BEFORE THE OREGON BOARD OF FORESTRY

Petition for Rulemaking to Identify and Develop Protection Requirements for Coho Salmon Resource Sites

Photo Courtesy of Robin Loznak

I. EXECUTIVE SUMMARY

Petitioner conservation and fishing industry organizations request the Board of Forestry (Board) to develop a rule designating resource sites on state and private forestlands for Oregon's coho salmon. The Oregon Forest Practices Act requires the Board to "collect and analyze the best available information and establish inventories of resource sites of federally listed…wildlife species." ORS 527.710(3)(a)(A). Oregon's three coho salmon evolutionary significant units (ESU) are federally listed as threatened. 62 FR 24588; 63 FR 42587; 70 FR 37160. The Board must therefore designate resource sites for coho salmon. In addition, the Board must "determine whether forest practices would conflict with [these] resource sites." ORS 527.710(3)(b), and, if so, must adopt rules to protect sites from these conflicts. ORS 527.710(b), (c).

This petition summarizes the biology and population status of, and past and current threats to, coho salmon in Oregon; the legal basis for petitioners' request; and the kinds of harm to coho allowed under current regulation. It also includes recommendations for describing a coho "resource site," identifies conflicts between existing forest practices and coho sites and suggests rule language to resolve these conflicts. Petitioners rely heavily on sources used by state and federal expert agencies in listing decisions, status reviews and recovery plans.

Like the range of coho salmon, the actions requested in this petition are regional in scale and implicate a significant portion of state and private forestlands in Oregon. A large-scale policy review is consistent both with salmon ecology and with the public's interest in comprehensively addressing weaknesses in current water protection rules, rather than relying on more piecemeal policy change approaches such as those taken by the Board in recent years. Appropriate resource site protections for coho salmon habitat in Oregon can bring this species to the point where endangered species protections are no longer necessary.

II. PETITIONERS

Audubon Society of Lincoln City is a conservation and education, non-profit organization that exists to encourage residents and visitors to protect and enjoy native wildlife and habitats found on the Central Oregon Coast. Our geographic footprint includes Lincoln and Tillamook Counties but our vision is for responsible stewardship of all wildlife and habitat from the mountain peaks of the Coast Range to the farthest reaches of the Territorial Sea.

Audubon Society of Portland is an Oregon non-profit corporation with a mission to promote the enjoyment, understanding and protection of native birds, other wildlife and their habitats. Audubon Society of Portland currently has approximately 16,000 members, including many who use Oregon's coastal forests for a wide variety of recreational purposes. Coho salmon play a critical role in the over health and functionality of Oregon's coastal forests, and the Audubon Society of Portland has long advocated for improvements in regulatory backstops in these coastal forests.

Cascadia Wildlands is a non-profit, public interest environmental organization head quartered in Eugene, Oregon. Cascadia Wildlands educates, agitates, and inspires a movement to protect and restore Cascadia's wild ecosystems, including the species therein. We envision vast old-growth forests, rivers full of wild salmon, wolves howling in the backcountry, and vibrant communities sustained by the unique landscapes of the Cascadia bioregion. Cascadia Wildlands has long advocated for increased protections for coho salmon and its habitat in the Cascadia bioregion.

The **Center for Biological Diversity** is a non-profit conservation organization more than 63,000 members, including over 1,600 in Oregon, many who enjoy exploring Oregon's forests and observing, studying, fishing for and photographing coho salmon. The Center has long advocated for coho salmon protection. For example, the Center brought litigation to ensure a plan to recover the Oregon Coast population of coho salmon. The Center also has worked to protect streams occupied by coho salmon from development in California. The Center's Oregon office and Endangered Species Program have also advocated for protections for old-growth and state forest lands in Oregon by attending and testifying at Board of Forestry and State Land Board meetings, advocating for stronger protections for imperiled wildlife on state and private forestlands, and participating in litigation to provide greater protections for imperiled species on state forests.

The **Coast Range Association** works to defend coastal communities that depend on the beauty of the coast and the bounty of the ocean. We are working to protect the ocean by conserving coastal resources, supporting the state's marine research program for near shore reserves and educating about the impact of the climate crisis on the oceans of the world. The Coast Range Association also works to reform the management of Oregon's coastal private forests. Both of these major components of our organization's work intersect with coho salmon and protections for the species on private timberland in Oregon.

The Conservation Angler advocates for wild fish and fisheries, protecting and conserving wild steelhead, salmon, trout and char throughout their Pacific range. The Conservation Angler is a watch-dog organization - we hold public agencies, countries and nations accountable for protecting and conserving wild fish for present and future generations - using all legal, administrative and political means necessary to prevent the extinction and to foster a long-term recovery of wild steelhead, salmon, trout and char to levels necessary to provide essential benefits to entire ecosystems.

Defenders of Wildlife is a national wildlife conservation organization that protects imperiled species and their habitats and has over 1.8 million members and supporters nationwide. Defenders is actively engaged in salmon habitat recovery and restoration in Oregon to reverse the decline in population of the different salmon species in the region which, in turn, affects the livelihoods of local communities as well as the health of aquatic species that depend on them for their survival, including the critically endangered Southern Resident Orcas. Defenders is committed to habitat recovery and restoration of coho salmon for healthy ecosystems that can meet the needs of Oregonians while protecting the state's aquatic natural resources.

Institute for Fisheries Resources (IFR) is a research and fishery protection organization founded by PCFFA and is a still closely affiliated sister organization to PCFFA, charged with science-based salmon habitat restoration efforts throughout the range of Pacific salmon. IFR has been particularly active in Oregon on salmon habitat restoration efforts since its founding in 1992.

Klamath-Siskiyou Wildlands Center was formed in 1997 to protect and restore wild nature in the Klamath-Siskiyou region of southwest Oregon and northwest California. We promote science-based land and water conservation through policy and community action. We envision a Klamath-Siskiyou region where local communities enjoy healthy wildlands, where clean rivers are teeming with native salmon, and where connected plant and wildlife populations are prepared for climate change. A critical component of this works surrounds coho salmon and the role this species plays in our region.

The **Native Fish Society** is a Pacific Northwest conservation, non-profit organization that exists to cultivate a groundswell of public support necessary to revive abundant wild fish, free flowing rivers, and thriving local communities. We create this momentum by empowering everyday people to take action on behalf of wild fish, our homewaters, and our communities. The Native Fish community is composed of 4,000 members and supporters, 91 place-based River Stewards, and 12 Native Fish Fellows.

The **Northwest Guides and Anglers Association** was organized in 2004 to address sport fishing issues in the Pacific Northwest, specifically, Oregon and Washington. NWGAA is a 501 (C) (6), not for profit organization. Our organization works to remedy environmental factors that limit the production of wild fish. The operation of other industry often affects water quality that limit fish production in our streams and rivers. Excessive water temperatures, improper flow and spill for out-migration and barriers to fish are just some of the problems that wild fish face. Our policy of ***no net loss of fish habitat*** applies to any industry that affects our industry, and we adamantly oppose actions that limit wild fish production.

Northwest Environmental Advocates is a regional non-profit environmental organization established in 1969, incorporated under the laws of Oregon in 1981 and organized under section 501(c)(3) of the Internal Revenue Code. NWEA's principal place of business is Portland, Oregon. NWEA's mission is to work through advocacy and education to protect and restore water and air quality, wetlands, and wildlife habitat in the Northwest, including Oregon. NWEA employs advocacy with administrative agencies, community organizing, strategic partnerships, public record requests, information sharing, lobbying, and litigation to ensure better implementation of the laws that protect and restore the natural environment.

Northwest Steelheaders is a non-profit recreational fishing and conservation organization with eleven chapters in Oregon and Southwest Washington. Northwest Steelheaders was founded in 1960 to represent the interests of recreational anglers and advocate for robust populations of salmon and steelhead. The mission of the Steelheaders is to enhance and protect fisheries and fish habitats for today and tomorrow, with our vision being abundant and sustainable fisheries in healthy watersheds.

The **Oregon Chapter of the Sierra Club** represents the organization's 20,000 members in Oregon and has worked to protect Oregon's environment and natural resources since 1978. Today, the Sierra Club employs eight staff in Oregon who work with volunteer leaders to advance the chapter's conservation priorities, including a priority on the protection of riparian forests relied upon by coho salmon.

Oregon Wild is a non-profit, public interest conservation organization. For more than four decades, Oregon Wild has worked to protect and restore old-growth forests in Oregon, as well as the fish and wildlife that depend on them, including coho salmon. Oregon Wild has worked extensively to protect remaining habitat and restore degraded habitat in the Siuslaw National Forest and on BLM lands, however, that work is being undercut by the lack of adequate protections on state and private lands in Oregon.

The **Pacific Coast Federation of Fishermen's Associations (PCFFA**) is the largest commercial fishing industry trade association on the U.S. west coast, representing the interests of hundreds of west coast, mostly family owned and managed commercial fishing operations, with its industry members engaged in every west coast fishery. However, salmon fisheries have long been the mainstay of this industry, and many once abundant salmon runs (like Oregon's coho runs) have in recent decades been damaged and nearly destroyed by a multitude of inland land use practices that destroy salmon habitat. Among those practices have been many poorly planned forestry operations that destroy salmon streams, sediment up salmon habitat, block salmon access to historic spawning and rearing areas, and have today greatly reduced the salmon productivity of nearly all of Oregon's coastal river systems.

Pacific Rivers formed in 1987 to protect and restore the watershed ecosystems of the West to ensure river health, biodiversity, and clean water for present and future generations. A critical component of protecting and restoring these watershed ecosystems revolves around coho salmon and protections for the species.

Rogue Riverkeeper is a non-profit organization with more than 3,500 members and supporters based in Jackson County, Oregon. Rogue Riverkeeper works to protect and restore clean water and fish in the waters of the Rogue through advocacy, accountability, and community engagement. The Rogue River watershed stretches across more than 3 million acres, from its headwaters near Crater Lake to the mouth of the river along Oregon's southern coast at Gold Beach. The Rogue Basin provides habitat for coho salmon and includes approximately 1 million acres of private forest land managed under the Oregon Forest Practices Act.

Trout Unlimited is a national nonprofit conservation organization with over 300,000 members and supporters nationwide, and more than 3,000 members in Oregon. Our mission is to conserve, protect and restore North America's coldwater fisheries and their watersheds. Coho salmon are an important indicator of watershed health and we support the petition to the Oregon Department of Forestry to identify and develop protection requirements for Coho salmon resource sites for the future benefit of all Oregonians.

Umpqua Watersheds was first formed in 1986 as a volunteer organization for citizens to help monitor public forest and watershed management projects, and obtained its official 501(c)(3) non-profit status in 1995. Since then, with the support of hundreds of households in Douglas County and thousands of volunteer hours, Umpqua Watersheds has expanded to include two staff members and two AmeriCorps State service members. Umpqua Watersheds works improving forest management and towards increased public input for forest and watershed management problems and solutions. Coho salmon play a critical role in the forests ecosystems our organization serves.

WildEarth Guardians is a non-profit conservation organization with offices in Oregon and six other states, and over 220,000 members and supporters throughout the West, including in Oregon. WildEarth Guardians protects and restores the wildlife, wild places, wild rivers, and health of the American West. For many years, Guardians has advocated for the protection and restoration watersheds and aquatic species from forestry and associated practices. We have an organizational interest in the proper and lawful management of forestry practices and its associated impacts on the watersheds and aquatic species of Oregon.

Wild Salmon Center is a non-profit organization whose mission is to promote the conservation and sustainable use of wild salmon ecosystems across the Pacific Rim. It identifies science-based solutions to sustain wild salmon populations and the human communities and livelihoods that depend on them.

III. INTRODUCTION

Historically, rivers that drain into the ocean and lakes along the Oregon coast supported abundant and healthy runs of coho salmon. The Oregon Department of Fish and Wildlife (ODFW) estimated that pre-development (circa 1850) coho salmon runs may have been in the range of one to two million fish during periods of favorable ocean conditions. The runs began to decline in the mid-1900s, primarily due to overharvest by fisheries, a period of poor ocean conditions, and watershed habitat degradation as timber harvest and agricultural activities expanded. Spawning habitat has been blocked by mainstem dams and culverts on small tributaries. In 1983, the total number of native spawners was estimated to have declined to 14,600 (ODFW 2016) and in 1997 the total adult population (pre-harvest) was only 26,200 (ODFW 2016). All Oregon coho salmon are federally listed as threatened. The National Marine Fisheries Service (NMFS), a branch of the National Oceanic and Atmospheric Administration (NOAA), has listed three separate coho salmon ESUs in Oregon. An ESU is a population or group of populations of Pacific salmon that (1) is substantially reproductively isolated from conspecific populations and (2) represents an important component of the evolutionary legacy of the species. NMFS first listed the Southern Oregon/Northern California Coast (SONCC) coho as a threatened species under the Endangered Species Act (ESA) on May 6, 1997. (62 FR 24588). Subsequently, the Oregon Coast coho was listed as threatened on August 10, 1998 (63 FR 42587). The Lower Columbia River coho salmon was listed as threatened on June 28, 2005. (70 FR 37160). All three ESUs presently remain listed as threatened following several federal court cases, biological reviews, and listing determinations. In addition to federal listings, the State of Oregon considers the Lower Columbia populations to be "endangered." OAR 635-100-0125. These three listed coho salmon ESUs comprise all populations of coho in Oregon, because the Klamath and Interior Columbia populations are extinct (ODFW, 2005).

Figure 1 shows the Oregon range of the listed coho ESUs. Coho watersheds cover the entirety of the Oregon coast along the Pacific Ocean from the Columbia River in the north to the Winchuck, Illinois, Rogue, and Applegate in Southwest Oregon. Numerous large river systems support coho salmon, including the Nehalem, Nestucca, Salmon, Siletz, Tillamook Bay, Yaquina, Alsea, Siuslaw, Coos, Coquille, Umpqua, Rogue, Applegate, and Columbia River systems.

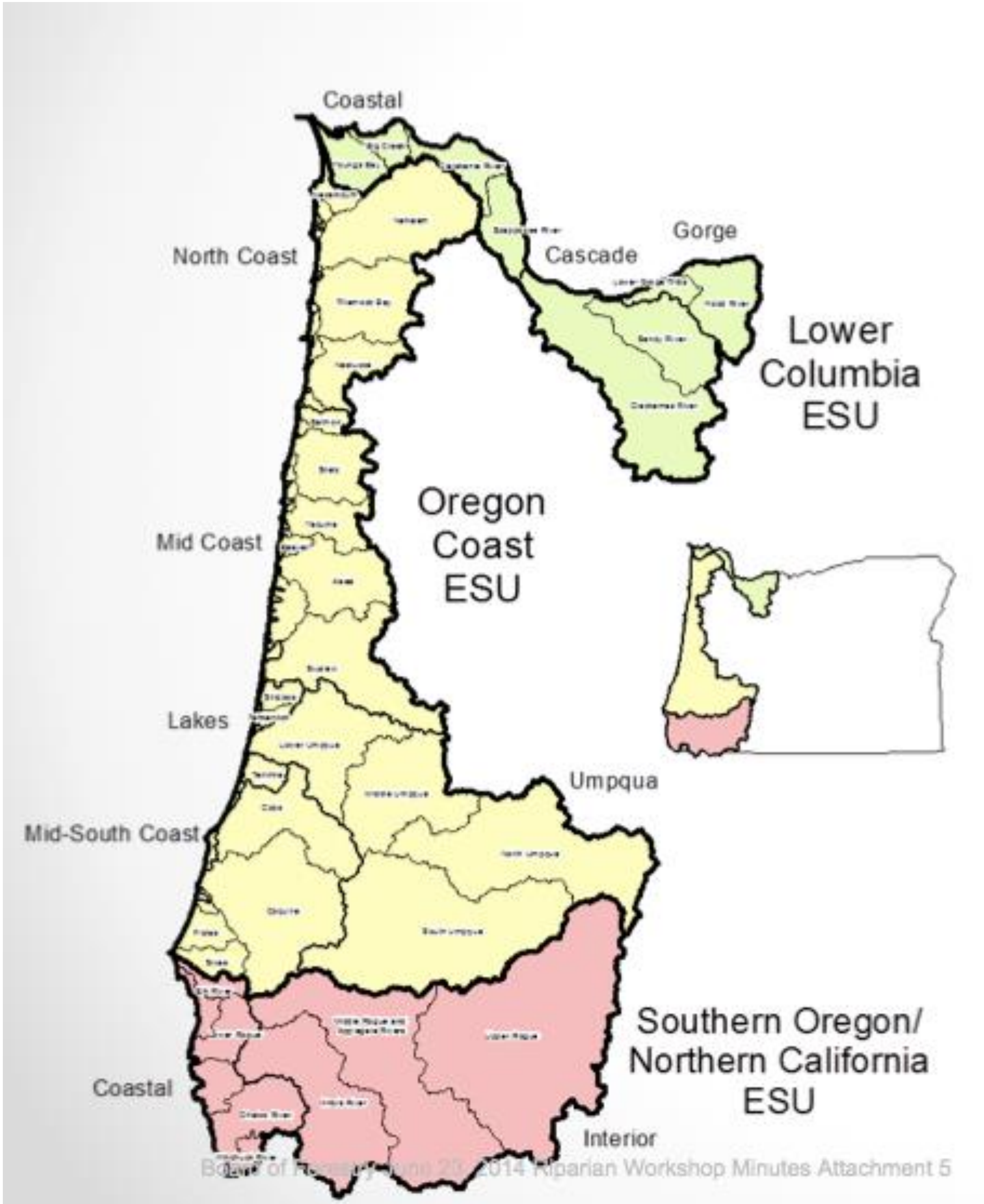

Figure 1. Oregon's coho salmon ESUs.

Critical spawning and rearing life cycle stages occur throughout the numerous rivers and tributaries of Oregon's coastal region. It is here that coho faces its most pressing current threat, the reduction of the quantity and quality of rearing habitat. Reviews by NMFS' biological review teams in 2011 and 2015 found that the long-term decline in Oregon coho abundance and productivity reflected deteriorating conditions in freshwater habitat, and that current habitat quantity, quality and distribution are insufficient to sustain the species during cycles of poor ocean conditions (NWFSC 2015; Stout et al. 2012).

The primary limiting factors for freshwater habitat are: (1) the loss of stream complexity including large wood debris structures, pools, connections to side channels and off-channel alcoves, beaver ponds, lakes, and connections to wetlands, backwater areas and complex floodplains; (2) reduced water quality, including high water temperatures and increased fine sediment; (3) blocked or impaired fish passage, especially from roads and water developments; and (4) inadequate regulatory mechanisms especially on state and private timberlands in Oregon. Research indicates that increasing rearing habitat (including quality, quantity, and diversity of habitat) is the best way to improve the resilience of Oregon's coho salmon in the face of anticipated reductions in marine survival in the future. Action by the Board to properly identify and protect coho salmon resource sites from forestry-associated impairment would address these limiting factors and facilitate the conservation and recovery of coho salmon. Action is needed because existing regulatory mechanisms have failed to adequately address these factors.

NMFS has concluded multiple times in documents relevant to all three ESUs that the current Oregon Forest Practices Act and rules do not adequately protect Oregon's coho. In particular concerns persist regarding (1) whether the widths of riparian management areas (RMAs) are sufficient to fully protect riparian functions and stream habitats; (2) whether operations allowed within RMAs will degrade stream habitats; (3) operations on high-risk landslide sites; (4 operations near debris torrent-prone headwater streams; and (5) watershed-scale effects. (NMFS SONCC 2016). In a 2016 coho status review, NMFS concluded that a combination of voluntary and regulatory approaches is key to successful recovery of the species, and that it lacked assurances that voluntary programs are 'backed up' by regulatory mechanisms that ensure that the species' status will not degrade because of the present or threatened destruction, modification, or curtailment of its habitat or range. (NMFS OC 2016). Specifically, the agency called for Oregon to "change forest management (especially in privately owned forests but also in state-owned forests) to increase the natural recruitment of large wood into streams, provide more shade to counter increasing water temperatures, and reduce transport of fine sediment into waterbodies during storms." (NMFS OC 2016).

Further, in 2015, NOAA and the Environmental Protection Agency concluded that "[m]anagement measures are needed to protect riparian areas for medium-size and small fish-bearing and non-fish-bearing streams, address the impacts of forest roads (particularly legacy roads), protect high-risk landslide areas, and ensure adequate stream buffers for the application of herbicides."

The Board's 2017 rule change strengthening Riparian Management Areas on small and medium "salmon, steelhead and bull trout" streams in parts of western Oregon did not come close to fully addressing existing forest practices conflicts with coho habitat. Resource site designation and protection is an opportunity for the Board to address critical aquatic, riparian and unstable areas excluded from the recent rulemaking, including: 1) streamside forests within about 200 feet (a site-potential tree height) of coho habitat waters; 2) streamside forests within 100 feet of non-fish bearing headwater streams that provide cold water to downstream coho reaches and deliver the large wood necessary for coho habitat formation; 3) steep and unstable landslide-prone areas likely to deliver large scale episodic inputs of materials to coho habitat streams, which may scour headwater channels, inundate depositional habitats, reduce or delay necessary habitat forming processes in watersheds, spatially or temporally reduce habitat access or complexity or otherwise impact coho survival and productivity in those streams. This is also an opportunity for the Board to address the cumulative watershed impacts of even-aged (clearcut) forest harvest on instream low summer flows in coho watersheds.

Oregon's coho salmon face dire and persistent threats to freshwater habitat that current forest practices are perpetuating. Recent studies are unable to conclude that degraded freshwater habitat is capable of supporting levels of coho productivity needed to sustain the species during periods of poor ocean conditions (Good et al. 2005), which is a key reason that coho remain listed. Subsequent status reviews conducted in 2011 and 2015 found continued uncertainty about coho ESU status because of persisting threats affecting its long-term status (including but not limited to ongoing habitat degradation and climate change) (NMFS OC 2016).

Oregon coho adult returns have shown sporadic increases since listing, but there has been no demonstration of long-term habitat improvement (e.g. reduced sediment in streams, reduced stream temperatures). In fact, Falcy and Suring 2018 found more evidence for a decline than increase in freshwater productivity, suggesting that stochastic ocean conditions were responsible for observed increases in adult coho abundance rather than freshwater habitat improvements. (Falcy and Suring, 2018).

The Board has a duty to address these deficiencies. While some ongoing habitat restoration projects have helped greatly in the recovery process, these voluntary measures are often inconsistent, vague, temporally and spatially limited or unquantifiable, and will not have sufficient effects on ecosystem function and coho salmon productivity, either individually or collectively, to provide a net improvement and overcome past and ongoing degradation (Anlauf et al 2013). Habitat "restoration" is being done at replacement value—if no detectable increases in quantity or quality of habitat is found (Anlauf-Dunn 2015). Protective rules for coho resource sites are needed on state and especially private lands in Oregon to ensure the persistence of the coho and enable its recovery so that protections under the ESA are no longer necessary. To inform the discussion below is table outlining land ownership with the range of the three ESUs:

	Percent of Oregon ESU that is forested and on:		
	non-federal land	private land	public, non-federal land
Southern Oregon/Northern California Coast Coho	27.6%	27.1%	0.6%
Oregon Coast Coho	47.8%	39.3%	8.5%
Lower Columbia River Coho	30.5%	25.4%	5.1%

IV. LEGAL GROUNDS FOR PETITION

Pursuant to ORS 183.390, "[a]n interested person may petition an agency requesting the promulgation, amendment or repeal of a rule. The Attorney General shall prescribe by rule the form for such petitions and the procedure for their submission, consideration and disposition. Not later than 90 days after the date of submission of a petition, the agency either shall deny the petition in writing or shall initiate rulemaking proceedings in accordance with ORS 183.335 (Notice)." Pursuant to Attorney General rule:

> The petition shall be legible, signed by or on behalf of the petitioner, and shall contain a detailed statement of:
>
> > (a) The rule petitioner requests the agency to adopt, amend, or repeal. When a new rule is proposed, the petition shall set forth the proposed language in full. When an amendment of an existing rule is proposed, the rule shall be set forth in the petition in full with matter proposed to be deleted and proposed additions shown by a method that clearly indicates proposed deletions and additions;
> >
> > (b) Facts or arguments in sufficient detail to show the reasons for and effects of adoption, amendment, or repeal of the rule;
> >
> > (c) All propositions of law to be asserted by petitioner.

OAR 137-001-0070.

Under Oregon's laws pertaining to the Board of Forestry (Board) and forest regulations, the Board is required to promulgate rules to provide for the maintenance of fish and wildlife resources. ORS 527.710(2)(d). Specifically, the Board is required to "collect and analyze the best available information and establish inventories of resources sites of either federally listed or state listed endangered or threatened wildlife species." ORS 527.710(3)(A). The National Marine Fisheries Service (NMFS) listed the Southern Oregon/Northern California, Oregon Coast, and Lower Columbia River coho salmon ESUs as threatened species under the ESA on May 6, 1997 (62 FR 24588), August 10, 1998 (63 FR 42587), and June 28, 2005 (70 FR 37160) respectively These ESUs presently remain listed as threatened following several federal court cases, biological reviews, and listing determinations. Therefore, the Board is required to collect and analyze the best available information on coho salmon and conduct a resource site inventory. *Id.* If the Board determines that forest practices would conflict with resource sites in the inventory, the Board shall adopt rules to protect resources sites after considering the consequences and appropriate levels of protection. ORS 527.710(3)(b), (c).

The Board has 90 days from the date a petition is submitted to act.

The process for Board evaluation of listed species that use resource sites and are sensitive to forest practices is more specifically set forth at OAR 629-680-0100 (1) (a)-(d). This process includes preparation of a technical paper that demonstrates how resource sites are sensitive to forest practices and proposes protection requirements and exceptions, followed by preparation of a review report by the State Forester that is submitted to the Board. The Board then reviews this information and adopt protection requirements based on this and other available information about the species.

While the Board has developed protections and identified sites for osprey, great blue heron, bald eagle, northern spotted owl, and is currently in the process of identifying sites for marbled murrelet, the Board has never identified resource sites for any fish species. OAR 629-635-0110; OAR 629-635-0120; OAR 629-635-0130; OAR 629-635-0210. OAR 629-635-0110; OAR 629-635-0120; OAR 629-635-0130; OAR 629-635-0210. The Board is over two decades past due in its statutory responsibilities to designate protections for coho. The identification of resource sites for Oregon's coho salmon and the promulgation of protections of these areas from forestry practices is an opportunity for the Board to fulfill unmet responsibilities to this imperiled aquatic species.

V. OREGON'S COHO SALMON

A. Biology and Ecology

Adult Pacific coho salmon (*Oncorhynchus kisutch)* are characterized by dark metallic blue or greenish backs with silver sides and a light belly and generally ranges from small 2 lb early maturing jacks up to 25 lb adults. Coho are one of seven salmon species in the Pacific and are anadromous, meaning they hatch and rear in freshwater streams and rivers then migrate out to the saltwater environment of the ocean to feed and grow before returning to freshwater as adults to spawn. Coho are a wide-ranging species that reproduce in rivers around the Pacific Rim from Monterey Bay in California north through the Aleutian Islands to Point Hope, Alaska; and from the Anadyr River in Russia south to Korea and northern Hokkaido, Japan. The Oregon coho salmon ESUs were identified as three of six West Coast coho salmon ESUs in a coast-wide coho status review published by NMFS in 1995 (Weitkamp et al., 1995). Weitkamp et al. (1995) considered a variety of factors in delineating ESU boundaries, including environmental and biogeographic features of the freshwater and marine habitats occupied by coho salmon, patterns of life-history variation and patterns of genetic variation, and differences in marine distribution among populations based on tag recoveries. These findings were reviewed again in 2011 pursuant to a species status review by a biological review team assembled by NMFS which confirmed the ESU boundaries and persistent threat of extinction facing the species.

The anadromous life cycle of coho salmon begins in their home stream, where eggs are deposited and buried in gravel nests called “redds”. The eggs hatch during the late winter or early spring, remaining as larvae in the gravel for 32-115 days, depending on water temperature and dissolved oxygen (Quinn 2005). At this time, they have fins and must emerge into the water column to feed. They emerge from eggs as ‘alevins’ (a larval life stage dependent on food stored in a yolk sac). These very small fish require cool, slow moving freshwater streams with quiet areas such as backwater pools created by large woody debris, beaver ponds, and side channels (Reeves et al., 1989) to survive and grow through summer and winter seasons. In particular, low gradient (<5%) stream reaches on lower elevation land are important for winter survival of juvenile coho salmon (Stout et al., 2012). Current production of coho salmon smolts in Oregon is particularly limited by the availability of complex stream habitat that provides the shelter for overwintering juveniles during periods when flows are high, water temperatures are low, and food availability is limited (ODFW 2007). Since coho salmon spend up to half of their lives in freshwater, the condition of the winter and summer juvenile rearing habitat is a key factor in their survival.

Levels of dissolved oxygen can also play a critical role in the quality of this habitat. “Incubation rate is primarily a function of temperature, and to a lesser extent DO. Much of the mortality is caused by physical factors, notably the restriction in flow rate of oxygenated water by fine sediment, the physical displacement or damage from scour or the intrusion of fine sediment in the aftermath of a flood." (Quinn 2005).

Most juvenile coho salmon migrate to the ocean as smolts in the spring, typically between March and June. Coho salmon smolts migrating from freshwater reaches may feed and grow in lower mainstem and estuarine habitats for a period of days or weeks, or months before entering the near-shore ocean environment. The areas can serve as acclimation areas, allowing coho salmon juveniles to adapt to saltwater. Recent studies have concluded that there is greater variation in juvenile life history and habitat-use patterns than previously expected, including evidence that estuaries may play a significant role in the life histories of some coho populations (Jones et al., 2014; McMahon & Holtby, 1992; Miller & Sadro, 2003; Koski, 2009; Bennett et al., 2011). The life history of juvenile coho subjects the species to variability in climate patterns affecting rainfall and temperature, estuarine habitats, catastrophic events like floods, drought, landslides, and fire. It also exposes them to the effects of land modifications and uses adjacent to streams, including roads, culverts, rural residential, agricultural, and other uses that may degrade habitat conditions or access. Adult coho salmon migrate to natal Oregon tributaries from September to February and normally spawn in relatively small tributaries with low to moderate gradient stream reaches close to where they were hatched (Sandercock, 1991; Sounhein et al., 2015; Oregon 2015).

After rearing in protective freshwater areas, juvenile coho salmon migrate downstream, into the estuary where they continue to grow and acclimate to salt water. In the ocean, salmon reach maturity before they return to their home streams. Ocean conditions, and marine survival, can vary considerably within and between years. Coho from Oregon are present in the ocean from northern California to southern British Columbia, can be widely dispersed in the ocean.

Accordingly, Oregon's coho populations are strongly influenced by ocean conditions off the Oregon Coast, especially by the timing and intensity of upwelling (a condition characterized by near- shore ocean currents providing cool, nutrient-rich water that stimulates production of food that supports coho salmon and other fish species). The majority of coho salmon adults return to spawn as 3–year-old fish, having spent about 18 months in freshwater and 18 months in salt water (Gilbert, 1912; Pritchard, 1940; Sandercock, 1991). The primary exceptions to this pattern are ‘‘jacks,’’ sexually mature males that return to freshwater to spawn after only 5 to 7 months in the ocean.

The most recent status review by NMFS observed that given current habitat conditions, Oregon's coho salmon are thought to require an overall marine survival rate of 0.03 to achieve a spawner: recruit ratio of 1:1 in high quality habitat (Nickelson and Lawson, 1998). The ocean survival rate necessary to achieve a 1:1 spawner to recruit ratio is also, in part, a function of freshwater conditions, since a comparatively higher ocean survival rate would be necessary to compensate for a lower smolt to adult ratio when spawner abundance is high. (NMFS OC 2016).

B. Population Status

The Oregon Coast Coho Conservation Plan estimated that pre-development coho salmon runs to the Oregon Coast coho salmon ESU (1800s and early 1900s) may have been in the range of one to two million fish or more during periods of favorable ocean conditions. Runs of this size would create concentrations of several hundred spawners per mile across the ESU. Such densities of coho salmon spawners are within the range of spawner densities that have been observed for this species in healthy watersheds throughout the Pacific Northwest (ODFW 2007).

Oregon Coast coho salmon were the most numerous species harvested in commercial and recreational fisheries off the Oregon coast during the 1950s and through the 1970s. Harvest rates of Oregon Coast coho salmon ranged from 60 percent to 90 percent from the 1960s into the 1980s (Stout et al., 2012). Modest harvest reductions were achieved in the late 1980s, but rates remained high until the species' dwindling return numbers led to further tightening of harvest regulations in the early 1990s (ODFW 2007). NMFS recently developed a chart to accompany the 2016 Oregon Coast coho recovery plan with a comparison of historical (1892–1956) and recent (1958–2015) estimates of spawner abundance and pre-harvest recruits. (NMFS 2016).

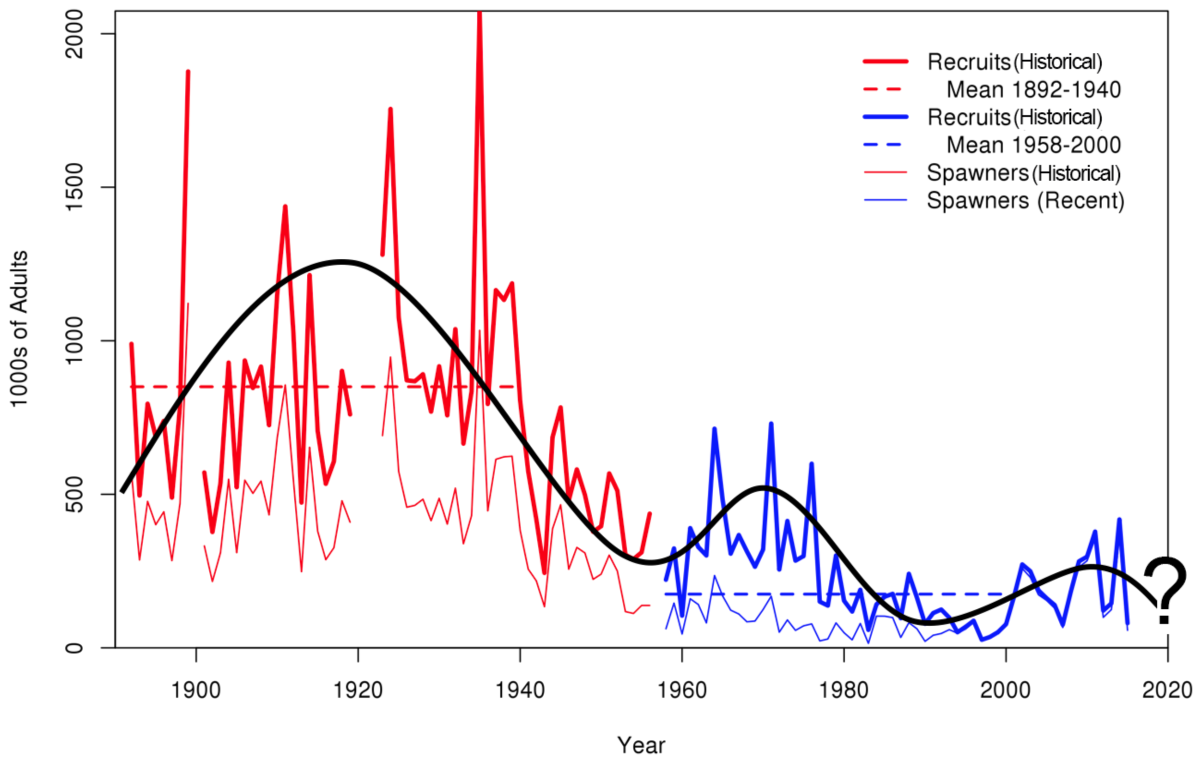

Figure 2. Comparison of historical (1892–1956) and recent (1958–2015) estimates of spawner abundance and pre-harvest recruits. Horizontal dotted lines are the geometric mean recruits for 1892–1940 and 1960–2009. Analysis based on data from Cleaver 1951, Mullen 1981a, and Mullen 1981b; recent data from Wainwright et al. 2008 and ODFW 2016. Dark line is one interpretation of the long-term trend.

According to the recent analysis by NMFS, all-time low returns in the 1970s and 1990s were around 20,000 coho salmon spawners, which could be as low as one percent of some of the pre-development run sizes (NMFS 2016). By the 1990s, the population complex of coho returning to rivers along the Oregon Coast dropped to less than about 30,000 adults, an estimate that was below five percent of estimates from the early 1900s. By 1997, the Oregon Coast population was estimated to be down to just 26,200 fish. A 1998 assessment of the coho population in the Tillamook Bay basin found a significant probability of extirpation due to poor-quality freshwater habitat. Since 1994, harvest limits for fisheries for wild coho salmon have been sharply curtailed or even closed. Under the "weak stock management" doctrine, very low Oregon Coast coho populations trigger closures and restrictions of all other ocean salmon fisheries where Oregon Coast coho intermingle with other more abundant stocks.

Oregon's other two ESUs have also shown decline. For the LCR coho salmon ESU, status reviews have concluded that hatchery origin fish dominated many of the coho salmon populations in the ESU and that there is little natural productivity. More specifically, there are eight populations in tributaries from the Columbia River mouth to Fifteenmile Creek upstream of Hood River. An analysis of these eight populations conducted by ODFW in 2005 found that most of the populations are severely depressed and current returns may primarily be offspring of naturally spawning hatchery fish. ODFW determined that the LCR ESU failed four of the six criteria (distribution, abundance, productivity, and reproductive independence), concluding that its near-term sustainability is at risk (ODFW 2005). Although populations in this ESU have generally improved, especially in the 2013/14 and 2014/15 return years, recent poor ocean conditions suggest that population declines might occur in the upcoming return years. This ESU is considered to be at moderate risk of extinction (NWFSC 2015). (NMFS LCR 2016).

Status reviews by Weitkamp et al. (1995) and Good et al. (2005) concluded that the SONCC coho salmon ESU was likely to become endangered. Risk factors identified in these early status reviews included severe declines from historical run sizes, the apparent frequency of local extinctions, long-term trends that were clearly downward, and degraded freshwater habitat.

(NMFS SONCC 2016). In the most recent viability assessment, Williams et al. (2011) reported that although long-term data on coho salmon abundances in the SONCC-coho salmon ESU were scarce, all evidence from shorter-term research and monitoring efforts indicated that conditions had worsened for populations in this ESU since the review by Good et al. (2005). Williams et al. (2011) concluded that the SONCC-coho salmon ESU was likely to become biologically endangered (NMFS SONCC 2016).

C. Potential Conflict of Forestry Practices with Resource Sites

Although the Board will conduct its own assessment utilizing the best available science, our review of the available science suggests that Oregon's logging practices on state and private lands historically have, and absent increased protections will continue, to conflict with the needed protection of Oregon's coho salmon habitat. While there are numerous threats facing this species and various factors that led to its listing, the most recent reviews by NMFS determined that the primary limiting factor on coho recovery is the condition of freshwater spawning and rearing habitat and the land-use activities, particularly near-stream timber harvest and associated landslides and road impacts, that continue to degrade watershed and estuarine functions that support habitat for Oregon's coho salmon (NMFS OC 2016; NMFS SONCC 2016; NMFS LCR 2016). This Board has the authority and the duty to reconcile conflicts between commercial logging activities and coho resource sites as a matter of state law. Board action now will also reduce or eliminate state and landowner vulnerability to citizen or government enforcement actions under the federal Endangered Species Act.

There have been several recent reviews of the status of Oregon's coho salmon populations conducted by biological review teams assembled by NMFS. These scientific reviews found that the long-term decline in Oregon's coho salmon productivity reflected deteriorating conditions in freshwater habitat, and that the remaining quality of the habitat may not be high enough to sustain species productivity during cycles of poor ocean conditions. (NWFSC 2015; Stout et al., 2012).

Many of the habitat changes resulting from land use practices over the last 150 years that contributed to the ESA-listing of Oregon Coast coho salmon continue to hinder recovery of the populations. Historically, habitat conditions in the coastal watersheds supported productive, resilient, and sustainable coho salmon populations. Natural processes created seasonally inundated floodplains comprising complex feeding and refuge habitat that provided rich feeding and reliable refuge. Water stored on floodplains provided flood and drought resilience to the ecosystem. Channels across floodplains contained deep pools and strong connections to floodplains. Many stream channels contained abundant large wood from surrounding riparian hardwood galleries and upstream conifer forests. Stream temperatures were generally sufficient to support all coho salmon life stages throughout the year, as upland and riparian conditions allowed for the storage and release of cool water during summer months and provided shade sufficient to keep water temperatures cool. Extensive and abundant riparian vegetation stabilized streambanks, providing protection against erosion, while extensive floodplains provided sediment deposition zones, where ecosystem productivity peaks (Cluer and Thorne, 2013; Cluer, 2016; NMFS OC 2016).

Today, available habitat has been reduced and existing conditions are degraded in many of these once healthy watersheds. While restoration efforts continue, the recurring logging and scars of habitat degradation across the landscape continue to limit abundance, productivity, spatial structure, and diversity of Oregon’s coho salmon. (NMFS OC 2016).

There are three main threats to coho salmon that persist due to historical and ongoing impacts associated with commercial logging in Oregon: stream complexity, water quality (temperature and sedimentation), and water quantity. Two of these concerns, stream complexity and water quality, were identified as primary and secondary limiting factors for the Oregon Coast coho salmon populations in a 2005 Oregon Coastal Coho Assessment (ODFW 2005b), and they continue to hinder recovery. While the loss of lowland floodplain habitat and climate change are also important long-term problems for coho this Board cannot solve alone, the likely persistence of these threats increases the importance of improving stream complexity, water quantity, and water quality as ways to safeguard against negative impacts on the coho populations from a changing climate (Oregon 2015; NMFS OC 2016). Forest protection also plays a larger role in combating climate change impacts.

Stream Complexity and Large Woody Debris

Stream complexity refers to the ability of a stream to provide a variety of habitat conditions that support adult coho salmon spawning, egg incubation and juvenile rearing. The loss of habitat capacity and degraded conditions to support overwinter rearing of juvenile coho salmon is especially a concern. Sufficient habitat capacity and complexity is critical to produce enough recruits-per-spawner to sustain productivity, particularly during periods of poor ocean conditions. Habitat conditions that create sufficient complexity for juvenile rearing and overwintering include complex large wood debris structures, pools, connections to side channels and off-channel alcoves, beaver ponds, lakes, and connections to wetlands, backwater areas and complex floodplains. Many of these habitat conditions are maintained through connection to the surrounding landscape. (NFMS OC 2016).

Several historical and ongoing land uses have reduced stream capacity and complexity in Oregon coastal streams and lakes through disturbance, road building, splash damming, stream cleaning, and other activities. Timber activities have reduced levels of instream large wood, increased fine sediment loads, (Anlauf et al. 2011), and altered watershed hydrology. ODFW and other natural resource agencies also added to the loss of stream complexity through past stream cleaning activities. While ODFW ended the stream cleaning process, the legacy effects from the loss of large amounts of wood in coastal stream systems continues to affect habitat conditions for coho salmon. (NMFS OC 2016).

Large woody debris (LWD) has been recognized as one of the most critical contributions to habitat complexity that is currently deficient across Oregon's coho habitat. Reviews by Bragg (2000) and Diez et al. (2001) called attention to the role of LWD in channel development, oxygenation, and turbulent mixing of water, organic carbon and nutrient cycling, species habitat, and other important aspects of stream and river ecosystems. More specifically, LWD in natural streams impacts important factors, such as the quantity and quality of bedload (Montgomery et al., 1996), levels of organic carbon (Bilby and Likens, 1980; Bilby, 1981) and nutrients (Webster et al., 2000; Ensign and Doyle, 2005), the instream flow patterns of water (Gippel, 1995; Shields and Gippel, 1995; Wilcox et al., 2006; Wilcox and Wohl, 2006), and channel heterogeneity for macroinvertebrates and fish (Angermeier and Karr, 1984; Wallace et al., 1995; Abbe and Montgomery, 1996; Wright and Flecker, 2004; Sweeney and Newbold, 2014). The lack of LWD causes increased channel instability and bank erosion in streams and a decrease in the level of complexity of instream habitat (Montgomery, 1997).

Consequently, reintroducing LWD is a common practice used to restore streams and rivers to their natural state or for restoring fish habitat (Gippel, 1995; Braudrick and Grant, 2000;

see Lehane et al., 2002 for review). This is frequently the focus of voluntary programs in Oregon that concentrate on coho salmon habitat (NMFS OC 2016). However, this Board's regulatory duty to prevent logging that reduces natural wood recruitment to levels inconsistent with coho survival and recovery cannot be replaced by voluntary artificial wood placement projects. NMFS determined that such regulation is "necessary for species recovery" and to "achieve the long-term goals of the ESA" (NMFS OC 2016).

Downed wood is naturally contributed into Oregon's waterways and coho habitat in two primary ways. One way is for large, mature riparian trees to fall across streams to create pools or small wetlands that increase habitat complexity. Maser and Sedell (1994) thoroughly reviewed the LWD literature and showed that streamside forests are the primary source of LWD. In the Oregon coast range riparian delivery accounts for between 30-70%, depending on how steep the slopes surrounding the watershed are, and the underlying geology. As an example in Oregon, a stream draining an old-growth wilderness area had more than 10 times the amount of LWD per unit length than a stream with an adjacent forest that had been logged during the previous 30 years (Maser and Sedell, 1994 Recent studies have concluded that a streamside forest can best provide a permanent supply off LWD to streams if its width is generally equal to the height at maturity of the dominant streamside trees (Sweeny and Newbold, 2014). Assuming the potential height of a mature Douglas-fir is 175 ft[1], the logging of trees within 175 feet of a stream removes potential large woody debris and reduces future coho salmon habitat. Based on the best available science (Spies et al. 2013) and in consultation with NMFS, the BLM Resource Management Plan established 120 ft no cut buffers on [coho] fish streams and 50 ft no cut buffers on non-fish streams. These BLM streams are comingled with private lands. As elaborated upon below in

[1] The site-potential tree height of a Douglas-fir can range up to 300 feet in certain areas.

greater detail, forest practices in Oregon regularly result in riparian logging well below these no cut distances, and such forest practices represent a conflict within coho resource sites. *See* OAR 629-665-0010.

Headwater stream channels that flow into coho-occupied streams are also critical sources of large woody debris in Oregon's coho streams and rivers. Headwaters are broadly defined as portions of a river basin that contribute to the development and maintenance of downstream waterbodies including rivers, lakes, and oceans (FEMAT 1993). Headwaters include wetlands outside of floodplains, small stream tributaries with permanent flow, tributaries with intermittent flow (e.g., periodic or seasonal flows supported by groundwater or precipitation), or tributaries or areas of the landscape with ephemeral flows (e.g., short-term flows that occur as a direct result of a rainfall event) (USEPA 2013; USGS 2013).

Headwaters and stream reaches upstream of occupied coho habitat play the critical ecological function of receiving runoff and groundwater from watersheds and discharge to larger waterbodies downstream. In doing so, they transport sediment and organic material, including large wood, from adjacent and upstream riparian systems, that are essential for the ecological condition of downstream ecosystems (Gregory et al. 1991; Benda and Dunne 1997). Debris flows are one type of landslide that transfers wood and sediment into and through headwater channels (Benda and Cundy 1990, Gomi et al. 2002).Over the decades to centuries between debris-flow events, headwater channels that are traversed by debris flows accumulate wood from blow down, natural cessation, and land sliding in adjacent forests (May and Gresswell 2003a). High-gradient headwater channels can be scoured to bedrock and emptied of large wood by debris flows (Gomi et al. 2001). Accumulated wood and boulders can be carried out of headwater channels in debris flows and delivered downstream as long-lasting deposits in larger, lower-gradient valleys and channels (Benda 1990, Wohl and Pearthree 1991, May and Gresswell 2004). This debris creates habitat complexity for coho, providing cover from predators and protection from high discharge, factors that may cause emigration and mortality of overwintering salmonids (Bell et al. 2001). However, these headwater streams cannot provide desired large wood to downstream stream reaches if they are stripped of trees from timber harvest as is currently occurring.

The designation of streams as having fish (F type) or not having fish (N Type) is largely based on juvenile stream sampling during the summer and/ or adult spawning. This dichotomy falsely identifies many small intermittent "headwater" streams as "no fish" when they actually do have juvenile coho use in the winter when the stream network is greatly expanded by heavy fall/winter rain. Researchers have found extensive use and dependence on intermittent (headwater) streams by coho salmon during winter (Wigington et al. 2006, Ebersole 2006, Hance et al. 2016). Hance et al. 2016 assert state that "Effective conservation planning requires a deeper understanding of the spatial characteristics of fall movement to inform judgments about the relative importance of any given [small intermittent] tributary in a stream network as potential winter rearing habitat for juvenile Coho Salmon and concludes that "effective restoration planning and watershed management should account for the spatial pattern of connectivity of summer-rearing and overwintering habitat throughout a stream network and consider the full diversity of movement patterns that may be required for fish to access seasonal habitats." Adequate forest buffers are needed in intermittent streams to provide a permanent source of large wood and sediment filtering. Culverts placed in small intermittent streams connected to nearby occupied coho habitat must provide for juvenile passage.

Oregon's forest practice laws and rules still focus almost exclusively on fish-bearing forest streams (which as noted above may be under-identified on ODF steam-typing maps) and their adjacent riparian areas, despite the wealth of scientific literature emerging over the last 25 years about the ecological importance of protecting headwater streams and contributing areas and responsive policy change on federal forestlands and private lands in other western states. FEMAT. A 2001 amendment to the Oregon Forest Practices Act seems to recognize the potential for non-fish bearing "debris-torrent" streams to deliver wood to fish-bearing streams, but this has resulted in identification of very few of the potentially delivering stream reaches which are provided with negligible protection. *See* ORS 527.676 (authorizing the State Forester to direct location of the wildlife leave-trees required for clearcuts for a linear distance of up to 500 feet of certain Type N stream reaches that would deliver to F streams); OAR 629-640-0210 (leaving green trees and snags along small type N streams subject to rapidly moving landslides); *see also* Oregon Stream Protection Coalition testimony to the Board on March 6, 2018 (transmitting preliminary analysis of debris torrent streams and illustrating that none of those delivery to high intrinsic potential streams had even been identified by ODF in the Siletz basin). As an example, within the Siletz basin, current ODF designated debris-torrent leave-tree reaches will provide wood for only about 1% of the debris torrents that will travel to fish-bearing streams on private forest lands, and will not provide leave trees on any N streams that deliver debris torrents to High Intrinsic Potential coho streams (Miller, 2019).

In sum, despite being recently widely recognized for their potential influence on downstream habitat conditions, headwater streams do not enjoy significant if any protections under Oregon law (Adams, 2007). Thus, the logging over or adjacent to headwater stream areas or seasonal non-fish bearing streams represents a conflict with resource site protection.

Water Temperature

Water quality has been identified as a factor for decline (NMFS 1997) and as a limiting factor for recovery (ODFW 2005b) of Oregon Coast coho salmon. In its 2005 assessment, ODFW and NMFS both identified water quality as the primary or secondary limiting factor for 13 of the 21 Oregon Coast coho salmon populations (Table 3-2). Primary water quality concerns include high water temperatures and increased fine sediment levels. (NMFS OC 2016).

The Oregon Department of Environmental Quality (ODEQ) has routinely monitored water quality at a number of river sites across the state. The data from this monitoring, as well as from other parties, has been used for developing the Oregon Integrated Report on the condition of Oregon's waters (Clean Water Act Section 305(b)) and waters that do not meet water quality standards and a TMDL is needed (Clean Water Act Section 303(d)). There are many streams within range of Oregon's coho salmon that have limiting water quality conditions for aquatic life and are listed on Oregon's 303(d) list. Figures 3 and 4 show water quality limited waters for temperature, dissolved oxygen, and pH (DEQ 2012).

Based on a review of available data, NMFS also concluded that impaired water quality is either a high or a very high stress in 27 out of 40 populations in the SONCC coho salmon ESU. The U.S. Environmental Protection Agency (EPA) has recognized 21 watersheds in the ESU as impaired for temperature. More specifically, the Lower Rogue population key limiting stresses are lack of floodplain and channel structure and impaired water quality; the Illinois River population key limiting stresses are altered hydrologic function and degraded riparian forest conditions; the Middle Rogue/Applegate population key limiting stresses are lack of floodplain channel and structure and altered hydrologic function; and the Upper Rogue River population key limiting stresses are altered hydrologic function and impaired water quality (NMFS SONCC 2016).

As one example, the Deer Creek watershed is located approximately 15 miles southwest of Grants Pass in the Siskiyou Georegion and stretches across 55,922 acres. Deer Creek is approximately 15 miles long and is a major tributary to the Illinois River in the Rogue watershed. Private land is the dominant ownership in the watershed, with the BLM managing 41 percent of lands and private ownership totaling 43 percent. According to the Water Quality Restoration Plan, the primary land uses in the watershed are agriculture and logging. Within the watershed, Deer Creek from the mouth to river mile 17, Anderson Creek from the mouth to river mile 3.2, and Squaw Creek from the mouth to river mile 3 were listed as water quality limited for temperature.

The BLM states that, "due to the mixed ownership in the Deer Creek Watershed, attainment of the water temperature standard requires multi-ownership participation and commitment to improve riparian function." Further, the Water Quality Restoration Plan documents how the reduced riparian zone on private lands decreases stream shade and increases solar radiation. Specifically, the BLM states:

> "Based on the ownership distribution and aerial scanning (Google Earth), approximately 70% of the riparian zones in the Deer Creek Watershed lack mature tree structure necessary to provide large instream wood. On private lands, in the lower gradient floodplain reaches of Deer, Anderson/Clear, Draper, and Crooks creeks, reductions in riparian vegetation have decreased stream shade, thereby increasing solar radiation input into surface waters."

(BLM Water Quality Restoration Plan Deer Creek Watershed, 2011).

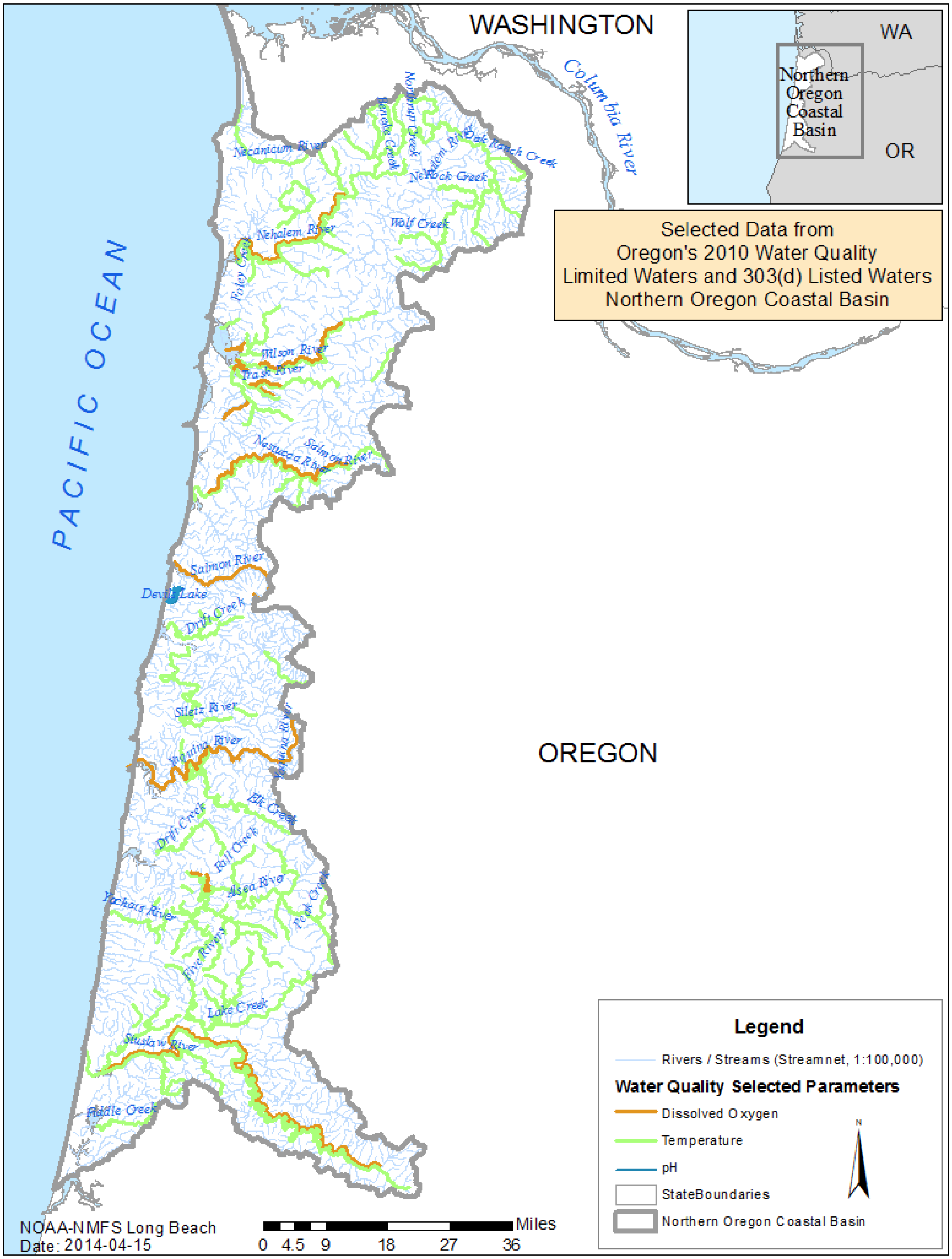

Figure 3. Water quality limited waters and 303(d) listed waters in Northern Oregon Coastal Basin.

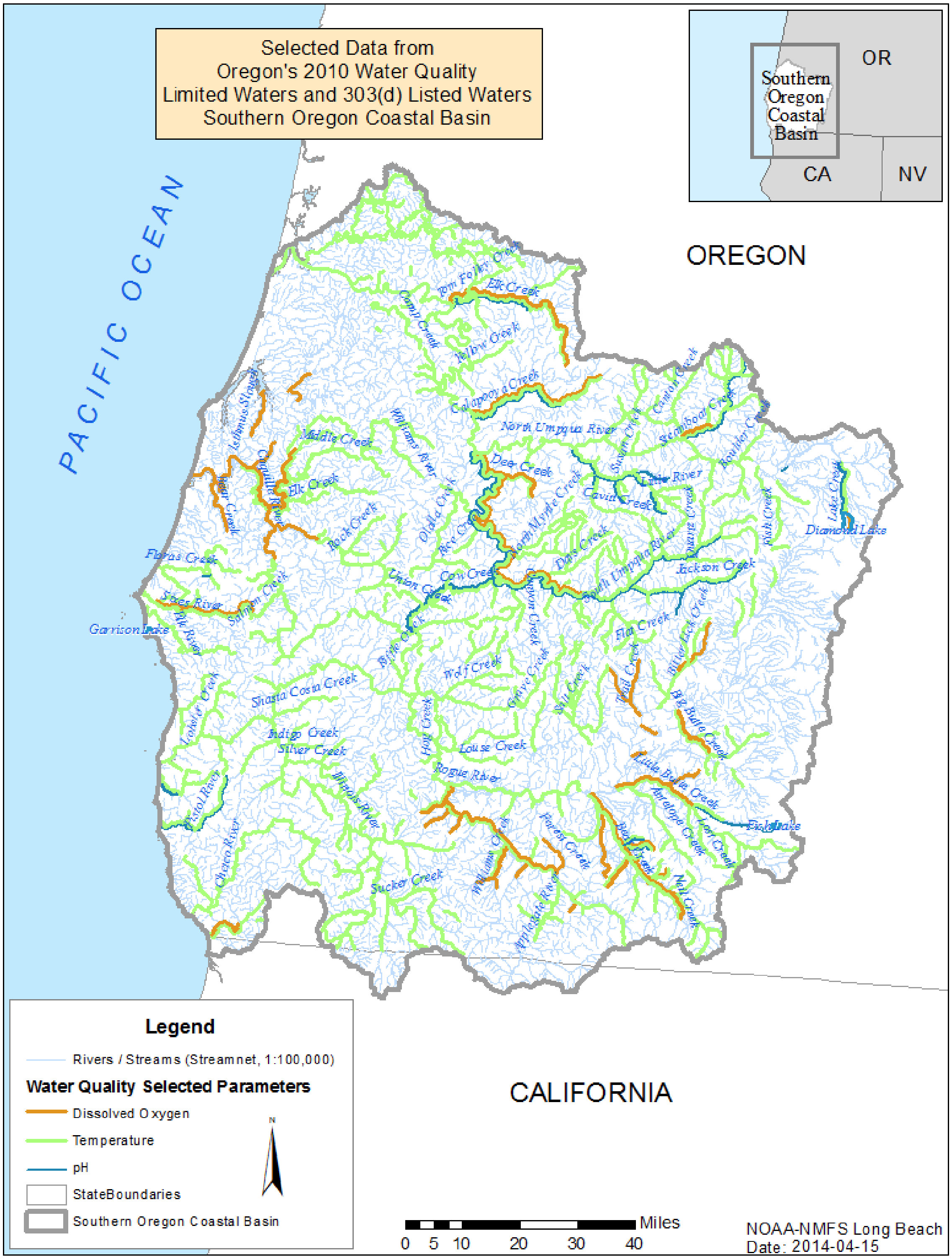

Figure 4. Water quality limited waters in Southern Oregon Coastal Basins.

Stout et al. 2012 determined that water temperature is the primary source of water quality impairment in the Oregon Coast coho salmon critical habitat. They found that many of the streams coho salmon juveniles inhabit are already close to lethal temperatures during the summer months. Unsuitable water temperature is one of the most widespread and significant stresses in the SONCC coho salmon ESU, and because of the ongoing drought, summer water temperatures likely increased since the last status review. Rearing juvenile coho salmon rely on cool thermal refugia to survive hot summers in the predominantly warm and dry summer climate that characterizes much of the ESU. Water temperature tends to increase as discharge drops synchronously with warming air temperatures, reducing the availability of sufficiently cool and large, well-distributed thermal refugia. This dynamic is exacerbated by thermal inputs from simplified and more shallow stream channels, exposed basalt bedrock, and low flows connected to logging activities. Coho salmon can survive at some temperatures exceeding applicable numeric criteria, but only if (1) high quality food is abundant, (2) sufficiently cold, large, and well-distributed thermal refugia are available, and (3) competitors or predators are few (NRC 2004; NMFS SONCC 2016). Water temperature is also similarly a key ongoing habitat concern for the Lower Columbia Rover coho ESU (LCFRB 2010, ODFW 2010, NMFS 2013a, NMFS LCR 2016).

Increased water temperature has been negatively correlated with salmon survival and abundance in freshwater (Lawson et al., 2004; Crozier et al., 2008). High water temperatures can also disrupt life cycle timing, potentially leading to a mismatch between smolt outmigration timing and onset of upwelling in spring (Crozier et al., 2008). Parasites and disease can be virulent at higher temperatures (Lawson et al., 2004). High water temperatures are also conducive to the survival and reproduction of non-native fish species such as smallmouth and largemouth bass. Rising temperatures anticipated with global climate change will have an overall negative effect on the status of the Oregon Coast coho salmon ESU (Stout et al., 2012). Approximately 40 percent of the Oregon Coast coho salmon ESU is already considered temperature impaired (ODEQ 2007), and rising water temperatures due to climate change could cause further habitat degradation, even in the absence of threats from other human activities like forestry and agriculture. Thus, the effects of climate change pose a significant risk to coho salmon populations in those systems that are already impaired and increase the likelihood of temperature impairment in the rest of the aquatic systems in the Oregon Coast coho salmon ESU.

Several land use activities have contributed to increased water temperatures in coastal streams. Historical and ongoing timber harvest and road building have reduced the function of riparian zones and shade on streams (Stout et al., 2012; NMFS OC 2016). Deforested streams, particularly small streams, experience higher summer maximum water temperatures than those under the full shading of a forest canopy (e.g., Brown and Krygier, 1970; Lee and Samuel, 1976; Lynch et al., 1985; Sweeney, 1993; Sweeney and Newbold, 2014). Elevated temperatures may reduce the habitat available to fishes (Barton et al., 1985; Jones et al., 2006; Whitledge et al., 2006), alter the life histories and reproductive success of aquatic insects (Vannote and Sweeney, 1980; Sweeney, 1993), and alter stream ecosystem metabolism (Bott et al., 1985; Sinsabaugh, 1997; Uehlinger et al., 2000). Streamside forest buffers and the associated bedload aggregation built from added stream complexity can reduce the thermal effects of forest clearing (reviewed by Moore et al., 2005), by lowering the solar radiation reaching the stream (Brown, 1969; Groom et al., 2011). Reductions in water temperature due to streamside forest restoration have been directly linked to recovery of benthic macroinvertebrate communities (Parkyn et al., 2003).

Because light passes obliquely through the canopy to the stream, the shading and temperature control that a riparian buffer provides depend in part on the width and density of the buffer (Sweeny and Newbold, 2014). A recent summary of all available science on the effects of riparian buffers on water temperature concluded that buffer widths of ≥20 m (65 feet) will keep stream temperatures within 2°C of those that would occur in a fully forested watershed but that full protection from measurable temperature increases is assured only by a buffer width of ≥30 m (97.5 feet) (Sweeny and Newbold, 2014). NMFS recently recommended that Oregon improve the effectiveness of ecosystem protections in forests, including implementation of the Oregon Forest Practices Act, specifically to reduce the negative impacts of forestry management which results in increased water temperature and fine sediment and modifying the OFPA and/or Forest Practice Rules for fish-bearing and non-fish bearing stream reaches (NMFS OC 2016).

The field-validated predictive modeling developed to support a recent rule change by the Board to address stream warming caused by riparian logging on small and medium streams demonstrates that riparian buffers of 120 feet are necessary to fully ensure water temperature increases do not take place (ODF 2015; ODF 2016). Buffers need to be at least 90 feet to prevent a greater than 50% chance that stream temperatures will increase as a result of logging (ODF 2015; ODF 2016):

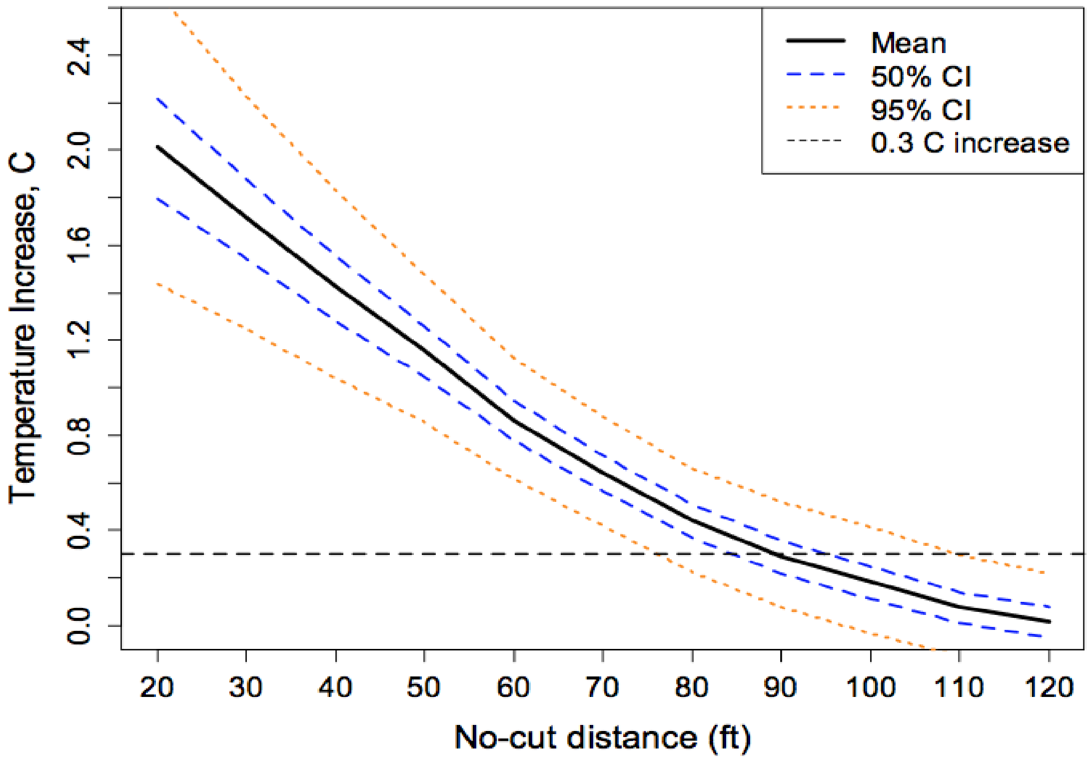

Figure 1. Mean temperature responses among all sites to simulated harvests at set slope distances from the stream. The black line indicates the mean response of the 33 sites, the dashed blue line represents a 50% Credibility Interval (CI) and the dashed orange line a 95% CI. The horizontal dashed black line indicates the PCW threshold of 0.3 °C.

Recent studies also indicate that these buffers are needed on headwater streams or streams that extend beyond the reach of streams that actually contain coho salmon spawning and rearing activities (Berger et al., 2009). A recent publication illustrates that only 50% of heat gain may be lost 900 meters downstream meaning that riparian buffers are needed upstream of coho salmon reaches in headwater areas to prevent stream temperature increases (Davis et al., 2016). The EPA also recommended in the recent riparian rule process that riparian buffers extend at least 1600 feet upstream of the coho reach (Henning EPA, 2015a).

Sedimentation

Increased levels of fine sediment also affect coho salmon production. Increased sediment loads generally result from historical and current forest management and agricultural operations and road building that lead to erosion and allow sediments to enter streams. Routine road maintenance as currently required by the OFPA is necessary but not sufficient to maintain and restore desired sediment levels in coho habitat (Anlauf et al. 2011).

Although the presence of fine sediment is an important component to stream health, the increased rate of sediment production due to forest road networks can result in negative consequences for water quality and aquatic life (Wemple et al., 2001; Gucinski, 2001). Endicott (2008) notes that fine sediments can be transported downstream where they may accumulate in particular sites, amplifying the cumulative effects of multiple sources (2008). Increasing sediment loads in streams increases turbidity (Endicott, 2008). Increased fine sediments can smother critical spawning gravel for salmon and reduce habitat for the macroinvertebrates upon which juvenile salmon feed (Endicott, 2008; Akay, 2008; Klein, 2012). Studies have shown that the amount of fine sediment in spawning gravels is inversely proportional to the survival of juvenile salmonids (Chapman, 1988; Weaver and Fraley, 1993; Gucinski, 2001). Fine sediments can fill pools used by salmonids, resulting in decreased habitat areas and increased fish mortality (Alexander and Hansen, 1986; Bjornn et al., 1977). Sediment also changes stream morphology that increases temperatures and has other effects and sediment in terms of fines that affect salmonid health and intergravel dissolved oxygen in redds.

Roads used to haul logs are a well-known chronic source of significant sedimentation and excessive road miles and poorly maintained roads conflict with maintaining and restoring coho habitat. The conflict is exacerbated when road surfaces are designed to channel road sediment into stream channels at culverts. Essentially the stream network is extended to log haul road surfaces which deliver a dose of fine sediment pollution to streams every time there is substantial precipitation. Sediment delivery to the stream network is greatly increased with wet season haul because roads deliver sediment laden water to small streams that only flow during the wet season. Road engineering techniques exist to "disconnect" the road system from the stream system towards reducing sediment delivery of road sediment at stream crossings. These drainage modifications are generally implemented near where the road crosses the stream and are designed to shunt the sediment onto hill slopes where the sediment laden water can be filtered by vegetation or soil permeability. Some of these include out-sloping the road, cross drain culverts, berms, detention pits and temporary placement of hay bales to divert and prevent sediment laden water from entering the stream. It's important to treat all stream crossing because sediment laden water from headwater road crossings will be transported downstream where it will settle out in coho habitat. In some cases, significant portions of the headwater stream network have been altered from natural stream channels to roadside ditches. It will likely be necessary to prohibit wet season log haul or limit log haul to "dry periods" of the wet season, decommission legacy roads, and prohibit new roadbuilding activity in areas of sedimentary geology or steep slopes. For example, some roads may closely parallel coho habitat making it difficult to prevent sediment laden water from entering the stream during wet season or wet period log haul. Catastrophic haul road failures are also a significant source of sediment and often the most visible as culverts blow out or fill failures are deposited directly into streams.

In two reports leading up to a formal determination, NOAA described ongoing concerns with sediment delivery to streams from forest roads. In the proposed finding in 2013, the EPA and NOAA stated:

> The federal agencies remain concerned that a significant percentage of the road network on forest lands in Oregon continues to deliver sediment directly into streams, and that

> new drainage requirements are triggered only when road construction or reconstruction takes place. It is not clear how the rules address water quality impairment associated with legacy roads and a large portion of the existing road network where construction/reconstruction is not proposed.

("Oregon Coastal Nonpoint Program NOAA/EPA Proposed Finding," 2013, p. 9).

In addition to roads, it is widely recognized that logging, especially logging practices in Oregon on state and private timberlands, have near-term and immediate effects on direct soil disturbance that are substantial and pervasive leading to negative sedimentation impacts to coho habitat. However, it has been determined that these immediate impacts can largely be avoided through no yarding, no-felling, no-cut buffers strips extending a minimum 30 m from the stream margin, extended wider to encompass steep inner gorge slopes where present (Rashin et al. 2006). But, Reid et al. (2010), Klein et al. (2012), and Keppeler (2012) taken together show that even when buffer strips are left, logging of upland slopes results in increased runoff, which in turn can cause channel and gully erosion, stream network expansion into previously unchanneled headwater swales, and persistently elevated suspended sediment (Frissell, 2012).

Expanded channel networks post-logging in stream headwaters generate new sediment, and also infiltrate sediment sources that were previously unconnected to surface waters. These changes and related geomorphic adjustments may cause recurring episodes of turbidity many years after logging. Turbidity impacts generally propagate to downstream receiving waters. Channel expansion can be partially but not fully mitigated by riparian buffers. Where stream and wetland densities are not high, it could potentially be avoided only by limiting logging rate and pattern within headwaters to minimize the marginal hydrologic stresses of logging, in the face of past and future natural vegetation disturbances (Frissell, 2012).

Thus, just as headwater streams were critical for the recruitment of woody debris to increase stream complexity and coho habitat quality, headwater streams also play a critical role in contributing water and sediment to downstream areas, hence are critical in determining water quality, quantity, and habitat conditions for aquatic resources in receiving waters across the landscape (Likens and Borman, 1974; Lowe and Likens 2005; Frissell, 2012). While the effects of logging, including increased sediment delivery to headwater streams can be at least partly mitigated by riparian buffers (within which logging operations, including ground disturbance and tree removal, are excluded), some larger-scale effects of logging across headwater areas tend to be pervasive, and not fully mitigated by narrow forest buffers. Moreover, current state rules governing forest practices on private lands do not require forest buffers on many--perhaps most--headwater streams that are not fish-bearing, especially those that lack permanent or continuous flow (Olson et al., 2007; Frissell, 2012).

Recent analysis by NMFS demonstrates large wood levels and channel complexity declining in several strata while fine sediment levels are on the rise. (Stout et al. 2012). NMFS specifically recognizes water quality and increased levels of fine sedimentation as the secondary limiting factor on Oregon Coast coho ESU recovery and that reducing fine sediment levels is a recommended future action to contribute towards coho salmon recovery. The SONCC 2016 status review specifically recommends revising the Oregon Forest Practices Act to address water quality and sedimentation concerns for the species (NMFS SONCC 2016). Thus, logging and road construction activities in riparian and headwater areas represent conflicts with the protection of coho salmon resource sites.

Water Quantity

Widespread conversion of mature and old growth forests in coho watersheds has substantially reduced summer low flows and increased winter flows. Reducing summer flows and increasing winter flows is a serious conflict between ongoing timber harvest and the maintenance and restoration of historic stream flows and watershed health.

Perry and Jones (2017) concluded that after an initial 10-15 year period of increased stream baseflows (late spring, summer and early fall), stream flows are reduced by about half for a period lasting from 15 through at least 50-years post logging. Baseflow depletions of 50% were observed in all watersheds where less than half of their area remaining in mature and old growth forest—that is, greater than half of catchment area logged. The hydrologic basis for this flow depletion appears to be increased evapotranspiration in second-growth forests—that is, greatly reduced water use efficiency—and possibly increased physical evaporation (from soil, or from condensation on the outside of foliage, etc.) in second-growth compared to mature and old growth conifer forests. The ultimate time frame for return to the higher base flow conditions observed before logging remains unknown but is more than 60 years. The recent analysis suggested that increased second growth forest cover is either a primary driver or a contributor to widely observed summer stream flow declines.

While, there remain some uncertainties around exactly why these watersheds were less than 50% area remain as mature and old-growth forests are experiencing increased low flows, it is safe to say that logging watersheds below such levels or logging in watersheds already below this level will further contribute to water quantity issues facing Oregon's coho salmon population.

Perry and Jones 2017 also found increased winter flows that can be harmful to coho salmon maintenance and recovery. It is important to note that these undesirable watershed scale effects are not new science. Decreased summer low flows and increased peak winter flows due to conversion of mature/old growth forests to young forests has been documented in the scientific literature since the 1980s, but the Board of Forestry has failed to act on this scientific information to the detriment of coho salmon habitat.

Reduced flow results in shallower, smaller, and less complex pools where coho salmon juveniles over-summer (May and Lee, 2004). Another potential result of low summer flow is loss of hydraulic connectivity in riffles (Magoulick and Kobza, 2003), reducing food availability for juvenile salmonids and hence reducing growth rates (Stillwater Sciences and Dietrich, 2002; McBain and Trush, 2012), increasing likelihood of starvation. With loss of connectivity, fish movement is restricted to single habitat units where they must expend energy to roam for food and become more vulnerable to predation (Magoulick and Kobza, 2003; NMFS SONCC 2016).

Concerning the SONCC ESU, NMFS concluded that over the next five years, the most important action to safeguard SONCC coho salmon against extinction is to ensure sufficient instream flows (NMFS SONCC 2016). Because sufficient, cool flow is paramount to coho salmon survival, NMFS concluded that the risk to the species' persistence resulting from habitat destruction and modification has increased since the last status review in 2011. The outcome of these low flow conditions are stressful habitat conditions for coho salmon for a longer period of time, which likely resulted in decreased survival (NMFS SONCC 2016).

Logging in watersheds with reduced summer flows represents a conflict with coho resource site protection.

D. Inadequacy of Oregon's Current Regulatory Regime

Federal

NMFS first listed the Southern Oregon/Northern California Coast (SONCC) coho as a threatened species under the federal Endangered Species Act (ESA), 16 USC §§1531 – 1544, on May 6, 1997. (62 FR 24588). Subsequently, the Oregon Coast coho was listed as threatened on

August 10, 1998 (63 FR 42587). The Lower Columbia River coho salmon was listed as threatened on June 28, 2005. (70 FR 37160).

Given its listing status, Oregon's coho population is protected by Section 9 of the Endangered Species Act which entails a prohibition on "take." 16 U.S.C. § 1531 et seq. "Take" includes the killing or capture of the species that would include fishing but has been defined to include the adverse modification of occupied habitat. *Babbitt v. Sweet Home Chapter of Cmtys. for a Great Or.*, 515 U.S. 687, 708 (1995) (Secretary reasonably construed ESA § 9 by including "adverse habitat modification" under the definition of "take" in 50 C.F.R. § 17.3). Despite this prohibition, fishing for naturally produced coho is l permitted on a very limited basis. Since 1977, salmon fisheries in the exclusive economic zone (EEZ) (three to 200 miles offshore) off Washington, Oregon, and California have been managed under salmon Fishery Management Plans (FMPs) of the Pacific Fishery Management Council (PFMC). The coho fishery is evaluated on an annual basis. Currently, the coho fishery is primarily directed at hatchery produced coho salmon with limited incidental take of naturally produced (wild) coho salmon. While all species of salmon fall under the jurisdiction of the current plan (PFMC 2014), it currently contains fishery management objectives only for Chinook salmon, coho salmon, pink salmon (odd-numbered years only), and any salmon species listed under the ESA that is measurably impacted by PFMC fisheries. These constraints take a variety of forms including FMP conservation objectives, limits on the time and area during which fisheries may be open, ceilings on fishery impact rates, and reductions from base period impact rates. NMFS may periodically revise consultation standards and annually issues a guidance letter reflecting the most current information (e.g., Stelle 2015). Currently, OC coho salmon under this FMP are limited to an exploitation rate of 15 percent (Stelle 2015).

Aside from direct fishing and killing of the species, NMFS has attempted to address freshwater habitat degradation through federal regulation. In 2008, NMFS finalized a special rule, pursuant to ESA section 4(d), that extends ESA section 9(a)(1)(B) to the Oregon's coho salmon ESUs ("Special Rule"). *See* 50 C.F.R. § 223.203 (2017). NMFS re-issued the Special Rule in 2011. 76 Fed. Reg. 35,755, 35,770 (June 20, 2011). The Special Rule identifies logging and road construction in the range of the Oregon's coho salmon ESUs among the activities that are subject to the take prohibition. 50 C.F.R. § 223.203 (delineating activities exempt from the section 9 take prohibition). In particular, "[a]ctivities that . . . could potentially 'harm' salmon"—like "logging" and "road construction in riparian areas" as well as areas that are "susceptible to mass wasting and surface erosion," and the "removal of large woody debris and 'sinker logs' or riparian shade canopy"—will "result[ ] in a violation of the section 9 take and other prohibitions." 73 Fed. Reg. 7816, 7830 (Feb. 11, 2008).

However, this prohibition is not being applied to private lands in Oregon despite the fact that the Oregon Department of Forestry oversees logging on these lands This is because private timber producers generally need only provide the Department with notice prior to logging, with no affirmative approval required *see* ORS 527.674, which severely restricts the application of legal mechanisms to prevent harm to coho salmon habitat within private timberlands. In addition, the federal ESA's regulatory burden is severely restricted by the statutes' respective notice provisions,[2] and a general lack of an enforcement standard that could be used by NMFS on state and private timberlands.

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[2] To bring a Section 9 citizen suit, a plaintiff must give the potential violator and the USFWS sixty days' notice of the alleged violations. Under state law, a timber producer must only provide the state with fifteen days' notice prior to logging. Because citizen suits under the Act are only prospective, in that the only potential relief is injunctive, these suits are nearly impossible to successfully prosecute.

Private and state-owned forestlands in the LCR salmon and ESUs/Distinct Population Segments (DPS) in Washington State are covered under several on-going Habitat Conservation Plans (HCPs), including the West Fork Timber (formerly Murray Pacific) HCP for forest lands in East Lewis County; the Washington State Department of Natural Resources (WDNR) State Forest Trust Lands HCP, and the Washington State Forest Practices HCP (NMFS LCR 2016). In contrast, Oregon does not have a single HCP related to forestry that covers coho salmon. The Board has directed the Department to move forward with an HCP development process for its north coast state forests (Tillamook and Clatsop State Forests), but no decision has yet been made on whether to finalize an HCP and won't be made until agreement has been reached with the federal Services. The Department is also currently facing litigation under Section 9 of the ESA for taking coho salmon on these north coast forests from public interest conservation groups.

Concerns for the species have spurred forest management changes on federal lands in Oregon. Since 1994, land management on USFS and BLM lands in Western Oregon has been guided by the Federal Northwest Forest Plan (USDA and USDI 1994; NMFS 2015b). The aquatic conservation strategy (ACS) contained in this plan includes elements such as designation of riparian management zones, activity-specific management standards, watershed assessment, watershed restoration, and identification of key watersheds (USDA and USDI 1994; NMFS 2015b).

Although much of the habitat with high intrinsic potential to support the recovery of coho salmon is on lower-elevation, private lands, federal forest lands contain much of the current high-quality habitat for this species (Burnett et al. 2007). All three coho ESUs have significant amounts of private forestland (25% for lower Columbia, 27% for Southern Oregon and 39% for

Oregon Coast). Relative to forest practice rules and practices on many non-federal lands, the Northwest Forest Plan has large riparian management zones (1 to 2 site-potential tree heights) and relatively protective, activity-specific management standards (USDA and USDI 1994). As an example, below is a map of habitat with high intrinsic potential within the SONCC ESU:

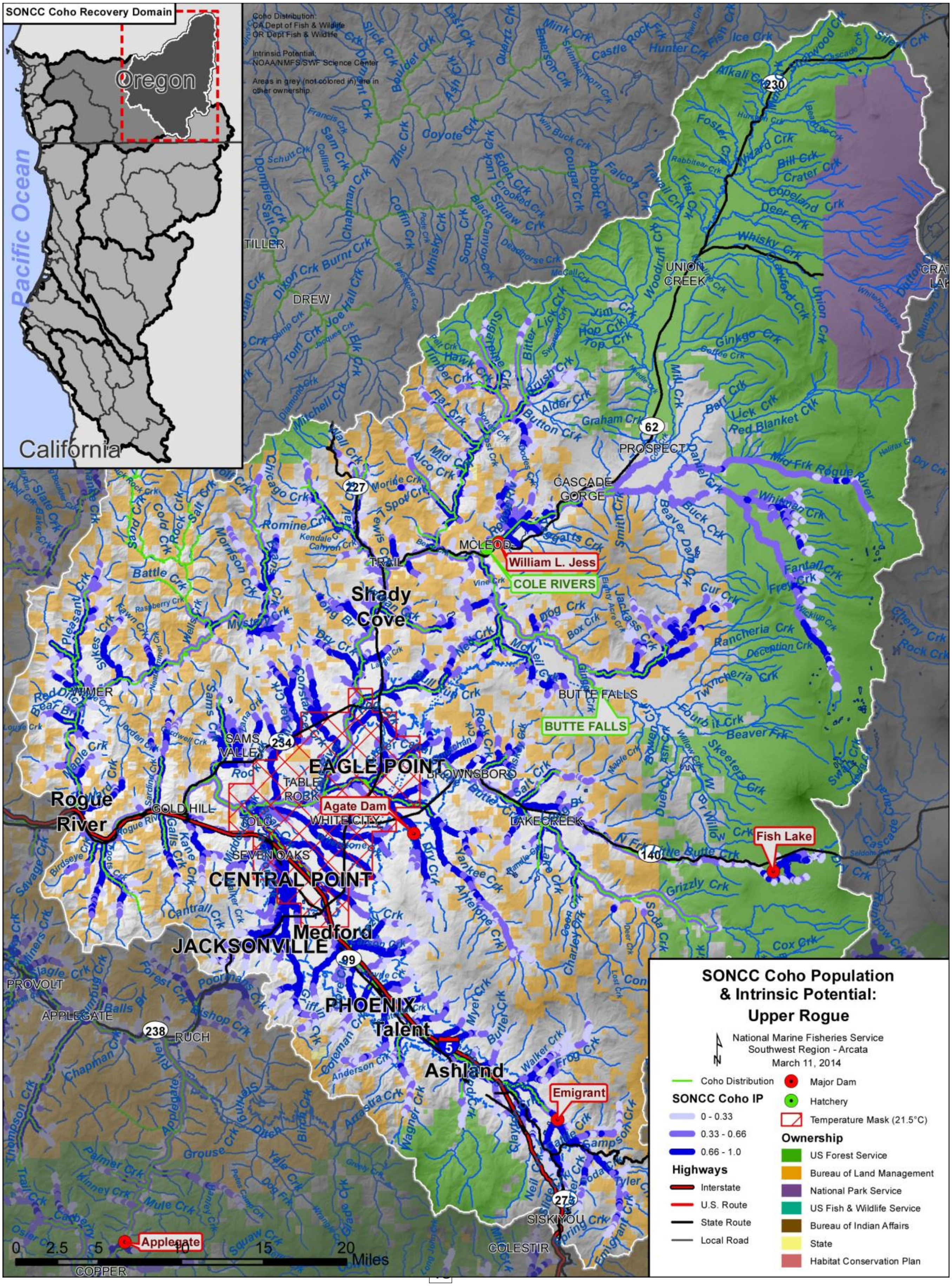
SONCC Coho Population & Intrinsic Potential: Upper Rogue
National Marine Fisheries Service
Southwest Region - Arcata
March 11, 2014
Coho Distribution
Major Dam
SONCC Coho IP
Hatchery
0 - 0.33
Temperature Mask (21.5°C)
0.33 - 0.66
Ownership
0.66 - 1.0
US Forest Service
Highways
Bureau of Land Management
Interstate
National Park Service
U.S. Route
US Fish & Wildlife Service
State Route
Bureau of Indian Affairs
Local Road
State
Habitat Conservation Plan
SONCC Coho Recovery Domain
Pacific Ocean
Oregon
California
Coho Distribution:
CA Dept of Fish & Wildlife
OR Dept Fish & Wildlife
Intrinsic Potential:
NOAA/NMFS/SWF Science Center
Areas in grey (not colored in) are in other ownership.
William L. Jess
COLE RIVERS
BUTTE FALLS
Agate Dam
Fish Lake
Emigrant
Applegate
Rogue River
Shady Cove
EAGLE POINT
CENTRAL POINT
Medford
JACKSONVILLE
PHOENIX
Talent
Ashland
0 2.5 5 10 15 20 Miles

Figure 5. The geographic boundaries of the Upper Rogue River coho salmon population. Figure shows modeled Intrinsic Potential of habitat (Williams et al. 2006), land ownership, coho salmon distribution (ODFW 2013a), and location within the Southern-Oregon/Northern California Coast Coho Salmon ESU and the Interior Rogue River diversity stratum (Williams et al. 2006). Grey areas indicate private ownership.

Specifically, fish-bearing streams have a riparian management zone of two site-potential tree heights or 300 ft, whichever is greater; perennial non-fish-bearing streams have a riparian management zone of one site-potential tree height or 150 ft, whichever is greater and seasonal or intermittent streams have riparian management zones of one site-potential tree height or 100 ft, whichever is greater. The riparian management zones enjoy relatively substantial protections: no timber harvest or new roads or landings except after watershed and site-specific analyses; changes in reserve width require similar analyses. (Adams, 2007).

In 2016, the Bureau of Land Management withdrew from the Northwest Forest Plan (BLM RMP 2016), removing 2.6 million acres from its protective regime. The BLM's new plan eliminates the ACS and provides a one tree height riparian reserve land allocation for all streams. (BLM RMP 2016). The RMP has a 120 ft no cut buffer for perennial streams and a 50 ft no cut buffer for intermittent streams with thinning allowed in outer riparian zones. These standards continue to far exceed what is currently protected on lands administered by ODF. The Forest Service continues to manage under the Northwest Forest Plan but has initiated a preliminary process to begin the revision of its plans as well.

In the Coastal Zone Act Reauthorization Amendments of 1990, 16 U.S.C. § 1455b ("CZARA"), Congress incentivized states to eliminate nonpoint source pollution by requiring EPA and NOAA to withhold a percentage of Clean Water Act ("CWA") and Coastal Zone Management Act ("CZMA") grant funds from states that fail to submit coastal nonpoint programs that protect water quality. 16 U.S.C. § 1455b(a)(2). CZARA generally requires states that have federally-approved coastal zone management plans to develop and implement a coastal nonpoint pollution control program ("CNPCP") that meets statutory criteria and federal guidance. 16 U.S.C. § 1455b(a)(1). CZARA's purpose is to compel coastal states "to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other State and local authorities." *Id*. The State programs must be coordinated closely with water quality plans developed under the Clean Water Act and Coastal Zone Management Act. 16 U.S.C. § 1455b(a)(2).

CZARA sets forth requirements for the contents of the State programs. *See generally* 16 U.S.C. §1455b(b) & (g). CZARA requires each state program to conform to federal guidance developed under subsection (g) of the Act. Subsection (g)(1) requires the agencies to publish and periodically revise guidance specifying management measures for sources of nonpoint pollution in coastal waters, while subsection (g)(2) provides a list of criteria the management measures must meet. Under CZARA's mandate, EPA developed management measures for six major nonpoint pollution sources, including agricultural runoff, urban runoff, silvicultural runoff, hydromodification and dams, shoreline erosion, and marinas. CZARA also requires states to develop and implement "additional management measures" where necessary to achieve and maintain applicable water quality standards, including the protection of designated uses.

Subsection (1) requires EPA and NOAA to jointly review the program within six months of submittal by the State. 16 U.S.C. § 1455b(c)(1). EPA and NOAA shall approve a state's program if those agencies determine that the portions of the program under their respective authorities meet the requirements of the Act. *Id*. If the State program is approved, "the State shall implement the program" through changes to the State's Clean Water Act section 319 and Coastal Zone Management Act section 306 plans. 16 U.S.C. § 1455b(c)(2).

In its regional temperature guidance EPA recommended numeric temperature criteria for the protection of cold-water fishes. Oregon's statewide numeric temperature criteria, which it adopted to protect designated beneficial uses, correspond to those EPA recommendations as follows: salmon and steelhead spawning 13.0°C; core cold water habitat 16.0°C; salmon and trout rearing and migration 18.0°C; migration corridors 20.0°C. Unfortunately, temperatures in coastal watersheds range up to at least 32.5°C (90.5° F), clearly exceeding EPA recommendations and Oregon's state-wide numeric temperature criteria. According to EPA's regional temperature guidance, such temperatures would not only not provide full support for cold-water salmonids but at the higher range are lethal to salmonids within seconds.

Repeatedly over the years, NOAA and the EPA declined to approve Oregon's CNPCP due primarily to forest practices in Oregon that fail to protect water quality sufficiently to meet water quality standards. On January 30, 2015, the federal agencies disapproved Oregon's proposal because the State has not implemented or revised management measures, backed by enforceable authorities, to (1) protect riparian areas for medium-sized and small fish-bearing (type "F") streams and non-fish-bearing (type "N") streams; (2) address the impacts of forest roads, particularly on so-called "legacy" roads; (3) protect high-risk landslide areas; and (4) ensure adequate stream buffers for the application of herbicides, particularly on non-fish-bearing streams.. These federal agencies determined that a broad body of science continues to demonstrate that the FPA rules do not adequately protect water quality citing a number of state-led studies dating to 1999. However, these agencies have lacked the will to withhold federal funding tied to compliance with these standards, as required by federal statute, and therefore violations of these standards continue and prove inadequate to protect water quality along the Oregon coast and throughout coho habitat. Part of the federal funding that has been withheld, which was the result of legal intervention by a public interest organization, has reduced nonpoint source funding to the Department of Environmental Quality, thus not directly creating an incentive for the Department of Forestry to alter its practices.

Several additional sections of the Federal Clean Water Act, such as section 401, (water quality certification), section 402 (National Pollutant Discharge Elimination System), and section 404 (discharge of fill into waters of the United States), regulate activities that might degrade salmon habitat (NMFS 2015b). Despite the requirements of the CWA, a significant percentage of stream reaches in coho ESUs Oregon do not meet current water quality standards. For instance, many of the populations have degraded water quality identified as a secondary limiting factor (ODFW 2007). Forty percent of the stream miles inhabited by Oregon Coast coho salmon are classified as temperature impaired (Stout et al. 2012). Similarly, SONCC coho have a high percentage of degraded water quality, especially on lands administered by ODF, as illustrated by the maps above. Although DEQ administers programs intended to restore water quality, each step taken by the agency has largely been the result of legal intervention and the EQC has to date chosen not exercise its authority to enforce implementation of water quality restoration targets on nonfederal forestlands, which is the primary reason NOAA and the EPA continually refuse to approve Oregon’s framework. It is clear that programs carried out under the Clean Water Act are necessary but not sufficient to protect coho salmon habitat in a condition that would provide for long-term sustainable populations

Federal protections exist for coho salmon, but they are insufficient to protect coho salmon spawning and rearing habitat, especially habitat on state and private timberlands in Oregon. Although maintaining and restoring high-quality habitat on federal lands is necessary for the recovery of coho salmon, federal land conservation is not sufficient for recovery unless habitat on non-federal lands can be maintained and restored. (Burnett et al. 2007, quoted in Stout et al. 2012; NMFS 2015b). This has been explicitly recognized by the state of Oregon, and this Board and the Department of Forestry have taken steps to mitigate impacts to coho salmon habitat on state and private timberlands in Oregon. However, protections for riparian areas, headwater streams, and impaired watersheds are still deficient in many respects and create conflicts with the protection of coho salmon resource sites.

Oregon State Timberlands

The Oregon Department of Forestry (ODF) manages its forest lands "to secure the greatest permanent value of those lands to the state." ORS 530.050. Pursuant to that directive, ODF may sell forest products and enter into timber sale contracts. ORS 530.050(2), (3). In addition, ODF may permit the use of its lands for other purposes so long as those uses are not detrimental to the best interest of the state, including for the protection of fish and wildlife. ORS 530.050(4). ODF has adopted rules governing the management of state forestlands. *See* OAR chapter 629, division 35. The State Forester is charged with the mandate to "secure the greatest permanent value to the state." ORS 530.050. "Greatest permanent value" means "healthy, productive, and sustainable forest ecosystems that over time and across the landscape provide a full range of social, economic, and environmental benefits." OAR 629-035-0020(1). The State Forester is required to actively manage state forest lands to provide sustainable timber harvest and revenues in a way that "[p]rotects, maintains, and enhances native wildlife habitats[.]" OAR 629-035-0020(2), (2)(b).

As elaborated upon *supra*, the Board of Forestry also has a legal requirement to: (1) collect and analyze the best available information on coho salmon; (2) conduct a resource site inventory; and (3) adopt rules to protect resource sites and develop a process to identify new sites in the future. ORS 527.710(3)(b), (c). These steps have not been taken, leaving a regulatory hole on Oregon's state and private timberlands for coho salmon.

Approximately 567,000 acres (2,295 square kilometers) of forest land within the range of Oregon Coast coho salmon ESU are managed by the Oregon Board of Forestry (ODF 2005). The majority of these lands are managed under the Northwest Oregon Forest Management Plan and the Elliot Forest Management Plan (NMFS 2015b). The State Forests Division developed, and ODF has adopted, policies and plans to protect threatened and endangered species on state lands, including riparian buffers that are greater than those on private timberlands in Oregon. However, NMFS recently concluded in its 2016 Oregon Coast coho recovery plan that current and proposed protective measures are insufficient to conserve coho salmon and their habitat now and in the future. Specifically, the Recovery Plan is concerned about the strength of these measures to provide stream shade, woody debris recruitment, and stream habitat complexity. It remains unclear that the Elliott State and the Northwest Oregon Forest Management Plans provide for coho salmon habitat that is capable of supporting populations that are sustainable in the long term during both good and poor marine conditions (NMFS 2015b). It is likely that some OC coho salmon habitat on state forests will be maintained in its current degraded state, some habitat will be further degraded, and habitat in areas that are not being harvested will recover.75 Fed. Reg. at 29,500.

Other independent reviews have also concluded that forestry practices on Northwest Oregon state lands are contributing to the decline of Oregon coast and Lower Columbia coho populations. A recent analysis conducted by Dr. Frissell on the north coast state forests concluded that the impacts from the logging, hauling, and road related activities that ODF plans, authorizes, and carries out harm Oregon coast coho and its habitat by increasing sediment delivery to streams and reducing input of large woody debris, all of which also happens to violate Oregon's water quality standards. *See also* Frissell Declaration at 13 ¶ 24 (regarding riparian buffers); at 17 ¶ 31 (same); at 43 ¶ 77 (regarding BMP compliance); at 45-46 ¶ 82 (regarding road density); at 50-51 ¶ 87 (regarding landslides).

The Tillamook and Clatsop State Forests are currently managed under the "Northwest State Forests Management Plan," ("FMP") which was revised by the ODF in 2010. The State Forester implements the FMP through ten-year implementation plans for each district on the Tillamook and Clatsop State Forests (Astoria, Forest Grove, and Tillamook). The Astoria and Forest Grove Implementation Plans are from 2011 and the Tillamook Plan is from 2009. Each District is managed annually pursuant to an annual operations plan. Through these plans, ODF officials plan, authorize, and conduct logging, road construction and maintenance, and timber hauling activities in those two state forests.

Under the current FMP, the goal for old forest structure is 15-25 percent and for layered forest structure it is 15-25 percent in each district, and no limit on the percentage of a watershed that can be clear-cut. These goals allow clear-cutting of roughly an additional 100,000 acres above the goal in the previous FMP (ODF FMP, 2010: S17), despite EPA's and NOAA's admonitions for over a decade that its forest practices programs are not sufficiently protecting water quality, and despite ample and relevant science demonstrating that clear-cutting and other logging practices generate nonpoint source pollution that harms water quality.

The riparian management provisions of the FMP provide a no-cut zone within 25 feet of any stream, as well as various limitations on cutting within inner (25-100 feet) and outer (100-170 feet) riparian zones depending on stream size and whether the stream is fish bearing (ODF FMP, 2010: J-8). These standards allow cutting in riparian zones that substantially limits potential recruitment of large woody debris to streams and increases the risk of sediment deposition, thereby harming coho salmon and their habitat.

The FMP does recognize the risk of landslides, debris flows, and other slope stability issues in the Tillamook and Clatsop forests, and calls for analysis of the risk of landslides and depending upon the risk category provides for varying levels of review and modification of the proposed activity (ODF FMP, 2010: 4-73). The FMP further calls for an inventory of forest roads; improved design, construction, and maintenance; and road closures, as well as use of the Forest Roads Manual (ODF FMP, 2010: S-19). Nonetheless, logging and road building continue in landslide prone areas, and the road system continues to contribute sediment to fish bearing streams either through hydrological connections, mass wasting events, or both.

Sediment impacts increase as a greater proportion of a watershed is clear-cut or crossed by road. Elevated sediment concentrations can result from forest practices due to increased soil disturbance and altered hydrologic regimes within harvested watersheds (Gomi et al. 2005). Logging-generated sedimentation is compounded by forest roads, which generate additional sediment and serve as conduits for sediment to flow into streams. The removal of large wood diminishes the stream's capacity to trap, store and regulate the transport of sediment downstream. In these ways, the removal of riparian and upslope vegetation and disturbance of soils elevates sediment loads. The Board has not prescribed limits on forest road densities in state forests.

Much of the road system in the Tillamook and Clatsop State Forests likely contributes to water quality problems because it was constructed decades ago to old construction standards (ODF, Forest Grove AOP, 2013: 12). Most forest roads in Oregon's state forests were constructed prior to the new state rules (ODF Issue Paper, 2000). These logging roads often were intentionally designed to discharge stormwater directly into streams using ditches, channels, and culverts to move stormwater off the road and into the existing stream network. Consequently, a significant amount of the road network in many watersheds with state forests may remain hydrologically connected to streams (Wemple et al., 1996; Rhodes and Huntington, 2000b). More recent design standards for logging roads acknowledge that direct discharges are ecologically undesirable and seek to direct drainage onto porous forest soils for infiltration. These contributions of sediment from Oregon's management of its state forests in coastal watersheds harm coho salmon and their habitat.

Private

Concerning private timberlands in Oregon, the Forest Practices Act grants the Board exclusive authority to develop and enforce rules governing forest practices that apply to state and private lands. ORS 527.630; ORS 527.736. The FPA is not intended to be a substitute for compliance under either the federal or state ESA. Instead, it is specifically stated in the FPA that compliance with forest practices rules does not substitute for or ensure compliance with the federal ESA. Under the FPA, landowners must submit a written plan when harvesting near a "specific site involving threatened or endangered wildlife species." OAR 629-605-0170 (1) (b); ORS 629-605-0170 (4) (b); ORS 629-0190. The Department has responsibility to notify the landowner if a written plan is required (e.g., if the landowner is operating near a known threatened or endangered species site). It is the landowner's responsibility to develop the written plan and it must contain information on the techniques and methods that will be employed for resource protection. ORS 629-605-0170(7)(d). The Department maintains a database of known threatened and endangered species sites that is compiled using available information, but private landowners are not required to survey for listed species, nor are they required to notify the Department of any threatened and endangered species' sites on their lands.

NMFS and the EPA concluded based on numerous recent studies that the Forest Practices Act regulations in place may be ineffective at protecting water quality and promoting riparian function and structure and the strategies are insufficient for recovering habitat of listed salmonids. Oregon's rules represent the least conservative forest practice regulations administered by the U.S. state governments within the range of Pacific coho salmon. In a 2010 status review of Oregon Coast coho salmon, NMFS concluded that the Oregon Forest Practices Act does not adequately protect coho in all circumstances. In particular, disagreements persist regarding (1) whether the widths of riparian management areas (RMAs) are sufficient to fully protect riparian functions and stream habitats; (2) whether operations allowed within RMAs will degrade stream habitats; (3) operations on high-risk landslide sites; and (4) watershed-scale effects (NMFS SONCC 2016).

The Board has recently enacted new riparian rules for the protection of coho streams in response to scientific research that shows current private lands logging rules don't prevent small and medium coho salmon streams from being warmed more than water quality standards allow (Dent and Madson, 2011a; Dent et al., 2011b). The Board correctly recognized that new mandatory, enforceable regulations are needed to protect cold water from harmful logging (although it focused too narrowly on the "Protecting Coldwater Criterion" applicable to certain fish-bearing streams, and ignored the constraints set by Load Allocations for stream temperature more broadly). The rule provides for two main buffer prescriptions: "no harvest" and "partial cut." Both options apply within 60 feet of small and 80 feet of medium "salmon, steelhead and bull trout" streams. A third prescription is allowed on some streams reaches of 200 feet or more that run east--west, and some landowners who are impacted the most by the new rule will be allowed to use a fourth less restrictive “equity exemption” option.

Specifically, the rule gives private timber operators the option of applying either:

(1) No cut buffers of 60 and 80 feet on small and medium coho salmon streams, respectively; the new buffers will extend upstream to the end of the unit on the mainstem stream, as defined in the rule; or

(2) “Partial cut” buffers of 60 and 80 feet keep that maintain a 20 foot no cut zone and require that more trees be left (measured in conifer and hardwood basal area) outside this area. Based on Board direction that the unlogged trees outside the no--cut area be “well--distributed,” the rule requires that the basal area floors be calculated according to 500 foot lengths of stream instead of the 1000 feet now allowed, and that the unlogged trees must be spread around within the outer 40 and 60 feet. For example, the rule establishes “floors” of 50% for the amount of total required basal area that must be in the middle zone, with a 25% minimum in the outer zone. Unlike current rules, both conifers and hardwoods are counted for basal area calculations on the theory that hardwoods also provide shade to streams. The currently required minimum number of live conifers will also be calculated per 500 feet of stream. Trees need only needs to be 8 inches in diameter to count.

There are additional exemptions for some streams:

(3) Smaller “north--sided” buffers on stream reaches that run in an east--west direction. A 40--foot no cut buffer is considered adequate on the north side of these stream reaches. The minimum length of stream to which such a prescription may apply is 200 feet –there is no maximum reach length; and

(4) The Equity Exemption Option allows eligible landowners to use 50 and 70 foot buffers, the same size as current RMAs, either as no cuts or as well--distributed partial cuts.

In essence, the rule change added 10 feet to the existing riparian no-cut buffers of 20 feet on less than a third of the "small" and "medium" fish streams in Western Oregon and excluded reaches in Southern Oregon with some harvest continuing to be allowed just outside of the 20 foot buffer. These changes, while marginally improving riparian protections on private timberlands in Oregon, do not prevent existing private timberland logging practices from conflicting with the protection of coho resource sites.

Pursuant to the discussion of threats to coho freshwater habitat above, the private land riparian regulations in Oregon are deficient to prevent conflicts with Coho sites in several ways:

(1) Even assuming landowners select the maximum 80 foot no-cut buffer along fish-bearing streams, this does not prevent adverse impacts from logging outside of this buffer that would increase stream temperatures, decrease woody debris input, increase fine sediment contributions. Buffers of 120 feet (or roughly 40 meters) would be necessary on all coho bearing stream to reasonably assure no conflict with the resource sites. This includes the areas occupied by the SONCC ESU which were exempted from the recent Board riparian rule updates.

(2) Existing riparian regulations are inadequate on non-fish-bearing streams to protect downstream coho reaches.

   a. *Small N streams*. Current rules do not establish an RMA for the majority of non-fish bearing headwater streams, which are small. The main requirement applicable to these streams – if they are *perennial* – is that understory vegetation and non-merchantable conifers (less than 6 inches) must be left within 10 feet of the high-water level. OAR 629-642-0400. This does not prevent adverse impacts from logging outside of this buffer that would increase stream temperatures, decrease woody debris input, increase fine sediment contributions.

b. *Medium and Large nonfish (Type N) streams (of which there are very few) and Domestic Water Use (Type D) streams,* receive only slightly more protection: a 20 foot (small D), 50 foot (Medium N or D) or 70 foot (Large N or D) RMA where operators are required to leave trees within 20 feet, understory vegetation within 10 feet, and either 10 (Medium) or 30 (Large) minimum conifers per length of stream. OAR 629-642-0400 and Table 9.

These required levels of retention on non-fish streams do not prevent adverse impacts from logging outside of this buffer that would increase stream temperatures, decrease woody debris input, increase fine sediment contributions. No cut buffers of 100 feet (or roughly 30 meters) would be necessary on all non-fish bearing streams within coho watersheds to reasonably assure no conflict with the resource site.

(3) *Landslide-prone areas and debris-torrent prone streams.* Coho habitat-forming large wood sources are depleted, and harmful sediment impacts increased by allowing logging on steep and unstable landforms where forest operations can exacerbate the risk of landslide initiation and delivery to coho streams. Areas of concern include: High Landslide Hazard Locations already identified in rule, inner gorges, convergent headwalls, or bedrock hollows with slopes steeper than thirty-five degrees (seventy percent); Toes of deep-seated landslides, with slopes steeper than thirty-three degrees

(sixty-five percent); the groundwater recharge areas of deep-seated landslides; within 150 horizontal feet of the outer edges of meander bends along valley walls or high terraces of an unconfined meandering stream.

(4) *Persistent low flows from watershed-level even-age management.* A watershed specific approach is needed to address the hydrologic problems created when watersheds are dominated by industrial clearcuts and young plantations (e.g. 50% or more) to maximize natural water storage and flow stability, especially in the drier, southern range of coho salmon.

VI. RULEMAKING REQUEST

In summary, the Oregon Forest Practices Act does not adequately protect coho salmon with respect to: the size and configuration of Riparian Management Areas (RMAs), operations allowed within RMAs that degrade coho habitats, operations on high-risk landslide-prone sites that would deliver to coho streams, watershed-level effects, including those causing persistent reduction of late season instream flows and other hydrologic impacts that are and will likely be further exacerbated by climate change.

NMFS and the EPA have specifically called for this Board to "change forest management (especially in privately owned forests but also in state-owned forests) to increase the natural recruitment of large wood into streams, provide more shade to counter increasing temperatures, and reduce transport of fine sediment into waterbodies during storms." (NMFS OC 2016).

Based on the current level of protection provided by Oregon's forest practices act laws, NMFS was unable to conclude that (1) that riparian management areas (RMAs) are sufficient to fully protect riparian functions and stream habitats; (2) operations allowed within RMAs will not degrade stream habitats; (3) operations are prevented on high-risk landslide sites; and (4) negative watershed-scale effects will be avoided. (NMFS SONCC 2016). In a 2016 review of the species, NMFS concluded that a combination of voluntary and regulatory approaches is key to successful recovery of the species, and that the agency needed assurances that voluntary programs are 'backed up' by regulatory mechanisms that ensure that the species' status will not degrade because of the present or threatened destruction, modification, or curtailment of its habitat or range. (NMFS OC 2016). Specifically, the agency called for Oregon to "change forest management (especially in privately owned forests but also in state-owned forests) to increase the natural recruitment of large wood into streams, provide more shade to counter increasing temperatures, and reduce transport of fine sediment into waterbodies during storms." (NMFS OC 2016).

The Board is required to collect and analyze the best available information on coho salmon and conduct a resource site inventory. ORS 527.710(3)(b), (c). Given that forests critical to coho salmon recovery are under Board's jurisdiction, it is necessary that the Board begin this process now to develop an adequate regulatory backstop for state and private timberlands in Oregon. The most straightforward approach for the Board would be to designate all watersheds containing coho salmon rearing and spawning habitat in Oregon as resource sites.

Given that commercial logging practices under the Board's jurisdiction have historically and continue to conflict with the protection of coho habitat functions and productivity in these resource sites, the Board has the opportunity to: establish specific protections for critical headwater reaches of coho salmon habitat, increase the size of riparian no-cut buffers and overall riparian management areas, strengthen implementation of road design improvements, and develop watershed specific protections in watersheds that are below or in danger of being reduced below the 50% threshold identified in the Perry Jones study.

While the Board is in the process of pursuing an HCP for the Tillamook and Clatsop that would pertain to coho salmon and insulate the Board from federal violations of the ESA, this obligation does not supplant its obligation to designate resource sites for the species under state law. To avoid unnecessary duplication and to encourage federal and state coordination, the resource site protection rules could specific that compliance with a federal HCP adequately protects the resource site. However, the HCP being explored may not come to fruition, its might only apply to portions of state lands that contain coho habitat, and it will not apply to private timberlands within the Board's jurisdiction. We believe that pursuing adequate state-wide coho protections through resource site designation contemporaneously with pursuit of a state coho HCP will allow for information sharing, unnecessary duplication of research, and coordination.

Oregon can proactively head off further decline of coho salmon and leverage our state resources to bring coho to the point where neither state nor federal endangered species protections are needed. Petitioners will gladly assist the Board in these processes and put the energies of Oregon's robust conservation community behind the state in crafting and implementing this plan.

Accordingly, pursuant to the legal requirements provided supra, Petitioners request the Board of Forestry: (1) collect and analyze the best available information on Oregon's coho salmon; (2) conduct a resource site inventory; and (3) adopt rules to protect resource sites. ORS 527.710(3)(b), (c). We further request that the Board engage the Oregon Department of Fish and Wildlife to coordinate efforts for this species, as ODFW has already conducted recent status review of coho salmon.

A. Proposed Rule Language

Petitioners propose the addition of the following rule:

OAR 629-665-0260

Coho Salmon Resource Sites and Protection Requirements

(1) *Written plan in coho watersheds.* For operations within 300 feet of any water of the state in any watershed containing waters that provide coho salmon spawning and rearing habitat, operators must submit a written plan to the State Forester.

(2) *Protection Prescriptions.* Planned forest practices will not be considered to conflict with protection of coho resource sites if the written plan describes how the operation will exclude commercial timber harvest, yarding, felling, and road construction:

> (a) Within 150 horizontal feet of streams, lakes or wetlands accessible to coho salmon, or the height of a site-potential tree;
>
> (b) Within 100 horizontal feet of perennial stream reaches upstream of coho-habitat streams, including intermittently flowing reaches below the uppermost point of perennial flow;
>
> (c) within 100 horizontal feet of a debris torrent-prone seasonal stream for at least 50% of its stream length;
>
> (d) within 50 horizontal feet of perennial seeps and springs;
>
> (d) on or within areas which may affect identified high landslide hazard locations, inner gorges, convergent headwalls, or bedrock hollows with slopes steeper than thirty-five degrees (seventy percent); Toes of deep-seated landslides, with slopes steeper than thirty-three degrees (sixty-five percent); the groundwater recharge areas of deep-seated landslides; and within 150 horizontal feet of the outer edges of meander bends along valley walls or high terraces of an unconfined meandering stream.

(3) *Road Risk Reduction Plans*. Within coho resource sites, the State Forester shall establish standards and a process for approval of landowner plans to reduce road system impacts on coho habitat and attain long-term goals for habitat and watershed conditions in coho resource sites, including watershed-specific goals where appropriate. The State Forester will approve road inventory and remediation plans on the basis of their adherence to standards for construction, maintenance, safe abandonment and consistency with long-term goals for resource sites. Plan inventories will categorize roads by priority for maintenance, improvement or abandonment according to the risks posed to aquatic habitats.

Roads within coho sites are expected to meet the following minimum standards:

(a) Are generally designed and located so as to pose a low risk of causing increased chronic or catastrophic sedimentation, and;

(b) Do not impede or prevent passage of adult or juvenile coho salmon to otherwise accessible habitat, including the lower reaches (1000 ft) of seasonal streams;

(c) Do not drain runoff directly to streams, i.e. are hydrologically disconnected;

(d) Have culverts of adequate size to accommodate reasonably foreseeable high precipitation events based on the best available climate change prediction information;

(e) Have critical dips and/or other design features that will prevent streams from being diverted down the road surface during and after high precipitation events when culverts could fail;

(4) *Watershed-level limitations.* The Board will establish additional limitations informed by the best available science by rule on forest vegetation removal in coho watersheds (HUC 12) to prevent or reduce watershed conditions that deplete instream water flows crucial to the survival of coho salmon.

(5) Amend the definition of "stream" include channel migration zones at OAR 629-600-0100 (74) (a) to add a subsection (F) that reads:

> *Within coho salmon watersheds, the channel migration zone, which is the area adjacent to an unconfined stream channel where channel location is reasonably be expected to shift position on its floodplain through lateral avulsion or erosion during the period of time required to grow mature forest trees from the surrounding area, except as modified by a permanent levee or dike*.

(6) Approval of written plans for operations affecting coho resource sites are subject to the provisions of ORS 527.700.

VII. CONCLUSION

Given the federal listing of Oregon's three coho salmon populations under the Endangered Species Act of 1973 as amended, pursuant to ORS 183.390 and ORS 527.710(3), Petitioners formally request that the Oregon Board of Forestry: (1) collect and analyze the best available information on Oregon Coast coho salmon; (2) conduct a resource site inventory and identify resource sites as suggested; and (3) adopt the above suggested rules to protect resource sites. ORS 527.710(3)(b), (c). Petitioners look forward to the Board's response within 90 days of receipt of a petition. Please contact Petitioners with any questions concerning this Petition. To contact Petitioners please address:

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