

Ecosystem Services Protocols for use on Forestlands in western Washington and Oregon



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By Willamette Partnership



Willamette Partnership is a non-profit coalition of diverse leaders dedicated to increasing the pace, scope and effectiveness of restoration. This report is produced by Willamette Partnership in collaboration with Todd Gartner, World Resources Institute.

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I. Forests and Ecosystem Services

Forests and forest landowners provide important benefits to both communities and ecosystems. Clean water, clean air, natural places to play, and forest products are all critical ecosystem services. These services provide drinking water to communities, support habitat for fish and wildlife, help mitigate effects of climate change, and support other benefits that underpin a sustainable economy. This white paper describes how family forest landowners can better communicate the ecosystem services their land provides, and articulate these benefits in a way that could provide access to various forms of incentives (e.g. stewardship recognition, regulatory assurances, market access, payments, etc.).

Landowners have a multitude of reasons for participating in ecosystem service incentive programs. Though cash and other financial incentives are often most important, surveys such as those conducted by Ecoagricultural Partners that are focused on payment for watershed services projects, suggest that successful programs are designed to appeal to landowners with a strong stewardship ethic and who really understand the value of maintaining a healthy forest that supports the productivity of their land and their way of life¹.

For the last decade, a variety of organizations have worked with forest landowners to help them access new markets for non-timber forest products, sustainable certification (e.g. Forest Stewardship Council), and carbon offsets. This paper describes how landowners in western Washington and Oregon can access emerging ecosystem service programs for *water* and *biodiversity*. The analysis draws heavily from Willamette Partnership's² (Partnership) understanding of current programs, market opportunities, and how forest landowners can best engage in these programs.

The paper begins with a brief description of an ecosystem service program and how a forest landowner can use elements of a program to access different forms of incentives. It broadly describes conservation incentive programs that may be applicable to forest owners in the Pacific Northwest and outlines potential opportunities for conservation-based incentives.

¹ Payments for watershed services in the United States : *Cost-effective strategies to align landowner incentives for abundant clean water* - http://www.ecoagriculture.org/documents/files/doc_374.pdf

² Willamette Partnership is an Oregon nonprofit corporation who works with a diverse coalition of conservation, city, business, farm, and science leaders across the western United States to shift the way people think about, value, manage, and regulate the environment.

Specifics are then provided on Willamette Partnership's ecosystem credit accounting system, including an overview of the Partnership's protocols and quantification tools for water and biodiversity, and direction as to which of those are most relevant to forest landowners. The paper ends with a discussion of opportunities and challenges facing family forest landowners' ability to access ecosystem programs and some recommendations on how best to overcome those issues.

II. Ecosystem Service Programs: Opportunities for Forest Landowners

The term "ecosystem services program" is broad, and can include many different kinds of efforts. In general, these efforts focus on providing decision-makers with 1) information and assessment tools that link ecosystem health with the attainment of economic and social goals and 2) options for developing new markets, economic incentives, and public policies that restore and sustain ecosystems.³

Yet, whether it is Forest Stewardship Council (FSC) certification, Climate Action Reserve's carbon offsets, or US Fish and Wildlife Service's Safe Harbor agreement, there are some common elements across all of these programs. These elements are:

- *Eligibility criteria* to define which landowners and projects can participate in a given program;
- *A quantification tool* to measure the ecosystem services provided by a project;
- *Verification protocols* to monitor whether projects are being managed as proposed and whether the ecosystem services being promised are delivered; and
- *A tracking system or registry* to provide reliable information on the projects providing ecosystem services within a given program.

Each of these elements can look very different depending on the ecosystem service being measured, the geographic focus of the program, the objectives of a program, or other program design decisions. This paper will focus on a subset of ecosystem service programs and uses of ecosystem service information. These include:

- Habitat mitigation (typically used for unavoidable impacts to endangered species habitat under the Endangered Species Act);
- Water quality trading (typically used to offset wastewater discharges from municipal sewer or stormwater utilities); and

³ WRI Mainstreaming Ecosystem Services - <http://www.wri.org/project/mainstreaming-ecosystem-services>
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- Better quantifying the ecosystem service value of management activities (e.g. as part of FSC monitoring, for use as information in a grant application, or communicating to the public).

In many cases, forest landowners do not have the resources to fully implement all the best management practices they would like to on their land. Ecosystem service programs can sometimes provide the financing and/or technical resources to implement and maintain these activities. Information on ecosystem services can also provide a landowner's operations with more certainty (e.g. Endangered Species Act assurances) or market differentiation (e.g. FSC certification, Salmon-Safe certification or information for direct marketing). This section describes what opportunities currently exist for forest landowners in western Washington and Oregon, and which opportunities might exist in the future with some additional information and a push from the landowner community. The opportunities are grouped by program type (mitigation and offsets, payments for ecosystem services, certainty and flexibility, and recognition and communication).

2.1. Mitigation and offsets for ecosystem services

Most forest owners are familiar with carbon offset markets, but emerging markets also exist in the Northwest for water and biodiversity. The term "markets" can be used loosely for both voluntary markets (e.g. most carbon offsets) or compensatory mitigation (e.g. wetland mitigation). For this paper, and in general around the country, "markets" are used for programs in which a landowner goes above and beyond legal requirements or business as usual to create ecological benefits (credits⁴), which are then sold to someone (e.g. a road department or a housing developer) causing an unavoidable impact. Even though the word "market" is used, these programs are highly controlled and shaped by regulations and policy. These emerging markets often have very limited demand, and the ecosystem service provided for mitigation or as an offset usually needs to be geographically close to where impacts are occurring. For example, a mile of stream restored on the Olympic peninsula cannot be used to offset a new bridge project in Oregon's Rogue River. While thin demand and geographic constraints will make it difficult for large numbers of forest owners to participate in water and biodiversity markets, there are some opportunities.

⁴ A *credit* is a quantifiable unit of ecological benefit or service generated by positive actions taken on the land. A credit can be used simply to communicate ecosystem services in units a target audience (e.g. FSC, the public, or a power plant) can understand and value. When verified and tracked, it can also be used as the basis for an incentive payment, or as an offset for impacts to those same ecosystem services.

2.1.1. Forest carbon

In Oregon and Washington, opportunities are available for forest landowners to participate in the carbon market. The largest markets are linked to standards such as the California Air Resources Board (ARB), Climate Action Reserve (CAR), Verified Carbon Standard (VCS), and American Carbon Registry (ACR)⁵. These programs base their calculations of potential carbon credits on data: species, diameter, and height for living trees and length, diameter, and decay class for dead trees. There is some variation in programs regarding what exactly is counted, but all require carbon to be calculated for harvested wood products as well as standing trees.

In addition, all programs require annual monitoring reports, regardless of the landowner's intentions for registering, verifying, or selling credits during a particular year. Monitoring reports are required to include a description of management activities and any changes to carbon stocks through growth, harvest, or natural disturbance. Monitoring reports are also to be signed by a registered professional forester.

Barriers to participation for landowners are centered on expenses for inventory, running growth and yield models, and in particular, verification. Because of these expenses, larger projects (more than 500 acres) are recommended because they are more likely to generate enough revenue to cover costs. However, all programs allow aggregation, which is the pooling of individual land plots to decrease the cost of monitoring and reporting. However, there are no examples of aggregated projects at this time to provide an estimate of potential cost savings from aggregation.

2.1.2. Conservation banking (Endangered species, fish passage, and habitat)

Conservation banking is an incentive based tool designed to work in parallel with the Endangered Species Act to allow "incidental take" of endangered species. US Fish and Wildlife Services oversees conservation banking for federally listed species, except for anadromous fish, which is governed by NOAA's National Marine Fisheries Service (NMFS). Both agencies have issued guidance on conservation banking^{6,7}. State fish and wildlife agencies often require mitigation for impacts to other sensitive habitat and species. Both Oregon and Washington have habitat mitigation programs in place that are triggered by actions such as modifying the

⁵ Northwest Natural Resources Group. Monitoring for Forest Carbon Under Third Party Verified Forest Carbon Offset Programs http://nncrg.org/files/Excerpt%20from%20Monitoring%20for%20Forest%20Carbon_v1.pdf

⁶ USFWS Guidance for the Establishment, Use, and Operation of Conservation Banks http://www.fws.gov/endangered/esa-library/pdf/Conservation_Banking_Guidance.pdf

⁷ NOAA Fishery Service: http://www.nwr.noaa.gov/publications/habitat/fact_sheets/conservation_banking_fact_sheet.pdf
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hydrology in Washington streams, or by building an energy facility of a certain size in Oregon and Washington.

Washington Department of Fish and Wildlife administers the Hydrologic Permit Approval (HPA) program, which requires permits prior to any construction that will change the natural flow or bed of state waters⁸. Mitigation can sometimes be required to get an HPA approval.

Both Oregon and Washington have energy facility siting councils that review energy facilities and transmission lines larger than a certain size. In Oregon, rules specify that proposed large energy facilities that meet certain criteria must comply with ODFW's habitat mitigation policy⁹. In Washington, a council evaluates applications for environmental and socioeconomic impacts. As part of a project's Environmental Impact Statement (EIS), mitigation can be required¹⁰.

Both state and federal fish and wildlife agencies are actively interested in conservation banking, and there is an expectation that the number of new species listings will grow in the next three to five years¹¹. However, there is only one approved conservation bank in Oregon and one bank in Washington with salmon credits potentially available. Mitigation has been required for road projects with impacts to spotted owl or marbled murrelet habitat, but we are not aware of any comprehensive approach to requiring mitigation for impacts to listed, forest-dependent species. Some opportunities to watch are listed below:

Thurston County's Prairie Habitat Conservation Plan: In both Oregon and Washington, some of the newest listings are proposed for prairie ecosystems. Southern Puget Prairies occupy 10% of their former range, and prairie species dominate 3% of the remaining grassland soils¹². Prairie has been converted for agriculture and urban development, and lack of active management has led to encroachment of Douglas-fir and invasive species. Thurston County is developing a Habitat Conservation Plan that will likely include a mitigation program for impacts to prairie. Prairie credits can be created by preserving and enhancing existing prairie or restoring prairie (e.g. removing forest cover on top of prairie soils and connecting to existing prairie habitat). It is unclear what the volume, value, or timing of demand for prairie credits might be.

⁸ <http://wdfw.wa.gov/licensing/hpa/hcp/>. Chapter 77.55 RCW (and WAC-220-110-10),

⁹ http://www.oregon.gov/energy/Siting/Pages/standards.aspx#Fish_and_Wildlife_Habitat.

¹⁰ <http://www.efsec.wa.gov/cert.shtml#Certification>

¹¹ Center for Biological Diversity v. Salazar -

http://www.biologicaldiversity.org/programs/biodiversity/species_agreement/pdfs/proposed_settlement_agreement.pdf

¹² Crawford, R. and Hall, H. Changes in the South Puget Prairie Landscape.

<http://www.southsoundprairies.org/tech/Changes%20in%20Puget%20Sound%20Landscape.pdf>

North Coast Fish Passage Banking: Both Oregon and Washington have expansive fish passage requirements. Any time a road agency, forest landowner, or anyone else installs a new stream crossing or structure that can pose a barrier to the migration and spawning of resident and anadromous fish species, fish passage rules can be triggered¹³. Oregon is piloting an approach to fish passage banking in which removing a high priority barrier (as mapped by Oregon Department of Fish and Wildlife) can generate credits to be sold to projects needing a waiver for not providing passage at a lower priority location. A small number of forest landowners in the North Coast may be able to participate in this program.

In Washington, the Department of Natural Resources' Family Forest Fish Passage Program¹⁴ funds the removal of high priority fish passage barriers or replacement of culverts and stream crossings to improve migration of salmon, trout and other fish species in Washington streams. The program is eligible to private, small forest landowners with structures on fish bearing streams.

Natural Resources Damages banking: Another take on banking is the Natural Resources Damages Assessment tied to pollution spills and cleanup of toxic sites. Where unpermitted damage occurs, federal agencies can require cleanup and payment for damages to the ecosystem. This is most common in Superfund cleanup or other major cleanup efforts (e.g. Portland Harbor or the Green Duwamish). If approved by the natural resources trustees, a mitigation bank may be able to provide credits to the parties responsible for the cleanup. Most of the damages being negotiated now are in major river systems, and credits generally need to be provided by relatively nearby streams. There have been instances in which damages have occurred to forest-dependent resources. For example, when the New Carissa ship ran aground off the coast of Oregon, owners were required to pay for damages to marbled murrelet, a bird that uses both the ocean and nearby coastal forests. Those damages were used, in part, to protect important forest habitat for the murrelet.

2.1.3. Water quality trading

Under the Clean Water Act, point sources of pollution (e.g. municipal wastewater facilities, stormwater systems, industries, or anyone with a pipe discharging water into a lake or stream) need to reduce their pollution levels. When the Clean Water Act passed in the early 1970s, untreated sewage and industrial wastewater were the major sources of pollution. Now, they

¹³ (ORS 509.580-910, OAR 635, Div. 412, OR HB 3002 (2001), RCW 77.57.010-080, RCW 77.55.060, WAC 220.110.070).

¹⁴ http://www.dnr.wa.gov/BusinessPermits/Topics/SmallForestLandownerOffice/Pages/fp_sflo_ffpp.aspx

often make up less than 20% of water pollution in a watershed¹⁵. Nonpoint sources (e.g. agriculture, roads, forestry, etc.) comprise a larger portion. Water quality trading allows a point source discharger to invest with landowners to restore “green infrastructure” that reduces pollution by the same amount or more as traditional concrete and steel technology installed at a treatment plant. There are currently over 25 active water quality trading programs in the country, and several in the Northwest. Most of the Northwest programs focus on restoring riparian vegetation, which provides shade and produces temperature credits. Some programs for nutrient trading are emerging in Southern Oregon and Idaho, but they are not actively trading yet. Unfortunately, improved forest management or avoided deforestation are not currently eligible to generate water quality credits in any of these markets. Forest practice rules in Oregon and Washington require riparian buffers, so it is difficult to demonstrate the value of additional shade and associated temperature credits. Reduction of sediment erosion and associated nutrients is a focus of FSC certification, and could generate credits. The existing nutrient models were built for agricultural lands, but are currently being adapted and validated for use on forestlands. If forest owners can demonstrate that road maintenance, expanded buffers, or other erosion control measures can reduce pounds of total nitrogen, phosphorous, or sedimentation from getting into a stream, then forest owners may be able to participate in water quality trading programs. Some of the existing and emerging programs are summarized below:

Rogue River temperature credits: The Medford-area wastewater treatment plant will be working with The Freshwater Trust to restore roughly 30 miles and \$8 million worth of riparian buffer in the Upper Rogue River over the next 10 years. The restored riparian forest will provide shade and other ecological benefits to offset the thermal load from the regional wastewater facility, which would have had to spend \$16 million to install mechanical chillers—an approach 100% sure to comply with the Clean Water Act, but also likely to do little for the salmon populations that the rules are trying to protect.

Watersheds where temperature and nutrient trading programs are being actively considered: Willamette River (Upper and Mid Willamette); Lower Boise River; Klamath River (Upper Klamath)

Forest Riparian Easement Program¹⁶: Housed in the Washington Department of Natural Resources (DNR) Small Forest Landowner Office, this program compensates small forest

¹⁵ Willamette Partnership. In It Together, Part I, p. 6.

¹⁶Small Forest Landowner Office. Forestry Riparian Easement Program.

http://www.dnr.wa.gov/BusinessPermits/Topics/SmallForestLandownerOffice/Pages/fp_sflo_frep.aspx

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landowners for placing an easement on their land. This easement is for retaining the unharvested trees required by the Forest Practices Act (FPA) for fifty years instead of removing them. Landowners are essentially “leasing” the trees and their riparian habitat benefit to DNR. As of 2012, DNR was seeking permanent funding for this program and has submitted a report of recommendations for new funding sources to the state.

2.1.4. Wetland and stream mitigation banking

Section 404 Clean Water Act requirements for Wetland Mitigation – OR and WA

Wetland mitigation banking is probably the largest opportunity in the Pacific Northwest across all landcover types in terms of both credit demand and value. Under the Clean Water Act, anyone who impacts a wetland is required to avoid, minimize, and then mitigate those impacts with strict requirements from the Army Corps of Engineers and state agencies. Very few forest owners operate mitigation banks. To generate a bank, a landowner would need to create, restore, or enhance a wetland, and many forest owners do not have the size of degraded wetland in proximity to an urban area needed to make a wetland mitigation bank work economically. Enhancement means to improve both the hydrologic and vegetation conditions of an existing wetland. Wetland banks need to be fairly large (e.g. greater than 20-30 acres) and need to be located within a watershed with enough impacts to create demand (e.g. on the urban fringe). There are over 20 active mitigation banks in Oregon and 14 in Washington (with 2 in the review stage)¹⁷.

Section 404 Clean Water Act requirements for Stream Mitigation – OR and WA

Under Section 404 of the Clean Water Act, permittees with impacts to streams are required to mitigate for those actions. In 2009, mitigation requirements under Oregon’s Removal Fill Law were expanded to include explicit requirements to mitigate for impacts to streams. Work is ongoing in Oregon to target stream functions, develop tools to identify streamflow duration and jurisdictional streams, and develop a statewide stream classification system. An interim framework for how the mitigation process will work is targeted for release in 2013, with a tested, watershed-based approach to mitigation by the end of 2014. The project will also link closely with Willamette Partnership’s Counting on the Environment (COTE) process that bridges regulatory jurisdictions and project partners’ efforts to transition Oregon’s wetland mitigation program into a more functions- and watershed-based approach. By the end of 2014, there will be a tested approach to mitigation that treats all waters in the state consistently. Washington

¹⁷ Status of Wetland Mitigation Banks in Washington State as of July 2013 - <http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/map.html>

State is in the early stages of determining how they will implement a functions-based approach to stream mitigation requirements.

2.2. Payments for ecosystem services

Payments for ecosystem services (PES) encompass a range of programs, but generally, a landowner is provided a cash incentive for providing ecosystem services. That incentive can be provided by a public agency (e.g. USDA through its Farm Bill programs) or an entity benefiting from the service (e.g. the City of Olympia's source water protection pilot). Under PES, the ecosystem services provided by landowners are generally not used to offset an impact elsewhere. They are often less associated with regulatory drivers, making them more flexible. However, the lack of regulatory drivers can limit demand. Below are some examples of emerging and active payment programs in the Northwest.

2.2.1. Drinking water source and flood protection

There is significant interest in source water protection nationally, and Washington's Department of Natural Resources and Department¹⁸ of Health have been paying close attention to the issue for several years. Wild fires and resulting erosion in Colorado and New Mexico, changes to upstream land use, and increasing water treatment costs are all causing drinking water utilities to look upstream. Utility managers know there are good reasons to invest in sustainable forestry in their drinking water sources, but they have not developed the science and the business case to know how much that investment might be worth to them. For example, how would extending rotation cycles or managing roads differently produce less sediment, more water in the summer, and/or less flood water in the winter? A number of cities and watersheds are exploring protection of headwater areas for drinking water and flood protection. These include:

Ashland, OR: Investing in forest thinning in USFS land above its reservoir

Olympia, WA: Exploring easements in areas upstream of its well field

Cannon Beach, OR: Purchased forestland upstream of its drinking water intake

Cedar River, WA: Seattle Public Utilities developed a Habitat Conservation Plan for multiple species, which also includes practices to protect the overall watershed as a drinking water source for Seattle

McKenzie River, OR: The Eugene Water & Electric Board is exploring a riparian forest protection program to protect drinking water in its area

¹⁸ WA DNR WATERSHED SERVICES TRANSACTION DEMONSTRATION PROJECT - http://www.dnr.wa.gov/ResearchScience/Topics/ForestResearch/Pages/watershed_services_transaction_demo.aspx

Snohomish County, WA: Exploring surface water management fees being used for payments
Washington County, OR: Exploring sourcewater protection programs in the Upper Tualatin River

There are several key steps stakeholders (technical experts, landowners, agencies, watershed councils, etc.) in a particular watershed can take to assess the applicability of source water protection programs focused on investing in forestland conservation and management, often referred to as “natural infrastructure”. They are described below.

Action items for watershed stakeholders:¹⁹

- 1) Assessment of watershed for ecological trends causing water-related issues tied to substantial current or projected costs;
- 2) Engagement with key stakeholders and decision makers early and often to articulate a vision of success, expand capacity for program development and implementation through strategic partnerships and consultation with experts, and build on the lessons of past successes and failures;
- 3) Conducting of necessary economic analyses to determine if natural infrastructure is the best approach and to make the case for financial investment;
- 4) Assessment of a broad array of finance mechanisms with an eye toward securing large-scale “anchor funding” as well as a broader “funder quilt” to ensure meaningful and sustained investment over the long term;
- 5) Prioritization of investments across parcels and interventions (i.e., reforestation or forest best management practices), including monitoring outcomes, and adapting investments accordingly.

Of the steps highlighted above, conducting an economic analysis (#3) may be most important. Water utilities, beverage companies and other downstream beneficiaries need to be able to articulate their return on investment if they are to spend money on natural infrastructure.²⁰

Utilities also need methods to know which forest parcels will provide the greatest bang for the buck (#5). Tools, such as the Conservation Priority Index (CPI)²¹, an ArcGIS extension, has the

¹⁹ Gartner, T., Mulligan, J., Schmidt, R., and Gunn. J. (2013). Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection (In Review).

²⁰ Green versus Gray: Nature’s Solutions to Infrastructure Demands
<http://www.thesolutionsjournal.com/node/1241>

²¹ Barten, P. Nicolson, C., and Van Doren, B. Land Cover, Water Resources, and Prioritizing Parcels in *Gartner, T., Mulligan, J., Schmidt, R., and Gunn. J. (2013). Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection (In Review).*

ability to scientifically rank the highest-priority forested parcels and neighborhoods in their watershed that have the greatest potential to sustain water quality through improved management, or degrade it through conversion to other uses. This allows local experts to focus their efforts on those most influential parcels.

As an example, the CPI was applied by Snohomish County, Washington in 2012 to Snohomish Basin as part of an effort to assess the viability of using payment-based mechanisms to encourage private landowners to protect forest cover on their properties and address issues related to stream flow, channel stability, and aquatic habitat. The CPI and the Washington State Department of Ecology Watershed Characterization were used to prioritize 268 subbasins within the Snohomish River watershed, and the CPI was used to prioritize 288 parcels within a pilot subbasin. The developed methodology will support future efforts in the protection of working forests and ecosystem services across the Puget Sound region.²²

2.2.2. Water rights leasing and transfers

Getting more water into streams by leasing or transferring water rights is not new, but the opportunities are growing as more states are considering market-based approaches. This includes new state laws making it easier to lease water instream, improved science to quantify the water quality or habitat benefits of that water, and the growing availability of grants and other dollars to pay for instream water. Washington Water Trust is actively working across Washington (e.g. in the Dungeness and the Yakima watersheds) to help increase instream flows. The Freshwater Trust and Klamath Basin Rangeland Trust do similar work in Oregon. Much of this work is funded by the National Fish and Wildlife Foundation through sources like Bonneville Power Administration. Interest is generally growing in these types of programs, but many forest landowners may not have the largest and most senior water rights. They generally use very little to no water, so may not generate the types of quantities necessary to participate.

2.2.3. Competitive grant opportunities

Financing for restoration and conservation may also be available through competitive grant programs, such as the Whole Watershed Restoration Initiative²³ (WWRI). WWRI is a public-private partnership focused on salmon habitat restoration efforts in areas of high ecological importance in Oregon, Washington and Idaho. Ecotrust, along with state and federal agencies pool dollars in priority basins to restore and protect major ecological functions by removing risk factors and restoring damaged habitat-forming processes in the watershed.

²² Gi-Choul 2013, *pers. comm.*

²³ Whole Watershed Restoration Initiative - <http://www.ecotrust.org/wwri/>

Though grantees are generally tribes, local governments, and non-profit organizations such as watershed councils and Soil and Water Conservation Districts, forest landowners may be able to work with these entities to enroll their lands in a project. Projects funded to date range from dam and culvert removal to re-establishing river flow patterns and restoring riparian areas to road decommissioning.

2.2.4. Landowner assessment tool for incentive programs

Throughout this paper, a variety of market and payment opportunities have been highlighted. Tools are increasingly becoming available to help landowners and land managers better understand which of these opportunities might realistically be applicable for their forest. For example, LandServer²⁴ - initially developed for the Chesapeake Bay states - is a web-based tool that provides farmers and woodland owners with a quick and easy natural resource assessment, an evaluation of their property’s potential to receive payments for implementing conservation actions, and information on how to get started.

LandServer produces reports by analyzing a robust database of geographic, ecological, physical, and other data sets while ensuring reports are only accessible with a secure user ID and password.

Here are a few of the data sets used to estimate landowner eligibility for conservation funding:

Forest Conservation	Habitat / Biodiversity	Water Quality
Land use	Trout Unlimited	State nutrient trading basins
Agricultural zoning	Conservation Success Index	Nutrient loading hotspots
Distance from water bodies	Occupied trout streams	Sub-watersheds
Floodplains	Targeted Ecological Areas	303(d) listed streams
National Wetlands Inventory	Species ranges	
Slope	Cash Payment	
Soils		
Forest Legacy area		
Forest Interior Dwelling Species		

Though not currently available in the Northwest, this type of tool could be extremely valuable as incentive-based opportunities begin to scale and replicate.

²⁴ Landserver - <http://www.landserver.org/about>
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2.3. Providing certainty and flexibility

Sometimes, the best incentive is the certainty that someone else's rules are not suddenly going to change your operation or limit the flexibility to fit your management strategy to the needs of your land. A number of ecosystem service programs aim to provide this certainty and/or flexibility. Some examples from the Northwest are described below.

2.3.1. Safe Harbor Agreement

The Partnership is working with USFWS and Salmon-Safe (a sustainable agriculture certification program) to provide wine growers with access to an “incentives trifecta.” As vineyards seek Salmon-Safe certification, they can go a step beyond to protect and enhance the native prairie habitat on their farms. In exchange, they are able to access a programmatic Safe Harbor Agreement with USFWS for any endangered species on their land as well as generate prairie credits that could be sold through a marketplace later on. A Safe Harbor Agreement documents a baseline condition and allows a landowner to bring the habitat quality back down to that baseline at a later date (e.g. it permits a certain level of “take”). In many ways, the incentives trifecta concept is exactly what the Northwest Natural Resource Group and FSC are employing in the Northwest. If forest owners are already documenting their baseline for FSC, how can they do that in a way that meets the regulatory assurances need from USFWS and the crediting need from carbon markets?

2.3.2. Flexibility within FSC

Forest Stewardship Council requirements reference various “plans” for managing important habitats or areas for water quality and quantity. In general, it seems that these plans are easy enough for forest landowners to complete. In the future, forest landowners might use some of the ecosystem service quantification tools to define net habitat or water gains from their operations to access some of the areas where FSC provides flexibility.

2.4. Recognition and communication

Landowners have a multitude of reasons for participating in payment programs. Though cash and other financial incentives are often most important, surveys, such as those conducted by Ecoagricultural Partners that are focused on Payment for Watershed Services projects, suggest that successful programs were designed to appeal to landowners with a strong stewardship ethic, who really understood the value of maintaining a healthy forest that supported the productivity of their land and their way of life.

Table 2.4²⁵ Motivation for participation on Payment for Watershed Programs

Seller motivation	Percent of PWS projects	
	Primary motivation	Secondary motivation
Cash payment	41%	19%
Access to technical assistance	3%	22%
Non-cash financial benefits (e.g., increased farm yields or reduced input costs)	22%	22%
Land stewardship/ environmental ethic	28%	50%
Social/community interests	6%	0%

In talking with one vineyard owner about prairie conservation, she said that her customers were “ready for a grown-up conversation about biodiversity.” She was most interested in the ability to use the COTE Prairie Calculator to move beyond anecdotes of the good things her operation does for biodiversity. She wasn’t particularly interested in payments or regulatory certainty. Instead, she wanted a way to communicate and differentiate the product she creates. There may be similar opportunities for forest producers to communicate with their customers.

Applying standard protocols for measuring, verifying, and tracking the ecosystem services provided by small forest owners could be an important piece of communicating the contribution of forests to clean water, clean air, and natural places to play. The section below describes how a landowner can measure their ecosystem services using the Partnership’s accounting system.

III. Willamette Partnership’s Ecosystem Credit Accounting System

In 2009, Willamette Partnership convened a group of federal, state, and local agencies, conservation groups, landowners, groups doing restoration, and groups with ecological impacts to build an ecosystem credit accounting system²⁶. That system enables landowners to quantify a range of ecosystem services on their land and use a common set of processes and policies to

²⁵ Payments for watershed services in the United States : *Cost-effective strategies to align landowner incentives for abundant clean water* - http://www.ecoagriculture.org/documents/files/doc_374.pdf

²⁶ *ibid*

generate credits that could be used to meet compensatory mitigation requirements or access voluntary payments. The ecosystem credit accounting system was approved for use in Oregon in 2009, but it was designed to be easily transferred to other geographies and other ecosystem types. Since 2009, Willamette Partnership has been working to extend the accounting system and is now working in Washington, California, Colorado, Idaho, and coordinating nationally with other regions. The accounting system includes a package of quantification tools for different credit types (see Table 3.1 for current and future credit types). Each of these quantification tools focuses on the ecological functions provided by the landscape, which is consistent with FSC's Principle 6 Environmental Impact:

*"Forest management shall conserve biological diversity and its associated values, water resources, soil, and unique and fragile ecosystems and landscapes, and by so doing, maintain the ecological functions and the integrity of the forest"*²⁷

Appendix A provides an overview of the potential contribution of Willamette Partnership Counting on the Environment (COTE) credit types to supplementing forest landowner Forest Value Nature Assessments, including the degree of intersection between forest criteria and COTE measurements and the level of opportunity that a COTE assessment represents for landowners.

²⁷ Forest Stewardship Council's Principles & Criteria: <https://us.fsc.org/mission-and-vision.187.htm>
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Table 3.1. Currently approved and future credit types

Currently approved credit types, tools, and land uses		
Credit Types	Quantification Tool(s)	Applicable Land Uses
Oak Habitat	COTE Oak Calculator	All lands with oak
Prairie Habitat	COTE Prairie Calculator	All lands with prairie (Willamette Valley but likely applicable to other systems)
Sagebrush Habitat	COTE Sagebrush Calculator	All lands with sagebrush
Wetland functions	Oregon Rapid Wetlands Assessment Protocol; Washington Wetlands Rating System ²⁸	All wetlands (in OR and WA)
Floodplain habitat	COTE Floodplain Calculator	All floodplains
Water temperature (shade)	Shade-a-Lator	Riparian zones
Water nitrogen, phosphorous, and sediment	Nutrient Tracking Tool	Agricultural and ranching lands (currently available in OR)
Future credit types, tools, and land uses		
Credit Types	Quantification Tool (s)	Applicable Land Uses
Prairie habitat	Thurston County Prairie Habitat Assessment Methodology (SHARP)	All lands with prairie
Stream functions	Stream Function Assessment Methodology	All streams (validated for OR)
Fish passage	Net Benefit Analysis Tool	For fish passage barrier removal on all lands (OR)
Water temperature (In-stream flow restoration)	W3T	All streams (may need validation for different watersheds)

3.2. Applying the accounting system to forestlands

When the ecosystem credit accounting system was first built, a priority was placed on engaging agricultural landowners. This was partly because of the Partnership’s early geographic focus on the Willamette Valley. Many of the restoration and conservation actions needed in the Valley were on agricultural lands, hence the ecosystem focus on riparian revegetation, wetland restoration, and prairie conservation. The Partnership is now actively looking at the accounting

²⁸ Washington Wetlands Rating System not formally part of the Partnership’s accounting system, but is applicable for generating wetland credits in WA.

system to ensure it can also work for rangelands, urban ecosystems, and forest ecosystems. Of the current and near-future Partnership credit types, those presenting the best opportunity for forest landowner engagement include the conservation or restoration of oak habitat, stream function and fish passage.

Oak habitat credits can be generated by restoration or enhancement of oak forest and oak woodland in Oregon and Washington. The Oak Habitat Calculator has the ability to quantify baseline conditions and model future habitat function based on activities undertaken by landowners.

In Oregon, stream function will be assessed using the Stream Function Assessment Methodology, which will be complete and approved for compensatory mitigation use in 2014. The assessment quantifies the hydrologic, geomorphic, biological, and chemical functions of stream types (both intermittent and perennial) and could be used to design Riparian and Streamside Management Zone boundaries and activities, and specifically to quantify and communicate the maintenance, restoration, and enhancement described in Indicators 6.3.c and 6.5.e.1. in the FSC standard²⁹.

In Oregon, the state Department of Fish and Wildlife is piloting a fish passage banking approach to mitigation requirements on the North Coast with potential application in other parts of the state. Forest owners should be able to apply a new Net Benefit Analysis tool in 2014 to quantify the quantity and quality of fish habitat opened up or closed by barrier removal or placement.

Many other credit types will be relevant to a smaller subset of forest landowners who have sensitive habitat types (prairie, sagebrush, wetlands, and floodplain) located in the mosaic of lands they may own or operate. If forest owners do own some of these important habitat types, they can use the quantification tools to guide management activities so forest management protects and enhances the function of all habitat types. For example, FSC standards include a number of provisions for conservation zones (C6.2 and C6.3.a.2) and riparian management zones (C6.3.c).

The most applicable credit types for forest owners are described in more detail in the next section.

²⁹ FSC-US Forest Management Standard (v1.0): <http://us.fsc.org/download.fsc-us-forest-management-standard-v1-0.95.pdf>

3.3 Descriptions of specific Partnership protocols and what they measure

3.3.1 Oak

Oak woodlands and oak savannas are some of the most threatened habitat types in the Pacific Northwest. These habitats are primarily located in the Coast Range, West Cascades, Klamath Mountains, Willamette Valley-Puget Trough-Georgia Basin, and East Cascades ecoregions. Of those ecoregions, the West and East Cascades, as well as the Klamath Mountains, are the most heavily forested. Fire exclusion, spread of invasive species, and residential development have all impacted the historic distribution of oak in Oregon and Washington. Conservation work on private lands currently represents some of the best opportunities to protect and restore this important habitat.

The Oak Habitat Calculator was developed to rapidly assess the habitat quality of oak woodlands and oak savannas in Oregon and Washington. The calculator quantifies the size, density, and percent cover of tree, shrub and vine species in an assessment area and evaluates the sustainability of a site by measuring its proximity to other oak patches or priority conservation areas and its susceptibility to threats and stressors within the landscape (e.g. aerial spraying of insecticides, proximity to road networks, etc.)

For forest landowners with stands of oak or parcels well suited to growing oak, the calculator would be applied and used to generate an estimate of ecological uplift from a suite of activities aimed at reducing invasive species of shrubs, vines and herbs, decreasing the proportion of conifers relative to oak and other deciduous tree species, and encouraging the growth and protection of large (>20" diameter) healthy heritage oaks. That ecological uplift is measured in weighted acres (i.e. functional acres), which are then converted to credits. Those credits represent a quantified measure of how well conservation activities undertaken by a landowner result in improvements to the functioning of oak as habitat.

3.3.2 Prairie

The native prairies of western Oregon and southwestern Washington are among the most endangered ecosystems in the United States³⁰ (Noss et al. 1995). Six native prairie species in the region have been added to the Federal List of Endangered and Threatened Wildlife and Plants since 1988 pursuant to the Endangered Species Act. Although recovery goals and criteria for these species were established in the US Fish and Wildlife Service's (USFWS) 2010 Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington, there is a need for tools that can be used to measure and track the recovery of listed species.

³⁰ Noss, R. F., E. T. LaRoe III, and J. M. Scott. 1995. Endangered ecosystems of the United States: a preliminary assessment of loss and degradation. Biological Report 28, U.S. Department of the Interior, National Biological Service, Washington, D.C., USA. Ecosystem Services Protocols for use on Forestlands

The Prairie Credit Calculator, originally developed to quantify the function of upland prairie habitat in the Willamette Valley, is being updated to measure habitat conditions for specific listed prairie species with a particular focus on Fender's blue butterfly, Kincaid's lupine and Willamette daisy habitat. The Calculator evaluates the abundance (percent cover and individual plant numbers) of prairie plant species as well as the connectivity to other high quality prairie patches.

For forest landowners with patches of existing upland prairie, the calculator would be applied and used to generate an estimate of ecological uplift from a suite of activities aimed at reducing invasive species of grasses and shrubs, increasing the availability of nectar needed for the maintenance of Fender's blue butterfly and increasing the connectivity to other existing prairie patches. The amount of ecological gain is calculated in weighted acres (i.e. a functional acres), which are then used to determine the number of conservation credits a property could generate from restoring or preserving upland prairie.

3.3.3 Wetlands

Wetland habitats provide extremely valuable ecosystem services in the Pacific Northwest. From water storage capacities to provision of bird and amphibian habitat, wetland functions are a high priority for restoration and conservation. In Oregon and Washington, forested wetlands tend to occur on seasonally or perennially wet flats, depressions, or stream terraces³¹.

Counting on the Environment uses the Oregon Rapid Wetland Assessment Protocol (ORWAP) to evaluate the quality of function for a wetland. ORWAP is applied within a wetland boundary to compute scores for 16 different wetland functions based on indicators of hydrology, vegetation and surrounding landscape conditions. The output is a numeric score that is used to quantify how well a wetland is functioning relative to an ideal or optimally functioning wetland. That score can be used to quantify credits generated from restoration activities on a specific plot of land.

Washington State uses a similar methodology called the Washington Wetlands Rating System. While not explicitly managed by Willamette Partnership, the approach is similarly applied to wetlands of different types and can quantify credits generated from benefits of wetland restoration.

The compensatory mitigation opportunities for wetland restoration are well established in Oregon and Washington and forest landowners could be well placed to create wetland sites that are used for offsets to permitted impacts to wetlands. In Oregon, the Department of State

³¹ Institute for Natural Resources. 2012. Wetland Classifications. <http://oregonexplorer.info/wetlands/ForestedWetlandsEcosystemServicesProtocolsforuseonForestlands>

Lands manages and US Army Corps of Engineers oversees compensatory mitigation of wetlands; in Washington, the Department of Ecology is the permitting agency.

3.3.4 Stream function

Restoration of stream function is one of the defining conservation issues in the Pacific Northwest. Forest landowners have a direct connection to protecting and potentially improving many important stream functions.

In 2014, Oregon will have a Stream Function Assessment Methodology for compensatory mitigation use under Section 404 of the Clean Water Act. The assessment methodology measures a range of physical attributes of a stream reach as well as characteristics of the contributing watershed to quantify the hydrologic, geomorphic, biological, and chemical functions of streams. The scores generated by the assessment methodology will quantify the ecological benefits from stream restoration in credits that can be used to offset permitted impacts. As described above, the methodology will be highly relevant to streams on forested land.

3.3.5 Water temperature

For many water bodies, point and non-point source pollution has led to increased temperatures that pose a risk to water quality for fish habitat and other ecosystem services. More and more states have been exploring water quality trading as a flexible tool for meeting water quality goals.

Under this approach, entities with discharge permits are allowed to offset their warm water inputs by restoring riparian shade, which reduces the effect of solar radiation in waters to which they discharge. The restored vegetation shades the water, keeping it cool and improving habitat conditions for salmonids and other species. The temperature credits generated through riparian restoration are quantified using Shad-a-lator – a model that transforms inputs in solar radiation into solar load blocked by riparian vegetation.

While several restoration actions have been identified for effective temperature mitigation, the restoration of riparian forests to provide shade is the project type most often implemented³².

3.3.6 Water nutrients

In addition to temperature increases, excessive inputs of nitrogen, phosphorus and sediments also have an impact on water quality. To quantify these impacts, USDA has developed the [Nutrient Tracking Tool \(NTT\)](#), which allows land managers to quantify reductions in nitrogen,

³² Willamette Partnership. In It Together, Part III, p. 20.
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phosphorus, and sediment resulting from on-farm practices and restoration activities. NTT uses information on soils, weather, and management practices to calculate edge-of-field reductions in N and P, sediment, flow, and yield.

In 2010, Oregon's Department of Environmental Quality approved NTT as a tool to quantify credits for use in water quality trading in the state. Though primarily developed to quantify the water quality benefits of agricultural management systems and conservation practices, the restoration of riparian forests as buffers may be an opportunity for forest landowners in Oregon.

IV. Path Forward: Recommendations and Conclusions

Currently, many of the opportunities to access water and biodiversity incentive programs are limited for forest landowners. Yet, there are some opportunities available now, and some specific steps forest landowners can take to both preserve opportunities for the future and create new opportunities.

4.1. Brightest spots

Forest landowners now have several new tools they can use to quantify and communicate the ecosystem services their land provides. Using the COTE Oak Calculator, a landowner can articulate that their selective harvest of Douglas-fir and control of invasives will increase the habitat function of that oak woodland by e.g. 60%. Using the Stream Function Assessment Methodology in 2014, landowners will be able to articulate how they are maintaining and enhancing the ecological functions of streams on their lands. For a few Oregon landowners who live on the North Coast with fish passage barriers, in the Willamette with degraded riparian areas or stream needing restoration, or in the Rogue with degraded riparian areas, there are or will be some opportunities to participate in payments or markets for ecosystem services. In Washington, landowners with current or historic prairie in Thurston County areas or landowners with larger holdings and potential to sell carbon credits, there may also be opportunities.

4.2. Places to focus action

There are several opportunities that could be easily opened up for forest owners if the science and policy were in place.

The science actions include:

- Adapting USDA's Nutrient Tracking Tool to quantify the sediment, nitrogen, and phosphorous reductions from improved forest management;
- Quantifying the reduced risk of catastrophic fire and landslides from improved forest management, road decommissioning, etc. to make the business case for source water protection; and
- Quantifying the expanded summertime flow and reduced floodtime flow to make the business case to flood managers and drinking water utilities to invest in headwaters; and
- Review the draft Stream Functional Assessment to make sure it is applicable to small forest owners in both Washington and Oregon.

The policy actions include:

- Recognizing FSC certification and/or NNRG membership as adequate for access to regulatory assurances (e.g. under the Clean Water Act via a certainty approach; under the Endangered Species Act via a Safe Harbor or a Habitat Conservation Plan);
- Clarifying where forest practice rules stop and “additionality” for generating credits and payments begin;
- Work with state fish and wildlife agencies and/or county long-range planners to incorporate oak protection into critical areas ordinances and/or growth management area delineations. Also work with those folks to create an oak mitigation or payment program that forest landowners would have access to;
- Adapt Landserver to the Pacific Northwest to help landowners better understand and evaluate the ecosystem services that their land provides and determine eligibility for payments for ecosystems services and other conservation funding opportunities; and
- Work with Natural Resources Conservation Service, USFWS, and others to create a statewide or regionwide strategy for oak conservation incentives.

Appendix A. COTE Overlay with the Forest Nature Value Assessment

Currently approved COTE credit types and opportunities for forest landowners

This matrix provides a snapshot of the potential contribution of Willamette Partnership COTE (Counting on the Environment) credit assessments to conservation and economic opportunities for forest landowners. Each COTE quantification tool was evaluated relative to the Forest Nature Value Assessment to determine the degree of overlap between COTE measures and Forest criteria.

While there is currently not a high degree of direct overlap, there are significant opportunities to tie in COTE assessments to forest landowner assessment and monitoring initiatives. These are described below. The direct crosswalk between Forest criteria and specific COTE quantification tools are in a **supplemental** to this Appendix:

[Biodiversity Field Assessment LO Test Version_COTE Overlay_FINAL.xlsx](#)

Credit Types	Quantification Tool	Applicable Land Uses	Applicability to Forest Nature Value Assessment	Degree of Overlap	Opportunity for Forest Landowners
Oak Habitat	COTE Oak Calculator	All lands with oak	High COTE tool assesses a highly similar ecosystem types as the Oak/Douglas-fir - Oak/pine woodlands forest type.	Moderate (<20%) Several Dynamics and Trees criteria are consistent with COTE measures.	High COTE Oak Assessment is rapid (< 2 hrs per oak woodland stand/mosaic). If landowners have oak habitat on their property, a COTE Assessment would provide good baseline data for future credit opportunities.
Prairie Habitat	COTE Prairie Calculator	All lands with prairie (Willamette Valley but likely applicable to other systems)	High COTE tool directly assesses the Open/ semi-open prairie/ native grassland/ meadow area Habitat criterion.	Low (<10%) Only 2 criteria are addressed by COTE Prairie assessment	High Landowners with prairie habitat can quantify baselines conditions for potential development of ESA prairie-species credits.

Credit Types	Quantification Tool	Applicable Land Uses	Applicability to Forest Nature Value Assessment	Degree of Overlap	Opportunity for Forest Landowners
Sagebrush Habitat	COTE Sagebrush Calculator	All lands with sagebrush	None	None	Low Forest landowners in eastern WA and OR with pinyon-juniper forest – sagebrush habitat would use the COTE Sagebrush Calculator as restoration tool or for baseline assessment.
Wetland functions	Oregon Rapid Wetlands Assessment Protocol (ORWAP); Washington Wetlands Rating System	All wetlands (in OR and WA)	Moderate ORWAP assesses all wetlands types in OR. Forest and open wetlands as well as seeps/springs are significant Habitat feature.	Moderate (>20%) ORWAP directly assesses several criteria under Habitat, Trees and Dead Wood	High Forested wetlands provide a valuable opportunity for landowners to potential generate wetland credits. Wetland mitigation banking is a well-established market with credits valued at \$85,000/acre in OR and \$178,000/acre in WA.
Floodplain habitat	COTE Floodplain Calculator	All floodplains	None	None	High Forested floodplains provide valuable ecosystem services. Landowners may be interested in quantifying these.
Water temperature (shade)	Shade-a-Lator	Riparian zones	High Shad-a-lator uses data from riparian vegetation for assessment. Riparian zones are key Habitat and Structural features.	Low (<10%) Only 2 criteria are addressed by a Shad-a-lator assessment.	High Restoration of riparian forests to provide shade is the project type most often implemented to generate shade credits