PART 3: Hatchery-raised Salmon Debate Writing Assignment

SUMMARY OF DEBATE

A best science agreement on the handling of hatcheries has not been put forth. Throughout Washington, there are numerous salmon hatcheries. Both the State and the Native American Tribes own and operate hatcheries. Currently, there is debate about the role that hatcheries play in the diminishing wild salmon population. Some believe that hatchery fish are competing with the wild stocks for food, habitat, etc. Some believe that there is little interaction between the two types of salmon, and therefore, that the populations of wild salmon are minimally affected by the hatchery fish. Yet others believe that hatcheries can be used to help wild populations.

INDIVIDUAL ASSIGNMENT

Part 1

Using the information presented in the articles below, as well as any additional resources you may find and read, compile a descriptive list of pros and cons for the salmon hatcheries (NOT fish farms) in the Pacific Northwest (OR, WA, BC). Be explicit – some issues will apply to all salmon species in all locations, whereas other may only be species- or location-specific.

Part 2

Based upon your review of this debate, and the science behind it, compose a short (1 paragraph) statement of opinion about the issue (eg. choose a side, and concisely explain your choice).

Puyallup Tribe aids hatchery chinook

The Seattle Times (Seattle, WA)

| March 18, 2007 | Yuasa, Mark

The Puyallup Tribe is working on some innovative ways to boost fisheries on hatchery chinook destined for the Lower Puyallup River, while still raising efforts to protect wild chinook. At the tribe's new Clarks Creek Hatchery, biologists created rearing ponds that simulate a more natural setting with tree-root wads and gravel to boost young chinook survival. "Chinook born in the wild develop instincts that help them avoid predators and find food," said Blake Smith, a tribe hatchery biologist. "Unfortunately, this isn't something we see a lot of in hatchery fish raised in traditional, almost featureless, cement ponds. The more these fish learn to survive in the wild, the more hatchery fish that will return to the river in a few years." The tribe has also obtained a new automated coded wire-tagging trailer. These millimeter-long metal tags will be inserted into the fingerling chinook snout, plus each fish will have its adipose fin removed so it can be identified in fisheries or on the spawning grounds as hatchery fish. The tags will show where and when they were released, their survival rates, migration and abundance. "We can make better management decisions when we know more about their migration and behavior," Smith said. "Better decisions mean more fish." The tribe's new hatchery will also generate more chinook in the lower river, away from where wild chinook tend to lurk in the upper river. This spring, the tribe plans to release about 650,000 chinook, and in a few years that number will jump to nearly 1 million. "If there are more hatchery fish to catch in the lower river we can expand fisheries while protecting wild salmon," said Chris Phinney, the tribe's harvest management biologist. "Getting wild chinook into the upper watershed to spawn is a priority for the tribal community and future generations." Last year, the sport fishery was limited to the lower river from Sept. 1 to Dec. 31, and anglers had to release all wild chinook. The tribe had no directed fishery on the Puyallup River. To further protect wild Puyallup chinook, sport fishing is annually closed in a portion of Commencement Bay from June to mid-August. This year, state Fish and Wildlife has forecasted 1,700 wild chinook to return to the Puyallup River [2,135 predicted to return last year], and 4,700 hatchery fish. The low abundance threshold calls for 500 wild spawning chinook. Chinook fisheries on the Puyallup River will likely be curtailed this coming year, but an increase of hatchery-produced chinook at Clarks Creek could raise the chances of more fishing opportunity in the future.

Fish Hatcheries Pose Risk to Wild Salmon, Report Concludes

Pacific Fisheries Resource Conservation Council

Vancouver, March 5, 2004 - A consultants' report on the potential impacts of salmon enhancement suggests that wild salmon and steelhead can be negatively affected by large-scale hatchery operations and other activities intended to expand salmon production in British Columbia and the Yukon Territory. While there have been obvious positive outcomes from enhancement programs, the risks also need to be considered when assessing the net benefit.

The consultants who authored the report entitled *Making Sense of the Debate About Hatchery Impacts* concluded that the uncertainty and consequent risk regarding impacts on wild salmon are too high to support the current scale of enhancement. A precautionary approach to hatchery management should be taken in the absence of sufficient knowledge and research on the overall effects.

"It has long been assumed that hatchery-produced fish would simply add to the overall production and compensate for reductions in salmon stocks caused by human and other impacts", said the report's authors Dr. Julia Gardner, David L. Peterson, Allen Wood and Vicki Maloney.

"The effect of hatchery production, however, has been more complex, with both positive and negative results, especially on wild stocks. The essence of the debate over hatcheries revolves around the question: If we are producing more salmon, why aren't there more salmon in the ocean"? the authors asked.

The report was commissioned by the Pacific Fisheries Resource Conservation Council to provide an objective summary of current information. The report authors are fisheries and research specialists who were asked to review information on issues related to salmon hatcheries and other salmon enhancement activities. The report was not intended to be an assessment of Canada's Salmonid Enhancement Program but rather a more general consideration of what has been learned in Canada and elsewhere.

In their report, the authors assessed the current enhancement methods in use on the West Coast. These included obstruction removal, improved or restored natural habitat, lake and stream enrichment, spawning channels and hatcheries. Of these activities, the authors found that major hatcheries and spawning channels pose the highest risks to wild salmon. Conversely, other methods such as habitat improvement intervene less in the life cycle of the salmon and have less attendant risk.

The greatest risk involves intensively cultured salmon replacing production from wild stocks, rather than augmenting the production from wild stocks. For instance, in the Strait of Georgia, while the overall abundance of coho salmon has been relatively stable, the proportion of the coho abundance from hatchery production has increased and wild salmon have decreased.

The report's authors determined that several factors affect the degree of risk posed to wild salmon. These include the scale of production, relative production, type of wild salmon species, forms of enhancement strategies and practices, types of fish interactions, and extent of knowledge about enhancement. The risks that are explored in the report include:

1. mixed-stock fishing effects when enhanced and wild salmon mix in a fishing area and fishing is allowed to respond to the total abundance of salmon, as opposed to fishing being limited by the abundance of the wild salmon in that mixture;
2. long-tem genetic effects when the genetic composition of the enhanced fish differ from the local wild stocks and inter-mating occurs; and
3. ecological interactions between enhanced and wild fish, including competition for food and space, predation effects, and disease risk.

In their conclusions, the authors suggest criteria to guide future decisions on salmon enhancement. These include operating hatcheries and enhancement facilities with primary regard for their potential impacts on wild salmon, using a combination of enhancement and management strategies to protect wild salmon, and focusing

on the early implementation of less interventionist approaches to enhancement. Also prominent in their conclusions is the need to increase research and monitoring of enhancement programs and to apply what has been learned from Canadian and American experience.

The consultants' report will serve as a reference document for the upcoming public consultations by the Pacific Fisheries Resource Conservation Council aimed at examining the role of hatcheries and other enhancement activities. These public consultations are meant to enable British Columbians to express their views on future directions for salmon enhancement. The discussions will help form the basis of a Council advisory statement. The Council's public consultations will take place in Prince Rupert, Nanaimo and Chilliwack with details to be released shortly.

The Pacific Fisheries Resource Conservation Council was established in 1998 to provide advice to the Governments of Canada and British Columbia and the public on matters dealing with the conservation of Pacific fish populations, specifically salmon and steelhead, and their freshwater and ocean habitat.

Do hatchery salmon help or harm the wild ones?
Monday, November 12, 2001
By ROBERT McCLURE
SEATTLE POST-INTELLIGENCER REPORTER
The killer appears faceless, his visage obscured inside the hood of his dark green raincoat. He grabs the salmon, then lifts a baseball bat high over his head. *Wham!* He dispatches the flopping fish with a few swift whacks, then moves on to the next. Captured on videotape by a hunter who stumbled onto this scene at an Oregon fish hatchery, the faceless salmon-killer and his accomplices spawned widespread outrage. Since then, the scene has been played again and again -- before Realtors and the Rotary, in cafes and Capitol meeting rooms. People asked: Why did state employees kill these fish? Why not let them breed? The answer lies in a cornerstone of the government's salmon-rescue blueprint, which boils down to this: the wilder, the better. When studies showed that hatcheries appeared in some cases to reduce the abundance of wild salmon, some hatchery runs -- like the one the Oregon hunter videotaped in 1998 -- were targeted for extinction. The video's stark portrayal of workers clubbing fish ignited a fierce debate that reverberated in federal courtrooms and that on Friday prompted the federal government to announce it will rethink its salmon-protection policy.

The debate is this: Can hatcheries that were built primarily to augment salmon and steelhead fishing be tweaked to help struggling wild runs, rather than hurt them?

Some suspect not. For years, scientists have compiled evidence suggesting that the presence of hatchery-bred fish can be harmful to wild fish and that hatchery-bred fish are less able to survive in the long run than wild ones. But increasingly, property-rights advocates, Indian tribes and timber, farming and construction interests are questioning the conventional scientific wisdom. Tribes, in particular, want to experiment with reforming hatchery practices to help struggling wild runs recover.

"We're spending millions of dollars to produce hatchery fish, and when they come back, we're killing half to three-quarters of them," said Andre Talbot, a fish scientist with the Columbia River Inter Tribal Fish Commission. "It's stupid. These are valuable animals." Counters Bill Bakke of the Native Fish Society: "Where we've closed down hatcheries in the past, at least in some cases, the fish population has actually increased. It's this mythology that the hatchery is the source of our fish that is the problem." In a court case sparked by the hunter's video, U.S. District Judge Michael Hogan ruled Sept. 10 that salmon raised in the hatchery near Oregon's Alsea River deserve the same legal protection as salmon spawned naturally in a nearby creek. He said federal officials improperly refused to protect hatchery-bred fish under the Endangered Species Act.

On Friday, National Marine Fisheries Service officials announced that the government would not appeal that ruling. Instead, NMFS is launching a yearlong re-examination of the fitness of hatchery fish. In the balance hangs the future role of Northwest hatcheries -- including Washington's state-run hatchery system, the world's largest -- that have cost hundreds of millions of tax dollars over the past two decades. The case could also lead to a re-counting of most West Coast salmon and steelhead stocks. If hatchery fish are counted, at least some stocks will prove numerous enough to lose Endangered Species Act protection, environmentalists fear. "If hatchery fish can have the (act's) protection, it's as if we'd settle for lions in zoos and say it's the same as lions in the Serengeti," said Patti Goldman, a Seattle lawyer trying to appeal Hogan's ruling on behalf of environmentalists. Property-rights advocates say they simply want to temper strict land-use restrictions imposed to protect salmon-bearing streams. "It's not that we hate salmon or hate fishermen," said Russ Brooks, a Bellevue attorney with the Pacific Legal Foundation whose suit led to Hogan's decision. "There's got to be some balance. The government needs to realize that they're affecting people's lives."

Salmon hatcheries have been a part of the Northwest since the late 1870s, when cannery owners built one on Oregon's Clackamas River. Having seen how Eastern fisheries were hammered by pollution and overfishing, they wanted to hedge their bets, and hatcheries do an excellent job of increasing the survival of salmon eggs and fry. But salmon must then go to sea and return before reproducing. As dams were built that walled off huge sections of river where fish no longer could spawn, still more hatcheries were built. Even as early as the 1950s, though, studies suggested that fish raised in hatcheries do not survive as well as their wild counterparts. Today, the state and federal governments operate about 100 hatcheries or related facilities in Washington, while tribes and local governments run others.

Near one on the Columbia River east of Vancouver, hatchery manager Ed LaMotte recently spotted two salmon pushing up the channel of the White Salmon River, their black bodies scabbed up from fighting through the rocks. Probably "strays," or fish that were born in the nearby federal hatchery but failed to return there, LaMotte speculated. "She's probably trying to build a redd," or nest, LaMotte said, pointing to one. "There's not a lot of good gravel, but she's trying." Upstream, the Condit dam holds back gravel needed by fish for nesting. Downstream, the Bonneville dam flooded the areas in the Columbia where fish used to spawn. When the Condit dam is removed in 2006, it will open up lots of spawning ground. But virtually the only fish left in this run are those coming from his hatchery, LaMotte said. "The genetics of the fish we raise in the hatchery isn't exactly the same as the genetics of the stock a hundred years ago, but it's about as close as you're going to get," LaMotte said. "With a little luck, some of the same traits that the fish need to survive in the wild will still be preserved."

Many scientists, however, say naturally spawned fish are the most likely to conserve much-needed genetic variations. Genetic variability has allowed salmon to survive thousands of years in streams as varied as the steep, cold creeks of the rain-drenched Olympic Peninsula and the slow-moving, warmer waters where the Snake River creeps through arid high desert -- all the while hustling to survive through droughts, floods, stream-altering volcanoes and earthquakes, and in an ocean whose hospitality regularly surges and swoons. Fish born outside a hatchery are genetically programmed to spread their risk. For example, some lay their eggs in the well-washed gravel of those cool Olympic streams, where they are very likely to survive and hatch. Others nest in the beds of lower-level, warmer streams where they are more likely to be smothered by dirt. However, suppose a drought comes along. The fish in the lower river are most likely to have water throughout the summer. The upper mountain streams might run dry. Later, descendants of the survivors can climb high and recolonize the upper reaches.

Consider also the timing of the salmon's return from the sea to reproduce. Wild fish usually come back over a period of several months, meaning at least some will probably avoid whatever disaster nature throws their way in any given year. Traditional hatchery management has often destroyed such variability. Fish are purposely hatched together, released together, and they return at roughly the same time. The problem? One example is that birds congregate where millions of young salmon are freed each year. It's an easy meal. Naturally spawned fish happening by get eaten, too. Hatcheries are notorious for taking fish adapted to one stream and hatching their progeny in another, meaning they may return to spawn, for example, when that particular stream is a raging flood and inhospitable to safe egg laying.

Meanwhile, hatchery fish compete with and overwhelm wild fish. Because they are typically released before wild fish hatch, hatchery fish early in life are larger -- so they gain an advantage competing for living space and food. Also, the sheer number of hatchery fish allows fishing seasons to go on when they otherwise would be shut down for lack of fish -- yet some fish from struggling wild runs get caught, too. And diseases caused by hatchery conditions can be transmitted to wild fish.

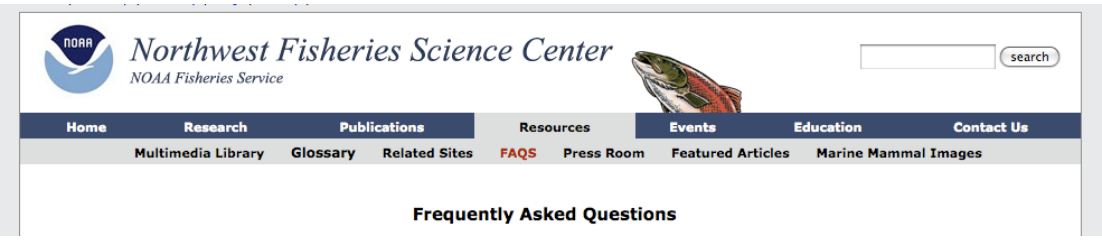
Fish biologist Jim Lichatowich decries hatcheries' "herds of salmon." "Unlike the salmon raised in a hatchery environment, with its feedlot regime, the salmon in a natural population in a healthy river do not all do the same thing in the same place at the same time," Lichatowich points out in his 1999 book "Salmon Without Rivers." Even though the fish are not always distinguishable in genetic tests, there are definite behavioral differences stemming from the hatchery experience, critics note. "Hatcheries and the wild stream have only two things in common -- daylight, and water," said Patrick Hulett, a researcher with the Washington Department of Fish and Wildlife.

Bakke's Portland-based Native Fish Society assembled a compendium of more than five dozen scientific papers regarding the hatchery-versus-wild debate. Among the findings:
· Adding hatchery coho to Oregon coastal streams did not boost the number of adults returning from the sea to spawn. "Our introduction of (young hatchery fish) has hurt coastal coho populations rather than helped them," scientists concluded.
· Scientists put hatchery-spawned fish, naturally spawned fish and hatchery-wild crosses in four streams and in a hatchery pond along Oregon's Deschutes River. The hatchery fish did fine in the pond, but did not survive as well in three of the four streams. "It indicates a genetic difference," said Reg Reisenbichler, a scientist at the U.S. Geological Survey who headed the study.
· A review of more than 300 attempts to use hatchery fish to rebuild wild runs found that only 25 were successful and concluded, "The closer the hatchery stock is genetically to the natural stock, the higher the chances for success."
· Once they are set free, hatchery fish are not as good at producing offspring as are wild fish. A study in Washington's Kalama River showed that the success of hatchery steelhead in producing offspring was only 15 to 28 percent that of wild fish. "Somewhere between the time they left the river and the time they came back as adults, they didn't cut the mustard," said Hulett of WDFW, one of the researchers involved.

Citing studies such as these, NMFS scientists decided in the early 1990s that protections for hatchery fish under the Endangered Species Act "should be viewed as a temporary measure, to be held to the minimum necessary for recovery." The idea, said NMFS geneticist Robin Waples, a key architect of the policy, was to protect as many of the varied genetic codes as possible. "We felt, biologically, this was reasonable," Waples said. "We're not trying to predict which populations are going to be important in the future, because we'd probably get that wrong. If you save a diverse array of these, the species has a much better chance of surviving into the future." Tribes want to use hatcheries as a "bridge" to a time when naturally spawning salmon populations can again sustain themselves. But first ecosystems will have to be repaired from the logging, dredging, damming and other insults salmon populations have suffered, they say.

Don Sampson, director of the tribal fish commission, accuses NMFS of misinterpreting the Endangered Species Act in trying to create a master race of wild fish -- "Aryan management," he once called NMFS' policy. He also accuses NMFS of doing little to help salmon recover -- failing, for example, to order the dismantling of four dams on the Snake River. "We ought to figure out as a scientific community in the Northwest how best to make these fish as natural as possible and integrate them with the wild populations," Sampson said. "Hatcheries ought to be used for a period of time. If that is 25 to 50 years so that wild populations can sustain themselves and survive, then we ought to plan to use hatcheries to get us through this bottleneck of mortality."

Advocates of hatcheries say disease can be controlled. Native wild fish can be taken annually to revitalize the genetic pool. Natural foods and more-natural water conditions can be employed. "We're still paying for past sins in a system that has largely reconfigured itself and continues to reconfigure itself and will continue to reconfigure itself," said Jeff Koenings, director of the Washington Department of Fish and Wildlife.



http://www.nwfsc.noaa.gov/resources/search_faq.cfm?faqmaincatid=3#faqid63

Q: What happens at a hatchery?
A: Hatcheries vary in their practices but the general process is as follows:

1. salmon returning to spawn in hatcheries or in rivers and streams are captured
2. eggs and sperm are collected and mixed together
3. fertilized eggs are incubated
4. hatched fish are placed in holding tanks to grow and develop
5. fish are released into the river
6. fish spend 1-3 years in the ocean
7. fish that are not harvested return to the hatchery or spawning grounds

Q: Are there different types of hatcheries
A: Each hatchery program is unique. The easiest way to differentiate hatcheries is to look at their goals and how they implement those goals. Hatcheries have one of three basic goals:

1. To Produce Fish for Harvest
   Some hatcheries strive to produce fish in order to maximize harvest and/or to mitigate for losses that would have occurred because of habitat degradation or blocked access. Hatcheries with this goal have been around for over 100 years. Over the years, concern has developed about how to best integrate natural and hatchery production. To address this concern, most of these hatchery programs try to minimize the impacts of straying on natural populations. Some hatcheries also try to minimize interactions between hatchery and wild stocks (e.g., by establishing hatcheries in streams where natural populations no longer exist).
2. To Recover Wild Populations
   Some hatcheries strive to conserve or recover natural populations of salmon. Hatcheries with the goal of recovery have not been around as long as those with the goal of production. In contrast to hatchery programs with the goal of production, these hatchery programs involve the intentional integration of wild and hatchery fish. Once hatchery fish have hatched and grown, they are reintroduced into the natural environment to become naturally spawning fish. In some programs, hatchery managers try to maintain genetic diversity and natural behavior in hatchery stocks. In these programs, hatchery fish may be reared in habitats that are more similar to wild environments (i.e., there may be areas for fish to seek cover, natural substrate, and currents for the fish to swim against).
3. Fish for Harvest and Recover Wild Populations

Q: Why are hatcheries controversial?
A: Hatcheries are controversial because:

1. For more than a century they have been viewed as a substitute for addressing the root causes of salmon decline, like loss and degradation of habitat, blockage of migratory routes, and over-harvest.
2. While it is not hard to identify risks that hatcheries pose for wild populations, it is not so easy to predict whether damaging effects to natural populations will occur in any specific case, and if they do, how serious the effects will be.
3. Critics of hatcheries sometimes disagree among themselves and don't always present consistent proposals for change.
4. They have strong support from groups that rely on them to provide fish for commercial, recreational, and Tribal harvest, as well as jobs.
5. There has been little effort to develop a comprehensive cost-benefit analysis that outlines the value and costs of hatcheries.