

Final Response to March 2004 Technical Review Panel Comments on the January 2004 Initial Response to the September 2003 Technical Review Panel Report (May 2004)

(Note that the Final Responses from the Battle Creek Salmon and Steelhead Restoration Project (Restoration Project) Project Management and Adaptive Management Teams have been directly incorporated into the following March 2004 Technical Review Panel Comments on the January 2004 Initial Response, and are noted in italics and highlighted. The current version of the Draft Adaptive Management Plan is located on the CBDA website- <http://calwater.ca.gov/Programs/EcosystemRestoration/Ecosystem.shtml> under 'Battle Creek').

Comments on the Initial Response to the Technical Review Panel Report For the Battle Creek Salmon and Steelhead Restoration Report

A six-member panel issued the initial Technical Review Panel Report (TRPR) in September 2003. The goal of the review was to provide a comprehensive evaluation of the technical merit of the Battle Creek Restoration Project, CA. The following comments represent the opinions of the Technical Review Panel (TRP) about the initial responses to our report and the draft Adaptive Management Plan. The major areas of our comments include general observations about the overall process and progress of the Project Management Team (PMT) and Adaptive Management Team (AMT), comments on specific responses, and comments on the Adaptive Management Plan.

General Observations

In general, the Battle Creek Project Management Team was very responsive to the TRP Report. The responses ranged from providing an explanation of how a decision or design was developed to specifications changed in response to the TRP Report. We have noted several Project team responses that seemed to dismiss the Technical Review Panel's concerns without adequate justification. Overall, it was apparent that the Team carefully reviewed our report and responded constructively.

The draft Adaptive Management Plan and table of uncertainties is a marked improvement over the plans we reviewed in August 2004. The Team has enlisted assistance for critical aspects of the plan and has made substantial progress. If the Adaptive Management Plan continues to improve at this rate, it will be an important example of adaptive management in large scale restoration projects.

Alternative Project Design

We are pleased to see that the Project and cooperators are carefully examining a broader range of alternatives. With respect to the analysis provided for decommissioning the PG&E facilities, the conclusions are understand that this analysis is in progress. There is an uncertainty assessment with respect to power values and construction cost however, certainty associated with the overall goal of resource restoration and uncertainty with respect to O&M is not addressed. We encourage the participants to maintain a long-term view of the costs and benefits and consider more than power value and construction because the project has more critical elements than these two decision factors.

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Response: One additional project design scenario that removes eight dams instead of five dams (Eight Dam Removal Scenario) was reviewed in a workshop sponsored by the lead agencies for the project on March 15, 2004. The minutes of the workshop and the summary of an additional analysis from the information presented at the workshop is posted on the CBDA website- <http://calwater.ca.gov/Programs/EcosystemRestoration/Ecosystem.shtml> under 'Battle Creek').

From an economic point of view, two main cost drivers are replacement power costs and construction costs. These warranted uncertainty ranges. All other cost is included in the expected case. The MOU proposed action (Five Dam Removal Alternative) is still the least cost alternative.

From the environmental benefits perspective, compared to existing conditions required under the Federal Energy Regulatory Commission license, it is clear that both Five Dam Removal Alternative and Eight Dam Removal Scenario significantly improve habitat and passage conditions for the target species and meet the needs of those species. It is concluded that there is not a significant difference in the amount of improvement over existing conditions provided by the Eight Dam Removal Alternative as compared to that provided by the Five Dam Removal Alternative. The Five Dam Removal Alternative provides more adaptive management opportunity for creating coldwater refugia below Eagle Canyon Diversion Dam and provides more power generating capability.

Comments on Specific Responses

The following specific comments will identify responses that may not have been specific to the issue the TRP was trying to identify.

2.2.3.b: TRPR "The Panel strongly encourages staff involved in the conceptual designs and interested parties to thoroughly review the final plans prior to contract award and construction."

The PMT/AMT response did not address the comment of the panel. During our meeting with the PMT and agency staff it became evident to panel members that some staff were surprised at the specific designs in the drawings. An administrative procedure should be set up to have agency staff review final designs before construction. As designs move from field visits, to concept, to design, and to construction, details that may have been important at the field visit stage are dropped by others as the tasks move from one person to the next. In a large project such as this, where many areas of diverse expertise are required, specifics can be missed. Final design check by agency experts does not need to lead to months of delay. Such a procedure can parallel the decision making process as the AMP and funding issues are addressed.

Response: A review of the Draft Plans and Specifications is currently scheduled from mid- June to mid-July 2004. The Federal Energy Regulatory Commission will take part in this review.

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2.3.1.b: TRPR Abbreviated Comment-b: *“Decision makers should note that the endangered status of winter-run Chinook salmon gives this stock higher priority than other salmonid species and runs in the Sacramento River basin for actions by management agencies;”*

The AMT response: was that “The Recovery Plan does, however, identify a need to prepare a feasibility study for the reestablishment of a winter run Chinook population in Battle Creek.” Given that this project has a heavy fishery emphasis when the benefits are being pitched, the AMT should go further than just saying someone else will take care of that important issue. For example, in the Outline of reconceived version of AMP page 9, E, 3rd bullet “The AMPT could recommend that NOAA Fisheries facilitate development of the feasibility plan by 2006 when the Restoration Project is expected to be fully operational. The plan could include contingencies.” The above text from the AMT plan is a much better response and is in the best interest of CALFED if they are going to fund this project.

Response: *There is a group of decision makers that meet regularly to discuss the Battle Creek Restoration Project, commonly referred to as the “Four Agency Group” representing the agencies that signed the Restoration Project MOU (NMFS, DFG, USFWS and USBR) as well as PG&E. The Four Agency Group recognizes the need to initiate efforts to reintroduce winter-run chinook consistent with the best available guidance on this action which at this time is considered to be the Draft Sacramento River Winter-run Recovery Plan (NMFS 1997). This guidance specifies completing a “Feasibility Study” for winter-run Chinook reintroduction. The prioritization of winter-run chinook and the need for feasibility analysis is also addressed in the CALFED Action Specific Implementation Plan for the Battle Creek Project which includes the current version of the AMP available on the CBDA website - <http://calwater.ca.gov/Programs/EcosystemRestoration/Ecosystem.shtml> under ‘Battle Creek’.*

2.3.2: TRPR Abbreviated Comment: *“Elimination of cross-basin transfer of North Fork water into the South Fork would be a major benefit for adult and juvenile salmon.”*

TRP comment: The AMT Response reads “The MOU for the Restoration Project includes terms that guard against false attraction to the extent controllable by limiting planned maintenance activities to a wet season period having elevated South Fork flow volume to dilute North Fork water.” DILUTION IS NOT THE SOLUTION. The seasonal nature of juvenile salmon imprinting to stream odors and the seasonal nature of returning salmon adults make the selection of the maintenance periods critical. The timing is more critical than the dilution, because juvenile salmon can imprint on odors in very small concentrations. Furthermore, the imprinting is thought to occur over a relatively short period during the seaward migration. After spending millions of dollars to separate the flows, you will find that it is no substitute for taking into account the biology and physiology of salmon. This issue should be referred to the AMP.

Response: *It is not possible to completely eliminate the possibility of discharge of the water from power system conveyances to adjacent stream reaches in situations where there are planned or forced outages. The Restoration Project, under the majority of the*

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time, does separate flow. In rare times of unit trips or planned maintenance outages, the timing and duration will be scheduled to minimize mixing as much as practicable. The Restoration Project prescribes a time for planned outages that is most likely to avoid exposure to migrating adults and maximize dilution of out of basin waters with in basin storm runoff. Less is known of the affects on imprinting juveniles which are in the watershed year round. The Adaptive Management Program recognizes the uncertainty with occasional discharges of North Fork water into the South Fork during maintenance. The program will focus on ways to optimize the timing duration and coordination of planned outages to minimize adverse affects on migrating adult and imprinting juvenile salmonids.

General Response to Panels Comments on Screen and Ladders:

If the PMT response gave the impression TRP comments to the screens and ladders were ignored or dismissed, that is unfortunate, as that was certainly not the PMT's intent. Several of the PMT responses to comments on the fish screens and ladders were perhaps not as complete and detailed as they should have been, and didn't convey the fact that several of the items were being investigated. Accordingly, specific responses are included below where additional information to the original response seems appropriate. In addition, the PMT wishes to bring the following items to the panel's attention, which the initial PMT responses may not have made sufficiently clear or which have developed recently:

1. The preliminary and final design of the facilities was conducted by an assembled team representing fisheries and environmental agencies, PG&E, and designers. All decisions regarding the design of the screens and ladders were made after careful consideration by the entire team, including active participants from California Department of Fish and Game and National Marine Fisheries Service, with periodic input from U.S. Fish and Wildlife Service. During both preliminary and final design, the team corresponded regularly and met monthly to discuss and resolve all design issues and spent considerable time addressing the configuration and design criteria for the screens and ladders.
2. Some of the initial PMT members from the fisheries agencies have since left the team. New fisheries PMT members recently evaluating the TRP report are approaching the project from a different perspective and have perhaps been more receptive to several issues raised by the Panel.
3. While the PMT appreciates the panel's input, some of the issues have more than one viable alternative or solution. Where the PMT felt the change would address a design or operational deficiency, the TRP suggestion was incorporated or is being investigated. In instances where the PMT staff felt the existing configuration would function properly and meet intended project needs, TRP comments were considered but not adopted. On several issues, we have differing opinions from two knowledgeable parties and the changes involved would require extensive modifications and redesign. In these instances, the PMT felt it would not be prudent to make wholesale changes.

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4. Project facilities will be monitored closely by the Adaptive Management Team after they are placed in operation and if problems develop or changes become necessary, the facilities will be revised accordingly. For numerous situations, several of which are covered in this response, the PMT has already identified alternative measures that could be implemented.

If the TRP has any questions or reservations on responses to fish ladder and screen items noted below, the PMT suggests a meeting be set up promptly to discuss and resolve the issues in person.

2.6.1.1.1: TRPR Abbreviated Comment d: “Throttling several feet of head with entrance gates may not provide appropriate fish passage conditions.”

TRP comment: “PMT Response: This is a very technically complex part of the fishway design.” The TRP concurs with the PMT statement. But the PMT largely ignored the Review Panel’s comments and experience with fish screens in this region. Instead, they suggested that they had consulted with relevant agencies and did not address the Panel’s concerns.

Response: The initial TRP comments in 2.6.1.1.1 dealt with three main issues at the Inskip Diversion Dam fish ladder:

1. The selection of the type of ladder. The TRP suggested changing the half Ice Harbor ladder to a fixed vertical slot fishway.
2. The energy line and head losses at various points along the fishway appeared to the TRP to be excessive.
3. The selection of a vertical slide gate at the ladder exit (the bypass entrance) instead of a swing gate. Current PMT response is given after the TRP’s response to 2.6.1.8.1b.

Regarding related items 1 and 2 above, the initial PMT response cited the reason why team members from DFG and NMFS selected the “half Ice Harbor” ladder and also explained the water surface elevations and head losses at the ladder weirs and other significant points. The fundamental issue appears to be the energy dissipation along the facility. Without sufficient water surface profile data, the Panel was understandably concerned with what appeared to be excessive head losses. The PMT feels this issue was addressed in sufficient detail in the January 2004 response but, based on the Panel’s response, it appears a misunderstanding still exists. In a recent conversation between Scott Kennedy (screen and ladder designer, DWR Northern District) and Fran Borcalli, Fran indicated that a 1-foot differential at each gate and each ladder baffle, as currently exists, will be satisfactory. For the potential benefit of others on the Panel, notable portions of the PMT’s initial response are again included below.

In the September 2003 report, the Panel commented that throttling several feet of head with entrance gates may not be appropriate. The PMT understood this to mean the first

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set of gates in parallel at the upstream end of the canal (at the headworks). This is the understanding on which the PMT response was based.

The PMT concurs that throttling several feet of head at the headworks is inappropriate and reiterates that the facility was not designed to operate that way. The maximum possible head differential between the pool upstream of the dam and the normal operating water surface elevation at the fish screen will be 3.5 feet. During normal operating conditions the water surface elevation at the fish screen will be the same as at the upstream end of the fish ladder.

If a 3.5 foot head differential were to occur, the gate at the downstream end of the fish screen (the bypass gate) will be partially closed, raising the water surface elevation at the fish screen by 1-foot. The water surface elevation at the upstream end of the fish ladder will remain unchanged and there would then be only 2.5 feet of head difference between the water surface elevation of the pool upstream of the dam and the water surface at the fish ladder.

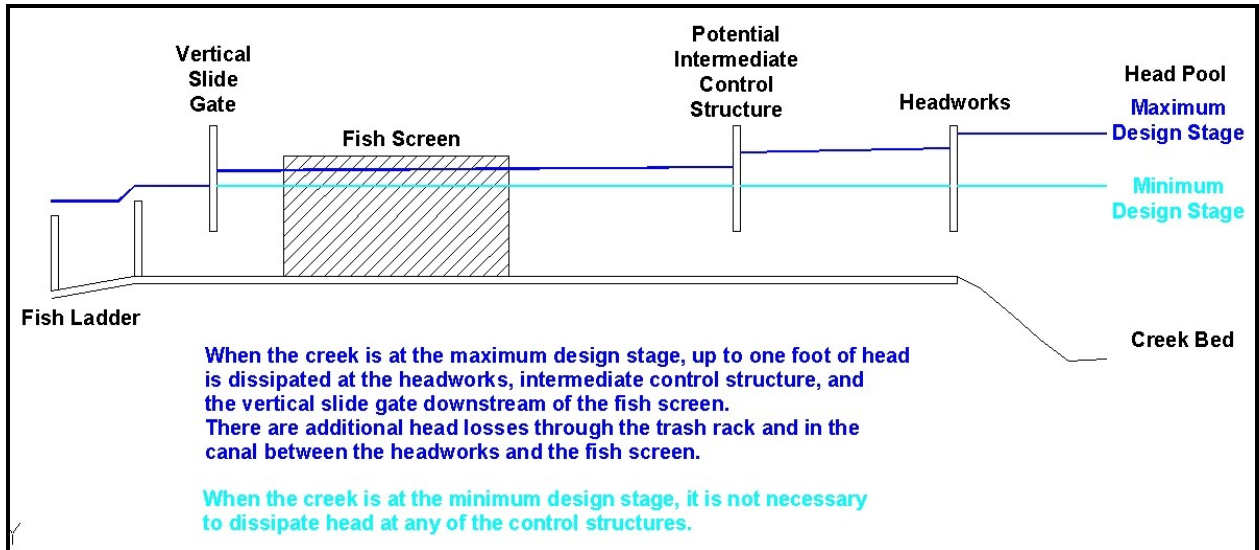
The gates at the headworks control the water entering the canal and will dissipate up to 1-foot of head. Local losses within the canal, between the headworks and the fish ladder, dissipate another 0.5 feet of head, for a total loss of 2.5 feet.

Since it is possible, but unlikely, that a 3.5-foot head differential could occur during the design flow range, the final designs incorporate a structure within the canal, upstream of the fish screen, that would be used to dissipate the additional foot of head, if necessary. The structure is included in the contract drawings, but the gates and appurtenances are not; they will be installed later, through adaptive management, if the head differential approaches 3.5-feet.

Of course, the facility operators would never actually wait for a large head differential to occur before taking corrective action. Before that situation arose, gates would be adjusted incrementally to insure that the maximum difference across any structure did not exceed one foot.

In summary, should a 3.5-foot head differential occur, then 3 feet of head would be dissipated across three different structures (1-foot per structure) spaced out over 300 feet of canal, and the balance of head would be dissipated by local losses.

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Note: The slide gate shown in the graphic above will be changed to a swing gate.

2.6.1.1.3 Fish Screens (Inskip Diversion Dam)

2.6.1.7.1 Fish Screen Structure (North Fork Creek Feeder Diversion Dam)

2.6.1.8.1 Fish Screen Structure (Eagle Canyon Dam)

The PMT response to comments on fish screen structures generally does not recognize much technical merit in comments by the TRP on fish screen structures. The responses each end in a similar dismissive statement. For example, 2.6.1.1.3a: Fish Screens “if the louvers are kept in the same position, the change would require multiple alterations to the final design plans, but may not pose other significant complications”. 2.6.1.7.1a: Fish Screen Structure, “if louvers are kept in the same position, the change would require a fair amount of changes to the drawings but may not pose other significant complications.”

Response: The initial TRP comments in 2.6.1.1.3 dealt with the following main issues at the Inskip Diversion Dam fish screen:

1. Raising the sill on which the screen sits or lowering the floor between the screens and the control louvers to improve velocity distribution along the water column behind the screen. Current PMT response is given after the TRP’s response to 2.6.1.8.1b.
2. The transition and the hydraulic conditions between the end of the ladder and the fish screen and at the bypass entrance. This was addressed in the initial PMT response and the current TRP response does not indicate this item warrants additional discussion.
3. Video counting of adults in the ladder. The PMT response covered the video monitoring station included in the current design and the TRP response did not

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indicate additional response is necessary on this item. At the time of the TRP's review, the video cameras and lights were going to be furnished and installed after construction or added to the contract via change order. The PMT has since reconsidered and will include the video cameras and lights in the contract specifications.

The initial TRP comments in 2.6.1.7.1 dealt with the following main issues at the North Battle Creek Feeder Diversion Dam fish screen:

1. Lowering the floor downstream of the screens so as not to impede flow through the lower portion of the flow and increasing the effectiveness of the control louvers throughout the full depth of the screen. Current PMT response is given after the TRP's response to 2.6.1.8.1b.
2. Provide a means for debris trapped between the brushes to be removed at the end of brush travel and prevent it from accumulating between the brushes. TRP suggested considering an inverted brush assembly. Current PMT response is given after the TRP's response to 2.6.1.8.1b.
3. The plunge pool is not adequately detailed. Current comments are combined with the response to the bypass outfall.
4. TRP comments on the Juvenile bypass outfall included:
 - The pipe outfall is submerged, creating a potential predation problem. Suggested placing the outfall above water.
 - Suggested using an open flume instead of a closed pipe (if raised above water), as is done at other similar screens, so debris does not clog the pipe and to make it easier to inspect & clean. The flume could collect flow at the bypass exit and eliminate the well in the current design.
 - Questions regarding the outfall cantilever and other questions that arose because the outfall and footing are not drawn correctly.

The juvenile bypass outfall and plunge pool details will be corrected on the drawings but the existing configuration will be retained. A number of alternatives were considered during the design phase and the PMT feels the current arrangement still offers the best balance between operational characteristics, reliability, and maintenance requirements. However, the Adaptive Management Team will monitor the facility and if problems do arise, the PMT plans to address them as follows:

1. If leaves and debris in the pipe become a problem, the flanged pipe will be replaced by a flume. The pipe is currently flanged and will be bolted to the concrete structure, so it can be easily replaced if necessary. The PMT, including fisheries representatives from DFG, feels that the smooth-walled pipe is not likely to be clogged by leaves and debris. The likely accumulation of debris may be at the pipe entrance, but that will be inspected regularly and can be easily maintained.

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2. If predation becomes an issue, the outfall elevation may be raised, to reduce the frequency during which the outlet is submerged. The outfall invert elevation at the horizontal segment of pipe (adjacent to the structure) is 2076.0 and the pipe then angles down to its final invert elevation of 2072.5 at the end; the water surface elevation at low flow is 2071. The PMT will pursue and incorporate provisions into the current design to allow the outfall elevation to be easily raised in the future. This may include provisions to hinge the pipe and/or support details that allow for vertical adjustment. The outfall currently discharges into a natural pool and the hope is that periodic maintenance to retain the necessary pool depth will be minimal. If the outfall elevation is raised, the plunge pool depth will be increased accordingly. Raising the outfall pipe will also reduce the potential for damage from debris at higher streamflows.
3. To address potential predation problems, we will also incorporate provisions in the structure so that the configuration can be changed in the future to use another juvenile bypass arrangement. The backup alternative will consist of a second drop box near the downstream end of the screen structure and a bypass pipe from the second drop box to a suitable riffle downstream. A knockout will be added to the downstream wall of the current drop box so that a pipe or flume to the future second drop box can be easily connected.

For the Panel's information, alternative bypass pipe designs and details considered during the design phase include:

- Two drop boxes were proposed to divert the fish to an adequate pool in the stream. This was abandoned in favor of the current arrangement because the NMFS representative (John Johnson) favored a direct route to return the fish back into the stream as quickly as possible. This arrangement, as discussed above, will be pursued if problems develop with the current arrangement.
- Another option explored was to route the PVC bypass pipe 70± feet upstream to the fish ladder. However, since the elevation of the screen box and the first ladder pool are approximately the same, the bypass pipe would have insufficient slope.
- During the Value Engineering process, a few suggestions for an alternative fish screen and bypass were formulated by the Value Study Team but were determined to be less desirable than the current layout:
 - An infiltration gallery was suggested for the diversion, eliminating the need for the bypass system.
 - Place the fish screen in a dissipator box 700' downstream of NBCF. This would have resulted in a much longer fish bypass since the screen would be quite a distance above the creek.
- A waiver to use an 18" diameter bypass pipe versus the minimum 24" bypass pipe was granted by NMFS. The 18" diameter pipe will allow for the minimum 0.75' (9") depth requirement for a bypass pipe.
- The current length of the outlet is set to satisfy low flow conditions. At higher flows, a shorter length can be used. A "telescoping" bypass conduit that could be

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shortened as flows increased was considered but abandoned because of potential complications from the pipe seams.

The PMT considered an adjustable pipe with a flexible joint near the screen box which could be raised by winch and cable to prevent damage as flows increased and the fish bypass was not needed.

2.6.1.8.1a: Fish Screen Structure, The designated representatives from the fisheries agencies were involved in this aspect of the design process and were in concurrence with the original design. (does not answer the question)

Response: *The initial TRP comments in 2.6.1.8.1 dealt with the following main issues at the Eagle Canyon Diversion Dam facility:*

- 1. The TRP suggested that the PMT reconsider the approach velocity used to design the screens and change it from 0.40 fps to 0.33 fps, to make the velocity consistent at all three sites. This was item 2.6.1.8.1a in the PMT's response; part of the TRPs March response is noted above. Current PMT comments are noted below.*
- 2. Lower the floor downstream of the screens so as not to impede flow through the lower portion of the flow and to increase the effectiveness of the control louvers throughout the full depth of the screen. Current PMT response is given after the TRP's response to 2.6.1.8.1b.*
- 3. Provide a means for debris trapped between the brushes to be removed at the end of brush travel and prevent it from accumulating between the brushes. TRP suggested considering an inverted brush assembly. Current PMT response is given after the TRP's response to 2.6.1.8.1b.*
- 4. TRP expressed concern about the selected bypass and suggests PMT consider the combination of debris, turbulent energy dissipation, potential predators, and juvenile needs. The original PMT response addressed this item in detail in 2.6.1.8.1d and the current TRP response does not indicate this warrants additional discussion.*

Regarding Item 1 above, the PMT addressed the issue they believe TRP raised—the screen velocity criteria. The DFG and NMFS screening criteria requires that the approach velocity for these in-canal facilities not exceed 0.40 feet per second. This is satisfied at all three sites. At Inskip and NBCF, where the sites offer a little more room, an approach velocity of 0.33 fps was used because the PMT felt the longer screen and lower approach velocity would improve fish passage conditions and the cost of designing the screens beyond the minimum requirements was within reason. At Eagle Canyon, the screen structure is confined by the near-vertical canyon wall on one side, the diversion dam upstream and the diversion canal downstream. Space is very limited at this site and viable options are few. Because of the physical constraints, a longer screen would be prohibitively expensive. Nonetheless, the 0.40 fps approach velocity still satisfies established DFG and NMFS screening criteria. As with the other two sites, numerous alternatives were considered during the design phase but PMT staff, including fisheries team members, felt the current configuration was the best option.

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2.6.1.8.1b: the change would require multiple alterations to the final design plans, but may not pose other significant complications.” These cookie-cutter responses do not address the issue, which I believe was how consistent flows will be across the screen and will they be within criteria across the entire screen.

Two critical aspects of fish screen design deserve additional consideration: 1) fish screen position in relation to the downstream floor, and 2) screen cleaning brush system.

1. Post construction monitoring of fish screens (velocity measurements) with a similar configuration as proposed clearly demonstrates that the lower boundary condition, the floor, impedes flow in relation to flow through the upper part of the screen which, by comparison, is not impeded. The velocity vectors through the screen are perpendicular to the screen and the floor, again in relation to the upper portion of the screen, creates resistance to flow at the lower portion of the screen that is not experienced at the upper portion of the screen. Setting the screen on an incline is fine however, the benefit of doing so can be reduced with the present configuration for reasons noted above.

Response: *The PMT will lower the floor downstream of the fishscreens. The floor may be sloped down immediately downstream of the screen at an angle perpendicular to the screen, to provide a transition to the new floor elevation and and to enable the louver assemblies immediately behind the screen to be supported properly. The panel did not indicate the distance by which the floor should be lowered. The PMT plans to lower the floors by 6 inches± but if the panel’s experience or observations from testing of similar facilities indicates another value is more appropriate, the PMT would welcome that input. Also, for our information and future reference, the PMT is interested in obtaining a copy of the test results to which the TRP refers.*

2. The entrapment of leaves and debris between brushes has been witnessed on a CDFG designed screen where there was no opportunity for the debris to be removed. This configuration should be avoided even if it requires some relaxation on other parameters for the frequency of screen cleaning.

Response: *The TRP response appears to cover two issues:*

1. *Each brush system consists of two trolleys, with two brushes at each trolley and TRP is apparently concerned that debris could become trapped in the middle of the screen, between the two trolleys. The area cleaned by the trolleys overlaps in the middle and, although the debris is not pushed to the end of the screen, the PMT, including representatives from DFG and NOAA Fisheries, feels the current design is appropriate and will clean the screens as frequently as necessary to prevent flow impedance and violation of the approach velocity criteria. The current two-trolley arrangement will be retained but this will be monitored by the Adaptive Management Team and if a problem develops in the future, the system will be converted to remove one trolley at Eagle Canyon and NBCF so the debris is swept to the end of brush travel while still meeting the DFG criteria of brushing every point on the screen at least once every 5 minutes. The Inskip screen is*

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longer and if one trolley is removed the cleaning interval will increase to over 8 minutes (assuming the maximum recommended brush travel speed of 6 inches per second is retained). If a problem develops at Inskip, one trolley will be removed if it is the only viable option and DFG and NOAA Fisheries will decide what the appropriate cleaning interval and brush travel speed should be.

The March 2004 TRP response indicated that "The entrapment of leaves and debris between brushes has been witnessed on a CDFG designed screen where there was no opportunity for the debris to be removed." The CDFG is not aware of any fish screen installations where debris has collected between the brushes of a two-trolley/brush cleaning system and the PMT requests additional information from the TRP on this facility so the issue can be investigated further.

- 2. TRP is apparently concerned that debris could also become trapped between the screen face and the brushes. To alleviate this potential problem, the PMT will pursue revising the system so that the brushes lift off the screen face at each end of travel, thereby allowing debris to float away with the flow. This may require increasing the brush travel and space is limited, especially at Eagle Canyon and Inskip, but if the resulting changes are not economically impractical, they will be incorporated.*

The PMT has reservations about an inverted brush system, for the reasons cited in the January 2004 response (primarily because it is not consistent with current fish screen criteria). In case the criteria changes in the future and this alternative becomes more applicable, we will investigate the possibility of incorporating provisions in the current design that will allow an inverted brush to be easily installed later if it becomes necessary.

Our comments were made based on experience of several panel members working on projects, mostly for the Corps of Engineers, which had oversight by a number of agencies, but primarily NMFS. These projects were mostly in the Pacific Northwest. Other panel member had extensive experience with these systems in California. We believe that acceptable design practices differ regionally. Panel members noted that well designed screens should not have fish impinged on them. This also seems to be a regional issue. The use of inclined screens is more common in California.

With the very large amount of money involved in that project, it may be penny wise and pound foolish to make a gate selection based on cost considerations. The actual cost of the gate is not that large when compared to the overall construction and program costs. The PMT Response is 'a vertical swing gate which would have provided better bypass flow conditions'. While they agreed with the central point of the comment, apparently no considerations is being made to change the design. They also mention the issues of having to provide a custom gate. We are not sure that this is really such a major factor. Gates of this size are not size are probably sitting on a shelf somewhere ready to ship. [Note: Subsequently corrected by the Panel to read " Gates of this size are probably not sitting on a shelf somewhere ready to ship.]

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Regarding the use of a gate at the at the bypass exit. Their response is 'This comment is currently being addressed.' These exit areas are very important to the proper functioning of the screens. We strongly encourage the Project to change this.

Response: *The bypass exit gate will be changed from a vertical slide gate to a swing gate. Although prior PMT members, including representatives from DFG and NMFS, felt the existing gate would satisfy operational needs, current fisheries PMT members concur with the Panel that a vertical swing gate will be a worthwhile improvement. The information designers have been able to find on gates of this size and type is very limited and it appears a custom fabrication will be required.*

2.6.1.7.1: TRPR Abbreviated Comment d: “The plunge pool shown on the plans is not adequately detailed.”

The PMT response indicates “construction inspectors with input from fisheries biologists to ensure that the final product will provide the appropriate depths land characteristics to prevent predators from being an issue, but to still provide a safe means of escape for the bypassed fish”. Pretty loose design specifications for multimillion dollar project!

Response: *The plunge pool is addressed in earlier combined responses to the outfall and plunge pool.*

Comments on Viable Population Sizes and Interim Quantitative Goal for inclusion with AMTT response to Tech Panel.

Page 3, Para 3 *“full expression of life history, dispersal, and the phenotypic diversity that can be distributed among diverse habitats may be as important as maintenance of genetic variation if populations are to remain resilient and productive in the face of natural disturbances (Healey 1994; Healey and Prince 1995; Rieman and Dunham 2000).”*

The above statement is critical if the interested parties really expect Battle Creek to become refugia for winter Chinook in periods of drought and warm conditions. I would sure like to see the authors follow up this statement with a little more consideration of the probability of “natural disturbances” and viable populations rather than dead ending the attachment by “Therefore, we refer the reader to the other non-quantitative aspects of viable populations.....”.

Response: *Effects and response to natural disturbances is discussed in the current version of the AMP in a contingency section. The AMP also discusses other non-quantitative aspects of viable populations in the population objective section.*

Comments on Outline of Reconceived Version of Adaptive Management Plan.

The AMP states that “The Adaptive Management objectives outlined in the AMP focus on management of hydroelectric operations within the Restoration Project to facilitate habitat changes beneficial to salmon and steelhead. There is expected to be a

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corresponding increase in salmon and steelhead populations as a result of these management actions.” It goes on to state that “To determine if the population objectives of the AMP are being met, assessments of population size, trends in productivity, population substructure, and population diversity must be compared to corresponding guidelines set forth by NOAA Fisheries.” These are critical statements of the goal of the Battle Creek Project and subsequent measures of success. These should be a high priority in all decisions, including the analysis of alternative project designs and the subsequent adaptive management plan.

Figure 3. It is not clear why gravel transport is considered part of non-Project restoration efforts. That seems to be a central aspect of the Project.

Response: *Figure 3 was changed as recommended in the current version of the AMP in recognition that continuing the sluice gates operations maintains sediment transport.*

Pages 1-8 and Table 1 include an impressive list of studies that will serve the larger community well in describing the success, limiting factors, and possibly the failures of the project. If increased flows do not result in sufficient spawning habitat, rearing habitat, or temperature reduction what will be the response? The options at that point are very few, even if the monitoring studies are fully able to document the limiting factor.

Response: *The MOU for the Restoration Project includes the Water Acquisition Fund and Adaptive Management Fund in the AMP that together have the capacity to purchase up to 13,000 acre feet of additional water each year, potentially for the life of the project (estimated using the purchasing estimates for the Eight Dam Scenario). Although it is not possible to know now if, when or how much additional water might be needed, the 13,000 acre feet of water can approximately double the flow during the warm months of the year.*

The largest perturbations that management can affect change will be Coleman NFH, upstream passage structures, and downstream passage conditions. We understand that at some point, the structures will be deemed acceptable. Our concern is that management agencies are still making small incremental improvements in passage structures in the West built as long ago as 50 years and as recently as last year. With flow, the natural processes in Battle Creek will create the best conditions that can be expected. Natural passage barriers are an exception to this point because they may be corrected with structures or modification of channel. We have much less confidence in the long-term performance of man made structures with respect to fish behavior and survival than with the natural processes that will follow increased flows.

Response: *The current version of the AMP recognizes uncertainty in fish response to screens and ladders as well as natural obstacles to migration that are in the channel. There are a number of adaptive responses that can be made to both the natural and man-made structures on an as needed basis including a provision for funding. The designs for the screens and ladders proposed for Battle Creek are expected to provide consistent high performance and reliability. The natural obstacles are expected to have highly variable performance and reliability for fish passage (in response to both high and*

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low flow events) and are expected to physically change through time; however they will be monitored closely and adjustments will be made to flow or physical form as needed.

A few comments about salmon survival and the AMP/critical uncertainties are warranted. The use of survival goals or criteria for each life stage of salmon should be an integral part of these documents. The reader should not be referred to the MOU or other documents for information on salmon survival. Salmon survival for some life stages may not be able to be determined or may be very difficult for the near future. However, others like survival during outmigration of juveniles, prespawning mortality of adults, and estimated egg to smolt may be possible. We endorse the use of cohort replacement rates (CRR) as a fundamental goal. It may sound “salmon centric” but the survival of salmonids should be a much bigger driver in the AMP and list of uncertainties.

Response: *The survival rates derived for the same species in the nearby upper Sacramento River habitats is available for use.*

From Table 1:

“Observe adult congregations below dam and compare to ladder counts”

This is a flawed approach that will result in minimal information. The duration of delay relative to the salmon’s point in their migration is the more specific issue. It may be difficult to obtain duration of delay from observing adult congregations.

Response: *The current version of the AMP includes radio tracking for effectiveness monitoring of ladders as well as providing other information.*

“Monitor fallback with tagged test fish”

This monitoring needs to go a lot further to obtain prespawning mortality that might be associated with fallback.

Response: *The current version of the AMP includes radio tracking for effectiveness monitoring of ladders as well as providing other information.*

“Measure and compare hydraulic parameters at fish screens for calculated and measured diversion rates”

This or associated tasks needs to go a lot further to monitor survival of juvenile fish passing.

Response: *A key screen design feature for ensuring survival is the real time operation feature that automatically shuts off the diversion when it does not meet specific hydraulic parameters known to avoid survival problems. The current version of the AMP recognizes that future knowledge on screens may be applied to the project with respect to hydraulic parameters shown to avoid survival problems.*

Section I.C.1. **Watershed-Based Assessment of Limiting Factors** is a critical framework for the Project and its adaptive management. This section is very important and should be carefully addressed throughout the document.

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Conceptual Models 1, 2, and 3 are important tools for explaining the Project and Adaptive Management Plan. These figures do not identify what biological or physical features or processes will be measured. It would be useful to either add a figure that illustrates the monitoring measurements or include these measures within the existing figures (though it may become overly complicated). Particularly in Conceptual Model 3, the proposed measurements could be indicated in bold font.

Response: *There is an extensive list of proposed monitoring measurements summarized in Table 23 of the AMP*

Draft Uncertainties Table for Reconceived Version of Adaptive Management Plan.

The many “Key Uncertainties” identified in Table 3 present a challenging list of physical and biological features or processes that would need to be measured. It would be wise to prioritize these Key Factors further and identify 1) uncertainties that will be measured within the Project and are absolutely critical for the Adaptive Management, 2) uncertainties that are extremely important and will be measured by the Project if funds are available or by other projects if coordination is possible, and 3) uncertainties that are important but less direct measures of the success of the project and will be measured through other efforts if possible.

Response: *The current version of the AMP relied on presenting studies that address multiple uncertainties. Each study did take into consideration uncertainties. This approach was considered more manageable because there were so many uncertainties.*

The uncertainties with man-made structures and activities are much greater than for natural processes. For example, temperature is an interesting physical variable and knowing what the response to increased flows and returning spring flow to the creek will be of interest to future projects. However, the options are pretty limited after construction of this project. On the other hand, Model and node 3F-3T on Passage/Dams (Page 4, item 8) has been rated as a low risk because: “Not key because literature on this topic is generally accepted and robust. Fish screening has repeatedly been shown to improve outmigrant survival to adequate levels as defined in MOU”.

Response: *The AMP as a part of the Restoration Project MOU has sufficient scope to address limiting factors. Among other considerations in the MOU, there is 12 million dollars in identified funding to make adaptive responses that can address limiting factors associated with flows, facilities and natural obstacles to fish migration and others that may be found in the future.*

Spawning and population dynamics “factors” have many high risk uncertainties at numerous nodes. The real question is: So what will the AMP do about a limiting factor identified for that uncertainty? Answer: nothing! The “factor” is beyond the scope of tools currently available.

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Response: *The current version of the AMP is considered to be a dynamic document that will be revised as formal learning occurs on the project. The AMP also recognizes that there are uncontrollable factors that operate in any natural system (i.e. climate, geology etc.).*

Consider bolding the uncertainties that might be corrected after construction of the restoration project is complete. Perhaps a rating system could be used, for example, indicating factors such as fish screening more likely to be solved than a shortage of spawning habitat.

The revised version of the Adaptive Management Plan for Battle Creek that was reviewed for the 13 Feb. 2004 meeting in Red Bluff included some substantial improvements over the earlier version of the plan. In particular, the sediment and geomorphic monitoring program proposed by Stillwater Science seems to address many of the issues raised by the review panel. However, three issues remain to be addressed with respect to monitoring during and after dam removal.

- 1) It will be important to conduct field measurements during dam removal operations in order to monitor turbidity and fine-sediment deposition on the streambed caused by construction activities and sediment mobilization associated with dam removal. Turbidity should be monitored during dam removal work, and for at least 1-2 days following the cessation of each episode of work. Fine-sediment deposition should be monitored during the first 2-3 days following cessation of each work episode and, if substantial deposition occurs, monitoring should continue until this sediment is flushed from the study area.
- 2) The sediment/geomorphic studies need to be tied more explicitly to riparian monitoring studies. For example, establishment, type, and density of riparian vegetation need to be correlated with locations and magnitudes of sediment erosion and deposition, and with type and stability of geomorphic surfaces along the river corridor.
- 3) The sediment/geomorphic studies need to be tied more explicitly to monitoring of fish abundance and location, as well as to habitat assessments. Spatially and temporally explicit correlations between fish presence and stream condition will require that the various study teams coordinate sampling times and locations.

Response: *All construction activities that have the potential to cause erosion and sediment discharge, including dam removal, will be under state and Federal permits requiring compliance monitoring for fine sediment and turbidity. The Action Specific Implementation Plan for the Restoration Project includes all the monitoring commitments and requirements.*

The sediment and geomorphic studies have been tied to the other monitoring activities by design and as an operating procedure through the quarterly Adaptive Management Technical Team meetings.

The AMP states that “The AMP sets policy regarding the management of Restoration Project-related fish populations, habitat, and passage when the MOU does not

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specifically address a policy issue. However, in cases where the language in the AMP may conflict with the MOU, policy regarding these topics will be set by the MOU. The MOU prevails in any discrepancy between policy specified in the AMP and that set by the MOU.” It would seem more appropriate for any differences to be resolved through ADAPTIVE MANAGEMENT. What is this process intended to accomplish if there is a loophole that one document “trumps” another document?

Response: *The MOU is a binding agreement among the parties that includes the AMP. The language in the current version of the AMP was further clarified to explain that they are considered as one document.*

Again we want to emphasize that the Review Panel strongly endorses the use of cohort replacement rates (CRR) as measures of the success of the Project for fish population goals and objectives.

The Population Objective Four, there is no mention of juvenile life history stages. The AMP still does not address juvenile life history stages. Apparently none will be measured. This would omit a critical piece of the information that is essential to understand if and why the Project succeeds in meeting its goals. Much more attention should be devoted to integrating the monitoring measurements into a full life cycle monitoring system. The Project could coordinate and gain valuable experience from similar integrated life cycle monitoring sites that have been established in Oregon by Oregon Department of Fish & Wildlife.

Response: *The current version of the AMP includes a juvenile habitat use study (Table 23).*

Habitat Objectives are poorly described. It will be critical to measure use of habitat types by different life stages of salmon and steelhead, but the AMP is extremely vague about what will be measured, when it will be measured, and where it will be measured. This section of the AMP could be improved substantially.

Response: *More explicit information has been added to the current version of the AMP on measurements for habitat objectives.*

Fish passage efficiency will be measured only through indirect evidence of aggregations of fish. This is a very indirect and poor assessment of passage success. Distribution is important BUT direct measure of passage efficiency is essential. Tagging studies will be needed. This is a critical aspect of the restoration, and strong quantitative measures are essential. The AMP states that “Passage of fish at fish ladders may be studied with tagged fish if warranted.” The Review Panel recommends strongly that it is warranted!

Response: *The current version of the AMP includes radio tagged fish for passage effectiveness studies.*

The AMP states that “Juvenile abundance will be determined at the sites by direct counts, by species and by size class.” We encourage the Project to calibrate the direct counts with electroshocking (mark-recapture) for a small portion of the sampled area.

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We also encourage the Project to measure the abundance of non-salmonids. Many of them are important resource issues in and of themselves, and all species may influence the carrying capacity and success of the Project.

Response: *The juvenile habitat use study in the current version of the AMP may be able to accomplish calibration of direct counts pending receipt for all the necessary permits. The AMP also contains a Natural Communities Study.*

The Battle Creek Project is EXTREMELY important opportunity to gain an understanding of an important question for the Pacific Northwest. How do salmon and steelhead use coldwater refugia at the scale of stream networks, stream reaches, bedforms (pools and riffles), or microhabitats. Every effort should be made to guarantee that we learn from this valuable opportunity. Regional agencies and universities should be contacted to let them know about the research opportunities. We encourage the Project to publish a small overview of the project in Fisheries and invite researchers from around the country to coordinate and expand the monitoring and research effort.

Response: *The current version of the AMP contains a cold water refugia study. Researchers are invited to participate in studies on Battle Creek, specifically through CALFED's has a process that is a focused proposal procedure open to the public (PSP process).*

Data management, public availability of data and syntheses, and a regular process for sharing the information is critical. This could be tied to the annual decision-making process. This section of the AMP needs additional information.

Response: *These comments are addressed in the operating procedures section in the current version of the AMP.*

At the start of the AMP, there needs to be a discussion of the prioritization of the key factors, the implications for selection of measurements (direct, indirect, models, regional information, none), and links to funding availability

Response: *The current version of the AMP contains a discussion of how studies and monitoring will be prioritized. The studies and monitoring displayed in Table 23 includes prioritization.*

If the Adaptive Management Plan is not going to be a stand-alone document, then there needs to be a road map or cross walk that leads readers to the right information in appropriate documents. If it is going to be a stand-alone document, more information must be included in appendices.

Response: *The AMP is part of the CalFed required Action Specific Implementation Plan that explains the restoration project and compares it to the No Action condition. This document includes the current version of the AMP as an Appendix and it is currently out for public review.*

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Again, the Technical Review Panel emphasizes the major improvements that we found in the Adaptive Management Plan and the Project Management Team's responses. We appreciate the straightforward discussions and hope these comments and observations contribute constructively to the process.

Technical Review Panel

Stan Gregory, Chair

Francis Borcalli

Dennis Rondorf

David Stensby

Ellen Wohl

Dennis Gathard*

*Gathard did not participate in this response due to his involvement in assessment of alternatives.