

Private Land Use on Watersheds

Affecting Threatened Coho Salmon Habitat

A Policy Analysis



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I. Statement of Problem

The cumulative effect of human-induced factors on wild Pacific coho salmon has resulted in the rapid decline of several stocks to dangerously low levels. These factors include direct harvest, fish passage impediments, water diversions, artificial propagation, and habitat degradation (NMFS 1999). Numerous studies have shown a direct link between land use activities (i.e. logging, road construction and agriculture) and the alteration or complete loss of essential coho salmon habitat (NMFS 1999). Compared to other salmon species, coho are particularly sensitive to inland habitat degradation (Spain 1997) due to their spawning locations, life cycles, and particular habitat requirements. Therefore, the successful recovery of Pacific coho salmon is largely dependent on elimination or reduction of such detrimental activities in the connected watersheds. However, roughly two-thirds of this critical watershed area is privately owned (Spain 1997) and, therefore, beyond direct agency jurisdiction. A strong private property ideology in our society, supported by the Fifth Amendment “takings” clause, limits government’s ability to regulate activity on private land for the sake of conservation (Farrier 1995). As a result, regulatory agencies find themselves in the difficult position of trying to balance the interests of private property owners with endangered species protection (USFWS web site). Failure to strike a proper balance often results in lawsuits which can, in turn, lead to delays, appeals, and unsatisfactory outcomes.

In 1995 NMFS proposed ESA listings for three genetically distinct Evolutionary Significant Units (ESU’s) of coho salmon. Many feared the economic and political fallout of these proposed listings, especially in the wake of recent timber harvest restrictions required to protect spotted owls and marbled murrelets (Spain 1997). Shortly after the proposed

listing Oregon Governor John Kitzhaber announced the state's "Coastal Salmon Restoration Initiative" (CSRI) as an alternative to ESA regulation. NMFS accepted the Oregon CSRI as sufficient protection and decided not to list the Oregon Coast ESU. However, in June 1998, nearly three years after the initial proposal, a federal court ruling forced NMFS to list this severely depleted fish stock (Mapes 1998).

The state of Oregon is committed to implementing the CSRI despite the ESA listing. NMFS has expressed an interest in working closely with the state of Oregon on salmon restoration. The current status of Oregon Coast coho as "threatened" gives NMFS more flexibility in working cooperatively with state and local officials. However, it also provides NMFS with less regulatory control over private land use than an "endangered" listing would. Although the ESA requires listing determinations be made "solely on the basis of the best scientific and commercial data available", in reality these decisions are often highly politicized.

This purpose of this analysis is to identify the optimal policy for private land use on watersheds affecting Oregon Coast coho salmon habitat that will result in recovery of this fish stock. Since such a large percent of essential coho habitat is surrounded by private lands, recovery of this species is highly dependent on private land use. However, it should be noted that the ultimate fate of Oregon Coast coho is dependent on more factors than private land watershed management alone. Public land use changes, harvest regulations, fish ladders, dam removal, and water diversion controls are all management options that can improve conditions for coho salmon (NMFS web site). Therefore, the recommendations proposed here are not meant to function as a stand alone policy, but rather are intended to work in conjunction with other salmon restoration initiatives.

II. Social Values and Environmental Policy: What's At Stake?

Public policies in a democratic society should ideally reflect the diverse values among its citizens. Value diversity can result in conflicts and power struggles as traditional values are challenged by newer ones. The issue of protecting endangered species on private lands is an example of one such value clash that has recently taken center stage in political, legal, social and scientific arenas. Traditional values associated with private property ownership, which can be traced to the Bill of Rights, are being challenged by relatively recent values associated with biodiversity and endangered species protection.

According to the Kennedy and Thomas (1995) model of natural resource management, environmental values originate in the social system and are expressed through the economic, political, and social systems. In this view, natural resource management has two primary roles: 1) to help society make educated, well informed social value choices concerning environmental resources through research and educational programs, and 2) to accommodate immediate and long-term social values within society. Policy alternatives designed to resolve social value conflicts must consider what is at stake for each side and how willing each side is to compromise. Policies that ignore the wants and beliefs of interested stakeholders are ultimately doomed to fail. Two simple questions natural resource policymakers must take into consideration when formulating options are : *Who cares?* and, *Why is it important?* These fundamental questions are addressed below for the social values related to private property rights and healthy coho salmon stocks.

II. a) Preservation of Private Property Rights

The U.S. tradition of property rights can be traced to 17th century English philosopher John Locke, whose ideas undoubtedly influenced the framers of the Bill of Rights. Locke conceptualized the notion of “property” to include more than just material possessions but also one’s labor and creativity (Meltz et. al 1999). This philosophy was consistent with the human-dominant anthropocentric perspective of early European settlers in North America who viewed natural resources as commodities to be “claimed and tamed”. Ideological values associated with property rights are well ingrained in our culture and our way of thinking. As Meltz (1999) points out, property rights in the U.S. are viewed “as both the undergirding of, and conversely an emanation from, our rights of life and liberty.”

The Takings Clause of the Fifth Amendment reads: “Nor shall private property be taken for public use, without just compensation”. As abbreviated as it may be, the Takings Clause forms the foundation of a growing property rights movement in the U.S. that has resulted in much debate and case law in recent years. As environmental regulations and other land-use controls expanded during the 1970s and 1980s, the frequency with which landowners challenged government actions also increased (Meltz et. al 1999). The Takings Clause is the primary constitutional restriction on the power of government to acquire or restrict private property rights. However, the courts have been hesitant to raise property rights to the level of other Constitutional civil liberties such as freedom of speech or religion. Four distinct types of property rights have been identified: possession, use, exclusion of others, and disposal (Meltz et. al 1999). Landowners have generally been unsuccessful in regulatory “takings” cases involving property use rights unless they had shown that the regulation resulted in total (or near total) economic loss of property value (Meltz et. al 1999).

The Supreme Court has firmly established a precedent allowing government to take necessary action on private land (without compensation) in order to prevent a public “harm” (Yandle 1995). The applicability of this “nuisance” related legal precedent to nature conservation has been questioned by private property rights advocates. The following quote by Farrier (1995) portrays this controversy:

“Although the idea that we can draw value-free distinctions between preventing harm and conferring benefits is coming under increasing critical scrutiny, the fact remains that such distinctions are regularly drawn by the wider community; governments ignore them at their own peril. Nature conservation has traditionally been defined as involving the provision of a benefit to the wider community. Landowners can be ordered to prevent harm, but not to provide benefits.”

Societal debate over what constitutes “preventing harm” versus “providing benefits” highlights the fact that property rights should neither be viewed as absolute nor static. Rather, they are dependent on dynamic responses within social value systems, and are therefore subject to change over time. Long ranging environmental policies should take this into account by anticipating future shifts in value trends.

While the current volume of “takings” challenges to species protection under the ESA is small and overwhelmingly in favor of the government, the potential exists for this trend to shift in favor of property owners (Meltz et. al 1999). As our scientific knowledge of biodiversity increases and the ESA lists grow, we become increasingly aware of the inadequacy of relying solely on existing public lands to conserve species or representative ecosystems (Farrier 1995). Growing reliance on private land use restrictions (without compensation) to save species could result in an increasing backlash of public opinion against the ESA and biodiversity conservation. Since benefits of species protection are often long-term, distant and too vague for many people to fully appreciate, mild support for ESA may turn into strong opposition as more people’s livelihoods are affected. While

environmental agencies may not necessarily agree with the ethics, economics or politics behind the property rights movement, they should still be concerned about alienating and angering private landowners who may be the one group that could help the most in providing species protection (Yandle 1995).

The current policy challenge of protecting Oregon Coast coho should be a good test of how much people are willing to sacrifice for species protection. According to Trygve Sletteland, director of the Pacific Rivers Council, logging practices would have to change on an estimated 10 million acres of private timberland in order for the state plan to work (from Robertson 1998). The Oregon Department of Forestry estimated that adopting NMFS suggested logging rules for coho salmon recovery would “severely” restrict timber harvesting on 35 to 50 percent of all private forestland in Western Oregon (Robertson 1998). Timber harvest restrictions on public lands (State and Federal Forests) due to ESA protection for spotted owl and marbled murrelet have increased the timber industry’s reliance on private land use in the past five years (Teresa Trump, Oregon Governor’s office, personal communication).

II. b) Restoration of Pacific Coast Coho Salmon

The numerous reasons given for saving species from extinction generally fall into four main categories: direct economic uses, ecological services, aesthetic benefits, and moral and ethical duties (Smith et. al 1993). Economically, salmon are extremely valuable to the Pacific Northwest. Coho salmon have historically been a staple for tribal and non-tribal peoples since the early 1800’s and have played an important role in the economic growth of the region (NMFS web page). Coho salmon landings off the California and Oregon coast were still as high as 3.0 million pounds in the 1970’s when catches were already much lower

than historical (NMFS web site). As recently as 1988, commercial and recreational salmon fishing in the Northwest (all species combined) contributed more than 62,000 jobs and generated over \$1.25 billion (Spain 1997).

Regarding ecological value, coho salmon are an important component of a riverine/riparian ecosystem that provides numerous ecological services including water purification, soil stabilization and fertilization, flood control, and nitrogen fixation. Since we do not fully understand exactly how coho salmon fit into this system there may be tremendous value in taking Aldo Leopold's advice of saving all the parts (Smith et. al 1993). Salmon are also viewed as important indicator species. Their complex life cycles, dependence on multiple ecosystems (e.g. freshwater streams, bays, open ocean) and specific habitat requirements make them scientifically valuable for determining ecological integrity.

Coho salmon are valued aesthetically during their dramatic, often romanticized, migrations during which adult fish swim thousands of miles to return to their native streams where they spawn and die. Thousands of people enjoy watching this annual ritual each year from designated viewing areas and other localities along spawning runs. Perhaps more important, though, is the symbolic value attributed to Pacific salmon. Salmon, in general, have come to symbolize the "heart and soul" of the Northwest region and their powerful and mysterious behavioral adaptations are a source of inspiration to many (Safina 1997).

A "biocentric" argument for preserving coho salmon (or any species for that matter) on purely ethical or moral grounds is likely to garner less support in our society than the three previous anthropocentric reasons. However, some believe that as social values originating within the "biocentric" movement gain more expression through political,

economic and social channels the “protective umbrella of legal rights” may eventually extend to other species (Smith et. al 1993).

III. Species of Concern: Pacific Coho Salmon (Oregon Coast ESU)

III. a) Biology and Life History

The coho salmon (*Oncorhynchus kisutch*) is an anadromous salmonid whose historic distribution was from Central California to Point Hope, Alaska, through the Aleutian Islands, and from the Anadyr River, Russia, south to Hokkaido, Japan (NMFS web site). The Oregon Coast ESU of this species, that is the focus of this analysis, virtually covers the entire Oregon coast from Cape Blanco to the Necanicum River.

Pacific coho salmon generally exhibit a 3-year life cycle. Juveniles rear in fresh water for 12 to 15 months, then migrate to the ocean as “smolts” in the spring. Coho salmon typically spend two growing seasons in the ocean before returning to their natal streams to spawn as 3 year-olds. Some precocious males, called “jacks”, return to spawn after only 6 months at sea. Adult coho typically begin their freshwater spawning migration in the late summer and fall, spawn by mid-winter, and then die. Unlike other Pacific salmon species, where the majority of production comes from large spawning populations in a just few main river basins, coho production is dispersed and utilizes numerous small streams (PFMC 1999). Depending on river temperatures, eggs incubate in “redds” (gravel nests excavated by spawning females) for 1.5 to 4 months before hatching as “alevins” (a larval life stage dependent on food stored in a yolk sac). Following yolk sac absorption, alevins emerge from the gravel as young juveniles, or “fry”, and begin actively feeding (NMFS web site).

Disease can have substantial local impacts on populations of coho salmon that are exposed to numerous bacterial, protozoan, viral, and parasitic pathogens in freshwater and marine environments. Disease may be contracted by direct infection with waterborne pathogens or by interbreeding with infected hatchery fish. Salmonids typically are exposed to a variety of pathogens throughout their life; however, disease results only when the complex interaction among host, pathogen, and environment is altered. Natural predators of coho salmon include other salmonids, other fish, birds, terrestrial mammals, sea lions and seals (PFMC 1999). However, relative to effects of fishing, habitat degradation, and hatchery practices, disease and predation are not believed to be major factors contributing to the overall decline of coho salmon in California and Oregon (NMFS web site).

III. b) Essential Coho Habitat

The Pacific Fishery Management Council's (PFMC) Salmon Plan defines essential habitat as "those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem" (PFMC 1999). Coho salmon are dependent on high quality habitat at three critical stages of life: spawning, rearing, and migration. Water depth, water velocity, water quality, cover, substrate composition, and lack of physical obstruction are all important elements for coho survival (PFMC 1999). Coho spawning habitat consist primarily of coarse gravel with a few large cobbles, a mixture of sand, and a small amount of silt. Inter-gravel flow must be high for eggs and alevins to obtain enough dissolved oxygen to survive. Coho smolt production is often limited by availability of rearing habitats. The most productive rearing habitats are small streams with low-gradient alluvial channels and abundant pools formed by large woody

debris (PFMC 1999). Spawning and rearing generally occur in streams with less than 4-5% gradient. Habitat requirements during seaward migration are similar to those during rearing. High stream flows aid in migration by flushing juvenile salmon downstream (PFMC 1999).

The PFMC report states that identification of all essential coho habitat is difficult due to inadequate historical and current information, and the present low abundance of the species. Even with more comprehensive and complete data, this would be a difficult task for Oregon Coast coho, considering there are over 18,000 miles of streams in Oregon coastal basins (NMFS web site). The report recommends adopting a more inclusive watershed-based approach for designating essential coho salmon habitat. Using this approach, the Oregon Coast ESU of coho salmon essential habitat includes the following watersheds: Necanicum, Nehalem, Tillamook, Siletz, Alsea, Siuslaw, Siltcoos, Umpqua, Coos, Coquille, Sixes, Rogue and Chetco (State of Oregon, CSRI Annual Report, web site). Combined these watersheds contain approximately 4,500 stream miles of coho spawning and rearing habitat (State of Oregon, CSRI, map of coho habitat). Coho salmon are not evenly distributed throughout their range but tend to concentrate in preferred habitat areas (State of Oregon, CSRI, web site). Such high quality habitat, that are judged to be of critical importance to the persistence of coho populations, have been identified as Core Areas. Nearly 1,500 Oregon stream miles have been identified as Core Areas for coho salmon (State of Oregon, CSRI, web site).

III. c) Adverse Human Impacts on Private Lands

Pacific salmon are highly dependent on pristine, unaltered habitat for successful spawning, rearing and migration behaviors. Habitat loss and degradation has been identified

as one of the major causes of stock extinctions and declines (Nehlsen et al. 1999 from PFMC 1999). Human activities on private lands that negatively impact salmon habitat include forestry, agriculture, ranching, road building, construction, mining, and beaver removal (PFMC 1999). Private land surveys on coho salmon watersheds in the Pacific Northwest reveal widespread degradation of freshwater, wetland, and estuarine habitats (PFMC 1999).

Watershed land adjacent to Oregon Coast coho salmon streams are categorized into three main types: urban, agriculture, and forest. The percent of river miles bordered by forest land ranges from 87%-97% (average = 91%) depending on the particular watershed. Agricultural land accounts for 6% of the stream miles and urban land for 2%, on a per watershed average (Oregon State, CSRI web site). Out of an estimated 4,589 stream miles of coho spawning and rearing habitat (Oregon Coast ESU), 31% is on private timber lands and 34% is on private lands used for other (or unknown) purposes (Oregon State, CSRI, habitat map). The remaining 35% is divided among U.S. Forest Service, Bureau of Land Management and state owned lands.

Numerous studies have shown the multiple negative effects forestry can have on pacific salmon (PFMC 1999). The following specific actions that are connected to forestry operations have all been linked to habitat degradation: soil compaction, waste-water discharge, run-off, alteration of riparian vegetation, changes in woody debris input, change in sediment loading, and streambank alteration. All of these actions negatively affect stream water quality and stream habitat of coho salmon in one way or another. Water quality degradation associated with forestry includes changes water temperature, dissolved oxygen levels, sediment and turbidity, nutrients, and contaminants. Physical habitat quality degradation associated with forestry includes changes in substrate, cover, shading, pool

frequency, pool quality, prey availability, and predation levels (PFMC 1999). Forestry can also result in hydrological changes such as discharge rates, stream flows, and rapid fluctuations, all of which can negatively impact coho salmon (PFMC 1999).

The use of coho salmon watersheds for agriculture and grazing purposes can have many of the same negative effects that forestry has (i.e. soil compaction, waste-water discharge, run-off, alteration of riparian vegetation, change in sediment loading, and streambank alteration). In addition, agricultural uses can alter wetlands and floodplains, and have detrimental effects on estuarine habitat.

III. d) Current Status

Historical data from the past fifty years show tremendous fluctuations in coho returns from year to year, which have been linked to varying ocean conditions (State of Oregon, CSRI, web site). The combination of human-induced stresses and unpredictable environmental conditions put Pacific coho salmon in particular jeopardy of extinction. Coho salmon (all ESU's) are extinct in 55% of their historic range, endangered in 13%, and threatened in another 20% (Spain 1997).

From the turn of the century to the 1930's Oregon coho salmon abundance was estimated around a million fish. By the 1940's annual production declined to about half that amount, and in recent years has dropped to about 50,000-80,000 fish (State of Oregon, CSRI, web site). Total coho salmon abundance for the Oregon Coast ESU in 1997 was the lowest number on record (State of Oregon, CSRI, web site). An estimated 24,000 wild (not hatchery produced) coho adults returned to spawn in 1997, approximately one-third the number of returns from the previous year.

Surveys of private lands in the Oregon coho salmon watersheds indicate that both the amount and quality of coho habitat has been significantly reduced (State of Oregon, CSRI, web site). Even with strict habitat degradation regulations in place, it will still take many decades before riparian conditions reach desirable levels of salmon freshwater habitat (State of Oregon, CSRI, web site). The following specific problems have been identified: 1) too few large/old trees bordering streams, 2) too little large woody debris, 3) stream channels lacking in structural and habitat complexity, 4) too much fine sediment loading from agricultural and forested lands, 5) lack of tree shading on agricultural lands (State of Oregon, CSRI, web site). Approximately one-half of the stream miles assessed in Western Oregon do not meet water quality standards. Specific problems include elevated stream temperatures due to hardwood removal, high pesticide levels in agricultural basins, and scarcity of indicator species of invertebrates.

Understanding the complex dynamics between ocean conditions and freshwater habitat is critical to predicting coho population trends. Models have estimated that 80% of current freshwater habitat is sufficient quality to support sustainable populations of coho during periods of good ocean conditions. However, only 20% of current habitat can support sustainable populations of coho during poor ocean conditions (State of Oregon, CSRI, web site). Since scientists do not fully understand what factors determine ocean conditions or the cyclical responses involved, a conservative approach that manages stressed stocks for poor ocean conditions may be the wisest approach.

IV. Policy Alternatives

IV. a) Current Endangered Species Act

IV. a1) ESA Overview

The Endangered Species Act was passed in 1973 for the purpose of providing “a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved” (USFWS, ESA web site). The ESA has been both praised by environmentalists as the strongest legislation enacted for the protection of non-human species, and criticized by landowners and developers for putting the rights of nature before human welfare.

The ESA covers many areas including species status determination, land acquisition, state involvement, interagency cooperation, and international cooperation. For this analysis the focus will be on those sections directly affecting private landowners. The primary relevance of the ESA to private landowners is found under “Prohibited Acts” (Section 9) which states it is unlawful to “take” any endangered species. “Take” is defined in the act as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (USFWS, ESA web site). Within the definition of “take”, the word “harm” has been broadly interpreted by USFWS (and upheld by the Supreme Court) to include habitat degradation on private lands (Meltz et al. 1999). This is particularly significant for the protection of aquatic species from detrimental human activities on surrounding watersheds. Although the Section 9 prohibition on “take” specifies endangered species, Section 4d. gives the Secretary (U.S. Dept. of Commerce or Interior) discretionary power to extend this prohibition to species listed as “threatened”. Once a species is listed

(threatened or endangered) the listing agency (NMFS or USFWS) must, when “prudent and determinable” designate the critical habitat essential for recovery.

Oregon Coast ESU coho salmon were listed as threatened by NMFS in August of 1998. The expanded definition of “harm” along with Section 4d discretion would allow NMFS to currently pursue command and control type regulatory action on private lands within the Oregon Coast ESU watersheds. Considering the delay in the initial listing and the continued decline of the stock, there may also be sufficient justification to change the status of Oregon coho to endangered in the near future. An endangered listing would give NMFS more leverage in passing restrictive land-use regulations and, if necessary, defending them in court.

The discretion granted to federal agencies under Section 4d along with provisions for “exceptions” (ESA Section 10) also allow for regulatory flexibility in dealing with private landowners. Private landowners can apply for “incidental take” permits if they prepare a Habitat Conservation Plan (HCP). The HCP process is designed to promote negotiated solutions to endangered species conflicts and to provide an alternative to litigation (USFWS and NMFS 1997). For coho salmon, approved HCP’s would allow landowners to continue certain activities that “harm” coho habitat. NMFS will need to make determinations as to which activities, what levels, and on which lands such land uses will be allowed so that the cumulative effect does not negate coho recovery efforts.

To achieve species protection on private lands both USFWS and NMFS have taken measures to make the ESA more “user friendly” for private landowners (Committee for the National Institute for the Environment 1999). In 1994 the Departments of Commerce and Interior issued a joint “No Surprises” policy. This policy states that landowners with

properly functioning HCP's in place would not be subjected to any additional land restrictions or financial burdens, barring extraordinary circumstances. In 1995 USFWS initiated the "Safe Harbor" program that authorizes all future incidental "take" of listed species that inhabit a property as a result of a landowner's affirmative conservation efforts (USFWS web site). Other measures designed to prevent conflicts between ESA and private landowners include requests for more funding for landowners and local governments involved with HCP's, more technical assistance to landowners designing HCP's, informing public of exactly what constitutes a "take" at time of listing, increased stakeholder involvement in recovery efforts, and more ESA education and outreach (USFWS web site).

IV. a2) ESA Strengths

A major advantage of using the ESA for species protection on private lands lies in the strength of the wording. Section 9 prohibitions (along with the broad interpretation of "harm") are arguably the strongest language in any U.S. environmental law. NMFS could use this language to severely restrict or eliminate all activities (forestry, agriculture, grazing, road building etc.) detrimental to coho essential habitat. If the watershed approach is adopted, land-use restrictions could potentially impact over 8,100 square miles on thirteen watersheds (State of Oregon, CSRI, web site). Thus, if NMFS chooses to exercise this power, the ESA provides the "teeth" necessary for command and control regulatory policy for coho restoration.

Another strength is that despite ongoing debate over whether the ESA violates the "takings clause", to date there has not been a single reported court decision finding a taking based on an ESA land-use restriction (Meltz et al. 1999). Some might argue that the ESA

has not fully been tested on the “takings” claim and this situation could change. However, considering there have been no successful challenges in 27 years, NMFS can proceed with regulatory action under the ESA with more confidence than under legislation for which “takings” have been granted (e.g. wetlands regulations).

The flexibility built into the ESA can be viewed as advantageous if utilized properly. The regulating agencies have had nearly three decades to study the effectiveness of the ESA on private lands, and make appropriate policy and programmatic changes to rectify weaknesses. In 1994 Interior Secretary Babbitt and Commerce Under Secretary Baker announced a series of administrative policy reforms (“10 Point Plan”) designed to improve ESA effectiveness and enhance its flexibility for private landowners (USFWS and NMFS 1997).

IV. a3) ESA Weaknesses

While command and control regulations may succeed in restricting negative activities, they are incapable of generating positive activity (Farrier 1995). Recovery of Pacific salmon is at least a 50 year process (Spain 1997). Without stakeholder cooperation a long-term, sustainable environmental policy may be difficult to maintain. Growing discontent with command and control regulations could lead to reauthorization, new legislation and judicial interpretations that favor property rights proponents.

Successful coho restoration may rely on utilizing the flexibility of HCP’s which emphasize cooperation and partnerships between landowners and agencies. However, what NMFS determines to be an acceptable incidental “take” in the case of coho salmon is problematic. The precise relationship between land use and habitat degradation is more

difficult to determine for aquatic habitats than terrestrial habitat. Critics of HCP's argue that they make too many concessions to private landowners at the expense of species. Policies such as "Safe Harbor" and "No Surprises" make adaptive management under the ESA extremely difficult because they limit an agencies future policy options. Finally, the cost of reviewing and monitoring HCP's may become prohibitive considering the number of private landowners involved in coho restoration. In general, one of the most severe shortcomings of the ESA has been the lack of sufficient funding (Kubasek et al. 1994). Without significant increases in Congressional appropriations, this problem will only get worse as many more species get listed each year than de-listed.

Another weakness of the ESA for species protection on private lands is that it may actually encourage landowners to destroy wildlife (Mann et al. 1995). For example, a timber company may increase harvest along a stream bank if it believes that by killing all the coho salmon their land will not be identified as "critical habitat".

Critics of the ESA often point to the bottom line of species recovery. That is, does this act fulfill its ecological purpose of recovering threatened and endangered species? From 1973 to 1994 the USFWS listed 955 species (Mann et al. 1995). During that time seven went extinct, eight were removed because they had been accidentally listed, and only six were de-listed because their status had improved (Mann et al. 1995). According to Robert Gordon Jr. of the National Wilderness Institute, "not one species can be legitimately claimed as primarily owing its recovery to the ESA" (from Mann et al. 1995). To some extent, the ESA can be viewed as life support for a large number of species which, although they are staving off extinction, chances of a full recovery are slim.

Severe land use restrictions enforced under this policy will result in economic setbacks for the timber industry. One estimate suggests that logging practices would have to change on 10 million acres of private timberland (Robertson 1998). Exact numbers of dollars and jobs affected are dependent on too many factors to estimate accurately at this time.

IV. b) Oregon Coastal Salmon Restoration Initiative Plan

IV. b1) Oregon CSRI Overview

The origins of the CSRI can be traced to the formation of locally based “watershed councils” in 1993 (Spain 1997). Watershed councils were created in response to salmon population declines as a means to facilitate local involvement in “grassroots” salmon restoration efforts. When NMFS proposed listing coho salmon in July of 1995, Oregon Governor John Kitzhaber offered to develop a counter proposal for coho restoration that would build on the “local control/voluntary action” approach of the watershed councils (Spain 1997). The result was a 2,7000 page plan called the “Oregon Coastal Salmon Restoration Initiative” which was submitted to NMFS in March of 1997 (State of Oregon, CSRI, web site). The plan’s mission is to restore “native fish populations-and the aquatic systems that support them-to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits.” (State of Oregon, CSRI, web site).

The CSRI focuses on four main areas of action: (1) coordination of effort by all parties, (2) development of action plans with relevance and ownership at the local level, (3) monitoring progress, and (4) making appropriate corrective changes in the future (State of Oregon, CSRI, web site). The 81 watershed councils currently involved are in the process of

developing action plans and monitoring programs for salmon restoration at the local level. Some fundamental principles of the CSRI include no additional regulatory burdens on private landowners, increase enforcement of existing laws, and reliance on voluntary efforts from local stakeholders (Spain 1997). The State legislature provided \$30 million to fund the CSRI for the first two years. Half of this amount was to come from a timber tax which the timber industry supported in an effort to avoid an ESA listing.

IV. b2) Oregon CSRI Strengths

Many of the strengths in the CSRI can be attributed to two important factors: (1) it was designed to address a specific ecosystem restoration / private land use problem, and (2) the plan's designers had the advantage of learning from past environmental policy mistakes. Whereas federal agencies struggle to find new ways to make the ESA work for species protection on private lands, the CSRI development was not bound by specific legislative language and therefore could be more innovative. Secondly, the CSRI designers could learn from past experiences involving natural resource management on private lands. The CSRI incorporates emerging ideas for environmental policy such as adaptive management, emphasis on local involvement, and an ecosystem (instead of single species) focus.

Another strength of the CSRI is that it has been remarkably successful at bringing nearly all of the interested parties to the table. The creation of the plan was a very open process and input was encouraged from all stakeholders. Draft versions were made available to the public and all written comments were posted on the state's web site. The final plan includes measures to improve coordination among all federal, state, and local agencies that have an impact on salmon (State of Oregon, CSRI, web site). The watershed councils give

private landowners an opportunity to participate in the process. Timber and agricultural industries have also endorsed the state's recovery plan (Spain 1997).

The CSRI is only in its second year of implementation so it is still too early to tell if the plan is achieving its stated ecological mission. Thus far, the plan does appear somewhat successful in striving toward stakeholder cooperation, partnerships, and process openness. For example, more than 1,200 "on-the ground" habitat recovery projects were conducted from 1996-1997, many of which were initiated by private landowners. Forest landowners completed over 800 projects to address sediment or fish passage concerns. Fourteen watershed councils have technical teams assisting them with habitat restoration assessments, project design, prioritization and implementation (State of Oregon, CSRI, web site). The first CSRI Annual Summary Report (1998), which is available to the public, is refreshingly candid for a government document. The report summarizes recovery actions, needed changes, and resource status in an honest way that points to as many weaknesses as strengths.

IV. b3) Oregon CSRI Weaknesses

The CSRI's Executive Summary mentions two potential obstacles to the plan's success that could turn into real weaknesses: (1) funding and (2) unintended consequences of ESA listing (State of Oregon, CSRI, web site). Only two years of funding have been guaranteed for what is considered to be at least a 50 year recovery effort (Spain 1997). Since future funding is dependent on Legislative approval, the fate of Oregon salmon will be subject to political whims in every future state budget. This is not an encouraging situation for salmon enthusiasts considering Oregon is currently in the midst of its worst budget crisis in history (Spain 1997).

Prior to listing, many people feared that an ESA listing of Oregon Coast coho salmon would result in withdrawal of key voluntary measures and a loss of public participation. Following listing, NMFS has until now taken a hands-off approach to regulatory control over private land use. However, if NMFS is pressured politically or forced judicially to take a more hard-line approach to dealing with private landowners, the CSRI may lose essential public support. The fact that success of the state plan may be dependent on factors beyond state or local government control has to be viewed as a weakness that could disrupt recovery efforts. Glen Spain (Pacific Coast Federation of Fishermen's Associations) insists that "the ESA and the CSRI were always meant to go hand in hand, supporting each other" (Associated Press 1999). While this may be true, private timber companies may interpret this to mean the CSRI should be used for habitat restoration on private lands while the ESA should be used strictly for public land management.

Another potential weakness of the CSRI is the reliance on unenforceable voluntary efforts to prevent an irreversible outcome such as extinction. Critics point out that watershed councils are made up of people whose land use practices are part of the problem. Such landowners are more likely to proceed with minor restoration efforts that do not cause them any inconvenience instead of projects that make a real difference (Spain 1997). There is also no guarantee that key elements of the CSRI will be based on ecological needs rather than political and funding constraints.

According to NMFS, current logging regulations under the Oregon Forest Practices Act are inadequate for coho salmon recovery (Robertson 1998). Many of Oregon's natural resource protection laws are weak compared to Washington or California, and have proven seriously deficient in preventing salmon habitat loss (Spain 1997). One example is Oregon

Revised Statutes Section 196.810 which prevents more than 20% of any waterway from being designated “essential indigenous anadromous salmonid habitat” (Spain 1997).

Therefore, the CSRI goal of increasing enforcement for existing environmental laws is viewed by environmentalists as ineffective until stronger laws are passed.

IV. c) No Direct Government Action Affecting Private Lands

IV. c1) No Action Overview

No direct government action on private lands should not be confused with taking no measures to reverse the decline of Oregon coast coho salmon. Given the numerous social, economic, ecological, and aesthetic values attributed to coho salmon, a policy that drives this species (or stock) to extinction is not a viable alternative. Instead, no government action on private lands means focusing effort on other areas of coho restoration. This includes habitat restoration on public (state and federal) lands, stock enhancement through hatchery releases, facilitating fish passage at hydroelectric facilities (fish ladders, channels, fish elevators, impingement studies), dam removal efforts, non-native and predator control measures, and conducting more research on effect of ocean conditions.

Approximately one-third of essential coho habitat in Oregon is on public lands. State and federal legislation could be passed designating this entire area (to whatever extent possible) as salmon restoration lands. These lands would then be managed exclusively for salmon habitat improvement and no detrimental land-use activities (e.g. logging, agriculture, roads) would be allowed.

More effort could be put into hatchery operations which produce coho salmon. With more genetic research survival rates of stocked fish might be improved. NMFS does not

count hatchery raised salmon when making ESA listing determinations. However, to the extent that hatchery fish embody some of the values associated with wild salmon, they should not be completely discounted as an environmental “substitute”. Hatchery operations can also provide added values as popular tourist attractions.

IV. c2) No Action Strengths

Most of the restoration efforts (not involving private lands) mentioned above are already being done at one level or another and should continue regardless of which policy is chosen for private lands. However, by shifting effort in terms of time, money, and human resources away from private land management, this strategy allows for a more thorough, concentrated effort toward these other important salmon restoration projects. A simple analogy may help explain this policy strategy:

Assume we have \$15 million for coho restoration projects on 15 streams. Also assume that we need to improve habitat conditions by at least 25% in any given stream for successful reproduction. If we disperse the money and spend \$1 million on each of our 15 streams we improve conditions on all 15 by 10% and reproduction fails in all 15. If we spend \$5 million on 3 streams we improve conditions in those streams by 30% and reproduction succeeds in 3 out of 13.

Addressing the issue of private land use on essential coho habitat will require substantial, long range funding considering the number of landowners and large geographic area involved. There are doubts whether the CSRI will obtain the funding necessary to achieve its ambitious goals (Spain 1997). As mentioned earlier, a major criticism of the ESA is that it has been seriously under-funded since its inception ((Kubasek et al. 1994)). The “no action” on private lands policy could be viewed as a strategy of “cutting your loses” and refocusing restoration efforts on a limited number of watersheds or streams that are not, (or

are least) affected by private land uses. Timber and agriculture industries would probably be willing to offer guaranteed, long-term funding of such a policy.

Another advantage of this policy is that it respects traditional values, rights, and freedoms associated with private property ownership in the U.S. Also, tensions between private landowners and federal and state agencies will be significantly reduced. Finally, this policy would not result in any economic loss or layoffs within Oregon's timber industry.

IV. c3) No Action Weaknesses

A policy of "no action" on private lands will likely face considerable political opposition. The environmental groups that brought suit to list coho salmon will have a strong case against NMFS if the agency makes no effort to reduce "harm" on designated critical habitat. Additionally, the general public may object to allowing activities on private lands that are counterproductive to other publicly funded coho restoration. The feasibility of this alternative is questionable considering the strong language of the ESA and previous case law.

Aside from feasibility concerns, this alternative may be ecologically risky considering the scientific uncertainty involved. By focusing coho recovery efforts on a select few watersheds (or streams) this policy may facilitate elimination of coho throughout much of its current (and historic) range. While this policy might restore enough habitat to prevent extinction and preserve the symbolic values of coho, it ignores the ecological values coho provide throughout their range. Genetic diversity between populations within an ESU will also be sacrificed. Loss of this critical information limits a species ability to adapt to changing environmental conditions. Genetic diversity is essential to long-term species health

and survival. Also, a policy that relies on hatchery fish to make up for spawning and rearing habitat loss has a negative effect on both survival and natural genetic viability of wild stocks. Thus, while saving “some” of the parts might be presented as a pragmatic alternative to losing everything, it may not be an ecologically sustainable one. The advice of Aldo Leopold may be well heeded: “If the biota, in the course of aeons, has built something we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering” (Leopold 1974).

IV. d) New Legislation: Pacific Salmon Habitat Act

IV. d1) New Legislation Overview

This alternative proposes passing a new federal Pacific Salmon Habitat Act (PSHA), which will have a three-fold purpose. The primary goal of the act will be to “lock up” as much essential salmon habitat land as possible in order to prevent future habitat degradation resulting from human land uses. The second part of this act will involve an extensive public relations/educational outreach program. Finally, the PSHA should contain provisions to ease the burden on local communities dependent on logging as a source of income and a way-of-life. This act is intended to compliment other salmon restoration efforts such as harvest restrictions, fish passage improvements, dam removal, in-stream habitat enhancement, and watershed improvements on public lands.

The main focus of the PSHA will be on purchasing title to as much critical salmon watershed land as possible. A triage approach will be used to determine which lands should be purchased first. Areas identified as “Core Areas” or part of “Key Watersheds” (State of Oregon, CSRI, web site) and areas that compliment existing public lands should be given

priority. Another important consideration should be the level of salmon habitat degradation caused by current and (predicted) future activity on the land. For example, it is more important to purchase large timber company lands used exclusively for tree harvest, than other private lands used primarily for hunting and nature watching with only a small amount of timber harvest. Modeling techniques should be used to determine the optimal land purchasing strategy taking into account scientific, economic, and social factors. The purchase of private lands not only puts a halt to environmentally detrimental activities, it also allows government to be proactive by improving degraded watersheds.

The goal of the PSHA public relations/ educational outreach program will be to raise public awareness of the multiple values of Pacific salmon and of the overall importance of preserving biodiversity. Specific objectives include building public support for the purchase of private lands, developing partnerships with stakeholders in the fight to preserve salmon ecosystems, monitoring public attitudes and opinions on this issue. This program can build off the successful public relations campaign and stakeholder involvement measures started by the CSRI. The PSHA should allow for adaptive management which responds to both ecological and social changes over time.

The success of new legislation is often directly related to the level of funding it receives. Lack of financial support has been blamed for much of the ESA's ineffectiveness (Kubasek et al. 1994, Mann et al. 1995) and for expected problems with the CSRI (Spain 1997). Large scale land acquisition programs, which are particularly costly, rely on the public's willingness to pay for them. However, as discussed earlier, there many important social values associated with Pacific salmon. Funding for endangered species and biodiversity conservation requires facilitating expression of these social values through the

economic and political system. Below are some suggestions for how the PSHA can be funded:

- The Act itself should have dedicated legislative appropriations to initiate purchase of “Core Areas” currently exposed to rapid habitat degradation from private land use.
- Land acquisition through long-term bonds can help defer initial costs to taxpayers. They also involve future generations, who will be the beneficiaries of biodiversity conservation, in paying for this important public good.
- Establishment of a “Pacific Salmon Trust Fund” paid for with a percentage of revenues from public land activities. Either activities on salmon watersheds that are not detrimental to salmon (e.g. limited hunting or recreation) or activities on other public lands. Public land user fees may have to be increased in general to pay for national biodiversity conservation.
- Trading, selling or leasing other public lands that are less important in terms of biodiversity conservation. Reverse GAP analysis can be used to determine which public lands would be eligible.
- Offer private landowners exclusive lease rights for specified types and levels of land use as part of the land acquisition deal. Minimal levels of detrimental land use activities (e.g. logging) might be allowed, conditional upon a specified indicator threshold for salmon recovery (e.g. 200,000 wild coho spawners).
- Create innovative salmon-related tourism and marketing opportunities such as migratory viewing areas, hatchery tours, multi-media products (videos, IMAX movie) with proceeds going toward the Pacific Salmon Trust Fund.

- Sell a limited number of daily, recreational fishing permits to guides and anglers for designated sections of rivers. Catch and release, fly-fishing only. A lottery system could be used if demand exceeds supply.
- Part of the Pacific Salmon Trust Fund should be reserved for a fund matching program whereby state, local and NGO funds used for land acquisition are matched by federal funds.
- Seek funding by large corporations (e.g. Nike, Orvis) interested in improving public relations and establishing a “greener” image. An adopt-a-river program can be established whereby corporations are publicly identified with sections of river they helped restore.
- Lower the market value of private lands on salmon watersheds by certifying a “green labeling” program. Similar to dolphin-safe tuna, consumers will know that wood and agricultural products not labeled “salmon safe” were harvested with detrimental impacts on Pacific salmon.
- The PSHA will reduce the funding needed to administer other programs and legislation. For example, part of the money appropriated for the Oregon CSRI or ESA HCP’s to deal with private landowners will not be needed if they are bought out. All such savings from other programs can be reappropriated to the PSHA for land acquisition.
- Money from the Land and Water Conservation Fund (16 U.S.C. 1534) may be appropriated to acquire land for endangered and threatened species conservation (Committee for the National Institute for the Environment 1999).

IV. d2) New Legislation Strengths

There is an obvious advantage to having complete control of land use on essential endangered/threatened species habitat. Options available to agencies that want to control private land use without risking a regulatory “takings” are of two main types: 1) purchasing title to land outright, and 2) purchasing land-use obligations designed to modify land-use practices. Federal legislation has created several programs that fall into the second category including the Conservation Reserve Program (CRP), the Wetlands Reserve Program, and the Swampbuster Program (Farrier 1995). While these programs may be cheaper than land acquisition in the short run, in the long run land acquisition has many advantages. Biodiversity conservation and restoration require long-range planning. Simple economics tells us that it is more cost effective to buy a product (e.g. car, house) than to lease (or rent) it for many years. Also, as with the CRP, if the privately owned land changes hands there is often no guarantee that the new landowner will participate in the program. Thus, many years of publicly funded habitat restoration could be lost very quickly. Owning title to the land allows government to establish long-range plans, actively improve the land, monitor efficiently, and practice adaptive management.

Another strength of this alternative is that it respects the language of the “takings clause” by compensating landowners for their land. The government will become a player in the market but should not have to pay the full (prior to ESA listing) market value of the land. The threat of severe private land use restrictions as part of an ESA recovery plan should provide landowners incentive to sell land at less than full market price. As Farrier (1995) suggests, in determining compensation private land value should be discounted to account for public costs avoided.

Including a public relations and educational outreach component in the PSHA will increase the probability of salmon restoration throughout the Pacific Northwest. Such programs, which target both current and future voters, can have long ranging positive affects which make future biodiversity conservation efforts easier.

IV. d3) New Legislation Weaknesses

The inherent weakness of any proposed new legislation alternative is that it must first pass the political feasibility test. The PSHA could face opposition from Congress, and with an election year coming up support from the Executive Brach may be unpredictable.

Another issue that might stymie the PSHA concerns the relative responsibilities of state (Oregon) and federal governments in salmon restoration. Questions such as “who has stewardship over Oregon’s fish and wildlife?”, “who benefits most by salmon restoration?” and “who should pay, and how much?” might be raised by politicians and the public.

Matching (state/federal) funds for land acquisition and a state version of the PSHA might be needed to balance state and federal interests and concerns.

The PSHA also bucks the recent trend towards a smaller federal government role. To some, the PSHA may resemble the antiquated conservationist paradigm where big government makes all the decisions (although the PSHA can also be viewed as a preservationist policy in many ways). Proponents of newer environmental paradigms that emphasize partnerships and local input (e.g. ecosystem management, place based politics) may also oppose the PSHA. While the public relations / education part of PSHA will enhance public interest and activity in biodiversity conservation, it will probably not advance the “land ethic” notion proposed by Aldo Leopold. In some sense, the PSHA solution of

taking essential habitat out of the hands of private landowners abandons hope of a land ethic solution to biodiversity loss.

The PSHA will require large amounts of funding, especially during the initial land acquisition phase. Although there are many possible funding sources (outlined above) there is no assurance that these will come through. Public support for this expensive program may diminish if immediate results are not seen. This could be a problem since salmon restoration is a long-term effort and it may take several years before tangible results (i.e. number of fish) are noticed.

Finally, although timber companies will receive some level of compensation for their land, timber jobs will be lost as a result of the PSHA. Federal and state governments should re-train and hire as many timber industry workers as needed for salmon restoration projects, eco-tourism and monitoring on purchased lands. In the long run Oregon's economy will benefit as the economic values of salmon (e.g. commercial, recreational, tourism) will more than make up for lost timber jobs and dollars. However, as was the case with timber restrictions for the spotted owl, this transition will not be easy and individual communities may suffer greatly. The PSHA should contain provisions to lessen the burden on these communities but it cannot replace the traditional way-of-life logging represents for many locals.

V. Criteria for Weighting Alternatives

The following five criteria were used to rank the policy alternatives for private land use in watersheds affecting Oregon Coast coho salmon:

- A) Habitat Restoration: *Significantly improves essential coho freshwater habitat used for spawning, rearing and migration.*
- B) Private Property Rights: *Respects the traditional values, rights, and freedoms associated with private property ownership in the U.S.*
- C) Stakeholder Involvement: *Fosters positive working partnerships between government and private land owners for biodiversity conservation.*
- D) Advance Land Ethic: *Shifts U.S. public perceptions and relationships to the natural world toward a “land ethic” that emphasizes stewardship and cooperation.*
- E) Facilitates Adaptive Management: *Allows for adaptive management with built-in flexibility to respond to changing scientific information in a timely manner.*

Coho salmon habitat restoration (criterion A) is important because of the direct link between habitat health and coho recovery. As discussed earlier, important values attributed to healthy Pacific coho salmon stocks makes their recovery a policy priority. Private property rights (criterion B) must also be given consideration because of the traditional American values they represent and their prominence in our culture and way of thinking. Any policy that completely disregards this criterion will face strong opposition and will probably not be sustainable over time. Stakeholder involvement (criterion C) has received much attention recently as an innovative approach to natural resource management. To the extent that social values drive political decisions, it is critical that policymakers stay in tuned to the interests, beliefs and concerns of their stakeholders. Creating a national “land ethic” (criterion D) will require a major epistemological shift in how Americans relate to nature. This kind of change will not happen overnight. However, as our knowledge of biodiversity

and ecosystem management expands, we become increasingly aware of the inadequacy of relying solely on public lands to conserve representative ecosystems (Farrier 1995). Only about half of the species listed as endangered or threatened under the ESA have been recorded on federal lands and nearly one fourth of major terrestrial and wetland ecosystems are inadequately represented on land managed by federal agencies (Farrier 1995). The “land ethic” may be instrumental in preventing future (and widespread) loss of biodiversity. It is, therefore, imperative that natural resource policies are developed with this goal in mind. Adaptive management (criterion E) is important because coho recovery may take over fifty years and there are many scientific unknowns involved. It is advantageous to choose a policy that can be adapted easily over time in response to changing information and circumstances.

Habitat restoration (criterion A) was given more weight (1.5X) than the other four criterion (1X). Justification for this relates to the irreversibility of outcomes if criteria goals are not achieved. All five criteria are related (either directly or indirectly) to the restoration of coho salmon populations on the Oregon coast. However, considering the downward population trend, if significant habitat restoration is not accomplished in short order Oregon coast coho face the irreversible possibility of extinction. Not achieving the other four criteria in the short-term, does not negate the possibility of meeting these goals (or making retribution) in the future.

Several other criteria were considered but not chosen for this analysis. A target recovery goal for coho salmon in terms of a specific numbers of adult spawners could have been used as a criterion. While this is extremely important, there are too many factors (besides private land use) that would affect this goal. Such a criterion would be more appropriate for an overall coho salmon recovery effort that includes dam removal, fishing

regulations, public land management, and in-stream restoration in addition to private land-use.

Minimization of social and economic impacts on logging communities in the region is another criterion that was explored but not included. Depending on the policy selected, these communities may lose many jobs and possibly a way-of-life they have known for many generations. It is recommended that whichever policy direction is followed, all possible measures are taken to lessen their burden. However, it is important to remember that there are also many salmon fishing communities in Oregon that have been negatively impacted by intensive timber harvest. It is expected that economic losses resulting from timber restrictions will be replaced by economic gains from salmon restoration (e.g. commercial fishing, recreational fishing, eco-tourism).

The amount of time it takes to achieve the selected criteria can be used as a criterion in and of itself. While there are obvious benefits to achieving these goals quickly, it is more important that the desired results are real, meaningful, and sustainable in the long run. Quick solutions are often not the best.

VI. Alternative Rankings and Justification

The four policy alternatives were ranked for each of the five selected criteria (Table 1, 1=best suited for criterion, 4=least suited for criterion). Criterion A (habitat restoration) was weighted more heavily (1.5X) than the other four criteria (1X).

Table 1. Policy alternative ranks by criteria (rank=1 means best alternative, rank=4 means worst alternative).

Policy Alternatives

Criteria	A) ESA	B) CSRI	C) No Action	D) PSHA
A) Habitat Restoration (X 1.5)	3 (rank=2)	4.5 (rank=3)	6 (rank=4)	1.5 (rank=1)
B) Property Rights	4	2	1	3
C) Stakeholder Involvement	3	1	4	2
D) Land Ethic	4	1	3	2
E) Adaptive Management	2	3	4	1
Total Score	16	11.5	18	9.5

The proposed Pacific Salmon Habitat Act would be the best alternative for habitat restoration. Government ownership of critical coho watershed lands offers the best assurance that detrimental land uses will be curtailed. Restoration projects that improve the land can also be conducted without approval of individual landowners. The ESA ranks second for this criterion because it contains language that would allow for strict land use regulations on critical habitat. The Oregon CSRI ranks behind these two for habitat restoration because of its reliance on voluntary actions and commitment to no new regulatory burdens on private landowners. The no action alternative ranks fourth for this criterion because two-thirds of coho habitat is on private lands. Habitat improvement efforts focused on public lands could be negated by continued degradation on private lands.

The no action on private lands alternative best satisfies criterion B (property rights) by taking a “hands-off” approach. The Oregon CSRI ranks second because it does not

impose any additional property use restrictions. This alternative only encourages private landowners to participate in management decisions. The PSHA ranks third for this criterion. Since landowners will be paid (compensation) for their land this alternative respects property rights more so than ESA (ranked fourth) imposed land restrictions without compensation. However, property rights proponents may question whether the price paid for PSHA land represents “just” compensation as required by the Fifth Amendment. For this reason, the PSHA ranks below the CSRI which does not infringe on property rights in any way.

One of the overriding principles of Oregon’s CSRI is to encourage stakeholder involvement (Criterion C) , both in the developmental and implementation phases. In its brief existence, the CSRI has done remarkably well at achieving this goal considering the number and diversity of stakeholders involved. The PSHA ranks second for stakeholder involvement due to its public relations / educational outreach program. Stakeholders will be less involved in management decisions under the PSHA than they are under the CSRI (e.g. local watershed councils). However, they will still play an important role in expressing their values through the economic, political and social systems. The ESA (ranked third) leaves some room for stakeholder involvement through HCP’s and assistance in drafting recovery plans (USFWS and NMFS 1997). However, successful coho habitat restoration on private lands will require rather draconian measures which may leave stakeholders feeling powerless. The no action alternative (ranked fourth) would require the least stakeholder involvement.

The Oregon CSRI has the best chance of advancing a “land ethic” (Criterion D) because (ideally) private landowners will take voluntary, self monitored measures to restore habitat. The PSHA ranks second for this criterion because of its educational outreach

program focused on the importance of bio-diversity conservation. The no action alternative ranks third because it will neither advance or set-back the notion of a “land ethic”. The ESA ranks last because private landowners whose land use is restricted due to an ESA listing may develop a more antagonistic relationship with nature.

The PSHA ranks first for adaptive management (Criterion E) because of the advantages associated with owning the land being monitored and managed. The ESA ranks second for this criterion because, although the land is still privately owned, Section 9 gives NMFS wide leverage in adjusting management strategies as conditions and stock status change over time. However, programs such as “Safe Harbor” and “No Surprises” can limit the ability to manage adaptively. The CSRI has the potential to facilitate adaptive management due to its flexibility and commitment to monitoring. However, it ranks third because its reliance on voluntary actions and decentralized decision making offer no guarantees that adaptive management will be carried out.

Overall, the PSHA was the highest ranked (i.e. lowest total score) alternative (Table 1), with the Oregon CSRI finishing a close second. The ESA and “no action” were a distant third and fourth, respectively.

VII. Feasibility Considerations

Cumulative ranks showed a large gap in scores between the top two alternatives (PSHA=9.5, CSRI=11.5) and the bottom two alternatives (ESA=16, No Action=18). For this reason, feasibility analysis was conducted comparing just the top two alternatives.

Feasibility was divided into four parts: political, legal, fiscal, and logistical.

As discussed earlier (see “New Legislation Weaknesses”) there are many potential political barriers to passing the PSHA. The CSRI has gained initial support from the State Legislature and from NMFS. It also has the backing of industry (timber and agriculture), although this could change if tougher federal restrictions are imposed. Overall, the CSRI is more politically feasible because it is currently underway, whereas the PSHA has not yet been tested.

The CSRI is open to legal challenges from environmental groups claiming that the ESA requires tougher restrictions on private land use. If NMFS accepts the CSRI as the recovery plan for coho, and does not impose any additional restrictions they will likely face another legal battle. The PSHA alternative does not conflict with ESA language nor is it likely to face “regulatory takings” lawsuits since private landowners will be compensated.

Both the CSRI and PSHA could potentially run into funding problems. The PSHA is a more costly alternative. It is questionable whether the American public is willing to pay such a high price for salmon restoration. As discussed earlier, a variety of innovative, untested funding sources may be required. The CSRI was funded for the first two years of implementation (through 1999). A lower budget, voluntary actions, and industry backing give CSRI a slight advantage over the PSHA in terms of fiscal feasibility.

The CSRI could face serious logistical problems in trying to coordinate efforts among the many stakeholders involved. This includes local watershed councils, numerous state and federal agencies, industry, recreation interests, Native American interests, environmental groups, academia and private citizens. The PSHA will also necessitate coordination among these groups in the initial land acquisition phase. However, once lands are acquired they can

be placed under the control of a single agency. Lines of communication and delineation of responsibilities should be clearer under the PSHA than the CSRI.

The feasibility of the PSHA and the CSRI are about equal. The PSHA is more legally and logistically feasible than the CSRI. The CSRI is more politically and fiscally feasible than the PSHA. The CSRI might be given a slight edge overall since it is already in its second year of implementation whereas the PSHA has not yet been initiated.

VIII. Recommendations

“Provide some refuge for salmon, and provide it quickly, before complications arise which make it impracticable, or at least very difficult. Now is the time.”

Livingston Stone (1892)

Based on the above analysis, the best policy alternative to pursue in regards to private land use on watersheds affecting coho habitat is the Pacific Salmon Habitat Act. The PSHA ranked first for meeting the selected criteria and was only slightly less feasible than the next closest alternative (i.e. Coastal Salmon Restoration Initiative). Therefore, it is recommended that the necessary measures be taken to enact the PSHA as quickly as possible. It is also recommended that implementation of the CSRI continue at least until the PSHA gets passed. Considering that coho populations continue to decline, it would not be advisable to discontinue a plan that is currently in place until the new plan is approved. Initially, the CSRI could compliment the PSHA as a means of reducing habitat degradation on lands not yet purchased. Oregon Coast coho should remain protected under the ESA and their status

(threatened/endangered) should be based solely on biological determinants. The strength and enforceability of the ESA should serve as a backdrop, setting the basic ground rules for negotiations with private landowners (Farrier 1995). The realistic possibility of severe land use restrictions under the ESA will increase private landowner's enthusiasm for less draconian measures such as PSHA or CSRI.

More than one-hundred after Livingston Stone's prophetic words (see quote above) we are first awakening to the catastrophic results of not heeding his advice. In the Pacific Northwest, more than 214 distinct stocks of salmon are at varying risks of near term extinction and virtually every river system and coastal basin has one or more species facing extinction (Nehlsen et al. 1991 from Spain 1997). Numerous complications have arisen during this century that now make salmon restoration extremely difficult, if not impossible. However, as long as there is the slightest chance of reversing this trend, it is our collective responsibility to act before it is too late. Now is not only the time – it may be the last chance we get.

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