March 15, 2002

Project ID: 29038 & 29006 Responses

ISRP Comment: Proposals could provide some insight into the data supporting acclimation benefits versus direct release.

MSRF Response: In regards to summer steelhead- The reviewers literature citations are duly noted and it is acknowledged that there is a need for further study to fully determine the benefits of acclimation. These proposals will provide sites to conduct those studies. We plan to conduct paired comparisons of direct stream release versus acclimated releases with the use of PIT tags to allow smolt to adult survival comparisons with a high level of statistical power. We are currently coordinating implementation of this work at our Twisp Steelhead Acclimation Pond Facility with WDFW, FPC, and NMFS researchers and hope to expand this work to include the proposed Eightmile and Early Winters sites.

We found literature containing paired comparisons of direct releases to acclimation to be limited. Viola et al. 1995 indicates that acclimation may substantially reduce the rate of residual hatchery summer steelhead in the rivers, thereby reducing the potential negative impacts of hatchery stock on the natural populations.

We also note that Whitesel et al. 1994 did find more favorable physiological responses to stress challenges for acclimated juvenile steelhead than for direct stream releases for work that was conducted in northeast Oregon streams. In addition, juvenile survival indices of acclimated release groups were higher than those of direct stream release groups and preliminary estimates also indicated that the smolt to adult survival of acclimated releases was greater than that of direct stream releases. These higher survival rates to adulthood in part were thought to be attributable to differences in their ability to respond to a stressor.

Steelhead acclimation programs such as that currently conducted by MSRF on the Twisp River and proposed for Eightmile Creek have the added benefits of A) allowing the fish the opportunity to recover from the stress of transportation in a protected predator free environment prior to downstream migration, and B) being held at lower densities at the acclimation site compared to the hatchery, thereby further reducing the stress associated with crowding.

In response to whether acclimation is necessary or desirable I would refer the reviewers to the attached correspondence and citations from Andrew Murdoch with Washington Department of Fish and Wildlife. (Attachment “A)

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ISRP Comment: The proposal anticipates sun setting (termination) after natural production has risen to expected levels, but how realistic is this? The reviewers would like assurance that the project would "sunset" and would like to review the criteria for determining how and when to terminate the program.

MSRF Response: It is difficult to answer this question as the definition of natural production goals have yet to be determined. Once those goals have been established the sun setting provision can be adequately defined. The assurance that the acclimation sunset provision is implemented would be addressed in the operating agreement developed between MSRF/WDFW and the property owners. The criteria for triggering that provision are proposed to be based upon recovery, which is yet to be defined by NMFS.

ISRP Comment: Would the fisheries managers let go of the sites?

MSRF Response: The projects are proposed for private property. The owners have conceptually agreed to long term operating agreements but are not giving up their property in perpetuity. The operating agreements will deal with the termination date for acclimation and agreed to by the parties. We note that these acclimation sites could potentially be used to acclimate other species of salmonids in the future to assist in their recovery or reintroduction. This would extend the use of the sites thereby delaying the sunset provision. This is not part of the current plan, but may remain a valuable option open to fisheries managers in the future.

ISRP Comment: Would wild fish actually use the site?

MSRF Response: There is a similar site adjacent to Wolf Creek where use by rearing wild steelhead has been confirmed. These areas provide a safe haven from main flow in times of flooding and to escape predators. (Bob Jateff WDFW biologist- pers comm.)

ISRP Comment: Where will the fish come from?

MSRF Response: Steelhead will come from the Wells Hatchery Complex (WDFW) and spring chinook will come from the Wells Methow Hatchery(WDFW)

References

Viola. A.E., and M.L. Schuck. 1995. A Method to Reduce the Abundance of Residual Hatchery Steelhead in Rivers. North American Journal of Fisheries Management 15:488-493,

Whitesel, T.A., P.T. Lofy, R.W. Carmichael, R.T. Messmer, M.W.Flesher, and D.W. Rondorf. 1994. A comparison of the performance of acclimated and direct stream released , hatchery reared steelhead and smolts in northeast Oregon. Pages 87-92 in D.D. MacKinlay, editor. High performance fish. American Fisheries Society, Physiology Section, Bethesda, Maryland.

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March 22, 2002

To: Terry O'Reilly, Methow Salmon Recovery Foundation

From: Andrew Murdoch, Project Leader

Subject: Acclimation of Steelhead and Chinook

Recently, Kenaston et al. (2001) evaluated the efficacy of acclimating steelhead in an Oregon coastal stream reported no significant benefits in terms of smolt-to-adult (SAR) survival and homing back to the release site. Studies concerning acclimation have been inconclusive as to the benefits in adult survival. Most studies designs were short term acclimation periods (i.e. less than 6 weeks) in coastal streams and the measurement of success was an expected change in adult survival. Kenaston et al. (2001) reported that winter steelhead acclimated for 33 day did not significantly increase adult survival, but their analysis had admittedly low statistical power. However, those studies that have been conducted in more inland river systems (Whitesel et al. 1994) and with an acclimation period greater than 6 weeks (Bjornn and Ringe 1984) have demonstrated significant increases in adult survival.

Most if not all hatcheries in the upper Columbia River and Snake River basins rear fish on warm well water to eliminate pathogens and increase growth rates. Fish are released at larger sizes than coastal hatcheries to increase the probability of survival through the many hydroelectric projects. Acclimation of hatchery-reared fish on river water prior to release versus warm well water has been reported to provide significant benefits. Bjornn and Ringe (1984) compared the survival of steelhead reared on river water for 12 weeks versus hatchery well water and reported consistently higher survival rates of acclimated steelhead.

Acclimation of hatchery fish may also benefit wild populations by minimizing negative interactions. Several studies have suggested that if liberated hatchery fish do not migrate quickly or simply fail to migrate (i.e. residualize), competition for space and food would negatively affect wild populations (McMichael et al. 1997, 1999). Paired release studies in the Wenatchee River comparing long term acclimated (3 - 4 months) and direct planted steelhead consistently resulted in the acclimated group emigrating at a fast rate and producing fewer residual steelhead (Murdoch et al. 1998, 2000, 2001). Adult survival analysis for these groups has not been conducted but should be available in the future. However, ongoing paired release studies with summer chinook in the Wenatchee River suggests the long term acclimation (i.e. 6 months) consistently increase adult survival over 200% when compared to fish acclimated for only 2 months (WDFW, unpublished

data). Currently, all hatchery-reared chinook in State operated facilities in the upper Columbia River basin are acclimated on river water for various periods of time (1-7 months). Small groups of fish have been direct planted, but survival information is
unavailable or incomplete at this time. Survival data analysis suggests that groups acclimated for longer periods of time have greater survival rates (WDFW, unpublished data). CWT recoveries from 1993 through 2000 suggest that straying of hatchery fish is also inversely related to acclimation time. The lowest stray rate of the stocks examined was consistently found in the group with the longest acclimation period (i.e. Similkameen Pond). Kenaston et al. (2001) did report that a higher percentage of acclimated fish returned to the release stream versus direct planted fish, but it was not significant. Savitz et al. (1993) examined the homing ability of caged versus non-caged coho and chinook in harbors of Lake Michigan. They reported no differences in the homing of caged and non-caged groups, but applicability of a these results to a riverine study is limited. This study was limited by unequal sampling effort, small samples size, and the lack of site specific olfactory cues.

In summary, studies suggest that in small coastal rivers where the length and time of migration to the ocean is negligible and smolt survival inherently high, acclimation may not be required to achieve SAR goals. However, there is strong evidence that when high smolt quality is necessary to maximize smolt survival and minimize negative interactions with wild populations, acclimation on river water for as long as possible is beneficial. The Department supports acclimation sites as a methodology to increase survival and reduce negative interactions with wild populations. Thank you for the opportunity to comment on a subject that until recently has had little interest in our region.

References

Bjornn, T.C., and R.R. Ringe. 1984. Evaluation of conditioning steelhead trout in cold water after rearing at 15C. Idaho Cooperative Fishery Research Unit. University of Idaho. Moscow, Idaho.

Kenaston, K.R., R.B. Lindsay, and R. K. Schroeder. 2001. Effect of acclimation on the homing and survival of hatchery steelhead. North American Journal of Fisheries Management 21:765-773.

McMichael, G.A., C.S. Sharpe, and T.N. Pearsons. 1997. Effects of residual hatchery-reared steelhead on growth of wild rainbow trout and spring chinook. Transactions of the American Fisheries Society 126:230-239.

McMichael, G. A., T.N. Pearsons, and S.A. Leider. 1999. Behavioral interactions among hatchery-reared steelhead smolts and wild *Oncorhynchus mykiss* in natural streams. North American Journal of Fisheries Management 19:948-956.

Murdoch, A., K. Petersen, T. Miller, and M. Tonseth. 1998. Annual progress report for Wenatchee summer steelhead, 1997 brood Washington Department of Fish and Wildlife. Olympia, WA.

Murdoch, A., K. Petersen, T. Miller, and M. Tonseth. 2000. Annual progress report for Wenatchee summer steelhead, 1999 brood. Washington Department of Fish and Wildlife. Olympia, WA.

Murdoch, A., K. Petersen, T. Miller, and M. Tonseth. 2000. Annual progress report for Wenatchee summer steelhead, 2000 brood. Washington Department of Fish and Wildlife. Olympia, WA.

Savitz, L.G. Bardygula, and G. Funk. 1993. Returns of cage-released and non-caged chinook and coho salmon to Illinois harbors of Lake Michigan. North American Journal of Fisheries Management 13:550-557.

Whitesel, T.A., P.T. Lofy, R.W. Carmichael, R.T. Messmer, M.W. Flesher, and D.W. Rondorf. 1994. A comparison of the performance of acclimated and direct stream released, hatchery-reared steelhead smolts in northeast Oregon. Pages 87-92 *in* D.D. MacKinlay, editor. High performance fish. American Fisheries Society, Physiology Section, Bethesda, Maryland.

Additional comments submitted in response to this proposal:

Letter in opposition from USFWS
Letter in opposition from Okanogan Wilderness League