THE OSPREY
A Newsletter published by the Steelhead Committee
Federation of Fly Fishers

Dedicated to the Preservation of Wild Steelhead • Issue No. 33, November 1998

THE BEST OF THE OSPREY

This issue of The Osprey is different.

For some time our editorial board has wanted to publish articles from earlier issues, articles that have addressed the problems facing wild steelhead over the past decade. We do this now for a couple of reasons. First, we think the pieces reprinted here are very good, written by people who knew their stuff and said it well, articles that many of today’s readers may not have seen. So unless otherwise noted, the pieces in this issue (a little more than half of them) are historical and are identified by their authors and the dates when they first appeared.

Second, there is a thread running through these pieces that shows a consistency of failure: failure to protect wild steelhead, failure by people who should have known better, managers, elected and appointed officials, commissioners and others. These folks knew years ago what the evidence and experience were, yet they failed to act or they took chances that resulted in wrong choices on behalf of wild steelhead, usually in misguided attempts to produce more rather than to conserve more. The evidence and the ideas illuminated in these articles were not secret when they were first published; they were not vague or little-known to those who should have made better choices. Nor was The Osprey the only voice to sound these alarms; they were everywhere if you were involved and if you really wanted to look.

The point of all this is not to say “we told you so,” but to highlight for readers a problem we think could be quite serious: As we move into 1999, the Endangered Species Act is requiring Western state and local governments to produce and implement recovery plans for wild salmonids, and for the National Marine Fisheries Service to see to it that these plans work. And we see all around us, in charge of these efforts, many of the same officials and so-called “experts” who were on watch while the carnage was happening. They have risen, in some cases, to places of even higher responsibility, in the relevant federal and state bureaucracies. They are advising governors and other senior leaders about the next-steps that must be taken—this time without failure, because there no longer is room for failure.

It seems to us a very risky notion that these same failed “leaders” should be rewarded by once again being handed the keys. Let’s hope they’ve learned and will do the right thing, even if it requires admitting that they were wrong. Let’s hold their feet to the fire at every opportunity; let them know we are watching and will accept nothing less than success.
THE KALAMA RIVER STUDIES, HEDGE OR HEED THE WARNINGS?

The Editors

In Issue No. 4, June 1988, Bill Bakke wrote a piece about the dangers to wild steelhead of hatchery operations in Washington and Oregon. Then the Executive Director of Oregon Trout, Bakke recounted the already-available evidence from an ongoing study by Washington state biologists of hatchery/wild interactions in the Kalama River, a study begun in 1975.

The piece re-printed here appeared in Issue 27, June 1996, eight years after Bakke's alert. It updated the Kalama studies and found the 1988 report to be right on target. It is worth noting that the Grady Creek hatchery project, discussed in this article, has failed to pass muster before court review of its badly flawed Environmental Impact Statement. Nonetheless, misguided political support for the project in Olympia may in 1999 still be alive and well, the risks to wild steelhead be damned, and managing agencies told to build it or else...

For 20 years now, Washington state's fish and wildlife biologists have been conducting scientific investigations of Kalama River hatchery steelhead to determine the reproductive success of hatchery steelhead in the wild. One phase of this study is near completion. It conforms to its original schedule and concept, and annual reports have been published. The two most recent of these, covering fiscal years 1994 and 1995 (through September 1995), contain preliminary analyses and conclusions that should give serious pause, right now, to steelhead managers and policy makers who are in a position to influence hatchery operations statewide.

The Kalama studies are a positive and to-be-emulated example of federal and state cooperation. Funding for this work has come from the National Marine Fisheries Service and NMFS, as we report elsewhere in this issue of The Osprey, is vitally interested in the well-being of wild stocks.

The studies also demonstrate a too-infrequent example of professional biologists planning, executing and, above all, sticking to a long-term study, the results of which were known in the beginning to have the potential for important, and perhaps controversial, impact on the work of the sponsoring bureaucracy. Rarely do managing agencies examine their own work, knowing in advance that the examination may put them, or some of their colleagues, out of business. But that is what is happening here and the work deserves our readers' attention. And the WDF&W scientists involved in this program should be recognized: Steve Leider, who helped design the study and has worked on it over the intervening twenty years; Chris Wagemann; Cameron Sharpe; and Patrick Hulett, the current project leader. Jim Johnston, Bruce Crawford and Mark Chileote were key investigators in earlier years.

The project was designed to estimate the natural reproductive success to the adult stage of hatchery and wild winter steelhead in the Kalama River. The study provided a mechanism to examine how the progeny of two wild steelhead “fared in the wild” compared to the progeny of either two hatchery or one hatchery and one wild steelhead. This comparison includes the entire life history from egg to fry to smolt to ocean-fed adult to returned spawner.

The data suggests that inter-breeding between hatchery and wild winter steelhead affects the productivity of the wild stock. The executive summaries (of the Kalama River studies) conclude, for each of the 1994 and 1995 annual reports: “The reproductive success of hatchery winter-run adults that spawned four years earlier was effectively zero.” (Emphasis added.) This, despite large sampling sizes of adult offspring, 546 and 601 for the return years 1993-94 and 1994-95. In the first year (1992-93) hatchery fish were about 17 percent as effective as wild winter steelhead in producing naturally-spawned and reared adult offspring.

And finally, “Overall, results from these three return years of age 2.1+ adults only (about 60 percent of the total data set) suggest that the difference in natural reproductive success between hatchery and wild winter-run was similar to that previously reported for summer-run steelhead in the Kalama River.” (Ed's comment: A previous, similar study by these same scientists found the reproductive success in summer hatcheryfish to average about ten percent.)

The scientists correctly qualify these results as preliminary because the project was designed to test three complete brood years and the offspring of the final year returned in the winter of 1995-96; those data are now being collected and processed.

A more important qualification has to do with the genetic mark allele by which the hatchery fish were identified and tracked: Did this particular genotype itself influence survivability? That question ("selective neutrality analysis") is also being tested throughout the project; In the second return year the answer appeared to be "no," contrasted to the first year when it might have been "maybe." The reports conclude that thus far the answer to this important question is "inconclusive," but that a final analysis will be forthcoming soon.

So the foregoing is a lengthy introduction to the Kalama River studies and it includes the usual caveats from scientists about "preliminary" and "subject to further analysis." But what does it mean right now?

The Kalama River studies suggest that when hatchery steelhead breed with each other and with wild fish they produce either no adults at all or a very small fraction of the adults that wild steelhead would have produced if not exposed to hatchery steelhead.
It is true that in the first year of the study hatchery spawners in the wild were 17 percent as effective as wild steelhead, but we have chosen to focus on the worst-case outcome: zero reproductive success. Even in the one year that hatchery steelhead produced some adults, they were seven times less likely to produce an adult as wild-wild pairings.

We can sort out the consequences of hatchery-wild inter-breeding by calculating the probability of various spawning pairings (wild-wild, hatchery-wild, wild-hatchery and hatchery-hatchery). Since only wild-wild pairings produce adults, we can determine the impact of hatchery steelhead on the reproductive potential of the wild stock. The probability of the various spawning pairings depends upon the ratio of hatchery to wild steelhead present at the same time and place (on the spawning grounds) and is calculated by multiplying the percentages of each spawning population.

Thus, the probabilities are as follows:

- Wild-wild = (% wild) x (% wild)
- Hatchery-wild = (% hatchery) x (% wild)
- Wild-hatchery = (% wild) x (% hatchery)
- Hatchery-hatchery = (% hatchery) x (% hatchery)

This statistical analysis implies that even a small percentage of inter-breeding will have an immediate and significant impact on the reproductive potential of the wild population.

For example, if hatchery steelhead represent only 10 percent of the spawning population, the probabilities of the possible pairings are:

- \( W \times W (0.9 \times 0.9) = 0.81 \)
- \( H \times W (0.1 \times 0.9) = 0.09 \)
- \( W \times H (0.9 \times 0.1) = 0.09 \)
- \( H \times H (0.1 \times 0.1) = 0.01 \)

As noted above, since H-W, W-H and H-H pairings produce no adults, the reproductive potential of the wild population is reduced, in the first generation, by 19 percent. After just two generations, the reproductive potential of the wild population is only 56 percent of the pre-hatchery potential, other factors (such as spawner-recruit relationships) remain the same. We can also think of this inter-breeding as effectively harvesting about 20 percent of each wild steelhead generation. Of course, this "harvest" occurs without actually catching any steelhead—there are simply fewer wild steelhead each generation to perpetuate their species. One way to arrest this descending spiral is to reduce the number of hatchery smolts as the wild population diminishes. This strategy is, of course, contrary to the usual response to declining wild runs which, historically, was to increase the planting levels.

In spite of these alarming implications arising from the Kalama River studies, the WDF&W proposes to press ahead with the Grandy Creek hatchery. On the face of it, we find it unbelievably arrogant of those who are supposed to preserve, protect and perpetuate wild populations to continue present hatchery practices, much less add a major new production facility at Grandy Creek where the department's own Environmental Impact Statement establishes 10 percent as an acceptable level of interaction.

We are aware that some senior biologist-managers have claimed that hatcheries work because their returning adults do not spawn in the same parts of the river as do wild steelhead and that this reduces to an acceptable level the risks of genetic pollution. This, despite the lack of credible science to support this assertion, which is more a hopeful hunch than an observed and measured reality. Nonetheless we would expect this claim (spatial distribution) to become one of the major arguments as some try to discount the importance of the Kalama findings.

And, as noted earlier, we recognize that it is a worst-case presentation to use zero rather than some higher number. But if conservative management is to be the direction of the department and its new leadership, then the worst numbers of a study

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"After just two generations, the reproductive potential of the wild population is only 56 percent of the potential it had before it commingled with hatchery steelhead."

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**Help Wanted: An Editor**

*The Osprey* needs a new editor. All labs of love eventually run out of steam. The newsletter, as regular readers know, is put together by a handful of volunteers under the guidance of its editor. In the near future this one hopes to be moving on to other things, things related to advancing years, real retirement, etc. Free-wheeling travel doesn’t fit well with deadlines.

The requirements aren't hard to describe but may be harder to fill: A passion for wild steelhead and a long-term commitment to trying to save what is left of them certainly is the first qualification. Without that, nothing else matters because the pay is lousy, only the satisfaction of knowing that the newsletter is making a difference.

Obviously an ability to write reasonably well, some previous editing experience, and residence in the greater Puget Sound region are the other *prima* requisites, as is a continuing individual membership in the Federation of Fly Fishers. Being on-line, with e-mail and fax, enormously helps the task but might not be absolutely necessary, depending on the other things.

We sincerely hope that this need can be the subject of consideration for FFF clubs and boards, whose memberships may harbor the most likely candidates. Most clubs have at least a few die-hard steelheader-members and they may know others. Talk it up. Somewhere, out there, this person exists. We need to find him/her.

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like this are the only ones to be used: there is no room for crossed-fingers optimism that "things will get better."

In the case of the Skagit system, the department’s own stocking method is designed to effect the greatest possible spatial overlap between hatchery and wild stocks with plantings throughout the system: from Grandy Creek to Marblemount in the Skagit itself and in the Sauk to Clear Creek, about 20 miles above the Sauk-Skagit confluence. This planting regime is designed to ensure widely distributed hatchery adults for sport fishers. The spatial mixing of spawners will be much more uniform than if all the smolts were released at, or below, the hatchery, just the opposite result that one would wish for if spatial separation is indeed the key to avoiding the impacts of W x H inter-breeding.

We can anticipate that some wild Skagit River stocks will be impacted even more adversely than anticipated by the probabilities of the various spawning pairings shown above. (In the case of major spawning grounds near the mouth of Clear Creek or the vicinity of the Marblemount hatchery on the Cascade River, for example, hatchery adult concentrations can be expected to skew the hatchery-wild ratio significantly toward hatchery fish.)

One would hope that the Skagit/Grandy Creek scenario is atypical of spatial separations and that inferences from the Kalama studies, when applied to typical steelhead stream systems, would suggest somewhat lesser probability factors for W x H inter-breeding. However, the measurable impact of these spatial factors is unknown, perhaps unknowable.

But that unknown factor is hardly a strong enough reed on which to rest the unfounded hope that disturbing implications of the Kalama findings are "nothing to worry about."

So this is where we are led by the Kalama studies, applying only high-school math and common sense to the department’s own figures in its Grandy Creek EIS: That the risk to wild steelhead is excessive in light of the Kalama River study, especially when we consider Reg Reisenbichler’s conclusions (reported elsewhere in this issue) about the decreased genetic fitness of wild populations that interact with hatchery stocks.

Our common sense — and the reality that everywhere steelhead hatcheries are used wild steelhead are in very serious trouble — suggests that hatcheries pose substantial risks to wild steelhead populations (see The Chairman’s Mend in this issue). Thus we are more troubled than ever about the wisdom of the proposed Grandy Creek hatchery.

We believe the findings of the Kalama River studies, even though preliminary, are a serious enough alarm bell that we challenge senior managers, commissioners and other readers to consider carefully (and above all to do something about) the terribly discouraging prospect that our calculations are essentially correct.

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THE U.S. FOREST SERVICE:
MISUSE OF STREAM STRUCTURES

Recently, however, without consulting interested publics or other fish-managing agencies, the Forest Service has changed its policy direction from stream protection to fish production. Fish are now viewed as a commodity, right along with board feet. I believe that in the Forest Service’s zeal to produce more fish, to make habitat better, our pristine streams actually have suffered needless and expensive experimentation with stream structures. (These are logs, boulders, and rock-filled wire baskets called gabions, placed in stream channels to improve habitat.) The Forest Service is not alone in the current fad to promote stream structures; national and local conservation groups have been eager to try this politically appealing shortcut to cure our ailing streams. I’ve chosen to critique the Forest Service because it has the biggest stream structure budget and because potential losses in terms of wild fish production are great.

The Forest Service has seriously compromised the effectiveness of its legally mandated stream-protection policy by asserting that technology can make stream habitat better. Essentially, the basis for stream protection has been undermined. The new policy can subtly begin to question the need for protection. Why protect watersheds if the stream channel can be repaired later? As unlikely as it might sound, funding for structures actually provides incentive for habitat degradation.

Besides drawing attention away from protection watersheds, the new program guarantees jobs and dollars for the Forest Service. It is backed by a multi-million dollar program employing hundreds of biologists and technicians. These new employees no longer see their role as protecting streams but simply as a stream channel repair workforce, with an endless task of repair work before them.

The Forest Service has invented a new fisheries science to promote stream struc-
ture technology. Simplistic assumptions are made about fish production, e.g. pools create fish. Structures are supposed to make pools and therefore produce more fish. Implicit with this reasoning is the idea that there is something wrong with our streams: They don’t have enough pools.

Sounds reasonable, but haven’t we heard other promises that technology can improve on what is natural?

Fish hatchery proponents use the same kind of argument. We were told that it was wasteful to allow wild fish to spawn in streams because of the high mortality rates they experience. The claim was made that artificial “supplementation” would “enhance” wild stocks and result in more fish. Many of our once-strong wild stocks are now in depleted condition owing to the “make-it-better” argument. Hatcheries and stream structures have the same fundamental flaws: They treat the symptoms rather than the cause. Once public funding is available stream structures are used everywhere, whether needed or not. Their use is rationalized on the basis of products (e.g., more pools, more fish) without a thorough understanding of the physical and biological processes involved. Justification for structures is made on scanty inventory data implying a “pool shortage.” Knowledge — the kind needed to understand how the stream works — is deemed unnecessary and, besides, it may jeopardize the project. The well-informed observer soon realizes that the real benefactor of these projects is not the fish nor the public but the regulating agency.

Implicit in hatcheries is the politically important effect hatchery fish have in masking the decrease of native runs owing to habitat degradation. Stream structures, like hatcheries, are another subsidy for the timber industry. Old-growth forests are being logged at ever-increasing rates on steeper slopes. The easy-to-harvest timber on flat ground is about gone. Our political leaders and high-ranking bureaucrats have given the go-ahead in Forest Plans and in the budgeting process to jeopardize watershed protection while quieting fisheries interests with ample funding for stream structure work. Those whose interests are natural rivers and wild fish have been left the proverbial “bone.”

In fact, the primary input determining fishery values in Forest Plans is the amount of money spent on in-stream structures, rather than stream and water quality protection. The equation goes something like this: more logging + more sediment + more money + more structures = more fish. Somehow, the “sediment” factor gets canceled — apparently because of the “structures” factor. The Forest Plans do not explain this mysterious disappearance of sediment impacts, but the Forest Service’s FORPLAN computer program predicts fish increases in every forest Plan alternative resulting from stream structures. Risks to fish habitat from logging have been conveniently minimized.

The Forest Service calls this habitat enhancement; I call it mitigation. This distinction is not trivial because it has important political implications. The timber industry is counting on the Forest Service to make good on its technologic cover-up of sediment impacts, sediment impacts that could halt logging in the courts, as occurred in the Mapleton District of the Siuslaw National Forest. Industry and the Forest Service hope stream structures will divert public attention from sediment impacts and keep them out of court. Two of the parties see this as a win-win situation. Industry gets the logs and the Forest Service gets the funding for project work. The losers, as usual, are the fish (they get the sediment) and the public.

Just as hatcheries have cost us dearly in terms of decreased natural production, so too will logging decrease the natural productivity of our watersheds. Trees and fish are renewable resources but our watersheds are not. When the trees are harvested off steep, unstable slopes (and much of the hillsides have slid into the stream channel), we will be painfully aware of irreversible stream processes. Channel widening, loss of riparian trees, temperature increases, chronic turbidity, and shifting streambeds unsuitable for spawning are not cured with any dose of stream structures. With abused watersheds there is no second chance.

The hatchery “con” was and still is politically successful because social costs to satisfy the vocal few who benefit from catching a fish can be passed on to the many who don’t fish. Angler greed for more fish provides widespread political support. Each angler naively believes he will catch more fish if more fish are provided through enhancement programs. The same kind of tactics are being used to promote stream structures. True costs of reduced stream protection, structure maintenance, and continued stream deterioration are hidden or diffused. The predicted tangible benefits of more fish are made explicit in Forest Plans and cost/benefit ratios.

The unsuspecting public is also exposed to a media campaign which legitimizes the use of heavy equipment to “fix” our streams. Anglers are quick to support stream structures and hatcheries because all information sources indicate benefits without any costs to them. Despite these public relations campaigns, experience teaches us that hatcheries are not without high and long-lasting costs, both economic and ecological. The same is true for stream structures.

The technical question of whether structures work is hotly debated among biologists. Naturally, those whose jobs require instream structure work are strong supporters. Others are more skeptical or even critical of politically driven enhancement projects. The Forest Service predicts that each structure produces a certain amount of fish habitat which, under the right conditions, will produce more fish. Implicit is the idea of unlimited potential for improvement. Streams are viewed as receptacles for any number of structures and the effect will always be positive. In order to meet their Regional Office targets, biologists often cram too many structures into too small a space. When a major storm hits and the stream floods and destroys the structures, there are often adverse impacts to freshly deposited salmonid eggs from blowouts and log weirs. Forest Service researchers have learned that construction of boulder berms to improve spawning habitat for steelhead actually reduced the far more important rock crevices needed by overwintering juveniles. This is one of the few cases where effective monitoring of structures has occurred.

Besides unintended adverse impacts, the economic benefits for structures are grossly exaggerated or are fabricated to generate positive cost/benefit ratios. The entire concept of structures producing fish is seriously flawed. The Forest Service
would like us to believe that structures are little mini-hatcheries turning out smolts. This simply is not true. Structures don’t make fish; streams do.

Salmon and steelhead use a multitude of habitats through their life cycles and these life cycles occur over great distances. Thus, salmonids are sometimes called fugitive resources because their movements in river systems and oceans prevent them from being “owned,” as trees or resident trout might be. In a similar sense, no single public agency can claim to have produced a wild fish. Forest Service claims of increasing fish production through structures are therefore fraudulent. The only legitimate and legal mandate the Forest Service has is the protection of habitat. Extensive logging followed by stream repair can hardly be called protection.

Stream structures, like hatcheries, have their place. The biologists who initially experimented with stream structures in the Northwest never intended their widespread use. In light of previously described biological and physical uncertainties, a conservative approach seems prudent and responsive. Limited use, with intensive scientific monitoring, is needed to build trust in this largely unproven technology.

As more attention is paid to stream structures, less emphasis is being made to protecting natural habitats and learning how they work to produce fish. The new fishery biologist, like his hatchery counterpart, is not asked to do more than technicians’ work. His understanding of how ecosystems work and ought to be managed is not being sought. The highly valued natural beauty of our streams is being bio-engineered according to optimum pool-to-riffle ratios. This requires the use of heavy equipment and machines in stream channels. The do not belong there. What has happened to our values that instinctively tell us that backhorses and cats should not be used to rearrange a river bed? This is not just a technical matter but an ethical one.

Streams, like the fish they produce, are inherently wild. They are to be nurtured, not encumbered by anchored logs, cables, protruding rebar, epoxy, and dynamited boulders. Yet this is the torn and patched legacy the Forest Service and others are leaving for the next generation. It is what they will know of us and judge us by.

THE CASE FOR LICENSE SALES: CHICKEN VS. EGG?

Representative Jim Buck, Republican chair of Washington’s House of Representatives’ Natural Resources Committee, provides here an often-overlooked viewpoint on the importance of keeping the money at home. Budget money for fish and wildlife, that is. While The Osprey has now and then vigorously disagreed with Buck’s methods and positions, we think in this case he is right on target.

Some folks might think I just did something really dumb. I went out and bought a Washington state combination hunting and fishing license. In these days of salmon crisis and perceived limited hunting opportunities, why would anyone do such a thing?

There are a number of good reasons, but before we get to them we have to answer a variation of the old question, “which comes first, the chicken or the egg?” Which comes first, lots of license sales or a better Washington Department of Fish and Wildlife?

There is, in Washington today, a real crisis of confidence among you, Washington sportsmen. You are communicating this crisis of confidence by voting with your checkbooks not to buy licenses. You have made your point.

Let me assure you the Legislature and the state Wildlife Commission are keenly aware of both the feelings of the public and the need to make improvements in WDFW. We are aggressively pursuing those improvements.

So what about buying a license? We all know that a lot of our license money goes to fund things like enforcement and hatcheries. But did you know that every time you buy a license WDFW gets $8.50 of money you have already paid in federal tax on fishing gear? Did you know that every time you buy a hunting license WDFW gets $12.50 of money you have already paid in federal tax on hunting gear? When I bought my combo license, I just brought $21 of sportsmen-paid tax money back to the state of Washington for fish and game. What happens to the federal tax money if I don’t buy my license?

It goes to some other state.

Throughout the year I contribute to many worthy causes. None of them gives me the same enjoyment or keeps my attention as much as my outdoor activities. I look at my investment in my combo hunting and fishing license as an investment in my future ability to hunt and fish in Washington. The cost of my license is less than I spend on charities.

Am I sure things will get better with WDFW and will I have more hunting and fishing opportunities? No, but I am sure that if I and enough other people do not support the effort, things will not get better.

So, which comes first, better license sales or a better WDFW? I believe the answer is better license sales AND a better WDFW. I’m betting my license fee that by working together, we can turn things around. So, I hope you will join me and buy a license. It will keep someplace like New Jersey from getting our share of the federal fish and wildlife taxes.
PUGET SOUND SUMMER RUNS:
WHERE TO FIND THEM

Curt Kraemer is another “regular” among The Osprey’s authors. He is the lead state biologist for steelhead in Region Four in Washington State, a long-time expert on Puget Sound rivers and their fish. There is nothing “political” about this piece which describes the movements of summer-run steelhead in Puget Sound rivers. There are some helpful lessons here for serious steelheaders, just as appropriate today as they were when this article appeared in Issue No 5, January 1989.

One of the intriguing facets of steelhead fishing is the mysterious appearance of the fish in the streams. An understanding of the instream appearance of the adult steelhead not only increases one’s enjoyment of the resource but it should also lead to increased angler success. The steelhead’s behavior is programmed to insure the survival of the race. Understanding this programming is also to understand individual fish behavior. Steelhead return to their natal streams for only one reason and that is to spawn. The fish are not in the stream to feed, although there may be some infrequent feeding, thus they behave differently from resident trout.

The fish are genetically imprinted to return to their home stream or hatchery to spawn and to do this as safely and efficiently as possible. Because summer-run fish enter their home streams four to 12 months prior to spawning and feed very little, they must survive on their stored fats. Successful spawners by definition have evaded predators and managed to live on limited fat reserves.

The movement in the stream can be divided into four stages.

1. The first stage is from the time the fish first enter the stream until they reach their summer staging area. Summer-runs begin entering the streams in the late winter and on through the early fall (March through September) with the peak of the run entering the streams in late June. The older three-salt fish peak earlier than the two- and one-salt fish. Once the fish enter the stream they work their way upstream to the area where they will spend most of the summer. The fish typically travel five to eight miles a day, although they are capable of traveling much farther in a day. Most of the movement takes place during the day with more movement early and late in the day. The fish usually move in the “easy” water along the bars, typically in one to five feet of water, depending on the visibility. When these fish aren’t moving they usually pause in locations that provide them with security: pockets, shaded areas, choppy water, tail outs and deeper holes are typical resting areas. The fish are trying to reach upstream areas as safely and efficiently as possible.

2. If the first stage is typically one of efficient upstream movement, the second stage is one of seeking security. Once the fish reach upstream areas, they move about looking for places of comfort and safety. The fish need an area where they are safe from predators as well as “comfortable” water. Safety is usually provided by some sort of cover: log jams, deep canyon pools, shaded areas, undercut banks, etc. “Comfortable” water ideally is in the mid-50 degree range and well-oxygenated. The fish may move about quite a bit to find this water. It is not unusual for fish to move a number of miles upstream or downstream from their home area. Commonly the fish will move into cooler streams to spend their summer. Once this summer haven is found there is usually very little movement until the fall rains. And because the fish “stay put” in these summer havens, they can be difficult to take.

3. The third stage of the fish’s movement takes place in the fall after the first significant rains and the corresponding rise in stream levels. The fish leave their summer havens and move to near their spawning areas. Once near these spawning areas the fish seek out secure places to over-winter, usually deep slow water with cover. This is the movement anglers are familiar with when large numbers of fish can show up at hatchery holes. As the fish move from their summer havens and seek out over-wintering places they are again fairly easy to catch. While the first stage takes place throughout the stream, this third stage takes place almost entirely in upstream areas and the angling is confined to these upstream areas.

4. The fourth stage of movement takes place in the late winter or early spring (January-March) as the fish move from their wintering areas to the spawning tributaries and riffles. This move is usually fairly short and of little interest to the angler. In Puget Sound streams this is usually in waters that are closed to fishing. Even if the fish were fair game they would provide poor sport as they are just shadows of the ocean-charged rockets of six to 12 months previously. In comparison to winter steelhead, very few summer fish recover from spawning to return a second time.

THANKS FOR YOUR SUPPORT IN 1998.

HAPPY HOLIDAYS!
EDITORIAL:
UNSHEATHING EXCALIBUR

Jack de Yonge was the newsletter's editor for three years, 1990–1993. These were good years for The Osprey as Jack's many years of professional journalism were reflected in the quality of articles and the focus of subject matter. This editorial, his second for the newsletter and the newsletter's first piece to focus on the Endangered Species Act, appeared in Issue No. 10, September 1990. Eight years later, it reads like a prophecy.

In this issue Bill Bakke of Oregon Trout writes about the actions to invoke the Endangered Species Act to try to force federal, state and other agencies to preserve endangered runs of wild salmon or the Columbia-Snake Rivers systems.

Steelheaders are on notice that the fate of wild salmon runs and the fate of wild steelhead runs are inextricably linked: What kills the salmon also kills steelhead; what will preserve, restore and multiply the salmon will also preserve, restore and multiply steelhead in the same water systems. Beyond that, all Pacific salmon will come to the fly. More and more of us angle for them as excellent sport fish worthy of the same high esteem and hook-and-release practices that we bestow on steelhead.

To summon the powers of the Endangered Species Act is to summon great forces.

Conservationists through great political and legal effort have invoked the act on behalf of the northern spotted owl in Washington, Oregon and northern California.

The owl is the indicator species for old growth forests, the forests of amazing ecological complexity that began growing before the British thought it worthwhile to put a tax on colonial tea. If the owl is not surviving, all the other creatures dependent upon the entire old growth ecosystem are not likely to survive—not as wild creatures. That includes steelhead, salmon and cutthroat and other sea-run trout.

In the debate over spotted owls, fisheries are rarely part of the focus. Instead it's trees and owls versus loggers' jobs, mill owners' profits and the export riches of Weyerhaeuser and the other giant timber companies. But fisheries will benefit greatly if the pernicious effects of clear-cut logging of old growth forests are stopped or dampened. The logging along and near stream-sides is bad enough. Shade disappears. Creeks get chewed to pieces by heavy equipment. Jammed debris under the force of storm waters creates "blowouts" that bulldoze creek channels and spawning habitats, straighten out meanders and increase the downhill pitch of creekbeds. The intensity and often crude roadbuilding necessitated by logging silts streams, increases runoffs, erodes hillsides and avalanches huge piles of dirt, rock and trees into water courses.

"It's amazing how negotiations get serious when that sword is brandished. Its bright tip tends to concentrate the attention of those who think the earth was created for them to rip up as they want."

Moderating the damage from logging cannot but help our fisheries.

But the spotted owl controversy and the controversy beginning to brew on how to manage the Columbia and Snake Rivers to save salmon have called up some nasty spirits. These have to be reckoned with before anyone says, easily, let's use the Endangered Species Act.

The timber interests are now farming and power interests on the Columbia-Snake system are shaking their fingers at "elitists"—that is, anyone who disagrees with them. Fly anglers are well acquainted with the term. Seek to banish bait fishing in trout waters? You are an elitist, against the common man. Seek to preserve wild fisheries? You are an elitist. Ask for hook-and-release fisheries? You are an elitist.

It is an argument to expect and to be met. If it is elitists to preserve wild fisheries and old growth forests so that they will exist long after all of us are dead, then so be it: Elitism then is an honorable, moral activity.

Timber interests and suddenly agriculturalists and industrialists also are now beginning an intense effort to have Congress change the Endangered Species Act, so that economic interests have to be considered equally with the interests of a species about to disappear. The aim is to turn the act into an Endangered Loggers Act or an Endangered Irrigators Act or an Endangered Aluminum Workers Act.

That effort has to be faced, fought and overpowered.

The Endangered Species Act is our act of last resort, the best and last power we can call up when science, logic and morality otherwise fail before the power of special economic interests willing to sacrifice entire ecosystems and the fish and other animals in them to dictates of personal profit.

The act is our sword. As long as we have it, we do not always have to draw it in order to persuade others to listen to our concerns, the preservation of anadromous fish and the ecosystems that nurture them. And if we must, as we have on the Columbia-Snake system, we can unsheathe the act. It's amazing how negotiations begin to get serious when that sword is brandished. Its bright tip tends to concentrate the attention of those who think the earth was created for them to rip up as they want.\[en]
HATCHERIES AND THE FUTURE OF SALMON AND STEELHEAD IN THE NORTHWEST

Ray Hilborn

Over the ten-plus years, our editorial committee has recognized this article, which appeared in Issue 11, January 1991, as our benchmark piece on the subject of hatcheries and the socio-political climate surrounding them. Dr. Hilborn, a recognized authority at the University of Washington's School of Fisheries, says things were that in 1991 were considered sacrilege by some fisheries authorities; yet only seven-plus years later have become accepted by just about everyone.

Below my office window at the University of Washington School of Fisheries is our small salmon hatchery.

Every fall thousands of school children come to see the chinook and coho salmon return to their natal waters. Our graduate students show them the fish and demonstrate how eggs are taken, mixed with sperm and how, magically, the life cycle of salmon is renewed.

These tours are the most significant publications activity of our school. Through these tours most Seattle school children come into their most direct touch with a major part of the environmental heritage of the Northwest.

It was only after three years of seeing the annual cycle of school visits that I began to wonder if we were really doing the right thing. Hatchery tours are common throughout the Northwest and I fear that the message they convey is that 1) salmon come from hatcheries, 2) habitat loss and pollution are so widespread that natural spawning fish are dying out or are extinct, and 3) the long term survival of salmonids depends upon hatchery technology.

My daughter's fourth grade teacher was planning a field trip to a state-run hatchery for a tour. He was unaware that only 20 minutes away between 100,000 and 200,000 naturally spawning sockeye salmon can be seen in a few miles of the Cedar River—that indeed most of our rivers still support runs of wild spawning salmon. I believe that fisheries scientists share a collective responsibility for the public belief that the maintenance of salmon runs depends upon hatchery operation.

This belief is particularly pernicious because it inexorably leads to the acceptance of hatcheries as a mitigative measure for habitat loss and dam construction. This view can be expressed as "If the wild stocks are doomed anyway, let's just build the hatcheries and get it over with."

This belief is not just found among the general public; many professional fisheries scientists also believe that the future of salmonids is in hatcheries. They believe that resources that could go into habitat protection or fisheries management would be better spent on artificial propagation.

The fisheries community in general is not aware that artificial propagation in the Northwest has failed to live up to expectations. Nor are they aware that artificial propagation poses a substantial, and perhaps the major, threat to the long-term viability of our salmon heritage.

Indeed, throughout the world most management agencies seem to be relying on some form of artificial propagation to "rebuild" fish stocks that are depleted due to poor fisheries management or poor habitat management. Artificial propagation has been proposed for such diverse species as herring, tuna, abalone and giant clams—the list is nearly endless. Thus the lessons we have learned with salmonids in our part of North America are of direct and important relevance around the world.

Are Hatcheries Sustainable?

Fisheries management is a long term proposition, our responsibility is to assure that the fisheries resource will be maintained by our generation for the next generation. We need to assure that 20, and even 100 years from now there will be salmon and steelhead in our rivers.

This means that the time horizon for fisheries scientists and managers must be much longer than the engineering horizon for dams on our rivers. Once the dams have rotted away or been taken down, we must be sure we will still have fish to use their rivers. While this may seem farfetched, removal of the Elwha River dams on Washington's Olympic Peninsula and the removal of the Hetch Hetchy dam in California are now being considered.

If hatcheries are to be used as mitigative measures, we must ask not only do they work now, but will they continue to work, and will they permit the maintenance of natural runs?

Unfortunately, most evidence suggests that while hatcheries may work initially, their success decreases after a few years.

Figures 1 and 2 show the trends in survival for two major hatchery programs; coho in Oregon and chinook in British Columbia.
In each case, as the hatcheries programs have developed, the success of the hatcheries has decreased.

The B.C. chinook example is an extreme point. More hatcheries were built throughout the 1980s so that by the mid 1980s there were 10 times more chinook smolts being released than in mid 1970s. But there were no more hatchery chinook being caught or escaping.

This pattern of declining survival of hatchery reared fish is found in nearly every hatchery program in North America.

There is no well accepted explanation for the declining survivals from hatcheries. The causes may be genetic changes, predator build up, disease accumulation or a host of other potential problems.

The cause doesn’t matter as much as the conclusion—that hatchery production is probably not sustainable over decades. To assume it will work for a century is a bold assumption indeed—one that puts the salmon/steelhead resources of our children at great risk.

**Impacts of Hatchery Fish on Wild Stocks**

I believe we must rely on wild fish for the long term maintenance of our salmonid populations. Wild fish are our heritage, and we must, in turn, pass them on to our descendants.

Artificial production poses a great threat to the maintenance of wild fish. This threat comes in at least four forms:

- Direct competition for food and other resources between wild and artificial fish;
- Predation of artificial fish on wild fish;
- Genetic dilution of wild fish by artificial fish allowed to spawn in rivers and streams;
- And increased fishing pressure on wild stocks due to artificial production.

There is ample evidence that salmonids compete for resources at most stages of their life history.

Figure 3 shows the survival rate of sockeye salmon from Babine Lake, a tributary of the Skeena River in British Columbia. The number of juvenile sockeye leaving Babine Lake was increased by artificial spawning channels.

The more fish that left Babine Lake and swam down the Skeena River, the smaller proportion of them survived their ocean life.

A major impact of this change is that the wild runs from the Skeena River have declined approximately 50 percent. Presumably the other sockeye on the Skeena were affected by the competition that is so obvious in the Babine Lake data.

Salmon and steelhead compete for food and space in freshwater and in the ocean. We should expect that as we increase the numbers of hatchery fish they will compete with wild fish, and the survival of wild fish will decrease. It is foolish to assume this will not happen.

Proponents of artificial propagation like to think of their hatcheries “giving a boost” to the wild stocks, particularly by allowing surplus hatchery fish to spawn in the wild. These extra spawners, turned away from the hatchery, are hoped to add to the natural spawning population.

Accumulating evidence suggests that the hatchery fish often do poorly in the wild, and that by reproducing with wild fish, the hatchery fish cause poorer survival of offspring of wild parents.

Two mechanisms explain this. First, hatchery managers select for fish that do well in hatcheries; that is, for fish that can hatch in plastic trays and learn to feed on a man-made diet. In the wild, fish must find mates, lay eggs in gravel, avoid predators, and find natural food. The requirements of a successful hatchery fish are very different from a successful wild fish and it should be no surprise that fish selected for a hatchery may do poorly when facing the rigors of a real river.

Second, hatchery practice often has involved taking brood fish from a watershed and using them in a hatchery elsewhere. Thus, the thousands of years of
natural selection for particular rivers have been swamped.

When fisheries managers allow surplus fish to spawn in the wild, they are allowing all of the genes brought in from elsewhere and selected for hatchery life to dilute the naturally adapted genes of the wild fish.

The net result may be that after a few generations there are no more wild fish. We will have—and indeed in many places now do have—mongrel fish not well adapted to any particular river. The great genetic diversity of the Northwest of 100 years ago is being lost at a horrifying rate and hatcheries are accelerating this loss.

When hatcheries have a poor return of adults, they often capture wild fish to use as brood stock. This “creek robbing” would be a criminal offense if conducted by ordinary citizens and they would be called poachers.

However, when conducted by hatchery staff it is somehow considered beneficial for the resource. I know of one case when a hatchery had an unusually poor return and the hatchery staff diverted half of the wild spawning stock into the hatchery for an egg take. It then turned out they—and not the natural spawning areas—had a surplus of eggs. So they sold the surplus to private salmon farms.

When hatcheries are successful at producing adult fish, the potential harvest rate is very high. Often 95 percent of the returning fish can be harvested because so few adults are needed for eggs.

There is wide concern throughout the Northwest that we have allowed our fisheries harvest rates to match the potential productivity of hatchery stocks, causing wild stocks to be overfished.

In some places this is obvious. Parts of Puget Sound such as the Nooksack River have been declared off limits for wild fish, and the harvest rates are so high that no wild fish can make it back to spawn.

Just north of Puget Sound, in Canadian waters between Vancouver Island and the mainland, harvest rates on coho salmon are as high as 95%, sustainable only by the most successful hatchery stocks. The net result of these high harvest rates is that as hatchery production has increased, wild stocks have declined. But the Canadians have no more coho now than they did 15 years ago. They have swapped hatchery fish for wild fish.

**The Real Threat: The Technological Fix Syndrome**

The real danger of hatcheries and other forms of artificial production is that they provide an excuse for habitat loss and poor fisheries management.

If we believe in hatcheries, then we can allow the rivers to be dammed, silted and destroyed. Just mitigate with a hatchery. While it seems we should know better by now, the lessons haven’t really sunk in. New hatcheries are still being built in Washington and Oregon. British Columbia and Alaska both have embarked on large scale hatchery programs even though their catches from wild fish are now at or above historic highs.

Even more dangerous is the spread of the technological-fix syndrome: If hatcheries don’t work now, we will try some other form of hatchery technology.

The current new idea is “supplementation” by which eggs are incubated in a hatchery and then spread throughout a watershed to rear naturally.

The technological fix has spread beyond salmon hatcheries. Now developers throughout the West Coast want to build “artificial” habitat for lost wetlands. Here the fisheries community must accept responsibility. We have been extremely eager to help in the design and testing of new technology. Indeed fisheries schools have been, in effect, salesmen of the technology.

**Great Hatchery Successes**

Whenever I speak out against the hatchery fetish, people ask about the great successes—trout in freshwater lakes, salmon in the Great Lakes, and the Japanese chum salmon hatcheries.

These programs are undoubtedly successful. Introduction of exotic species or monoculture often works reasonably well. Rabbits did very well in Australia, starlings do well in North America. The wide-

spread introduction of trout around the world has produced some valuable recreational fisheries.

However, in most cases this has amounted to the replacement of indigenous species by new species, and not to boosting the production of an existing wild population.

Indeed, my first response to each of these examples is that in every case the wild species that were there before have been almost totally replaced by the introduced or artificially produced fish.

Even with these great successes, we see echoes of our own concern here. Trout management is going away from hatcheries to nurturing of habitat for wild fish. This is documented in Ray White’s recent article in *Trout*, “We’re Going Wild: a 30-year transition from hatcheries to habitat.” In the Great Lakes, where introduced Pacific salmon generated a major recreational fishery, concern mounts about declining hatchery survival—they just don’t know if their salmon fishery is sustainable.

The highly successful chum fishery in northern Japan has produced large catches of chum salmon for Japanese fishermen, but the total yield of salmon from northwest Pacific waters has not increased. It is quite possible that Japanese chum have simply replaced the naturally occurring mix of six species of salmon with a single species.

**What Should be Done?**

Is there a place for hatcheries? I really don’t know. Certainly if all hatcheries were now closed, the catch of chinook and coho salmon in the Northwest would drop greatly. We could certainly expect some wild stock production to rebound, particularly if we devoted some of the resources that have gone for hatcheries to habitat protection and improvement. Closing all hatcheries now would certainly cause a lot of pain to recreational, Indian and commercial fishermen—but it might ensure the long-term survival of the fish and the fishermen who depend on them.

On the Columbia River, where much of the habitat has been lost, and the series of dams poses a severe barrier to downstream migration of juvenile salmon, most people believe that we must have hatcheries. I am not convinced. The most successful salmon stock on the Columbia is the wild spawning
ARE THERE ENOUGH OF US?  

It was about 15 years ago that I converted from gear to flies for steelhead, almost all of my fishing then in Puget Sound country. So it wasn’t until the late 1980s and early 90s that I graduated to occasional visits to the Thompson River in British Columbia. The Thompson, at first, was a kind of afterthought, something to do on the way home from the Maurice, Kispiox and Bulkley, in those beautiful late October afternoons when, on a weekday anyway, you could slip into the Graveyard Pool and be alone, or nearly so, for maybe a half-hour.

On those trips it was inevitable that I began running into the steelhead heroes of that period, Harry Lemure, Bob Strobel, Bob Aid, a younger Pete Soverel, others and, perhaps most memorably, “Steelhead Bob” York.

It was Bob York who said to me, among many other things, and this about 1991, that we’ll probably never be able to save wild steelhead; it isn’t in our culture to do so. Those words stuck, and I have often pondered what Bob really had in mind. Over the past year or two I think his meaning has become painfully clear and I may be among the minority that hasn’t figured it out until recently.

Bob’s culture is an American society that has largely turned a deaf ear to the cries of brutalized wilderness, to the silent pleas of vanishing salmonid populations. It is a society which seems to be trapped in the endless, habitual struggle between natural resource exploitation (“How the West Was Won”) and too-late efforts to kick the habit.

A current example of this dilemma might be Washington senator Slade Gorton’s publicly-trumpeted position that the Elwha dam(s) will be removed only if and when national legislation is passed requiring the entire U.S. Congress to sign off on any effort to begin retiring Snake River dams. The evidence supporting removal of these dams (located hundreds of miles apart in Washington state) is as different as the dams themselves and each case rests on its own merits. Yet a powerful politician is able to link them inexorably simply because he wants to; one issue now is hostage to the other.

State representative Jim Buck, one of our contributors in this issue, himself has said similar “over-my-dead-body” words, on a smaller but similar stage, when earlier this year Olympia was trying to fix the Washington Department of Fish and Wildlife budget fiasco. His ultimatum had to do with proposed hatchery cut-backs as a means to find desperately-needed money for other programs. For Buck, chair of the House of Representatives’ Natural Resources Committee, the money had to be found elsewhere. Like Gorton, Buck is a powerful man because of his legislative position. For more than a hundred years the culture of his Olympic Peninsula district has been tied tightly to timber and fishing interests, i.e. natural resource exploitation.

In the Washington State senate, after the November 3 elections now again with a Democrat majority, the much-maligned Grandy Creek Hatchery project will probably again raise its ugly head, under the whip of Sen. Mary Margaret Haugen who will become one of the most powerful political personalities in Olympia. Grandy Creek is her baby, and if she wishes she can hold the managing agencies hostage to budget needs: “Build it or else.” Will that happen? Does the science matter, after all? Or will her Skagit Valley catch-and-kill constituents have the last laugh?

It would be wrong to lay all of our save-the-salmonids problems at the feet of our elected representatives, but these three instances reflect the larger problem: Historical and now-vested “interests” remain dominant in our culture and these interests so far are still calling the shots.

Insider Oregonians told us for months that Governor Kitzhaber’s highly-touted salmon recovery plan depended far too heavily on voluntary compliance by the same “interests” (read timber, agriculture, irrigators, others) and that the National Marine
Fisheries Service was too optimistic in its acceptance of this plan as a means by which to avoid federal intervention. And now a federal court has agreed, saying that voluntary compliance is not enough to meet the ESA's requirements.

Likewise, in Washington state, 1998 and '99 will produce some kind of state-supported recovery plan because NMFS requires it. However, the senator officials responsible for the plan's development are the same men who have been on watch for two decades while salmon and steelhead stocks have collapsed. Hardly a cause for optimism.

And the betting seems to be that NMFS itself really has no stomach for moving into the affairs of state governments and their regulatory agencies in order to forcibly impose recovery measures. The ESA may require that they do so, but we all know about the many laws on our books that are routinely ignored or evaded where political will does not support what the laws say.

In a sense, a democracy such as ours is a lousy system for protecting threatened critters. We have rewarded and applauded exploitation for two hundred years. How does a culture change its habits? How many northwesterners, transplanted here from elsewhere since World War II, and already into their second and third generations, really care that much about salmon and steelhead in the Methow River? Fifty? Five hundred?

Thousands of Idahoans care a lot about Snake River salmonids but they don't control the waters downstream. Oregon and Washington do. How does the "culture" of these three states respond? Well, it RESPONDS very poorly, slowly and ineffectively, while the salmonid populations continue to dwindle. Linda Smith, a Republican Washingtonian campaigning for the U.S. Senate, tosses off a sound bite about returning to "dust bowl" conditions if any of the lower Snake dams are ever removed. She won't hear of it. This plays well to farmland voters; what does it do for salmon and steelhead? But the culture accepts it, typical campaign rhetoric. Nobody really gets mad, maybe a few of us are just a little more numb by it all.

How does this "culture" problem get fixed? Can anybody really expect timber executives, super-farmers, public utility managers, aluminum company stockholders to come around to favoring fish? Would soccer moms boycott Safeway if it stopped selling fresh salmon, or Indian-provided steelhead? How many sport fishers are there who care enough to make a difference? How many of them will continue to expect their license fees to pay for hatcheries and their endless supply of plastic fish?

Who is left to fight the fight?

Years ago Bob York had already concluded that there just aren't enough of us. God help us all if he was right.

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**EDITORIAL:**

**THE PRICE OF CLEARCUTS**

_Two giant floods followed by a profound deep freeze paralyzed thousands of West Coast steelhead anglers in November and December and into January, especially those living in western Washington State._

If there was an amusement in the aftermath of the warm storms that deluged both sides of the Cascade mountains, it came from the fervent efforts of hired and elected talking heads for timber companies and the U.S. Forest Service and the forest-cutting organizations to pretend that massive clearcutting of steep-priver slopes had nothing whatever to do with the amount of water eventually dumped downstream.

One only had to be in the storms and around the new, massive clearcuts now adorning Washington streambanks to see what was happening.

Along the Skagit River, for instance, some fresh cut over areas are a mile long, a half mile wide and on slopes so steep that cutters have to lash themselves epiphil in order to bite into trees with a chainsaw.

Water poured in buckets down these mountainsides recently made barren of old growth, second growth and now spindly third growth trees, all feeding an unending demand from Japan, Korea and China. Asian buyers until just lately have been paying record prices for logs. American and Japanese tree owners in Washington and Oregon have been hewing the forests down as fast as they can, often because they fear past environmental disasters they have created will lead to new, stringent state and federal regulations on logging.

The water gushed down the muddy slopes in vast sheets. On many cuts it overwhelmed the cheap culvert systems federal and state regulators allow to be installed on logging roads. Logging slash—limbs, bark, foliage, broken logs—piled up in front of many culverts. A great head of water would form. Then it would burst the culverts, tearing a new creek bottom through the road and down hill on the naked slopes.

Topsoil already loose from the skidding and bulldozing of logging operations
poured downhill with the rush of water and the tumble of slash—downhill into nearby creek beds.

Many creeks that offer spawning gravels to steelhead, cutthroat trout, dolly varden and to coho and chum salmon experienced blowouts.

A blowout occurs when landslides, usually caused by logging operations, dam a stream during these major storms. Behind the dam builds yet another big head of water and logging debris. Eventually the dam breaks—blows out.

A great wall of water and tumbling logs and giant stones rushes down the creek, scouring its bottom and sides, straightening out meanders by eating up all points and other dirt obstructions.

From hundreds of clearcuts on every major river the tumult of water, mud, slash and rock dumped from small creek into larger, from larger into river, from tributary river into major concourse. Major rivers became howling floods that on their downstream ends ran into the dike systems that ordinarly preserve farms and towns built on flood plain from the inconvenience of getting wet.

The dikes raised the water columns up, up, up and sometimes over. More often the dikes broke and the river waters under great pressure ripped through, with velocities and depths that really caused damage on the flood plains.

These same events scoured the river bottoms, ripping up existing spawning beds and filling in others with mud. To date the loss of salmon and steelhead spawn laid down this year has not been calculated.

A few reporters—darned few, it turned out—wondered whether the massive floods could be related to massive clearcutting in the watersheds.

No, no, no, no! responded the timber companies, state regulators, forestry-school academics and Forest Service spokespeople.

It's never been shown that clearcuts allow more water more quickly to flow into streams, they said.

That, of course, is bushwaw. Long ago the Forest Service's own research branch did studies that showed that a relatively level clearcut—much less one pitched at 60 degrees—does not soak up and retard water as standing forest does.

Some studies showed that clearcuts increased runoff by more than 30 percent.

Equally, there are dozens of studies now showing that bad clearcutting—with its cheap, poor road-building—is a major cause of landslides and of blowouts and that soil and rock from these clearcuts fill up the river bottoms, thereby lowering the general water level at which flooding will begin.

But nowhere in the local or national press did the slightest knowledge show that anyone knew of these studies—or even bothered to inquire whether such studies exist.

Worse, no environmental organization bothered to hand feed the information to the reporters. Hand feeding is a sure way of getting the press' attention.

So the people who do the cutting and who wreck the water courses got off without being checked. Their pious statements that floods come from the will of God got printed. And while annual cohorts of many fish runs got wiped out, spawning beds were destroyed or mucked over and again, society as a whole gets to pick up the bill for damages created and accelerated by the timber industry and its minions.

THE CHAIR'S CORNER

Howard Johnson

What is poaching? The dictionary defines poaching as "—to take (game or fish) without any right" or "to take game or fish illegally or by un-sportsmanlike means."

What does that mean to you and to me? It means that some people are killing the public's fish and game in violation of our laws. In some cases the poacher's kill can equal or exceed the legal harvest. So what can we do about it? Or do we continue to ignore the problem and accept, silently, what's happening?

First, let's consider why people poach. Some do it for economic benefit, profiting from the sale of fish or game; some, from greed; others because of hardship, or just plain ignorance. But none of these reasons justifies jeopardizing the resource.

Our fish and game laws are there to protect the resource, to maintain our runs of salmon and steelhead. If these regulations have to factor in losses from poaching, then the allowable legal take is significantly reduced and the law-abiding sportsman is the one who is shortchanged.

Solutions? There are essentially two, enforcement and education.

Because of budget and priorities our fish and wildlife departments are woefully understaffed to provide enforcement for poaching control. We should demand that legislatures fund enforcement and that it be given highest priority. And the public needs to be more aware of poaching so that it can report offenders to the proper authorities.

Deterrents need to be strengthened. Convictions for poaching need to include fines and/or confiscations that really punish the offenders. Too often a poacher's fine is so small that the offender still gains. Jail time often is warranted.

Finally, we need to instruct judges (or elect better ones) that poaching is a serious crime and must be treated as such. And the public needs instruction also, beginning in classrooms and in the media.

We sportsmen have the most to lose. If we condone poaching and tolerate a weak legal system that provides little or no enforcement, we have only ourselves to blame.
FOR FISH BIOLOGISTS, NO EASY CHOICES

The Osprey, No. 35, November 1996, page 15

Biolodest Kraemer, in Issue No. 13, September 1991, writes about hatchery-wild interactions and the real choices faced by steelhead managers as they try to do the right thing for wild fish while also responding to pressures from user groups. Readers can decide for themselves whether, over the years, the best choices have been made. We can also ask ourselves whether the pressures we have applied were wise and really in the best interests of what we are trying to save.

Steelhead, like all fish, are products of their environment.

The characteristics of a particular race of steelhead, including those that are of interest to anglers, are genetically determined and passed from one generation to the next. There is usually some variation in these characteristics that determines the probability of an individual surviving to adulthood and contributing to the continuation of the species.

It is this selection by the environment, within the genetic variability of a population, that allows a population to adapt to environmental changes and to evolve over time.

So the wild steelhead found today in many states and provinces are different genetically than those found here 200 years ago.

All our river systems have been altered by man’s activities. Critical estuaries have been filled, roads and parking lots built, rivers impounded by dams.

All these changes have resulted in changes in the riverine environment that steelhead use. River flows have been altered, with peak flows higher and low flows lower. Often the summer water temperatures are higher. The amount of sand and gravel being moved by the stream has changed, with major changes occurring in the quality of the spawning gravel. These changes have resulted in subtle shifts in the characteristics of each river’s steelhead populations.

Washington’s Tolt River gives us a chance to watch this process in action. The dam on the Tolt’s South Fork may have changed the winter high flows so that winter run steelhead now have access to a section of river that was once used exclusively by summer runs.

With the summer runs losing the advantage of exclusive use of the river habitat just below the dam, one would expect over time to see a decline in the number of summer runs and an increase in the number of winter fish. The stream can be producing just as many smolts but now of a different race.

A factor that determines how quickly the environment influences the selection process on a population is the density of fish using a given habitat. The more fish using the environment, the more severe the selection against individuals within the population that are out of tune with the environment.

In other words, the closer a population is to carrying capacity, the less likely it is that a maladapted individual will contribute to the continuation of the population. In a healthy wild population near carrying capacity, hatchery fish have little chance of passing on maladapted genes.

Long-term survival of wild fish populations requires the maintenance of the population’s reproductive potential.

In populations at or below carrying capacity, spawning fish must produce enough fry, parr, and smolts to ensure that more adults return than those that spawn them. As long as the reproductive potential of the population is maintained, spawning escapements below carrying capacity will produce more adults than the parent generation and move the total population numbers towards carrying capacity.

At carrying capacity, by definition, each generation only produces enough fish to replace themselves. Here all the habitat is being used to its fullest and maximum selective pressures are at work on the population.

In rivers managed with both hatchery and wild populations, the closer the wild population is to carrying capacity, the less chance the maladapted hatchery fish have to contribute to the genetic pool of the population. The higher the density of wild fish, the more the selective pressure that operates against the hatchery fish.

The closer wild populations are to carrying capacity in a river system, the more escapement of hatchery fish the population can tolerate with minimal impacts on the wild fish.

Any discussion of hatchery and wild steelhead soon leads to the question of what brood stock for a hatchery program minimizes hatchery impacts on wild stocks.

On the surface the answer would seem to be straightforward: Use wild fish as your brood stock. But as is the case in many biological issues, the answer is rarely that simple.

The best brood stock depends in part on what the goals of enhancement are. If the enhancement program is a short term effort to rebuild depressed wild stocks, then wild stocks from the system would be the best choice.

In the more common case, where enhancement is undertaken to provide more fish for harvest, the answer may be different. Often the need for additional fish to harvest is the result of overharvest of the wild stocks. Here the choice of brood stock can be much more complicated. Hatchery-wild interactions, harvest management questions and much more must be considered. If the wild population is being overfished (too many fish being killed), the use of wild stocks as brood fish for a hatchery program can lead to problems.

When steelhead or any fish are held for long periods in a hatchery environment they experience genetic selection by the hatchery system. Over time this may result in a fish that has different freshwater traits and behaviors that the original wild fish while retaining similar run timing and other adult characteristics.

Steelhead raised in a hatchery experience environmental selection just like their wild cousins. Those fish most successful in the hatchery are those that tolerate crowding, artificial feeding, etc. The wild part that are successful in streams are those that are able to establish and defend territories and develop energy-efficient feeding strategies.
Thus the offspring of fish raised in a hatchery will be out of tune in a wild river system. The selective pressures on both hatchery and wild fish are about the same once they leave their rivers and begin their seaward journey.

When enhancement efforts aim to increase the number of fish available for harvest, the result is often the continued overharvest of the wild fish, with the shortfall in needed escapement made up with surplus hatchery adults. The more fish available, the more anglers on the rivers. Enhancement efforts are many times a quick political remedy to overfishing that postpones making difficult user decisions.

Much discussion has taken place recently about the desirability of hatchery fish and their potential impacts on the genetic pool of wild fish. The current dogma is that if one must have hatchery fish, then the best fish are wild brood stock from the river system to be enhanced.

Given the current and growing popularity of steelhead fishing, hatchery fish will continue to play an important role in Washington's steelhead management. The fisheries manager's job will be to be aware of potential pitfalls and to manage to safeguard the wild resource while providing opportunities to the many and varied user groups. We the users have the responsibility of being the resource's watch dog and of providing our managers with clear and concise statements as to how we wish to use the steelhead resource.

In Puget Sound rivers the Chambers Creek winter run steelhead, the much maligned Washington Department of Wildlife's product, remains the fish of choice for enhancement. By marking all hatchery releases, taking advantage of this particular race of fish's early run timing, managers have successfully managed to harvest the hatchery product at a high rate while maintaining reasonable (lower) harvest rates on the wild fish.

A commonly expressed concern is that these maladapted fish—and they are maladapted—have damaged the wild stock's gene pool. After 50 years of enhancement in some Puget Sound streams, the wild stocks have retained their productivity. In recent years, where management changes have been made to reduce the harvest of wild fish, stocks have quickly and positively responded.

Depressed runs have usually returned to healthy levels in a generation.

The wild stocks have many characteristics different from the hatchery product. They spawn much later in the spring, generally are older fish (more three-salt adults), have higher fecundity, and later run timing.

All these factors have operated to minimize the interaction between the Chamber's Creek fish and a particular river system's wild stocks.

The foregoing should show that fish management rarely has easy answers. We have altered all our rivers' ecosystems. We can't return them and their inhabitants back to their original conditions. We can and must make conscientious and responsible decisions about how man will interact in these systems and with the fish that use them.

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THE SKagit RIVER: WHAT WENT WRONG?

No recounting of previous articles would be complete without something by Pete Soverel, for many years the national chair of the FFF Steelhead Committee. Pete's lament about the Skagit River, which appeared in Issue No. 14, January 1992, is both informative and inspirational. Today, nearly seven years later, his well-described concerns are just as valid.

We have seen precipitous declines in Skagit River steelhead and, for that matter, in virtually every other Northwest watershed. Scientists and long-time steelheaders agree on some major causes.

- Habitat degradation
- Excessive harvest
- Hatchery production practices

Habitat Degradation

Dams and forest practices are the principal habitat villains. I will not dwell on dams: they just don't mix with anadromous fish.

In the Skagit watershed, as bad as the dams are, their impact on steelhead pales when compared to logging. What timber companies have done to our own countryside we would not visit upon an enemy. For miles in every direction the landscape appears as a World War I battle scene: denuded of trees, the ground torn in every direction, human debris littering the landscape.

Loggers have taken all standing vegetation from the flat ground, from the steep slopes and even from the very stream banks. They have skidded logs up hillsides and through stream beds. They have cut roads into hillsides. They have removed the timber at a rate much faster than it can regenerate itself.

With each run storm every skid line, every logging road, every drag line and every clear cut becomes a massive source for mud, rocks, slash and water to pour down the hillsides into the Skagit system.

The resulting silt smothers salmon and steelhead eggs waiting to hatch in the river gravel, it kills the insects that pre-migrant fish need to survive in the river before heading to the ocean.

A walk up Finney Creek, below Concrete, shows what logging does to streams.

Finney Creek was once a beautiful stream and one of the most productive anadromous fisheries in the state, maybe the world. Mud flows silt in it for miles. Blowouts—debris torrents pushed by walls of water—have bulldozed gravel out of what once were spawning beds. Once the last creek in Washington state to turn muddy during a major winter storm, Finney Creek now is the first to gray up and the last to clear up.

The same situation applies to Grandy Creek just downstream, site of the proposed hatchery for Skagit steelhead. What is the water quality there likely to be during a November flood?
Compare Siouxon Creek, which has never been logged, with Canyon Creek which has been clear cut to the ground. Within a few miles of each other, the creeks drain similar terrain. Siouxon Creek runs clear no matter how much rain; Canyon Creek runs muddy at almost the first shower.

An angler can rub his fingers together in Finney Creek and other heavily logged watersheds and feel the grit. Steelhead have to "breathe" this stuff.

The unsettling, awesome reality is that what man has done to Finney and Canyon Creek he has done to virtually every tributary of the Skagit River and nearly all other anadromous watersheds in Washington state.

Timber companies pillage our land, ruin our rivers and kill off our fish in order to sell logs to Japan, as though operating in a third world country which sells its birthright for a few pieces of silver.

More disturbing, these activities are aided and abetted by those state and federal agencies to which we entrust the stewardship of our forest lands, the Washington Department of Natural Resources and the United States Forest Service.

To rebuild our salmonid runs, we must change the way we harvest timber. We must stop clearcut logging and harvest timber in ways which minimize the impact on the forest's streams and rivers. Failing this, steelhead are doomed.

**Excessive Harvest**

Indians are a favorite target of many anglers, but everyone should understand that even before the 1974 Boldt decision in federal court that upheld tribal treaty rights to harvest steelhead and salmon, wild steelhead already were in serious decline in many watersheds from excessive sports harvest and habitat destruction.

Further, many of Washington's steelhead rivers are not covered by Boldt and are, thus, excluded from a tribal fishery. Still, these rivers also have seen sharp declines in wild steelhead.

Before encountering any tribal nets, steelhead run the gauntlet: highsea drift nets in the Pacific and then inshore seine and gill nets. None of these netters, purportedly, target steelhead; but tell that to the steelhead who winds up in the net.

In Washington, we do not have any good figures on the steelhead interception rate because the non-Indian commercial fishermen are not permitted to sell steelhead and hence write no fish tickets on steelhead caught. (It is another matter that a good number of these "incidental" steelhead metamorphize into chinook salmon filets."

We know from data from British Columbia and Alaska fisheries that many steelhead are caught in the salmon fishery. Since the total steelhead run in the Skagit is measured at most between 10 and 15,000, interception of only a few thousand fish represents a substantial percentage of the entire run.

Most of our commercial salmonid fishery is not selective: It catches both depressed stocks and abundant stocks. Gill nets are the worst offenders. We need a more selective way to harvest salmonids to avoid killing those stocks which need protection. We need to devise ways which permit commercial fishing but which avoid killing steelhead and other depressed salmonids.

When the fish finally have made it back to their natal river, having survived all the challenges in salt water, the tribal and sports fisheries are after them. So when either fisher kills one of these fish, he kills a fish that has a very high likelihood of spawning.

Tribal nets are certainly more efficient than sports anglers, but steelhead are very susceptible to angling harvest. *(Ed's note: Indeed, the tribal catch on steelhead is pegged to the non-Indian sportsfishing kill on steelhead. Each interest is supposed to kill equal shares, and do so.) Before the Boldt decision, sportsmen had depleted many steelhead runs without any help from Indians. On non-treaty rivers, we continue to do so.*

We and the tribes need to exercise the finest sense of proportion and balance in setting harvest limits. We should err on the side of caution, especially since steelhead runs are in serious decline up and down the coast.

Until we know why, we should reduce harvest. And because we both fish for steelhead in our rivers, we share a common interest in ensuring an adequate escapement to spawning areas.

Sports fishers cannot avoid working closely with tribal fishers to preserve our wild stocks of steelhead.

**Hatchery Practices**

Steelhead hatcheries are perhaps the least understood and are therefore the most insidious factor contributing to steelhead declines. From biological and genetic perspectives, introduced hatchery steelhead have had profoundly negative impacts on native steelhead.

The Washington Wildlife Department has studied extensively the interaction between wild and hatchery steelhead, in the Kalama River and elsewhere. In virtually no case has the net production of a system increased with hatchery "supplementation." At best, the resulting hatchery-wild mix might temporarily reach numbers approximating the pre-supplementation level of wild fish.

More important, hatcheries divert our attention from what is wrong (habitat and excessive harvest) to an artificial and unworkable solution. What we should be fixing are the problems, not building hatcheries to compensate for the injustices we are visit-  

We should kick the hatchery habit, just as importantly as we must fix up our forest practices. Relying on hatcheries for steelhead "production" is bad for us and bad for wild steelhead. The proposed Grandy Creek hatchery on the Skagit is the worst thing we could do to restore steelhead to the wonderful Skagit watershed.

The Skagit was a world class fishery. We should restore it to its former glory by emphasizing wild production, not by erecting a complex of concrete raceways filled with tame fish.

We accept wild steelhead as our heritage; what will we leave for the future? How can we deny an obligation to pass on at least as much as we have inherited? Do we pass counterfeit fish off to our descendants and say "This was the best we could do."

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Editor, *The Osprey*

Enclosed find a personal check to cover subscription renewal and donation to the FFF Steelhead Committee. Nowhere in print is there such coverage of the “real” issues concerning wild steelhead management—or lack of.

Keep up the decent effort!

Sincerely, Joe Shedlock, Millington, TN

Editor, *The Osprey*

Thanks for reviewing the Oregon Natural Resources Council (ONRC) report on the economics of removing the four lower Snake River dams (Issue No. 32, July 1998). ONRC has done a great service to the people of the Northwest and the salmon and steelhead by addressing the removal of these dams with dollars rather than emotion. This approach should bring light to an issue which to date has drawn mostly heat.

The report is particularly effective in exposing the federal subsidizes which prop up the dammed river-dependent industries (power, including aluminum production, barging, and irrigation) and demonstrating the true net economic value of the dams to be negative, not positive.

However, I am troubled by two aspects of the ONRC study, both of which relate to the $194.4 million of salmon restoration costs. First, the detail of the ONRC report shows that $164 million of the $194.4 million is for what BPA calls foregone power revenues. The concept of foregone power revenues assumes that river water used to assist salmon migration, and therefore not usable for power generation, is a BPA cost chargeable to salmon recovery. Therefore, to accept the $164 million without comment is to accept implicitly the philosophical notion that power generation is the highest and best use of the river, and that the salmon have no financial standing.

As I wrote in the October 1995 issue (No. 25) of *The Osprey*, this is an incredibly arrogant and invalid assumption to use as a basis for BPA’s salmon recovery cost accounting. This is particularly true considering that water used for irrigation and barging, unlike water used for salmon passage, is not charged as a BPA foregone power revenue expense. We must hold to the position that salmon passage should rank at least as high as power generation, barging, and irrigation in river financial priorities.

However, I will acknowledge somewhat reluctantly that, until a better measure is developed, the only easily measured common denominator for the value of river water is its value in production of electricity. For this purpose only, and not for the ranking of the various uses of river water, I endorse the use of foregone power revenues in the ONRC economic study. If this distinction is not carefully drawn, the $164 million becomes a two-edged sword.

Second, with the ESA listing of Upper Columbia River steelhead (upstream from the mouth of the Snake) as endangered, it seems highly unlikely that all of the salmon recovery costs can be attributed to the Snake River runs. A significant piece of it probably will have to be applied to the mainstem Columbia. How much is the question. As the ONRC study points out, even if only half of the salmon recovery expense is assigned to the Snake, the study will show net savings from removal of the four dams.

Two additional pieces of work, both of which are acknowledged in the detail of the ONRC Report, need to be done with some urgency to make it more defensible.

1. Identify how much of the salmon recovery expense can be attributed to the Snake, as opposed to the mainstem Columbia above the mouth of the Snake. The result of this work may be lower net benefit from removal of the Snake dams, but a more solidly grounded study.

2. Make some sort of conservative statement of the economic benefit of sport and commercial fisheries for restored Snake River salmon and steelhead runs.

With the results of these additional analyses in hand, the validity of the financial case for dam removal will become more nearly iron clad.

Bill Redman, Bellevue, WA

(*Bill Redman is the newest member of the newsletter’s editorial board.*)

Editor, *The Osprey*

I enjoyed the article by Bruce Sanford (Issue No. 32, July 1998). After 20 years in Bozeman, MT I had hoped my move to Wenatchee would be filled with many pleasant evenings on the river. As I sit here today the river is closed to all fishing. The fisherman paths are overgrown with weeds. The WDF&W signs that I worked so hard to get approved and that our club put up along the river are now ghosts that no one can see. To quote Jeremy Maynard in the *Steelhead Release* “there is some mortality to steelhead in a catch-and-release situation but to remove all anglers from the riverside removes the eyes and ears of the best friend a river has, the river angler.” The Upper Columbia rivers need to be opened to catch and release fishing.

Keep up the good work.

John Cunningham, M.D., Wenatchee, WA
Picture the millennium like this:

Will we have photos of the best catch of the day to brag about?
Or no Pacific Steelhead in 2001?
It’s your choice. You can help.
For me, because man's greed has brought the steelhead near eradication, I back that fly out and let the fish go. After that hard fight he goes back to the river that bred him and sustained him as a juvenile and called him back as an adult.

I let this marvelous fish go not because I am opposed to killing, but precisely because I and others of my species have reduced him to the thin edge of extinction.

Steelhead are truly the ultimate indicator of wildness. I treasure the connection through fly line to him. Through the line I can participate in a small way with his wildness: his journey from a river at the base of a mountain in the clouds to the far reaches of the western Pacific and back to the same river.

To be connected to that wondrous fish held in the shallows by my thin wire hook, his eye turned downward, is to be in touch with everything that is wild, beautiful and pure in the world.

If we do not manage to protect and restore this fish and what he represents, then our descendants will see us as guilty of some great sin for which we will be forever accountable. That thought weighs heavily.

So I am not prepared, when I have brought the wild steelhead to hand, to take the light of life from his eye. I will release him so that he and I both can devote ourselves to correcting past wrongs: he to the sweet gravel of his birth to reproduce his kind; I to helping correct the wrongs we humans have inflicted. Man and steelhead have coexisted for 12-15,000 years. In barely two human generations have we gotten things out of kilter.

We have a moral obligation to set them right.