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Northwest Woodlands

A Publication of the Oregon Small Woodlands, Washington Farm Forestry, Idaho Forest Owners & Montana Forest Owners Associations

STREAMS AND RIPARIAN AREAS

Benefits and Challenges of Streams on Your Property

What Are We Studying and Why?

A Successful Fish Passage Project

Basic Road Maintenance Tips

Applying a Fixed-Width Buffer

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NEXT ISSUE . . . Managing Forests for Extreme Events

This magazine is a benefit of membership in your family forestry association. Contact the officers listed on page 5 for membership details.

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A few of the more common acronyms in this issue...

ATFS . . . . . .American Tree Farm System
BMP . . . . . .Best management practices
CWA . . . . . .Clean Water Act
ESA . . . . . .Endangered Species Act
EPA . . . .Environmental Protection Agency
RMA . . .Riparian management area (OR)
RMZ . . .Riparian management zone (WA)
SPZ . . . . . .Stream protection zone (ID)
SMZ. .Streamside management zone (MT)

DEPARTMENTS

ON THE COVER:

A painting of the West Satsop River on Tree Fever Farm in Grays Harbor County, Washington. Oil on linen, 12 x 16 inches. Currently with Scottsdale Artist School, juried into their 2016 "Best and Brightest" show. Painting courtesy: Nancy Romanovsky

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PRESIDENT'S MESSAGE

Idaho

PAUL BUCKLAND

Crickside Management

It's a real blessing to have a crick on your property. Yeah, that's right, I said "crick". It's one of those words that folks stick to the regional colloquialism that they grew up with. My Grandpa Fred said, "Around kin, I say "crick", but when I'm in town around city folk, I say "creek." Go figure! I'll stick with "crick" no matter who I'm talking to. You say "to-mah-toe", I say "to-may-toe," I guess. But, it's really "crick."

I don't have any perennial water on my current tree farm. We've got a couple of ephemeral draws that run water during snowmelt, but that's it. I don't really count that as water though. I miss having water on our property. Our last house had Cougar Crick running right through it. Some of my fondest memories are playing in the crick with my young kids. We built a log and rock dam in the crick one summer—to improve fish habitat, of course. But, it made for a dang fine summer wading pool too. We made little wooden boats and raced them to the dam. My daughter looked at me in disbelief when I pointed out that, although she didn't win the boat race, it was a good sign that her boat got caught in a circling eddy. You know, because it indicated a deep, cool pool for the fish to rest. I don't think my lesson on fluid dynamics and fish habitat had much impression on the youngsters, but it was fun playin' in the crick anyway.

I've recently had the opportunity to witness the aftereffects of a wildfire that had burned through both managed and unmanaged stream buffers. Although I primarily felt the loss in timber value from a professional perspective, I felt an emotional loss as well. The unmanaged buffer burnt to a crisp this summer. This stream now has a "buffer" of lifeless black sticks to "shade" it—for fish habitat. A colleague developed an alternate plan to salvage log some of the timber value out of the buffer—what's left of it anyway. The money from the burnt logs will be used to invest in the replanting and rehabilitation of that riparian area. Hopefully, this quick action will help reduce the amount of ash that comes sluicing off the hillside this winter. There'll be tree shade on that crick in 20 years or so for sure.

The managed stream, however, experienced spotty fire severity. Some areas are toast, while others were relatively untouched and everything in between. Did the previous management (harvesting) cause the fire to react differently or less severely? Perhaps the discontinuous canopy had something to do with that. Either way, it's my guess that this stream will recover and provide quality fish habitat sooner than the unmanaged stream. We also got the benefit of income from some of the logs in this stream buffer. In my opinion, active management is a win-win for your pocketbook and the stream...or crick. Jeez, am I writing for kinfolk or city folk here? ■

PRESIDENT'S MESSAGE

Oregon

SCOTT HANSON

Where Water Quality Protection Meets Private Property Rights

A question for the reader: Where do you stand on the choice between the highest water quality protection costs versus absolute private property rights of the forest owner? Is there any middle ground between environmental coalitions and associated public agency goals versus a forest owner's property rights? To understand the debate, we must recognize that water is viewed through a different lens by different groups. As a gross generalization, I propose there are two groups of people in our society focusing on water quality from forestland: the Believers, who conclude it is their right to have access to high water quality at any cost, and the Caretakers, who are the owners of the land and provide the protections that keep the forest a forest. Everyone knows the best water quality comes from forestland. So how do we find the balance between those who believe they have the right to make demands on landowners and those who have the responsibility to care for the forests with all the associated costs?

A primary difference between Believers and Caretakers is that the former likely has no real property investment risk in protecting water quality, while Caretakers bear a huge responsibility and cost. Caretakers accept their responsibility to protect the environmental values in the forest, including water quality, but also must find the balance with the costs of keeping a forest healthy. Keeping forests healthy requires occasional disturbances that are minor and temporary. Harvesting timber, followed by reforestation, is the most logical way to pay the bills and keep a forest a forest, while continuing to provide all the amenities Believers expect. Both the forest and water are deeply respected by Caretakers, whose family's livelihood depends on a strong long-term relationship. Private forestland is either purchased or inherited. Caretakers own a deed to the forestland. Boundary lines are important. So, when the Oregon Board of Forestry decides on new riparian rules under the Forest Practices Act, there is a potential financial impact on Caretakers that can challenge their ability and desire to keep a forest a forest. Management decisions implemented decades ago may prove foolish today. To use a football analogy: the goalposts have been moved.

There is no easy answer to arrive at forest policy given the current relationship between Believers and Caretakers. However, I am proud to be a Caretaker—I work with a renewable resource that produces wood products for our society. Forestland and water are resilient to man's touch. Society must find a balance between a precautionary mandate promoted by Believers, and the realities associated with a Caretaker's ability to keep a forest a forest—or face the possible negative outcome to water quality when forestland is converted to some other use at the discretion of the landowner. Only time will tell, but over regulation has the potential to make things worse for water quality, not better. ■

PRESIDENT'S MESSAGE

Washington

BOYD WILSON

Riparian Zones: The Good and The Bad

In your high school English class, perhaps you read the 1886 novel by Robert Lewis Stevenson, "Dr. Jekyll and Mr. Hyde." This fictional story was the first to explore the theory that two personalities could exist within a single person. It sometimes appears that this premise applies to riparian zones. They are thought of as good because of the benefits to plants, animals and society, and bad because of their negative economic effect on the landowner. Riparian zones are a lightning rod for controversy. How did we get to this state?

"Riparian" refers to the banks of water bodies, such as streams, lakes and ponds. But today the term riparian is usually interpreted to include the water itself when the banks, gravel bars and swamps are small and intermixed—where the surrounding vegetation has a significant influence on the water and aquatic life. Not only that, but a riparian area may occur far from open water, such as a seep where underground water comes to the surface and starts to flow, or not. Thus, a riparian zone does not have to be connected to the ocean. It can be its own wet, quiet place.

In an earlier time, human demands on local resources seemed limitless. Cows and other domestic animals grazed right down to the stream bank, drank directly from that stream and polluted the same water. Loggers harvested to the stream bank and yarded through the streams. Our waters seemed like a good place to dispose of industrial waste. Finally, the salmon runs began to diminish and good sense prevailed. In 2006, the Washington State Forest and Fish law dealt with improving environmental issues affecting fish, aquatic life and water quality. Besides improving road, culvert and unstable slope problems, buffer zones were established along streams, restricting harvest.

Forest and Fish did a fine job of protecting our natural resources and set rules for how forest harvesting could occur. For the forest industry it provided certainty to their business: follow the rules and trees can be cut. But some small forest landowners (SFL) were not so well off. Harvest rules require an uncut buffer be left along riparian zones to protect the resources, which are primarily fish and water. This often takes a big piece of the SFL ownership and is viewed as unfair, considering the benefits the landowner is contributing to society. So the law has prevented the landowner from harvesting his trees.

There is provision in Forest and Fish for smaller buffers if the same level of resource protection can be achieved. There is good scientific evidence that this can be done. The hurdle is to convince regulators and lawmakers that harvesting within a riparian zone can have minimal impact on the other resources. ■

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Down on the Tree Farm

FEBRUARY

✓ Register for your association's annual meeting: IFOA, March 28-29; MFOA, April 15; WFFA, June 17-18; and OSWA, June 23-25. They are one of the best benefits of membership—an opportunity to exchange success stories and challenges with your fellow forestland owners.

✓ Clean out and repair your bird boxes and perches; install new ones wherever you've seen recent activity. Raptors would appreciate a handy perch adjacent to your mouse, vole or ground squirrel activity!

✓ Research integrated pest management options for invasive plants or insect/disease issues on your forestland. Pesticides are often the best solution, but they're not the only solution. Consult with your tree farm contacts for treatments that have been successful. Whenever possible, practice prevention.

✓ Where there is potential for pine engraver beetles to enter your thinning slash, complete your precommercial thinning early in the year, so the slash has time to dry before the first flight.

✓ Tour your proposed logging operation with your forester and logger. Rely on their experience and good reputation to conduct a successful operation. Develop a solid contract and time your operation carefully. Take the responsibility to assure that your logger has all appropriate fire equipment in good working order.

FOR MORE INFORMATION...

For more information, check out these favorite websites and publications:

- wdfw.wa.gov/living/projects/nestboxes
- bit.ly/1N878Tj (integrated pest management)
- fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5187526.pdf (pine engraver)
- oregonstate.edu/dept/kbrec/sites/default/files/em9116_0.pdf (fuel reduction)
- knowyourforest.org/sites/default/files/documents
- knowyourforest.org/learning-library/logging-and-selling-timber
- timbertax.org
- forestseedlingnetwork.com/media/15903/Selecting_and_Buying_Quality_Seedlings.pdf
- cfpub.epa.gov/surf/locate/index.cfm (Surf Your Watershed)
- ext.wsu.edu/documents/StormDamage.pdf
- Plant%20Your%20Seedlings%20Right%202a.pdf

MARCH

✓ Begin tree planting in higher elevations this month. Avoid planting in frosty soils and protect your seedlings from freezing. Finish well before the moisture is gone from the soil.

✓ Complete fuel reduction projects around your structures and in your forest. Don't forget the outbuildings, public and private access roads, and that awesome precommercial thinning project you just completed!

✓ Assemble pertinent tax records and prepare your return. If you are lucky enough to have an accountant or tax preparer, take your paperwork to them early.

✓ Order seedlings for 2017 reforestation projects. Make sure your seedlings match your site.

✓ Install seedling protection measures before the tasty buds have opened.

✓ If you're pruning to improve aesthetics or log value, or to remove ladder fuels, finish before sap begins to flow to minimize bark damage and insect activity.

✓ Survey nesting sites to record activity. Keep a sharp eye out for adults and sensitive young.

✓ Take some time to evaluate your riparian buffers and wetlands using the articles in this issue as a guide.

APRIL

✓ Celebrate Arbor Day on April 29 in Montana and Idaho. Oregon celebrates the holiday during the first full week of April, while the Washington celebration falls on the second Wednesday of April. Overall, a good month for trees!

✓ Survey winter storm damage and plan for salvage and/or repair.

✓ Finish cutting firewood before fire season to minimize the potential for fire. Spreading the cut wood on the ground will allow it to dry before collection.

✓ Plan for fire season: meet with neighbors, ask your fire protection agency for a courtesy inspection, prepare equipment, move firewood away from your house and assure adequate access for engines. Make sure your family members know what to do in the event of a fire. You are an important part of the fire prevention solution.

Down on the Tree Farm is a compilation of all of the excellent tips contributed to this column by experienced volunteers over the last 15 years. Suggestions are always welcome and may be sent to the editor at: annewithnww@gmail.com.

The Understory

Editor's Note: We have two opportunities in June to celebrate the 75th anniversary of the American Tree Farm System. Elaine Oneil contributed significantly to this column about the celebrations on June 11 in Baker City and June 18 in Montesano. Save the dates!

Seventy-five years ago, the American Tree Farm System (ATFS) established the first certified tree farm in North America on the Clemons Tree Farm near Montesano in Grays Harbor County, Washington. We have come a long way from this visionary start to scientifically-driven management of Northwest forests. It's time to celebrate!

While some of the original tree farms, including the Clemons Tree Farm, are now too large for ATFS certification, we have hundreds of family farms with impressive longevity. According to the four state-managed tree farm programs, we have over 3000 certified tree farms. About 150 of these have been continuously managed for more than 50 years—and another 600 for over 25 years.

Each one of these 3000 tree farms has a story, and we have the opportunity to tell these compelling stories to a broader audience during two 75th anniversary celebrations. The timing of the celebrations couldn't be better as the drive toward a sustainable future means that everyone is taking a fresh look at forests and forest products as a solution—a solution for reducing carbon emissions and climate impacts, and a solution that provides needed building materials for our growing population.

The Montesano celebration will spotlight the integrated nature of the forest sector, starting with the seedlings we plant that ultimately grow into high-quality wood for tall wood buildings that will grace our cities. Tree farmers are the beginning of this continuum, from growth to use—rural to urban—and we are celebrating their contributions to the ecology, economy and well-being of the Northwest. We plan to come together with architects and engineers who find the idea of using "wood with a story" very appealing, especially given the current momentum toward building with cross-laminated timber and other engineered wood products that come from our forests. Please join us in bridging the urban/rural gap through this conversation about wood with a story, grown sustainably in the Northwest by dedicated, visionary forest landowners, large and small.

In Baker City, we'll celebrate all tree farmers during a woods tour with the Defrees family, 2015 Outstanding Tree Farmers of the Year for Oregon. The tour will honor 107 years of sustainable management on the tree farm and highlight a wide range of accomplishments, including thinning to improve tree vigor, slash disposal to reduce wildfire risk, wildlife habitat improvement and aspen restoration. The Defrees family has hosted many tours and classes and this promises to be an enjoyable event.

Let's celebrate 75 years of sustainable forestry! We capture hearts and minds with our stories of family tree farmers who tend their land to grow a crop that can take more than a generation from planting to harvest. Come join your fellow tree farmers and forestry partners to celebrate a significant milestone on June 11 in Baker City, Oregon and June 18 in Montesano, Washington. We are looking forward to seeing you! For more information: Oregon Small Woodlands Association at jimjamesoswa@yahoo.com; Washington Farm Forestry Association at info@wafarmforestry.com; and Washington Tree Farm Program at info@watreefarm.org.

An Overview of Watershed Science

By JON SOUDER

I have read many definitions of what is a conservationist, and written not a few myself, but I suspect that the best one is written not with a pen, but with an axe. It is a matter of what a man thinks about while chopping, or while deciding what to chop. A conservationist is one who is humbly aware that with each stroke he is writing his signature on the face of his land. Signatures of course differ, whether written with axe or pen, and this is as it should be." –Aldo Leopold, *A Sand County Almanac* (1949)

The axe in Leopold's eloquent essay can represent a metaphor for any management action (or inaction) by a woodland owner. The care with which actions are taken affects not only the stand, but also the larger watershed. By the end of this issue, we hope that woodland managers will have an enhanced appreciation of the benefits and values of streams and riparian areas on their property.

PHOTO COURTESY: SHERRI JOHNSON

A large, fish-bearing stream in the Trask River watershed, Oregon. Best management practices (BMPs) vary based on the size of the stream and the presence or absence of fish.

The theme for this issue, "Streams and Riparian Areas," is a natural follow on to the last two *Northwest Woodlands* issues, "Silviculture" (Summer 2015) and "Managing for Wildlife" (Fall 2015), because of the considerable interrelationships among these topics. Also important for woodland owners are forest practice rules that govern how streams and riparian areas are treated during management operations. Depending on the extent and type of work in streams, you may also need permits from the U.S. Army Corps of Engineers and a state agency. While we won't cover detailed regulatory requirements here, suffice it to say that consulting with your local state forestry and fish and wildlife agencies is always prudent, as is working with your consultant, forestry Extension agent, and maybe even a local watershed group, as you develop your plans.

Streams

Streams convey life and are the lifeblood of the forest as they arise from springs and seeps, flowing downstream, increasing in volume and velocity while picking up sediments and nutrients from adjacent forests. Streams provide habitat to the entire food pyramid, including plankton and periphyton that photosynthesize and are consumed by macro-invertebrate grazers. Other bugs, called detriti-

vores, break down leaves and organic matter. These bugs are subsequently consumed by larger invertebrates—such as crayfish, frogs and salamanders—fish, and even birds such as water ouzels (American dipper) and waterfowl. At the top of the food web pyramid there are herons, egrets, eagles, ospreys, bears, beavers, and others all dependent on the stream for their sustenance. Streams can also be viewed as a network of highways, with nutrients and sediments on a one-way journey downstream. Fish and other aquatic organisms are able to traverse from one branch to another, both upstream and downstream.

In the world of woodland management, all streams are not created equal. First, it's important to know when a channel is considered to be a stream, and how various types of streams are classified. Usually, there are three general criteria: (1) size, which is based on the "active channel width" (the width during the highest flows that occur every 1.5 to 2 years); (2) whether fish are in the stream, or could access the stream if man-made barriers were removed (and whether these are anadromous or resident fish); and (3) whether the stream is used for domestic water supplies (registered or unregistered). Forest practice rules determine when a channel qualifies as a stream, usually based on the size of the contributing area above a given point. In headwaters, you will likely have streams that are classified as "small" and non-fish bearing; as you go downstream, channels will become wider and at least resident fish are likely to be present. Still lower, streams will converge, becoming wider and ultimately being called rivers. Depending on your proximity to the Pacific Ocean, and any intervening barriers, anadromous fish may return to your stream to spawn and rear their juveniles. At lower elevations, you are also more likely to have water diverted from your stream for domestic use. If this is the case, for your use or others, there will be additional considerations to protect water quality.

PHOTO COURTESY: SHERRI JOHNSON

A headwater stream through a forest in the Trask River watershed. The smallest classified streams requiring protection may contain water for only a short period, and sometimes not every year.

Streams also serve as a highway to transport woody materials, nutrients, and sediments downstream, then deposit them on the beds, banks, and floodplain. Much attention has been placed on the value of large wood in

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streams and its habitat-forming role. But also important are three other types of material in streams:

• "Float load" includes not only wood, but also leaves and other organic matter that is lighter than water;

• "Dissolved load" consists of nutrients, salts, tannic acids, and pollutants such as pesticides; and,

• "Sediment," which can be further divided into the "washload" of clay, sand and silts that are suspended in the water column, and the "bedload" that more typically drifts or tumbles along the bottom pushed by currents but suspended during high flows.

Streams are commonly classified into: (1) steep "source" reaches, where land sliding and bank sloughing contribute sediments; (2) higher gradient "transport" reaches that move these materials downstream in suspension; and (3) low gradient "depositional" reaches where sediments drop into the channel bottom. Sources can also be tributaries entering larger channels, and deposition can occur wherever the flow is sufficiently slow that sand and rocks lose their suspension in the water column.

Aquatic ecosystems have evolved to accommodate periodic disturbances such as fire, landslides and floods that are common in the Northwest. Natural disturbances can range in magnitude from individual trees toppling into the stream, to significant events like land sliding and stand destroying wildfires. While these events have localized to regional effects, they are natural cycles and provide benefits as well as exact costs: landslides bring the wood, rocks, and gravels into streams that provide stream habitat, called "complexity" when they are abundant and well-distributed. However, these effects are deleterious to stream habitats when they increase beyond historic, natural levels, or when certain advantageous components—such as trees in landslides—are missing.

Riparian

Riparian areas—where the woods meet the stream—play key roles in the ecosystem: they act as buffers or filters for upslope effects; they provide shade to adjacent streams; they provide food for aquatic organisms through their leaves and arboreal insects that drop into the water; and many species, such as amphibians, are obligate to riparian zones due to their moist microclimate. Tree and shrubs growing in riparian areas stabilize streambanks—at least until trees topple, frequently uprooting considerable soil in the process. But those trees that end up in the stream play a critical role in forming habitat, as the water swirling around the trunk and limbs both excavates bedload where the current is strong, and deposits sands and gravels where it is weak. Where these trees are conifers, particularly cedars, they will persist where they fell or float downstream, while deciduous species, such as alder, will decay more rapidly.

Given that Northwest forests, particularly their streams and riparian areas, are the products of natural disturbances, how do we understand the likely effects of our management actions and methods to mitigate these effects if they are undesirable? The scientific literature provides much insight and guidance, which has been distilled into a form useful to woodland managers by Extension and others, but much of this work has been conducted as isolated studies focusing on a single resource. Over the past ten years there have been a couple of long-term efforts initiated in the Northwest that have evaluated forest management at multiple scales for multiple resources (i.e., hydrology, soils and sediment, streams, fisheries, and even birds). The first of these efforts is the "Intensively Monitored Watershed" (IMW) approach that focuses on evaluating the effects of

management and restoration actions on fish species listed under the Endangered Species Act (ESA) at 15 different study sites in Washington, Idaho, Oregon and northern California, with the majority in the Columbia River basin.

A second effort, specifically focused on evaluating forest management activities, consists of three long-term (ten year) paired watershed studies in Oregon being conducted under the auspices of the Watershed Research Cooperative (WRC) at Oregon State University. These studies are being conducted in a "Before-After-Control-Impact" (BACI) design, in watersheds where no management actions are done (the "Control" sites), and others where management, including clearcutting, takes place (the "Impact" sites) following best management practices (BMPs). In her article, Sherri Johnson of the U.S. Forest Service's Pacific Northwest Research Station identifies the research questions and parameters.

Roads and road maintenance

The water quality effects from forest roads has been prominent in the news lately, but has been a concern among forest managers since the 1970s. One recent court case about whether discharge permits for forest roads were required under the Clean Water Act (CWA), proceeded all the way to the U.S. Supreme Court, which decided in March 2013 that they weren't point sources of pollution, and would not require discharge permits as long as BMPs were followed. Congress got into the act in 2014 when it amended the CWA to prohibit National Pollution Discharge Elimination Permits (NPDES) for silvicultural operations, with the exception of quarry and log yards. However, there are still calls to regulate forest roads under the CWA, and in November 2015 the Environmental Protection Agency (EPA) settled with plaintiffs from an earlier case, opening a new rule-making process that is required to be completed by November 2016.

There are three interrelated water quality concerns related to forest roads:

• First, if travel or operations are to occur during wet weather, roads should be surfaced to avoid creating a mud bog and rutting that damages the roadbed. For roads that will undergo significant truck traffic, the durability (hardness) of the surfacing rock becomes important, both from maintenance and water quality perspectives, since broken down gravel can wind up in an adjacent stream.

• Second, any surface runoff should be prevented from entering adjacent streams, usually by putting in waterbars, hardened rolling dips, or by installing ditch relief culverts that drain onto vegetated buffer strips.

• Third, stream culverts, even for streams that do not contain fish, should be sized so that they can pass at least a 50-year storm (and preferably 100-year event) without plugging, to reduce the potential for either the fill surrounding the culvert to fail, or for the stream to be diverted down the road and erode its surface.

Fortunately for woodland owners, there is a wealth of information about how to achieve forest road BMPs. A good overall guide (albeit a bit Oregon-centric) is Steve Bower's and Paul Adam's "Managing Woodland Roads: A Field Guide" available through the OSU Extension Service (catalog.extension.oregonstate.edu/pnw641). Your state forestry or Extension office may be able to recommend specific resources and practices for your property.

The size of your property, and whether you have existing roads that need maintenance or new roads that need to be constructed, will determine the level of investment and effort

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required to bring your infrastructure up to BMP standards. Jennifer Beathe, a forest engineer for Starker Forests, an 87,000-acre family-owned corporation operating in five counties in the Willamette Valley of Oregon, provides her perspectives on road management situations she faces. Starker is known for its sustainable intensive management practices, including longer rotations and a significant investment in meeting Oregon Plan for Salmon and Watershed's goals to improve fish passage and reduce road-related sediment inputs into streams. Jennifer discusses Starker Forests' road maintenance strategies, which are particularly challenging because they generally allow public recreation on their lands, except during fire closures.

Buffer width case study

State Forest Practice Acts and their implementing rules require buffers adjacent to streams. These buffers are known variously as riparian management areas (RMA) in Oregon, riparian management zones (RMZ) in Washington, and stream or streamside management zones (SMZ) in Idaho and Montana, respectively. The extent of these buffers, and what activities may be permissible, vary among the four Northwestern states. Requirements are also in a state of flux, particularly in Oregon as the Board of Forestry recently announced that increased buffers will be required for small- and medium-sized fish-bearing streams west of the Cascades and north of the Siskiyous. However, rulemaking may take at least a year and likely won't be effective until 2017. This may leave woodland managers in a quandary about how best to proceed with management actions in light of this uncertainty. Proposals on the table generally provide some relief for small landowners; while others would continue and expand the flexibility to apply "alternative" treatments and/or provide options as long as they are designed to meet the intent of the rules that all four states in the Northwest currently provide. Probably the best advice is to consult early and often with your state forestry department since their staff has both expertise and experience in applying forest practice rules.

While there may be changes in the air, there's much that can be done in the meantime. A good example is the work that Andrej and Nancy Romanovsky are doing on their 140-acre Tree Fever Farm along the West Satsop River in southwestern Washington. Scientist (Andrej) and landscape artist (Nancy) bring unique perspectives on managing their woodlands. In his article, Andrej discusses how he took advantage of Washington's narrower buffer zones for small woodland owners to harvest and replant land that had been off limits

to the previous industrial timberland owner. As active members of WFFA, the Romanovskys continually experiment and test innovative techniques to manage their property, including the companion planting of western redcedar and Sitka spruce in order to increase the survival of the six acres of cedar planted in this area.

Fish passage and stream connectivity

Fish and other organisms, such as amphibians, need to be able to move around stream networks to reach spawning grounds, food resources, suitable stream temperatures and hiding cover. The term "connectivity" is used to describe the degree to which improvements can take place. Connectivity is particularly important for fish—especially for those that are anadromous, as adults attempt to reach their spawning grounds—and for juveniles when streams dry up in the summer or freshets potentially sweep them downstream in the winter. Recent studies of Coho salmon, in particular, show that they range widely in search of appropriate rearing habitats.

New and reconstructed roads must meet requirements of state and federal forestry or fish and wildlife agencies to assure fish passage. It's good practice to move towards these conditions as part of an overall maintenance and improvement program. In general, the criteria for acceptable adult fish passage is a maximum 1-foot drop at an outlet with a jump pool, and a maximum 6-inch drop at an outlet for juvenile fish passage. Generally, culverts need to have native materials in their bottoms. If the stream gradient is three percent or less, culverts can be embedded 20 percent at the inlet and 40 percent at the outlet, with up to a six percent gradient. A stream simulation approach can be used to dissipate energy within the crossing by utilizing larger materials. Stream simulation can be used with closed bottom culverts, open bottom culverts, or bridges. You'll probably need design assistance in these steeper channels.

There are many new approaches for stream crossings that provide choices for the woodland owner. In this issue, Tami Miketa presents a case study of a fish passage improvement on Cherokee Creek in western Washington where the DNR and the Stillaquamish Tribe assisted a woodland owner to replace a deteriorating culvert with a bridge. Washington is unique among the Northwest states in having both a Habitat Conservation Plan (HCP) covering private forestlands, and a State Environmental Protection Act (SEPA) that requires analysis as part of DNR's approval process. Some of this regulatory burden is offset by Washington's Family Forest Fish Passage Program that provides 75-100 percent of the funding needed to install priority fish passage projects that have high habitat benefits. An added benefit is that, once a landowner has reported a problem culvert to the DNR, they are provided with a "safe harbor" from any liability to replace the culvert on their own under the 1999 Forests and Fish rules, even if the culvert has not reached a priority to receive funding. ■

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The Study of Stream Responses to Forest Harvest

By SHERRI JOHNSON

Woodland owners and managers with streams through their forests have the benefits of access to these special places, but also have challenges and responsibilities of managing a riparian forest. The condition of forests in riparian zones is a major influence on the adjacent stream and stream biota. Riparian guidelines have been developed to help landowners best manage these dynamic areas and enhance stream and riparian conditions.

Why have guidelines in riparian areas?

In the 1960s, studies of forest management near streams showed that the temperatures in streams increased substantially after clearcut harvest and burning. Early methods of harvest and roadbuilding also increased the amounts of fine sediment in many streams, and negatively impacted fish populations. Riparian buffers began to be implemented to reduce these impacts.

These days, state agencies set water quality standards and guidelines for activities near streams so as to meet the provisions of the Clean Water Act (CWA) and "to maintain biological integrity of the Nation's waters." Each state sets their own metrics for protecting and providing for clean water; these metrics are developed in cooperation with the Environmental Protection Agency (EPA), which administers the CWA. The metrics generally involve numeric criteria, or standards, and describe the duration, magnitude, and timing for meeting the criteria. They are applicable to all lands within the state, including federal, state and private.

Streams that are home to fish receive greater attention and different guidelines than those without fish. In the Northwest, providing for cold water trout and salmonids is one of the beneficial uses of streams. These salmonids spawn and rear in colder water than other warm- or cool-water fish species, so temperature is a key water quality standard in the Northwest. Another standard is sediment; these salmonids are often associated with clear streams with rocky substrates. Additional standards exist for other water quality parameters, such as dissolved oxygen, pH, periphyton growth and nutrient concentrations. These are often more of a concern in low-gradient streams in agricultural or urban watersheds.

What metrics?

An ideal metric is one that is robust for key processes, can be consistently measured even by those without much experience, is inexpensive to measure, and for which values are known for reference conditions across multiple ecosystems. Temperature is a common metric because it is very easy to collect with the newer inexpensive thermistors. Data on pre-disturbance conditions exist but are limited; the temperature standards for Northwest states were developed following review of the literature for key species and were set according to presence of various life stages of fish, and whether they are rearing, spawning or incubating.

Metrics are viewed by some as proxies or indicators of the general condition of the stream ecosystem and its suitability for key species. Forest-stream interactions are complex, and healthy forest-stream interactions support a diversity of species and processes. Maintaining trees and shade to protect stream temperatures during harvest will generally also provide wood and leaf inputs to the riparian areas and to streams. The wood helps to create and maintain complex habitats for biota to have places to hide from predators or to escape to during floods or droughts. Leaves serve as food resources and habitat for instream invertebrates.

One of the challenges with guidelines is that a focus on a single metric, species, or process can neglect multiple other key features or interactions. Anthropogenic activities have historically pushed some processes and dynamics outside their range of natural variability. Concerns include higher stream temperatures, less instream wood, higher nutrient concentrations, and lower summertime instream flows. When managing for only one metric or species, there can be unintended positive or negative conse-

quences for other species or interactions. For example, a stream with appropriate temperatures but with other factors out of whack might not provide good habitat for the beneficial use of salmonids or amphibians. Another challenge is that current temperature metrics are based on responses of fish to average or maximum temperatures when fed abundant food. In streams, there are fluctuating temperatures and the potential for less food being available—all of which will affect fish condition and stress. Better understanding of fish responses to variable environments and fluctuating temperature, especially the role of minimum temperatures, could be valuable in the future.

Riparian-stream interactions

Small streams in particular have multiple connections with their riparian zones. What happens instream is strongly tied to the landscape and environment through which a stream flows. Intact forested riparian zones provide many functions for streams and stream communities. Trees intercept light and heat energy and provide detrital material, invertebrates, and structural material directly to streams. These insects are major food and energy resources for fish (See sidebar). Leaves provide food and habitat for lower trophic levels (i.e., fungi, bacteria and invertebrates) and tree roots and boles provide instream structure for fish. As water flows through the riparian zone and through the stream, transformations occur that influence energy, stream temperature, and nutrient concentrations. Nutrient uptake, cycling and transformations occur along the way and can lead to increased or decreased concentrations of nitrogen, carbon and or other constituents in the stream. Temperatures in the stream are influenced by the flow of water. Water can flow through the cobble beneath the streambed and these hyporheic flows can reduce the diurnal range of stream temperatures compared to bedrock sections.

Streams also influence their streamside forests. Although many studies have focused on the influences of riparian zones on streams, more recent studies are demonstrating how streams influence their surrounding forests. High stream flows can transport materials previously submerged in the stream into the adjacent ripari-

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Importance of Terrestrial Prey for Trout

by Judith Li, PhD, emeritus faculty in the Department of Fisheries and Wildlife at Oregon State University

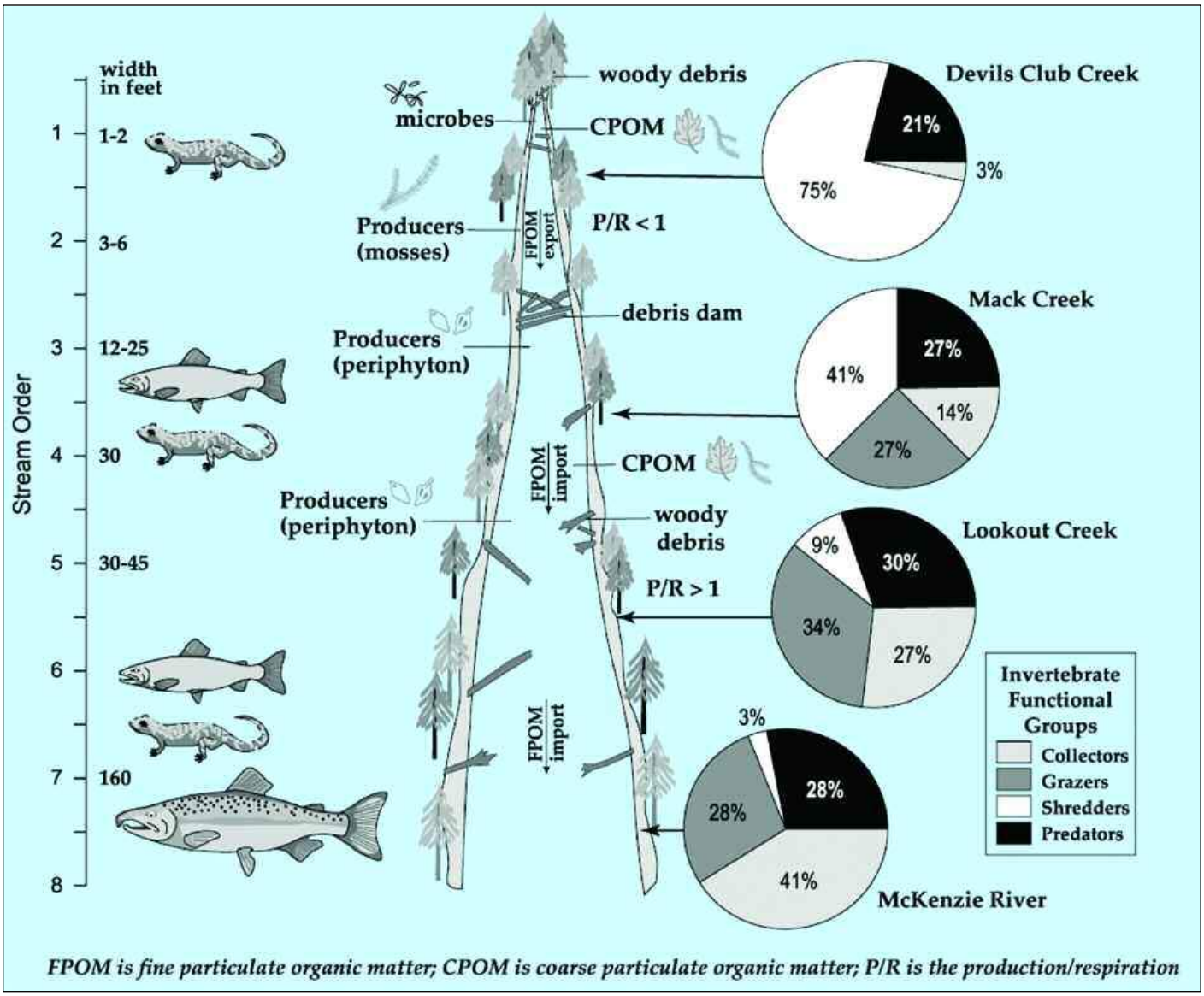
Cutthroat trout consume a variety of insects as food: aquatic insects, aquatics that have emerged as flying adult insects, and terrestrial riparian insects. At multiple tributary and mainstem sites at Hinkle Creek, Oregon, terrestrial insects were consistently part of Cutthroat trout diet, but what types of insects and how many differed by season and location in the watershed. We obtained samples of fish diet by gently flushing trout stomach contents, and then identified the insects under laboratory microscopes. In 2004, a higher proportion of terrestrial insects were eaten in summer (average 84 percent of diet) compared to spring (average 36 percent). In fall, consumption by trout was generally low, but terrestrial prey still made up 48 percent of the diet. Trout ate aquatic mayflies, stoneflies, and caddisflies, plus terrestrial beetles and true flies in spring; in summer, primarily termites, ants, and true bugs; and in fall, only small springtails were observed in the diets. Overall, smaller trout in tributaries ate more than larger fish in mainstem sites. Compared to mainstem fish, tributary trout likely expended more energy feeding in high gradient, swiftly flowing streams that had limited pools for refuge or feeding. Higher energy costs in tributaries, and trout's reliance on terrestrial invertebrates, point to the importance of maintaining riparian vegetation that provides terrestrial prey for fish in small streams.

an area and deposit them there at the high water line, effectively providing a reverse subsidy of energy back to the riparian zone. Lateral subsurface flows can transport water and nutrients away from the stream; using tracers, instream nitrogen has been detected in the riparian vegetation at some distance. Riparian microclimates, including air temperature and relative humidity, can be greatly influenced by the presence of streams nearby; studies are finding that the zone of influence can be up to 10 meters. Organisms also move from the stream to terrestrial zones; aquatic insects emerge from the water and fly away from the stream, and amphibians live in the streams as juveniles, then move into terrestrial habitats as adults.

Forest and stream dynamics are not uniform within a watershed. Riparian-stream interactions change from headwaters to downstream. Geology, soils, stream substrates and forest composition vary over space, which creates a diversity of conditions over the landscape. Headwater stream dynamics are strongly dominated by their adjacent riparian forests, while downstream, as the stream widens and shading is reduced, direct solar energy inputs become more of a factor. The stream volume also increases downstream and species adapted to larger rivers become more prevalent. Generalized changes in interactions from headwaters to downstream were described in the River Continuum Concept, a result of research in the 1970s of streams across the country, including tributaries of the McKenzie River at the H.J. Andrews Experimental Forest, Oregon.

Research on responses to current forest management practices

Forest practices have evolved in



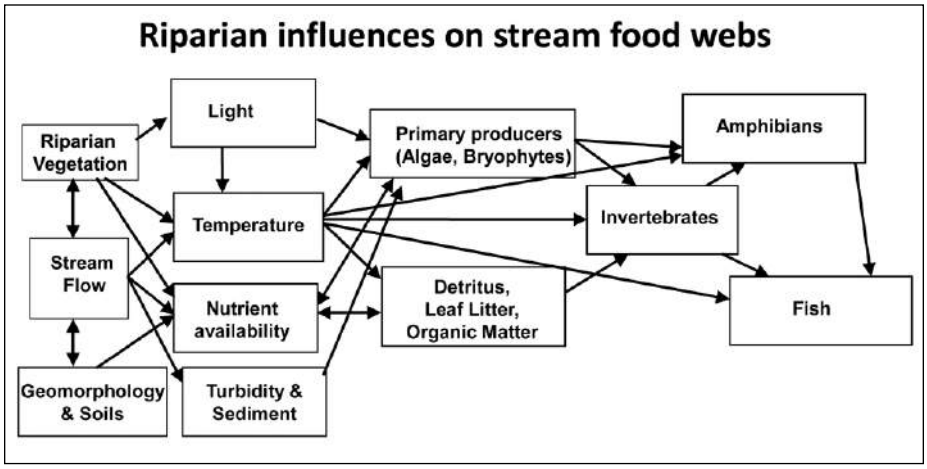
SOURCE: REDRAWN BY KATHERINE RONNENBERG FROM MEEHAN ET AL., 1978 AND VANNOTE ET AL. 1980

The River Continuum Concept showing common changes that occur in aquatic foodwebs from headwaters to downstream. In the headwaters, leaf inputs are a dominant resource for stream invertebrates and the top vertebrates are salamanders. As the stream widens and receives more light, resources shift to include algae as well as leaf particles. Invertebrate communities respond to changes in food, and fish become the dominant predator.

response to prior research and monitoring of the effects of forest management on key response variables. With improvements to forest management practices, changes in forest harvest techniques, and updates to Best Management Practices (BMPs) over the years, it is essential to have ongoing and new studies to evaluate current practices. Some techniques from early research on forest practices continue. Many of the studies going on in the Northwest have been designed to study small stream ecosystems preharvest as well as post-harvest. Some of the research is focusing on whole watershed treatments, while others make use of reach-scale studies with upstream reference streams. Reference sites or watersheds are useful for explaining year-to-year variability. The forest types have changed since the early experiments. Whereas, early studies examined first harvest effects in older forests, the forests being harvested now are often second-growth or plantations. The differences in the age and legacy condition of forests and the riparian zones at the time of harvest may impact the magnitude of responses of biota or of hydrology.

Early studies often focused on single responses of physical parameters (flow, temperature, sediment) or single species (Cutthroat trout, Chinook salmon and others). As our understanding of stream food webs and hydrology has expanded, many researchers recognize that it is necessary to study multiple components of aquatic and riparian ecosystems to best understand responses to disturbance or forest management.

Changes in technology and research methods are allowing increasing numbers of factors to be studied, at higher spatial and temporal resolution than ever before. These days, researchers use small data loggers with thermistors for frequent temperature measurements, and sophisticated sensors for measuring instream turbidity, water stage height, dissolved oxygen and specific conductivity. Data are collected much more frequently and at many more sites than was possible in the past. Often research projects use satellites to beam their data to their office computers for real time evaluation.



SOURCE: SHERRI JOHNSON

Forest-stream linkages and responses that are being studied before and after harvest in multiple small watersheds as part of the Trask River Watershed Study. We are examining how forest harvest near streams in state and private forests affects physical and biological factors.

Stream biota are more difficult to study than physical factors. Streams have diverse groups of organisms that move frequently and change over a season; it is challenging to know what fish, amphibians, or insects are doing, what they are eating, whether they are competing for food resources, who is eating them, how quickly they are growing, or where they prefer to spend time. Stream food web studies are also taking advantage of new technology. Individual frogs, amphibians and fish can be marked using passive integrated transponders, known as PIT tags, which function like electronic bar codes. Those individuals can be followed to evaluate habitat preferences and recaptured to quantify growth over time. Another newer technique for understanding energy, nutrient exchange and diet preferences uses the naturally occurring isotopic ratios of commonly occurring materials, including nitrogen, carbon, hydrogen, and sulphur. With these analyses, researchers can evaluate trophic positions and differences in feeding among sites or over time.

Conclusion

Although researchers have been studying streams and riparian zones for several decades, these are physically and biologically complex areas, and many questions about stream food web responses to forest management remain. Quantifying the tradeoffs between riparian and stream management strategies and the economic benefits of differing management objectives is particularly challenging. Woodland owners are at the front lines of simultaneously managing for harvestable timber from riparian zones, as well as continuing to provide high quality stream and riparian habitats. ■

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Celebration of Returning Salmon in Cherokee Creek

By TAMI MIKETA

With the return of fall rains, the rivers and streams feeding into Puget Sound begin to rise and, as they do, Coho salmon begin to return to their spawning grounds. The journey has never been easy or certain for these fish, so emblematic of the Pacific Northwest. Unfortunately, for many salmon as well as trout, streams used over millennia for migration are blocked by improperly sized culverts installed across forest streams during the past century. A recent project on Cherokee Creek near the western Washington community of Darrington demonstrated how the State of Washington, tribes, conservation groups and private landowners are working together to restore stream access for salmon, trout and other fish.

Administered by the Washington Department of Natural Resources (DNR), the state-funded Family Forest Fish Passage Program (FFFPP) seeks to help restore declining salmon and trout populations by helping private landowners replace inadequately sized or improperly installed culverts on forest streams with new structures that allow fish to migrate upstream and access quality habitat. Since the program began in 2003, 343 fish barriers, usually blocking road culverts, have been eliminated on nonindustrial timberland, opening 763 miles of stream habitat to migrating salmon and trout.

Cherokee Creek is especially significant for Coho Salmon. Each week during the fall when salmon are migrating, staff from the local Stillaguamish Tribe conduct spawner surveys, recording the number and location of reproducing adults and "redds" (salmon egg nests). The information helps them forecast the size of returning Coho Salmon runs in future years. They share the data with other Treaty Indian Tribes and the Washington Department of Fish and Wildlife (DFW), who cooperate in managing the fishery and monitoring the health of runs. The stream also provides spawning, rearing and refuge for several other species of Pacific salmon, as well as Cutthroat and Bull trout.

Using FFFPP funds, the Cherokee Creek fish passage project replaced a deteriorating metal culvert. Not only was the culvert aging, it was too small to withstand floods, had created an artificial waterfall that was too high for salmon to get over on their journey upstream, and was interfering with natural stream ecology.

Now in its place is a steel bridge and an 80-foot-long section of restored stream channel that allows fish access to more than a mile of productive spawning habitat. Many miles

PHOTO COURTESY: WASHINGTON STATE RECREATION AND CONSERVATION OFFICE

A private landowner's deteriorating metal culvert on Cherokee Creek in western Washington was too small to withstand floods and prevented salmon from reaching upstream spawning grounds.

PHOTO COURTESY: WASHINGTON STATE RECREATION AND CONSERVATION OFFICE

Washington State Family Forest Fish Passage Program funds paid nearly the entire cost to install a steel bridge and restore an 80-foot-long section of stream channel on private property, opening more than a mile of previously blocked fish habitat.

of streams in Washington are inaccessible to fish because of these kinds of barrier culverts or other in-stream structures.

At an open house to celebrate the people, partnerships and programs that make these projects happen, almost on cue, a number of returning Coho Salmon were seen swimming through the restored area, their genetic compasses guiding them back upstream to habitat that had not been accessible for years. The excitement of the landowners and their neighbors over the completed project was hard to contain. "I am like a kid in a candy store—I haven't seen this many returning salmon in years," stated one nearby landowner.

To complete fish passage projects, DNR works with DFW, the Governor's Recreation and Conservation Office, and a host of project sponsors including tribes, salmon enhancement groups, and conservation districts. In sponsoring the Cherokee Creek project, the Stillaguamish Tribe conducted landowner outreach, collected habitat data, provided matching project funds, managed the project design, and also handled construction oversight, permitting, billing, and grant management.

Safety, access, and economic benefits have also resulted from the project. The culvert replacement and restoration work provided new business for a local engineering firm and jobs at general contracting firms. Future timber harvest by landowners

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Road Maintenance Techniques to Protect Water Quality and Riparian Areas

By JENNIFER BEATHE

Forest roads are generally minor sources of sediment when compared to other land use activities. However, forest roads can produce sediment that can be seen on the road surface and in roadside ditches. Road failures cause environmental concern by contributing detrimental quantities of sediment to streams that offer habitat for fish and other aquatic organisms. Failures can also cause the integrity of our forest landowning community to be questioned when it appears we aren't properly taking care of our transportation systems.

Woodland owners rely heavily on existing roads for access to their property and many roads have been used for decades. The largest source of sediment over all of the management features of forestlands is roads, but when properly located, designed, built and maintained, roads have a low potential for contributing sediment.

Performing maintenance on forest roads is a common practice when working in actively managed forests. The two main reasons for keeping up with road maintenance are to ensure a stable surface for travel and to protect water quality by keeping drainage systems working properly. As a small woodland owner, consider your road needs for logging versus personal use. The width, alignment, grade and surfacing can be different depending on whether you are driving grandchildren around in a Ranger or expecting to haul 50 loads of logs. You can provide ample and effective surface drainage, and make choices about the timing of road use to maintain water quality. Like many things in life, having a plan is important.

PHOTOS COURTESY: JENNIFER BEATHE

Rocked roads can offer year-round access to landowners. Rock applied in layers becomes a durable surface that resists rutting and reduces erosion.

An inventory

Conduct a road inventory to identify road maintenance needs. An inventory of road conditions is most useful when there has been water on the roads and in the ditches. It can be difficult to see problems with drainage when it hasn't rained in two months!

When a problem, such as excessive erosion in the road or the ditch, has been identified, figure out what caused the problem. Was there a culvert to take water out of the ditch and away from the road? If so, was it big enough? Are there natural springs in the area adding to the runoff? In places where there is an abundance of water runoff, it can be helpful to increase the number or size of cross culverts along the road.

Downcut ditches are an indication of an inadequate number of cross culverts in a road. The downcut causes scour when the water has too much momentum. Some steep ditches are unavoidable. Techniques such as ditch blocks, or placing rock in the ditch, can help to slow the momentum of the water to avoid scour. Other solutions such as wattles or "biodegradable logs/bio-bags" (net bag filled with wood chips or other natural fiber) work well to control sediment in small channels.

Inspect and maintain culvert inlets and outlets to decrease the likelihood that they will clog or wash out. Fortunately, a shovel and a little labor can often repair problems. From time to time, a landowner might consider

having a backhoe or grader improve the condition of the ditch or culvert inlet area.

Basic road drainage

For surface drainage, forest managers use waterbars, drain dips, and either crowned, insloped or outsloped roads, created by a grader, to allow water to drain away from the roadbed.

In western Oregon and Washington, most forestland owners prefer crowned roads with ditches and cross culverts (also called cross drains) because road grades are often steep or slippery. A crowned road is effective when regular maintenance of ditches, crown and cross drains is possible.

In eastern Oregon, eastern Washington, Idaho and Montana, road managers often prefer outsloped roads to accomplish their drainage objectives. Outsloped roads should have gentle road grades (seven percent slope or less) and have mostly seasonal road use with light traffic.

A drain dip is a gentle depression in the road surface that is designed to carry water to the outside, onto adjacent ground. They work best on roads without steep grades. Waterbars are small humps, or earth dams, that are built into the road surface. They work well on inactive roads and skid trails. Log trucks can have difficulty negotiating drain dips and waterbars and they are not the most favored drainage structures on mainline roads. Waterbars are typically located in dirt roads. If logging in the summer on a dirt road, the waterbars can be removed and reinstalled upon completion of the operation.

PHOTO COURTESY: JENNIFER BEATHE

A temporary ditch check that consists of rocks, straw bales or wattles will reduce flow velocity and ditch erosion.

The grader can install and maintain waterbars and correct road surface damage resulting from drainage failures, vehicle traffic, or freeze-thaw cycles that reduce drainage effectiveness. Use of a grader is most effective when the road is moist and not too wet or too dry. Grading can result in increased sediment, so only grade when and where it is needed.

After hauling, make sure that drainage features are functioning. While performing road maintenance, place any excess soil in a stable location that is not located near a stream or running water. Apply grass or mulch to the area for further protection of water quality.

When large debris collects in drainage ditches, it can become a blockage to water flow. However, light amounts of vegetation can stabilize ditches and help filter water. When building new roads, forest managers can apply grass seed or mulch to exposed soils, including the ditch, to

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promote this type of vegetation. For cross drains, drain dips, and waterbars, the forest manager should identify where the water is headed. The preferred place to send water that leaves the road prism is through undisturbed, stable and abundant ground vegetation. Do not allow runoff to saturate the road fill or road failure may occur.

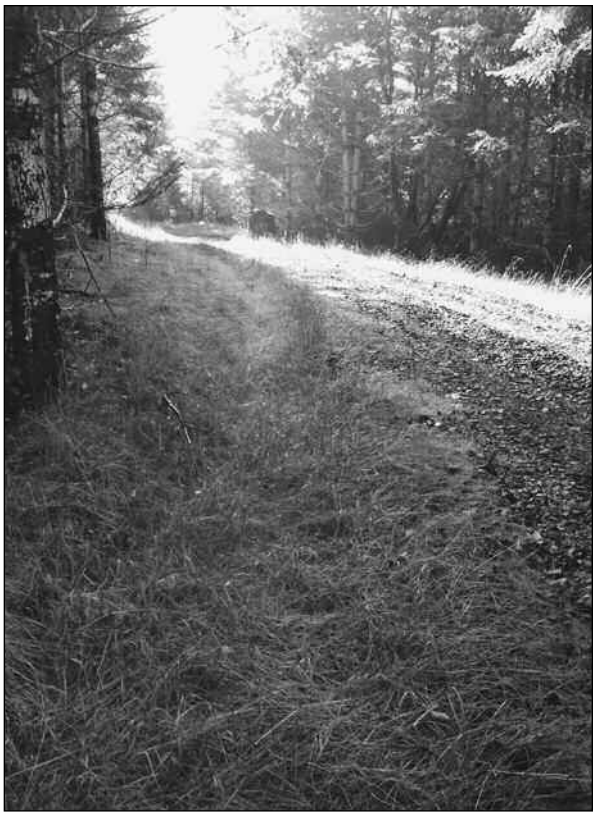

PHOTO COURTESY: JENNIFER BEATHE

Grass in the ditch can minimize erosion and downcutting.

Riparian areas

Roads that are near streams need structures and techniques that protect water quality. The simplest technique to protect water quality around riparian areas is to avoid locating roads near streams. That is not always as simple as it sounds. Foresters know that many streams have old skid roads adjacent to them. If that "road" has not been brought up to today's road standards, it may be best to leave it alone and locate your road elsewhere, such as midslope or on a ridge.

Ditch relief culverts or drain dips can be placed in the road near stream crossings to capture road runoff and divert it through adjacent forest vegetation and soil before it reaches the stream. A sediment trap can be installed in the ditch to aid in filtering the water before it reaches the riparian area. The forest floor acts as a filter. As in non-riparian areas, wattles or biodegradable logs/bio-bags also work well to control sediment in roadside ditches near riparian areas.

A large investment in rock and maintenance may be necessary when using roads in or near riparian areas. While adding rock to a road can be expensive, it usually lasts long enough to decrease the cost of road maintenance in the long run.

Best Management Practices

BMPs are practical guidelines for forest management that can help protect property while also maintaining high water quality, productive soils, and other valuable forest resources. Landowners can apply their state's BMPs or forest practices rules as they relate to their forest and management activities. Following BMPs will help keep sediment away from streams, ponds, and wetlands.

BMPs include making judgements on wet weather road use. Traffic during wet or rainy periods can increase the fine sediment that, with surface runoff, could reach and pollute streams. Good surface drainage is maintained by making good choices about timing of road use to maintain water quality. Voluntarily following BMPs and state laws that ensure high water quality helps forest landowners be successful stewards of the land.

Forest practices continue to evolve and improve. It's important for landowners to know and understand

the methods of maintaining water quality in their forestlands so they can remain productive for the long term.

Local resources

The Forest Stewardship Program is a nationwide program that assists family forest owners to manage their lands, including road maintenance. The program is a cooperative effort between the Forest Service and state forestry agencies.

In Washington the program is administered by the Department of Natural Resources Small Forest Landowner Office (dnr.wa.gov/sflo). Additional resources for Washington are available from the Washington Forest Protection Association (wfpa.org/forests-and-fish-law/roads-and-culverts).

Oregon landowners follow the Oregon Forest Practices Act as administered by the Oregon Department of Forestry (ODF). Stewardship foresters can help identify road maintenance issues. *Oregon's Forest Protection Laws, An Illustrated Manual* is useful in all topics of forest management (oregonforests.org/sites/default/files/publications/pdf/OR_For_Protect_Laws_2011.pdf).

Montana Department of Natural Resources and Conservation offers service foresters and forest stewardship workshops to help landowners outline and define their long-term stewardship goals (dnrc.mt.gov/divisions/forestry/forestry-assistance/forest-stewardship, and msuextension.org/forestry/stewardship.htm).

The Idaho Forest Stewardship Program provides technical and educational assistance to help family forest owners improve the environmental qualities and economic benefits of their woodland. Idaho also has a stewardship handbook for family forest owners (idl.idaho.gov/forestry/service/benefits-ifsp.pdf).

Local chapters of the family forestry associations and Extension foresters also offer resources. ■

PHOTO COURTESY: JENNIFER BEATHE

Heavy grass seeding near riparian areas can grow rapidly and stabilize the soil quickly.

Jennifer Beathe *has worked as a forester for 17 years at Starker Forests, Inc. She has a BS in forest engineering from Oregon State University. During her time at Starker Forests, her responsibilities have included culvert and bridge design, construction supervision, logging supervision, easements and right-of-ways, forest road layout, culvert monitoring and public outreach. Jennifer is currently serving on the board of Oregon Forests Resources Institute and is involved with several local watershed councils. She can be reached at 541-929-2477 or jennifer@starkerforests.com.*

Solving a Riparian Puzzle: One Tree Farmer's Experience

By ANDREJ A. ROMANOVSKY

This article is about applying a fixed-width alternate plan to a no-harvest riparian zone. A small forestland owner who purchases a tree farm from a large grower, like my wife and I did, has a wide riparian management zone (RMZ) established by the previous owner. The width of this old RMZ can often be reduced, thus allowing the small owner to expand his or her plantations. We recently did just that when we conducted a rehabilitation project in the old RMZ on our tree farm. We established a new, narrower RMZ of a fixed-width and harvested old trees of various species growing between this new RMZ and our Douglas-fir reproduction stands. We then established a western redcedar (WRC) plantation on this strip of land.

No-man's land

Our 140-acre Tree Fever Farm is located near Montesano in western Washington. We purchased the property in 2011 from Weyerhaeuser Real Estate Development Company. Our well-stocked, young, primarily Douglas-fir stands occupy about 100 acres of highly productive sites, mostly site class II. We also have a sizable RMZ, which includes about 1 mile of one bank of West Fork Satsop River (West Satsop) and both banks of a 900-foot stretch of a creek.

When we purchased the property our RMZ was nearly 30 acres. Along the West Satsop it was represented by a strip of land between the river's bank and young Douglas-fir plantations. The width of this strip was supposed to be 200 feet, but in reality it varied between 100 and 300 feet. The RMZ harbored mostly brush and low-quality hardwoods. The thorny thickets of devil's club were the gloomiest parts of our riparian forest. They were intermixed with overcrowded patches of vine maple and "jungles" of Himalayan and evergreen blackberry and salmonberry. Dispersed among occasional old (> 100 years) trees of different species were primarily bigleaf maple, Sitka spruce and western hemlock, but also WRC and Douglas-fir. In a large portion of the RMZ the predominant species was red alder. Many of the old trees were rotten, missing tops, and crippled from lightning strikes. There was also a lot of windfall.

I suspected that, as small forestland owners, we could have a narrower riparian buffer and use some of the RMZ that we inherited from Weyerhaeuser to grow timber. I named this potentially usable but unused land "the no-man's land." No one knew what exactly was hidden in the no-man's land: the area was practically impassible, especially during summer, and most trees could be seen neither from the river nor from the Douglas-fir plantations. We wanted to harvest whatever we could from this area, clear the devil's club, and then establish a WRC plantation, thus rehabilitating the unproductive no-man's land into a working forest.

The catch-22 of a near-riparian harvest

In order to apply for a harvesting permit the owner needs to have the proposed area of harvest marked, a timber inventory compiled, and sensible access for harvesting equipment.

American Tree Farm System (ATFS) 75th Anniversary Celebration in 2016

The first Tree Farm dedication in the United States was on June 12, 1941. Tree Farm Number One was a 120,000-acre forest owned by Weyerhaeuser Timber Company in Washington's Grays Harbor County. Chaplin Collins, editor of the local *Montesano Vidette*, suggested naming the forest the "Clemons Tree Farm" in honor of pioneer logger Charles H. Clemons. The name Tree Farm caught on. At the dedication, Washington State Governor Arthur B. Langie said, "The Clemons Tree Farm may set the pace for millions of acres of such lands throughout the state."

Today, ATFS has over 3000 members in Washington, Oregon, Idaho and Montana. Five percent of those members have been in ATFS for over 50 years, and another 20 percent have been in ATFS for over 25 years. Nationally, there are 94,764 ATFS participants.

Unfortunately, one needs to mark the area and make an inventory before knowing whether a harvest is feasible. Studying aerial photos would not help much: if trees have crowns spreading 50 feet and more (as in our RMZ), it is impossible to determine precisely the distance between the trunk of a tree and the edge of the riparian stream because both the trunk and the edge are hidden under the crowns. Work on the ground is unavoidable and cannot be done in summer, when the area is impassible. Even in winter, walking through the riparian jungles and climbing over the large windfall takes time, especially when it rains or the fallen trees are covered with ice. And the days are short in winter. Properly identifying and marking the no-man's land and measuring all trees in it could take several days. Such work could easily bring you a four-figure bill from your forester.

What would the owner get in return for this bill? The compiled inventory may show that there is not enough timber to bring in the harvesting equipment. Or it may reveal that the quality of the timber is too low to warrant a harvest. Or it may determine that the timber is concentrated in those areas that cannot be accessed without cutting long roads through the current stands. Furthermore, the proposed harvest area between the new RMZ and the current plantations may end up being too narrow (not enough light) for planting new trees. Finally, the Department of Natural Resources (DNR) may not even approve your application!

Not many owners are willing to incur such an expense just to learn that the proposed harvest is not feasible. Not many foresters are willing to conduct this work just to earn the landowner's disappointment. The owner and the forester would be eager to pay and to work, respectively, if they knew that they had a harvest. To determine whether a harvest is feasible requires substantial upfront expenses and a lot of work. This is the catch-22.

Where there's a will, there's a way!

After reading everything I could find about managing the RMZ and talking to every forest professional I knew, I became convinced that an alternate plan for a fixed-width buffer was likely to work in our case. The greatest advantage of the alternate plan is that it is so easy: you determine the site class from a DNR map, find the corresponding width from a DNR table and then just measure this distance from the edge of the bank and mark a line. You do not need to measure multiple zones within the RMZ or decide which trees you can or cannot harvest within each zone. Everything outside your marked line can be cut; everything inside must be left. Along the West Satsop, we have two site classes: II and V. Based on the DNR table, we could reduce the width of our RMZ to 118 feet (where it runs through site class II) and 75 feet (on class V sites).

In January 2014, my son Stephan (age 17) and I spent our winter break marking the fixed-width RMZ along the river and compiling an inventory of the no-man's land. We were lucky with the weather: we had three days in a row without rainfall, and then a fourth day with relatively innocuous, on-and-off rain. This gave us just enough time to thump through the entire RMZ along the zigzagging river, measure and mark it every 25 feet or so, and then inventory all trees between the new RMZ and the current stands. We thought our activity was similar to a combat operation. I played the role of a heavy tank, specializing in bushwhacking and carrying the tape through the thickets towards the edge of the bank. Stephan was a helicopter: he specialized in climbing up the more passible slopes. When the work was completed the entire front surface of my rain suit looked like it was shot with shrapnel! We also had casualties in our battle: we spent at least an hour at the end of each day removing irritating spines from our faces and learning how devil's club got its name.

The number of trees in our inventory was relatively low (about 100), but the trees were humongous. Two spruces had diameters at breast height (DBH) exceeding 100

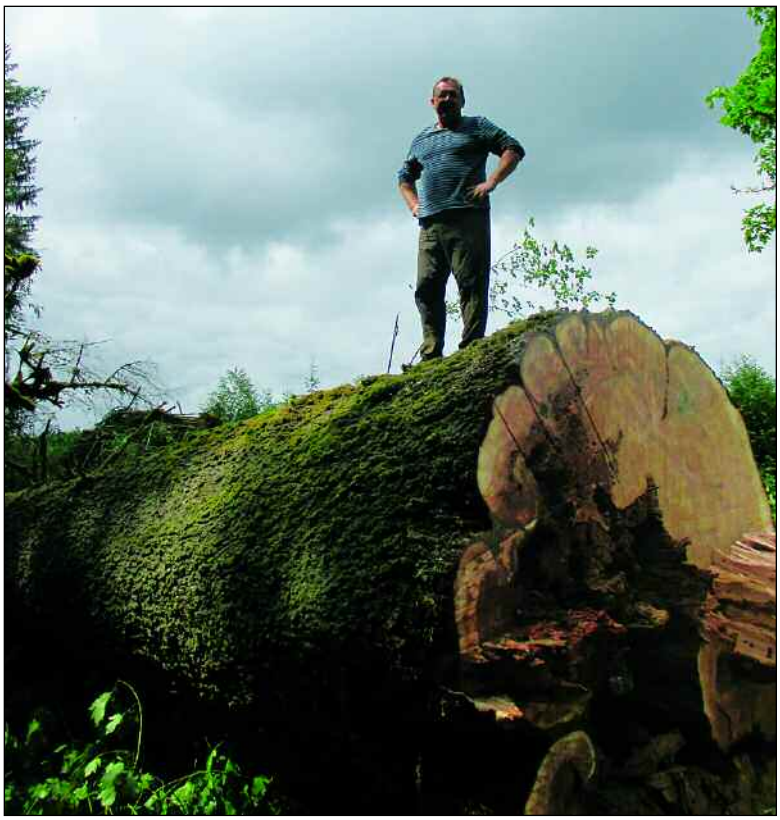

PHOTO COURTESY: DAVID HOUK

The author is standing on the trunk of a rotten Sitka spruce, cut on the no-man's land during the July 2014 rehab harvest. The tree had a 107-inch DBH.

–Continued on next page–

inches. When I e-mailed the numbers to our consulting forester, Chuck Chambers, he asked, "Did you measure the circumference or DBH?" Of course we measured the DBH! We also had beginner's luck with our measurements. When Chuck ran our numbers through his program, he came up with an estimated harvest volume of 132.5 thousand board feet (MBF), which differed by only one percent from the actual volume we harvested a few months later! Now we knew that we had enough trees to warrant bringing in the equipment, so we hired Chuck.

Using professional help was a game-changer

The next steps were not easy either, but the pieces of the puzzle started taking their places because we had a great forester! Chuck is a pioneer of tree farming and one of the most knowledgeable foresters in the Northwest. At 79, Chuck is as busy as ever consulting on multiple forestry projects and attending to his family's tree farms. His advice is based on several decades of experience. Chuck took care of our harvest permit and a site visit by the DNR forest practice forester. After Chuck showed him the vast jungles of brush and devil's club, and told him that the owners wanted to plant conifers instead, the state forester became a proponent of the rehabilitation harvest.

Upon approval of our application, Chuck brought several loggers to the property and tried to show them the proposed harvest. Not a single logger had time to look at all the different areas included in the harvest, and some gave us their bids without even visiting the property! Chuck then helped me select a logger and write a contract.

The contract deserves a few extra words because the job was rather unusual. Stephan and I were the only ones who had seen all the trees to be harvested, and everyone was skeptical about it. The loggers looked at our expected volume numbers as if we had produced them by reading tea leaves. The financial outcome of the harvest was doubted by everyone, and most loggers expected us to lose money on it. The harvest area was separated into several narrow patches, and figuring out optimal access to each patch required some brainwork. In view of these factors, Chuck and I thought it was very important to make detailed maps and include a complete inventory and site measurements in the contract.

Finding the mills was another riddle. Because our trees were very large, represented many species, and had various profound defects, from lightning strikes to rot, it was important to understand where to send different loads. Chuck's experience, and an experienced logger, helped us to solve this riddle and to do OK on selling our diverse mixture of gigantic trees. Hiring an experienced forester was the best decision we made.

A new WRC plantation

In July 2014, we performed a rehabilitation harvest on 6 acres of no-man's land. We removed the gigantic trees and sold 96.6 MBF of softwoods and 37.3 MBF of hardwoods. While all bigleaf maples and many spruces and hemlocks went for pulp, most of the WRC, fir, and alder were sold for logs. We made money on this sale. We also enhanced our new RMZ with large woody debris by placing a lot of trunks and large branches into it that we could not sell. In addition, we cleared a 1-acre opening in the near-riparian area. Thus, the total area available for a new plantation

became 7 acres.

In March 2015, we planted WRC and Sitka spruce on these 7 acres. The WRC is our favorite tree and we were looking for a way to have it on our tree farm. Furthermore, I received a grant from the Western Sustainable Agriculture Research and Education program (WSARE; supported by the National Institute of Food and Agriculture and U.S. Department of Agriculture) to study different ways of protecting a young WRC plantation from deer browsing. Hence, our new plantation features 1,800 WRC seedlings planted without any protection (control group), 1,800 WRC seedlings co-planted (in the same hole) with 1,800 Sitka spruce seedlings, and 1,500 WRC seedlings protected with traditional Vexar tubes. This is 6,900 conifers to replace the 100 harvested trees! The new plantation looks rather colorful, as different types of WRC protection are marked with flags of different colors.

While solving our riparian puzzle was not easy, having it solved fills us with satisfaction. It is nice to look at our new WRC plantation, a baby stand of a working forest, and know that just a year ago there were impassible brush jungles here. I am deeply grateful to Chuck Chambers (West Mason Consulting) for his help with the rehab harvest project and for mentoring me in tree farming. ■

PHOTO COURTESY: NANCY ROMANOVSKY

WRC protected with Vexar on the newly established research plantation. In the background, you can see the fixed-width RMZ on the right and Douglas-fir reproduction (with red alder) on the left. The entire cleared area shown used to be the no-man's land.

Andrej A. Romanovsky, MD, PhD, *is a medical researcher. He works as full professor at St. Joseph's Hospital and Medical Center in Phoenix, Ariz., where his laboratory studies body temperature regulation and fever. In partnership with his wife, Nancy, he owns and operates Tree Fever: Forestland Conservation and Development. Their ATFS-certified tree farm has been awarded EQIP and CSP contracts. He can be reached at TreeFeverFarm@gmail.com. If you would like to preserve your tree farm in an oil painting for generations to come, you can commission one from Nancy, nancy@nancyromanovsky.com.*

TreeSmarts: Answers to Your Tax Planning Questions

TreeSmarts: Answers to Your Tax Planning Questions appears every other issue in Northwest Woodlands. *The column is edited by John P. Johnston, a partner, CPA, and CMA with Bancroft Buckley Johnston & Serres LLP in Seattle, Washington. He is a member of the AICPA, IMA and WSCPA. Questions can be emailed directly to John at jjohnston@bbjsllp.com.*

What tax planning options do you have when your land needs to change?

I am going to take a slightly different tack this time in discussing this issue's topic, streams and riparian areas. Instead of discussing the tax strategies and considerations of having environmentally sensitive areas on your tree farm, what if instead we talk about a much more radical possibility when there are waterways and riparian issues? What if you just want to completely change the farm? Or, perhaps, the powers-that-be have deemed your property so sensitive or problematic that they decide *for* you that your property is no longer yours? Or, tangentially, perhaps Mother Nature has made some of her own decisions. These situations obviously have huge tax consequences, especially if your farm has been in your or your family's possession for many years. Fortunately, there is at least a silver lining for tax.

Let's start with the topic of simply wanting to change your current holdings into something different. Maybe you're tired of dealing with the riparian areas on your farm and you just want to trade it in for another forest without all those problems. Or better yet, maybe you have some other kind of real property (e.g., a parking lot, commercial building, or fallow farmland) that for whatever reason isn't meeting your needs and expectations, and you've decided it would be better to trade it in for some timberland. After all, it's a lot more rewarding to introduce the next generation to planting seedlings than re-tarring that pay-parking lot. Some of you are probably already familiar with this concept of a *like-kind exchange*.

A like-kind exchange, or Internal Revenue Code (IRC) §1031 exchange, is a very useful tool in the business of tree farming. Generally speaking, it allows you to trade like-kind assets without a tax consequence. This is incredibly useful when you are trying to do such things as improve upon your ideal portfolio of species and/or age classes, secure better access to your existing holdings, or move your holdings altogether out of the path of development. There are some very strict and, at times, complicated compliance issues, such as very specific timing protocols or sometimes needing a third-party facilitator. But there are CPA's and exchange specialists out there to help wade through those issues. What might be useful to understand initially is a little bit more about what "like-kind" actually means.

Generally speaking, for the purposes of a IRC §1031 exchange, like-kind refers only to the *nature or character* of the property and not to its *grade or quality*. What this means is that real property (e.g., land) can be exchanged for other real property, and personal property (e.g., a truck or machinery) can be exchanged for other personal property. The fact that one piece of land is paved and the other has trees on it is irrelevant—they are still like-kind as defined by the IRC. In fact, IRC §1.1031(a)-1(c) supports that a 30+ year leasehold (e.g., cutting right) can qualify as like-kind to traditional timberland. Another interesting example in a Private Letter Ruling (PLR 9621012) was that a certain conservation easement was like-kind to land that was either timberland, a ranch or a farm. So you can see there is quite a bit of flexibility.

As usual, there is not nearly enough space here to discuss the vast combinations and permutations of this concept, but I just want to give you a few more unique considerations before we go to the next topic. First, you can do exchanges with related parties, but you'll need to comply with special holding and other requirements. Also, like-kind exchanges can be used to move real

estate from a state with income tax to one without income tax and permanently avoid the original state's tax (lots of retiring New Yorker's do this when moving to Florida). However, it doesn't work across federal borders, so going to/from Canada isn't an option.

But now onto the next subject, known as *involuntary conversions*, or IRC §1033 conversions. This is, for example, when Mother Nature or the government decides to convert your property without your permission. I wrote about this in more detail in the summer 2014 issue, so I'll keep it a little briefer here. Suffice it to say, if you involuntarily end up with cash in your pocket rather than trees growing on your land, you stand a good chance of avoiding taxes if you reinvest that cash in similar-in-use or like-kind property. Here's a quick example, common in tree farming. Say an ice storm hits this winter and damages your trees. You have no choice but to salvage what you can and replant. Well, if you reinvest the proceeds within two years in like-kind or *similar-in-use* property, you don't have to pay tax on the harvest income. Similarly, if the government takes your land under eminent domain, you have three years to reinvest. And the compliance issues aren't nearly as strict and complicated as IRC §1031.

Better yet, IRC §1033 replacement property can be either similar-in-use, or like-kind. Here are a few other examples of IRC §1033 replacement property:

- Manufacturing plant replacing a long-term leasehold on a similar plant
- Improved city lot replacing mineral rights or utility easement
- Perpetual water rights replacing lakefront real estate

As always, the foregoing discussion only touches on some of the highlights, and the underlying issues and rules are extensive and complex. But the important thing to know is that there are some great tools built into the tax code to take advantage of, and there is plenty of information out there to get you started. So if you don't like what's going on currently with your real property, whether never-ending complications from a wetland, or an unyielding county that wants your land, you have options. ■

Disclaimer: To ensure compliance with requirements imposed by the IRS, any tax advice contained in this communication was not intended or written to be used, and cannot be used, for the purpose of (i) avoiding tax-related penalties that may be imposed on the taxpayer under the Internal Revenue Code or applicable state or local tax law, or (ii) promoting, marketing or recommending to another party any tax-related matter(s) addressed herein.

Send in Your Tax Question

Do you have a question that relates to accounting, business, or tax planning? If so, send it to tax expert John Johnston (jjohnston@bbjsllp.com) and he will answer it in the next scheduled column.

Tips From The Treeman

Steve Bowers

DEAR TREEMAN, I attended your tree identification class in Elkton some time back. You mentioned the western larch as also being called a tamarack. I did some research and calling the western larch a tamarack isn't entirely correct, but most people call it that anyway. —*Sue*

DEAR SUE, You are correct, but not entirely. Many of our east-of-the-Cascade friends are familiar with larches, though many, or most, mistakenly call them tamaracks. And you know Treeman is a stickler for details...no room for equivocation or extemporization here!

Three larch species are found in North America: the subalpine larch *(Larix lyallii)* at high elevations in western Canada; the eastern larch *(Larix laricina)* in eastern North America; and the western larch *(Larix occidentalis)* native to western North America, southeastern British Columbia and southwestern Alberta.

Other common names for the eastern larch include American, red and black larch in addition to tamarack. Latin for tamarack is *Larix laricina*, so technically, the east coasters have the advantage, but accuracy based on geography should distinguish the trees as eastern tamarack versus western tamarack.

And while Latin may ingratiate you with pretentious academicians, sobriquets and colloquiums comprise much of the vernacular for us plebeians. Thus it is, we find tamarack is of Algonquian descent and means "wood used for snowshoes." The Algonquian are one of the most populous and widespread North American native language groups, with tribes originally numbering in the hundreds of thousands. Some of the more common tribes speaking a derivative of Algonquian include the Shawnee, Blackfoot and Arapaho, to name a few.

The Algonquian language of New Hampshire and Vermont called the tamarack "hackmatack" (pronounced HAC-muh-tac). Additionally, "tacamahac" (TAC-a-mu-hac) was the common name for the balsam poplar. Considering the myriad native languages, it is easy to see a confusion in translation between the two and the nomenclature resulting in today's tamarack: easier and more defensible than many people today calling the grand fir *(Abies grandis)* a white fir *(Abies concolor)*. —*Treeman*

DEAR TREEMAN, I've read various things on how harmful western juniper can be in certain areas of the state. While I was surfing the internet I saw that juniper berries are used to make gin—right here in Oregon. Looks like juniper is good for something after all. —*Gary*

DEAR GARY, Yes, sir; the commercial production of gin has been in Oregon for nearly 20 years. In North America there are 13 indigenous species, but some are considered inedible. Common juniper *(Juniperus communis)* is the widest and most utilized species for gin production, and our region's western juniper *(Juniperus occidentalis)* can be included as a viable species for human consumption.

In 1500 B.C., Egypt used a concoction of juniper berries to cure tapeworms and the ancient Romans used it for various stomach ailments. The Greeks used it in their foods, especially during Olympic events, believing it increased stamina. But alas, as with so many things, our innocuous juniper berry degenerated from an herbal medicine to an object of abasement—booze.

The word gin comes from the French *genievre*, or juniper. Actually, juniper berries are not real berries, but cones containing such diminutive and compressed scales as to be non-discernable, thus appearing as round berries. Only the female tree makes the berries, while the male possesses cones; another example in nature of man's futility and woman's viability.

In the late 1580s, a juniper-flavored spirit was found in Holland by British troops fighting against the Spanish in the Dutch War of Independence. They drank it to give them what they soon came to call "Dutch courage" in battle. The first confirmed date for commercial production of gin is early 17th century Holland, produced as a medicine and sold in chemist shops. To make it more palatable, it too was flavored with juniper.

In 1689, England's King William III made a series of statutes encouraging the distillation of spirits while simultaneously imposing a heavy duty on imports. These decisions resulted in thousands of gin shops throughout England, a period known as the Gin Craze.

The Gin Act of 1736 imposed high taxes on retailers and led to riots in the streets. There is a lesson here: government interference creates a problem...leading to government interference to solve the problem...leading to government interference to solve the problem created by government interference...ad infinitum...

In the British North American colonies, Paul Revere and George Washington were notably fond of gin, and the Quakers were well-known for their habit of drinking gin toddies after funerals: precipitated by "Dutch courage?"

National prohibition led to the explosion in gin production. Moonshining quickly filled the gap with gin the booze-of-choice. It did not require aging: merely mix raw alcohol with juniper berries and other flavorings in a large container such as a bathtub, thus the origin of the term "bathtub gin."

Around the world, juniper-flavored beverages include a Finnish rye-and-juniper beer known as sahti, flavored with both juniper berries and branches. Borovicka, or juniper brandy, is a Slovak beverage containing juniper berries, popular in Poland and the Czech Republic. Germany produces a juniper gin called Dornkaat. So take a shot of "Oregon courage" and continue reading... —*Treeman*

Celebration of Returning Salmon in Cherokee Creek

continued from page 19

along the access road can now occur over the newly installed bridge. And as an added bonus, the project came in $30,000 under budget, allowing funds to be applied to more projects in other high-priority streams.

From DNR's perspective, it's the partnerships that make the whole thing happen. In a letter commending the project's success, Commissioner of Public Lands, Peter Goldmark wrote: "The Stillaguamish Tribe's work in partnership with the Department of Natural Resources is essential for success in delivering FFFPP financial assistance to small family forest landowners. The program is one of the critical links in a comprehensive approach to forest road management. I am so pleased that FFFPP has become such a successful program with a proven track record in repairing the highest-priority fish passage barriers."

FFFPP works statewide to continue to correct these barriers. It's important to note, however, that the program has more than 840 projects on a waiting list that still need funding from the legislature. For more information about the program, visit DNR's Small Forest Landowner Office website at dnr.wa.gov/sflo. ■

Tami Miketa *is manager of the Small Forest Landowner Office at DNR. She has worked for DNR for 25 years. Before her current position she was the implementation manager for the State Lands Habitat Conservation Plan. She started her career with DNR as a region wildlife biologist. Tami earned her B.S. degree in wildlife biology from Washington State University. She can be reached at 360-902-1415 or sflo@dnr.wa.gov.*

Family Forest Fish Passage Program

The Family Forest Fish Passage Program is popular. Here's what small forest landowners have said about the program:

"I am absolutely tickled with the quality of the project. When the road was put in 50 years ago we had no idea the impact it would have on the generations of salmon. We are very thankful to have fish returning and a new bridge to access our tree farm." —Herb and Delores Welch

PHOTO COURTESY: SCOTT ROCKWELL

Salmon could soon be seen swimming in the restored stream channel to reach previously blocked upper reaches of Cherokee Creek.

"It's a win-win: the landowner gets a great structure that they never could afford otherwise, and the fish get a better stream." —Holly Koon and Max Duncan

"All parties involved in this project were excellent to work with. We have a quality bridge that will last forever." —Ron Roberts

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Family forestland owners
Dale Cuyler and Brenda Woodard

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