Lower Boise River Water Quality Trading Program
Technical Advisory Committee

Meeting #2: Foundations of Revising the Lower Boise River Water Quality Trading Framework

Lower Boise River Technical Advisory Committee for Water Quality Trading

March 28, 2016
Idaho Department of Environmental Quality State Office Conference Room C/D
10:30-4:00pm MST

Objectives:

- Explore recommendations on March 1 Framework concepts
- Review new Framework concepts and provide direction on Framework contents
- Identify action items and responsible parties for next meeting

Time	Topic Description
10:30 – 10:40	Introductions and review of process
10:40 – 11:10	Status update on action items: • Scope of Framework • Trading Area • Baseline/Base Year • Creditable Project Types
11:10 – 12:00	Credit characteristics: • What is a credit? • What is credit life and how is it set? • What is the difference between credit and project life?
12:00 – 12:45	LUNCH
12:45 – 1:45	Quantifying water quality benefits: • Approaches to quantification • Considerations and implementation • Methods and their suitability for various project types
1:45 – 2:00	Break
2:00 – 3:00	Managing risk and uncertainty: trading ratios: • What are trading ratios and how are they applied? • Establishing trading ratios • Other mechanisms to reduce risk and uncertainty
3:00 – 3:30	Leveraging multiple funding sources for projects and credit generation
3:30 – 4:00	Meeting wrap-up and action Items: • Summarize key recommendations or proposals • Identify issues that require additional conversations • Identify key action items and responsible parties
4:00pm	Adjourn

Lower Boise River Technical Advisory Committee on Water quality trading

Technical Advisory Committee Meeting:
Foundations for Revising the Lower Boise River Water Quality Trading Framework
March 28, 2016

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Water Quality Trading Note V: Are Credits There When You Need Them?

Developed by Willamette Partnership. Adapted from Building a Water Quality Trading Program by the National Network on Water Quality Trading[1]

Trading programs need to ensure that the water quality credits used in a trade represent real environmental benefit occurring when it is needed to support designated uses and meet permit obligations. There are many pieces of a trading program that feed into this. This policy note focuses on delineating when credits and projects officially begin and end as well as assurances that the credit-generating activities will be present throughout the "life" of that credit. Another component of ensuring credits are real is setting guidelines for quantification of benefits through monitoring or modeling (covered in a companion WQT Note.

Credit Characteristics

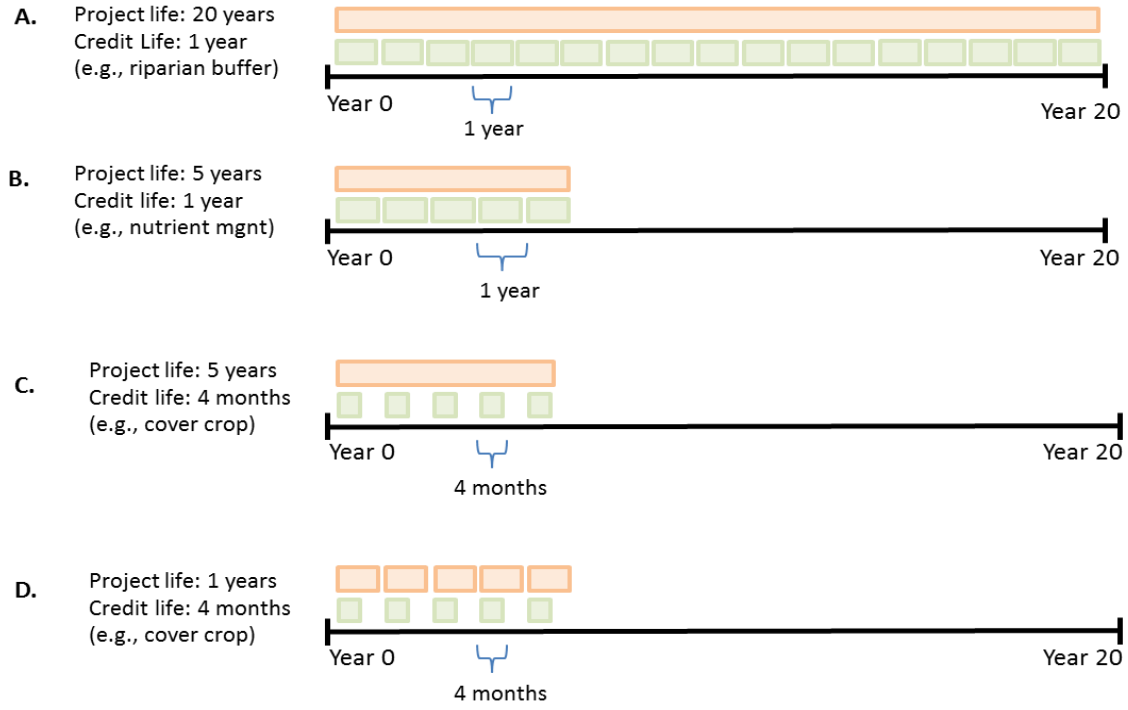
Trading programs need to define when a credit becomes active and when it expires. Several terms are used to describe the different time periods important to credit characteristics. Figure 1 depicts the relationship between these terms:

- **Credit Life**: Think of this as the credit's shelf life. It's the period from the date a credit becomes usable by a permittee to offset its discharge (i.e., its "effective" date), and the date that the credit is no longer valid (i.e., its "expiration" date). Trading programs often define a credit life consistent with when benefits are delivered, which may or may not be the same as when the project or BMP is actively applied. Credit life may be monthly, seasonal, annual, or crossing over several years based on the ecology of the watershed.

- **Project Life**: The period of time over which a given project or BMP is anticipated to function, and thus generate credits. The project life may extend over multiple years. The project life and credit life will always overlap, although a credit life may be shorter than the project life of the underlying BMP (e.g., annual credits from irrigation upgrades that will function for many years). Trading programs need to define whether projects can be renewed past their initial certified project life, assuming they continue to provide water quality benefits.

[1] The National Network on Water Quality Trading is a collaborative effort that brings together the perspectives of agriculture, point sources, environmental groups, regulatory agencies, and the practitioners delivering WQT programs across the country. The purpose of the Network is to establish a national dialogue on how water quality trading can best contribute to achieving clean water goals. The National Network publication "Building a Water Quality Trading: Options and Considerations" is anticipated for release in spring 2015.

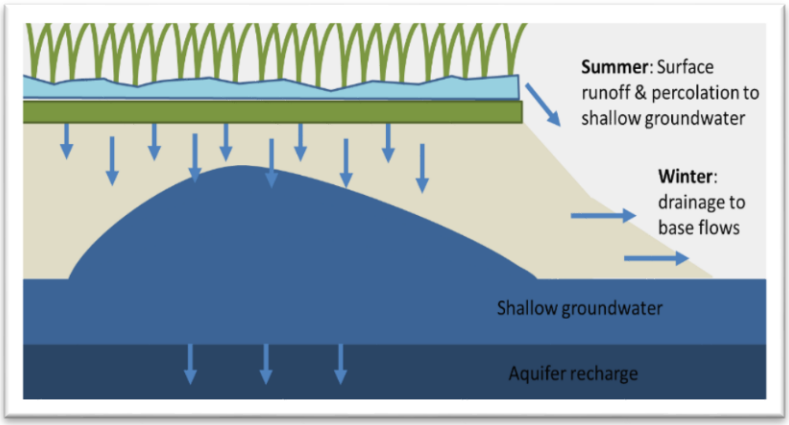
Figure 1. The relationship between credit life and project life. Trading programs can choose to allow for project renewal. Note that, while not depicted for C or D, there are cases where the science may support annual credits generated from seasonal practices.



Credit Life in the Boise River

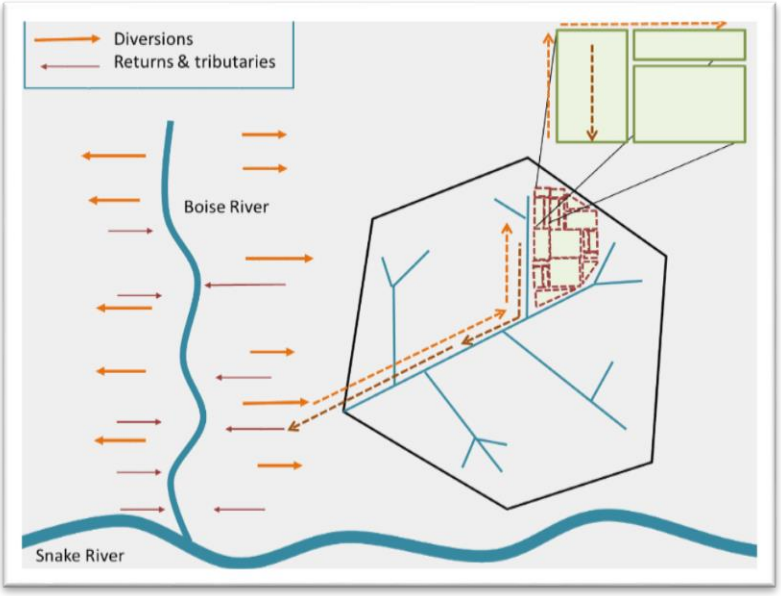
Technical analysis, based on the Lower Boise Total P TMDL Addendum, conducted by Willamette Partnership in 2015, concluded that an annual credit life would be most appropriate for TP credits in the Boise (Willamette Partnership, 2015). That means that a project implemented in the summer can produce credits that are still usable as offsets in the winter.

Figure 2. Surface and groundwater interactions in the Lower Boise



There are a couple important cycles in the Boise River watershed that support this conclusion. The first, depicted in Figure 2, is a strong connection between surface water and groundwater in irrigated agricultural lands. Typically, irrigation in this area permeates below the plants root zones to form a "mound" of shallow groundwater during the spring and summer. In the winter, that groundwater essentially drains out into nearby canals and tributaries, making up all or nearly all of the winter time base flows (Willamette Partnership, 2015). In this way, the water quality benefits from on farm BMPs is actively moving through the Boise system throughout the year.

The second major dynamic affecting credit life is the web of diversions and returns that characterize the Lower Boise watershed, depicted in Figure 3. Much of the Lower Boise's flow is diverted into irrigation canals, returning quickly as surface and more slowly as base flow from shallow groundwater. And once that water returns to the Boise, it may even get diverted yet again.



Both of these processes increase the length of time that a pollutant load (e.g., point source discharge) or a reduction in load (e.g., BMP water quality benefit) is active within the Lower Boise watershed. The surface-groundwater cycle is approximately annual in nature. The effect of the multiple diversions and returns is likely to be similar, though it will vary depending on where in the watershed you are.

Finally, it's important to note that the SISL model estimates water quality benefits on an annual basis and cannot predict monthly loads. All these factors point to using an annual credit life for TP in the Boise.

Project Assurances

Assurances that the project will be maintained are another mechanism to build confidence that credits are there when they are needed. Some key terms tied to project assurances include:

- **Project Protection Agreement**: the enforceable agreements to protect BMPs at the project site, which may include leases, contracts, easements, or other agreements. This agreement could run with the land to ensure the project will not be affected if ownership changes. The duration of the project protection agreement is referred to as the Project Protection Period.
- **Minimum Project Protection Period**: defines how long project protection needs to be in place for a given BMP. It can be the same or longer than the credit life. The minimum project protection period is often longer than the credit life where a large upfront investment will generate benefits over multiple years (e.g., structural BMPs like irrigation upgrades or biodigester installation), where benefits take time to mature (e.g., riparian forest restoration), or where short term contracts do not provide enough certainty for buyers and/or sellers to participate (e.g., a buyer needs to predict the credit price for at least 5 years before investing). Farmers may prefer short-term projects to preserve flexibility in farm operations while buyers may prefer long-term contracts that match their 5-year permit cycle or longer-term facility planning cycle.

Timing of Credit Issuance

When credits are issued, they are ready for sale and use. For BMPs that are fully functional upon installation, credit issuance often occur immediately following a completed project review/verification. For projects that take time to mature, crediting programs may choose to take a phased approach to

credit issuance, which times credit issuance to match the delivery of benefits. This can increase the cost and/or provide a disincentive to implement BMPs that take time to mature, which is problematic primarily where those same actions are linked to changing the ecological processes that drive water quality (e.g., stream geomorphology, or improved connections to hyporheic or interstitial flow) and are therefore a high priority for restoring watershed function. Ratios, other analyses, or permit compliance schedules can help account for the time lag.

"Banking" Credits for Later Use

Banking in a water quality trading context is different from the meaning of the term used in wetland mitigation. For water quality trading, banking is the generation of a credit in one time period with the intention that it be used to offset a discharge in another time period—without an ecological justification for doing so. There may be economic or other reasons for banking credits. For example, in the WQT context, banking would allow no-till practices that reduce 100 lbs. of phosphorus in 2014 to be used to offset a wastewater discharge in 2015. However, banking has a strong potential to create temporal mismatches between when the impact occurs and when the offset is effective. The 2003 U.S. EPA Trading Policy does not directly address banking, but does state that "[c]redits should be generated before or during the same period they are used to comply with a monthly, seasonal or annual limitation or requirement specified in an NPDES permit." (EPA 2003)

References:

Willamette Partnership (2015). Lower Boise Framework Update: Findings & Recommendations (available upon request from DEQ).

U.S. Environmental Protection Agency (2003). Water Quality Trading Policy. 68 Fed. Reg. 1608. Available at http://www.gpo.gov/fdsys/granule/FR-2003-01-13/03-620.

Water Quality Trading Note VI: Quantifying Water Quality Benefits

Adapted from Sections 4 of Building a Water Quality Trading Program by the National Network on Water Quality Trading (National Network 2015) and Section 3 of the Draft Joint Regional Recommendations on Water Quality Trading for the Pacific Northwest (WP et al. 2014).

Estimating the number of credits available to sell (also known as a project's credit value) begins with estimating its water quality benefits. Water quality benefits are the pollution reductions resulting from a credit generating project's actions. Credits are equal to the water quality benefits, adjusted by baseline requirements and trading ratios (discussed in companion Water Quality Trading Note memos).

Quantifying water quality benefits requires the estimation or measurement of pre- and post-project implementation. Three general approaches are used to quantify water quality benefits, each of which has appropriate applications and considerations.

Approaches to Quantifying Water Quality Benefits

Direct Measurement

Direct measurement or monitoring, quantifies water quality through the measurement of water chemistry or surrogates for water quality (e.g., stream bank erosion, shade from riparian vegetation plantings). For many project types it is difficult to causally link measurable improvement to a single project site because of variation in weather, hydrology and other watershed dynamics (e.g., a diversion or project upstream), which means direct measurement may not be the most suitable approach. The most appropriate application for direct measurement are those projects where variables can be highly controlled, such as constructed basins, where monitoring can occur for water entering and existing the project site.

Where direct measurement is feasible and appropriate, a trading program should establish clear monitoring and quality assurance protocols. Agencies may require technical review and approval before direct measurement can be used in a trading program. The technical review for a direct measurement method is likely to include the following:

- A monitoring and quality assurance plan, including approach to establishing a current condition from which to measure change.
- Instrumentation or sampling methodology that captures water quality data frequently enough to create an estimate of average water quality improvement over a specific period of time (e.g., year, season, month).
- Evidence that the instrument is appropriate for the purpose, installed and calibrated correctly, and produces adequate results.
- Record keeping procedures to catalogue each sample taken, method of collection and results.

Direct measurement can reduce uncertainty associated with quantifying water quality benefits of nonpoint source project types, and reduce the need for uncertainty ratios in calculating the number of credits generated from a project. However, direct measurement can be costly and time consuming to implement due to instrumentation, calibration and the time necessary to establish a sufficient dataset.

Modeling

Models are often used to estimate water quality benefits where they cannot be measured directly. Modeling employs mathematical simulation procedures to estimate water quality benefit. Models are appropriate where direct monitoring is not feasible or when data are not sufficient to develop location-specific pre-determined pollution reduction rates for individual project types. The approach may include the development of a watershed specific model or adoption and application of an existing model.

Several factors should be considered when developing or selecting a modeling approach including:

- *Identify relevant methods:* A model needs to produce outputs in units relevant to the water quality trading program and convertible to the same units as the regulatory water quality standard or its surrogate targets. A model also needs to operate at an appropriate geographic scale and resolution.
- *Adapt to local conditions (calibrate):* Model parameters should be calibrated to closely match local conditions. This calibration may require the development and integration of standard datasets for the local area (e.g., soils, climate, and crop management) or be based on expert judgement.
- *Technical review (Validate)*: Models need to be accurate, repeatable, sensitive, and transparent. Model validation may include comparing output results with measured data or other model outputs, literature values and/or expert judgement.

Modeling can allow for more project site specific quantification of water quality improvement and may be the best available option where direct measurement is not feasible. The use of models may require moderate-to-high levels of training and technical capacity amongst users. Additionally calibration, validation and sensitivity analysis can be data, time, and cost intensive.

Pre-determined rates

Pre-determined rates, which are usually expressed as a ratio or percentage, are standardized values of water quality benefit based on measured data, scientific literature values, or iterative modeling exercises. Pre-determined rates are most appropriate for quantifying water quality benefits where sufficient local data exists, but direct measurement is not feasible. Although pre-determined rates are not sensitive enough themselves to site-specific conditions, they do allow for project-specific quantification. As with modeling, pre-determine rates should go through a technical review and formal approval process. Justification for pre-determined rates should include documentation of how rates were selected, why they are appropriate and/or transferable to the proposed geography and conditions, as well as guidance and analysis of sources of variation in performance of project types based on location conditions. Implementation of pre-determined rates is relatively low cost in comparison to other quantification methods. However, the start-up costs to generate and approve rates may be high due to information required to justify and validate rates may not yet exist.

Combination of methods

A trading program developer may utilize one or more methods of quantification in combination to calculate water quality benefits associated with project types. By combining quantification methods, a trading program can take advantage of the strengths and avoid pitfalls associated with any single approach. However, by combining methods there is also the potential for combining the different types of uncertainty associated with different methods. In selecting multiple methods, program developers

should consider how different methods interact and may or may not be compatible, what additional training and support may be necessary, and how each method will be improved and supported over time.

Selecting an Appropriate Quantification Approach

Based on the experience of existing programs and stakeholders nationally, as well as recommendations developed regionally by Idaho, Oregon, and Washington state agencies the following are characteristics of a good quantification method. While it is unlikely that any one method will meet all characteristics, the selection should be a balance of the following:

- **Accurate**: representative of true pollution load reductions. Assessments of uncertainty, like reporting confidence intervals associated with model results, can help to represent the level of accuracy;
- **Repeatable***:* if different people apply the method using the same data, location, and factors, the model will deliver a similar result (i.e., is not overly subjective). "Protocols" or user guidance can greatly improve the consistency with which a method is applied;
- **Sensitive***:* variation in quantified credits reflects actual differences in the water quality indicators being measured, and not stochastic or background variation;
- **Transparent:** easy to understand and well-documented relationship of inputs and indicators to the overall estimate of pollution reduction. Ideally, methods are well vetted in the scientific community and posted in the public domain for use by anyone without charge.
- **Practical:** pragmatic and economical to set up and apply, easy to use for the targeted user group, and compatible with other relevant models (e.g., TMDL models) so its outputs can plug easily into evaluations of overall program performance.

Trading programs can improve the likelihood of achieving the above characteristics by selecting standard method(s) or models for quantifying water quality benefit that are well referenced and documented. When feasible, quantification methods should include those used to develop an associated TMDL or at a minimum be consistent with the methods used to develop the associated TMDL.

While quantification methods should be standardized, they also need to be responsive to changes. A water quality trading program's adaptive management section should include procedures for incorporating new information and updating of quantification methods. As with the methods themselves, the adaptive management process should include sufficient technical documentation and justification and be transparent.

Lower Boise River Water Quality Trading Framework

To quantify water quality benefits the 2010 Lower Boise Trading Framework employs a combination of modeling and predetermined rates. The Surface Irrigation Soil Loss (SISL) model was developed by Idaho Natural Resources Conservation Service in 1991 to estimate annual soil loss from furrow irrigated fields and to assess the benefits of conservation practices. To convert soil loss to total phosphorus, the framework assumes that two (2) pounds of total phosphorus are attached to every ton of sediment

lossed (IDEQ, 2010; TFT, 2015). As an example, if an agricultural field is modeled as losing 2 tons of sediment, then the total phosphorus loss is calculated as four (4) pounds.

To determine water quality benefits from implementation of a credit generating action, predetermined rates are applied to the total phosphorus loss calculation. For the 2010 Lower Boise Trading Framework, a list of agricultural BMPs and associated total phosphorus reduction potentials or efficiency rates were developed by Dr. Carter and approved by the Idaho Soil Conservation Commission (Idaho 2010). These predetermined rates are used in combination with the SISL model to quantify the water quality benefits or credits associated with conservation projects.

The combination approach of modeling and pre-determined rates used in the 2010 Lower Boise Trading Framework remain applicable and appropriate today for on-farm project types. In 2015, The Freshwater Trust (TFT) completed a review and analysis of the existing effectiveness rates to determine what updates may be required to quantify water quality benefits. Through a review of the most recent relevant literature and validation using the Nutrient Tracking Tool developed by USDA-NRCS, TFT propose several adjustments to the existing effectiveness rates.

Table 1. 2010 Framework and revised effectiveness rates.

BMP (NRCS Code)	ISCC Effectiveness (uncertainty), %	LitReview Effectiveness Range, %	Proposed Revised Effectiveness,*
Polyacrylamide (450)	95 (10)	50 to 95	80
Filter Strip (393)	55 (15)	5 to 93	35
Sprinkler Irrigation (442)	100 (10)	NA	90
Microirrigation (441)	100 (2)	NA	98
Tailwater Recovery (447)	100 (5)	NA	95
Straw in Furrows (484)	90 (20)	52 to 85	65
Strip-Till or No-Till (329)	90(10)	-3.3 to 91	70
Sediment Basin, Field Scale (350)	75 (10)	NA	65
Sediment Basin, Watershed Scale (350)	65(15)	NA	50
Underground Outlet (620), years 1-2	85(15)	NA	70
Underground Outlet (620), after year 2	65 (25)	NA	40
Surge Irrigation (449)	50 (5)	NA	45
Nutrient Management(590)	NA	NA	NA
Constructed Wetland, Farm Scale (656)	90 (5)	-76 to 90	75
Constructed Wetland, Watershed Scale (656)	NA	-76 to 90	NA
Cover Crop (340)	NA	10 to 94	60

* "uncertainty" values have already been subtracted

=no change

=revised 5 percentage points downward

=revised 10 percentage points downward

=not included in original trading framework

References:

Carter, David L. (2002) Proposed Best Management Practices (BMPs) to be Applied in the Lower Boise River Effluent Trading Demonstration Project. Available at: https://www.deq.idaho.gov/regional-offices-issues/boise/basin-watershed-advisory-groups/lower-boise-river-wag/

Idaho Dep't of Environmental Quality (2010a). Water Quality Pollutant Trading Guidance, with attached Lower Boise Trading Framework. Available at https://www.deq.idaho.gov/media/488798-water_quality_pollutant_trading_guidance_0710.pdf.

The Freshwater Trust (2015). Lower Boise River Technical Analysis: Evaluation of agricultural best management practices, on-field conditions, and hydrologic connection to support water quality trading (available upon request from DEQ).

Willamette Partnership, The Freshwater Trust, Idaho DEQ, Oregon DEQ, and Washington Ecology (2014). Draft Regional Recommendations for the Pacific Northwest on Water Quality Trading. Available at http://willamettepartnership.org/publications

Water Quality Trading Note VII: Trading Ratios

Adapted from Section 5 of *Building a Water Quality Trading Program* by the National Network on Water Quality Trading (National Network 2015)[2] and Section 4.2 of the *Draft Joint Regional Recommendations on Water Quality Trading for the Pacific Northwest* (WP et al. 2014).

Much of trading program design focuses on reducing risk and uncertainty. Nonpoint credit projects operate in a dynamic environment, where natural events such as floods and drought can alter credit-generating BMPs and affect pollutant loads. That dynamism can create variability in BMP performance and make it difficult to estimate the water quality benefits delivered from individual BMPs (*scientific uncertainty)*. Other sources of risk come from changing rules (*regulatory risk*), risk that purchased credits will not be delivered as promised (*buyer risk*), and uncertainties regarding credit supply and demand (*market uncertainty*). Combinations of eligibility policies, approved credit-generating actions, credit quantification methods, and trading ratios can be integrated to successfully address these uncertainties.

When constructing a water quality trading program, managers can tailor each component to consider specific policy objectives, watershed goals, economic feasibility, and acceptable levels of risk or uncertainty.

Trading Ratios: A trading ratio is a numeric value that is multiplied by the number of credits that would otherwise be required (i.e., the amount of water quality benefits reduced by baseline obligations), used to ensure that the environmental benefit of a credit-generating project is equivalent to or greater than the reduction that would occur if the buyer installed treatment technology on site (U.S. EPA 2007). Trading ratios are often expressed as a number of credits needed per unit of discharge (e.g., a 2:1 ratio means that two credits need to be bought per one unit of impact), or as a discount factor (e.g., a 10% reduction factor applied to the estimated credits).

Different trading ratios can be used to adjust estimated water quality benefits (U.S. EPA 2007):

Uncertainty ratio: A ratio that reduces the estimated pollution reduction or estimated credit amount in order to compensate for potential inaccuracies in estimation methods and/or variability in project performance. In some cases, the uncertainty ratio is used to compensate for lack of scientifically derived attenuation or equivalency factors.

Reserve ratio: A ratio that sets aside a portion of the estimated credits into a reserve pool to insure buyers against unforeseen credit losses due to project failure. Such credits will need to be tracked and accounted for; and

Retirement ratio: A ratio applied to the estimated credits which sets aside a portion of credits for net environmental benefit. This kind of ratio is often used to accelerate water quality improvements and demonstrate environmental gains. In other cases, it is used as a hedge against potential environmental degradation.

[2] The National Network on Water Quality Trading is a collaborative effort that brings together the perspectives of agriculture, point sources, environmental groups, regulatory agencies, and the practitioners delivering WQT programs across the country. The purpose of the Network is to establish a national dialogue on how water quality trading can best contribute to achieving clean water goals.

In addition to the above ratios, the 2007 U.S. EPA Permit Writer's Toolkit further defined trading ratios as mechanisms to adjust estimated loads to appropriately convey the impact of the estimated loads on the point of concern (delivery ratios) or to create equivalency between different forms of the same pollutant or different types of pollutants that contribute to the environmental stress in multi-parameter trading programs (equivalency ratios). Because these factors are often derived from and incorporated within the measurement or modeling of water quality benefits, the National Network on Water Quality considers them largely as part of the credit quantification, and not as trading ratios. Figure A depicts how the National Network publication differs from the 2007 Permit Writer's Toolkit in its consideration of delivery, location (attenuation), and equivalency ratios.

Delivery, location, and/or attenuation ratio: A ratio to adjust estimated loads to appropriately convey the impact of the estimated loads on the point of concern; and

Equivalency ratio: A ratio to create equivalency between different forms of the same pollutant or different types of pollutants that contribute to the environmental stress in multi-parameter trading programs.

Given variability in terminology around ratios, it is helpful when trading programs document the assumptions underlying the chosen ratio in a transparent manner in the approved regulatory documents (e.g., trading guidance or individual permit).

Figure A. Comparison of treatment of trading ratio topics in the Permit Writer's Toolkit and National Network

	Trading Ratios	Quantification of Water Quality Benefits
2007 U.S.EPA Permit Writer's Toolkit	• Delivery • Location • Equivalency • Uncertainty • Retirement	• Edge-of-field
National Network	• Retirement • Reserve • Uncertainty	• Edge-of-field • Delivery • Location • Equivalency

Other Mechanisms to Manage Scientific and Biophysical Risk

In the discussion of trading ratios, it is easy to lose sight of the multiple other mechanisms that are available to deal with scientific uncertainty around BMP effectiveness, variability in natural systems, and the accuracy and precision of the tools we use to estimate load reductions.

Ultimately, risk and uncertainty are inherent in water quality trading programs, especially when it comes to nonpoint sources. The goal of the water quality trading program is to ensure that adequate steps are being taken to minimize the various forms of risk while managing transaction costs.

See Table B (final page) for a summary of the mechanisms available to mitigate scientific and biophysical risk in water quality trading programs.

Basis for Trading Ratios in the Lower Boise Framework

The original Lower Boise Framework, adopted by DEQ and appended to the state guidance in 2010 (DEQ 2010), proposed a set of ratio or ratio-like factors that would apply to trades. The table below describes the proposed ratios from that document and more recent information that can be considered during the 2016 revision.

Table A. Ratio considerations for the 2016 Lower Boise Framework revision. See Section 5 of the National Network on Water Quality Trading publication for specific references.

Ratio	Original Framework	Considerations for Revision
Delivery	Site location and deliver ratios ranging from 0.20 to 0.95 were proposed to account for the attenuation of phosphorus between specific points of generate, points of sale, and the mouth of the Lower Boise near Parma (DEQ 2010, Appendix B).	The TMDL Addendum on Total Phosphorus (DEQ 2015) and a related technical report from Willamette Partnership (WP 2015, p.5-6) recommend that these location ratios are no longer relevant. Our current understanding of the Boise system indicates that there is no evidence of significant attenuation from one point of discharge to another location.
Uncertainty	Dr. Carter's report recommends accounting for variability in BMP efficiency rates with uncertainty rates for each BMP type, ranging from 5-20% (Carter 2002). This does not account for variability in performance or weather, which may affect water quality benefits provided.	Nationally, some form of uncertainty ratio is almost always employed. In some cases, it's applied to the entire trade (VA), in other cases, it's associated with variability for specific BMP types (WI), uncertainty in model estimates (Ohio River Basin) or efficiency rates incorporate uncertainty directly (MD, PA) (National Network 2015, p.87).
Retirement (Net Envt Benefit)	The original Lower Boise Framework references a ratio attached to each trade to help meet nonpoint source water quality goals. The proposed approach ranges from 10%-20% ratio in initial years, with later phases tying these ratios to TMDL and TMDL implementation plan needs (DEQ, 2010, Sec 2.2.7).	The use of retirement ratios for net environmental benefit is being applied in the Ohio River Basin, Maryland, and Pennsylvania (National Network 2015, p.90).
Minimum trade ratio	The original framework references a possible minimum ratio of 1:1 for simple trades, where buyers and sellers are located near each other. However, given the variety of factors considered with other ratios (described above), the 1:1 scenario would have been rare.	A technical memorandum from EPA Region 3 suggest that ratios should never be less than 2:1 (EPA 2014).

Table B. Types of scientific and biophysical uncertainty and mechanisms by which to address them

Type of Uncertainty	Mitigating Mechanism	Pros	Cons	Cost
Scientific and Biophysical	Direct measurement	• If conducted properly, may be most accurate credit estimation method	• Is labor intensive • Is technically challenging • Has attribution challenges	high
	Conservative BMP effectiveness estimates	• Can rely on available data • Achieves consistency among trades	• Rely on averages that are not site-specific	low
	Scientifically-vetted estimation tools and models	• Can be site-specific	• Have their own degrees of uncertainty	varies
	Uncertainty ratio	• Communicates easy-to-understand margin of safety • Can be adapted to specific BMPs or circumstances	• May be duplicative if other mechanisms are in place (e.g., conservative assumptions within quantification method, reserve pool in place)	varies
	Retirement ratio	• Assures water quality is not compromised	• May be duplicative if other mechanisms are in place (see above)	varies
Extreme Events	Clear liability in the event of failure, mechanism for remedy	• Consistent with existing NPDES policies regarding liability (rests with permittee).	• Potential for time lag before new or remedied projects are functioning • May be duplicative if other mechanisms are in place	varies
	Centralized Credit Reserve (via reserve ratio)	• Pools risk	• May be duplicative if other mechanisms are in place • Less appropriate service areas with one or few permittees.	varies

References:

Idaho Dep't of Environmental Quality (2010). Water Quality Pollutant Trading Guidance. Available at: https://www.deq.idaho.gov/water-quality/surface-water/pollutant-trading/.

Idaho Dep't of Environmental Quality (2015). Lower Boise River TMDL: 2015 Total Phosphorus Addendum. Available at https://www.deq.idaho.gov/media/60177413/lower-boise-river-tmdl-total-phosphorus-addendum-0815.pdf.

The Freshwater Trust (2015). Lower Boise River Technical Analysis: Evaluation of agricultural best management practices, on-field conditions, and hydrologic connection to support water quality trading (available upon request from DEQ).

U.S. Environmental Protection Agency, Office of Wastewater Management, *Water Quality Trading Toolkit for Permit Writers*, (2007; updated 2009) (hereafter "2007 U.S. EPA Toolkit for Permit Writers"), *available at* http://water.epa.gov/type/watershed s/trading/WQTToolkit.cfm.

U.S. Environmental Protection Agency, Region 3 (2014). Accounting for Uncertainty in Offsets and Trading Programs. EPA Technical Memorandum. Accessed 8/19/2015 at http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/TradingTMs/Final_Uncertainty_TM_2-12-14.pdf

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Water Quality Trading Note VIII: Can You Leverage Multiple Funding Sources to Generate Credits?

Developed by Willamette Partnership. Adapted from Building a Water Quality Trading Program by the National Network on Water Quality Trading[3]

Bringing multiple sources of funds to help make a bigger, better project with more environmental gains is a great thing. However, there are some sources of funds restricted from use in generating credits/supporting mitigation of environmental impacts. The nuance between mixing funds at the project level vs. mixing funds to generate a credit to offset a discharge is important. There are fewer concerns with mixing funds for better projects, but mixing funds for credits is viewed as not providing net environmental benefit by some. Some of these funds are targeted to support voluntary conservation and restoration, sometimes called "public conservation funds." Examples include:

- US EPA Section 319 grants;
- USDA NRCS Environmental Quality Improvement Program (EQIP);
- USDA Agricultural Conservation Easement Program (ACEP); and
- State wildlife grants.

There are many sources of grants and loans expressly designed to fund water quality infrastructure projects. These are not considered public conservation funds, such as:

- Clean Water State Revolving Funds;
- USDA Rural Development funds; and
- District, utility and city sewer, stormwater, irrigation, and surface water management fees.

Many trading programs include provisions governing the use of public conservation funds for activities to generate credits. The provisions often include restrictions meant, either directly or indirectly, to ensure that the environmental benefit secured through the sale of the credit is in addition to what would have occurred without it. The most significant reasons for limiting the use of public conservation funds for credits are:

- These credits are not additional: Those funds and resulting projects would have occurred anyway; and
- These credits are already "counted": Those project benefits were funded by other sources, and those sources expect to see benefits. Also, many public conservation fund sources are essential parts of TMDL implementation plans to meet Load Allocations or other goals of the Clean Water Act.

Multiple funding sources can be critical to implementing larger projects and broader watershed improvement strategies. Trading programs should not shy away from applying multiple sources of

[3] The National Network on Water Quality Trading is a collaborative effort that brings together the perspectives of agriculture, point sources, environmental groups, regulatory agencies, and the practitioners delivering WQT programs across the country. The purpose of the Network is to establish a national dialogue on how water quality trading can best contribute to achieving clean water goals. The National Network publication "Building a Water Quality Trading: Options and Considerations" is anticipated for release in spring 2015.

funding, which can be critical to implementing larger projects and broader watershed improvement strategies, but need to be clear about which funding is generating which water quality benefits, and for whom. Participants in the National Network supported the use of public conservation funds to:

- Meet a credit seller's baseline requirements (e.g., to fund a conservation plan or to install a baseline BMP); and
- Add additional environmental benefit beyond the proportion used to generate credits.

Table 1 is exerted from the National Network's Section 3.2.6. and discusses some of the options and state policies around using public conservation funds to generate credits. Table 2 lists some comments for and against using public conservation funds to generate credits from comments on the recent Oregon Trading Rule.

Table 1. Exert from Section 3.2.6. of the National Network's Guide

Options	Considerations	Examples
Option A: Never allow public funds to be used for credit-generating projects	If public conservation funding is never allowed, then programs can be more certain that the project would have been completed without the credit payment and the benefits are not double counted. However, disallowing public conservation funds to co-finance projects may reduce participation by landowners, who may need the multiple payments to incentivize participation, or preclude the development of larger projects that need to leverage multiple funding sources to be viable. This option was important to several of the National Network participants. Some felt this was unnecessarily restrictive, others felt it was a preferred option.	The MDA and MDE trading program does not allow for the use of public conservation funds in whole or in part to generate credits.[4]
Option B: Allow projects partially funded by public funds to generate credits in proportion to the private investment	Allowing for public conservation funds for projects to generate credits in proportion to the amount of private investment may still raise questions about whether projects could have been completed with the public payment alone. Proportionate crediting is based on the full cost of the project (planning, design, construction, and maintenance) and care must also be taken to ensure that water quality benefits counted towards meeting the TMDL are restricted to the portion of benefits attributed to the public funds.	As a result of some challenges in Oregon's wetland mitigation banking program, interagency guidance, which did not include OR DEQ, allowed for credits to be generated in proportion to private investment in the project.[5]

[4] MDA 2008b, supra note 180, at pp. 6-7 & 11.

[5] *See* U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Oregon Department of State Lands, Oregon Watershed Enhancement Board, and Oregon Department of Fish and Wildlife, *Oregon Interagency Recommendations: Public Funds to Restore, Enhance, and Protect Wetland and At-Risk, Threatened and Endangered Species Habitats: Appropriate Uses of These Funds in Species and Wetland Mitigation Projects*, (2008) (hereafter "Oregon Interagency Recommendations

	This option may be more complex to administer and track. However, this option is generally viewed as a good compromise and has been adopted by several programs.	
Option C: Allow public funding to generate credits	Allowing for public conservation funds for projects to generate credits without any restrictions may raise questions about whether trades generate additional water quality benefits. This approach may also create financial inefficiencies and potential inequities for farmers that do not receive conservation payments. However this approach can increase landowner participation by creating added financial incentives to install BMPs. The intent of the program providing payments to allow credit generation or not also matters. This approach will undermine support for trading programs with some stakeholder groups, and could create legal risks for point sources under the CWA.	PA DEP allows projects receiving federal conservation funding, to generate credits, but requires approval from the funding source prior to generating credits.[6]

Table 2. Oregon's arguments for and against using public conservation funds to generate credits

Supporting use of public conservation funds to generate credits
ACWA is concerned about the potential complexity of trying to segregate and track various funding streams on collaborative programs/projects. If public conservation funding agencies are not interested in funding water quality trading projects, they can make that clear in their funding guidelines and contracts. Further complicating water quality trading by requiring substantial fund-source tracking does not promote the use of water quality trading as a compliance tool. The more complicated the DEQ makes water quality trading, the less likely water quality trading will be useable for Oregon municipalities. There is no role for Oregon DEQ staff to be "checking" water quality trading project funding to ensure that it conforms to the funders" guidelines.
These provisions (the definition and disallowance of credit based on funding source) together target and in some cases may **eliminate restoration organizations' ability to leverage** voluntary natural resource protection or conservation funds, for water quality benefits, in advance of a landowner expressing interest in selling the credits generated. This language **usurps the discretion and authority of funders** in deciding how their conservation funds should be used. As we discussed in the forums, having projects that are driven by broader conservation outcomes, over simply trying to meet a trading standard, results in higher quality projects.
In Section 4, the requirement that trading projects funded solely with public conservation funds be excluded from generating credits should be removed. If public conservation funding agencies are not interested in funding water quality trading projects, they can make that clear in their funding guidelines and agreements. Communities that have the ability to build broad public and private support for watershed restoration should be encouraged to do so, not discouraged.

on Public Funds"), *available at* http://www.fws.gov/oregonfwo/LandAndWater/Documents/PublicFunding-final.pdf.

[6] Pennsylvania Code, *supra* note 40, at Title 25 § 96.8(e)(4)(ii).

NWPPA Comment 4: NWPPA believes ODEQ's water quality trading program should be able to use credits generated by any funding method in proposed OAR 340-039-0040.

Discussion: Oregon's final water quality program should not place the Department in the political role of passing judgment on the source of funds used to generate credits.

Do not use public conservation funds to generate credits
The District recognizes the importance of the use of public funds dedicated to conservation and that trading investments should enhance the restoration outcomes associated with the use of those funds. The use of public conservation funds in conjunction with credit generation programs must be evaluated within the context of additional benefits provided by these funds and alignment with the goals of these funding sources. Where such collaborative efforts are implemented it should be the permittee's responsibility to demonstrate how funds were used and the multiple benefits achieved through their use.
0040 (4): This provision on credits generated by projects "funded solely with public conservation funds" is not clear as to its intent. EPA recommends replacing "may" with "must," to establish a clear prohibition. This section should also address how much credit can be generated based on the proportion of matching funds or funds used for the same project that are not public conservation funds. In addition, DEQ should consider adding the statement to the rule that is used in the IMD: "DEQ does not prohibit the use of these [public conservation] funds to implement BMPs or appropriate site conditions necessary to achieve baseline requirements."
The Metro Regional Government strongly encourages the Department of Environmental Quality to adopt rules for water quality credit trading allowing for the maximum flexibility of mitigators to partner with conservation organizations and co-mingle funds to produce the greatest possible benefit for the people of Oregon, while separating investments made from dedicated conservation funding from those made from other funding sources for crediting.
Draft OAR 340-039-0040(4) is contrary to the central concept of additionality in trading. First, it prohibits trading funded "solely with public conservation funds" meaning that even if trading projects were funded with 99 percent public conservation funds, the trade would be allowed. This is not an effective rule. Second, no public conservation funds can be deemed available for use by a permittee for trading. Such funds constitute part of the baseline that must be subtracted from the credits. It certainly negates nearly all the policies articulated at the outset of the rules to
ODFW recommends that public conservation funds be used only for improving water quality where regulatory requirements are not currently in place. Public conservation funds intended to restore habitat should not to be used to meet regulatory requirements either in part or in full. This recommendation comes from an agreement reached in 2008 amongst numerous agencies (U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, Oregon Department of State Lands, Oregon

credits in OAR 340-039-0040. As drafted, the rule language would allow the generation of credits from any program funded almost entirely by public conservation dollars as long as private or ratepayer funds cover $1 of the cost. Such a policy is: (1) inconsistent, in most cases, with the intent of those public conservation programs' statutory or ballot measure language, (2) inconsistent with the existing TMDLs and associated nonpoint implementation plans, which rely on the funding from voluntary conservation
generate credits. In our view, the current language, "Trading projects funded solely with public conservation funds may not be used to generate credits" would not ensure that the compensatory offsets that are required by the Clean Water Act would be "additional" to what would have occurred without the offset.
However, to ensure Oregon's water quality trading program is both credible and effective, we recommend including specific language in the rule that prohibits the use of public conservation funds for meeting regulatory compliance obligations. For multi-source funded projects this language is necessary to ensure the conservation benefits allocated to a site is commensurate with values derived through non-public conservation fund sources.

References:

Willamette Partnership, The Freshwater Trust, Idaho DEQ, Oregon DEQ, and Washington Ecology (2014). Draft Regional Recommendations for the Pacific Northwest on Water Quality Trading. Available at http://willamettepartnership.org/wp-content/uploads/2014/09/PNW-Joint-Regional-Recommendations-on-WQT_ThirdDraft_2014-08-05_full1.pdf.

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