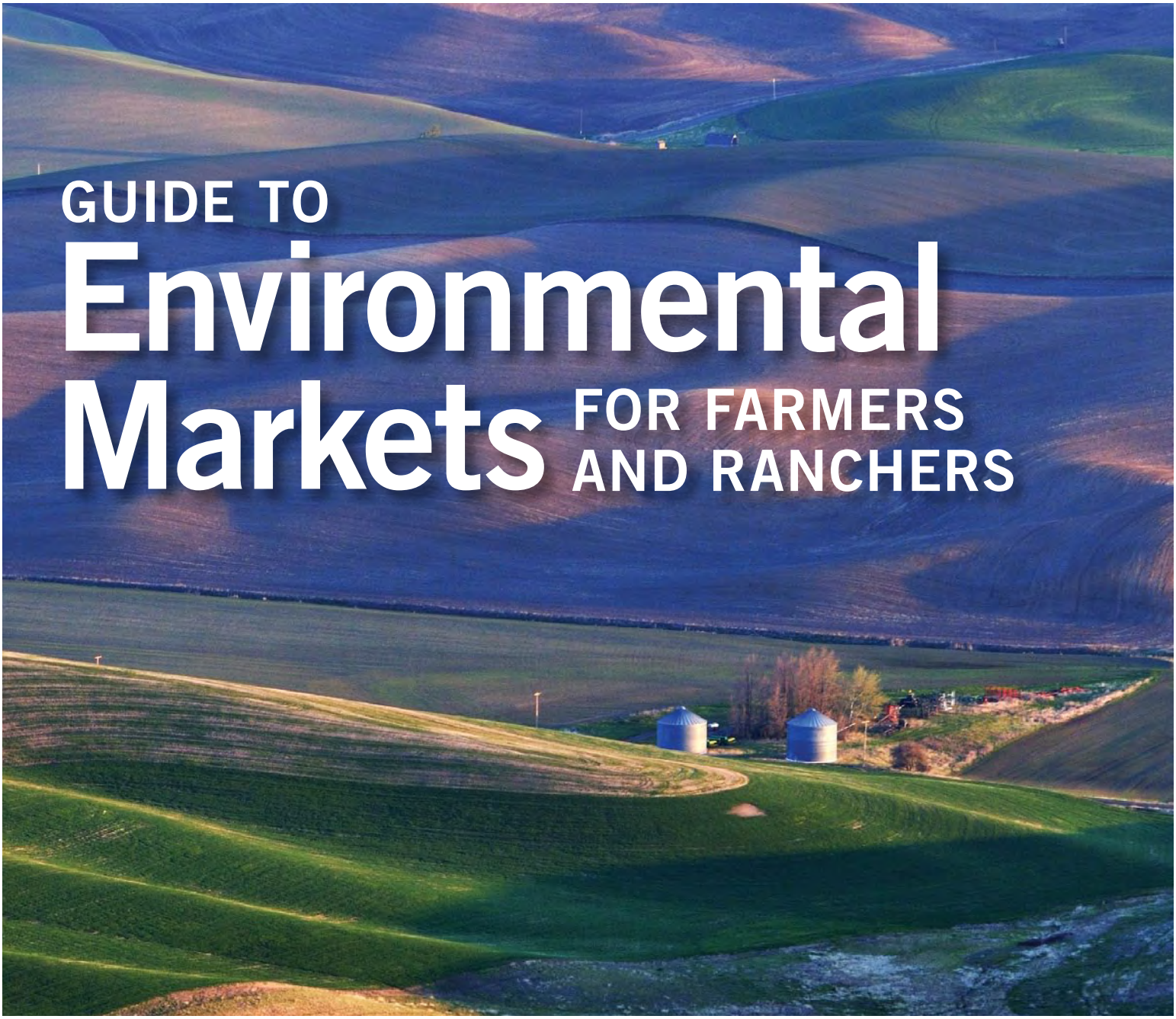

GUIDE TO Environmental Markets FOR FARMERS AND RANCHERS

A practical guide to ways agricultural producers can profit from the growing environmental marketplace

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Dennis Canty

WITH Katherine Killebrew

American Farmland Trust

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October 2010

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ACKNOWLEDGMENTS

This report was written by Don Stuart of American Farmland Trust and Dennis Canty of Evergreen Funding Consultants with substantial research, editorial and writing support from Katherine Killebrew of the University of Washington.

Funding was provided by the U.S. Department of Agriculture through a Conservation Innovation Grant from the Washington State Office of Natural Resources Conservation Service and by grants from the Boeing Company and Horizons Foundation.

The project team was assisted by an advisory group including Dan Wood, Washington State Farm Bureau; Mike Rundlett, Western Washington Agricultural Association; Jay Gordon, Washington State Dairy Federation; Jack Field, Washington Cattlemen's Association; Chris Voigt, Washington State Potato Commission; Tracy Erickson, wheat farmer from St. John, Washington; Ron Shultz, Washington State Conservation Commission; and Josh Giuntoli, Washington Office of Farmland Preservation.

In addition to the advisory group, several reviewers provided helpful comments on the draft guide, including Bobby Cochran of the Willamette Partnership; Sara Vickerman of Defenders of Wildlife; Kelly McCaffrey and Amanda Cronin of the Washington Water Trust; and Josh Baldi, Melissa Guildersleeve, Lauren Driscoll and Peggy Clifford of the Washington Department of Ecology.

The authors are very grateful to the funders, researchers, reviewers and advisors who helped shape this guide.

American Farmland Trust is the nation's leading conservation organization dedicated to saving America's farm and ranch land, promoting environmentally sound farming practices and supporting a sustainable future for farms.

Contents

PATTY-THOMAS/ISTOCKPHOTO

CHAPTER ONE

An Introduction to Environmental Markets

This guide presents farmers and ranchers with a straight-up view of environmental markets: what they are, how they work and which ones can be most useful in helping to support agricultural operations.

Most active farms and ranches preserve and generate environmental benefits. An environmental market makes it possible to buy and sell credits for environmental activities such as restoring wetlands, improving water quality or storing carbon. Markets for environmental benefits have been operating in the United States for many years, but recent developments have increased their potential as sources of on-farm income.

This guide answers several questions about the use of markets in farm and ranch communities:

1. What are environmental markets?
2. How can farmers and ranchers produce environmental credits?
3. Who would be interested in buying such credits and why?
4. What is a credit worth and how much does it cost to produce one?
5. What additional requirements must be met to sell credits, such as contracting, insurance, monitoring and certification?
6. How can farmers and ranchers work together to leverage their market position and accelerate the development of markets?

An Overview of Our Approach

Environmental markets have been operating throughout the United States since the first successful market for sulfur dioxide in the northeastern United States in the 1970s, which led to dramatic reductions in acid rain.[1] Since then, more than 800 markets of various kinds have been created in the United States, with nearly half focused on wetland restoration and the remainder on water quality improvements, terrestrial habitat restoration and other environmental purposes. Many more markets are international and involve non-agricultural trading partners.

This guide focuses on market opportunities available to farmers and ranchers in the state of Washington, with a primary focus on markets that can provide a sustainable source of income to farm and ranch operators while they continue to engage in active, profitable agriculture. Typically, farm landowners will be able to take advantage of these markets without removing land from agriculture. In those instances where land may be required to produce credits that could otherwise be devoted to growing crops or raising livestock, this guide will suggest ways to minimize that result. And it will highlight opportunities to generate environmental market credits that can be produced side-by-side with traditional agricultural practices, rather than circumstances where farms and ranches are taken out of production for environmental restoration.

The guide is designed to help farmers and ranchers realistically assess and take advantage of actual market opportunities. The authors believe these markets represent a major potential opportunity for American agriculture. But our purpose here is not to advocate, but rather to provide useful information. We hope our readers will make their own judgments about their ability to participate in environmental markets.

Some environmental markets are active and vibrant, offering immediate opportunities for farmers and ranchers. Others are in their early stages but should provide better opportunities in the next few years. The last chapter of the guide describes actions that farmers and ranchers can take to accelerate the development of markets and help make them more useful for agriculture.

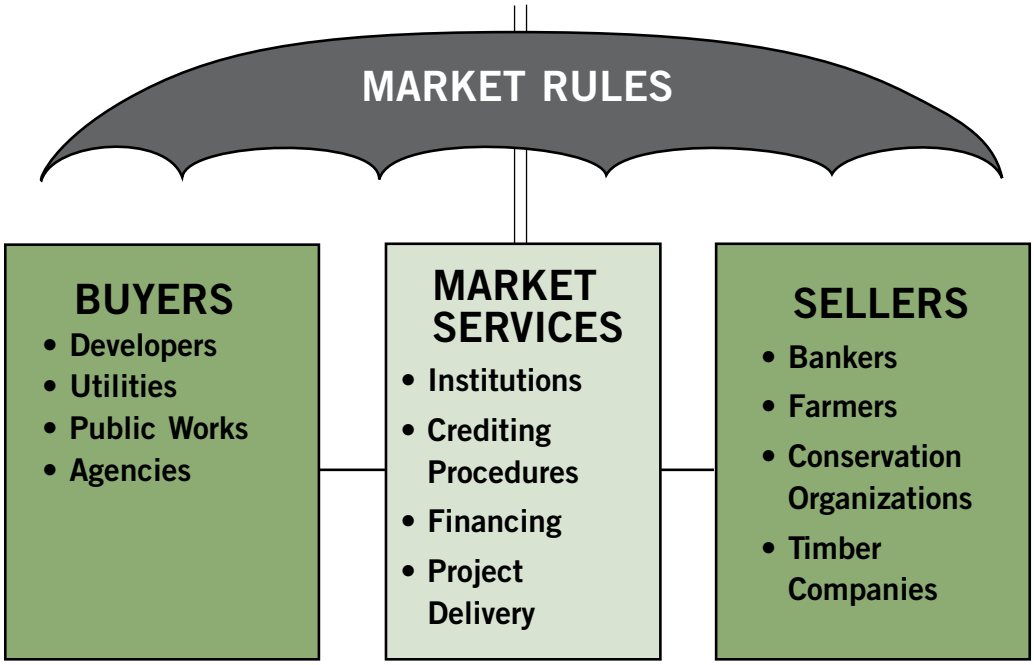
How Environmental Markets Work

Environmental markets have many similarities with markets for traditional commodities, including having a group of producer-sellers, a group of consumer-buyers, and intermediaries who help bring products to market, repackaging them as needed to meet market demands. And as with most conventional markets, there are also standards that products must meet in order to be bought and sold in the marketplace.

The biggest difference is that buyers in environmental markets are frequently driven to participate by regulations. Many state and federal laws require that public agencies and private businesses and developers compensate for damage they incur to the environment by mitigating for the damage at the development/operations site or elsewhere. Regulatory agencies are increasingly looking at off-site mitigation and offset projects as more effective ways to compensate for environmental damage, and this has fueled the growth of environmental markets for these activities. Most buyers in today's environmental markets participate because they are required to purchase credits to fulfill environmental regulations.

The other oddity about environmental markets is that they deal in "credits" rather than more tangible/measurable assets. Each market has a different credit and they generally represent a unit of an environmental resource, such as an acre of restored wetland, a pound of nitrogen removed from a stream, or a ton of carbon dioxide kept out of the atmosphere.

An environmental market might look like this in diagram:



Federal and state regulatory agencies typically set the market rules, either through approval of individual transactions or through market-wide requirements. The market services vary greatly depending on how complex the market is.

The simplest environmental markets are executed through direct transactions between buyers and sellers with regulatory involvement through approval of the

buyer's environmental permits. These simple transactions are often labeled "over-the-counter" deals in market lingo. As markets grow and mature, they incorporate additional market services such as aggregation, third-party verification, brokerage functions and internal financing. Some environmental markets, such as the Chicago Climate Exchange,[2] get to the point where they mimic traditional stock and commodity exchanges, with many buyers and sellers executing transactions simultaneously and with a wide range of market services, such as clearinghouse functions, to facilitate transactions and guard against defaults.

The Farmer and Rancher Role

Around the country, farmers and ranchers have a prominent role in the latest generation of environmental markets. For example:

- Supplying water quality credits by adopting conservation tillage practices in the Great Miami River Water Quality Credit Trading program in Ohio
- Producing habitat credits through riparian restoration at the Hidden Ranch Conservation Bank in California
- Generating water quantity credits by rotating fallow seasons in the Lower Arkansas Valley Super Ditch program in Colorado

Typically, farmers and ranchers will be involved in environmental markets as credit producers and sellers. This means they will have the opportunity to undertake projects on their land to improve the environment by restoring wetlands, storing carbon in soils, generating renewable energy, improving water quality or through other activities that create credits. Provided the credits comply with market rules and are approved by market managers, they can be sold to institutional, corporate or individual buyers, ideally at a profit. In some cases, farmers and ranchers can also serve as wholesalers, banding together in cooperatives to help develop, market and sell credits.

It is likely that *most* farmers and ranchers in Washington will have an opportunity to produce and sell environmental credits in the next 10 years. The opportunity arises from a rare convergence of market demand and supply. On the demand side, environmental markets are growing in popularity among regulatory agencies and environmentalists as cost-effective tools to compensate for environmental damage, and they are more likely to be specified by regulators in environmental permitting processes. On the supply side, many farmers and ranchers have opportunities to undertake low-cost, high-value environmental restoration on their properties and create marketable credits while continuing in productive agriculture.

Whether farmers and ranchers participate in environmental markets will depend upon how the markets are designed. Discussions with farmers, ranchers and agricultural organizations[3] indicate that successful markets are those that will:

- Allow farmers and ranchers to maintain active traditional agriculture and minimize their loss of productive farmland
- Engage farmers and ranchers directly in creating and maintaining credits

- Support a credit price that is higher than the cost of credit production and ideally allows for a substantial profit
- Be simple and flexible in market standards and processes

As Chapter Two describes in further detail, most environmental markets are in early stages of development. Farmers, ranchers and their organizations need to participate in this development in order to ensure that environmental markets are appropriately designed and become a welcome new source of income for agricultural producers.

Organization of this Guide

Chapter Two of this guide profiles five types of environmental markets that are currently active in the United States and are at some stage of development in Washington. The focus of Chapter Two is to give the reader an accurate, up-to-date assessment of the state of each market type and its short- and long-term potential for agriculture. Chapter Three explains how to generate multiple credit types on a single farm or ranch and maximize the income potential of markets. Chapter Four addresses actions that farmers and ranchers and their organizations can take to unleash the potential of environmental markets. An Appendix contains sources of additional information.

NOTES

1 See the U.S. Environmental Protection Agency's website on acid rain at: http://www.epa.gov/acidrain/reducing/index.html.

2 Details about the Chicago Climate Exchange (or CCX) and its programs can be found on line at: http://www.chicagoclimatex.com.

3 As noted in this introductory chapter, this guide was aided by an advisory committee of agricultural leaders. In addition, several farmers and ranchers were interviewed, three intensive focus group discussions were conducted, and a regional Workshop and Listening Session was conducted at which input was taken from key leaders in Washington and Oregon agriculture. The results of these events and discussions can be found at www.farmland.org/environmentalmarkets.

ZUBIN LI/ISTOCKPHOTO

CHAPTER TWO

The Current Status of Environmental Markets in Washington

Greenhouse Gas Markets

OVERVIEW

Greenhouse gas (GHG) markets reduce the release of carbon dioxide, methane and other greenhouse gases into the atmosphere. They are motivated by global concerns about climate change. Credits can be produced by reducing emissions at industrial and other facilities that emit greenhouse gases or through emission reductions at other locations like farms, ranches and forests. Emission reductions at other locations are known as offsets. Conservation actions on farms, ranches, and forests are accepted as offset credits in most of the world's greenhouse gas markets.

AP PHOTO/READING EAGLE, TIM LEEDY

PENNSYLVANIA FARMER ERIC ROSENBAUM SELLS HIS FARM'S CARBON CREDITS THROUGH THE CHICAGO CLIMATE EXCHANGE.

Greenhouse gas credits are currently traded on several markets, including the European Climate Exchange,[4] the Chicago Climate Exchange[5] (a national market for voluntary GHG credits), the Climate Action Reserve,[6] the VCS Voluntary Carbon Standard,[7] and several state and regional markets in the United States, such as the Regional Greenhouse Gas Initiative market in nine Northeast states.[8] In addition, there is a market for individual offset projects funded by voluntary credit purchases via third-party brokers.[9] A Washington market for greenhouse gas credits is a likely future element of the Western Climate Initiative, a cooperative program among seven states and four Canadian provinces to establish a regional cap-and-trade program for greenhouse gases.[10] Washington farmers and ranchers may also be able to sell credits in a national greenhouse gas market if one is created through the anticipated federal climate law.[11]

Farmers and ranchers may participate by taking actions on their properties to reduce emissions or capture carbon through changes in tillage, manure management, planting trees and other vegetation, and fertilizer use. Credits must be certified and verified through complex procedures that may hinder participation by individual farmers and ranchers. Constraints are likely to be reduced as greenhouse gas markets mature, and long-term growth prospects are encouraging.

WHAT IT'S WORTH

The 2009 global regulated market for greenhouse gas credits is estimated at $144 billion. The current U.S. market is fully voluntary, so it is considerably smaller with a total value of voluntary credits in 2009 at $387 million (somewhat reduced from previous years by the 2009 economic collapse).[12] Prices are typically measured on the basis of metric tons of carbon dioxide (or equivalents) kept out of the atmosphere.[13] The average price of an emission reduction in the United States also declined in 2009 to $6.50/ton.[14] In the United States, prices have ranged between 80¢ and $7.40/ton in recent years, although the price is highly dependant on the quality of the credits and the standards applied to their certification.[15] The U.S. market is expected to rival global traffic if a national cap-and-trade passes Congress and could increase to between $22 and $61 per ton by 2020.[16]

HOW IT WORKS

Buyers are typically aggregators working on behalf of industries, businesses and individuals that buy greenhouse gas credits to reduce their environmental footprint and, in some cases, to prepare for greenhouse gas regulation.

Aggregators are used because the supply of greenhouse gas credits from any individual farm or ranch property is likely to be small and insufficient to justify the significant costs of bringing credits to market. A wide range of nonprofit and for-profit businesses are currently serving as aggregators in U.S. markets, with more than 50 aggregation firms participating in the Chicago Climate Exchange. Aggregators in Washington State include the Pacific Northwest Direct Seed Association,[17] the Climate Trust,[18] and the Bonneville Environmental Foundation,[19] and for forest lands, the Northwest Natural Resources Group.[20] While the volume of credits currently bought in the U.S. market is small, the volume is expected to increase exponentially if greenhouse gas emissions become regulated under federal law.

Sellers are farmers and ranchers willing to change farm practices in order to generate and sell credits in greenhouse gas markets.

Farmers and ranchers can generate greenhouse gas credits through a variety of actions, including conversion to conservation tillage, reductions in synthetic fertilizer, methane capture, conservation rangeland management and riparian buffer conservation. Credit-generating practices are likely to be available to most Washington farmers and ranchers,[21] although larger acreages are currently more likely to be able to participate and turn a profit.[22]

The best immediate markets appear to be in manure management and conservation tillage, but management of synthetic fertilizer use has excellent long-term prospects.

Anaerobic digesters are a tried-and-true technology to capture and use methane from dairy manure. Because methane is a very potent greenhouse gas, they are likely to produce profitable greenhouse gas credits for large operations and in communities with multiple nearby dairies.[23] Credits for conservation tillage are not as profitable, but the practice is tested and widespread and has a fairly dependable market. Conservation rangeland management is also less profitable in the Northwest region but is well established. The management of synthetic fertilizer through a precision farming program[24] may offer very significant income due to the extremely potent nature of nitrous oxide emissions (nearly 300 times more damaging than carbon dioxide emissions), but standards and protocols are still in development.

There is uncertainty about the strength of the long-term market for credits from agricultural producers.

The greenhouse gas or carbon market is in a state of flux. The Chicago Climate Exchange provided an early organized marketplace for greenhouse gas credits, with good access for farmers and ranchers, but that market has been slowed by the economic downturn and amid anticipation that new climate legislation may invoke new rules and protocols for producing and selling credits.[25] In the meantime, the Western Climate Initiative is proposing its own rules and protocols. While it appears that the new regional and national programs will be friendly

to farm and ranch credit producers, much will depend on the involvement of the agricultural sector in development of the next generation of programs.[26]

OUTLOOKS, CHALLENGES AND OPPORTUNITIES

At the moment, the potential supply of credits from farm and ranch land is far greater than demand for these credits.

As indicated previously, most farms and ranches in Washington will have some opportunity to generate greenhouse gas credits, and the supply of such credits is not expected to be a limiting factor in the foreseeable future. However, demand for all greenhouse gas credits is soft at the moment due to the economy and uncertainties over climate regulation.[27] At the moment, far more credits could be brought to market than are likely to be saleable.

There are significant issues related to the dependability of credits produced on farms and ranches that must be overcome to open these markets.

Unlike changes in technology or investments in very long-term offsets such as extended forestry rotations (which provide greenhouse gas benefits over 40 to 70 years), offsets from changes in farm and ranch practices may appear to be very temporary and reversible. This could be overcome by emphasizing long-lived offsets (such as anaerobic digesters), by developing alliances among farmers and ranchers to produce credits collectively, and/or by performance guarantees backed by financial obligations to provide credits if programs fall behind on commitments.

It will also be challenging to open markets to individual small farmers and ranchers.

One very substantial constraint on farmer and rancher participation in greenhouse gas markets is the high cost of market entry associated with verifying and certifying credits. Verification is the process for ensuring that the project is completed and maintained as planned, and some markets require that the credit-producing action be verified every year. Certification is the process for ensuring that credits meet certain standards for effectiveness, and there are currently several competing certification protocols and providers in the greenhouse gas marketplace. Both verification and certification require third-party involvement that can get expensive for small producers. Some type of aggregation or cooperation among producers is probably necessary to open access to small farmers and ranchers.

In time, farms and ranches could be a major supplier of greenhouse gas credits, and these sales could be an important part of the operator's income.

Agriculture is a major source of greenhouse gases, estimated to contribute as much as one-third of all human-caused greenhouse gas emissions. It is also unlikely to be regulated to any great extent under federal climate laws, making this sector a particularly strong candidate for development of offset credits. If greenhouse gases are regulated, demand for farm and ranch credits is likely to be strong. Projections about the ultimate size of the domestic greenhouse gas market in the United States range from $60 billion to nearly $1 trillion dollars

per year, with farm and ranch offsets attracting a sizable chunk of investments in offsets.

EXAMPLE

PHOTO COURTESY OF USDA NRCS

In 2002, Pacific Northwest Direct Seed Association (PNDSA) registered an aggregation of 6,470 limited-tillage acres from 77 of its Washington, Oregon and Idaho farmer-members for carbon offset trading. These acres were contracted to be direct-seeded for 10 years. The stored carbon was marketed, in the form of a lease, to Entergy, a New Orleans-based energy company. The Entergy contract requires PNDSA to sequester about 3,000 metric tons of atmospheric carbon dioxide, while their contracts with farmers sequester about 3,500 tons, providing some leeway in case of loss of acreage. Current payments to farmers are quite small (a little over $1 per acre) so this was largely a demonstration project for PNDSA. As this market grows in years ahead, these payments could increase.[28]

GAUGE YOUR PROSPECTS

Opportunities for participation in greenhouse gas markets exist right now for many Washington farmers. Prime candidates for greenhouse gas markets are:

✓	**Involved in applicable agricultural practices.**
	Land is used for dairy farming, is in conventional tillage, or in rangeland.
✓	**On large parcels or with similar parcels nearby.**
	Parcels are sufficiently large to generate enough income to compensate for high initial costs of market participation.
✓	**Willing to bet on long-term market prospects.**
	Sufficiently profitable, flexible and diversified to initiate work in a promising but still fluid marketplace.

Landowners who don't fit this profile are still likely to have opportunities to participate in greenhouse gas markets in time, but will probably have to do so after markets have stabilized and they can participate through the services of an aggregator.

GET INVOLVED

The best way to get involved in greenhouse gas markets is to evaluate the potential of your farm or ranch and then contact existing aggregators to determine their interest in potential project types. The Washington Department of Ecology, the Bonneville Environmental Foundation and climate-oriented nonprofit organizations may be able to offer useful advice on the state of markets and prospective buyers. For conservation districts and farm and ranch organizations, it may also be reasonable to contact the environmental staff of Washington-based industries that are likely to

be regulated, particularly those in aerospace and transportation. Finally, it would be advisable to pay attention to how offset programs in the Western Climate Initiative are designed.

NOTES

4 The European Climate Exchange (EUX) is at: www.ecx.eu.

5 Chicago Climate Exchange (or CCX): http://www.chicagoclimatex.com.

6 Climate Action Reserve, http://www.climateactionreserve.org/

7 Voluntary Carbon Standard, http://www.v-c-s.org/

8 Details about RGGI are available on line at: http://www.rggi.org/home.

9 For example, Carbon Solutions Northwest provides brokerage services in carbon markets and has a good deal of experience with agriculture. http://www.carbonsolutionsnorthwest.com

10 Details about the Western Climate Initiative are available on line at: http://www.westernclimate–initiative.org.

11 See, e.g. H.R.2454—American Clean Energy and Security Act of 2009—which has passed the House of Representatives but is, at this writing, stalled in the U.S. Senate.

12 See: *Building Bridges: State of Voluntary Carbon Markets 2010*, Executive Summary pg. iii, Ecosystem Marketplace, 2010. Obtained at: http://moderncms.ecosystemmarketplace.com/repository/moderncms_documents/state_of_v_carbon_summary.1.1.pdf.

13 For every ton of carbon stored in the soil 3.67 tons of Carbon Dioxide (CO_2) are removed from the atmosphere. Pacific Northwest Direct Seed Assn. http://www.directseed.org/carbontrading.html.

14 Ecosystem Marketplace, Ibid note 10, pg. iii.

15 For this reason, prices for credits on the Chicago Climate Exchange tend to be much lower than for credits with, for example, the Climate Action Registry.

16 There are wide variations in carbon price forecasts. See *Forecasting the Future Value of Carbon: A literature review of mid to long term forecast*, pg. 17, EcoSecurities Consulting Limited, Portland, OR, January 30, 2010. In particular, see the analysis of a Pew Center study of the recent Lieberman-Warner Climate Security Act now pending in the U.S. Senate. Obtained at: http://www.nwcouncil.org/energy/grac/20090130_Carbon%20Price%20Forecasts_NWPCC_FINAL.pdf

17 See the PNW Direct Seed website at: http://www.directseed.org/carbontrading.html.

18 See the Climate Trust website at: http://www.climatetrust.org/offset.html.

19 See the Bonneville Environmental Foundation website at: http://www.b-e-f.org/business/products/offsets.

20 See the NNRG website at: http://nnrg.org/NW-Neutral.

21 Washington State University's "Climate Friendly Farming" project website has a good compendium of agricultural practices with potential for carbon trading. See: http://csanr.wsu.edu/publications/researchreports/cffreport.html.

22 It may be possible for multiple landowners to aggregate credits to achieve a profitable transaction.

23 See materials collected on anaerobic digesters, at WSU Climate Friendly Farming website, ibid note 14.

24 Huggins, D.R., & Kruger, C.E. (2008). *Improving Nitrogen Use Efficiency in Dryland Cereal Crops With Precision Nitrogen Management Technology*, Sustaining the Pacific Northwest , 6(2), Fall 08 ed. obtained at: http://csanr.wsu.edu/publications/SPNW/SPNW-v6-n2.pdf#page=5.

25 As well as by the diminishing credibility of CCX credit standards.

26 *Those who show up to guide creation of these standards will heavily influence how, and even if, agriculture can participate.*

27 *Ecosystem Marketplace and EcoSecurities*, Ibid, notes 10 and 13.

28 See PNDSA's website discussion of this project at: http://www.directseed.org/carbonhistory.html#carbonhistory.

Wetland, Habitat and Biodiversity Markets

OVERVIEW

AP PHOTO/ELAINE THOMPSON

Wetland, habitat and biodiversity markets focus on the replacement of wetlands, habitat, vegetation and other natural features that are damaged by development or land use actions. Credits are generally produced through restoration of specific habitat types, although occasionally credits can be achieved through protection of intact habitats. Credits are typically required as a mitigation condition in the permitting of the development or land use action.

At the moment, there is no large-scale formal exchange for wetland, habitat and biodiversity credits. Instead, most trading takes place through smaller-scale mitigation and conservation banks at the watershed or sub-watershed scale. A 2005 study by the Environmental Law Institute[29] identified 415 wetland mitigation banks[30] in operation in the United States and another 169 pending approval.[31] A 2010 tally indicates that there are an additional 119 conservation banks[32] for habitats with only two in Washington.[33]

The majority of these banks are run by private entities, produce credits from single restoration sites, and sell credits to developers in the immediate area. A small group of banks, 33 in total, are classified as "umbrella banks" and produce market credits from multiple sites at a multi-watershed scale. In Washington, there are 12 operating wetland mitigation banks, six more in permitting stages, and two conservation banks, all operating at the watershed or sub-watershed scale.[34]

While there are no markets for comprehensive biodiversity protection in the United States, the European Commission has pledged to halt biodiversity losses in the European Union by 2020, and it appears as if this may be the next big market to originate in Europe. Several commentators have suggested that a U.S. biodiversity market may not be far behind.

Many of the existing mitigation and conservation banks have involved farmers and ranchers. In many parts of Washington and elsewhere in the United States, agriculture is concentrated in river valleys that are also favored locations for wetland and habitat re-establishment. As a consequence, it is common for mitigation and conservation bankers to purchase farmland and convert part or all of it to bank purposes.[35] There are also, however, significant possibilities to establish wetlands or to protect and restore habitat on active farms without taking quality farmland out of active agriculture.[36]

WHAT IT'S WORTH

It is difficult to estimate the entire public agency spending on mitigation, but spending by WSDOT—the largest development agency in Washington—suggests that the numbers are substantial. Two state bond issues in 2003 and 2005 pumped more than $11 billion into state highway and bridge construction projects to be spent between 2005 and 2020. WSDOT's studies[37] indicate that approximately 14 percent of total construction funding for recent projects has been spent on environmental mitigation, with around 3.3 percent spent on wetland mitigation and 2.1 percent on

streams, the only category of habitat reported. If this continues, nearly $600 million will be spent by WSDOT on wetland and stream mitigation during the 2005 to 2020 construction period. The entire public sector demand for wetland and stream mitigation is probably several times bigger than this statewide, meaning that even a small portion of mitigation funding could fuel a substantial market for wetland and habitat credits.[38]

An analysis of WSDOT's wetland mitigation spending indicates that their total costs for their own wetland mitigation projects are more than $700,000 per acre. Interviews with mitigation bankers indicate that banked wetlands are selling at $250,000 to $400,000 per acre. These costs are substantially higher than average costs of wetland restoration for conservation purposes, which are generally in the $50–100,000 per acre range. This indicates that there is a significant margin between the bare-bones cost of restoration and the value of credits on the marketplace.

HOW IT WORKS

Buyers are typically public and private entities with development projects that result in damages to wetlands and other habitats and who must offset these damages in order to secure permits for their projects.

Wetlands are very common in western and parts of eastern Washington. Almost any development project of a significant size will have wetland impacts. Local, state and federal laws require that these impacts be mitigated through restoration of wetlands on the development site or, in areas with mitigation banks, by buying credits from the bank.[39] The largest buyers are utilities and road and highway agencies that have limited opportunities to avoid wetland impacts for their large, linear projects. Other buyers can include wind development projects and oil and gas pipeline projects. While impacts to other habitats and biodiversity are just as common, there are fewer buyers because the regulation of these resources is not as stringent as for wetlands.

Sellers could include farmers and ranchers with land that is suitable for wetland or for habitat restoration.

As indicated previously, there is a great deal of agricultural acreage in river valleys in Washington and much of it was in wetlands and riparian forest prior to cultivation or livestock use.[40] Often, these areas retain soil and drainage characteristics that make them less suitable for grazing or crop production but easily restorable to wetlands and habitat. This can allow credit-producing restoration to happen alongside traditional agricultural practices and increase farm income from marginal areas.

The market is constrained by the complex and time-consuming process for certifying mitigation and conservation banks, but simpler processes may be possible.

While formal banks provide the most dependable way to supply wetland and habitat credits, it is difficult to navigate the extensive review and approval process for new banks in Washington. This option will appeal to only the most dedicated farmers and ranchers. An alternative would be to pair agencies that need wetland and habitat credits with farmers who may be able to supply them in permitting processes. Discussions about this pathway with the Washington Department of

Ecology, the lead state agency on wetlands regulation, have been encouraging, and an informal market for wetland and habitat credits may be achievable.

The significant price difference among mitigation wetlands could fuel a robust marketplace for farm-raised wetland credits.

Several circumstances have combined to drive up the costs of wetland and habitat credits, beginning with the long-standing state and federal policy, now formally rescinded but still influential, to encourage mitigation actions on or adjacent to development sites, a practice that significantly increases site acquisition and development costs. Off-site mitigation through banks is nearly as costly due to the very high transaction costs associated with bank permitting, advance restoration, and financing of project development. This has resulted in wetland credit costs in the $300–700,000 per acre range rather than the $100,000 per acre cost of most wetlands restoration projects. Lowering the barriers to farmer and rancher participation and simplifying processes could result in a robust market for cost-effective credits from farms and ranches.

OUTLOOKS, CHALLENGES AND OPPORTUNITIES

At the moment, the constraints on transactions are limiting activity in a market that has high levels of credit supply and demand.

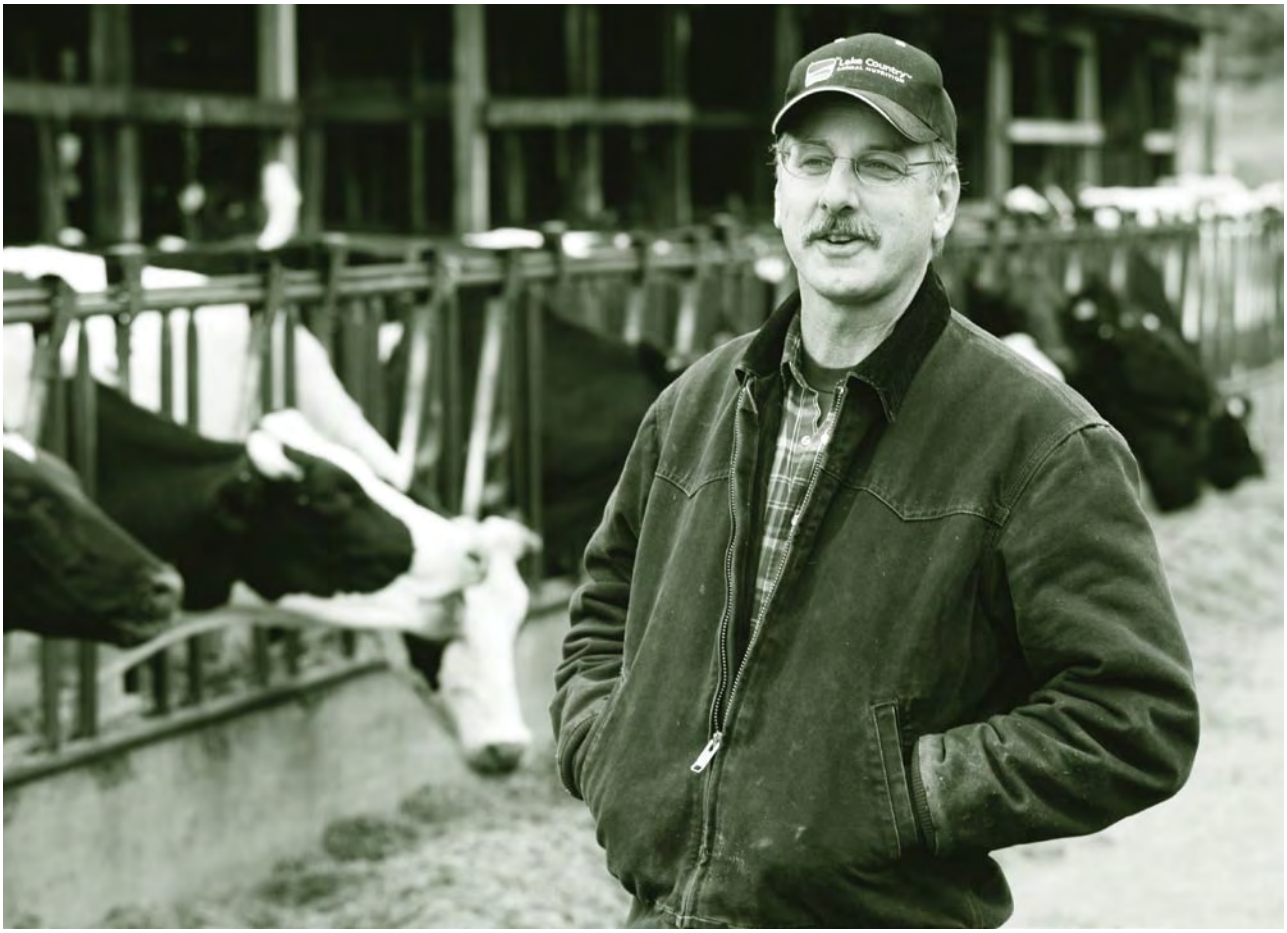
As discussed earlier in this summary, the demand for wetland and habitat credits to address mitigation needs will wax and wane somewhat with development activity in the state. But the demand is far more dependable compared to the demand for other environmental credits. In addition, the abundant opportunities for cost-effective wetland and habitat restoration on farms and ranches indicate that supply will be virtually inexhaustible in the near term. There is the potential for a very substantial and sustainable market for wetland and habitat credits in Washington.

The big challenges to realizing a robust marketplace for wetland and habitat credits appear to be institutional.

There are several big challenges to this market. First is the flow of information between prospective buyers and sellers, who generally are unaware of one another. Second is the lack of consistent standards for the permitting of farm- and ranch-provided credits. Third is the all-important need to ensure that credits meet permitting requirements over time. None of these problems are insurmountable, but each will require focused work with farmers and ranchers, prospective credit buyers, and permitting agencies in order to resolve them.

Farmers and ranchers could be influential at addressing institutional constraints and opening new wetland and habitat markets.

Much could be done within the agricultural community to stimulate the growth of these markets. The likely first step is to organize groups of farmers in specific watersheds to collectively work on identifying and advertising the availability of credits, then working with regulators to identify permitting standards and develop collaborative approaches to producing, marketing and ensuring the performance of credits. The authors of this guide have proposed a “conservation cooperative” approach modeled after commodity co-ops for organizing the farm



AP PHOTO/JOHN FROSCHAUER

JAY GORDON RECEIVED FUNDING FOR AN EASEMENT PROTECTING FARMLAND THAT PROVIDES TRUMPETER SWAN HABITAT.

community to participate in environmental markets. The cooperative could then take the lead in negotiating permitting terms with the regulatory agencies that govern credit use in mitigation.

EXAMPLE

Jay Gordon, the highly respected Executive Director of the Washington State Dairy Federation, operates a multi-generational family dairy farm near Elma, Washington. A small patch of the Gordon farm turned out to be a critical habitat area for migratory trumpeter swans. The swan population has been in decline, and their habitat will be affected by the removal of Elwha River dams on Washington's Olympic Peninsula. Working with the Trumpeter Swan Society, and using dam removal mitigation funding from the National Parks Foundation, the Gordon family sold a 55-acre easement on the key property. The easement requires that the land continue to be managed for sustainable livestock grazing, which will also keep it usable by the swans for habitat.[41]

GAUGE YOUR PROSPECTS

Opportunities for participation in wetland and habitat markets exist right now for some Washington farmers. Prime candidates for these markets are:

✓	**Lands with hydric soils, located in floodplains or along lakes, rivers and other water bodies.**
	Land in these areas is most readily restorable to wetlands and riparian habitats—habitat types that have the best opportunity to produce marketable credits under current market conditions.
✓	**Along migration corridors for birds or large mammals that are troubled or endangered.**
	Short term habitats along migration corridors are often found on existing farms and ranches and can often be improved through conservation management without taking land out of agriculture.
✓	**In basins with large road, utility or other public works projects in the planning stages.**
	These projects frequently have wetland and habitat impacts that require mitigation and may result in demand for farm and ranch credits.
✓	**With operators willing and able to dedicate portions of farm and ranch acreage to credit-producing restoration.**
	Ideally, these areas will be marginal for traditional agricultural practices but much more suitable for restoration.
✓	**In farm and ranch communities where several operators have an interest in participating in these markets.**
	Navigating the complicated process for selling credits will be easier for groups of farmers and ranchers than for individuals jumping into these markets.
✓	**On open rangelands or on land in crops that can be managed for continuous cover or in areas along field boundaries or on steep slopes or eyebrows.**
	Such lands provide habitat protection and restoration possibilities that do not necessarily require land to be removed from agriculture.

Landowners who don't fit this profile are still likely to have opportunities to participate in wetland and habitat markets in time, but will probably do so after markets have become more formally established.

GET INVOLVED

The best ways to get involved in wetland and habitat markets are to:

1. Evaluate the opportunities for wetland and habitat restoration on the farm or ranch
2. Discuss opportunities for these markets with neighboring farmers and ranchers to determine if there is interest in cooperating on producing and marketing credits
3. Contact potential buyers, particularly the Washington State Department of Transportation, local road departments and local water and wastewater utilities
4. Contact the Washington Department of Ecology, Washington Department of Fish and Wildlife, and the National Marine Fisheries Service to identify permitting opportunities for using credits

NOTES

29 Jessica Wilkinson and Jared Thompson, 2006. *2005 Status Report on Compensatory Mitigation in the United States*. Environmental Law Institute. Obtained at: http://www.ecosystempartners.com/download/market_mitigationoverview.pdf.

30 A wetland bank is created specifically to produce wetlands.

31 There are apparently about 615 active and sold out wetland and conservation banks in the U.S. The market collectively generates between $1.5 and $2.4 billion. Ecosystem Marketplace: State of Biodiversity Markets: Offset and Compensation Programs Worldwide. See: http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf.

32 A conservation bank is for habitat, generally for specific wildlife species.

33 See Ecosystem Marketplace Network, 2010, at www.speciesbanking.com.

34 Ecosystem Marketplace, ibid note 24, pg. 50.

35 This can be controversial. Concerning the Clear Valley bank in Skagit County, for example, see the Wetland Mitigation Bank Settlement Agreement Fact Sheet issued by Skagitonians to Preserve Farmland: http://www.skagitonians.org/upload_pubs/Wetland%20Mitigation%20Bank%20Settlement%20Agreement%20Fact%20Sheet%20FINAL031320091.pdf.

36 See the discussion in: Maximizing Opportunities for Farmland Protection in Environmental Markets (and minimizing the potential for loss), American Farmland Trust, March 2010. Linked at: www.farmland.org/environmentalmarkets.

37 WSDOT, 2009. *WSDOT Project Environmental Mitigation Costs: Case Studies, Third Edition*. Linked at: http://www.wsdot.wa.gov/projects/mitigation/default.htm.

38 According to the Ecosystem Marketplace's State of Biodiverity Markets Report, the U.S. market for biodiversity markets, most of which is for wetland mitigation, amounts to $1.5 to $2.4 billion annually, although this seems low, given what is spent in Washington alone. http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf

39 Clean Water Act requirements for wetland mitigation, and federal regulatory requirements, are summarized on EPA's website at: http://epa.gov/wetlandsmitigation.

40 In Snohomish County, for example, some 80% of the designated agricultural lands are in the floodplain—personal communication with Ryan Hembree of Snohomish County's Focus on Farming Project.

41 See the discussion of the Gordon Dairy at: http://www.farmland.org/programs/campaign/voices/wildlife-conservation-washington-dairy.asp.

Water Quality Markets

OVERVIEW

ROBERT HUNT/ISTOCKPHOTO

Water quality markets typically result from federal Clean Water Act or other legal requirements to reduce pollution.[42] Buyers are usually regulated facilities operating under federal permits that limit their discharges—generally National Pollutant Discharge Elimination System (NPDES) permits. Water quality trading allows these permitted facilities to meet their discharge requirements by purchasing credits from farmers and other credit providers instead of making more costly improvements to their own treatment facilities.[43]

A market for water quality credits will typically be for reductions in a specific pollutant(s) (e.g. phosphorous, nitrogen, temperature, etc.) for a specific water body. While many markets are for individual watersheds, they can also cover entire river basins. Over 50 formal water quality trading programs exist in the United States.[44]

Water quality markets offer farmers an opportunity to sell credits by implementing best management practices (BMPs) that reduce the flow of nutrients or pollutants into rivers and streams. Credits are typically measured in pounds of nutrients, such as nitrogen or phosphorous. Their production will need to be approved by the permittee-buyer and, where the purchase is motivated by permit requirements, will need to satisfy the requirements of their permit.[45] Some markets also translate temperature, selenium and sediment into tradable credits. Methods to calculate and verify water quality credits vary by market and by type of pollutant traded.

A **BMP** (Best Management Practice) is a farming practice that can be implemented to improve conservation performance while continuing to engage in profitable traditional agriculture.

No formal water quality trading programs exist yet in Washington. The first official program is likely to develop in the Spokane River basin, where a trading program is likely to be developed in the next few years. In the meantime, there may be opportunities to supply credits to utilities to meet their individual NPDES permit requirements. There may also be circumstances in which regulated dischargers anticipate future regulations and initiate trading programs in advance. The rules for approval of one-off and anticipatory trades will be addressed in guidance that is currently being prepared by the Washington Department of Ecology.

WHAT IT'S WORTH

Prices for water quality trading are generally based on pounds of nutrients (usually phosphorous or nitrogen) removed per day. Credit prices vary greatly, with some programs establishing a pre-set price per pound and others allowing the market to determine it. The Neuse River Basin program in North Carolina, for example, allows buyers to purchase nitrogen offsets at a rate of $11 per pound per year. The program is considering raising the price to $57 per pound per year to fully account for the costs of land, project administration and maintenance.[46]

The Great Miami River trading program, which uses a reverse auction system, allows the market to determine prices. Farmers propose pollution control projects, listing how much they expect projects to cost and how many credits will be provided. In the first round of proposals, credit prices ranged from $0.33 to $12 per pound.[47] The number of pounds that can be removed, per acre, differs considerably based upon the practice and the locale. As of 2008, the Great Miami project had made payments totaling $923,069, an average payment of $18,461 per project.[48]

HOW IT WORKS

Buyers are point source pollution facilities, such as public wastewater treatment plants or private industrial sites.

Under the Clean Water Act, a point source pollution facility must limit its discharge into a river or stream to the amount specified in its NPDES permit. If the facility needs to expand to accommodate growth or reduce pollution to meet a Total Maximum Daily Load (TMDL) for the watershed, it may choose to purchase water quality credits instead of paying for costly new treatment infrastructure.

A **TMDL** is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. TMDLs are developed for impaired water bodies, or those that do not currently meet water quality standards.

Sellers are nonpoint sources in the same watershed as the point source, such as farmers, ranchers and foresters.

Nonpoint sources do not operate under NPDES permits and can sell credits by undertaking voluntary pollution reduction actions. Farmers, ranchers and foresters can often implement BMPs that achieve the amount of water quality improvement needed for a watershed at a cost much lower than installing point source infrastructure upgrades.

Reverse auctions are processes in which a buyer requests bids from prospective sellers for specific types of credits and chooses from among the bids based on price, terms, or other factors. Similar to a request for proposals process.

Eligible credit-generating BMPs commonly include tillage and nutrient management projects.

The BMPs that are eligible for generating credits vary by program, but commonly include practices that reduce erosion, increase water infiltration into the soil, filter run-off, and provide a buffer between farming activities and environmentally sensitive areas. NRCS lists close to 100 practices that reduce nutrients in surface water, such as installing filter strips, using nutrient management strategies, planting riparian buffers, or adopting reduced or no-till agriculture.[49] Programs typically require farmers to meet a baseline, or minimum level of pollution control, prior to generating credits from BMPs. Most programs estimate, rather than measure directly, the amount of nutrient reduction provided by a BMP.

Deals may be made through one-on-one negotiations or via market structures such as clearinghouses and banks.

Buyers and sellers may find each other and conduct trades through one-on-one negotiations, or programs may develop a clearinghouse or online exchange to facilitate transactions. Many programs incorporate credit aggregators or banks to collect credits from nonpoint sources and re-sell them to regulated facilities, and some have held reverse auctions to solicit credits from nonpoint sources.

OUTLOOK, CHALLENGES AND OPPORTUNITIES

The majority of active water quality trading programs have experienced some level of trading activity, but no programs exist yet in Washington.

Trading programs exist throughout the United States, including six in the Pacific Northwest. Prices for credits vary by program, but generally fall in the range of $1 to $12 per pound of nutrient reduction.[50]

Factors limiting trading in existing programs include weak demand for credits and high transaction costs.

In many existing programs, lack of demand for credits from point source facilities is the biggest limit to trading. Weak discharge caps provide no incentive for point sources to undertake facility upgrades or purchase credits. Programs without strong regulatory drivers tend to experience sluggish trading.

High transaction costs also impede trading. Landowners interested in generating credits may have difficulty connecting with potential buyers, and negotiating contracts may be a long and complex process. Measures to reduce transaction costs used by existing programs include employing third party aggregators or clearinghouses to help buyers and sellers find each other, and developing standardized, streamlined compliance documents and contracts.

Opportunities for trading in Washington should improve in the mid- to long-term.

In the future, the Spokane River Basin could be the site of the state's first official water quality trading program. A new TMDL is currently under development for the basin, which will require point sources to adopt more stringent pollution controls. The state is considering water quality trading as a way for point sources to meet the new regulatory cap.

As the state's population grows, point source facilities will need to find new ways to accommodate increasing discharge loads. Contracting with farmers, ranchers and foresters to provide water quality improvements will likely be an attractive alternative to on-site facility upgrades. Potential opportunities exist whenever a TMDL is under consideration in a watershed or whenever a wastewater facility is renegotiating its NPDES permit.

EXAMPLE

The Great Miami River Watershed Trading Pilot Program in Ohio connects farmers interested in selling water quality credits to 450 point source dischargers needing to meet TMDL limits. The program uses a reverse auction system in which farmers submit proposals for pollution reduction projects. Conservation district professionals help farmers develop projects that are appropriate for existing agricultural operations. The most competitive proposals are selected for funding and implementation.

To date, the program has held seven rounds of reverse auctions, funding more than 50 projects with $923,069. Most projects have involved converting acres to conservation agriculture or no-till.[51]

GAUGE YOUR PROSPECTS

Although formal water quality trading programs do not exist yet in Washington, landowners may still be able to sell water quality credits in one-on-one exchanges with point source facilities. Prime candidates for water quality markets are:

✓	**In the right location.**
	Land is located within a basin with acute pollution or temperature issues. ➤ Washington Department of Ecology (DOE) maintains a list of water bodies that have active or impending TMDLs. Landowners can visit www.ecy.wa.gov/programs/wq/tmdl/TMDLsbyWria/TMDLbyWria.html to find out which water bodies are on the list and to see what pollutants are causing the issue. Water bodies are listed by county and by Water Resource Inventory Area (WRIA). And the land shares the basin with point source facilities operating under NPDES permits. ➤ DOE maintains a database of NPDES permit holders. Landowners can visit https://fortress.wa.gov/ecy/wplcsreports to find out which permit holders operate in their basin. The database allows searches by county and by WRIA.
✓	**Able to generate credits.**
	Landowner has the ability to undertake practices that improve the water quality issue affecting the basin. Practices may include: ➤ Installing filter strips and using cover crops ➤ Using nutrient management strategies ➤ Planting riparian buffers ➤ Establishing silvopasture on grazing and forest land ➤ Adopting reduced or no-till agriculture

GET INVOLVED

After determining that opportunities for trading may exist in your basin, the best way to pursue a deal is to contact the Washington Department of Ecology's Water Quality Program. DOE can provide additional details about water quality issues in your basin, point source facilities that may be interested in trading, and steps for initiating a trade. Using information from DOE's NPDES permit database, you can also contact point source facilities directly to discuss trading opportunities. Conservation district professionals can likely advise you about what actions you can undertake to improve water quality and generate tradable credits.

Without a formal program in place, pursuing water quality trading in the short-term will require a willingness to seek out buyers and initiate trades. However, for landowners in basins with prime conditions for trading, the extra effort has the potential to provide an economic and environmental pay-off.

NOTES

42 33 U.S.C. §1251 et. seq. 1972. See the summary of the Clean Water Act on EPA's website at: http://www.epa.gov/watertrain/cwa.

43 See EPA's "Water Quality Trading Assessment Handbook," November 2004 obtained from: http://www.epa.gov/owow/watershed/trading/handbook/docs/NationalWQTHandbook_FINAL.pdf.

44 Many of these are referenced in the Washington Conservation Markets Study Final Report, Evergreen Funding Consultants (January 27, 2009), on line at: http://ofp.scc.wa.gov/wp-content/uploads/2009/02/cons-mkts-study-report-v1-25-09.pdf. According to the Ecosystem Marketplace "State of Watershed Payments" report, June 2010, at: http://moderncms.ecosystemmarketplace.com/repository/moderncms_documents/state_of_water_2010.pdf, there are 60 "payments for watershed services" programs in the U.S. of which only 10 appear to be active.

45 This will require that the specific BMP, and the credits it will generate, be approved by the Washington Department of Ecology. According to WAC 73-218-030, "best management practices mean approved physical, structural, and/or managerial practices that, when used singularly or in combination, prevent or reduce pollutant discharges.

46 U.S. EPA, 2007. *Appendix A: Water Quality Trading Program Fact Sheets.*

47 Hamilton, Katherine, 2006. "Testing the Waters: The Great Miami River Watershed Water Quality Credit Trading Program." The Katoomba Group's Ecosystem Marketplace News.

48 "Water Quality Programs: An International Overview," World Resources Institute Issue Brief, March 2009 pg. 6. Obtained from: http://pdf.wri.org/water_trading_quality_programs_international_overview.pdf.

49 USDA Natural Resources Conservation Service, 2008, Conservation Practice Physical Effects table is explained and can be linked through: http://www.nm.nrcs.usda.gov/technical/fotg/section-5/CPPE.html.

50 USEPA and World Resources Institute, ibid notes 35 and 37.

51 Hamilton, Ibid note 36.

Water Quantity Markets

OVERVIEW

Limits on the availability of water in many of Washington's watersheds can create a market for the water that is already privately owned under existing water rights. Buyers are state agencies and nonprofit organizations seeking to acquire water for fish or other environmental purposes or private water buyers. Municipalities and private developers may also serve as buyers. Sellers are commonly landowners with longstanding water rights who choose to sell or lease some or all of their rights.[52]

Markets are most likely in watersheds where the water appropriated under existing rights already fully uses the water that is considered available for human use.[53] Water is sold in the same units used for most agricultural water rights: in acre feet. It can be sold outright, or it can be leased for a limited period of years. If desired, it can be sold or leased during specific months or seasons of the year or under specific circumstances: in years of drought or excess, for example. The place of use for the seller and the purchaser must be such that the change of place or quantity will not adversely affect other water rights holders or dewater some segment of a stream.

Relinquishment occurs when rights holders fail to use all or part of their right for five consecutive years. The portion of the right not used is subject to loss.

Farmers can reduce water consumption for market through installation of new irrigation systems, changes in crops or livestock management, or through practices that reduce their need for consumptive water. Under Washington law, water rights that are not used for five consecutive years can be lost through relinquishment. So leasing a water right can allow the farmer to implement the new practices, earn income from the unused water, and also preserve the opportunity to recover it later should conditions or plans change. If the water use change is seen as permanent, the farmer can also sell the unused water outright. The seller must have clear ownership of the water right—a significant discouragement for some potential sellers. Demand for water already generates a water rights market in many watersheds, and this demand is likely to grow in the years ahead.

WHAT IT'S WORTH

The water quantity market is increasingly robust in Washington due to the efforts of the Washington Water Trust,[54] the Trout Unlimited Washington Water Project (formerly Washington Rivers Conservancy),[55] the Washington Department of Ecology,[56] and the BPA-funded Columbia Basin Water Transactions Program.[57] The Columbia Basin program allocated more than $4 million to water transactions in 2008.[58]

The annual quantity—or the total acre-feet of water that may be withdrawn or diverted in one year—is the key metric used to describe water rights transactions. Parameters such as priority date, instantaneous quantity (the rate at which surface

and ground water may be diverted), purpose of use, season of use, point of diversion, and place of use are also specified in water rights documents and play a role in determining the value of the right.[59]

Prices paid will depend on the circumstances and need in the particular watershed/basin. According to information from the Columbia Basin Water Transactions Program, lease prices for consumptively used water rights in Washington over the past three years vary from $3.76 to $151.27 per acre-foot per year, with most transactions in the range of $10 to $20 per acre-foot per year.[60]

HOW IT WORKS

Buyers are federal and state agencies, municipalities, private developers and nonprofits.

Water rights buyers for conservation purposes include the Bureau of Reclamation, U.S. Fish and Wildlife Service, Bonneville Power Administration, the Washington Department of Ecology (DOE), and water trusts like Washington Water Trust and Trout Unlimited (often partnered with agencies). Water rights leases and purchases by municipalities and private developers may also provide an environmental benefit by moving the point of diversion downstream.

Sellers are landowners with valid water rights, often in basins constrained by low flows.

Farmers, ranchers and foresters throughout the state with unneeded water rights may find interested buyers. Conservation buyers typically target rights holders in areas where low flows are inhibiting endangered fish populations. DOE has identified 16 critical basins—eight in eastern Washington and eight in western Washington—that are priorities for acquisitions,[61] but there are also opportunities elsewhere.

A number of activities can allow farmers to forgo or reduce water use, and then sell or lease the extra rights.

Farmers may fallow part or all of their land to reduce irrigation needs or grow crops that require less water, such as pasture or hay. They may switch from using surface water to ground water or from diverting water from a low-flow tributary to a river's mainstem. Irrigation efficiencies like lined irrigation canals or improved irrigation systems can also reduce water use. Federal and state cost-share funding may be available for irrigation projects.[62]

Deals can take a variety of forms to fit the needs of buyer and seller, from purchase of complete rights to lease of partial or full rights.

Common transaction agreements slice water rights in time or quantity. Examples of partial rights deals include long-term leases; short term leases (and sometimes annual leases in drought years), in which farmers switch to less water-intensive crops or let land go fallow for the year; split-season leases, in which sellers use water for part of the season, such as spring and early summer, but leave water instream during late summer or fall; diversion reduction agreements, in which sellers cease irrigation for short periods to coincide with critical conservation times such as fish migrations; and dry year leases, in which buyers have the opportunity to lease water during particularly dry years.[63]

OUTLOOKS, CHALLENGES AND OPPORTUNITIES

Water quantity markets are developing in Washington, driven by the need to protect salmon and steelhead under the Endangered Species Act, as well as by rising demand for municipal water and by the need to protect senior water rights under state law.

Washington's Trust Water Rights Program provides the legal framework for water transactions for environmental uses, mitigation and the water market generally. Water rights holders may temporarily or permanently dedicate water rights to protect instream flows. Trust rights retain their priority date and are protected from relinquishment. DOE is responsible for managing trust water rights. Prices for consumptive rights vary by location and terms, but generally range from $20 to $50 per acre-foot per year.[64] In the future, it is also possible that sales of water quantity might also be partly funded by water quality demand.

Factors limiting trading in existing markets include concerns about impacts on agricultural communities and the time and resources required to finalize deals.

Permanent acquisitions can lead to "buy-and-dry" scenarios in which the inability to divert water for irrigation makes land unsuitable for agriculture. As farm activity declines, local opportunities for agriculture-related employment, sales and services may also decrease. For this reason, leases may be preferred, especially in areas where dryland farming is not feasible. Leases can provide a steady income without closing off future opportunities for continued farming, sales of water rights or sale of the land with intact water rights.

Most water rights transfers require a long due diligence and negotiation process. Buyers must verify validity of the water right and title, priority of the rights and whether the rights can be transferred to a new use. The highly customizable nature of transfer agreements also draws out the time required to finalize deals, with some requiring a year or more of discussion and negotiation between buyer and seller.

Opportunities for trading should remain steady in the mid-term and improve in the long-term.

Water banks are intermediary brokers and clearinghouses that help move water to where it is needed most. Banks can play many roles, including connecting buyers and sellers, pooling water rights from multiple sellers, and providing administrative support for transactions.

Water banks are under development or operating in several locations in the state, including in the Yakima River Basin, Walla Walla watershed, Upper Kittitas County, Columbia River Basin and Dungeness River Basin.[65] Water banks can facilitate deals by providing a central registry of interested buyers and sellers, posting price information, and helping buyers and sellers navigate the regulatory process for completing transfers.

Innovative transfer arrangements may also increase opportunities to participate in water markets. In Colorado, six ditch companies recently formed a "super ditch" company to collectively lease water to nearby municipalities. By pooling everyone's water rights, each farmer in the super ditch must fallow land only once every seven years. The lease agreements with municipalities may span 40 to 50 years, providing long-term, predictable income for continued farming.[66]

EXAMPLE

In the Dungeness River Basin, a water rights lease agreement between Washington Water Trust, DOE and farmers helped salmon and maintained farm activity. Using data about water flows during periods when salmon need more water, the parties structured a split-season lease agreement. The agreement allowed farmers to withdraw irrigation water for two-thirds of the growing season. Farmers received compensation equal to the forgone revenue from the third part of the season, giving them the opportunity to gain new income if they were able to produce crops during the dry period.[67]

GAUGE YOUR PROSPECTS

Opportunities for water quantity trading exist right now for many Washington farmers. Prime candidates for water quantity markets are:

✓	**In the right location.**
	Land is located within one of the 16 critical basins identified by DOE: ➤ Eastern Washington: Lower Yakima, Methow, Middle Snake, Naches, Okanogan, Upper Yakima, Walla Walla, Wenatchee. ➤ Western Washington: Cedar-Sammamish, Chambers-Clover, Duwamish-Green, Elwha-Dungeness, Nooksack, Puyallup-White, Quilcene-Snow, Snohomish.
✓	**Eligible.**
	Water rights have been continually used for a beneficial purpose (such as irrigation) at least once every five years.
✓	**Able to generate credits.**
	Farm has flexibility to reduce or forgo water use, for all or part of the year, by: ➤ Fallowing land; ➤ Switching to crops that require less water; or ➤ Installing a more efficient irrigation system.

Landowners outside the 16 critical basins may still find nonprofit water trusts and other private buyers interested in acquiring water rights. Nonprofit water trusts can provide information about whether they or other parties are seeking water rights in these areas. In the future, as demand for water increases due to population growth and climate change, opportunities for participating in water quantity markets will only expand.

GET INVOLVED

The best way to get involved in trading is to contact public and nonprofit buyers interested in acquiring water rights, such as the Washington Department of Ecology's Water Acquisition Program, Washington Water Trust and Trout Unlimited–Washington Water Project. These organizations can help explore options for sale or lease agreements, explain the process of transferring rights and assess the fair market value of your rights. In many cases, buyers will take care of the paperwork needed to receive state approval for transferring rights.

NOTES

52 Washington's trust water rights program is established through RCW Ch. 90.42 and Ch. 90.38 (for Yakima).

53 WA Department of Ecology identifies 16 basins that have inadequate flows for fish and as priorities for water rights acquisitions: Lower Yakima, Methow, Middle Snake, Naches, Okanogan, Upper Yakima, Walla Walla, Wenatchee, Cedar-Sammamish, Chambers-Clover, Duamish-Green, Elwha-Dungeness, Nooksak, Puyallup-White, Quilcene-Snow, Snohomish. See WA Dept. of Ecology map at: http://www.ecy.wa.gov/programs/wr/market/pdfs/16basinsmap.pdf.

54 Washington Water Trust (http://washingtonwatertrust.org)

55 Trout Unlimited Washington Water Project (http://www.tu.org/conservation/western-water-project/washington)

56 Washington Department of Ecology (http://www.ecy.wa.gov/programs/wr/market/wacq.html)

57 Columbia Basin Water Transactions Program (CBWTP is funded by BPA), http://www.cbwtp.org/jsp/cbwtp/index.jsp

58 Columbia Basin Water Transactions Program. (2009). FY08 Annual Report. This funding helped support projects by some of the other organizations acquiring water.

59 Additional limitations may also apply to water rights defined under the Family Farm Water Rights law under RCW Ch. 90.66.

60 Details for cost and nature of Columbia River transactions can be queried at the CBWTP website at: http://www.cbwtp.org/jsp/cbwtp/query/query.jsp. Washington Water Trust personnel indicate that the range is probably closer to $20 to $50 for consumptive water rights—and higher during drought.

61 Washington Department of Ecology, ibid note 42.

62 For cost share programs, check with the local conservation district or NRCS office.

63 Malloch, S. (2005). Liquid Assets: Protecting and Restoring the West's Rivers and Wetlands through Environmental Water Transactions. Trout Unlimited. Obtained at: http://www.tu.org/atf/cf/{ED0023C4-EA23-4396-9371-8509DC5B4953}/Malloch.LiquidAssets.2005.pdf.

64 Per Washington Water Trust. Highest for consumptive water and especially high in a drought year.

65 Washington Department of Ecology's water banking program is described on line at: http://www.ecy.wa.gov/programs/wr/market/waterbank.html. See also 2008 Report to the Legislature: Water Banking in Washington State. Publication no. 09-11-024

66 Lower Arkansas Valley Water Conservancy District. "Arkansas Valley Irrigators Incorporate 'Super Ditch Company.'" Obtained at: http://www.lavwcd.org/pressreleases/Arkansas-Valley-Irrigators-incorporate-Super-Ditch-Company.html.

67 Policy Consensus Center. (2004). Of Water and Trust: A Review of the Washington Water Acquisition Program. Obtained at: http://www.ecy.wa.gov/programs/wr/instream-flows/ofwater_trust.html.

Renewable Energy Markets

OVERVIEW

JOHN LONGFELLOW

Public concern about the environmental impacts of producing and using fossil fuels has created an independent market for renewable energy. Twenty-nine states (including Washington) require that energy production utilities and resellers include a minimum percentage of renewable energy as a part of their energy portfolio sold to the public. Some states (including Washington) also require such companies to offer their customers the option of purchasing renewable energy at a premium price. These requirements have resulted in renewable energy producing two types of tradable units: the physical electricity itself, which sells at a normal market price for energy, and renewable energy certificates (also known as RECs, green tags and green certificates), which have an added and independent value driven by demand specifically for renewable energy.[68]

Energy sales readily reach across state and international boundaries. So, at least in theory, the market for renewable energy is also available throughout broad geographic regions. Energy is, however, more expensive when transmitted over long distances. Moreover, several state requirements include multiplier incentives to encourage utilities to purchase from in-state sellers.[69] So, in practice, demand for renewable energy on the compliance-driven market is likely to come from utilities located in or near the state whose requirements are being met. Farmers and ranchers can participate in these markets by generating electricity for sale into the power grid that also qualifies to be certified for RECs.

Farmers and ranchers can participate in renewable energy markets by installing wind turbines, solar panels or methane digesters to generate electricity from non-depleting resources. To be eligible for RECs, the energy must be certified as renewable by an independent agency.[70] For each one megawatt hour (MW-h) of renewable energy generated, a REC is issued by a regional tracking system. Producers can sell the electricity and RECs together to a utility company, or can un-bundle the products and sell them separately. Most of the states requiring renewable energy also require the percentage to increase in the coming years. Washington's 17 largest utilities are required, for example, to use renewable resources or acquire equivalent RECs for 3 percent of loads by 2012, 9 percent by 2016 and 15 percent by 2020,[71] increasing the demand in the years ahead.

A **megawatt-hour** (MWh) is a measurement of energy. One MWh is equal to 1,000 kilowatt-hours (kWh). The average U.S. household uses 10.7 MWh of electricity each year.

Avoided cost is the incremental cost a utility would have to pay to generate energy itself or acquire it from another source. Under the federal Public Utility Regulatory Policy Act, utilities must purchase power from energy producers at the utility's avoided cost.

WHAT IT'S WORTH

Demand for renewable energy from all Western Interconnection states with portfolio requirements is expected to be 55.6 million MW-h by 2015.[72] The current value for physical electricity in Puget Sound Energy's service area ranges between $34 and $49

per MW-h.[73] RECs appear to range in value from $1 to $60 per REC (MW-h).[74] This would suggest a likely compliance-driven market for renewable energy (electricity plus RECs) of between about $2 billion and $6 billion by 2015. Voluntary (non-regulatory) demand is expected to reach an additional 30 million kW-h by 2015.[75]

- Typical rates for landowners leasing land to wind power developers is about $2,500 to $5,000 per wind-turbine per year on a 20-year lease, $3,000 to $4,000 per MW of capacity, or 2 percent to 4 percent of the project's revenues.[76]
- Anaerobic digester systems are said to cost about $200 to $500 per animal unit (per 1,000 pounds live weight).[77] A digester built in 2007 in Zillah, Washington, for 3,000 dairy cows cost $3.8 million and has a 1.2 MW production capacity.[78]
- At current installation costs, a solar panel system, amortized over the life of the system, will cost about 25¢ per kW-h—two to four times what most people currently pay for their electricity. A 5 kW system that completely meets the energy needs of a large conventional home can cost $30,000 to $40,000 installed, or about $6 to $8 per watt.[79]

HOW IT WORKS

Buyers are in-state and out-of-state utilities operating under renewable portfolio requirements and third-party REC marketers.

Renewable energy is purchased on compliance-driven and voluntary markets. The compliance-driven market stems from state-level policies in Washington and 28 other states that require utilities to obtain a percentage of their power from renewable sources in the next five to 15 years. Many states allow utilities to purchase out-of-state energy, but given the expense of transferring energy over long distances, most demand for renewable energy in Washington is likely to come from utilities within the Pacific Northwest and California.

The voluntary market for renewable energy is driven by growing consumer preference for non-polluting electricity. Washington and other states require utilities to give customers the option to buy green energy by paying a premium on monthly energy bills. Third-party marketers such as Bonneville Environmental Foundation and 3Degrees also buy RECs and re-sell them to organizations and individuals interested in offsetting their use of non-renewable energy. Most third-party marketers purchase RECs from producers anywhere in the country and make sales nationwide.

Sellers are landowners with abundant wind, solar or biomass resources.

In Washington, high-potential wind sites are located along the Columbia River on the Oregon-Washington border, near Ellensburg, and in exposed areas along the coast. Solar intensity is greatest in eastern Washington, but central and western Washington also receive adequate sunlight to generate solar electricity. Dairy cow and other livestock operations are potential sources of renewable energy from anaerobic digestion. Access to financing, proximity to electricity transmission lines and approval from zoning officials are also important prerequisites for potential sellers.

Landowners can install wind turbines, anaerobic digesters and solar panels to produce renewable energy.

Wind generation is ideal for agricultural land because wind turbines occupy a relatively small footprint and allow most farming and ranching activities to continue underneath. On flat and open land, wind projects typically require 60 acres of open, undeveloped land for each MW of installed capacity. Most of this land serves as a buffer and can remain in farming, with only about three acres occupied by turbines and access roads. Farmers can lease land to third-party wind developers or plan and install their own projects. To be profitable, projects typically need to be at least 100 kW; many are much larger, from 1 to 200 MW and beyond. Capital costs for mid-to-large scale installations are about $1 million per MW of capacity.

Anaerobic digesters convert liquid manure into biogas (primarily methane) and electricity. Manure from a 1,400-pound dairy cow can generate about 550 kW per year, meaning that a 200-head dairy herd could produce 500 to 600 kW of energy per day.[80] Washington operators are allowed to use a limited percentage of food and other non-agricultural waste in the digester operation allowing them to charge "tipping-fees" (for waste disposal) which can improve the efficiency of the anaerobic process. So a digester can receive income from the electricity, from the RECs, from the tipping-fees, from the carbon market for methane gas capture and from the sale of the compost and livestock "bedding" which are by-products of the operation. And the liquid end product can be re-applied to fields as fertilizer.[81]

Solar photovoltaic (PV) systems convert sunlight into electricity using a series of interconnected panels. Panels may be placed on south-facing building roofs or mounted as stand-alone units on unused land. Depending on shading, type of mounting and panel efficiency, PV systems require about 100 square feet per kW of installed capacity. The advantage of solar is that small systems with limited investments are within the reach of most operators.[82] While these systems are not yet fully competitive with power rates in Washington, they can be very useful in inaccessible locations where powering with grid electricity is a challenge.

OUTLOOKS, CHALLENGES AND OPPORTUNITIES

Renewable energy markets are growing steadily in Washington, driven largely by renewable portfolio standards.

Although only a small percentage of Washington farms currently generate their own energy, growing demand from utility companies and the private sector offer opportunities for others to get involved. The state's largest utilities must use renewable resources or acquire equivalent RECs for 3 percent of loads by 2012, 9 percent by 2016 and 15 percent by 2020.

Prices for physical energy—separate from RECs—depend on a utility's avoided cost. In 2010, Puget Sound Energy's avoided cost ranged from $34 to $49 per MW-h. Prices for RECs range from $1 to $60 per REC. As non-renewable energy production becomes increasingly costly, the avoided cost paid for renewable energy seems likely to increase.

Factors limiting participation in markets include high project costs and outdated utility grid infrastructure.

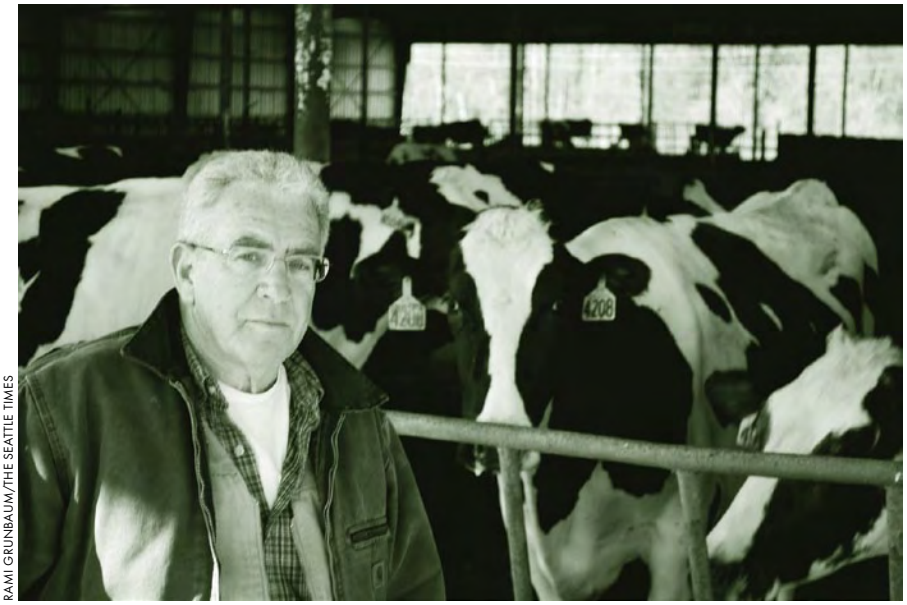
Commercial-scale renewable energy projects can require multimillion dollar investments. For solar and anaerobic digester projects in particular, earning a net return on investment from energy sales alone is possible only in the long-term.[83] And landowners must take advantage of all available grants and production incentives to make projects financially feasible.[84]

The current power grid is designed to transmit electricity from large, central power plants rather than from distributed producers. In rural areas, low-voltage lines do not have the capacity to handle new generators above 20 kW. Most commercial-scale renewable projects are many times this size, so producers must identify project sites close to higher capacity lines or work with utilities to upgrade nearby infrastructure.

Opportunities for selling renewable energy are strong today and will continue to grow in the long-term.

To meet Washington's renewable portfolio standard, utilities will need to acquire about 8.9 million MW-h of new renewable energy by 2020, about twice the amount obtained by 2009. Nationwide, demand for renewable energy offsets from consumers and private companies is predicted to reach 55.6 million MW-h by 2015,[85] a 70 percent increase from demand in 2010.

Numerous federal and state grants, loan programs and production incentives are available to help finance renewable energy projects.[86] The Rural Energy for America Program, part of the 2008 Farm Bill, funds loan guarantees up to $25 million.[87] The federal Production Tax Credit pays producers 2.1 cents per kW-h of renewable energy for the first 10 years of operations.[88] For a wind project, this credit alone is worth about 40 percent of project costs.[89] Washington utilities pay incentives of 15 cents per kW-h of renewable energy production.[90] Recent technological improvements have lowered renewable energy installation costs while increasing production capacity, particularly for wind energy.[91]



RAMI GRUNBAUM/THE SEATTLE TIMES

FARMER DALE REINER, PRESIDENT OF QUALCO ENERGY

EXAMPLE

In Snohomish County, local farmers, the Tulalip Tribes, and an environmental group joined together to form Qualco Energy Corporation and develop an anaerobic digester project. Four nearby dairies deliver manure from 3,500 cows to the digester, which has a production capacity of 450 kW. Qualco Energy has entered into a five-year contract with Puget Sound Energy to buy electricity and RECs from the digester. In addition to methane, which is used to generate electric-

ity, gardening compost and fertilizer are also by-products of the digester process. And the facility also earns income from "tipping fees" for disposal of waste from food processors and others, and earns credits on the carbon market.[92]

GAUGE YOUR PROSPECTS

Opportunities for participating in renewable energy markets exist right now for many Washington farmers, ranchers and foresters. Prime candidates are:

✓	**Able to tap into renewable resources.**
	Land has strong wind or solar production potential: ➤ Online tools are available to estimate renewable energy potential for different locations: www.windpowermaps.org (wind) and www.pvwatts.org (solar). Or landowner has access to animal waste or other biomass resources: ➤ To be cost-effective, anaerobic digesters typically need manure from at least 500 dairy cows or 2,000 head of swine.
✓	**Able to finance renewable energy production.**
	Landowner has the capacity to finance renewable energy installation: ➤ Online tools are available to estimate life-cycle costs for different projects: www.retscreen.net/ang/d_o_view.php. ➤ The Database of State Incentives for Renewables & Efficiency provides a comprehensive list of available renewable energy incentives: www.dsireusa.org.

GET INVOLVED

After determining that renewable energy production may be possible on your land, the next step is to learn more about zoning and siting requirements, purchasing and installing equipment, and connecting to the energy grid. The best way to find electricity and REC buyers is to contact utility companies and third-party marketers. Many utility companies release requests for proposals (RFPs) for renewable energy projects. RFPs are often posted on utilities' websites and contain information about potential prices and the size and type of projects the company is seeking.

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CHAPTER THREE

Getting Involved in Markets

How can farmers and ranchers get involved in markets?

As the profiles of environmental markets in Chapter Two indicate, there are some environmental markets currently operating and others that are getting close. Now is a good time to be thinking about how to participate. In this chapter, we will explore how farmers and ranchers can:

1. Identify opportunities to produce environmental credits
2. Evaluate market demand
3. Evaluate cost vs. return
4. Assess risks
5. Develop a environmental markets plan, and
6. Produce and market credits

Identifying opportunities for environmental credit production

This section discusses how to identify opportunities for credit production on a given farm or forest parcel. There are often two options available to the farmer or rancher. The first is to change farm and ranch practices to reduce environmental impacts and create credits. The second is to convert environmentally constrained areas on the farm or ranch from agricultural production to environmental credit production.

CHANGING FARM PRACTICES

Changes in practices used in traditional agriculture can often result in production of saleable environmental credits. There are many conservation management practices that can work. For example:

- Greenhouse gas credits from conservation tillage, rangeland management and precision application of nitrogen fertilizer
- Wildlife habitat credits from rangeland management and cover crops
- Water quality credits from contour farming, conservation tillage and cover crops
- Water quantity credits from irrigation efficiencies and changes in crops or crop rotations
- Renewable energy credits from changes in manure management

The big advantage of these opportunities is that they can often be realized without a significant change in the fundamental uses of the farm and ranch. And, in many cases, they may actually improve crop productivity or reduce operating costs. The first step will be to identify aspects of the farm operation where these types of changes make sense.

CONVERTING ENVIRONMENTALLY CONSTRAINED AREAS

In addition to changes in farming practices, there may also be opportunities in areas of the farm that have serious environmental constraints—along streams, with boggy soils, etc.—that make them hard to farm or ranch but easy to restore for environmental credit. Put another way, markets can provide an opportunity to convert *environmental constraints* on a farm or ranch into *environmental assets*, suitable for development of income-producing credits.

Environmental constraints can be physical, such as boggy soils, or legal, such as the regulatory limits on use of streamside areas. The following graphic shows common

environmental constraints in the left column and the potential for creating various credit types to the right. Note that water quantity credits are not included—they are not dependent on conditions of specific areas of a ranch or farm but on agricultural practices.

	Credit Type				
Environmental Constraint	**GHG**	**Wetland**	**Other Habitat**	**Water Quality**	**Energy**
Hydric or wetland soils		✓			
High water table and poor drainage		✓	✓		
Wetlands and ponds		✓	✓		
River/stream riparian zones	✓	✓	✓	✓	
T &E species habitats (woodland)	✓		✓		
Floodplains		✓	✓	✓	
Steep slopes	✓		✓	✓	✓
Areas subject to high winds				✓	✓

✓ Most Suitable ✓ Suitable

OPTIONS FOR PRODUCTION OF ENVIRONMENTAL CREDITS

A good initial step is to produce a sketch map of the farm or ranch with areas suitable for changes in ag practices or in environmentally constrained areas. Two examples are shown below, one for a small farm and the other for a large ranch.

Figure One: Credit opportunities on a farm

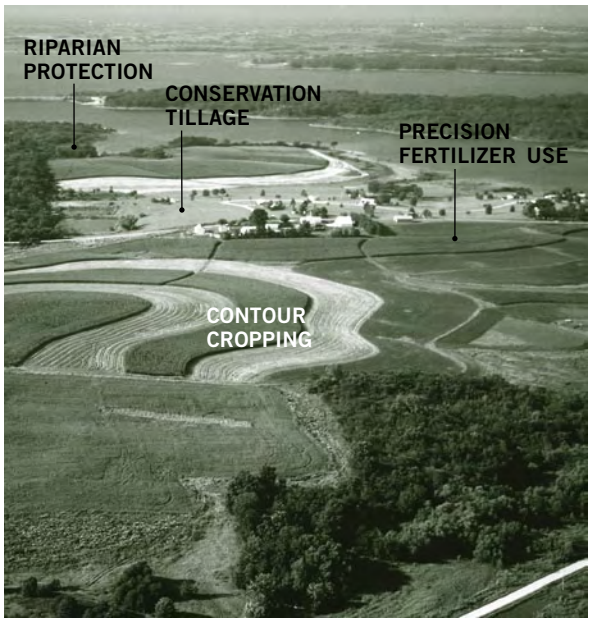
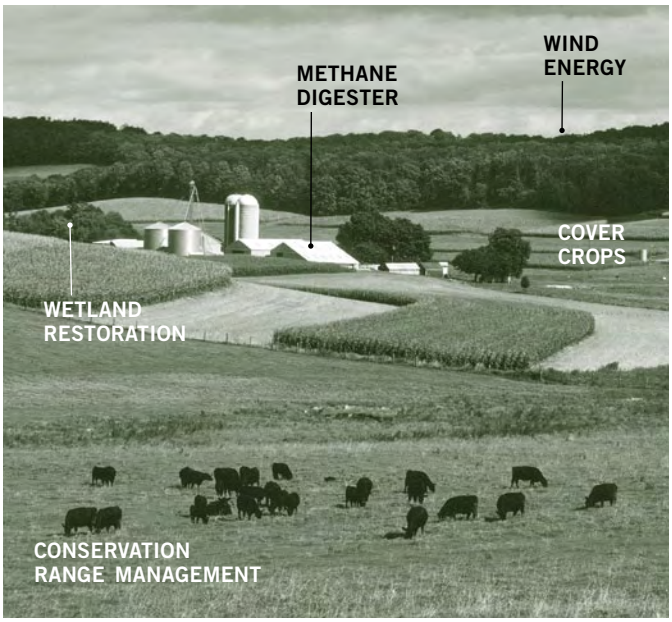


Figure Two: Credit opportunities on a ranch



PHOTOS COURTESY OF USDA NRCS

Based on this information, an inventory of potential environmental credits can be developed for the individual farm or ranch. Here is the inventory for the farm example cited above.

	Area Suitable for Credit Type				
Farm Areas	GHG	Wetland	Other Habitat	Water Quality	Energy
Opportunities for conservation tillage	8.2 ac.		8.2 ac.		
Opportunities for precision fertilizer use	3.5 ac.			3.5 ac.	
Potential riparian area	4.2 ac.		4.2 ac.	4.2 ac.	
Potential wetlands		2.2 ac.	2.2 ac.		
Steep slopes			1.0 ac.		1.0 ac.

Note that this is a very preliminary assessment at this stage and actual decisions on which credits to produce will depend on the evaluation of credit demand and financial analysis described in the following sections.

Evaluating demand for environmental credits

Demand is obviously a critical factor in environmental markets, as it determines whether a buyer is likely to be available if credits are brought to the environmental market. Characteristics of demand will have a major influence on what types of credits are brought to market, when they are produced and how they are priced.

The summaries of each environmental market in the preceding chapter discuss potential credit buyers and the challenges and opportunities associated with credit demand in each of the five profiled markets. Following is a summary of the current state of demand in each of these markets in Washington.

CURRENT MARKET DEMAND

Greenhouse Gas Market: This is currently a voluntary market in Washington, with a modest level of demand from individuals and organizations wishing to limit their carbon footprint and from industries preparing for climate regulation. Demand is expected to grow quickly if either the Western Climate Initiative or national climate legislation creates a cap on emissions, allows trading to meet the cap and permits the liberal use of market-generated greenhouse gas offsets in the trading scheme.

Wetlands and Habitat Market: This market is driven by federal, state and local regulations on wetland and ESA habitat disturbance associated with new development. Demand for wetland mitigation is particularly strong due to major highway construction currently underway in Washington as well as long-term growth in the Puget Sound region. However, the ability to meet this demand through environmental markets is inhibited by lack of market infrastructure and some reluctance by regulators toward an open marketplace for wetland credits. Habitat markets are weak due to laxity in state and federal habitat regulation in Washington.

Water Quality Market: The major drivers of this market are new caps on nutrients and temperature imposed in Total Maximum Daily Load programs. This is a large and growing issue throughout Washington, and regulators are increasingly looking to a combination of point-source treatment and nonpoint source control to meet new standards. In time, this is expected to result in a robust demand for water quality credits in this market and potentially the largest environmental market in Washington, but progress toward an open trading platform is slowed by regulatory concerns over the quality and dependability of market-generated credits.

Water Quantity Market: This market is driven by new and increased consumptive uses in basins that are already severely constrained in water supply and regulated to protect instream flows. This active market is concentrated in 16 flow-limited basins in Washington, but the combination of growth and climate change is likely to result in a broader and more vigorous market in the future. This is the most accessible environmental market in Washington at the moment.

Renewable Energy Market: The big drivers of this demand are renewable energy portfolio standards and production incentives for renewable sources in Washington and many other states. Demand is soft at the moment due to the lenient deadlines for meeting portfolio requirements and financing constraints for larger facilities, but long-term growth in the market is expected to be strong and farmers and ranchers are in an excellent position to take advantage of the demand.

LONG-TERM MARKET DEMAND

As with all emerging markets, there is some level of speculation involved in determining how to prepare for and invest in new environmental markets. For readers interested in tracking the large-scale, long-term evolution of these markets, the following table identifies drivers, indicators and sources of information for each of the five markets profiled in this guide.

Market	Demand Drivers	Indicators	Sources of Data
Greenhouse Gases	Regulatory caps; voluntary interest in mitigation	New federal and state caps; new regional cap-and-trade programs; demand in voluntary markets	Legislation and commentary on federal climate bills; Western Climate Initiative at www.westernclimateinitiative.org/; International Emissions Trading Association at www.ieta.org/ieta/www/pages/index.php
Wetlands and Other Habitats	Mitigation for new development	Upcoming public highway and utility projects; new ESA habitat requirements	Washington State Department of Transportation at www.wsdot.wa.gov/projects/; local transportation and utility projects via jurisdictional websites; ESA listings from USFWS at www.fws.gov/endangered/ and NOAA at www.nmfs.noaa.gov/pr/laws/esa
Water Quality	New compliance requirements for existing operations; mitigation for new development	Total Maximum Daily Loads for nutrients and temperature; upcoming NPDES permit deadlines for major public sector dischargers	TMDL info for WA at www.ecy.wa.gov/programs/wq/tmdl/; NPDES permit info from WA Dept of Ecology at www.ecy.wa.gov/programs/wq/tmdl/ or local jurisdictions
Water Quantity	Cap on new consumption or requirement for mitigation by new users	Upcoming private development or public demand in flow-limited basins	WA info on critical flow-limited basins at www.ecy.wa.gov/programs/wr/market/wacq.html
Renewable Energy	Renewable portfolio standards for electrical utilities; subsidies for renewable generation	Existing and new portfolio standards; power rate subsidies by state and nationally	Guide to states with renewable portfolio standards at http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm; overview of WA standards and REC markets at www.leg.wa.gov/Senate/Committees/EWE/Documents/RenewableEnergy.pdf

Evaluating Financial Returns

The decision over whether to participate in environmental markets and, if so, which to participate in, will mostly turn on the potential financial returns. There are three important factors in this analysis: the value of credits produced, the costs of credit production (including long-term liabilities), and the value of other agricultural production foregone through dedication of land to credit production.

The analysis of various markets in Chapter Two indicates the following about current credit values:

1. Currently, values are highest for wetland and water quantity credits and lowest for greenhouse gas and renewable energy credits.
2. Long-term trends suggest that water quality, wetland and water quantity credits will be very valuable in the five-to-10 year timeframe.
3. The value of other habitat credits will vary by species and stringency of regulation, with habitats for endangered terrestrial species growing substantially in value.
4. Greenhouse gas credits will increase significantly in value if a regional or national cap-and-trade program is mandated, but will remain flat otherwise.
5. Renewable energy credits will lag other markets in value until renewable portfolio standards go into full effect in 12 to 15 years.

On the cost side, the analysis indicates the following:

1. Wetland credits tend to be very costly to produce because of high transaction costs, land and stewardship requirements, and often the need to move dirt.
2. Production of renewable energy credits is also expensive and capital-intensive.
3. Because production can often be integrated into agricultural practices without major changes in land use, water quantity, greenhouse gas, terrestrial habitat and water quality credits may be produced at lower cost.
4. Secondary costs such as certification, marketing and regulatory approval can be every bit as important as the costs of actual credit production.

Finally, the analysis of existing markets indicates the following about agricultural values foregone through participation in environmental markets:

1. Water quantity credits will often require productive land to be taken out of production, at least on a temporary basis, and probably have the highest foregone value.
2. Greenhouse gas, water quality and some terrestrial habitat credits can probably be integrated into farm activities with modest changes to agricultural practices, with moderate foregone values.
3. Wetlands and renewable energy credits will often be produced in areas unsuitable for other agriculture, and it seems possible to keep foregone production low.

Each farm will have a different balance sheet (or several sheets) for these three variables depending on existing farm and ranch practices, the physical character of the operation, and the local status of environmental markets. The following example evaluates the impacts of wetland credit development on the farm used as an example earlier in this chapter. As indicated, the farmer has the option of converting 2.2 acres of marginal pasture to wetland use. The balance sheet might look like this:

Figure 3: Profit and Loss from a Farm Participating in a Wetland Market

Income			
Income	Credit Sales	$320,000	2.2 credits (one per restored acre) sold at $160,000 per credit
Total Income		$320,000	
Expense			
Direct Expense	Excavation	$30,000	
	Plant materials	$24,000	
	Drainage pipe	$12,000	
	Backhoe contractor	$8,000	
	Consulting ecologist	$30,000	
	Construction contractor	$55,000	
	Credit verification	$6,000	
	Credit insurance	$15,000	
Total Direct Expense		$180,000	
Foregone Revenue	Net milk income	$3,000	Assumes loss of 2 cows each producing 20,000 pounds of milk per year at $15/cwt and 5% rate of return for a 10-year period
Total Expense		$183,000	
Net Income		$137,000	

Note that this example combines a high credit value/high credit cost/low foregone value situation. Other market scenarios will vary depending on the mix of these characteristics. For assistance with financial analysis of market scenarios, consult local conservation district staff, the NRCS state conservationist's office or the agriculture department of the local land-grant university.

Assessing risks in environmental markets

Environmental markets are financial markets and bear many of the risks associated with equity, bond and commodity markets. Several types of risk are particularly important in environmental markets: approval risk, price risk and liquidity risk. Each will be described in the following sections.

APPROVAL RISK

Most transactions in environmental markets are designed to fulfill regulatory responsibilities of the buyer and require approval by a third-party, the regulatory agency. The most consequential risk in environmental markets is that the regulator may not approve a transaction even if the buyer and seller act in good faith, use standard practices for credit production and transaction, and follow a prescribed regulatory pathway. This is a particularly serious issue if the would-be seller has invested heavily in the project.

The best defense against approval risk is the use of established market protocols and early consultation with regulators. In more formal environmental markets, such as regional greenhouse gas credit exchanges and wetland mitigation banks, rules for credit production, verification and approval are well-defined, and when followed lead to confidence that regulatory approval will be provided for a transaction. In less formal two-party transactions, consultation with regulators is essential. However, rules and personnel can change quickly, and approval risk may be unavoidable in informal markets.

Higher approval risk needs to be weighed against potential for higher investment returns. Oftentimes, a two-party over-the-counter transaction may offer higher approval risk but also higher returns than a transaction through an established bank or exchange.

PRICE RISK

In evolving markets such as environmental markets, the value of a credit may vary considerably from month to month due to a wide range of internal and external factors, including supply and demand of credits, regulatory rules or production costs. For instance, credit prices for carbon have varied from ten cents to more than $25 dollars in the last few years. Volatility in prices can pose a significant risk when investments in credit-producing projects happen well in advance of credit sales.

Futures and forward contracts are a good defense against price risk. A forward contract commits a buyer and seller to a credit transaction in the future for a price agreed to today. A futures contract is essentially the same thing, but provided through a formal exchange such as the Chicago Climate Exchange. Under either, the farmer or rancher would agree to provide credits at a future time for a price negotiated at the time of the contract.

Price risk must be weighed against the opportunities to profit from rising prices. More stringent environmental regulations on greenhouse gases, instream flows, nutrient pollution and other environmental resources are likely to result in increasing demand for credits. Even if the supply of credits grows due to liberalization of trading protocols—a reasonable scenario for the future—this growing demand is likely to result in higher credit prices.

LIQUIDITY RISK

Unlike big financial markets like the New York Stock Exchange, most environmental markets have very limited market activity, with transactions measured in the dozens or hundreds per year. This can make it difficult to predict when buyers and sellers will be coming to the marketplace. When sellers come to the market but no buyers are available, or vice-versa, the market is said to have a liquidity problem. Liquidity risk is particularly important to would-be sellers who often have invested in credit production but find it difficult to sell credits.

Liquidity risks can be minimized for sellers by keeping investments in credit production low for untested markets and by selling credits via forward or future contracts (described above). Early outreach to prospective buyers is also crucial, particularly for more experimental markets. As a community, farmers and ranchers may also want to consider publicizing and marketing credits more widely in order to reduce liquidity risk.

Liquidity risk is balanced by the potential benefits of being first into a new market. Often, early sellers will get prices that will be hard to match once additional sellers and buyers wade into the marketplace.

Developing a market strategy

The next step is to use the information generated in the preceding analyses to determine how best to participate in environmental markets. Often, there will be multiple options for using environmental markets on a single farm or ranch, and it can be helpful to organize the options into market scenarios. This is illustrated below using the example farm that has been discussed throughout this chapter.

SCENARIOS

Scenario One: A Toe in the Water

The farmer in this scenario is interested in getting involved in environmental markets, but is cautious about committing land and resources in the early stages of market development. The farmer may talk to technical service providers, such as conservation district personnel, about the farm's suitability for generating market credits. Knowing that the farm is well-suited for all five markets (see figures one and two), the farmer begins by looking at potential demand for credits and speaks to regulators about use of credits to fulfill upcoming regulatory needs for prospective buyers. Attracted by the strong demand for wetland credits, he/she talks to federal and state regulators and to Department of Transportation project managers about supplying wetland credits for upcoming highway projects in his/her watershed. With some encouragement, he/she begins to pencil out the expenses and income associated with converting 2.2 acres of pasture into wetlands, coming up with a pro forma budget that looks like the balance sheet in figure three. Looking further at managing risks of this scenario by offering futures contracts to DOT for the credits, the farmer commits to investing in the wetland restoration work to develop credits. Aside from the wetland area, the balance of the farm remains in traditional agricultural practices. Within three years, the farmer has completed the wetlands project and has been paid for the credits.

Scenario Two: Wading In

In this scenario, the hypothetical farmer identifies and pursues the wetland opportunity in scenario one, but decides to look further at other markets. Having read about pending federal climate legislation, he/she decides to pursue greenhouse gas markets and looks at three options for producing credits: replanting riparian zones, converting tilled land to conservation tillage, and modifying fertilizer use through precision agriculture methods. After further research, he/she finds that riparian zone credits are not currently cost-effective for small producers due to high verification costs, and that methods for calculating the greenhouse gas benefits of precision agriculture are still in development. However, he/she discovers an active market for conservation tillage credits through aggregators operating in the Chicago Climate Exchange. The farmer negotiates a forward contract to produce conservation tillage credits annually beginning in the next growing season, in addition to being paid for wetland credits.

Scenario Three: Jumping In

In this scenario, our hypothetical farmer commits to the same wetland and conservation tillage projects as in scenario two but decides to maximize credit-producing activity on the farm. He/she looks back at the riparian zone that didn't pencil out for greenhouse gas credits and focuses instead on habitat or water quality credits. Doing a quick analysis of demand, he/she determines that a downstream sewage treatment plant operator is in need of nitrogen control credits to meet an upcoming permit requirement. The state regulatory agency is amenable to meeting the permit requirement with a mix of upgrades to the plant and off-site credits. Discussions between the plant operator and farmer result in a forward contract for water quality credits to be delivered in five years and annually thereafter from the farmer's new riparian area. In addition, the farmer investigates the potential of a small wind farm on the steep upland areas of the farm. The initial hardware costs are steep, but the farmer makes a good contact with a regional utility that is boosting its renewable portfolio and they agree to talk again when turbine prices come down. Nevertheless, the farmer becomes active in three environmental markets in three years.

KEY STRATEGIC ISSUES

As the scenarios demonstrate, the key strategic issues in determining which market to focus on and how much to commit are:

- The intrinsic ability of the operation to produce credits of various types
- The extent and timing of demand for potential credits
- Cost versus price for potential credits, and
- The prospects for getting credit transactions approved by regulators

As a general rule, if the fundamentals are strong—demand is high, price exceeds cost by a decent margin and regulators are willing—the project will succeed.

However, there are other issues specific to environmental markets that must be kept in mind when producing credits. These issues are addressed in the extensive literature on environmental markets, and will get touched on very briefly here. The most significant are:

Stacking: This term refers to the production and sale of two or more credit types from a single parcel of land. Proponents argue that the same parcel can provide multiple environmental values—for example, greenhouse gas sequestration in the tree canopy, habitat value in the shrub layer and nutrient control in forest soils—and that credits should be available and saleable from each. However, most environmental markets disallow this practice, commonly known as stacking, and instead require that land used for production of one environmental credit be retired from future markets.

Verification and certification: Many markets are constructed so that credits must be verified by an approved third-party verifier and then certified under a national or international standard by a certification body. This can add substantially to credit production costs and delays. Many of the transactions that are discussed in this guide are two-party, over-the-counter deals and will not be subject to verification and certification, but the continuing emergence of more formal markets and exchanges will add this level of complexity.

Additionality: This is a concept in environmental markets that holds that credits should be created only for those actions that are over and above a "business as usual" approach for the producer. The difficulty in agricultural communities is determining what constitutes "business as usual" from an environmental standpoint, and whether it is simply compliance with regulations or some level of voluntary activity. Again, this is not likely to constrain two-party transactions but could be a major impediment in the more organized markets that will emerge in coming years.

GETTING STARTED

This chapter lays out a methodical approach to getting started in markets, beginning with an analysis of the opportunities for credit production on a given farm, proceeding through evaluations of demand, cost and risk, and ending with an analysis of options and a decision on how to proceed. It seems likely that a farmer or rancher who takes this approach will have a pretty strong plan for jumping in to environmental markets.

At the same time, the authors realize that farmers and ranchers get involved in new markets for all kinds of reasons. Perhaps their uncle or cousin tries something new and it works out, or the price of a certain commodity has just spiked, or maybe it's just time to start something new.

Environmental markets are new and largely untested marketplaces for farmers and ranchers. The risks of noncommittal regulators, bouncing prices and stranded credits are real and need to be taken seriously. However, there is tremendous promise as well. Millions of dollars are spent every year on restoration and cleanup to meet environmental regulations, and there is abundant evidence that some of it can be spent more effectively on environmental projects on farms. There is also something elegant about the idea of farmers getting paid to be good stewards of the land.

The authors hope that this guide helps farmers and ranchers get started in the exciting new world of environmental markets.

PHIL AUGUSTAVO/ISTOCKPHOTO

CHAPTER FOUR

What Farmers and Ranchers Can Do to Encourage Environmental Markets

Environmental markets are evolving rapidly in Washington and throughout the United States. Many have excellent potential for farmers and ranchers, but they could just as easily evolve in ways that are less accessible or profitable for agriculture. Farmers and ranchers, individually and through their organizations, need to be actively involved in their development.

This chapter identifies some of the key issues with farmer and rancher participation in the five markets discussed in this guide, showing how farmers and ranchers can help address these issues to the benefit of the agricultural community.

Actions for Individual Markets

In the following sections, issues with ag participation are highlighted and accompanied by discussions of what farmers and ranchers can do to address each issue.

GREENHOUSE GAS MARKETS

Limits in credit-producing activities: At the moment, the most practical carbon market opportunity is the use of anaerobic digesters in the livestock industry, although conservation tillage is marketable in some areas of the country. Conservation rangeland management and tree planting ("afforestation") are less common. Farmers and ranchers should concentrate on broadening the list of credit-producing practices. Some promising examples include reduced (and precision) application of artificial nitrogen fertilizers; amendment of soils with biochar; and limited tillage in irrigated agriculture.[93] Farmers can help by accelerating studies of credit-producing actions, pushing for reasonable rules on use of new actions, and adopting new actions to demonstrate their workability.

Organization of farmer and rancher participants: The carbon market already has institutions that make it easier for farmers to participate.[94] The Kentucky Corn Growers,[95] Iowa Farm Bureau,[96] North Dakota Farmers Union,[97] and the Pacific Northwest Direct Seed Association,[98] for example, have created programs that buy carbon credits from their members and aggregate those credits for resale to large carbon buyers. But traditional farm groups need to become much more active in offering such services to their members. More farmers need technical help from a trusted point of contact so they can easily enter the marketplace with confidence that their interests will be protected. These are not traditional activities for many farm groups. But they can be a valuable service to the membership and a source of income for the association.

Regulation of carbon emissions: A strong carbon market requires regulation of carbon emissions. Much of the agriculture industry disapproves of such regulation. So there is a risk that opposition to regulation of carbon emissions can prevent agriculture from influencing the development of farmer-useful carbon markets in the event such regulation should occur. It is quite possible that, despite ag opposition, carbon cap legislation could pass Congress without ag-friendly provisions allowing carbon trading—a bad outcome for most of agriculture. It is important for agriculture industry advocates who oppose a carbon cap to make a clear distinction that will allow them to support the use of carbon markets should that cap pass. That way they would still potentially be able to influence how those markets are designed.[99]

WETLAND, HABITAT AND BIODIVERSITY MARKETS

Institutional support for farmers and ranchers: One of the factors currently limiting ag participation in wetland, habitat and biodiversity markets is the lack of institutional support and assistance for farmers who might be interested. These markets are complicated. There are cost and regulatory advantages to the development of large wetland restoration projects that are not possible for most individual farmers. At the moment, these markets are mostly supplied by large, sophisticated wetland and habitat conservation banking firms, or by large transportation agencies and the development industry itself providing their own mitigation. Farmers and ranchers need to develop local, regional and statewide institutions to support agricultural involvement in markets. One option is the "conservation cooperative," a watershed or regional organization founded by farmers and ranchers to help them produce and effectively market environmental credits.[100]

Conversion of agricultural land: There can also be advantages for buyers (wetland bankers and development firms) in simply acquiring and converting high-quality working farmland to mitigation banks.[101] These lands are frequently inexpensive, well-located and on soils that can be easily restored as wetlands. While Washington state discourages the conversion of high quality farm soils to wetland banks, the current market for mitigation of wetlands, and to a lesser extent of habitat and biodiversity, still poses a risk that high quality working farmland may be taken out of production—a threat to the industry and to its infrastructure businesses.[102]

To some degree, the use of large, contiguous sites for wetland banks may provide ecological advantages. So there will be pressure to use them. But there is also an important ecological role for many smaller wetland sites that may be sprinkled broadly across the landscape. Farmers and ranchers need to advocate for the use of small, wet, unproductive areas found on many farms as a viable mitigation alternative and one with far better consequences for the viability of the agricultural sector. This would be consistent with the state's current approach of encouraging restoration of low productivity areas such as wet, boggy areas that were formerly, or still are, wetland.[103]

WATER QUALITY MARKETS

Approval of market options in permitting: The current factor limiting most water quality markets is lack of clarity from regulators about whether large institutional point-source polluters can trade with farmers as a means to comply with their NPDES permits. At the moment, many of the regulators who issue those permits seem to lack confidence in farmer-produced water quality credits as a means to offset point-source pollution. Sound scientific modeling of farm practices can provide more than adequate certainty and measurability,[104] and farmers and ranchers should advocate and perhaps sponsor this modeling. In addition, the dependability of farmer and rancher credits can be enhanced through proper contract enforcement, performance insurance, and by pooling many contracts and buying more than are absolutely needed.[105]

Organization of farmer and rancher participants: Water quality trading could also benefit from the development of the farmer conservation cooperatives discussed above in Chapter Two on Wetland, Habitat and Biodiversity Mitigation. Such cooperatives could help organize the farmers in a TMDL-limited watershed; help them create

marketable credits; aggregate those credits so there are enough of them to be of interest to the local buyers; improve efficiency in their production; and provide the pooling and insurance needed for buyers and regulators to feel certain that they will occur. They could support the scientific modeling needed to assure credit measurability and facilitate the independent certification of credits. They could provide farmer-credible technical assistance about the market that is needed for farmers to participate. They could participate in and improve planning for strategic implementation of improvements throughout a watershed. They could work with local conservation districts to help farmers get their practices implemented on the ground. And they could knowledgeably represent the local farm community in the development of rules and in the public education required for markets to become possible.

WATER QUANTITY MARKETS

"Buy and dry" practices in water quantity markets: One of the concerns about water quantity markets is that badly needed water will end up traded away in many transactions with individual sellers. Each of these deals may make sense for a particular seller, but they may collectively erode the long-term viability of agriculture. The Colorado "Super Ditch" mentioned in Chapter Two took a cooperative approach to preventing this outcome.[106] It also made it easier for more farmers to participate in the marketplace and made more water available to all without permanently removing it from agriculture through the creative management of leased water. By using a farmer-cooperative to market water, the farm community was able to safeguard the industry's interests and individual farmer interests while providing a steady flow of revenue for farmers and making unneeded water available for other uses—including environmental ones.

Uncertainties over water rights: Another of the limits on water markets is that the complexities and uncertainties associated with water rights cause farmers to hesitate to inquire for fear that a close examination of their water rights might reveal weaknesses in their ownership. A farmer conservation cooperative can also provide a trusted, farmer-interested contact to which farmers can turn for initial technical assistance if they are uncertain about the legal status of their water rights.

RENEWABLE ENERGY MARKETS

High costs of market entry: The limiting factors for this market seem to be the cost of entry and an outdated grid infrastructure that is often not capable of handling large contributions of power from many widely dispersed locations. By organizing (e.g. multiple dairies building a digester together), farmers might pool resources. Several farmers in a community who are interested in producing energy might convince a local power company that improvements in grid infrastructure would be justified. This will not only help farmers, it will help others as well. A grid that is more capable of accepting diverse, decentralized sources of energy seems likely to increase entrepreneurial opportunities for many new, innovative, green sources of supply.

Advocating for reasonable baselines

Buyers of environmental credits do so to mitigate for or offset damage they would otherwise need to prevent in some other way. So the credits they buy must represent an actual improvement in that environmental value. The seller must do more than just continue "business as usual." And those changes need to be greater than the seller would have been required to make without a deal. Environmental market transactions, therefore, will pay only for those improvements that are in excess of a "baseline" of environmental performance provided by the seller.

Obviously, the more stringent the baseline, the less a farmer or rancher will have to sell. Buyers, sellers and regulators may have different perspectives on what that baseline should be. A seller might argue that, so long as there is no current enforcement action underway against him, anything new he does should be paid for since without the payment the improvements would not have taken place. A regulator might argue that everyone should behave responsibly toward the environment, and only extraordinary conduct should be paid for. Or the two might reach agreement on some compromise baseline that represents an agreed-upon level of minimum performance above which payment can be received.

What is appropriate as a baseline for an environmental market is a matter of judgment and perspective. If baselines are to be established that allow the market to work and that leave room for some reasonable opportunity for profit, it is essential that farmers and ranchers be actively involved in their development. This is a role that could be played by existing farm groups or by cooperatives created specifically to represent farmers and ranchers in selling environmental credits.

Identifying possibilities for new markets

The five markets discussed in this guide were chosen because each presents current opportunities for farmers and ranchers. But there are other potential markets for farm-produced environmental services that may have escaped mention here or that seem likely to emerge in the future. A couple of examples include:

Flood mitigation: For example, many urban communities face an ever-increasing risk of flooding. The protection of farmland or the completion of restoration projects on lands located in the upstream watersheds from these communities could help reduce future flood risks and could mitigate for environmental flood-risk impacts of future development elsewhere in these watersheds. The Federal Emergency Management Agency (FEMA) is currently developing rules that could require future watershed development, even within urban areas, to provide such mitigation.[107] This ordinance and other flood mitigation requirements could result in funding for protection of farmland and for wildlife and other restoration activities on private farms in affected watersheds.

Transfer of development rights (***TDR***)***:*** TDR programs represent another potential opportunity for farmers and ranchers. For example, a current proposal by the Cascade Land Conservancy in Seattle would authorize "rural villages" to be created in rural areas on the condition that developers purchase development rights from surrounding undeveloped lands, such as local farmland.[108] Protecting nearby farmland for farming would provide farmers with added revenue, mitigate for the

harmful impacts of allowing additional development in rural areas, and allow farmers to continue in active agriculture.

Alert farmers and ranchers are likely to be the first to recognize such possibilities that appear in their own local communities. They may have an early chance to influence how such efforts operate, helping ensure they result in the protection of agricultural lands and the improvement of economic viability for farm operations.

Educating government and the community

Environmental markets benefit everybody, not just farmers. But, as with most good ideas, there must be some group with a significant financial interest to lead the public debate in order for the idea to take hold. Farmers are that group.

Work with the business community: It seems likely that the agricultural industry can be highly effective in this role. Traditional agricultural associations like the Farm Bureau and individual commodity groups have a history of being good at working well with the business community. Since environmental markets provide a benefit to the economy by reducing the necessary cost of environmental protection, this is clearly an occasion for traditional ag groups to take the lead with other business leaders.

Form coalitions with food groups: Agriculture can also take advantage of increasing consumer/public interest in local farms and local, sustainable, direct market food. The industry has leaders in this community who can speak directly and convincingly with the environmental groups that will have great influence over the adoption of rules needed to make these markets work. Washington Tilth in the organic industry, farmers markets and other direct farmer market organizations, local food policy councils and food safety and security groups, and a growing number of local community food advocacy groups organized at the county level all represent opportunities for agriculture to make the case to environmentalists and to urban voters and their elected representatives about environmental markets.

Advocate for markets with public officials: Agriculture is also usefully organized at the local, state and national levels to carry this debate to every level of government. In Washington, many of our counties have local advisory commissions or boards that can provide official guidance to county governments. And farm organizations like the Grange, Farm Bureau, Farmers Union and a multitude of commodity organizations and commissions are well positioned to argue the case at the state, federal and local levels.

Give markets a try: Making the case for environmental markets will also require that increasing numbers of farmers actually begin using them. So the hope is that informed farmers will keep an eye out for opportunities that may arise. At the same time, America's conservation district professionals are the logical group to help keep a close eye on environmental market opportunities for specific farmers in their local communities. These markets represent a new and potentially substantial way to pay for voluntary, market-based conservation. And conservation district personnel may be the first to recognize the possibilities for particular farmers with whom they may already be working.

Identify new markets and market opportunities: Finally, public officials, community activists, business owners and government agency personnel may not appreciate the possibilities of markets as they face new environmental challenges. Farmers and ranchers may need to make them aware of ways in which agriculture can easily and profitably help solve local environmental problems by selling credits through such markets. For example, without farmer participation in supplying habitat mitigation, a new (and much desired) shopping mall that would threaten critical wildlife habitat might not be built or might cost much more than would otherwise be necessary. Or highly inconvenient environmental regulations that threaten to damage a local economy might become unnecessary given the chance to purchase water quality or other environmental improvements from nearby agriculture. By being involved in community affairs and conscious of the possibilities of environmental markets, farmers and ranchers can help their local communities avoid such outcomes.

NOTES

93 See generally the materials produced by the Washington State University Climate Friendly Farming project, online at: http://csanr.wsu.edu/publications/researchreports/cffreport.html. On Biochar, see discussion at: http://www.biochar.org/joomla/index.php?option=com_content&task=view&id=67&Itemid=7&limit=1&limitstart=6

94 For example, the Chicago Climate Exchange (CCX): http://www.chicagoclimatex.com.

95 The Kentucky Corn Growers Carbon Trading Program is discussed at: http://www.chicagoclimatex.com.

96 See the AgraGate website at: http://www.agragate.com/about/default.aspx.

97 See the NFU website at: http://nfu.org/issues/environment/carbon-credits, and the NDFU site at: http://carboncredit.ndfu.org.

98 The PNDSA discussion is at: http://www.directseed.org/carbonhistory.html#carbonhistory.

99 The AFBF policy on this is to oppose current climate legislation but to support offset trading should such legislation pass. See: http://www.fb.org/issues/docs/climatechange10.pdf.

100 See the discussion also under "organixation of farmer and rancher participants" on the next page.

101 A few recent examples include: In Skagit County—see: http://www.skagitonians.org/upload_pubs/Wetland%20Mitigation%20Bank%20Settlement%20Agreement%20Fact%20Sheet%20FINAL031320091.pdf; In Snohomish County, see: "Preservation with a profit," Christopher Schwarzen (Seattle Times, 11/1/06); and a similar controversy occurred in Whatcom County over the Meridian widening. See: http://www.wsdot.wa.gov/projects/SR539/tenmileborder.

102 Policy at the WA Department of Ecology for the siting of wetland banks discourages locating them on high quality farm soils. See WAC 173-700-303(2). Obtained at: http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/pdf/Guidance/RuleText_EasyRead.pdf.

103 Policy at the WA Department of Ecology for the siting of wetland banks encourages their location in wet, otherwise non-productive areas: See WAC 173-700-303. Obtained at: http://www.ecy.wa.gov/programs/sea/wetlands/mitigation/banking/pdf/Guidance/RuleText_EasyRead.pdf.

104 See: Evaluation Framework for Water Quality Trading Programs in the Chesapeake Bay Watershed, Mid-Atlantic Water Quality Program, (2009), Pg. 21-22 and note 11. Obtained at: http://www.mawaterquality.org/publications/documents/STACMAWPTradingEvaluation_001.pdf.

105 E.g. see the approach taken by PNDSA to aggregating carbon for their client, Entergy Corporation discussed in the carbon project example in Chapter 2, above.

106 In many instances, WA irrigation districts could use this cooperative rotational pool model.

107 See the discussion on the FEMA website at: http://www.fema.gov/about/regions/regionx/nfipesa.shtm.

108 See generally the discussion at Cascade Land Conservancy's website at: http://cascadeagenda.com/tdr/cascade-land-conservancy-activities. And see: http://cascadeagenda.com/files/leadership/Agenda%20and%20Background-final.pdf, at page 3.

APPENDIX

Contacts, Resources and Literature

Carbon Markets

MARKETS AND BUYERS

Bonneville Environment Foundation
(BEF is, among other things, a market for carbon credits in the PNW.)
www.b-e-f.org
www.b-e-f.org/business/products/offsets
(503) 248-1905

Chicago Climate Exchange (CCX)
(Until recently, the top market for carbon credits in the United States. CCX prices have declined as other markets with higher credit standards have taken over the voluntary marketplace.)
www.chicagoclimatex.com

Climate Action Reserve
(An active marketplace for high quality carbon credits based in California but available in Washington)
www.climateactionreserve.org
(213) 891-1444

Climate Trust
(A private non-profit advocacy group that operates its own voluntary offset program)
www.climatetrust.org/offset.html

Iowa Farm Bureau program — AgraGate
(Provides carbon aggregation services for carbon markets to farmers throughout the United States)
www.agragate.com/about/default.aspx

Kentucky Corn Growers Carbon Trading Program
(Provides aggregation services for carbon markets to its membership)
www.chicagoclimatex.com

National Farmers Union carbon aggregation program
(Provides carbon aggregation services for carbon markets to farmers throughout the United States)
http://nfu.org/issues/environment/carbon-credits and the North Dakota Farmers Union site at http://carboncredit.ndfu.org

Northwest Natural Resources Group (NNRG)
(Operates the Northwest Neutral carbon offset program for forest products and resources)
http://nnrg.org/NW-Neutral

Regional Greenhouse Gas Initiative (RGGI)
(This is the group creating a carbon market for the Northeastern United States.)
www.rggi.org/home

Voluntary Carbon Standard (VCS)
(A group creating a new, higher standard for quality carbon credits. A market available in Washington.)
www.v-c-s.org/

Western Climate Initiative (WCI)
(WCI is a collaboration among western states and Canadian provinces staffed through the Western Governor's Association and seeking to create a carbon market in the western states.)
www.westernclimateinitiative.org

INFORMATIONAL WEBSITES

American Farmland Trust: Engaging Farmers in Climate Change Solutions
(This site collects reports and information from several farmer events from around the country at which input was taken on ag perspectives on carbon markets.)
www.farmland.org/programs/environment/workshops/default.asp

Climate Friendly Farming
(WSU is a national leader on climate issues – this site contains much of the current information on the status of various approaches to ag participation.)
http://csanr.wsu.edu/CFF/
(253) 445-4626

Ecosystem Marketplace, *Building Bridges: State of Voluntary Carbon Markets, 2010*
http://moderncms.ecosystemmarketplace.com/repository/moderncms_documents/state_of_v_carbon_summary.1.1.pdf

International Emissions Trading Association
(Provides updated information on international carbon markets)
www.ieta.org/ieta/www/pages/index.php

PNW Direct Seed
www.directseed.org/carbontrading.html
www.directseed.org/carbonhistory.html#carbonhistory (specifically on their no-till carbon trading project)

Western Climate Initiative
(The latest information on the effort to create a unified western states carbon market.)
www.westernclimateinitiative.org/
(360) 407-0291

Washington State University's "Climate Friendly Farming" project
(Includes substantial information on the current state of research into agricultural practices with potential for carbon credit generation)
http://csanr.wsu.edu/publications/researchreports/cffreport.html www.biochar.org/joomla/index.php?option=com_content&task=view&id=67&Itemid=7&limit=1&limitstart=6

LITERATURE

American Farm Bureau Federation policy on climate legislation
(States the AFBF position on climate legislation)
www.fb.org/issues/docs/climatechange10.pdf

EcoSecurities Consulting Limited, *Forecasting the Future Value of Carbon: A literature review of mid to long term forecast,* January 30, 2010
(Detailed analysis of various forecasts and approaches to forecasting future prices for carbon — including the impact of potential legislation)
www.nwcouncil.org/energy/grac/20090130_Carbon%20Price%20Forecasts_NWPCC_FINAL.pdf

Huggins, D.R., & Kruger, C.E. *Improving Nitrogen Use Efficiency in Dryland Cereal Crops with Precision Nitrogen Management* Technology, (2008), Sustaining the Pacific Northwest, Fall 08
(Describes the state of the science on potential carbon impacts of artificial nitrogen fertilizers)
http://csanr.wsu.edu/publications/SPNW/SPNW-v6-n2.pdf#page=5

Lewandrowski, J., *Additionality*, (2008)
(Describes the issues and concerns surrounding "additionality" and "baseline" in carbon markets)
www.farmland.org/programs/environment/workshops/documents/Additionalitybriefingpaper.pdf

REGULATORS/GOVERNMENT AGENCIES

U.S. Environmental Protection Agency website on climate change
(Provides a description of climate issues and links to programs and information)
www.epa.gov/climatechange/basicinfo.html
Washington Department of Ecology Climate Change Program
(DOE has primary responsibility for climate policy in Washington state)
www.ecy.wa.gov/climatechange
(360) 407-6848

Wetland, Habitat and Biodiversity Markets

MARKETS AND BUYERS

Washington Department of Ecology Wetlands Program
(DOE manages wetland banks and wetland mitigation in Washington.)
www.ecy.wa.gov/programs/sea/wetlands/index.html
Washington Department of Fish and Wildlife
(WDF&W regulates aquatic habitats for salmon and other wildlife.)
http://wdfw.wa.gov/habitat/permits_regs.html
Washington Department of Transportation road projects
(WSDOT is the largest single buyer of mitigation in the state.)
www.wsdot.wa.gov/projects/
Wildlands
(Wildlands is the leading wetland and conservation banking firm in Washington.)
www.wildlandsinc.com/

INFORMATIONAL WEBSITES

American Farmland Trust, *Maximizing Opportunities for Farmland Protection in Environmental Markets (and minimizing the potential for loss)*, March 2010
www.farmland.org/environmentalmarkets
Ecosystem Marketplace
Habitat and species banking
(This is a strong resource for habitat and wildlife market banks, generally.)
www.speciesbanking.com
Ecosystem Marketplace Network
(Describes the state of wildlife conservation banking nationwide)
www.speciesbanking.com

LITERATURE

Gordon Dairy trumpeter swan protection and easement
(Describes the farmland and trumpeter swan easement at the Gordon Dairy)
www.farmland.org/programs/campaign/voices/wildlife-conservation-washington-dairy.asp
Skagitonians to Preserve Farmland, *Mitigation Bank Settlement Agreement Fact Sheet*
(Describes the final agreement on the Clear Valley wetland mitigation bank in Skagit County)
www.skagitonians.org/upload_pubs/Wetland%20Mitigation%20Bank%20Settlement%20Agreement%20Fact%20Sheet%20FINAL031320091.pdf
Wilkinson, J, and Thompson, J., *2005 Status Report on Compensatory Mitigation in the United States.* Environmental Law Institute, 2006
(Provides a comprehensive survey of mitigation programs in the United States)
www.ecosystempartners.com/download/market_mitigationoverview.pdf

WSDOT Project Environmental Mitigation Costs: Case Studies, Third Edition
(Annual collections of case studies describing mitigation projects of the Washington Department of Transportation)
www.wsdot.wa.gov/projects/mitigation/default.htm

REGULATORS/GOVERNMENT AGENCIES

Federal Emergency Management Agency
(Explains FEMA's role in a new salmon habitat model ordinance that may drive new flood mitigation requirements)
www.fema.gov/about/regions/regionx/nfipesa.shtm
U.S. Environmental Protection Agency
(Summary of federal regulatory requirements relating to wetland mitigation under the Clean Water Act)
http://epa.gov/wetlandsmitigation
Washington Department of Ecology Wetlands Program
(DOE manages wetland banks and wetland mitigation in Washington.)
www.ecy.wa.gov/programs/sea/wetlands/index.html
Washington Department of Fish and Wildlife
(WDF&W regulates aquatic habitats for salmon and other wildlife.)
http://wdfw.wa.gov/habitat/permits_regs.html
U.S. Fish & Wildlife Service
(Provides information on listings of endangered terrestrial species)
www.fws.gov/endangered/
NOAA Fisheries
(Provides information on listings of endangered marine fish species)
www.nmfs.noaa.gov/pr/laws/esa/

Water Quality Markets

MARKETS AND BUYERS

Washington Association of Sewer and Water Districts
(WASWD is the trade association for many of the wastewater treatment utilities that might be interested buyers of water quality credits in Washington.)
https://www.waswd.org/Default.aspp
Spokane River Stewardship Partners
(The website for the organization representing the principal NPDES permittees on the Spokane River)
www.spokaneriverpartners.com

INFORMATIONAL WEBSITES

Ecosystem Marketplace — Water quality trading website
(A good collection of information about water quality trading)
www.ecosystemmarketplace.com/pages/dynamic/web.page.php?section=water_market&page_name=tmdl_market
Miami Conservancy District — Great Miami River Water Quality Trading Program
(This is the most active trading program for farmers in the country. The website is very informative on their procedures for buying credits.)
www.miamiconservancy.org/water/quality_credit.asp
USDA Natural Resources Conservation Service
Field Office Technical Guide
(Most of the conservation practices farmers are likely to use to earn environmental credits are described in the NRCS FOTG.)
www.nrcs.usda.gov/technical/efotg/index.html

Conservation Practice Physical Effects

(Provides a table that describes the on-the-ground effects for each of the NRCS best management practices in the Field Office Technical Guide)
www.nm.nrcs.usda.gov/technical/fotg/section-5/CPPE.html

LITERATURE

Evaluation Framework for Water Quality Trading Programs in the Chesapeake Bay Watershed, Mid-Atlantic Water Quality Program, (2009)

(Provides a framework for evaluating the success and effectiveness of water quality trading programs generally, with specific reference to programs in the Chesapeake Bay)
www.mawaterquality.org/publications/documents/STACMAWPTradingEvaluation_001.pdf

Hamilton, K., 2006. *Testing the Waters: The Great Miami River Watershed Water Quality Credit Trading Program,* (2006) The Katoomba Group's Ecosystem Marketplace News.

(Describes the Great Miami water quality trading program)
www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=4568&section=home&eod=1

Water Quality Programs: An International Overview, World Resources Institute Issue Brief, March 2009

(Identifies the factors for success in an evaluation/assessment of 57 water quality trading programs — 51 of which were in the United States.)
http://pdf.wri.org/water_trading_quality_programs_international_overview.pdf

REGULATORS/GOVERNMENT AGENCIES

Washington Department of Ecology

Water Quality Program

(Washington water quality is regulated by DOE. This site describes their programs.)
www.ecy.wa.gov/programs/wq/wqhome.html

Water quality TMDLs

(Provides TMDL and NPDES permit info for Washington)
www.ecy.wa.gov/programs/wq/tmdl

Spokane River TMDL

(Describes the new Spokane River TMDL)
www.ecy.wa.gov/programs/wq/tmdl/spokaneriver/index.html

U.S. Environmental Protection Agency resources

Water Quality Trading Program

(EPA's website contains a wealth of information on water quality trading around the United States.)
www.epa.gov/owow/watershed/trading.htm

Water Quality Trading Assessment Handbook, USEPA

(With no Washington state policy, EPA's handbook is a valuable resource. It describes what is required for trading be to be accepted by EPA.)
www.epa.gov/owow/watershed/trading/handbook/docs/NationalWQTHandbook_FINAL.pdf

Clean Water Act - 33 U.S.C. §1251 et. seq. 1972

(Summary of water quality requirements of the Clean Water Act)
www.epa.gov/watertrain/cwa

Water Quality Trading Toolkit for Permit Writers

(Resource on how permit writers view water quality trading)
www.epa.gov/owow/watershed/trading/WQTToolkit.html

Water Quantity Markets

MARKETS AND BUYERS

Columbia Basin Water Transactions Program
(CBWTP is funded by BPA and is a highly active purchaser in the Columbia Basin.)
www.cbwtp.org/jsp/cbwtp/index.jsp

Trout Unlimited — Washington Water Project
(Formerly Washington Rivers Conservancy - a major purchaser of water rights)
www.tu.org/conservation/western-water-project/washington
(509) 888-0970

Washington Water Trust
(A major purchaser of water rights in Washington)
http://washingtonwatertrust.org
(206) 675-1585 (Westside) or (509) 925-5600 (Eastside)

INFORMATIONAL WEBSITES

Columbia Basin Water Transactions Program (CBWTP)
(Details for cost and nature of Columbia River transactions can be queried at the CBWTP.)
www.cbwtp.org/jsp/cbwtp/index.jsp
www.cbwtp.org/jsp/cbwtp/query/query.jsp

LITERATURE

Landowners Guide to Washington Water rights
(This provides an excellent and readable description of water rights in Washingtonby Washington Rivers Conservancy [now Trout Unlimited Washington Water Project].)
www.warivers.org/wrc_handbook.pdf

Lower Arkansas Valley Water Conservancy District, *Arkansas Valley Irrigators Incorporate 'Super Ditch Company'*
(A description of the Super Ditch concept — how a farmers' cooperative can work in the water rights transactions arena)
www.lavwcd.org/pressreleases/Arkansas-Valley-Irrigators-incorporate-Super-Ditch-Company.html

Malloch, S., *Liquid Assets: Protecting and Restoring the West's Rivers and Wetlands through Environmental Water Transactions,* (2005), Trout Unlimited
(A survey of current water transactions programs and an assessment of how to use water rights acquisitions effectively)
www.tu.org/atf/cf/{ED0023C4-EA23-4396-9371-8509DC5B4953}/Malloch.LiquidAssets.2005.pdf

Policy Consensus Center, *Of Water and Trust: A Review of the Washington Water Acquisition Program,* (2004)
(Analysis and assessment of existing water rights acquisitions in Washington)
www.ecy.wa.gov/programs/wr/instream-flows/ofwater_trust.html

Washington Department of Ecology, *2008 Report to the Legislature: Water Banking in Washington State.* Publication no. 09-11-024
(Describes the status of water banking in Washington)
http://www.ecy.wa.gov/programs/wr/market/waterbank.html

REGULATORS/GOVERNMENT AGENCIES

Washington Department of Ecology
Water market programs
www.ecy.wa.gov/programs/wr/market/market.html
(Explains the three basic water market programs authorized at the Washington Department of Ecology)
(509) 457-7140

Water banking program
(Explains the water banking program in particular)
www.ecy.wa.gov/programs/wr/market/waterbank.html
Water acquisition program
(Provides Washington info on critical flow-limited basins)
www.ecy.wa.gov/programs/wr/market/wacq.html
Priority water acquisition basins
(Identifies the 16 basins that have inadequate flows for fish and are priorities for water rights acquisitions)
www.ecy.wa.gov/programs/wr/market/pdfs/16basinsmap.pdf.

Renewable Energy Markets

MARKETS AND BUYERS

Washington Public Utility District Association
(The principal purchasers of renewable energy and RECs in Washington will be the major energy utilities, which are likely to be members of this association.)
www.wpuda.org/index.cfm

INFORMATIONAL WEBSITES

Database of State Incentives for Renewables & Efficiency
(This is a source for utility, state and federal incentives for renewable energy projects.)
www.dsireusa.org
Green-E
(An independent certifier of renewable energy credits)
www.green-e.org
Guide to states with renewable portfolio standards, U.S. Department of Energy
(Provides a description of various state renewable energy standards)
http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm
Interstate Renewable Energy Council
(Provides technical information about issues such as connecting to the energy grid)
http://irecusa.org
Municipal Research and Services Center's website
(Provides a list of county and municipal siting and zoning requirements for renewable energy projects)
www.mrsc.org/Subjects/Planning/energy/e-plan.aspx
Northwest SEED (Sustainable Energy for Economic Development)
(Provides educational workshops and publications about developing renewable energy projects)
http://nwseed.org
Overview of WA standards and REC markets, Washington State Legislature
(Provides an overview of the requirements of Initiative 937)
www.leg.wa.gov/Senate/Committees/EWE/Documents/RenewableEnergy.pdf
Qualco Energy Corporation
(The website for Qualco Energy — the farmer-Tribal cooperative project to generate power from dairy waste)
www.qualcoenergy.com
Washington State Dairy Federation
(The Dairy Fed has been quite active in promoting the development of digesters in Washington.)
www.wadairyfederation.org

LITERATURE

Hardcastle, A. & Waterman-Hoey, S., *Renewable Energy Industry Trends and Workforce Development in Washington State,* (2009), Washington State University

(Analysis of status and projections for renewable energy in Washington)
www.energy.wsu.edu/documents/workforce/Renewble_Energy_Tends_Phase_I_FINAL_Report_090408.pdf

Lester, D., "Manure digester not all that Zillah dairy expected," *Northwest Renewable News,* (February 2010)

(Press article contains useful economic details on one of Washington's working anaerobic digesters.)
http://nwrenewablenews.wordpress.com/2010/02/05/manure-digester-not-all-that-zillah-dairy-expected

Mazza, P., *Community Wind 101: A Primer for Policymakers,* (2008), Climate Solutions

(Useful discussion of wind projects developed by local communities)
www.ef.org/docs/CommWind_web.pdf

National Renewable Energy Laboratory, *An Examination of the Regional Supply and Demand Balance for Renewable Electricity in the United States through 2015,* (2009), NREL/TP-6A2-45041

(Projections for future demand for renewable power)
www.nrel.gov/docs/fy09osti/45041.pdf

Olsen, A., *Farm Energy Success Stories,* (2010), Environmental Law and Policy Center

(Case-study examples of renewable energy projects on farms—including some useful economic details)
http://farmenergy.org/wp-content/uploads/2010/03/ELPC-FarmEnergySuccessStoriesFinal.pdf

Puget Sound Energy, "All Generation Sources RFP, Exhibit G: Schedule of Estimated Avoided Cost," (2010)

(Provides estimates of likely contract prices for new energy generation sources)
www.pse.com/sitecollectiondocuments/energysupply/rfp/Final%20All%20Source%20RFP/ExG_RFP.pdf

Schnepf, R., *CRS Report for Congress: Agriculture-Based Renewable Energy Production,* Congressional Research Service, (2007), RL32712

(A comprehensive description of the potential for agriculture based energy)
http://collinpeterson.house.gov/PDF/agenergy.pdf

Shoemaker, J. A., *Farmers' Guide to Wind Energy,* Farmers' Legal Action Group, (2007)

(A useful guide to what farmers need to know to participate in wind energy projects)
www.flaginc.org/topics/pubs/wind/FGWEcomplete.pdf

Summit Blue Consulting, LLC, *Renewable Energy Credit Prices — The Market Signal from the State Renewable Portfolio Standard Program,* (2008)

(An assessment of the state of the renewable energy market)
www.nyserda.org/rps/SB%20EXH%20C%20REC%20Price%20Report_11-14-08.pdf

Svejkovsky, C., *Renewable Energy Opportunities on the Farm,* (2006), ATTRA Publication #IP304

(Describes various renewable energy possibilities for ag producers)
http://attra.ncat.org/attra-pub/energyopp.html

Washington Renewable Energy Standard, Database of State Incentives for Renewables & Efficiency, (2009)

(Explains Washington's renewable energy standards under I-937 and provides local contacts at the Department of Commerce)
www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=WA15R&re=1&ee=1

REGULATORS/GOVERNMENT AGENCIES

U.S. Environmental Protection Agency *EPA's Green Power Partnership: Renewable Energy Certificates,* (2008)
(This is EPA's site describing renewable energy certificates and how they work and links to 3rd party REC marketers.)
www.epa.gov/grnpower/gpmarket/rec.htm

U.S. Department of Energy, Energy Efficiency and Renewable Energy's website
(Provides general information about renewable energy sources, government programs and financial opportunities)
www.eere.energy.gov

Washington Department of Commerce Energy Policy Division's website
(Provides contact information for utilities, a directory of renewable energy companies, and information about renewable energy policies)
www.commerce.wa.gov/site/526/default.aspx

Washington Department of Revenue, "Special Notice: Renewable Energy System Cost Recovery Program – Production Incentive," (2009)
http://dor.wa.gov/Docs/Pubs/SpecialNotices/2009/sn_09_RenewableEnergy.pdf

General Resources on Environmental Markets and Agriculture

American Farmland Trust materials on environmental markets in the Northwest
(This is the collection of materials and efforts being undertaken by AFT.)
www.farmland.org/environmentalmarkets

Katoomba Group's Ecosystem Marketplace
(Ecosystem Marketplace is probably the top place where international information on environmental markets, generally, is shared.)
www.ecosystemmarketplace.com

Washington Conservation Markets Study — Final Report (2009)
(This is the report on the study commissioned by the Washington State Legislature on how environmental markets can work for agriculture.)
www.farmland.org/programs/states/wa/documents/WAConservationMarketsStudyReport_27Jan2009.pdf

Washington State Conservation Commission
(WSCC and Washington's local conservation districts are likely partners and resources in implementing conservation practices on farms.)
www.scc.wa.gov
(360) 407-6200

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