

NATIVE FISH SOCIETY

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TO: National Marine Fisheries Service, ODFW

FR: Bill M. Bakke

Re: Comments on the Middle Columbia threatened steelhead recovery plan

I am sending comments focused on the Deschutes River and Klickitat River recovery plan for threatened steelhead and on issues that have an affect on all Mid-C threatened steelhead.

Harvest management impact on threatened steelhead

In the recovery plan document it says “Fisheries management through these various organizations has resulted in the decline of total exploitation rates for Columbia River salmon and steelhead, especially since the 1970s. Because of these changes, the ICTRT currently considers harvest a secondary limiting factor for Oregon Middle Columbia steelhead populations.” (page 6.3.7 September 2008 version)

Harvest subtracts wild adult spawners from the various Mid-C watersheds. While the harvest rate may be lower than it use to be the question remains whether harvest is supporting or impeding recovery of threatened steelhead. A harvest rate analysis can not determine whether spawner abundance in each tributary is able to fully utilize the habitat. To make that assessment an estimate of the habitat capacity must be made and the number of spawners needed to make full use of it. The Mid-C steelhead recovery plan does not evaluate harvest from a spawner abundance perspective and the harvest rate methodology is not escapement goal management. An important purpose of harvest management is to deliver the spawners to the habitat for natural production and to support the reproductive capacity of the population and its habitat. That is not how harvest is viewed in the Mid-C recovery plan. Until harvest is evaluated in terms of spawner abundance goals by tributary population, the impact on populations and recovery are unknown. This is a critical uncertainty that fish managers can control so that harvest supports recovery.

The Mid-C steelhead recovery plan has a lot to say about needed habitat improvement, and that is certainly important in order to increase abundance and the productivity of threatened steelhead. However, these benefits from habitat are dependent upon having fish to utilize it. A purpose of

harvest management is to deliver natural spawners to their home streams so expected benefits from investment in habitat repair can be achieved.

Each hatchery has a spawner goal to achieve adults to supply the eggs for artificial incubation and smolt production. It is fair to say that each hatchery has an escapement goal. This goal is in excess of egg take needs to compensate for mortality. In 2008, the Columbia River below the mouth of the Willamette River was closed to fishing in order to get enough hatchery fish back to fill their egg take needs. The Molalla River, on the other hand, was the only river left open for a spring chinook fishery because there is no hatchery on it. The fishery was allowed even though the wild spring chinook are listed as a threatened species and known to have very few natural spawners. Natural populations are not managed in the same way that hatcheries are. Natural spawner abundance is based largely upon what happens to come back, fish that escape the fisheries and other sources of mortality. Is this a double standard built into fishery management? Wild populations should have a spawner abundance goal just as hatcheries do, so that both parts of the production system work effectively.

Knudsen (2000) has written numerous papers about the importance of managing for spawner abundance and said, "...both productivity and biodiversity depend on sufficient escapement of spawners to fully utilize the available freshwater habitat, fertilize the systems with carcasses, and optimize genetic diversity."

Harvest is one aspect in evaluating life cycle mortality. The recovery plan should construct a life cycle mortality index for Mid-C threatened steelhead. This would include such factors as dam and reservoir mortality, predation, fishing, prespawning mortality, ocean survival etc. Is the mortality rate from all causes limiting recruitment and recovery? What can be done in fishery management, dam operations, and habitat improvement to compensate for sources of life cycle mortality that is beyond human control? This analysis may be embedded in the document, but it is not apparent.

In the Mid-C recovery plan harvest management does not provide an improvement in steelhead productivity because the fishery managers assume that harvest is not a limiting factor on wild steelhead recovery. By not conducting an evaluation of harvest to see what productivity benefits could be achieved for steelhead, the Mid-C steelhead recovery plan is incomplete.

It is difficult to believe that fishery managers would not be interested if a 12 percent improvement in productivity from habitat improvements could be made? Yet WDFW estimates the total harvest impact for the Klickitat to be 12% and it is assumed to not be a limiting factor, impeding recovery of threatened steelhead. There seems to be two standards for risk in the Mid-C threatened steelhead plan with the assumption that harvest equals no risk at all.

Steelhead kelts are not included in the recovery plan assessment

Steelhead kelt survival and resulting repeat spawners (primarily females) is an important life history strategy unique to steelhead and sea-run cutthroat trout. The Mid-C threatened steelhead plan does not consider the value of steelhead kelts or repeat spawners even though they have value for increasing reproductive capacity, genetic variability and contribution to smolt yield in low run years. The Mid-C steelhead plan could be strengthened with an analysis of repeat spawner contribution to productivity and abundance and by including measures to increase their survival and contribution. Please see my comments on steelhead kelts in the section on the Klickitat River recovery plan.

Stray hatchery steelhead

Since the 1980s it has been known, based on research, that transported steelhead become lost and stray into non-natal streams. The impact of non-local strays on Deschutes River steelhead recovery is well documented and addressed in the Mid-C steelhead recovery plan. Each steelhead watershed in the Mid-C analysis should include an evaluation of stray steelhead impacts. Since many if not most of these stray steelhead come from fish transported downriver, measures to control this problem should be included in each watershed analysis. Productivity improvements for threatened steelhead by controlling stray steelhead can be estimated and actions to achieve those improvements identified. It is not enough to use recreational fisheries as a means to control stray steelhead, for the numbers in some years are very large and fishing is a relatively ineffective tool for stray removal. Also, as long as millions of hatchery steelhead smolts are released without adipose fin clips, it is illegal to kill those fish in a sport fishery. Constructing hatchery fish exclusion weirs on spawning tributaries and the expense associated with them including operation and maintenance would be considerable. The problem is transportation and upstream hatchery broodstock management. Those are the primary areas where the solution to this problem resides. The recovery plan needs to evaluate the impact of stray hatchery steelhead in each subbasin and recommend a solution.

Comments on the Middle Columbia River Steelhead Recovery Plan for the Klickitat River.

Klickitat River Steelhead Recovery Plan

The draft recovery plan states that wild, native steelhead (both summer and winter run) have critical unknowns. The biological data that is lacking needs to be corrected before a recovery plan can be designed and adopted. Information on abundance and productivity are unknowns. In addition, it is unknown whether the abundance threshold of 1,000 is being met. It is also unknown what effect winter and summer steelhead have on the productivity and abundance of each population. Given these information deficits, their extinction risk is a critical uncertainty and it seems that categorizing them as moderate risk of extinction cannot be supported due to the lack of data. The summer steelhead are described as “non-viable” (page 38). It would appear that given the lack of information and the non-viable status of this population, that it could be categorized as high risk of extinction.

Hatchery steelhead stocking and hatchery strays

The stocking of hatchery summer steelhead in the Klickitat for the last 40 years at a rate of 16,000 to 120,000 smolts annually and an estimated intra-basin stray rate of 6.8% represent a major question as to the status and viability of native wild steelhead. Introgression, predation, predator attraction, and competition between hatchery and wild steelhead are important issues that need to be evaluated. In the Oregon Middle Columbia steelhead evaluation, the major limiting factor for recovery of wild steelhead is stray non-native steelhead. Both the hatchery stock and the strays from Snake River hatcheries are non-native steelhead that affect the productivity and abundance of wild steelhead in the Klickitat River. Yet the recovery plan does not state that this is a limiting factor of major importance. The problem with this assessment and its conclusion is that there is more reliance on speculation than on measurement, creating high uncertainty regarding the health and status of the wild steelhead.

In the Oregon Middle-Columbia River threatened steelhead assessment an estimated increase in native steelhead productivity from removing non-native hatchery strays is 53% to 59% in the Deschutes River (Rich Carmichael personal communication). It is reasonable to expect similar benefits for Klickitat threatened steelhead, but this assessment was not done.

Harvest effect on mortality

Harvest related mortality is an issue that may impede recovery of Klickitat River steelhead, especially the summer fish. According to harvest data in the plan the summer steelhead now sustain an estimated 19.2% harvest impact. The document also provides a reference to ODFW harvest impact assessment and note Oregon recommends no more than a 20% harvest impact to protect natural populations. The problem with the harvest impact analysis for the Klickitat is that it is based on assumption, so the actual impact is an unknown. Also, the plan does not provide information on hydro dam associated mortality, predation in the mainstem, estuary and near shore areas on juveniles and adults. It is likely, given the assumed harvest impact of 19.2 % that the overall mortality on juvenile and adult steelhead from all sources is higher than 20% recommended by ODFW.

It is important to verify the actual harvest impact on spawner abundance and to determine whether harvest management is supporting recovery rather than impeding it for threatened steelhead. This analysis is fundamental in developing a recovery plan.

Spawner abundance objectives for threatened steelhead should be a requirement in the Klickitat steelhead recovery plan. Spawner abundance for each of the seven wild populations in this basin should be determined by analyzing the carrying capacity of the habitat. Based on that assessment, rebuilding targets can be defined and habitat improvement priorities can be determined. Harvest management has an obligation to deliver the spawner abundance needed in each Middle-Columbia steelhead watershed and fisheries managed to achieve that target abundance. Annual accounting of spawner abundance would be needed to verify harvest management effectiveness.

In this plan, as in all other Middle-Columbia River subbasin plans, habitat improvement actions are numerous. While improvement in steelhead habitat is important to the success of the recovery plan, it is also meaningless without spawners to fully utilize the habitat. Harvest subtracts threatened steelhead spawners from watersheds and for that reason harvest must be managed to achieve spawner abundance objectives by watershed. This logical and scientifically supported recommendation is not stated in the Klickitat recovery plan, or any other subbasin recovery plan, and its omission makes it unlikely the plan will be successful.

In the Oregon Middle Columbia steelhead recovery plan for threatened steelhead there is no productivity improvement associated with harvest because it is assumed that harvest management

cannot be improved. While that may or may not be true, the draft plan should prove its case. If a water or land management agency were the author of the recovery plan rather than a fishery agency, would an assertion that no productivity improvement could be made by changes in irrigation water management or changes in management of riparian areas for livestock or timber be acceptable? I am hoping that the fishery agency planners are not being soft on harvest evaluation impacts on threatened steelhead.

Harvest management risk assessment for Klickitat River threatened steelhead is needed and that assessment should evaluate and compare harvest rate based management and escapement based harvest management to determine which methodology is more likely to support recovery.

Native steelhead stock structure

Preserving native genetic diversity of threatened populations is one purpose of the Endangered Species Act articulated by NOAA Fisheries. The release of Skamania Hatchery summer steelhead since 1961 and stray hatchery steelhead from other Columbia Basin hatcheries could degrade the reproductive success of native Klickitat steelhead through genetic introgression and ecological competition.

Research on genetic structuring of steelhead in the Klickitat River (Narum et al. 2006) indicates there are seven distinct native steelhead breeding populations in this watershed. This research also shows that “genetic divergence between the two groups (Skamania Hatchery and native wild steelhead) remains substantial, suggesting little interbreeding between these stocks. About 4 percent of the naturally produced steelhead were found to be from the hatchery steelhead. These results indicate that the genetic integrity and variation of native Klickitat steelhead have been maintained despite repeated hatchery releases and that the potential is high for restoring this threatened population (Narum 2006).

Given this important information the question then is how will this information be used to construct a recovery program for threatened steelhead? It can be argued that a 4% introgression rate by hatchery steelhead is not consistent with nor supportive of an ESA recovery program. In addition, studies have pointed out that ecological impacts from hatchery fish are responsible for degradation of native steelhead productivity (Kostow 2003; Kostow 2008).

The purpose of the ESA is to maintain the abundance, productivity, diversity, and distribution of threatened and endangered species. The fact that Skamania hatchery steelhead has not eliminated the native genetic structure and the native population in 47 years of hatchery releases is an accident rather than the result of a biologically sound, science based plan. The fact that the hatchery fish naturally spawn in the watershed and produce juveniles that can reduce the productivity, diversity, and abundance of native threatened steelhead should be reason enough to terminate these hatchery releases. In addition, the release of resident rainbow trout in the basin should also be terminated for they are competitive with native steelhead and may even interbreed with them.

Native brood stock hatchery supplementation

The next move by the agencies will be to establish a hatchery supplementation program using native, wild brood stock in order to provide a kill fishery and to theoretically increase wild steelhead abundance. A native brood stock hatchery supplementation program may be a greater threat to the wild, native steelhead than the present release of Skamania Hatchery steelhead. They are a greater threat for several reasons. It could decrease genetic variation in the Klickitat steelhead composed of seven distinct breeding populations. It can also result in changing the effective population size by expanding the number of hatchery origin fish in the spawning population (Ryman and Laikre 1991; Ryman et al. 1995). Mining wild brood stock subtracts spawners and could increase the extinction risk and may impede recovery of threatened steelhead (ISRP 2008). At the same time that wild adults are diverted to the hatchery program, harvest of these fish will subtract breeding adults from the population and run counter to recovery (ISRP 2008). While the HSRG recommendations call for more wild steelhead in the hatchery breeding program and few to zero in the natural breeding population to protect the reproductive success, and productivity of the wild steelhead, there are no barriers to control the number of naturally spawning hatchery fish. Also, the HSRG does not address the emerging issues of ecological impacts from naturally spawning hatchery fish and hatchery releases. These effects include competition for rearing space, food resources, predator attraction, disease transfer, and predation on native fish (Kostow 2003; Chilcote 2003). So hatchery supplementation should be operated and monitored to control these impacts, however, they cannot be eliminated and will constitute additional risk to the threatened steelhead because native brood stock fish survive at a higher rate than old hatchery fish and are effective spawners.

There is no evidence that supplementation hatchery programs work, that means they may add adults to the fishery but they do not increase natural production or the productivity of the natural population. There are many definitions for supplementation. The RASP definition is accepted as scientifically sound and should apply to supplementation for threatened species.

Supplementation is "the use of artificial propagation in an attempt to maintain or increase natural production while maintaining the long-term fitness of the target population, and keeping the ecological and genetic impacts on nontarget populations within specified biological limits" (RASP 1992).

Based on steelhead native brood stock research in Hood River (Araki 2007) native brood stock steelhead have a 20% lower survival rate in the first generation and 40% lower in the second generation when compared to the wild steelhead they were derived from. So even though native brood stock hatchery fish have a higher survival rate than old hatchery stocks such as the Skamania Hatchery steelhead, their reproductive success declines rapidly and the effect of their interbreeding with wild steelhead also reduces productivity.

Chilcote (1998) noted the following from research on hatchery and wild steelhead interactions: A conservative interpretation of these findings would indicate that when hatchery fish comprise more than 50% of the natural spawning population there is an unacceptable risk of reproductive failure and, therefore, possible extirpation.

“There is no clear evidence that hatchery fish developed from local wild populations are superior to hatchery fish from non-local populations in terms of natural recruitment. This indicates that in terms of possible adverse impacts on the productivity of wild populations, the percentage of hatchery fish in the natural spawning population is more important than the origins of the hatchery stock involved” (Chilcote 1998).

Strategies that use hatchery fish to rebuild depressed wild populations may be counterproductive because they are likely to cause a loss in overall population productivity and thereby cancel the recruitment benefit from adding hatchery spawners to the population (Chilcote 2003).

The Oregon Department of Fish and Wildlife (2008) presented information to the stakeholders group for recovery of lower Columbia salmonids with the following conclusion. "...relative population survival rates (recruits produced per spawner) were found to decrease at a rate equal to or greater than the proportion of hatchery fish in the natural spawning population. In other words, a spawning population with 20% hatchery strays had the net survival rate (recruits per spawner) that was 20% less than a population comprised entirely of wild fish (0% hatchery strays). Likewise, a population with 40% hatchery strays had a population survival rate that was 40% lower than a population comprised entirely of wild fish."

The persistent and long recognized problem with hatchery introductions is that artificial propagation does not contribute to increased natural productivity needed for viability, and appears in most cases, to erode productivity of wild populations. (McClure et al. 2008)

Management practices involving widespread transplantation of nonlocal stocks may also further endanger listed species or contribute to the decline of unlisted species. In considering recovery options, an objective assessment of potential risks should be undertaken and management techniques requiring less intervention should be evaluated before initiating artificial propagation. (Hard et al. 1992)

The emerging science raises important questions regarding the efficacy of using hatchery supplementation to boost wild steelhead production and the threats are both genetic and ecological. Given the fact that seven distinct steelhead populations are found in the Klickitat River there is the added issue of maintaining the population diversity and distribution of threatened wild steelhead.

Winter and summer steelhead management

Winter steelhead may have been blocked by the lower gorge at Lyle Falls during winter flows creating a separation between summer and winter steelhead. Data on winter and summer steelhead distribution recognize a gradient barrier that separates the two types of steelhead. With this in mind, ODFW blocked winter steelhead access to the upper Siletz River where a native summer steelhead population is located prior to the construction of a fishway at a water fall. Fish passage facilities in the gorge now allow winter steelhead to pass upstream and occupy spawning and rearing areas that were historically available only to summer steelhead. Blocking passage of winter steelhead at Lyle Falls fishways should be included in the

recovery plan. This may mean that winter steelhead production will decline since most of their historic habitat is inundated by Bonneville Pool. To continue to allow passage for winter steelhead will increase ecological competition between summer and winter steelhead and could also result in some interbreeding due to overlapping spawning time. Both issues have an impact on threatened summer steelhead recovery. The recovery plan and the fish management plan should treat winter and summer steelhead as distinct populations as recommended by the ISRP (2008).

Castille falls and the falls on the Little Klickitat river should be treated as barriers to winter steelhead and those areas reserved for a wild summer steelhead. Management actions should be developed to block access to stray and stocked hatchery steelhead at these falls. This would provide a refuge for some of the threatened summer steelhead stock structure.

Triploid trout stocking

The stocking of resident trout should be terminated in the Klickitat River. Hatchery trout and a hatchery trout fishery have an impact on juvenile wild steelhead rearing in streams. The resident fish compete for food, rearing space, and may be predators on threatened steelhead. The fisheries directed at hatchery trout have a harvest impact on threatened steelhead for some may be large enough to be legally retained or they are incidentally killed as anglers sort fish for “keepers”.

Triploid hatchery trout are looked upon as the new technology that would allow a trout fishery in streams with anadromous fish. The justification is that triploid trout will not interbreed with threatened steelhead. In reviewing the literature on triploid trout I found no scientific studies that looked at the ecological interactions between wild and triploid hatchery trout. I did find one study from Idaho where the investigators strongly recommended research on interactions. The enthusiasm for stocking triploid trout into streams with threatened steelhead and salmon should be permitted only after interaction studies are completed. There is likely a strong ecological impact from hatchery trout on juvenile steelhead.

Hatchery salmon impacts on threatened steelhead

The draft recovery plan provides little information on the ecological impact of hatchery salmon releases in the Klickitat River on threatened steelhead. Ecological interaction leading to competition for food and rearing space and potential predation or predator attraction could be a limiting factor on threatened steelhead productivity and recovery.

This part of the draft plan needs to be more fully documented with measures to reduce or eliminate the risk to steelhead recovery.

Steelhead Kelts and recovery

Steelhead kelts are an important life history attribute that have largely been overlooked in steelhead management and recovery of threatened populations. For example, fish passage facilities at main-stem Columbia River dams and some tributary dams were not designed to pass kelts safely downstream (Narum 2008). Consequently, repeat spawners (returning as often as four times) decline in number relative to the number of dams they have to pass. Studies show up to 96% mortality for kelt steelhead during downstream migration from the Snake River (Wertheimer and Evans 2005).

Research on kelt survival and resulting repeat spawner abundance – primarily females – indicate wild steelhead populations from Bonneville Pool tributaries have 10% repeat spawners while those in the Snake Basin have less than 1%. Dams select against repeat spawners.

Steelhead kelts and resulting repeat spawners are valuable genetic resources for native steelhead and this is especially true in years of poor recruitment of first time spawners (Narum 2008).

Disruption of this life history strategy in steelhead could increase their risk of extinction due to reduced reproductive capacity, genetic variability and contribution to smolt yield in low run years. There is evidence that older experienced spawners are more successful in producing offspring.

It is important for the Klickitat steelhead recovery plan to address this information limitation on steelhead kelts and repeat spawner abundance and develop measures that can compensate for mortality caused by angling and dam passage.

Conclusion

The Klickitat steelhead recovery plan reads more like a fishery management plan than one for the recovery of a threatened species. A fishery plan is a utilization plan and should not be the basis for recovery of native species under the Endangered Species Act. It is unlikely that a fishery management plan can be transformed into a recovery plan, so don't try. I recommend that the draft plan be placed neatly on the shelf and the relevant agencies start developing a recovery plan based on science and consistent with the criteria for salmonid recovery under the ESA.

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