salmon in the Snake and the Clearwater? If we assume the Indian salmon catch was several hundred thousand, where were the 7-9 million dead salmon left over from the run?

The average individual has a difficult time in comprehending the magnitude of 7 to 9 million anything. Imagine a 3-foot long dead salmon in the center of a six-foot square piece of water. Eight million salmon would fill a football field wide river 180 miles long. This field of dead fish would have required Lewis and Clark 6 days to pass through. The number of animals and birds attracted to this bountiful harvest would have been noted in their journals. No dead salmon were noted in the Snake or the Clearwater. Does that mean the Snake was not heavily used for breeding?

They did begin to partake and enjoy fresh salmon on the Columbia, although they were still starving and eating dogs and horses. They made several more notations on salmon as they passed Indians fishing further down the Columbia. On the 22nd of October, they reached Celilo Falls; the great pinch point on the Columbia, where the salmon were forced into expending tremendous efforts to pass upstream. Eight to ten million salmon passing this spot would require 4 to 16 salmon a second leaping up the falls, for 8 or 12 weeks, an event that would astound any observer and leave a lasting impression.

Yet, these skilled observers said very little about salmon. The notations in the journals are rather subdued. Instead a notation about the great number of sea otters (now thought to be seals) below these rapids 200 miles inland.[77] They mention large numbers of seals two other times as they proceeded down river. This speaks to the abundance of seals, not salmon, and the direct connection between the two. Lewis and Clark journeyed up the river during the spring salmon run of 1806, again with minimal notation about salmon.

The truth about the Lewis and Clark expedition was the party barely survived the ordeal. Consider that their trip through Oregon, Washington and Idaho was through an aboriginal landscape with no dams, farms, logging, industry, no pesticides or roads. An environment that some characterize today as the perfect environment. If the land was truly bountiful, why was the home to a mere 200,000 natives and why was the expedition forced to eat dog and horse meat to survive?

Careful reading of other early diaries shows similar lack of salmon. Captain Wilkes in 1841 speaks of Indians complaining of scarce salmon in his Diaries. Historic accounts of Fort Vancouver and Astoria do not mention the commercial value of large salmon runs.

Indian Ritual

The science of anthropology and sociology provide further evidence of very small salmon runs before development of the Pacific Coast. It is common knowledge that the Indian nations along the Columbia River relied on salmon as a major food source. Since the Indians' culture was built around not wasting natural resources, they would only take what they could eat or trade. The Indians traded salmon as far away as the plains.

It is also known that many of these nations had developed a ritual around the arrival of the first salmon to ensure that the runs would be bountiful. This implies that

[77] Moulton, Gary E., 1989, The Journals of the Lewis and Clark Expedition, Univ. of Neb. Press. Vol 5, page 327.

there were runs that were not adequate and these shortfalls occurred often enough to generate the need to invoke divine intervention to ensure success.

Based on studies that place the aboriginal take of salmon between 500,000 and 900,000, the 100 to 200 tribal groups along the river would be hard pressed to use and catch any more than 25,000 to 50,000 fish each.[78] Since the ritual was for a specific tribal group, there must have been many years when a single tribe caught less than 25,000 fish. Assuming that the Native American's catch efficiency, before 1800 was only 5%, (compared to as high as 85% attributed to the catch of 1883[79]), this would indicate aboriginal runs in the Columbia River of less than 500,000 salmon on numerous occasions.

Core Sample Data

Estimates of prehistoric fish runs can be generated by examining fish scale deposits in ocean bottom core samples.[80] The number of scales at a given depth in the sample is related to the fish population and the depth of the scale in the sample is related to time. The data from that study was subjected to a fourth order polynomial curve fit and are plotted on figure 20 as the red line. The green line is a 4th order polynomial curve fit to the total Columbia River salmon return data, and the blue curve is a 4th order polynomial curve fit to the Sockeye salmon abundance data take from a study of Alaskan lake sediments.[81]

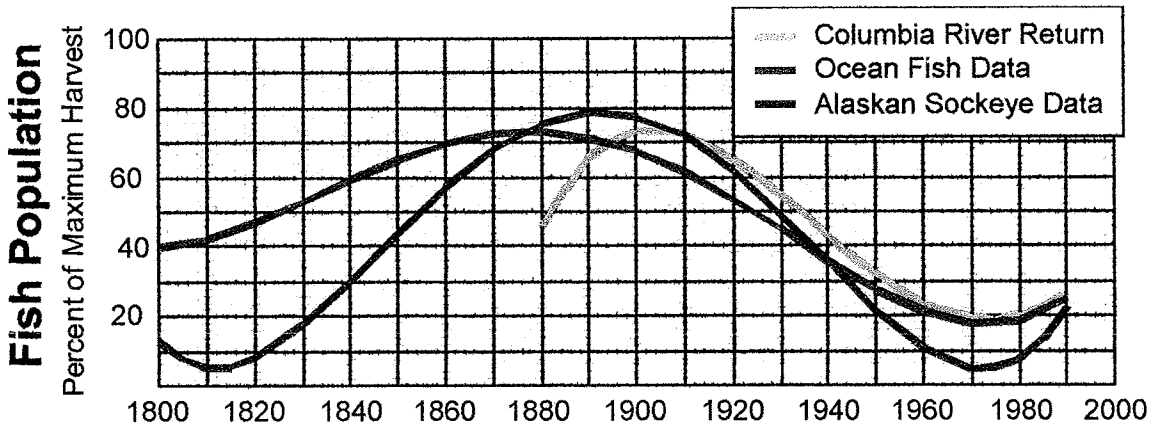

Figure 20. Estimate of 1810 Salmon Population

The steep drop off of the Columbia River total return (catch and escapement) after 1890 is due to the lack of Columbia River data in the early 1800s. One way to get an estimate of the Columbia River salmon early in the 1800s is to use these curves. Since

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[78] Craig & Hacker, 1940, The History and Development of the Fisheries of the Columbia River, US Bureau of Fisheries Bulletin, Pages 133-216

[79] _____, 1986, NWPPC, Appendix D, Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin, Page 9

[80] Smith, R. L., 1978, Biological Effects of Ocean Variability: Time and Space Scales of Biological Response, Rapports et Process-verbazux des Reunions **173**: 117-127

[81] Finney, Bruce P., et. al., 2000, Impacts of Climatic Change and Fishing on Pacific Salmon Abundance over the Past 300 years. Science, Vol 290, October 2000.

they track each other remarkably well from 1990 to 1890, it is reasonable to expect they would continue to be similar to the year1800. Therefore the Columbia River salmon population in 1800 would be somewhere between 40% and 15% of its maximum level. Using the average value of 26.5% would produce an aboriginal salmon run of about 1.1 million fish (0.27 x 4,000,000). That is significantly less than 16 million constantly quoted by the popular press.

Therefore, based on historic accounts, Indian ritual and scientific data it appears the popular pre-1805 salmon runs are grossly overstated. This data shows the aboriginal runs in the Columbia River between 0.5 and 2 million fish, which is very close to the current salmon runs. Thus, the whole basis for returning the river to pre-1850 conditions goes away.

Notice all sets of data show population peaks in the late 1800's and lower populations in mid1960s and the early 1800s. This is remarkable because they are population data on such distinctly different species; that is five ocean fish, Alaskan and Oregon salmon. Climate effects usually increase Oregon salmon while decreasing Alaskan Salmon or visa versa. The ocean fish are not influenced by river conditions. Therefore, this bulge in population near the end of the 1800s must be due to other factors.

A Century of Killing

In 1800, the human population reached 1 billion, technology was improving transportation and weapons, and by the end of the century the population had almost doubled. Humans were becoming a global force while still clinging to the idea that nature was there for us to exploit. History relates that, as early as 1780, seal hunting was big business along the Pacific coast.[82] Throughout the 1800s, fur trading was big business in the Pacific Northwest. Seals, sea lions, and otters were hunted extensively for their fur and oil. Much of this killing was done by the Native Americans. It is true that western culture brought the means (guns and a market), but the Native Americans had the skill set to harvest large quantities of pelts.

The western powers merely provided the means for gathering the pelts and getting them to the market. For example, the Hudson Bay Company and various other American and Russian trading charters and the cities of Astoria, Oregon and Vancouver, Washington were founded on the fur trade. The Russians developed fur-trading colonies as far south as Fort Ross in California.

Large numbers of ships sailed the Pacific Coast carrying millions of pelts to China. A single Russian ship, *Neva*, arrived at Canton, China with 151,000 fur seal pelts in 1805.[83] The result of this slaughter was that by the late 1800s these animals were driven to economic extinction and hunting stopped. In 1892, the Audubon Society reported that only seven individual Guadeloupe fur seals existed on the Pacific Coast.[84]

From the 1850s, pioneers and settlers poured into the northwest killing eagles and bears along with many other salmon predators. There are few counts of actual predator

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[82] Whitaker, John O., 1980, The Audubon Society Field Guide to North American Mammals, Alfred A. Knopf, New York, Page 611

[83] Gibson, James, R., 1992, Otter Skins, Boston Ships, and China Goods, Univ. Wash. Press, Seattle, WA page 14.

[84] Whitaker, John O., 1980, The Audubon Society Field Guide to North American Mammals, Alfred A. Knopf, New York, Page 612

populations, but it is common knowledge that a great many of the salmon predators were near extinction by the end of the 1800s. The dodo, passenger pigeon, buffalo, and several species of whales were driven to extinction or near extinction during the same period. As a consequence of harvesting large numbers of whales, the ocean's food supply shifted dramatically. These large mammals consumed great quantities of biomass. A single whale can consume 35 million plankton.[85] The killing of 500,000 whales would free 17 million, million plankton to feed other species.

Thus by the end of the 1800s due to the massive reduction in whale population, food was available to feed other ocean species, and predators were severely reduced through the combined actions of one to two billion humans; not just Euro-Americans, but Native Americans, Europeans, and Asians as well. These conditions would obviously influence the numbers of salmon, sardines, anchovies, hake, saury and mackerel and produce the bloom reflected in the historic data. The assumption that the 1883 run of Chinook in the Columbia River was a normal aboriginal run is obviously false. If human activity produced the bloom in salmon, what produced the drop in salmon population?

A Century of Conservation

After the century of killing, a century of conservation followed. Visionaries like Muir, Audubon and Teddy Roosevelt saw the consequences of this senseless killing. Through their efforts, legislation was passed to protect many of these species and their habitat. It certainly seems like a humane thing to do. Unfortunately, the pendulum of human opinion never spends much time in the center. The conservation philosophy gained momentum and final dominated in 1973 with passage of the Endangered Species Act; legislation designed apparently to prevent species from extinction. For four billion years nature has been driving species into extinction, some of them mass extinctions. Then in 1973, the US congress decided to take control of evolution away from nature and place it in the hands of US bureaucracy. A well meaning, but misguided and totally unworkable act, that ranks above the attempt of the Roman Senate to legislate the value of PI as 3.000.

Fifty years ago, people did not want to see lions killing impalas. Today, we seem to have come to terms with the fact that death is necessary for life. Likewise, extinction is necessary for creation. There is only a finite amount of food on this planet and thus a finite number of biological niches. For four billion years, superior species have driven inferior and over specialized species into extinction. Life is dynamic and must remain flexible. Wooly mammoths and sabre-toothed tigers once dominated the environment, but the environment changed and they went extinct, making room for a species that was more in tune with its environment. Today we have laws that artificially protect a specie simply because it no longer fits its environment. The wisdom of this practice is unclear.

Whereas the conservation movement had good intentions, it is naive to think that increasing one species would not seriously affect another. It is one thing to protect a species and another thing to feed them. The result is that the salmon's food supply over the last 100 years has decreased and the total number of salmon predators has been on the rise since. Human activity has thus unbalanced nature and set it against the salmon.

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[85] Engel, Leonard, 1961, The Sea, Time Life Pub. Page 104

To illustrate this point, let us examine the fall and rise of just two of the salmon predators, seals and sea lions, off the Pacific coast. In the last hundred years, harbor seals alone have increased from around 100 animals to over 310,000, California sea lions from 1000 to over 300,000.[86] Some investigators feel that the number of California sea lions today exceeds any historic estimate.[87] Thus, from around 1100 animals in 1911 the numbers have grown until today there are over 850,000 if the northern fur seals and northern sea lions are included. Over the same period, the population of the six fish we have historic data on has plummeted to less than 10% of their maximum numbers. See Figure 21.

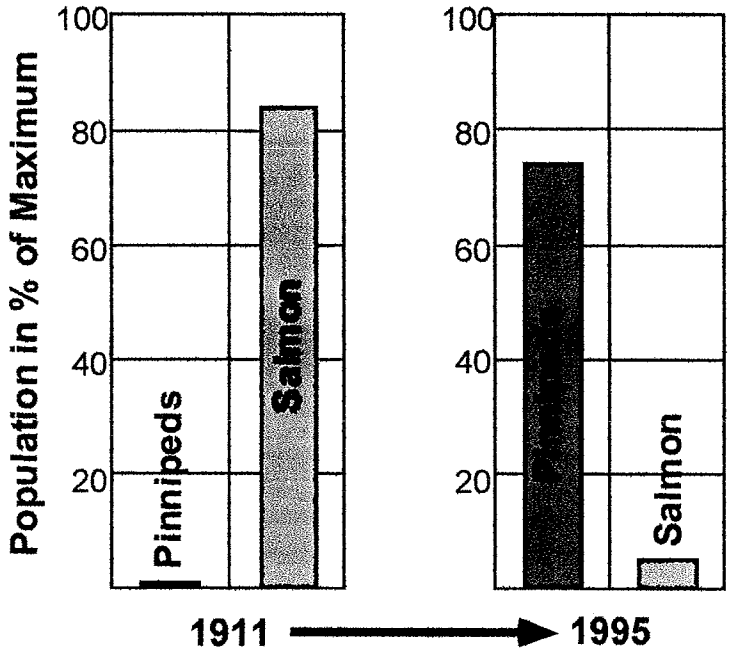

Figure 21. Population changes during the 20th century

To believe that these facts are unrelated is myopic and irresponsible. What is ironic is that human activities have indeed caused the decline of salmon, but it is not the activities of logging, farming or hydropower, but the activities of over zealous environmentalist.

A Century of Doubt

As we enter the 21st century, the human population is approaching 6 billion. By the end of the century it may well be 20 billion. We now have environmental laws that are confusing and conflicting. The Marine Mammal Protection Act and the Migratory Bird Act protect species that are killing endangered species protected by the Endangered Species Act. The Clean Water Act removes from the rivers, estuaries and oceans important nutrients needed to feed endangered species. We are now faced with numerous

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[86] _____, NOAA-NWFSC Tech Memo 28: Impact of Sea Lions and Seals on Pacific Coast Salmonids, Page 1

[87] _____, NOAA-NWFSC Tech Memo 28: Impact of Sea Lions and Seals on Pacific Coast Salmonids, Page1

decisions that have far reaching consequences that we have neither the skill nor the science to make correctly. Further, we are surrounded by special interest groups who confuse the issue by dealing in half-truths.

Presently, we are basing important decisions on opinions, and environmental dogma. There are many of the basic precepts of the environmental movement that are not true. Precepts such as, life is fragile, biodiversity is necessary, human impact is all bad, nature is all good.

Life cannot be fragile. Nothing that has been around 4 billion years is fragile. One hundred thousand years ago, all of eastern Oregon and Washington was a sea of molten lava. Yet, life abounds there. The Mount St Helens eruption devastated 100's of square miles, killing all life in the area. Yet, one year later, life was back and twenty years later life is flourishing. The truth is that life on this planet will survive. Man may not.

There have been many times during that 4 billion years when biodiversity was significantly reduced and life flourished. In the beginning there was only one species, biodiversity was totally absent, yet all life originated from that single species. Many mass extinctions have taken place over geologic time. The extinctions after the last ice age and the dinosaur extinction are two that are commonly known. One of the major reasons that extinctions occur is that the environment is constantly changing. Species that cannot adapt simply go extinct.

We look at the Mount St. Helen's eruption as a natural wonder and a clear cut as an unnatural disaster. In truth, neither are intrinsically good or bad, they just are. Good and bad are human terms that require an arbitrary basis for judgment. Nature has no good or bad, it just has life and death, creation and extinction, what works, works. Success is measured on how well the species thrives. Nature can do that because nature has no vested interests in who survives.

If paleontology has taught us anything, it has shown that overspecialization is a prelude to extinction. Many of the species we are currently struggling to support are critically overspecialized. In fact, man is critically over specialized. Certainly, we must pay attention to the environment, but not for the environment's sake but for human's sake. We must make tough decisions based on complete science as to what is fed the dwindling food supply on this planet, seals or children. These are not easy decisions, not pleasant decisions, and certainly not decisions that can be based on opinion.

It is time to look ahead to the consequences of an expanding human population. This is not the first time or the last that humans have dealt with the problem of over population. Many are calling for social change to resolve this problem. A prospective panelist for a discussion on adding nutrients to rivers was asked the following qualifying question by the EPA.

> *"The panel will address the questions of whether there is an inherent conflict between adding nutrients to watersheds to increase salmon runs vs. other societal objectives such as protecting or enhancing water quality. Philosophically, should society opt to add nutrients to substitute for the fundamental causes of the salmon decline? Will such an approach unintentionally mislead the public into thinking that the salmon decline can be reversed without major societal changes?"*

The feeling that social change is necessary is common in the environmentalist movement; sometimes so much so that the hidden agenda obscures the actual objective. Obviously, the food problem discussed at the above conference is a real problem to the survival of the fish, but this is not the first time that the philosophical environmentalist agenda has surfaced. For example, the entire hatchery/wild salmon issue has its roots deep in the philosophy that social change is needed. If hatchery salmon are counted, then many salmon sub species will not be endangered, thus environmental modification and the accompanying social change cannot be forced on those rivers.

Wild versus Hatchery Salmon

Hatchery programs have long been a part of the plan to recover salmon, certainly a major root of the 4 H (Hatchery, Harvest, Habitat and Hydro) concept. Suddenly in the later part of the 1990s, the Hatchery program came under heavy pressure. Hatchery fish and their eggs were destroyed by the millions. Entire runs eliminated under the pretext that wild salmon were endangered by the success of hatchery salmon. This seems illogical if we are indeed trying to save salmon. In fact, on many Pacific Northwest Rivers, the Columbia for example, salmon are not endangered unless you exclude hatchery salmon. Returning salmon have been counted at Bonneville since 1938. Figure 22 is a plot of the returning Chinook and Coho from 1938 to the present.

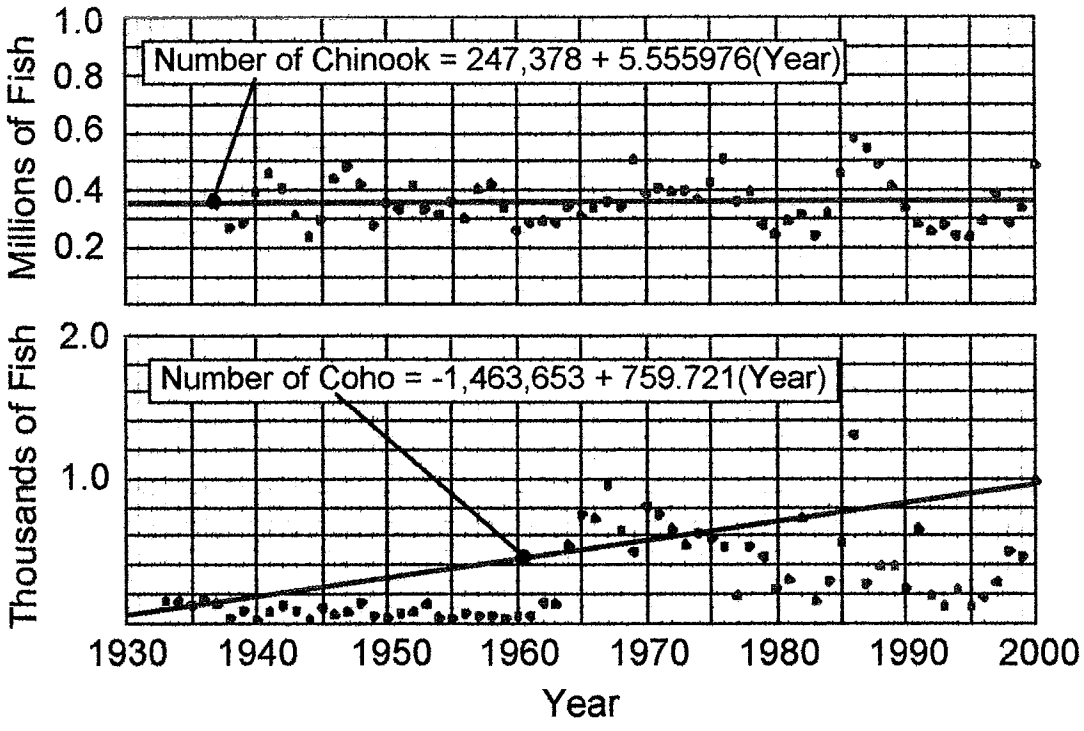

Figure 22. Salmon Return at Bonneville

By simple inspection of these curves, the salmon population of the Chinook seems to be reasonably stable for the last 62 years and the coho salmon would appear to be improving. In fact, the statistically generated best fit trend lines (given in the boxes)

for both have a positive slope. Whereas the coho slope is relatively steep, the chinook gain is only slightly positive, but neither species would appear to be in danger of going extinct and therefore may not belong on the endangered species list. Taking the salmon off the endangered species list significantly reduces the leverage to induce social change.

Salmon can be kept on the list by several clever scientific tricks for example, by selecting your data groupings or dividing them into sub species. If you selectively look at the Columbia River coho after 1965, you will find the trend line is negative, indicating that the coho are endangered. Salmon have already been divided into subspecies, such as Chinook or Coho, which the Endangered Species Act allows, but we have seen that the subspecies are doing well. However, in the case of the salmon, the law was massaged a bit and the salmon were divided into effectively a sub-sub-subspecies based on a common belief that salmon unerringly return to their original spawning ground. Therefore, a separate sub-sub-sub-subspecies, of Chinook salmon could be defined as the Columbia River/Snake River/Salmon River/South Fork of the Salmon River/Johnson Creek Chinook. Anytime a species is divided into six subdivisions the result will be a population small enough to make the species look endangered.

However, the truth is that salmon stray in large numbers and often. Otherwise, all salmon would be spawning in only one river. Studies have shown that salmon straying can be as high as 78 percent.[88,89] Twenty percent of the adult chinook carcasses on the Sixes River spawning ground were strays from Elk River. Admittedly, these studies were on straying hatchery salmon, because nobody is interested in studying straying "wild" salmon but that does not mean that wild salmon do not stray as well. The straying of wild salmon would invalidate the idea that sub-sub-subspecies are unique and therefore threatened.

Further, since Salmon have strayed in large numbers for the few years studied is it not reasonable to assume that they have been straying in large numbers since the inception of hatchery programs for over 100 years? The result of this massive straying is that no racially pure wild salmon exist as well. In other words, there is no difference between a wild Snake River coho and a hatchery coho from the Alsea River. Certainly there is no physical difference. Then, what keeps these salmon on the endangered list?

According to a few scientists, the difference is in the genes, but there is very little data to support this claim. Whereas the individual's DNA is unique, the differences in DNA that separates individuals is not well understood. Certainly there are DNA differences between ethnic groups and even members of the same family, but does that mean that ethnic groups are subspecies? The idea that crossbreeding between different subspecies will weaken the species is also false. The action by the regulatory group to utilize sub-sub species as well as use DNA differences to classify endangered species is unprecedented. Are regulatory agencies guilty of making new law?

If no truly wild salmon exist, and there is not a real difference between a wild Snake River coho and a hatchery coho from the Alsea River, we are left with many questions. Should salmon be on the endangered lists? Why are other fish whose

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[88] Jacobs, S. E., 1988, Straying in Oregon by Adult Salmon of Hatchery Origin, ODFW Information Report (Fish) Portland OR.

[89] Downey, T. L., Susac, G. L., Nicholas, J. W. , 1988, Research and Development of Oregon's Coastal Chinook Salmon Stocks, OR. Dept. of Fish and Wildlife, Fish Research Project NA-87-ABD-00109, Annual Preport, Portland, OR.

populations have diminished similar to the salmon such as, sardines, anchovies, hake, saury and mackerel, not on the endangered list? How much of the salmon issue is involved in the perceived notion that social reform is necessary? How much did social reform shape the direction of salmon research? How many other issues other than hatcheries and nutrients have been covered up? Is social change necessary?

Social Change

It is apparent that many feel that it is important to change society back to a more "environmentally friendly" society. Certainly, the comfort of the "good old days" appeals to all of us. I for one long for the days before tongue piercing, but moving society backward is not necessarily better and has never worked well in the past. Certainly, protecting the environment is important but the idea that aboriginal people were more environmentally friendly may not be true. Further, a species that is in tune with the environment has undoubtedly a better chance for survival. In fact, the more in tune, the greater the population and the longer the species exists on the planet. But, culture and environment are firmly connected; changing a modern human environment to an aboriginal environment will only produce a species in tune with its environment if we change the human culture from our modern culture to an aboriginal culture. Since modern humans are not in tune with aboriginal environments, culture catastrophe will follow.

Consider humans appeared on the planet earlier than 200,000 years ago as just another mammal that survived like all other mammals before it, searching for food, and raising young. Each family group staked out and protected a home area where the family group foraged.

In the beginning, humans followed a survival strategy that we call today, hunter-gatherers. About 12 thousand years ago, the world population was 10 million hunter-gatherers.[90] In other words, for a large percentage of that human existence the population of humans was static. In the early 1800s, there were 1 billion humans on the planet. Why had it taken almost a million years to get the first 10 million humans and then only 12 thousand years to add 990 million people? The answer lies in the term overgrazing. Twelve thousand years ago, the entire planet was saturated with humans. It takes a lot of space to feed a hunter-gatherer. No more habitable space existed 12 thousand years ago for these hunter-gatherer groups to forage.

Living in a saturated niche is not a pleasant existence. Life is hard and one individual must die before another can be born. Change was necessary. Most living things survive by changing, but they change physically, improving their chances of survival say by adding claws, changing size or stripes, or improving parenting to deal with the environment better. Around 12,000 years ago, humans made a dramatic change, but not physically. They changed their survival strategy, by changing their culture. Humans found that social change was an effective tool to rapidly improve the odds of survival. Agriculture was developed.

The change was slow at first, but farming was a superior survival skill, simply because it allowed more people to be supported on less land. Farmers were no longer living on an over grazed landscape. Food became abundant, population increased.

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[90] Pfeiffer, John E., 1978, The Emergence of Man, Harper & Row, New York, page 291.

Hunter-gatherers were forced off the land because the abundant food made farming life more attractive and the increase in population that the abundant food supported gave the farming communities political, and military strength. Humans had learned how to be more in tune with their environment.

In essence, this miracle was accomplished by using technology and increasing energy utilization. Hunter-gatherers use only the energy that strikes the earth from the sun, eating only what grows naturally on the surface. Farmers utilized the available solar energy better by allowed only edible plants and animals to use the available solar energy in their territory. Thus, they thrived and the population of humans began to increase dramatically. Good times do not last forever, eventually the population increases required new technology and additional energy to increase population density. Animal power, then water and wind power were used to produce energy. Each time additional energy was added to the system production increased along with population density. City states and finally nations began to form.

If one looks at the history of mankind over even the last 12 thousand years, it is apparent that we reached many plateaus and each time we added technology and increased energy production to continue growth. In the crucible of survival of the fittest, western culture developed. Today, we have 5 billion people on the planet and by the end of this century; we may have 20 billion. Many of the people today do not have the benefits of modern culture and are living in an overgrazed environment where food and energy are lacking. Certainly social change is needed.

However, going back to a hunter-gatherer culture is not the answer, it is not the social change that is required. Consider that 200 years ago all the people living in Oregon were hunter-gatherers. The entire population of Oregon was about 200,000 individuals and had been for thousands of years. The Pacific Northwest was saturated with human hunter-gatherers. Life was hard, and rarely lasted more than 45 years, without the plow and the axe, the land was overgrazed and barely supported the natives.

Today, we have nearly 4 million people living in Oregon. Consider the consequences of turning the environment back to a hunter-gatherer environment. For example, consider the effects of 4 million campfires on our forests, or the effects of feeding 4 million people on only the game and wild plants in Oregon. The impact would not only be on the environment but on the population, as well, it would soon return to 200,000 people.

Certainly, 4 million people in Oregon impact this environment, but what is more important is that the impact is considerably less per capita than the impact would be if we were hunter-gatherers. There is a very strong relationship between population density, technology, energy demand, and physical environment. We cannot return large areas of the environment back to a hunter-gatherer environment without severe impacts on human population.

The social change needed today is very similar to those changes we have used so successfully in the past; increase technology and energy production. We should not be stopping farming, logging and dam building, but utilizing those resources more wisely. The solutions to our problems at the beginning of the 20th century are not the solutions to our problems in the 21st century. Over the last century, conservation became synonymous with protectionism. Protecting natural resources and the environment is not the same thing as using the resources and the environment wisely. The choice is simple,

we need to manage our forests, rivers, and the environment to maximize their value to humans or remove 4 billion people from the planet.

Human Activity

The National Marine Fisheries and the Fish and Wildlife Services conclude that the decline in salmon over the last 100 years has been mainly due to human activity in the river habitat.[91] They identify such things as increase in population, dam operations, introduction of contaminants, disturbance of vegetation and soils near streams due to farming, ranching and logging, etc. as the cause of the decline. Whereas these activities may not appear to be beneficial, evidence that they caused the decline in the salmon population is circumstantial and anecdotal.

Influence of Human Population

Certainly human population growth and Chinook salmon population reduction occurred over the same period. See Figure 23. However, the conclusion that they are related is not well substantiated. Facts exist that indicate human activity is not the source of the salmon decline. These facts must be explained by the river theory. On the other hand, these facts are consistent with the ocean theory.

If salmon population were related to human population and development, we would find a correlation between the salmon and human population curves. We find no recognizable match in the curves, or changes in salmon at times of major changes in river habitat. In Figure 22, the human population curve (green) is concave upward. If human population is a critical factor in the decline of salmon, you would expect the salmon decline curve to be concave downward (dotted red curve). By examining the curves where they intersect, it is apparent that before 30% of the human population had arrived, over 70% of the salmon had already disappeared. Human population growth alone is not the cause of the salmons decline.

[91] _____, Oral Presentation Notes, NMFS Public Information Meeting on the proposed 4d rules.

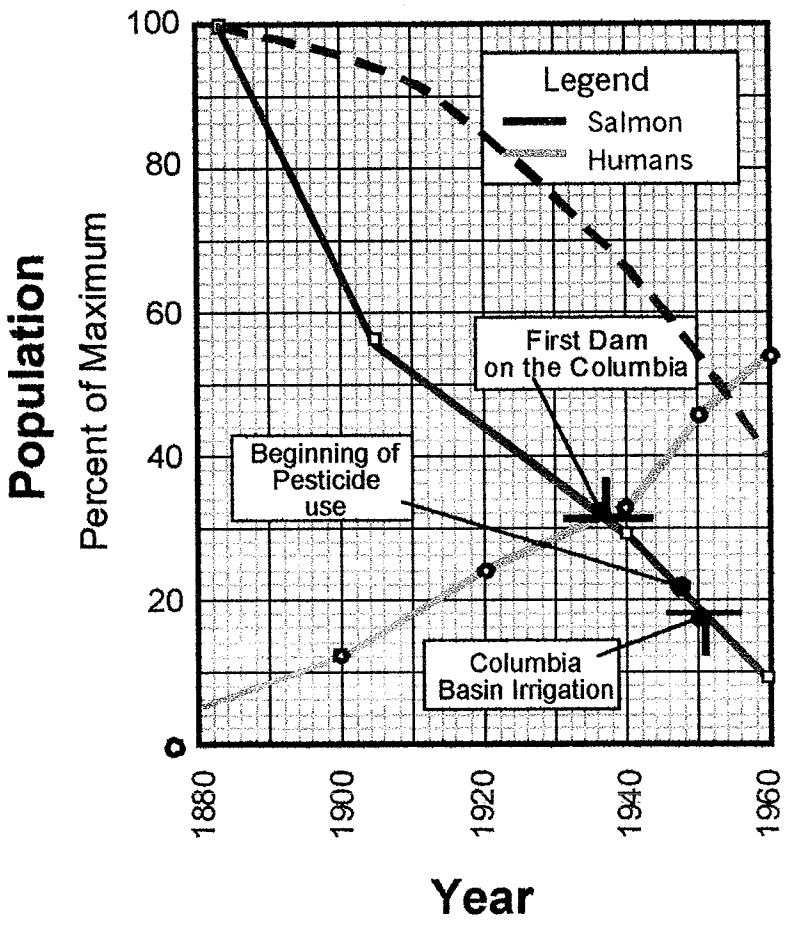

Figure 23. Salmon Reduction Relative to Human Activities over Time

Dams

Dams are often singled out as the major culprit. The simple fact that they seem to block the flow of the river is enough evidence for many. However, that conclusion is too simplistic. Consider that of the 136 dams built on the Columbia and its tributaries, 84 percent were completed after 1935. Thus, more than 65 percent of the salmon were gone before 84percent of the dams were built. The effects of dams on salmon studied by the Northwest Planning Council dealt only with the negative effects of dams.[92] Few things in this world are 100 percent bad; obviously, dams must have positive effects on salmon as well. For example, they reduce silt in the streams, they provide lakes which are important to sockeye salmon, they cool the stream water, allow control of water flow in the streams so that adults and juveniles can migrate and many other positive effects. We saw earlier where dams help returning salmon. Dams also allow a means of getting accurate counts of fish returning. Figure 24 is a plot of the chinook return past Bonniville dam. The blue and purple bars are when dams were added to the Snake and Columbia River systems.

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[92] _____, 1986, NPPC, Appendix D, Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin, Page 140

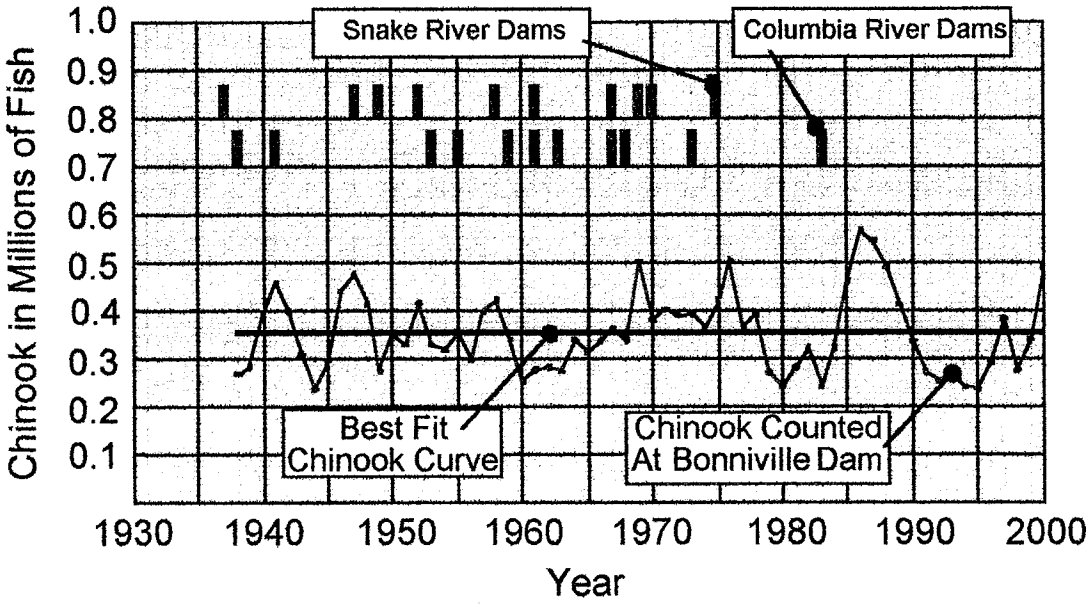

Figure 24. Effect of Dams on Return of Chinook over the Last 62 years.

If dams are the major problem for salmon, we should see a reaction to each of the additional dams. No such reaction is visible in the return curves. In fact, the best-fit trend curve has a positive slope. That means that over the last 60 years the Chinook salmon numbers are not heading for extinction but are in fact increasing in numbers.

A study of 23 Columbia River tributaries shows that the tributary with the least number of dams produced salmon as well as the tributary with the most number of dams.[93] The same study showed that the fish that spawned in a tributary that only had one dam in the system produced half as many fish as a tributary on the middle fork of the Salmon River in Idaho, which requires the fish to pass eight dams. It appears the data does not support the popular opinion that dams are harming the salmon. If dams were the major cause of the decline in salmon then why are there no salmon in many rivers without dams?

Farming

Looking at individual human activities, like the Columbia Basin Irrigation Project completed in 1953, which added 500,000 acres of farms to Eastern Washington and Oregon, we see that 82% of the salmon had already disappeared before this major increase in farming activity. Pesticides were unavailable for use until after the Second World War. Figure 22 shows 80% of the salmon had disappeared from the river by that time. Most of the Columbia River flows through the eastern Washington and Oregon deserts where irrigation is necessary for farming. Figure 25 compares the number of irrigated acres to the decline in Salmon population. Notice once again that 70% of the salmon were gone before 30 % of the farming was operational.

[93] McNeil, William J., 2000, Progeny to Parent Ratios for Columbia Basin Stream Type Chinook Salmon, Yakima Basin Joint Board of Irrigation and Idaho Water Users.

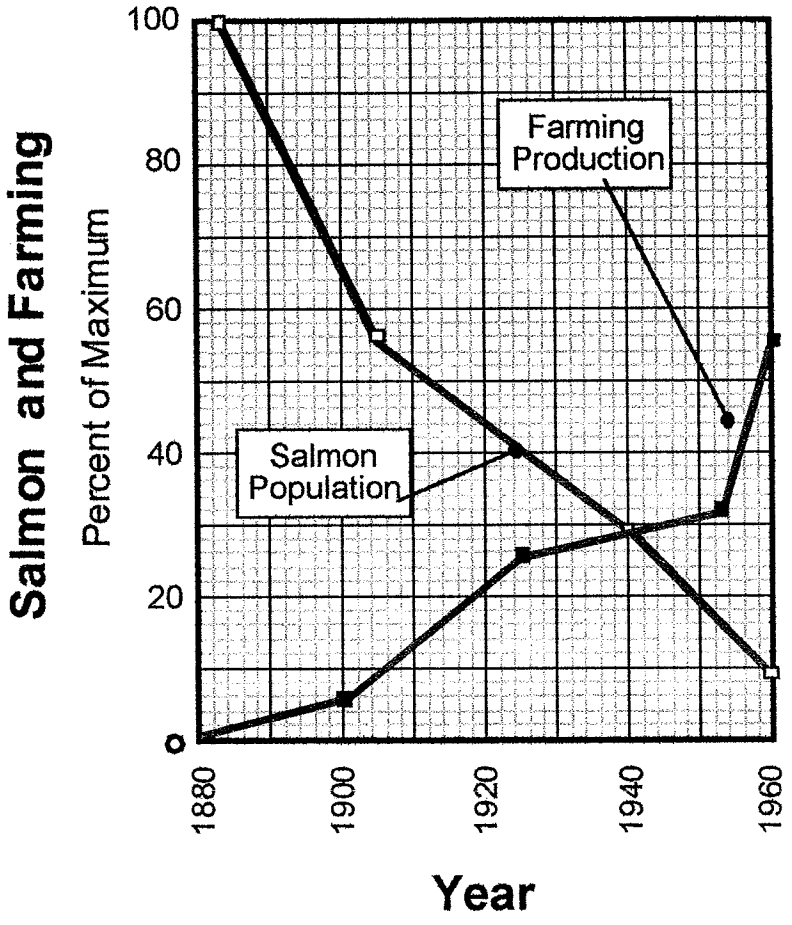

Figure 25. Salmon reduction compared to Farming

Logging

Figure 26 is a plot of the logging activity. Note that by 1920, 55% of the salmon had already disappeared and logging operations were less than 1% of their maximum. The rapid increase in logging occurred during and after World War II. By that time, 70% of the salmon were lost. Thus if we look at all human activity except regulatory activity we find that 70 percent of the salmon were already gone before any of these activities were significant.

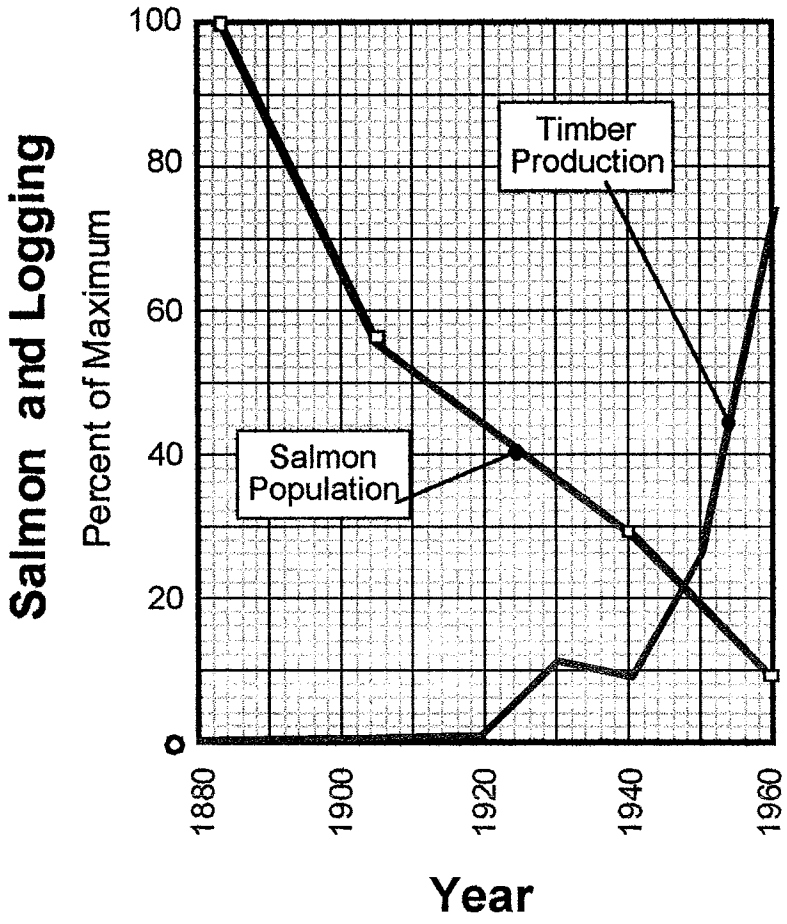

Figure 26. Salmon Reduction Relative to Logging over Time

Regulatory Performance

Before we leave human activities, let's take a closer look at what has happened since 1960. See Figure 27. Here we see that the four dams on the Snake River were not in operation until after 1960 when the salmon population had already diminished by almost 90%. Further, the salmon population actually increased during construction and initial operation of the dams. This would seem to indicate that removal of these four dams would not affect salmon recovery.

Next, we see a sharp down turn in salmon harvest in 1970. Following that there was a flurry of environmental laws passed. The Clean Water Act, Marine Mammal Protection Act and the revised Forest Practices Act were passed in 1972, and the Endangered Species Act was passed in 1973. During the almost 30 years of increasing regulation of human activities, the salmon have continued to decline.

No fish species has ever recovered after listing under the ESA.[94] There are probably many reasons for this lack of success. One reason may be that regulating human activity is not the answer to salmon decline. If this is true, it follows that further

[94] Williams, J. D., et al., Fishes of North America, Endangered, Threatened or of Special Concern. Fisheries **16**(6):2-20

regulation is unlikely to save any salmon as well. Thirty years of a failed program is hardly a recommendation to continue that program.

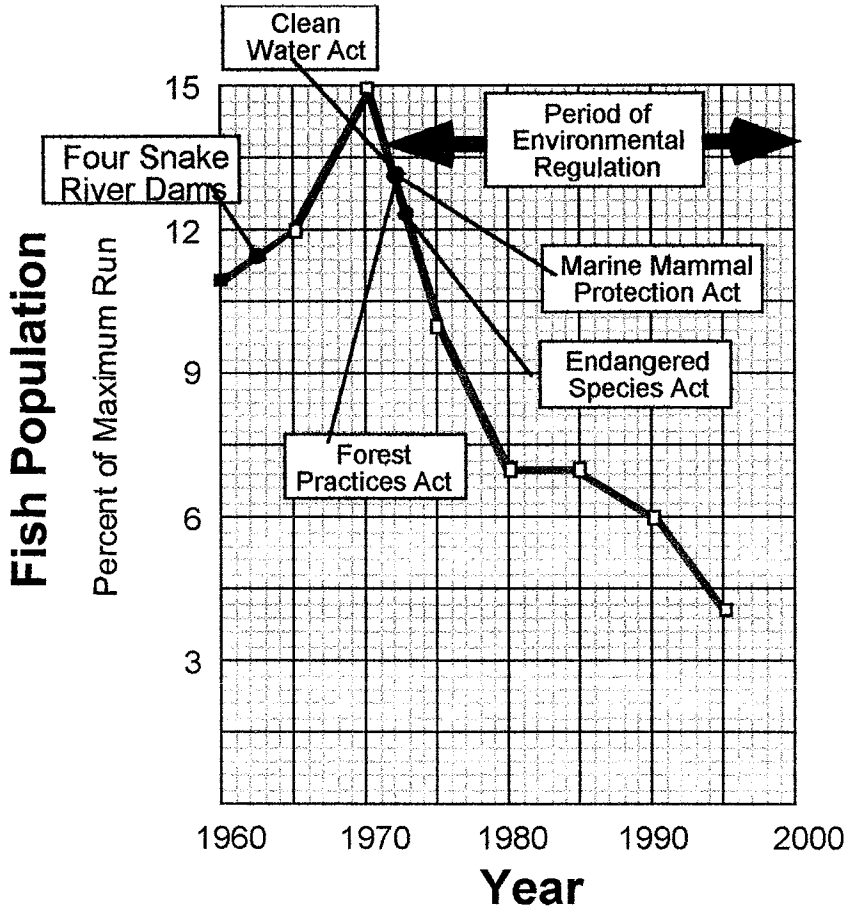

Figure 27. Salmon Reduction since 1960.

To arbitrarily blame the 70% decline in salmon population on human activities is far too simplistic an approach. River ecosystems have been subjected to natural periodic catastrophic disturbances such as glaciation, volcanism, wild fire, landslides, etc., several times over the salmons' history. Each time the salmon have progressed unassisted through a series of recovery stages over a period of decades to centuries.[95]

Attempts to manage systems and resources in a static context may increase the rate of extinction.[96] In other words, to assist the salmon is one thing; to over assist them may weaken them genetically. Salmon must survive in the 21st century environment not in some human stylized, artificially reproduced 18th century environment.

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[95] Reeves, G. H. et al. 1995, A Disturbance Based Ecosystem Approach to Maintaining and Restoring Freshwater Habitats of Evolutionary Significant Units of Anadromous Salmonids in the Pacific Northwest, American Fisheries Society Symposium, page 334

[96] Reeves, G. H. et al. 1995, A Disturbance Based Ecosystem Approach to Maintaining and Restoring Freshwater Habitats of Evolutionary Significant Units of Anadromous Salmonids in the Pacific Northwest, American Fisheries Society Symposium, page 336

River Habitat Restoration

The present solution to the salmon problem focuses almost entirely on the rehabilitation of the River habitat. The effectiveness of stream habitat rehabilitation was evaluated in the Keogh and Waukwaas Paired Watershed study on the north end of Vancouver Island.[97] We have spoken briefly about the results of this study earlier. Both rivers had similar problems of fish habitat loss and reduced survivals caused by logging in the 1940s. The Keogh River was heavily rehabilitated using riffle reconstruction, boulder clusters, single deflector log and multiple log structures, lateral debris jams, and root wads. The project included deactivating roads, establishing 1000-foot riparian zones, building ponds and channels, as well as stabilizing slopes, treating riverbanks, and adding nutrients to the Keogh River. The neighboring Waukwaas River was left as it was in 1940 and no restrictions to human interaction with the stream are in effect.

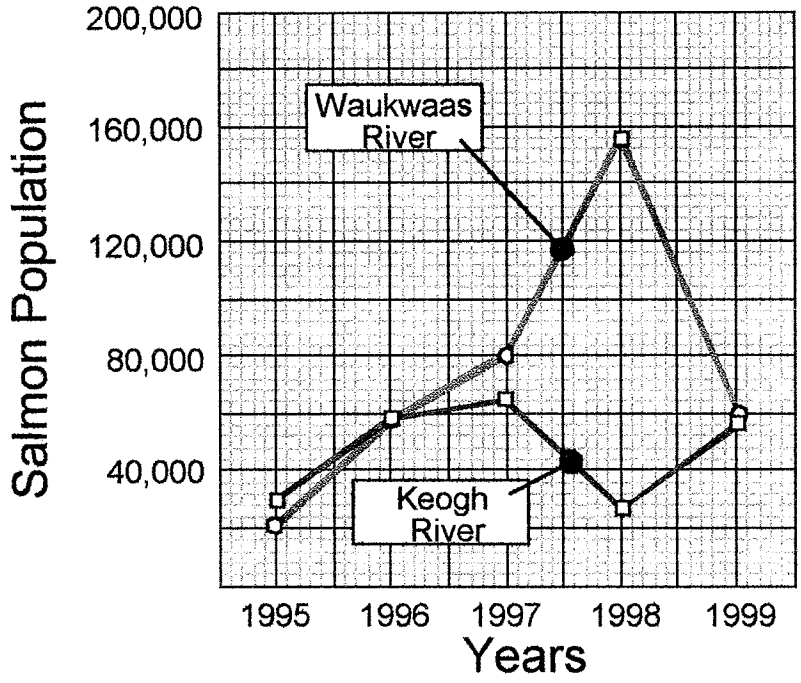

Figure 28. Salmon Smolt Production Keogh and Waukwaas Rivers

The study examined anadromous salmonid density, growth, smolt yield and survival rates in both rivers. Over the short period (5 years) of data retrieval, the untreated Waukwaas River out performed the enhanced Keogh River in smolt production.[98] See Figure 28 and 29.

In 1998, the Waukwaas produce 8 times more steelhead and over 5 times more Coho that the Keogh. Even if the large Waukwaas production in 1998 is discounted, the production in the Waukwaas is still better than the heavily treated Keogh. The study does

[97] McCubbing D. J. F., and Ward, B. R., 1997, The Keogh and Waukwaas Rivers Paired Watershed Study for B. C.'s Watershed Restoration Program: Juvenile Salmonid Enumeration and Growth.
[98] McCubbing D. J. F., and Ward, B. R., 1997, The Keogh and Waukwaas Rivers Paired Watershed Study for B. C.'s Watershed Restoration Program: Juvenile Salmonid Enumeration and Growth, page 23

not expect a full response until 2001, but these early results certainly do not give one much confidence in river habitat rehabilitation as a way to save salmon. Certainly not enough confidence to go forward with extreme programs such as the adoption of the 4(d) rules proposed by the NMFS or dam removal.

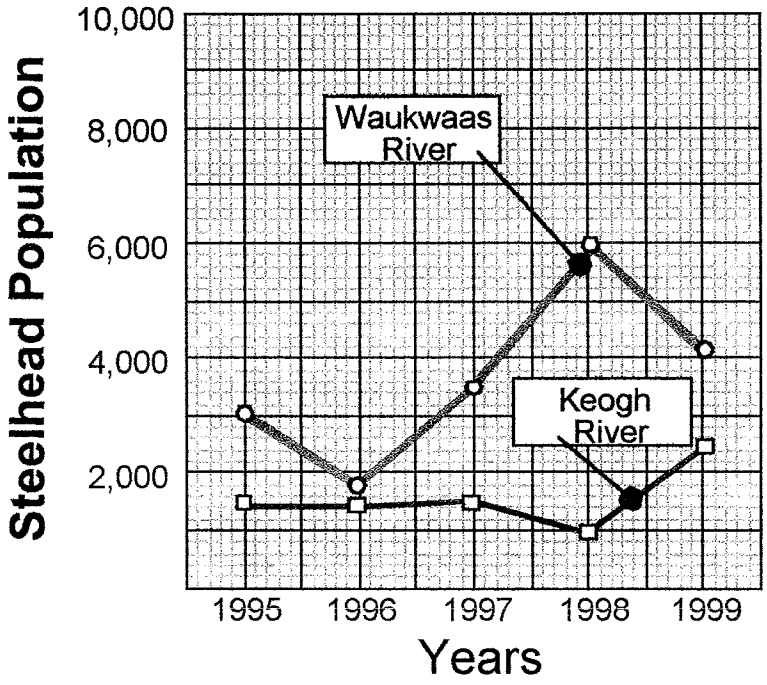

Figure 29. Steelhead Smolt Production Keogh and Waukwaas Rivers

Thus, it would seem that human activity in general, and the four dams on the Snake River in particular, are only minor factors in salmon population reduction. Other studies support this conclusion. A study in 1950 by McKernan compared the salmon catch for the Columbia River and eight Oregon coastal rivers during the period between 1923 and 1948. The study was designed to determine if pollution, dam construction, irrigation, and logging contributed to the decline in salmon population. The rivers were selected for the study because of their dissimilar habitat. The results showed, without exception, that the fisheries reacted the same on all rivers studied.[99] The inescapable conclusion is that the human activities in question are minor variables in the problem. Thus, it was known as early as 1950 that human activities may not be closely connected to salmon decline. In the past 50 years, billions of your energy and tax dollars have been spent trying unsuccessfully to prove that conclusion wrong.

The Endangered Species Act as a Tool for Social Change

We have noted that the ESA has never saved a species from extinction, that the need for saving species to preserve biodiversity is lacking and that extinction is part of creation. Thus, there seems to be little value for the ESA except as a means of forcing

[99] McKernan, D., Johnson, D., and Hodges, J., 1950, Some Factors influencing the trends of Salmon Populations in Oregon, Trans. Of the 15th N. A. Wildlife Managers Institute, Wash D.C., page 427-449

social change, by punishing industry. Punishing industry punishes individuals. Industry does not shoulder the cost of cleaning up oil spills. Individuals pay that cost through higher fuel prices. Skyrocketing fuel and energy prices are a direct result of the ESA policies.

Certainly, industry can and has caused harm to human survival. This harm needs to be stopped, but the ESA is the wrong tool. Stopping a project because it threatens a species with extinction is too broad of an approach. Conservation was a valuable concept 100 years ago, but today it is too broad an approach as well. The problems of the 21st century require that humans manage their environment to optimize their chances of survival. If humans do not survive, what is the point of conservation?

Ever action has positive and negative effects on human survival. Old growth forest is not intrinsically valuable. It is not even environmentally sound. It is certainly beautiful; but what cost beauty? We have set aside other beautiful areas, Yellowstone and Yosemite for example, but we now find that too many visitors are destroying those places. What is the value of beauty that nobody or only the elite can view?

None of these questions is addressed by the ESA. The first flaw in the ESA is that it is a regulatory law, which distances the law from the people. Hearings are required, but no action needs to be taken except to have the hearings. Another major flaw is that we are trying to regulate a process, which is presently poorly understood. The regulations are not driven by the best possible science, but by 10-year old science. A third flaw is that the basis for determining action is driven by what is best for nature not people. In truth, subspecies of humans (i.e., loggers and farmers) are endangered by this law. Finally, third party law suits give tax exempt special interest groups the power to force their special interest on the public as a whole. This has taken government out of the hands of the people and elected officials and given it to special interest groups.

Conclusions

Postpone all Plans based on Current Science

Current plans for salmon recovery are founded on science that is incomplete, inadequate, out of date and based on opinions and qualitative science. Current models are simplistic, incomplete and are not validated. The present plans, the 4d rules in particular, focus almost entirely on the river physical habitat, and are open ended, i.e. have no criteria to measure success.

Current Plans Address only 5 % of the Problem

The river physical habitat is 5 percent of the problem. To continue to concentrate on improving river habitat, while ignoring that 70% of the solution is comprised of the food and predators is a prelude to failure. Any action to increase the numbers of salmon requires a sufficient food supply and without predator control, predator population will simple expand and consume any extra salmon generated.

Food

The salmon food supply is complex. Presently vast reservoirs of nutrients lie untapped on the ocean floor, waiting for whims of weather and current to return it to the

biosphere where salmon can utilize it. The Clean Water Act is stripping valuable and useful nutrients from our rivers, estuaries and ocean waters near our coasts. What humans consider waste is often what nature considers food. Riparian zones act as a sink for nutrients and prevent soil born nutrients from reaching our streams. Clean water is dead water.

Predator Control

Salmon have over 160 different predators, which comprise 35% of the solution. Addressing this factor alone would be at least seven times more effective than the current regulations that deal with only 5% of the problem. Most of these predators are protected by environmental laws. Protection of endangered or threatened species is undoubtedly another major contributor to the decline of the salmon. If there is ever going to be human harvest of salmon again, it will be necessary to artificially suppress predators. Without artificial predator control, increasing the number of salmon by any means will simply increase the number of salmon predators. The relationship between prey and predator is not simple but it is a dominant factor and cannot be ignored.

Physical Habitat Modification Not Working

Studies of rivers that compare good habitat to poor habitat show that poor habitat out performs what current scientific opinion defines as good habitat. Neither, the need for or the value of riparian zones is defendable. Much of the science behind the riparian zone requirement is opinion and qualitative and the value of these zones has not been quantified or verified.

The probability of increasing the salmon runs by removing all the dams, farms, industry, towns and logging within two hundred miles of the Columbia and its tributaries; completely restoring all the wet lands and the river to its 1805 condition, is extremely low. On the other hand, the probability of destroying family farms and family timber operations is extremely high if current regulations are followed.

Saving Salmon or Reforming Society

The only physical difference between wild and hatchery salmon is the spelling of the modifier. The idea that 16 million salmon is the baseline salmon production of the Columbia River is not defendable. The maximum number of salmon in the Columbia River was about 4 million in the 1880s. Several lines of reasoning support prehistoric salmon runs in the Columbia River below 250,000 fish.

Reforming society by artificially inducing an aboriginal environment on a modern culture will devastate human culture. Modern culture requires large amounts of energy and advance industry and technology. Humans have constructed over the centuries a complex system that supports large numbers of people. Destroying that system will destroy large numbers of people.

Humans have shaped nature, but that is natural, other successful species also shape their environment. Humans need to manage our resources not hoard them. Locking up land, natural resources so they cannot be used is more miserly than prudent management of dwindling resources.

The current approach to salmon recovery involves establishing a costly and heavily regulated environment. Salmon need to survive in the 21st century environment not in some artificially generated aboriginal environment.

Do Good Broad Based Science

There is little doubt that human population has reached levels, which require human control over the environment. In order to do this successfully, humans need to understand how nature works much better than they do today. This requires a broad based multi-disciplined scientific system approach. The approach should be based on a characterization plan, address all parts of the problem, and include methods to measure success.

Re-examine Environmental Law

It turns out that short sighted although well-meaning acts to preserve some species in the early 1900s have lead to the demise of other species today. Ironically, the cause of salmon decline may be due more to the actions of the Sierra Club and the Audubon Society than farmers or loggers. In other words, saving a species from extinction is as bad as driving one into extinction, just as shortsighted and well-meaning acts like dam removal will also significantly affect the future. The current energy shortage is a direct result of the shortsighted energy policies of the last 30 years. The significant waste caused by the increase in number and size of wildfires in the last year can be traced to the changes in forest policy. The increase in loss of life and property due to flooding has its roots in changes in river management policy.

The Endangered Species Act is seriously flawed. It is used as a tool to promote social change more than protect the environment. Third party lawsuits place too much power in the hands of a few special interest groups. Regulatory laws remove the power from the people and place into the hands of Bureaucrats. The Clean Water Act, the Forest Practice Act, the Marine Mammal protection act, and the Migratory Bird Act all need to be evaluated to change their focus from protection to management.

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