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BY HAND DELIVERY AND EMAIL

Oregon Board of Forestry
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Re: Opposition to Petition for Rulemaking to Identify and Develop Protection Requirements for Coho Salmon Resource Sites

To the Oregon Board of Forestry:

Stoel Rives LLP represents the Oregon Forest & Industries Council ("OFIC") and submits this letter on its behalf. OFIC represents more than 50 Oregon timberland owners and forest products manufacturers. OFIC and its members are committed to working with industry members, stakeholders, and regulators in advocating for responsible forest management policy to ensure the health of Oregon's working forests.

On April 25, 2019, a consortium of non-profit environmental organizations ("Petitioners") submitted to the Board of Forestry (the "Board") a "Petition for Rulemaking to Identify and Develop Protection Requirements for Coho Salmon Resource Sites" (the "Petition"), seeking to compel the Board to initiate rulemaking under the Forest Practices Act (the "FPA") to designate, inventory, and protect resource sites for coho salmon.

The Board has broad discretion to deny the Petition, and OFIC urges the Board to exercise that discretion to deny the Petition because it is both procedurally and substantively deficient. First, granting the Petition would present grave policy and prudential concerns, with the potential to spur piecemeal regulation, invite more regulatory and judicial disturbances in the future, and divert valuable Oregon Department of Forestry ("Department") resources away from other priorities already established by the Board. Second, the Petition runs counter to the FPA's statutorily mandated rulemaking procedure, ignoring requirements for predicate investigation and conflict findings such that it is unclear whether the proposed rules are even needed, let alone whether the proposed rules represent appropriate levels of protection. Third, Petitioners seek rules that exceed the scope of the Board's authority to enact resource site protections. Fourth, the Board's ongoing work on coho habitat assessment and study renders rulemaking in this vein unnecessary and premature. And finally, the Petition and its proposed rules are premised on outdated science and inaccurate technical interpretations and assumptions. For each of these reasons, expanded on below, OFIC respectfully requests that the Board deny the Petition.

I. The Board Should Exercise Its Broad Discretion to Deny the Petition

Under the Oregon Administrative Procedures Act ("APA"), "[a]n interested person may petition an agency requesting the promulgation, amendment or repeal of a rule . . . ." ORS 183.390(1). The agency then has 90 days either to "deny the petition in writing or . . . initiate rulemaking proceedings in accordance with ORS 183.335 (Notice)." *Id.*

The Board has broad discretion in not only its ultimate disposition of a petition for rulemaking, but also in how the Board arrives at such a ruling. Beyond the 90-day decision deadline and requirement that a petition denial be set forth in writing, neither ORS 183.390 nor OAR 137-001-0070 (governing petitions to promulgate rules under the APA) provides any specific evaluative criteria or standard of review that agencies must follow when considering petitions for rulemaking under ORS 183.390(1). This lack of statutory direction stands in stark contrast to the specific criteria agencies must consider when evaluating petitions to amend or repeal *existing* rules under the APA.[1] The Legislature means both what it says and, important here, what it does not say.[2] Thus, the absence of any evaluative direction in ORS 183.390(1) makes clear that the Board, in reviewing the Petition, may consider any factors it deems relevant to accept or deny the Petition.

The case law supports this interpretation. Indeed, the Oregon Court of Appeals affords agencies due deference in their discretion in ruling on petitions for rulemaking under ORS 183.390.[3] Chief among the factors an agency may consider in weighing the petition is the sufficiency of the evidence supporting the need for the rulemaking.[4] Also important is whether

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[1] *See* ORS 183.390(3) (setting forth six specific factors that must inform petitions to amend or repeal rules).

[2] *Halperin v. Pitts*, 352 Or. 482, 495 (2012) (refusing to "insert what the legislature has omitted" (quoting *US W. Commc'ns v. City of Eugene*, 336 Or. 181, 188 (2003)).

[3] *See, e.g., Rajneesh Found. Int'l v. Corp. Comm'r*, 65 Or. App. 356, 358 (1983) (affirming Corporation Commissioner's "proper" denial of petitioner's request for rulemaking because the authorizing statute allowed Commissioner to "designate[] by rule" at his discretion); *see also In the Matter of A Petition Filed by the Or. Telecomms. Ass'n to Amend OAR 860-032-0190 & in the Matter of Pub. Util. Comm'n of Or. Staff Investigation of the Or. Universal Serv. Fund*, No. AR577, 2014 WL 1400632, at *1 (Or.P.U.C. Apr. 7, 2014) (denying petition for rulemaking that sought to include access to broadband in basic telephone services).

[4] *See Rajneesh Found. Int'l*, 65 Or. App. at 359 (denying petition because petitioner "failed to present evidence that . . . it . . . would meet the criteria" outlined in the authorizing statute); *In the Matter of Petition Filed*

(continued . . .)

any other pending regulatory or administrative actions may affect or mitigate the need for the rule in the future.[5]

The Oregon Attorney General, too, has confirmed and even expanded the breadth of a reviewing agency's discretion in ruling on a petition for rulemaking under the APA. Guidance from the Attorney General's Manual on the APA suggests that if a reviewing agency is interested in the subject matter of a petition, but feels the petition is in any way deficient, it "may deny the request [for rulemaking] and inform the petitioner that the subject raised in the rulemaking petition is under consideration despite the denial."[6]

A. The Board Is Well Within Its Discretion Under the APA to Deny the Petition

Under the aforementioned framework, the Board can and should exercise its broad discretion to deny the Petition. As the following Sections will make clear, Petitioners, like those in *Rajneesh Foundation* and *Oregon Telecommunications Association*, have not presented the Board with evidence sufficient to trigger a need to take the unnecessary and costly step of initiating a new rulemaking. Moreover, to the extent a need to change existing coho protections exists (a point we do not concede), the Board and Department are already in the process of studying and assessing that need.[7] As recognized by the Oregon Public Utility Commission in *Oregon Telecommunications Association*, rulemaking in the face of pending future regulatory action or intervening agency action is both premature and unduly wasteful of already limited administrative resources.

To the extent the Board believes any additional coho study or assessment is warranted at this time, the Board still should deny the Petition and simply proceed on its own with whatever evaluation and assessment it deems necessary. This course would allow the Board to investigate any potential need for rules to protect coho on its own terms, in a manner that maximizes flexibility and efficiency, conserves administrative resources, and matches existing Board priorities. Thus, even if the Board finds any aspect of the Petition compelling, it still should deny the Petition, as such a denial would in no way impede the Board's ability to initiate study in this area now or in the future.[8]

(. . . continued)
by the Or. Telecomms. Ass'n, 2014 WL 1400632, at *1 (denying petition due to "insufficient evidence to cause [OPUC] to adopt such a change at this time").

[5] *See In the Matter of Petition by the Or. Telecomms. Ass'n,* 2014 WL 1400632, at *1 (also noting that potential federal rulemakings "may well [have] impact[ed] this issue").

[6] Oregon Attorney General's Administrative Law Manual and Uniform Model Rules of Procedure under the Administrative Procedures Act, 53 (July 2014).

[7] *See* Part II.C, *infra*.

[8] *See also Anderson v. Pub. Emps. Ret. Bd.*, 134 Or. App. 422, 428 (1995) ("[A]n agency is not always required to promulgate rules before it can act.").

B. Principles of Sound Governance Require the Petition Be Denied

The prudential and policy implications of granting the Petition warrant denial. First, granting interest group-driven petitions for rulemaking can lead to inconsistent and confused regulation. Addressing long-term regulatory concerns through piecemeal rulemaking rather than through integrated planning runs a significant risk of creating a patchwork regulatory scheme full of inefficiencies and regulatory gaps.[9] Second, granting the Petition would impose the additional risk of prioritizing certain species above others based on select interest group priorities, rather than science- and evidence-based considerations. The worrisome trend toward protection-by-petition can already be seen, most recently with the marbled murrelet.

As the Board is aware, in July 2016, several non-profit environmental organizations, including many involved in the current Petition, filed a petition for rulemaking with the Board to initiate rulemaking and identify resource sites with respect to the marbled murrelet. The Board considered the petition, reviewed an evaluative staff report, and took public comment. The Board initially denied the petition. But when the petitioners filed a lawsuit seeking judicial review of that denial in circuit court, the Board, after consulting with the Department of Justice, in a hurried special meeting in November 2016, withdrew and reversed that decision.

Even then, former Board member Tom Insko recognized the potential consequences of that reversal. In his comments during the special meeting, Insko expressly cautioned that going forward, "I hope that the department would work with staff to begin to identify a way to ensure that we're not, [or] at least reduce the chances that we are in the situation we're in today, where we're having to prioritize [certain species] based on legal action."[10]

Thus, the marbled murrelet petition was concerning for three reasons. First, it represented just the type of protection-by-petition that can, and evidently did, spur hasty, ad hoc regulation requests. Second, as Insko warned, the acceptance of the marbled murrelet petition only invited and incented more such petitions—present Petition included. Third, and most problematic, it set precedent that petitions for rulemaking followed by petitions for judicial review can effectively compel an agency into promulgating whatever rules a special interest entity desires, regardless of whether the rules are warranted. This cycle of petitions spurring petitions will only continue if this Petition is granted, diverting valuable and limited Board and Department resources away from sound forest stewardship toward meaningless procedural tasks and unnecessary rulemakings.

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[9] *See, e.g., In the Matter of Revisions to Rules in Div. 036 F Water Rules*, No. 17 017, 2017 WL 386485, at *1 (Or. Pub. Util. Comm'n Jan. 24, 2017) (describing that "current [water utility] rules are lengthy, poorly organized, and reflect many years of piecemeal rulemaking").

[10] Comments of Tom Insko, Recording of Board's Final Order Regarding Petition for Rulemaking on Marbled Murrelet (November 11, 2016) https://www.oregon.gov/ODF/Board/Documents/BOF/20161129/BOF_20161129_Audio2.mp3.

The FPA recognizes the need to avoid that result, and incorporates responsible policy into its rulemaking requirements. Under ORS 527.710(3)(c) rules must be "consistent with the policies of ORS 527.630." One of those policies requires that the State "provide a stable regulatory environment to encourage investment in private forestlands." ORS 527.630(6). Acceptance of the Petition would not only violate that policy but propel a self-fulfilling cycle prompting even more regulatory disturbances in the future.

Finally, the authorizing statute underlying the Petition, ORS 527.710, authorizes the Board to adopt only "appropriate" rules. Absent a sufficient evidentiary basis to support the Petition, and in light of the prudential concerns discussed below, Petitioners' proposed rules would hardly be "appropriate," by any definition. In short, the Board is well within its discretion to deny the Petition given that the specific rulemaking requested not only is unwarranted under the APA but also inappropriate under the FPA.

Accordingly, based on the Board's broad discretion under the APA, any one of the several reasons above represents an independently sufficient ground for denial here.

II. The Rules Proposed Here Are Procedurally Improper Under the FPA and Substantively Unnecessary Based on the Science

A. The Requested Rulemaking Is Premature and Unsupported Under the Prescribed FPA Framework

The Oregon Legislature established specific rulemaking procedures in ORS 527.710(3) under which resource site protection rules are promulgated. Thus, in stark contrast to the broad discretion afforded to the Board under the APA with respect to its disposition of petitions for rulemaking, the Board must adhere to a specific statutorily mandated course when considering and initiating resource site protection rules. Though that process may—but does not necessarily—lead to a rulemaking, once it is commenced, the Board cannot deviate from its step-by-step progression.

First, under ORS 527.710(3)(a), the Board must "collect and analyze the best available information and establish inventories of [certain] resource sites needing protection," including "threatened and endangered fish and wildlife species."[11] Second, once such inventories are

[11] Beyond these statutory procedures, the Board's rulemaking must also comport with the regulatory requirements of OAR chapter 629, division 680. The rules require that "[t]he Board's evaluation [under ORS 527.710(3)(a)] . . . be based on best available information summarized in a technical review paper." OAR 629-680-0100(1)(a). The State Forester must review the technical paper, evaluate the literature referenced, consult with technical experts, and prepare and submit to the Board a report compiling his or her findings, before the Board's ultimate review. OAR 629-680-0100(1)(b).

established, the Board must undertake the threshold inquiry to "determine whether forest practices would conflict with resource sites in the inventories." ORS 527.710(3)(b).

If, and only if, that threshold is crossed—i.e., if the Board identifies conflict—must the Board proceed to "consider the consequences of the conflicting uses and determine appropriate levels of protection." *Id.* Thus, only after fulfilling the predicate investigation in subsection (a), and facing a threshold conflict finding in subsection (b), should the Board "adopt rules appropriate to protect resource sites." ORS 527.710(3)(c).

Other statutory requirements also apply. ORS 527.714 requires that rules "adopted to implement the provisions" of ORS 527.710(3) that would "provide new or increased standards for forest practices" may be adopted only if the Board determines certain standards are met. ORS 527.714(5). These standards include: evidence that degradation of the resource is likely; that the scientific or biological status of a species has been documented using best available information; that the proposed rule reflects available scientific information; that the objectives of the proposed rule are clearly defined and the restrictions placed on forest practices as a result of adoption of the proposed rule are to prevent harm or provide benefit to the resource site being protected; that alternatives, including non-regulatory alternatives, be considered and the alternative chosen must be the least burdensome to landowners and timber owners while still achieving the desired protection; and that the benefits to the resource to be achieved by the proposed rule must be in proportion to the degree that forest practices in the aggregate are contributing to the issue.[12]

The legislative history of ORS 527.710 directs that these rulemaking procedures must be followed. On behalf of the working group that drafted House Bill 3396 enacting these provisions of the FPA, Gail Achterman explained that ORS 527.710 directs the Board to adopt rules "in accordance with certain procedures."[13] Achterman, in response to a question as to the Board's power to adopt rules on listed species, stated that the Bill's directive was to "have the Board of Forestry identify resource sites, which would presumably be the critical habitat of those threatened and endangered fish and wildlife species, determine if conflicts arise with forest practices, and then protect sites that need protection."[14] Thus, the specific procedures set forth in ORS 527.710 are not meaningless formalities but rather represent carefully crafted checks to ensure that resource site protection rules are promulgated based on science (subsection (a)'s "best available information" analysis) and after weighing important policy implications (subsection (b)'s conflicts analysis). Petitioners ignore the important and mandatory processes of ORS 527.710(3) and ORS 527.714. Petitioners request that the Board promulgate new

[12] See exhaustive list at ORS 527.714(5)(a)-(f).

[13] Gail Achterman, delivering the Statement of Intent for HB 3396 (June 18, 1987).

[14] Hearing on HB 3396 Before the House Committee on Energy and Environment, 1987 Or. Leg., 64th Sess. (June 16, 1987).

resource site rules, despite that neither the predicate investigation, nor the threshold conflict finding, nor the ORS 527.714's standards analysis has occurred.

This statutory departure leads to at least three fatal problems. First, were the Board to act as Petitioners so request, it would violate the express direction of the Oregon Legislature outlined above. Second, because the Petition precedes any of the predicate investigation and inventory mandated by ORS 527.710(3)(a), there has been no conflicts finding to trigger rulemaking. Accordingly, there has been no finding that such rules are even needed. Petitioners ask the Board to impermissibly skip subsection (a) and conflate subsections (b) and (c) of ORS 527.710(3) in order to achieve their desired outcome.

Third, even overlooking the Petition's procedural violations, the Petition, if allowed to proceed, does not provide the Board enough substantive information on which to base a rulemaking. Though Petitioners cite several assorted policies and studies, as outlined below in Part II.D, these sources are far from the "best available information," and have not been collected and analyzed by the Board and Department as ORS 527.710(3)(a) and the implementing rules require. Absent that information or ensuing investigation, resource sites needing protection have not been defined and inventories have not been established. As such, the Board cannot engage in a meaningful conflicts analysis under ORS 527.710(3)(b). Consequently, there exists no identified conflict on which to base the Board's subsequent analysis of the consequences of the conflicting uses and appropriate levels of protection. The Petition does not provided a basis for the Board to determine what are "appropriate" rules to protect relevant resource sites, let alone whether any such rules are even necessary. Ultimately, conducting rulemaking under such circumstances and on such a superficial scientific record would be premature, inappropriate, and contrary to the intent of the FPA.

B. Petitioner's Proposed Rule Misconstrues and Exceeds the Scope of the Resource Site Rule Framework

Even if the Petition were to be understood as requesting that the Board simply *initiate* the ORS 527.710(3) rulemaking process, the scope of the substantive request far exceeds that contemplated under the statute. Petitioners propose that the Board designate as resource sites not just entire streams but "all watersheds containing Coho salmon rearing and spawning habitat in Oregon."[15]

Extending resource site protection to an entire watershed far exceeds the bounds imposed by the Legislature when it drafted the resource site provisions. When the FPA was enacted, the focus rested on protecting sensitive bird species, so some analogy is necessary here to construe how these rules are to be applied to aquatic species. Under ORS 527.710(3)(A)-(D), a "resource

[15] *See* Petition at 63.

site" designation can be attributed either directly to listed species *or* indirectly to the specific habitats supporting those species. *See, e.g.*, ORS 527.710(3)(B) (extending resource site potential to "[s]ensitive bird nesting, roosting, and watering sites"). However, the scope of those habitat protections goes only so far. As Achterman explained when delivering the intent behind ORS 527.710(3), the term "site" for purposes of the statute means "the trees actually containing bird nests . . . not the trees and some additional acreage."[16] A subsequent Opinion from the Oregon Attorney General confirms that the "'site' to be protected is not the species' habitat generally. Rather, it is a specific nesting or roosting site."[17] Thus, even if additionally protective rules were needed here, extending any such protection to the "habitat generally," beyond the immediate water "actually containing" coho, would contravene the FPA's intent.

Beyond the inappropriate geographic or spatial scope, Petitioners' proposed rules also erroneously expand the substantive scope of the protections authorized by ORS 527.710(3). Petitioners advocate for unwarranted levels of protection for those already expanded resource sites, for example, suggesting that the Board increase the size of riparian no-cut buffers to distances of 50 to 150 horizontal feet.[18] This, too, would run counter to the intent of the FPA.

Though the FPA working group did acknowledge that "appropriate levels of protection" may vary, depending in part on the "value of the resource site and its sensitivity to conflicting forest practices," in providing exemplars of this balancing principle, Achterman hypothesized: "appropriate . . . protection can range from minimal (e.g. limits forest practices only during the nesting season) to complete, (e.g., prohibits all forest practices around the nesting site)."[19] The Oregon Attorney General recognized this flexibility in opining that the FPA's "'overall maintenance' standard would allow temporary disturbances of resources."[20] This framework makes clear that severe protections (e.g., prohibition of all forest practices) should be implemented only to small, specific geographic areas (e.g., specific trees), not entire estuarine ecosystems or watersheds.

Department staff recognized and confirmed the scope of proper protections under ORS 527.710 when it issued recommendations related to the marbled murrelet rulemaking. As staff

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[16] Achterman, Statement of Intent for HB 3396.

[17] Or. Op. Att'y Gen. OP-6383 (1990).

[18] Moreover, the science does not support this buffer. The vast majority of stream-riparian interactions are captured in less than 100 feet. There is little to no support for the nexus between buffer width and any significant demographic parameter. That coho populations in streams on BLM lands are no different than those in streams on private industrial forest lands supports that buffer width has no significant influence on coho production. *See* E.A. Steel, et al., *Landscape characteristics and coho salmon (Oncorhynchus kisutch) distributions: explaining abundance versus occupancy*, CAN. J. FISH. AQUAT. SCI. 69: 457–68 (2012).

[19] Achterman, Statement of Intent for HB 3396.

[20] Or. Op. Att'y Gen. OP-6383 (citing Minutes, Senate Committee on Agriculture and Natural Resources (HB 3396), June 20, 1987, tape 190, side A, at 131).

explained, some rules proposed by those petitioners were "outside the authority of the Board and the Department. The Department does not have authority to authorize or to withhold authorization of forest operations," nor could it "conduct surveys on private land without the authorization of the landowner," nor "deny a landowner their ability to harvest or conduct other operations . . . ."[21]

In sum, the Petition suffers not only procedural deficiencies but also fatal substantive flaws, requesting rules that would exceed the scope of the Board's rulemaking authority and again ignore the intent of the FPA.

C. The Board's Existing Work on Coho Protection Renders Rulemaking Here Unnecessary

Petitioners propose rules that are unnecessary and redundant because the primary concerns Petitioners identify are already being studied and addressed by the Board and Department. With respect to stream temperature and streamside forest structure, the Department conducted the RipStream and continues to evaluate its findings concerning the effectiveness of existing FPA protections on promoting healthy amounts of large woody debris and shade throughout the Coast Range, South Coast, Interior, and Western Cascade regions.[22]

A separate comprehensive study is being conducted in the Siskiyou georegion.[23] Most recently, the Board ordered the Department to continue this study after it concluded existing evidence was insufficient to determine whether existing FPA rules on small and medium fish streams for clearcut and thinning harvest types in the Siskiyou region were or were not adequate to ensure stream quality.[24] The Department is currently developing a plan to inform that further study. Thus, the Department is already engaged and active in studying the sufficiency of existing FPA rules to protect stream health from timber harvest as it relates to fish populations.

In fact, the Petition recognizes some of the Board's existing progress in this vein, acknowledging that "the Board is in process of pursuing a [Habitat Conservation Plan] for the Tillamook and Clatsop that would pertain to coho salmon . . . ."[25] However, rather than build on that progress, Petitioners seek to avoid the obvious conclusion that the Board is already taking appropriate steps in this arena by asserting that their proposed rules should avoid "unnecessary

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[21] ODF Staff Report following Marbled Murrelet Petition, 7 (Mar. 2017).

[22] *See* "Proposal for Gathering Information on Modeling Desired Future Condition and Large Wood Recruitment," Adam Coble (Mar. 20, 2019).

[23] *See* "Update on the Siskiyou Streamside Protections Review," ODF (Mar. 2019).

[24] *See* "Siskiyou Streamside Protections Review: Board Decision," prepared by Department Staff for Board's June 5, 2019 meeting.

[25] *See* Petition at 64.

duplication of research[] and coordination."[26] Instead of treading into new unnecessary and premature rulemaking, the Board should continue its ongoing studies to responsibly assess the efficacy of the FPA on current coho habitat.

D. The Petition and Its Proposed Rules Are Premised on Scientific Errors and Mistaken Assumptions

If anything, continuing with the Board's current course of study will enable Department staff to identify and correct the numerous errors in Petitioners' interpretation of the relevant scientific literature. Many of Petitioners' claims about deficiencies in the current rules are based on outdated and misinterpreted research. This is particularly true of the claims related to sediment but applies with equal force to those regarding temperature and wood debris. The Petition also neglects to consider recent work from the Oregon State University's comprehensive Hinkle, Alsea, and Trask Watershed Studies, despite these studies' specific focus on evaluating response to harvest under current forest management rules. These failures, along with numerous other scientific inaccuracies, are detailed in *OFIC response to Petition for Rulemaking to Identify and Develop Protection Requirements for Coho Salmon Resource Sites*, dated July 12, 2019, a copy of which is enclosed with this letter. OFIC welcomes the opportunity to provide additional technical detail on these points, should the Board so request.

To conclude, based on the numerous procedural and substantive deficiencies identified above, OFIC respectfully requests that the Board exercise its discretion to deny the Petition.

Sincerely,

Greg D. Corbin

Enclosure: *OFIC Response to Petition for Rulemaking to Identify and Develop Protection Requirements for Coho Salmon Resource Sites*, (July 22, 2019)

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[26] *Id.*

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

22 July 2019

EXECUTIVE SUMMARY

A consortium of environmental groups and fishing interests (the Petitioners) assert that forest management practices on private and state timberlands must be made more restrictive to meet Board of Forestry (BOF) obligations to protect threatened coho populations. Recent studies show how coho habitat and abundance on private timberlands compare favorably with those on public lands, and how habitat conditions are protected and improving as a result of the Oregon Forest Practices Act and voluntary restoration actions under the Oregon Plan for Salmon and Watersheds. The Petitioners base their summary on older science and historic practices and ignore the ample protections afforded to coho and other salmonids under the existing regulatory system for modern forest management. We strongly urge the BOF to reject the Petitioners request.

New Research On Forestry-Fisheries Interactions Should Be Informing Rule Changes

Prior to the 1970s, forest practices were detrimental to water quality, salmonids, and their habitat. The Alsea Paired Watershed study evaluated forest practices of the era, and documented many of these impacts. The findings from the original Alsea study strongly influenced the creation of the nation's first Forest Practices Act (FPA) in Oregon. Since the 1990s, the Oregon Department of Fish and Wildlife (ODFW) has carefully monitored juvenile coho abundance and habitat conditions. The Oregon Department of Forestry (ODF) has conducted numerous studies of forest practice compliance and effectiveness in this same period. In 2002 a consortium of private forest landowners, Oregon State University, federal land managers, and state agencies established a set of 3 paired watershed studies in western Oregon in the Hinkle, Alsea, and Trask river basins. These studies have been publishing results for the last ten years that directly address issues raised by the Petitioners. These sources provide ample evidence that modern forestry is working to preserve and recover coho salmon stocks in Oregon.

Oregon's Forests Provide Productive Coho Habitat

Although forestry in Oregon clearly had historic impacts on coho habitat, the ODFW data indicates that current forest management only has a minor influence on a few features of stream habitat. A 2011 study used data collected from 121 coastal Oregon basins to examine the relationships between 11 stream habitat characteristics and landscape composition concluded that many of the stream habitat attributes were controlled primarily by immutable watershed characteristics, such as stream gradient, catchment geology, climate, and elevation. The attributes most influenced by management-related factors were pool frequency and wood volume. There was relatively little difference in wood abundance on lands under federal, state, or private industrial forest management.

A similar analysis of stream habitat used data collected from 1998 through 2013 from 490 stream reaches in coastal Oregon basins. Little difference was found among ownership categories for shade, wood volume, or gravel. However, land use classes did affect pool frequency. It was postulated that the low pool frequency on private non-industrial lands was due to more intense land use, including areas of agriculture and rural residential and urban development. The difference in pool frequency between private industrial and public forestlands was attributed to historic land use practices, especially log drives that ended in the 1950s.

The density of juvenile coho salmon in the 490 coastal stream reaches did not differ by land ownership type. Despite wide, no-touch stream buffers and negligible timber harvest on federal lands for 10 generations of coho, the density of these fish was found to be no greater than on private forestlands.

Habitat and Water Quality Response to Current Rules

The findings described above are supported by recent evaluations of the response of individual habitat attributes or water quality parameters to current forest management practices in Oregon.

Sediment

There are two primary sources of forest management-related sediment; erosion of road surfaces and landslides. Over the last several decades there have been numerous management measures implemented that have greatly reduced sediment related to these sources, including legacy roads (roads built prior to 1972). Changes to road management practices, particularly disconnecting road drainage systems from natural drainage networks, has greatly reduced sediment delivery. Results from the paired watershed studies and other contemporary research document these improvements.

Landslides are the dominant erosional process on steep forested slopes in western Oregon. On private lands, Oregon has rules in place to reduce the fraction of landslides associated with roads, and it manages the quality of landslides on steep hillslopes through voluntary leave tree areas. This mixture of prescriptive rules, best management practices, and technical guidance have worked to reduce forestry-related mass wasting.

Temperature

The petitioners claim streams in private (and State) forests are not adequately protected to maintain temperature, and point to the Department of Environmental Quality (DEQ)-derived estimate that 40% of coastal coho streams are temperature limited. However, the DEQ process for assigning temperature impairment (and as a result, the petition) greatly over represents the length of temperature-impaired streams. Within forested streams inhabited by coho, temperatures are not a problem, as evidenced by recent research. The ODF RipStream study found that 83% of streams on private forestlands showed no exceedances of the biologically-based numeric criterion under standard rules. The few sites that were warmer than the criterion after harvest did not remain so beyond the first post-harvest summer. The "protecting cold water" (PCW) standard was exceeded more frequently (40% of the time; Groom et al. 2011a). This standard only applies where stream temperatures are already suitable for coho and other salmonids (i.e., *colder* than the biologically-based numeric criteria), and it is based on the minimum increase that current instruments can detect (0.3^{o}C). Buffers on small and medium coho streams were recently widened to address the PCW standard.

Habitat Quality

Large wood is an acknowledged component of fish habitat in streams. Historic practices, including logging to the stream bank, splash damming and log drives, and stream "cleaning", generally reduced in-stream wood loads. However, there is no technical basis for the claim in the petition that current buffering requirements will not provide wood loadings in coho streams on private forestlands sufficient to support productive coho habitat.

Private forest lands in Oregon provide large wood inputs to streams in two ways: riparian tree retention and direct placement. The Petitioners claim that current buffers are too narrow to provide enough wood to create and maintain pool habitats. However, there is ample evidence that the current buffer configuration is capable of providing wood input comparable to that from wider buffers, especially for large pieces of wood. The greatest proportions of piece number and volume are derived from distances that closely match riparian buffer widths in current rules.

In recognition of the time it will take for streamside trees to mature and begin to provide wood to channels, private forest land owners have been encouraged to place wood into streams by rule options, including incentives for placing wood in channels during harvest, and by participating in OWEB-sponsored habitat projects. Since 1997, more than 700 projects of this type have been completed on private forestlands.

Connectivity (Fish Access)

Migratory fish like coho and other salmonids need access to the habitats they use throughout their complex life histories. Current forest practices rules acknowledge this need and guide landowners in identifying and correcting existing passage barriers and ensuring new barriers are not created. Landowners also work with watershed councils to identify and restore fish passage at high priority sites in a worst-first fashion; between 1997 and 2017, nearly 2,000 stream crossings have been improved for fish passage on private forestlands. Stream network access for coho salmon in Oregon's forests is better now than it has been in 50-years, and it continues to improve under existing forest practices rules and the Oregon Plan.

Water Quantity (Summer Low Flows)

It is well established that timber harvesting can result in changes in summer low flows, but the magnitude and direction of change, i.e., increase, decrease, or no change is dependent on several factors including site specific geomorphology, the amount and species of forest removed, and climate. Further, most of the studies on streamflow response to harvest occur on small, headwater streams so scaling downstream responses, especially to fish-bearing reaches are challenging. To be detrimental to coho, any post-logging flow deficits would have to occur simultaneously over a majority of a watershed upstream from coho-bearing reaches. This scenario is unrealistic due to larger watersheds containing a mosaic of stand ages that result from different land ownership patterns with different management strategies (e.g., rotation ages), site histories, etc. In this mosaic, areas with young stands would augment summer streamflows and offset older stands that are diminishing baseflows.

The Petitioners also forewarn of "large scale fish die-offs" from projected low flows based on statements in a single paper. However, the researchers in this paper did not study fish-bearing streams, did not evaluate or generate predictions for downstream effects, and did not provide any citations to support a statement of fish die offs.

Fish Response to Current Rules

The relatively minor changes to stream habitats that result from modern forest management, as discussed above, are reflected in fish populations. One study in coastal British Columbia and the three paired watershed studies in Oregon – Hinkle, Alsea, and Trask – offer insight on how coastal cutthroat trout and coho salmon respond to contemporary harvest practices. In the British Columbia study, 21% of the treatment basins were clearcut, and no logging treatment effects on summer or winter relative abundance or condition of cutthroat could be detected, nor were any changes evident to instream physical habitat associated with the logging treatment. In Hinkle Creek, researchers evaluated coastal cutthroat and steelhead trout responses to contemporary logging, but in this case the harvest occurred upstream in fishless headwaters. Fourteen to thirty-four percent of the headwaters of the treatment basins were clearcut. They found a significant increase in late-summer biomass of age-1+ cutthroat in the treatment watersheds after logging. Otherwise, logging in fishless headwaters had no significant effect on the cutthroat population or their habitat. In the Trask study, 24-44% of the treatment basins were clearcut or thinned, with and without riparian buffers on non-fish streams, according to current management practices for private, state, and federal (Bureau of Land Management) land ownerships. No effect of forest harvest was detected in growth of trout and sculpins downstream. In the Alsea Paired Watershed Study Revisited, virtually all of the headwater portion of Needle Branch was clearcut, except for the standing timber left in the riparian buffer, per existing rules. For the downstream reach, approximately 40% of the drainage was clearcut. After harvest, pool habitat improved and the age 1+ cutthroat population responded positively throughout the treatment basin.

In contrast to the positive cutthroat response, juvenile coho showed no significant changes "in any of the biotic parameters measured". This finding mirrored results from the original study, where coho populations were largely unaffected by logging. A check on the habitat and fish populations 2-3 decades later still found no effects on coho.

These findings are drastically different than those that came from studies of historic logging practices. The consistent results support the conclusions of many researchers that historic logging practices, including streamside clearcut logging, in conjunction with stream channel disturbance due to log drives, splash dams, and removal of large wood from stream cleaning, are largely responsible for any deficiencies in habitat conditions seen today. Evaluations of fish and habitat responses to current forest practices, where standing trees are left in riparian areas along fish-bearing reaches, and the channel is left intact during and after logging, show the response is generally neutral or positive.

High Compliance Rates

Oregon's private forest landowners are serious about implementing science-based, outcome-oriented rules. In 2012, ODF initiated a comprehensive program for measuring compliance of forest practices rules. The field-measured performance of road and water protection rules showed a very high compliance rate – 96% overall. This was followed by similarly high compliance rates in subsequent years.

Coho Recovery Will Take Time

There is no urgent need to add more stringent regulations, as the Petitioners demand. Much has been done, and continues to be done, to address limiting factors for coho. And this is not only in the forestry sector. ODFW has worked with the fishing industry to reduce harvest of wild coho in the ocean, and to increase the number of wild spawners by drastically reducing the production of hatchery-raised fish. All told, there is evidence that current freshwater habitat, in concert with other protection measures, are capable of producing more spawning adult coho than returned 60 years ago.

The Oregon Way

Oregon has adopted a unique blend of regulatory and voluntary measures to conserve and improve salmon populations and their habitat. Strong land use laws have helped keep forest and agricultural lands from being developed. The FPA has resulted in comprehensive, science-based rules that govern management of private forestlands. These plus the voluntary measures in the Oregon Plan for Salmon and Watersheds make up what is known as the "Oregon Way", a unique approach with the goal of balancing the protection and use of Oregon's bountiful natural resources. The Petitioners disregard the massive voluntary investments in coho habitat restoration done cooperatively by forest landowners, watershed councils, and other local stakeholders through the Oregon Plan over the past 20 years.

We urge the Board of Forestry to reject the petition for rulemaking to identify and develop protection requirements for coho salmon resources sites.

Introduction

A consortium of environmental groups and fishing interests (the Petitioners) assert that forest management practices on private and state timberlands must be made more restrictive to meet Board of Forestry (BOF) obligations to protect threatened coho populations in the Southern Oregon/Northern California (SONCC), Oregon Coastal (OC), and Lower Columbia (LC) ESUs. They request that the BOF:

- Designate coho resource sites on state and private forestlands;
- Determine whether forest practices conflict with these resource sites;
- Adopt rules to protect these sites from conflicts.

The Petitioners describe a list of impacts to fish habitat and water quality purportedly caused by contemporary forest management practices and go on to provide their views of how private forestlands should be managed in Oregon. We believe there is ample evidence that current forest practices, and the system that supports them, are functioning properly to protect fish, aquatic habitats, and water quality. The Petitioners base their summary on older science and historic practices and ignore the ample protections afforded to coho and other salmonids in Oregon's forested watersheds under modern forest management. We strongly urge the BOF to reject the Petitioners' request.

Oregon has adopted a unique blend of regulatory and voluntary measures to conserve and improve salmon populations and their habitat. Strong land use laws have helped keep forest and agricultural lands from being developed. The Forest Practices Act (FPA) has resulted in comprehensive, science-based rules that govern management of private forestlands. These plus the voluntary measures in the Oregon Plan for Salmon and Watersheds (the Oregon Plan) make up what is known as the "Oregon Way" (Oregon Forest Resources Institute 2014), a unique approach with the goal of balancing the protection and use of Oregon's bountiful natural resources, including water quality and fish habitat. The Petitioners disregard the massive voluntary investments in coho habitat restoration done cooperatively by forest landowners, watershed councils, and other local stakeholders through the Oregon Plan. These voluntary efforts have been ongoing for over 20 years, addressing many of the factors limiting coho production throughout their range in Oregon. The combination of improvements in forest practices and active habitat restoration over the last two decades is making significant progress towards improving conditions for coho on forest lands in Oregon. This approach should be given the time required to allow fish and habitat improvements to manifest.

In this document, we offer a more comprehensive look at the contemporary science behind the Petitioners' assertions. We do not provide a point-by-point rebuttal, but instead draw your attention to key clarifying information. We focus on current research findings related to contemporary forest management in Oregon and its effects on freshwater salmonid habitat, and on the fish themselves.

New Research On Forestry-Fisheries Interactions Should Be Informing Rule Changes

Prior to the 1970s, forest practices were detrimental to water quality, salmonids, and their habitat. Before the implementation of the FPA in 1971, forest management left no trees along streams; had no limitations on equipment operating within stream corridors or on steep hillslopes; allowed broadcast burning of entire watersheds, no limit to size of clearcuts, no requirement of reforestation following harvest, no required protection of streamside overstory or understory protection, no requirements to provide fish passage at road crossings, and streams could be piled with logging slash. Splash-damming and the straightening and clearing of streams to facilitate log transport were common (Miller 2010). This was followed by an era of stream "cleaning" at the behest of fisheries managers to remove large wood that was thought to block upstream movement of adult spawning salmon. The Alsea Paired Watershed study evaluated forest practices of the era, and documented many of these impacts (Moring 1975, Moring and Lantz 1975). Similar results were found in an intensively studied watershed in British Columbia (Carnation Creek; Hartman et al. 1987). Both studies included an important aspect - measuring fish response – that went beyond the simpler task of measuring changes in watershed conditions and habitat. The findings from the original Alsea study strongly influenced the creation of the nation's first FPA in Oregon. The impacts associated with forest management identified in these studies were addressed through progressive changes to the rules as new information became available. Nonetheless, these historic impacts continue to be routinely cited as justification for more stringent forest management regulations by federal regulatory agencies and environmental groups.

The effectiveness of forest management practices at protecting aquatic habitat and water quality continues to be evaluated. In 2002, a consortium of private forest landowners, Oregon State University, federal land managers, and state agencies was formed to assess aquatic ecosystem response to forest management rules in place at that time. This group established a set of 3 paired watershed studies in western Oregon (http://www.watershedsresearch.org/). The Hinkle, Alsea, and Trask paired watershed studies have been publishing results for the last ten years and these results directly address issues raised by the Petitioners. In addition, juvenile coho abundance and habitat conditions have been carefully monitored by ODFW since the 1990s to generate information on status and trends (Firman and Jacobs 2001). These sources provide evidence that modern forestry is working to preserve and recover coho salmon stocks in Oregon.

<u>Oregon's Forests Provide Productive Coho Habitat</u>

An extensive ODFW research effort on stream habitat and salmon populations in Coast Range streams has been ongoing since the mid-1990s (Firman and Jacobs 2001). This data set is perhaps the most detailed in the Pacific Northwest and recent analyses of these data has produced results that clearly contradict many of the claims included in the petition. This work has found that the condition of many habitat features is comparable on public and private forest land as are juvenile coho salmon densities (Bilby et al. 2015, Steel et al. 2017).

Although forestry in Oregon clearly had historic impacts on coho habitat, the ODFW data indicates that current forest management only has a minor influence on a few features of stream habitat. Anlauf et al. (2011) used data collected from 121 coastal Oregon basins to examine the relationships between 11 stream habitat characteristics and landscape composition (Figure 3). The landscape composition variables included both features that were independent of land management activities (termed immutable features) and characteristics related to past and current land management activities. This analysis concluded that many of the stream habitat attributes were controlled primarily by immutable watershed characteristics, such as stream gradient, catchment geology, climate, and elevation (Figure 3). For example, variation in fine sediment levels among catchments was almost entirely dictated by factors independent of land management. Other attributes that were little influenced by land management included channel width, secondary channel area, pool depth, and channel complexity. Complexity was a composite attribute based on pool frequency, pool characteristics, and area of secondary channel. The attributes most influenced by management-related factors were pool frequency and wood volume. Management-related predictors accounted for about 25% of the spatial variation in wood volume and 35% of the spatial variation in pool frequency. Further analysis by Bilby et al. (2015) showed the management-related effect on wood abundance in Anlauf et al.'s (2011) analysis was influenced by low wood abundance on agricultural and developed lands (Figure 4). There was relatively little difference in wood abundance on lands under federal, state, or private industrial forest management.

Steel et al. (2017) conducted a similar analysis of stream habitat using data collected from 1998 through 2013 from 490 stream reaches in coastal Oregon basins. They assigned reaches to classes based on the ownership of land upstream of the sampled reach. They found little difference among ownership categories for shade, wood volume, or gravel (Figure 5). However, they did find a difference among land use classes in pool surface area. As with the Anlauf et al. (2011) conclusions, immutable landscape attributes were responsible for most of the spatial variability in pool surface area. However, stream reaches with a higher percentage of the catchment in public ownership (USFS, BLM, and State lands) had a larger pool surface area than those draining private industrial forest lands. Private non-industrial lands exhibited the lowest pool surface area. The authors postulated that the low pool surface area on private non-industrial lands was due to more intense land use, including areas of agriculture and rural residential and urban development. The difference in pool surface area between private industrial and public lands was attributed to historic land use practices, which pre-date contemporary forest practices, especially log drives. Log drives ended in the 1950s.

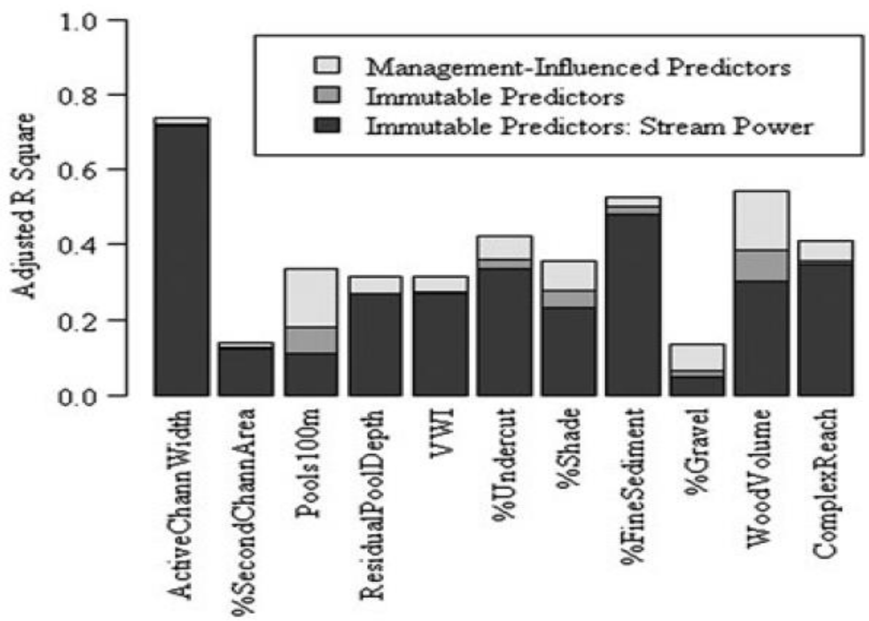

Figure 3. Proportion of variability attributed to management-influenced predictors, immutable predictors (climate, geology, topography), and stream power indicators (gradient, precipitation, drainage area) for the 11 in-stream habitat response features evaluated. From Anlauf et al. (2011, Figure 2).

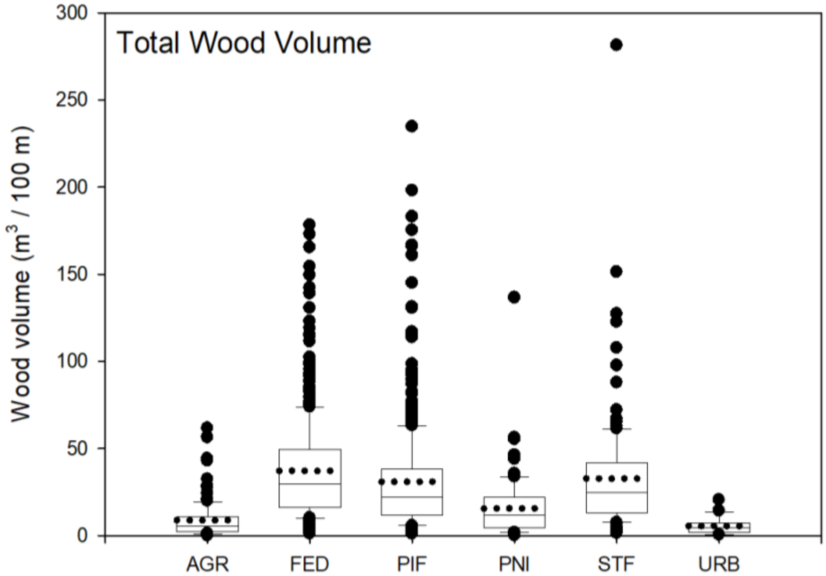

Figure 4. Box plots of wood volume by land ownership class in stream reaches on the Oregon coast. Ownership classes: AGR-agriculture; FED-federal forest; PIF-private industrial forest; PNI-private non-industrial forest; STF-state forest; URB-urban. Dotted horizontal line in each box represents mean wood volume for the land ownership class. From Bilby et al. (2015).

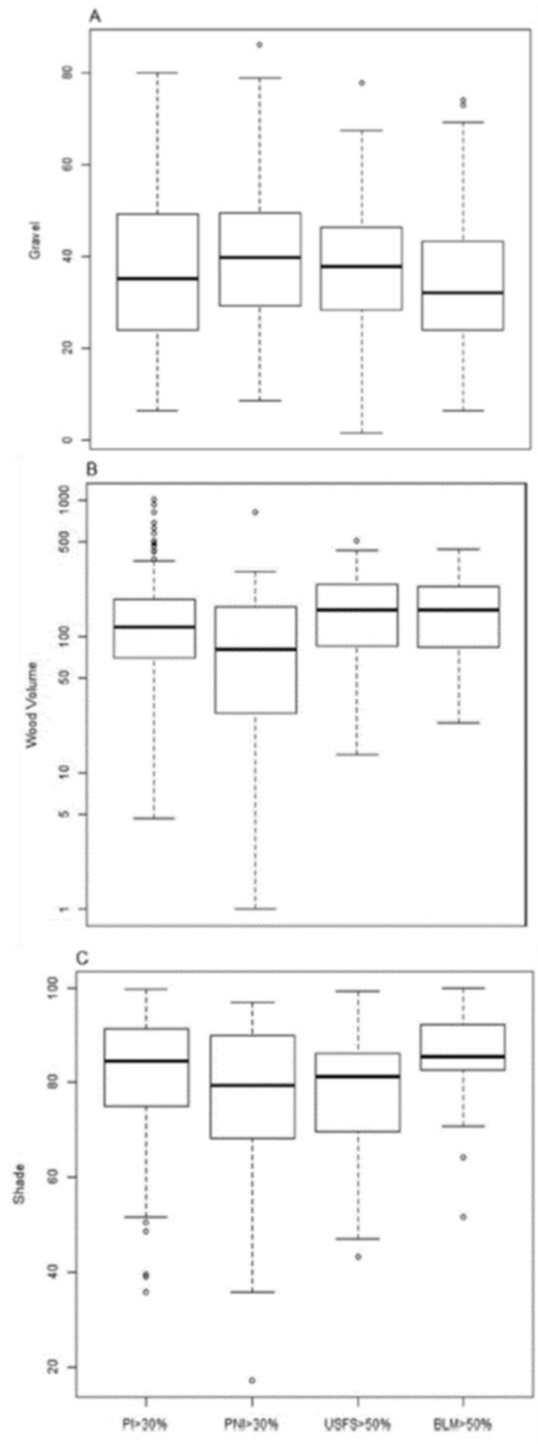

Figure 5. Gravel (A), wood volume (B), and shade (C) associated with land ownership classes for stream reaches on the Oregon coast. Reaches were assigned to an ownership class when the proportion of watershed area upstream from the sampled reach exceeded a minimum level; 30% for PI (Private Industrial forest land); 30% for PNI (Private Non-Industrial lands); 50% for USFS land and 50% for BLM land. From Steel et al. (2017, Figure 6).

Steel et al. (2017) also examined factors related to the abundance of juvenile coho salmon in these 490 stream reaches. This paper compared juvenile coho salmon densities among three land-ownership categories; public, private industrial forest, and private non-industrial, which included a mix of forest, agriculture, and developed lands. The authors developed a series of models predicting coho density from a suite of habitat variables. The models included both variables related to land management as well as immutable landscape characteristics; those that are not influenced by human activities. They reported that land ownership type had no influence on juvenile coho density. The box plots in the Figure 6 are from a presentation by K. Burnett based on the ODFW data set examined by Steel et al. (2017) but including only data collected from 1997 through 2008. This analysis contrasts summer juvenile coho densities among a broader set of land ownership classes than those used by Steel et al. (2017). As with the Steel et al. (2017), this analysis found no difference among land ownership classes in coho density.

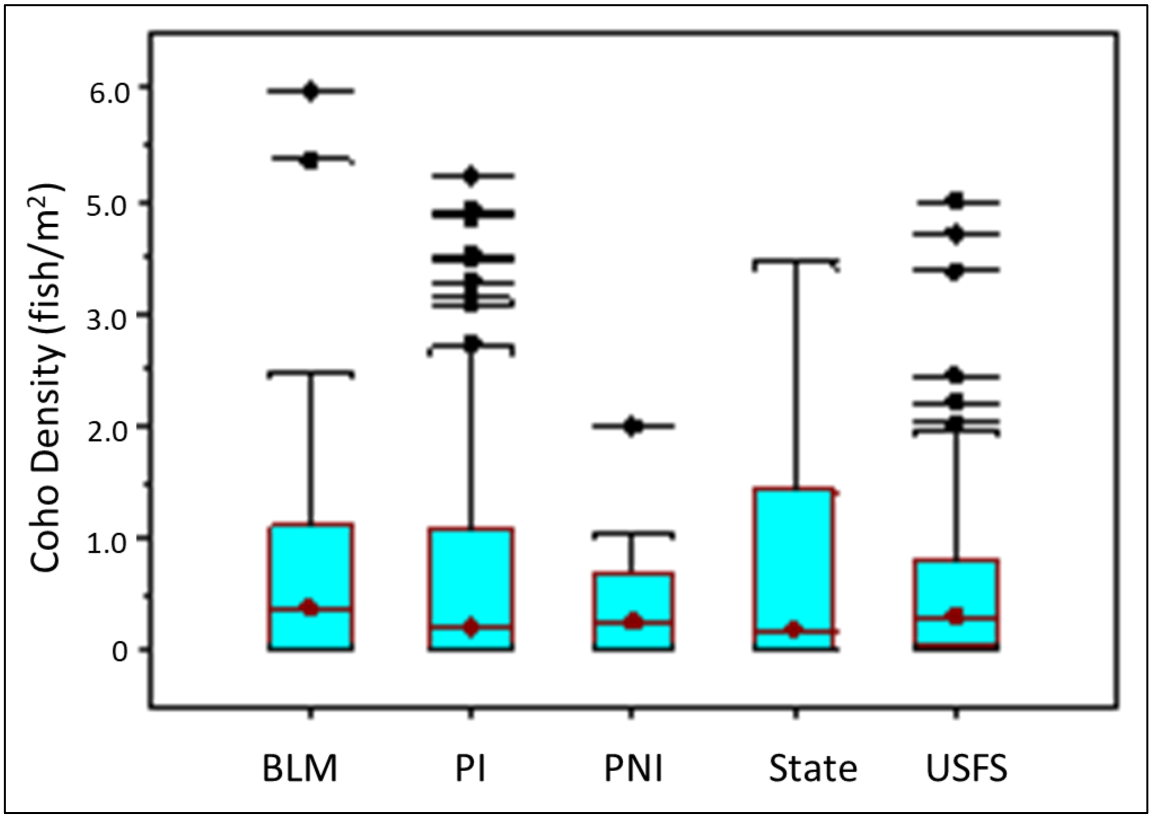

Figure 6: Summer juvenile Coho densities in 490 stream reaches in the Oregon Coast Range. Land ownership classes include BLM- Bureau of Land Management, PI-Private Industrial Forest; PNI-Private Non-Industrial Lands; State- State Forest Lands, USFS-U.S. Forest Service. From Burnett et al. (2007).

The lack of difference in coho salmon densities between land ownership classes with restrictive management measures, like USFS or BLM lands, and densities in streams on lands with more aggressive management (Private Industrial Forests and State Forests) suggest that changes to forest practices rules are unlikely to have any detectable influence on coho salmon densities. Despite wide, no-touch stream buffers and negligible timber harvest on federal lands for eight generations of coho, the density of these fish is no greater than it is on private forestlands. The lack of fish response to more restrictive forest management rules is further illustrated by the lack of coho salmon response to the implementation of the Forest and Fish Rules in Washington. These rules were developed under a Habitat Conservation Plan between Washington and the federal agencies responsible for implementing the ESA (NOAA Fisheries and

USFWS). These HCP management practices have been in place for nearly 20 years. However, Lower Columbia coho salmon (the only ESA-listed coho ESU in Washington) have failed to respond (https://stateofsalmon.wa.gov/lower-columbia-river/fish-populations). Abundance data for coho are available for 3 of the 17 populations of Lower Columbia Coho in Washington. As of 2018, none of the monitored populations had achieved the abundance goals established in the recovery plan for this ESU. These results indicate that there is very little likelihood that more restrictive management requirements would result in increased coho populations.

Habitat and Water Quality Response to Current Rules

The findings of Anlauf et al. (2011) and Steel et al. (2017) are supported by recent evaluations of the response of individual habitat attributes or water quality parameters to current forest management practices in Oregon. As noted above, much of the recent information on aquatic ecosystem response to forest management in Oregon was generated by the studies that were included as components of the OSU Watershed Research Cooperative.

Sediment

There are two primary sources of forest management-related sediment; erosion of road surfaces and landslides. Over the last several decades there have been numerous management measures implemented that have greatly reduced sediment related to these sources. Delivery of road sediment to streams was a serious issue prior to the 1990s. However, changes to road management practices, particularly disconnecting road drainage systems from natural drainage networks, has greatly reduced sediment delivery. Reiter et al. (2009) studied trends in turbidity across large timescales (decades) and whole watersheds. They documented steady declines in turbidity as best management practices for roads were improved from the 1970s through early 2000s in the Deschutes River basin in Washington. These road improvements mirrored those in Oregon during the same timeframe. Arismendi et al. (2017) measured turbidity and suspended sediment levels in small non-fish tributaries of coastal Oregon streams (Trask River drainage) above and below road crossings. They evaluated the effects of road re-construction and timber harvest/log haul phases of forest management and found “minimal increases of both turbidity and suspended sediment concentrations after road improvement, forest harvest, and hauling”.

In the Alsea Paired Watershed Study Revisited, Hatten et al. (2018) found “no evidence that contemporary harvesting techniques affected suspended sediment concentrations or yields”. Overall, “suspended sediment concentrations and yields after contemporary harvesting were similar to pre-treatment levels.” In the Trask River paired watershed study (Bywater-Reyes et al. 2017), there was some evidence of increased sediment yield after harvest, but the underlying geology and physiography of the harvested areas were far more influential on sediment yield than the harvest prescription (buffer or no buffer). This is similar to what Wise and O’Connor (2016) found when they developed a suspended sediment model for Oregon using landscape level variables and actual sediment data. They indicate, “The significant explanatory variables were lithologic province, precipitation, and area disturbed by recent wildfire.”

Other, novel techniques are being used to identify long-term trends in sediment production from forestlands. By examining the layers of sediment deposited on a natural lake bed in the Umpqua River drainage (Loon Lake), Richardson et al. (2018) identified relative rates of sediment accumulation during historic (~515-1945 AD) and contemporary (1946-2012) periods. They found lower sediment accumulation after 1972 than between 1946 and 1971, which they associate with improved road building and timber harvest practices after the FPA was adopted in 1972.

The Petitioners reiterate concerns expressed by the NMFS and the Environmental Protection Agency (EPA) about potential sediment delivery from roads built prior to 1972 (i.e., legacy roads) as a basis for requesting the BOF to impose more stringent regulations on private forestland owners. However, we are not aware of any recent scientific evidence that demonstrates a connection between legacy roads, sediment production, and impacts to coho. Many of these roads are now part of the modern road network and have been upgraded to current standards and are routinely inspected and maintained. As a result, most deficiencies related to legacy roads have been addressed.

Landslides are the dominant erosional process on steep forested slopes in western Oregon and throughout the Pacific Northwest (Swanson et al. 1987). On private lands, Oregon has rules in place to reduce the fraction of landslides associated with roads, and it manages the quality of landslides on steep hillslopes through voluntary leave tree areas.

Roads have, by far, the greatest effect on stability of slopes on forestlands, at least on a unit area basis (Sidle et al., 1985). Since the inception of the FPA, there have been rules governing the location, design, construction, and maintenance of forest roads for the purpose of reducing sediment delivery to waters of the state. In 1983, improvements were made specifically to reduce the risk of landslides, and in 2002, rules were enhanced to address landslides and public safety. Several technical notes were published in 2003 to help landowners reduce landslide risks in their operations (ODF 2003a,b,c). Administrative guidance is also available to help landowners identify slide-prone sites and streams (Robison et al. 1999).

Current rules also address landslides not related to roads. Division 630 (Harvesting) rules are designed to reduce ground disturbance on high risk sites, and to avoid the accumulation of slash in slide-prone streams (ODF 2018). Division 642 (Water Protection) rules include requirements to leave green trees and snags on small, nonfish streams subject to rapidly moving landslides (ODF 2007). The trees are to be retained on both sides for 500 feet upstream of fish-bearing reaches for the purpose of providing large wood to fish-bearing streams in the event of a debris torrent.

This mixture of prescriptive rules, best management practices, and technical guidance have worked to reduce forestry-related mass wasting. For example, in their intensive field review of the source and characteristics of landslides associated with two large rain events in 1996, Robison et al. (1999) conclude: "Based on the low numbers of road-associated landslides surveyed in this study and on the smaller sizes of these landslides (as compared with previous studies), current road management practices are almost certainly reducing the size of road associated landslides, as well as the number of landslides." Importantly, rules governing high risk sites apply to forestry operations in all of western Oregon, not just those areas that pose a risk to public safety.

Water Temperature

The petitioners claim streams in private (and State) forests are not adequately protected to maintain temperature, and point to the Department of Environmental Quality (DEQ)-derived estimate that 40% of coastal coho streams are temperature limited. This statistic fails to note that the length of impaired stream is arbitrarily assigned by DEQ based on single points of measurement in what otherwise are spatially diverse environments where temperatures vary greatly over time and at fine spatial scales (Dent et al. 2008, Reiter et al. 2015). For example, Knowles Creek, a tributary of the Siuslaw River, is listed in the 2012 water quality assessment as temperature impaired for 7.4 miles (river mile 5.7-13.1). The data supporting this listing came from measurement in 2000 at river mile 6.8 that showed 101 days in excess of the 16°C numeric criterion. Notably, another monitoring location upstream at river mile 10.5 showed no exceedance during this period. Somewhere between river mile 10.5 and 6.8, the river warmed beyond the 16°C standard, yet the entire reach from 5.7 to 13.1 was listed as temperature impaired. In addition, there does not appear to be any follow-up monitoring for the 10+ years since the original measurement in 2000, despite known year-to-year differences in temperatures at a given location (Gomi et al. 2006). Therefore, the DEQ process for assigning temperature impairment (and as a result, the petition) greatly over represents the length of temperature-impaired streams. Temperatures within forested stream reaches are not a problem for coho, as is evidenced by current research.

Buffers on fish streams have been repeatedly evaluated relative to water temperature control since the inception of the FPA and changes have been made when even minor increases have been identified. ODF conducted a rigorous evaluation of the effectiveness of stream buffers on small to medium fish-bearing streams (the RipStream project) beginning in 2002, using a before-after, control-impact experimental design (Groom et al. 2011a, b). An important finding from this study was that 83% of streams on private forestlands showed no exceedances of the biologically-based numeric criterion under standard rules (Figure 7) (Groom et al. 2017). Those few sites that were warmer than the criterion after harvest did not remain so beyond the first post-harvest summer. The "protecting cold water" (PCW) standard was exceeded more frequently (40% of the time; Groom et al. 2011a). This standard only applies where stream temperatures are already suitable for coho and other salmonids (i.e., *colder* than the biologically-based numeric criteria), and it is based on the minimum increase that current instruments can detect (0.3^{o}C). The estimated average daily maximum temperature increase was 0.7^{o}C (Groom et al. 2011b). This finding resulted in an expansion of streamside buffers for the majority of streams in the range of coho in Oregon in 2017. The effectiveness of these new rules has not yet been assessed. The need for changes to riparian rules affecting streams in the Siskiyou Mountains georegion (i.e., the upper and middle Rogue River system that was outside the area studied by the RipStream project) are currently being evaluated by ODF. One final aspect of this study that has been corroborated by numerous other researchers is that any temperature increases caused by contemporary timber harvest adjacent to streams do not continue beyond about 10 years, owing to rapid regrowth of understory vegetation and young trees (Brown and Krygier 1970, Gomi et al. 2006, Feller 1981; Harr and Fredriksen 1988). There is a rigorous process in place to ensure that current management practices are addressing any temperature issues related to forest harvest along coho-bearing streams.

The Oregon paired watershed studies also shed light on the effectiveness of current rules, and the dynamics of stream temperatures in a managed landscape. In Hinkle Creek, stream temperatures before and after harvest were measured in four fishless headwater tributaries (Kibler et al. 2013). Riparian management prescriptions did not require retention of a standing tree buffer on these small streams. In contrast to expectations, mean maximum daily stream temperatures ranged from 1.5°C cooler to 1.0°C warmer relative to pre-harvest years. At the watershed scale, the researchers did not observe cumulative stream temperature effects related to harvesting 14% of the watershed area in multiple, spatially distributed harvest units across the four headwater catchments. At the watershed outlet, they observed no change to maximum, mean, or minimum daily stream temperatures. They attributed the lack of consistent temperature increases in headwater streams to shading provided by a layer of logging slash that deposited over the streams during harvesting and to increased summer baseflows.

In the Alsea Paired Watershed Study Revisited, evidence of a harvesting effect on the 7-day max numeric criterion was only apparent when analyses were constrained to the regulatory period of July 15 to August 15 and all sites in each catchment were grouped together; in this case stream temperature increased 0.6 ± 0.2°C ($p = 0.002$). Moreover, as was found at the majority of sites in the ODF RipStream study, the regulatory standard of 16°C (7-day max.) for core cold-water fish rearing habitat was never exceeded in Needle Branch. Furthermore, over the entire post-harvest study period, the warmest maximum daily stream temperature observed in Needle Branch was 14.7°C, in sharp contrast with the original Alsea Watershed Study, where maximum daily stream temperatures rose to 21.7°C (1966) and 29.4°C (1967) in the first two post-harvest years.

In an effort to understand how contemporary harvest practices on non-fish streams might affect downstream fish-bearing reaches, Bladen et al. (2017) examined data from all three paired watershed studies. They found post-harvest increases in the 7-day max metric at 7 of 8 streams, when compared with unharvested controls. However, there was no evidence for additional downstream warming related to the harvesting activity. Rather, the 7-day max values cooled rapidly as stream water flowed into forested reaches ~370–1,420 m downstream of harvested areas. The magnitude of effects was related to underlying lithology, and the cooling influence of groundwater. Together, these studies demonstrate that current harvesting practices on private forestlands have greatly improved protection for stream water temperatures, and are broadly effective for keeping streams sufficiently cold for salmon and trout.

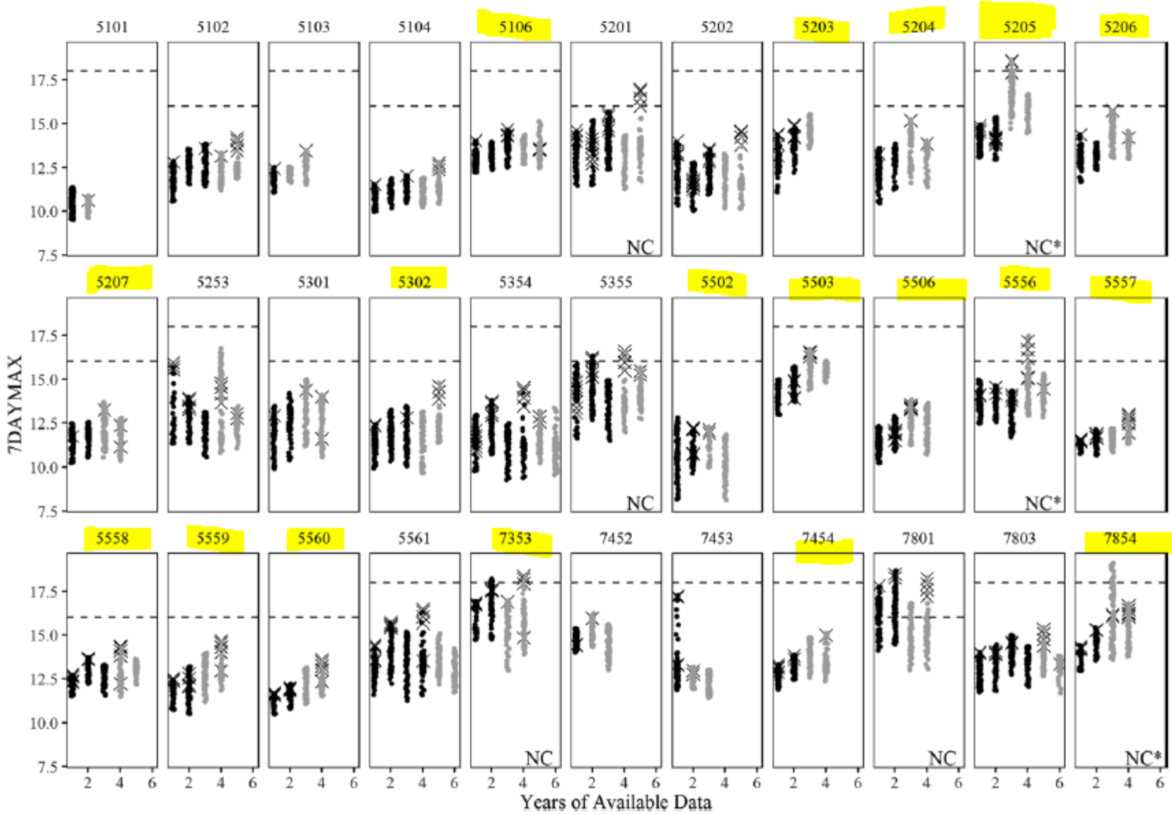

FIGURE 4. 7DAYMAX Temperatures at St. 3 for the Period July 1-September 15 for All Years Included in the Analysis. Site identification numbers appear above each site's data. Black dots are preharvest years, gray dots are post-harvest. X's are temperatures that would not have been considered exceedances because of high summer air temperatures during that period (ATE). The dashed lines show the numeric criteria threshold for each site. Sites that exceeded their numeric criteria at St. 3 are identified with an "NC", and those that additionally exhibited a potential harvest signal have an asterisk ("NC*").

Figure 7. Stream temperature (7-Day Max) response to timber harvest along small and medium fish-bearing streams on Oregon's Coast Range, using riparian buffering requirements of the period 2002-2008 (ODF 2014). The numeric criteria (16°C or 18°C) were designed to protect juvenile coho and other salmonids. From Groom et al. (2017, Figure 4). Yellow highlighting identifies private sites.

Habitat Quality

Large wood is an acknowledged component of fish habitat in streams (Grette 1985, Bisson et al. 1987, Sullivan et al. 1987, Hicks et al. 1991, Bilby and Ward 1991). After shade and stream temperature protection, large wood input is the key objective of water protection rules (ODF 2018). Pre-FPA practices, including logging to the stream bank, splash damming, log drives, and stream "cleaning", generally reduced in-stream wood loads (Bilby and Ward 1991; Miller 2010). However, there is no technical basis for the claim in the petition that current buffering requirements will not provide wood loadings in coho streams on private forestlands sufficient to support productive coho habitat. The petition also conflates effects from current forest management practices with legacy impacts on wood caused by practices such as splash damming and streamside logging.

Private forest lands in Oregon provide large wood inputs to streams in two ways: riparian tree retention and direct placement. The Petitioners claim that current buffers are too narrow to provide enough wood to create and maintain pool habitats. However, there is ample evidence that the current buffer configuration is capable of providing wood input comparable to that from wider buffers, especially for large pieces of wood. Most wood input to streams from riparian areas occurs from areas close to the channel. Trees located close to stream channels have a much higher probability of entering the channel when they fall than a tree located at a greater distance from the stream. McDade et al. (1990) found that 90% of input of wood pieces occurs within 82-ft of a channel edge. Similarly, Murphy and Koski (1989) found that over 90% of wood pieces input in streams in mature conifer stands in southeast Alaska originated within 66-ft of the channel edge with about 45% of total wood input occurring from immediately adjacent to the channel as a result of bank cutting.

These empirical studies have been used to produce a number of models that predict wood input under various riparian management scenarios (VanSickle and Gregory 1990, Welty et al. 2002, Gregory et al. 2003). All these models consistently describe a pattern of sharply diminishing inputs with distance from the stream. However, some of the model predictions generate more input from farther from the channel than empirical assessments (Figure 8), possibly because the models generally do not account for enhanced input of channel-adjacent trees due to bank erosion (Murphy and Koski 1989). All these analyses, however, indicate that more than 80% of wood pieces greater than 4-in diameter and 6.6-ft length originate within about 85 feet of the channel edge.

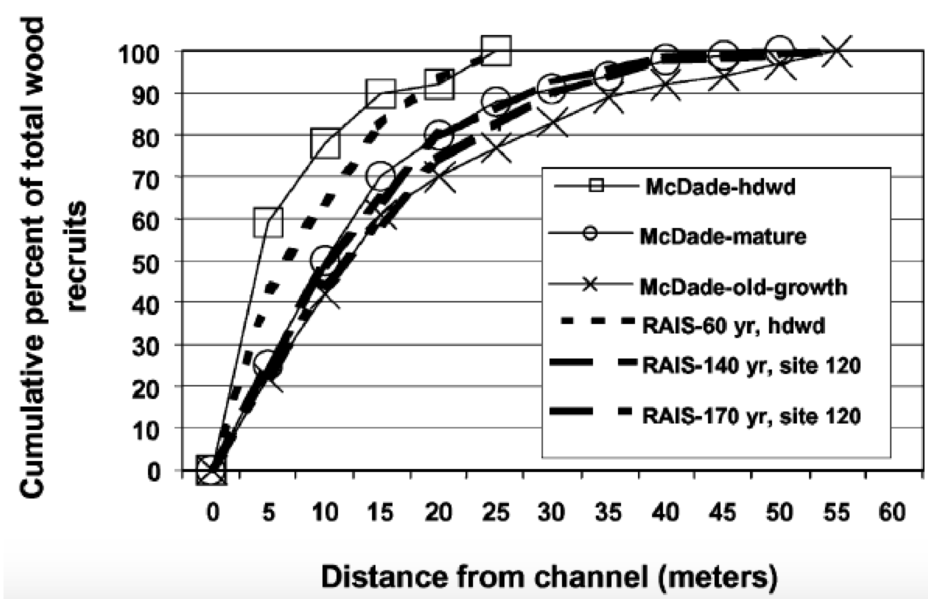

Figure 8. Input of wood pieces as a function of distance from a channel edge. The McDade lines represent field-measured input distances. The RAIS lines are generated from a wood input model (From Welty et al. 2002).

Input of wood *volume* is even more closely concentrated near the stream edge than piece input. This concentration of volume input near the channel edge is because trees taper with height. Therefore, largest diameter pieces in channels are produced very close to the channel. Benda et al. (2016) modeled large wood volume inputs to streams from treefall only (no bank erosion or landslides) under differing riparian tree thinning scenarios, and found the majority of wood volume (75%-90%) was generated within 20% of site-potential tree height from the stream bank, or about 35-ft for a Douglas Fir forest (Figure 9).

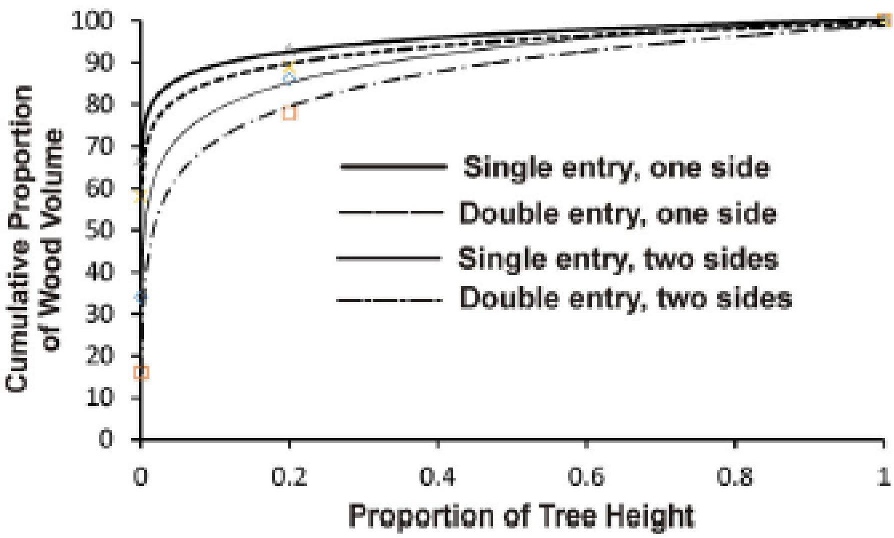

Figure 9. Source distance curves showing varying cumulative proportion of in-stream wood volume with distance from stream for single and double entry thinning, on one and both sides of the stream. From Benda et al. (2016, Figure 8).

Oregon's current riparian rules target tree retention close to streams for protecting banks, stream shade, and large wood recruitment. The current buffers on coho streams in Oregon are 100-ft for large streams, 80-ft for medium streams, 60-ft for small streams, and capture the majority of the area contributing wood to stream channels. Ongoing work by ODF with data collected during the RipStream study will be helpful for evaluating the effectiveness of these rules for increasing the amount of in-channel large wood through time.

Trees growing in riparian buffers on private forestlands will take several decades to mature sufficiently to begin to provide wood to channels (VanSickle and Gregory 1990, Welty et al. 2002, Gregory et al. 2003). In recognition of this temporal lag in wood recruitment, private forest land owners have been encouraged to place wood into streams by rule options, including incentives for placing wood in channels during harvest, and by participating in OWEB-sponsored habitat projects. From its onset, Oregon Plan participants have implemented large wood (or other instream structure) placement projects to accelerate habitat improvement at high-priority sites. Since 1997, more than 700 projects of this type have been completed on private forestlands (Oregon Watershed Restoration Inventory [OWRI] unpublished data). One example of such a project is Mill Creek, a tributary to the Siletz River in Lincoln County. This stream is an important coho producer in the Siletz basin, and it contains numerous reaches with high intrinsic potential (Burnett et al. 2007). Historical forest management resulted in relatively low in-channel wood volume in this watershed.

Mill Creek is one of 7 basins in ODFW's Life Cycle Monitoring Network, where the number of salmon and trout moving into and out of the system has been monitored for 17 years. An all-basin, wood loading project was implemented on Mill Creek in 2015 and the response of habitat and fish abundance, survival and population productivity is being tracked. The project is emblematic of the type of cooperative research, monitoring, and restoration projects envisioned under the Oregon Plan. Cooperators include private landowners (Weyerhaeuser Company), state agencies (ODFW, ODF, DEQ, OWEB), the Siletz Tribe, the USFS, and Oregon State University.

Connectivity (Fish Access)

Migratory fish like coho and other salmonids need access to the habitats they use throughout their complex life histories. Current forest practices rules acknowledge this need and guide landowners in identifying and correcting existing passage barriers and ensuring new barriers are not created. The road construction and maintenance rules include criteria for installation of stream crossing structures that provide fish passage. There are also triggers for replacement of older structures during routine road maintenance. Landowners also work with watershed councils to identify and restore fish passage at high priority sites in a worst-first fashion. Between 1997 and 2017, nearly 2,000 stream crossings have been improved for fish passage on private forestlands (OWRI unpublished data).

In addition to their unsubstantiated claim that coho don't have proper access to streams on private forestlands, the Petitioners argue that intermittent streams are unrecognized, unprotected, and threatened by forest management in coastal Oregon. Wigington et al. (2006) and Ebersole et al. (2006, 2009) describe coho use of intermittent streams in the West Fork Smith River, a lower Umpqua River tributary. Moore and Crane creeks, intermittent tributaries to this system, were estimated to have no continuous surface flow in 14 of the 24 years (58%) with streamflow records. For the six years with no continuous flows in summer, the "dry" periods were estimated to have lasted 15-87 days (Wigington et al. 2006). Residual pools were observed during periods of discontinuous surface flows in 2002-2004, and these were thought to provide refuge to fish that ultimately survived at higher rates than in mainstem reaches downstream. The importance of intermittent streams in channel networks has been documented elsewhere in Oregon. Everest (1973) showed how spawning in intermittent tributaries by summer steelhead in the Rogue River basin may have been the mechanism that helped summer and winter races evolve and stay separated in the basin. Petitioners claim that the value of such streams is overlooked because they would be classified as non-fish bearing using current methods. This claim is not accurate. ODFW has specific requirements for when and how streams are to be surveyed for the presence of fish (ODFW, undated), and these would have led to designation of these Smith River tributaries as fish-bearing with all associated protections. Furthermore, though these streams flowed through culverts at or near their confluence with the mainstem Smith R., with potential to impede passage:

> "Each culvert has been resized and replaced within the past 20 years such that movement of juvenile and adult fish between the main stem and each tributary is believed to be uninhibited by current culverts." (Ebersole et al. 2006)

Stream network access for coho salmon in Oregon's forests is better now than it has been in 50-years, and it continues to improve under existing forest practices rules and the Oregon Plan.

Water Quantity (Low Summer Flows)

It is well established that timber harvesting can result in changes in summer low flows (Harr and Krygier 1972, Harr 1979, Keppeler and Ziemer 1990, Hicks et al. 1991), but that the magnitude and direction of change, (i.e., increase, decrease, or no change) is dependent on several factors including site specific geomorphology (Segura et al. 2019), the amount and species of forest removed (Stednick 1996), and climate (Chang et al. 2012, Segura et al. 2019). Further, most of the studies on streamflow response to harvest occur on small, headwater streams so scaling downstream responses, especially to fish-bearing reaches are challenging. The streams studied by Perry and Jones (2017) were relatively small systems (22-252 ac) above the limits of fish distribution in the volcanic lithology of the western Cascade Mountains (headwaters of the Willamette and Umpqua rivers). They reported summer low flow increases for about the first decade after clearcut logging, followed by low flow deficits up to 50% of reference basins during the 25-45 year period of regrowth in Douglas fir plantations. While these percent changes appear to be sizable, the actual amount of flow is relatively small (hundredths to tenths of a cubic foot per second). In the Perry and Jones paper there was no attempt to quantify downstream hydrologic response. In contrast, Surfleet and Skaugset (2013) documented a 45%-106% increase in August flows of fishless headwater tributaries after clearcut harvest of 26% of the basin (total) in Hinkle Creek, a western Cascade Mountain stream. The effect lasted 5 years (total) but the increase was not detectable downstream in the SF Hinkle mainstem where fish were present. In the original Alsea study, in the sedimentary lithology of the Oregon Coast Range, Harris (1977) was able to detect slight but statistically insignificant average flow increases for August-September in Needle Branch during the first seven years after harvest. The flows had returned to pre-logging levels at the end of the 7-yr period.

The landscape-level view of forest management effects on flow is also important to consider. Although the general pattern of summer streamflow response to timber harvest can be measured or modeled in any single small watershed location in a system, to be detrimental to coho, any flow deficits would have to occur simultaneously over large portions of their range. This scenario is unrealistic due to larger watersheds containing a mosaic of stand ages as a result of different land ownership patterns with different management strategies (e.g., rotation ages), site histories, etc. In this mosaic, areas with young stands would augment summer streamflows and offset diminished baseflow from older stands.

Low summer flows are a natural feature of small streams in western Oregon, and though both increases and decreases are known to occur after timber harvest, these effects are unlikely to be severe enough or widespread enough to impact native fish populations. For example, in the Alsea Study Revisited, summer low flows increased in Needle Branch, and this may have led to measured increases in the percentage of channel length in pool habitat in the headwater portion of the basin (Bateman et al. 2018). Resident cutthroat responded positively to this change. Juvenile coho showed no response, but their distribution was confined in most years to the lower portion of the drainage. At the catchment scale, which included lower Needle Branch, there were post-harvest increases in the percentage of pools with undercut banks and the number of deep pools (Bateman et al. 2018). These habitat changes could be a result of more water in the channel during summer, or from scouring during higher water periods of the year. Timber harvest effects on basin hydrology are still being analyzed.

In smaller tributaries of the Alsea basin, it is fairly common for some portions of streams to go dry near the upstream limits of fish distribution (Bateman et al., 2018). In the Rogue River, summer steelhead spawn in smaller, often intermittent tributaries (Everest 1973). Their fry emerge and emigrate from these streams before they go dry. This adaptation is believed to be largely responsible for the separation of summer and winter "races" of steelhead in this system (Everest 1973). In the Umpqua River, coho are adapted to use intermittent tributaries (Ebersole 2006), and in some years, they survive there better than in perennial tributaries. Though low summer flows or dry streams can be measured or predicted, these situations do not necessarily translate into adverse changes in fish habitat or populations, especially in the long run. The Petitioners forewarn of "large scale fish die-offs" based on statements in Perry and Jones (2017). However, no evidence of such die-offs was presented by Perry and Jones (2017) nor any of the research they cited.

Fish Response to Current Rules

The relatively minor changes to stream habitats that result from modern forest management, as discussed above, are reflected in fish population responses. DeGroot et al. (2007) measured relative abundance and body condition of coastal cutthroat trout (*Oncorhynchus clarkii clarkii*) in four headwater streams of coastal British Columbia. They used a before-after-control-impact (BACI) design, with spatial replication of controls and treatments, to assess trout response from 2 years before to 3 years after logging in both summer and winter. Logging practices included no disturbance of the channel bed or banks (no machinery allowed with 16-ft of the streambank), careful removal of the riparian overstory, and logging debris and slash left in place. An average of twenty-one percent of the area in treatment basins were clearcut. They could not detect any logging treatment effects on summer or winter relative abundance or condition of trout, nor were any changes evident to instream physical habitat associated with the logging treatment. In Hinkle Creek, Bateman et al. (2016) also used a BACI design to evaluate coastal cutthroat and steelhead trout (*Oncorhynchus mykiss irideus*) response to contemporary logging, but in this case the harvest occurred upstream in fishless headwaters. In addition to fish habitat, they measured fish density, biomass, size, condition, survival, and movement for 5 years before and 3 years after logging. Fourteen to thirty-four percent of the headwaters of the treatment basins were clearcut upstream of the fish sampling locations. They found a significant increase in late-summer biomass of age-1+ cutthroat in the treatment watersheds after logging. Otherwise, logging in fishless headwaters had no significant effect on the cutthroat population or their habitat. In the Trask Paired Watershed Study, Jenson (2017) used statistical and bioenergetics models to study the effects of timber harvest in non-fish headwaters on growth of trout and sculpins downstream. Harvest treatments ranged from clearcut without streamside buffers, clearcut with required wildlife leave trees retained along streams (private landowners), clearcut with trees in continuous 25-ft streamside buffers (Oregon State lands), and thinning with continuous buffers (Bureau of Land Management). A fourth unharvested basin was used as a control. Twenty-four to 44% of the area upstream of the study reaches were harvested in the treatment basins. Jensen (2017) found no effect of forest harvest on growth of either species.

DeGroot et al. (2007), Bateman et al. (2016), and Jensen (2017) studied streams flowing through second-growth forests where no information existed on trout populations at the time the original forests in the basins were harvested. In the Alsea Paired Watershed Study Revisited, the researchers not only had a historical baseline of fish and habitat conditions in the treatment and control watersheds (Moring 1975, Moring and Lantz 1975), they could compare the effects of contemporary logging of second-growth commercial forests with those of historical logging practices on mature (150-yr old), naturally-regenerated forests. In addition, they were able to study logging effects on coho salmon and coastal cutthroat trout.

In the headwater portion of Needle Branch virtually all of the basin was clearcut, except for the standing timber left in the riparian buffer, per existing rules. For the downstream reach, approximately 40% of the drainage was clearcut. Flynn Creek, an unlogged research natural area owned by the USFS, has served as a control watershed since the original study began in 1959. Fish and habitat conditions were measured 4 years before and 5 years after logging. After harvest, there were significant increases in the percentage of channel length in pool habitat in the headwater portion of the Needle Branch, and mean shade levels provided by understory shrubs more than doubled. Age 1+ cutthroat density and biomass significantly increased. At the catchment scale, which included lower Needle Branch, there were post-harvest increases in the percentage of pools with undercut banks and the number of deep pools (Bateman et al. 2018). Age 1+ cutthroat numbers and biomass also increased significantly after harvest.

In contrast to the positive cutthroat response, juvenile coho showed no significant changes “in any of the biotic parameters measured” (Bateman et al. 2018). This finding is consistent with results from the original study, where fry survival, juvenile numbers and biomass, and smolt yield for coho did not decrease in Needle Branch in the early post-logging period (Moring and Lantz 1975). When researchers returned 2-3 decades later, no latent adverse effects were detected (Gregory et al. 2008).

These results are compatible with the findings of Mellina and Hinch (2009), who reported that negative responses to streamside clearcut logging (from historical practices) were primarily associated with logging in conjunction with stream channel disturbance and removal of large wood from stream cleaning. In situations where standing trees are left in riparian areas along fish-bearing reaches, and the channel is left intact during and after logging, the fish response is generally neutral to positive.

<u>High Compliance Rates Ensure Implementation of Existing Rules</u>

In 2012, ODF, in keeping with its long track record of informing the BOF with science, initiated a comprehensive program for measuring compliance of forest practices rules. The field-measured performance has demonstrated a very high compliance rate. Road and water protection rule sets were the first to be evaluated, and overall compliance rates were 96% (Clements et al. 2013). These results echoed the earlier, equally comprehensive check on compliance by ODF (Robben and Dent 2002). Oregon's private forest landowners are serious about implementing science-based, outcome-oriented rules.

<u>Coho Recovery Will Take Time</u>

There is no urgent need to add more stringent regulations, as the Petitioners demand. ODFW (2007) recognizes this: "A 50-year timeframe is probably the most realistic scenario to achieve the desired status goal for the ESU, given likely levels of funding, the time required to resolve scientific uncertainty, and the time required for habitat actions to effect fish survival and production." Much has been done, and continues to be done, to address limiting factors for coho. And this is not only in the forestry sector. ODFW has worked with the fishing industry to reduce harvest of wild coho in the ocean, and to increase the number of wild spawners by drastically reducing the production of hatchery-raised fish. All told, there is evidence that current freshwater habitat, in concert with other protection measures, is capable of producing more spawning adult wild coho than returned 60 years ago (NMFS 2016).

<u>Conclusion</u>

The forest industry believes the management measures and voluntary enhancement actions that are taking place on their lands can be an important component of the effort to ensure populations of salmon and steelhead increase in abundance in Oregon. Protecting habitat for these iconic species is a fundamental part of forestland management. Contemporary forestry practices administered under the Oregon FPA helps forest landowners provide habitat for salmon within healthy forests, while providing jobs and delivering valuable goods and services to all Oregonians. In addition, in 1997, Oregon developed the Oregon Plan for Salmon and Watersheds (The Oregon Plan). The forest industry has demonstrated its commitment to implementing the FPA and contributing to the success of The Oregon Plan. The industry supports science-based regulations and has a long history of funding relevant research. These are just part of forest landowner contributions to "The Oregon Way." Since 1997 private forest landowners in partnership with government agencies, native American tribes, watershed councils, and private citizens have contributed nearly $200 million for projects on private forestlands in Oregon (Oregon Watershed Restoration Inventory, unpublished data). Private forest landowners have themselves contributed nearly $100 million toward restoration activities that benefit fish passage and habitat. This work is all completely voluntary, beyond regulation, and illustrates how important fish habitat is to Oregonians. As forest landowners, we work, we play, we fish, and we live in the forest ecosystem.

We urge the Board of Forestry to reject the petition for rulemaking to identify and develop protection requirements for coho salmon resources sites. The Petitioners draw from outdated research and conjecture to create a highly inaccurate characterization of the condition of coho habitat on Oregon's private forestlands. As we've shown, recent and relevant research paints a much different picture: the current rules are effective at protecting important attributes of coho salmon habitat and voluntary restoration measures are helping to accelerate recovery from damage related to historic land management practices. There is no urgency to impose overly restrictive regulations on private landowners to protect coho stocks. New riparian protection rules were added just two years ago, and their effectiveness has not yet been evaluated. Coho recovery is well underway, and existing habitat protections and restoration activities on private forestlands should ultimately assist with the de-listing of coho under the federal ESA. Recovery takes time, but even the amount and quality of freshwater habitat existing today is enough to ensure persistence of coho with changing climate and ocean conditions. Oregon has a well-developed forest management regulatory system that is science-based and constantly evolving to address water quality and fish habitat.

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