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Dynamic Accountability in Hatchery Management: Salmon Hatchery Mismanagement and a Strategy for the Future

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Despite the breadth and depth of research on endangered salmon species, salmon hatcheries, and the interaction of hatchery fish and wild fish, there is too little organization or collaboration among salmon hatchery operators. This article proposes a solution to hatchery mismanagement and the possible routes to that solution through injunctive relief pursuant to the U.S. Endangered Species Act. In a nutshell, the proposal is to create a system of “dynamic accountability” among hatchery managers by creating an organized network of professionals who must pool their information and experiences in order to learn from each other on a rolling basis. Ultimately, this model for hatcheries may be a way to improve other captive breeding programs with the tools of information pooling and continuous improvement.
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II. Introduction

Imagine you are a judge caught in the crosshairs of a battle for survival; a battle for the survival of an endangered or threatened species. The species at issue in the case you are adjudicating is found in its wild habitat, but is increasingly bred in captivity to boost its population. However, even with advanced breeding technologies, the species is still heading towards extinction at an alarming rate. The problem seems to lie with the captive breeding programs, the different breeding procedures used, a lack of communication among breeders, and general mismanagement among breeding programs. As a judge, you know the limits of your own scientific expertise, but you wonder, is there anything I can do to help this species? Using your judicial power there must be something you can do.

Someday soon the district court judges in Oregon and Washington State may be forced to answer this question on behalf of the Pacific Salmon. This article seeks to offer assistance to endangered and threatened species where captive breeding programs do not seem to be doing all they can to combat extinction. In particular, this article gives the courts a way to assist the Pacific Salmon, a group of salmon species bred in hatcheries and found in the wild, using the Endangered Species Act “the Act.” Using the Act’s mandate of the “best scientific and commercial data available” the courts can force the government agencies in charge of hatchery programs to do more, in turn forcing the hatcheries to go further in their determination of what constitutes the “best scientific and commercial data available.”  

can mandate change among hatchery programs by finding that hatcheries “take” wild salmon through improper breeding techniques and destruction of habitat.2

These courts can compel action through the issuance of an injunction, which prescribes a course of action that the hatcheries and associated agencies must follow. For example, Judge Redden, “the salmon judge,”3 of the United States District Court for the District of Oregon recently mandated change to the Biological Opinions “BiOps” of the Army Corp of Engineers “Corps” and the Bureau of Reclamation “BOR,” whose BiOps were approved by the National Oceanic and Atmospheric Association “NOAA.”4 Judge Redden held that under Section 7 of the Act, the Corps and BOR failed to prove that the Federal Columbia River Power System, which includes 14 hydroelectric dams, “is not likely to jeopardize the continued existence” of listed species, because the BiOps did not include specific mitigation plans past 2013.5 The judge found NOAA’s approval of the BiOps to be arbitrary and capricious.6 Redden remanded the BiOps to NOAA to reevaluate mitigation measures past the year 2013.7 Using the judiciary’s power in a similar way, the court can issue a judicial injunction mandating the management of captive breeding programs (in the Pacific Salmon’s case, hatchery programs) work

5. Id.
6. Id.
7. Id.
together to create a body of knowledge whereby each individual hatchery population is benefitted.

The cooperative professional organization proposed here is modeled on the theories of Michael C. Dorf and Charles F. Sabel, posited in their groundbreaking article, *A Constitution of Democratic Experimentalism*, which is discussed further in Section IV (B)(2) of this article. The organization will consist of a working group where hatchery managers may speak about the problems they have faced at their hatcheries, successful methods they have used, and generally, the state of the Pacific Salmon in their mini-ecosystem. The goal of this organization would be to create the best available science through communication and frank dialogue, without consequences for managers who mismanage, but are willing to improve their programs. The group will use the Institute of Nuclear Power Operations as a model and will create working papers similar to the Hatchery Reform Project.

**A. What is a Hatchery?**

Hatcheries are “fish breeding and raising centers” that may be created for a multitude of purposes including: sport; commercial fishing; tribal fishing; and conservation.

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11. Frequently Asked Questions- Salmon Hatchery Questions and Answers, NORTHWEST FISHERIES SCIENCE CENTER- NOAA FISHERIES SERVICE,
Salmon hatcheries have been used for these purposes in the Pacific Northwest since the 19th century. However, in the 1930s the construction of hydroelectric dams along salmon rivers jumpstarted the involvement of the United States federal government in salmon hatcheries.

The start of United States government’s involvement in hatcheries is usually pinpointed to 1938. In 1938, Congress passed the Mitchell Act to protect salmon populations that were affected by the creation of hydroelectric dams, where spawning grounds were either blocked by dams or flooded. The Mitchell Act directed the Department of Commerce to conduct research to determine how to best conserve the salmon species along the Columbia River and “to perform all other activities necessary for the conservation of fish in the Columbia River Basin in accordance with law.”

The current Mitchell Act program includes the operation of 17 fish hatcheries, which release between 50 and 60 million juvenile fish. The National Oceanic and Atmospheric Association “NOAA” estimates that, including the Mitchell Act hatcheries, there are 365 hatchery programs in the region, which are operated by the states of


12. Id.


14. Id.


Washington, Idaho, and Oregon, the U.S. Fish & Wildlife Service, and by Native American tribes. In 2008, American, Canadian and Pacific Rim hatcheries, released a combined estimated total of 5 billion fish into the Pacific Ocean.

The creation of hatchery fish is a multi-stepped process. First, salmon that return to spawn are captured and the egg and sperm are extracted, mixed together, and the produced zygote is incubated. When the salmon fry hatch, the fish are placed into holding tanks to grow. The fish are then released into the river where they make their way to the ocean.

**B. Hatcheries are Here to Stay**

An observer unaware of the Columbia River Basin may look at the river and see thousands of salmon rushing by and think to himself, why are these species endangered, there are so many fish! What this observer would not know is that currently, “more than 95% of coho, 70% of spring-run Chinook, 80% of summer run Chinook, and 70% of

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20. Id.

21. Id.
steelhead adults [were] reared in hatcheries.”  

Unfortunately, wild salmon are still on the decline in California, Oregon, Washington, and Idaho. The main threat to wild salmon is the increasing human population on the west coast of the United States.

Robert Lackey, a retired senior fisheries biologist with the EPA, does not have hope for the wild fish, especially considering the large lifestyle changes people would have to make, in order to restore the salmon populations. After his tenure with the EPA, Mr. Lackey retired to become a professor of fisheries science and political science at Oregon State University. Mr. Lackey’s viewpoint is important, because of his prior position with the EPA, his Gold Medal for Exceptional Service from the EPA, and his contribution to salmon recovery scholarship, with over 100 published articles and books on the subject.

Not only have the hydroelectric dams made it near impossible for Pacific Salmon to reach their natal breeding grounds, the dams have further decimated the salmon

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24. *Id.*

25. *Id.*


populations by creating a perfect smorgasbord of salmon for sea lions to feast upon.\textsuperscript{28} The sea lions gather just below the Bonneville Dam and “gorge on salmon migrating upriver to spawn.”\textsuperscript{29} The federal government has tried to prevent the sea lions from eating the endangered and threatened salmon with firecrackers, loud noises, and rubber bullets, but to no avail.\textsuperscript{30} The sea lions are having a “significant effect” on salmon recovery, and therefore NOAA has authorized state agencies to kill up to 85 salmon eating sea lions a year.\textsuperscript{31} This is just one example of a species adapting to man-made creations and using the creation, in this case the dam, for its benefit.

Predator species have also adapted to the hatchery fish. The great blue heron has learned to mimic the feeding process at the hatcheries, sprinkling water on the surface to encourage the salmon to come to the surface.\textsuperscript{32}

One way to address the problems created by hydroelectric dams would be to get rid of hydroelectric dams. In Washington State that is exactly what the operator of the Condit Dam decided to do.\textsuperscript{33} For PacifiCorp the cost of keeping the Condit Dam in

\begin{itemize}
\item \textsuperscript{29} \textit{Id.}
\item \textsuperscript{30} \textit{Id.}
\item \textsuperscript{31} \textit{Id.}
\item \textsuperscript{32} Joseph C. Dupris, Kathleen S. Hill, & William H. Rodgers, Jr., \textit{The Si’lailo Way: Indians, Salmon and Law on the Columbia River} 301 (2006)[hereinafter Si’lailo Way].
\item \textsuperscript{33} Lynda V. Mapes, \textit{Condit Dam to be Demolished Wednesday}, SEATTLE TIMES (Oct. 25, 2011, 9:00 PM), http://seattletimes.nwsource.com/html/localnews/2016606447_condit26m.html.
\end{itemize}
environmental compliance was too high, while the price of demolishing the dam was quite low.\textsuperscript{34} One citizens group stated that 33 miles of steelhead and 14 miles of salmon habitat lie upstream from where the dam used to be located.\textsuperscript{35} Demolishing a dam is not always the most cost effective way of dealing with government regulations pertaining to salmon species, but in some cases demolition ought to be considered an option.

C. What can be done to Improve Hatchery Performance?

According to the conservation group “Give a Dam for Salmon,” the United States government has spent more than $7 billion on attempts to restore the salmon populations in the Columbia and Snake Rivers.\textsuperscript{36} In 2002, the United States General Accounting Office (GAO) studied Columbia River expenditures in a report entitled “Columbia River Basin Salmon and Steelhead: Federal Agencies’ Recovery Responsibilities, Expenditures, and Actions.”\textsuperscript{37} The GAO estimated that in the five years preceding the study, over $1.5 billion was spent on Columbia River salmon, alone.\textsuperscript{38} Even with these large expenditures the effects of recovery actions on salmon populations are unknown.\textsuperscript{39} This paper

\begin{itemize}
\item \textsuperscript{34} Condit Dam Removal Project, \textit{STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY}, http://www.ecy.wa.gov/programs/wr/cwp/condit.html (last visited Dec. 28, 2011)
\item \textsuperscript{36} \textit{Why remove the lower 4 Snake River Dams?}, \textit{GIVE A DAM FOR SALMON}, http://www.giveadamsalmon.org/index.php?option=com_content&task=view&id=27&Itemid=42#Taxpayers (last visited Dec. 28, 2011).
\item \textsuperscript{38} \textit{Id}.
\item \textsuperscript{39} \textit{Id}. at 19.
\end{itemize}
prepares to create a level of accountability for the expenditure of billions of dollars, which the government admits may not even benefit the salmon population.

D. The Endangered Species Act

The Endangered Species Act was created to conserve endangered and threatened species and their habitats. To determine whether a species is threatened or endangered under the Act, under section 4 of the Act, the Secretary may list species for any of a number of reasons, including over-harvestation, habitat loss, and other “natural or manmade factors affecting its continued existence.” Section 4 of the Act also mandates the Secretary use the “best scientific and commercial data available” to make her determination on the status of a species. This article questions whether the best scientific and commercial data currently used is the best scientific and commercial data available. Salmon hatchery managers have the ability to work together to create better data by continuously updating each other’s information. With the right incentives, this


41. The word Secretary in the Act refers to the Secretary of the Department of Interior or the Department of Commerce, dependant on the species to be examined. 16 U.S.C. § 1532(15) (2011).

42. 16 U.S.C. 1533(a)(1) (2011). The factors include: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Id.

kind of information sharing can improve the quality of the best scientific and commercial data through a judicial injunction.

The Endangered Species Act mandates cooperation between government agencies. In particular, section 7(a)(1) of the Act requires that all government agencies confer with the Secretary to “utilize their authorities” to “carry out programs for the conservation of endangered species and threatened species….“44 Additionally, section 7(a)(2) of the Act requires that each Federal agency ensure that any agency action “is not likely to jeopardize the continued existence of any endangered species or threatened species” or result in the destruction or adverse modification of [critical] habitat.45 Under section 7(a)(2), the agency completing the action must use the “best scientific and commercial data available.”46 Federal hatcheries either should be bound by section 7(a)(1)’s “conservation” duty or threatened with a citizen suit under 7 (a)(2).

Private hatcheries should face liability under Section 9 of the Endangered Species Act. Under section 9, which pertains to any endangered fish or wildlife listed under section 4 of the Act, it is unlawful for any person to “take any such species within the United State or the territorial seas.”47 In the Act, “take” is a defined term, which includes harm to a protected species.48 Under the Act, harm to the species can include “significant

46. Id.
habitat modification or degradation.” 49 The Secretary can also prohibit any take of a threatened species through Section 4(d) of the Endangered Species Act. 50 In the case of threatened Pacific Salmon populations the Secretary has utilized Section 4(d) to protect certain distinct population segments. 51 Mismanagement of hatchery fish can modify and degrade the habitat of wild fish, harming the wild fish and engaging in a prohibited take of threatened and endangered salmon under the Endangered Species Act.

Violation of these sections of the ESA can result in an injunction to prevent the future violation of the Act. In order to sustain a request for an injunction, the plaintiff, be it the federal government or a citizen’s group, need only demonstrate that “irreparable injury is likely to occur in the absence of an injunction.” 52 However, to issue a preliminary injunction the court “must balance the competing claims of injury and must consider the effect on each party of the granting or withholding of the requested relief.” 53 When deciding whether an injunction is appropriate the court must weigh the equities at issue and the public interests at stake. 54 In the case of an injunction against the hatcheries, the studies cited in this article create a body of proof a plaintiff can use to

54. Winter, 555 U.S. at 22 citing Amoco, 480 U.S. at 546, n. 12.
prove that hatchery mismanagement causes “irreparable injury” to the salmon population and it is in the public interest to cease harming the salmon.

E. Listing the Pacific Salmon

The term Pacific Salmon encompasses five different salmon species, including chinook, chum, coho, pink and sockeye. This article uses the term Pacific Salmon to represent all five species and in certain places will speak specifically about one of the five species, in which case, the species name will be used. NOAA often groups the steelhead fish with Pacific Salmon species, as both share the same habitat and are *salmonids*.

Pacific Salmon begin their lives in fresh water streams, migrate to the ocean for their adult lives, and return to their natal stream to breed and die. The last step in their lifecycle, the journey from ocean back to natal stream, is what makes the Pacific Salmon’s existence so precarious. The natal stream may be a thousand or more miles from the ocean with obstacles such as fishermen’s nets, polluted waters, power dams, fish ladders, waterfalls, and predators making the journey near impossible. The biggest


58. *Id.*

59. *Id.*
threats to Pacific Salmon populations are classified as the “4-H’s”: Habitat destruction, Hydroelectric dams, over-Harvest of rare stocks, and competition with Hatchery fish.\textsuperscript{60}

In 1991 NOAA received a petition to list the Pacific Northwest Salmon as an endangered or threatened species.\textsuperscript{61} In response to the petition, NOAA conducted years of research to determine which species of Pacific Salmon were endangered or threatened.\textsuperscript{62} Section 3(16) of the Endangered Species Act defines the term species to “include any subspecies of fish or wildlife or plant, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.”\textsuperscript{63} The term distinct population segment (DPS) is not defined under the Act but the services have defined it through a series of policy statements. For the Pacific Salmon, the National Marine Fisheries Service (NMFS), under the Department of Commerce, was charged with defining the term “species.”\textsuperscript{64} In 1991, the agency issued a “Policy on the Definition of Species under the Endangered Species Act” defining “species” as an Evolutionary Significant Unit (ESU) of the biological species.\textsuperscript{65} To be labeled an ESU the fish stock had to meet two conditions: “(1) It must be substantially reproductively isolated from other nonspecific population units; and (2) it must represent an important

\textsuperscript{60} Id.


\textsuperscript{62} Id.


\textsuperscript{64} 56 Fed. Reg. 58,612 (Nov. 20, 1991).

\textsuperscript{65} Id.
component in the evolutionary legacy of the species.” Under this definition, the FWS and NOAA published a joint policy detailing the general process for determining DPS’s under the Endangered Species Act. This “Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act,” was published on February 7, 1996. The policy’s purpose was to interpret the term DPS in a “clear and consistent fashion.” However, within this policy statement, the agencies made it clear that the NMFS “Policy on the Definition of Species under the Endangered Species Act,” defining the DPS for Pacific Salmon is consistent with the joint policy of February 7, 1996.

The 1996 policy on DPS’s considered three elements when determining the status of a DPS: “1. Discreteness of the population segment in relation to the remainder of the species to which it belongs; 2. The significance of the population segment to the species to which it belongs; and 3. The population segment’s conservation status in relation to the Act’s standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).” Under the policy, a population is discrete, in relation to the remainder of the species, if it is either “markedly separated” from other members of the taxon or “delimited” by international government boundaries which make for differences in “control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of

66. Id.
68. Id.
69. Id. at 4,725.
If a population is considered discrete under the policy, then its significance, under the Act, will be determined through a consideration of scientific evidence of the population’s importance to the taxon. Then, if the population is considered both discrete and significant it will be evaluated for endangered or threatened status, based on the factors established in section 4(a) of the Act.

Once the definition of species was determined, NOAA scientists identified and evaluated 52 ESUs. A total of 28 ESUs are now listed as endangered or threatened.

F. Where Hatchery Salmon Fall Under the ESA

Hatchery fish may be genetically in the same Linnaean species as wild fish, but should hatchery fish be counted in abundance estimates when the Secretary makes her decision to list a salmon species as an endangered or threatened species? This is the question that the 9th Circuit faced in the seminal case, Trout Unlimited v. Lohn. The case involved Trout Unlimited’s challenge to two of the NMFS’s decisions: 1) the rejection of Trout Unlimited’s petition to separate hatchery and wild salmon into different

70. Id.
71. Id.
72. Id.
74. Id.
75. Trout Unltd. v. Lohn, 559 F. 3d 946 (9th Cir. 2009).
ESUs; and 2) NMFS’s decision to downlist a population of steelhead from endangered to threatened.\textsuperscript{76}

Trout Unlimited argued that these two decisions were arbitrary and capricious and therefore in violation of the Administrative Procedure Act.\textsuperscript{77} The 9\textsuperscript{th} Circuit determined the Hatchery Listing Policy is entitled to \textit{Chevron} deference.\textsuperscript{78} The Hatchery Listing Policy was entitled to \textit{Chevron} deference because the court granted \textit{Chevron} deference to an earlier listing policy in another case, and the listing policy at issue in \textit{Trout Unlimited} went through the same notice-and-comment process as the earlier policy which the court found “Congress ‘expressly delegated authority to the Service to develop criteria for evaluating petitions to list endangered species.’”\textsuperscript{79}

In \textit{Trout Unlimited}, applying \textit{Chevron}, the 9\textsuperscript{th} Circuit held that hatchery fish might be considered as part of the same “evolutionary significant unit” as wild fish.\textsuperscript{80} The 9\textsuperscript{th} Circuit reasoned that Trout Unlimited’s argument “collapses two analytically distinct phases of agency action: the initial decision regarding the composition of the ESU, and the subsequent decision whether to list the ESU.”\textsuperscript{81} The court found Trout Unlimited’s argument was misdirected at the composition phase, where the only concern ought to be the “neutral” task of defining a species, and not the hatchery fish’s threat to

\begin{flushleft}
\textsuperscript{76} \textit{Id.} at 953.

\textsuperscript{77} \textit{Id.}

\textsuperscript{78} \textit{Id.} at 954.

\textsuperscript{79} \textit{Id.} at 954 (quoting Nw. Ecosys. Alliance v. U.S. Fish & Wildlife Serv., 475 F.3d 1136, 1141-42 (9\textsuperscript{th} Cir. 2007)).

\textsuperscript{80} \textit{Trout Unltd.}, 559 F. 3d at 955.

\textsuperscript{81} \textit{Id.} at 955.
\end{flushleft}
the existence of wild fish. The court believed Trout Unlimited argument ought to have been directed at the listing stage, where threats to the species’ continued existence are analyzed. As to whether there are genetic and behavioral differences between hatchery and wild fish, using the Chevron standard of deference, the court reasoned that there was evidence proving both the similarities and differences between hatchery and wild salmon, and it was not the court’s job to interfere with the agency’s discretion in choosing to group hatchery and wild fish in the same scientific category.

III. Hatchery Fish in Science and Society

A. Differences between Hatchery and Wild Salmon

Hatchery fish are a part of the same Linnaean species as wild salmon, however human intervention has caused some genetic differences between the two populations, as one writer explains “hatchery fish, for the most part, have dumber DNA.” For one, the hatchery populations may come from a small common stock, therefore when the fish are introduced into the wild, there can be an increase in inbreeding, due to a reduction in genetic diversity among the population. Hatchery managers may also alter the population by artificially selecting breeding stock for a specific trait, for example

82. Id.

83. Id.

84. Id. at 956.


selecting for larger fish. In addition, hatchery stock may be bred from a population that returns to spawn at a certain time of year, rather than the diversity of spawning times that exist in nature, a trait that is extremely important to salmon populations. Another factor that can alter the genetics of hatchery fish is the hatchery environment itself, which may alter the population by selecting fish that fare best in the hatchery environment, which does not necessarily correlate to fish that would survive best in the natural environment. In the wild, fish choose mates based on mysterious, unquantifiable reasoning, while in the hatchery, humans, who do not know which salmon would naturally make the best breeding pairs, choose mates for the fish. These factors combine to create a salmon population that is in the same species as wild salmon, but is not exactly what nature intended.

Wild salmon have been evolutionary distinct for over 50 million years, while hatchery salmon populations have existed for a few decades, or less. History and science show that wild salmon are able to adapt to environmental challenges, however the same cannot be said for the hatchery populations. If the goal of salmon conservationist is simply to maintain hatchery populations, and hatchery salmon prove unable to adapt to

87. Id.
88. Id.
89. Id.
90. Id.
92. Id.
environmental changes, the cycle will never end and the United States will be paying to operate hatcheries into eternity. On the other hand, if conservation strategies involve boosting the population of wild salmon, perhaps someday hatcheries can be eliminated and salmon can thrive on their own.\textsuperscript{93}

Studies show that hatchery fish are inferior in their ability to survive and breed in the wild.\textsuperscript{94} A NOAA technical memorandum confirmed these findings, concluding that the nonlocal, domesticated hatchery stocks of steelhead, coho, and Atlantic salmon studied had low (<30\%) lifetime relative fitness in the wild compared to native populations, which means that the hatchery fish did not survive in the wild for as long as the wild fish.\textsuperscript{95} However, contrary to the hypothesis that all hatchery fish fare worse than wild fish, local hatchery, first generation stock had a relatively high level of success.\textsuperscript{96} Because hatchery fish that were produced from domesticated stock had low lifetime fitness, but the first generation stock of hatchery fish had a high level of lifetime fitness,
the authors of NOAA’s technical memorandum concluded that a loss of fitness increased with the duration of the lifecycle spent in captivity.97

This study seems to suggest that as a government becomes more reliant on hatcheries to compensate wild salmon populations the more weak the hatchery populations will become. First generation hatchery fish are just as fit for life in the wild as wild fish, but the more time a population of fish stays in a hatchery the more ill-prepared it will be for life in the wild. Using first generation hatchery fish is problematic because it means that wild salmon have to be continually introduced into the hatchery environment to produce the harvests. These are findings hatchery managers ought to be aware of when strategizing the best way to balance assisting the wild salmon populations and creating the most resilient hatchery fish.

B. Effect of Hatchery Salmon on Wild Salmon

Unfortunately, another side effect of hatcheries is that they have contributed to increased mortality among wild salmon. A study published in the scientific journal, The Royal Society, hypothesized that because wild salmon and hatchery salmon share the same food sources while the populations are in the ocean, when there are limited food supplies, the wild salmon will suffer because the hatchery fish exacerbate the food limitation.98 The study analyzed Chinook salmon populations and found that the impact of hatchery fish on wild fish is most likely dependent on ocean conditions. The authors

97. Id. at 21.

found, when there are poor ocean conditions, hatchery releases “appear to have a strong negative effect on the survival of wild salmon.”

C. The Problems with Salmon Hatcheries

Hatchery management has long been criticized as a hindrance to the resurgence of wild salmon, and overall, hatchery fish have been seen as a poor substitute for wild fish. In *The Si’ilailo Way: Indians, Salmon and Law on the Columbia River* the authors assert their belief that the failure of the hatchery system is the fault of the “law’s inability to exact any measure of legal retribution for errors made.”

The authors expand upon this thought, stating that in the hatcheries of today, failure in hatchery management is considered normal and there is no law to protect the fish from being mismanaged.

Essentially, with no penalty for doing poorly, hatcheries do poorly and there is nothing to stop them from continuing to do poorly.

An example of poor hatchery management was found in the case, *Wild Fish Conservancy v. Salazar,* another case heard in the 9th Circuit Court of Appeals. At issue in the case were the operation of the Leavenworth National Fish Hatchery, a salmon hatchery, and the impact of the hatchery on the migration of the threatened Bull Trout.

Under Section 7 of the Endangered Species Act, the U.S. Fish and Wildlife Service “the Service” was required to ensure the operation of the hatchery was “not likely to

99. *Id.*
100. DUPRIS, HILL, & RODGERS, supra note 32.
101. *Id.* at 302.
102. *Wild Fish Conservancy v. Salazar,* 628 F.3d 513 (9th Cir. 2010).
103. *Id.* at 516
jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat….“104 The U.S. Fish and Wildlife Service issued a Biological Opinion (BiOp) in 2008 which concluded, for the years 2006-2011, the hatchery was not likely to jeopardize the existence of the threatened bull trout.105 However, the Circuit Court found the hatchery blocked the bull trout’s passage into Icicle Creek, and therefore, during the salmon collection period, the bull trout were not able to return upstream to spawn.106

In this case, for purposes of Section 7 of the ESA, the Fish and Wildlife Service was the “action agency” because it operated the hatchery and the “consulting agency” because it was in charge of approving or denying the Section 7 permit.107 The Service found that the actions of the Service in operating the hatchery were “not likely to appreciably reduce the likelihood of both the survival and recovery of the bull trout in the wild.”108

The Wild Fish Conservancy challenged the Service’s BiOp in the district court and on a motion for summary judgment, the district court found the BiOp was “sufficiently well-documented and explained” and granted the Service’s motion for summary judgment.109 The Conservancy appealed to the Circuit Court and that court

105. Wild Fish Conservancy, 628 F.3d at 516.
106. Id. at 518.
107. Id.
108. Id. at 520.
109. Id. at 521.
found that the five-year period studied by the Service was not long enough. According to the court, the Service had an obligation to determine if there was “an appreciable impact on the species” and the time frame used undermined the agency’s ability to do so.\textsuperscript{110}

The Fish and Wildlife Service needs to do a better job assessing the impacts of hatcheries and help to ensure that all species are protected. Saving the salmon while harming the Bull Trout was not the agency’s objective and should not be the end result of agency actions.

In a paper, \textit{The Controversy about Salmon Hatcheries}, published in the scientific journal, \textit{Fisheries}, scientists argued that hatchery salmon are not at fault for their “weakness,” rather poor management of the hatchery fish makes these fish inferior.\textsuperscript{111} The authors feared that without “rigorous and objective evaluation” of hatchery production, the Pacific Salmon would be at risk.\textsuperscript{112} The authors asserted that the main reason hatchery salmon are not reproductively successful in the wild is poor management, for example, the practice of placing surplus hatchery fish into streams they were not designed for, for the sole purpose of increasing harvest.\textsuperscript{113} Another poor management decision that leads to the perception that hatchery fish are inferior is the determination of what time of year is best to release hatchery fish into the wild.\textsuperscript{114} When

\footnotesize
\begin{itemize}
\item 110. \textit{Id.} at 522.
\item 112. \textit{Id.} at 13.
\item 113. \textit{Id.} at 14.
\end{itemize}
hatchery fish are introduced into the wild at a time when wild fish are not spawning, the hatchery salmon have decreased chances of reproduction.\textsuperscript{115}

Another poor management decision that the authors of \textit{The Controversy about Salmon Hatcheries} observed is the introduction of unrelated fish into a wild habitat. These non-native species most likely have a different spawning period than the native species, a factor that can be “so crippling to progeny success that no fisheries manager would expect out-of-basin wild fish to perform as well as the native fish in local conditions.\textsuperscript{116} Mismanagement of hatchery fish has given hatchery fish a bad reputation, although there is no evidence that decreases in wild salmon fitness are the result of artificial propagation of hatchery salmon.\textsuperscript{117}

This article demonstrates that there is much to sort out in hatchery management. But the only parties competent to do so are hatchery managers themselves. Courts are certainly not in a position to sort out the veracity of such claims. In the final part, this article proposes a mechanism for holding hatchery manager accountable.

\textbf{IV. A Mechanism for Holding Hatchery Managers Accountable}

\textbf{A. What is the Best Function for Salmon Hatcheries?}

Salmon Hatcheries have existed in the Pacific Northwest for over a century and, for good or for ill, with the way things stand right now, according to the National Academy of Sciences, without hatcheries there would be major declines in salmon

\textsuperscript{114} Id.

\textsuperscript{115} Id.

\textsuperscript{116} Id. at 15.

\textsuperscript{117} Id.
runs. So, unless a cleaner, cheaper form of electricity is discovered soon, hydroelectric power is here to stay, and with it, the dams that block salmon from returning to their spawning grounds.

In some ways wild salmon populations may benefit from hatchery fish. For one, by introducing hatchery fish into a small population of wild salmon, small inbreeding populations can be avoided, as hatchery fish will actually increase the genetic diversity of the wild population. In fact, the declining populations of salmon may in part be due to declining fitness of the wild salmon, not solely due to habitat degradation or an influx of hatchery fish into wild salmon population. Hatchery fish are also a diverse population and have the ability to give rare alleles, which may not be able to survive in the wild, a chance to survive in the hatchery and potentially in the wild upon release.

B. How can we Better Manage Hatcheries?

i. Democratic Experimentalism

In their article, “A Constitution of Democratic Experimentalism,” Michael C. Dorf and Charles F. Sabel posit the idea that a decentralized government can better adjust to local circumstances. The role of Congress in the experimentalist structure would be to “encourage and coordinate this decentralized decisionmaking.” Using an

118. Dupris, Hill, & Rodgers, supra note 32.
120. Id.
121. Id.
122. Dorf & Sabel, supra note 8, at 340.
123. Id.
experimentalist design, the hatchery collective this article seeks to create will include federal agencies in an oversight role, but beyond that, the individual hatcheries and their managers would be responsible for the functioning of the group. For example, rather than Congress attempting to increase the amount of spawn that reach maturity through a mandate that hatcheries only release spawn at a certain time, Congress would delegate this task to the experts, the hatchery managers, to determine the best way to increase the amount of mature hatchery fish. According to the principles of experimentalism, the actors will determine the size of the collective\textsuperscript{124}, so in this instance hatchery managers can decide whether it is best to have separate collectives dependent upon the species of fish that are managed at a hatchery, collectives dependent upon the region or river the hatcheries feed, or one large collective.

The administrative agencies will also play a role in the organization of the collective. In the experimentalist paradigm administrative agencies play the role of an overseer or “benchmarker,” locating and organizing the local actors.\textsuperscript{125} Additionally, the administrative agencies can develop benchmarks, whereby the progress of the collective, in reaching its goals can be measured. In the case of a salmon collective, the Fish and Wildlife Service, along with other involved federal, state, and local agencies, would best know the local hatchery managers and be able to coordinate them. Additionally, because the Endangered Species Act contain a mandate that the Secretary use the “best scientific and commercial data available,”\textsuperscript{126} hatcheries can use an experimentalist model to create

\begin{itemize}
  \item \textsuperscript{124} Id. at 343.
  \item \textsuperscript{125} Id. at 345-46.
  \item \textsuperscript{126} 16 U.S.C. § 1533 (b) (1) (A) (2011).
\end{itemize}
a “rolling best-practice rule,” whereby innovators are encouraged to come up with novel solutions to the problems they face. As the authors in A Constitution of Democratic Experimentalism posit, the way to reduce risk in an industry is to “characterize more and more precisely the sources from which hazards may derive and to reduce and monitor each precisely characterized source more and more effectively.” The hatchery collective envisioned in this article will use this model to reduce the risks and hazards that face wild and hatchery salmon, as a result of hatchery management decisions.

The authors of A Constitution of Democratic Experimentalism give some examples of experimentalism in practice, one of which is the US Forest Service. The Forest Service pools information from different forests within the system through a system of inspections and internal promotion. The inspections give the administration a chance to see what is being done on the ground, to show the Rangers new innovations that Rangers in other forests are using, and gives the Rangers a chance to show off their own innovations. Salmon hatcheries can learn from this structure and incorporate some sort of inspection requirement into their collective body. As in the Forest Service, the function of the inspection will not be to punish, but to learn from one another. Hatchery managers can also learn from the Forest Service’s promotion from within format. Fisheries scientists and the other professional who deal with hatchery fish at the ground level can be promoted to the position of hatchery manager and eventually run the

127. Dorf & Sabel, supra note 8, at 353.
128. Id. at 353.
129. Id. at 367
130. Id.
collective, this way the people at the top have a true understanding of the daily practices of hatcheries. The Forest Service also uses activity logs for District Rangers and moves District Rangers to different locals every few years.\textsuperscript{131} These practices facilitate error detection through inspection of the activity logs, new Rangers detecting mistakes old Rangers made in managing the station, and allows the Forest Service to compare the service of new Rangers to previous Ranger.\textsuperscript{132} Hatchery managers can also implement these tools, keeping a log of their activities and rotating locations every few years, as a way to detect errors and facilitate the transfer of ideas.

\textit{ii. Cooperation in Industry}

In his book, “The New Environmental Regulation,” Daniel Fiorino mentions the “greening” of corporations and the ways corporations can and are accomplishing environmental goals beyond the confines of environmental statutes and regulations.\textsuperscript{133} An idea that Fiorino posits, which hatchery managers may utilize, is collective action by industry groups. Fiorino gives the example of “Responsible Care,” a group developed by the Canadian chemical industry and its United States’ equivalent, The American Chemistry Council (ACC), which was created in 1988.\textsuperscript{134} These groups conditioned membership upon a company’s following of the group’s management practices, guiding principles, and codes of practice.\textsuperscript{135} As Fiorino states, “As important as the principles,

\begin{itemize}
  \item \textsuperscript{131} Id. at 369.
  \item \textsuperscript{132} Id.
  \item \textsuperscript{133} DANIEL J. FIORINO, THE NEW ENVIRONMENTAL REGULATION 105 (MIT Press 2006).
  \item \textsuperscript{134} Id. at 105.
  \item \textsuperscript{135} Id.
\end{itemize}
codes, and practices was the network of resources, relationships, and pressures that backed them up.”\textsuperscript{136} The groups understood that one member’s poor management practices could taint the entire industry, therefore the group had committees, work groups, manuals, and other resources whereby each member could learn from one another.\textsuperscript{137}

In 2003, the ACC branched away from Responsible Care because it believed that Responsible Care had become too normative and corporations were using membership as a tool to make the companies look better without actual compliance.\textsuperscript{138} ACC modernized the management system, required third-party independent certification, performance tracking through a set of indicators, and additional plant security.\textsuperscript{139} Responsible Care’s guidelines are more strict than the guidelines of some countries and when a company becomes a member it binds itself to these standards in all of the countries it works in.\textsuperscript{140} However, one thing to keep in mind is that these groups are industry groups, controlled by manufacturers, and therefore their primary loyalties are to the industry, and not some higher purpose. On that note, the trade groups also have a desire to maintain membership and membership fees, and may be inclined to help non-complying members, rather than

\textsuperscript{136} Id.

\textsuperscript{137} Id. at 106.

\textsuperscript{138} Id.

\textsuperscript{139} Id.

expel them.\textsuperscript{141} One problem some see with Responsible Care is the lack of sanctions for non-compliance.\textsuperscript{142}

Another industry to utilize self-regulation is the nuclear power industry. The Institute for Nuclear Power Operations (INPO) was created by the nuclear power industry in 1979 in response to the accident at the Three Mile Island nuclear power facility.\textsuperscript{143} Following the Three Mile Island incident, President Carter set up the Kemeny Commission to investigate the accident, and the commission recommended that the nuclear power industry create an independent body to design safety standards and facilitate a free flow of information within the industry.\textsuperscript{144} Shortly after, the nuclear power industry created INPO with the mission, “To promote the highest levels of safety and reliability – to promote excellence – in the operation of commercial nuclear power plants.”\textsuperscript{145} As Michael C. Dorf and Charles F. Sabel write in their article, the Nuclear Regulatory Commission retains the authority to promulgate regulation, but in practice defers to the INPO to create industry standards.\textsuperscript{146}

To fulfill its mission statement, the INPO conducts plant evaluations, creates training and accreditation programs, facilitates event analysis and information exchange,

\begin{itemize}
\item[141.] Two decades of Responsible Care: Dredible response or comfort blanket?, 76 ENDS REPORT 360 19, 22 (Jan. 2005).
\item[142.] Id. at 21.
\item[143.] About Us, INPO- INSTITUTE OF NUCLEAR POWER OPERATIONS, http://www.inpo.info/AboutUs.htm#history (last visited Dec. 30, 2011).
\item[144.] Id.
\item[145.] Id.
\item[146.] Dorf & Sabel, supra note 8, at 371.
\end{itemize}
and assists operators.\textsuperscript{147} INPO has been largely successful, in 2010 the organization’s CEO stated, “[I]ndustry self-regulation has been one driving factor toward improved industry performance. In the early 1980s, the typical nuclear power plant had a capacity factor of 63 percent, experienced seven automatic shutdowns per year, and had collective radiation exposure levels that could be significantly reduced. Today, the typical plant has a 91 percent capacity factor with zero automatic shutdowns per year and an occupational radiation exposure about six times lower than in the 1980s.”\textsuperscript{148} One criticism of INPO is that its reports are not available to the public and therefore the public may not be seeing the whole story.\textsuperscript{149} On the other hand, confidentiality can lead to more frank, honest discussion among industry leaders, without fear of reprisal. This model and the Responsible Care/ACC model can be instrumental in the improvement of salmon hatchery operations.

These models show what industries with high risks and high returns need-information pooling. In the nuclear energy field it took a push from President Carter and the accident at Three Mile Island to get the ball rolling, while the chemical industry created its self-regulating body in response to negative public perception of the industry.\textsuperscript{150}

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{147} Id.
\item \textsuperscript{149} Dorf & Sabel, \textit{supra} note 8, at 373.
\item \textsuperscript{150} DANIEL J. FIORINO, \textsc{The New Environmental Regulation} 105 (MIT Press 2006); \textsc{About Us}, INPO- INSTITUTE OF NUCLEAR POWER OPERATIONS, http://www.inpo.info/AboutUs.htm#history (last visited Dec. 30, 2011).
\end{enumerate}
\end{footnotesize}
iii. Applying Industry Models to Salmon Hatcheries

For the salmon hatchery industry there ought to be enough external pressure to create a self-regulating body, but since there are so many different players- Federal, State, Native American, and private hatcheries, there needs to be a catalyst to action. This paper proposes that the catalyst to action for the salmon hatchery industry is the Endangered Species Act and the district courts. Through the Endangered Species Act, the district courts can mandate salmon hatchery operators create a group similar to the Forest Service, Responsible Care, ACC, or INPO.

C. Previous Efforts to Reform the Hatchery Industry

Congress established the Pacific Northwest Hatchery Reform Project, through annual appropriations to the Fish and Wildlife Service, in 2000 to reform the hatcheries of the Pacific Northwest.151 Congress saw a need for hatchery reform because “many hatchery programs—as currently operated—were contributing to the risks those stocks were facing.”152 Part of the project involved the creation of the “Hatchery Scientific Review Group (HSRG),” an independent panel charged with reviewing all hatchery programs in the Puget Sound and Coastal Washington.153 When the review group completed it’s review of all of the hatcheries, the group published a series of reviews, particular to each area studied, with specific recommendations, as well as general

152. Id.
153. Id.
recommendations, and issued analytical tools to support the recommendations. The project was completed in 2005.

With the completion of the Pacific Northwest Hatchery Reform Project in 2005, that same year, Congress directed NOAA to replicate the project in the Lower Columbia River Basin and later, expanded the scope to cover the entire Columbia River Basin. The challenge for the reform project was attempting to meet harvest goals, while concurrently meeting conservation goals. The hatchery reform group understood that to meet these two goals, which are potentially conflicting, both hatchery and harvest reforms were necessary.

After their work was completed the HSRG developed recommendations for the future of hatchery reform. These recommendations were: “Institutionalize and apply a common implementation framework; use the framework to set priorities, guide project review, make funding decisions and determine return on investments; provide training of fishery staff; perform regular programmatic reviews; and maintain and update data sets and a website.” Unfortunately these recommendations are just that - recommendations.


156. Id.

157. Id.

158. Id.

There are no accountability mechanisms, only the suggestion that funding entities “uniformly adopt the HSRG framework and system-wide recommendations as a requirement for future funding and accountability of their respective hatchery mitigation or enhancement programs.”\textsuperscript{160} The recommendations are non-binding and hatchery managers can choose to follow them or not. It appears these recommendations would involve, at least, a short-term increase in the workload of the average hatchery, so most hatchery managers face the obvious incentive against the additional overhead necessary to comply.

\textbf{D. The Future of Hatchery Reform}

Now that congressional funding has dried up and congressionally mandated research is complete, what happens to the salmon? It appears that the federal government is not acting to mandate hatchery reform, thus if something is to be done, some other entity needs to step up and assist the salmon. This author believes the entity best suited to aid the salmon is the Ninth Circuit Court of Appeals.

As mentioned in section I(D) of this paper, the Secretary must use the “best scientific and commercial data available” to make her determination as to whether a species is threatened or endangered.\textsuperscript{161} As of now, the Secretary does not have the best scientific and commercial data because hatchery managers have not provided the best


\textsuperscript{161}. 16 U.S.C. § 1533(b)(1)(A) (2011); See \textit{supra} § I(D).
data. The ability to collect data is available to hatchery managers and therefore the listing agency, but it simply needs to be pooled.

Hatchery managers must do more to provide the best scientific and commercial data. The Ninth Circuit Court of Appeals can use the information provided in this paper and the findings of the HSRG, to prove that the Secretary must do more to pool information from individual hatcheries to create a collective body of work that encompasses all hatcheries and their positive and negative contributions to salmon population. The listing or delisting of Pacific Salmon DPSs must be done with consideration of the hatchery salmon and their impacts on wild fish, and overall fish health.

i. Forcing Federal Hatcheries to Act

Additionally when confronting this issue in an appropriate case, the District Court can issue an injunction mandating the creation of a collective body of hatchery managers through of The Endangered Species Act, which mandates cooperation between government agencies. The Act requires that each Federal agency ensure that any agency action “is not likely to jeopardize the continued existence of any endangered species or threatened species” or result in the destruction or adverse modification of [critical] habitat.” 162 The agency completing the action must use the “best scientific and commercial data available.” 163 The evidence presented in this paper suggests that hatcheries jeopardize the existence of wild salmon, through poor hatchery management, the introduction of non-indigenous fish, the taking of resources wild fish need to survive,

163. Id.
among other variables. Using the “best scientific and commercial data available” it seems implausible, given the proof of harm hatchery fish cause to wild fish, that hatcheries would be deemed “not likely to jeopardize the continued existence” of salmon populations, be it hatchery populations, wild populations, or a combination of the two.164

The District Court can issue a finding that Federally operated hatcheries are “jeopardizing” the continued existence of Pacific Salmon, and therefore the hatcheries must either be shutdown or something must be done to prevent jeopardy. The court can issue an injunction requiring Federal hatcheries work together, to create a group similar to ACC or INPO to facilitate discussion on how hatcheries can best serve the fish they seek to protect, while limiting harm to the species. To enable the court to issue an injunction the plaintiff must demonstrate that “irreparable injury is likely to occur in the absence of an injunction.”165 In this case, the salmon populations, both wild and hatchery, will be harmed by the continued mismanagement of hatcheries and therefore more money will have to be poured into hatcheries, causing further irreparable harm. To issue a preliminary injunction the court “must balance the competing claims of injury and must consider the effect on each party of the granting or withholding of the requested relief.”166 The court must weigh the equities at issue and the public interests at stake.167

In the case of salmon hatcheries the public has an interest in making hatcheries as efficient as possible. The public, as taxpayers, do not want to continuously spend money

164. Id.
on an inefficient system and would benefit financially from a hatchery system that is efficient and organized. Additionally, the public would benefit from a more sustainable salmon population, based more solidly on the scientific method, not the free-for-all methods some hatchery managers currently implement. The evidence presented in this article illuminates the necessity and utility of an injunction to prevent future hatchery mismanagement.

   ii. Forcing non-Federal Hatcheries to Act

While the jeopardy provision of the ESA may provide a hook for the Ninth Circuit to force action by federal hatchery managers, it does not pertain to actions by state, private, or Native American actors. The Ninth Circuit can hook in private, state, and Native American hatcheries by proving the hatcheries “take” endangered fish, a prohibited activity under the Act. Under Section 9 of the Endangered Species Act, which pertains to any endangered fish or wildlife listed under section 4 of the Act, it is unlawful for any person to “take any such species within the United States or the territorial seas,”\(^\text{168}\) while Section 4(d) prohibits the take of certain listed threatened species.\(^\text{169}\) Some threatened Pacific Salmon populations are protected under Section 4(d).\(^\text{170}\) Take is a defined term within the Act, which means “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct.”\(^\text{171}\) The regulations also


contain a definition for the term harm, as used within the Act, which is “an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.”172 This paper proves that mismanagement of hatchery fish can modify and degrade the habitat of wild fish, harming the wild fish and engaging in a prohibited take of threatened and endangered salmon under the Endangered Species Act. Therefore the district courts can find the hatcheries in violation of the ESA and issue an injunction mandating the hatcheries work together to ensure there is no take of native salmon species and best management practices are being used to ensure the salmon the best chance of survival.

iii. Other Uses for a Hatchery Collective

The hatchery collective that this author proposed the Ninth Circuit create can also be used by hatcheries as a marketing tool. Similar to the way the chemical industry benefitted from creating a collective, the hatchery industry can label their product as from a “collective certified hatchery” or some other moniker denoting compliance with group norms. Hatchery salmon often end up on the dinner table and consumers oftentimes respond to marketing that shows their food is an environmentally friendly product.

Additionally, the state and federal governments can set up a program whereby hatcheries that are involved in the collective receive incentives in the form of funding, promotions for employees, or some other incentive that appeals to hatchery managers.

172. 50 C.F.R. § 17.3 (2011).
Hatcheries will realize the benefits of collective action, and ideally take it upon themselves to continue the program without the supervision of the 9th Circuit.

V. Conclusion

Currently, salmon hatcheries are managed in a way that misunderstands the nature of the underlying science. It is always improving, but the improvements are not always being communicated, reviewed by competent peers, being acted upon. Rather than focusing on a long-term conservation strategy, whereby salmon can flourish without human intervention, salmon hatcheries have focused on short-term mass production of hatchery salmon, and in turn altered the position of wild salmon in the ecosystem. To restore some semblance of order in the ecosystem, ensure the continued existence of wild salmon, and prepare for the inevitable further human population increase in the Pacific Northwest, hatchery managers must come together.

The district court are in a position to ensure the conservation of the Pacific Salmon through an injunction. The district courts can “force” hatcheries to communicate and strategize together, by proving that hatcheries harm and therefore “take” endangered and threatened species of salmon. The evidence in this paper points to the direct harm that hatcheries cause salmon through mismanagement of the fish populations. By working together, with a common goal of wild salmon conservation, hatcheries can ensure that the best available scientific data is utilized and salmon are no longer “taken” by the hatcheries.