

Salmon Anchor Habitats in NW Oregon: A Review of the Policy Making Process

Salmon Anchor Habitat Work Group
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1. Introduction

The 2003 Oregon Legislature directed the Oregon Department of Forestry (ODF) to convene a citizen work group to review and evaluate the ODF Salmon Anchor Habitat Strategy for state forests in northwest Oregon. This paper summarizes that policy development for the benefit of the work group.

Salmon are emblematic of life in the Pacific Northwest. Salmon were a key resource for Native Americans, and remained economically important as Euro-Americans settled in the region. Salmon stocks have declined significantly since then due to over harvesting, habitat degradation, hatchery practices, construction of dams, and changing ocean conditions. The regional commercial salmon fishing fleet is a fraction of its former size, but the recent upswing in coho runs gives hope to this beleaguered industry. Sport fishing for salmon remains economically important to many coastal communities, and efforts to protect and recover Pacific Northwest salmon populations are widespread.

Declining salmon runs in Oregon have prompted a range of responses from state and federal government agencies, including catch limits, modifications to dams and water management, and changes in land use regulations. At the federal level, some populations of Oregon coho salmon are listed as threatened under the Endangered Species Act (ESA). State agency responses include regulations and guidelines in the Oregon Forest Practices Act (FPA), the Oregon Plan for Salmon and Watersheds (Oregon Plan), and policies specific to watershed and anadromous fish protection in regional and local land use plans.

The state of Oregon owns two types of forest land- Common School lands acquired as part of the federal Act creating the Territory of Oregon in 1948, and Board of Forestry (BOF) lands, also sometimes referred to as "Chapter 530" lands (Rice and Souder, 1998). In this document, "state forests" refers only to BOF (Chapter 530) lands. Oregon law states the purposes for state forests and requires that they be managed for the "greatest permanent value" to the people of Oregon. This directive can be interpreted in several ways. Achieving multiple purposes and deciding which to emphasize can be contentious.

One key purpose of state forests is the production of revenue for counties and taxing districts where the forests are located, and for the state itself. Historically, timber harvesting has generated most of this revenue. Oregon coastal forests are among the most productive in the world, and many counties rely on forest products for a significant portion of their economic base and county government revenue. Oregon state forests are also managed to meet public goals other than revenue generation, including salmonid protection, maintaining and restoring native aquatic habitats, and recreation. Residents of communities adjacent to Oregon state forests have a stake in maintaining water quality for municipal supplies, scenic qualities and recreation opportunities.

As part of its comprehensive state forest planning, the ODF developed a strategy for minimizing management activity risks to salmon, based on the concept of *anchor habitats*. Based on our review of the policy, the Salmon Anchor Habitat (SAH) evolved through consultation with federal and state agencies, scientific peer review, and cooperative efforts with stakeholder groups, but some stakeholders feel that they were not included in the process. (Note: As used in this document, the term *stakeholder* means “a person with an interest or concern in something” [Jewell and Abate, 2001]. Correspondingly, a *stakeholder group* means group with an interest or concern in something.) Stakeholders in state forest planning and management include, but are not limited to, the counties and taxing districts where state forests are located.

A key issue throughout development of the strategy was the underlying rationale for SAHs. Some stakeholders view SAHs as long-term “refugia” necessary to assure survival and recovery of “at risk” species. Scientific reviewers were less conclusive about the need for such refugia in this case. They generally believed that there is sufficient uncertainty about best way to protect salmon habitats in Tillamook region state forests to justify a more conservative approach in some sub-basins while Northwest Oregon Forest Management Plan (FMP) strategies are applied across the broader landscape. The ODF adopted this rationale and developed the SAH Strategy as a ten-year, adaptive management approach. Scientists point out that active land management is an ongoing experiment. In this light, ODF believes that it is testing the hypothesis that FMP Landscape and Aquatic Strategies will provide sufficient riparian and salmon protections, but “hedging it’s bets” with a set of less actively managed SAHs.

At about the same time as the SAH Strategy was adopted, the 2003 Oregon Legislature considered House Bill 3632, which would have redirected management of state forests to emphasize timber production. The bill was not enacted, but the Legislature directed ODF to form a constituent work group to review the SAH Strategy. (See budget note in Appendix B.) The work group is charged with assessing impacts of ESA salmon protection requirements, monitoring implementation of the SAH Strategy and its impacts on timber harvest activities, identifying issues and making recommendations for necessary changes to the SAH Strategy. The ODF is directed to report to the Board of Forestry and the Legislature on work group activities and recommendations, accompanied by scientific evidence, by September, 2004.

The issues that led to creation of the SAH Workgroup are not new. Opinions have differed about the various purposes for which Oregon state forests are managed since the forests were originally established. Stakeholder differences have intensified in recent decades of great social change and rapid population growth. Demands placed on Oregon state forests today are greater than ever.

Some stakeholders believe that state forests should be managed primarily for timber resources, while others believe that fish, wildlife and other non-timber values should play a greater or equal role. Each group may acknowledge that several types of resource values can and should be accommodated on state forests but differ about the relative

emphasis accorded to each. And beyond this, there may be differences of opinion about the best way to achieve certain goals, even if consensus exists about what these goals are. ODF is attempting to implement the FMP in the context of legislative efforts as diverse as HB3632 and the Tillamook 50/50 Initiative, which seeks to manage half of the Tillamook and Clatsop State Forests for old-growth forest. The purpose of this document is to provide the work group with a short summary of SAH strategy development and identify issues that have arisen so that all work group members have a common understanding of the context for their work. The second section discusses background on state forests. Salmonid protection and restoration strategies and policies are summarized in the third section. In the fourth section Northwest Oregon forest planning relating to salmonids is reviewed. Stakeholder positions and concerns regarding the SAH strategy are discussed in the fifth section. A brief conclusion follows.

2. Background

2.1. The Tillamook region before the fires: Coastal old-growth forest

Early in the 20th century, the 800-square mile landscape now encompassed by the Tillamook and Clatsop State Forests was covered by what may have been the largest contiguous stand of virgin forest in Oregon, and perhaps the entire lower 48 states (ODF, 1992). This coastal temperate rainforest landscape was part of a slowly shifting mosaic of tree patches and stands, shaped over long time periods by random combinations of natural disturbances including fires, windstorms, and periodic outbreaks of tree pathogens such as insects and disease (Spies, 1997; Perry and Amaranthus, 1997). Patches of the mosaic ranged from small clearings formed by the death and collapse of individual trees to areas tens, or even hundreds of square miles in size set on a trajectory of ecological development at the same time by stand replacing fires. In some places, multiple disturbances would leave patches of several different stages of forest development mixed within a stand horizontally or vertically or both (Spies, 1997).

The mean fire return interval for coastal Oregon forests has been calculated at 90-400 years. At the time of the Tillamook fires, the region had not experienced a major disturbance for at least 400 years, so most of the trees here were old and massive- up to 7 feet in diameter. The forests were diverse, with hardwood trees and shrubs in the understory and multi-storied canopies of conifers above. The landscape was habitat for numerous species of wildlife, with streams and rivers that supported prolific salmon runs. Western hemlock and Sitka spruce dominated lowland areas, with Douglas fir, western red cedar and white fir at higher elevations (Wells, 1999).

Research in recent decades has allowed a better understanding of the natural role fire plays in forested ecosystems. Despite their apparent destructiveness, fires can be beneficial to forests. For example, periodic fires enhance biodiversity by fostering a range of forest development stages - many wildlife species are adapted to habitat characterized by younger or patchy stands. Fire can improve overall forest health by limiting the spread of tree pathogens. Contemporary views of ecosystem function stress the dynamic, changing nature of the landscape over time, and fire is understood as a keystone process in this cycle.

In an objective, abstract sense, an old-growth forest and the ecological, esthetic and timber resources it contains can eventually be recovered after a fire, although over a timeframe that can span many human lifetimes. But humans experience landscapes over years and decades rather than centuries, and it is understandably difficult for people who experience a large-scale, stand replacing forest fire to interpret it as anything other than catastrophic.

2.2. Euro American settlement and the rise of the timber industry

The late 1800's and early 1900's were a period of rapid change in Oregon forests. Federal laws such as the Donation Land Claim Act (1850), the Homestead Act (1862), and the Timber and Stone Act (1878) were intended to encourage settlement and development of the west under the Jeffersonian model of individual, independent farmers. Between 1850 and 1900, millions of acres of federally owned timberland in Oregon were transferred into private hands. Much of this land was unsuitable for farming and virtually given away, even though it held timber of enormous value, even by 19th century standards (Landman, 1995). Wells (1999) describes a roughly 50-year period of frenzied land speculation, unrestrained logging and extremely volatile markets for timber during the late 1800's and early 1900's. By 1929, Oregon was producing 5 billion board feet of lumber annually (Landman, 1995). Timber emerged as the dominant industry along the northwest coast, but the wildly fluctuating economic climate, coupled with high value timber standing on land that itself had little economic worth, fostered an atmosphere of intense exploitation of coastal forests, and a "...cut out and get out mentality" (Wells, 1999, p. 34).

2.3. The Tillamook fires and their aftermath

Despite Oregon's status in the early 1930's as a leading timber producer the steep terrain and inaccessibility of the Tillamook region left most of it in virgin, uncut forest. Starting in 1933, and again in 1939, 1945 and 1951, a series of massive forest fires occurred in the region, burning 355,000 acres in all. In utilitarian terms, the fires killed trees containing an estimated 13.1 billion board feet of timber (ODF, 1983). The Tillamook fires, and the salvage logging and restoration efforts that followed, were a defining period for people who lived in the area (Wells, 1999). Many things have changed in the intervening decades, but ecological and social effects of the Tillamook fires continue to shape the lives of northwestern Oregon residents. From the perspective of subjective human experience, the Tillamook fires represented a huge loss of both economically valuable timber and ecological values.

Salvage logging on the Tillamook began "almost as soon as the embers had cooled", and continued for many years. Shortly after the 1933 fire, Weyerhaeuser Co. and John W. Blodgett formed the Consolidated Timber Company and, along with an estimated 200 smaller operators, salvaged about 4 billion board feet of sound Douglas fir logs over a 13-year period (Wells, 1999; ODF 1993). World War II and the housing boom that followed spurred a steady increase in lumber prices, making it economically feasible for loggers to return to the same areas multiple times to recover wood they had left on earlier entries (ODF, 1983).

By 1971, about 7.5 billion board feet of timber had been removed, more than half the amount that existed prior to the fires (Wells, 1999; ODF, 1983). Much of this timber was processed by mills in towns adjacent to the burned forest, including Tillamook, Astoria, Seaside, McMinnville, Forest Grove and Hillsboro. Timber salvaged between 1934 and 1955 was worth nearly \$100 million in 1993 dollars (ODF, 1993). Salvage logging after the Tillamook fires was undeniably a boon to the timber companies, their employees, local communities and consumers, but these activities were not without costs. Multiple salvage entries into the same stands hindered early reforestation efforts (ODF, 1983). Logging and roadbuilding practices at the time were largely unregulated, and at least one study has concluded that salvage operations, rather than the fires themselves, were the principal cause of damage to forest soils and streams (Wells, 1999; ODF, 1992).

2.4. Burned and cutover lands revert to state, reforestation bond, replanting

By the mid-1920's the timber industry employed 50,000 people and placed more than \$40,000,000 into circulation each year. There were about 5 million acres of deforested land (2.6 million acres of which were privately held) with 125,000 more being added annually (Levesque, 1985; Landman, 1995). Landman (1995) notes that Oregon forest land ownership patterns, immense short-term logging profits, a seemingly endless supply of virtually free unlogged land, and a tax system that did not distinguish between forested and cutover land created strong disincentives for retention and management of timberlands for the future. In the Tillamook region, fires and the salvaging that followed left a burned and cutover landscape, large tracts of which were abandoned by timber companies. Counties foreclosed on much of this land, but were then faced with having to pay state property and fire patrol taxes on lands that produced no revenue.

Similar problems were occurring statewide, so Oregon passed land acquisition acts in 1931 and 1939, with several amendments following each. The acts allowed counties to deed burned and cutover lands to the state, in exchange for assurances that a portion of any future revenue from them would go to the counties. Clatsop State Forest was established with ceded lands in 1937. Oregon acquired 255,000 acres of Tillamook region land under this act (ODF, 1983). Levesque (1985) cites a total of 308,000 acres conveyed by the counties for Tillamook State Forest (p. 355).

Recognizing that active replanting was needed in the Tillamook region to get trees growing sooner, Oregon's governor tried to enact a timber severance tax to fund what promised to be a major undertaking. This effort failed after strong opposition from the timber industry. The Oregon State legislature then authorized a reforestation bond issue, and sent it to the voters in 1948. The measure was rejected by Tillamook, Clatsop and Marion counties, but passed by a margin of 1,875 votes out of about 420,000 total, on the strength of votes in Multnomah, Benton and Lane counties (Landman, 1995).

After the measure passed, a 1949 bill creating the "Oregon Forest Rehabilitation Fund" gave the BOF authority to sell state bonds to reforest the Tillamook region, and authorized expenditure of \$25,000,000. Nearly \$13,000,000 was eventually spent between 1949 and 1973 to reforest 325 square miles of land, using aerial and ground-based replanting and reseeding of Douglas fir (ODF, 1983). Citizens from surrounding

counties assisted for many years, building strong personal attachments to the forest, but accounted for only about 1% of the area replanted (Wells, 1999). The 1949 bill specified that the State Forester's duty, under BOF direction, was to "rehabilitate, reforest and develop state owned forest lands so as to secure the highest permanent usefulness to the whole people of the state of Oregon." (Or. Laws 1949, ch. 102, 11, quoted in Landman, 1995.) Tillamook State Forest was established in 1973.

2.5. Oregon state forest management statutes: Evolution and controversy

In 1931, the Oregon Board of Forestry (BOF) was authorized to manage state forest lands for "any and all of the following purposes: a) continuous forest production and so far as practicable to promote sustained yield forest management for the forest units of which such lands are a part, b) water conservation or watershed protection; c) recreation." (Or. Laws 1931, ch. 93, 3, quoted in Rice and Souder, 1998.) These purposes were amended in 1941 and 1967 to include grazing, erosion control, fish and wildlife environment, landscape effect, and water supply protection. The 1941 amendment specified that state forests were to be managed to "secure the greatest permanent value...to the state." (Or. Laws 1941, ch. 236, 5, quoted in Rice and Souder, 1998.) The 1967 amendment clarified that non-timber uses of state forests would be evaluated according to the best interests of the state as a whole.

In 1972, the State Forests Committee adopted revised state forest management policies emphasizing timber production, with the stipulation that a combination of uses should share the lands wherever possible (Landman, 1995). Since 1973, the BOF has used its discretionary authority to set timber production as the priority use of state forest lands (Rice and Souder, 1998). This has been controversial. After numerous public comments and two revisions, administrative rules were updated and clarified again in 1998. Most people commenting expressed concern that the revised rules would either: (1) result in reduced revenue to schools and counties, and/or timber-related jobs, or (2) result in a timber harvesting emphasis at the expense of other state forest values. (Rice and Souder, 1998.)

Reflecting current scientific concepts about ecosystem processes and function, the new rules included a directive to "consider the landscape context" (OAR 629-035-0020[3][d], 1998). A landscape is defined as "a broad geographic area that...may include a watershed or subwatershed areas." (OAR 629-035-0000[12], 1998.) Timber production remains a primary emphasis, and is the most readily available source of revenue from state forests (Levesque, 2002a), but must be conducted within the context of protecting other forest values. (Rice and Souder, 1998.) The key stipulation that state forests must be managed to "...secure the greatest permanent value..." to Oregon was retained in the new rules, and defined more explicitly:

"[G]reatest permanent value' means healthy, productive and sustainable forest ecosystems that over time and across the landscape that provide a full range of social, economic, and environmental benefits to the people of Oregon. These benefits include but are not limited to:

- (a) Sustainable and predictable production of forest products that generate revenues for the benefit of the state, counties and local taxing districts;
- (b) Properly functioning aquatic habitats for salmonids, native fish, and other native aquatic life;
- (c) Habitats for native wildlife;
- (d) Clean air, soil and water
- (e) Protection against floods and erosion, and;
- (f) Recreation” (OAR 629-035-0020[1], 1998.)

The rule also states that revenue production may be viewed as a primary management goal, but:

“This management focus is not exclusive of other forest resources, and must be pursued within a broader management context that:

- (a) Results in a high probability of maintaining and restoring native aquatic habitats
- (b) Protects, enhances and maintains wildlife habitats
- (c) Protects soil, air and water, and;
- (d) Provides outdoor recreational opportunities” (OAR 629-035-0020[1], 1998.)

The state’s responsibilities to counties and taxing districts where state forests are located, and the relative emphasis placed on various state forest purposes, have been contentious topics for decades. Changing, and often sharply different social values, and divergence between perspectives in rural coastal communities and those in the more populous Willamette Valley underlie many of these conflicts. There is sentiment in state forest areas that state tax structures left them with little choice but to cede their lands, and that they would not have done so without the understanding that the lands would be managed primarily for timber and revenue production to benefit local counties (Levesque, 2002a).

Most revenue generated from state forests does go to the counties and taxing districts after a maximum of 25% is retained for management expenses. Counties and taxing districts are also responsible for paying reforestation bond funds back to the state, without interest. County stakeholders point out that they have assisted with land transfers, and helped fund management activities, fire suppression, road building and decommissioning in amounts that exceed what is called for in administrative rules (Levesque, 2002a). Mill owners and county officials point to the well-paying jobs that state forest timber harvesting supports in depressed rural counties and argue that the small amount of federal forest land in northwest Oregon makes state forests critical to their timber supply (e.g. Ivanoff, 2003).

Local counties and taxing districts argue that their vested financial interest in state forest management, and responsibilities to pay back reforestation bonds, make them qualitatively different from other stakeholders statewide. They have tended to view the state forest revenue sharing arrangement as a trust or contract relationship (Levesque

1985). A 1939 speech by then Oregon Governor Charles Sprague is sometimes cited to support this view: "... the law directs the Board of Forestry to block these lands into practical operating units, to reforest, rehabilitate and manage them in perpetuity, in trust for the counties and taxing units therein." (Oregon Governor Charles Sprague, quoted in Levesque 2002a.)

Landman (1995) acknowledges that the county-state relationship has been referred to as a "trust" but notes that neither the 1939 Act, nor any subsequent legislation, includes such language. In a 1984 case involving a proposed exchange of state lands, a trial court found that a trust or contract relationship did exist between the counties and state (Levesque, 1985). On appeal, the Oregon Supreme Court disagreed, and found that while the counties have a "...protected, recognizable interest..." in state forest revenue, this did not constitute a contract relationship (*Tillamook County vs. State Board of Forestry*, 1986). The counties cannot be completely deprived of funds from state forests, but in a review of the statute, Rice and Souder (1998) found "...a lack of any *a priori* requirement to maximize, or even produce revenue from every acre of Chapter 530 lands" (p. 260). They also note that "...it is difficult to infer [from Chapter 530 provisions] that the legislature explicitly established priorities among the various purposes for which the lands were acquired, or how they are to be managed" (p. 259). They note that the BOF must adhere to the FPA and ESA, and must consider the counties' "...protected, recognizable interest..." but inside these bounds lays considerable latitude for the BOF to specify management alternatives.

From the state's point of view, the counties and taxing districts actively sought state help and entered into the agreements willingly because they benefited from lower tax burdens and assistance with management and reforestation (Landman, 1995, ODF, 1983). Some stakeholders argue that state ownership stabilized land ownership, provided for forest rehabilitation, and provided a stop-gap for accumulation of cut-over lands (Ecotrust et al., 2001). Several large Oregon communities including Forest Grove, Beaverton, Astoria and Hillsboro are adjacent to Tillamook and Clatsop State Forests. Residents here have less of a financial interest in timber harvesting than rural coastal counties. They are concerned about harvesting impacts on other commercial and noncommercial economic benefits in which they have a stake, including municipal water quality, esthetic values and wild land recreation opportunities in the state forests (Bushman, 2003; Schouten, 2003; Van Dyck, 2003). These stakeholders believe that non-consumptive state forest values contribute to the region's high "quality of life", that some argue is an increasingly important driver of Oregon's future economic growth and diversification (e.g. Powers and Ruder, 2003; Oregon Business Plan, 2004).

Stakeholders concerned about salmon argue that seven of the Pacific Northwest's healthiest runs occur in Tillamook and Clatsop rivers, and that the threatened status of these runs makes habitat preservation a top priority (Portland Audubon Society, 2002). Some economists note that protecting and increasing salmon and their habitats can produce a range of economic benefits, just as timber harvesting does, and question timber industry estimates of economic impacts of harvesting restrictions to benefit salmon (e.g. Niemi, et al. 1999; Powers and Ruder, 2003). Uses other than timber have been part of

the state forest regulatory framework since 1941, and specific direction to consider benefits on a statewide basis has been present since 1949 (Landman, 1995). Table 1 shows a more complete list of forest values, benefits and services.

Rice and Sounder (1998) conclude that despite attempts at clarification, defining “greatest permanent value” remains a key management dilemma because of the numerous ways this phrase can be interpreted. Tillamook County historian Paul Levesque takes a local economic perspective but seems to agree in principle, stating that “Clearly trust lands were intended to be revenue producing lands, not reserves [or] state parks...the question then becomes one of balance between timber production and other environmental and amenity issues.” (Levesque 2002b.) Aside from stakeholder differences, one problem is the lack of a common metric for comparing forest values. For example, watershed protection, fish and wildlife habitat, and wild land recreation provide many benefits, including to county residents where state forests are located, but these benefits can be difficult to quantify.

TABLE 1: STATE FOREST VALUES

<u>Commercial Goods</u> timber harvest forest-supported, ocean-based, commercial salmon fishery non-timber forest products commercial recreation outfitting other guided recreation	<u>Spiritual / Cultural Values</u> opportunities for solitude in natural setting experience of forest ecosystems maintenance of traditional livelihoods- timber harvesting & milling commercial fishing
<u>Watershed Values</u> water quantity water quality reduced sedimentation of reservoirs timing of water flows headwater fisheries support upriver freshwater fish, crabs, clams	<u>Other Ecosystem Function Values</u> carbon storage micro-climates air quality ecosystem health & resilience soil productivity
<u>Recreation Values</u> wildlife viewing hunting angling within state forests forest-supported off-forest fisheries forest travel and experience adventure recreation other dispersed recreation	<u>Scenic Integrity</u> scenic beauty open space natural vistas

(Adapted from a list in Power and Ruder, 2003.)

State forest planning is conducted by ODF with public input, and consultation with state and federal agencies (e.g. ODFW and NOAA), but the BOF oversees the process and must approve final plans. Within the considerable latitude provided for in current statutes, the tasks of addressing various stakeholder claims, and sorting out the mix of state forest products, services and values that provides the “greatest permanent value” to Oregon is ultimately the responsibility of the BOF.

3. Salmon in Northwest Oregon

3.1. Historical context

It is well established that Pacific Northwest salmon runs were historically prolific, but have declined significantly due to over harvesting, hatchery management, logging, mining, dams, grazing, irrigation and urban and industrial development (Huntington et al. 1996; Lichatowich 1999). Nehlsen, Lichatowich and Williams (1991) inventoried Pacific salmonid stocks and found that at least 106 major stocks had already become extinct, and of 214 remaining native, naturally spawning runs, 101 were at high risk of extinction, 58 were at moderate risk, 54 were of “special concern”.

Oregon coast coho populations historically exceeded 1.5 million adult spawners annually. Compared to other salmonids, coho spend extended periods of their life cycle in fresh water habitats, making them particularly vulnerable to human-caused habitat degradation (Huntington et al., 1996). As recently as the early 1970’s, populations ranged from more than 600,000 to over 1 million adults, but numbers declined to less than 25,000 by the late 1990’s (IMST 1999a). Oregon coho numbers rebounded strongly in 2002. Experts believe this was mainly due to improvement in cyclic ocean conditions and restrictions on commercial salmon harvests, and point out that rapid upswings are often followed by equally dramatic downswings (Brinckman 2003). There is growing consensus that ocean productivity that supports salmon populations fluctuates between “good” and “bad” cycles over 2-3 decades. Oregon coho seem more susceptible to these fluctuations than stocks farther north (Waples 2002).

Many experts agree that monitoring through several reproductive cycles and the next downturn in ocean conditions will be necessary before concluding that the Oregon coast coho has rebounded successfully (e.g. Lawson 1993; Reeves 2004, personal communication). It is widely agreed that high quality fresh water spawning and rearing habitats are key to recovery and long-term survival and of coho populations. Salmonids other than coho, such as chinook, chum, steelhead, and sea-run cutthroat are also present in Oregon coastal watersheds and rely on high quality habitat to persist. Intense public interest in reversing historical declines and protecting healthier populations, tenets of the Oregon Plan, and the need to sustain recent coho stock improvements suggest that salmonid habitat protection will continue to be a key concern for state forest managers, regardless of the Oregon coast coho’s future ESA listing status.

3.2. Protection strategies: Hatchery vs. wild; threatened vs. healthy stocks

The past 10-15 years have been a period of increasing knowledge and shifting views concerning salmonid management, protection and recovery. These shifts hinge on growing questions about the use of hatcheries to augment wild populations, and about the wisdom of focusing primarily on trying to stave off extinction of the most seriously threatened fish stocks while paying relatively little attention to stocks in better condition.

For decades, managers have relied on hatcheries to augment wild populations in commercial and sport salmon fisheries, and to rebuild stocks that were depleted due to over harvesting or habitat degradation. However, there is growing evidence that hatchery fish are not the same as wild fish, and can actually pose several threats to them. Hilborn

(1992) notes that hatcheries may succeed in the short-term, but nearly every North American hatchery program shows a pattern of declining fish survival over time. This includes a 25-year trend for hatchery coho in Oregon. Scientists do not completely understand why survivals decline, but the implication is that hatchery production may not be sustainable.

Managers select fish that adapt well to hatcheries, which are very different from conditions in the wild. Past hatchery practices often involved taking fish from one watershed and introducing them elsewhere. Some argue that this practice dilutes the gene pools of stocks adapted to particular watersheds, pointing to accumulating evidence that compared to wild fish, hatchery fish often do poorly in the wild, as do offspring of wild fish and hatchery fish (Hilborn 1992). Hatchery fish prey on wild fish, compete with wild fish for resources during most life history stages, and intensify fishing pressure on wild fish in places where hatcheries increase overall numbers and harvest levels (Goodman 1990). There is growing concern in the Pacific Northwest that attempting to sustain salmon harvest rates with hatchery fish is endangering wild stocks. Large harvests have caused some wild stocks to decline as hatchery production increases, leaving similar numbers of fish but with most coming from expensive hatchery programs rather than natural reproduction (Hilborn 1992). Not everyone agrees about the effects of hatcheries and fishery management, and genetic differences between hatchery and wild fish. Some believe that the importance of genetic diversity has been overplayed, and that hatchery practices simply need to be reformed to have a crucial role in maintaining salmon stocks (e.g. Buchal 1998). Battles over genetic relationships between hatchery and wild fish, and over the role of hatcheries in salmon stock management, continue to play out in the courts.

Another major shift in thinking about salmon is growing attention to protection of remaining healthy salmon stocks and their habitats. Lichatowich (1999) argues that for most of the past century, poor understanding of fish biology and faith that hatcheries could mitigate problems of over harvesting and habitat degradation shifted attention away from the need to preserve healthy populations and the streams they rely on. Today, much attention and money continues to be directed at recovering stocks with low probabilities of long-term survival, and experts are increasingly concerned that ESA-related efforts focused on unhealthy stocks are diverting attention from proper management of native populations in better condition (Huntington et al. 1996).

Moreover, Frissell (1993) and Huntington et al. (1996) note that knowledge about the health of many salmon stocks is incomplete, and found evidence to suggest that a significant number are in less than desirable condition. Biologists rated habitat conditions as either “fair” or “poor” in a majority of watersheds supporting healthy native salmonid stocks, suggesting that these stocks’ healthy status may be somewhat tenuous (Huntington et al. 1996). Salmonid species native to the Oregon Coast Range exhibit wide variation in physical attributes, genetic and life-history features within and among populations (Reeves et al. 2002). Huntington et al. (1996) argue that because much of this historic genetic diversity has been lost through over harvesting and habitat degradation, protection of remaining healthy stocks is critical. Huntington et al. (1996)

also point out that attending to relatively healthy salmonid populations is important because they “...provide what are likely to be the least expensive, most reliable options for [conserving salmon stocks] because maintaining salmon populations should be easier than restoring them.” (p. 7.)

Better understanding of salmonid life histories, of hatchery risks and limitations, and of the importance of relatively healthy salmon stocks have led to calls for a “new paradigm” that advances habitat restoration and ecosystem function rather than hatchery production to protect and restore salmon populations (e.g. Nehlsen, et al. 1991). Similarly, experts consistently recommend landscape or watershed level, ecosystem-based approaches to land management and species conservation (e.g. FEMAT 1993; IMST 1999; Reeves et al. 2002). For salmon, these approaches take the form of identifying and protecting watersheds where habitat and reproduction levels are relatively intact (Rahr et al. 1998). Reeves, et al. (2002) point out that “areas of good [salmonid] habitat are relatively rare in coastal Oregon today and...protecting these areas is essential in the short term to protect existing populations and supply colonists to other areas as they recover” (p. 84). Federal efforts to identify and protect “key watersheds” (FEMAT 1993) are an example of this approach, but Reeves et al. (2002) note that federal watershed ownership is limited in the Oregon Coast Range, so their role in aiding recovery of declining salmonid populations there is limited.

3.3. Salmonid protection and restoration policies in Oregon

Ensuring that Oregon’s rich endowment of streams and rivers continue to support healthy populations of salmon is a critical issue for land managers. Gregory (1997) notes that current riparian conditions in Oregon reflect a 150-year legacy of minimally regulated land uses. Federal and state riparian regulations now in place are undoubtedly extensive by historic standards, but are a relatively recent development.

Oregon’s salmonid recovery efforts are motivated by the State’s recognition of the economic, social, and cultural importance of salmon, and by the need to comply with the federal ESA. The ESA requires state forests and private landowners to avoid “take” of listed species. Activities directed toward recovery of threatened or endangered species are the responsibility of federal agencies and lands. State and federal management goals may differ, but jurisdictional boundaries rarely conform to watersheds, and the importance of interagency, landscape-level approaches is a recurring theme of scientific reviews of anadromous fish policies (e.g. FEMAT 1993; Gregory 1997; IMST 1999b).

In 1991, the National Marine Fisheries Service, now NOAA-Fisheries (NOAA) published a policy explaining that a salmon population would be considered a separate species if it represented an “Evolutionarily Significant Unit” (ESU). In 1993, two coalitions of environmental groups (Oregon Trout, et al., Pacific Rivers Council, et al.) petitioned the NOAA to list the coho salmon as endangered. In early 1994, NOAA found that these petitions had merit and began an assessment of coho stocks, which was completed in mid-1995.

Six distinct coho salmon ESUs were identified. The Oregon coast ESU was one of three proposed for listing as threatened. NOAA cited evidence that abundance of this ESU may be less than 5% of that in the early 1900's (NOAA 1995). Over harvesting, habitat degradation, hatchery practices, construction of dams, and ocean conditions were all contributing factors (IMST 1999a,b). After entering into an agreement with Oregon to implement and strengthen the 1997 Oregon Coastal Salmon Restoration Initiative (OCSRI, a state-initiated effort to forestall listing), NOAA agreed not to list the Oregon coast coho. This decision was immediately challenged in court. The Oregon District Court ruled that NOAA Fisheries could not legally consider future conservation efforts, only the current status of the fish (*Oregon Natural Resources Council et al. v. Daley*, CV-97-1155 ST, D. Or. June 1, 1998). The Oregon coast coho ESU was officially listed as threatened under the ESA in August, 1998. At that point, state forest management had to assure that management activities did not "take" coho.

In September 2001, federal judge Michael Hogan ruled that NOAA was correct in finding that an ESU is the same as a "distinct population segment" as defined in the ESA, but that NOAA could not split an ESU into hatchery and wild components and then list only one component. NOAA's 1998 ESA listing of Oregon coast coho was then set aside. (*Alsea Valley Alliance v. Evans*, 99-6265-HO, D. OR, September 12, 2001.) NOAA had originally determined that certain hatchery-bred fish were part of the Oregon coast ESU, due largely to their genetic similarity to listed naturally spawned fish, but then excluded these hatchery fish from the listing because they were deemed not "essential to recovery." In making its decision, the court did not consider NOAA findings that hatchery fish pose genetic and ecological threats to wild salmon. Instead, it focused on the legal question of whether the ESA permits NOAA to list only wild salmon populations after including some hatchery populations in the same ESU. The court indicated that NOAA had "tied its own hands" in defining the ESU, and must list it on an "all or nothing basis" (Goldman 2002).

On December 14, 2001, the US Ninth Circuit Court of Appeals granted a coalition of conservation and fishing organization appellant-interveners (Oregon Natural Resources Council, Pacific Rivers Council, Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, Audubon Society of Portland, Coast Range Association, Siskiyou Regional Education Project and Sierra Club, herein ONRC et al.) an emergency motion to stay Judge Hogan's decision. The Oregon coastal coho listing remained in effect pending resolution of the ONRC et al. appeal. In March, 2004 the coho again lost ESA protection when the court dismissed the appeal on grounds that it lacked jurisdiction to get involved. The Oregon coast coho remains listed as threatened under the ESA, but this status is not currently enforceable pending a status review by NOAA (Rojas-Burke, 2004).

Oregon has a significant history of state policies that influence salmonid protection and recovery. The 1972 Oregon Forest Practices Act (FPA) included some provisions for riparian area protection and has been strengthened several times since then, most significantly in 1994. In 1997, Governor John Kitzhaber signed Senate Bill 924, which established the Oregon Plan for Salmon and Watersheds (Oregon Plan). The bill also

established the 7-member Independent Multidisciplinary Science Team (IMST) to advise the state on matters of science related to the Oregon Plan. The IMST reflected part of the 1997 agreement between Oregon and NOAA concerning coho salmon. This agreement was terminated after the coho listing in 1998, but Executive Order 99-01 (signed by Governor Kitzhaber in 1999) clarified and expanded the Oregon Plan's scope, and specified a continuing role for the IMST in Oregon wild salmonid recovery. Today, the Oregon Plan includes the OCSRI and Steelhead Supplement, and the Healthy Streams Partnership, a complimentary statewide program.

The 1999 executive order also created a citizens' advisory group (the Forest Practices Advisory Committee, or FPAC) to help the Oregon Board of Forestry assess additional changes in FPA regulations that might be needed to meet state water quality standards, and protect and restore salmonids in western Oregon. In 2000, FPAC proposed 24 final recommendations following public and scientific input. The BOF is now considering the FPAC recommendations (and those from a similar group focused on eastside watersheds), as well as recent monitoring information (ODF 2003). Together, the FPA and Oregon Plan frame the bulk of Oregon's wild salmonid recovery efforts, and responses to ESA requirements. These statutes and the ESA are considered within the context of additional specific policies for state forests, as explained above.

4. Managing for salmonids in Northwestern Oregon state forests

4.1. Mid 1990's: Northwestern Oregon state forest planning initiated

In 1994, the ODF initiated long-range planning for managing Northwest Oregon state forests, including the Tillamook, Clatsop, North Santiam and various smaller parcels. This process resulted in adoption of the Northwest Oregon State Forests Management Plan (FMP) in 2001. The ODF also began seeking a permit from the USFWS and NOAA for incidental take of species living in these forests that were listed, or potentially would be listed under the ESA (Hayes et al. 1998). The northwestern spotted owl and marbled murrelet were already listed, and salmonids were recognized as species of concern with significant potential for listing. Regardless of the weight given to various desired outcomes, active, on the ground management activities were implicit in the plan from the start, and "active management" was explicitly adopted as policy by the BOF in 1998. Given that the state forests would be actively managed, proactive, "good-faith" consideration of listed and sensitive species (and their habitats) was deemed crucial to development of durable, litigation-resistant management policies.

ODF decided to develop a multi-species habitat conservation plan that included a component for riparian species, including salmonids, in order to obtain authorization under Section 10 of the ESA for incidental take of listed species in conjunction with on-going forest management activities. In 1998, the ODF voluntarily submitted its draft Western Oregon State Forests Habitat Conservation Plan (HCP) for independent scientific review by a team of 26 experts based in the OSU College of Forestry. Their report (Hayes et al. 1998) contained a number of recommendations that would influence future development of the SAH strategy.

While agreeing that riparian management area (RMA) strategies in the HCP had significant positive aspects, and congratulating the ODF for its willingness to solicit scientific feedback, Hayes' team expressed several concerns. Some reviewers recommended a broader, landscape level of organization encompassing entire watersheds in a hierarchical framework. Similarly, others felt stream network and hydrologic system "connectivity", and integration of riparian and landscape components of the plan should be more explicitly emphasized. Concerns were raised that the level of management activities proposed in RMAs, while potentially effective, still entailed considerable risk, and should be considered an experiment rather than a proven wildlife and biodiversity management strategy. Some reviewers felt that strategies outlined in the HCP would decrease heterogeneity of riparian areas over time.

Better scientific justification and more conservative approaches were suggested by several reviewers, including wider "no-touch" areas and greater consideration of ecological roles played by smaller, non-fishbearing streams. Several reviewers questioned the extent to which species would track habitat across the landscape over the 20-year time period proposed for moving habitat blocks. Reviewers suggested that uncertainty surrounding species response called for more caution, with checks established to ensure responses were favorable before widespread intensive management was applied. Some argued that a series of reserves was needed to account for this uncertainty, and one suggested establishing blocks of "habitat anchors" of older forest that remain stationary for longer time periods.

Following scientific review of the HCP, ODF continued to refine it. At the time of this writing, the HCP has not been submitted, pending further consultation and comment from NOAA Fisheries.

4.2. Late 1990's: Oregon Plan established, IMST Report

Planning for the FMP continued through the late 1990's against a backdrop of ongoing developments concerning salmonids, including listing of the Oregon coast coho under the ESA, and legislation establishing and clarifying the Oregon Plan. By 1999, the IMST had completed reports on several aspects of salmonid recovery, including "Recovery of Wild Salmonids in Western Oregon Forests: Oregon Forest Practices Act Rules and the Measures in the Oregon Plan for Salmon and Watersheds" (IMST 1999b).

A scientific conceptual basis for the IMST report was provided: salmon survived in a dynamic, shifting mosaic of habitat by adapting highly varied, genetically diverse life forms that were abundant in multiple locations, increasing the likelihood of metapopulation survival. Fish in refugia recolonized poor habitat as its condition improved. The IMST concluded that evidence that wild salmonids could be recovered under non-historical ecological conditions was "...neither extensive nor compelling", and that "...the goal of management and policy should be to emulate (not duplicate) natural processes within [wild salmonids] historic range" (IMST 1999b, p. v).

The IMST stated that "...current rules for riparian protection, large wood management, sedimentation, and fish passage [issues which the team considered critical to recovery]

are not adequate to preserve depressed stocks of wild salmonids” (IMST 1999b, p. 2). The IMST provided scientific direction in 19 specific recommendations (15 of which were directed to ODF) to guide FPA rule formulation and Oregon Plan measures that it deemed necessary to successfully recover salmon (Appendix C).

The IMST noted that FPA rules are not specifically directed toward recovery of wild salmonids (the mission of the Oregon Plan) but that it was through these rules and Oregon Plan measures that salmonid recovery should be accomplished. In light of this, the first IMST recommendation was to “explicitly incorporate the policy objective of the Oregon Plan and Executive Order 99-01 into FPA.” (IMST 1999b, p. 4.) The IMST also repeatedly stressed the need for landscape level planning, such as consideration of linkages between riparian and upland processes, and forest practice rule application that accounts for cumulative disturbance histories, landscape features and climatic variation in different watersheds.

IMST recommendations that were later addressed, at least in part, by the ODF SAH Strategy include these:

- Provide enhanced certainty of protection for “core areas”.
- Treat non-fish-bearing streams the same as small, medium, and large fish-bearing streams when determining buffer-width protection.
- Provide increased riparian protection for the 100-year floodplains and islands.
- Increase the conifer basal-area requirement and the number-of-trees requirement for RMAs, with increases in these requirements for medium and small streams regardless of fish presence.
- Retain trees on "high risk slopes" and in likely debris torrent tracks to increase the likelihood that large wood will be transported to streams when landslides and debris torrents occur. (IMST 1999b.)

See Appendix D for the full set of IMST recommendations to the Oregon Department of Forestry and Oregon Department of Fish and Wildlife.

4.3. 2000-2003: The Salmon Anchor Habitat strategy takes shape

4.3.a. Swiss Needle Cast arises as a significant issue

As planning for northwest Oregon state forests progressed, Swiss needle cast (SNC) emerged as another serious management issue. SNC is a native foliage disease caused by a pathogenic fungus that attacks only Douglas fir. Affected trees lose their older needles prematurely and show a progressive loss in height and diameter growth. Most managed forestland in Oregon was planted with Douglas fir after clear cutting, and is now stocked with relatively young, even-aged, single species forests. In the 1970's and 1980's, SNC began to show a rise in occurrence in western Oregon and Washington Christmas tree and commercial timber plantations.

In the 1990's, damage intensified along the Oregon and Washington coasts and by 1999, 295,000 out of 2.9 million acres in coastal Oregon were classified as severely infected (Filip et al. 2000, Hansen et al. 2000). Addressing SNC would prove to be a significant

complicating factor for ODF as is at worked to develop an effective strategy for protecting salmon habitat.

4.3.b. The Ecotrust Coalition Salmon Anchor Habitat Proposal

In 2001, Ecotrust, Oregon Trout, and Wild Salmon Center (Ecotrust Coalition) submitted a proposal entitled “A Salmon Conservation Strategy for the Tillamook and Clatsop State Forests” to BOF and the general public (Ecotrust et al. 2001). Sharply reduced salmon runs, the Oregon coast coho listing, Oregon Plan goals, and lack of site-specific delineation of salmon “focus areas” in the Northwest Oregon FMP framed the proposal’s rationale. The anchor habitat strategy itself was based on the Knowles Creek Project, a cooperative watershed and salmon restoration effort initiated in 1991 by the USFS, Hancock Timber Resources Group, and Pacific Rivers Council (Ecotrust et al. 2001). A key facet of this project was protection of functional sub-basins in the watershed, which was heavily logged from the 1950’s to the 1980’s (Dewberry 1995).

The proposal was submitted as an ecologically and economically viable strategy for recovering salmon runs, while reducing state liability for take of salmon during forest management activities, and allowing for predictable and sustainable timber harvest. The proposal was quite consistent with recommendations made by Hayes et al. (1998) and the IMST (1999b). Twenty-one anchor habitats were proposed, based on ODFW spawning surveys, core area maps, and snorkel counts conducted in 1999 and 2000. Adjacent upstream areas were included to protect productivity “hotspots”. Within 100’ of anchor streams, management would be limited to activities that restore aquatic and riparian function, but harvesting consistent with retaining and growing large trees and establishing diverse forest structure including large snags, large downed woody debris, and a multiple layer canopy would be allowed beyond this zone. Steep, unstable slopes at a high risk for landslides, mostly located inside the proposed anchor habitats, would be placed off limits to most harvest activities, as would certain stream bottom and lowland RMAs. The proposed areas (31.4% of Tillamook and Clatsop State Forests) would not be permanently removed from the timber base, but would remain protected until other parts of the watershed were recovered and contributing to salmon productivity.

The Coalition argued that timber harvesting proposed by ODF to combat Swiss needle cast, milling more saw logs locally, projected increases in salmon, and revenues from better recreation opportunities could largely offset timber revenue foregone to protect anchor habitats. Language from ORS chapter 530, OAR 620, Division 35, and a BOF commitment to maintain and restore properly functioning aquatic habitats for salmonids was cited to support the Coalition’s case that their proposal was consistent with the intent of statutes and rules that guide state forest management. The Coalition argued that

“An anchor habitat strategy for the Tillamook and Clatsop Forests will allow for scheduled timber harvest and predictable payments to counties under state law. It will assist in ensuring compliance with the federal Endangered Species Act and state laws protecting salmon. Reducing state exposure to potential liability for violation of state or federal law should be a high management priority for the state during its present planning process. Our proposal is intended to help facilitate the

use of management strategies that will protect salmon and highly productive habitat, while allowing for other forest activities to commence in a timely way and continue without interruptions caused by legal violations.” (Ecotrust et al. 2001, p. 6.)

4.3.c. The ODF Northwest Oregon Forest Management Plan, Final Plan

In January, 2001 the Northwest Oregon FMP, Final Plan (FMP) was published, after a six-year development process reflecting public and stakeholder input, state and federal statutes, and scientific review. The plan was based on active, structure-based and adaptive management paradigms. A primary assumption for riparian areas was that, given current stand conditions, active management would more quickly restore forests that supported diverse habitats and properly functioning aquatic systems (FMP, 2001).

The plan noted that more diverse and functional riparian habitats would take many decades to create, and that several species of concern exist today only in very specific areas, with limited habitat. The FMP considered “anchor habitat” critical to short-term survival of these populations by providing a higher, short-term level of protection to existing key habitat areas, and mentioned “several species of salmonids” as an example (FMP 2001, p. 4-81). The plan explained that “the concept of stationary central blocks of habitat, or ‘anchors’, is a way to ensure that as new habitat develops for a given species, it may be more readily colonized”, and that “while anchor habitat areas are not intended to be permanent reserves, they will be maintained until it can be demonstrated through adaptive management that the species concerned is colonizing new areas of habitat and persisting in those areas” (FMP 2001, p. 4-81).

The FMP explained that the anchor habitat concept would apply in different temporal and spatial patterns for spotted owls, murrelets and salmonids since habitat needs, life histories and dispersal mechanisms are different for each. Anchor habitats for salmonids were defined as designated sub-watersheds distributed throughout the North Coast, identified as habitat strongholds using research and monitoring, primarily aquatic habitat and fish survey data. For the initial implementation period of the FMP, alternative management standards would apply in these areas, pending more comprehensive watershed assessments. (FMP 2001, p. 4-81.) It was noted that SAH areas would also protect many headwater amphibian habitat areas, and that an anchor habitat strategy for salmon already existed for some time in the form of the proposed HCP Salmon Emphasis Area (SEA) strategy. (FMP 2001, p. 4-82.)

The FMP also explained that implementation plans (IPs) would be developed for each forest district describing how each was moving toward desired future conditions and providing landscape level habitat components. The IPs would describe land management classifications applied to reflect strategies adopted in the FMP and proposed HCP, including RMAs, “...or specific habitat areas identified for covered species (anchor habitat concept)” (FMP 2001). ODF used the IPs to specify the actual management standards that it planned to use on the ground during operational activities, based on goals, objectives and strategies described in the more general FMP.

Concurrent with adoption of the FMP in 2001, the BOF directed ODF to aggressively treat stands affected by SNC. Heavy thinning or clear cutting affected areas are the most effective and efficient silvicultural treatments (Filip et al. 2000). A key point of discussion throughout development of the SAH Strategy was how significant harvest levels to deal with SNC could be reconciled with scientific recommendations to reduce management-related risks to salmon in these basins. ODF had to find a way to deal with both of these issues if they were to produce a successful plan.

4.3.d. Disparities in timber harvest estimates

In the year prior to FMP adoption, ODF contracted with OSU College of Forestry Professor Dr. John Sessions to analyze a range of forest management alternatives for northwest Oregon state forests. The preferred alternative identified by this effort predicted a potential annual timber harvest of approximately 279 million board feet (MMBF) for the three North Coast districts. ODF intended the models to represent a range of relative harvest levels subject to later revision and refinement, and the BOF cautioned the coastal counties about viewing the 279 MMBF figure as definite (Schnee 2004, pers. conv.). However, the coastal counties predicated their support for the FMP on the expectation that harvests would increase to volumes at or near 279 MMBF. After Dr. Sessions' analysis was completed and the FMP was adopted, several factors emerged indicating that called short-term harvests would likely be significantly lower. Final drafts of district IPs were also developed and offered for public review and comment after adoption of the FMP. Proposed harvest levels in the IPs were similar to those proposed in earlier IP drafts, but well below those predicted by Dr. Sessions' model (ODF 2003).

From early 2002 to 2003, ODF worked closely with the counties and Mason, Bruce and Girard, Inc., a forestry consultant retained by them to identify reasons for disparities between modeled timber harvest levels and those in the district IPs, and to attempt to realize harvest levels specified in the FMP while also meeting other "greatest permanent value" objectives. The final IPs reflected a 15% increase of the draft IPs (ODF 2003). Reasons for these disparities include:

- Inconsistency between starting timber inventory data used in the model and actual timber inventories
- Inconsistency between timber growth and yield parameters used in the model and actual timber growth and yield in the forest districts. Actual growth and yield were significantly lower, primarily due to SNC
- Lack of inclusion of a road layer in the original model to reflect access and operational considerations

One of the parameters used by ODF during development of the SAH Strategy was that timber harvests reflected in the final draft IPs would not be lowered to accommodate SAHs. Thus, while timber harvest projections declined as new information and considerations emerged after the Sessions modeling effort and prior to adoption of the IPs, this decline was not related to the SAH Strategy (Schnee 2004).

4.3.e. The ODF-ODFW Salmon Emphasis Area Workshop

In January, 2001, ODF convened and videotaped a Salmon Emphasis Area Workshop consisting of a 5-member scientific panel, and ODF and ODFW personnel. ODF staff explained that the SEA/SAH concept was rooted in FEMAT, spotted owl and murrelet strategies, and IMST recommendations for protecting salmon anchor habitats, which led to commitments to SEAs in the FMP that would be met in the HCP. The purpose of the workshop was to “flesh out” what SEAs would look like. The scientific panel was asked to respond to four questions:

- What value will accrue from the inclusion of an anchor habitat strategy for salmonids?
- What advice can be offered to the department in determining which watersheds would be most suitable for application of alternative management standards to meet scientifically credible goals for this strategy?
- What advice can be offered to determine the appropriate amount, size and distribution of watersheds that should be designated as SAH to meet scientifically credible goals for this strategy?
- Given the landscape management strategies and the aquatic and riparian strategies proposed for NW Oregon state forests, what advice can be offered regarding particular limiting factors, key aquatic system functions or management risks that alternative management standards should be designed to address in these areas?

The terms “SEA” and “SAH” appeared to be interchangeable. Most panelists felt quite strongly that SAHs were key to salmon recovery, depending on how they were implemented. The importance of looking at entire river basins, including non-fishbearing streams, was a recurring theme. SAHs should be areas known to contain species of interest, but also places with high quality habitat for those species, even if the stock is not healthy there. Salmon habitat was described as “links in a chain” of areas used in various life history stages. Thus, significant portions of watersheds, from headwaters to lowlands, would eventually need protection if salmon recovery were to succeed. One panelist equated “anchor populations” with “core populations” in metapopulation parlance, another mentioned “source” and “sink” habitats. SAHs would serve as “supply centers”, where species could extend their range to other areas as habitat improves.

Panelists agreed that many salmon stocks face a high risk of extinction, so they felt conservative, risk-averse strategies were warranted, especially in the short-term. They argued that protection of high quality habitats in multiple locations across the landscape was necessary to reduce risk, provide genetic diversity and accelerate recovery. Methods used to identify “fish-bearing” streams were questioned. Summer snorkel counts and spawner surveys were seen as necessary, but perhaps insufficient. Fish surveys in other seasons and habitat quality surveys were also needed. Panelists cited the need to identify barriers to habitat connectivity, and botanical conditions conducive to healthy fish populations. One panelist suggested fewer, but larger SAH areas.

The panel plant specialist questioned the short-term value of SAHs, suggesting that existing regulations buffer riparian areas sufficiently. This panelist favored focusing on

riparian processes and functions over the IMST approach of emulating historic structure and conditions. In the long run, foresaw continued degradation of ecological conditions important for fish, because disturbance regimes that maintained riparian forests are gone. He also later seemed to qualify his original position, suggesting that “set-asides are clearly a good idea in the short run, but we need to be very careful in the long run”. His point seemed to be that long-term restoration of riparian forest conditions that benefit salmonids might proceed faster with varying degrees of active management, depending on the situation. Other panelists seemed to agree that more knowledge was needed about where active or passive restoration might work, but suggested that the way to address this issue is through rigorous monitoring and comparison with non-SAH areas.

The question of why SAHs are needed in addition to current FPA regulations arose. Panelists responded that current FPA rules may protect against further habitat degradation, but may not move toward salmon recovery. It was further argued that current RMA prescriptions are an experiment that hasn’t run its course yet. In 20 years, current prescriptions may have proven to reduce risks, but to assume they are adequate without enough experience to verify this risks repeating past mistakes. The panelists urged caution based on their past experiences with “new approaches” that were less effective than expected. They added that the larger context of this experiment, which began in 1970’s with the initial FPA, is extirpation of entire salmon stocks.

Several panelists agreed that value systems strongly influence policy, and that competing social values were a significant limiting factor in salmon recovery efforts. The panel chair stated that he assumed that the FMP and Oregon Plan were intended to be integrated and complimentary. Given that the key goal of the Oregon Plan is recovery of salmon stocks, the panel chair concluded that the FMP must intend to accomplish this recovery, among other things, not just prevention of further habitat degradation.

4.3.f. The ODFW Salmon Anchor Habitat Study

Identification of basins in the SAH Strategy as it now stands (ODF 2003) was based primarily on work conducted by ODFW (Talabere and Jones 2002) that was intended to be used by ODF and other state agencies, and for integrated planning with other landowners. This work addressed Agency Measure ODFW IVA9 of the Oregon Plan Steelhead Supplement 1, which calls for:

- Refining and mapping priority areas for steelhead, beginning with coastal basins
- Reviewing and updating of core area maps for coho salmon
- Evaluation of the appropriateness of core area maps for chinook and chum
- Defining the effect of priority area designations on management programs

Talabere and Jones’ (2002) work was also part of the ODFW response to IMST recommendations. Senate Bill 924 from 1997 requires state agencies to respond each IMST recommendation within six months. IMST then evaluates responses for scientific

merit, and forwards the evaluations to the Governor, House Speaker, Senate President and Oregon Plan Manager. IMST Recommendation 17 stipulated that:

“ODFW should complete ‘core area’ designation for all wild salmonids in Oregon and identify high priority protection/restoration areas not covered by current ‘core area’ designations. ODFW should work with the Oregon Plan Implementation Team in prioritizing habitat for enhanced levels of protection and/or restoration.” (IMST 1999b).

ODFW also incorporated IMST and National Research Council advice to apply metapopulation theory to salmonids (NRC 1996) and use principles of landscape ecology to guide salmonid recovery and conservation efforts (IMST 1999b, Talabere and Jones 2002).

With this legislative and scientific direction, Talabere and Jones (2002) identified a system of potential SAH subwatersheds in northwest Oregon, based on fish numbers and habitat quality. The rationale was to transition from short-term protection of existing population centers and high quality habitats to longer-term restoration of watershed processes and function, habitat connectivity, and persistence of metapopulations at the watershed scale. Their work is grounded in current science concerning salmonid population ecology, past efforts to prioritize where Oregon should focus salmon recovery strategies, and spatially explicit knowledge about current salmonid populations.

To frame their analysis, Talabere and Jones (2002) summarized recent efforts to identify areas critical to salmon conservation in Oregon. The 1993 FEMAT report expanded Key Watersheds identified by Johnson et al. (1991), but led to designations on federal land only. Much Pacific salmonid range occurs on non-federal land, so in 1994 ODFW biologists identified source and recovery areas for salmon in Oregon. Streams or stream reaches where wild salmonids were relatively more abundant than in other parts of the river basin could serve as sources of individuals for repopulating adjacent recovery areas. The Oregon Chapter, American Fisheries Society identified Aquatic Diversity Areas (ADAs), small to medium-sized basins selected based on habitat, fish species endemism, and evolutionary significance of a population to the species (Li et al. 1995).

In 1995, a group of physical and biological scientists led by then Oregon Senate President Bill Bradbury, prioritized watersheds and restoration activities (Bradbury 1995). The Bradbury Process aligns biological resources, risk factors, and protection/ restoration potential with federal Key Watersheds, ODFW source areas, and ADAs to rank watersheds for restoration. This was the first integrated, systematic attempt to identify watersheds critical to salmon across a broad geographic area. Using a less integrative approach but more data, ODFW expanded on the source area concept and developed core areas as part of the Oregon Plan (OCSRI 1997). Core areas were stream reaches identified for each species using spawning survey data. Where necessary, professional judgment was used to delineate reaches. The core area concept was ODFW’s best effort to identify stream reaches critical to salmonid conservation.

As discussed above, Ecotrust et al. (2000) identified potential SAHs for coastal basins in northwest Oregon following a survey of juvenile salmonids in 1999-2000. Most recently, Kruger (2001) prioritized restoration of in-stream flows for salmonid recovery in Oregon's coastal basins, based on number of native salmonid species present, existence of a designated "Core Area", fish-related ecological benefits, other ecological benefits, physical habitat condition, extent of human influence, water quality, ESA listing status, presence of in-stream water rights, and natural low flow problems.

After reviewing the scales of analysis used in these efforts, Talabere and Jones selected the *subwatershed* as most appropriate, because it had a standardized, available map base for Oregon coastal basins, was biologically meaningful for salmonid populations, had data sufficient to allow summary of biological and physical parameters, and is of a size that can be effectively managed for landscape processes (Talabere and Jones 2002). This size was also considered the minimum necessary to support a local self-sustaining population of coho salmon given moderate to high quality aquatic habitat. Subwatersheds are designated as 6th field hydrologic unit codes (HUCs), nested within successively larger HUCs up to the regional scale (e.g. Pacific Northwest). Oregon Coast 6th field HUCs average 15119 acres (range 9200 – 24139 acres), and contain an average of 28.8 miles of stream (range 6.2- 65.2 miles).

Abundance and frequency of adult salmon occurrence within 6th field HUCs were the primary bases for potential SAH selection. Annual surveys to calculate the number of adult coho, chinook, and chum salmon in coastal basins are conducted by the Coastal Salmonid Inventories Project, ODFW (Jacobs et al. 2000). Subwatersheds with more than four adult spawner coho per mile in at least 50% of spawning surveys since random surveys began in 1989 were selected as SAHs. Additional input from ODFW field biologists was used to identify areas not accurately depicted by, or outside the scope of spawning survey data. These included:

- sub-watersheds that had very few surveys,
- sub-watersheds important for steelhead, for which there was limited spawning data;
- areas outside the spawning survey area, and,
- areas heavily influenced by hatchery production or other local factors such as barriers.

Sub-watersheds with high quality aquatic habitat were also selected as candidates for ODF SAHs. Stream habitat data has been actively collected and managed by the ODFW Aquatic Inventories Project since 1990. Using percent pool area, residual pool depth, and wood volume as criteria, Talabere and Jones designated *high*, *medium* or *low* in-stream habitat quality in 6th code HUCs. Subwatersheds where greater than 40% of surveyed stream length met *high* habitat quality criteria were selected as SAH.

4.3.g. Finalizing the Salmon Anchor Habitat Strategy

ODF and ODFW collaborated to identify a network of basins within main-stem rivers in Northwest Oregon State Forests that would promote the goals identified for the SAH Strategy. ODF owns land in sixty-nine 6th code HUCs within the Talabere and Jones

(2002) ODFW study area, thirty-two of which have greater than 20% ODF ownership. Of these thirty-two, approximately twenty-three met Tallabere and Jones' (2002) criteria for being SAH watersheds. Where two adjacent watersheds were considered equal in value as SAHs, ODFW District Biologists working with ODF foresters selected one of the pair by considering factors such as other wildlife values, and forest management operations. The pool of twenty-three watersheds was winnowed down to fourteen by this process. This number later became fifteen when the Cedar/Ben Smith basin was subdivided into the Cedar and Ben Smith basins.

The Miami and Coal Creek basins were added after discussions with salmon stakeholders (ODF 2003), which had presented an independent SAH proposal (Ecotrust et al. 2001). Although the ODFW/ODF and Ecotrust Coalition SAH selection processes were independent, many of the same watersheds were identified by both efforts and were included in the ODF SAH Strategy.

The current ODF SAH Strategy includes seventeen watersheds. Abundance of spawning adult salmon was the primary selection factor for ten watersheds, habitat quality was the primary factor for three watersheds, and professional judgment was the primary factor for four watersheds. Three watersheds have one species (coho), eight have two species (coho and chinook) and six have three species (coho, chinook, and chum). Steelhead and coastal cutthroat trout are considered present in all SAH watersheds.

A key point of discussion throughout development of the SAH Strategy was how to reconcile silvicultural prescriptions designed to address the BOF requirement to aggressively treat SNC with scientific and federal recommendations to reduce management-related risks to salmon. Basins most heavily affected by SNC are close to the coast, and frequently coincide with SAH basins. The resulting plans provide for significant harvest levels, and complementary strategies to further reduce risks to salmon associated with harvesting. SAH basins were broken into three groups, with higher levels of thinning and clear-cutting allowed in basins most heavily infected by SNC. Over time, ODF expects that watershed analyses will provide insight into specific strengths and weaknesses of SAH habitats in these watersheds. Current policies will be reviewed after 10 years, and updated to build on each basin's strengths to improve the weaker elements of riparian and aquatic habitats.

The Implementation Plans for Northwest and Southwest Oregon Forest Management Plans (IP) were published in March, 2003, and included a detailed section explaining the SAH Strategy and how it would be implemented. The SAH Strategy is complimentary to, but independent from, the draft HCP. A primary difference is that the SAH Strategy is intended to apply for a 10-year period (July 1, 2003- June 30, 2013) whereas HCPs typically apply for much longer, up to 50 years. As noted above, the HCP has not been submitted, pending further consultation and comment from NOAA. No decision has been made yet on whether to proceed with the HCP.

The SAH Strategy acknowledges and responds to concerns raised in several reviews of HCP and FMP strategies that greater interim protection should be given to known

salmonid habitat (e.g. Hayes et al. 1998, IMST 1999b). Restoration and/or maintenance of salmonid habitat is an important focus while implementing the approved IPs for SAHs, which are intended to protect areas of relatively high salmonid production. This will be achieved through application of the eight approaches described in the FMP and IP strategies, even though harvest levels will be significant in most of the SAH basins.

Developing the SAH Strategy in the context of treating Swiss needle cast, meeting responsibilities to provide revenue to the counties, and protecting water quality and recreational opportunities took several years of planning, public input and scientific review. Basins within which SAHs have been designated for the next ten years are expected to continue to provide aquatic and riparian habitat necessary for salmon until the historically more important downriver spawning areas can return to productivity (ODF, 2003).

4.3.h. Adjustments to FMP aquatic/riparian strategies to accommodate SAHs

The SAH Strategy represents a ten-year trial of reduced-risk approaches to riparian area management recommended by scientific reviews of ODF plans (i.e. Hayes et al. 1998, IMST 1999b, the SEA Workshop.) The foundations for management in SAHs are landscape and aquatic/riparian strategies and management standards included in the FMP, which were adjusted in designated SAH basins. These adjustments focus on further minimizing risk of sediment delivery from roads or unstable slopes, potential water temperature problems, adverse effects on hydrologic flows, disruption of the large wood supply, prioritizing anchor habitats for watershed assessments, eliminating existing conditions that pose risks to salmonids and restoring aquatic habitats (ODF 2003).

When considering salmon habitat, scientists repeatedly stress the importance of landscape elements and processes upslope and up-drainage from fish-bearing streams (Gregory 1997; IMST 1999b). Non-fishbearing streams contribute to water quality, and supply large wood and coarse gravels during flood events. Trees and undisturbed slopes adjacent to fishbearing streams minimize sediment delivery, provide food sources and large woody debris, and maintain stream shading. With these key riparian functions and upslope processes in mind, FMP aquatic/riparian standards were modified to lower management activity levels in SAH basins. Wider “no harvest” zones near fishbearing streams, higher tree retention adjacent to small streams, additional restrictions on ground-based equipment, and greater precautions in High Landslide Hazard areas were the principal adjustments made.

Under FMP standards, no harvesting is allowed within 25 feet of fish-bearing, and large and medium non-fishbearing streams. From 25 to 100 feet, partial cutting that retains a minimum of 25% Stand Density Index (SDI) and at least 50 trees per acre is allowed. No ground equipment is allowed within 50 feet from aquatic zone. If mature forest already exists, no cutting is allowed in this zone. Under SAH standards, no harvesting is allowed within 100 feet of these streams. Additional tree retention and no use of ground-based equipment within 50 feet of small non-fish-bearing streams are specified under SAH standards.

The SAH Strategy includes a focus on maintaining trees on debris torrent fans that could supply large wood by avoiding harvests in these areas, a goal that is expected to be frequently met under FMP standards. Six SAH basins have clear-cut maximums that exceed 10%. In these basins, on small, seasonal non-fishbearing streams that are direct tributaries to fishbearing streams, no harvesting is allowed within 50 feet of “high energy reaches” or “potential debris flow track reaches.”

Exceptions to SAH standards for operational considerations that would allow shorter roads or fewer log landing locations are unchanged from the FMP, as is the provision for harvesting in areas with severe insect and disease problems, as long as sufficient watershed information exists to determine the benefits of restoration. The SAH Strategy specifies that all proposed road construction or improvements, and all commercial harvest units in SAHs will be reviewed by a Geotechnical Specialist to identify High Landslide Hazard Locations and high risks to streams. Clear cuts and road construction will be avoided on sites determined to be both a High Landslide Hazard Location and pose a high risk to streams.

SAH watersheds are also subject to “activity level caps”: the maximum percentage of each SAH basin slated for clearcutting and/or thinning over the 10-year period the SAH Strategy is in effect. Under the strategy, harvesting wasn’t reduced- activity level caps simply assured that the amount of harvesting being planned anyway would not be exceeded during the 10-year SAH period. Higher caps were specified in SNC areas. To establish activity level caps, ODF asked their district personnel how much harvest activity was planned over the 10-year period. The SAH Strategy stuck to these levels. Under the SAH Strategy, 10-25% of each SAH basin is scheduled to be clearcut over a 10-year period, depending on the degree of SNC present.

The SAH Strategy is not intended to prescribe a permanent approach to managing riparian areas. SAHs will serve as “controls” to compare the rate and extent to which habitats are developed and maintained with watersheds subject to more active management. Fish, riparian condition and silvicultural practice monitoring is expected to yield knowledge that can be used for adaptive management of other watersheds on the forests by adjusting prescriptions in response to new information. Watershed assessments are specified in the FMP; the SAH Strategy simply prioritizes designated SAH basins for comprehensive assessment.

5. Stakeholder Perspectives and Issues

State forest stakeholders continue to express a range of viewpoints about how state forests should be managed in general, and also about particular policies and legislation affecting them. This section represents an attempt to characterize the issues that led to formation of the SAH Workgroup.

Stakeholders that favor emphasizing timber resources on state forests argue that timber harvesting is already tightly regulated. These stakeholders believe that current regulations are adequate and sufficiently protect riparian areas and salmonids. They see no need for an additional SAH Strategy, since many specific regulations for riparian area protection already exist in the FPA, and additional regulations and guidelines are

currently being considered. They note that FMP management standards exceed those in the FPA. They cite recent increases in salmon numbers as evidence that current rules are working. Forest practices have been greatly improved with better understanding of ecosystems, effects of timber harvesting and silvicultural options and regulations continue to be modified in response to new knowledge.

Stakeholder counties and taxing districts where state forests are located are concerned about the potential financial impacts of the SAH Strategy. State law guarantees them a portion of any revenues produced by state forests, the majority of which comes from timber sales which, they believe, may be reduced to protect and restore salmon habitat. Oregon's economy has suffered in recent years, especially in rural areas such as coastal counties, and payments from timber harvests make a real difference to local governments. Some state legislators believe that state forests can and should generate more revenue to address state budget needs as well.

Stakeholders that favor a greater emphasis on non-timber resources argue that timber has been "king" for decades, with great resulting impacts on riparian ecosystems and other non-timber values. They believe they are simply asking for a more balanced approach that reflects other societal values, and recognizes a greater range of economic benefits associated with forests. They feel that given the legacy of past forest practice impacts on salmon, the burden of proof lies with the timber industry and forest managers to assure salmon populations and riparian areas are not just protected, but recovering. These groups believe that the SAH Strategy is already a compromise that allows significant timber harvesting on most of the forest. They point out that salmon numbers are cyclic, and argue that recent increases do not mean threats to salmon have been removed. They believe that long-term persistence of salmon depends on a range of diverse, healthy habitats across the landscape which, they argue, we still do not have.

In 2003, a bill that would have significantly changed state forest management was introduced and discussed in the Oregon State Legislature. Had it passed, HB3632 would have refocused state forest management and redefined the "greatest permanent value" clause to more explicitly emphasize timber production over all other state forest values and uses. In many ways, discussion surrounding the bill was a microcosm of sentiments that have been expressed for decades.

The bill's supporters, primarily timber industry representatives and some Tillamook region counties and taxing districts, argued that state forests should be managed in a fashion similar to private forests, guided by the FPA. They believe that the 2001 FMP places too many restrictions on timber harvesting, and that management standards became more restrictive in the 2003 district IPs. The SAH Strategy was cited as an example of this. If FPA rules are good enough for private lands, they asked, why are more restrictive management standards needed on state lands? Some HB3632 supporters worried that this more restrictive management framework will eventually be applied to private lands as well. Others cited the problem with defining "greatest permanent value" and argued that HB3632 would clarify this while protecting environmental values.

The Oregon's timber industry is in a crisis, said the bill's supporters, and ODF harvesting strategies are too conservative when replanted trees in the Tillamook region have finally reached significant commercial value. They argued that the rapid spread of SNC makes it imperative to harvest affected trees and replant with resistant species as soon as possible, and this is not happening under the current FMP. They pointed to Oregon's dire fiscal situation, and argued that thousands of jobs would be produced and millions of dollars would accrue to the state if HB3632 were passed. Projections developed by an OSU Forestry professor were cited to support this. Some Tillamook region counties felt they had been marginalized during FMP planning. One bill supporter argued that HB3632 steers Oregon state forest management back to the original intent of the Tillamook reforestation program that county residents are still paying for.

HB3632 opponents included the ODF, the BOF chair, environmental groups, labor representatives, and some Tillamook and Clatsop region county representatives, and a coastal Oregon fishing guide. Many cited the long and arduous process that led to the current FMP, and argued that it represented a balanced approach that would allow significant timber harvesting while minimizing the risk of lawsuits. Rather than accommodating a range of forest values, they argued the HB3632 would refocus management on timber only, to the detriment of all other uses. Some felt that forest management under HB3632 would violate the ESA. HB3632 opponents pointed out that private and state forestlands are managed for different purposes. They argued that FPA rules try to balance the effects of private timberland management on public resources with the rights of private landowners to manage their land as they wish. State forests, they argued, should be managed under more restrictive standards because they are a public resource providing a greater range of values.

Several timber industry, county and labor stakeholders agreed that timber production should be a primary goal, but thought HB3632 stood a good chance of impeding timber sales because it risked upsetting the delicate balance among stakeholders represented by the FMP. They argued that the FMP stood an excellent chance of working without legal entanglements, and could serve as a model that federal forest managers might adopt. This could open many times the amount of land to timber harvesting than HB3632 would. ODF representatives argued that passage of HB3632 would necessitate a new forest plan. They cited the years of planning, public comment and scientific review that preceded the FMP, and argued that it was not fair to stakeholders to impose significant changes now.

HB3632 opponents questioned the number of new jobs that might be created, citing low log prices, excess mill capacity and evidence that as harvests doubled on state forests in the 1990's, very few new Tillamook county timber jobs resulted. One HB3632 opponent noted that coho runs were finally increasing, and the positive economic impacts this was having in his community. He worried that increased timber harvesting would turn the clock back at a time when fortunes were finally improving for the beleaguered sport and commercial coho fisheries. Some opponents argued that HB3632 would further "politicize" state forest management by reducing the role of the BOF and placing more control in the Legislature. Some HB3632 opponents argued that recreation and environmental quality in northwest Oregon are key to the area's high quality of life, an

important factor in attracting and maintaining employers and the highly skilled workforce that form an increasingly large part of Oregon's economy. They maintained that the impacts of increased timber harvesting on these values far outweighed the net economic benefits to the state.

6. Conclusion

Northwest Oregon state forests are valued by more people, and for a greater variety of reasons, than at any time in history. Commercially valuable timber is available for the first time since the Tillamook fires in forestlands that also support threatened populations of wild salmon. These converging trends place state forest managers in the position of trying to meet what at times seem to be conflicting responsibilities.

Stakeholder visions for the Tillamook and Clatsop State Forests differ widely, as comparison of the Tillamook 50/50 Initiative and HB3632 shows. State forest management debates seem to hinge on divergent perspectives concerning the direction Oregon's economy is and should be going in the future, and the factors that affect this. There is also ongoing disagreement about what constitutes the actual costs and benefits associated with various forest management scenarios, and their magnitude. A ten-year trial of the SAH Strategy has been proposed as a compromise, but the current SAH Strategy does not appear to satisfy proponents of either the Tillamook 50/50 Initiative or HB3632.

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APPENDIX A:
LIST OF ACRONYMS AND ABBREVIATIONS USED IN THIS DOCUMENT

ADA - Aquatic Diversity Area
BLM - (United States) Bureau of Land Management
BOF - (Oregon) Board of Forestry
ESA - Endangered Species Act
ESU - evolutionary significant unit
FEMAT - Forest and Ecosystem Management Assessment Team
FPA - (Oregon) Forest Practices Act
FMP - (Northwest Oregon State) Forest Management Plan, Final Plan
HUC - hydrologic unit code
HCP - (Western Oregon State Forests) Habitat Conservation Plan
IMST - Independent Multidisciplinary Science Team
IP - Implementation Plan (for Northwest & Southwest Oregon Forest Management Plans)
NOAA - National Marine Fisheries Service
NRC - National Research Council
OCN - Oregon Coastal Native (coho salmon)
ODF - Oregon Department of Forestry
ODFW - Oregon Department of Fish and Wildlife
OSU - Oregon State University
RMA - Riparian Management Area
SAH - Salmon Anchor Habitat
SEA - Salmon Emphasis Area
SNC - Swiss needle cast
USFWS - United States Fish and Wildlife Service
USFS - United States Forest Service
USGS - United States Geological Survey

**APPENDIX B:
ODF BUDGET NOTE**

Prior to setting aside any lands for Salmon Anchor Habitat, the Department of Forestry is directed to form a work group of constituents including counties and regulated industry to review the implementation plan for salmon anchor habitat (SAH) strategies. The group will review such things as impacts of listing decisions by NOAA-Fisheries, State of Oregon Endangered Species Act (ESA) assurances efforts, monitoring implementation of the strategies in each basin, monitor impacts of SAH on harvest activity through the harvest level work plan. The group will identify issues and make recommendations for necessary changes to the SAH strategies to the Board of Forestry. The Department is directed to report on the activities of the work group and its recommendations, accompanied by scientific evidence, to the Emergency Board no later than September, 2004.

APPENDIX C: ORIGINS AND USE OF THE TERM “SALMON ANCHOR HABITAT”

“Anchor habitat” is similar to the term core habitat, a concept rooted in studies of wildlife population dynamics and conservation biology. Core habitats for a particular species are typically defined as relatively large, minimally disturbed areas characterized by intact ecological functions and healthy, self-sustaining populations of that species. Core habitat is also closely related to the concept of refugia - areas where species thrive and reproduce in numbers great enough that some individuals emigrate and colonize newly available habitats in other locations.

Core populations are a facet of metapopulation theory, which describes how populations of organisms are structured, and is used to understand the dynamics of species that are unevenly distributed across the landscape. A metapopulation is “a population of populations” (Hanski and Gilpin, 1991, quoted in Hunter, 1997). Component populations that comprise metapopulations are sometimes called subpopulations, which in turn may be either core or satellite populations. Core populations are usually large and self-sustaining over relatively long periods. Satellite populations are smaller and less stable, and may go extinct from time to time, if not supplied with immigrants from core populations in refugia (Hunter, 1997).

Metapopulation theory is particularly applicable to salmonids. Fresh water habitats for salmonids were historically widely distributed, but only in suitable streams and rivers, rather than evenly across the landscape, most of which is terrestrial. Another defining characteristic of salmonid habitat consistent with metapopulation theory is that it is dynamic rather than static- a shifting mosaic of disturbed and undisturbed areas (IMST, 1999b). Subpopulations of salmonids appeared and disappeared over long periods of time in response to natural disturbance and habitat change, in a way that has been compared to “...small lights winking on and off in a large darkness” (Hunter, 1997, p. 60).

The IMST invokes metapopulation theory by explaining that salmonids accommodated disturbance-induced habitat changes in three ways: 1) long-term adaptation, which produced highly varied life-history forms and genetic diversity needed to accommodate a wide range of changing conditions, 2) high fish abundance in multiple locations, which increased the likelihood that metapopulations and their gene pools would survive, and 3) occupation of refugia (higher quality habitat) which allowed for recolonization of disturbed habitats as they improved over time (IMST, 1999b).

Specific linkage of the “anchor” habitat concept to salmon in Pacific Northwest forests arose at least as early as 1993, in Forest Ecosystem Management and Assessment Team (FEMAT) recommendations for designation of key watersheds to protect and recover salmonid species of concern (FEMAT, 1993):

“Refugia, or designated areas providing high quality habitat, either currently or in the future, are a cornerstone of most species conservation strategies. Although fragmented areas of suitable habitat may be important...to recover aquatic species, refugia should be focused at a watershed scale....past attempts to recover fish populations were unsuccessful because the problem was not approached from a watershed perspective.

A system of Key Watersheds that serves as refugia is crucial for maintaining and recovering habitat for at risk stocks of anadromous salmonids and resident fish species, particularly in the short term. These refugia will include areas of good habitat as well as areas of degraded habitat. **Areas presently in good condition serve as anchors for the potential recovery of depressed stocks.** Those of lower quality habitat should have a high potential for restoration and will become future sources of good habitat with the implementation of a comprehensive restoration program. These watersheds contain at risk fish species and stocks and either good habitat, or if habitat is in a degraded state, have a high restoration potential....Because Key Watersheds maintain the best of what is left and have the highest potential for restoration, they are given special consideration.” (FEMAT, 1993. Citations in original omitted for brevity.)

To summarize, the term “anchor habitat” is conceptually similar to core habitat/core population components of metapopulation theory, recognized by scientists as the best way to understand salmon and their habitat (National Research Council, 1996; IMST, 1999b). The term “anchor” has been used in reference to salmon or riparian habitat for some time (e.g. FEMAT, 1993, Hayes et al., 1999, ODF, 2001, Ecotrust et al. 2001, Talabere and Jones, 2002).

In ODF plans, the anchor habitat approach was extended to salmon from strategies to protect spotted owl and murrelet habitat. In these contexts, anchor habitat refers to remaining population centers in an otherwise significantly altered landscape that receive somewhat greater protection and conservative management. Anchor habitats will not look the same for all species, because life histories and habitat uses are different.

The ODF SAH Strategy was an evolution of salmon emphasis areas (SEAs) defined more generally in the proposed HCP. The SEA concept was later described more specifically and given the name SAH, reflecting usage by scientific reviewers and similarity to approaches ODF applied to spotted owls and murrelets. In the most current ODF planning documents, SAH means areas identified primarily by ODFW, in which ODF has laid out specific management strategies under a 10-year, adaptive management framework.

**APPENDIX D:
INDEPENDENT MULTI-DISCIPLINARY SCIENCE TEAM
RECOMMENDATIONS TO OREGON DEPARTMENT OF FORESTRY
AND OREGON DEPARTMENT OF FISH AND WILDLIFE**

Recommendations for ODF

Recommendations that May Require a Modified Policy Framework

Recommendation 1. Explicitly incorporate the policy objective of the Oregon Plan and Executive Order 99-01 into FPA.

Recommendation 2. ODF should develop a policy framework to encompass landscape (large watershed) level planning and operations on forests within the range of wild salmonids in Oregon.

IMST recommends that the following elements be included in this modified forest policy framework:

Long-term landscape level assessment of the upslope and riparian forest and associated aquatic systems to ensure that the desired condition is maintained across the landscape and through time.

Identified goals for the characteristics of aquatic systems and riparian and upslope forests across the landscape to ensure the integrity of salmonid habitat.

Monitoring that will provide the information needed to evaluate the aggregated outcomes of management at the landscape level.

Coordination among agencies and watershed councils to facilitate landscape level planning and management at scales that extend beyond the forest.

Recommendations Consistent with the Existing Forest Policy Framework

Recommendation 3. Treat non-fish-bearing streams the same as small, medium, and large fish-bearing streams when determining buffer-width protection.

Recommendation 4. Provide increased riparian protection for the 100-year floodplains and islands.

Recommendation 5. Increase the conifer basal-area requirement and the number-of-trees requirement for RMAs, with increases in these requirements for medium and small streams regardless of fish presence.

Recommendation 6. Complete the study of the effectiveness of the FPA rules in providing large wood for the short- and long-term.

Recommendation 7. Provide enhanced certainty of protection for “core areas”.

Recommendation 8. Develop and implement standards or guidelines that reduce the length of roadside drainage ditches that discharge into channels.

Recommendation 9. Implement the standards and guidelines for the length of roadside drainage ditch between cross-drainage structures, especially on steep-gradient roads.

Recommendation 10. Require the flow capacity of cross-drainage structures and stream-crossing structures and culverts to meet current design standards.

Recommendation 11. Provide for the stabilization of roads not constructed to current standards (including "old roads and railroad grades") in critical locations. Stabilization means reduction or elimination of the potential for failure. It includes a variety of strategies ranging from removal to abandonment, entirely or of sections, by which specific roads and railroad grades become a much less important source of sediment.

Recommendation 12. Require durable surfacing on wet-season haul roads and require that hauling cease before surfaces become soft or "pump" sediment to the surface.

Recommendation 13. Retain trees on "high risk slopes" and in likely debris torrent tracks to increase the likelihood that large wood will be transported to streams when landslides and debris torrents occur.

Recommendation 14. Continue to apply the current best management practices (BMP) approach to the management of forest lands with significant landslide potential, and develop a better case history basis for evaluating the effectiveness of BMP in this area.

Recommendation 15. Modify culverts and other structures to permit the passage of juvenile and adult salmonids upstream and downstream at forest road-stream crossings.

Recommendations for or with other agencies

Recommendation 16. ODFW and ODF should develop a collaborative program of monitoring to quantify the linkages between parameters of ecosystem condition and wild salmonid recovery.

Recommendation 17. ODFW should complete "core area" designation for all wild salmonids in Oregon and identify high priority protection/restoration areas that are not covered by current "core area" designations. ODFW should work with the Oregon Plan Implementation Team in prioritizing habitat for enhanced levels of protection and/or restoration.

Recommendation 18. ODFW should include consideration of practices (forestry, agriculture, urban, other land uses) above and below core areas, as these may affect the conditions and processes critical to maintenance of core area function in forestry areas.

Recommendation 19. The Oregon Forest Research Laboratory (FRL), in collaboration with ODFW, should develop forest road-stream crossing strategies that facilitate the passage of large wood at road-stream crossings.

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