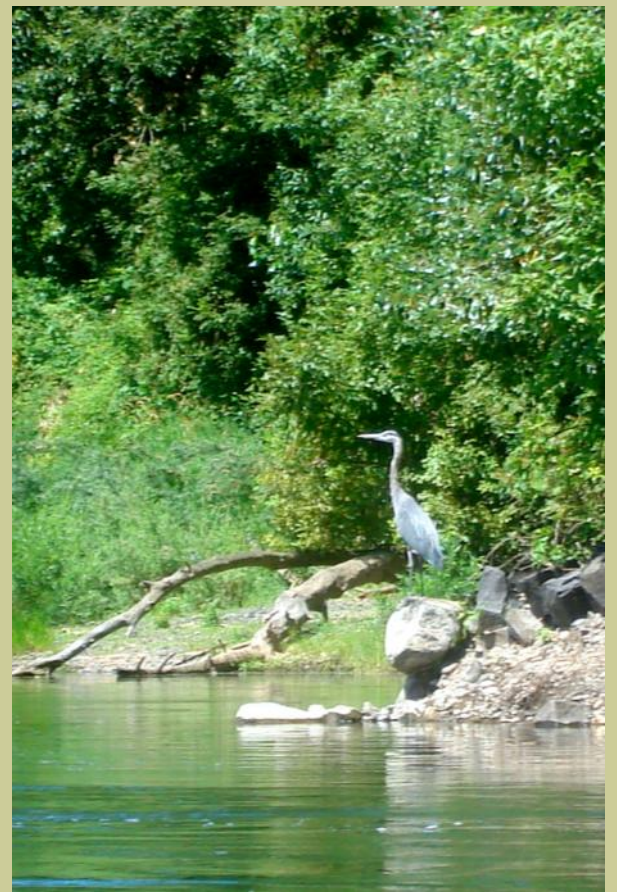




Ecosystem Credit Accounting

**Pilot General Crediting Protocol:
Willamette Basin Version 1.1**

September 23, 2009





Ecosystem Credit Accounting

Pilot General Crediting Protocol: Willamette Basin Version 1.0

The Willamette Partnership is a non-profit coalition of diverse leaders dedicated to increasing the pace, scope and effectiveness of restoration. With its partners it is developing an ecosystem credit accounting system.

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The Willamette Partnership thanks everyone for all the hard and thoughtful work that has brought several years of experience and discussion into Version 1.0 of this protocol.

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Part I: Introduction

Emerging markets for ecosystem services will connect people who manage land and water in new ways. Markets provide land managers with a new suite of options for generating revenue from their land. Improved water quality, increased water quantity and habitat conservation represent some of the “products” land managers can produce and sell through ecosystem service markets. These markets also provide people who manage land and water with viable alternatives for reducing the effect of unavoidable environmental impacts—alternatives that meet regulatory standards, reduce costs and fortify natural resources.

This document is a guide for managers and regulated entities in the Willamette Basin interested in using an ecosystem credit accounting system for multiple ecosystem services, including wetlands, salmon habitat, upland prairie, and water quality.

Version 1.0 applies to a two-year pilot testing of the General Crediting Protocol: Willamette Basin (Protocol). The Protocol was designed to mesh within existing agency rules and practices, but does not necessarily reflect agency requirements in all cases. The piloting of the Protocol will not affect existing mitigation programs, and each agency will be in charge of its own policy changes. The Protocol will be revisited in August 2010 and August 2011 as part of the testing phase to make needed adjustments.

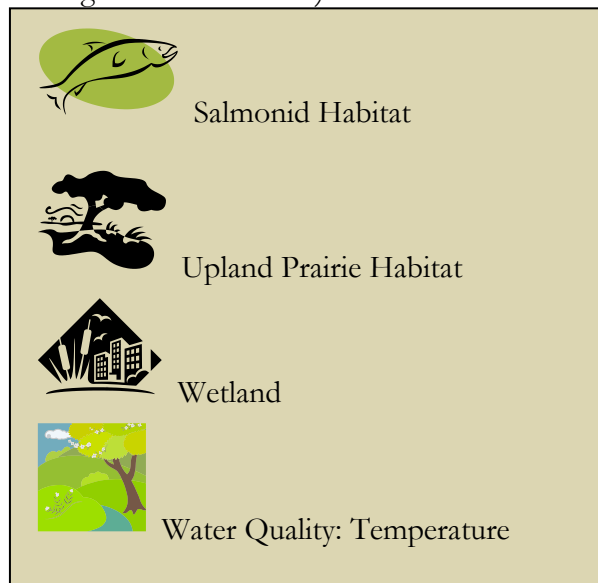
1.1 Objectives and How to Use the Pilot General Crediting Protocol

The Protocol provides market participants (managers, buyers, sellers, and third parties) with the overall process and framework they need to develop, sell, and buy ecosystem credits in the Willamette River Basin using the functions-based accounting system developed

as part of the Willamette Partnership’s Counting on the Environment process. The information contained in the Protocol was developed under the guidance of a stakeholder working group. This group is composed of federal, state, and local governments, conservation organizations, potential credit buyers, and potential credit sellers.

The Protocol describes an integrated, functions-based accounting system that includes the rules governing trades and the metrics required for quantifying ecosystem benefits and impacts. Version 1.0 will be updated periodically as we learn more from its pilot application. New ecosystem service protocols and approved methodologies will be added to it, existing protocols and rules will evolve with new information and knowledge gained from implementation, and the package will likely be expanded to new geographies.

Throughout , there will be call-out boxes containing the symbols below. These represent rules and information specific to the four Version 1.0 currencies, which include salmonid habitat, upland prairie habitat, wetlands, and cooler water derived from riparian restoration credits (referred to as “Temperature Credits” throughout the Protocol).



I.2 Background on the Willamette Partnership and Counting on the Environment

Emerging markets for ecosystem services will connect people in new ways. Markets such as these provide land managers with a new suite of options when it comes to generating profits from their land. Improved water quality, better wetland habitat, increased habitat for fish, and higher quality upland prairies represent some of the “products” land managers will soon be able to produce and sell through ecosystem service markets. These markets also provide anyone with unavoidable environmental impacts from legally permitted activity with viable alternatives for making-up for it—alternatives that meet regulatory standards, reduce costs, and fortify natural resources.

The Willamette Partnership formed in 2004 as 501c3 non-profit coalition with a mission to expand the pace, scope, and effectiveness of restoration. Quantification of ecosystem services and development of an ecosystem credit accounting system are major components of the Partnership’s work. The Willamette Partnership will act as the accounting system’s administrator (Market Administrator) as it is fully-developed and deployed - ensuring its reliable and transparent operation.

I.3 Program Principles and Context

The Willamette Basin in Northwestern Oregon unfolds between the volcanic cones of the Cascade Range to the East and the forested Coast Range Mountains to the West. Over the last 150 years, the Basin has amassed a large human population and a diversified industrial economy anchored by the Portland Metropolitan Area to the North and past the Eugene Metropolitan Area to the South.

Amidst all the Basin’s natural amenities and human development the Willamette River and its tributaries drain enough water to make it the 13th largest river in the lower 48 states – the Willamette Basin drains more water per square mile than any other large watershed in the contiguous United States. The entire Willamette River Basin includes a land area of around 11,500 square miles, a population of around 2.5 million and around 75 percent of Oregon's economic activity. The changes made to the environment to maintain this economic productivity also produce impacts to the environment. All expectations are for the human presence in the basin to grow substantially over the next 30 years, along with the impacts such a presence carries with it.

There are several pieces in place to minimize and reduce these impacts (e.g. established prescriptive environmental policies, wetland mitigation banking and species conservation banking), but they do not always work in synergy. The Partnership’s work, including the Protocol, is based on the assumption that ecosystem markets should be tied to meeting overall environmental goals rather than just strict interpretations of current rules and program guidelines. The rules and guidelines described in this Protocol are designed to work within existing regulatory structures. As such, the ecosystem credit accounting system constantly strives to:

1. Produce the highest quality restoration and conservation where it makes the greatest ecological difference,
2. Foster transparency, accountability and credibility in emerging ecosystem markets, and;
3. Facilitate the connections among buyers and sellers that put the greatest amount of resources into real benefits with the least amount of transaction costs.

I.4 Overview of the Crediting and Debiting Process

PROJECT DEVELOPERS

The following steps outline the process a land manager would follow to generate, register and sell ecosystem service credits based off of a conservation project.

1. **Site Selection and Validation.** A seller selects a potential site to conduct conservation activities, and submits a validation checklist to the Market Administrator to confirm the project's eligibility. This stage provides a screen to minimize investment and expenditures on the part of market participants that for one reason or another would not be eligible to sell credits.
2. **Credit Calculation.** With a basic understanding of the site's location and the site's potential to generate ecosystem service credits, sellers may then choose to carry on with a more in-depth analysis of the site to determine the exact type and number of credits that can be produced using marketplace tools. Project developers apply approved methods to calculate a baseline condition and a post-action condition based on conservation or restoration designs. This stage produces a formal estimate of credit quantity that can be independently verified.
3. **Verification.** To provide assurance to regulators and to the public, all projects will undergo independent verification through the following process: by professional verifiers accredited by the Market Administrator or by the lead agency overseeing a specific currency. This process confirms calculations done by (or

for) the seller and confirms the work done on the ground. The last stage of verification includes any formal letters of credit certification or release needed from agencies.

4. **Registration and Issuance.** Once a project has been verified, a package of information is sent to the Market Administrator's registry, operated by Markit Environmental Registry (Markit). Markit will review the package for completeness, and if ready, will issue credits to the project developer's account. A registry account can be opened any time after the credit estimate is complete.
5. **Selling and Transferring Credits.** The actual sale of credits is a straightforward process that mainly involves the seller and buyer. Markit and the Market Administrator will not be involved with any financial transaction between buyers and sellers. Markit simply receives a report of a sale after a transaction is made and moves credits from one account to another.
6. **Track the Credits.** Sellers will need to conduct annual verifications of all credits they develop until the credits are sold. The failure to verify credits will result in their removal from the Markit Registry. Sellers will use the same verifier for the first five years. Ongoing verification reports will be used to release credits subject to phased credit releases and performance standards.

BUYERS

The buyers of ecosystem service credits include any public or private entity with a regulatory obligation to reduce the impact of their development actions. Buyers might also

include entities interested in voluntarily purchasing a credit to retire, use or resell. The process for these buyers to purchase credits demands interaction with many parties and a commitment to the long-term tracking of conservation projects associated with purchased credits.

1. Credit Calculation. The number of credits a potential buyer is required to purchase depends on the amount of impact that their development action creates. For development actions covered by Version 1.0 of the Protocol, the *process* of calculation and verification is the same as for Project Developers.
2. Permit Allowance/Validation. In most cases, potential buyers of ecosystem service credits need formal approval from the necessary regulatory agencies to achieve partial or full compliance with their permit requirements through the trading of credits. This step also determines that buyers are eligible to purchase credits to offset their impacts.
3. Set up a Buyer’s Account. Buyers must open an account on the Markit Registry. Buyers will pay an account origination fee to help defer the costs of managing the Registry.
4. Negotiate and Finalize a Credit Purchase. The Registry does not set the price of the credits listed, nor does it set the terms and conditions of sales. The price, terms and conditions are all set and agreed upon by the seller and buyer—with the only exception being the verification requirements associated with final and ongoing certification.

Comparing Counting on the Environment and Interagency Review Team Processes

Counting on the Environment	Interagency Review Team
Site Selection/ Eligibility: additionality suitability sustainability concept design	Pre-prospectus meeting with sponsor — — — Complete Prospectus/ Public Notice
Data Collection: detail design delineation & assessment credit calculation	Assemble IRT IRT interaction with sponsor — —
Verification	IRT review of Instrument
Registration and Issuance	Instrument approval & Initial credit release
Ongoing Verification	Annual monitoring reports and site visits Ongoing issuance of credits

I.5 Web-Based Debiting and Crediting

Version 1.0 of the Protocol will be automated whenever possible. This automation occurs through the use of web-based applications that seamlessly transfer data entered by market participants

The buyers and sellers of credits will most likely interact with three major web-based tools supported by the Market Administrator: 1) a user interface or market portal that provides public information, direction to participants and a centralized hub for the rest of the market’s tools to connect; 2) a credit calculator that uses data submitted by buyers

and sellers to calculate credits and debits and, 3) a registry that performs the credit and debit tracking functions needed to ensure the transparency and legitimacy of the accounting system.

The level of automation, and therefore the overall efficiency of the accounting system, is expected to increase over time.

I.6 Technical Assistance

The Willamette Partnership will provide technical assistance to buyers, sellers and regulators encountering difficulties with the use of Version 1.0 of the Protocol.

I.7 Training and Orientation

Despite automation, and effort to create a practical system that various parties with different types of expertise can use, Version 1.0 of the Protocol will require that market participants go through some level of training and orientation prior to using it. Web-based training modules will be incorporated into all the major tools associated with Version 1.0. Training classes, organized by the Market Administrator, will also be scheduled on demand to accommodate new users of the system.

I.8 Key Questions

Q: Is Version 1.0 of the Pilot General Crediting Protocol designed for a specific type of user?

A: The Willamette Partnership designed Version 1.0 to be used by individuals that already possess some specialized training. Targeted users include trained watershed professionals from private consultancies, Soil

and Water Conservation Districts and other public or non-profit organizations.

Q: Why does Version 1.0 calculate unregulated ecosystem services?

A: Version 1.0 includes calculations for ecosystem services for which there is already demand, ecosystem services for which demand may soon emerge, and ecosystem services that allow for a more comprehensive approach to restoring the entire landscape. This also allows for the voluntary purchase of unregulated credits.

Q: How many different credit types will there be?

A: Version 1.0 will support four primary credit types, but as time goes on and more credit protocols are developed and there is demand for other ecosystem services, the Protocol will include new credit types.

Part II: Project Validation

2.1 Project Definition, Eligibility, & Validation

2.1.1 Defining Your Project Boundary

Land managers make two types of essential geographic determinations when using the Pilot General Crediting Protocol. The first determination sets the location of the entire area from which the land manager will seek to generate credits (the *project boundary*). The second type of determination a land manager makes sets the locations of map units within the project boundary. A map unit is a section of a property delineated by common habitat type, habitat structure, and habitat elements. These boundaries are first set through the interpretation of aerial photos and then confirmed or adjusted on the ground. A single project site will have as many map units (polygons) as it has diversity in habitat types. By using this map unit approach, the Protocol will be able to support and calculate multiple credit types on project sites with multiple habitat types.

Developers that are assessing the size and scope of their impact will also determine project and map unit boundaries for their initial impact calculations.



Map Unit Specifics

Stream map units are generally drawn in 100 foot segments from bank to bank starting from the downstream end of the project boundary and working upstream. Segments can be broken into smaller pieces when a significant habitat feature is present (e.g. a culvert, beaver dam, etc...).

2.1.2 Supported Credit Types & Project Actions

The Pilot General Crediting Protocol currently supports a subset of ecosystem credit types and actions that create benefits and impacts. This initial selection of credit types was based on market demand and available assessment methods. Credit types and their tradable units include:

- Wetland (functional acre)
- Salmonid habitat (functional linear foot)
- Upland prairie habitat (functional acre)
- Water quality: Temperature (kcal/day)

The near-term priorities for additional credit-type development include:

- Water quality: Nitrogen, Phosphorus, and Sediment (lbs/yr)
- Generalized stream habitat (functional linear foot)
- Carbon (metric ton of CO₂ equivalent)
- Biodiversity/Habitat (functional acre)
- Multiple credits for flow augmentation

Each of the credit types above may be generated by conducting different types of conservation actions. Over time the Protocol will include more types of credit generating actions. Approved action types are listed in Table 2a.

Table 2a: Version 1.0 Eligible Conservation Actions by Target Currency

	Conservation Actions	
Target Currency	Version 1.0 actions	Near-term priorities
Water Quality-Temperature	Plant native vegetation	Flow augmentation Floodplain restoration
Wetland Habitat	Improve function of an existing wetland	Protect existing wetland
	Restore and create wetland hydrology	
Salmonid Habitat	Plant native vegetation	Protect existing habitat
	Improve in-stream fish habitat: large wood placement	
	Improve fish passage: culvert removal	
	Manage sediment inputs: add fencing	
	Restore channel geomorphology: side channels, remeanders, etc...	
Prairie Habitat	Improve function of an existing prairie	
	Restore prairie functions	
	Protect existing prairie	
Water Quality-Nitrogen & Phosphorous		Crop cover
		Fertilizer use
		Irrigation type
		Manage sediment
		Plant native vegetation

Just as there is an approved suite of credit-generation actions, an approved suite of development actions also exists. This set of approved impact-actions may also be expanded in the future (Table 2b).

Table 2b: Version 1.0 Eligible Development Actions by Target Currency

Target Currency	Development Actions
Water Quality- Temperature	Waste load allocated in TMDL and permit
Wetland Habitat	Altered vegetation
	Altered hydrology
Salmonid Habitat	Altered vegetation
	Altered hydrology
	Contaminants
	Natural system modifications
Prairie Habitat	Altered fire
	Altered vegetation
Water Quality- Nitrogen & Phosphorous	Change crops, fertilizer, or irrigation
	Altered vegetation
	Contaminants

2.1.3 Determining Eligibility to Trade & Additionality

Eligibility criteria determine who can buy credits, who can sell them and who can trade them with whom. They are designed to keep out overly-risky or inappropriate projects. Alternatively, for potential buyers like wastewater treatment plants, they must employ minimum treatment technologies required by state and federal regulations before they can trade to meet permitted allowances.

Additionality

All credited projects need to demonstrate that they provide “additional” benefits beyond

what is required under current regulations (e.g. Forest Practices Act, SB 1010, or municipal natural resource protections) and business as usual. The additionality requirement ensures credits are awarded for doing more than what would otherwise have happened without a market mechanism in place. Additionality does not include the use of trading to meet regulatory obligations.

All issued credits must result from conservation actions that are: 1) above and beyond a regulatory threshold for compliance, and 2) above and beyond business as usual. Defining “business as usual” will be based on

a set of questions answered by the landowner during the project validation process. A sample Validation Checklist is available on the Willamette Partnership's website at <http://www.willamettepartnership.org/ecosystem-credit-accounting/tools-and-templates>

Markets focused on restoration generally do not provide strong incentives for preserving high quality habitat. To counteract this shortcoming, credits generated within this suggested market must result only from conservation actions that occur a minimum of 10 years after a significant, intentional development action on the site. This disincentivizes the degradation of natural resources just to receive credit for restoring them soon after. For example, a landowner would be ineligible to sell credits for restoring riparian forest if they had removed any portion of a pre-existing riparian forest in the last 10 years. If land changes hands from the landowner conducting the development action to a new landowner not included in the Protocol's definition of landowners (see Footnote 1), and who is conducting the conservation action, the second landowner would be eligible to sell credits.

MINIMUM QUALITY STANDARDS

Both buyers and sellers will need to meet some minimum standards for reducing impacts and ensuring credit quality. The time and investments required to create, verify and register credits is significant. Quality standards help save time and money by ensuring good site selection and project design prior to making these investments. OR Dept. of State Lands has published site selection criteria at http://oregonstatelands.us/DSL/PERMITS/docs/CWM_RFG_draft.doc

If a conservation action includes planting as a component, that planting must consist of locally-sourced native species to the extent available. Planting must consist of suitable diversity and maturity, which are planted at established density levels based on appropriate reference conditions. Each market will set minimum standards. For riparian planting, the planting plan must include an appropriate mix of trees AND shrubs (e.g. no less than 20% of stems as trees and no less than 20% of stems as shrubs). Minimum standards for other types of conservation actions may be added for specific markets.

LAND PROTECTION

Creditable projects will also need to include land protection agreements to sell credits. These requirements may vary by market, but land protection ensures benefits are protected as landowners may change. Long-term agreements that run with the land, such as easements, are always preferable to short-term contracts. Yet, requiring permanent easements is a significant barrier to entry for landowners thinking of entering markets and is not recommended for temporary impacts.

For permanent impacts (e.g. wetland removal and fill or species take), creditable projects need permanent conservation easements or another equivalent agreement (deed restrictions, covenants, or agreements from public agencies). For temporary impacts (e.g. air or water pollution), creditable projects, at a minimum, need an appropriate agreement such as a lease, contract, or equivalent covering the crediting period of the project. For example, if nutrient reductions are sold for five years, there needs to be at least a five-year lease with the landowner to protect those reductions.

⁹ The landowner includes, "the wife, husband, son, daughter, mother, father, brother, brother-in-law, sister, sister-in-law, son-in-law, daughter-in-law, mother-in-law, father-in-law, aunt, uncle, niece, nephew, stepparent,



Credit for Barrier Removal

In special cases (e.g. fish barrier removal), where the credited stream reaches are not owned by the project developer, credit can only be awarded for those reaches where the landowners have signed agreements not to install barriers in the future and to retain whatever riparian corridors are there at the time of crediting. These agreements do not need to be recorded with the property, but they do need to be registered as part of the credit issuance process.

other parties. Endowment funds may be contributed as a lump sum or regular payments defined by time or on sale of credits.

DOCUMENTING AVOIDANCE AND MINIMIZATION

Buyers/permittees will also need to meet some minimum standards before accessing markets. These standards are often set in agency rules. Generally, these rules require that buyers avoid or minimize the impact of their development actions, by being in full compliance with all relevant laws and rules related to offsetting their impact through the best practicable technology and practice, prior to using credits to offset impacts. For example, OR Dept. of Fish and Wildlife's Habitat Mitigation Policy (OAS 415) requires avoidance of irreplaceable, essential habitat.

STEWARDSHIP

Mitigation for all permanent impacts needs a long-term stewardship plan before any credits can be released. That plan needs to identify likely, qualified long-term stewards; include a long-term cost estimate and endowment amount; and letters of intent or equivalent for land protection agreements.

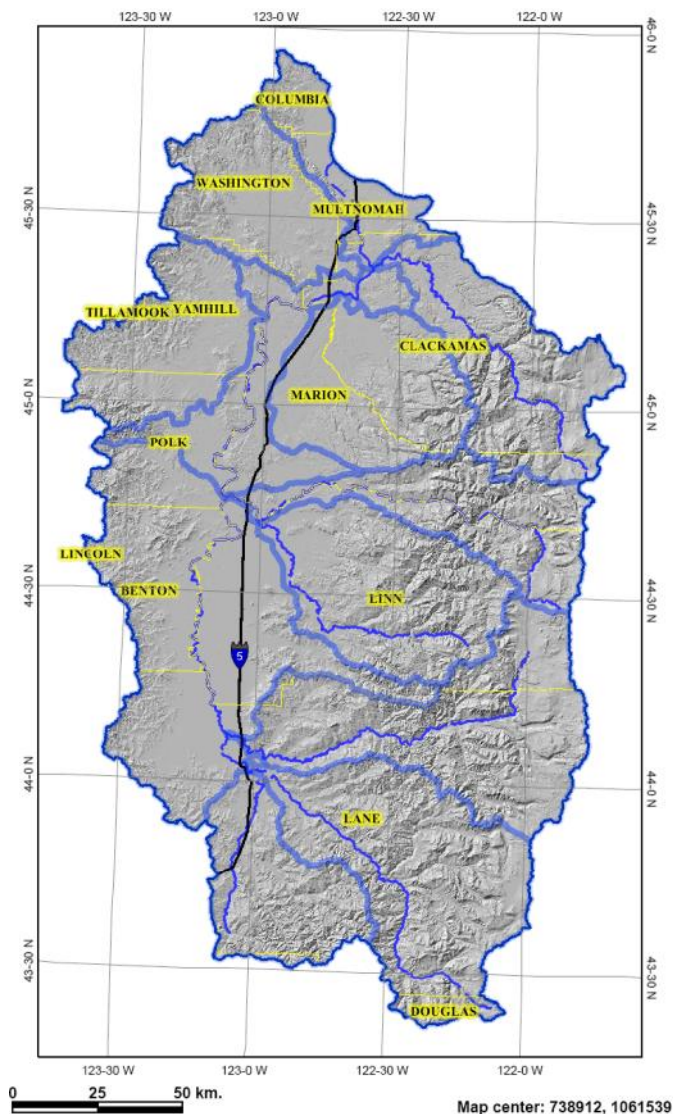
Agencies will provide buyers with documentation if this requirement is met at the planning level and/or design level of an impact project.

The liability of long-term stewards for performance of mitigation projects is limited to the conduct of the activities outlined in the long-term management plan. In the case a steward fails to conduct these activities, agencies and/or bankers may require the return of any remaining endowment funds, land rights, or other stewardship responsibilities.

Endowments should cover the full cost of stewardship, and the amount set as a non-wasting endowment adjusted for inflation. Long-term stewards must be able to account for expenses and endowment gains/losses for reports to and audits from agencies and

TRADE AND SERVICE AREAS

Service/trading areas make it clear to market participants which types of buyers and sellers can conduct trades with each other. They help to make trades spatially-relevant. All trades will abide by service area restrictions specific to the currency being traded.



Legend

- Interstate 5
- Major Rivers
- Counties
- 4th field watersheds

Service Area Specifics



For wetlands and salmonids, the 4th-field hydrologic unit is the default size of the service/trading area unless a compelling case can be made by any party to expand or constrict the size.



For prairie and other upland species, the Eco-region (as defined by the nature Conservancy’s Eco-Regional Plan document) is the default size of the service/trading area unless a compelling case can be made by any party to expand or constrict the size.



For water quality, the service area is defined by the area covered by the Total Maximum Daily Load (TMDL) or other regulatory instrument.



Service areas for salmon and prairie may change as Recovery Plans are approved or priority populations are further refined.

2.1.4 Project Start Date and Crediting Period

In general, the start date for a project will correspond to the start of the activity that generates environmental benefits or impacts.

The crediting period, sometimes called the “life of the credit”, is the period where conservation actions are eligible to receive credits. The crediting period differs by credit type.

Project Start Dates

 Start date of riparian plantings or in-stream work

 Recording date of easement or start date for restoration/enhancement work

 Start date for site prep or hydrologic improvements

 Start date of riparian plantings

Life of a Credit/Crediting Period

 Perpetual

 Perpetual

 Perpetual

 20 years for riparian shade, but perpetual provided sites are continue to be maintained and verified.

2.1.5 Determining a Buyer's Eligibility to Trade

For all Version 1.0 currencies, buyers will need approval from relevant agencies to purchase credits. To the extent feasible, buyers with potential ecosystem impacts should discuss trading options early in consultation with agencies. Buyers will need to avoid or minimize the impact of their development actions, by being in full compliance with all relevant laws and rules related to offsetting their impact through the best practicable technology and practice, prior to using credits to offset impacts.

Agencies will provide buyers with documentation if this requirement is met at the planning level and/or design level of an impact project, which the Market Administrator will use to determine a buyer's eligibility to trade.

2.1.6 Receiving a Notice of Validation from the Market Administrator

The first step in generating credits is getting your project validated. Validation is an optional step for buyers to help determine which credit they might be eligible to buy. Validation is mandatory for project developers. It provides them with an idea of which credits they will be eligible to sell, some technical commentary on project design and an estimate of how many credits they can expect to receive. The Market Administrator maintains a list of approved validators, who are often the same people accredited to verify credit estimates later in the process. A project developer can choose any validator they want, or complete the Validation Checklist themselves. The validator can help the project developer open an account on the Market Administrator's website and submit a

validation opinion. Validators are also free to provide technical advice on project designs.

Generally, if this opinion is complete, it will be automatically accepted by the Market Administrator, but acceptance may differ by credit type. Validation is a statement by the Market Administrator to the project developer that they have met eligibility requirements. It is not a confirmation on the quantity of credits issued.

Validation Leads



The National Marine Fisheries Service is the lead permitting agency (e.g. Army Corps) need to confirm eligibility by letter or approved bank prospectus for salmon credits



The U.S. Fish and Wildlife Service is the lead permitting agency (e.g. Army Corps) need to confirm eligibility by letter or approved bank prospectus for prairie credits



The Army Corps and OR Dept. of State Lands need to approve a bank prospectus for wetland credits.



Market Administrator will review and accept Validation Checklist based on eligibility criteria set by the Oregon Department of Environmental Quality.

Example: Getting the Santiam Farms Project Validated for Wetland, Salmon, and Temperature Credits

A farmer owns a 30-acre field that regularly floods and is bisected by a salmon-bearing stream. She thinks the field may generate more value as a wetland and salmon mitigation bank than a rye grass field. The farmer has a few conversations with local soil and water conservation district staff to discuss potential conservation options and determines she is interested in pursuing markets.

The farmer completes a validation checklist that says she is not otherwise required to restore wetlands, that not all farmers are doing this as part of normal farming practices, and that there has not been any new or, significant drainage installed to remove wetland in the last 10 years. As part of the validation checklist the farmer also notes that she plans to use a diversity of native plantings and place a conservation easement or equivalent protection on the property.

Since her property is located on Ames Creek, any credits generated will be limited to the South Santiam River watershed (the service area) for sale. The farmer will need to initiate the wetland bank prospectus process with the Interagency Review Team. Once the validation checklist is complete and the Interagency Review Team confirms the project is eligible, the Market Administrator will send the farmer a Notice of Eligibility and the farmer can move forward with more formal conservation designs and developing a banking instrument.

Part III: Credit/Debit Calculation

3.1 Credit Calculation Overview

Credit calculation involves both office and field work, and will require two site visits. Calculation of baseline conditions can be conducted any time before conservation actions begin. Post-action conditions are projected and require design documents for accurate estimates. Applying the Protocol and its approved metrics will require some training, which is offered by the Market Administrator. Depending on the types of credits being generated, experience in wetland and stream assessment, plant identification, and use of spatial data may be needed. The Market Administrator provides datasheets, a field guide, metric handbooks, and web-enabled tools to make credit calculation as easy as possible.

More on the development of each approved metric can be found in Appendix B, and detail on the application of the credit calculation tools are available on the Market Administrator's website.

http://www.willamettepartnership.org/ecosystem-credit-accounting/copy_of_field-tools

The approved metrics for Version 1.0 of the protocol include:

Approved Metric Links



Counting on the Environment's Salmon Credit Calculation Method

<http://www.willamettepartnership.org/ecosystem-credit-accounting/salmon-habitat>



Counting on the Environment's Prairie Credit Calculation Method

<http://www.willamettepartnership.org/ecosystem-credit-accounting/upland-prairie-habitat>



Oregon Rapid Wetland Assessment Protocol (ORWAP)

http://www.oregon.gov/DSL/WETLAND/or_wet_prot.shtml



Shade-a-Lator

<http://www.willamettepartnership.org/ecosystem-credit-accounting/water-quality-temperature>

3.2 Calculating Functional Ecosystem Scores

Once a project developer has delineated the project boundary (which may include a final wetland delineation/determination), come up with a conservation design and determined their project eligibility, they are ready to begin calculating credits.

3.2.1 Establishing Your Baseline

The first step is establishing baseline ecosystem functions. The baseline defines the current condition from which a conservation action improves function or a development action that degrades function. Data collection occurs in two phases. The first phase occurs in the office through the collection of spatial data and information from existing databases. Sources include:



Office Data Needs



Aerial photos, Verification that the stream is salmon-bearing and whether spawnable substrate is present, location of fish passage barriers



Aerial photos, request to the Oregon Natural Heritage Information Center to determine if any rare plant or animal species are known to use the site



Aerial photos, topography, Natural Resources Conservation Service web soil survey, Oregon Explorer (species occurrences), OR Dept. of Environmental Quality (water quality issues), PRISM Data Explorer (precipitation)



Aerial photos, T-Tools ARC GIS extension

The second baseline data collection phase, field data collection, confirms the map unit boundaries defined in the office during validation. As map unit boundaries are confirmed, the field team assigns them unique identifiers and collects data for each map unit within the project boundary. See the Willamette Partnership's Field Guide for more guidance on data collection standards and designating map units.

Data is collected on general location, habitat type, and a variety of performance indicators that are associated with structural conditions and also individual habitat elements. These questions are used within the database to trigger relevant functional calculations, and also to establish the relationships existing between adjacent map units for calculations. Additionally, if present, information relating to existing conservation efforts or opportunities, current management activities, and observations on wildlife activities will also be noted. Data collected for each map unit is comparable from map unit to map unit and from property to property.

Upon completion of the field inventory, the data from the datasheets is transferred to the metric calculator database, hosted by the Market Administrator. Like the datasheet, the majority of the data is entered through the use of check boxes. In a few instances actual numeric or text data is required to be entered. The field maps are also reviewed and any changes or additions to the map unit boundaries are digitized to match field conditions.

3.2.2 Establishing Levels of Uplift or Impact

The amount of ecosystem improvement is calculated in the office using the baseline assessments and a set of project designs outlining the area, scope, and activities to be completed as part of the conservation actions. Map unit boundaries are adjusted based on the projected extent of common habitat types and features. The baseline data for these map units is adjusted based on these designs to create a post-action dataset and estimate of ecosystem function. The post-action data is projected from anticipated conditions 20 years from construction. New functional scores are calculated from the metrics' database.

3.2.3 Calculating Net Gains and Losses of Ecosystem Function

After future ecosystem functions are projected, the metrics subtract baseline condition from future condition to get a measure of ecosystem change by individual or overall function. Net losses are calculated in the same way, but by default, it is assumed ecosystem functions in the future drop to zero.

Crediting Preservation



Prairie credits are determined using only the post-action, future conditions. This emphasizes preservation of high quality prairie.

3.2.4 Categorizing Overall Ecosystem Value

There has been enormous interest in calculating a single index of overall ecosystem gain and loss across habitat types. The Counting on the Environment process developed an overall rating category for ecosystem function to be used solely as additional project information. The rating is completely optional, and has no bearing on credit quantities, trading ratios, or credit approval processes. As the concept develops, the overall ecosystem rating can be used to provide incentives or potentially as a new, voluntary type of ecosystem credit.

For now, the rating provides additional information to potential buyers on the diversity of values available at the site.

Because of the consistent approach used by all three habitat metrics (salmon, prairie, and wetland) in using the percentage of optimal at which the properties were operating, the program was able to assign an overall ecosystem service rating using these same calculations.

describes the criteria for assigning either *high*, *medium*, or *low* ratings. The more ecosystem credit types on a site, the greater the potential for broad ecosystem conservation and restoration. The higher the % of optimal, the greater the site’s likelihood to maximize the functionality for the ecosystems it targets.

The overall rating is based on 1) the number of credit types on the site as a measure of ecosystem diversity, and 2) the average percentage of optimal score across all the site’s credit types. The average percentage of optimal is calculated for credit projects by taking the average of the post-conservation functional score across salmon, prairie, and wetland scores. Debit projects will use baseline, pre-action conditions. Table 1

Table 3.2.4: Matrix for Overall Ecosystem Rating			
	# of Credit Types		
Average % of Function	1	2	3 or more
0-33%	Low	Low	Medium
34-66%	Low	Medium	High
67-100%	Medium	High	High

3.2.5 Determining Reserve Pool Contributions

The accounting system builds from the common use of trading ratios. Trading ratios are used to account for risk, accuracy, time differences, and to ensure environmental gains. They either increase the amount of credits a buyer needs to buy or decrease the amount of credits a seller can sell. The accounting system uses both of these methods to populate a “Reserve Pool” of credits intended to cover risks in the market. Contributions to the Reserve Pool are obligatory and are not available for sale.

The following describes the approach for determining Reserve Pool contributions. The goal of this approach is to ensure that, after the functional assessment of credits and debits occurs, an average trade would receive a 2:1 ratio using acres, no trade would be allowed to go below a 1:1 floor and that in only rare instances would a trade go above a 3:1 ceiling.

Trading ratios are applied to both the functional loss and functional gain using the factors below (Table 3.2.5 provides a summary of ratio factors).

FOR SELLERS

For sellers, if a mitigation site is in a high priority area, no additional reserve is needed and the ratio remains unchanged, but if not, then a seller must hold back 25% of the functional gain. Priorities are determined slightly differently for each market. Exceptions can be made to the priority locations on a case by case basis. Adjustments will be made to priority maps regularly or as needed to accommodate new information.

Priority areas



Willamette Basin Salmon credit priority areas are established by the National Marine Fisheries Service and include the genetic legacy and core populations in the Clackamas, North and South Santiam, McKenzie Rivers, and Middle Fork Willamette tributaries.



Prairie priorities include areas identified in the Willamette Valley Synthesis Map.



Wetlands priorities include areas identified in the Willamette Valley Synthesis Map or on sites where the average OR Rapid Wetlands Assessment Protocol value score over the five functional groups is greater than 0.6.



Water temperature credit priorities include areas identified in the Willamette Valley Synthesis Map and areas identified within the Willamette Basin Total Maximum Daily Load (September 2008).

FOR BUYERS

Table 3.2.5 describes how a buyer’s Reserve Pool contributions are determined. Buyers will need to purchase, at minimum, an additional 50% of credits to cover the risk of natural disturbance to projects (e.g. flood and fire), potential inaccuracies in the method, and other risks (i.e. financial, rule changes, etc...). Buyer trading ratios are also determined by whether the impact site is located in a priority or if **any** portion of a buyer’s purchase comes from credits released in advance of performing some function. If any credits are purchased in advance of some functionality and the impact site is not in a priority **or** in reverse, the restoration site is functioning and the impact site is in a priority, then a buyer must buy an additional 100% of credits. If credits are purchased in advance of some functionality **and** the impact site is in a priority, then a buyer must purchase 150% more credits.

Table 3.2.5 Buyer’s Ratios

Purchasing Credits in Advance? Impact Location	No	Yes
Not Priority	+50%	+100%
In a Priority	+100%	+150%

3.2.6 Completing Agency Banking Agreements

The final stage of credit calculation in many cases, but not all, is a banking agreement. This is true for salmon, prairie and wetland credits which requires the lead agencies approval of a

banking agreement. This is an agreement between the agencies and project developers that formalizes the credit estimate, project description and other elements required to maintain a bank.

Agency Leads



National Marine Fisheries Service and the lead permitting agency (e.g. Army Corps) approves a bank agreement



US Fish and Wildlife Service and lead permitting agency (e.g. Army Corps) approve bank agreement



Army Corps and OR Dept. of State Lands approve a bank agreement (instrument)



Market Administrator-accredited verifier will review credit estimate

Part IV: Project Verification and Registration

4.1 Verification

4.1.1 Verification Principles and Process

The ecosystem credit accounting system requires third party verification of all projects. Third parties include both the lead agencies overseeing regulated markets and third parties accredited by the Market Administrator to verify credits. The Willamette Partnership will act as the Market Administrator for the Willamette River Basin. Once a Credit Estimate is passed on by a project developer for verification, the project developer will be assigned a verifier. The project developer will enter into a verification agreement with their assigned verifier.

The goal of verification is to confirm:

1. Credit generation protocols were followed completely and accurately
2. Proposed actions have been completed per the Credit Estimate
3. Appropriate documentation is in place to issue credits (e.g. land protection agreements, monitoring and maintenance plans, agency approvals)
4. The quantity of estimated credits is accurate within a level of plus or minus 15% based on best professional judgment

For a credit to be verifiable, the Credit Estimate must be free of material misstatements. A material misstatement must be declared if the reported credit generation information does not appropriately describe project conditions and differs greatly from the verifier's assessment of that same information.

To be verifiable, a verifier's estimates of credit quantity must be within 15% of information proposed by the project developer. There is inherent uncertainty involved in field data collection. The 15% standard is meant to capture differences in reporting uncertainty, stemming from sampling and calculation differences. If the difference in estimates is greater than 15%, the difference is material, and the verifier must use best professional judgment in determining the quantity of credits to verify.

If a verifier's estimate is within 15%, the original Credit Estimate is used to determine credit quantities. If not, the verifier and the Project Developer can either A) agree on the revised quantities recommended by the verifier or, B) refer the issue to the Dispute Resolution Committee of the Market Administrator. More detail is provided in the Verification Protocol (see footnote 2).

Once successful verification is complete, the verifier submits their Verification Report, which is attached to the credit records.

4.1.2 Becoming an Accredited Verifier & Conflict of Interest

Verifiers must be a lead agency overseeing a credit currency or must be accredited by the Market Administrator before they are eligible to conduct verification activities related to the Protocol. The Market Administrator will accredit verifiers that are qualified to review one or more types of credits. A verifier is an individual that has demonstrated their ability to assess a specific type of credit. A third party verifier must also demonstrate the means to accept the standard liability of professional services contractors. This liability will be determined in the Verification Services Agreement signed between the verifier and the

Project Developer. Verifiers bear no liability for project implementation or project performance. The Market Administrator will release a Request for Applications annually or as needed to allow interested verifiers to apply for accreditation. Interested verifiers must complete the following steps:

1. Submit an application in response to the Market Administrator’s advertised request.
2. Receive notice from the Market Administrator that the application has been approved.
3. Attend a Verification Training Session (held approximately two months following the Market Administrator’s notification of acceptance from its request for applications).
4. Keep the Market Administrator informed of any changes affecting the accreditation (e.g. potential conflicts of interest)

Accreditations granted in the 2009 and 2011 pilot phase will be good for two years. After that, accreditations are effective for 5 years from the time they are issued. After the 5 years has expired, verifiers must re-apply for renewal by responding to the request for applications the year their accreditation will expire.

The independence of verification is important. Verifiers acting on behalf of the Market Administrator must work in a credible, independent, nondiscriminatory, and transparent manner, complying with applicable state and federal law. This includes disclosing any pre-existing relationships between the Project Developer or Buyer and the verifier. Verifiers must provide a Notice of Verification and Conflict of Interest Form (see footnote 2) to the Market Administrator at least 10 business days before verification activities can proceed.


As an added protection, a verifier can only provide verification services to a Project Developer for a period up to five years. If a verifier violates these conditions, the Market Administrator at its discretion, may disqualify an accredited verifier for a period of up to five years. See the Conflict of Interest Code (see footnote 2) for full detail.

Please see the Verification Protocol (see footnote 2) for more detail on becoming an accredited verifier and the details of the verification process.

4.1.3 Regulatory Agency Role in Verification

All lead agencies for all currency types reserve the right to verify either the impacts or credits created by a project. For some currencies, agencies will use the verification reports submitted by third parties to determine whether they need to exercise this right. For others, agencies will act as the lead verifiers and submit those reports to the Market Administrator prior to registration.

Verification Leads



For salmon, prairie, and temperature credits, third parties will lead verification.



For wetland credits, Army Corps and OR Dept. of State Lands will lead verification, but will consider third party reports

4.1.4 Key Verification Steps

Verification is conducted by a lead agency or individuals who have been accredited by the Market Administrator. Monitoring and reporting on credit performance occurs at least annually, is primarily the responsibility of the project developer, and occurs on a 5 year cycle. Full verification occurs in years 1 and 5 and every fifth year until the active crediting life of the project ends. Agencies may extend this cycle for ongoing monitoring. Full verification includes a site visit and detailed review of monitoring reports submitted by project developers. Verification in years 2-4 and 6-9 are streamlined reviews of monitoring reports to look for major changes in performance.

Site visits in these years may be conducted at the verifier’s discretion, and monitoring schedules may be adjusted if the site warrants.

There are a number of core verification activities needed for all credit types. Table 4.1.4 contains the verification elements:

Table 4.1.4: Verification Process

Year 1 activities	
Review Notice of Eligibility	<ul style="list-style-type: none"> • Confirm Ownership & Stewardship • Confirm minimum quality standards • Confirm additionality
Verify Credit Estimate submitted to the Market Administrator	<ul style="list-style-type: none"> • Review supporting documentation (current conditions data, sampling points, data inputs into credit generation calculations, model outputs, contracts, etc.) • Confirm completion of appropriate implementation steps (planning docs, invoices, photos, etc.) • Conduct site visit • Revise credit estimates as necessary based on verifier feedback
Year 2-4	
Verifier reviews annual monitoring reports submitted by project developer	<ul style="list-style-type: none"> • Review supporting documentation (data sheets, model outputs, contracts, etc.) • Conduct site visit if needed

Once these core verification activities are completed, the verifier can complete a Verification Report (see footnote 2) that contains a summary (which will be available to the public), an opinion on the credit estimates, and a log of activities and findings. This report needs to be submitted to the Market Administrator's system. Projects need to submit annual verification reports to remain in the Registry.

4.1.5 Agency Certification of Verification Report and Project Documents

Many credits will need an agency certification before credits can be issued. Once a Verification Report has been submitted and if required, agencies will review the project documentation and give the Market Administrator approval to issue credits. For some credit types, agency approval will not be required, and the Market Administrator will act as the certifying agency.



Once project developers have assembled all of the necessary documentation and received their certification, they are ready to send their package to the Market Administrator's Registry operated by Markit to issue credits and make them available for sale.

Certification Leads



Certification is **both** an approved banking instrument and credit release letter signed by National Marine Fisheries Service



Certification is **both** an approved banking instrument and credit release letter signed by US Fish and Wildlife Service



Certification is **both** an approved banking instrument and credit release letter signed by the OR Dept. of State Lands and the US Army Corps of Engineers.



Certification is completed by the Market Administrator and is reported to the OR Dept. of Environmental Quality

4.1.6 More Detailed Verification Information

The Partnership's Verification Protocol (see footnote 2) will have additional information on all of the following; Record Keeping and Retention, Publicly Available Information, Correcting or Revising Your Credit and Debit Report, Dispute Resolution, Key Verification Questions.

4.2 Registration

4.2.1 Registration Summary and Fee Structures

The entire focus of registration and verification is to ensure that credits are real, transparent, and traceable throughout their entire life. All verified credits need to be registered on the Registry operated by Markit <http://www.markitenvironmental.com/>. Project developers can open a Registry account any time after a credit estimate has been created. The Registry imposes required fees that are automatically charged to account holders during the project registration process. The fee structure for project registration will be determined through the piloting phase of the Protocol and credit issuance process to ensure registration does not create unnecessary financial burden. Markit will review the project documentation for completeness before issuing credits.

4.2.2 Opening a Registry Account

As a first step, a project developer must set up an account with the Registry. Account registration only needs to occur once; any number of projects can be registered under the same account. Any person or organization may apply for a Registry account regardless of location or affiliation.

Account applications are completed through the Registry software. Along with completing an online application, each user must also agree to the legal Terms of Use for the Registry. The Terms of Use document found at <http://www.markitenvironmental.com/>. When a new account is approved by the Registry, the account holder will receive an invoice for the account maintenance fee. Payment is due within 30 days of approval to avoid cancellation of the new account.

There are four types of accounts in the Registry:

1. **Project Developer.** An organization that wishes to develop projects that generate credits. This account type can also transfer and manage credits.
2. **Buyer/Trader/Broker/Retailer.** This type of account will transfer and manage credits, but not develop its own projects.
3. **Verifier.** Verifiers who have been accredited by the Market Administrator to verify projects. There is no annual account fee for verifiers.
4. **Reviewer.** This account type is for agencies who need to review and certify projects, and for those who have been asked by the Registry to serve as a project reviewer. There is no annual account fee for reviewers.

The public also has the ability to view some information on the Registry without opening an account. Some personal and project information will remain private.

4.2.3 Submitting Your Credit and Debit Report to the Registry

Throughout the credit issuance process, the Market Administrator will be maintaining a project file for Project Developers. When the

Project Developers say so, the Market Administrator will transfer this file to Markit.

4.2.4 Registry Guidance and Technical Assistance

Markit is available to provide technical assistance on accessing documents on the Registry, paying fees and other related activities.

4.3 Credit Sale & Transfer

4.3.1 Credit Issuance and Listing

All of a project's issued credits will be listed on the Registry website and available for the public to search. Both the Market Administrator and Markit are currently looking at additional ways to help project developers market their credits to potential buyers.

4.3.2 Transfer




The terms of credit sales are completed external to any of the Registry or Market Administrator processes. Project developers and buyers connect via the Registry or some other avenue, come to terms on credit quantities, price, and other terms. Once a sales agreement is complete, the project developer submits a Notice of Sale to the Registry, and the Registry transfers credits from the project developer's account to the buyer's account.

4.3.3 Reselling and Retiring Credits


For some credits that cannot be resold (e.g. wetlands), credits will be automatically moved into a buyer's retirement account after transfer. For credits that can be resold, a buyer must notify the Registry, and agencies if necessary, that they have used the credits to offset an

impact or otherwise want those credits permanently retired. The Registry then moves those credits into a retirement account that can be reported on, but not accessed to resell credits.

Reselling Credits




Salmon, prairie, and water quality credits can be resold




OR Dept. of State Lands has the authority to allow resale on a case-by-case basis with approval from the Director


Approving Trades




Approval required from the lead permitting agency (e.g. Army Corps).



Approval required from the lead permitting agency (e.g. County government).



Approval required from OR Dept. of State Lands and US Army Corps of Engineers.



Approval of a trade required from OR Dept. of Environmental Quality unless a program has been approved in a permit.


4.3.4 Transferring projects into or from the Marketplace Registry and another registry

Currently, there is no mechanism to transfer credits generated under the Protocol to other registries (e.g. the Voluntary Carbon Standard registries). The Willamette Partnership and Markit will be working on these protocols immediately.


4.4 Ongoing Verification and Credit Release Schedules

Many credit types will release credits in phases as projects reach performance standards. There are two exceptions in the Version 1.0 currencies:

Immediate Credit Releases






100% of water temperature credits are released on planting



100% of prairie credits released for preservation actions

Phased Credit Releases



For wetland, salmon, and prairie enhancement and restoration actions, credits will be released on the following schedule:

1. No more than 30% of the total estimated credits for a project site can be released in advance. Advance release and sale will increase the number of credits a buyer will need in order to offset their impacts. For advance release, the credits need to be verified and issued based on as-built designs, land protection agreements need to be in place, and the major construction phase of the project must be complete (e.g. channel work, hydrological modification, planting, etc...).
2. When the project achieves its first suite of performance targets, up to 50% of the credits can be released.
3. When it reaches its second suite of performance targets, up to 80% of the credits can be released.
4. Once a project has reached all of its performance targets AND a long-term management plan is in place and functioning, and remaining credits can be released. The long-term plan includes recording land protection agreements, securing a steward, and establishing endowments if necessary.

4.5 Liability for Performance





For existing markets, liability rules are fairly well established. There are two forms of liability. Regulatory liability stems from permits or agency enforcement rules and contract liability that rests in the agreement between buyers and sellers. In most cases, regulatory liability is transferred from buyers to sellers of ecosystem credits. Once an agency approves a buyer's mitigation plan, and the buyer purchases credits, the buyer is not responsible for the performance of credit projects. This is not true for most water quality trading programs, where the buyers or point sources holding discharge permits remain liable.

The Market Administrator will not change existing liability rules for current markets. For new markets (e.g. prairie and salmonids), project developers will be liable for meeting performance standards. Liability for credit project performance by currency is outlined below.

As sites transfer from a project developer to a long-term steward, liability for performance is removed from the project developer, but covered by the Reserve Pool. The Reserve Pool is managed by the Market Administrator as a pool of issued credits that can be accessed as a last resort for projects that fail because of force majeure or other acts beyond control of the seller, or for project failures that cannot be resolved. In addition, government or other funding may choose to invest in the Reserve to acquire more credits/fund more projects to create a stronger back-up to their trading programs.

A 5-year performance bond (or other term as may be required) or other up-front financial insurance will be required for all currencies to ensure the money is available to acquire reserve pool credits in cases where a project developer goes bankrupt, or otherwise is unable to cover the costs of accessing the Reserve. An Agency may waive the performance bond requirement on a case-by-case basis.

Who Has Liability?

	For salmon credits, liability rests with project developer
	For prairie credits liability rests with project developer
	For wetland credits liability rests with project developer
	For water temperature credits, liability rests with final buyer using credits for offsets

Part V: Protocol Development Process

5.1 Screening Process and Scoping

The Partnership's Counting on the Environment process uses three types of protocols. The first governs the overall credit accounting procedures and tools that apply to all currencies. The second defines the specific ecosystem currencies offered by the Partnership. The third defines the eligible metrics and actions that can generate credits or debits for those currencies. As the ecosystem crediting accounting system expands and revises its protocols, it is committed to using the open, public, and robust processes to build consensus around the substance and intention of these protocols.

The Partnership believes there is a balance between standardizing credit protocols as possible across geographies and across credits types and ensuring these protocols remain true to the localized differences in ecosystems and the people who rely on them. Every protocol used strives for this balance.

The Partnership is using the Counting on the Environment process as a structured collaboration to develop its protocols. Partnership staff lead the process, but work with stakeholders to convene the expertise and representation to ensure high quality and credible protocols. Protocols rely on the best available ecological assessment methods, but use a standard framework to ensure consistent project boundary definition, data collection, and reporting formats. This enables rapid application of new protocols without sacrificing ecological integrity.

NEW PROTOCOLS AND METRICS

For new currency protocols, the Partnership will place priority on ecosystem services where

there are existing buyers with unmet needs and that address a high priority habitat type or environmental concern. It will place priority on the conservation actions and development actions that, when moved into a marketplace, have the greatest potential to accelerate conservation in actions and places that are needed. For eligible metrics, the Partnership will consider the certainty of existing science and data available and consensus among stakeholders on the need and validity of new credit or debit metrics.

Once initial screening is complete for additions/changes to overall accounting procedures or currency protocols, the Partnership will convene a stakeholder Working Group to assess protocol options, provide feedback on drafts, and give their approval for the protocol.

For additional metrics, the Counting on the Environment process will conduct a more thorough evaluation of existing science and assessment methods to recommend metrics. Recommended metrics will be forwarded to the Working Group from a technical focus group, tested in the field, revised again, and then tested for repeatability and ease of use. This package will be brought before the Working Group for approval.

REVISING EXISTING PROTOCOLS

Protocol development is an iterative process. Protocols will be revised at least bi-annually, and the Partnership will collect ongoing comments from the public and protocol users.

Revisions will be conducted using a similar process to the one above, but on an accelerated timeline, and with one field test.

Appendices

- Glossary of Terms
- Approved Metrics
- Roster of Working Group Participants
- Willamette Partnership: Credit Issuance, Checklist and Log 7/31/09

Appendix A: Glossary of Terms

Accuracy: The degree to which something approaches reality. Depending on one’s purposes, “reality” may be represented simply by independent judgments of experts, or by extensive and intensive quantitative measurements of a function or other attribute.

Adaptive Management Mechanisms: The processes of implementing programs in a scientifically-based, systematically structured approach that tests and monitors assumptions and predictions in management activities and uses the resulting information to improve the programs or management activities used to implement them.

Additionality: the concept that calls for credited ecosystem improvements to represent an overall increase in, or avoided reduction of, ecosystem services, relative to those services that would have existed without creating the credits.

Approved Metrics: Approved metrics are the methods, equations, rules, and tools that translate indicators of ecosystem health (e.g. vegetation cover and composition, soils, hydrology) measured at a site and/or landscape scale into “credits” or “debits.” The approved metrics envisioned for this project includes the ability to generate 1) credit estimates for multiple types of tradable ecosystem services (e.g. wetlands, carbon, water quality, rare habitat), and 2) an index measure of overall ecosystem benefit that can be used as an indicator to communicate the additional benefits tied to creating one credit type (e.g. the biodiversity benefits of a carbon credit).

Attribute: Characteristics commonly valued by or warranting attention from society. Examples are individual or groups of functions, values, or services. Other attributes include integrity, health, hazards, suitability for development or enhancement, natural site potential, impacts, threats, sustainability. Not the same as *indicators*. The condition of attributes is measured or estimated *using* indicators.

Baseline: The current/existing conditions on a site before any action is taken that benefits or impacts ecosystem services. The baseline is the reference point by which improvement is measured to determine quantities and types of credit available. It is an important element of determining additionality.

Bundling payments for ecosystem services: Creating a diversified portfolio of payments that can be gathered by a single landowner or manager for actions taken on a site. Income may be derived from the sale of certified products, like lumber, from incentive programs, and/or from the sale of credits in an ecosystem marketplace.

Buyer: A likely buyer of credits.

Condition: (used synonymously with ecological or biological condition). The extent to which a given site departs from full ecological integrity or health. Specifically, the relative ability of a site to support and maintain its complexity and capacity for self-organization with respect to species composition, physicochemical characteristics and functional processes. Ultimately, condition results from the integration of the chemical, physical, and biological processes (or functions) and structures (e.g., species) that maintain the system over time. As a concept, “condition” is often used interchangeably with naturalness or closeness to some least-altered standard.

Conflict of Interest: A situation in which, because of other activities or relationships with other persons or organizations, a person or firm is unable or potentially unable to render an impartial verification opinion of a Project Developer’s estimated credits.

Context: A site’s position within a watershed, landscape, community, region, or other spatial unit which partially determines the level of functions, values, and services that may be delivered. Especially, the distance between where a function is performed naturally and where its benefits are realized.

Credit: a single unit of trade that quantifies the provision (or right of use) of a regulated or non-regulated ecosystem service. A credit becomes an offset when it is used to compensate for the unavoidable impacts on the environment. These offset credits are often called mitigation credits.

Currencies: a type of credit created through a specific Protocol.

Debit: A measure of the ecosystem impacts created by any project that decreases the available ecosystem services that project provides. The “debit” is used as a way to determine how many credits that project sponsor needs to offset the impacts they generate.

Ecosystem Services Markets: The full spectrum of regulatory, quasi-regulatory (cap-and-trade) and voluntary mitigation markets, such as wetland mitigation banking, habitat/conservation banking, water quality trading, environmental water transactions and carbon markets.

Ecosystem Services: benefits that human communities enjoy as a result of natural processes and biological diversity including (but not limited to) fish and wildlife habitat, the water cycle, filtration of air and water pollution, pollination, mitigation of environmental hazards, control of pests and diseases, carbon sequestration, avoidance of carbon dioxide emissions, and maintenance of soil productivity. “Ecosystem service” is also used to refer to the combination of a *function* and its *value*, the latter largely determined by *context*.

Eligible Actions: measurable conservation and development actions that have been approved by the Market Administrator for generating credits and debits.

Exchange: An institution that inventories and tracks all of the different credits available within a market or a marketplace by documenting their generation, ownership, and trade. An exchange generally requires credit traders to pass some sort of legitimacy or competency test prior to participation.

Functions: Naturally-occurring physical, chemical, and biological processes or groups of processes. In ecosystem marketplaces these are only rarely measured directly and in absolute terms. More often, *indicators* and *models* are used to estimate relative levels of functions.

General Crediting Protocol: a set of rules that defines the universal processes through which credits are issued within a distinct ecosystem credit accounting system or marketplace.

Habitat: The particular association of biotic and abiotic features with which individuals or populations of the same species are typically associated.

Indicators: Variables that correspond closely with and in some cases determine the relative levels of an *attribute*.

Market Administrator: An organization responsible for the operation and maintenance of an ecosystem credit accounting system or marketplace. For the Willamette River Basin, the Administrator is the Willamette Partnership. Specific responsibilities may include: defining credit calculation methods, managing the credit creation process, managing the credit verification process and managing the credit issuance process. It also may act as an information resource for market participants.

Market Environmental Registry: A database and protocols to track, register, certify, and bank credits and debits for an ecosystem marketplace. The system needs to accommodate credit definition and verification protocols across ecosystem services, geographies and jurisdictions. An ecosystem services credit registry differs from traditional commodity exchange platforms in that it will require strict performance standards, long contractual arrangements, and regular verification.

Material Misstatement: An error (for example from an oversight, omission or miscalculation) that results in the reported quantity of credits or debits being significantly different from the true value to an extent that will influence performance or decisions. A discrepancy is considered to be material if the overall credit estimate differs from the overall credits estimated by the verifier by 15% or more.

Measure. *verb:* To quantify something, usually on a continuous scale, using precise equipment. Contrast with estimation, which typically implies visual estimate without use of equipment. *noun:* something that is measured or estimated, such as the condition of an indicator.

Mitigation or conservation bank: An area of land conserved or restored to provide additional ecosystem services that is drawn on to compensate for adverse environmental impacts elsewhere.

Mitigation: Generally, a reduction in impacts. While used generically to refer to actions taken to reduce impacts, a more precise term is offset, if the objective is no net loss as in regulatory programs that call for mitigation or offset of impacts.

Offset: Generally, the act of fully compensating for unavoidable impacts. In a cap and trade system, an offset is an action carried out by a third party to generate credits (to reduce or avoid pollution or resource use). These offset credits can then be sold to polluters or resource users. These offset credits are often called mitigation credits.

Payments for ecosystem services: The variety of arrangements through which the beneficiaries of ecosystem services pay back the providers of those services. Payments encompass the full spectrum of options including, but not limited to, government incentives programs, mitigation banking programs and/or tax programs

Project Developer: An individual or organization proposing a credit or debit project for verification and entry into the registry.

Rapid assessment: By convention, an assessment requiring no more than a single day to complete.

Stacking credits: The creation of different credit types in the same geographic area. It allows landowners to market multiple ecological values at a single site, including those with and without specific geographic delineation. This project is not talking about stacking credits, but will show how to “bundle” different credits from the same project, by parsing the project into different areas for different markets.

Out-of-kind mitigation: Mitigation activities where the habitat functions and values created are not an exact equivalent to the impacted habitat functions and values being mitigated.

Service or Trading area: The geographic areas in which credits may be applied to offset debits associated with impact sites.

Validation: The process through which a project developer receives confirmation that their project is eligible to develop and potentially sell credits.

Validator: A validator is an individual or agency approved to conduct validations.

Values: Characteristics of a resource that are desired (usually) or considered detrimental. Includes the economic, ecological, and/or social importance or detriment assigned to a function or other attribute, as determined partly by its context, that is, (a) the opportunity to support the attribute; (b) the effectiveness of a site in supporting the attribute, and (c) the local, regional, and national significance of the attribute, as influenced partly by the scarcity of the function or attribute and the site’s position in the landscape. In ecosystem marketplaces, values are only rarely measured directly, e.g., in dollars. More often, indicators are aggregated into models which are used to estimate relative levels of the values.

Verification: Activities undertaken during third-party verification that include reviewing a Project Developer’s estimated credits, verifying the accuracy of measurement, and submitting a Verification Report to the Registry.

Verifier: A verifier is the person or institution that confirms actions taken on the landscape produce the desired ecological benefits necessary for credit creation.

Appendix B: Approved Metrics



Counting on the Environment's Salmon Credit Calculation Method

The Salmon Credit Calculation Method calculates scores for six ecological functions relevant to optimal habitat for the range of salmonid species. The output of the metric is a weighted linear foot that is based on the % of optimal functions performed by the stream and near-stream habitat.

The salmon metric began development as part of the Oregon Department of Transportation bridges project and was further refined by Parametrix, INC. The Counting on the Environment process of the Willamette Partnership convened a salmonid focus group to review the metric, assign weights to the six functions, and develop trading rules specific to the salmonid currency.

<http://www.willamettepartnership.org/ecosystem-credit-accounting/salmon-habitat>



Counting on the Environment's Prairie Credit Calculation Method

As the Counting on the Environment process reviewed existing metrics, it did not find an existing metric that meshed well with the other approved metrics or that had found common acceptance in Oregon. Paul Adamus, working with the focus group of state prairie experts, developed a new rapid assessment method for upland prairie.

The metric produces a functional score between 0 and 1 that is used to weight acreage to generate functional acres as a unit of trade. The metric's required, rapid portion includes questions that establish the site qualifies as upland prairie, assess the site's contextual value, and then scores the site-specific functions. The metric also includes an optional detailed assessment using vegetation plots. This portion is used to refine credit estimates and track performance over time.

<http://www.willamettepartnership.org/ecosystem-credit-accounting/upland-prairie-habitat>



Oregon Rapid Wetland Assessment Protocol (ORWAP)

ORWAP is a functions-based assessment developed by Paul Adamus and the Oregon Department of State Lands for use as a statewide rapid assessment for wetland conditions. It was not developed explicitly as a crediting metric. The Department of State Lands and the Army Corps of Engineers have approved ORWAP for use as a functional assessment http://www.oregon.gov/DSL/WETLAND/or_wet_prot.shtml. The Counting on the Environment process convened a wetlands focus group to assign rules for converting ORWAP scores into quantities of functional acres as tradable credits.

ORWAP computes a score for each of 16 wetland functions and their societal value. Although ecosystem services are considered to be the combination of a site's functional capacity and its value, ORWAP currently does not specify a process for combining the function and value score into an "ecosystem service" score based on each pairing. These 16 functions are grouped into 5 functional groups with a score between 0 and 10.

<http://www.willamettepartnership.org/ecosystem-credit-accounting/wetlands>



Shade-a-Lator v. 6.2

The Shade-a-lator is a model, developed by Oregon's Department of Environmental Quality that calculates thermal load reductions, in kcal/day/ft, from riparian shade restoration projects <http://www.deq.state.or.us/wq/trading/trading.htm>

Generally, these projects are linear, extending from several hundred feet to several thousand along a stream. The assessment's spatial unit is a stream reach whose upstream-downstream boundaries are defined by the user, and whose lateral boundaries extend outward and perpendicular to the stream to a distance also defined by the user, but typically not more than 150 feet (the usual size of recommended buffers). Within the lateral buffer, the Shade-a-lator samples one set of attributes in 100ft bands and samples dominant vegetation type at 15 foot bands, in both cases moving from the stream out through the buffer.

<http://www.willamettepartnership.org/ecosystem-credit-accounting/water-quality-temperature>

Appendix C: Roster of Working Group Participants

ORGANIZATION/AGENCY	REPRESENTATIVE
City of Albany	Diane Taniguchi – Dennis
City of Eugene	Eric Wold
City of Portland	Mike Reed
Cascades West Council of Governments	Cynthia Solie
Clean Water Services	Charles Logue
Defenders of Wildlife	Gina LaRocco
Ecotrust	Sarah Kruse
Office of Gov. Ted Kulongoski	Jane Bacchieri
The Freshwater Trust	Brett Brownscombe
Institute for Natural Resources	Jimmy Kagan/Sally Duncan
Mud Slough Wetland Mitigation Bank	Mark Knaupp
The Nature Conservancy	Cathy Macdonald
National Oceanic and Atmospheric Administration	Marc Liverman
Oregon Dept. of Agriculture	Dave Wilkinson
Oregon Dept. of Environmental Quality	Ranei Nomura
Oregon Dept. of Fish & Wildlife	Mike Pope
Oregon Dept. of Forestry	Jeff Brandt
Oregon Dept. of Land Conservation & Development	Katherine Daniels

ORGANIZATION/AGENCY	REPRESENTATIVE
Oregon Dept. of State Lands	Kirk Jarvie
Oregon Dept. of Transportation	Bill Warncke
Oregon Dept. of Water Resources	Bill Ferber
Oregon Watershed Enhancement Board	Ken Bierly
U.S. Army Corps of Engineers	Bill Abadie
U.S. Environmental Protection Agency	Yvonne Vallette
U.S. Fish and Wildlife Service	Joe Zisa
U.S. Forest Service	Robert Deal
U.S. Natural Resources Conservation Service	Meta Lofstgaarden/ Russ Hatz

Appendix D: Willamette Partnership: Credit Issuance Checklist and Log 7/31/09

Issuance Phase	Activity	Documentation	Who sends	Who receives	Currency Requirements			
						Temp	Wetland	Salmonid
1. Validation								
	Determine feasibility							
		Proof of rights to credits	ProjDev	NA	X	X	X	X
		Land protection documents	ProjDev	NA	X	X	X	X
		Agency pre-approval notices	ProjDev	NA		X	X	X
		Baseline wetland delineation	ProjDev	NA		X		
	Determine eligibility							
		Validation Checklist and Notice	ProjDev	Partnership	X	X	X	X
		Validation Notice	Partnership	ProjDev/Markit	X	X	X	X
2. Calculation								
	Complete plans							
		50% design	ProjDev	NA	X	X	X	X
		Agency approvals	ProjDev	NA		X	X	X
		100% design and permits	ProjDev	NA		X	X	X
	Create credit estimate							
		Baseline Maps & Datasheets	ProjDev	Partnership	X	X	X	X
		Post-Action Maps & Datasheets	ProjDev	Partnership	X	X	X	X
		As-built adjustment to Post-Action	ProjDev	Partnership	X	X	X	X
		Credit Estimate Report	ProjDev	Partnership	X	X	X	X
3. Verification								
	Verify credit estimate							
		Verification Notice and Conflict of Interest Form	Verifier	Partnership	X	X	X	X
		Adjusted Maps and Datasheets	Verifier	Partnership	X	X	X	X
		Verification Report	Verifier	Partnership	X	X	X	X
	Agency certification							
		Agency Certification	Agency	Partnership	X	X	X	X
4. Registration								
5. Sell/Trade								
	Open account							
	Submit package							
		Credit Issuance Package	Partnership	Markit				
		Document Q/A, Q/C	Markit	NA	X	X	X	X
	Issuance							
	Sales							
		Notice of Sale/Transfer	Markit	Agency	X	X	X	X
6. Track								
	Ongoing verification							
		See Verification phase	Verifier	Partnership	X	X	X	X