non-passage alternatives. Additionally, the potential genetic and demographic benefits associated with the action may outweigh the benefits associated with the two feasible non-passage alternatives.

Regardless of the final outcome of this year's decision, the Service will continue working with NMFS and the other resource agencies to address issues associated with restoration of fish populations in Battle Creek and the integration of operations at the Coleman NFH. The Service is also committed to the further development of monitoring programs and/or research activities designed to address outstanding biological questions/issues.

Thank you in advance for your consideration of the enclosed information and for the participation of your staff in this process. Please contact me at (530) 365-8622 if you or your staff have any questions on the enclosed document.

Sincerely,



Scott Hamelberg
Project Leader

Enclosure

cc:

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Kevin Niemela, USFWS, Red Bluff
John Scott, USFWS, Anderson
Mike Keeler, USFWS, Anderson
Dale Pierce, USFWS, Sacramento
Mary Ellen Mueller, USFWS, Sacramento
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Don Koch, CDFG, Redding
Shirley Witalis, NMFS, Sacramento
Mike Tucker, NMFS, Sacramento
Carlos Garza, NMFS, Tiburon *SANTA CRUZ*
Diane Windam, NMFS, Sacramento

**Management Strategy for the use of adult Coleman National Fish
Hatchery-origin steelhead surplus to broodstock needs.**

Representatives from the National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), Bureau of Reclamation (BOR), and U.S. Fish and Wildlife Service (Service) have met three times over the last four months to attempt to develop a joint strategy for managing hatchery-origin steelhead surplus to broodstock needs at the Coleman National Fish Hatchery (NFH). On May 15, the group focused on non-passage options for surplus hatchery-origin steelhead (i.e., options other than passage above the barrier weir into upper Battle Creek), while the second meeting (July 11) focused specifically on issues related to passing the adults above the weir. To further the discussion and to provide additional guidance on the steelhead recovery planning process, the July 11 meeting was attended by NMFS experts in recovery coordination and ESA policy issues and Service and NMFS experts on genetic issues. A third meeting was held on Aug 13 to attempt to achieve a consensus decision prior to the 4-Agency meeting on August 21, 2002.

Although much good effort has been devoted to identify the best use of surplus Coleman NFH-origin steelhead, a consensus decision regarding the disposition of adult steelhead surplus to Coleman NFH broodstock needs has not been reached. As the collection of steelhead adults begins with the onset of the broodstock collection and spawning operations for fall chinook salmon at Coleman NFH, a final decision remains necessary prior to the first week of October 2002.

Through this document, a strong case is made to support the proposal to pass adult surplus hatchery-origin steelhead above the Coleman NFH barrier weir. This justification is submitted to the National Marine Fisheries Service due to the Agency's regulatory responsibility associated with their jurisdiction over this species (natural-origin Central Valley steelhead are listed as threatened under the Endangered Species Act). The species is not listed under the California Endangered Species Act. Following the submission of this document, it is expected that the National Marine Fisheries Service will announce a determination on the issue by mid-September 2002, thus allowing time to prepare for the implementation of a final action prior to the first week of October 2002.

Proposed Action: *Pass all adult hatchery-origin steelhead surplus to Coleman NFH spawning needs above the barrier weir. In conjunction with this action, tissue samples for future genetic analyses and other biological data (e.g., length, gender) will be collected from at least a sub-sample of the steelhead (hatchery and natural-origin) passed above the barrier weir.*

Available genetic information

Available information (Busby et al. 1996) suggests Coleman NFH steelhead are genetically similar to remaining natural stocks in Mill and Deer creeks. The analysis of population structure

performed by NMFS was based on data for 51 polymorphic allozyme gene loci. Population structure detail was obtained through generation and examination of different ways of summarizing patterns of genetic relationships based on Nei's unbiased genetic distance values (Nei 1978, cited through Busby et al. 1996), between each pair of the populations (Busby et al. 1996). Attachment 1 presents a dendrogram (one dimension) constructed using the unweighted pair-group method analysis (UPGMA) with arithmetic averaging populations (Busby et al. 1996). Attachment 2 presents a different representation of the same data using multidimensional scaling (MDS) which allows viewing the pattern of relationship among populations in two or three dimensions populations (Busby et al. 1996). The analysis and data presentation demonstrate that the sample from Coleman NFH and the samples from Mill and Deer creeks (i.e., the two natural populations in the Sacramento River Basin believed to contain the most likely remnants of native steelhead) form a small coherent group that is quite distinct from all other California steelhead populations. Based on their analyses of steelhead population structure, NMFS concluded that the genetic similarity of Coleman NFH steelhead with those of Mill and Deer creeks could have resulted from: 1) introgression of the Coleman NFH steelhead genetic characteristics into the natural populations; or, 2) a close ancestral relationship resulting from the use of predominantly local (i.e., upper Sacramento River) broodstock.

***Conclusion:** NMFS's genetic analyses demonstrate that Coleman NFH steelhead and two natural populations in the Central Valley constitute a genetically distinct group of populations with high genetic similarity compared to other California and West Coast steelhead populations.*

Coleman NFH Steelhead Broodstock History

Historically, most steelhead adults collected for Coleman NFH broodstock have come from Battle Creek or the upper Sacramento River. Propagation of steelhead at the Coleman NFH was initiated in 1947 with the collection of natural-origin steelhead adults at the Keswick Dam fish trap. In 1953, hatchery-origin adults began to return to Battle Creek and steelhead broodstock were collected from Battle Creek for the first time. From 1954 through 1977 steelhead broodstock were collected at both Battle Creek and the fish trap at Keswick Dam. In 1978 steelhead broodstock were collected at the Red Bluff Diversion Dam. From 1979 through 1983 all steelhead broodstock were collected from Battle Creek. Steelhead broodstock were collected from the Keswick Dam fish trap most recently in 1984, and subsequent to that year, all steelhead broodstock have been collected from Battle Creek.

Throughout the history of the steelhead program at the Coleman NFH, both natural and hatchery adults have been used as broodstock at Coleman NFH. Steelhead collected at the Keswick Dam fish trap are considered to be natural-origin whereas steelhead collected from Battle Creek are considered to be a mix of natural- and hatchery-origin adults.

***Conclusion:** Natural-origin steelhead from the upper Sacramento River are the founding stock for Coleman NFH steelhead broodstock, and natural-origin steelhead and hatchery-origin steelhead have been integrated at the Coleman NFH for over 50 years.*

Inclusion of Coleman NFH steelhead in the Central Valley ESU

Busby et al. (1996) determined that steelhead at Coleman NFH are included within the California Central Valley Evolutionarily Significant Unit (ESU). This determination was made based on the following information: 1) steelhead from Coleman NFH and natural-origin steelhead from Mill and Deer creeks form a distinct genetic clustering when compared to other steelhead populations from the West Coast; and 2) the steelhead propagation program was founded with native Central Valley steelhead and natural steelhead have been incorporated as hatchery broodstock on a regular basis. Although Coleman NFH steelhead are considered part of the ESU, they are not currently listed.

Conclusion: Genetic data and broodstock history led NMFS to conclude that Coleman NFH steelhead are part of the Central Valley ESU.

Reexamination of ESUs

Based on the status review of West Coast steelhead, NMFS determined that steelhead from Coleman NFH are included within the California Central Valley ESU. However, as a result of the Hogan Decision (Alsea case), the NMFS is currently reexamining the status of ESUs that contain a hatchery component. Within this review process, decisions to exclude the hatchery component from established ESUs will likely require newly acquired information which is substantive enough to reverse the previous decision to include the hatchery stock within the ESU. Although the outcome of the review of the Central Valley steelhead ESU is unknown, given the strength of the previous analysis and lack of any newly acquired information suggesting that Coleman NFH steelhead should not be included within the Central Valley ESU, the probability of reversing the previous decision to include Coleman NFH steelhead in the ESU appears low.

Conclusion: Although the outcome of the review of the Central Valley steelhead ESU is unknown, given the strength of the previous analysis and lack of any newly acquired information, the probability of reversing the previous decision to include Coleman NFH steelhead in the ESU appears low.

Genetic similarity of Coleman NFH steelhead with natural origin steelhead within the Battle Creek watershed.

No previous genetic analysis on natural-origin steelhead in Battle Creek has been conducted. Therefore the genetic similarity/difference between Coleman NFH steelhead and natural-origin steelhead in the Battle creek watershed is unknown. However, due to the long history (50 plus years) of steelhead propagation in the Battle Creek watershed, we would expect the genetic similarity between natural and hatchery-origin steelhead in Battle Creek to be at least as high as the genetic similarity between Coleman NFH steelhead and natural steelhead in Mill and Deer creeks.

In addition to incorporation of natural-origin adults as hatchery broodstock (see previous section on broodstock history), there is a high likelihood that hatchery-origin adults have spawned naturally in Battle Creek. Although the parentage of natural-origin steelhead in the Battle Creek watershed is unknown, there is a high likelihood that some percentage of these fish are the progeny of naturally-spawning hatchery-origin adults. Coleman NFH spawning records indicate steelhead adults have intentionally been passed above the Coleman NFH barrier weir during many years throughout the program's history. For example, spawning records from 1953 through 1995 indicate frequent releases of adults (range: <100 to approx. 1,500 per year) above the Coleman barrier weir. In more recent years, (i.e., since 1996), large numbers of hatchery- and (presumably) smaller numbers of natural-origin adult steelhead have also been passed above the Coleman NFH barrier weir into upper Battle Creek (Table 1). An unknown number of steelhead adults may also escape past the Coleman NFH barrier weir each year (i.e., ascend the barrier weir directly without using the fish ladder). Of the hatchery and/or natural-origin adults that are passed above the weir (or escape above the weir), it is expected that a significant proportion spawn naturally in upper Battle Creek and contribute (natural-origin adults) to the next generation. Hatchery- and naturally- produced steelhead adults have largely been distinguishable in Battle Creek since 2001 because of a recently implemented (1997) steelhead mass marking program (i.e., adipose fin clipping) at Coleman NFH. During return year 2001/2002 approximately 87% of the steelhead adults passed upstream of the barrier weir were of hatchery-origin (Table 1). As a conservative estimate, if this percentage (80% +) is applied to the total number of steelhead passed above the barrier weir in previous years, then there is a high likelihood that a percentage of natural-origin adults currently present in Battle Creek are the progeny of hatchery-origin steelhead that naturally spawned and reproduced successfully.

Table 1. Number of steelhead from Coleman National Fish Hatchery released above the barrier weir in Battle Creek, return years 1995/1996 - 2001/2002.

Return Year	Number of Steelhead Passed
1995/1996	276
1996/1997	295
1997/1998	418
1998/1999	1,163
1999/2000	1,416
2000/2001	1,483
2001/2002	1,866 (87% hatchery-origin)

Conclusion: Although direct genetic analyses have not been conducted, natural- and hatchery-origin steelhead in the Battle Creek watershed are likely very similar genetically (due to common ancestry and over 50 years of continual mixing/integration).

Current Habitat Carrying-Capacity upstream of the Coleman NFH barrier weir

Some concern surrounding the question of whether or not to pass surplus hatchery-origin adult steelhead has revolved around issues of habitat carrying-capacity in upper Battle Creek. An analysis of spawning habitat carrying-capacity recently completed by CDFG suggests the existing habitat should be able to support approximately 3,700 spawning steelhead (analysis on file). The number of fish to be passed is expected to be well below this estimate of habitat carrying-capacity.

Conclusion: Passage of hatchery-origin steelhead above the barrier weir in Battle Creek will not exceed the estimated spawning habitat carrying-capacity.

Genetic/Demographic Effects

The genetic and demographic risks of passing Coleman NFH steelhead above the barrier weir are both considered low at this time because of (a) the ancestry of the hatchery broodstock (consistent with a high genetic similarity to the Deer and Mill creek natural populations) and (b) the current low abundance of natural-origin spawners in Battle Creek, respectively. On the other hand, excluding Coleman NFH steelhead from the upper Battle Creek watershed would preclude potential genetic and demographic benefits to the natural population. For example, NMFS geneticist Dr. Carlos Garza noted (July 11, 2002) that excluding returning, Coleman NFH adults from the upper Battle Creek watershed may, in fact, incur greater risk than allowing them upstream to spawn naturally. This latter conclusion was based on his consideration of Coleman NFH broodstock history and the low abundance of returning natural-origin adults relative to the available spawning habitat (carrying capacity) in Battle Creek.

Relative benefits and risks of alternative actions

Aside from the option of passing the surplus adults above the barrier weir, the co-managing agencies developed and evaluated 11 potential "non-passage" alternatives. After additional consideration of the 11 non-passage alternatives, two have been identified as potentially feasible alternatives: (a) release of surplus adults back into Battle Creek below the weir, and (b) outplanting to a closed system (e.g., freshwater lake or reservoir) to support a sport fishery. Although the benefits and risks of these two alternatives have been discussed during previous meetings a more complete discussion is offered below. After further examination of the remaining non-passage alternatives, and based on available information we conclude passing surplus adults above the weir still affords greater benefit and less risk than the other two alternatives.

The first of the remaining two feasible alternatives is to return all hatchery-origin steelhead surplus to Coleman NFH broodstock needs back to Battle Creek "below" the barrier weir. This alternative will leave the adults in the Battle Creek system, but will afford some level of spatial separation between hatchery-origin adults and natural-origin adults. All natural-origin adults encountered during broodstock collection will be passed upstream of the barrier regardless of the disposition of hatchery-origin adults. However, even if surplus hatchery-origin steelhead are released below the barrier weir in Battle Creek, commingling of hatchery- and natural-origin adults is still likely occur in Battle Creek. For example, not all natural-origin adults will choose to pass the barrier weir (i.e., may volitionally spawn with/among hatchery-origin adults in Battle Creek below the barrier weir). Conversely, unknown numbers of hatchery-origin adults may consequently volitionally ascend the weir and access habitats upstream of the barrier weir and spawn with/among natural-origin adults. This scenario, therefore, has the potential to confound population/habitat suitability monitoring, as precision on estimating the numbers of available spawners and hatchery/natural ratios above and below the weir in Battle Creek is further compromised. "Recycling" hatchery-origin steelhead below the weir would also potentially increase density and competition effects on natural steelhead attempting to approach/pass the weir. Additionally, the higher quality spawning and rearing habitats available above the weir will likely remain underutilized.

The second option consisted of removal of all hatchery-origin steelhead from the Battle Creek watershed with subsequent placement in an appropriate off-site nonanadromous location. This alternative is expected to provide only minimal recreational benefit because the areas that have been proposed are already heavily stocked with rainbow trout by the California Department of Fish and Game. Furthermore, this alternative could involve potential genetic and demographic risks associated with the reproductive loss resulting from the direct removal of significant numbers of natural spawners and the potential loss of the corresponding genotypes.

Summary

Examination of available information suggests clear rationale does not exist to support not passing adult Coleman NFH steelhead above the barrier weir in Battle Creek. Consequently, for the four reasons outlined below, the proposed action to pass surplus adult hatchery-origin steelhead above the barrier weir in Battle Creek currently appears to be the best alternative for those fish in terms of maximizing potential benefits with minimal risks. Tissue samples for future genetic analyses and other biological data (e.g., length, gender) will be collected from at least a sub-sample of the steelhead (hatchery and natural-origin) passed above the barrier weir.

1) Existing genetic data, the ancestral history of the hatchery broodstock, and recent estimates of the abundance of natural-origin adults returning to Battle Creek indicate that the genetic and demographic risks of passing adult Coleman NFH steelhead above the weir are minimal at this time. Conversely, based on the same information, passing hatchery-origin adults upstream of the weir can potentially confer significant genetic and demographic benefits to the naturally

spawning population in upper Battle Creek, thus potentially assisting with restoration of steelhead in the Battle Creek watershed.

2) Genetic analysis and consideration of broodstock history led NMFS to conclude that Coleman NFH steelhead are part of the Central Valley ESU. Data that would reverse this conclusion appear to be lacking.

3) The estimated carrying-capacity of spawning habitats in Battle Creek upstream of the barrier weir suggests the habitat can support substantially more adults than are expected to be encountered and passed upstream.

4) Through a multi-agency process, alternatives other than passage above the barrier weir have also been developed and analyzed as part of the series of meetings to resolve this issue. Eleven non-passage alternatives were previously developed and analyzed. Evaluation of these alternatives have narrowed down the number of feasible alternatives from eleven to two. However, those two alternatives carry minimal benefit, create additional risks and significantly reduce, or eliminate, the potential benefits associated with passing Coleman NFH steelhead above the barrier weir.

Agency Positions:

The U.S. Fish and Wildlife Service, the California Department of Fish and Game (letter on file), and the U.S. Bureau of Reclamation, support the proposed action of passing surplus hatchery-origin adult steelhead above the Coleman NFH barrier weir in Battle Creek.

References:

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, Idaho, Oregon and California. National Marine Fisheries Service. NOAA Technical Memorandum NMFS-NWFSC-27.

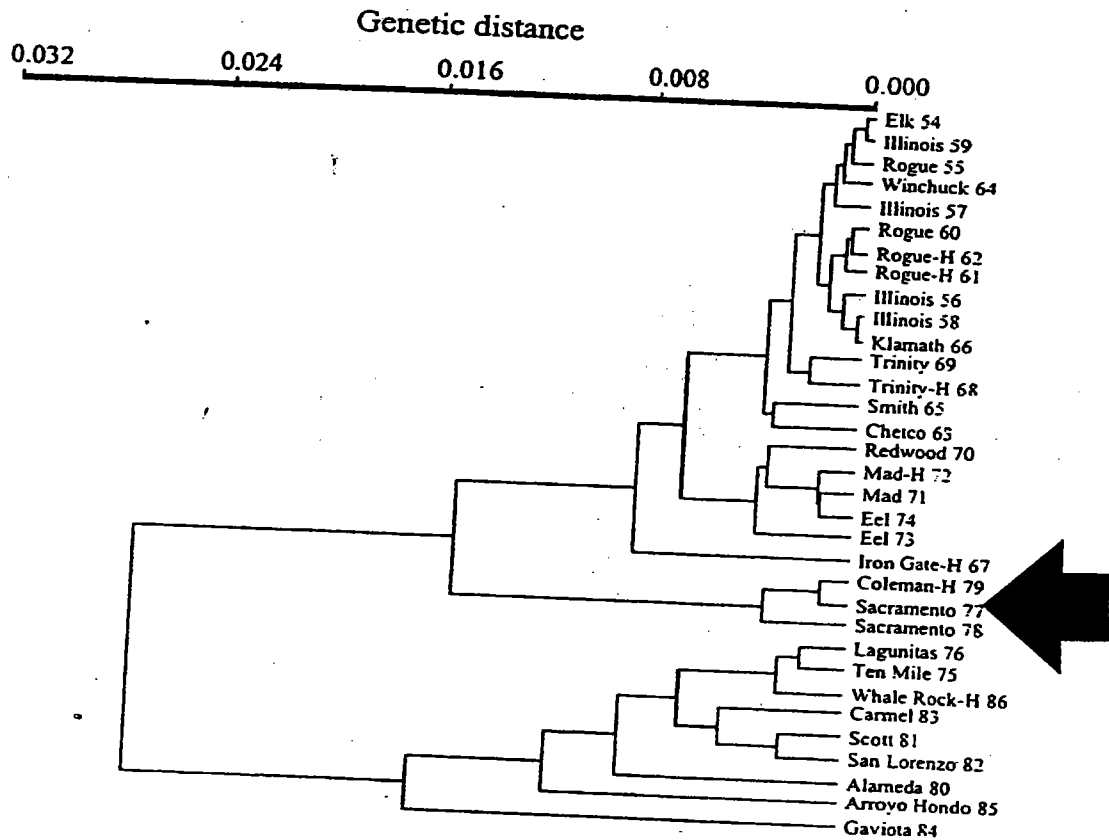


Figure 3. Dendrogram based on unweighted pair-group method analysis (UPGMA) clustering of pairwise genetic distance values (Nei 1978) among 33 hatchery (-H) and natural steelhead populations from southern Oregon to southern California. Analysis was based on data for 51 polymorphic gene loci scored in samples analyzed by NMFS. Sample names and numeric codes correspond to those in Appendix A.

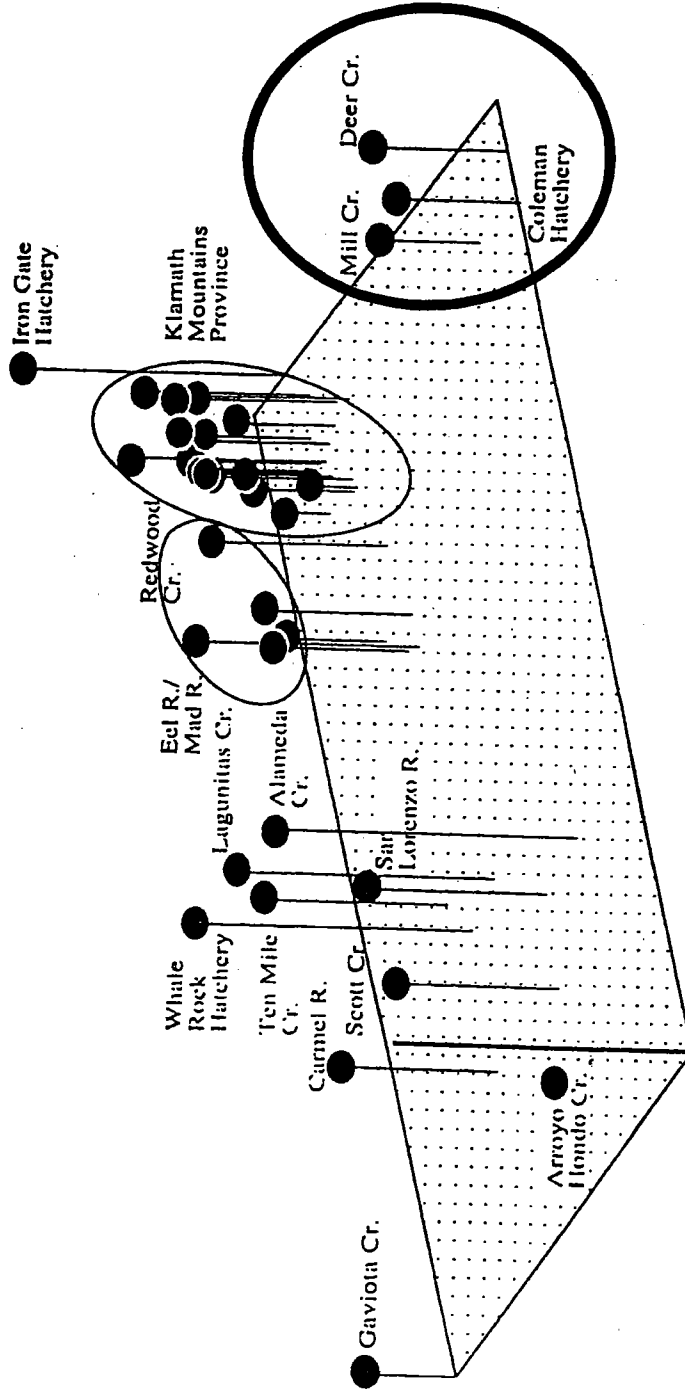


Figure 4. Multidimensional scaling plot (MDS) of genetic distance values used in Figure 3.