

**Oroville Facilities Relicensing Efforts  
Environmental Work Group  
Draft Narrative Reports for Resource Action Discussion**

**Resource Action: EWG-42**

**Task Force Recommendation Category: 2**

**RELEASE HATCHERY STEELHEAD EARLIER OR AT SMALLER SIZE TO REDUCE  
THEIR PREDATION ON JUVENILE WILD SALMON AND STEELHEAD**

**Date of Field Evaluation:** No field evaluation was conducted

**Evaluation Team:** Philip Unger

**Description of Potential Resource Action Measure:**

Feather River Hatchery (FRH) staff currently release all juvenile steelhead reared in the hatchery into the Feather River as yearlings. In contrast, FRH staff release all Chinook salmon production into the Sacramento/San Joaquin Estuary as young-of-the-year smolts. The FRH steelhead may spend a year or two in the Feather River before emigrating to the ocean, and in some cases may not emigrate at all. Yearling steelhead primarily feed on insects and other aquatic invertebrates, but older juvenile steelhead feed increasingly on small fish. The diet of these juvenile steelhead may include fry of wild origin salmonids, including Central Valley steelhead and Central Valley spring-run Chinook salmon, both listed as threatened species under the Federal Endangered Species Act. It has been observed that steelhead fry can become prey of older steelhead (SP-F3.2, Task 2; SP-F2, Task 1), and the same is likely true of salmon fry. Therefore, predation by FRH steelhead has a potential to reduce survival of wild salmon and steelhead. This measure would attempt to reduce this potential impact by modifying hatchery release practices for steelhead as follows:

- 1) Steelhead would be released earlier in the year, before wild salmon and steelhead have emerged from their redds, or
- 2) Steelhead would be released at smaller sizes, which are less likely to prey on fish, including salmonid fry.

**Related Resource Actions:**

There are several other Resource Actions that are either similar to or otherwise related to this measure:

- EWG-35A and EWG-35B are related to this action because they also address the resource goal of reducing predation on juvenile salmonids.
- EWG-40, is related to this action because it is designed to decrease hatchery production to reduce impacts on crowding in the lower Feather River.
- EWG-98, which is designed to provide additional instream habitat for juvenile steelhead and salmon.

**Nexus to the Project:**

This Resource Action is related to ongoing project operations and facility structures that impede or restrict passage of anadromous and migratory fish in the Feather River

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above Oroville Reservoir, and to practices of the FRH, which is an Oroville Project Facility.

**Potential Environmental Benefits:**

Little is known about predation of steelhead yearlings and older juveniles on salmonid fry, but such predation, if it is significant, has a potentially significant adverse effect on survival of wild salmonid fry in the lower Feather River. By reducing such predation, survival of wild-origin Chinook salmon and steelhead could be enhanced.

**Potential Constraints:**

The principal potential constraint on this measure is that there is little or no evidence to indicate that it would be effective in its overall goal of increasing the numbers of wild Central Valley steelhead and Central Valley Chinook salmon. There is also no evidence that predation on salmonid fry by the steelhead yearlings released by the FRH occurs in significant numbers. Another potential constraint is that changing the release timing or the size of the released juveniles could result in reduced survival of these fish and ultimately result in reduced numbers of returning adults.

**Existing Conditions in the Proposed Resource Action Implementation Area:**

The Feather River downstream of the Fish Barrier Dam provides approximately 16 river miles of rearing habitat for wild and hatchery origin Chinook salmon and steelhead fry. A few weeks after emigrating from their redds, salmon fry may move further downstream and may spend months rearing in the lower Feather River, the lower Sacramento River, the Yolo Bypass, and the Delta, before emigrating out to the ocean as smolts. During this period of rearing, the fry are preyed on by Sacramento pikeminnow, striped bass and other fish predators, possibly including resident trout and older steelhead juveniles. Young steelhead are likely to remain in the Feather River for much longer than juvenile salmon, and may not emigrate until their second or third year of life, or later. Particularly during their first year of life, the young steelhead are also vulnerable to predation by fish, which may include predation on fry by resident trout and older juvenile steelhead.

**Design Considerations and Evaluation:**

Evaluation of this measure should include predation studies of released hatchery steelhead. The focus of these studies should be predation on salmonid fry by different sizes of juvenile steelhead at different times of year. Results of such studies are needed to obtain evidence of whether or not this measure is likely to have any effect on survival of Chinook salmon or steelhead fry. If the results indicated that predation by released steelhead on fry was potentially significant, the results would then be used to determine the best time of year and best sizes of releases,

**Synergisms and Conflicts:**

This Resource Action is compatible with the resource goals of EWG-35A and EWG-35B, EWG-34 and EWG-41, which is to reduce predation on wild-origin Chinook salmon and steelhead fry.

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The most important potential conflict from this measure is a potential reduction in the hatchery production of adult steelhead.

**Uncertainties:**

As noted earlier, the principal uncertainty related to this Resource Action is the significance on survival of Chinook salmon and steelhead fry of predation by steelhead released by the hatchery. Assuming such predation is significant, other uncertainties include the time of year that it has the greatest impact on survival of fry, and the range of sizes of the steelhead juveniles that prey on the fry.

**Cost Estimate:**

The Resource Action itself would likely have little cost, but the studies that would need to be conducted to determine its feasibility and how to implement it, would be very costly.

**Recommendations:**

There is little evidence that hatchery releases of steelhead significantly prey on Chinook salmon or steelhead fry. This action should not be adopted unless such evidence is produced.