INTERDISCIPLINARY ANALYSIS OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINSTRATION'S HATCHERY POLICY PROPOSAL

by

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A THESIS

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Environmental Studies, by its very nature, embraces interdisciplinary study. This approach allows a complete, contextual examination of an issue. In this case, the National Oceanic and Atmospheric Administration's Hatchery Policy Proposal will be examined through three distinct, but overlapping lenses. The first approach will provide a breakdown of the NOAA's proposal with a political ecology study. This exploration will use a metanarrative to reveal the roots of the struggle for political control over endangered salmon conservation and management. The second approach will attempt to ground the political ecology narratives by looking at the science behind the NOAA's proposal. This section will explore the rise of hatcheries, the current science surrounding them, and their future. The final approach will use the views of environmental ethicists to analyze the political ecology narratives, the underlying science, and the Hatchery Policy Proposal itself. Together these studies will provide a basis for future policy decisions.

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CHAPTER 1

INTRODUCTION

The appearance of the first Pacific Northwest salmon on the Endangered Species Act (ESA) list, in 1991, focused a spotlight on conservation and management efforts for the fish (Blumm 2002 and Wolf and Zuckerman 2003). Recognizing a centuries' worth of failed attempts to bolster salmon populations through hatcheries, management and conservation leaders searched for a more successful and effective solution. They quickly capitalized on a mounting body of scientific evidence that suggested more encompassing measures, like habitat restoration, offered a better chance of achieving long term, sustainable salmon populations. During the next decade, greater and greater resources were put into approaches that factored in the whole ecosystem. Positive conservation and management results came from methods that recognized the complexity of the ecosystem, rather than attempting quick fix hatchery solutions.

Abruptly, in 2004, the Bush Administration and the NOAA, the primary body responsible for endangered salmon conservation and management in the Pacific Northwest, threatened to abort the advances in endangered salmon conservation and management with its Hatchery Policy Proposal. In counting hatchery salmon with wild salmon to determine ESA listing status, the NOAA's Hatchery Policy Proposal called for a markedly increased role for hatcheries in the conservation and management of threatened and endangered salmon species (Federal Register 2004). This move reflected

the Bush Administration's favoring of industry interests, like hydropower, irrigation, and timber, over nature and a deeper ideology that embraced the mechanization of nature (White 1995).

The NOAA's Hatchery Policy Proposal rejected years of scientific research and the advice of its own scientific advisory committee with the formation of its proposal (Myers et al. 2004). It also left countless salmon stakeholders, like the Pacific Coast Federation of Fishermen's Associations, scrambling to protect their interests. The Hatchery Policy Proposal opened the door for the delisting of salmon from the ESA list and the loss of the protections and resources that came with it. The repercussions of enacting the NOAA's Hatchery Policy Proposal would be catastrophic for salmon and stakeholders concerned with their sustainability. The NOAA's Hatchery Policy Proposal signaled a major policy shift and brought the contentious debate regarding role of hatcheries in Pacific Northwest salmon conservation and management to a head.

This thesis will use narrative policy analysis and environmental ethical insights to provide a foundation for future policy making by answering and analyzing the question: What were the underlying political, socio-cultural, economic, and scientific changes that produced the NOAA's Hatchery Policy Proposal?

Framework

This study will truly be interdisciplinary in nature. It will largely embrace a political ecology approach, and specifically a narrative policy analysis including a science perspective section falling under the heading of "nonstory". This paper will

combine the narratives of the political ecology section and nonstory science section into an encompassing "metanarrative" that will be useful for future decisions regarding salmon, including the Hatchery Policy Proposal. In addition to utilizing the narrative policy analysis, this examination will also incorporate a broader philosophical look at the nature of salmon species, hatcheries, the role of the 1973 Endangered Species Act, and the various narratives.

The narrative policy analysis takes a three-pronged approach. The first part of the study is to explore the primary narrative and counter narrative. The primary narrative carries the most weight regarding a subject and is offset by the counter narrative. Both the primary narrative and the counter narrative will be covered in the second chapter of this thesis. The third part of the narrative policy analysis is to introduce and incorporate the "nonstories". Nonstories fall outside of the traditional story format and lack distinct beginnings, middles, or endings. This study will incorporate the nonstory of the NOAA's version of science in the third chapter. These narratives and nonstories will then come together to form a more comprehensive metanarrative (Roe 1994). The metanarrative, captured in the fourth chapter, will flesh out points of agreement, disagreement, and uncertainty in the various stories. Finally, this metanarrative will be critiqued and analyzed using the insights and philosophical tenets of two prominent environmental ethicists, Holmes Rolston III and Arne Naess, and be reviewed for its practicality for policy makers. The final chapter will also examine the usefulness of the Endangered Species Act and make suggestions regarding possible improvements for endangered salmon conservation and management.

Study Area

Since this study focuses on Pacific Northwest salmon, it is fitting that they be incorporated into the definition of the study area. The study area for this thesis will be defined by the historic range of Pacific salmon in the continental United States north of the western states of California and Nevada. It will encompass all the river basins used by salmon in this region. A river basin includes all the rivers and streams that drain into those rivers. In terms of states, this study will include parts of Oregon, Washington, Idaho, and even the far western edge of Montana. Admittedly, this is a subjective delineation of the Pacific Northwest. Due to the integrated nature of the region and its endless, overlapping linkages that extend far beyond the boundaries of the United States, some limit must be put on this project's scope. While affected areas will most certainly be missed with this definition of the Pacific Northwest, it should be broad enough to be comprehensive and focused enough not to be unwieldy.

The actual subjects within the study area, the various salmon species, will be discussed in detail in the third chapter of this thesis.

Pacific Salmon History

For many centuries, the only human narrative regarding the Pacific Northwest salmon belonged to Native Americans. These people first settled in the region over 9,000 years ago, and relied heavily on the salmon for their survival (Cone 1995). Salmon constituted a major portion of many Native American diets, and the annual return of the

salmon each year was often a matter of life and death for these people (Busch 2000). "Native American lifeways in the Northwest evolved with the salmon; religion, world view, traditions, and history revolved around the annual salmon runs" (Petersen, 1995, p. 197). Native Americans adhered to a relatively strict set of guidelines in harvesting salmon returning to spawn. Fishermen were allowed to collect only a certain number of fish, and fishing could only be done during specific time periods (Cone 1995). Parts of the salmon harvest were dried or smoked and used for food during the winter. Native Americans also enjoyed a relatively harmonious and respectful relationship with what was often called "The Swimmer" (Busch 2000). Over the course of many generations, they developed an intimate knowledge of these fish. Native Americans in the Pacific Northwest celebrated a deep, often religious, connection with the salmon (Roche and McHutchinson 1998).

Pacific salmon have suffered greatly since the arrival of European Americans in the Pacific Northwest in the mid 1800s. Before they appeared, there were an estimated 10 million to 16 million salmon returning every year to the Columbia River. In the 1990s, after decades of attempts to help the struggling salmon, only 2 million fish returned to the Columbia River (Behnke 2002). In another example, in 1897 over 1 million cases of sockeye were canned. By 1903, with more canneries operating, there were only 372,020 cases (Busch 2000). Between the arrival of European American fishermen to the Pacific Northwest and the first listing of a salmon stock on the ESA, spawning salmon went from a torrent to a trickle.

There were countless transgressions committed against salmon over the last 125 years. Dams, of course, received a great amount of this attention. Often built without fish ladders, despite laws demanding them, dams effectively cut-off adult salmon from their spawning grounds and harmed juvenile salmon migrating down stream (Cone and Ridlington 1996). In addition to the mammoth curtains of concrete and wood that halted salmon, there were a number of other factors, some more subtle than others, that negatively impacted salmon. For example, mining washed increased amounts of sediment and toxic metal tailings into streams and suffocated or poisoned salmon eggs (Taylor 1996). Splash dams, a common feature during the early 1900s, bulldozed streambeds down to the bedrock, washing away gravel necessary for spawning. Mining, in addition to removing water from streams, also returned sediment and often toxic metals. Mines and industries, like lumber mills, introduced pollution into streams and poisoned salmon (Busch 2000). "Under human influences the landscape gradually evolved right out from under the salmon" (Montgomery, 2003, p. viii). Salmon faced an onslaught from every conceivable direction and paid a steep price.

On top of all the above listed factors, commercial fishermen hooked, netted, trapped, and scooped millions upon millions of salmon during the last 125 years. The height of this fishery ran from about 1870 until 1920 (Netboy 1980). While even the earliest commercial fishermen experienced great success, advances in commercial fishing technology made it even easier to bring in large hauls of salmon. Gillnets arrived on the Columbia River in 1864 (Busch 2000). A dearth of regulations allowed nets to stretch across the entire river blocking fish passage, much as dams would do decades later. Fish

wheels, appearing in 1879 on the Columbia River, picked salmon right out of the water. The purse seine, with its lethal efficiency, also made arrived in the late 19th century. Fish traps, which funneled fish through a narrow opening, made catching salmon even easier (Cone 1995). A salmon returning upstream to spawn faced a lethal gauntlet of fish catching devices. Over the years more commercial fishing innovations would lead to more efficient and effective fishing. Some of these advances included the gas powered motor for faster fishing and the spinning reel that made it easier to catch salmon (Busch 2000).

Coinciding with the advances in commercial fishing, canning also came into existence. The advent of canning, spurred by a reward from Napoleon Bonaparte (Busch 2000), was a major catalyst for commercial salmon fishing interests. Markets previously out of range of barreled salmon opened up to the canned salmon. Commercial fishing in the Pacific Northwest blossomed with the opening of the first commercial cannery in the 1860s. While on the East Coast, in places like Appomattox and Gettysburg, Americans slaughtered each other by the thousands, on the West Coast, salmon faced a similar fate.

Canning made it possible to harvest large numbers of fish at one time and then spread out their sale over long periods. Spoilage issues became irrelevant in the tin can era and more fish then ever were harvested. "Canneries spread quickly throughout the Pacific Northwest; by 1874 there were a dozen in Oregon between Astoria and Portland… by 1883, there were fifty-five canneries on or near the Columbia River, between Oregon and Washington" (Busch, 2000, p. 108). All these canneries made salmon the Pacific Northwest's second largest export by 1880, only lagging behind

timber (Petersen 1995). Canning technological advances, like the "Iron Chink", soon supplemented or replaced the largely Chinese labor force, driving the commercial fishermen to catch even more salmon (Netboy 1980).

Not surprisingly, as commercial fishermen hooked, netted, and scooped thousands upon thousands of salmon for canners to pack, salmon populations began to fall dramatically. The canneries' maximum output occurred in 1883 and from that point on consistently fell. "And so, by the turn of the century, over fishing, pollution and disregard for regulations had already seriously damaged many salmon stocks" (Busch, 2000, p. 110). The once abundant salmon saw their numbers dwindling to dangerously low levels before the 20th century even began. Unfortunately, things would fail to improve much for the salmon over the next century.

Again, it should be mentioned that commercial fishermen and their brethren in the canneries were but one piece of the salmon destruction formula. "The story of the decline of the Pacific salmon is a long and involved one, with tragic elements of over fishing, habitat loss, climate change, fisheries mismanagement, and a dozen other interconnected factors" (Busch, 2000, p. 23). Commercial fishermen caught and killed millions of salmon, but other factors played a role with consequences felt for a much longer time. Some of these will be discussed in greater detail in the third chapter as they relate to the Hatchery Policy Proposal. There is no shortage of research and material discussing these factors. While important the actual details of these myriad of issues is not the focus of this study and delineating their subtleties would be a massive research project unto itself. The bottom line is that over the last decade, the combination of

logging, dams, mining, agriculture, pollution, and commercial fishing fomented a significant decline in salmon numbers. Some salmon species which had existed for thousands of years disappeared completely (Lichatowich 1999). Although slow to recognize and recalcitrant to react to the salmon's plight, in 1872, the American government finally turned to hatcheries as the solution to the mounting salmon crisis (Cone 1995).

Hatchery History

One of the first and most consistent responses over the decades to the salmon's falling numbers has been the use of fish hatcheries. Salmon hatcheries have a history spanning over two centuries. The first successful attempts to artificially propagate salmon can be traced to Germany in 1763. The technology soon made its way to England and then onto the United States. The first hatchery began operating in America in Maine, in 1871 (Netboy 1974). Early hatcheries were rudimentary, especially in terms of feeding and disease prevention (Busch 2000). Nevertheless, they did produce juvenile salmon that could be transported and introduced to streams, rivers, and lakes.

Once the hatchery technology became available, the American government was quick to encourage its use. On the Atlantic coast, Atlantic salmon were already in dire straits. In 1872, the federal government gave $15,000 that went to the building of a hatchery on California's McCloud River (Netboy 1974). While the first batches of eggs from this hatchery actually went to the East Coast, "The new states of the Pacific Northwest embraced hatcheries and established bureaucracies to build and manage them"

(Wolf and Zuckerman, 2003, p. 26). The McCloud River hatchery was quickly followed up with a hatchery located on the Columbia River, in 1877 (Busch 2000).

Once the first hatchery on the Columbia River was established, others were quick to follow. Over fishing caused a decline in salmon numbers and hatcheries were built in response (Blumm 2002). "In subsequent years many salmon hatcheries were built… there was a prevailing illusion that little more was necessary to augment the fishery than to plant fertilized ova or fry in the streams" (Netboy, 1980, 47). Hatcheries were spreading throughout the Pacific Northwest to try and raise salmon numbers. In 1971, there were over forty hatcheries operating in the Columbia River basin alone (Petersen 1995). Once initially established, these hatcheries became entrenched as the default solution to the salmon crisis.

The governments' support for salmon hatcheries reflected a deeper philosophical belief of the era which held that "nature was inefficient and wasteful; it was human responsibility to control the natural world, make it more efficient, and harness parts of it, like salmon, fully to human use" (Wolf and Zuckerman, 2003, p. 27). The early 20th century was a period of technological advances that made it seem like an automated society was just around the corner. Fields could be irrigated, navigation aided by locks, power generated from dams, and fish propagated in hatcheries (Wolf and Zuckerman, 2003, p. 28) According to this perspective, resources were not being exploited, they were being maximized for the beneficial use by humans.

From the beginning there was almost a zeal for the use of hatcheries and hatchery salmon. "By 1910, 500 million artificially propagated salmon were being planted in

Pacific coastal streams each year" (Wolf and Zuckerman, 2003, p. 26). For a process almost completely devoid of scientific foundation, hatcheries were churning out salmon at remarkable rates. Hatcheries became the primary means of trying to restore salmon from the 1930s to the 1960s (Taylor 1996 and Bush 2000). Unfortunately, despite producing many juvenile salmon and being the preferred salmon conservation and management methodology, fewer and fewer adults were returning to spawn.

Hatcheries produced salmon at incredible rates during the early and mid 1900s, but were actually hurting salmon populations. "Even as they became more proficient at raising juvenile fish, the hatcheries were actually undermining the vitality of the wild stocks of salmon that they hoped to supplement" (Wolf and Zuckerman, 2003, p. 29). Simply producing more juvenile fish was not the answer to the salmon crisis. The large numbers of juveniles that the hatcheries grew and stocked in streams were not resulting in increased adults returning to spawn.

Hatchery Controversy

The initial decision to use hatcheries, in the late 1800s, was supported by science, industry, and politicians. Hatcheries were viewed as a quick fix and became standard policy for salvaging an ever-worsening salmon situation (Lichatowich 1999). The next century was marked by rapid advancements in hatchery science that raised hopes and expectations, only to be followed by periods of disappointment. Salmon numbers failed to rise significantly over the long-term, and often fell further (Cone 1995). For example, in some innovative hatcheries, "rotting cows' heads were hung over the water, and the

maggots that fell into the water were snapped up by eager salmon fingerlings" (Busch, 2002, p. 99). While insects certainly made for a more natural feed than the sheep livers or condemned beef used by other hatcheries (Busch 2000), it did little to help the long-term sustainability of hatchery salmon. This cycle of raised hopes trailed by dashed dreams repeated itself time and time again (Blumm 2002). Whether the hatchery technology advance was rotten cow heads or any of a number of other more progressive techniques, the result was always the same: no long-term, sustainable boost to wild salmon numbers. While people began to recognize some of the shortcomings of hatcheries over the course of the 20th century and debated the merits and misfortunes of hatchery salmon, wild salmon numbers continued to fall dangerously low (Lichatowich 1999).

Eventually, the science and conventional wisdom recognized that while salmon hatcheries certainly offered short-term solutions, reality revealed they could not duplicate the success of nature (Cone 1995). Hatcheries showed that they could not compensate for the negative impacts of issues like over harvesting, dams, destroyed habitat, and logging "[F]ish managers have been able to turn out millions of salmon in concrete pools and to release them into rivers. … But after more than a century of human-induced production, wild salmon runs have diminished" (Egan, 2004, p. A1). In the late 1970s, conservation efforts began to shift away from emphasizing hatcheries (Busch 2000) and instead focused more on sustainable solutions, like reducing stream pollution, increasing stream flow levels, repairing riparian ecotones, and restoring lost or damaged salmon

habitat. By the late 1990s, this whole watershed approach was the dominant view (Cone 1995).

The first listing of a salmon stock, or unique species, according to the Endangered Species Act guidelines, in 1991, appeared to signal the need for an increased emphasis on these broader, more encompassing approaches to saving the salmon. In addition to their myriad of other disconcerting issues, hatcheries essentially served as cookie-cutter salmon factories that simply could not compensate for the delicate balance of genetic uniqueness and variation contained within a wild salmon species (Lichatowich 1999). Hatcheries were putting greater and great numbers of juvenile salmon in streams, but seeing fewer and fewer adults return home to their natal streams (Cone 1995). Hatcheries were still recognized as an acceptable short-term, band-aid solution for the salmon crisis, perhaps even necessary to fulfill certain treaty obligations, but not a sustainable answer (Cone 1995).

When it came to saving unique, endangered salmon species, scientists and conservation managers were moving away from only relying on hatcheries, and actually were trending towards the broader, more sustainable solutions, like increased river levels habitat restoration. "For salmon specialists, the old world view of species production and ecosystem consumption was giving way to a new one of species conservation and ecosystem restoration" (Cone, 1995, p. 287). With the employment of more holistic methods for saving and hopefully boosting salmon population, it appeared the hatchery salmon controversy had moved to the back burner.

Alsea Valley Alliance v. Evans Court Decision

The *Alsea Valley Alliance v. Evans* (2001) legal decision thrust hatcheries back to the forefront of the salmon debate. This landmark court case held that hatchery salmon, if genetically the same as a given wild species, could not be ignored and must be counted in with that wild species to determine total population numbers. Specifically, federal judge Michael R. Hogan, ruled "that NMFS' 1998 listing of Oregon Coast Coho made improper distinctions beyond the level of an ESU by excluding hatchery populations from listing protection even though they were determined to be a part of the same ESU as listed naturally-spawned populations" (NOAA Court Case Summary 2004). The court case demanded genetically similar hatchery fish and wild fish are counted together. It was a decision "that invalidated the listing of Oregon coast Coho salmon as 'threatened' under the Endangered Species Act because NOAA Fisheries failed to include hatchery fish in its assessment of the species' population" (Pegg 2004). The *Alsea Valley Alliance v. Evans* court decision demanded that the NOAA revise its ESA listing policy.

The *Alsea Valley Alliance v. Evans* court case was spearheaded by the Pacific Legal Foundation, a group that proudly claimed to be "Rescuing Liberty From the Grasp of Government" (Pacific Legal Foundation Homepage 2005). The PLF was concerned with the Endangered Species Act's affect on people, stating it "is a public interest legal organization that is the national leader in the effort to reform the Endangered Species Act" (Pacific Legal Foundation Website 2005) and "is financed by developers, timber and agricultural interests angered by what they see as regulatory zealotry" (Egan, 2004, p. A1). These same groups were responsible for over $1 million in donations to the George

W. Bush election campaign in 2000 (Egan, 2004, p. A1). The PLF represented the Alsea Valley Alliance, while the United States government was represented by Evans.

It should be noted at this point that the *Alsea Valley Alliance v. Evans* case did not rule on what criteria should be used to determine the "threatened" or "endangered" status of a species. In other words, Judge Hogan ruled that it was illegal to ignore hatchery fish when they shared the same genetic composition as wild fish, but not that fish counts had to be used to determine a species' "threatened" or "endangered" ESA status. "But the judge did not tell fisheries officials how to determine if a species was endangered. He ordered the fisheries agency to 'consider the best available scientific evidence' in coming up with a new policy" (Egan, 2004, p. A1). The *Alsea Valley Alliance v. Evans* court decision demanded a new policy regarding the salmon's endangered species status, but the structure and details would be left up to the NOAA.

NOAA Hatchery Policy Proposal

The NOAA declined to appeal the *Alsea Valley Alliance v. Evans* court decision and responded to the ruling with their Hatchery Policy Proposal (Pegg 2004). This proposal, first published in its complete form in the June 3, 2004 Federal Register did little to change the "threatened" or "endangered" guidelines. Instead, it opted to simply count hatchery salmon with wild salmon to determine ESA listing status. The NOAA cited the *Alsea Valley Alliance v. Evans* decision as the logic behind the proposal. "Bush administration officials say they are boxed in by a court decision that forces them to include hatchery fish in deciding the fate of a particular run of salmon" (Egan, 2004, p.

A1). Others believed that the NOAA was hiding behind the *Alsea Valley Alliance v. Evans* decision and succumbing to political pressure (Welch 2004).

In between the *Alsea Valley Alliance v. Evans* decision and the publication of the Hatchery Policy Proposal, the NMFS appointed an advisory committee of scientists to guide the formation of its new policy. Again, Judge Hogan ruled that the old policy regarding endangered salmon was illegal, but did not say what form the new policy needed to take. Therefore, the NMFS brought together a number of leading scientists to help inform the new policy. This advisory panel concluded that hatchery salmon were distinct and inferior compared to wild salmon (Myers et al. 2004). These results were then passed on to the NMFS to help form the new policy.

Amazingly, the NMFS ignored the advice of its own scientific panel in the formation of its Hatchery Policy Proposal. These scientists stated that they thought hatcheries were more detrimental than helpful. They wanted the rules made so that there was a clear distinction between wild fish and hatchery fish. That way Judge Hogan's ruling regarding hatchery fish would still be respected, but wild salmon would be guarded (Myers et al. 2004 and Weiss 2004). If this rewriting of the rules did not occur, the advisory panel believed serious harm could come to endangered salmon. "Wild salmon could decline or go extinct while only hatchery fish persist" (Myers et al., 2004, p. 1980). The *Alsea Valley Alliance v. Evans* decision left endangered salmon in a precarious position. "NMFS should continue to pursue its current recovery goal of establishing self-sustaining, naturally spawning populations" (Myers et al., 2004, p. 1980). The NMFS

scientific advisory panel suggested that if endangered salmon were to be saved, a policy calling for a broad, whole ecosystem approach would be needed.

Obviously, the Hatchery Policy Proposal did not take the tack suggested by the NMFS advisory panel. "The scientists… were later told that some of their conclusions about hatchery fish were inappropriate for official government reports" (Harden, 2004, p. A1). Rather, the NOAA cast aside the panel's policy suggestions, instead electing to return to relying on hatcheries to save endangered salmon (Federal Register 2004). The NOAA decided that it would rely on hatchery fish to protect endangered stocks of salmon, despite the advice against this path by its own scientist advisory panel.

The Hatchery Policy Proposal, as outlined fully in the Federal Register notice entitled, "Endangered and Threatened Species: Proposed Policy on the Consideration of Hatchery-Origin Fish in Endangered Species Act Listing Determinations for Pacific Salmon and Steelhead" (Federal Register 2004), is a radical shift in stance by the NOAA. The proposal flies in the face of not only the latest advances in salmon conservation research, but also the NOAA's own, self-appointed advisory panel's recommendations. Despite seeming to go against accepted science, the Hatchery Policy Proposal is couched in scientific language. Sorting through issues, like the differences between "evolutionary significant units" and "distinct population segments", is crucial to not only understanding what is actually going on within the proposal, but also the intent of its authors. The NOAA chose not to shift the "endangered" paradigm away from individual count numbers towards a more encompassing, whole ecosystem approach. This study will

examine the specific science issues of the Hatchery Policy Proposal to better understand the bigger picture decision of the NOAA to count hatchery salmon in with wild salmon.

Narratives

Not surprisingly, The Hatchery Policy Proposal was greeted with both great support and extreme consternation. The Bush Administration, NOAA leadership, and industries, like hydropower, irrigation, and timber, believed the proposal was legal and created economic opportunities. Advances in hatchery science could help boost salmon numbers, and with the recent *Alsea Valley Alliance v. Evans* court decision, work within legal standards. The Hatchery Policy Proposal was an opportunity for the Bush Administration to control nature and help business. The primary narrative looks more closely at the administration's underlying ideology and how it shapes critical interpretations and viewpoints.

While NOAA officials embraced the expanded species definition afforded through the *Alsea Valley Alliance v. Evans* court decision, others were much more leery. Of course, environmentalists immediately cried foul. Hatcheries were long known to endanger wild salmon and as watchdogs for the environment, this was a natural concern to seize upon (House 1999). Fisheries scientists also largely decried the Hatchery Policy Proposal (Myers et al. 2004).

More interestingly, commercial salmon fishermen, some of the very people the NOAA and NMFS claimed to serve, objected to the Hatchery Policy Proposal. Commercial salmon fishermen believed the Hatchery Policy Proposal undermined the

long term viability of salmon and their ecosystems (Spain and Grader 2004). Due to the interesting nature of the commercial salmon fishermen's position, their hands-on, day-to-day knowledge of the fish, and the link between the salmon's survival and their own, the commercial salmon fishermen's narrative will be examined as a microcosm of the counter narrative. The reemphasis of hatcheries as the primary conservation and management tool for endangered salmon is a highly contentious issue. This thesis will explore the varying narratives and the nonstory in an attempt to delineate the stories for future policy decisions.

CHAPTER 2

POLITICAL ECOLOGY

Introduction

The primary narrative concerning the state of endangered salmon in the Pacific Northwest comes from the Bush Administration through the leadership of the National Oceanic and Atmospheric Administration (NOAA) and its subgroups, like the National Marine Fisheries Service (NMFS). These organizations of the federal government are entrenched institutions of power, entrusted with guiding the protective measures and funds allocated to the management of the endangered salmon. This powerful organization, with the backing of the President of the United States and the federal government, oversees the science and the policy regarding endangered Pacific Northwest salmon.

The NOAA was proposed and established in 1970 by President Richard M. Nixon (Shea 1987). Born of politics and funded by the decisions of beltway politicians, the NOAA must answer to politics and the inherent lobbying of organizations, industry, and political action committees. The NOAA falls under the supervision of the Department of Commerce, which is headed by the Secretary of Commerce, currently Donald L. Evans. The Secretary of Commerce is a cabinet level position and is appointed by the President of the United States. The Secretary of Commerce, then, takes his guidance from the President of the United States. This is a fairly straightforward hierarchy of

responsibilities, but it bears spelling out. Unlike a tenured judicial position, if the Commerce Secretary is not acting as the President desires, he or she can be fired. While the NOAA professes to be "a science agency with conservation management and regulatory responsibilities" (NOAA, 2004, p. 1), its direction and philosophy are ultimately guided by the Secretary of Commerce and, his boss, the President of the United States. Politics and politicians are deeply involved at the upper levels of the NOAA.

The Whitehouse's website proudly proclaims that the Secretary of Commerce is "the voice of business in government. Secretary Evans is a core member of President Bush's economic team, advising the President on many issues, including pro-growth and job-creating economic policies, international trade, business concerns, and energy policy" (Whitehouse, 2005, p. 1). The Department of Commerce is first and foremost a group for business and industry. Within the NOAA itself, there exists recognition of the importance of their work to the economy. The NOAA realizes that "most, if not all, of the Agency's activities also contribute to the major Department of Commerce goal of Stimulating Productivity and Economic Development" (Shea, 1987, p. 2). It is no secret that the economy and the state of commerce are the foci of the Department of Commerce, and the economic emphasis can be felt all the way through the NOAA. Some of the most significant industries to the Bush Administration include hydropower, irrigation, and timber (Knickerbocker 2003). Their importance to the Bush Administration can be seen everywhere from the voiding the Roadless Area Conservation Rule to supporting farmers during the Klamath Basin water shortage (Knickerbocker 2003). The NOAA then is an

extension of the Bush Administration and both are concerned first and foremost with the state of business and industry. This is an important point and serves as the backdrop for the Hatchery Policy Proposal.

The Department of Commerce is a large and powerful organization with over 40,000 employees and an annual budget of $5.8 billion (Whitehouse – Evans Biography 2005). The NOAA receives a major portion of the Commerce Department's annual budget, amounting to around $4 billion (White House – Lautenbacher Biography 2005). In 2002, over 20% of the NOAA's annual budget went to grants (Drescher 2004). This amounted to around $800 million, spread to the 300 recipients the NOAA deemed worthy of their money. With this power, the NOAA can choose its science. In addition to wielding the power of the federal government, the NOAA also has a lot of money to invest in projects that fit their interests. As the holders of enormous purse strings and the authority of the federal government, it is not difficult to understand why the Department of Commerce and the NOAA are the dominant narrative regarding Pacific Northwest salmon.

The NOAA itself is based in Washington D.C. and covers an extremely broad and diverse set of responsibilities. Nominally, "The National Oceanic and Atmospheric Administration (NOAA) conducts research and gathers data about the global oceans, atmosphere, space and sun, and applies this knowledge to science and service that touch the lives of all Americans" (NOAA Homepage, 2005, p. 1). At any given time the NOAA oversees everything from tornados, to satellites, to the status of threatened marine species. The aim of all of these programs is to establish predictability, and ideally

control, over the environment. "NOAA's primary mission and the ultimate goal of all its activities is to predict environmental changes on a wide range of time and space scales in order to protect life and property, and provide industry and government decision-makers with a reliable base of scientific information" (Shea, 1987, p. 1). The NOAA is housed under the Department of Commerce because the knowledge it acquires and the action it takes are intended to serve industry and government. Predicting and ultimately managing nature is one of the primary motivations for hatchery use (Lichatowich 1999).

The actual NOAA sub organization for responsible for overseeing fisheries, and in particular salmon, is the National Marine Fisheries Service (NMFS). The NMFS was formed in 1970 as part of the NOAA through Nixon's Reorganization Plan No. 4 (Buck 1995). Prior to its move to the NOAA and the Department of Commerce, the NMFS was known as the Bureau for Commercial Fisheries and had been located in the Department of the Interior (Buck 1995). The NMFS "is committed to taking a rational, scientific approach to the difficult, contentious issues of living marine resource management. As stewards, NOAA Fisheries manages for the sustainable use of living marine resources, striving to balance competing public needs and interests in the use and enjoyment of those resources while preserving their biological integrity" (NOAA Homepage, 2005, p. 1). The NOAA, through the NMFS, is responsible for managing the Pacific Northwest salmon and their ecosystems by regulating the waters 3 to 200 miles off the United States coast (NMFS About Us 2005).

Interestingly, as a "steward" (NMFS Homepage 2005) for the endangered salmon, the NMFS "conserves, protects, and manages living marine resources in a way that

ensures their continuation as functioning components of marine ecosystems, affords economic opportunities, and enhances the quality of life for the American public" (NMFS Homepage 2005). In other words, the NMFS claims to be working for the salmon – conserving and protecting them – while creating "economic opportunities" and "enhancing" the lives of humans. "NMFS oversees the management and conservation of the Nation's marine fisheries, protects marine mammals, and promotes economic development of the U.S. fishing industry" (Federal Register, 1999, p. 63914). Quite remarkably, the NOAA is on a "quest to both protect the environment and improve the human condition" (NOAA, 2004, p. 2).

This highly difficult task of seeking the best for two competing parties is especially tenuous considering the precarious state of salmon in the region. Prioritizing and evaluating the merits of fish versus the economy is at best a muddied science and, at worst, ripe for corruption. "With economic and opportunity costs of protecting species on one hand and risks of species extinctions on the other, defining jeopardy in these terms is clearly not an easy or comfortable question" (Rohlf, 2001, p. 159) Even the NOAA recognizes this situation. "At no point has greater economic, political and public pressure been put on NOAA's National Marine Fisheries Service (NOAA Fisheries) to provide optimal stewardship of these resources" (Hogarth, 2003, p. 3). The NOAA is in the delicate position of serving both the salmon and the people trying to catch the salmon. Interestingly, the Bush Administration has actually worked to reduce environmental protections when those interests compete with the hydropower industry (Knickerbocker 2004). This is a theme that will be repeated with the Hatchery Policy Proposal.

At first glance, it might seem surprising that the endangered salmon stewards, the NOAA and NMFS, are housed in the business and industry oriented Department of Commerce. Again though, it must be kept in mind that the NOAA and NMFS actually aim to conserve and manage salmon for the use of people. The NMFS then does not ultimately serve the interests of the salmon, but rather the interests of the salmon and the industries working with salmon. As managers of salmon within the Department of Commerce, the NMFS ostensibly serve the fish for the benefit of commercial salmon fishing industry. The goal is to have a predictable resource. Under the Bush Administration, it is actually the industries that compete with salmon and commercial fishermen, like hydropower, irrigation, and timber that get prioritized.

The counter narrative regarding Pacific Northwest salmon is given by commercial salmon fishermen in the form of the Pacific Coast Federation of Fisherman's Association (PCFFA). These are the very people's interests the NOAA and NMFS are supposed to be serving. What makes this tension even more interesting is that it is the commercial fishermen who want a more encompassing, whole ecosystem approach to salmon management rather than the quick fix option. It is the federal government that is looking to churn fish out through the use of hatcheries. The NOAA's narrative regarding the status of Pacific Northwest salmon, in the form of the Hatchery Listing Policy, ignores much of the local and even site specific information captured in the commercial fishermen's counter narrative. Members of the PCFFA work with salmon on a daily basis and know nature and salmon through their labor (White 1995). Commercial salmon fishermen believe that the NOAA's Hatchery Policy Proposal does not adequately

address the long-term needs of endangered Pacific Northwest salmon and thus puts their livelihood at risk. The PCFFA wants a return to emphasizing habitat restoration over hatcheries in the conservation and management of endangered salmon.

Explanation of Sources

Much of the primary narrative discussion is based directly on the Hatchery Policy Proposal. There are supporting documents from the NOAA, including its website that will also be used to clarify or expound upon points of confusion within the actual proposal. The primary narrative will also incorporate publications and press releases from the website of the Pacific Legal Foundation. The Pacific Legal Foundation initially brought the *Alsea Valley Alliance v. Evans* court case, which served as the catalyst for the NOAA's proposal. Finally, this section relies on previous analyses of the salmon crisis. The salmon's situation has seen a remarkable amount of research, much more than could be done in one thesis, and this accumulation of knowledge will be utilized to help inform the discussion.

The counter narrative also capitalizes on the large body of previous salmon research. Some of the more noteworthy of these sources include Joseph Cone's, *A Common* Fate, Jim Lichatowich's, *Salmon Without Rivers*, and Richard White's, *The Organic Machine*. These books, and others like them, discuss many of the issues germane to a political ecology analysis of NOAA's Hatchery Policy Proposal. In addition to the large bodies of previous research, one of the main documents used for the counter narrative comes from a Pacific Coast Federation of Fisherman's Associations

June 2004 Newsletter. This document and website analysis provides an incredible snapshot of the PCFFA's views on the Hatchery Policy Proposal. It also gives a valuable glimpse into the narratives of local people concerned about the future of salmon in the Pacific Northwest. Like the previous section, periodicals will also be used when needed.

Primary Narrative Introduction

The primary narrative coming from the NOAA and the federal government evolved over the last century. In response to the salmon crisis, the government turned to hatcheries (Cone 1995). There emerged an unhealthy cycle of hatchery use, supported by researchers saying that hatcheries were good because the government used them. "Once the hatchery program became a political tool, it gained immunity from close scrutiny and scientific evaluation" (Lichatowich, 1999, p. 140). For many decades, the federal government's salmon conservation and management leaders relied solely on hatcheries to try and fix the salmon's tumbling numbers. The lack of rigorous scientific research on hatcheries exacerbated the problem and worked against wild salmon populations.

Over the last 30 years, salmon conservation and management leaders recognized the scientific results that called for more holistic methods. Within the last ten years, there has been a significant effort by NOAA to emphasize bigger picture issues, like habitat restoration, over hatcheries. There were certainly points of disagreement between the NOAA and fisheries scientists, but by most accounts, steps were being taken in the right direction (Flagg and Nash 1999). Conservation, over mere supplementation, began to take a foothold in endangered salmon management (Cone and Ridlington 1996).

All of that changed with the Hatchery Policy Proposal. Amazingly, the Hatchery Policy Proposal effectively rejected the NOAA's own conservation and management advances for endangered salmon and calls for a return to the use of hatcheries (Harden 2004). The primary narrative will rely on the stories of the NOAA's policy makers, and not the NOAA's scientists who have doubts about the efficacy of hatcheries (Myers et al. 2004). This is a complicated point because there really were two stories within the primary narrative. There was the position of the policy decision makers in the NOAA, and then there was a different position for NOAA scientists. The causes and implications of this fractured narrative warrant a study unto themselves.

Historical Interpretation

To understand the position of the NOAA, it is important to recognize its origins. The NOAA emerged as part of the Marine Resources and Engineering Development Act of 1966, which wanted to "develop, encourage, and maintain a coordinated, comprehensive, and long-range national program in marine science for the benefit of mankind, to assist in protection of health and property, enhancement of commerce, transportation, and national security, rehabilitation of our commercial fisheries, and increased utilization of these and other resources" (Shea, 1987, p.3). The NOAA and NMFS were formed from the beginning with the idea that they would manage marine resource use and predict environmental processes for the benefit of humans, commerce, and most especially, the fisheries industry.

Two of the primary building blocks of the NOAA's mission – resource "use" and resource "prediction" – played directly into the NOAA's evolving view of hatcheries and the resulting hatchery policies. Hatcheries in a sense were like fish factories (Cone 1995). Hatcheries had been used for over 130 years, and over the course of time their yield became predictable (Flagg and Nash 1999). One of the major benefits of the hatcheries for the NOAA was that they always knew how many fish would be produced, although not necessarily how many would return. In 1998, over five billion juvenile fish, from over 100 hatcheries, were released to the Pacific (Flagg and Nash 1999). In predicting the number of fish produced, they could also theoretically predict the number of fish that could be harvested by commercial fisheries and Native Americans. Hatcheries, at least in the short term, reduced the amount of uncertainty regarding salmon production. The predictability and short term yield increase meant hatcheries fit well within the organization's historical mission and vision.

Interpretations of Science

Much of the Hatchery Policy Proposal was based on the simple idea that some stocks of hatchery fish were genetically the same as some stocks of wild fish (Federal Register 2004). For all intents and purposes, that was fundamentally true, although the Hatchery Policy Proposal called for a slight relaxation of the genetic requirements for fish to be considered part of the same species (Federal Register 2004). This premise held that if a species no longer existed in the wild, but there were enough individuals in zoos, they would not be considered endangered (Egan 2004). This view took an extremely

narrow, genetic definition of a species and ignored many biological and behavioral factors. The scientific interpretation behind the NOAA's Hatchery Policy Proposal suggested that species of hatchery salmon and species of wild salmon were closely enough related to be considered the same species (*Alsea Valley Alliance v. Evans* 2001). Hatchery fish and wild fish could breed together and shared the same ecosystem. Despite some genetic differences, the NOAA believed that hatchery fish and wild fish were similar enough to be listed in the same "distinct population segment" (Federal Register, 2004, p. 31355).

The NOAA believed that, at least in the short run, hatcheries could sustain and possibly bolster the population of endangered salmon species. "Hatchery programs are capable of producing more fish than may be immediately useful in the conservation and recovery of an ESU and can play an important role in fulfilling trust and treaty obligations with regard to harvest of some Pacific salmonid populations" (Federal Register, 2004, p. 31359). Hatcheries could also produce salmon "serving as a source population for repopulating unoccupied habitat" (Federal Register, 2004, p. 31358). For the NOAA, hatcheries could boost salmon populations in the short term and reintroduce salmon into stretches of historic habitat range that were no longer occupied. Hatcheries were a win-win situation for the Bush administration because salmon would still be produced, but business and industry interests could be taken care of too (Welch 2004).

The primary narrative noted that there was a certain amount of potential risk that went with hatcheries and hatchery fish. The NOAA admitted, "The artificial propagation of hatchery fish presents both potential benefits and risks to the biological status of

salmonid ESUs" (Federal Register, 2004, p. 31355). The Hatchery Policy Proposal listed a number of potential risks related to using hatchery fish, including:

> behavioral differences that result in diminished fitness and survival of hatchery fish relative to naturally spawned fish; genetic effects resulting from poor brood stock and rearing practices (e.g. inbreeding, out breeding, domestication selection); incidence of disease, and increased rates of competition with and predation of naturally spawned populations. (p. 31356)

The NOAA stated that any and or all of these factors could possibly be "long term deleterious consequences" to the endangered salmon. The primary narrative noted that it was difficult to factor in these risks because there was simply not enough conclusive information at the time (Federal Register 2004).

The NOAA justified the Hatchery Policy Proposal by weighing the short term benefits of the hatcheries against the long term unknowns and by factoring in the updated state of hatcheries. Obviously, the unknown harms did not receive much weight because the proposal called for hatcheries to be used. The NOAA said that a poorly run hatchery could be harmful, but that a well run hatchery could be beneficial (Federal Register 2004). "Although their effectiveness has not been shown, conservation hatcheries may play a role in future salmon recovery" (Myers et al., 2004, p. 1980). The NOAA claimed using hatcheries to conserve and manage endangered salmon species was acceptable due to the advances in hatchery technology. Despite the failures of past hatchery

technologies, they viewed these new conservation hatcheries as the key to the proposal's success (Federal Register 2004).

The NOAA's interpretation of science, while perhaps technically accurate, ignored a significant amount of research. In other words, the NOAA framed its scientific view in such a way that the science it did include was valid, but it also simply left out a lot of key findings. Among those results that it chose not to include in its Hatchery Policy Proposal were the conclusions of the NOAA's own scientists (Myers et al. 2004). The Bush Administration and NOAA leaders decided to ignore scientific findings that did not match with their ideology. Their interpretation of science was narrow, partial, and highly subjective. These results will be discussed in greater detail in the nonstory section of this study.

Legal Interpretations

Not surprisingly, much of the NOAA's narrative is based the 2001 legal interpretation of the *Alsea Valley Alliance v. Evans* case. In this landmark decision, a federal court judge in Eugene, Oregon, ruled in favor of the Alsea Valley Alliance and the Pacific Legal Foundation. The decision held that the government was not following the law when it refused to count hatchery Coho salmon in with wild Coho salmon in determining the Coho's ESA listing status. The NOAA decided not to appeal the case and took the decision to mean that it needed to revise its previous policy on ESA listing status (Egan 2004). For the NOAA, the court decision did not signal a new approach to

determining a species listing status. Rather, the *Alsea Alliance v. Evans* case meant the NOAA had to include hatchery fish in their species counts.

Another legal issue overarching NOAA policy decisions was the issue of treaties (Cohen 1986). One of the major treaties that had to be factored in by the NOAA was the 1974 *U.S. v. Washington* court case, also known as the Boldt decision (Port Angeles Today 2004). The *U.S. v. Washington* case was largely based on the 1855 Steven Treaty of Point Elliot (Cohen 1986). The Boldt decision allowed Native Americans to harvest 50% of the fish passing through their historic fishing sites (Cohen 1986). Native American tribes were guaranteed a certain amount of salmon at their historic fishing sites. Of course, the extent that treaties between the United States government and Native Americans were honored is a story unto itself (Cohen 1986). At least nominally, through treaties Native Americans kept the right to fish in their historic fishing grounds and keep some of the salmon.

In addition to working within the legal structure outlined in *U.S. v. Washington*, the NOAA also weighed the 1985 Pacific Salmon Treaty between the United States, Canada, and Native American Tribes. The Pacific Salmon Treaty, through the Pacific Salmon Commission, "establishes fishery and allocation regimes, develops management recommendations and is a forum for mutual fisheries issues" (Northwest Indian Fisheries Commission 2004). The NOAA had its own goals and objectives, but these also must have worked within the frameworks established by the Boldt decision and the Pacific Salmon Treaty.

Treaties with Native Americans account for at least some of the legal motivations for the NOAA to bolster salmon populations in the short run through the use of hatcheries. Even if the NOAA were completely opposed to hatcheries, treaties had been signed with Native American tribes granting them certain amounts of salmon every year. Native Americans also operated their own salmon hatcheries and generally supported the use of hatcheries (Brown 1982). In the short run, the NOAA saw hatcheries as one way to insure that the tribes were able to get salmon and thus fulfill the obligations of the treaties and work within the bounds established by the *Alsea Valley Alliance v. Evans* court decision.

Ethics

While treaties have played a major role in shaping NOAA policy towards salmon management, more so recently than in the past, there is also an ethical obligation for the NOAA to insure there are salmon for Native Americans. European Americans, with their commercial fishermen, dams, and irrigated crops destroyed what was one the lifeblood of Native Americans in the Pacific Northwest. The flooding of Celilo Falls and other places like it not only destroyed traditional Native American fishing grounds, it also destroyed a way of life and ancient customs. The NOAA may have been stuck with a legal, binding treaty that guided their actions, but they also had an ethical obligation to Native Americans.

In addition to the ethical obligation to provide salmon for Native Americans, the NOAA is also motivated by its mission to manage resources for use by people. "NOAA's

primary mission and the ultimate goal of all its activities remains the prediction of environmental change to protect life and property, and provide industry and decision makers with a reliable base of scientific information on the world in which we live" (Shea, 1987, p. 17). The NMFS mission requires that they strive to make salmon a predictable commodity available for people, and especially commercial fishermen. Not only that, but the NOAA believes hatcheries benefit commercial fishermen. "Since the ESA was enacted, maintaining the biodiversity and genetic integrity of species of fish when the commercial fishery is enhanced by artificial hatching has proved to be a very complex and controversial issue, and one that has stretched the minds of many multi-disciplinary groups of scientists" (Flagg and Nash, 1999, p.4). Decisions made within the Department of Commerce must be made weighing the pros and cons toward business and industry.

The Department of Commerce, and the NOAA and NMFS, serve business and industry, so policy decisions require a pro business and industry lens. At its core, the Department of Commerce looks out for business interests and it is this fundamental ideology, then, that ultimately guides its decisions and policies. Oddly, despite the fact that business and industry interests are the primary concerns of the Department of Commerce, it is also charged with protecting endangered species. The NOAA is responsible for the Endangered Species Act listing status and the protections that go along with it. At best, juggling business and industry interests at the same time as endangered salmon is a tenuous balancing act. At worst, it is a situation ripe for corruption. "In setting its marker for saving wild salmon in the Pacific Northwest, the

Bush administration dealt an apparent setback to prospects for recovery of a signature species - and effectively sided with industries rather than fisheries that rely on the region's waterways" (Knickerbocker, p. 2, 2004). The Bush Administration has close ties with industries, like hydropower, irrigation, and timber and prioritizes those industries, even at the expense of salmon. This ideology of protecting and favoring industry interests plays a major role in the Bush Administration policies.

Sense of Entitlement

The NOAA's sense of entitlement to manage salmon in the Pacific Northwest stems from it being a part of the federal government. With the backing of the President and all the power of that office, the NOAA dominates the discussion regarding salmon conservation and management. The NOAA and the NMFS were entitled to conserve and manage endangered salmon by a mandate coming from the highest office in the United States (NOAA Homepage 2005). The passage of the Endangered Species Act by the United States Congress, in 1973, laid the foundation for the NOAA to wield even more power and influence. The addition of salmon, in 1991, to the ESA endangered list cemented that control and insured the federal government, through the NOAA and NMFS, would be entitled to endangered salmon conservation and management (Cone and Ridlington 1996).

In addition to the inherent power coming from the federal government, the NOAA also had a long history of conserving and managing salmon. Although the NOAA itself was formed relatively recently in 1970, it was actually the merging of a number of older,

more established groups. For example, one of the organizations that came together to form the NOAA was the Bureau of Commercial Fisheries, established in 1903, but tracing its history all the way back to the 1800s (Shea 1987). The organizations that formed the NOAA were some of the first to be responsible for fish conservation and management. Thus, the NOAA, through its ancestors, was one of the original organizations to have control over fish and still carries the power of the federal government. The Hatchery Policy Proposal is a result of these senses of entitlement.

Finally, the Bush Administration's sense of entitlement comes from its ideological belief of the importance of the mechanization of nature. Bush holds that nature exists to serve humans, and that it is fundamentally right to try and manage nature through things like dams and irrigation pipes. According to the Bush viewpoint, humans should seek to automate nature as much as possible. This deep-seated belief echoes an attitude from earlier in the 20th century that also promoted dams and irrigation. In addition, to supporting hydropower, the Bush Administration is also promoting hatcheries again as a way to manage salmon. The human control over nature sense of entitlement of the Bush Administration plays major role in the formation of the Hatchery Policy Proposal.

Threats to Power

With the backing of the federal government, the NOAA was largely free from threats to power. NOAA and NMFS swing the big stick of the Commerce Department, its cabinet Secretary, and the President of the United States. Certainly each state plays a

role in the management of salmon, but that comes secondary to the NOAA's policies. For example, Oregon Fish and Wildlife permits a certain amount of Spring Chinook to be caught, but that law must conform to what the NOAA dictates.

A significant threat to the NOAA's power has always been the judiciary branch. A case in point was the *Alsea Valley Alliance v. Evans* decision. The NOAA established a policy regarding salmon species and the ESA. That policy needed to be updated because the court ruled it was illegal. Of course, this can be a difficult and unlikely avenue for success. "While courts have been willing to scrutinize the Services' procedures, the judiciary typically gives FWS and NMFS wide latitude in areas it sees as within their biological expertise" (Rohlf, 2001, p. 163). While difficult, one of the only ways to counter NOAA policy is to sue and have the judicial system rule against an NOAA policy.

A second, less concrete threat to the NOAA's power comes in the form of popular opinion. If the NOAA made a policy that was unpopular with the people, they could elect a new president that can change the head of the Department of Commerce. In addition, the public could also engage in activities like media campaigns, lobbying in congress, and public protests to try and affect change. Popular opinion, though, brings with it only so much power. That is especially true if the President of the United States is in his last term and not facing reelection. Popular opinion could conceivably threaten the NOAA's power, but as long as the organization is backed by the federal government, the judiciary is all that stands between it and policy.

One final potential threat to the NOAA's power is the international community. Salmon and their management extend beyond state and national borders. Pacific salmon spawn in countries ranging from Japan, to Korea, to Russia, to Canada, to the United States of America (Ade 1989). Once salmon that hatched in the United States reach the ocean, they are susceptible to fishermen all over the world (Kasahara and Burke 1973). International regulations, while requiring the agreement of the United States, could potentially be a threat to American power over the conservation and management of endangered salmon. If an endangered salmon hatched in the Snake River basin is caught by a Japanese trawler in the Pacific Ocean, there is not a lot the United States government can do about it. Salmon conservation and management is an international issue (Cloud and Thorgaard 1993).

Conclusion

The primary narrative given by the NOAA leadership exposes the highly charged debate around endangered salmon conservation and management. It is such a contentious issue that NOAA policy makers actually went against their own scientists in issuing the Hatchery Policy Proposal (Myers et al. 2004). A multitude of factors went into the NOAA thought-process behind the proposal, including a major legal decision and an ideology that favors industry interests over nature, but in the end, the NOAA and NMFS fell back to relying on hatcheries to help endangered salmon stocks. The NOAA's interpretation of history, science, law, and ethics led it to write the Hatchery Policy

Proposal. For a voice against the NOAA's Hatchery Policy Proposal, this thesis will now examine the commercial fishermen's counter narrative.

Counter Narrative

Despite professing to advocate for the commercial fishing industry, the counter narrative to the NOAA and NMFS comes from the commercial fishing industry. The commercial salmon fishing industry believed that NOAA's Hatchery Policy Proposal would harm salmon and, therefore, their industry (Spain and Grader 2004). The commercial fishing industry was interested in the long-term, sustainability potential of salmon. Commercial salmon fishermen thought that the Hatchery Policy not only failed to adequately address this issue, but could actually harm the long-term viability of salmon. Commercial salmon fishermen wanted to see salmon habitat continue to be restored and a large, self-sustaining population of wild salmon emerge (Spain and Grader 2004). The Hatchery Policy Proposal undercut the efforts to restore this natural fishery. Obviously, commercial salmon fishermen rely on salmon for their livelihoods and thus are extremely concerned about their welfare following the publication of the Hatchery Policy Proposal (Spain and Grader 2004).

While there were a number of individuals and associations comprising the commercial salmon fishing industry, the strongest and most cohesive voice of the commercial salmon fishermen came from the Pacific Coast Federation of Fisherman's Associations. The PCFFA is an encompassing, "umbrella" group that represents a number of smaller commercial fishing organizations. In operation for over 20 years,

nearly as long as the NOAA, the PCFFA stood as "by far the largest and most politically active trade association of commercial fishermen on the west coast" (PCFFA 2005). In all, there were 25 commercial fishing, or closely related, organizations represented by the PCFFA. The PCFFA claimed that it "provides the individual fisherman with a vehicle to protect themselves and their industry, to assure the sustainable protection of the fragile resources we all depend upon, and a vehicle for empowerment. PCFFA provides fishermen a means to challenge and counter the dictates of big business or big government. PCFFA provides fishermen with a voice in their affairs, a say about their future" (PCFFA 2005). The PCFFA operated under the idea that one strong voice is much more powerful than many weaker voices. The PCFFA brought together commercial salmon fishermen to give them leverage against competing industry interests, like timber, hydropower, and irrigated agriculture.

Despite the relatively low salmon numbers, commercial fishing in the United States was becoming an increasingly important industry. "American fishermen are taking increasingly larger shares of fish, with a steadily growing lead over catches by the formerly dominant foreign nations" (Shea, 1987, p. 17). As more and more people recognized the potential health benefits of eating fish, especially wild salmon and their heart healthy qualities, there became a greater demand for these fish (Montgomery 2003). The PCFFA, while wanting to cash-in on this demand, resisted the temptation to make wholesale harvests and quick fix solutions and advocated for a whole ecosystem approach to the salmon's management. The PCFFA believed the Hatchery Policy Proposal worked against salmon, and therefore against their industry, by pinning

endangered salmon conservation and management on the shoulders of hatcheries and not taking a more holistic approach.

Historical Interpretation

Commercial fishermen first began to realize the potential of Pacific Northwest salmon in the 1830s, with the first actual export of salmon occurring in 1829 (Montgomery 2003). The Hudson Bay Company, located in the region to collect furs to sell around the world, stumbled onto salmon as a food commodity and began exporting salt-cured salmon to its markets. In short time, the Hudson Bay Company began to capitalize on the protein rich salmon. "By 1847, profits from the sale of salmon exceeded those from the sale of furs" (Busch, 2000, p. 108). Even as trappers began to clear out the beavers and otters, a new, perhaps even more valuable natural resource was just beginning to be tapped. Chinook salmon were the most popular, with sockeye salmon being caught second most (Petersen 1995). Unfortunately, much of the salt-cured salmon, kept in wooden barrels during long sea voyages, spoiled before it even reached its destination.

After an initial surge in catches, commercial salmon fishermen saw salmon numbers and their catches decline towards the end of the 19th century. The exact reasons for this fall will be spelled out in more detail in the following chapter, but it is safe to say that the initial abundance in salmon catches crashed over the next century (Cone 1995 and Lichatowich 1999). Over the last 20 years, the commercial salmon fishing industry

has lost over 70,000 jobs (Spain and Grader 2004). While the early salmon fishermen became rich, later salmon fishermen struggled even to make ends meet.

Over the last century, commercial fishermen witnessed an extremely abundant and lucrative resource vanish before their eyes. In the late 1800s, commercial salmon fishermen could not help but catch fish. Only a few years later, those same fishermen were struggling to find fish at all (Blumm 2002). Commercial fishermen were once the princes of the Pacific Northwest, feeding a burgeoning population that would ultimately do such great things as create the aluminum to destroy the Nazi war machine. Despite salmon becoming even more popular, by the time of the Hatchery Policy Proposal commercial fishermen were now largely paupers. These commercial fishermen realized they played a major role in destroying the hand that fed them. They have seen what their ancestors did wrong and are looking to make amends. "[T]here has evolved a fervid backlash among the fishing fraternity against hatchery fish" (Busch, 2000, p. 101). Commercial salmon fishermen have seen how not to manage salmon, have seen the failed promise of hatcheries over the years to bring back their great resource, and turned their call for more holistic methods to save the salmon (Spain and Grader 2004).

Interpretations of Science

The commercial fishermen represented by the PCFFA believed that wild fish were different than hatchery fish. This view was based less on genetic research, and more from hands-on experiences with their behavior. "In a nutshell, the Administration has redefined artificially produced hatchery fish as biologically equivalent to wild fish…

This turns conservation biology on its head, saying in effect that restoring wild fish and fish habitat no longer matters" (PCFFA, 2004, p. 3). The commercial fishermen worked on a daily basis with salmon. They caught both hatchery and wild fish and believed their perspective on these fish, gained through their interactions, indicated there was a difference between hatchery fish and wild fish. This sort of understanding of salmon that comes through working hands-on with the fish is strongly supported by Richard White in the *Organic Machine* (1995).

The PCFFA advocated for a more holistic approach to saving salmon. They wanted to see broader habitat restoration work, including increased water flows, which they believed would lead to more sustainable salmon populations:

> The principal limiting factor to salmon production, however, is the loss of in-river spawning and nursery habitat, including the loss of streamflow to irrigation and diversions. As we all know, without adequate water in rivers, salmon runs cannot survive and fishermen cannot harvest them. Nor can salmon runs survive without watersheds to spawn in, and unblocked rivers to migrate from. This is not rocket science. (PCFFA, 2004, p. 2).

PCFFA was not comfortable leaving endangered salmon's fate in the hands politicians with questionable motives. Hatcheries had failed to produce so many times before. Watching the NOAA ignore its own scientists' suggestions signaled trouble for the

fishermen. Members of the PCFFA instead joined with the NOAA's scientists and called for more encompassing recovery and protective measures to be taken (Frissell 1993).

Legal Interpretations

Interestingly, members of the PCFFA and all commercial fishermen were, at least in part, legally granted the right to harvest salmon by the NOAA and NMFS. Voicing a counter narrative to the NOAA's primary narrative was then a case of "biting the hand that fed you." Commercial salmon fishermen had a legal right to catch salmon, but that right was granted by the government. Members of the PCFFA worked within the bounds established by the NOAA. If the PCFFA was concerned about the laws regarding Pacific Northwest salmon, they had to use the judicial system to try and get the laws and policies changed. The members of the PCFFA then are legally at the mercy of the NOAA. The PCFFA itself has no tangible legal standing to direct the conservation and management of endangered salmon.

Ethics

The PCFFA was committed to the commercial fishing industry and the families supported by the industry. "We are professionals who derive our incomes largely from harvesting the sea. Large or small vessel operator, full-time or part-time, we all share a common passion for this way of life, a dedication to its future, and a commitment to a sustainable resource" (PCFFA Website). At its foundation, the PCFFA was concerned with protecting its industry. Like their ancestors, commercial fishermen continued to

provide a healthy food source for many people. Commercial salmon fishermen were driven to provide for their families, supply fish for people to eat, and protect the long-term potential of their industry (PCFFA 2005).

In caring about the long term sustainability of the commercial fishing industry and the families supported by it, the PCFFA was also concerned about the long-term welfare of the salmon. This meant that the PCFFA was committed to habitat protection. "PCFFA is involved and fighting for fishermen everywhere on a wide variety of regional and national habitat protection issues. … As it is, habitat losses to date already cost our industry an estimated $27 billion/year -- enough to support 450,000 family wage jobs" (PCFFA, 2005, p. 1). Ethically, the PCFFA was bound to serve and protect the commercial fishing industry and the families it supported, and thus, the PCFFA was bound to protect and conserve salmon and their critical habitats.

Sense of Entitlement

Commercial salmon fishermen understandably felt a great sense of entitlement to salmon. Commercial fishermen were among the first European Americans in the region and basically fed the rapidly growing population (Lichatowich 1999). In fact, commercial salmon fishermen were interacting with Pacific Northwest salmon long before any governmental regulating body. Commercial fishermen provided inexpensive, protein laden meals that fueled the Pacific Northwest's workforce. During the past 50 years, commercial salmon fishermen saw annual catches range from over two billion pounds of salmon, to fewer than one billion pounds (Behnke 2000). Over the decades,

commercial fishermen harvested millions of what were once deemed "trash fish", so-called due to their remarkable abundance, and played a vital role in building the Pacific Northwest (Cone 1995).

In addition to their historical legacy, commercial fishermen felt a sense of entitlement due to the "moral economy" of salmon being their livelihood. Commercial fishermen relied on the salmon and the money they generate to support their families. These fishermen and their families saw salmon numbers fall over the years, and with that decline has come a decline in income and jobs (Spain and Grader 2004). These fishermen and their families earned a living by catching salmon. Fishing was a job and a way of life for members of the PCFFA, and they felt if anyone was entitled to a voice in the conservation and management of endangered salmon, it was them.

Finally, as professional fishermen, members of the PCFFA also invested large amounts of money to harvest salmon. Providing salmon for millions of people around the world requires boats, nets, tackle, and crews costing thousands of dollars (Crutchfield and Pontecorvo 1969). Without the fundamental sense of entitlement to the salmon, commercial fishermen could not invest the money necessary to harvest the salmon. Commercial salmon fishing times were tough, yet these fishermen put thousands of dollars into their livelihoods every year. This monetary investment gave members of the PCFFA a sense of entitlement to harvest salmon.

Threats to Power

Commercial salmon fishermen saw an increased number of threats to their power at the time of the Hatchery Policy Proposal. Salmon numbers have significantly declined since their peak in the late 19th century (Blumm 2002). Fewer salmon mean less money for the commercial fishermen, and thus less power in a capitalist economy. While other industries, like the power and timber industries, were profiting under the Bush presidency, commercial salmon fishermen continued to struggle. That meant that other business and industry interests had more money to invest with lobbyists and influence politicians. Commercial fishermen were also constantly battling other external factors related to these other interests that negatively influence their catches, including dams, water pollution, and continued habitat destruction.

In addition to seeing salmon numbers decline, commercial salmon fishermen have also seen their jobs threatened by growing numbers of salmon farms and ranches (Ade 1989 and Spain and Grader 2004). In addition to harming wild salmon stocks with disease and genetic contamination from strays, salmon farms churned out millions of inexpensive salmon that drove down grocery store salmon prices. These farmed salmon, while not providing the same nutritional composition as wild fish, remained inexpensive and popular with consumers. As salmon farms become more and more efficient, their numbers continued to grow (Ade 1989).

Increased environmental legislation also posed a potential threat to power for commercial fishermen. While PCFFA members wanted to see salmon habitat protected, more regulations with a greater reach and more influence undercut and limited

commercial fishermen's abilities (Spain and Grader 2004). The listing of more salmon stocks on the endangered species list limited the fish they could catch. Commercial fishermen were forced to work within a more rigid structure, which stripped power from them. PCFFA members were caught in a catch-22 situation, where they want environmental protections for salmon habitat, but not so much that they could not catch fish. Commercial salmon fishermen wanted to see more holistic legislation passed to protect salmon habitat and raise endangered salmon numbers, but not so strict that it cut into their fishing.

Conclusion

The counter narrative given by the PCFFA claimed that the NOAA's primary narrative turned its back on commercial salmon fishermen and endangered salmon stocks in favor of industry. Resorting to hatcheries, which have a legacy of failures, seemed to ignore the latest advances in endangered salmon conservation science and management that suggested more holistic measures do a better job of saving salmon. Many of the NOAA's own scientists, as well as countless other fisheries scientists, supported this counter narrative. Within the last decade there were major strides to protect endangered salmon ecosystems, working towards the long-term sustainability of salmon in the wild. The counter narrative interpretation held that these conservation and management advances would be set back by the Hatchery Policy Proposal.

CHAPTER 3

SCIENCE NONSTORY

Introduction

At the time of the Hatchery Policy Proposal's issuance, the endangered salmon's situation in the Pacific Northwest was a highly contentious issue, with each side claiming the support of science. NOAA leaders said they based the Hatchery Policy Proposal on the latest science. At the same time, hatchery opponents like members of the PCFFA, cited science and their personal experiences as the foundation to their objections over the Hatchery Policy Proposal. Science was the biggest weapon in the battle over the future endangered salmon conservation and management, and remarkably, each side declared it as their own. Examining the science behind the various parties views, is therefore, key to filtering the rhetoric and understanding the core of the salmon debate. Both parties considered science the fulcrum around which their paradigms hinged, but each took a different perspective on what constituted that science. The particular scientific viewpoint of the dominant narrative is the nonstory of this study. Understanding that nonstory, including the scientific issues it leaves out, is vital to completing the political ecology picture.

The Salmon Family

Before delving into the science each side espoused, it is important to look at the bedrock of salmon science: the salmon themselves. Salmon, along with trout, belong to the family *Salmonidae* (Bell 1996). Fossil evidence suggests that the first *Salmonidae* appeared over 140 million years ago. Pacific salmon belong to the genus *Oncorhynchus*, which translates from Russian to mean hook-nosed (Busch 2000) or hooked snout (Behnke 2002). Atlantic salmon, on the other hand, belong in the genus *Salmo*. There are five species of Pacific salmon that spawn in the United States: Chinook, chum, Coho, sockeye, and pink (Ade 1989). There is also a masu salmon that spawns in Asia (Ade 1989). Like any group of organisms, the individual species evolved at different points since the initial *Salmo* genus appearance. Steelhead represents another member of the *Oncorhynchus* genus, and is often considered a salmon, but does not belong to the salmon sub family. Steelhead, while anadromous and often sharing the same ecosystems as salmon, actually genetically belong to the rainbow trout sub family. These genetic differences result in small variations in the shape of the bones in the head (Behnke 2002). This thesis will use the strictest definition of salmon, excluding steelhead, to help focus the discussion.

Salmon Life Cycle

While exhibiting some genetic, biologic, and behavioral differences, the five species of salmon do share some commonalities, including the fundamental path of their life cycle. While this topic has already been touched upon briefly, it is crucial component

in grasping salmon science and the nonstory of this thesis. The salmon life history is quite literally a circle, beginning and ending in the same place. As mentioned above, salmon are anadromous. That means, unless they are landlocked, these fish are born in freshwater then spend part of their lives in a marine environment, before they return back to freshwater to reproduce by the exhaustive process called spawning (Ade 1989). Salmon are born from eggs in freshwater. Most of the time these eggs emerge from redds, or gravel nests, that the adult female salmon build prior to laying the eggs. The redds are constructed when the salmon turns on its side near the gravel bed and moves its fins and tail to create a depression. She then lays her eggs in the redd, which are often built in riffles where the eggs are more easily oxygenated, as a male salmon covers the eggs with milt, or sperm. The female then covers the redd with gravel (Behnke 2002). After repeating this process a number of times the adult salmon dies, releasing important nutrients captured while out at sea, into the stream ecosystem.

After a few weeks, the eggs hatch and juvenile salmon emerge. Called fry, these fish then live in freshwater until they are ready to migrate to the ocean. The amount of time fry spend in freshwater varies significantly from species to species. When the salmon are ready to make their way out to sea, they are called smolts, and usually take on a more silver coloring. Sometimes the trip to from natal stream to ocean can take over 1,000 miles (Behnke 2002). Along the way, fry and smolts face countless dangers. Going from freshwater to salt water and then back again requires significant biological changes within the salmon. Eventually the smolts enter the ocean with its abundance of food. Scientists know that salmon in the ocean cover vast tracts of ocean as they grow

and get ready to reproduce. Adult salmon can spend from as little as two years to as many as seven or even more feeding in the ocean.

Researchers are still trying to understand the homing process, but when it is time for salmon to reproduce, they make their way back to their stream of birth. Some hypotheses hold that salmon can smell the unique chemical makeup of this stream, while others believe there is a magnetic compass that guides their journey. Whatever the case, the adult salmon make their way back upstream to the place of their birth. Once they reach their home, they go through the elaborate process of spawning described above. Once the eggs are laid and the next generation is prepared, the adult salmon die. It should also be noted that this is a gross simplification of the salmon life cycle. For example, there are strains of Chinook, Coho, pink, and sockeye, called kokanee, that are trapped in freshwater and have different life and reproductive qualities (Behnke 2002). This description, however, should serve as a general enough base for understanding this chapter and its place in the larger study.

Salmon and Endangered Species Act Listing Status

In 1991, individual Pacific salmon species were broken down at a finer level, called stocks, in a publication by the American Fisheries Society (AFS) (Robins et al. 1991). This report and the designations contained within were recognized by the federal government and were important because it separated salmon into groups at a more specific level than species. The AFS report recognized that within each salmon species, these stocks were subsets of fish that were genetically indistinguishable, but behaved

differently and resided in unique habitats. Pacific salmon stocks were "a population or group of populations of a particular region that share a common life history" (Behnke, 2002, p. 19). These stocks used their ability to home in on their natal streams to reproduce in unique locations and at unique times. After a while, the narrowness of the spawning time and geography set these stocks apart from one another. The stocks possessed "local adaptations, or intraspecific diversity" (Behnke, 2002, p. 20). Salmon species reproducing in different streams, at different times, were deemed different from one another.

Responding the AFS publication, also in 1991, the NMFS took the concept of a stock and called it an Evolutionary Significant Units (ESU). The ESU was actually an expansion of the concept of a distinct population segment (DPS) as outlined in the ESA, but allowed for more genetic protection of intraspecific diversity. Stocks that could technically breed together, but were geographically isolated, would be considered parts of different ESUs and therefore hatchery fish were not counted as part of the ESUs. The ESA said that DPSs could be protected as threatened or endangered species. In calling salmon stocks ESUs, the NMFS basically said that the stocks were DPSs, and therefore eligible for protection under the ESA. The ESU designation allowed for more salmon to be protected because losing the specialization of those salmon would hurt the species as a whole. "The total diversity of a species would be significantly diminished if these life history forms were lost" (Behnke, 2002, p. 21). The issue with the DPS equals ESU transitive property logic was that the DPS designation said the adults could breed together, which would make hatchery salmon and wild salmon part of the same DPS.

The *Alsea Valley Alliance v. Evans* court decision picked up on that discrepancy, saying that an Oregon Coast Coho could breed with hatchery fish and therefore they were part of the same DPS. Since they were part of the same DPS, the judge ruled that they had to be counted together to help determine if they qualified as threatened or endangered according to the ESA (Federal Register 2004). The NOAA Hatchery Policy Proposal basically reverts back to the DPS standard for ESA listing status of salmon that the ESU creation tried to avoid. Counting hatchery fish in with wild fish would ultimately making the protection of intraspecific stocks much more difficult.

Hatchery Science

One of the key components to the NOAA's Hatchery Policy Proposal is the use of hatcheries. At the most basic level, salmon hatcheries are intended to hatch fish from eggs, and raise them to be juveniles, when they can then be introduced to a stream. "In a typical hatchery, fish grow in concrete tanks, usually segregated by size, in dense concentration, under unnatural light and temperature – not all that different from feedlot cattle or hothouse plants" (Petersen, 1995, p. 219). Hatchery fish are raised in an artificial environment and rely on humans for survival.

Over the years, many concerns and criticisms of hatcheries and hatchery fish have emerged. Hatchery fish are given pellet food loaded with vitamins to help the salmon grow rapidly (Busch 2000). With no predators in the hatchery, the fish rush to the food when it is served. This lack of caution allows them to beat out wild fish for food when they are introduced to a stream, and also makes them more vulnerable to predators. Wild

fish are often displaced by these naïve, but super sized hatchery fish. The hatchery fish then often become easy food for a predator. Hatchery fish are less adapted to survive in the wild, so therefore the early advantages actually work against the overall population. This process ultimately reduces the number of salmon that can return to spawn and decreases the genetic variation that came with wild fish.

Another problem with hatcheries is the dumping thousands upon thousands of hatchery fish into a stream, which can eclipse the stream's carrying capacity (Wolf and Zuckerman, 2003, p. 27). Wild fish can be crowded-out by hatchery raised fish, which often enter the stream larger than their age counterparts already in the stream. "In other words, while hatcheries produce millions of fish a year, relatively few survive… Even more important, since hatchery fish compete with wild strains for food and space, biologists fear a drastic reduction of the salmonid gene pool" (Petersen, 1995, p. 220). Hatchery fish own an initial advantage over wild fish, but not the long-term qualities to make the population thrive. Hatchery fish can out-compete wild fish for limited resources, but not translate that advantage into long term sustainability.

In the past, Hatchery managers often put the offspring of salmon from one stream into another stream. Early hatchery managers did not realize that salmon were programmed to reproduce in specific streams at specific times. "This erroneous and simplistic concept, which saw a species as so many standardized, homogeneous, and interchangeable parts and thus ignored intraspecific diversity, was the basis for artificial propagation programs that mixed and hybridized different salmon populations with different life histories" (Behnke, 2002, p. 20). A dramatic example of this practice is that

many salmon indigenous to the Pacific Ocean could be found migrating up streams leading to the Atlantic Ocean (Mills 1971). Other hatchery fish were sent to places like Hawaii and Mexico (Busch 2000). While advances have been made in regard to this practice, centuries of evolutionary individualization by salmon for the characteristics of particular streams were destroyed with the influx of foreign genetic material from hatchery fish.

In addition to harming wild salmon by initially out competing them for resources, hatchery salmon can also introduce disease to wild fish. Due to their crowded rearing conditions, lack of natural cleansing cycles, and genetic uniformity, fish in hatcheries are more susceptible to disease than fish in the wild. Diseases bred in hatcheries can then be introduced to the wild. "Fish raised *en masse* proved prone to diseases that could wipe out millions at a time. And survivors could spread the malady to other fish once they began mingling in wild waters" (Petersen, 1995, p. 220). Hatchery fish lacked the genetic diversity of wild fish, and therefore diseases that affected one fish could affect many fish. Hatchery fish that survive the disease can then carry it to wild fish.

Finally, on top of the damage they have caused wild fish, another drawback to hatcheries is the cost. Hatcheries are expensive. "Tainting the water even further is the high cost of hatcheries. Washington's Cowlitz hatchery, for example, cost approximately $10 million (U.S.) to build" (Busch, 2000, p. 101). Hatcheries are a pricey option in salmon conservation. Despite the hefty price tag, hatcheries remained a popular conservation and management tool.

Hatchery managers and scientists have not been blind and deaf to the failures and criticisms of hatcheries. The recent move away from hatcheries toward more holistic means of protecting endangered salmon has threatened this industry. "The reform of hatchery practices for the benefit of both ESA-listed stocks and even healthy stocks has been emerging for more than a decade" (Flagg and Nash, 1999, p. 7). Resources and funds that used to go towards hatcheries have instead been going to habitat restoration. In response to these factors, hatcheries have continued to try and make advances. "Backed by the increasing scientific concerns over traditional hatchery practices, the shift towards a conservation ethic has increased" (Flagg and Nash, 1999, p. 7). Hatchery managers are implementing new ideas and technologies to try and make hatchery fish a better fit in the natural environment. Even with their problems, many people believe that hatcheries remain a viable option to managing endangered salmon.

Conservation Hatcheries

The NOAA Hatchery Policy Proposal attempted to circumvent the hatchery criticisms by proclaiming that it would use futuristic, conservation hatcheries. Conservation hatcheries would basically try to simulate natural conditions for hatchery fish so that the past problems of hatcheries can be avoided.

> [F]ish that are carefully reared under semi-natural conditions, then acclimated to a specific stream and introduced to re-establish, or expand the range of, the natural

> population, might make an important contribution tot the rebuilding or support of that population. (Federal Register, 2004, p. 31358)

Based on the latest advances in hatchery science, conservation hatcheries would be trying new and innovative ways to prepare hatchery fish for their introduction to the wild. "One of the goals of fisheries conservation is to rebuild stocks. The role of the conservation hatchery is to assist the rebuilding by lessening the genetic and ecological impacts of hatchery releases on wild fish" (Flagg and Nash, 1999, p. v). These conservation hatcheries would also theoretically keep genetic variation intact. "Experience and logic demonstrate that it is possible to design hatchery management regimes and breeding programs to achieve most genetic goals" (Cloud and Thorgaard, 1993, p. 90). The NOAA is banking on these futuristic hatcheries to better prepare artificially propagated salmon to survive in the wild.

Conservation hatcheries have the ambitious goal of essentially being perfect hatcheries. From simulating natural environments to creating genetic variation in the fish, these hatchery Edens would have all the answers (Flagg and Nash 1999). "A conservation hatchery is therefore a facility equipped with a full complement of culture strategies to produce very specific stocks of fish in meaningful numbers. It can also permit individual strategies to match the particular requirements and biodiversity of any individual stock to its ecosystem. One combination of strategies may be used to produce fish to restore a depressed stock, and another to reduce the risks of a certain supplementation program" (Flagg and Nash, 1999, p. 1). Conservation hatcheries could

theoretically individualize to a given stock's needs and restore it to health and basically do everything right to make hatchery fish equivalent to wild fish.

Whole Ecosystem Approach

On the flip-side of the hatchery science debate was the call for a whole ecosystem science approach to endangered salmon conservation and management. Scientists from around the world recognized the benefits to sustainable salmon restoration that emphasized habitat restoration and increased stream flows (Lichatowich 1999). Even the NOAA's own advisory board suggested that a whole ecosystem approach be used to help restore endangered salmon stocks. There are countless ways that attempts were made to implement this whole ecosystem approach (Frissell 1993). New advances, ranging from restoring complex woody debris into streams to building up the riparian ecotone, were constantly occurring. While still a relatively young area, the whole ecosystem approach to restoring salmon saw positive trending results (Montgomery 2003). While the focus of this chapter is largely the nonstory of the Hatchery Policy Proposal, it is worth taking a moment to examine key issues in the whole ecosystem approach to greater appreciate its integrated nature. The Bush Administration's decision to discard this solution illustrates more than just arrogance, it also shows a complete lack of understanding or care of the complexity of the salmon issue.

Taking a whole ecosystem approach is more complicated than it sounds. The salmon's life cycle exposes it to a variety of potentially influencing factors. Natural factors have played a major role influencing salmon population numbers. Nature is not a

stable system, and the cycles and anomalies that inherently come with nature impact salmon. For example, drought years lower water levels in streams, reduce potential spawning habitat, and raise water temperatures. The result, of course, is the reduction of the amount of salmon produced. A second example of a natural phenomenon that might affect salmon would be a major rockslide. The rockslide could introduce large amounts of sediment burying spawning grounds and making the water turbid. It could also block off habitat and spawning grounds. Again, salmon populations would be hurt.

One of the most important of these natural factors involves the temperature state of the ocean and namely the "Pacific Decadal Oscillation" (Montgomery, 2003, p. 42). The Pacific Decadal Oscillation describes these cyclic temperature swings, which occur roughly every 30 years. When the ocean coast waters are relatively cold, there are increased krill and fewer food competitors for salmon. The result is an increased number of salmon. When ocean coastal waters are warm, the exact opposite occurs and salmon populations fall (Montgomery 2003). Ocean trends can lead salmon populations to swell or fall beyond any human impacts. It should be noted that as the Bush Administration champions the recent upswing in salmon numbers, it has also been a period of cooler ocean coast waters. Like the Pacific Decadal Oscillation, phenomenon like the much shorter lived El Nino and La Nina phenomenon have a similar affect on salmon populations.

While natural factors undoubtedly affect salmon populations, anthropocentric factors play an even more important role in the long term. Since the first humans arrived in the Pacific Northwest and began to use the salmon and their habitat, the two have been

closely linked. As has been discussed, Native Americans enjoyed a relatively harmonious relationship with the salmon. The arrival of European Americans in the region did not decrease the significance of the relationship between humans and salmon and their habitat, but it did alter the form and intensity of that relationship. European Americans essentially mechanized the river salmon called home (White 1995). Over the years, humans, salmon, and their river homes became indelibly linked. In particular, there are three industries, irrigation, timber, and hydropower, which have had major impacts on salmon.

The relatively cool, wet winters and hot, dry summers of the Pacific Northwest have encouraged many farmers in the region to utilize irrigation to grow their crops, including highly water dependent crops like alfalfa. This system takes water from the rivers during the dry summer months and puts it on fields of crops. Adult salmon coming upstream to spawn need certain water flow levels. If these minimum flows are not met, water temperatures can reach deadly high levels and spawning grounds can disappear. Juvenile salmon coming downstream can get washed into irrigation pipes destined for fields and end up as crop fertilizer. Chemically intensive farming can also lead to increased eutrophic conditions that decrease oxygen levels for fish, a condition that is also worsened by high water temperatures. The irrigated farming issue has come to a head, and served as a rallying point for both sides, in recent years in the Klamath Basin. Droughts have caused farmers to demand irrigation water from the rivers, while salmon supporters have fought to leave water in the rivers to help salmon survive (Hurley 2004).

The Bush Administration has come down on the side of farmers in the ongoing Klamath debate (Knickerbocker 2004).

One of the Pacific Northwest's great resources is its forests, which has been capitalized on by the timber industry. Much of the lumber for the United States, and the whole world, comes from the Pacific Northwest. These trees, which have helped fuel the building boom of the last decade, are also very important to salmon. Scientists have become increasingly aware of the importance of riparian ecotones along the river's edge. These riparian ecotones play a number of important roles, from filtering water entering a stream, to providing shade to cool water temperatures, to helping maintain flow levels. Harvesting trees from in or near riparian ecotones, while largely illegal now, robs fish of these much needed benefits. In addition, harvesting trees, especially in the "clear cut" fashion that remains largely popular today, can be harmful to salmon. Harvesting trees increases the speed and amount of water runoff during precipitation, introducing increased amounts of sediment into streams. This sediment can clog spawning grounds and suffocate salmon eggs. The timber industry has also spawned lumber mills to process the wood which can dump or leach toxic chemicals into streams and rivers. The impacts of the timber industry can have profoundly negative and long term consequences for salmon.

No discussion of salmon in the Pacific Northwest would be complete without talking about dams. Dams, ranging from the hydropower Goliaths spanning the main stem of the Columbia River, to the irrigation dams encouraged by the Bureau of Reclamation (Reisner 1993), to early splash dams of loggers, have played a major role in

shaping the course salmon over the last century. Dams block salmon adult salmon passage upstream and juvenile salmon passage downstream. Even when built with fish ladders, salmon pose a major obstacle for salmon passage. Juvenile fish making their way downstream can get lost in the reservoirs created by the dams, become easy prey for freshwater fish that inhabit those reservoirs, and be injured or killed by the pressure of passing through the dam turbines. Even if the dams begin to come down, something the Bush Administration has insured will not happen in the immediate future, salmon and dams will forever be linked. Dams directly led to the extinction of an unknown number of stocks of salmon (Petersen 1995). Today, they still have a major impact on salmon populations.

Conclusion

Science plays a major role in the NOAA's Hatchery Policy Proposal, and rightfully so, but it is important to keep in mind the larger picture. Missing the forest for the trees is not difficult considering the Bush Administration's framing of the Hatchery Policy Proposal and simplification of the discussion. One of the most important things to keep in mind is that the proposal did not have to count hatchery fish with wild fish. The *Alsea Valley Alliance v. Evans* decision demanded a new policy, but that did not necessarily mean that the NOAA had to make hatcheries the basis for the new proposal. Rather, what the Hatchery Policy Proposal largely ignores is the importance of ecosystems to the ESA. "The purpose of the ESA simply cannot accommodate an attempt to *create* a modified ecosystem upon which threatened and endangered species

might depend, particularly without strong scientific foundation" (Gayeski and Brulle, 2004, p. 1). A salmon and its habitat are both valued under the ESA – something the NOAA fails to consider with its call for human supported hatcheries.

The whole ecosystem approach to saving salmon is a multifaceted issue enmeshed in the political, socio-cultural, economic, and scientific fabric of the Pacific Northwest. The story of dams, and the other industries of the Pacific Northwest like irrigated farming and timber, is much more complex than just saying they hurt salmon. Dams, farms, and timber are part of the story of the region and its interwoven influences. For example, dams have been one of the primary beasts of burden in building the Pacific Northwest. The identity of the region may be tied to salmon, but it is also linked directly to dams. Defeating the Nazi war machine during World War II would have been much more difficult if not for the aluminum industry that was fueled by the Columbia River's main stem dams. As White points out in *The Organic Machine*, human history and natural history cannot be separated. Like a Venn Diagram, the salmon's history overlaps with human history. Each is a part of the other, but there is also an independent component. Recognizing the existence of both of these pieces, something the Bush Administration and the NOAA fail to do with their scientific viewpoint, is crucial to saving salmon.

The NOAA and PCFFA each claimed science supported their view on the proper course for endangered salmon conservation and management. While the NOAA's claims were based mostly on the fact that conservation hatcheries have done no harm yet, the PCFFA looked at the damage hatcheries have done in the past and the early promising results of the whole ecosystem approach. The NOAA was accurate when it said that

conservation hatcheries were innocent until proven guilty, but since there are no true conservation hatcheries, this is an argument that cannot be won. The PCFFA, environmentalists, and scientists believed that the proper course of endangered salmon conservation should utilize the whole ecosystem approach. They have seen hatcheries fail and the beginnings of the whole ecosystem approach work. If any progress is to be made on the highly contentious nonstory issue of science, there will need to be recognition that different sciences are being used.

While the NOAA is technically right in its claims, even its own advisory board believes it is distorting the science picture (Myers et al. 2004). The dominant narrative given by the NOAA overlooks or ignores key scientific issues. The NOAA's version of science is incomplete. The government's goals and interests do not fit with the scientific community's stance on endangered salmon conservation and management. The NOAA is trying to twist science through the Hatchery Policy Proposal to fit the ideology of its leadership. The resulting jaded scientific slant frames the endangered salmon issue in a way that allows the government to suggest hatcheries are the solution and thus serve its other interests, like the hydropower, irrigation, and timber industries. The view that nature can be mechanized or duplicated by humans is consistent with the Bush Administration's ideology. The belief that humans can replicate or even improve upon nature is ingrained in this viewpoint. "With the emphasis on wild fish required under the ESA, there is opportunity to transfer the role of certain hatcheries from production to conservation" (Flagg and Nash, 1999, p. 9). The Hatchery Policy Proposal effectively stated it would eliminate the biological and behavioral distinctions between endangered

wild salmon and hatchery salmon. Sadly, this same logic has been used for over a century and proven time and time again to be misplaced. The Bush Administration's decision to revert back to a salmon management technique that can only be described as flawed, ineffective, and harmful speaks not only to their motivations to prop up industry interests, but also their misguided ideology that humans can master nature.

CHAPTER 4

METANARRATIVE

Introduction

According to Emery Roe's narrative policy analysis approach, after outlining the narratives and nonstory, the next stage in the process is to put together a metanarrative. The metanarrative's intent is to form a new story that joins the other stories for future policy makers to utilize. That is not to say that the metanarrative will mask the complexity or uncertainty of the other stories, or that the all the voices of the metanarrative will be in agreement. More usefully, the metanarrative should illustrate possible points of agreement, as well as reveal the roots of disagreement. It is not intended to be a judgmental, finger pointing process. The goal of the metanarrative is to provide a basis for future policy discussions by unearthing the taproots of the differing paradigms (Roe 1994). The metanarrative will examine the historical interpretations, interpretations of science, legal interpretations, ethics, sense of entitlement, and perceived threats to power, to reveal the underlying political, socio-cultural, economic, and science changes that fomented the NOAA's Hatchery Policy Proposal.

The Hatchery Policy Proposal was obviously a highly emotional issue with a myriad of perspectives. The dominant voice in the discussion, leading the primary narrative, was the NOAA. Policy makers there believed the way to protect endangered salmon stocks was to utilize futuristic conservation hatcheries. The counter narrative,

while claiming a large contingent of supporters, found a sympathetic voice with the commercial salmon fishermen, one of the groups supposed to be benefiting from the NOAA's and NMFS's policy decisions. After a century of failing to raise salmon population numbers, it is apparent that conserving and managing salmon is not an easy task. Salmon science is complex, and there are no easy answers. Yet, by attempting to bring the strident voices of the two sides together through the formation of a comprehensive metanarrative, perhaps some advances can be made towards future policies aimed at protection of endangered salmon stocks.

Historical Interpretation

Both the NOAA and commercial salmon fishermen witnessed decades of relatively low salmon numbers. The initial over harvest of salmon by commercial fishermen at the turn of the 20th century, exacerbated by dams and degraded habitat over the next century, left 26 stocks of salmon endangered by the time of the Hatchery Policy Proposal. Over the course of that time, the NOAA and the PCFFA also saw a myriad of methods used to try and restore salmon numbers to their earlier highs. The dominant management technique utilized during that time period was the hatchery. Despite the overwhelming political support and steady technology advances, hatcheries never made much, if any, progress in sustainable salmon population gains.

Based on the NOAA's history, it should come as little surprise that it produced the pro hatchery, Hatchery Policy Proposal. The NOAA has a long history emphasizing control and predictability over nature. The NOAA wants to be able to predict weather,

natural disasters, as well as salmon populations. In their eyes, the best way to conserve and manage endangered salmon over most of the last century has been to use hatcheries (Cone 1995). Not surprisingly, the NOAA has viewed the factory-like qualities of hatcheries in a positive light. The NOAA's concern has been about quantity, not necessarily quality. Hatcheries offer the control over nature that the NOAA has sought out. Turning endangered salmon conservation and management over to more hands-off processes, like improving habitat, goes against the NOAA's historic motivations and tendencies. Using hatcheries fit much more with the NOAA's historical perspective.

The PCFFA saw hatchery after hatchery fail to improve their catch numbers significantly. Time after time, their hopes rose with new hatchery technologies and then fell as salmon numbers continued to slide. Not surprisingly, the PCFFA took a largely cynical view of hatcheries and their new technologies. Since its peak in the late 1800s, commercial salmon fishermen have watched their once vibrant industry eke along. Hatcheries have been offered as a way to help commercial salmon fishermen, but have yet to do so. The PCFFA's jaded view on hatcheries stemmed from a history of waiting on them to boost the salmon industry, only to come up short time and time again (Spain and Grader 2004).

Interpretations of Science

One of the most striking areas of disagreement between the NOAA and the PCFFA was their interpretation of science. It was not so much that they disagreed about the results of the science. The real point of contention was that the NOAA and the

PCFFA looked at different science. The NOAA and PCFFA had differing goals, ideologies, and motivations, which their scientific perspective reflected. The NOAA examined evidence suggesting advances in hatchery science, namely the use of conservation hatcheries, could possibly protect salmon (Flagg and Nash 1999). There were no conservation hatcheries, so proving that they would not work was impossible. Finding scientific criticism of something that did not exist was highly difficult. There was no evidence to say they would not protect salmon because they did not exist. At the same time, the PCFFA, as well as the NOAA's own scientists, saw a cycle over the last century of hatchery advances that failed to significantly help salmon. The PCFFA also cited evidence that hatcheries had harmed salmon populations and the fish's long term sustainability. The PCFFA viewed hatcheries as a wasted, likely even detrimental answer to managing endangered salmon. Reconciling these two views is difficult, at best, because they examine two different sets of science. The issue of scientific interpretation should be one of the leading issues future policy makers examine when planning the course of endangered salmon.

Legal Interpretation

The *Alsea Valley Alliance v. Evans* was the catalyst for the Hatchery Policy Proposal. While the NOAA's decision not to appeal the ruling may be telling, the bottom line ended up being that NOAA policy makers needed to update their policy regarding the ESA and hatchery fish. Their response was the Hatchery Policy Proposal, which basically expanded the definition of which fish would be counted to determine ESA

status, but did not attempt to change the definition of what constituted an endangered salmon (Egan 2004). The NOAA claimed to be trapped by the court decision. The PCFFA, on the other hand, felt that the NOAA was caving to the demands of big business and industry (Spain and Grader 2004). The Alsea Valley Alliance was represented by a group that donated a million dollars to the Bush Administration's reelection campaign. They felt that political pressure guided the Hatchery Policy Proposal, and that the NOAA did not work hard enough to work around the court's decision.

The fact that loop-holes did exist for policy abuse in the *Alsea Valley Alliance v. Evans* decision and that hatcheries have a history of coming up short suggests that this issue could use greater examination. The long-term ramifications of relying on hatcheries, instead of more holistic whole ecosystem measures, appear simplistic. Endangered salmon do not need a quick fix solution. Historically, band-aid answers for endangered salmon have allowed the status quo to go unchanged, further undercutting the salmon's chances for survival. The longer the problem goes on, the greater stress the endangered salmon face.

The *Alsea Valley Alliance v. Evans* decision allowed NOAA officials wiggle room in choosing their course for protecting endangered salmon. The judgment did not spell out the requirements for determining if a salmon stock should be listed as endangered. Instead, it said that under the current framework it was illegal not to count hatchery fish. It required that a new framework be established. The scope and framework of that new policy would be at the NOAA's discretion. Stakeholders like the PCFFA, and even the NOAA's own scientists, had no real say in the process. The power

vested in the NOAA and its leadership in the Bush Administration during the legal process should be noted. Not only would the NOAA's leadership make the policy resulting from the court decision, but in the judicial process they represented the defense of the endangered salmon. The complete lack of checks and balances in the process is alarming.

Ethics

While assuming the best intentions and the highest ethics from all the concerned parties might be magnanimous, it would not be doing the salmon justice. In this case, the ethics of the NOAA and the Bush Administration are tied directly to their goals, ideologies, and motivations. This administration has track record of being committed to hydropower, irrigation, and timber interests. Their ethics are to serve those interests to the best of their ability. When push comes to shove, the NOAA then must weigh the needs of fish versus the needs of business. The fact that the NOAA is housed in the Department of Commerce, which is headed by a Bush appointee, and that Bush has a history of prioritizing business indicates where the NOAA's ethics stand.

The PCFFA, on the other hand, is ethically motivated to protect the commercial fishing industry and the families it supports. The best way to achieve those ends is to have a sustainable salmon fishery. PCFFA members, then, are concerned with the long term protection of salmon. Perhaps not surprisingly, the PCFFA's interests are often in direct opposition to a number of the Bush Administration's. The values and obligations of the NOAA and the PCFFA contradict each other. Dams, irrigation, and logging all can

harm salmon. The PCFFA prioritizes fish over hydropower, irrigation, and logging, while the Bush Administration does the exact opposite.

Sense of Entitlement

Both the NOAA and the PCFFA felt a sense of entitlement to suggest how threatened and endangered salmon should be conserved and managed. The NOAA wielded the biggest stick in this regard because it has the legal right to protect the salmon, as well as the backing of the federal government and the industries it supported. In addition, since they controlled the fishing licensing, the NOAA could dictate to PCFFA what sort of regulations they must follow in regards to catching salmon. The NOAA's interpretations of science and history, along with their legal standing, basically gave them an unmitigated sense of control over the salmon and their habitats. Teamed with their pro business ideology and the legacy of hatchery use, the Bush Administration's sense of entitlement led to the Hatchery Policy Proposal.

At the same time, commercial salmon fishermen worked day-in and day-out with salmon and had a vested interest in their management. PCFFA members possessed valuable first-hand knowledge of the salmon's situation, and with that knowledge came a sense of entitlement and, in turn, obligation to the salmon (White 1995 and Glavin 1996). Also, with major investments in boat, tackle, and licenses, they were committed to being on the water harvesting salmon as much as legally allowable. Commercial salmon fishermen were some of the first European Americans in the Pacific Northwest and witnessed first-hand the decline of the salmon. Their livelihoods were tied directly to the

long-term sustainability of the salmon. For all these reasons, PCFFA members felt a great sense of entitlement towards shaping the course of salmon conservation and management.

If, as Richard White suggests in *The Organic Machine*, the river has been divided among various users, then the sense of entitlement each party shares is understandable. "Because the river has become an organic machine, a partial human creation, each of the groups claiming the river has created part of what they claim" (White, 1995, p.110). The sense of entitlement, however, ignores the non-anthropocentric side of the river. White recognizes that rivers are also part of cycles or systems beyond humans. To ignore that aspect of the river, the part that includes the salmon, is simplistic and wrong. Rightly or wrongly, both the NOAA and the PCFFA feel a sense of entitlement in determining the course of endangered salmon management. If the salmon are to remain in the rivers, each side must also recognize that there is a important part of the river that exists outside of human control.

Threats to Power

In regards to endangered salmon management, there is an extreme imbalance of power between the NOAA and groups like the PCFFA. The Bush Administration and the NOAA leadership run the show, to the point where they ignore the advice of the advisory committee they appointed. There certainly are avenues for the PCFFA to try and instigate change, like a lawsuit or a media campaign, but ultimately the power rests with the government. The management of endangered salmon comes down to a political

appointee from a pro business administration. As long as that administration believes it has political capital and can act in accordance with its ideology, there is little reason to hope it will concede any of its power or find a middle ground to work with groups like the PCFFA. Policy makers need to recognize and rectify the amalgamation of power within the NOAA and the lack of oversight that goes along with it.

Conclusion

By and large, the NOAA and PCFFA come from ideological polar opposites and these differences are reflected in their views on the conservation and management of endangered salmon. Of particular note, the NOAA and PCFFA strongly disagree on their interpretations of science and their ethical obligations. The NOAA, with its history of hatchery use, ignores science that suggests hatcheries may harm salmon populations and is committed to serving industry interests, like hydropower, irrigation, and timber. The PCFFA, on the other hand, recognizes the harm of hatcheries and supports the science put out by the NOAA's own scientists, calling on more holistic approaches to salmon conservation and management. The PCFFA is concerned about the long term sustainability of its livelihood, salmon, especially as it relates to industries with competing interests, like the hydropower, irrigation, and timber. The PCFFA believes that rebuilding salmon populations could bring 25,000 jobs and $500 million in revenue, but that hatcheries are not the answer (Knickerbocker 2004).

Future policy makers must recognize the differences between the NOAA and groups like the PCFFA when charting the future course of endangered salmon

conservation and management. They must also bear in mind the loci of power within the NOAA and seek out other stakeholders to, at the very least, temper the government's position. Scientists in the early 1900s said hatcheries were good because the government used them. They were wrong then, and it would be a shame to see policy makers today make the same mistake by taking the government's word as gospel. The NOAA's sense of entitlement is quite strong and future policy makers will have to bear this in-mind if they expect to go against the government's position. To think that the Bush Administration and the NOAA will easily relinquish their hold on the reins of power is not just foolhardy, it could also be damaging to a career. The Bush Administration has a history of removing people that disagree with its position. Policy makers must delicately navigate a cordon laced with obfuscations and pitfalls if they hope to save salmon.

The narratives surrounding the Hatchery Policy Proposal are a complex web of competing interests and irreconcilable values. The NOAA and fish conservation and management policy makers have a long history of believing that people can manage the environment. This socio-cultural perspective has deep roots that can still be felt today. The NOAA was driven to form the proposal by a legal decision spearheaded by interests ranging from property rights, to hydropower, to irrigation, to timber. These groups also gave significantly to the Bush election campaign. Not surprisingly, the resulting Hatchery Policy Proposal helps industry interests, like hydropower, irrigation, and timber and reflects a President and Commerce Department that places a greater emphasis on economic interests than salmon. Underlying the whole Hatchery Policy Proposal are the varying viewpoints on science. The NOAA policy makers believe that cutting-edge

technology in hatchery science, conservation hatcheries, can solve the endangered salmon crisis. The Bush Administration's Hatchery Policy Proposal is the coming together of a number of political, socio-cultural, and economic factors.

In sum, there are significant differences between the NOAA and groups like the PCFFA. These differences stem from ideological differences and manifest themselves in the differing parties' views on endangered salmon conservation and management. Both sides would probably say that they want to save salmon. However, the importance of that goal, especially in relation to other industry interests is, is markedly different as is the means to that end. The metanarrative of the NOAA and the PCFFA is steeped in emotion and entrenched ideologies, and the finding of common ground is quite uncommon.

CHAPTER 5

PHILOSOPHICAL ANALYSIS

Introduction

The metanarrative provides a wonderful place for policy makers to begin discussing the Hatchery Policy Proposal, as well as other future salmon conservation and management decisions. It highlights the rare points of mutual agreement, as well as potential sources of conflict and tension. Alone, the metanarrative stands as a valuable source of information for policy makers to make progress in the protection of endangered salmon stocks. At the same time, there exists the possibility of making greater strides with an analysis of the metanarrative. This expanded critique could offer future policy makers an even more valuable source of information. Bringing in the insights of renowned environmental philosophers and ethicists, like Holmes Rolston III and Arne Naess, and applying those to the discussion of the Hatchery Policy Proposal, could be an extremely worthwhile endeavor. Carrying the dialogue beyond the limits of the Hatchery Policy Proposal to the Endangered Species Act itself could supply future policy makers with new ideas for the conservation and management of endangered salmon stocks. This final chapter will use Rolston and Naess to analyze the ESA and the Hatchery Policy Proposal narratives to give insight for future policy decisions.

Politicians, like then President Richard Nixon, hailed the introduction of the Endangered Species Act (ESA), in 1973, as an opportunity to save species teetering on the precipice of extinction. The bill's popularity led to a rare, near unanimous passage in the Senate, with a favorable vote of 99-1 (Burgess 2001). Success of the ESA in Congress followed on the heels of Earth Day, first celebrated in April 22, 1970 (Petersen 135). The ESA and Earth Day marked a major perspective change on American views of nature. "The impact of the Endangered Species Act … should be measured not just by how many species it saved or how much money it cost developers, but by how it changed the way people think" (Cothran, 2001, p. 55). In the midst of the Cold War, the paradigm that measured success in terms of production and growth shifted, at least to a degree, to one that recognized and valued nature.

The ESA's course of popularity was very similar to that of hatcheries. The accolades that followed the enactment of the ESA were similar to the applause surrounding early hatcheries. Then, just as hatcheries were derided when they failed to produce, the ESA faced criticisms as the realities of the law began to manifest themselves. The ESA was still considered a major step in the right direction, but it lacked the specifics necessary to be a truly affective. "Critics have described the [ESA] as a naïve piece of legislation in search of a credible public policy objective" (Lackey, 2001, p. 8). Opponents to the ESA argued that it was an ineffective piece of legislation that saved a few select species at the price of overlooking or even condemning many others. "The ESA may protect some plants and animals that would otherwise disappear. But it has undoubtedly caused the deliberate destruction of millions of other endangered

plants and animals" (Cothran, 2001, p. 62). Like the hatcheries, the ESA was considered ineffective, and perhaps even harmful.

Today, detractors of the legislation use hindsight to point out that after over twenty-five years, 97% of species listed by the ESA remain on the list. Some "environmentalists contend that the ESA is only a self-perpetuating emergency response (Burgess 2001). Critics say that the ESA is a band-aid for a gaping wound, that it does not help threatened and endangered species enough to remove them from ESA listing status. In a sense, the ESA is like a salmon hatchery: it offers a quick fix to the problem but can not make the changes necessary for long-term self-sustainability.

Like other species, being listed on the ESA has not been the salvation of salmon. The idiosyncrasies and loopholes of the ESA continue to threaten these ancient fish. "The [ESA] is no less free of paradox and intellectual intrigue. Threatened and endangered salmon are the only listed animals for which government routinely licenses large numbers of people to kill them" (Lackey, 2001, p. 8). The reality is that since salmon were added to the Endangered Species Act, their numbers have continued to fall. The ESA is not doing enough to save salmon species of the Pacific Northwest.

While moving the Snake River Sockeye onto the ESA's threatened or endangered list, in 1991, did not lead to an increase in salmon numbers, it did give salmon sorely needed attention. It also meant major changes for many people in the Pacific Northwest. "Ultimately, listing wild salmon as endangered or threatened as defined by the [ESA] means that everyone, not just fishermen, [was] affected. Efforts required to restore wild salmon directly conflicted with many other individual and societal priorities" (Lackey,

2001, p. 8). The addition of salmon to the ESA list meant adaptation for humans. The listing also immediately gave salmon a seat at the head table for many major decisions impacting the Pacific Northwest.

As a symbol of the Pacific Northwest, salmon supporters can use the salmon's ESA listing as a springboard to affect change. The extinction of salmon in the Pacific Northwest is a distinct possibility, but not one that the region's residents would be happy to see. Listing of salmon as endangered by the ESA provides the resources and attention necessary to foment wholesale improvement to the ESA. The plight of Pacific Northwest salmon, coupled with the vision of great environmental ethicists, could drive the improvements to the ESA and the Hatchery Policy Proposal needed to save salmon.

Environmental philosophers and ethicists, like Holmes Rolston and Arne Naess, have indirectly tackled the Pacific Northwest salmon controversy. While they may not have immediately addressed the NOAA's Hatchery Listing Proposal or even the Pacific Northwest salmon controversy, Rolston and Naess do grapple with the nature of species. They go to great lengths emphasizing the importance of species and describing their role in the larger picture. Through the work of Rolston and Naess, the essence, role, and place of salmon species can be explored. The information and knowledge gained from Rolston and Naess can then be used to perform an informed critique of the ESA and the Hatchery Policy Proposal. The environmental ethics incorporating species outlined by Holmes and Naess provide a clear understanding of the shortcomings of the narrowness of the ESA and, in turn, indicate why salmon species continue to struggle in the Pacific Northwest.

Explanation of Sources

While politicians and in Washington D.C. may have crafted the ESA, insight and wisdom regarding species in the natural world is not necessarily limited to those inside the Beltway. In addition to lobbyists, PACs, and special interest groups, environmental philosophers have also given the subject serious thought. The environmental ethics laid out by Holmes Rolston III, in Environmental Ethics, and Arne Naess, in Ecology, Community and Lifestyle, view species as an essential component. In addition to Rolston and Naess, this section will include the findings of previous researchers into the salmon crises.

Holmes Rolston, III

At the most basic level, Rolston believes species do exist. His view holds that "species objectively exist as living processes in the evolutionary ecosystem" (Rolston, 1988, p. 135). While this assumption may seem like a given, it should not be taken for granted. Rolston does not suggest that species have a purpose on a conscious level. However, he does see species as "a living historical form" (Rolston, 1988, p. 135) that developed from a continuity spanning multiple decades. Species are essentially processes established over many centuries. Each species is unique and plays a particular role in a given ecosystem. Following Rolston's line of thinking, because every species in an ecosystem plays a particular role, the ecosystem needs all of the species to be complete.

In the case of salmon, the line of thinking that each species fills a niche in the ecosystem can be extended to the understanding that each salmon species developed

uniquely from all other salmon species. Rolston then would also recognize salmon stocks as independent units. Some stocks, while being genetically similar, return to their natal streams at different times of the year under different conditions. This evolutionary adaptation has insured the long term survival of salmon. Unexpected or major events influencing nature, like a major drought, may affect salmon coming to spawn at one time of year but not another. The affected salmon might not be able spawn, but their genetic cousins can carry on their genes. The various stocks allow the species to survive.

The timing of the reproduction is also in harmony with the larger stream ecosystem. The streams Pacific Northwest salmon use to spawn are a complex web of integrated systems. For example, when spawning salmon die and decompose in the stream, they release an array of nutrients into the stream that other organisms utilize. Some of these organisms are then consumed by the juvenile salmon after they hatch. The cascading serious of relationships speaks directly to Rolston's view of species in context.

One of the fundamental tenets of Rolston's view is that species are the ideal essence and that individual beings are how that essence manifests itself. "A species is a coherent, ongoing form of life expressed in organisms, encoded in gene flow, and shaped by the environment" (Rolston, 1988, p. 136). Therefore, species are worth more than individuals. Individual sentient beings are subordinate to species. Rolston uses this logic to justify killing thousands of individual organisms in the pursuit of saving a species. In a sense, it is like species are waves that pass beyond individual beings. As time advances, species become stronger and more adapted to their environment.

Rolston's emphasis of placing the species over the individual goes against the essence of the Hatchery Policy Proposal. The NOAA's proposal recognizes the genetic variation of species, but values the individual over the species. The diversity of genes is not appreciated. Salmon quantity is emphasized over genetic quality. As long as a enough individuals of a species exist to continue propagation, natural or artificial, that is good enough. Rolston's appreciation for the species' "ongoing form of life" is not reflected in the Hatchery Policy Proposal.

Rolston avidly believes in the absolute importance and naturally inherent value of species. In Environmental Ethics, he devotes an entire chapter to the topic, entitled: *Life in Jeopardy: Duties to Endangered Species*. Rolston believes species should be valued beyond simple commodity status. "A substantial number of endangered species have no resource value" (Rolston, 1988, p. 130), yet they should be saved. For Rolston, species have a value beyond any empirical measure. Species are valuable because each follows a unique evolutionary path that sets it apart from all other species. "Each [species] brings to realization some potential in nature unreached by others" (Rolston, 1988, p. 136). This greatness of potential maximization is what makes any given species special. To destroy these "formative (speciating) processes" (Rolston, 1988, p. 137) would be devastating and irreversible. Rolston believes saving the creative process that forms species is crucial. He also recognizes that once a species is gone, it is gone forever. The species building process is almost sacred to Rolston. The minute details of the evolutionary process cannot be repeated and once lost cannot be replicated.

Obviously, the NOAA and the PCFFA view salmon as a commodity. Both view salmon in terms of their potential to support an industry. At the same time, the NOAA is supposed to be looking after the salmon's well being. Yet, it is the PCFFA that seems to recognize that evolutionary processes captured within wild salmon and the almost sacredness of the individual salmon species. The PCFFA states, "wild salmon are the genetic foundation from which all hatcheries must periodically be replenished. Lose those hardy wild strains, adapted over millions of years, and eventually the domesticated hatchery cousins are also lost" (Spain and Grader, 2004, p. 4). The PCFFA holds the view that salmon are a commodity, but still recognizes the histories and legacies unique to wild salmon species.

Rolston's environmental ethic regarding species is not so simple as to say that species always take precedence over humans. Rolston lines out specific instances where the extinction of species is justified. Rolston says that if a species is going extinct for natural reasons - non-anthropogenic – then there should be no interference. Rolston also points out that if a species causes harm to humans (i.e. malaria or smallpox) then it is acceptable to eliminate that species. Ultimately, Rolston takes an axiological stance on anthropocentrism, which favors some human interests over nonhuman interests. The bottom line regarding Rolston and species is that he believes humans have a duty to protect species being threatened by human actions. Echoing his sentiment, Freeman House explains in Totem Salmon, "As we engage directly the recovery of our shared habitats, we find ourselves in the embrace of the expansive community that offers the best hope of realizing ourselves as fully human. There is no separate life" (1999, p. 218).

In Rolston's view, this protection should be a whole ecosystem approach and this will benefit both salmon and people.

Arne Naess

Like Rolston, Naess also makes species a key component of his environmental ethic. In Ecology, Community and Lifestyle, Naess states that all species have "the universal right to live and blossom" (1989, p. 166). This right forms the basis of Naess' view on species. Naess goes on to say that a species' right to live goes beyond the empirical. "The right of all the forms to live is a universal right which cannot be quantified" (Naess, 1989, p. 166). The right to life is a superceding right. All forms of life, all species, hold this inalienable right. To Naess, a species' right to life and the opportunity to continue to evolve and blossom trumps any other argument.

Naess would likely take a dim view of the Hatchery Policy Proposal. Hatcheries essentially reuse fish DNA, interfering with natural selection and the evolutionary process. The Hatchery Policy Proposal also takes a very quantitative view of salmon. A species' right to life is bounded by the Hatchery Policy Proposal. It places limits on a species' right to bloom. Individuals may be able to live in hatcheries, but the species is capped in terms of its ability to thrive.

Naess also contends that there should not be a hierarchical structure to species valuation. In other words, he believes that all species hold equal and inherent value and not a relative intrinsic value (Naess, 1989). "No single species of living being has more of this particular right to live and unfold than any other species" (Naess, 1989, p. 166).

Species hold no rank; each is equal in the eyes of Naess. This is an essential piece of Naess' environmental ethic. It basically outlines that no matter a species' place in the food chain of life, each holds an equal value. A nebulous equality surrounds the entire collection of species. In this sense, the ecosystem and all its species cogs deserve equal protection.

The NOAA's proposal devalues salmon, saying that their removal from the ecosystem is insignificant. Hatcheries can provide an artificial source of salmon that occurs outside the wild salmon's ecosystem. In saying that hatchery salmon and wild salmon are equal, the NOAA is denying the inherent right of the wild salmon to "live and unfold" (Naess, 1989, p. 166). Effectively removing salmon from the ecosystem impacts not just salmon, but also the complex web of ecosystems and species interacting with salmon. The Hatchery Policy Proposal threatens to put salmon in a virtual vacuum, inoculated from interacting with the rest of the environment.

At the same time, Naess, like Rolston, believes that humans are unique from other organisms. Naess contends that humans can grasp oneness with other beings and realize they are participating in something greater than themselves. While humans may lack a certain biological specialization (for example, a giraffe's long neck used to reach high branches for food), they do posses creativity (as there is in all life) and a higher level of cognition. "The *cortex cerebri* is the decisive factor" (Naess, 1989, p. 166). Naess's stance puts humans in an interesting position. On the one hand, all species are created equal. On the other, humans fall into a completely different category than the other species. If Naess left the argument there, it might be inferred that humans held a superior

position in the game of life. It might be concluded that human interests came before other species and that humans held the inherent right to take what they wanted and manage with their interests in mind. Naess counters that line of thinking with the argument that humans posses self-realization.

Self-realization means quite simply that humans are aware of themselves in the greater picture. That possession of self-realization means that humans can also relate to other species. Self-realization (rather than self-preservation) allows humans to identify beyond human boundaries, into nature, and finally with the cosmos. The human life form "is capable of understanding and appreciating its relations with all other life forms and to the Earth as a whole" (Naess, 1989, p. 166). Ultimately, Naess is somewhat ambiguous in his stance on anthropocentrism. He obviously does not take a *valuational* anthropocentrism position. On the other hand, it is not clear if he completely supports axiological anthropocentrism. Ultimately, he favors egalitarianism, with the caveat that humans may hold some priority.

Recognizing Naess' views on humans and species, the logical next step is that humans should be held to a higher standard than other forms of life. In fact, he contends that because of self-realization, humans "must therefore assume *a kind of responsibility for [their] conduct towards others*" (Naess, 1989, p. 170). Naess thinks that instead of ruling as tyrants with little thought given to other species, humans actually hold a position of great power. The power of self-realization means that humans are the keepers of the natural world. Where humans come into contact with the natural world, their role,

rather than king, is secretary; their duty is to insure the smooth functioning of the interactions with the natural world.

The NOAA's Hatchery Policy Proposal definitely contradicts Naess' beliefs. Rather than acting as stewards for wild salmon, the NOAA interferes and even acknowledges the potential to undermine them. Where the PCFFA calls for greater human responsibility for endangered salmon, the Hatchery Policy Proposal wants to isolate endangered salmon. The NOAA wants ecosystems to be apart from the state of salmon. The NOAA and its Hatchery Policy Proposal seem not to recognize the importance of a whole ecosystem approach or the interconnectedness of the Earth as a whole.

Rethinking Salmon and the Endangered Species Act

Despite being listed by the Endangered Species Act, salmon continue to struggle. Dams choke the main stem of the Columbia River and many of its tributaries. Water temperatures remain critically high. Deforestation clogs streams with sediment. Even synthetic estrogen excreted from women on birth control pills hurts salmonids by reducing male fertility rates (Schultz et al. 2003). Commercial fishermen continue to take the maximum allowable catch. Also among the major problems is the burgeoning human population in the Pacific Northwest:

> The human population of the Pacific Northwest is growing at an annual rate comparable to those of some third world countries. … Given such a probable

> human population level, you may ask whether or not society is being delusional about the chances of the Endangered Species Act, or anything else, doing much to save wild salmon. (Lackey, 2001, p. 9)

A spectrum of problems exists that threaten the future of salmon species in the Pacific Northwest. Thirty years after its passage, it is time for the ESA to be overhauled. "The statute is in trouble and species continue to disappear" (Burgess, 2001, p. 4). The shortcomings of the legislation range from poor implementation provisions, to inconsistent treatment levels, to poor addressing of habitat issues, to countless other small loopholes and vagaries that make it inefficient (Burgess, 2001, p. 23). The bottom line is that salmon numbers are continuing to decline. All the while, stresses on the fish (e.g. population growth) continue to rise. The ESA quite simply is not capable of doing enough to protect threatened and endangered salmon species.

Rolston and Naess advocate for a more encompassing approach to saving species. "A species is what it is inseparably from the environmental niche into which it fits" (Rolston, 1988, p. 153). By expanding the focus to entire ecosystems, the protection of species would automatically fall under this umbrella approach. "By focusing on ecosystems rather than species, this sort of approach has the potential to reap tremendous benefits in the protection of biodiversity" (Jensen, 2003, p. 19). The ESA is too limiting in its approach. "Nor, I believe, can we have any effective protection of biodiversity without this larger, more holistic approach to conservation, an approach clearly intended by the ESA" (Jensen, 2003, p. 22). The ESA's current form provides a stopgap measure

that leaves species on the ESA list of threatened and endangered species. By remaining on the list, species will continue to dangle precariously close to extinction. A broader, more holistic approach to the ESA is necessary to bring back salmon.

To truly save salmon species in the Pacific Northwest, a bigger picture model needs to be implemented and enforced. Rolston recognizes that "endangered species typically means an endangered habitat" (1988, p. 153). To take the argument a step further, species and their habitats, the ecosystems in which they operate and live, cannot truly be separated. "During the last fifty years, scientists have shown that salmon, like other creatures, have evolved in close relationship with their physical environment" (Cone 7). Section 4 of the ESA states, "Critical habitat is to be determined and listed at the same time a species is listed unless the critical habitat 'is not then determinable'" (Burgess, 2001, p. 5). This definition needs to read "ecosystem" instead of "habitat" and shed the meaningless "critical" component. The NOAA should also move to factor ecosystems and habitat into its definition of endangered salmon. Turning a blind eye to fish habitat ignores the real issues and casts salmon down a road of further struggles.

Rolston claims that "[d]estroying species is like tearing pages out of an unread book, written in a language that humans hardly know how to read" (Rolston, 1988, 129). If that is true, then the ESA ignoring ecosystems is like tearing out entire chapters of the book. Rolston and Naess place an extremely high regard on species. Species are essential to both of their environmental ethics. Both Rolston and Naess realize, however, that without taking a complete ecosystem approach, one that values all species equally, species will continue to suffer. Salmon species of the Pacific Northwest are among those

species suffering. As more and more stresses continue to mount and more and more of the salmon's ecosystem is destroyed, the potential for salmon extinction in the Pacific Northwest is an unavoidable reality. In order to save salmon species in the Pacific Northwest, it is time to move past the narrow, limiting focus of the ESA and resulting policy proposals like the NOAA's Hatchery Policy Proposal. Instead, it is time to embrace the whole ecosystem approach advocated by Rolston and Naess.

Conclusion

Salmon truly are at a crossroads. Their fate rests in the hands of an administration that favors interests competing directly with the welfare of the salmon. In supporting industries like hydropower, irrigation, and timber, the Bush Administration and the NOAA embrace the mechanization of nature (White 1995). The complete scientific picture is being overlooked by them in favor of a scientific viewpoint that ignores the immense complexity of the river ecosystem and the salmon's place within it. The Bush Administration's ingrained ideology favors business and industry interests over salmon and resulted in the formation of the Hatchery Policy Proposal. This proposal rejects the findings of the NOAA's own scientific advisory committee and the concerns of local Pacific Northwest groups, like the PCFFA, that possess a working knowledge of salmon. The Bush Administration is wedded to industries like hydropower, irrigation, and timber and puts their interests above all others. The course of the salmon's future will depend on whether the Bush Administration's interests can be overcome.

The NOAA Hatchery Policy Proposal reverts back to the philosophy that nature can be managed by humans. In the past:

> Politicians, scientists, and most citizens believed in reshaping and managing the landscape to meet our short-term needs. We believed we had the wisdom and ability to simplify and control ecosystems, to make them more productive. We held these beliefs deeply enough to overlook signs of failure even as they clamored for our attention. (Wolf and Zuckerman, 2003, p. 27)

In failing to recognize the lessons from history, lessons that almost directly mirror the current situation, the Bush Administration and the NOAA are likely to be condemning salmon and their ecosystems. The Hatchery Policy Proposal would set back the small but steady advances in salmon gains over roughly 50 years and essentially deem the countless millions of dollars spent on wild salmon restoration efforts worthless. The Bush Administration and the NOAA believe the parts of the machine are greater than the whole, and are prioritizing their own agenda and ideology above the local interests. The Hatchery Policy Proposal arose from the NOAA because of its historical interpretations, interpretations of science, legal interpretations, ethics, sense of entitlement, and threats to power. It is time to take a deeper look at those foundations and weigh them against the locally based counter narrative and the calls for a whole ecosystem approach to endangered salmon conservation and management.

If the NOAA leadership is truly to save salmon, a goal that does not seem high on the priority list, it must move away from its current position and take a broader approach to endangered salmon conservation and management. In fact, NOAA policy makers should really follow their own advice if they want to save salmon: "To meet these challenges, we must be at the forefront in developing and implementing an ecosystems approach to management that is geographically specific, incorporates science, involves partners, addresses broader ocean issues, and is adaptive" (Lautenbacher, 2004, p.4). Holistic conservation and management methods are not knew or unknown. NOAA leaders must practice what they preach and make the difficult decisions to give salmon the full protections they need. There are many unpredictable variables that come into play in the endangered salmon conservation and management effort, and putting all the eggs in one basket denies the reality of the situation (House 1999). The situation of endangered salmon can be improved, but it will take a broader vision, with multiple solutions, and a coalition of stakeholders working together (Crutchfield and Pontecorvo 1969). The priorities of the NOAA must change and recognize the importance of salmon, and machine's other organic components, if healthy, sustainable salmon populations are to be reached.

Relying on hatcheries to save endangered salmon stocks is naïve, ignores lessons from the past, the experience of local people like commercial salmon fishermen currently working with the fish, and the foresights of esteemed environmental ethicists. Hatcheries may have a role in helping restore endangered salmon, but they should not be the sole solution. There should not be salmon without rivers. Pacific Northwest salmon are at a

critical period. The NOAA can doom the salmon to an existence relying on humans and hatcheries or take an integrated approach factoring in the PCFFA counter narrative. There is no one answer to saving endangered salmon, but policy makers can seize upon the moment and force a paradigm shift towards the ESA that truly embraces a whole ecosystem approach to conservation and management (Frissell 1993). Rather than halting at the crossroads and turning back to the past, a protection policy can be created that embraces the whole ecosystem approach and blazes a new, sustainable path for endangered salmon conservation and management. The odds against salmon are mounting. Now is the time to act.

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