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Managing Riparian Forests in the Pacific Northwest: An Ongoing Debate about How Much is Enough

BY DR. GEORGE G. ICE, C.E., R.P.E., P.H.

Is it déjà vu all over again? For more than 50 years there has been an ongoing debate about how riparian forests should be managed in the Northwest to protect water quality and fish habitat. This issue of the *Western Forester* provides a quick update for foresters on where we are in this debate, what research activities are testing the effectiveness of riparian management activities, and what other efforts are underway to enhance riparian forests. This article provides an overview of key riparian functions, the long history of concerns in the Northwest, what regulations are already in place, some current controversies affecting decisions about appropriate riparian management practices, and key questions for the future.



Key riparian forest functions

First, something everyone can agree upon. Riparian forests provide key functions to adjacent streams. These functions include shade from adjacent and overhanging trees and shrubs that moderate water temperatures; vegetative cover, intact soils and litter layers, and roots that provide bank and channel stability; large wood recruitment to provide cover from fish predators and stream structure (e.g., pools); a source of fine allochthonous (land-based) organic matter including needles, leaves, and



PHOTO COURTESY OF GEORGE ICE

A riparian management area adjacent to a small- and medium-sized stream in the Oregon Coast Range.

small branches; terrestrial insects; and a cooler, more humid microclimate. Other functions may also be attributed to riparian forests, such as attenuation of flood waves and in-channel mass wasting (landslide) events, although the geometry of the channel/floodplain, and not the forest condition, is often more important for these.

Longstanding concerns about how best to manage riparian forests

Concerns about riparian forest management in the United States and its effects on water quality and quantity go back to the beginnings of professional forestry in this country. The

establishment of the National Forest System was largely justified by the need to protect favorable flows of water. Concerns about how forestry might be affecting fish habitat eventually led to paired watershed research in the late 1950s and 1960s at the Alsea Watershed Study near Toledo, Ore., and the H.J. Andrews Experimental Forest near Blue River, Ore.

The Alsea Watershed Study, in particular, showed that negative impacts to water temperature, suspended sediment, and dissolved oxygen concentrations could be minimized by retaining a riparian forest around fish-bearing streams. The H.J. Andrews study

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Managing Riparian Forests in the PNW

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confirmed much of what was observed at the Alsea, but also showed that for some events such as landslides originating outside the riparian area, riparian management could not avoid all negative impacts. Other measures, such as improved road construction

methods, were needed to complement buffers and other riparian practices.

After these early studies new concerns and research emerged. During the Alsea Watershed Study concerns were raised about how fresh slash could impact dissolved oxygen concentrations in streams. This finding and concerns about fish passage were used to support sometimes excessive stream cleanout of wood. The need to resupply large wood to forest streams was high-

lighted in two conferences held at Oregon State University in 1975 and 1977 (Debris in Streams I and II). Based on these changing perspectives and research findings there have been a series of revisions to the forest practices act rules for every Northwest state. These changing perspectives, rules, research, and ongoing debates have been addressed in past *Western Forester* articles. Key archived issues covering this subject include those from September/October 2002, March/April 2005, November/December 2010, and January/February 2013 and are available at www.forestry.org/northwest/westernforester/.

Comparison of state riparian forest rules

A full comparison of riparian rules for Northwest states is beyond the scope of this article, but all four states have detailed riparian rules governing forest management near streams and other waterbodies.

Alaska's rules tend to provide more protection for streams with anadromous fish and low-gradient or unconfined channels. A riparian management zone of 100 feet can be required for the most protected streams with a no harvest zone of 66 feet. For streams without anadromous fish, special water-quality protection measures are required for a width of 50 to 100 feet around a waterbody including retention of low-value timber within 25 feet of the water. Additional BMPs for harvesting, yarding, and timber-felling apply if there are unstable slopes near streams.

Idaho has established 75-foot-wide tree retention buffers around fish-bearing streams with two basic options based on relative stocking density. Relative stocking is a comparison of the actual stand density to the biological maximum for a forest type. The 60-30 option requires more trees be retained within the first 25 feet of the stream, with 60% of the biological maximum being the target in this zone. The 60-10 option retains the same target within the first 50 feet but allows harvesting to 10% of relative stocking in the next 25 feet.

Oregon requires riparian management areas (RMAs) of 50, 70, or 100



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Next Issue: Fuel Treatments

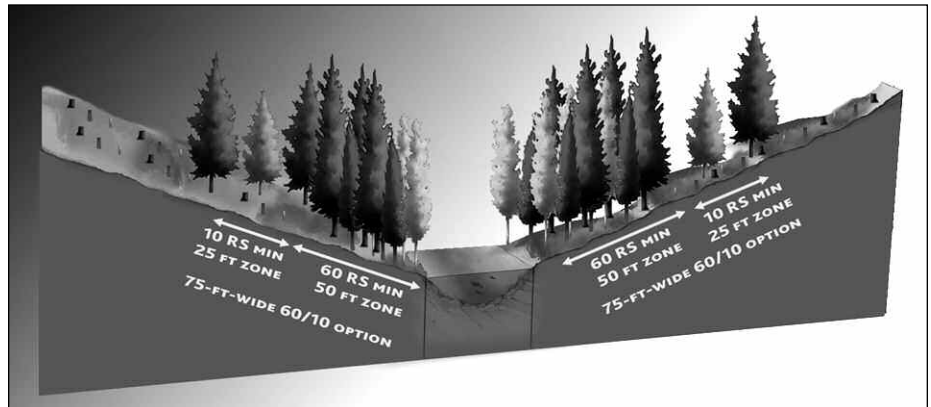
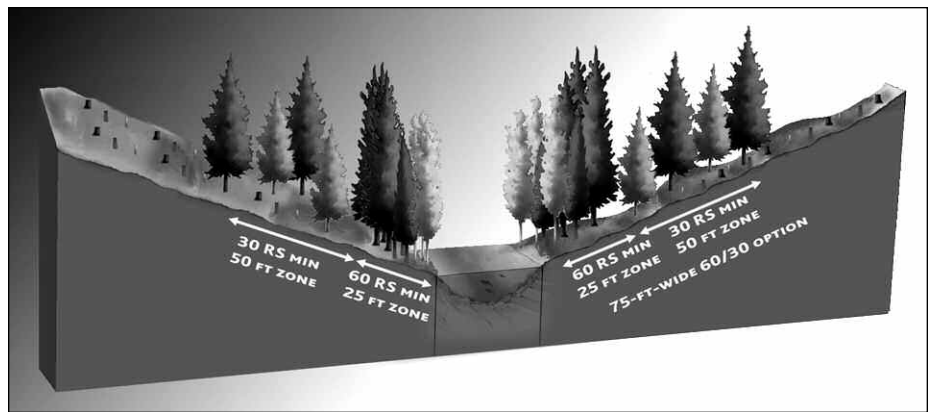
feet around fish-bearing streams, depending on stream size. All trees within 20 feet of the stream or that lean over the stream must be left. Additional tree retention requirements within the RMAs are based on basal area values designed to achieve mature forest conditions and provide large wood recruitment. Landowners are also encouraged to leave required wildlife trees in the riparian area.

Washington's rules for fish-bearing streams include three zones: a core zone of 30-50 feet where no harvest is allowed; an inner zone of 10-100 feet, depending on stream size and forest site potential, where basal area retention is designed to meet Desired Future Condition targets; and an outer zone of 22-67 feet with additional targeted tree retention. Washington's rules also require some tree retention adjacent to non-fish bearing reaches with an emphasis on the first 300-500 feet above fish-bearing reaches.

With all these state rules there are conditions and situations that can require additional protection.

Current controversies about riparian forests

Recent and ongoing research on the effectiveness of alternative forest management practices is described further in this *Western Forester* issue. Research results can't come too soon. There are numerous ongoing technical and legal debates influencing future manage-



IMAGES COURTESY OF ARA ANDREA

These figures show the two new Forest Practices Act rules options for Idaho's forested riparian areas.

ment of riparian forests.

Oregon Forest Practices Act rule revisions: One hot topic is the Oregon Board of Forestry's (OBOF) deliberations on new riparian rules to address findings from the RipStream Study and the Watersheds Research Cooperative (watershedsresearch.org). In Oregon,

compliance with the forest practices act (FPA) rules is considered equivalent to meeting state water quality standards. There is evidence that small changes in water temperature probably occur as a result of the current practices. There is also evidence that these changes are benign or even beneficial to fish. The OBOF is required to choose the least burdensome alternative to meet this water quality standard. By statute, the OBOF must also ensure that the rule benefits are proportional to the harm caused by forest practices (see excellent commentary by Dr. Paul Adams in the June/July/August 2015 issue of the *Western Forester*).

Federal legislation and oversight: No state operates completely autonomously. Key federal legislation affecting riparian management includes the *Clean Water Act* (CWA, requiring states to develop point and nonpoint source pollution control programs like the forest practices acts of Alaska, Idaho, Oregon, and Washington); *Coastal Zone Management Act* (CZMA, providing funds to states having approved coastal

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PHOTO COURTESY OF DOUG MARTIN

Retention of riparian buffers along salmon-bearing streams in the Eagle Creek basin on north Chichagof Island in Southeast Alaska. Buffers are a minimum of 66 feet wide; wider areas are buffers associated with adjacent slope breaks, low value timber, and wetlands.

pollution control management plans); and *Endangered Species Act* (ESA, which identifies species or subpopulations needing additional protection to avoid “taking”).

Oversight by federal agencies of state programs and regulations can be powerful. For example, nonpoint source control programs for forestry in the Northwest have strong similarities largely because all four states are administered by Region X of the United States Environmental Protection Agency (EPA). Five current riparian forest issues are strongly influenced by this oversight: (1) interpretation of water quality standards; (2) the development of total maximum daily loads (TMDLs) for streams listed as impaired for water quality; (3) federal assessment of Oregon's FPA rules under the CZMA; (4) ongoing listings and assessments of riparian species under ESA; and (5) new regulations designed to clarify the extent of Waters of the United States.

Anti-degradation standards for water quality: EPA provides guidance and ultimately must approve state-

adopted water quality standards. One required component of water quality standards is an anti-degradation element designed to protect high-quality water that would otherwise meet biologically-based criteria. The Protect Cold Water Standard (PCWS) in Oregon is such a standard. It prohibits human activities from increasing water temperatures by more than 0.3°C even if the water would otherwise meet temperature criteria.

The dilemma for the OBOF, described earlier, is how to respond to small, temporary changes in water quality that rapidly decrease downstream when fish populations seem to even benefit from this level of disturbance. Foresters recognize that disturbance is essential to maintain desirable forest conditions and this concept of a cycle of disturbance and recovery needs to be factored into riparian management rules and even water quality standards applied to forests. Two options have been proposed: (1) adopting state policies where small, brief, and infrequent exceedances of

water quality standards do not trigger classifications of water bodies as impaired (currently the policy in Idaho for certain conventional pollutants like temperature); and (2) characterizing forest management impacts, not just for immediate response, but over the full rotation or cutting cycle.

Total Maximum Daily Load assessments: Under the CWA, states are required to develop TMDL assessments for streams and other waterbodies identified as impaired for water quality and not protecting beneficial uses (like fish or drinking water). TMDLs are designed to calculate the pollution loads from point (e.g., factories) and nonpoint source (e.g., forestry or agricultural) activities and determine what reductions are necessary to protect beneficial uses. Based on TMDL calculations, additional regulations beyond FPA rules may be required in certain watersheds. As an example, the 2012 Addendum to the South Fork of the Salmon River TMDL finds subbasins not meeting temperature water quality standards, largely due to recent forest wildfires. Target shade levels are set for individual reaches as part of this TMDL addendum and could affect future riparian management until recovery occurs.

Coastal Zone Management Act: States receive financial support from EPA to encourage the development of approved pollution control management plans under CZMA. EPA Region X has not fully accepted Oregon's coastal program. While EPA lists several elements of concern, the adequacy of the Oregon FPA rules for riparian areas is central to this debate. EPA has made comparisons between the riparian rules under the FPAs for Oregon, Washington, and California, suggesting that the OFPA rules are less than those from other states. There is a “law of diminishing returns” with buffers, so the biggest benefits come immediately adjacent to the stream. Arguments should be about how to effectively and efficiently protect water/fisheries resources and not which states have stricter riparian rules. A more convincing argument would be that trout and salmon populations from forestlands in Oregon show declines compared to California and Washington, but this does not seem to be the case.

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ESA listings: Special management measures can be required to avoid incidental taking of species listed under the ESA. As an example, in May the Center for Biological Diversity filed a notice of intent to sue the National Marine Fisheries Service (NOAA) over that agency's actions to recover the Oregon Coastal Coho Salmon Endangered Species Unit. This notice specifically targeted forest practices and cited a NOAA assessment that logging operations are "likely to reduce stream shade, slow the recruitment of large woody debris, and add fine sediment." A number of riparian forest species including the Cascade torrent salamander and Columbia torrent salamander were recently identified for possible listing (See <http://1.usa.gov/1jy9qRi>). The Washington FPA and program are the key components of a statewide Habitat Conservation Plan for ESA-listed fish species on state and private forests in that state.

Waters of the United States: There is currently an ongoing technical, legal, and political debate about the extent of Waters of the United States (WOTUS) under the CWA. EPA has just release

new rules stating that streams, no matter how small or ephemeral, are categorically WOTUS. This rule could influence forest riparian management by applying water quality standards and forest practices regulations to headwater reaches, even when the downstream connections are weak and ephemeral. For additional information on the WOTUS rule visit: www2.epa.gov/clean-waterrule/final-clean-water-rule.

Key questions for the future

There will always be new challenges and information needs about how to manage riparian forests. Some key questions we need to address include:

- What stream/forest characteristics are important to fit riparian management regulations to unique site-specific conditions?
- How do we maintain favorable riparian forest conditions in both the short and long run?
- Can we manage riparian forests to enhance fish populations?
- Can active management practices like wood placement be used effectively to meet stream needs such as wood recruitment?

• Can we develop incentives to private landowners to actively manage riparian forests?

• How much is enough when we establish riparian management dimensions, including the width, extent of the stream network, and practices allowed?

• What is practicable and least burdensome?

Comparing research results from historic and current studies, it is clear that we have made tremendous progress reducing water quality impacts from forest management. Riparian management rules are a large part of that improvement. But we are in an ongoing cycle of monitoring, research, and debates about forest riparian management practices and the most efficient way to achieve environmental and social/economic goals. ♦

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Aquatic Ecosystem Response to Management in Riparian Areas of Pacific Northwest Working Forests

BY MARYANNE REITER

"The current concern about the impact of logging on water and fish is not new, as many people wish to believe."

—G.W. Brown, 1972, early researcher on the Alsea watershed studies

While concern over the impact of logging practices on water and fish was not new in 1972, what was new at the time was the approach the Alsea Watershed Study used to examine those concerns. The study was done at the watershed scale, not just on a small reach, and it examined logging effects on water and fish at the same time instead of in isolation. This approach allowed the scientists to start linking physical effects with biological responses—a method we still use over 50 years later.

Since the original Alsea Watershed study, forest practices and the instrumentation and techniques to measure their effects have changed dramatically. Several studies initiated in the past decade have examined a range of practices including timber harvest, road construction, and site preparation (e.g., herbicide application) as well as a broad range of responses from sediment to water quantity to fish. This article provides a brief overview of studies on working forest landscapes of the Pacific Northwest that are measuring how riparian pro-



PHOTO COURTESY OF EMILY ROSKAM

Amphibian researchers in the Trask Watershed study.

tections affect aquatic ecosystems and focuses on a few key stream responses to management.

Overview of research efforts on private forestland: Who is doing what where?

The multitude of stream studies being conducted range in size from larger watersheds that may have smaller watersheds within them, to small basins and down to the reach scale. The scale of the study depends on the questions being asked, and of course, the resources available to answer the questions. Larger, nested-watershed studies are needed to evaluate whether local practices have downstream effects. But if the question involves understanding the variability of a practice across a large area, then a reach-scale study is appropriate since they are generally smaller and can be imple-

mented more widely. The following describes the current studies in Oregon, Washington, Idaho, and Alaska that are evaluating aquatic ecosystem response to forest management.

Cooperative, multi-disciplinary long-term watershed scale studies

Four major watershed scale studies are being conducted by universities in cooperation with landowners and agencies (see Table 1). The goal of these watershed studies is to examine the effects of contemporary forest practices on water quantity and quality (e.g., sediment, temperature, nutrients, etc.) and aquatic biota (e.g., periphyton, macroinvertebrates, amphibians, and fish) across intensively managed forest landscapes. Many of these studies evaluate both local responses (harvest unit or road crossing) as well as whether effects are transported downstream in order to explore any offsite impacts. These watershed studies are critical to understanding actual biological responses and the underlying processes that govern those responses, which is key to predicting long-term and widespread management effects rather than just assuming a biological response from a single parameter



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Table 1. Selected studies examining the effects of contemporary forest practices on aquatic ecosystems in the Pacific Northwest.

State, study name, and landowners	Experimental design	Harvest treatments and riparian buffer widths (each side)	What was measured instream?*
Cooperative Watershed Scale Studies			
Idaho: Mica Creek - Potlatch Corporation	Nested, paired watershed; BACI	Clearcut, partial cut. Non-fish: 30 ft equip. exclusion. Fish streams: 75 ft.	A, F, M, N, SF, S&T, T
Oregon: Hinkle Creek - Roseburg Forest Products	Nested, paired watershed; BACI	No overstory buffers on non-fish streams; up to 100 ft on fish streams	A, F, M, N, SF, S&T, T
Oregon: Alsea Watershed Study - Plum Creek	Paired watershed; BACI	Small fish-bearing stream 50 ft buffer	C, DO, F, M, N, SF, S&T, T
Oregon: Trask Watershed Study - ODF, BLM, and Weyerhaeuser Co.	Nested, paired watershed; BACI	Non-fish streams: 0 ft to 25 ft.	A, DO, F, M, N, OM, P, SF, S&T, T
Agency/University Studies			
Alaska: Riparian Management Evaluation in Coastal Working Forests - Martin and Shelly, Martin Environmental	Stream reach; BACI and studies where there are no control reaches	Fish streams: 65 ft standard or 100-220 ft for wide buffers	CHN, LW, T
Oregon-RipStream - ODF, various Coast Range landowners.	Stream reach; BACI	Fish streams: 50 ft to 70 ft on private sites	LW, T
Washington-Type N and F Buffer Effectiveness Studies - various private landowners	Small watersheds; BACI	Non-fish streams: 0 ft to 50 ft; fish streams (eastside): 75 ft for shade	A, F, LW, M, N, OM, SF, S&T, T
* A=amphibians, C=chemicals, CHN=channel/habitat, DO=dissolved oxygen, F=fish, LW=large wood, M=macroinvertebrates, N=nutrients, OM=organic matter, P=periphyton, SF=streamflow, S&T= sediment and/or turbidity, T=temperature			

response such as temperature.

In Oregon, three of the contemporary watershed-scale studies have been organized under the Watersheds Research Cooperative at Oregon State University (watershedsresearch.org/). These studies include collaborators from research organizations, including Oregon State University, state and federal agencies, and landowners (Table 1 shows more detail on the various studies). In northern Idaho the Mica Creek experimental watershed (www.web-pages.uidaho.edu/micacreek/index.htm) began collecting long-term data in 1991. The study was done in cooperation with Potlatch Corporation and the University of Idaho.

These four watershed studies generally used a nested, paired design, meaning there were small watersheds within the larger watershed and that

some of the study basins were not harvested so they could be used as a reference. The studies measured ecosystem parameters before harvest to compare to post-harvest response, which is termed a before-after/control-impact (BACI) design.

Agency studies

State forestry departments also sponsor and conduct research and monitoring efforts to evaluate the efficacy of their forest practices rules. In Oregon, the Oregon Department of Forestry (ODF) conducted a multi-year study across the Coast Range to examine the effects of forest harvest on stream temperature and large wood recruitment; the results of that study has led to a re-assessment of small and medium stream buffers on private forests (www.oregon.gov/ODF/Board/Documents/RFPC/RipStreamProject.pdf).

In Washington, the state Forest Practices Board established the Cooperative Monitoring, Evaluation and Research Committee (CMER) to provide the science needed to support their adaptive management program. CMER currently has several studies focused on the effects of riparian management for both non-fish and fish streams (<http://1.usa.gov/1KbE0pd>).

A similar effort has been ongoing in Alaska where the effectiveness of the forest practices act for protecting aquatic ecosystem characteristics has been evaluated over the last 18 years. Participants in this monitoring program include private landowners, the Alaska Department of Natural Resources, and Department of Environmental Conservation.

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Resources

In addition to the information on the study websites indicated in the article, below are some other sources of recent information.

Alaska Research Reports: <http://forestry.alaska.gov/forestpractices.htm#eff>

American Fisheries Society 2015 Meeting Session: Effects of Contemporary Forest Management Practices on the Physical, Chemical, and Biological Characteristics of Headwater Streams: <https://afs.confex.com/afs/2015/webprogram/Session3474.html>

Washington Stream Temperature Research: <https://fortress.wa.gov/ecy/publications/SummaryPages/1203020.html>

Findings on various topics

The following is a brief summary with a focus on the biological response of the results and initial findings from the various research and monitoring efforts (see sidebar for additional information).

Fish. Fish response to management varied with proximity of the harvest treatment to the stream reaches where fish were present. At Hinkle Creek, harvest along headwater streams resulted in no change in density or biomass of age 0 and age 1+ cutthroat trout and no detectable changes in habitat. Subsequent harvest with buffers along fish-bearing stream reaches resulted in increases in fish size and growth.

The cutthroat trout in the Alsea study showed increased biomass, and abundance after timber harvest, which was largely a result of the increased number of young fish. This study also found that harvest effects are localized (proximal to streamside harvest). The Alsea age 0 trout also showed no evidence of treatment effect on abundance or biomass but mean fork length declined somewhat after harvest. The Alsea coho salmon showed no evidence of a management effect on abundance, biomass, mean size, distribution, or condition. For both Hinkle and Alsea there were also very

few measurable changes in habitat as a result of timber harvest with buffers.

Trout one year and older in Mica Creek showed the greatest post-harvest increase in density response immediately downstream of the clearcut watershed, with lesser increases below the partially harvested reach. Mica Creek researchers speculated that fish density increased in the harvest units relative to the reference streams due to increased primary productivity, more flow, and earlier season increases in water temperature.

Amphibians. Three of the studies examined the response of amphibians to timber harvest (Hinkle, Trask and CMER Type N). The species examined included Pacific giant salamanders, torrent salamanders, and coastal tailed frogs, depending on the site. Responses varied among studies, species, and buffer treatment. For example, preliminary findings in the Trask study indicate that there was no response to harvest in Pacific giant salamander density but a consistent increase in growth rate. In contrast, the Washington Type N study found a decrease in density of that species at sites with a 50-ft no-touch buffer for 50% of the stream length, but no change at sites with a 50-ft buffer for 100% of the stream length or at sites where no overstory buffer was retained. In Hinkle Creek there was no apparent

response of Pacific giant salamanders to harvest treatments.

The response of the other amphibian species studied in Washington, i.e., coastal tailed frogs and torrent salamanders, varied depending on treatment. For streams with no overstory buffer retained there was no change in density of coastal tailed frog larvae, an increase in coastal tailed frog adults, and an increase in torrent salamanders. For the streams with a 50-ft no-touch buffer over 50% of the treatment reach length there were positive density responses in tailed frog larvae but no change in the tailed frog adults and torrent salamanders. At sites with a 50-ft buffer along 100% of the channel, tailed frog density increased but the other species did not change.

Macroinvertebrates. The CMER study in Washington found that there was no significant change in macroinvertebrate drift and no large shifts in community composition in the harvested watersheds (all riparian treatments) relative to the reference watersheds. This is similar to the results found in Mica Creek where functional feeding groups and species diversity were relatively unresponsive in streams below areas that experienced road construction and timber harvest.

For the small, non-fish headwater and mainstream fish-bearing sites in Hinkle Creek, changes in macroinvertebrates after timber harvest included a decrease in taxa richness; an increase in the percent of some species; and an increase in the rate of adult aquatic insect emergence. These changes were observed adjacent to harvest activities with no changes in macroinvertebrates detected downstream.

Similarly, initial results from the Trask study indicate that macroinvertebrates have a local response following harvest with the degree of change related to the degree of riparian canopy removal.

Temperature. Temperature responses of small, non-fish streams varied by stream, harvest, and riparian buffer characteristics. Riparian overstory buffer requirements for this class of stream ranged from 0 to 50-ft wide, depending on state rules and study design, with harvest treatments including clearcut and partial cut.

Results from these studies indicate

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that changes in temperature for streams without a riparian overstory buffer ranged from a 1.6°C decrease to a 3.6°C increase in daily maximum temperatures. The lack of temperature response in some small streams was potentially due to increases in stream-flow following harvest as well as residual shade from low shrubs or slash.

For studies measuring stream temperatures downstream of these small headwater streams, there were no significant increases in fish-bearing reaches as a result of upstream harvest. For example, at Mica Creek riparian buffers effectively ameliorated any upstream harvest effect on summer temperature since no changes in downstream temperatures were observed. An Oregon fish-bearing reach study with 50-ft to 70-ft wide buffers found that average daily maximum temperature increased 0.7°C. Average daily maximum temperatures for fish-bearing reaches in eastern Washington, where all available shade must be maintained within 75 ft of the channel, the average increase was 0.2°C. In Alaska, while temperatures were significantly higher in the study reaches, the increases were very small (<1.0°C).

Summary

In the last decade numerous long-term studies have been initiated that focused on quantifying the effects of contemporary stream protection practices on aquatic ecosystems in the Pacific Northwest. These ongoing studies have examined small- to large-stream systems in order to understand the interaction of aquatic ecology and watershed-scale management across the working forest landscape. What they have found is that contemporary forest management effects are dramati-

cally different than historic practices and are often within natural background variability. The initial results from studies examining fish dynamics have indicated that there is no apparent downstream fish response to upstream harvest of non-fish streams. Timber harvests along fish-bearing streams have generally shown a positive response in growth and/or density. Likewise, preliminary data shows that amphibians and macroinvertebrates had little immediate response to harvest even in streams where no overstory was retained. Stream temperature response varied from no

change or a decrease to an increase of a few degrees.

These studies, taken together, indicate that while there are detectable changes in physical parameters, current riparian and upland management practices do not appear to negatively impact the aquatic ecosystems of the working forest landscape streams. ♦

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The Science of 50-foot Riparian Buffers in Headwaters

BY DEANNA (Dede) H. OLSON

One hop and I can cross the stream at many of my managed-forest study sites. These headwaters may appear insubstantial in comparison to the rushing waters downstream, but after 20 years of research the complexities of these small streams and their adjoining riparian zones are being revealed. In western Oregon headwater streams, I have been conducting studies of the effects of alternative riparian buffer widths with upland forest thinning on aquatic and riparian habitats and animals.

A wealth of knowledge continues to emerge from this work, with many different conditions and processes at play around the edges—specifically within 50 feet of the stream edge and 50 feet from the upland buffer edge toward the water. A 50-ft minimum buffer width with upland thinning is gaining support for retaining or restoring a host of aquatic-riparian conditions. For me, that's about 16 steps upslope. For some organisms, it's home territory for a lifetime.

I am part of an interagency team implementing the Density Management and Riparian Buffer Study of western Oregon (see Figure 1). In 1993, we considered what forestry information might be needed in 20 years' time and envisioned the need for more science on the efficacy of different buffer widths around small streams to retain aquatic-riparian values in the context of upland thinning. This need rang true given that much of the moist forest landscape was in early clearcuts, small streams were



numerous, and there was uncertainty about exactly what the key ecological values were in those headwater drainages. My contribution has been to design the riparian buffer component and focus on studying the aquatic habitats and vertebrates in those managed headwaters before and after two upland thinnings.

Pre-treatment, we characterized stream habitats and inhabitants at the managed-forest study sites where stands were 30-80 years old, naturally regenerated after clearcutting. We found 15 aquatic-dependent vertebrates in and along banks of our streams, each with unique habitat associations, and most streams were

spatially discontinuous, going subsurface for short distances. An upland thinning treatment reduced dense overstories to 80 trees per acre, with skips and gaps for added structural heterogeneity. Along streams, 1 of 4 no-entry buffer zones (see Figure 2) were delineated: the one and two site-potential tree-height buffers of the federal Northwest Forest Plan, and two alternatives—a 50-foot minimum-width buffer that varied in width with site conditions (unique trees, steep slopes, seeps) and a 20-foot buffer designed to retain streambank stability. Also, no-harvest control units were designated, yielding a before-after-control-impact study design implemented at 13 sites from Mount Hood to Coos Bay. Today, 8 sites have persisted through the second thinning (~12 years after the first thinning), reducing the largest overstory trees to 30 trees

per acre. In this region, the density of the largest trees in late-successional and old-growth forests can be less than 30 trees per acre. At this entry we aimed to retain accelerated tree growth of under- and over-story trees.

The value of the 50-foot minimum buffers in the context of this dual thinning harvest has emerged from several related studies. First, we saw a buffer effect on species. Two salamanders exhibited reduced counts in and along streams with the 20-foot buffer: Dunn's salamanders (*Plethodon dunni*) along stream banks within ~6 feet of water 10 years after the first thinning and 1 year after the second thinning, and instream torrent salamanders (*Rhyacotriton* spp., Figure 3) 1 year after the second thinning. Both taxa had increased counts along streams with the 50-foot minimum buffer and the one-tree buffer after the second thinning. These salamanders are northwest endemic species of concern. Relative to all the species in our study, torrent salamanders were indicators of discontinuous streams in our headwater systems and downstream they appear to be displaced by predatory coastal

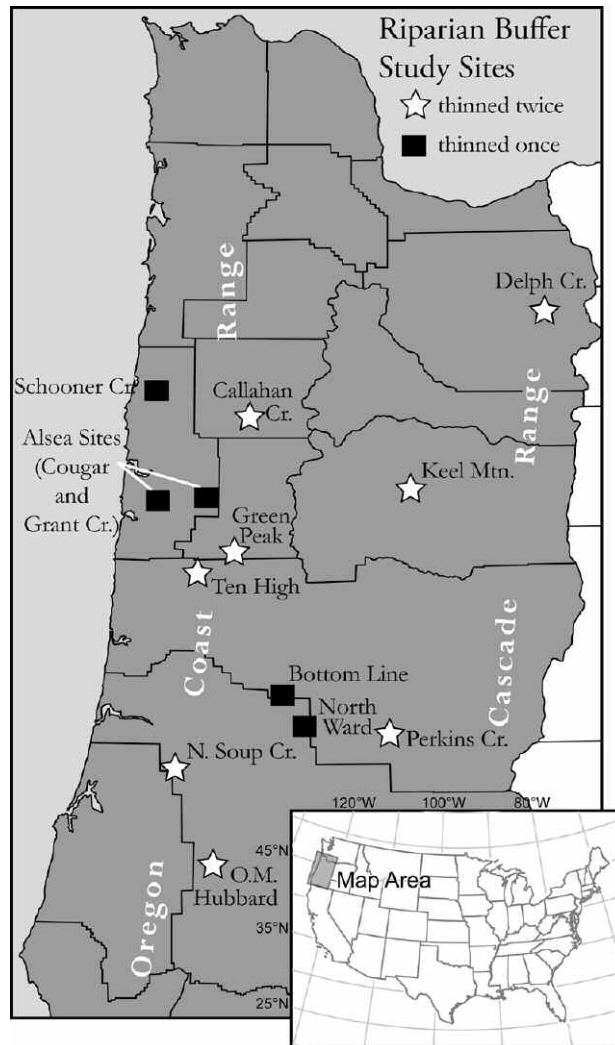
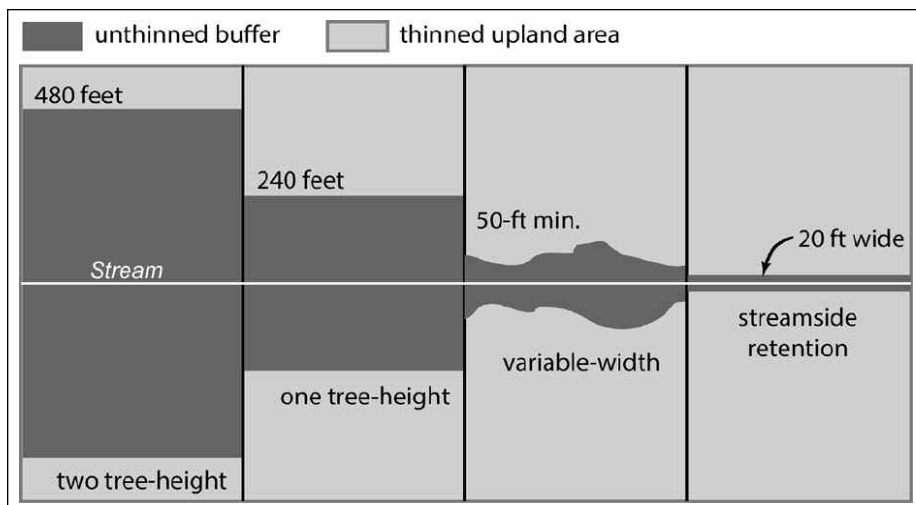


Figure 1.

SOURCE: KATHRYN RONNENBERG, US FOREST SERVICE, PACIFIC NORTHWEST RESEARCH STATION



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Figure 2. Four stream-riparian buffer widths examined with upland thinning.

giant salamanders (*Dicamptodon tenebrosus*) and fish. Two of the four torrent salamander species in the region are currently under consideration for listing as US threatened or endangered species.

Woodland salamanders (family Plethodontidae) live on the forest floor and never need to be immersed in water. Studies of this assemblage at a subset of our sites revealed a thinning effect 2 years after the first thinning at 1 of 2 sites, and no thinning effect after 5-6 years at 3 sites. Importantly, we found that western red-backed salamanders (*Plethodon vehiculum*) most often occurred within 16 feet of water, and *Ensatina* (*Ensatina eschscholtzii*) were most often found between 32 and 50 feet from streams. In a mark-recapture study, we found more salamander movements within ~50 feet of streams. The riparian zone within 50 feet of streams appears to be a structured salamander metropolis almost like an I-5 corridor! Centrally nested in food webs, these animals are indica-

tors of a larger community thriving along streams. A 50-foot minimum width no-entry buffer would benefit this riparian assemblage.

Instream habitats were retained with buffers, with one exception. More early-decay-stage wood was found in streams with the 20-foot buffer. Hence, an expectation that wide buffers would provide down wood by self-thinning over time has not been supported by our study, or at least not yet.

Other "50-foot patterns" have emerged. Over 80% of our instream wood that we could trace to source trees came from within 50 feet of streams. Our study of riparian tree growth detected an edge effect of

accelerated growth extending 50-feet into the no-entry buffer from the upland thinning edge. This means that riparian forest restoration can be accelerated by adjacent thinning, for example, growing larger trees faster for future large down wood recruitment. Lastly, microclimate analyses conducted by colleague Paul Anderson of PNW show that there is a zone ~50-feet wide along streams where the steepest "stream effect" gradient occurs, the zone of cool, moist conditions that attenuates as you step away from streams, and that through two thinnings, water temperature has not been affected with any buffer.

Thus, a 50-foot minimum buffer with upland thinning retains or restores several headwater aquatic-riparian values, including animals and habitat conditions. As a scientist, I am ready to test this buffer in different contexts—we have moved one step forward in forest buffer designs and at this reset point, a few more steps up that science slope are now needed.

For more reading visit www.fs.fed.us/pnw/lwm/aem/people/olson.html. ♦

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PHOTO COURTESY OF WILLIAM P. LEONARD

Figure 3. After two thinning harvests, fewer torrent salamanders (*Rhyacotriton* spp.) were found in streams with the narrowest buffer (20-feet wide), and more were found in streams with the 50-foot minimum-width buffer.

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Streamside Management Rule—Idaho Experience

BY TERRANCE W. CUNDY,
DALE MCGREER, AND ARA ANDREA

On July 1, 2014, Idaho changed its streamside management rule for tree retention requirements next to fish-bearing streams. The goal of this article is to provide an overview of the key points in developing this new rule. Given our limited space, the details of the new rule are not provided here; however, the rule in its complete form, along with supporting information, is available at www.idl.idaho.gov/forestry/fpa/shade-rule/index.html.

In Idaho, the silvicultural Best Management Practices (BMPs) are statutorily defined in the Idaho Forest Practices Act administrative rules (Forest Practices Rules), and the Idaho Department of Lands (IDL) administers these Forest Practices Rules. Revision of the Forest Practices Rules is initiated by the Idaho Forest Practices Act Advisory Committee (FPAAC), an advisory committee consisting of nine voting members, which include a fisheries biologist, a non-industrial private forest landowner, two forest landowners, two forest operators, two informed citizens, and an at-large member. Non-voting members include a private forestry consultant, USDA Forest Service hydrologist, and an Idaho Department of Environmental Quality (IDEQ) manager. IDEQ leads a statewide audit of forest operations every four years to monitor overall compliance with these BMPs. To a lesser degree, effectiveness, completeness, and logical consistency are evaluated. Following each audit, IDEQ generates rule-change recommendations, then



Terrance W. Cundy



Dale McGreer



Ara Andrea

FPAAC works with IDL to promulgate rule changes to address these recommendations.

Concerns regarding the streamside tree retention rule began in 2000 with the IDEQ audit. Following the 2004 audit, IDEQ provided FPAAC and IDL recommendations for changing the streamside tree retention rule. The shade rule, at that time, was quite simple: "Leave 75% of the current shade..." This rule had been in place since 1976 with some minor rewording over the years. Three concerns with the rule were identified by IDEQ following these two audits:

1. There was no minimum quantitative requirement for shade;
2. There was no clear scientific basis for the rule; and
3. As written, the rule theoretically allowed repeated re-entry to streamside stands that could drive shade to near zero.

It is important to note that compliance with the shade rule, during either audit, was not an issue. In addition, IDL Forest Practices inspectors were not observing rule abuses of repeated re-entry. Thus, the driving factor for revision of the rule was simply that there was no minimum requirement for a measurable amount of stream shade. Obviously, in today's regulatory environment, any new rule would need to

address the second concern of having a clear scientific basis. However, the final important factors in developing a new rule are more subtle and include simplicity and operational feasibility. Combined, these factors resulted in a process that took over 10 years to complete and included a number of failed attempts.

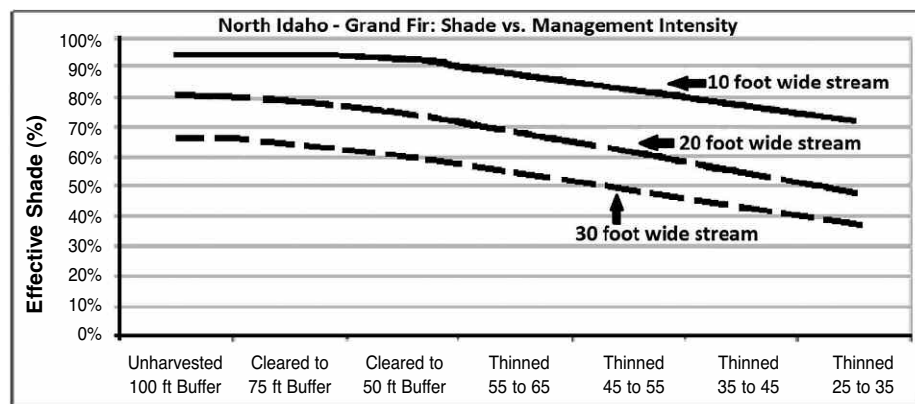
Scientific basis of the new rule

The constraints of the new streamside tree retention rule, agreed upon by FPAAC, were:

- The desired condition for streamside areas is a relatively mature, healthy forest;
- The rule should explicitly address the variety of forest types in Idaho;
- The rule should promote stewardship of streamside areas, that is, it should protect stream resources (in particular shade) and encourage active management; and
- The rule should be simple to implement.

To meet these constraints and to ensure scientific rigor, both field data and modeling analyses were used. IDL retained outside professional consulting for this work.

To address the variety of forest types in Idaho, existing field data on forest type and stand tables for streamside areas were used. The goal was to recognize that streams under different forest



SOURCE: CRAMER FISH SCIENCES

Figure 1. Modeled shade over streams of three different widths and several different management intensities. Starting left to right on the figure, the "benchmark" for shade was a 100 foot wide (each side) buffer, with no harvest inside the buffer. The next increment of management was to reduce the buffer width to 75 feet (each side), again with no harvest inside the buffer. The third increment was to reduce the buffer width to 50 feet (each side), with no harvest inside. The next increments reflect a 50 foot (each side) buffer, with harvest inside the buffer reducing a relative density score to various ranges.

types in different parts of the state have different levels of shade. In the end, five forest type-geographical combinations were identified: north Idaho grand fir; central Idaho grand fir; southern Idaho grand fir; western hemlock and sub-alpine fir; and Douglas-fir and ponderosa pine.

Model simulations were then completed in which the field-based stand tables were “harvested” to various extents and “re-grown” over time, and effective shade was calculated over streams of three different widths. Streamside stands were characterized by relative density (RD), a metric calculated from stand density index. The simulations were summarized in graphs, an example is shown in Figure 1.

While not discussed in detail here, it is important to note that the analyses also evaluated the accumulation of large woody debris. The evaluation showed that for the range of harvest intensities modeled, large woody debris was expected to increase in all cases. Therefore, the rule making could safely proceed based on shade protection only.

Reaching a decision on the new rule

Armed with information as in Figure 1, the decision for the committee, IDL, and ultimately the legislature, was: “Where do we want to land on the curve?” This is inherently a value question, not a scientific question. Every individual’s answer reflects a unique perception of the balance of risk and reward. Landowners tend to put more value on the short-term financial benefits from increased harvest; environmental advocates tend to put more value on reducing short-term risk of shade reduction and therefore prefer increased retention. This mix of perspectives is built into the composition of FPAAC.

In summary, after lengthy discussion, FPAAC ultimately proposed a rule

that required high levels of tree retention, generally in the RD 55-65 range. The committee also recommended that the rule have two options, which is unique in forest practices rules nationwide as far as we are aware. The two options were largely driven by the different management strategies of large and small landowners. Large landowners wanted an option that fit with their general approach of infrequent streamside harvest activities coincident with evenaged harvesting of the adjacent upland stand. Small landowners wanted an option that fit with their general approach of more frequent, unevenaged or salvage harvest activities in streamside areas.

Getting the rule passed

To pass this rule with broad support, IDL and FPAAC committed to making the rule processes as transparent as possible; stakeholder engagement was intense and targeted, exceeding legal requirements. IDL conducted numerous face-to-face meetings and presentations to industrial forestland owners, nonindustrial private forestland owners, IDEQ, tribes, Environmental Protection Agency, and conservation organizations. This key to successful rule passage—going well beyond the legally required public rule-making process to engage and educate stakeholders—was made evident by the fact that no public comments were received that formally challenged the proposed rule.

The rule making process took two years to ultimately resolve technical and political concerns. When presented to the legislature in 2014, small landowners voiced two legitimate concerns: (1) the rule is fairly complicated; and (2) the rule is very conservative and greatly restricts timber harvest.

In response to these concerns, IDL added a request to the legislature to fund additional forester positions to provide technical assistance to private

landowners. Finally, IDL in partnership with IDEQ committed to testing the new rule in the spirit of adaptive management. Data from the tests could move the rule one direction or the other, to higher or lower levels of retention.

Based on these efforts, the proposed rule was approved by the legislature in early 2014 and it ultimately became law July 1, 2014.

Moving forward

Since the rule went into effect, the IDEQ, IDL, and University of Idaho have developed a partnership to study the implementation and effectiveness of the new rule as promised to landowners. We expect that initial data will be provided to the FPAAC in 2016 and 2017, but it will likely take a few more years to satisfactorily sample the range of forest types and geography. ♦

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A Watershed View of Riparian Management

BY MARK TEPLY

Riparian forests and the terrestrial and aquatic organisms that benefit from them exist and function at the watershed scale. Riparian forests are shaped not only by individual stand dynamics, but also by myriad natural processes that work at the watershed scale, including insect, disease, fire, windthrow, mass wasting, and flooding. In an unmanaged landscape, these processes operate to create diverse habitats on the landscape that serve a multitude of species and provide any one species necessary diversity to support many life history stages. The mix of riparian stand conditions in the watershed is as important as any one riparian stand.



One size fits all?

So why is it that we have developed forest practices rules that create a narrow set of stand conditions? Rules prescribe fixed width buffer sizes, species composition, and minimum stocking. The prescriptions may vary by factors such as stream type, forest type, and site class. These are important refinements, but they are coarse. Overall, forest practices rules tend to drive stands toward a narrow set of desired

future conditions (DFCs).

Forest practices rules provide operational certainty. DFCs are informed by science, of course, but their definition is as much based in science as they are in policy. DFCs represent thresholds that are both scientifically and socially acceptable. For the timber operator, DFCs represent a clear standard against which foresters can plan and operate in riparian areas. The rules are an agreed approach to permit active management in riparian areas while providing resource protection. This certainty is valuable to both timber and conservation interests.

Forest practices rules tend to be precautionary. The DFCs agreed upon during the rule-making process usually reflect conditions at the upper end of stocking distribution. Statistical uncertainty is often taken into account to add a margin of safety. The result is a set of rules that provide resource protection with great confidence. When faced with the challenge of making rules to be applied across large geographical areas, it is understandable why regulators take a precautionary approach. They seek to ensure protection in all instances. The consequence, however, is that riparian stands are driven toward a narrowly defined DFC.

This approach to riparian rule making has implications to forest health. Treatment options to address overstocking, insects, disease, and fire risk in riparian areas are limited. Yes, these are natural stand development and disturbance processes—something we'd like to see some of in a watershed. But,

in driving riparian stand conditions to the upper end of stocking distribution, we run the risk of creating riparian stands across the entire watershed that are less resilient to disturbance. The scale and intensity of insect, disease, and wildfire, for instance, could be greater than would otherwise occur with a diverse set of riparian stand conditions in the watershed.

Uncharacteristic disturbance regimes also have implications to streams. Wholesale loss of riparian forests (e.g., due to wildfire) could increase peak flows, sediment delivery, and stream temperature, which could damage stream habitat and aquatic organisms throughout the watershed. A diverse riparian landscape could limit the scale and intensity of riparian losses, and in turn, limit the impacts to stream habitat and aquatic organisms. So, besides limiting the ability of riparian forests to serve a multitude of species and life history stages as noted earlier, riparian forest practices rules also tend to put stream habitat and aquatic organisms at greater risk.

A watershed approach

Creating diversity can be achieved based on understanding the historic range of variability (HRV) of riparian stand and stream habitat conditions, and the natural disturbance regimes that maintained them. This knowledge can be put to work by designing treatments that move the watershed toward distribution of riparian stand conditions that support natural disturbance regimes. The intent is not to mimic the



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natural disturbance regime, but rather to restore riparian stand and stream conditions that allow natural disturbance processes to operate at a landscape level in a manner that maintains a distribution of stand conditions across the landscape.

There's nothing novel about this approach. It's an underpinning of forest restoration ecology and HRV approaches are in use in terrestrial environments. For instance, the Eastside Screens, an amendment to Region 6 eastside National Forest landscape plans, directs use of an HRV approach for designing forest treatments at a landscape scale. But, its use is limited to upland situations. Management of riparian areas on these national forests is still governed by the Inland Native Fish Strategy (INFISH), which does not use an HRV approach. Like state forest practices rules, INFISH provides operational certainty and is precautionary. To be sure, the notion of creating openings in riparian areas would be controversial in national forest planning.

One example where an agency has embraced the watershed approach is Washington State Department of Natural Resource's management of the Olympic Experimental State Forest (OESF). As described in the September/October 2015 issue of the *Western Forester*, active management of riparian areas is considered at an equal level to uplands management. Planning considers natural disturbance regimes as a way to not only support multiple species and life stages, but to also add resiliency to the system. Teddy Minkova, OESF research manager, described the outcome as: "Harvested areas are interspersed with areas that are lightly managed (such as riparian forests and wetlands) or unmanaged (such as old-growth forests) to create a complex mosaic of forest structure and seral stages across the landscape."

Challenges

Watershed approaches to riparian management aren't easy and face operational and regulatory uncertainty. As past research manager on the OESF I can speak firsthand about the complexity involved in promoting and implementing the approach. It is still in the "proof of concept" stage and faces skepticism by both timber interests and

the environmental community. The watershed approach requires far more collaboration with managers and stakeholders than is required under forest practices rules. It also requires more effort than needed in following forest practices rules. The added work of understanding HRV, disturbance regimes, and the interaction of watershed, riparian, and stream conditions, and then translating this knowledge to defensible, operational management prescriptions is difficult.

But, these challenges, as the OESF is proving, are solvable and there is no reason to stop trying. Such attempts probably have their greatest value in validating that there are credible alternatives to the one-size-fits-all approach to riparian

management. Even if such watershed approaches prove so complex and contentious that they are economically and socially untenable, they do at least acknowledge the ecological importance of diversity in riparian stand conditions across the landscape. That alone is reason enough to challenge ourselves the next time we follow the rules. ♦

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Raising the Bar in Riparian Forest Policy

Oregon Experience Shows High Stakes, High Theater, Low Vision

BY PAUL W. ADAMS

Although the concept of “cooperative federalism” dates back to the 1930s, the Clean Water Act (i.e., the 1972 amendments to the Federal Water Pollution Control Act) helped bring this approach into modern environmental policy. Under this landmark 1972 legislation, the federal and state government would become partners in tackling water pollution problems that had grown very serious throughout the US after largely state-level water quality programs had proven ineffective. This cooperation and sharing of responsibilities is especially evident in the non-point-source pollution control programs that evolved for forest practices, which today includes more states with voluntary and quasi-voluntary forestry



programs than states with regulatory programs like those so familiar in the Pacific Northwest.

The current riparian rulemaking process in Oregon is proving to be an interesting test of cooperative federalism given that neighboring Washington and California require significantly wider, longer, and more restrictive riparian buffers than Oregon. With these states having “raised the bar” for regulatory restrictions along forest streams, federal agency representatives have submitted oral and written testimony to the Oregon Board of Forestry (OBOF) in support of comparable restrictions. Testimony by one agency staff member prompted my commentary (A Red Flag: The Science is Clear) in the June/July/August 2015 issue of the *Western Forester*, and reflects some of the high theater seen and heard at recent OBOF meetings as various aspects and rule alternatives have been discussed and debated.

As of this writing in early October, the OBOF is expected to consider two major packages of new riparian rules that are distinctly different, although both alternatives would significantly increase restrictions on timber harvesting along small and medium streams in western Oregon where salmon, steelhead, or bull trout are found. The more restrictive rule package would require 90-foot, no-cut buffers or 100-foot restricted harvest buffers, and with both of these options the buffers would extend 1,000 feet upstream of where fish use ended. An analysis required by Oregon law of the economic impact of proposed rules showed an estimated value of the leave trees within 90-foot no-cut buffers in western Oregon to be \$76.8 million on industrial lands and \$112.7 million on private nonindustrial lands, for a total of \$189.5 million.

The high economic stakes of more restrictive rule packages have not missed the attention of industrial and nonindustrial forest owners in western Oregon, and both groups have been active in attending and offering information and comments at meetings of the Regional Forest Practices Committees and the OBOF. It is important to note, however, that social science research suggests that nonindustrial landowners may be as concerned about maintaining their private property rights as they are about the economic impacts. And, even as Oregon's population has become increasingly urban, the passage of ballot measures 37 and 49 shows that voters are supportive not only of private property rights but also of landowner compensation when regulations become overly restrictive.

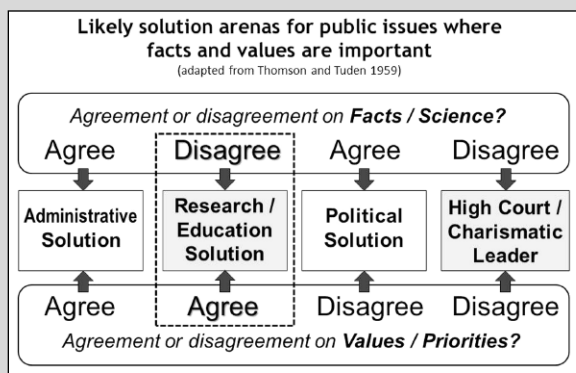
Both state and federal officials have acknowledged landowner concerns about economic and other impacts of various rule proposals that have been discussed by the OBOF in recent months. The more restrictive rule package now under consideration includes an exemption for nonindustrial landowners with an as-yet unspecified maximum acreage or riparian percentage. And in the notes that accompany the less restrictive package, the following statement appears [emphasis

More Science to the Rescue?

When public debates arise about forest resource policies, forestry professionals often stress the need for more technical facts and figures (“science”) related to the issue of concern. The expectation is that if everyone has more technical data and knowledge, a policy solution also will become more apparent.

But will more science, research, or technical analysis provide an obvious policy answer? Not necessarily, especially if there is substantial disagreement about the trade-offs or priorities of the values that are embedded in the policy choices. When key stakeholder groups have different values or significantly different priorities among those values, the policy solution more likely will come from a political process (negotiation, compromise, voting, etc.) or, in especially difficult situations, a major court decision or a charismatic leader who can effectively distract people from their differences.

Nearly a half-century ago two social scientists (Thompson and Tuden 1959) proposed a model for identifying where a solution to a public problem was most likely to be found based on its complexity and whether there is agreement on the key facts and values involved. The illustration here is adapted from that model and suggests (especially given the strong and continuing debates about forest laws/regulations, as well as the many lawsuits and appeals on public forests) that “more science” only comes to the rescue when we are dealing with a relatively simple issue, i.e., where there is already general agreement on the key values and priorities involved. At this point in time, riparian forest policy in the Pacific Northwest is anything but a simple issue.



added]: "Maintaining 50-foot and 70-foot RMA widths and separate standards for Small and Medium SSBT streams will reduce the risk of Measure 49 claims and keep landowners and our Regional Forest Practices Committees in the game...as teammates, rather than adversaries. That will also make voluntary implementation of new prescriptions for some distance upstream of the end of SSBT use more likely."

Yet acknowledging landowner concerns is not the same as supporting creative solutions to protecting and enhancing fish habitat, particularly with federal agencies that largely operate in a "command and control" culture where cooperative federalism typically stops with state regulatory agencies and rarely cultivates relationships with individual landowners. This culture apparently also supports a limited, numeric-standard centric view of policy options, i.e., one that seems fixed in a simplistic, 1970s approach to resource "protection," rather than a rigorous application of a 21st century understanding of watershed ecology and management. What else might explain the apparent dismissal of encouraging results from recent studies of the water quality and fisheries effects of current forest practices (i.e., the Watersheds Research Cooperative's paired watershed studies in western Oregon)?

Thus, perhaps it is time to truly "raise the bar" with a more enlightened riparian policy approach that carefully considers not only the diverse, dynamic, and complex nature of riparian and aquatic resources but also the similar attributes of the human species that owns and manages these resources. Of course, such a holistic approach would be very challenging, but it could also release some of the great, positive potential that exists among the thousands of landowners and managers who would welcome the opportunity to work in an indisputably cooperative manner to maintain and improve our natural resources. ♦

Paul W. Adams is chair of the Oregon SAF Policy and Legislation Committee. An SAF Fellow, he can be reached at adamspaulw@gmail.com.

Riparian Restoration: Lessons from the Field

BY JON A. SOUDER

Successful riparian restoration is often more challenging than the typical revegetation that foresters are comfortable and experienced with. Landowner objectives and strategies differ, requiring a larger number of decisions and trade-offs; there are typically more constraints on site preparation and post-establishment activities, and while many factors that adversely affect survival and growth of the plantings are similar, some are unique to riparian areas. This article will focus on afforestation of cleared agricultural areas based on my experiences of over 15 years as executive director of the Coos Watershed Association in Charleston, Ore.



The Coos watershed (Coos) is 630 square miles on the south-central Oregon coast and contains the largest estuary on the Oregon coast. The estuary is of the "drowned river valley" type, with fringing tributary sloughs that historically had tidal wetlands at their mouths and streams flowing through narrow river valleys above their heads-of-tide. The estuary is also fed by a larger river system that drains approximately 60% of the watershed. Tide extends upriver 20 miles and the valley floor is a broad alluvial terrace, often diked, with adjacent pasture lands. Valley slopes tend to be steep and the sandstone lithography leads to high levels of landsliding, especially when vegetation is removed. Land uses are predominantly agriculture and rural residential homesites (0.5 to 5 acres) in the valleys outside the urban areas surrounding the estuary, with both non-industrial and industrial forest on the slopes and ridges.

Traditionally, reforestation has had a simple objective: get a stand of trees established at the least cost and manage them to grow as fast as possible. Riparian restoration is different. Landowners in the Coos have a diverse set of objectives ranging from regulatory

compliance for buffer strips, fencing, shade, and future large wood recruitment; streambank protection, particularly when hardened banks are expensive or prohibited; aesthetics, such as a park-like grove or flowery trees and shrubs that attract bees and other pollinators; and increasingly, participation in an incentive payments program such as the USDA's Conservation Reserve Enhancement Program (CREP), for carbon sequestration, or through a conservation easement. Understanding landowner objectives is the critical first step to designing effective riparian restoration projects since this will guide subsequent choices. The best example of this is a landowner we worked with who didn't want to plant any Douglas-fir because he didn't want any attraction to harvest in the future.

Once the objective has been determined, there are generally multiple strategies that can be employed. Perhaps the most fundamental choice relates to planting densities and the commitment to maintenance until the plantings are "free-to-grow." This can be thought of in the traditional evolutionary strategy of "r selection," where lots of offspring are produced, but each as a low probability of survival; versus "k selection," where fewer offspring are produced but more care is invested in each. The r approach is to plant densely, scrimp on maintenance, and then expect that the survivors will be sufficient to meet your objectives; in contrast, the k approach is to plant at a density closer to the desired final survival and invest the resources needed to ensure this outcome. While I know of no study that has directly compared the two riparian restoration strategies, my experience is that planting fairly dense and then protecting and maintaining the project for at least five years will be successful.

Along with determining density, the selection of species is a concern. Decisions include whether the species are native or introduced (we've had hybrid poplar and apples requested). Some landowners have strong opinions

(CONTINUED ON PAGE 23)

PNW SAF Forestry Leadership Conference

February 4-6, 2016 – Liberty Inn, 1400 Wilmington Drive, DuPont, WA 98327

A new year offers state society and local chapter leaders a fresh start to address professional member recruitment and retention. The Washington State Society of American Foresters (WSSAF) is inviting forest natural resource managers and students from Washington, Oregon, Alaska, and Inland Empire to participate in the Leadership Conference. This year's program will provide participants the opportunity to learn about practical leadership principles, communication techniques, and member engagement. An optional pre-conference field trip is available to nearby Joint Base Lewis McCord (JBLM) Military Reservation. All SAF members are invited to participate and will gain insights from this conference.

THURSDAY, FEBRUARY 4 (1:00-4:30 PM)

Optional Pre Conference Field Trip to JBLM: *Introduction and History of JBLM Forest Management - Field Stops to learn and discuss*—**Aaron Fox**, Forestry Branch Chief/Installation Forester, US Army

FRIDAY, FEBRUARY 5 (9:00 AM-5:00 PM)

PNW Forestry Leadership Conference Welcome—**Mayor TBD** and **John Ehrenreich**, DuPont former City Council Member

Disc Leadership Exercise—**John Walkowiak**, WSSAF Chair

Tricks of the Trade: *Writing Effective Email Communications*—**Carrienne Lane**, Write Words

Lunch Provided (Noon)

Luncheon Speakers: **Keith Blatner**, District 1 SAF Board Representative and **Ed Shepard**, District 2 SAF Board Representative.

Inspiring Involvement—**Bob Alverts**, SAF Immediate Past-President

Membership Engagement Roundtable:

- **Dick Pierson**, Golden Member, WSSAF
- **Dave Cass**, WSSAF
- **Joe Newton**, Umpqua Chapter
- **Steve Pilkerton**, Oregon SAF
- **Jeremy Douse**, Alaska SAF
- **Student Chapter Representatives** invited from:
 - Oregon State • Green River CC
 - University of Washington • Grays Harbor College • Central Oregon CC

Increasing Use of Social Media—**Candra Grimm** (invited), WFPA, and **Nick Smith**, Healthy Forests, Healthy Communities

State Society Executive Committee Meetings (4:15 PM)

Dinner On Your Own

SATURDAY, FEBRUARY 6 (8:00 AM-1:00 PM)

Start with *WHY & How it Can Work for You*—**John Walkowiak**, WSSAF Chair
Membership Recruitment and Retention Tools—**Corey Ruple**, SAF Membership Services Director, Bethesda, MD

Documenting and Sharing Success Stories—**Steve Wilent**, Editor, *The Forestry Source*

Engaging Members in Making Policy—**Paul Adams**, Policy Chair, Oregon SAF, and **Harry Bell**, Policy Chair, WSSAF

Northwest SAF Office: Using it to Engage Membership—**Lori Rasor**, Manager/Editor, SAF Northwest Office

Closing remarks from WSSAF, OSAF, AKSAF, and IESAF

Lunch Provided (Noon) / Adjourn (1:00 PM)

LODGING—The Liberty Inn, 1400 Wilmington Drive, DuPont, Wash., is our conference and lodging facility. Lodging rates for Professionals is \$79/night single/one bed or \$99/night double/two beds. A special Student lodging rate of \$69/night double occupancy has been secured. Breakfast is free for guests and there is plenty of free, secure parking. Restaurants are within walking distance for dinner on your own. Contact the Liberty Inn at 1-877-912-8777 and mention the *Washington Society of American Foresters (WSSAF)* or visit www.libertyinnndp.com.

REGISTRATION—The registration fee for professional members is \$95/person (\$115 after January 20) and \$40 for students (\$55 after January 20). This fee includes two lunches, breaks, and all materials. The registration fee for the optional field trip \$30 for all members and includes a box lunch. **No refunds after January 20.**

SAF CFE HOURS: CFE hours Category 1 for the Field Day and Category 2 for the Leadership Conference will be available.

QUESTIONS?

Program: John Walkowiak, 253-320-5064, jewalkowiak@harbornet.com.
Registration: Amanda Mattern, 503-224-8046, amanda@forestry.org

REGISTRATION FORM – 2016 SAF PNW Leadership Conference

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PNW Leadership Conference, Northwest SAF Office, 4033 SW Canyon Rd., Portland, OR 97221. Visa and MasterCard accepted.
Contact SAF NW Office at 503-224-8046 or email Amanda Mattern at amanda@forestry.org with questions.

Calendar of Events

Fuel Reduction on Steep Slopes, Nov. 19-20, Corvallis, OR. Contact: FEI.

Habitat Site Restoration, Dec. 1-2, Anchorage, AK. Contact: NWETC.

Scaling for Non-Scalers, Dec. 7, Wilsonville, OR. Contact: WFCA.

Visualizing and Analyzing Environmental Data with R, Dec. 8-9, Kirkland, WA. Contact: NWETC.

Forest Inventory and Analysis Science Symposium, Dec. 8-10, Portland, OR. Contact: Sharon Stanton, sharonmstanton@fs.fed.us, <http://fia.fs.fed.us/symposium/>.

Introduction to Aquatic Toxicology, Dec. 9-10, Tigard, OR. Contact: NWETC.

International Forest Hydrology Science Symposium, Dec. 10, World Forestry Center, Portland, OR. Contact: Brianna Beene, brianna.beene@oregon-state.edu.

ArcGIS 10: Geoprocessing-Advanced Techniques for Environmental Applications, Dec. 15-17 in Bellingham, WA. Contact: NWETC.

Skyline XL, Jan. 12-13, Corvallis, OR. Contact: FEI.

Cable Logging, Jan. 25-28 in Coeur d'Alene, ID, and Feb. 23-26 in Corvallis, OR. Contact: FEI.

Facilitation Skills for Environmental Professionals, Jan. 26-27, Tigard, OR. Contact: NWETC.

ArcGIS 10: An Introduction to Environmental Applications, Jan. 26-28 in Seattle, WA, and Mar. 22-24 in Bellingham, WA. Contact: NWETC.

Sawmilling 101: Introduction to Softwood Sawmill Operations and Financial Performance, Feb. 4, Coeur d'Alene, ID. Contact: WFCA.

WSSAF/OSAF Leadership Conference, Feb. 4-6, DuPont, WA. Contact: John Walkowiak, 253-320-5064, jewalkowiak@harbornet.com, www.forestry.org/oregon/saf_members/leadership/2016/

Brownfield Site Restoration and Remediation, Feb. 9, Kirkland, WA. Contact: NWETC.

Inland Empire/Montana SAF Leadership Academy, Feb. 26-27, Lubrecht Forest Lodge, Greenough, MT. Contact: Gary Ellingson, nwmanagemt@nmi2.com.

Unit Planning and Layout, Feb. 29-Mar. 3, Corvallis, OR. Contact: FEI.

Log Trade Trends: A Global Perspective, Mar. 1-2, World Forestry Center, Portland, OR. Contact: Amanda Mattern, 503-226-4562, amanda@western-forestry.org, <http://logtradetrends.world-forestry.org/>.

Basic Road Design, Mar. 21-24, Corvallis, OR. Contact: FEI.

Inland Empire SAF annual meeting, joint with Idaho Forest Owners Association, Mar. 28-29, University Inn, Moscow, ID. Contact: Bill Love, loblollylove@hotmail.com.

SER Northwest Regional Conference: Monitoring Ecological Restoration, Apr. 4-8, Portland, OR. Contact: Rolf Gersonde, rolf.gersonde@seattle.gov, <http://restoration2016.org/>.

Montana SAF annual meeting, joint with Montana Forest Owners Association, Apr. 15-16, Red Lion

Colonial Inn, Helena, MT. Contact: Gary Ellingson, nwmanagemt@nmi2.com.

Oregon SAF annual meeting, Apr. 26-29, Mill Casino, Coos Bay, OR. Contact: Shaun Harkins, 541-267-1855, shaun.harkins@plumcreek.com.

Washington State SAF annual meeting, May 12-14, La Conner, WA. Contact: Paul Wagner, pwagner@atterbury.com.

Contact Information

FEI: Forest Engineering Inc., 3895 NW Lincoln Ave., Corvallis, OR 97330, 541-765-7558, office@forestengineer.com, <http://forestengineer.com/>.

NWETC: Northwest Environmental Training Center, 1445 NW Mall St., Suite 4, Issaquah, WA 98027, 425-270-3274, <https://nwetc.org>.

WFCA: Western Forestry and Conservation Association, 4033 SW Canyon Rd., Portland, OR 97221, 503-226-4562, richard@westernforestry.org, www.westernforestry.org.

Send calendar items to the editor at rasor@safnwo.org.



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Shared Forestry Decisions: A Family Forest Perspective

BY GILBERT SHIBLEY

On my family's land, located 30 miles southeast of Portland, Ore., we manage our 320 forested acres for many different benefits. We share some of those benefits with others and we share some of the management decisions with others. Here I will describe some practical implications of this complex blend of interests and decisions where our public creeks meander under our private trees.



Deciding where to cut trees was not hard when the first generation got here—just cut trees to build shelter and clear stumps for room to farm, all from the same stand of trees on the ridge. For me now, in our fourth generation, decisions down by the creek are not so simple. For those riparian spaces EPA says to use BMPs and Oregon spells it out in forest practices laws and rules. My dad (eagerly) and my mom (reluctantly) jointly decided in 1944 to invest in 315 acres of logged-off land next to the farm, partly because it had a creek for fishing and swimming. I doubt they

imagined how well the forest could be brought back and I know for sure they never guessed how complex its management would be, especially at the interface of forest and stream.

The goal for that new property was to help the forest re-establish itself and hope it would return enough income to at least pay the taxes. Now our goals are both to sustainably harvest timber like our industrial neighbors do and to provide multiple non-timber benefits like our federal neighbors do in this same canyon. I grew up at home in the woods of this canyon, starting when it did not look much like a forest. The creeks were at the center of my fun and learning in nature.

Our top goal now is to preserve and perpetuate this family legacy of forest treasure for the future, in honor of family generations here before us. We now mention those ancestors when we host guests from near or far as we enjoy these rich assets for recreation and simple beauty together.

After 20-plus years of work in education I arrived back here in the 1970s—along with forest practices rules, land use laws, and the environmental movement. Shared decisions then included a very dynamic mix of social and political values quite unlike those on the west-

ern frontier settled by an independent bunch of subsistence farmers. The trees had really grown when I returned, so my forestry knowledge had to grow quickly. To keep the land in forest and in the family, my generation also needed to help our parents with estate planning, adjusting to new land use and forest practices rules, getting more involved in small woodland organizations, and generally exploring new ideas and opportunities. I had a growing sense of our interdependence with public agencies and a responsibility to play a part. To manage the land I needed one boot on the ground and one under a meeting table. I found myself making joint management decisions with fellow citizens as well as with several generations of my family, some with ownership shares in an LLC and some not yet.

I helped to form and later lead our local watershed council. We now cooperate in their projects, as overseen by ODFW, of placing trees in the creek for fish habitat. We also participate in their stream shade enhancement projects in places where we have the worst soil, the most invasives, and the least native conifer.

For three years I represented the Oregon Small Woodlands Association on the 20-strong Stakeholder Team in a joint state/federal planning process for salmon and steelhead recovery after ESA listings on the Lower Columbia watersheds. Trained as a biologist, and at the time teaching other family foresters for OSU Extension Service, I enjoyed collaborating with folks of diverse and even divergent interests as we helped state and federal agencies in their work. I was able to help fish biologists understand the costs to my family of some habitat benefits we both wanted for the fish. They helped me to appreciate the hardworking conditions they face at their computers and in the public arena, barely offset by any time they get with fishing tackle in good holes on weekends.

I find Oregon's current stream protection rules are good in intent and flexible enough to fit with our management plans. In two smaller areas near a large stream I enlisted the help of children and grandchildren to measure dbh to calculate basal area for planned



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A 2006 patch cut of less than one acre where the ridge drops toward the canyon. A family homestead corners here on a donation land claim bought from a neighbor in 1870.



A few years later on the same slope the logger was on (left), one of our Gen6 (sixth generation) assists with regeneration of the forest.

thinning of the RMA. They learned for later when they will own the land, and I got their help reaching an informed decision within tree retention requirements.

When it comes to bigger operations or potential use of alternative strategies, I use a consulting forester. We jointly decide on the site and scope of any harvest. Near a creek, he does the counting and calculating for trees to leave and may ask for help in marking. We view this as shared decision making with two guys' boots on the ground. We shared once in deciding to go for a hardwood conversion project using an "alternate prescription" within Oregon's riparian rules. We call it our fish-friendly clearcut because years later they will benefit big time.

As manager, I want to fairly balance costs and benefits for this small family business on behalf of many kinds of stakeholders. In my practice of family forestry I try to wisely blend family legacy and legal obligations, annual cash flow needs, ecologically smart management practices, and good public relations.

I understand the riparian management area to be a place where we manage for water, fish, and wildlife plus the obvious forest health and wealth. It should, therefore, be a place for ordinary forest management tools and

strategies. With thinning we can get bigger trees faster for both family and fish. We use thinning and brush control to reduce fuels 50 ft. out from our roads, pre-making wider fire trails. I am hoping to also make some streamside areas into similar fuel-reduction zones, especially near our boundaries with fuel-rich BLM land.

Trees and streams often share the same acre. For that ecosystem's health, our decisions should look like we share that space and their concerns just as if we could hear them. ♦

Gilbert Shibley is part owner and co-manager in both Shibley Family LLC and Forest Home Woodlands LLC, adjacent tree farms at about 800 ft. elevation in Clackamas County, Ore. He can be reached at shibleys@123mail.net.



PHOTOS COURTESY OF GILBERT SHIBLEY

Below the ridge 360 feet, a large stream at high flow displays south bank shade and gets a natural bit of large wood as saturated bank slides in near the swimming hole.

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Policy Scoreboard

OSAF Submits Comments to BLM on New Management Plans.

In August, OSAF submitted comments to the BLM on the Draft EIS of its updated Resource Management Plans (RMPs) for its western Oregon lands. The comments included:

As a general principle, Oregon SAF supports legislation, policies, and plans that allow and promote active management of most of the O&C land base by knowledgeable and experienced forestry professionals. Included in such management is, very importantly, vegetation management such as tree harvesting for both ecological and economic benefits. We believe that active management is critical to the development of forests that are resilient in the face of climate change, wildfire, insect/disease infestation, and other perturbations. Given broad goals, the expertise and experience of local forestry professionals can be used to make informed management decisions to effectively meet those goals. In addition, directives for "no-touch" reserves and other broad and inflexible restrictions are not supported by current science and management experience.

We believe that, to the greatest extent possible, management plans need to clearly define broad goals and then allow local

resource managers to use their professional expertise and experience to meet these goals. We believe in the integrity and abilities of agency resource specialists and specialists, and that, given clear goals, they can plan and oversee effective actions to meet multiple and diverse forest resource goals. Consequently, we disagree with RMP directives that are overly prescriptive, unnecessarily limit the use of expertise and experience of local resource specialists, and do not adequately address site-specific conditions.

In addition, the cover letter stressed:

A significant increase in active management of federal forest lands can substantially improve forest resource and community health, diversity, and sustainability. Active management, including outputs of commercial forest products, represents an opportunity rather than a threat to achieving and maintaining forest health and ecological diversity. Forest products are arguably among the greenest of the natural resources needed to sustain society. From the basis of both existing federal law and a visionary approach to meeting future human needs, federal forest lands have a key role in providing a significant source of these products. With relatively few exceptions, management that includes outputs of commercial forest products is highly compatible with the maintenance or enhancement of environmental values.

Contact: Paul Adams, OSAF Policy chair, adamspaulw@gmail.com.

OSAF Sends Letter and Updated Riparian Forests Position to Board of Forestry.

OSAF sent its updated

position statement on "Managing Riparian Forests" (see www.forestry.org/oregon/policy/position/) to the Oregon Board of Forestry prior to its meeting on July 23, where some key decisions about new rules along small and medium fish-bearing streams were expected. Although the board deferred those decisions until November, in its cover letter the OSAF stressed the importance of active management of riparian forests, as well as the lack of evidence that greater restrictions in other states are cost-effective in providing desirable resource conditions, e.g.:

Like all forests, riparian areas are locally unique, dynamic and ever-changing. Highly precautionary and restrictive policies (e.g., large "no-touch" zones) for riparian forests have not consistently produced desirable environmental results and do not effectively address changing environmental conditions.

Current research shows few or no persistent, wide-scale impacts to fish populations and general water quality when contemporary practices and Oregon's Forest Practices Rules are applied. Conversely, there is little or no evidence that highly restricted management in riparian forests is a cost-effective approach for achieving desirable resource conditions.

Active management can maintain or improve riparian forest benefits through carefully applied professional forestry, fisheries, and hydrology expertise and experience. There is growing need to encourage active management of many of Oregon's riparian forests, with updated policies and direction to promote research, education, and incentives that effectively support desirable resource conditions.

OSAF members are encouraged to use its position statements to articulate a professional perspective on forestry issues to decision makers and the interested public. Contact: Paul Adams, OSAF Policy chair, adamspaulw@gmail.com.

New Trust Land Committee

Formed. The Clallam County Board of Commissioners recently created the Trust Land Advisory Committee (TLAC). The TLAC will investigate and report on the pros and cons for Clallam County to manage its own trust lands that are now managed by the Washington State Department of Natural Resources. This is a multi-stakeholder group and at least three WSSAF members have been recommended as members. The committee's final recommendations are due late 2016. Contact: Harry Bell, WSSAF Policy chair, harry@greencrow.com. ♦

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Riparian Restoration

(CONTINUED FROM PAGE 17)

related to species: many in the Coos do not like willow because they feel it is difficult to control and their forebearers spent a lot of effort to remove it; we've found that alternatives such as red osier dogwood are acceptable and have many desirable characteristics. If future harvest is expected, fast-growing species or those that have unique value will be preferred. Alternately, if the management objective is to return ecological functions, a broad diversity of shrubs and trees, conifers, and hardwoods is likely to be desired. Another approach is utilizing vegetation succession by planting pioneer species first to capture the site, and then coming back later (10-20 years) to under plant with shade-tolerant species such as cedar and hemlock. My experience is that if restoring a diversity of plant species is an objective, both shade-tolerant and intolerant species can be planted at the same time with adequate consideration of their needs (watering, shade cards, or cloth); however, growth and vigor of the shade-tolerant plants will be reduced for at least the first 5 years.

The extent of the planting area will be an important landowner consideration. The amount that someone is willing to devote to the restoration will be affected by their overall operation and potential restoration effects. Too narrow, and the plantings may not have the benefits anticipated and the entire project could be compromised if the stream channel shifts; too wide, and other desired land uses may not be viable. Funders—such as CREP—have minimum widths, and the amount of most incentive payments is based on the area restored. A minimum rule of thumb to allow for some channel migration is that the width should be at least the bankfull height plus 10 feet; if possible, devoting the entire area of the meander belt is safest. The objective for many riparian plantings is to shade the adjacent stream; if this is the case, planting only one bank can be sufficient. We've had some very successful projects in narrow valleys where the landowner was only willing to provide the minimum width on the south and west aspects; we've had others where we miscalculated and lost stretches of

fence to stream channel changes.

Establishing desired plantings is just the first step in a long journey. Similar to traditional reforestation, site preparation is critical. Be prepared because clearing competing invasive species such as Himalaya blackberry oftentimes releases other weeds in the soil seed-bank—we've gone through cycles of blackberry, field bindweed, and finally Japanese knotweed during riparian establishment. Planting considerations are largely similar, but some tools such as hoedads don't work well on flat ground (shovels are better), while sharpened cuttings can be pushed directly in or assisted with a planting bar (which looks like a pogo stick). If you're using a k selection strategy, protecting the stalk with aluminum foil will control small mammal girdling and vexar tubes will reduce browsing, which if intense may even require fenced enclosures. Our experience is that plantings in enclosures survive and grow at approximately twice the rate of unprotected ones. Since we plant in the winter, we have not resorted to watering. Most of our plantings then require at least 5 years of annual maintenance in the summer until they are free-to-grow.

Successful riparian restoration

requires a long-term perspective: the job is not complete until the expected benefits are achieved. Thus, free-to-grow is just a stage, and the risks to the restoration project change over time: we have had beavers move in and completely decimate a stand of black cottonwood (and reducing competing vegetation during maintenance makes it easier for them). We've had landowners go bankrupt, and the new owners decide not to continue with the CREP contract; we've seen a change in perspective with new owners wanting a more open, "park-like" riparian zone by removing established shrubs and deciduous trees. Riparian restoration, thus, differs from traditional reforestation because management objectives may change with ownership; in contrast with typical forestland, the riparian stand is likely not the primary reason the parcel was purchased. Continued communication with landowners is key to ensuring that the benefits from riparian restoration persist over time. ♦

Jon A. Souder is assistant professor of Forest Watershed Extension at Oregon State University in Corvallis. He can be reached at 541-737-8561 or jon.souder@oregonstate.edu.

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