OWEB Strategic Investment Program Focus Area Proposal

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Re-igniting the Oregon Plan: Achieving Restoration Scale in Coastal Sedimentary Basins

1. Proposed Priority Description

Over the last twenty plus years, literally hundreds of individual watershed restoration projects have occurred on the Oregon Coast, and cumulatively, some programs have restored complete streams and smaller sub-basins. At the same time, scientific knowledge about salmon biology and restoration effectiveness has increased dramatically. Given this increased knowledge and experience—and the relationships that have developed among the restoration partners—we propose to magnify the scope of restoration to a larger scale (Hydrologic Unit Code [HUC] 5th field), integrate multiple actions, and consider the entire watershed continuum during project implementation. Of particular interest are those sub-basins containing significant sedimentary geology (i.e., sandstone), since these basins function differently than those underlain by harder rock (i.e., basalt). To achieve *Oregon Plan* goals, we believe that focusing on a mixed-ownership basin of working lands will provide the best illustration of project outcomes that can be achieved through voluntary actions.

a) What is the native fish or wildlife habitat to be conserved or other natural resource issue to be addressed?

Restore Natural Processes. Our experience is that the best restoration results from restoring natural processes from headwaters to the ocean. While various species—and their life stages—have specific niches both spatially and temporally, all have evolved and adapted to the dynamic fluvial processes of the Oregon coast. Focusing on restoring natural processes allows for the explicit incorporation of upstream influences downstream, and from ridge-top to riparian to stream channel effects.

Multi-species Focus. Restoring natural processes affects multiple species and the food webs upon which they depend: Oregon coastal anadromous fish species of concern are coho, Chinook and chum salmon, and winter steelhead. Multiple USFWS Species of Concern will also benefit, including searun cutthroat trout, Pacific, western brook and river lampreys, and Millicoma dace (*Rhinichthys cataractae* ssp.). A natural processes-based approach will restore a diversity and mosaic of habitats, setting the conditions such that the entire ecosystem responds.

Importance of Underlying Geology. Recent research by Jim O'Connor and his colleagues (2014) at the USGS Oregon Water Sciences Center provides evidence that natural geomorphic processes are different in the sedimentary lithography of the Oregon coast. Habitat-forming processes and restoration outcomes are fundamentally different between hard rock lithography and their fully alluvial streams, versus sedimentary lithography streams with their mixed alluvium and bedrock substrates. Shallow soils combined with steep slopes in this sedimentary lithography result in frequent landslides that historically contributed wood and gravels into streams, which in combination with large riparian trees, was the natural process that created and maintained stream habitats in a dynamic process

River Continuum Perspective. Increasing knowledge about fundamental salmon biology, including the diversity of coho and Chinook life histories (Jones et al. 2014), and the seasonal use of intermittent streams and lower mainstems (Ebersole et al., 2006, 2009) emphasizes the need to

consider the entire river continuum, from headwaters streams to estuarine wetlands, to obtain satisfactory restoration and recovery. Key concerns are the connectivity among tributary streams when mainstem conditions are sub-optimal, including the ability of species to adequately disperse from their natal location to access preferred rearing habitats. Restoring connectivity goes beyond traditional fish passage at culverts to include mainstem habitat structures (engineered log jams), improved tide gates, and restoration of estuarine and freshwater wetlands. Results from these efforts have shown to increase growth and fitness, and improved survival as these areas are used as refugia during winter freshets.

Water Quality Limited Streams. The legacy of past land use practices has resulted in poor water quality in coastal streams, many of which are listed under §303(d) of the Clean Water Act (CWA). Impairments are often the result of forest roads that increase sediment loads because the road surface is hydrologically-connected to live streams; these roads are insufficiently "storm-proofed" to withstand floods; riparian areas have been narrowed and simplified, lacking adequate conifer recruitment for shade and future downed large wood; and similarly, stream channels have been simplified through straightening, splash damming and stream cleaning, to the point that they have become bedrock substrate incapable of supporting aquatic food webs and spawning and rearing habitat for salmonids and other fish species.

Reasonable Assurance of Voluntary Measures. A Focused Investment Program (FIP) has the potential to overcome some of the regulatory hurdles that have impeded recovery efforts on the Oregon coast. Through numerous Endangered Species Act (ESA) reviews of coho salmon, the concern over the certainty of voluntary measures to attain recovery criteria has lead to the continued listing of Oregon Coast Natural (OCN) Coho as a Threatened species. Similarly, the current Total Maximum Daily Load (TMDL) process relies upon regulatory compliance, rather than voluntary measures, to restore water quality to meet the CWA. A FIP with this approach would demonstrate that voluntary measures can reasonably assure that both ESA recovery criteria and CWA standards can be met at a scale that is replicable to other areas.

b) What are the specific expected ecological outcome(s) to be achieved after this priority is addressed?

1. *Complete Fish Passage Connectivity*. Road stream crossings will either be improved or removed such that 100% of structures pass all anadromous species at all life stages. Tide gates will be removed or upgraded to the latest technologies to improve fish passage. Ecological outcomes will be improved stream network connectivity and improved access to off-channel habitats such as wetlands.

2. *Reduce Sediment Inputs*. All roads will be "storm proofed" to reduce catastrophic and chronic sediment yields. Stream banks will be stabilized through planting and fencing. Ecological outcomes include improved aquatic food webs and improved spawning gravels.

3. *Improve Instream Complexity*. Headwater, mainstem, tributary streams, and wetland channels will be restored through large wood placement, constructed log jams, and channel re-meandering. Coho stream habitats will meet the 2,800 smolts/mile threshold for "high quality habitat." Aquatic food webs, velocity refugia, and cover will all be improved.

4. *Restore Riparian Areas and Wetlands*. Re-vegetation of riparian areas and wetlands will be emphasized. As a result of this (and other activities), water temperatures in small- and medium-sized streams will meet the 64ºF standard, and monitoring on large-sized streams will show a trend towards meeting that standard.

c) What is the defined geographic location within which this proposed priority can be successfully addressed?

The geographic focus will be the Oregon coast, specifically the OCN Evolutionarily Significant Unit (ESU), and within the ESU those 5th field HUCs with sedimentary underlying geology (Tyee Sandstone) as shown in Map 1. Fifth field HUCs are 40,000-250,000 acre (62-390 sq. mi.) basins, of which 128 drain to the Oregon coast. Within the sedimentary lithography, there are approximately 26-32 HUC 5th field basins. Target 5th field sub-basins should have landownership that includes significant private ownership.

Using 5th field HUCs as the project scale is the result of tradeoffs between what can reasonably be expected within a 5 year time frame and with the funding available in a FIP, while implementing restoration at a scale that demonstrates significant cumulative benefits. The Oregon Coast Coho Conservation Plan ("Coho Plan")(ODFW 2007) sets its performance criteria at the level of Independent Population with the ESU, which encompasses a number of HUC 5th field basins. On the other hand, we have excellent examples of individual restoration projects, numerous entire stream restoration efforts, and a few cases where HUC 6th fields have been successfully treated. Thus, the HUC 5th field is a stretch upwards in restoration scale, while at the same time being small enough to have a high probability of success.

A HUC 5th field project is also more likely to encompass a diversity of land ownerships, use, and fish life history expressions, lending additional credence to the success of this suggested restoration approach. Of particular importance is the involvement of privately-owned lands: given landownership patterns on the Oregon coast, watersheds cannot be adequately restored without a broad (and deep) involvement by private owners, local governments, and local institutions such as watershed councils.

2. Significance to the State

a) Why is this proposed priority of ecological significance to the state, even though it may not be present everywhere in the state

The geography proposed for this FIP area was the original *Oregon Plan for Salmon & Watershed* project area, and thus has both historical and cultural significance to the State of Oregon. While much has been achieved in the last 20 years, much work remains. In general, coastal basins have high potential for salmon restoration because there are comparatively few dams that impede or prevent migration; many of the target 5th HUC basins are relatively short distances from the ocean, thus reducing the extent of threats; and finally, there are watershed councils within the project area that have a history of successful restoration programs.

The target Tyee Sandstone geology also has significant ecological importance. Streams flowing within the Tyee Sandstone belt are some of the most productive on the Oregon coast: the Siuslaw River, W.F. Smith River, W.F. Millicoma and S.F. Coos Rivers, Alsea River, and the Yaquina River are all either currently or potentially strongholds for coho and other salmon and steelhead. These basins also have high natural rates of landsliding due to their steep topography and shallow soils, often accelerated by land management, especially roads. However, the material coming into streams rapidly breaks down to sand as its transported downstream (O'Conner et al. 2014). This combination of high potential productivity and high risk lends itself to the FIP approach outlined in this proposal.

b) Are there any social and/or economic considerations that the Board should understand regarding this proposed priority?

The Oregon Multi-species Conservation Plan ("Multi-species Plan")(ODFW 2014) includes a public opinion survey about the importance of fish conservation to the people of the state, both anglers and the general population (Appendix 6). General population respondents were asked to indicate whether they agreed or disagreed with various statements on wild salmon, steelhead, and cutthroat trout within coastal basins (bays and rivers, not the ocean). The majority agreed that coastal wild salmon, steelhead, and cutthroat trout are important for the local coastal economies (71%), the state economy (58%), and the health of the environment (73%). This shows broad support for native fish conservation efforts.

Both consumptive and non-consumptive expenditures for native fish conservation in 2008 were identified in the Dean Runyan (2009) surveys for ODFW and Travel Oregon. Travel-generated expenditures to the Oregon coast for fishing exceeded $130 million in 2008, with the bulk coming into these counties from outside the coastal area, and representing over 10 times that of local expenditures. The Dean Runyan study also showed that Oregonians are outdoorsy, with over 75% of state residents participating in some outdoor, wildlife-related, activity. For Oregon coastal communities, freshwater fishing opportunities brought 533,000 trips in 2008, and saltwater fishing for salmon added another 309,000 trips. Even non-consumptive fish viewing resulted in 267,000 trips in 2008, either overnight or over 50 miles, with another 77,000 local trips of under 50 miles.

c) In addition to its significance to the state identify how the proposed priority fits within regional & local ecological priorities.

The Multi-species Plan and Coho Plan provide the regional priorities for the project. The Multi-species Plan states that "the need to implement watershed scale restoration work is identified as necessary to restore natural processes." Thus, both the scale and the emphasis on restoring natural processes are consistent with this proposal. The Multi-species Plan also identifies "Salmon Ecosystem Value" (SEV) for each 6th field HUC watershed along the Oregon coast down to the Elk River. Most 5th field HUCs in the Tyee Sandstone zone are identified as "Higher" (the highest category) in terms of their restoration value.

Many local watershed councils have Watershed Assessments and Action Plans that provide the foundation for successfully implementing a FIP based on the proposed approach. The Multi-species Plan outlines a framework to develop additional assessments and action plans. Given the expectation for substantial integrated restoration as an outcome of a FIP, preference should be given to those groups that have existing, high quality assessments. Sources other than FIP should be used to support development of new assessments and action plans if they are presently inadequate.

3. Limiting Factors

a) What ecological limiting factors exist that relate to the proposed priority identified?

According to the Multi-species Plan, habitat limiting factors impact all life history stages across all coastal basins. "Connectivity" (i.e., access to estuarine, wetland, side-channel, and floodplain habitat) and "complexity" (i.e., large wood, boulders, sinuosity) are commonly identified needs. Estuary habitats are especially important for coho, Chinook and chum juveniles as rearing grounds. Cool water refugia in the summer (often at tributary confluences) are particularly important for juvenile coho. Water temperature, sedimentation, upstream passage, and the availability of gravel are also limiting factors.

b) Reference any framework(s) that exist.

The Oregon Department of Fish and Wildlife's recently completed "Coastal Multi-Species Conservation and Management Plan" (ODFW 2014) implements Oregon's Native Fish Conservation Policy (OAR 635-007-0502 thru 635-007-0505). The ODFW (2007) incorporates its "Oregon Coast Coho Conservation Plan" as a companion to the Multi-species Plan. Further, the NOAA draft Recovery Plan for OCN Coho incorporates the recommendations of the Coho Plan as its framework for implementation.

4. Threats and Benefits

a) What overall threats exist to the proposed priority identified?

Concerted watershed restoration began on the Oregon coast about 20 years ago, and fish populations have begun to respond to these (and related) actions, particularly coho salmon whose populations have almost doubled from the 1950s (ODFW 2014). Threats that can be significantly affected by a FIP relate primarily to habitat and water quality. Potential climate change effects (increase summer temperatures; greater winter storm intensities and frequency, potential sea level rise, etc.) can, and need to, be considered in the overall 5th field HUC restoration program. Finally, there is a threat that progress made to date cannot be sustained due to litigation and regulation overwhelming the ability for voluntary, cooperative and collaborative partners to have the flexibility needed to meet standards.

b) What will happen if the threats aren't addressed?

There is some uncertainty about potential climate change impacts to coastal watersheds, but also evidence indicating that some of the changes (temperature, flow regime, etc.) can be successfully ameliorated through restoration projects. Aside from climate change, the greatest potential threat is that momentum in coastal watershed restoration will decline as a result of "combat fatigue" if years of effort do not correspond to generally perceived improvements in fish populations and water quality improvements. While there are plenty of examples of project successes, there is not effort at a scale that can say, for example, that coho salmon are "restored" in this basin or Independent Population, or that an entire HUC 5th field basin meets water quality standards under the CWA. Success at the scale proposed here will re-ignite and re-invigorate watershed restoration on the coast.

c) Describe the economic, social, iconic and cultural benefits of addressing the outcome and impacts of not addressing it.

We've discussed the iconic role that salmon play in Oregon's culture. The *Oregon Plan* has had its greatest success involving private landowners in locally-based solutions. The involvement of private landowners (including timber companies, farmers, and rural residential owners) is critical to the broad-scale conservation and recovery since State and Federal lands cannot by themselves achieve these goals. "The highest rearing potential among land uses was on private industrial forest land. This corresponded with a high percent of pool habitat, slack water pools, and large wood." (ODFW comments on NMFS Listing Review, 2009). Regulation can prevent bad things from happening, but only through voluntary, cooperative restoration can conservation need be met.

d) Briefly summarize how much has been done already, how much is remaining.

The ODFW estimates that about 30% of the needed miles of high quality coho habitat to support the minimum number of spawners needed to replace themselves during a period of protracted poor ocean conditions (< 3% survival) currently exists. This leaves about 70% of coho habitat to be restored. The Multi-species Plan expands potential restoration areas significantly to accommodate

the needs of other salmon and steelhead. Some 5th field HUCs have had considerable restoration accomplished, potentially reaching 50% of what's needed, and these would provide the target areas for a FIP intended to complete everything needed to restore natural processes.

e) What is your best estimate of cost to address the priority, and as a result, how economically feasible do you believe it is to address this priority over time?

The cost for an individual FIP project is variable depending upon the HUC 5th field chosen, the types of anticipated activities, and how much work has already been accomplished in a specific basin. The target $5 million over 5 years seems like a reasonable amount for an individual basin. To a large extent, proposals could be solicited with these constraints, with the choice dependent upon a comparison of value received. This threshold is not beyond the capacity of a number of organizations within the target project area.

5. Opportunities

a) Ecological:

1. What are the measures of ecological success?

Specific outcomes expected from the FIP are identified in response to Question 1b. Each of these outcomes has specific metrics and protocols to their evaluation. Some of these are consistent with the current ODFW survey program such as spawning densities, aquatic habitat condition (miles of coho habitat supporting 2,800 smolts/mile), and juvenile rearing surveys can calibrate the aquatic habitat results. Other outcomes that directly result from restoration actions (such as fish passage and road improvements) can easily be measured through Implementation Monitoring; while others will need more time to evaluate their effectiveness. The U.S. Forest Service's Geomorphic Road Analysis and Inventory Package (GRAIP) allows for the evaluation of hydrologic connectivity and models sediment yields; while the DEQ has Excel templates to evaluate summer water temperature in the context of Clean Water Act standards. The DEQ's Predictive Assessment Tool for Oregon (PREDATOR) directly integrates sediment and temperature regimes with macroinvertebrate communities.

What's the likelihood of ecological success in the short (6-year), medium and long-term (define the term lengths)?

The likelihood of success within a 6 year time period is excellent, particularly if the target 5th field HUCs have sufficient past actions and good information synthesis (aquatic inventories, spawning surveys, etc.) to identify and prioritize restoration needs. Based on our experience, in these situations restoring natural processes in an entire 5th field HUC would be a reasonable expectation. Depending on flow events, success can be observable within a couple of years.

Medium term (within 6-20 years) it should be possible to replicate the 5th field HUC approach to other watersheds, and other geologies. The limiting factor in the medium term is developing (and utilizing) good information and building partnerships among restoration practitioners and landowners and managers. Our experience is that it takes time (and talent) for trust among these partners to be built, and this trust is often accomplished by taking small steps together (Souder 2014). Successful partnerships that lead to recovery of both natural processes and species provide examples for others to aspire towards.

Long term (20-50 years) success will depend upon sustaining the conservation effort through continued funding (as anticipated by passage of Measure 76); as well as building and sustaining local community-based organizations such as watershed councils. State and Federal agencies can provide

support through reasoned regulation, continued monitoring, research and technical assistance. Given these contributions, the success of fish conservation on the Oregon coast is quite likely.

2. **What types of voluntary conservation actions could be undertaken to address the proposed priority?**

The Multi-species Conservation and Management Plan provides a laundry list of needed habitat restoration actions, all of which have been accomplished through voluntary actions. Likely activities to achieve our desired outcomes in the target basins include:

Connectivity. Improve road:stream crossings so that 100% will pass anadromous fish for all life stages: remove unneeded crossings; replace culverts with bridges; upgraded culverts will be 1.5 times active channel width (ACW). In tidal areas: remove dikes and tide gates; where removal is not practical due to need to protect infrastructure, all stream-mouth and all tributary tide gates greater than 48" in diameter will be fitted with muted tide regulators (MTR) or similar fish-passage devices; tide gates 48" or smaller will be fitted with light-weight aluminum side-hinged tide gates.

Sediment Reduction. Unneeded roads will be decommissioned. Hydrologic-connectivity between the remaining roads and streams will be reduced to less than 15% watershed-wide, using Oregon Department of Forestry (ODF) Best Management Practices for ditch relief spacing. All stream crossing culverts that do not pass 100-year storms will be replaced to reduce fill-failure risks. Stream banks will be revegetated, and bio-engineered bank protection will be installed if needed.

Complexity. Large wood will be placed where ACW is less than 30 feet. Constructed log jams will be installed in mainstems and larger channels to mimic effects of natural landsliding. Tidal and estuarine channels will be configured to provide velocity refugia and cover. Straightened channels will be remeandered where possible.

Riparian Areas and Wetlands. Streambanks will be revegetated (utilizing CREP when possible) with a mosaic of native species of trees and shrubs suitable for the site. Beaver will be encouraged through plantings and infrastructure protected consistent with landowner management objectives. Freshwater and estuarine wetland restoration opportunities will be sought; partnerships with DSL and U.S. Fish & Wildlife Service will be established to provide funding.

3. **Should the proposed priority be divided into geographic areas that are appropriate for partners to address?**

While the approach outlined here could be expanded to the entire Oregon coast, the focus on Tyee Sandstone lithography has restricted the geography, while the proposed scale of 5th field HUC basins will allow for multiple projects. The combination to encompass multiple species, multiple life histories, and the river continuum approach means that dividing into either specific habitat types (headwaters, mainstem, estuarine wetlands) or species (coho, Chinook, steelhead) would not be appropriate in the context of the proposed approach.

b) **Social:**

1. **Do partnerships exist to address the proposed priority?**

The *Oregon Plan* envisioned that local watershed councils would play a key role to implement conservation measures. After 20 years, many councils have risen to this challenge, while others still struggle. The FIP approach will reward those councils who have made the effort to build and sustain successful organizations, both in terms of restoration effectiveness as well as community support and partnerships with local landowners and managers. A key component of this success is the ability

of the council to bring divergent interests to the table, and produce outcomes beyond the ability of any single party to accomplish by itself.

2. **What social opportunities exist to address the proposed priority? Is there momentum built?**

One significant social opportunity is for locally developed TMDLs and their implementation consistent with the restoration approach outline here. Water quality—particularly temperature and sediment—are consistent concerns throughout the target project area, and are a key limiting factor for salmonid habitat, with temperature more critical in the summer and sediment (turbidity) of more concern after rains begin in the fall. The current "Implementation Ready" approach to TMDL development has encountered resistance in the Mid-coast; while in the Coos basin a collaborative approach is gaining momentum. A FIP in an area with cooperatively developed TMDL allocations would provide the "reasonable assurance" needed to pass muster.

3. **Describe educational benefits, if any**.

A successful FIP using this approach will provide a demonstration of the advantages of cooperative watershed restoration that can be used as outreach to other areas and situations.

4. **Summarize the social, community, political, regulatory or other factors that will help lead to the success of this proposed priority**.

This topic has been largely discussed above. One key constraint that we're facing in our work is the inability to offer lowland owners (and local agencies) anything in exchange for their cooperation in salmon recovery. To be successful, this FIP approach will need regulatory agencies to be active participants and to become open to allowing cooperative approaches to achieve desired outcomes.

5. **What can be leveraged to address the proposed priority (funding, acreage impacts, and other resources)?**

Suitable FIP applicants should be able to demonstrate adequate funding leverage from their partners, including private ones. Overall, we usually have 40% - 60% match (both cash and in-kind) for restoration projects, with the percentage depending upon the relative benefits received by each party. Given the "portfolio approach" outlined in this proposal, it is likely that private landowners will be willing to contribute more cash towards project features that more directly affect their operations (i.e., road improvements), while being more willing to make in-kind contributions for other types of restoration (i.e., wood and boulders for instream habitat complexity). The key is to indentify "joint benefits" and determine each party's willingness to pay for these.

c) **Economic Benefits: Describe the economic benefits of addressing the ecological proposed priority, including ecosystem services.**

We discussed public benefit valuation in response to question 2b. At the HUC 5th field basin level, there will be ecological service benefits related to fish passage, salmon habitat, temperature and sediment, although these have not been commonly applied at the basin (as opposed to project) level. There are also programs, such as the DEQ's State Revolving Fund, that allow a community to fund water quality improvement projects in exchange for loan repayments; we are working with the City of Coos Bay on their $2 million program. There are two additional economic (and social) benefits worth identifying: (1) the Ecosystem Workforce Development Project at the University of Oregon had determined the "multiplier" effect on incomes and jobs of watershed restoration projects (Nielsen-Pincus and Moseley 2010); and the increased capacity that will accrue to local organizations

through a FIP will lead to employment of staff whose demographics (age, education, etc.) will support the community's social network.

FOR ALL SUBMISSIONS: Assess the proposed priority by locating the proposed priority in one of the quadrants below.

In general, the focus outlined here lies within the left hand column: it's well understood what needs to be done to conserve and restore coastal Oregon fish communities. By-and-large, the problem is not one of knowledge; rather it's the hurdles involved in getting partnerships built and maintained so that there is a willingness to move forward. If these partnerships are strong, and the proposing entity has good organizational capacity, implementation should be relatively easy; if the partnerships and capacity are not in place, implementation will be difficult and the organization is probably not a good candidate for the FIP.

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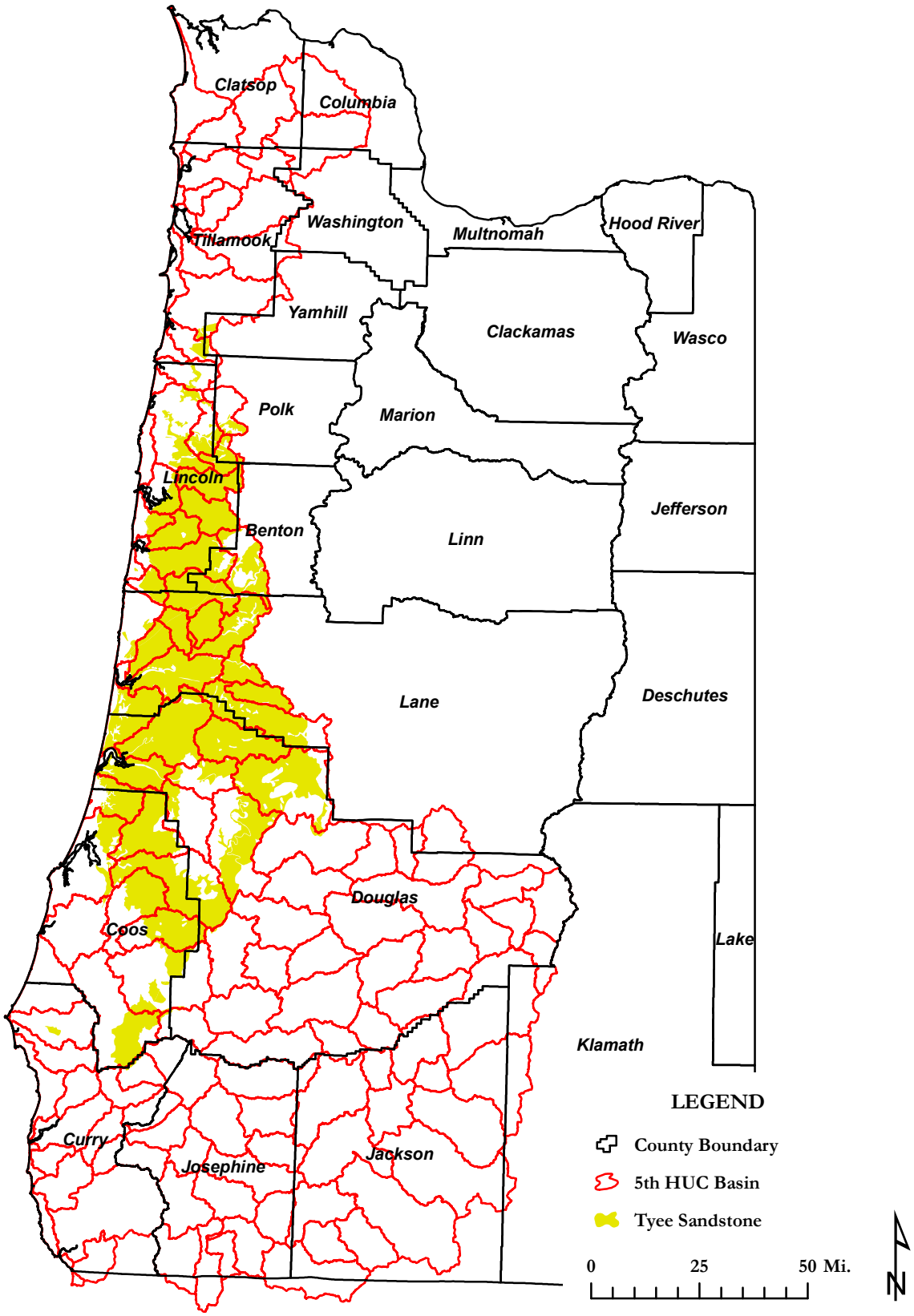
8. Supporting individuals or organizations.

Time limitations have precluded extensive outreach to individuals and organizations. Based on our experience, there are a number of watershed councils in the Tyee Sandstone zone who would be interested. Additionally, we have had discussions with the local DEQ water quality planner who will be responsible for TMDL development, and she is supportive. Because of the proposal's explicit linkage to ODFW's plans, we would expect them to be supportive, as would NOAA due to the linkage between the OCN Coho Recover Plan and ODFW's Coastal Coho Conservation Plan. Watershed councils typically work with the major timber companies within their boundaries: in our case that includes Weyerhaeuser, Roseburg Forest Products, Lone Rock, and Campbell Global. Agency partners include the Oregon Department of Forestry, who manage the Elliott State Forest, and the Bureau of Land Management for the Tioga Creek Tier 1 Key Watershed in the Northwest Forest Plan. Staff from the U.S.G.S. Oregon Water Sciences Center and the U.S.E.P.A. Corvallis Laboratory will likely continue to be interested in restoration of Tyee Sandstone basins.

Map 1. Extent of Tyee Sandstone geology in relation to HUC 5th field basins on the Oregon coast.