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**Virtual Commission Meeting**  
**March 20, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

March 20, 2024

Business Meeting	March 20, 2024	10:00 am – 12:30 pm
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### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](http://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA).  
There may be a slight delay when streaming the meeting content.
- **Phone:** Dial 1 669 900 6833, Meeting ID number: 895 4327 8461, Passcode: 084229
- **Zoom:** <https://us02web.zoom.us/j/89543278461?pwd=NkV4YkRJSmJNdzhITW1pdGVVS2UzUT09>

### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#). The deadline for submitting written comments and requests to make verbal comments is **4:00 pm Monday, March 18, 2024**.

Verbal comments:

- Limited to three minutes
- Will be heard in the public comment period

Provide the following information for virtual verbal comments:

- Your first and last name
- The topic of your comment
- The phone number you will use when calling the meeting.

If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

### Agenda

#### A. Welcome & Introductions (10:00 am)

#### B. Public Comment (10:30 am)

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

#### C. [Review Role of Oregon Agricultural Heritage Commission \(10:40 am\)](#)

OAHP Coordinator Taylor Larson will walk the commission through the Commission Manual and facilitate a discussion about the role of the Commission. *Information item.*

#### D. [2024 Program Refinements \(10:50 am\)](#)

Program Coordinator Taylor Larson and Conservation Easement Specialist Robin Meacher will update the commission on refinements being made to the program for 2024. *Information item.*

#### E. [Legislative and Funding Update \(11:10 am\)](#)

Acquisitions and Special Programs Manager Renee Davis will update the commission on recent legislative and funding developments affecting the OAHP program. *Information item.*

**F. [Conservation Management Plan Implementation Methodology Update \(11:30 am\)](#)**

OAHN Coordinator Taylor Larson and Barbara Wyse from Highland Economics will walk the Commission through a near final draft of the Conservation Management Plan Implementation Methodology, solicit feedback and answer questions. *Information item*

**G. [2024 Commission Work Plan \(12:15 pm\)](#)**

Program Coordinator Taylor Larson will walk the Commission through a programmatic timeline with a focus on upcoming Commission activities in 2024. *Information item*

**Contact Information**

*OAHN Program Coordinator – Taylor Larson*

[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

*OAHN Conservation Easement Specialist – Robin Meacher*

[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

March 20, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM C – Reviewing the Role of the OAHC

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Taylor Larson, OAHP Program Coordinator  
Renee Davis, OWEB Acquisitions and Special Programs Manager

#### Introduction

This staff report provides context relating to the role of the OAHC.

#### Background

All new OAHC members receive a manual that outlines their role on the commission as it relates to the Oregon Agricultural Heritage Program (OAHP). Staff will walk the commission through the most current version of the OAHC Manual and facilitate a brief discussion as to the important role that the commission plays in the administration of the OAHP program.

#### Recommendation

This is an information item only.



# STAFF REPORT

## Oregon Agricultural Heritage Program

March 20, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM D – 2024 Program Refinements

**To:** Oregon Agricultural Heritage Commission (OAHC)

**From:** Taylor Larson, OAHP Program Coordinator  
Robin Meacher, OAHP Conservation Easement Specialist  
Renee Davis, OWEB Acquisitions and Special Programs Manager

#### Introduction

This staff report provides an overview of refinements being made to the Oregon Agricultural Heritage Program (OAHP) grant offerings for 2024 as a result of work done by the OAHP Application Process Committee in May of 2023 and subsequent follow-up work by staff.

#### Background

In March 2023, the OAHC recommended funding for its first round of working lands conservation covenant and easement and conservation management plan grants. As a result of lessons learned during this initial grant solicitation, the commission appointed an Application Process Committee to consult with staff on how to adjust the application process to ensure that the commission has the information necessary to make sound funding recommendations and applicants understand how applications are evaluated. The Application Process Committee met in May of 2023. Staff presented draft updates of the application for the Working Lands Conservation Easement grant program and the committee reviewed the application refinements for consistency with administrative rule. The committee also discussed areas for further development prior to a future solicitation, including additions to the required documentation requested at time of application and revisions to the grant applications and program guidance. Other OAHP grant programs were not part of the discussion at the time.

2023 Funded OAHP Projects				
Project Name	Applicant	OWEB Award	Type	Status
Wahl Ranch	Wild Rivers Land Trust	\$2,702,395	Conservation Easement	In Progress
Aspen Valley Ranch – Rim Tract	Deschutes Land Trust	\$286,280	Conservation Easement	In Progress
Seeley Farm Phase 1	Oregon Agricultural Trust	\$276,297	Conservation Easement	In Progress
Pitchfork T	Deschutes Land Trust	\$129,175	Conservation Easement	In Progress

O'Keefe Ranch	Oregon Agricultural Trust	\$277,776	Conservation Easement	In Progress
Ferrell, Justin and Jayna	Oregon Agricultural Trust	\$223,056	Conservation Easement	In Progress
Hagen	McKenzie River Trust	\$289,233	Conservation Easement	In Progress
Baker and EOARC Wet Meadow Management Plans	High Desert Partnership	\$41,366	Conservation Management Plan Development	In Progress
Branch Road Farm Conservation Management Plan	Coast Fork Willamette Watershed Council	\$24,942	Conservation Management Plan Development	In Progress

## Refinements for 2024 OAHP Solicitation

### Conservation Covenants and Easements -- Application Format and Process Revisions

OAHP staff began identifying and cataloging potential changes to the application and solicitation process for Working Lands Conservation Covenant and Easement grant applications during the application evaluations in 2022-23. This process resulted in reworking the application to center questions on gathering baseline information on the real estate and transaction items integral to evaluating readiness and likely success of a conservation easement project. Refinements include more questions designed to capture details from the applicant about the specific agricultural and natural resources the land supports and that the project seeks to protect. Examples include requesting more standardized data on soil types and distribution; applicable water rights; habitat and vegetation types, distribution, and quality; and how the specifics of the proposed project will result in long-term protection of those resources. The application also seeks to gather more details about current property management and whether/how those actions are expected to change as a result of the project. Application questions were also rewritten to closely track the information identified by the committee as most relevant to the evaluation criteria.

The next solicitation, which is tentative pending final outcomes of the 2024 Legislative Session, will involve a review process that utilizes a technical review team (TRT) consisting of agricultural, rangeland, fish and wildlife habitat, water quality, and land use experts. In addition, regional experts may be asked to provide specific knowledge regarding components of certain projects. The supplemental review team members will provide regional, project-specific feedback to OAHP staff, which staff will then relay to the TRT during the review team meeting. The TRT will evaluate and rank all project applications to inform the staff evaluations and funding recommendations presented to the commission. Site visits to each project will be required and attended by OWEB staff.

### Conservation Covenants and Easements -- Program Guidance

The committee also suggested and discussed certain topics in the program guidance that would benefit from additional context. The program guidance accompanies grant applications as part of a grant solicitation cycle. In addition to suggestions from the committee, staff solicited feedback from all grantees on the level of clarity provided by the program guidance. Based on the adjustments to the

application and additional information from these feedback sessions with grantees, staff reworked the application and program guidance document to provide further detail on expectations around the type of information the applications are seeking to gather. These revisions present potential future applicants with the program's expectations on the level of completeness of certain foundational aspects of program design – including supporting documentation for the proposed purchase price, the level of detail in the title analysis, and the level of agreement on the terms and conditions of a proposed easement between the landowner and the easement holder. The revised program guidance document also speaks to expectations of the program post-grant award, so potential applicants and interested landowners can have an idea of what is required to bring a OAHF covenant or easement project to closing.

As part of the revision process for the program guidance, staff worked with Oregon Department of Justice to develop a conservation easement example that is better aligned with the program goals and needs. The easement example will be provided to potential applicants along with the other program guidance to demonstrate OWEB's expectations for requirements involving OWEB's administrative rights within any easement funded with OAHF funds. Potential applicants will be encouraged to consult with OWEB staff prior to submitting an application if they expect to present an easement draft that significantly departs from the required language presented in the easement example.

#### **Conservation Management Plan and Technical Assistance – Revisions**

As described in the Item E staff report, the Conservation Management Plan (CMP) grant program and associated Technical Assistance (TA) grants are receiving at least \$750,000 to develop and implement CMPs that have carbon sequestration and greenhouse gas emissions reduction benefits. Before the solicitation can open, staff will need to conduct an outreach process to gather input from tribes, environmental justice communities, and other partners such as land trusts and agricultural organizations. Based on the results of this outreach, the CMP and TA applications for the 2024 solicitation will be updated to include questions that aim to understand the potential carbon sequestration benefits of the proposed project. The CMP application will also be adjusted to allow applicants to apply for development and initial implementation of CMPs in a single application.

#### **Recommendation**

This is an information item only.



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

March 20, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM E – Legislative and Funding Update

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Renee Davis, OWEB Acquisitions and Special Programs Manager  
Taylor Larson, OAHP Program Coordinator

#### Introduction

This staff report provides an overview of recent actions taken by the Oregon Legislature, the Governor, and the Oregon Climate Action Commission that impact the Oregon Agricultural Heritage Program (OAHP) in 2024 and beyond.

#### Background

[House Bill 3409](#) was signed into law by the Governor on July 27<sup>th</sup>, 2023. The Bill established a Natural and Working Lands (NWL) Fund that is administered by OWEB and overseen by the Oregon Climate Action Commission. Money appropriated to OWEB from the fund is to provide incentives to help landowners, Indian tribes, land managers and environmental justice communities adopt practices that support natural climate solutions; and (b) Provide financial assistance for technical support for landowners, Indian tribes, land managers and environmental justice communities for the adoption of natural climate solutions.

#### Status Update

The Oregon Climate Action Commission has directed OWEB to use \$1,500,000 of the funds through the Open Solicitation grant program and \$750,000 of the funds through the Oregon Agricultural Heritage Program (OAHP) for technical assistance and to develop and implement Conservation Management Plans that have carbon sequestration and greenhouse gas emissions reduction benefits via a payment-for-climate-smart-practices approach. The Oregon Climate Action Commission also gave OWEB the option to increase the amount of funding to OAHP from Open Solicitation if the demand for OAHP exceeds the initial funds available.

Staff will seek the OWEB board's acceptance of the grant funds at the April 2024 board meeting. The bill states that priority shall be given to expenditures for technical assistance to environmental justice communities or tribes and for incentives for conservation management plan activities supported by an environmental justice community or a resolution of a tribe. OWEB envisions the rollout of funding opportunities involving the NWL funds—including funding for OAHP grant offerings--will include extensive outreach and engagement prior to launching grant solicitations.

As of the drafting of this staff report, \$5.161 million in funding for OAHP (\$4,541,680 for grants and \$619,320 for operations) was included in the end-of session bill (SB 5701). The bill passed out of both legislative chambers prior to adjournment of the 2024 Legislative Session. The bill now goes to the

Governor for consideration. At the March OAHC meeting, staff will provide an update about OAHP funding.

**Recommendation**

This is an information item only.



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

March 20, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

## ITEM F – Conservation Management Plan Implementation Methodology Update

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Taylor Larson, OAHP Program Coordinator  
Renee Davis, OWEB Acquisitions and Special Programs Manager

### Introduction

This staff report provides context to the commission for a presentation of the near-final Draft Conservation Management Plan (CMP) Implementation Methodology by Highland Economics at the March meeting.

### Background

The Oregon Agricultural Heritage Program (OAHP) has authority to recommend grants funding the development, implementation and monitoring of CMPs as described in [ORS 541.989](#) and [OAR 698-010-0080](#).

At the recommendation of the OAHC, when the program was initially developed, the decision was made to structure OAHP incentives for CMP implementation as payments for the ecosystem services associated with the practices.

In 2022, staff solicited grant applications to fund Conservation Management Plan development and will open a grant solicitation to fund the development and implementation of CMPs in 2024 as described in staff report Item E. OWEB will be seeking OAHC guidance regarding the payment levels for ecosystem services provided by the CMP practices. In order to determine the payment levels for these ecosystem services, Highland Economics has conducted the economic analyses described below.

In 2019, on behalf of OWEB, [Highland Economics](#) completed a [Review & Feasibility Determination of Methodologies for Valuing Agricultural Conservation Management Actions](#) as a first step toward the development of CMP implementation methodology. In 2022, staff began working with Highland Economics to develop methodologies for OWEB to pay for the implementation of CMPs. In March 2023, Highland Economics presented an update to the commission on progress made and solicited feedback.

Barbara Wyse of Highland Economics will provide the commission with an update on the near-final draft of the CMP Implementation Methodology and engage in dialogue with the commission around desired near-term refinements and potential longer-term opportunities for adaptive management of the methodology.

### Next Steps

Staff will work with Highland Economics to capture and incorporate commission feedback into a final version of the methodology that will be presented to the commission at the May meeting. The methodology will then be published along with other program materials associated with the upcoming CMP grant solicitation.

**Recommendation**

This is an information item only.



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

March 20, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM G – 2024 Commission Work Plan

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Taylor Larson, OAHP Program Coordinator  
Renee Davis, OWEB Acquisitions and Special Programs Manager

#### Introduction

This staff report summarizes the work schedule for the Oregon Agricultural Heritage Commission (OAHC) over the coming year.

#### Background

In 2024, the OAHC will need to adopt a recommended spending plan that provides direction to staff and applicants about allocation of available funding across the four grant types offered through the Oregon Agricultural Heritage Program (OAHP). Once applications have been received, reviewed, and ranked, the commission will make a formal funding recommendation to the OWEB Board. Over the coming year the commission will also need to serve in its capacity as a Rules Advisory Committee (RAC) to the OWEB Board, making recommendations on revisions to the administrative rules governing OAHP. For example, OAHP rule revisions will incorporate the climate evaluation criteria adopted by the OWEB Board in July 2023 and provide additional clarity to staff and applicants around the mechanics of the program.

#### Tentative 2024 OAHC Work Plan and Proposed Schedule

The table below offers a high-level overview of the work needed to be completed by the commission in 2024. It is important to note that this work plan is tentative in nature, pending outcomes from the 2024 Legislative Session (see Item E staff report). During the March meeting, staff will review the proposed schedule, update the commission about new developments related to programmatic and legislative topics, and facilitate a discussion with the commission about the work plan and schedule.

<b>Proposed OAHC Meeting Schedule</b>		
<b>Purpose</b>	<b>Date</b>	<b>Location</b>
Informational	3/20/24	Virtual
Spending Plan Adoption; Finalize Plan for Rulemaking; Finalize Conservation Management Plan Methodology	5/1/24	In-Person/Hybrid (TBD)
RAC Meeting #1; Update on OWEB outreach process for Natural and Working Lands (NWL) funding	6/5/24	Virtual
RAC Meeting #2 and Update on NWL Outreach	7/9/24	Virtual
RAC Meeting #3 and Update on NWL Outreach	8/7/24	Virtual
Tentative – Finalize OAHP Rule Revisions for Recommendation to OWEB Board; OAHC Deliberation and Approval of Funding Recommendations to the OWEB Board (for the January 2025 board meeting)	11/7/24	In-Person/Hybrid (TBD)

**Recommendation**

This is an information item only.



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**Virtual Commission Meeting**  
**April 30, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

### April 30, 2024

Business Meeting	April 30, 2024	2:00 pm – 4:00 pm
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### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA).  
There may be a slight delay when streaming the meeting content.
- **Phone:** Dial 1 669 900 6833, Meeting ID number: 862 4075 0376, Passcode: 624874
- **Zoom:** <https://us02web.zoom.us/j/86240750376?pwd=QnFH3dyZmVFZGVGeDE5V2tVTFd1QT09>

### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#). The deadline for submitting written comments and requests to make verbal comments is **4:00 pm Monday, April 29, 2024**.

Verbal comments:

- Limited to three minutes
- Will be heard in the public comment period

Provide the following information for virtual verbal comments:

- Your first and last name
- The topic of your comment
- The phone number you will use when calling the meeting.

If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

### Agenda

#### A. Welcome & Introductions (2:00 pm)

#### B. [Public Comment \(2:15 pm\)](#)

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

#### C. [Review and Approve Minutes \(2:20 pm\)](#)

The Minutes from the March 20<sup>th</sup>, 2024, OAHC meeting will be presented for Commission approval. *Action Item*

#### D. [2024-2025 Spending Plan Adoption \(2:25 pm\)](#)

The commission will consider the available funds and make a spending plan recommendation to the OWEB Board detailing the amount of money to be allocated to each of OAHCP's four grant programs. *Action item.*

#### E. [2024 Rulemaking Updates \(3:30 pm\)](#)

Staff will update the Commission on the process for upcoming rulemaking. *Information item.*

#### F. Other Business (3:45 pm)

This time is reserved for other business that may come up before the Commission. *Information item*

**Contact Information**

*OAHP Program Coordinator* – Taylor Larson  
[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

*OAHP Conservation Easement Specialist* – Robin Meacher  
[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)



Agenda Items C

# **Approval of Meeting Minutes**

Commission Meeting April 30, 2024



# Oregon Agricultural Heritage Commission

## Meeting Minutes: March 20, 2024

MINUTES ARE NOT FINAL UNTIL APPROVED BY COMMISSION

This meeting was held virtually.

Audio Recording at: [https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA)

### OAHC Members Present

Boyer, Barbara  
Collins, James Robert  
Contreras, Ed  
Hoeflich, Russ  
Krahmer, Doug  
Lowe, Amanda  
Masterson, Laura  
Reimer, Jeff  
Taylor, Bruce  
Wolfe, Woody

### OWEB Staff Present

Bettinardi, Nicole  
Davis, Renee  
Larson, Taylor  
Meacher, Robin  
Page, Stephanie

### Others

Ackley, Kathleen  
Black, Rhonda  
Hudson, Marc  
Johnson, Jim  
Kendrick, Karsyn  
Lee, Jan  
McAdams, Nellie  
McAlister, Liza Jane  
Olson, Tara  
Penberthy, Matt  
Scisco, Michael  
Warren, Kelly

The meeting was called to order at 10:02 am by co-chair Doug Krahmer.

### A. Welcome and Introductions (Timestamp: 00:00:00)

Commissioners and staff introduced themselves and reported on their recent activities, shared information, and commented on various agricultural, watershed enhancement, and community conservation-related topics. *Information item.*

### B. Public Comment (Timestamp: 00:19:30)

This time was reserved for the commission to hear general public comments and review the written public comment submitted for the meeting. There was one written public comment submitted for this meeting from Coalition of Oregon Land Trusts and Oregon Agricultural Trust.

The following people provided verbal comments. *Information item.*

- Karsyn Kendrick, Coalition of Oregon Land Trusts
- Marc Hudson, Oregon Agricultural Trust

### C. Review Role of Oregon Agricultural Heritage Commission (Timestamp: 00:28:29)

OAHP Coordinator Taylor Larson facilitated a discussion with the commission on the Commission Manual and their role as commissioners within OAHP and OWEB. *Information item.*

### D. 2024 Program Refinements (Timestamp: 00:51:18)

OAHP Coordinator Taylor Larson and Conservation Easement Specialist Robin Meacher updated the commission on refinements being made to the program for 2024. *Information item.*

### E. Legislative and Funding Update (Timestamp: 01:07:10)

Acquisitions and Special Programs Manager Renee Davis updated the commission on recent legislative and funding developments affecting the OAHP program. *Information item.*

**F. Conservation Management Plan Implementation Methodology (Timestamp: 01:27:51)**

OAHP Coordinator Taylor Larson and Barbara Wyse from Highland Economics updated the commission on the near-final draft of the Conservation Management Plan Implementation Methodology and solicited commission feedback. *Information item*

**G. 2024 Commission Work Plan (Timestamp: 02:12:02)**

OAHP Coordinator Taylor Larson walked the commission through a programmatic timeline focusing on upcoming commission activities for 2024. *Information item*

**The meeting was adjourned at 12:33 pm.**



Agenda Item D

**2024-2025 Spending Plan  
Adoption**

Commission Meeting April 30, 2024



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

April 30, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM D – 2024-2025 Spending Plan Adoption

**To:** Oregon Agricultural Heritage Commission (OAHC)

**From:** Taylor Larson, OAHP Program Coordinator

#### Introduction

The 2024 legislative session resulted in a \$5.161 million general fund appropriation to the Oregon Agricultural Heritage Fund (\$4,541,680 for grants and \$619,320 for operations) through Senate Bill (SB) 5701. The Oregon Climate Action Commission has also directed OWEB to use \$750,000 from the Natural and Working Lands (NWL) Fund to support OAHP technical assistance (TA) grants, as well as grants for the development and implementation of Conservation Management Plans (CMP) that have carbon sequestration and greenhouse gas emissions reduction benefits via a payment-for-climate-smart-practices approach. The commission will discuss options for allocation of funds in a spending plan for the biennium and set a spending plan to inform grant solicitations during Spring of 2024.

#### Background

At the April 2024 OWEB board meeting, funds from both the NWL Fund as well as SB 5701 were included in the board's updated spending plan for OAHP. \$4,541,680 are to be made available through grant cycles to support any of OAHP's four grant programs. The NWL funding (\$750,000) is to be made available for CMP and TA grants following an outreach and engagement process that ensures priority shall be given to expenditures supported by an environmental justice community or a resolution of a tribe. This outreach process will inform the grant solicitation process for CMP and TA grants funded with the NWL funding.

#### Other Considerations

As the commission sets its 2024-2025 spending plan, it is important to provide guidance to applicants as to whether the commission has geographic consideration for OAHP funding in one or more of the OAHP grant offerings. Example geographic considerations are interest by the commission in broader geographic distribution of funding, or priorities for specific geographies. Similarly, the commission should discuss if it intends to place any funding caps or provide additional budget guidance to applicants for any of the OAHP grant offerings.

#### Recommendation

Due to the demonstrated demand for the conservation easement grant program and the time needed to conduct an engagement process for CMP and TA projects associated with the NWL funding, staff recommend the commission adopt a spending plan as detailed in the table below.

<b>Grant Program</b>	<b>Fund Source</b>	<b>Allocation</b>	<b>Open Solicitation (Estimate)</b>
Working Land Conservation Covenants and Easements	Other Funds	\$4,541,680	5/3/2024
Conservation Management Plan Development and Implementation	Natural and Working Lands Fund	\$500,000	1/15/2025
Technical Assistance	Natural and Working Lands Fund	\$250,000	1/15/2025
Succession Planning	Other Funds	\$0	TBD



Agenda Item E

## **Rulemaking Updates**

Commission Meeting April 30, 2024



# STAFF REPORT

## Oregon Agricultural Heritage Program

April 30, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM E – 2024 Rulemaking Updates

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Eric Hartstein, OWEB Senior Policy Coordinator  
Taylor Larson, OAHP Program Coordinator

#### Introduction

At their April 23, 2024 board meeting the OWEB board-initiated rulemaking for the OAHP and directed the OAHC to begin a Rules Advisory Committee (RAC) process. OWEB’s Senior Policy Coordinator, Eric Hartstein will provide a brief orientation to the commission about the RAC process and answer logistical questions the commission may have.

#### Background

During the second half of 2024, the commission will serve in its capacity as a RAC to the OWEB board, making recommendations on revisions to the administrative rules governing OAHP. Rule revisions are needed to incorporate the climate evaluation criteria adopted by the OWEB board in July 2023 and provide additional clarity to staff and applicants around the mechanics of the program. The proposed RAC meeting schedule is detailed in the table below for the commission’s consideration.

Proposed RAC Meeting Schedule			
Purpose	Date	Time	Location
RAC Meeting #1	6/5/24	2:00 PM	Virtual
RAC Meeting #2	7/9/24	TBD	Virtual
RAC Meeting #3	8/7/24	TBD	Virtual
RAC Meeting #4 --- At this meeting, the OAHC as RAC will finalize recommended rule revisions to the OWEB board	11/7/24	All Day	In-Person/Hybrid (TBD)

As needed, one or more of these RAC meetings will be followed by an official business meeting of the commission. By way of example, the June and/or July RAC meeting will be followed by an OAHC business meeting to discuss the final draft of the Conservation Management Plan implementation methodology developed by Highland Economics. And the November 2024 RAC meeting will conclude and be followed by an OAHC business meeting. at which the commission will review staff funding recommendations for the 2024 OAHP grant solicitations and deliberate on funding recommendations to the OWEB board for OAHP grants.

#### Recommendation

This is an informational item only.



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**Virtual Commission Meeting  
June 5, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

### June 05, 2024

Business Meeting	June 05, 2024	4:00 pm – 5:00 pm
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#### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](http://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA).  
There may be a slight delay when streaming the meeting content.
- **Zoom:** <https://us02web.zoom.us/j/86555795990?pwd=RIRSUVZSdS9sQjJEUhQWVF6QStqQT09>

#### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#). The deadline for submitting written comments and requests to make verbal comments is **4:00 pm Monday, June 3, 2024**.

Verbal comments:

- Limited to three minutes
- Will be heard in the public comment period

Provide the following information for virtual verbal comments:

- Your first and last name
- The topic of your comment
- The phone number you will use when calling the meeting.

If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

#### Agenda

##### A. Welcome & Introductions (4:00 pm)

##### B. [Public Comment \(4:05 pm\)](#)

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

##### C. [Review and Approve Minutes \(4:15 pm\)](#)

The Minutes from the April 30<sup>th</sup>, 2024, OAHC meeting will be presented for Commission approval. *Action Item*

##### D. [Working Land Conservation Easement Grant Agreement Extensions \(4:25 pm\)](#)

The commission will consider recommending the OWEB Board approve extending the timeline for satisfying all conditions included in open Working Land Covenant and Easement grant agreements by nine months. *Action item.*

##### E. Other Business (4:40 pm)

This time is reserved for other business that may come up before the Commission. *Information item*

**Contact Information**

*OAHP Program Coordinator – Taylor Larson*

[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

*OAHP Conservation Easement Specialist – Robin Meacher*

[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)



Agenda Items C

# **Approval of Meeting Minutes**

Commission Meeting June 5, 2024



# Oregon Agricultural Heritage Commission

## Meeting Minutes: April 30, 2024

MINUTES ARE NOT FINAL UNTIL APPROVED BY COMMISSION

This meeting was held virtually.

Audio Recording at: [https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA)

### OAHC Members Present

Boyer, Barbara  
Duhnkrack, Nancy  
Krahmer, Doug  
Hoeflich, Russ  
Loop, Lois  
Lowe, Amanda  
Masterson, Laura  
Reimer, Jeff  
Taylor, Bruce  
Wolfe, Woody

### OWEB Staff Present

Bettinardi, Nicole  
Davis, Renee  
Hartstein, Eric  
Larson, Taylor  
Meacher, Robin  
Page, Stephanie

### Others

Penberthy, Matt  
Vesna Grace Hopkins

The meeting was called to order at 2:00pm by Bruce Taylor: [Recording](#)

### A. Welcome and Introductions (Timestamp: 00:00:22)

Commissioners and staff introduced themselves and reported on their recent activities, shared information, and commented on various agricultural, watershed enhancement, and community conservation-related topics. *Information item.*

### B. Public Comment (Timestamp: 00:08:09)

This time was reserved for the commission to hear general public comments and review the written public comment submitted for the meeting. There were no written public comments submitted for this meeting. The following people provided verbal comments. *Information item.*

- Matt Penberthy, Coalition of Oregon Land Trusts

### C. Review and Approval of Minutes (Timestamp: 00:10:50)

The minutes of the March 20, 2024, meeting was presented for commission approval. *Action item.*

Russ Hoeflich moved the commission approve the meeting minutes as presented. Lois Loop seconded. Motion passed unanimously.

### D. 2024-2025 Spending Plan Adoption (Timestamp: 00:12:00)

The commission considered the available funds in order to make a spending plan recommendation to the OWEB Board detailing the amount of money to be allocated to each of OAHP's four grant programs. *Action item.*

Nancy Duhnkrack moved the commission adopt the recommendation of the staff for the spending proposal as outlined in our [OAHC] workbook. Jeff Reimer seconded. Motion passed unanimously.

### E. 2024 Rulemaking Updates (Timestamp: 00:59:00)

OAHP Coordinator Taylor Larson and Senior Policy Coordinator Eric Hartstein updated the commission on the process for upcoming rulemaking. *Information item.*

**F. Other Business (Timestamp: 01:18:50)**

Staff provided a review of components of conservation easement projects and a high-level status update on the first cycle of projects. *Information item*

**The meeting adjourned at 4:00.**



Agenda Item D

**Working Lands Conservation  
Easement Grant Agreement  
Extensions**

Commission Meeting June 5, 2024



# STAFF REPORT

## *Oregon Agricultural Heritage Program (OAHP)*

June 5, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

### ITEM D – Working Land Conservation Easement Grant Agreement Extensions

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Taylor Larson, OAHP Program Coordinator  
 Robin Meacher, OAHP Conservation Easement Specialist

#### Background

In March of 2023 the OAHC recommended funding seven Working Land Conservation Easement Grants. Beginning after the OWEB board awarded the grants in April of 2023, OWEB staff have worked closely with grantees to move projects toward closing. Each grant awarded by the board is conditioned on general and project-specific due diligence requirements, which must be met before funds are released for the transaction.

Several factors have resulted in project delays that may result in grantees being unable to complete their easement transactions by the closing deadlines identified in their grant agreements with OWEB.

#### Considerations regarding Conservation Easement Projects

Conservation easements are complex real estate transactions that involve significant considerations by the entity holding the easement, the landowner granting the easement, and the funding entities. Throughout the process to date, several factors have contributed to extended timing needs for all projects, including: the timing and availability of appraisers to complete the required appraisal reports, complicated conservation easement negotiations, alignment of multiple funders' timelines, and overall learnings regarding the first-time application of OWEB and OAHP statutes, administrative rules, and program requirements to each individual working lands conservation easement project. Recognizing these realities and being mindful of the importance of adaptively managing the program based on learnings, staff believe providing additional time to grantees to complete work is warranted. The Commission will have a chance during 2024 rule making to consider whether 18 months is the appropriate amount of time to meet all conditions.

#### Recommendation

Staff recommend the Commission recommend the OWEB Board approve extending the timeline for satisfying all conditions included in all open Working Land Covenant and Easement grant agreements, including closing dates, by nine months as detailed in the table below.

Grant #	Project Name	Award	Existing Expiration	Proposed Expiration
223-7100-22521	Seely	\$267,297	10/28/2024	7/28/2025

**Item D**

223-7101-22522	O'Keefe	\$277,776	10/28/2024	7/28/2025
223-7103-22597	Hagen	\$269,255	10/28/2024	7/28/2025
223-7104-22600	Wahl	\$2,702,395	10/28/2024	7/28/2025
223-7105-22611	Pitchfork T	\$121,134	10/28/2024	7/28/2025
223-7106-22616	Aspen Valley	\$263,779	10/28/2024	7/28/2025



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**Virtual Commission Meeting  
July 9, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

July 09, 2024

Business Meeting	July 09, 2024	4:00 pm – 5:00 pm
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### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA). There may be a slight delay when streaming the meeting content.
- **Zoom:** <https://us02web.zoom.us/j/85177588823?pwd=0bB1bzpwOXvkWHitmUF16TLVqj4cbC.1>

### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#). The deadline for submitting written comments and requests to make verbal comments is **4:00 pm Friday, July 5, 2024**.

Verbal comments:

- Limited to three minutes
- Will be heard in the public comment period

Provide the following information for virtual verbal comments:

- Your first and last name
- The topic of your comment
- The phone number you will use when calling the meeting.

If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

### Agenda

#### A. Welcome & Introductions (4:00 pm)

#### B. Public Comment (4:05 pm)

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

#### C. [Review and Approve Minutes \(4:15 pm\)](#)

The Minutes from the June 5<sup>th</sup>, 2024, OAHC meeting will be presented for Commission approval. *Action Item*

#### D. [2024 Working Land Conservation Easement Technical Committee Structure \(4:20 pm\)](#)

The commission will hear an update on the proposed review and evaluation structure to be used for the 2024 OAHP Conservation Covenant and Easement grant solicitation. *Information item.*

#### E. [Economic Values to Support an OAHP Payment for Ecosystem Services Program \(4:30 pm\)](#)

Highland Economics will present a final draft of the “Economic Values to Support an OAHP Payment for Ecosystem Services Program and answer clarifying questions from the Commission. *Information item.*

**F. Other Business (4:55 pm)**

This time is reserved for other business that may come up before the Commission. *Information item*

**Contact Information**

*OAHP Program Coordinator* – Taylor Larson

[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

*OAHP Conservation Easement Specialist* – Robin Meacher

[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)



Agenda Item B

## **Public Comment**

Commission Meeting July 9, 2024



July 5, 2024

To: Oregon Agricultural Heritage Commission and OAHP Staff  
From: Andrea Kreiner, Executive Director, Oregon Association of Conservation Districts (OACD)

Re: Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices

I am providing comments from OACD on the final Methodology to Value Benefits of Agricultural Conservation Practices included in the meeting materials for Agenda Item E: [Economic Values to Support an OAHP Payment for Ecosystem Services Program](#).

In order to avoid duplication, we concur with the comments submitted from the Oregon Climate and Agriculture Network (ORCAN) regarding the attributes of a payment methodology, desired outcomes, practice-based valuation, eligibility alignment with the Oregon Climate Action Commission's [Natural and Working Lands Final Report](#), and suggestion regarding the use of modeling tools, such as COMET-Farm.

We also have concerns about the recommendation to base the value for carbon on the current voluntary market value of carbon credits. We agree that the social cost of carbon (\$43/ton) is more appropriate, both based on public valuation and effectiveness as an incentive.

OACD would like to be involved as OWEB and the Commission move forward in developing the related implementation processes. We strongly encourage a listening session to be held with the Soil and Water Conservation Districts, who are a key assistance provider on conservation management plans and implementation. And, we encourage listening sessions to be held as soon as possible, since time is of the essence in beginning to get Natural and Working Lands Funds out the door.

Sincerely,

Andrea Kreiner

Executive Director

**From:** [oregon-gov-web-services@egov.com](mailto:oregon-gov-web-services@egov.com)  
**To:** [BETTINARDI Nicole \\* OWEB](#)  
**Cc:** [REPPLINGER Linda \\* OWEB](#)  
**Subject:** Public Comment  
**Date:** Wednesday, July 3, 2024 5:34:06 PM

First and Last Name	Anthony Myint
Phone Number	510-599-2999
Email Address	anthony@zerofoodprint.org
I wish to provide (select one):	written comment
If you are providing VERBAL comment, how do you plan to attend the meeting (select one):	
I want to provide comment at (select one):	Other (please provide more information in the comment section below)
Agenda Topic / Item Letter	July 9, 2024, Oregon Agricultural Heritage Commission Meeting ITEM E – Economic Values to Support an OAHP Payment for Ecosystem Services Program
	<p>Thank you to the staff and OAHP for embarking on a program to accelerate the implementation of agricultural climate solutions in OR. I am a resident and also Executive Director of a 501c3 leading collaborations with the CA Department of Food and Ag and CA Air Resources Board, and the CO Dept of AG to similarly accelerate the adoption of climate smart/regenerative agriculture projects. We have awarded \$2.6M to 113 projects and are on pace to deploy \$20 million in the coming years. We have just launched our OR/Northwest program and so I'm excited to collaborate and find synergies and interoperability with your eventual program. As someone who has designed and implemented agricultural grant programs, in collaboration with multiple stakeholder groups, I'm thoroughly impressed by the research and consideration that has informed the program design. If my cursory review is correct, then I believe the framework can be described as payment for practices, wherein the pay</p>

Type Comment  
Here (comments  
may also be  
uploaded  
below):

rates are determined by outcome valuations. I have one small set of corrections and then one larger consideration. But first I will preface that we made a different choice in overall system design, in case it's useful to your process. I'm not suggesting you should change your system, but just pointing out a tradeoff that may or may not have been considered. As we designed our program with CA Resource Conservation Districts, Farmers, Policy Makers and Stakeholders, we ultimately chose a reverse auction/competitive bid style instead of a standardized pay for practice program. A reason for this was 1) the desire to meet the farming community where they were at and pay for the full or partial cost that was truly needed to incentivize implementation. We were concerned around interest and adoption rate, and I think since these pay rates are below or at the low end of EQIP rates, there is a valid concern as well. The #2) reason was that standard pay rates intrinsically mean every project is over or under paying producers. The reasons to make the choices the staff have made are also good ones and are explained in the document, so again just food for thought. Okay here are the two specific comments: 1) Small data items: Table 4-1 is confusing because in the first three rows the \$5 for carbon sequestration seem to be omitted, arithmetically from the total. Please correct. I also don't see the value in foregrounding data for tons C per hectare in addition to tons CO<sub>2</sub>e per acre. The latter is the stat in common use in the US. 2) Sorry this is a bigger concern and more philosophical, but the carbon valuation of \$10 per metric ton, based on voluntary carbon market prices, is not comparable with the program goals, and therefore, not the correct basis for valuation. The staff have identified that CA compliance market has a price of \$30 per ton and the federal price is \$51. Recent studies in Nature suggest it should be \$185 per ton is appropriate (<https://apnews.com/article/science-climate-and-environment-government-politics-4c1e8783694201355f88012079367f27>). My suggestion is that the voluntary market is merely a suggestion of what buyers are willing to pay, not the value of the carbon outcomes. In reality, state funds will not be used for Midwest fertilizer reduction projects or cookstoves in Africa, etc. so these are not valid. Furthermore, for example, the average price Americans are willing to pay for gym memberships per capita, is not a valid reflection on how much a health initiative should be willing to pay to incentivize participation in fitness programs. The incentivize is meant to incentivize, not serve as a market indicator reflecting the poor decisions of society. I'm not trying to nitpick carbon pricing but rather, just suggesting that the program may be undersubscribed in general, because your compensation rates are comparatively modest, and so a higher carbon valuation may a) create closer alignment between incentives and your goals while b) boosting participation. Our program has ended up organically paying about \$30 per ton of modeled CO<sub>2</sub>e based on the prices farmers are requesting to implement projects. We are skewed toward the thrifty side, since we are funding only the most cost-effective carbon sequestration projects and so I'd suggest the CA or Federal price of \$30 or \$51 per ton as the

	<p>more appropriate considerations and both are entirely defensible and more pertinent than the artificially discounted voluntary carbon market prices. Regardless, our organization, Zero Foodprint is standing by to provide further producer cost-share to optimize outcomes and ensure equity and access, and so in some respects, our different approaches could strengthen the complementarity. We will award ~\$1 million to OR farms and ranches in the coming 3 years with funds from the USDA, matched by New Seasons, Tillamook, Organically Grown Co. Bob's Redmill and many other businesses, and we are closely involved with other state and local governments on interoperable grant programs for climate smart and regenerative agriculture, and so I hope to present our work before your program is finalized, but before it's announced or open to the public. I have met with Stephanie Page/OWEB, but I've not met with OAHP staff. Please contact me at <a href="mailto:anthony@zerofoodprint.org">anthony@zerofoodprint.org</a> As I've stated, I fully endorse this program as-is, and I believe it is excellent, rigorous and defensible, but I am concerned that you will be undersubscribed and that the pay rates undervalue carbon sequestration.</p>
<p>Request physical, language, or other accommodations</p>	

Uploaded Files:

- [Business Healthy Soils Challenge Invite Letter .pdf](#)

**Submission ID:** f74204b0-a51b-4355-b0e6-3ec1802eb045

**Record ID:**



**REGENERATIVE  
RECOVERY**  
COALITION

As a leader in the food industry, you know Coloradans care about where their food comes from and how it's grown. **Join Zero Foodprint, The Colorado Department of Agriculture, The CO Restaurant Association and The Alliance Center to lead the healthy soil challenge!**

[Restore Colorado](#) teams up with restaurants, food businesses and corporate and philanthropic donors to work with farmers and ranchers across Colorado to advance soil health practices. Our goal is to raise \$5 million per year by 2025. **The money we raise in Colorado will be reinvested in Colorado food production – this is the start of a regenerative agriculture movement and we need your help!**

Through your partnership, Restore Colorado will team up with the state's farmers and ranchers to plant cover crops, apply compost, manage rotational grazing and more. Regenerative agriculture improves soil health, water quality, water retention, resilience, yield and the nutrient value of the food we eat, while removing emissions from the atmosphere.

**Even if we transition to 100% renewable energy today, we'd still need to take carbon out of the atmosphere and the best way to do this is through building healthy soil.**

As we continue to experience severe drought, intense precipitation and year round wildfire, actionable partnerships between consumers and producers will be critical to the future of our food systems. "If you are not part of the solution, you are part of the problem" and we're offering you a way to engage in transformative solutions with a low lift and a BIG impact.

**Join Zero Foodprint to lead this movement and build healthy soils across Colorado!**

Becoming a member of Zero Foodprint means:

- Contributing 1% of Net Sales to Restore Colorado. You can add a 1% surcharge for customers (they can opt out), or generate the 1% however it works best for you!
- Maximize your competitive advantage as 88% of consumers demand more climate smart practices from the businesses they support.
- Convenient and low time commitment from you and your team with a BIG impact!

You can learn more about the program at [RestoreColorado.Org](https://RestoreColorado.Org). Please reach out to [info@zerofoodprint.org](mailto:info@zerofoodprint.org) for more information and ways you can support Restore Colorado.

*Sincerely,*

*Kate Greenberg  
Commissioner  
CO Dept of Agriculture*

*Anthony Myint  
Executive Director  
Zero Foodprint*

*Brenna Simmons-St. Onge  
Executive Director  
The Alliance Center*



July 5, 2024

To: Oregon Agricultural Heritage Commission and OAHP Staff

From: Megan Kempe, Executive Director, Oregon Climate and Agriculture Network (OrCAN)

Re: Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices

I'm commenting on the final Methodology to Value Benefits of Agricultural Conservation Practices included in the July 9th OAHC business meeting materials for Agenda Item E: [Economic Values to Support an OAHP Payment for Ecosystem Services Program](#).

I appreciate the Report's recognition of the following desired attributes of a payment methodology:

- Easy and inexpensive to implement.
- Transparent and easy to understand.
- Flexible and adaptable to diverse practices and farms.
- Consistent with Natural Resources Conservation Service (NRCS) conservation practice definitions.

And the following desired outcomes:

- Provide certainty (in payment value and terms) for landowners.
- Encourage participation by farmers and ranchers by making participation as easy as possible.
- Incentivize cost-effective and environmentally beneficial outcomes, such that significant environmental benefit is delivered per conservation dollar.

I appreciate the practice-based vs. outcome based valuation, because I agree that an outcome-based valuation would result in uncertainty for landowners (as payments are not guaranteed), be less easy to understand, and be more costly and resource-intensive to implement. In particular, the monitoring needed for an outcome based system would be costly and resource-intensive for producers and technical service providers to implement.

I appreciate the exclusion of structural practices (facilities/infrastructure) and the focus instead on natural climate solutions/ conservation practices which aligns with OAHP's purpose and is a more effective use of funds.

I'm pleased to see the recognition of soil health enhancement as a key policy objective to enhance the productivity and resiliency of Oregon's agricultural lands. Soil health practices have multiple benefits including carbon sequestration, water efficiency, water quality, and plant health supporting increased profitability and climate resilience for producers. I hope soil health enhancement can be used to demonstrate the impact of the funding.

## Carbon sequestration

I appreciate that carbon has a different requirement for eligibility (a 3, 4, or 5 rating vs. a 4 or 5 rating) to increase the consistency between the proposed methodology and the recommended practices to reduce greenhouse gas emissions and sequester carbon in Oregon's natural and working lands sectors included in the Oregon Climate Action Commission's [Natural and Working Lands Final Report](#).

*I have serious concerns about the Report's recommendation to base the value for carbon on the current voluntary market value of carbon credits from agricultural lands and other nature-based credits, including the cost of carbon offsets. A market value is inappropriate and inconsistent with the Report's determination of public value of ecosystem services. The \$5-\$10 per acre, recommended in the Report, does not reflect the public benefit of the carbon sequestration. Furthermore, it is widely recognized that the voluntary carbon market is not compensating farmers at a level that is meaningful or incentivizing. Prices in the voluntary carbon market are too low-- they aren't high enough to be worth farmers' time/effort and they aren't incentivizing implementation of carbon sequestering practices. This is especially true for small and mid-sized farms where low payment rates per acre definitely do not pencil out. We recommend using the social cost of carbon (currently \$51 a ton according to the [Brookings Institute](#)) is more reflective of public value and would be more effective as an incentive.*

Overall, I hope the Commission and Agency will consider whether these dollar values are going to be significant enough to encourage producers to participate in the OAHF Conservation Management Plan grant program and both reward early/existing adopters and incentivize new practices. I am concerned that the carbon sequestration valuation will not.

I would also like to encourage inclusion of greenhouse gas (GHG) emissions reductions as a benefit. There are a number of practices such as reduced tillage and cover cropping that can result in reduced GHG emissions. It would make sense to combine carbon sequestration and reduction of GHG emissions into one benefit category: Climate Mitigation.

I think modeling tools such as COMET-Farm can be effective tools for valuing climate benefits. California's Healthy Soils Program requires producers to use COMET-Planner to generate their expected CO<sub>2</sub> outcomes, which they submit with their applications. But I generally agree with the Report's recommendation against them because, as the Report notes, relying on outputs from these tools may lessen the certainty and simplicity of a payment system and may lessen the perceived fairness of the payment system as difference in modeled outcome does not necessarily mean difference in delivered outcome for a given conservation practice.

Table 2-4: Summary of Estimated Average Carbon Quantification and Value Per Practice Type includes a practice type which I find confusing and inconsistent with the rest of the table and report. The first practice in the table is "Soil Sequestration Practices (In-Field Practices/ Grassland)" This is not a practice, but instead a benefit. I also find the inclusion of grassland twice in the chart confusing. I'd suggest changing Soil Sequestration Practices (In-Field Practices/ Grassland)" to "In-Field Practices" and separating out grasslands.

## Missing practices

Utilization of cover crops should be included, if not for its carbon sequestration benefit, then for climate mitigation and water quality benefits. Nitrogen fixing cover crops can reduce reliance on nitrogen fertilizers. And living roots in the ground both increase water infiltration and water holding capacity and reduce erosion.

Prescribed/rotational grazing should be considered as a qualifying practice based on its carbon sequestration and water quality benefits.

## Other comments

I noticed that section in Section 4 ESTIMATED VALUE BY PRACTICE an explanation that Table 4-1 provides per-acre cost share rates used by a USDA program, the Environmental Quality Incentives Program (EQIP) for comparison purposes. I'm curious to know why EQIP was used rather than USDA's Conservation Stewardship Program (CSP), which supports conservation practices or activities with benefits of cleaner water and air, healthier soil and better wildlife habitat.

## Implementation

The science is evolving and as was noted in the Report, research results vary widely. We appreciate the utilization of Natural Resources Conservation Service (NRCS) physical effects ratings and the effort to align with Oregon Climate Action Commission's [Natural and Working Lands Final Report](#) as a starting point and hope that OWEB will continually evaluate and revise this valuation based on evolving science and feedback from stakeholders.

Similarly, qualifying practices should be periodically reviewed and updated based on evolving science.

As was noted at a recent OAHC meeting carbon sequestration is only one of the four environmental benefits, but the current source of funding is the Natural Climate Solutions Funding, so there will need to be work to determine how projects with carbon sequestration benefits will be prioritized.

It may also be helpful to clarify the role of the OAHP Conservation Management Plan (CMP) Advisory Committee and their discretion to prioritize funding to practices on farms and ranches that are expected to provide the most environmental benefit per conservation dollar. I hope the Advisory Committee will not be doing additional valuation. It will be important that guidance documents related to valuation are straightforward and easy for producers and technical assistance providers to understand and rely on.

## Next Steps

My understanding, based on conversations with OAHP's Program Coordinator, is that the next step is public engagement and then creation of guidance documents related to how to apply and guidance for creation of Conservation Management Plans. I recommend the agency convene listening sessions with interested parties to get input on qualifying practices and valuation of those practices, grant timelines, process and guidance documents. OrCAN will engage in those discussions and will engage our network of farmers/ranchers and farm service providers in the process. Several of our partners in the Natural Climate Solutions Coalition will be interested in engaging as well.

It is critical for the success of the OAHP CMP Program, which currently relies on renewal of Natural Climate Solutions Funds, that we demonstrate *demand and success* by the time the Legislature considers renewal of these funds during the 2025 legislative session. *Time is of the essence for community engagement and implementation.*

OrCAN and our partners look forward to working with OWEB to roll this Program out as quickly as possible.

Thank you so much for your consideration of these comments.

A handwritten signature in black ink that reads "Megan Kemple". The signature is written in a cursive, flowing style with a long horizontal stroke at the end.

Megan Kemple, Executive Director  
Oregon Climate and Agriculture Network (OrCAN)



Agenda Items C

# **Approval of Meeting Minutes**

Commission Meeting July 9, 2024



# Oregon Agricultural Heritage Commission

## Meeting Minutes: June 5, 2024

MINUTES ARE NOT FINAL UNTIL APPROVED BY COMMISSION

This meeting was held virtually.

Audio Recording at: [https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA)

### OAHC Members Present

Boyer, Barbara  
Collins, Jim Bob  
Contreras, Ed  
Duhnkrack, Nancy  
Krahmer, Doug  
Loop, Lois  
Lowe, Amanda  
Masterson, Laura  
Taylor, Bruce  
Wolfe, Woody

### OWEB Staff Present

Bettinardi, Nicole  
Davis, Renee  
DeBardelaben, Theresa  
Larson, Taylor  
Meacher, Robin  
Page, Stephanie

### Others

The meeting was called to order at TIME by co-chair Bruce Taylor: [Recording](#)

### A. Welcome and Introductions (Timestamp 00:00:00)

Chair Bruce Taylor welcomed the commission and public at 4:00. Commissioners and OWEB staff introduced themselves. *Information item.*

### B. Public Comment (Timestamp 00:03:35)

This time was reserved for the commission to hear general public comments and review the written public comment submitted for the meeting. There were no written or verbal public comments for this meeting. *Information item.*

### C. Review and Approval of Minutes (00:03:52)

The minutes of the April 30, 2024, meeting were presented for commission approval. *Action item.*

Doug Krahmer moved the commission approve the meeting minutes as presented, seconded by Amanda Lowe. Motion passed unanimously.

### D. Working Land Conservation Easement Grant Agreement Extensions (Timestamp 00:04:45)

OAHP Coordinator Taylor Larson updated the commission on the current timelines of the Conservation Easement Grant Agreements and recommended the commission consider recommending the OWEB Board approve extending the timeline for satisfying all conditions included in open Working Land Covenant and Easement grant agreements by nine months. *Action item*

Ed Contreras moved to the commission recommend the OWEB board approve extending the timeline for satisfying all conditions included in open Working Land Covenant and Easement grant agreements by nine months. Doug Krahmer seconded. Motion passed unanimously.

### E. Other Business/Next Meeting (Timestamp 00:10:20)

OAHP Coordinator Taylor Larson updated the commission about recent OAHC member changes and upcoming commissioner recruitments. The commission also discussed the date for their next meeting.  
*Information Item.*

**The meeting adjourned at 4:19.**



Agenda Item D

**2024 Working Land  
Conservation Easement  
Technical Committee Structure**  
Commission Meeting July 9, 2024



# STAFF REPORT

## Oregon Agricultural Heritage Program

July 9, 2024 OAHP Commission Meeting



Tina Kotek, Governor

### ITEM E – Overview of Technical Committee Structure

**To:** Oregon Agricultural Heritage Commission

**From:** Taylor Larson, Oregon Agricultural Heritage Program Coordinator

[taylor.larson@oweb.oregon.gov](mailto:taylor.larson@oweb.oregon.gov) 971-701-3248

Robin Meacher, Oregon Agricultural Heritage Program Conservation Easement Specialist

[robin.m.meacher@oweb.oregon.gov](mailto:robin.m.meacher@oweb.oregon.gov) 971-301-1578

#### Introduction

Staff will provide the commission with an overview of the structure of the technical committee and application review process that will be utilized for evaluation and ranking of OAHP conservation covenant and easement applications submitted in the June 2024 solicitation. *This is an information item only*

#### Background

OWEB utilizes the technical expertise of volunteer experts to evaluate and rank grant applications. Technical committee participants volunteer their time to review applications and participate in a technical committee meeting that will be facilitated by OAHP staff. The roster of technical committee members is based on the type of expertise relevant to the pool of applications and the availability and willingness of individuals that possess that expertise.

#### Working Land Conservation Covenants and Easements Review Process

OAHP staff have developed a roster of expertise relevant to the pool of applications and a list of potential individuals that can provide that expertise. OAHP staff has reached out to potential members to gauge interest and availability. Applications received (June 28, 2024) and determined eligible and complete by OAHP staff will be provided to the technical committee and due diligence contractors for technical review. Soundness considerations will be reviewed by OWEB's due diligence contractor prior to the technical committee meeting where applications are discussed and ranked.

OAHP staff will visit each application site prior to the technical committee meeting. Staff site visits are for the purposes of verifying information presented in the application about the property characteristics and the natural resource and agricultural conservation values. Site visit and soundness evaluations will be presented to the technical committee by OAHP staff at the technical committee meeting where applications will be evaluated and ranked by the committee.

The technical committee meeting will take place in October/November. Technical committee rankings and evaluations will be summarized by OAHP staff in project-specific evaluations accompanied by a

staff funding recommendation. The staff evaluations and funding recommendation will be presented to the OAHC for review and to inform the Commission's funding recommendation to the OWEB board.

**Recommendation**

This is an information item only.

**Attachments**

Attachment A: OAHP Conservation Covenant and Easement Technical Committee Areas of Expertise



# STAFF REPORT

*Oregon Agricultural Heritage Program*

July 9, 2024 OAHP Commission Meeting



Tina Kotek, Governor

## **Attachment A – Conservation Covenant and Easement Application Review Technical Committee Areas of Expertise**

Agricultural Soils/Production Capabilities

Land Use/Threat of Conversion

Rangeland/Grazing

Willamette Valley/Lower Columbia Cropland

Wildlife Habitat/Landowner Capacity

Water Quality



Agenda Item E

**Economic Values to Support  
an OAHP Payment for  
Ecosystem Services Program**

Commission Meeting July 9, 2024



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

July 9, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

## ITEM E – Economic Values to Support an OAHP Payment for Ecosystem Services Program

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Taylor Larson, OAHP Program Coordinator  
Renee Davis, OWEB Acquisitions and Special Programs Manager

### Introduction

This staff report provides context to the commission for a presentation of the final draft Conservation Management Plan (CMP) Implementation Valuation Methodology by Highland Economics (Attachment A).

### Background

The Oregon Agricultural Heritage Program (OAHP) has authority to recommend grants funding the development, implementation and monitoring of CMPs as described in [ORS 541.989](#) and [OAR 698-010-0080](#).

At the recommendation of the OAHC, when the program was initially developed, the decision was made to structure OAHP incentives for CMP implementation as payments for the ecosystem services associated with the practices.

In 2022, staff solicited grant applications to fund Conservation Management Plan development and will open a grant solicitation to fund the development and implementation of CMPs in late 2024 or early 2025 following an outreach and engagement process. In order to determine the payment levels for these ecosystem services, Highland Economics has conducted the economic analyses described below.

In 2019, on behalf of OWEB, [Highland Economics](#) completed a [Review & Feasibility Determination of Methodologies for Valuing Agricultural Conservation Management Actions](#) as a first step toward the development of CMP implementation methodology. In 2022, staff began working with Highland Economics to develop methodologies for OWEB to pay for the implementation of CMPs. In May and June 2024, Highland Economics presented updates to the commission on progress made and solicited feedback.

Barbara Wyse of Highland Economics will provide the commission with an overview of the final draft of the Economic Values to Support an OAHP Payment for Ecosystem Services Program and engage in dialogue with the commission around potential longer-term opportunities for adaptive management of

the methodology and ideas for staff to incorporate into an associated program implementation guidance.

### **Next Steps**

The methodology will be published along with a guidance document and other program materials associated with the upcoming CMP grant solicitation.

### **Recommendation**

This is an information item only.

### **Attachments**

A. Economic Values to Support an OAHP Payment for Ecosystem Services Program

# Methodology to Value Benefits of Agricultural Conservation Practices

June 2024



*Prepared for:*

Oregon Agricultural Heritage Program



*Prepared by*



*About Highland Economics:*

Highland Economics is a small, woman-owned firm specializing in the economics of natural resources and the environment, business planning and feasibility assessment, and the socioeconomic impact of industries, policies, or management actions. We are a team of five economists, based in Oregon and Montana. We work with non-profits, agricultural interests, tribes, water districts, private companies, and local, state, and federal agencies on a wide range of land, air, water, recreation, agriculture, and habitat issues. This study was led by principal and senior economist Barbara Wyse, who has nearly 20 years of experience analyzing the economics of agricultural production and the socioeconomic impacts of proposed actions or regulatory changes. We aim to provide rigorous, even-handed analysis that uses economic insights to transform complex data into clear and actionable information. We often serve as expert witnesses on economic issues, including numerous cases on agricultural economics and demographic analysis for the U.S. Department of Justice.

*This analysis was prepared for:***Oregon Agricultural Heritage Program (OAHP)**

The Oregon legislature established the OAHP to provide voluntary incentives to farmers and ranchers to support practices that maintain or enhance both agriculture and natural resources. OAHP helps farmers and ranchers protect and maintain or enhance conservation on working land. Oregon Watershed Enhancement Board (OWEB) administers the program. Federal matching funds come from the Natural Resources Conservation Service's Agriculture Conservation Easement Program. OAHP currently funds four grant programs: working land conservation easements and covenants, conservation management plans and activities, succession planning education, and technical assistance for support organizations.

*Highland Economics is solely responsible for the contents of this report. We thank the following reviewers who improved the report through their comments:*

Dr. David Lewis, Professor, Oregon State University  
Louis Landre, State Agricultural Economist, Oregon Natural Resources Conservation Service  
Rose Graves, Conservation & Climate Scientist, The Nature Conservancy, Oregon Chapter



# 1 TABLE OF CONTENTS

---

- 1 Introduction ..... 1
  - 1.1 Purpose ..... 1
  - 1.2 Target Public Benefits ..... 1
  - 1.3 Payment Program Desired Attributes and Outcomes ..... 2
  - 1.4 Valuation Process & Data Sources ..... 3
  - 1.5 Practice-Based vs. Outcome-Based Valuation ..... 4
- 2 Overview of Valuation Methodology ..... 6
  - 2.1 Valuation Structure ..... 6
  - 2.2 Types of Eligible Practices ..... 8
  - 2.3 Required Effectiveness of Eligible Practices ..... 8
  - 2.4 Annual Value By Benefit Type ..... 10
- 3 Eligible Practices ..... 14
- 4 Estimated Value by Practice ..... 18
- Appendix A: NRCS Physical Effects Rating ..... 22
- Appendix B: Data to Support Carbon Values ..... 31
  - Effectiveness of Conservation Practices (Level of Carbon Sequestration) ..... 32
  - Carbon Value ..... 39
- Appendix C: Data to Support Water Quality Values ..... 43
  - Effectiveness of Conservation Practices ..... 45
  - Overview of Water Quality Benefits & Current Water Quality in Oregon ..... 49
  - Value of Nutrient Water Quality Improvements ..... 53
  - Value of Sediment Water Quality Improvements ..... 55
  - Value Per Acre of Wetland Water Purification Services ..... 56
- Appendix D: Data to Support Aquatic Habitat Values ..... 58
  - Effectiveness of Riparian Conservation Practices ..... 58
  - Conservation Value of Aquatic Habitat & Fish ..... 61
  - Recreation Fishing Value of Aquatic Habitat & Fish ..... 64
- Appendix E: Data to Support Terrestrial Habitat Values ..... 68
  - Forests and Grasslands Habitat Value ..... 70
  - Wetlands Habitat Value ..... 72



Appendix F: Potential Role of the CMP Review Committee: Prioritization of Funding/Project Selection ..... 75  
References ..... 77

## 1 INTRODUCTION

Agricultural lands have long been recognized in Oregon as providing a host of benefits to the public. Oregon's land use laws and the efforts of numerous organizations around the state have protected working lands for the many values they provide, including provisioning of food and

### PAYMENT FOR ENVIRONMENTAL SERVICES: OAHP PROGRAM GOALS

1. INCENTIVIZE COST-EFFECTIVE AND ENVIRONMENTALLY BENEFICIAL PRACTICES ON OREGON FARMS AND RANCHES BY PAYING FOR ENVIRONMENTAL OUTCOMES.
2. ENCOURAGE PROGRAM PARTICIPATION BY:
  - A. MAKING PARTICIPATION AS EASY AS POSSIBLE.
  - B. PROVIDING CERTAINTY (IN PAYMENT VALUE AND TERMS) FOR LANDOWNERS.

fiber, open space amenities, and fish and wildlife habitat. Agricultural lands also play a large role in the quality and quantity of water in our waterways and have recently been recognized for their important role in sequestering and storing carbon. Given the importance of agricultural lands and practices on a diverse array of ecosystem services, there is a large body of research from scientists in our state and throughout the Nation on environmental effects of agricultural land management and the ecological benefits of specific agricultural conservation practices. To a lesser extent, there is research on the social and economic value of these ecological effects and associated ecosystem services resulting from conservation practices.

### 1.1 PURPOSE

In recognition of the importance of agricultural land management on the level and quality of ecosystem services available for public enjoyment and benefit,

the Oregon Agricultural Heritage Program (OAHP) is developing a payment program to compensate farmers and ranchers for environmental outcomes that provide value to the public (i.e., ecosystem services). Building on a feasibility analysis completed in 2019, this report documents a methodology for valuing conservation practices that provide desired environmental outcomes. The methodology is based on the value to the public of ecosystem services provided by each conservation practice.

### 1.2 TARGET PUBLIC BENEFITS

The purpose of the proposed OAHP payment program is to incentive conservation outcomes with public benefit. The key outcomes providing public benefit that OAHP aims to incentivize with this payment program are:

- Water quality enhancement,
- Aquatic habitat provision,
- Terrestrial habitat provision, and
- Carbon sequestration/reduced emissions.

Water conservation practices and water transactions are not included in the methodology. They are an important project type in other OWEB grant programs, which cover both permanent and short-term water conservation activities. Other OWEB grant programs require that increased irrigation efficiency or other on-farm practices translate to reduced total on-farm water use, increased availability of water for instream flows or other uses, or water quality improvements. Several studies on the effects of increased irrigation efficiency on total farm water use indicate that efficiency improvements can translate into higher crop production per unit of water use (and higher farm income) but the same level of overall agricultural water use (see, for example, (Ward & Pulido-Velazquez, 2008) (Perez-Blanco, Hrast-Essenfelder, & Perry, 2020)). As such, farm conservation practices that enhance water irrigation efficiency have benefits but may not provide direct public benefit in terms of enhanced instream flows. The purchase or transfer of water rights, such as those completed by non-profit organizations engaged in water transactions, is expected to be the most certain and permanent way to ensure desired environmental outcomes regarding instream flows.

Several conservation practices reduce air contaminants or odors and can thus improve air quality, which is a public benefit. However, improved air quality was not identified by OAHP or key partners as having as high a priority as improvements to habitat, carbon, and water quality, and was thus not included in the valuation methodology.

### 1.3 PAYMENT PROGRAM DESIRED ATTRIBUTES AND OUTCOMES

Interviews with conservation specialists and planners, OAHP Commissioners, and other stakeholders identified a set of desirable attributes and outcomes of a payment for ecosystem services program. Specifically, OAHP and key partners identified the following desired attributes of a payment methodology:

- Easy and inexpensive to implement.
- Transparent and easy to understand.
- Flexible and adaptable to diverse practices and farms.
- Perceived as fair by a broad array of partners.
- Consistent with Natural Resources Conservation Service (NRCS) conservation practice definitions.

Further, OAHP and key partners identified the following payment methodology desired outcomes:

- Provide certainty (in payment value and terms) for landowners.
- Encourage participation by farmers and ranchers by making participation as easy as possible.
- Incentivize cost-effective and environmentally beneficial outcomes, such that significant environmental benefit is delivered per conservation dollar.
- Identify reasonable and conservative payment values commensurate with the benefits to the public of each eligible practice, recognizing that payment for practices is a new approach that OAHP aims to explore and adaptively manage over time.

As noted in the last bullet, the purpose of the payment program is to compensate and provide incentives to agricultural landowners and managers for voluntary practices that provide value (in terms of enhanced ecosystem services) to the *public* at large. The value of *private* benefits to the farmer or rancher of a conservation practice are not included in the valuation methodology.

#### 1.4 VALUATION PROCESS & DATA SOURCES

Developing the methodology to value the public value of ecosystem services provided by conservation practices in Oregon required four steps. These four steps, and the data sources and important limitations for each step, are:

- 1) **Identify agricultural conservation practices that result in habitat, carbon, and water quality improvements.** The primary data source for this step is the NRCS physical effects rating for conservation practices. Interviews with conservation practice professionals in Oregon, including experts at NRCS, regional soil and water conservation districts, and Oregon Department of Agriculture also informed this step.
- 2) **Quantify the biophysical or environmental effect expected from implementation of each conservation practice in terms of changes in ecosystem services** (e.g., tons of reduced sediment conveyed to waterbodies or change in carbon dioxide equivalents in the atmosphere). The primary data sources for this step included published scientific literature in peer-reviewed journals, in government publications, and agricultural extension publications. The estimated effects on ecosystem services of a given conservation practice can vary substantially by data source due to a) differences between studies in how ecosystem services are measured (i.e., methodological differences) and b) differences in the level of ecosystem services produced by a practice in any given location due to variation in site-specific conditions and practice implementation/management effects. The estimates of ecosystem service effects by practice presented in this document are intended to reflect average expected ecosystem service effects throughout the State. The actual level of ecosystem service provided at any one site will likely differ from the values estimated in this report.
- 3) **Quantify the economic value of the expected effects on habitat, carbon, and water quality.** Published economic literature in peer-reviewed journals, government publications, and agricultural extension publications were the primary data sources for this step. This step was also supported by analysis of existing payment for ecosystem service values and methodologies. As with measurement of ecosystem service effects, the economic value of changes in ecosystem services varies by study, due to a) methodological differences in studies (how value is measured) and b) differences between sites and locations in the value of a given level of ecosystem service provision.
- 4) **Value benefits of the ‘final’ ecosystem services directly enjoyed by people that result from enhanced habitat, water quality, and carbon sequestration.** Biophysical or environmental changes from conservation practices are most easily measured in terms of sediment, nitrogen, carbon, and such measurements. However, what provides

benefit to people and economic value is the effect of these measures on ‘final’ ecosystem services people directly care about such as fish populations or drinking water purity in downstream areas. Since there are not data available that directly link and quantify the effects of conservation practices on these ‘final services’ (e.g., there are not data that indicate how many more salmon are produced for every acre of additional riparian habitat), for each type of benefit the methodology estimates value by extrapolating data from available studies together with reasonable assumptions and professional judgement. In this process, one pitfall of not being able to directly quantify and value final ecosystem services such as fish populations is that double counting can occur if the methodology values several intermediate services based on the same final service: for example, if both water quality improvements and aquatic habitat improvements are valued based on the same expected fish population effects.<sup>1</sup> To address this, the methodology aims to separate the types of benefits and associated final ecosystem services that are valued due to changes in habitat versus water quality versus carbon. The methodology also aims to separate the incremental effects of different intermediate services on final services such as fish populations (i.e., the effects of nutrients versus temperature or sediment). Finally, to avoid double counting or overestimating, the methodology also uses conservative assumptions and estimates. This last step in the valuation process enables the benefit values derived for water quality, habitat, and carbon to be added together.

Unless otherwise noted, all dollar values presented in this report are in 2023 dollars. Values from earlier years were adjusted for inflation using the Gross Domestic Product Implicit Price Deflator (GDPIPD).

## 1.5 PRACTICE-BASED VS. OUTCOME-BASED VALUATION

While grounded in expected outcomes, the proposed methodology is a practice-based valuation system. A purely outcome-based valuation system would require measurement of environmental outcomes, and payments would only be made to farms and ranches that achieve a measurable change in environmental outcomes. In contrast, the proposed practice-based valuation system provides a uniform value for a given practice.<sup>2</sup>

The primary goal of the OAHP program is to pay for environmentally beneficial outcomes, with payments commensurate to the benefit of environmental outcomes. This seems to indicate that the methodology should be outcome-based, where payments are only made once environmentally beneficial outcomes are achieved and quantified. The outcome-based approach,

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<sup>1</sup> Double counting would not occur in there were data available for the independent effects of sediment vs nutrients vs riparian shading on fish populations.

<sup>2</sup> The exception is for some practices where payments are higher if the practice is implemented in a riparian zone. For example, if trees and shrubs are established outside the riparian zone, the payment is lower than if they are planted in a riparian zone. Table 2-3 summarizes payments by practice type and shows that payments for practices in riparian zones may be eligible for a higher per acre payment due to higher expected benefits.

however, has multiple challenges and drawbacks that are counter to the desired features of the payment methodology identified in Section 1.3. Namely, a purely outcome-based approach is expected to result in uncertainty for landowners (as payments are not guaranteed), be less easy to understand, and be more costly and resource-intensive to implement.

The practice-based methodology was also chosen as there are practical challenges to base payments on measured outcomes. For many types of environmental benefits, the desired environmental outcomes of a given conservation practice may not accrue until numerous years after the practice is implemented. For example, riparian forest buffers may require years to reach a certain level of maturity before water quality benefits may be experienced. As another example, it can take years (e.g., 6 to 10 years) for conservation practices that enhance soil carbon to have a measurable effect (Smith, 2004), and there can remain significant uncertainty in the ability to measure year-to-year change, which would be necessary in an outcome-based annual payment program. Similarly, for water quality, as noted by the Oregon Department of Agriculture (ODA) regarding measurements of water quality: “Many factors make it difficult to assess a specific land use’s nonpoint source contribution to water quality impairment, or to document improvements in water quality” (Oregon Department of Agriculture, 2017).<sup>3</sup>

It is possible for a payment scheme to be based on modeled outcomes, rather than field measurement of outcomes. There are several NRCS-sponsored tools (Nutrient Tracking Tool and Comet-FARM) available to estimate the environmental outcomes in terms of changes in water quality or carbon of a conservation practice. For a given conservation practice the estimates of environmental benefit in these tools are typically based on a wide array of factors including the specific crops grown (historically and currently), the soil type of the parcel, the past management practices on the parcel (such as tillage and nutrient use), irrigation application, slope, and the precipitation patterns. The quantified environmental effects in these tools are estimates of environmental change based on these site-specific variables, many of which are management variables that may vary from year to year. The modeled outcomes can vary significantly based on these management variables. A payment system based on modeled outcomes would thus require historic and current management data to run the model to estimate outcomes, and modeled outcomes could vary from year to year. Thus, relying on outputs from these tools may lessen the certainty and simplicity of a payment system. Additionally, relying on modeled output may lessen the perceived fairness of the payment system as difference in modeled outcome does not necessarily mean difference in delivered outcome for a given conservation practice.

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<sup>3</sup> “Confounding factors include: • Natural variability. • Multiple human and natural sources of pollutants • Localized increases and decreases in pollutant levels (or changes that occur over short periods of time) that are not detected by existing monitoring. • Legacy effects, such as stream channelization or flow modification, that may prevent water quality from achieving standards. • Upstream conditions that prevent downstream reaches from achieving water quality goals.”

## 2 OVERVIEW OF VALUATION METHODOLOGY

The desired attributes and outcomes outlined in Section 1.3 drove the methodology development process and shaped the key features of the methodology. This section provides an overview of these key features, including valuation structure, types of practices valued, required level of practice effectiveness, and the expected role of the conservation management plan review committee in prioritizing and selecting projects for funding. There are tradeoffs between valuation complexity and certainty in delivering benefits versus program ease and cost of program administration.

### 2.1 VALUATION STRUCTURE

To meet the desired methodology features that payments be easy to understand, provide certainty and ease for the landowner, be easy and inexpensive to implement by OAHP, and be perceived as fair by landowners, the proposed methodology provides a guaranteed payment for each eligible practice.

To maximize the value of environmental benefits provided per dollar invested in conservation practices and ensure payments are commensurate with benefits, the valuation methodology has the following structure:

- **Valuation is based on expected environmental outcomes**, in terms of changes to carbon, water quality, and habitat.
- **Expected environmental outcomes are quantified** using the following metrics:
  - Carbon: metric tons of carbon dioxide equivalent,
  - Water quality: tons of sediment and kilograms of nitrogen,
  - Terrestrial habitat: acres of habitat, and
  - Aquatic habitat: acres of riparian habitat (that benefits aquatic habitats).
- **Environmental outcomes for each practice type are estimated based on comprehensive review of the scientific literature**; due to expected variation in outcomes (between sites and through time) the methodology applies a conservative estimate of average benefits per acre. Direct measurement of environmental outcomes is not required in the methodology, so a conservative estimate of average benefits is used.<sup>4</sup> Environmental outcomes are estimated on a per acre basis, and value is also estimated on a per acre basis.

KEY METHODOLOGY ELEMENTS
1. VALUATION STRUCTURE
2. TYPES OF PRACTICES VALUED
3. REQUIRED EFFECTIVENESS OF VALUED PRACTICES
4. PRIORITIZATION OF PRACTICE FUNDING

<sup>4</sup> Not requiring measurement and monitoring reduces certainty in the outcomes delivered but is expected to result in significant cost savings. For carbon payment programs, in some cases the cost of precisely measuring the change in carbon stocks may exceed the value of the increase in carbon stock (World Agroforestry Centre, n.d.)<sup>4</sup> As an example of a monitoring protocol, the CarbonNow market for

- **Only the most effective practices are valued.** The valuation methodology uses strict eligibility criteria such that the only practices with high reliability and high effectiveness in providing benefits are valued.
- **Practices with multiple types of benefits have higher value,** based on the expected value of each type of benefit provided. By incentivizing practices with multiple benefits, the likelihood of the program delivering environmental benefits commensurate with payments is higher. With multiple types of benefits provided, even if one type of benefit underperforms expectations, another type of benefit may outperform expectations and still deliver benefits commensurate with payments.
- **Values for each type of benefit are intended to be conservative.** The proposed values err on the conservative (lower value) side, while still aiming to provide a healthy incentive for practice adoption. Environmental outcomes can vary significantly between sites, and the economic and social value of even the same environmental outcome can also vary significantly between sites. Recognizing this variation, the valuation methodology aims to use reasonable but conservative estimates of both environmental benefit delivered and economic valuation of the expected environmental benefit, considering the full range of potential environmental outcomes and associated economic value.
- **The OAHP Conservation Management Plan (CMP) advisory committee is expected to review each farm or ranch funding application and only plans and associated practices that are approved by the committee will receive funding.** While the valuation methodology proposed a value per acre for each eligible conservation practice, site-specific factors and the role of the proposed practices in addressing known conservation issues and challenges will be considered in the CMP review process. This review process will enhance cost effectiveness and benefit maximization as the review committee will have the discretion to prioritize funding to practices on farms and ranches that are expected to provide the most environmental benefit per conservation dollar.

All values presented in this report are in 2023 dollars, unless noted otherwise.<sup>5</sup>

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soil organic carbon requires three to five years of historical data and annual soil organic carbon and bulk density tests at 12 inch depth along with carbon modelling in its outcome-based program (LOCUS Agriculture, 2023). Costs can also be high for water quality monitoring. An analysis of transaction costs for eight projects in the Medford water quality trading program to reduce stream temperature estimated that average transaction costs amounted to 85% of total project costs (Guillozet, 2016). By minimizing the measurement and monitoring costs, the proposed payment methodology can dedicate funding to achieve environmental benefits and increase total acreage covered by the program.<sup>4</sup> On balance, with the safeguards and limits in place to enhance cost effectiveness of the program, the hope is that the proposed payment methodology will be the most cost-effective methodology for delivering benefits for a given dollar investment.

<sup>5</sup> Values from prior years have been converted to 2023 dollars using the Gross Domestic Product Implicit Price Deflator (GDIPIPD).

## 2.2 TYPES OF ELIGIBLE PRACTICES

In consultation with the OAHP, the scope of the valuation methodology covers the following types of conservation practices. These are the types of practices that are expected to be eligible for payments (and for which this valuation methodology has estimated a public value per acre of implementation):

- Rangeland and agricultural lands practices, but not forestland practices or in-stream restoration practices.
- Practices that have beneficial impacts on water quality, aquatic or terrestrial habitat, and/or carbon sequestration/reduced emissions.
- Non-structural practices (i.e., practices related to facilities/ infrastructure or equipment are not included).

Partners interviewed at the outset of the analysis differed on whether equipment or facilities/infrastructure should be eligible. In keeping with a focus on incentivizing outcomes and maximizing environmental benefits for a given conservation dollar, funding of equipment is not included, as the acquisition of the equipment does not guarantee environmental outcomes (rather the use of the equipment in a conservation practice provides the environmental outcome). Therefore, the methodology focuses on the value of practices.<sup>6</sup> Further, practices related to facilities/infrastructure are not included as the up-front costs of these practices is generally quite high and OAHP determined that it was preferable to have more numerous, lower-cost projects than deplete program funds on a limited number of infrastructure projects.

## 2.3 REQUIRED EFFECTIVENESS OF ELIGIBLE PRACTICES

As noted in Section 1.3, numerous conservation professionals and partners interviewed at the outset of the methodology development process indicated that it was important for the methodology to be consistent with NRCS practice definitions. NRCS has defined 167 conservation practices. For each of these conservation practices, NRCS has also developed a “physical effects” rating for the expected benefit of the practice in 45 categories of environmental outcomes. The types of outcomes evaluated are related to soil health, water conservation, habitat, water quality, air quality, livestock health, and erosion. NRCS rates practices on a scale from -4 (moderate to substantial worsening) to 5 (substantial improvement), as shown in Table 2-1.

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<sup>6</sup> For instance, environmental outcomes of a no till drill would depend on the acreage that converts to no till conservation practice. Therefore, instead of paying for the drill, the methodology pays for acreage that is converted to no till.

Table 2-1: NRCS Physical Effects Rating Categories

NRCS Physical Effects Rating	Description of Physical Effect Level
5	Substantial Improvement
4	Moderate to Substantial Improvement
3	Moderate Improvement
2	Slight to Moderate Improvement
1	Slight Improvement
0	No Effect
-1	Slight Worsening
- 2	Slight to Moderate Worsening
- 3	Moderate Worsening
- 4	Moderate to Substantial Worsening

In the methodology, only practices with at least a moderate to substantial expected average benefit rating (i.e., a 4 or 5 rating) per the 2023 NRCS Physical Effects rating matrix are valued for water quality, aquatic habitat, or terrestrial habitat improvements. For carbon practices, the methodology establishes a value for all practices with a rating of moderate improvement or higher (3, 4, or 5 rating). Carbon has a different requirement for eligibility to increase the consistency between the proposed methodology and the practices eligible for payment under the Oregon Global Action Commission’s recommended practices to reduce greenhouse gas emissions and sequester carbon in Oregon’s natural and working lands sectors.

Of the 45 environmental outcomes rated in the NRCS Physical Effects matrix, the methodology focuses on the ratings for eight outcomes that careful review indicated are the most pertinent to the environmental benefits (water quality, terrestrial habitat, aquatic habitat, and carbon/greenhouse gases) that OAHP aims to incentivize through the program. Table 2-2 summarizes the NRCS benefit categories that are used to identify which practices qualify for payment for providing carbon, water quality, or habitat benefits. If there are two qualifying categories, then the highest rating in each of the two categories is used.

The last row of Table 2-2 also shows the two NRCS physical effects categories that are used to determine whether a practice provides moderate to substantial soil health benefits. Payments are proposed for practices that enhance soil health only as they provide benefit to the public through improved water quality, carbon storage, and habitat. However, as soil health enhancement is a key policy objective to enhance the productivity and resiliency of Oregon’s agricultural lands, information regarding the effects of practices on soil health is included.

**Table 2-2: NRCS Physical Effects Criteria Used for Each Environmental Benefit**

Environmental Benefit Type	NRCS Physical Effect Qualifying Category 1	NRCS Physical Effect Qualifying Category 2
Carbon	Emissions of Greenhouse Gases – GHG's <sup>1</sup>	
Water Quality – Sediment	Sediment Transported to Surface Water	
Water Quality – Nutrients	Nutrients Transported to Surface Water	Nutrients Transported to Groundwater
Aquatic Habitat	Elevated Water Temperature	Aquatic Habitat for Fish and other Organisms
Terrestrial Habitat	Terrestrial Habitat for Wildlife and Invertebrates	
Soil Health <sup>2</sup>	Organic Matter Depletion	Soil Organism Habitat Loss or Degradation

1/This rating category also includes sequestration of greenhouse gases, such as through tree or shrub establishment or soil sequestration.

2/Payments are proposed for practices that enhance soil health only as they pertain to water quality, carbon, and habitat, which are captured in the other benefit categories. However, as soil health enhancement is a key policy objective to enhance the productivity and resiliency of Oregon's agricultural lands, information regarding the effects of practices on soil health is included.

## 2.4 ANNUAL VALUE BY BENEFIT TYPE

Table 2-3 summarizes the estimated annual per acre value for each type of environmental benefit. The number of years that the practice will receive payment will be determined by OAHF and the CMP advisory committee.

Practices are only valued for a benefit type if they qualify as providing at least a “moderate to substantial” benefit (except for carbon, which qualifies with a moderate or better rating), as described in Section 2.3. As shown in Table 2-3, value of a practice differs based on whether a practice is an edge-of-field practice or if it is an in-field practice. For edge-of-field practices, values also differ based on the type of habitat provided in the edge of field area, whether it is trees/shrubs, wetlands, or grass/shrub habitat.

As highlighted in the introduction to this report, there is uncertainty in quantifying the ecosystem services provided by agricultural conservation practices and in estimating the value of the ecosystem services. Our knowledge and understanding of the effects and value of practices continues to evolve, and more research is being conducted in Oregon and elsewhere to further our understanding. We recognize that numerous factors will affect the value of any given practice in any given location. Rather than predicting the exact value that can be expected from a conservation practice in any one location, the values in Table 2-3 are intended to be defensible and conservative values that are representative of expected average outcomes from conservation practices across the State of Oregon.

**Table 2-3: Per Acre Per Year Value for Eligible Agricultural Conservation Practices**

Type of Eligible Practice	Water Quality (Sediment) <sup>1</sup>	Water Quality (Nutrients) <sup>1</sup>	Carbon	Aquatic (Fish) Habitat	Terrestrial Habitat	Maximum Value (if all services provided)
In-Field Practice	\$6	\$9	\$5		\$100	\$120
Edge-of-Field Practice						
Trees/Shrubs	\$90	\$135	\$10	\$150 (if riparian)	\$100	\$485 (if riparian), \$335 (if not riparian)
Wetland			\$5		\$150	\$380
Grass/shrub habitat			\$5		\$100	\$330

Note: For edge of field practices, multiple practices do not increase the maximum value per acre (e.g., for an acre of riparian forest restoration, the value per acre would be \$485, not \$485 for riparian forest buffer plus \$485 for tree/shrub establishment.) Acreage for edge of field is estimated as the acreage of land exclusively covered by the conservation practice and exclusively dedicated to the conservation practice (such as the area planted in trees and shrubs).

1/To avoid overestimating the value of benefits related to fish abundance (which are captured under aquatic habitat but are also related to sediment and nutrients), water quality benefits from reduced sediment and nutrients are focused on benefits related to on aesthetics, drinking water quality, avoided water treatment costs, and non-fish related recreation benefits of water quality. Conservative values are also used to avoid overestimating.

For water quality, an edge-of-field practice can trap nutrients and sediments from all lands draining through the edge-of-field area. As such, the value is higher for an edge-of-field practice than an in-field practice. The literature indicates that a catchment area ratio of 20:1 (20 acres draining through each acre of the edge-of-field area) is a reasonable estimate. To be conservative, water quality benefits of edge-of-field practices are estimated at 15 times the value of in-field practices (see Appendix B for a more in-depth discussion). So, for an in-field practice with physical effects ratings that qualify it only as providing water quality-sediment benefits, the value would be \$6 per acre per year. For an edge-of-field practice with physical effects rating that qualifies the practice as providing only water quality-sediment benefits, the value would be \$90 per acre per year (20 times higher than the in-field practice). For an in-field practice that provides sediment and nutrient water quality benefits, the water quality-related value would be \$15 per acre, while for an edge-of-field practice that provides sediment and nutrient water quality benefits, the water quality-related value would be \$225 per acre (15 times higher).

If that same edge of field practice includes planting trees/shrubs and qualifies as providing a carbon benefit, it would receive an additional \$10 per acre value, and if it also qualifies as providing terrestrial habitat it would also receive a \$100 per acre value. Finally, if this edge-of-field practice is in the riparian zone (such as a riparian forest buffer) and qualifies as a practice benefiting aquatic habitat, it would also qualify for an extra \$150 per acre. Adding together the values for this edge of field practice providing all types of benefits, the water quality (\$225), carbon (\$10), aquatic habitat (\$150), and terrestrial habitat (\$100) equals \$485 per acre per year. Riparian habitat areas can qualify as enhancing both aquatic habitat (through shade/temperature regulation of waterways and other effects) and terrestrial habitat.

For edge of field practices, only one practice will be valued per acre (such that stacking associated practices such as riparian buffer and tree/shrub establishment is not allowed). As such, the maximum value per acre per year would be \$485.

Appendix B through Appendix E provide detailed information on the research and economic analysis supporting all values in Table 2-3. Tables 2-4 and 2-5 provide more detail on the value per unit of environmental improvement and estimated effectiveness of each qualifying carbon and water quality practice, respectively. For habitat, no additional detail is provided as the methodology provides a flat value per acre, with no differentiation in effectiveness.

**Table 2-4: Summary of Estimated Average Carbon Quantification and Value Per Practice Type**

Practice Type/Vegetation Type	Tons C / Hectare / Year	Tons CO <sub>2</sub> e / Acre / Year	Value per Metric Ton of CO <sub>2</sub> e	Value Per Acre/Year	Eligible Practices
Soil Sequestration Practices (In-Field Practices/Grassland)	0.35	0.5	\$10	\$5	Conservation Cover, Pasture/Hay Planting, Soil Carbon Amendment, Range Planting, No Till Management, Reduced Till Management, Nutrient Management
Habitat-Based Practices					
Grassland	0.35	0.5	\$10	\$5	Wildlife Habitat Planting
Tree/Shrub	0.7	1.0	\$10	\$10	Tree/Shrub Establishment, Windbreak/Shelterbelt, Riparian Forest Buffer, Forest Stand Improvement
Wetland	0.35	0.5	\$10	\$5	Wetland Creation, Wetland Restoration

Table 2-5: Estimated Effectiveness and Value for Water Quality Conservation Practices

Water Pollutant	Unit	Estimated Reduced Pollutant Loading Per Acre of Practice		Value Per Unit	Eligible Practices
		In-Field Practices	Edge-of-Field Practices		
Sediment	Ton /Acre	1	20	\$6	Riparian Forest Buffer, No Till, Critical Area Planting, Riparian Herbaceous Cover, Grazing Land Mechanical Treatment, Grassed Waterway, Forest Farming, Filter Strip, Vegetative Barrier, Constructed Wetland
	Value / Acre	\$6	\$120		
Nitrogen	Kilogram / Acre	0.75	15	\$12	Riparian Forest Buffer, Nutrient Management, Conservation Cover, Riparian Herbaceous Cover, Vegetated Treatment Area, Filter Strip, Constructed Wetland, Saturated Buffer
	Value / Acre	\$9	\$180		
Value / Acre, Sediment & Nutrient Qualifying Practices		\$15	\$300	N/A	

### 3 ELIGIBLE PRACTICES

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As shown in Table 3-1 below, there are 14 practices for which values have been estimated for carbon. Practices with carbon value are those that have an NRCS physical effects rating for greenhouse gas emissions reduction of 3, 4, or 5 (practices meeting this rating are highlighted in green in the table for the carbon column). All but four of these practices have other benefits related to water quality or habitat, which increase the total practice value. Table 3-1 also identifies an additional 15 practices that do not qualify as a carbon practice but that are expected to be eligible as a water quality and/or habitat practice. Practices eligible for water-quality or habitat-based payments must have an NRCS physical effects rating of a 4 or 5; these practices are highlighted in green in the table for the water quality and habitat columns. Table 3-2 provides a crosswalk of the OAHP carbon eligible practices, and the Oregon Climate Action Commission's (OCAC) recommended practices to reduce greenhouse gas emissions and sequester carbon in Oregon's natural and working lands sectors.

There are several practices that provide at least moderate terrestrial habitat improvements according to the NRCS physical effects rating but are not valued at this initial valuation stage. These include access control, prescribed burning, pest management, and herbaceous weed control. The estimated value for terrestrial habitat is based on providing additional quantity of habitat, and all these practices are related to quality of habitat. To be conservative, these in-field practices were consequently not included. The valuation methodology could be applied to these or other practices that OAHP desires to be eligible in the future. Feed management is another practice that is not included. This practice can be effective at reducing greenhouse gas emissions; it was not included in the carbon valuation as it is not conducive to a per acre payment methodology. In the future, a per cow carbon value could be developed.

Table 3-1: NRCS Practices Qualifying for Payment by Benefit Category (Based on NRCS Physical Effects Rating)

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat for Fish & Invertebrates)	Terrestrial Habitat (Habitat for Wildlife and Invertebrates)	Soil Health (Max of Organic Matter, Soil Organism Habitat)
<b>Carbon Eligible Practices</b>							
Conservation Cover	327	Qualifying	Qualifying	Qualifying			Qualifying
Pasture and Hay Planting	512	Qualifying				Qualifying	Qualifying
Tree/Shrub Establishment	612	Qualifying			Qualifying	Qualifying	Qualifying
Windbreak/Shelterbelt Establishment and Renovation	380	Qualifying			Qualifying		Qualifying
Nutrient Management	590	Qualifying		Qualifying			
Residue and Tillage Management, No Till	329	Qualifying	Qualifying				Qualifying
Riparian Forest Buffer	391	Qualifying	Qualifying	Qualifying	Qualifying	Qualifying	Qualifying
Wildlife Habitat Planting	420	Qualifying			Qualifying	Qualifying	
Soil Carbon Amendment	336	Qualifying					Qualifying
Forest Stand Improvement	666	Qualifying					
Range Planting	550	Qualifying					Qualifying
Residue and Tillage Management, Reduced Till	345	Qualifying					
Wetland Creation	658	Qualifying					
Wetland Restoration	657	Qualifying					

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat for Fish & Invertebrates)	Terrestrial Habitat (Habitat for Wildlife and Invertebrates)	Soil Health (Max of Organic Matter, Soil Organism Habitat)
<b>Water Quality or Habitat Eligible Practices</b>							
Critical Area Planting	342		Qualifying				Qualifying
Grazing Land Mechanical Treatment	548		Qualifying				
Riparian Herbaceous Cover	390		Qualifying	Qualifying			Qualifying
Upland Wildlife Habitat Management	645					Qualifying	
Constructed Wetland	656		Qualifying	Qualifying			
Filter Strip	393		Qualifying	Qualifying			
Forest Farming	379		Qualifying		Qualifying		
Grassed Waterway	412		Qualifying				
Restoration and Management of Rare or Declining Habitats	643				Qualifying	Qualifying	
Vegetated Treatment Area	635			Qualifying			
Vegetative Barrier	601		Qualifying				
Wetland Wildlife Habitat Management	644					Qualifying	
Early Successional Habitat Development/Mgt.	647					Qualifying	
Saturated Buffer	604			Qualifying			
Stormwater Runoff Control	570		Qualifying				

Table 3-2: Qualifying Practices, Crosswalk with USDA and Oregon Climate Action Commission (OCAC)

Practices	NRCS "GHG Emissions" Improvement Rating	Included in USDA Climate Smart Practices?	Included in the Oregon NWL Recommended Practices	
			Agricultural Lands	Rangelands
Tree/Shrub Establishment	Moderate to Substantial	Yes	Yes	
Conservation Cover	Moderate to Substantial	Yes	Yes	
Pasture and Hay Planting	Moderate to Substantial	Yes	Yes	
Windbreak/Shelterbelt Establishment and Renovation	Moderate to Substantial	Yes	Yes	
Soil Carbon Amendment	Moderate to Substantial	Yes	Yes?	
Riparian Forest Buffer	Moderate	Yes	Yes	
Range Planting	Moderate	Yes		Yes
Forest Stand Improvement	Moderate	Yes	Yes (forest lands)	
Wetland Creation	Moderate			
Wetland Restoration	Moderate	Yes	Yes (tidal wetland)	
Residue and Tillage Management, No Till	Moderate	Yes	Yes	
Wildlife Habitat Planting	Moderate	Yes	Yes	
Nutrient Management	Moderate	Yes	Yes	
Residue and Tillage Management, Reduced Till	Moderate	Yes	Yes	



## 4 ESTIMATED VALUE BY PRACTICE

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Table 4-1 applies the values described in Section 2 to the 167 NRCS conservation practices. Values range from \$485 per acre per year for riparian buffers to \$5 per acre per year for some in field practices that are only expected to be eligible for carbon-related payment.

For comparison purposes, the table also provides per-acre cost share rates used by a USDA program, the Environmental Quality Incentives Program (EQIP). EQIP is a conservation program administered by NRCS that offers farmers and ranchers financial cost-share and technical assistance to implement conservation practices. For comparison, the final column in Table 4-1 provides information on the fiscal year 2024 Environmental Quality Incentives Program (EQIP) reimbursement rate for Oregon per acre (or other unit as indicated in the column) based on the cost to implement practices (Natural Resources Conservation Service, 2024). Generally, EQIP may provide up to 75% cost share (or up to 90% cost share for socially disadvantaged farmers) for materials and services to implement a conservation practice.

Table 4-1: Payments by Practice Per Acre Per Year

Conservation Practice	NRCS Practice Code	Edge of Field Habitat Type	Edge of Field	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic (Habitat (if Riparian Trees)	Terrestrial Habitat	Annual Payment per Acre		EQIP Oregon Cost Share per Acre
									If Riparian	If not Riparian	
<b>Carbon Eligible Practices</b>											
Conservation Cover	327	Grass/Shrub	Yes	\$5	\$90	\$135			\$225	\$225	\$117 to \$848
Pasture & Hay Planting	512	Grass/Shrub	No	\$5				\$100	\$100	\$100	\$102 to \$684
Tree/Shrub Establishment	612	Tree/Shrub	Yes	\$10			\$150	\$100	\$250	\$100	\$294 to \$5,380
Windbreak/Shelterbelt Establishment and Renovation <sup>1</sup>	380	Tree/Shrub	Yes	\$10			\$150		\$160 (\$2.05/tree)	\$10 (\$0.13/tree)	\$0.55 to \$7.58/ tree
Nutrient Management	590		No	\$5		\$9			\$14	\$14	\$8 to \$38
Residue & Tillage Management, No Till	329		No	\$5	\$6				\$11	\$11	\$16 to \$42
Riparian Forest Buffer	391	Tree/Shrub	Yes	\$10	\$90	\$135	\$150	\$100	\$485	\$335	\$1,882 to \$7,536
Wildlife Habitat Planting	420	Grass/Shrub	Yes	\$5			\$150	\$100	\$255	\$105	\$399 to \$4892
Soil Carbon Amendment	336		No	\$5					\$5	\$5	\$72 to \$2,000
Forest Stand Improvement	666	Tree/Shrub	Yes	\$10					\$10	\$10	\$113 to \$2,265
Range Planting	550		No	\$5					\$5	\$5	\$127 to \$379
Residue & Tillage Management, Reduced Till	345		No	\$5					\$5	\$5	\$20 to \$43
Wetland Creation	658	Wetland	Yes	\$5					\$5	\$5	\$3,428 to \$4,055

Conservation Practice	NRCS Practice Code	Edge of Field Habitat Type	Edge of Field	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic (Habitat (if Riparian Trees)	Terrestrial Habitat	Annual Payment per Acre		EQIP Oregon Cost Share per Acre
									If Riparian	If not Riparian	
Wetland Restoration	657	Wetland	Yes	\$5					\$5	\$5	\$932 to \$4123
<b>Water Quality or Habitat Eligible Practices</b>											
Critical Area Planting	342		Yes		\$90				\$90	\$90	\$332 to \$1,231
Grazing Land Mechanical Treatment	548		No		\$6				\$6	\$6	\$13 to \$97
Riparian Herbaceous Cover	390		Yes		\$90	\$135			\$225	\$225	\$817 to \$9,315
Upland Wildlife Hab Mgmt.	645		Yes					\$100	\$100	\$100	\$10 to \$309
Constructed Wetland	656		Yes		\$90	\$135			\$225	\$225	\$8,117 to \$13,924
Filter Strip	393		Yes		\$90	\$135			\$225	\$225	\$174 to \$244
Forest Farming	379		No		\$6		\$150		\$156	\$6	\$4 to \$6
Grassed Waterway	412		Yes		\$90				\$90	\$90	\$1,259 to \$2,497
Restoration and Management of Rare or Declining Habitats	643		Yes				\$150	\$100	\$250	\$100	\$16 to \$2,906
Vegetated Treatment Area	635		Yes			\$135			\$135	\$135	\$7,989 to \$17,793
Vegetative Barrier <sup>2</sup>	601		Yes		\$90				\$90 (\$0.005/ft)	\$90 (\$0.005/ft)	\$0.14 to \$1.13/ft
Wetland Wildlife Habitat Mgmt.	644		Yes					\$100	\$100	\$100	\$10 to \$504
Early Successional Habitat Development/Mgmt.	647		Yes					\$100	\$100	\$100	\$29 to \$360

Conservation Practice	NRCS Practice Code	Edge of Field Habitat Type	Edge of Field	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic (Habitat (if Riparian Trees)	Terrestrial Habitat	Annual Payment per Acre		EQIP Oregon Cost Share per Acre
									If Riparian	If not Riparian	
Saturated Buffer	604		Yes			\$135			\$135	\$135	N/A
Stormwater Runoff Control	570		Yes		\$90				\$90	\$90	N/A

1/Conversion from per acre values to per tree values for windbreak / shelterbelt establishment or renovation is based on NRCS suggested spacing between trees and 17.5 feet between rows (NRCS suggests 15 to 20 feet spacing between rows), and 2 rows of trees for approximately 78 trees per acre. Dividing the per acre payment values by this many trees provides the payment per tree.

2/Conversion to per foot values assumes a 2-foot-wide barrier, so an estimated 21,780 feet length is required to make an acre of coverage.



## APPENDIX A: NRCS PHYSICAL EFFECTS RATING

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Table A-1 below shows for all NRCS practices (not just ones eligible for payments in this methodology as shown in Table 3-1), the physical effects ratings for each benefit category, as well as for soil health. If the CMP advisory committee chooses to provide payments for practices not qualifying as eligible for payment in Table 3-1, then payment according to the values in Table 2-3 could be made for every benefit type (such as water quality-sediment or aquatic habitat) that the CMP advisory committee concludes would result in a “moderate to substantial” improvement.

Table A-1: Physical Effects Rating for NRCS Practices by Benefit Category

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Carbon Eligible Practices</b>							
Conservation Cover	327	4	4	4	1	3	5
Pasture and Hay Planting	512	4	1	1	0	4	4
Tree/Shrub Establishment	612	4	3	1	4	5	5
Windbreak/ Shelterbelt Establishment and Renovation	380	4	1	1	4	3	5
Nutrient Management	590	3	0	5	0	0	2
Residue and Tillage Management, No Till	329	3	4	2	0	1	4
Riparian Forest Buffer	391	3	5	5	5	5	5
Wildlife Habitat Planting	420	3	1	1	4	5	0
Soil Carbon Amendment	336	4	1	1	0	0	4
Forest Stand Improvement	666	3	0	1	1	2	1
Range Planting	550	3	2	1	1	2	4
Residue and Tillage Management, Reduced Till	345	3	3	2	0	1	3
Wetland Creation	658	3	2	3	0	2	2
Wetland Restoration	657	3	2	3	0	2	1
<b>Water Quality or Habitat Eligible Practices</b>							
Critical Area Planting	342	2	4	2	1	2	5
Grazing Land Mechanical Treatment	548	2	4	3	0	1	3
Riparian Herbaceous Cover	390	2	4	5	2	2	4
Upland Wildlife Habitat Management	645	2	2	0	0	5	0
Constructed Wetland	656	1	5	4	0	0	0
Filter Strip	393	1	5	5	2	1	1

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Water Quality or Habitat Eligible Practices (Continued)</b>							
Forest Farming	379	1	4	1	4	3	3
Grassed Waterway	412	1	5	2	1	1	3
Restoration and Management of Rare or Declining Habitats	643	1	2	0	5	5	0
Vegetated Treatment Area	635	1	2	4	0	0	3
Vegetative Barrier	601	1	4	1	1	1	1
Wetland Wildlife Habitat Management	644	1	3	0	0	5	0
Early Successional Habitat Development/Mgt.	647	0	0	0	0	5	0
Saturated Buffer	604	0	0	5	0	0	0
Stormwater Runoff Control	570	0	4	2	0	0	1
<b>Other NRCS Practices, Not Eligible for Payments (Insufficient Benefits)</b>							
Alley Cropping	311	2	3	3	2	3	5
Cover Crop	340	2	2	2	0	1	2
Energy Efficient Agricultural Operation	374	2	0	0	0	0	0
Prescribed Grazing	528	2	2	1	1	2	4
Recreation Area Improvement	562	2	1	0	0	0	1
Silvopasture	381	2	3	3	3	2	3
Amendments for Treatment of Agricultural Waste	591	1	0	2	0	0	1
Brush Management	314	1	2	0	0	3	0
Conservation Crop Rotation	328	1	3	3	0	1	4
Contour Buffer Strips	332	1	3	2	1	1	1
Contour Orchard and Other Perennial Crops	331	1	3	2	1	0	2
Cross Wind Trap Strips	589C	1	1	1	0	0	1

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Other NRCS Practices, Not Eligible for Payments (Insufficient Benefits) (Continued)</b>							
Drainage Water Management	554	1	0	1	0	0	2
Emergency Animal Mortality Management	368	1	0	2	0	0	0
Field Border	386	1	3	1	2	1	4
Field Operations Emissions Reduction	376	1	0	0	0	0	0
Firebreak	394	1	-1	0	1	1	-2
Fuel Break	383	1	-1	0	0	0	0
Hedgerow Planting	422	1	0	2	1	2	2
Herbaceous Wind Barriers	603	1	1	1	1	1	1
Irrigation Water Management	449	1	2	2	0	0	1
Salinity and Sodic Soil Management	610	1	0	0	0	0	0
Waste Recycling	633	1	0	2	0	0	1
Waste Treatment	629	1	0	2	0	0	1
Wetland Enhancement	659	1	2	3	0	2	1
Woody Residue Treatment	384	1	1	0	0	0	1
Amending Soil Properties with Gypsum Products	333	0	0	-2	0	0	0
Clearing & Snagging	326	0	-2	0	0	0	0
Contour Farming	330	0	2	2	1	0	1
Controlled Traffic Farming	334	0	0	0	0	0	2
Cross Wind Ridges	588	0	1	1	0	0	1
Deep Tillage	324	0	0	0	0	0	0
Dust Control on Unpaved Roads and Surfaces	373	0	1	-1	0	0	0
Dust Management for Pen Surfaces	375	0	0	1	0	0	0
Forage Harvest Management	511	0	0	1	0	1	3

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Other NRCS Practices, Not Eligible for Payments (Insufficient Benefits) (Continued)</b>							
Groundwater Testing	355	0	0	0	0	0	0
Heavy Use Area Protection	561	0	2	1	0	0	0
Irrigation and Drainage Tailwater Recovery	447	0	1	2	0	0	0
Mulching	484	0	2	2	0	1	2
Row Arrangement	557	0	2	-2	0	0	1
Spoil Disposal	572	0	2	0	0	0	1
Spring Development	574	0	1	0	0	0	0
Stripcropping	585	0	3	2	1	1	2
Surface Drainage, Field Ditch	607	0	1	-2	0	0	0
Surface Drainage, Main or Lateral	608	0	-1	-2	0	0	0
Surface Roughening	609	0	3	0	0	0	0
Terrace	600	0	2	2	0	0	2
Tree/Shrub Pruning	660	0	0	1	1	2	2
Tree/Shrub Site Preparation	490	0	-1	0	0	0	-1
Water Harvesting Catchment	636	0	0	0	0	0	0
Land Clearing	460	-1	-1	-1	-1	-2	-3
Recreation Land Improvement and Protection	566	-1	2	0	0	-2	1
<b>Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable</b>							
Anaerobic Digester	366	4	0	2	0	0	0
Feed Management	592	4	0	2	0	0	0
Roofs and Covers	367	4	0	0	0	0	0
Prescribed Burning	338	2	1	2	0	4	1
Access Control	472	1	3	1	3	4	1
Fishpond Management	399	1	0	0	5	0	0

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)</b>							
Herbaceous Weed Treatment	315	1	1	1	0	4	1
Land Reclamation, Abandoned Mined Land	543	1	4	0	1	1	3
Land Reclamation, Currently Mined Land	544	1	4	0	0	0	3
Stream Habitat Improvement and Management	395	1	2	2	5	3	0
Anionic Polyacrylamide (PAM) Erosion Control	450	0	4	2	0	0	0
Aquatic Organism Passage	396	0	0	0	5	2	0
Bivalve Aquaculture Gear and Biofouling Control	400	0	0	2	4	0	0
Fish Raceway or Tank	398	0	0	-1	4	0	0
Land Reclamation, Landslide Treatment	453	0	4	0	0	0	2
Lined Waterway or Outlet	468	0	5	0	0	-1	0
Pest Management Conservation System	595	0	2	0	2	4	2
Pond	378	0	2	2	4	2	0
Sediment Basin	350	0	4	5	0	-1	0
Shallow Water Development and Management	646	0	2	1	0	5	1
Structure for Water Control	587	0	1	0	4	0	0
Structures for Wildlife	649	0	0	0	3	4	0
Trails and Walkways	575	0	2	0	4	0	0
Water and Sediment Control Basin	638	0	4	0	0	2	0
Watering Facility	614	0	2	4	1	2	0
Short Term Storage of Animal Waste and Byproducts	318	-1	0	4	0	0	1

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)							
Waste Storage Facility	313	-1	0	4	0	0	1
Waste Treatment Lagoon	359	-3	0	4	0	0	1
Air Filtration and Scrubbing	371	2	0	0	0	0	0
Combustion System Improvement	372	2	0	0	0	0	0
Energy Efficient Building Envelope	672	2	0	0	0	0	0
Animal Mortality Facility	316	1	0	2	0	0	0
Composting Facility	317	1	0	2	0	0	0
Fence	382	1	0	0	1	1	1
Irrigation System, Microirrigation	441	1	1	2	0	0	0
Irrigation System, Surface & Subsurface	443	1	0	1	0	0	0
Mine Shaft & Adit Closing	457	1	0	0	0	0	0
Pumping Plant	533	1	0	0	0	0	0
Road/Trail/Landing Closure and Treatment	654	1	3	1	1	1	5
Rock Wall Terrace	555	1	2	0	0	0	0
Sprinkler System	442	1	1	2	0	0	0
Streambank and Shoreline Protection	580	1	2	1	2	2	0
Waste Facility Closure	360	1	0	0	0	0	0
Waste Separation Facility (no)	632	1	0	2	0	0	1
Access Road	560	0	1	0	0	0	1
Agrichemical Handling Facility	309	0	0	0	0	0	0
Aquaculture Ponds	397	0	0	-2	2	0	0
Channel Bed Stabilization	584	0	1	0	1	0	0
Dam	402	0	2	0	2	1	1
							1
Dam, Diversion	348	0	0	0	-1	-1	0

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)							
Dike and Levee	356	0	0	0	0	0	0
Diversion	362	0	2	3	0	0	0
Dry Hydrant	432	0	0	0	0	0	0
Energy Efficient Lighting System	670	0	0	0	0	0	0
Forest Trails and Landings	655	0	0	1	1	0	-1
Grade Stabilization Structure	410	0	2	0	1	1	2
High Tunnel System	325	0	-1	0	0	0	0
Hillside Ditch	423	0	2	-1	0	0	0
Irrigation Canal or Lateral	320	0	0	-2	0	0	0
Irrigation Ditch Lining	428	0	1	1	0	0	0
Irrigation Field Ditch	388	0	0	0	0	0	0
Irrigation Land Leveling	464	0	1	2	0	0	0
Irrigation Pipeline	430	0	1	1	0	0	0
Irrigation Reservoir	436	0	2	0	0	0	0
Land Reclamation, Toxic Discharge Control	455	0	0	0	0	0	0
Livestock Pipeline	516	0	0	0	0	0	0
Livestock Shelter Structure	576	0	0	3	0	0	0
Monitoring Well	353	0	0	0	0	0	0
Obstruction Removal	500	0	0	0	0	0	1
On-Farm Secondary Containment Facility	319	0	0	0	0	0	0
Open Channel	582	0	0	-1	0	0	0
Pond Sealing or Lining - Geomembrane or Geosynthetic Clay Liner	521	0	0	2	0	0	0

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)</b>							
Pond Sealing or Lining, Compacted Soil Treatment	520	0	0	2	0	0	0
Pond Sealing or Lining, Concrete	522	0	0	2	0	0	0
Roof Runoff Structure	558	0	1	2	0	0	0
Sinkhole Treatment	527	0	2	2	0	0	0
Stream Crossing	578	0	2	1	1	0	0
Subsurface Drain	606	0	2	-2	0	0	2
Underground Outlet	620	0	0	-1	0	0	0
Vertical Drain	630	0	1	1	0	0	0
Waste Transfer	634	0	0	2	0	0	0
Water Well	642	0	0	0	0	0	0
Waterspreading	640	0	0	2	0	0	1
Well Decommissioning	351	0	0	0	0	0	0
Denitrifying Bioreactor	605	-1	0	3	0	0	0
Precision Land Forming and Smoothing	462	-1	1	1	0	0	-2

## APPENDIX B: DATA TO SUPPORT CARBON VALUES

This appendix presents the data and sources for the values for carbon sequestration practices. Carbon dioxide is the most prevalent greenhouse gas (GHG) emitted by human activity, but other GHGs also contribute to climate change. These other GHGs are converted into CO<sub>2</sub>e based on their global warming potential compared to carbon dioxide. For example, in terms of global warming potential, one ton of methane is equivalent to approximately 25 tons of carbon dioxide, so one ton of methane is equal to 25 tons of carbon dioxide equivalent, or CO<sub>2</sub>e. Throughout this appendix we present sequestration by conservation practice as the metric tons of carbon sequestered per hectare per year, as this is the metric most often used in the literature. We then convert this to tons of CO<sub>2</sub>e per acre per year, as carbon prices are typically expressed in terms of dollars per metric tons of CO<sub>2</sub>e.

As shown in Table B-1, we establish carbon values based on an estimated annual sequestration rate of approximately 0.35 to 0.7 metric tons carbon (C) per hectare per year, or 0.5 to 1.0 metric tons CO<sub>2</sub>e per acre per year.<sup>7</sup> We couple this with a carbon value of \$10 per metric ton of CO<sub>2</sub>e to estimate a carbon value per acre that varies from \$5 to \$10 per acre. The sections below provide the supporting data for this value level; as with all other values used in the methodology, the carbon value aims to be a reasonable but conservative estimate of public benefits of conservation practices.

**Table B-1: Summary of Carbon Quantification and Values Per Practice Type**

Practice Type/Vegetation Type	Tons C / Hectare / Year	Tons CO <sub>2</sub> e / Acre / Year	Value per Metric Ton of CO <sub>2</sub> e	Value Per Acre/Year	Eligible Practices
Soil Sequestration Practices (In-Field Practices/Grassland)	0.35	0.5	\$10	\$5	Pasture/Hay Planting, Soil Carbon Amendment, Range Planting, No Till Management, Reduced Till Management, Nutrient Management
Habitat-Based Practices					
Grassland	0.35	0.5	\$10	\$5	Wildlife Habitat Planting, Conservation Cover
Tree/Shrub	0.7	1.0	\$10	\$10	Tree/Shrub Establishment, Windbreak/Shelterbelt, Riparian Forest Buffer, Forest Stand Improvement
Wetland	0.35	0.5	\$10	\$5	Wetland Creation, Wetland Restoration

<sup>7</sup> This conversion is based on a conversion ratio of 3.67 tons of CO<sub>2</sub>e for every ton of carbon, and 2.47 acres for every hectare.

### EFFECTIVENESS OF CONSERVATION PRACTICES (LEVEL OF CARBON SEQUESTRATION)

Table B-2 summarizes key sources of literature on the effectiveness of agricultural conservation practices in enhancing soil and woody vegetation carbon sequestration. In-field practices, such as no-till, conservation cover, establishment of grassland (range planting or pasture/hay planting), or wetlands can increase soil carbon storage. The average annual soil organic carbon (SOC) sequestration rate is estimated at 0.35 tons of carbon per hectare per year based on a variety of sources. Different studies of soil carbon sequestration rates on farmland and in grassland/wetland ecosystems vary widely in their estimates of annual sequestration, both in terms of magnitude and in terms of sequestration rate over time.

Table B-2: Summary of Data on Carbon Sequestration by Practice Type, Metric Tons C per Hectare per Year

Practice	Biardeau et al. (from COMET-Planner), 2016	Soil Carbon Chambers et al., 2016 (NRCS review)	Canqui et al., 2022 (Meta-Analysis)	Cai et al., 2022 (Meta-Analysis)	Fargione et al., 2018 (Natural Climate Solutions)	Gattinger et al., 2012 Meta Analysis	US EPA Greenhouse Gas Inventory, 2022	Oregon Forest Carbon Inventory	USDA Forest Carbon Data
Riparian forest buffers & tree/shrub establishment or afforestation	1.5 to 1.7							0.5 to 1.5 <sup>B</sup>	0.2 to 0.7 <sup>C</sup>
Other tree/shrub establishment, including hedgerow/alley cropping/multi-story cropping	1.2 to 1.4								
Herbaceous Cover (conservation cover, herbaceous wind barriers, vegetative barriers, contour buffer strips, field borders, etc.)	1.2	0.42 to 0.96			1.2 <sup>D</sup>		0.3 <sup>A</sup>		
No Till	0.3	0.15 to 0.27		~0					
Cover crops (Not Eligible)	0.3	0.15 to 0.22	.12						
Forage and biomass planting	0.3	.02 to 0.17							
Prescribed grazing (Not		0.17 to 0.44							
Range planting		0.22 to 0.35							
Organic soil amendments (replacing synthetic fertilizer)	1.8					0.27 to 0.45 <sup>E</sup>			
Mulching (Not eligible)	0.2	0.07 to 0.18							

A/Estimated annual average flux (net sequestration) throughout the US for cropland converted to grassland.

B/Data on annual average above ground flux (net sequestration) in all Oregon forests, excluding corporate ownership.

C/Data on average annual carbon sequestration (soil and all above ground biomass) in first 10 years of afforestation for different Oregon tree types.

D/Estimated annual average flux (net sequestration) throughout the US for cropland converted to native grassland.

E/Estimated differences in a meta-analysis of conventional versus organically farmed soils. (Gattinger, et al., 2012)

Much of the literature focuses on soil carbon sequestration on agricultural lands (soy and corn cropping) in the Midwest, which may have very different SOC sequestration rates than agricultural lands in Oregon. The rate at which SOC stocks change is a function of climate, cropping history, type of plants seeded, landscape position, hydrology, soil characteristics, and time. Table B-2 presents carbon sequestration values from different meta-analyses of agricultural management practices, as well as data from national and Oregon carbon inventories. Data from other studies is also presented in the text below.

For establishment of grass cover, estimates are highly varied for sequestration rates. However, one review of available studies by NRCS concluded that conversion of cropland to grassland on Conservation Reserve Program lands results in carbon sequestration rates of approximately 0.22 to 0.45 tons per acre per year (Natural Resources Conservation Service, 2012).<sup>8</sup> Within this range, the 2022 US EPA National Greenhouse Gas Inventory estimates an annual sequestration rate of 0.3 metric tons carbon per hectare for lands converted from agricultural land use to grassland (Environmental Protection Agency, 2022).<sup>9</sup> These studies support a value of approximately 0.35 metric tons carbon per hectare sequestered per acre of grass cover, the value used in the payment methodology.

Estimates are more varied for studies of in-field practices. Some studies show a significant effect on soil organic matter from no till, while others show little effect. A 2006 EPA review concluded that published carbon sequestration rate estimates for conversion of cropland from conventional tillage to no-till range from 0.22 to 0.33 ton per acre per year, with an estimated saturation time range<sup>10</sup> of 15 to 50 years (US Environmental Protection Agency, 2006). However, a recent review of 144 studies over the past 50 years (including 1,061 pairs of published data on till and no-till) found that no till increases SOC at shallow soil depths in the first years of practice implementation, but that these gains may be offset by diminishing amounts of carbon stored in deeper soil depths (ranging from 0.28 to 2.29 metric tons C per hectare) (Cai, et al., 2022).<sup>11</sup> This study found that over 14 years the net change in soil carbon approached zero, indicating that no till is not a guaranteed solution from increasing SOC in agricultural soils.

Similarly, another recent review of 77 cover crop comparisons in the United States found that only 29% (22 of the 77) resulted in an increase in SOC (0.41 metric ton C per hectare per year); taking into account all 77 comparisons, the average increase in SOC was 0.12 metric tons per hectare, or 0.05 metric tons C per acre (note that cover cropping is not included as an eligible carbon practice). Increased SOC from cover cropping was correlated with more cover crop biomass (greater than 2 metric tons per acre) in the cover crop, a longer timeframe of practice

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<sup>8</sup> This is based on the following study: Follet, R.F., Pruessner, E.G., Samson Liebig, S.E., Kimble, J.M. and Waltman, S.W., 2001. Carbon sequestration under the Conservation Reserve Program in the historic grassland soils of the United States of America. I R. Lal, ed. Carbon Sequestration and Greenhouse Effect. Soil Science Society of America Special Publication No. 57. pp. 27 – 40

<sup>9</sup> EPA. 2022. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. U.S. Environmental Protection Agency, EPA 430-R-22-003. <https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020>.

<sup>10</sup> Saturation time range refers to the number of years of increased soil carbon sequestration before SOC has reached maximum or saturation levels.

<sup>11</sup> Cai, A., Han, T., Ren, T., Sanderman, J., Rui, Y., Wang, B., Smith, P. and Xu, M., 2022. Declines in soil carbon storage under no tillage can be alleviated in the long run. *Geoderma*, 425, p.116028.

implementation (more than five years of cover cropping), and low baseline SOC (Blanco-Canqui, 2022), (Jordon, et al., 2022). Several meta-analyses of soil organic carbon have also found that SOC concentrations often accrue over time and that there are additive effects of multiple BMPs on SOC and soil health, with SOC responding to combining of conservation practices (such as no-till, cover cropping, and organic amendments) (Crystal-Ornelas, Thapa, & Tully, 2021)(Allam et al., 2022). As a potential example of additive effects, one study in eastern Oregon compared the combined effects on soil carbon of winter cropping and no-till compared to conventionally tilled and winter fallow, and estimated a change in soil carbon of 1.7 to 2.6 metric tons C per hectare per year in the soil zone of 0 to 40 cm (Machado, et al., 2006).<sup>12</sup>

Permanence of carbon storage is an issue with all soil or plant-based carbon sequestration (as trees can release carbon through wildfire events or harvest, or soils can be disturbed and release carbon). However, permanence is particularly an issue for in-field soil carbon practices as changes in annual management practices (such as introducing till on formerly no-till lands) can result in release of carbon stored in prior years. Based on these types of uncertainties, we establish a conservative estimate of value for soil-based carbon sequestration practices of 0.35 metric tons carbon per hectare, the same value used for grassland.

Wetlands, which store the majority of carbon in soils, are designated the same level of carbon sequestration (0.35 metric tons C per hectare per year) as in-field management practices and grassland establishment. For wetlands, we review values from four different publications on carbon stocks in US wetlands (Nahlik & Fennessy, 2016) (Tan Z. , Liu, Sohl, & Young, 2015), and compare these against values from a different set of five studies on carbon stocks in US agricultural lands (see Tables B-3 and B-4). These data indicate carbon stocks in wetlands vary substantially, but in the western US may average approximately 200 tons of carbon per hectare (with tidal saline wetlands averaging approximately 350 tons of carbon per hectare), while agricultural land may average approximately 40 tons per hectare. One study estimates that it can take wetlands 20 to over 60 years to return to natural conditions (Tangen & Bansal, 2020). Peatland in particular accumulates carbon very slowly. For example, one recent study estimated that the average time for a degraded wetland to move from a carbon source to a carbon sink through restoration could be 141 years (for a non-peatland wetland) to 525 years (for a peatland wetland) (Schuster, Taillardat, Macreadie, & Malerba, 2024). A 50-year period to move from 40 metric tons carbon per hectare to 200 to 350 metric tons carbon per hectare equates to approximately 3 to 6 metric tons carbon per hectare.

However, several assessments of annual wetland carbon sequestration indicate that approximately 0.35 metric ton to 1 metric ton carbon per hectare may be more accurate (see Table B-5). A study of wetlands in the Prairie Pothole Region of the US estimated sequestration rates on wetlands ranging from 0.35 to 1.1 tons of carbon per hectare per year (Tangen & Bansal, 2020). Another study of restoring peatland ecosystems through the United States estimated that restored peatlands in the Western US would result in total annual storage of 0.95 ton of carbon equivalent per hectare (after accounting for carbon dioxide and methane flux) (Fargione,

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<sup>12</sup> Machado, S., Rhinhart, K., & Petrie, S. (2006). Long-term cropping system effects on carbon sequestration in eastern Oregon. *Journal of Environmental Quality*, 35(4), 1548-1553.

et al., 2018). Similarly, a 2022 study of carbon sequestration on restored freshwater, mineral soil wetlands in an agricultural landscape in Ontario, Canada, found organic carbon sequestration rates of 0.89 metric tons per hectare per year, with soil restored over 40 years. Although several of these studies indicate higher levels of carbon storage in wetland, we take into account that methane emissions from wetlands may rise with increased warming (although wetlands are still expected to provide a net benefit in mitigating climate change, see (US Geological Survey, 2023)), so we use an estimate of 0.35 tons per carbon per hectare per year for wetlands. Given the uncertainty in timing for wetlands to become carbon sinks, this rate of sequestration may not occur immediately after practice implementation.

**Table B-3: Estimated Carbon Stock of Wetlands, Metric Ton Carbon per Hectare**

Study	Geography	Data Year	Carbon Stock (Metric Ton Carbon Per Hectare)
Tan et al., 2015	National, federal forest	2001 to 2005 average	151
	National, federal forest	2050	138
	National, nonfederal forest	2050	<b>206</b>
Nahlik and Fennessy, 2016	Tidal Saline	2011	345
	Coastal Plains	2011	197
	E Mts & Upper Midwest	2011	477
	Interior Plains	2011	194
	West	2011	<b>214</b>
	National	2011	299
Adhikari et al. 2019	Wisconsin	1990 to 2010	243

Sources: (Adhikari, et al., 2019) (Nahlik & Fennessy, 2016) (Tan Z. , Liu, Sohl, & Young, 2015)

**Table B-4: Estimated Carbon Stock of Cropland Soils, Metric Ton Carbon Per Hectare**

Study	Geography	Data Year	Carbon Stock (Metric Ton Carbon Per Hectare)
Spawn et al. 2019, inferred from % change	US Croplands	2008 to 2012	23
Lal 2004, inferred	Global	2000	45
Tan et al., 2015 (cropland/agricultural may include grassland, pasture, hay, and other land uses)	National, federal cropland	2001 to 2005 average	37
	National, federal agricultural land	2050	40
	National, nonfederal agricultural land	2050	48
Dangal et al. 2022 (Calibrated model with sampling of US	US Croplands	2001 to 2005	35

cropland soils)			
USGS 2011	Great Plains Region agricultural land	2001 to 2005	37

Sources: Highland Economics analysis of (Spawn, Lark, & Gibbs, 2019); (Zhang, Lark, Clark, Yuan, & LeDuc, 2021), (Tan Z. , Liu, Sohl, Wu, & Young, 2015), (Dangal, et al., 2022) (Bouchard, et al., 2011)

**Table B-5: Data on Annual Carbon Sequestration by Wetlands**

Study	Year	Location	Metric Ton Carbon / Hectare / Year
Creed et al.	2022	Ontario	0.89
Tangen and Bansal	2020	Prairie Pothole Region	0.35 to 1.1
Fargione et al.	2018	Western Wetlands	0.95
Estimate Used for Oregon Payments for Carbon			0.35

Sources: (Creed, et al., 2022), (Fargione, et al., 2018), (Tangen & Bansal, 2020)

For practices with tree establishment, we use values from the US Forest Service on average carbon stocks in afforestation projects (Hoover, Bagdon, & Gagnon, 2021) and data from the Oregon Forest Carbon Inventory (US Forest Service, Oregon Department of Forestry, 2019). The US Forest Service estimates metric tons of carbon stocks stored per afforested hectare by tree type and by region (the Pacific Northwest is divided into two subregions: East and West). The estimated carbon stocks per hectare of forest are estimated at year 0 and then at selected later decades of tree age (Year 10, Year 30, Year 50, and Year 100). Estimates are provided for the amount of carbon stored in live trees, in other aboveground biomass (including standing dead trees, understory, down dead wood, and the forest floor) as well as for soil carbon, see Table B-6.

**Table B-6: Metric Ton Carbon Stock Per Afforested Hectare Per Year**

Tree Type/Region	Aboveground (Non-Soil) Stock Metric Ton Carbon / Hectare / Year			Soil Stock Metric Ton Carbon / Hectare / Year			Total Metric Ton Carbon / Hectare / Year		
	Year 0	Year 10	Year 30	Year 0	Year 10	Year 30	Year 0	Year 10	Year 30
Western Pacific Northwest									
Alder/Maple	2.7	6.3	77.8	86.4	87.6	95.1	89.1	93.9	172.9
Douglas Fir	2.7	5.7	140.9	71.1	72	78.2	73.8	77.7	219.1
Douglas fir, high productivity	2.7	6.7	193.2	71.1	72	78.2	73.8	78.7	271.4
Eastern Pacific Northwest									
Douglas Fir	1.1	7.1	77.7	71.1	72	78.2	72.2	79.1	155.9
Lodgepole Pine	1.1	4.5	39.4	39	39.5	42.9	40.1	44	82.3
Ponderosa Pine	5.4	7	34.8	38	38.5	41.8	43.4	45.5	76.6

Source: Highland Economics analysis of (Hoover, Bagdon, & Gagnon, 2021)

We use the total aboveground and belowground carbon stock estimates at each point in time, and then subtract out the total carbon stock estimates at Year 0 to estimate total accumulation

through time. To convert this to an annual average carbon sequestration estimate for the first decade of afforestation, we then divide the estimate total increase in carbon stock by the age of the forest to estimate average annual carbon accumulation during the first decade after planting (years 0 to 10). We also estimate the average annual carbon accumulation in the second two decades after planting (years 10 to 30) and cumulatively across the first three decades after planting (years 0 to 30), see Table B-7. We conservatively rely on the data on the total annual average carbon sequestration in approximately the first ten years after planting, which varies from 0.2 to 0.7 metric tons of carbon per hectare, depending on the tree type and region within the Pacific Northwest. For riparian vegetation, it is primarily deciduous trees and shrubs (which tend to have lower carbon levels) that dominate throughout most of the state, while conifers are predominant at higher elevations.<sup>13</sup> We assume that conservation practices that are establishing forest/tree shrubs are using plants slightly older than seedlings, such that the sequestration levels achieved during the CMP payment period is slightly greater than the average during years 0 to 10. **As an average value, we assume 0.7 metric tons of carbon per afforested hectare, which equates to 1.0 metric ton of CO<sub>2</sub>e per afforested acre in Oregon.**<sup>14</sup> If the conservation practice is continued such that the trees mature (and if trees are the majority of vegetation rather than shrubs), then on average over 30 years, the annual average carbon sequestration achieved per acre would be much higher. However, we use the conservative value of 0.7 metric tons per hectare per year as this is the approximate expected sequestration during the period of the payments for newly established trees/shrubs.

**Table B-7: Average Annual Sequestration Per Afforested Hectare**

Tree Type/Region	Annual Average Sequestration (Metric Ton Carbon / Hectare / Year)		
	Year 0 to 10	Year 10 to 30	Year 0 to 30
Western Pacific Northwest			
Alder/Maple	0.5	4.0	2.8
Douglas Fir	0.4	7.1	4.8
Douglas fir, high productivity	0.5	9.6	6.6
Eastern Pacific Northwest			
Douglas Fir	0.7	3.8	2.8
Lodgepole Pine	0.4	1.9	1.4
Ponderosa Pine	0.2	1.6	1.1

Source: Highland Economics analysis of (Hoover, Bagdon, & Gagnon, 2021)

<sup>13</sup> (Oregon Department of Fish and Wildlife, 2016)

<sup>14</sup> There are 2.47105 acres in a hectare and 3.67 metric tons of CO<sub>2</sub>e per metric ton of carbon.

**Table B-8: Oregon Forest Ecosystem Carbon Inventory Report (2019), Net Annual Change in Aboveground Live Tree carbon between 2001-2006 and 2011-2016<sup>1</sup>**

Forest Ownership	Annual Average Sequestration	
	Metric Ton CO <sub>2</sub> e / Acre / Year	Metric Ton Carbon / Hectare / Year
Private – Corporate	0.18	0.12
Private-Noncorporate	0.95	0.64
Other Federal	2.29	1.54
State and Local Gov.	0.79	0.53
National Forests	1.17	0.79
All Ownerships	1.04	0.70

<sup>1</sup>/Accounts for growth, harvest, and mortality from fire, insects/disease and natural factors.

Source: Table 4.4 in the Oregon Forest Carbon Ecosystem Carbon Inventory Report (Christensen, Gray, Kuegler, & Yost, 2019).

## CARBON VALUE

This section summarizes information on the value of GHG reduction. This value, often referred to as the price of carbon, is typically expressed as dollars per metric ton of CO<sub>2</sub>e. The economic value of reduced GHG is the value of avoiding damages caused by climate change, which is often called the ‘social cost of carbon’ (SCC). There is substantial variation in the available estimates of SCC. This is due to the numerous uncertainties affecting SCC value, including 1) the timing and magnitude of climate change effects, 2) society’s ability to mitigate climate change effects, 3) the difficulty in expressing in monetary terms many environmental and social change impacts of climate change, and 4) the difficulty in expressing future costs in today’s dollars (related to the discount rate chosen). Current estimates of SCC vary from approximately \$15 per metric ton to over \$250 per metric ton.

Market prices for carbon are generally nearer the lower end of the SCC. Market prices are not based on the SCC but rather are generally based on the cost of carbon abatement (reduced emissions) or cost of increased carbon sequestration, as well as the level of demand for carbon credits. Carbon prices also vary substantially based on the type of carbon credit offered (reducing emissions or increasing sequestration), whether it is a voluntary carbon credit or a credit in a compliance market, the volume of carbon traded at a time, the geography of the project, the year of credit delivery, and other factors. Credits are also typically evaluated based on the following factors to be eligible for sale in a carbon market:

- **Additionality:** the carbon is removed from the atmosphere because of the market and is additional to the emissions reduction or carbon sequestration what would happen without the market,
- **Quantification Certainty:** the amount of carbon removed from the atmosphere is measured and certain,

- **Permanence:** the amount of carbon removed won't be released back into the atmosphere soon.

For several reasons we base our value for carbon on the current voluntary market value of carbon credits from agricultural lands and other nature-based credits, including the cost of carbon offsets from other types of carbon sequestration projects such as afforestation. These costs represent the costs to the State of Oregon of investing in other nature-based carbon sequestration projects. Further, we use the lower carbon prices from the voluntary compliance market as they reflect uncertainty in carbon quantification, permanence, and additionality from agricultural conservation practices. As we are not requiring measurement of carbon in the proposed methodology, and as there is uncertainty in the additionality and the permanence of carbon stored in agricultural conservation practices, we propose a value of \$10 per metric ton of carbon as a reasonable value for compensation of agricultural landowners. This value is similar to values received in other agricultural carbon payment programs and is at the upper end of current values in the voluntary compliance market.

Figure B-1 summarizes data on voluntary carbon market pricing for different types of projects as of July 2023. As shown in the figure, prices in the voluntary market vary from approximately \$2 to \$11 per credit (metric ton of CO<sub>2</sub>e). In comparison, prices in the compliance market (mandated by regulation, such as the cap-and-trade carbon market California) are currently about \$30 per metric ton of CO<sub>2</sub>e.

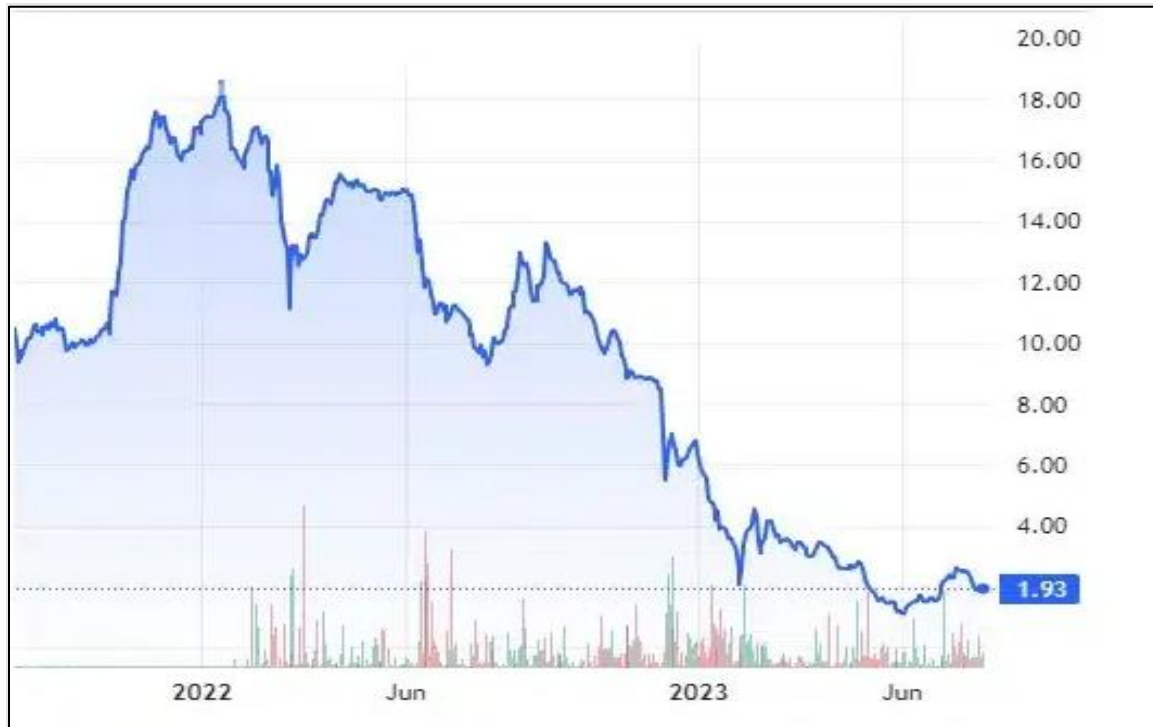
Figure B-1: 2023 Voluntary Carbon Market Credit Price Range, 2023

Project Type:	Volume Sold (MtCO <sub>2</sub> e):	Average Price:	Price Range:
Wind	12.8	\$1.9	\$0.3 - \$18
REDD+	11	\$3.3	\$0.8 - \$20+
Landfill methane	7.9	\$2	\$0.2 - \$19
Tree planting	3	\$7.5	\$2.2 - \$20+
Clean cookstoves	3	\$4.9	\$2 - \$20+
Run-of-river hydro	1.5	\$1.4	\$0.2 - \$8
Water/purification	1.2	\$3.8	\$1.7 - \$9
Improved forest management	0.8	\$9.6	\$2 - \$17.5
Biomass/biochar	0.7	\$3	\$0.9 - \$20+
Energy efficiency - industrial-focused	0.7	\$4.1	\$0.1 - \$20
Biogas	0.6	\$5.9	\$1 - \$20+
Energy efficiency - community-focused	0.6	\$9.4	\$3.3 - \$20+
Transportation	0.5	\$2.9	\$2.2 - \$6.8
Fuel switching	0.5	\$11.4	\$3.5 - \$20+
Solar	0.3	\$4.1	\$1 - \$9.8
Livestock methane	0.2	\$7	\$4 - \$20+
Geothermal	0.1	\$4	\$2.5 - \$8
Agro-forestry	0.1	\$9.9	\$9 - \$11

Source: (Opanda, 2023)

Recent trends in the voluntary nature-based carbon offset market are shown in Figure B-2 below. Nature-based carbon credits have diminished in price in the last year, with some analysts concluding that the timing of the decline in prices is related to some news stories criticizing the validity and effectiveness of rainforest carbon projects (CarbonCredits.Com, 2023).

Figure B-2 Recent Trends in Pricing for Nature-Based Carbon Offsets



Source: (CarbonCredits.Com, 2023)

The cost of alternative carbon sequestration projects is also pertinent because it represents the cost to Oregonians of other methods to sequester an equivalent amount of carbon. In other words, if Oregon were not to pay for agricultural conservation practices, what price would Oregon have to pay instead to purchase afforestation or other carbon sequestration credits to remove an equivalent level of carbon dioxide from the atmosphere? One analysis (Sohngen & Brown, 2008) published in 2008 estimated that the cost to extend timber rotations in some Pacific Northwest forests to increase carbon sequestration was approximately \$10 per metric ton CO<sub>2</sub>e.<sup>15</sup> A 2017 study in Washington state reported that ten-year historic prices for forest carbon credits sold in voluntary markets were also approximately \$10 per credit, providing additional support for the use of \$10 per metric ton CO<sub>2</sub>e (Fischer, Cullen, & Ettl, 2017). However, this same analysis indicated that the breakeven price to compensate landowners for

<sup>15</sup> The original study value was \$7 per metric ton, converted from 2008 to 2023 dollars, this is roughly equivalent to \$10 per metric ton.

increasing timber rotations by 20 years (from 45 to 65 years) would be approximately \$62 per ton of CO<sub>2</sub>e.<sup>16</sup>

Specific to agricultural carbon markets, there are several carbon payment programs active in the American Midwest to pay farmers for conservation practices. These programs pay approximately \$3 to \$45 per acre for increased soil carbon storage. Indigo Agriculture pays an estimated \$3 to \$12 per acre, with 0.1 to 0.4 credits expected on average for tillage, cover cropping, and nitrogen inputs. Indigo Agriculture values carbon at \$30 per credit (metric ton) (Indigo, 2021). Another program, Carbon Now, guarantees farming payments of \$12 per acre per year (Locus Agriculture, 2020). Farmers are paid \$15 per verified metric ton of CO<sub>2</sub>e. For comparison, as shown in Table B-1, the proposed value is \$5 per acre per qualifying practice for in-field practices using a value of \$10 per metric ton of CO<sub>2</sub>e. As such, the proposed valuation methodology is in the same ballpark of value (albeit on the lower side) as the agricultural carbon payment schemes in the Midwest that require measurement and in-field verification of increased carbon storage.

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<sup>16</sup> The original value in 2017 was \$50 per metric ton.

## APPENDIX C: DATA TO SUPPORT WATER QUALITY VALUES

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The methodology values two types of water quality pollutants that are related to agriculture: sediment and nutrients. Agricultural runoff can erode agricultural soils, resulting in sediment, nutrients, and other contaminants being transported to adjacent streams and other waterbodies. Reducing sediment loading to waterbodies is important to reduce clogging of stream channels, silting up of reservoirs and reductions in reservoir capacity, deterioration of water clarity/aesthetics/recreation, and adverse impacts on fish, including salmonids.<sup>17</sup> Sediments can also carry nutrients and pesticides to waterbodies, further reducing water quality. Nutrients are important as excess nutrient levels (primarily nitrogen and phosphorus) can lead a eutrophication and excess algal growth which can smell and look bad, adversely impact aquatic habitat conditions (including low levels of dissolved oxygen), and release toxins detrimental to human health.

The Oregon Department of Environmental Quality provides an annual assessment of water quality throughout the state. The 2022 Integrated Report found that for assessment units throughout the state for which there are data, 87% are impaired by one or more pollutants. The greatest number of impairments are for temperature, dissolved oxygen (related to nutrients), and *E. coli*. In terms of beneficial uses of waterbodies, fish and aquatic life use impairment is the most common unsupported beneficial use (largely driven by nonattainment of temperature criteria) (Oregon Department of Environmental Quality, 2023). The value of conservation practices (specifically riparian buffers) to improve aquatic habitat and regulate water temperatures is addressed in the next section.

Because reducing water-borne erosion is the primary mechanism to reduce sediment and nutrient loading in waterways, the methodology focuses on quantifying the change in water quality based on the effectiveness of conservation practices in reducing erosion and filtering water-borne sediment and nutrients. The methodology for quantifying water quality benefits includes the following steps:

1. Estimate the average annual reduction in sediment and nutrient loading from each acre of conservation practice implemented, focusing on two categories of practices: in-field soil erosion control practices and edge of field buffer practices. This requires combining data from three sub-steps:
  - a. Quantify average water-related erosion rates on agricultural land in Oregon, and the associated average annual per acre nutrient and sediment loading to waterways.
  - b. Estimate the effectiveness (in terms of percent reduction) of various conservation practices in reducing water-related erosion and loading.
  - c. Estimate the drainage area for edge of field practices that filter sediment and nutrients and reduce the loading to waterways from multiple acres (as opposed

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<sup>17</sup> Soil removed from fields also has costs to the farm, as it results in lost topsoil, nutrients, and can affect agricultural fertility and productivity.

to in-field practices that reduce erosion and loading only from the acreage on which the practice is implemented).

2. Estimate the economic value of improved water quality per ton of reduced sediment loading per kilogram of reduced nutrient loading.
3. Combine the data from Step 1 and 2 to estimate the economic value (dollar per acre per year) of each type of conservation practice. In other words, multiply the unit value of reducing loading (dollar per ton or per kilogram) from Step 2 by the estimated reduction in sediment and nutrient loading from each type of conservation practice (tons or kilograms per acre per year) from Step 1.

Findings from this process are summarized in Table C-1. As shown in the table, for in-field practices, **the annual per acre value is \$6 for practices eligible as sediment loading reduction practices and is \$9 for practices eligible as nutrient loading reduction practices, for a combined potential value of up to \$15 for eligible in-field water quality practices.** For edge-of-field practices, we estimate that each acre of practice filters and reduces sediment and nutrients from 15 acres (i.e., the drainage area is 15 acres for each acre of practice). As such, for each acre of edge of field practice, we estimate a 15-fold value of the in-field practices. **The annual per acre payment is \$90 for edge-of-field practices eligible as sediment loading reduction practices and is \$135 for edge-of-field practices eligible as nutrient loading reduction practices, for a combined potential payment of up to \$225 for eligible edge-of-field water quality practices.**

**Table C-1: Summary of Water Quality Quantification and payment Per Acre Values**

Column	Practice Type/Vegetation Type	Water-Related Sediment Erosion Tons/Acre	Nitrogen Loading per Acre (Kg/Acre/Year)	Phosphorus Loading per Acre (Kg/Acre/Year)
A	Loading Per Cropland Acre Per Year	2	3	0.2
B	BMP Effectiveness (% Reduction in Loading)	50%	25%	25%
C= A*B	Reduction in Loading Per Acre Covered by Practice	1	0.75	.05
D	Value Per Unit Load Reduction	\$6	\$12	To avoid possible overestimation of value, we do not value phosphorus in addition to nitrogen as many studies focus on the value from nutrient reduction rather than separate values for P and N.
E = C *D	Value per Covered Acre, In Field Practice	\$6	\$9	
F	Covered Acres (Drainage Area) per Edge of Field Buffer	15	15	
G= E*F	Value per Acre of Edge-of-Field Practice	\$90	\$135	

Source: Highland Economics analysis, data sources provided in sections below.

Table C-2: Value by Practice Per Acre Per Year

Practice Type/Vegetation Type	Value per Acre for Sediment Reduction	Value per Acre for Nutrient Reduction	Total Value per Acre	Eligible Practices (Based on NRCS Physical Effects Rating)
<b>In-Field Practices</b>				
Sediment Loading Reduction Only	\$6	N/A	\$6	Residue and Tillage Management, No Till; Grazing Land Mechanical Treatment; Critical Area Planting; Forest Farming
Nutrient Loading Reduction Only	N/A	\$9	\$9	Nutrient Management
<b>Buffer/Edge-of-Field Practices</b>				
Sediment Loading Reduction Only	\$90		\$90	Grassed Waterway, Vegetative Barrier, Stormwater Runoff Control
Nutrient Loading Reduction Only		\$135	\$35	Saturated Buffer, Vegetated Treatment Area
Sediment & Nutrient Loading Reduction	\$90	\$135	\$225	Riparian Forest Buffer, Riparian Herbaceous Cover, Conservation Cover, Filter Strip, Constructed Wetland

Source: Highland Economics analysis, data sources provided in sections below.

## EFFECTIVENESS OF CONSERVATION PRACTICES

As noted above, sediment and nutrient pollutant loading of waters is closely tied to rates of erosion.<sup>18</sup> We first present data on total erosion rates from agricultural lands, and then the level of sediment and nutrients loading to waterways from agricultural lands (see Table C-3). We then present data on the effectiveness of conservation practices in reducing sediment and nutrient loading to waterways (see Table C-4).

To estimate sediment and nutrient loading from agricultural lands with and without conservation practices, we rely on data on erosion on Oregon agricultural lands and data on total phosphorus and nitrogen loading from a variety of sources. Table C-3 summarizes available data on agricultural land erosion in Oregon and the Pacific Northwest and associated sediment and nutrient loads. Erosion rates vary widely throughout the state depending on such factors as rainfall, slope, vegetation, soil characteristics, and tillage and irrigation management practices.

Based on the data sources presented in Table C-4, we establish water quality value based on an estimated annual erosion rate of approximately 5 tons per cropland acre per year (Oregon State

<sup>18</sup> It can also be related to livestock presence, however the NRCS physical effects rating does not highly rate access control or other livestock conservation practices as highly or moderately effective in reducing transport of sediment or nutrients to surface waterways.

University Extension, 2003). Of this, we estimate that 40%<sup>19</sup>, or 2 tons is carried to waterways, consistent with estimates from the National Resources Inventory on the average water-related erosion from cultivated cropland in Oregon (U.S. Department of Agriculture, 2020). We further estimate, on an average annual basis per acre of cultivated cropland *without conservation practices*, that the nutrient loading from each acre of cropland is approximately 3 kilograms of nitrogen and 0.2 kilograms of phosphorus per acre per year.

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<sup>19</sup> This sediment delivery ratio is consistent with data from US Department of Agriculture, see [https://efotg.sc.egov.usda.gov/references/public/IA/Erosion\\_and\\_sediment\\_delivery.pdf](https://efotg.sc.egov.usda.gov/references/public/IA/Erosion_and_sediment_delivery.pdf).

Table C-3: Data on Erosion Rates and Loading from Agricultural Lands

Source	Publication Year	Location	Total Sediment Erosion (Tons/Acre/Year)	Water-Related Sediment Erosion (Tons/Acre/Year)	Nitrogen Loading (Kg/Acre/Year)	Phosphorus Loading (Kg/Acre/Year)
USDA, Natural Resources Inventory	2020 (based on 2017 data)	Oregon Statewide: Cultivated cropland	3.92	2.13		
USDA, Natural Resources Inventory	2020 (based on 2017 data)	Oregon Statewide: CRP Land	1.1	1.1		
Oregon State Extension	2003	Oregon Statewide	Less than 1 to over 15, medium rate of 4 to 6 tons per acre per year			Medium value of 0.1 <sup>a</sup>
Wise and Johnson	2011 <sup>b</sup>	Oregon and Washington, estimated average stream nutrient loading per agricultural acre			1.5 to 6.0	0.15 to 0.4
Schillinger et al.	2010	Columbia Basin and Columbia Plateau, furrow irrigated	35 to 55 tons			
Schillinger et al.	2010	Columbia Basin, conservation tillage, water erosion	11 to 13 tons			
Kok et al.	2009	Dryland Inland PNW	5 to 20 tons, depending on tillage system			

Sources: (U.S. Department of Agriculture, 2020), (Oregon State University Extension, 2003), (Wise & Johnson, 2011), (Schillinger, Papendick, & McCool, 2010), (Kok, Papendick, & Saxton, 2009)

a/Oregon State Extension publication provides data (based on oil test values) that the concentration of phosphorus in agricultural soils varies across the state, but that medium levels are 60 mg/kg in soils west of the Cascades and 40 mg/kg in soils east of the Cascades. We assume 50 mg/kg on average for agricultural soils statewide. Applying this concentration to an estimated 2 tons of water-related erosion results in an estimated 0.1 kilogram per acre per year of P loading.

b/ Note that these data are from 2011 (See Table 6 in Wise and Johnson), but a recent USDA review of nutrients from agricultural lands notes that nutrient loading has increased nationwide over the last decade, so these estimates may be less than current values.

The literature indicates that the effectiveness of conservation practices can vary widely by site based on factors such as topography, field and crop type, sediment characteristics, climatic conditions, soil water content, surface versus overland flow of water, and buffer vegetation type and width (Helmert, Isenhardt, Dosskey, Dabney, & Strock, 2006). Based on numerous literature sources (see Table C-4), we assume an average effectiveness of OAH program eligible conservation practices in reducing loading of waterbodies by 50% for sediment and 25% for nutrients.

**Table C-4: Data on Effectiveness of Conservation Practices in Reducing Erosion and Loading from Agricultural Lands**

Source	Publication Year	Location	Practice Type	% Sediment Removal	% Total Nitrogen Removal
Environmental Protection Agency	2021	Nationwide	Riparian Forested Buffer, Grass Buffer, Filter Strips	75% to 97%	25% to 91%
Environmental Protection Agency	2021	Nationwide	Reduced Tillage Systems	55%	45% to 55%
Helmert et al.	2015	Nationwide	Riparian Herbaceous or Forest Buffers, Vegetative Filter Strips, Vegetative Barrier, Grassed Waterways	41% to 100%, average of approximately 50%	7% to 100%
Natural Resources Conservation Service	2007	Nationwide	Filter Strip, Riparian Forest Buffer, Riparian Herbaceous Cover Buffer	40% to 70% are typical	10% to 100%
The Nature Conservancy	2021	Nationwide	Vegetated buffer, Prairie Strip, Saturated Buffer, Wetland, Grassed Waterway	22% to 96%	44% to 84.5%
National Resources Inventory	2020	Oregon	Vegetation Cover (forest planting and critical area planting)	50% <sup>a</sup>	
Salceda et al.	2022	Michigan	Tree and grass buffers on grazed slopes		62% to 85%
Srivastava et al.	2023	Review of Studies	No Till	48% to 72%	
Srivastava et al.	2023	Review of Studies	Filter strips, field borders, grassed waterways	40% to 45%	Up to 80%
Seitz et al.	2019	Switzerland	Reduced tillage in organic farming	61%	
USDA, Rust and Williams		Columbia Plateau, dryland	No till	~50% to nearly 100%	

Source	Publication Year	Location	Practice Type	% Sediment Removal	% Total Nitrogen Removal
Schilling and Wolter	2009	Illinois	Nutrient Management Plan		38%
Hu et al.	2007	Ohio	Nutrient Management Plan		43%
Srivastava et al.	2023	Review of Studies	Nutrient Management Plans		30%

Sources: (Helmets, Isenhardt, Dosskey, Dabney, & Stroock, 2006); (Oregon Department of Agriculture, 2012) (Environmental Protection Agency, 2021), (Natural Resources Conservation Service, 2007), (The Nature Conservancy, Meridan Institute, Soil and Water Conservation Society, 2021), (U.S. Department of Agriculture, 2020), (Seitz, et al., 2019); (Srivastava, Basche, Traylor, & Roy, 2023), (Rust & Williams)

a/Calculated based on the average reduction in the soil erosion rate reported from cultivated cropland versus CRP lands, assuming that these lands are comparable in other characteristics.

For edge of field buffers that filter sediments and nutrients from a broader drainage area, we estimate that each acre of buffer installed will effectively reduce sediment and nutrient loading from 15 acres at the same level of effectiveness as an in-field conservation practice on 1 acre (i.e., each acre of an edge of field buffer practice will reduce the same amount of sediment and nutrients reaching waterways as 1 acre of in-field practice). Studies on the effectiveness of buffers often vary greatly in the upslope drainage area to buffer area ratio, ranging from 50:1 to 1.5:1 (Helmets, Isenhardt, Dosskey, Dabney, & Stroock, 2006). The US Department of Agriculture Manual for the design of conservation buffers notes that “lower ratios (e.g., 20:1) can provide substantially greater pollutant removal than higher ratios (e.g., 50:1) in many cases” (USDA National Agroforestry Center, 2008). **We conservatively assume 15 acres of upland drainage area for every 1 acre of buffer, or a ratio of 15:1.** This implies that each acre of buffer provides the same level of water quality benefit as 15 acres of an in-field conservation practice.

## OVERVIEW OF WATER QUALITY BENEFITS & CURRENT WATER QUALITY IN OREGON

Improved surface-water quality has many benefits to Oregonians, including:

1. Human health and well-being value from high quality drinking water and household water supplies. People value access to high quality residential water supplies that are both odorless and clear, and do not pose a health threat. Water quality contaminants that pose a health threat include nitrates and heavy metals. High particulates and turbidity can also treatment costs, and if very high, can result in residential and municipal diverters ceasing to draw from a surface water supply, disrupting urban water supplies (McFadin, 2019).
2. Recreational and aesthetic values of clean water bodies. People value clean water bodies, particularly when participating in water-based and shoreline recreation and other shoreline activities where they can see the water. Clean water increases these aesthetic and recreational values.
3. Enhanced income from economic activities reliant on high quality water supplies. This includes the economic value of good quality water for agriculture, and for industrial or commercial activities. Poor quality water, such as high levels of salinity or particulates,

can reduce crop yields, increase treatment costs to industrial or commercial users, and increase costs related to maintenance of reservoirs and rivers (sediment can clog stream channels and reduce storage capacity of reservoirs).

People also value species that are dependent on clean water supplies. This includes the intrinsic value to people of biodiversity, including endangered species, as well as the human use values for species that are commercially important (e.g., for fishing etc.). Fish abundance benefits related to water temperature and other riparian habitat effects are discussed in Appendix D. This section focuses on the non-fish habitat value of water quality listed in points 1 through 3 above in an effort to avoid over-estimating the combined value of water quality and riparian habitat in enhancing fish abundance. To the extent that fish habitat benefits are included in this section, the focus is on nutrient and sediment-specific benefits.

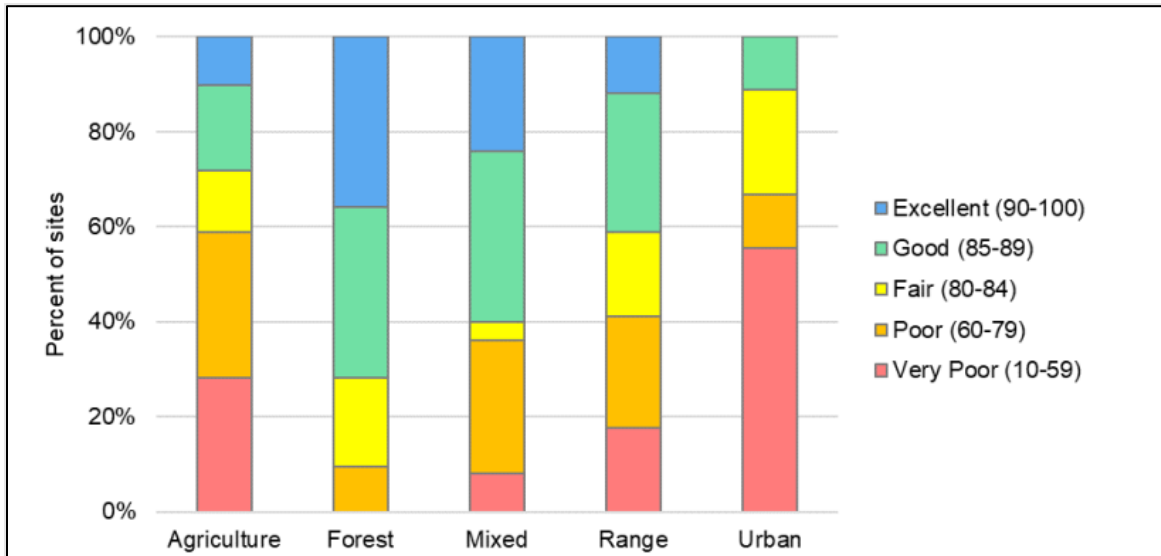
Most studies of the value of water quality improvements are based on the benefits provided by a certain percent improvement in water quality or a change in a water quality index at the watershed level. Nearly all study findings indicate that:

- Americans are willing to pay (through taxes or other measures) for water quality improvement.
- Americans care about water quality because it affects aesthetics of water bodies, aquatic habitat quality and species diversity/abundance, drinking water quality and treatment costs, and recreation opportunity and quality.
- People value local water quality improvements most highly (i.e., water quality improvements in their own watershed), although they also highly value water quality improvements throughout their own state as well as in other states.
- The value of water quality improvements varies depending on the baseline water quality in surface waters; the lower the current quality of water, the more people are generally willing to pay to improve water quality.

As noted in the last bullet above, the value of water quality improvements is typically greatest when water quality is currently impaired. According to the Oregon Department of Environmental Quality, nearly 60% of sites in agricultural areas have an Oregon Water Quality Index rating of “poor” or “very poor”, see Figure C-1. Further, according to a 2014 report on Oregon’s nutrient management program, the “presence of hazardous algal blooms, primarily in lakes and reservoirs, is an emerging issue at least partially related to excess nutrients in Oregon”. The report notes that “while there are no widespread nutrient concerns in the state, excess nutrient loads contribute to localized water quality issues in certain streams, lakes and estuaries. DEQ’s overarching objective is to address nutrient inputs where they are contributing to water quality impairments for nuisance algal blooms, dissolved oxygen, chlorophyll and pH.” DEQ has developed nutrient load reduction goals for at least 16 waterbodies (with at least two more in development) through development of total maximum daily loads. DEQ identified 32 lakes and reservoirs as impaired due to algal blooms in its 2010 Integrated Report. Table C-5 summarizes current impairments in Oregon waterbodies. These data indicate that water quality improvements in Oregon would likely have significant value.



Figure C-1: Influence of Land Use on Oregon Water Quality Index Scores



Source: From (Oregon Department of Environmental Quality, 2023)

Table C-5: Number of Waterbodies by Basin on Oregon Impaired Waterbody List (303d) by Water Quality Impairment Category

Basin	Number of Waterbodies on 303-List by Impairment									
	BioCriteria	Dissolved Oxygen-Spawning	Dissolved Oxygen-Year-Round	Harmful Algal Blooms	Nitrates-Human Health Criteria	pH	Phosphorus-Aquatic Life Criteria	Sedimentation	Temperature-Spawning	Temperature-Year-Round
Columbia River	0	0	1	0	0	2	0	0	1	13
Deschutes	23	16	8	7	0	18	10	14	5	119
Goose & Summer Lakes	7	2	2	0	0	0	1	0	0	52
Grande Ronde	10	3	2	0	0	0	1	19	24	105
Hood	9	3	0	0	0	0	0	9	10	16
John Day	36	0	0	0	0	3	0	45	25	159
Klamath	5	0	2	2	0	2	0	17	0	1
Malheur	8	0	2	0	0	0	0	2	0	37
Malheur Lake	8	2	5	0	0	2	0	0	0	45
Mid Coast	34	23	7	3	0	3	0	12	40	107
North Coast	43	12	10	0	0	0	0	0	0	7
Owyhee	0	3	1	0	0	1	1	1	0	16
Powder	2	7	5	0	0	1	1	12	0	59
Rogue	23	3	21	6	0	2	1	10	35	147
Sandy	5	2	1	0	0	0	0	0	14	24
South Coast	27	9	17	1	0	6	0	0	8	139
Umatilla	5	12	3	1	4	0	3	1	1	18
Umpqua	61	0	0	7	0	0	0	0	52	202
Willamette	93	91	39	16	1	12	3	7	77	281
Total	399	188	126	43	5	52	21	149	292	1547

Source: Highland Economics analysis of impaired waterbodies in Oregon's 303d list, accessed at: <https://www.oregon.gov/deq/wq/tmdls/pages/default.aspx>.

### VALUE OF NUTRIENT WATER QUALITY IMPROVEMENTS

Several studies conducted within the last 10 years regarding U.S. household willingness to pay for water quality improvements related to nutrients are summarized in Table C-6 below. **While the values estimated range widely, these studies indicate that the public generally values reducing nutrients to maintain or improve water quality by at least \$100 on average per household per year.** As of 2022, there were an estimated 1,726,340 households in Oregon (US Census Bureau, 2022). As such, we expect that, in total, Oregon households value nutrient-related water quality maintenance or improvement (and are willing to pay for it) by at least \$172.6 million annually. Given that several values in Table C-6 are for a 25% reduction in nitrogen, this value may equate to a 25% reduction in nitrogen loading in the State of Oregon.

**Table C-6: Value to the Public of Water Quality Benefits from Nutrient Reduction (Household Willingness to Pay), 2023 Dollars**

Study	Year	Location	Improvement Being Valued	Value per Household per Year
Parthum & Ando	2020	Upper Sangamon River Basin, Illinois	Reduce algal blooms, meet nutrient target, and increase fish populations/diversity	\$100
Jakus et al. <sup>a</sup>	2013	Utah	Improve water quality through statewide nutrient reductions in Utah waters (paid for through increased water bill)	\$104 to \$404
Jakus et al. <sup>a</sup>	2013	Utah	Maintain nutrient conditions/water quality in Utah waters (paid for through increased water bill)	\$46 to \$190
Yau-Huo and Zhan	2022	Iowa	25% less nitrate in source water, 50% less algal toxin detected in source water and HAB-related beach closure, 10% increase in lake water clarity	\$180

Sources: Highland Economics analysis of (Parthum & Ando, 2020), (Jakus, et al., 2013), (Shr & Zhang, 2022)  
 a/ Original values were \$35 to \$142 per household per year to maintain water quality and \$78 to \$303 per year to improve water quality in 2011 dollars. These values were derived by taking the total annual value in Table 5-11 in the report and dividing by the total number of households (user plus non-user) for both the lower bound and the upper bound.

Based on this value, we estimate the potential value to Oregonians of reduced nutrient loading. To reduce possible double counting (since phosphorus and nitrogen have similar types of effects on water quality), we focus on one nutrient: nitrogen. Several of the studies in the literature presented in Table C-6 above are based on a 25% decrease in nitrogen. We use data on the total nitrogen aggregated load (load being defined as exceeding the assimilative capacity of the state’s watersheds) in Oregon from the Environmental Protection Agency (EPA)<sup>20</sup> to estimate how many kilograms of nitrogen would equate to a 25% reduction in loading. The EPA estimates that there are 58.5 million kilograms of nitrogen aggregated load in Oregon waterways (US

<sup>20</sup> The EPA website notes that these data are from a US Geological Survey model known as SPARROW.

Environmental Protection Agency, 2023). A 25% reduction of this load would be approximately 14.6 million kilograms less of aggregated nitrogen load entering Oregon waterways.

To estimate the value per kilogram of reduced load, we use the estimate we derived above for the potential value to Oregon residents of a 25% nutrient reduction: \$172.6 million. Dividing the \$172.6 million value by 14.6 million kilograms of nitrogen yields a value of approximately \$12 per kilogram of reduced nitrogen load. This value is similar to a value estimated in a study in Virginia of the value of floodplains in retaining nitrogen of approximately \$16 per kilogram per year; with this value based on the minimum cost of alternative methods (by wastewater treatment plants) to reduce nitrogen in waterways (Hopkins, et al., 2018).<sup>21</sup>

Although we don't separately and additively value phosphorus nutrient reduction (to avoid the potential for double counting), we apply the same methods to compare our approach to values from the literature for phosphorous reduction. Using the same methods as for nitrogen, we estimate the water quality value of phosphorus based on 7.97 million kilograms of phosphorus aggregate load in Oregon watersheds statewide (US Environmental Protection Agency, 2023). A 25% reduction in phosphorus would equal approximately 2 million tons of reduced phosphorus entering Oregon waterways. Dividing \$172.6 million by 2 million kilograms yields a value of approximately \$88 per kilogram of reduced phosphorus load. This is very similar to the benefit value of approximately \$83 per kilogram per year estimated in a study in Wisconsin of reducing phosphorus by improving manure management (Sampat, Hicks, Ruiz-Mercardo, & Zavala, 2021).<sup>22</sup>

Finally, another method of valuing reduced nutrient loading is to examine the cost of alternative methods of nutrient load reduction. According to the Environmental Protection Agency (EPA) and other sources, average costs of reducing nutrient runoff from agriculture and urban areas may vary from \$4 to \$29 per kilogram of nitrogen reduction and can be approximately \$99 for phosphorus, see Table C-7 (US Environmental Protection Agency, 2015) (Shaik, Helmers, & Langemeier, 2002).<sup>23</sup>

**Based on the consistency between our estimated value and other values from the literature, we estimate a value of \$12 per kilogram of nitrogen nutrient reductions from conservation practices.**

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<sup>21</sup> Original value was \$12.69 in 2014 dollars.

<sup>22</sup> Original value was \$74.50 in 2021 dollars.

<sup>23</sup> Original values were \$1 in 2002 dollars to \$9 per pound of nitrogen in 2015 dollars, and \$35 per pound of phosphorous in 2015 dollars. These were converted to values per kilogram and expressed in 2023 dollars.

Table C-7: Value of Reduced Nutrient Loading (Per Kg Per Year, 2023 Dollars)

Author	Year	Location	Type of Benefit Analyzed	Cost per kg N	Cost per kg P
Hopkins et al.	2018	Virginia	Sediment/nutrient retention on floodplain, minimum cost of wastewater treatment for N	\$16	
Sampat et al.	2021	Wisconsin	Recreation/aesthetic/health benefit of reduced algal blooms from better management of livestock manure		\$83
Environmental Protection Agency	2015	Nationwide	Minimum cost of urban nitrogen pollution prevention in stormwater	\$29	\$99
Shaik et al.	2002		Cost of nitrogen pollution abatement in Nebraska	\$4 to \$9	

Sources: (US Environmental Protection Agency, 2015), (Shaik, Helmers, & Langemeier, 2002) (Sampat, Hicks, Ruiz-Mercardo, & Zavala, 2021), (Hopkins, et al., 2018)

### VALUE OF SEDIMENT WATER QUALITY IMPROVEMENTS

In 2008, the Economic Research Service of the US Department of Agriculture published a study estimating the value of agricultural soil conservation and reduced erosion (Economic Research Service, US Department of Agriculture, 2008). Their study, entitled “Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment” estimates values specific to each region of the country for 14 benefit economic categories. Despite capturing wide-ranging benefits, the study does not include several key types of benefits: those related to endangered species, coastal recreational activities, and people’s willingness to pay to know that water quality is improved. Another caveat to using the values from this study is that several categories of benefits were estimated several decades ago, and while the values have been adjusted for inflation, the level of benefit may have changed through time. That said, this study is one of the only available direct estimates of the value of sediment reduction and was developed specifically to value the benefits of agricultural conservation, so we use it as the basis for our valuation.

Table C-8 summarizes the values for the Pacific region, which includes Oregon, Washington, and California. As shown in the bottom row of the table, **reduction in water-related erosion in the Pacific region is valued at approximately \$6 per ton per year**. This is the value we use in the methodology for the water quality benefit of reduced sediment loading. As a second source, we draw from a 1987 study of the avoided costs in the Willamette Valley of reduced sedimentation (Moore & McCarl, 1987). This study quantified fewer benefit categories, focusing on benefits related to dredging, roads, ditches, water treatment plants, and hydropower, and estimated a value of approximately \$2 per ton per year. For comparison to the 2008 US Department of Agriculture study, we sum only the values from the benefit categories in the 2008 study that were included in McCarl and Moore’s estimate of \$2 per ton per year. Summing the values from the 2008 study for ‘irrigation ditches and canals’, ‘road drainage ditches’, ‘municipal water

treatment’, and ‘steam power plants’ results in a corresponding value of \$2.90 per ton per year, which is fairly compatible with the \$2 per ton per year estimate from the Willamette Valley study. While these two studies were either completed several decades ago or partially rely on data that is several decades old, the similarity of findings gives some reassurance that our estimate of \$6 per ton per year for reduced sediment loading may be approximately accurate.

**Table C-8: Value of Reduced Sediment Loading (Per Ton Per Year, 2023 Dollars)**

Category	Pacific Region Estimated Value (ERS, USDA, 2008)
Irrigation ditches and canals	\$1.71
Road drainage ditches	\$0.34
Municipal water treatment	\$0.79
Flood damages	\$0.55
Marine fisheries	\$0.71
Freshwater fisheries	\$0.00
Marine recreational fishing	\$0.82
Municipal and industrial use	\$0.29
Steam powerplants	\$0.07
Soil productivity	\$0.67
Dust cleaning	\$1.91
Total wind-related	\$2.59
Total water-related	\$5.94

Source: (Economic Research Service, US Department of Agriculture, 2008)

### VALUE PER ACRE OF WETLAND WATER PURIFICATION SERVICES

Finally, as an alternative reference point, we estimate value based on findings in the literature on the value of water quality services provided by wetlands, as constructed wetlands are an eligible water quality conservation practice. Numerous economic studies have estimated the value of wetlands, with many of them focusing on the value of water quality services provided by these areas – typically based on the replacement cost of alternative water quality treatment facilities or surveys of the value that households are willing to pay for clean water. Two meta-analyses indicate that the value of wetlands for water quality varies tremendously from study to study. A 2001 review of 39 studies estimated that with 90% confidence, the value of water quality enhancement from wetlands likely ranges between approximately \$260 and \$2,800 per acre per year, with an average value of \$560 per acre (Woodward & Wui, 2001). A 2006 review of 80 studies found an even larger range of water quality values from wetlands: approximately \$120 to \$30,000 per acre per year (Brander, Raymond, Florax, & Vermaat, 2006).<sup>24</sup> As noted by one of the studies, “From our analysis it is clear that the prediction of a wetland’s value based

<sup>24</sup> The \$120 per acre per year value (in 2023 dollars) was a median value of wetland services in literature Brander et al. and presented in the original study as approximately \$26 per hectare per year in 1995 values. Woodward and Wui (2001) cited values of \$126, \$417, and \$1,378 per acre per year in 1990 dollars for the lower limit, average, and upper limit values, respectively, which were adjusted to 2023 values.



on previous studies is, at best, an imprecise science” (Woodward & Wui, 2001). While predicting a single wetland’s value using the available literature is highly uncertain, these two literature reviews indicate that our estimated value of up to \$225 per acre for wetlands and other similar practices that provide water filtration services is a reasonable and conservative value.

## APPENDIX D: DATA TO SUPPORT AQUATIC HABITAT VALUES

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Numerous NRCS conservation practices can be effective for aquatic habitat. However, most of these are in-water restoration measures that are not expected to be eligible practices in the proposed payment for ecosystem services program. The primary land-based conservation practice that is most relevant for aquatic habitat value is riparian restoration. This includes riparian forest buffers, as well as the following practices, if they are in the riparian zone: windbreak/shelterbelt establishment and renovation, tree/shrub establishment, restoration and management of rare or declining habitats, forest farming, and wildlife habitat planting. These are the practices that the NRCS physical effects system rated as providing substantial improvement (a 5 rating) or moderate to substantial improvement (a 4 rating) for ‘elevated water temperature’ or for ‘aquatic habitat for fish and other organisms’.

This section focuses on the effectiveness and value of riparian habitat to provide shade/ lower stream temperatures and provide key stream inputs such as large woody debris to support fish and other aquatic species. Riparian buffers also provide (and are valued for, as discussed in Appendix C) nutrient and sediment reductions that improve water quality and provide aquatic habitat benefits. So as to not over-value the combined benefit of buffers related to water quality and aquatic habitat, we use a conservative value of \$150 per acre to estimate the additional habitat value (i.e., additional to sediment and nutrient water quality benefits) provided by practices that establish riparian forest vegetation.

There is strong precedent for public investments in riparian preservation and restoration. The State of Oregon has invested significantly in conserving riparian habitats to enhance and preserve aquatic habitat. As a recent example, the program costs of the 2022 draft Habitat Conservation Plan for western Oregon State forests is estimated at \$3.6 million annually, or a total of \$250 million over the 70-year permit term; this plan covers 10 species of fish, 2 birds, 3 salamanders and 2 mammals (ICF, 2022). Riparian zones are the focus for fish species while habitat conservation areas are the primary focus for other species.

### EFFECTIVENESS OF RIPARIAN CONSERVATION PRACTICES

The Oregon Conservation Strategy defines flowing water and riparian habitat together as a strategy habitat because their “conservation roles are interconnected”. As noted in the Strategy, healthy riparian vegetation “protects banks from erosion, influences in-channel aquatic habitats, maintains favorable water temperature for fish through shading, filters runoff, and provides nutrients to support terrestrial and aquatic life (Oregon Department of Fish and Wildlife, 2016).“

A separate publication about riparian areas from the Salmon and Trout Enhancement Program of the Oregon Department of Fish and Wildlife notes that “shade created by the riparian vegetation moderates water and air temperatures...Stream food chains depend on organic debris for nutrients. In small headwater streams, 99% of the energy for organisms comes from the vegetation along the stream, and only 1% from photosynthesis. The leaves, needles, cones, twigs, wood, and bark dropped into a stream are a storehouse of readily available organic

material that is processed by aquatic organisms and returned to the system as nutrients and energy” (Oregon Department of Fish and Wildlife).

Several entities in Oregon are restoring riparian vegetation with the goal of reducing stream temperatures and improving aquatic habitat. These efforts follow on the heels of an innovative program in the Tualatin River watershed. In 2004, the Oregon Department of Environmental Quality approved a plan for a wastewater and stormwater utility to invest in the restoration of 35 river miles of riparian habitat to meet a temperature water quality requirement. The utility discharges effluent from four wastewater treatment plants into the Tualatin River. Restoration included planting riparian forests (of 45-foot buffer width on each side of the stream) to provide shade to water upstream of the wastewater facilities and to augment stream flows. Comparatively, installing and operating two water chillers would have cost the utility \$93.7 million; as such riparian restoration provided cost savings of \$75.8 million<sup>25</sup> (Niemi, Lee, & Raterman, 2006).

While people value many aspects of healthy aquatic habitats, fish population diversity and abundance are of key importance for many Oregonians. As such, this analysis focuses on the effectiveness of riparian vegetation conservation practices in enhancing fish populations, and the associated value to the public of fish population diversity and abundance as indicated by surveys of household values and data on the value of recreational fishing.

The scientific literature indicates that there is a strong link between riparian vegetation, water temperature, and fish abundance. Additionally, several studies in the Pacific Northwest have noted the increasing importance of riparian vegetation to help mitigate adverse effects on cold water fishes such as salmonids of rising temperatures from climate change. Table D-1 summarizes findings from several studies conducted in the Pacific Northwest evaluating how riparian buffer restoration in the Pacific Northwest influences fish abundance. As shown in the table, fish abundance response varies by species, timeframe of restoration, and type restoration. However, several studies indicate that for every one percent of riparian area restoration in a basin or river, some salmon species respond with an approximate one percent increase in fish abundance, or even greater.

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<sup>25</sup> The source cited cost savings of \$50.5 million in 2005 dollars; this study adjusted value to 2023 dollars.

**Table D-1: Summary of Literature: Fish Abundance Response to Riparian Buffer Restoration**

Study	Year	Geography	Riparian Restoration Area	Fish Population Response
Justice et al.	2017	Upper Grande Ronde River, OR	Buffers in entire watershed at full maturity (benefits increase most dramatically in first 25 years)	(Spring Chinook) 46,000 fish to 222,000, (377% increase)
			Buffers in highest 25% priority riparian areas at full maturity	(Spring Chinook) 46,000 to 93,000 (100% increase)
		Catherine Creek	Buffers in entire watershed at full maturity	(Spring Chinook) 55,000 to 88,000 (61% increase)
			Buffers in highest 25% priority riparian areas at full maturity	(Spring Chinook) 55,000 to 71,000 (30% increase)
Battin et al. <sup>a</sup>	2007	Snohomish River Basin, Western WA	Riparian restoration on 30% or less of watershed (to bring buffers to 40% to 84% of riparian area), off-channel habitat, barrier removal,	Baseline of ~6100 fish. Increase of 49% to 58% in population over no restoration scenario with climate change
Opperman & Merenlender <sup>b</sup>	2004	Mendocino County, CA	Riparian restoration and exclusionary fencing	Improved large woody debris, temperature, channel morphology
Lewis et al.	2022	Salmon River, Oregon Coast	Barrier removal, off channel habitat area, hatchery removal on 50 miles	0.79% increase in statewide coho salmon population
Sievers et al.	2017	Global meta-analysis	Riparian restoration (livestock exclusion, large woody debris); Too limited data to draw conclusion on riparian revegetation	Average increases: 87.7% trout increase for livestock exclusion; 66.6% trout increase for large woody debris
Fullerton et al.	2022	Snoqualmie River, WA	Full or partial riparian restoration for shading	~30% increase in mass of potential Chinook yearlings under climate change around Year 2090. ~12% to 15% increase in mass of potential yearlings under historical climate (1995-2005). Very limited effect on sub yearlings.

Study	Year	Geography	Riparian Restoration Area	Fish Population Response
Fogel et al.	2022	Chehalis River Basin, WA	Riparian tree planting and protection for temperature reduction	All populations expected to decline by mid-century (spring Chinook, fall Chinook, steelhead, and coho) due to climate change. Relative to current population size, riparian restoration reduced the adverse impact of climate change on populations by ~5% to 30%.
Jones et al.	2006	Georgia	Riparian buffers (30 m versus 15 m)	Wider buffers have lower temperatures, less fine sediment and higher trout populations (expected 87% higher population).

Sources: Highland Economics analysis of (Justice, White, McCullough, Graves, & Blanchard, 2017), (Battin, et al., 2017) (Opperman & Merenlender, 2004), (Sievers, Hale, & Morrongiello, 2017), (Fullerton, Sun, Baerwalde, Hawkins, & Yan, 2022), (Fogel, et al., 2022), (Jones, Poole, Meyer, Bumback, & Kramer, 2006), (Lewis, Kling, Dundas, & Lew, 2022)

a/ The study estimated effects on salmon population with two models. In one model, the starting population was 6,096 fish, which the study modeled would decrease by 40% under climate change but with restoration would decrease by 5%. The other model starting population was 6,174 fish, and under climate change and no restoration would decrease by 20%, but with restoration and climate change would increase by 19%. Applying these percents to the starting population and comparing the projected future salmon population with and without restoration, we estimate results in a 49% salmon population increase in one model (7,347 fish compared to 4939 fish) and a 58% population increase in the other model (5,865 fish compared to 3,704 fish).

b/ This study noted that positive riparian change may attract fish from elsewhere rather than increase total population.

### CONSERVATION VALUE OF AQUATIC HABITAT & FISH

Table D-2 summarizes the value to households of a few recent water quality studies that focus on the value to households of improving aquatic habitat conditions. As shown in the table, the values in these studies range from approximately \$130 to \$300 per household per year. If we assume that this value includes the value for nutrient-related water quality of \$100 per household per year discussed in Appendix C, then the non-nutrient value to households may be approximately \$30 to \$200 per household per year of minimum to 25% improved aquatic conditions statewide.

**Table D-2: Value to the Public of Improving Aquatic Habitat Conditions or Fish Populations (Household Willingness to Pay, \$2023)**

Study	Year	Location	Improvement Being Valued	Value per Household per Year (2023 values)
<b>Habitat Conditions</b>				
Vossler et al.	2023	Midwest	One-level improvement in biological condition gradient (a water quality index) through a multi-state study area	\$300
Vossler et al.	2023	Midwest	Achieve minimum water quality statewide to support biological uses	\$268
Haefen et al.	2023	North Carolina	Urban stream water quality improvement through 25% increase in urban stream canopy and decreased runoff	\$127
<b>Fish Abundance</b>				
Lewis et al.	2022	Oregon and Washington	One year increase in Coho abundance in Pacific Northwest by 1,000 fish, or a 0.67% increase in fish abundance	\$0.08 (no college degree) to \$0.19 (college degree)

Sources: (Vossler, et al., 2023) (Haefen, et al., 2023) Highland Economics analysis of (Lewis, Kling, Dundas, & Lew, 2022).

a/Derived based on a value of \$252 per mile, assumption of a 50-foot buffer on each side of the river for 12 acres per river mile, applied to the population of the county in the year 2000.

Table D-2 also showcases a recent study of Pacific Northwest households that valued an increase of 1,000 fish (0.67 percent increase) in coho salmon populations at \$0.08 (no college degree) to \$0.19 (four-year college degree) per household per year. Focusing specifically on Oregon, we apply Census data that approximately 36 percent of Oregonians older than 25 years have a four-year college degree and estimate a weighted average value to Oregon households of \$0.12 per household per year per 1,000 coho fish. As noted above in Appendix C, there are approximately 1,726,000 households in Oregon as of 2022. Thus, this study indicates that Oregon households would value an annual increase of 1,000 coho fish (or a 0.67% increase) at approximately \$206,000 annually.

Several older studies have also examined the value of fish to residents of the Pacific Northwest. In Olsen *et al.* (1991), researchers surveyed residents on their values for salmon and steelhead in the Pacific Northwest. Households that do not fish had an average willingness to pay of approximately \$65 per year to double the population of fish, while households that do fish had an average willingness to pay of approximately \$180 (Olsen, Richards, & Scott, 1991).<sup>26</sup> While

<sup>26</sup> The study's original values (\$26.52 and \$74.16, respectively, in 1989 dollars) were updated to 2023 dollars using the GDP price deflator.

this was roughly one-third the willingness to pay of fishing households, the study indicates that non-anglers in the Pacific Northwest still value improvements to fish populations.

In 1996, Loomis measured the value to survey respondents of removing two dams on the Elwha River in Washington State, which would restore an anadromous fishery. Surveyed households included those in the dams' host county (Clallam), those in the State of Washington, and those in the rest of the country. Households were asked if they would be willing to vote for a referendum that would increase their taxes to pay for the dams' removal, effectively measuring their willingness to fund efforts to restore the fish population. Results indicated that Clallam County residents would be willing to pay approximately \$120 per year, Washington residents would be willing to pay approximately \$145 per year, and US residents outside of Washington would be willing to pay an average of approximately \$135 per year (Loomis, 1996).<sup>27</sup>

In 1998, Layton *et al.* surveyed over 1,600 Washington State households to elicit household values for programs that increase the populations of migratory, freshwater, and saltwater fish in the Columbia River and the Puget Sound area. The results showed that Washington households, on average, were willing to pay approximately \$20 to \$60 per month to increase fish populations by 50 percent (Layton *et al.*, 1999).<sup>28</sup> In Bell *et al.* (2003), researchers surveyed five coastal communities in Oregon regarding their willingness to pay for local coho salmon enhancement programs. Findings indicate that households were willing to pay approximately \$70 to \$200 per year to prevent the species from going extinct to \$140 to \$210 per year to double the population, depending on the community and the household income (Bell *et al.*, 2003).<sup>29</sup>

In summary, these studies show that households may be willing to pay from approximately \$50 to over \$200 per year for increasing local, regional, or state-wide populations of all migratory fish populations by 50 percent to 200 percent (Bell, Huppert, & Johnson, 2003; Layton, Brown, & Plummer, 1999). In contrast, the value estimated just for Coho from the more recent 2023 study by Lewis *et al.* would estimate a value of \$8 to \$30 per household of an improvement of 50 percent to 200 percent of coho populations. Comparing these studies indicates that the value to Oregonians of increased abundance for all salmonid species may be much higher than the value estimated by Lewis *et al.* for just coho species abundance.

To apply these estimated conservation values to potential fish population increases that would result from riparian restoration is highly uncertain. However, doing so will give a sense of the potential magnitude of value to Oregon households of riparian restoration. **Considering all the values presented above regarding the potential value to households of improved aquatic habitat conditions and salmonid fish abundance, we estimate that the habitat value to households of riparian restoration throughout the state may be approximately \$75 per**

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<sup>27</sup> The study's original values (\$59, \$73, and \$68, respectively, in 1994 dollars) were updated to 2023 dollars using the GDP price deflator.

<sup>28</sup> The study's original values (\$9.92 and \$31.28, respectively, in 1998 dollars) were updated to 2023 dollars using the GDP price deflator.

<sup>29</sup> The study's original values (\$41.13, \$115.54, \$78.15, and \$121.81, respectively, in 2000 dollars) were updated to 2023 dollars using the GDP price deflator.

**household per year.** Applying this value to the estimated 1.73 million households in the state translates to approximately \$129.5 million in value annually.

To express this value on a per acre basis for riparian areas, we first approximate the potential riparian acreage in Oregon, assuming all streams are buffered at 25 feet on both sides or 50 feet on one side. According to the Department of Fish and Wildlife, there are approximately 106,400 miles of rivers and streams in Oregon (Oregon Department of Fish and Wildlife, 2003). Assuming a riparian buffer width of 50 feet there are 6 acres of buffer per river mile, such that statewide there would be approximately 645,000 acres of riparian buffer. Dividing the estimated \$129.5 million value to Oregon households by this acreage translates to approximately \$200 per acre per year for the aquatic habitat benefit to salmonids of riparian areas; to account for the fact that some of this value may be captured in the water quality estimate for sediment and nutrients, **we propose a value of \$150 per acre per year for additional aquatic habitat value from riparian restoration.** Also, as noted above, relatively high values are still held by households that do not fish, indicating that a relatively high portion of this value is for conservation value and not recreational value.<sup>30</sup>

This value per acre of riparian habitat is within the range of several other values from the economics literature. One study found that households were willing to pay an average of \$443 per year<sup>31</sup> to restore a 45-mile section of the Platte River in Colorado, which would provide benefits of dilution of wastewater, natural purification of water, erosion control, habitat for fish and wildlife, and recreation (Loomis, Kent, Strange, Fausch, & Covich, 2000). A survey of households in North Carolina indicated that households were willing to pay around \$60 per year<sup>32</sup> to restore just a six-mile section of the upper Little Tennessee River (to enhance presence of game fish, water clarity, wildlife habitats in the riparian buffer, recreational opportunities, and ecosystem integrity (Holmes, Bergstrom, Huszar, Kask, & Orr III, 2004).

## RECREATION FISHING VALUE OF AQUATIC HABITAT & FISH

As another approach to estimating the value to society of improved aquatic habitat, we examine the value of recreational fishing in Oregon. Numerous studies have found that the value of recreational fishing generally increases with increased abundance of fish (because per trip value is higher or because total trips taken is higher) and with enhanced scenery (Melstrom, Lupi,

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<sup>30</sup> These non-use or existence values are generally higher for rare habitats or species (such as those classified as Threatened or Endangered), due to their relative scarcity, than for abundant species or habitats. Additionally, existence values are higher for iconic species, such as salmon. People's non-use values for salmon may be based on personal beliefs and moral ethics (i.e., believe enhancing salmon populations is the right thing to do), altruism (i.e., believing salmon should be abundant so that others can use it or benefit from salmon), and/or a desire to bequest the resource (i.e., believing salmon should be abundant for future generations). The most common way to measure value of a species such as salmon to people is through surveys in which people are asked about their willingness to pay to protect the species. These surveys are highly challenging to develop and implement well, and results from different surveys aiming to measure similar changes in resources can be highly variable.

<sup>31</sup> The source cited a value of \$252 per year in 1998 dollars; this study adjusted value to 2023 dollars.

<sup>32</sup> The source cited a value of \$34 per year in 1998 dollars; this study adjusted value to 2023 dollars.

Esselman, & R, 2014) (Solomon, et al., 2020). Both these attributes can be enhanced by riparian vegetation.

We estimate the total value of fishing trips in Oregon based on data on the number of fishing trips taken and the value per fishing trip. Table D-3 summarizes the estimated number of fishing trips in Oregon for salmon, steelhead, and trout fishing based on existing survey data and previous studies. Freshwater fishing trips are based on data from the following two studies: the 2011 US Fish and Wildlife Service Survey of Hunting, Fishing, and Wildlife Viewing in Oregon and a 2008 study sponsored by ODFW on Fishing, Hunting, Wildlife Viewing, and Shellfishing in Oregon. Using these studies, we estimate that there are approximately two million fishing trips annually for freshwater salmon/steelhead fishing and approximately the same number for trout fishing. For saltwater salmon angling, we use the estimate developed by the Oregon Ocean Salmon Management Program at ODFW: 67,000 annual saltwater salmon fishing trips.

**Table D-3: Oregon Recreational Fishing Effort, Angler Trips (2023 Dollars)**

Data	Source			Estimated Total Trips
	US Fish and Wildlife Service Survey, 2011 (Anglers 16+)	Dean Runyan Associates Survey (for ODFW), 2008	Ocean Salmon Management Program, ODFW, 2010-2020	
Salmon & Steelhead Fishing (Freshwater)	2,396,000 <sup>a</sup>	1,859,000		2,000,000
Trout Fishing	2,175,000 <sup>a</sup>	1,713,000		2,000,000
Salmon Fishing (Saltwater)	270,000 <sup>b</sup>	328,000	67,000	67,000 <sup>c</sup>

Source: Highland Economics analysis of (Ocean Salmon Management Program, Oregon Department of Fish and Wildlife, 2020), (Dean Runyan Associates, 2009) (Pacific Fishery Management Council, 2021).

a/ Data were presented as fishing days; this is converted to the estimated number of trips based on the average number of days fishing on all freshwater fishing trips for all species.

b/ Data were presented as fishing days; this is converted to the estimated number of trips based on the average number of days fishing on all saltwater fishing trips for all species.

c/ ODFW Ocean Salmon Management Program data is expected to be more accurate than the other sources, which are surveys of licensed anglers. Note that relative to freshwater fishing, where there are many more anglers and fishing days, the % error of margin in surveys for saltwater fishing estimates is expected to be larger.

There is a large body of literature estimating the net economic value of recreational fishing trips to anglers. This analysis focuses on studies of angling in the Pacific Northwest. The value of a fishing trip or a fish caught can vary widely depending on the target species, the abundance of fish and associated catch rate, the aesthetics and quality of the surrounding environment, and the characteristics and demographics of the angler. The economics literature generally presents the net value of recreational fishing two ways: the extra value to the angler for each additional fish caught, and the value to the angler per fishing day or per fishing trip. We focus on the economic value to the angler per fishing trip.

Estimates of the economic value of recreational angling in the Pacific Northwest tend to fall between \$70 and \$90 per day. For example, a 2017 review conducted for the US Forest Service of diverse types of outdoor recreation found that across many studies of different target species,

bodies of water and angling techniques, the average value estimated for the recreation net benefit of freshwater fishing in the Pacific Northwest is \$89 per day (Rosenberger, White, Kline, & Cvitanovich, 2017).<sup>33</sup> Similarly, a 2018 study sponsored by the Oregon Parks and Recreation Department used a value of approximately \$97 per fishing day<sup>34</sup> (saltwater and freshwater) to estimate the net economic value of fishing participation in Oregon (Rosenberger, 2018). A 2008 study sponsored by WDFW estimated the value of a salmon/steelhead fishing day (freshwater and saltwater) at approximately \$85 per day, and the value of trout fishing at approximately \$75 per day<sup>35</sup> (TCW Economics, 2008).

Most fishing trips in the Pacific Northwest are day fishing trips, so the value per trip is similar (although slightly higher since some fishing trips are multiple days) than the value per fishing day. We conservatively assume that the value per Oregon fishing trip is similar to the per day values cited above and apply a mid-range value per fishing trip of \$85 per salmon/steelhead fishing trip and \$75/trout fishing trip. With these data, we estimate that recreational fishing in the State of Oregon has an annual net value to recreators of approximately \$320 million (see Table D-4).

**Table D-4: Estimated Annual Net Value to Anglers of Recreational Fishing in Oregon**

Type of Fishing Trip	Estimated Value per Trip	# of Annual Trips	Estimated Current Annual Net Economic Value to Anglers
Salmon/Steelhead	\$85	2,000,000	\$170,000,000
Trout	\$75	2,000,000	\$150,000,000
Total		4,000,000	\$320,000,000

Source: Highland Economics analysis of (Ocean Salmon Management Program, Oregon Department of Fish and Wildlife, 2020), (Dean Runyan Associates, 2009) (Pacific Fishery Management Council, 2021), (TCW Economics, 2008), (Rosenberger, White, Kline, & Cvitanovich, 2017).<sup>36</sup>

We assume that statewide recreational fishing value would increase with additional riparian restoration and the associated fish abundance increase. In other words, we expect that fishing value increases with fish abundance and that fish abundance increases with riparian restoration. As presented above in Table D-1, the data indicate that at least for some fish species, there may be a 1:1 ratio of the percent riparian area restored and the percent increase in fish abundance in a basin (i.e., for every 1% increase in riparian area there may be a 1% increase in fish abundance). As the precise relationships is not known, in Table D-5 we present potential combinations of statewide riparian restoration acreage with increases in statewide fishing value. Depending on the relationship between recreational fishing value and riparian restoration, the value may be as low as \$50 per acre of riparian (if there is only a 5% increase in fishing value from 50% of riparian areas statewide restored) to over \$1,200 (if there is a 25% increase in

<sup>33</sup> The study value was \$71.52 in 2017 dollars.

<sup>34</sup> The study value was \$81.37 in 2018 dollars.

<sup>35</sup> The study values were \$58 per day and \$50 per day in 2006 dollars for salmon/steelhead and trout fishing, respectively.

<sup>36</sup> The study value was \$71.52 in 2017 dollars.

fishing value from 10% of statewide riparian buffers are restored). As highlighted in bold values in the table, **an increased value to recreational anglers of approximately \$150 to \$500 per restored riparian acre per year restored appears reasonable** (assuming a 1% increase in recreational fishing value for every 2% to 4% of statewide riparian area restored). This provides further support for the estimated \$150/riparian acre/year value used for additional aquatic habitat benefits, over and above benefits related to nutrients and sediment.

**Table D-5: Approximate Potential Sport Fishing Value Per Acre per Year of Riparian Buffer Restoration (2023 Dollars)**

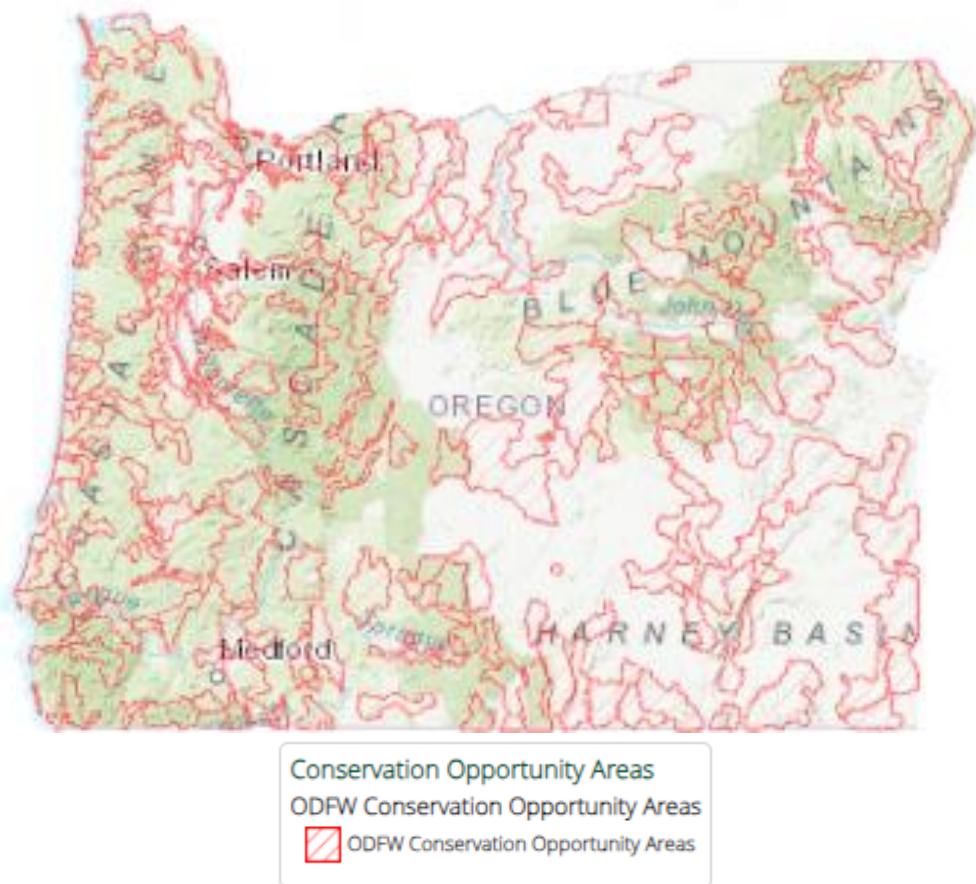
% Riparian Buffers Restored on Oregon Streams and Rivers (Increased Riparian Acreage)	Potential % Increased Sport Fishing Value (Increased \$ value)				
	5% (\$16,000,000)	10% (\$32,000,000)	15% (\$48,000,000)	20% (\$64,000,000)	25% (\$80,000,000)
<b>10%</b> (64,485 acres)	<b>\$248</b>	<b>\$496</b>	\$744	\$992	\$1,241
<b>20%</b> (128,970 acres)	\$124	<b>\$248</b>	<b>\$372</b>	\$496	\$620
<b>30%</b> (193,455 acres)	\$83	<b>\$165</b>	<b>\$248</b>	<b>\$331</b>	\$414
<b>40%</b> (257,939 acres)	\$62	\$124	<b>\$186</b>	<b>\$248</b>	\$310
<b>50%</b> (322,424 acres)	\$50	\$99	\$149	<b>\$198</b>	<b>\$248</b>

Source: Highland Economics analysis.

## APPENDIX E: DATA TO SUPPORT TERRESTRIAL HABITAT VALUES

The Oregon Conservation Strategy identifies 11 native strategy habitats of conservation concern and 249 species of greatest conservation need. Habitats of conservation concern include aspen woodlands, coastal dunes, estuaries, flowing water and riparian habitats, grasslands, late successional mixed conifer forests, natural lakes, oak woodlands, ponderosa pine woodlands, sagebrush habitats, and wetlands. These habitats and species are distributed across the state, with 206 priority conservation areas identified across the state, as shown in red in the figure below from the Oregon Conservation Strategy. Each of Oregon’s eight ecoregions has at least four habitats of conservation concern that provide important benefits to strategy species (Oregon Department of Fish and Wildlife).

Figure E-1: Oregon Habitat Conservation Opportunity Areas



Source: <https://www.oregonconservationstrategy.org/conservation-opportunity-areas/>

As shown in Table E-1, conservation practices expected to be eligible for payment are practices that either establish or maintain vegetated habitat areas, and that the NRCS physical effects rating identifies as providing ‘moderate to substantial improvement’ or ‘substantial improvement’. Several NRCS conservation practices that are rate highly for effectiveness for

terrestrial habitat that do not establish or maintain natural vegetation areas are not included. As such, this methodology focuses solely on areas managed for terrestrial habitat.

**Table E-1: Proposed Habitat Value for Eligible Agricultural Conservation Practices**

Type of Eligible Practice	Aquatic (Fish) Habitat	Terrestrial Habitat	Maximum Habitat Value	Eligible Practices
In-Field Practice		\$100	\$100	Pasture and Hay Planting
Edge of Field Practice				
Riparian Trees/Shrubs	\$150	\$100	\$250	Riparian Forest Buffer, Tree/Shrub Establishment, Wildlife Habitat Planting, Forest Farming, Restoration and Management of Rare or Declining Habitats
Riparian Trees/Shrubs	\$150			Windbreak/Shelterbelt Establishment and Renovation, Wetland Wildlife Habitat Management
Non-Riparian Trees/Shrubs		\$100		Wildlife Habitat Planting, Restoration and Management of Rare or Declining Habitats
Wetland		\$150	\$150	Wetland Creation, Wetland restoration
Grass/shrub habitat		\$100	\$100	Wildlife Habitat Planting, Upland Wildlife Habitat Management, Wetland Wildlife Habitat Management, Restoration and Management of Rare or Declining Habitats, Early Successional Habitat Development/Mgt.

Note: Estimated habitat value per acre is equal to the maximum value listed in Table E-1; multiple habitat practices implemented on one acre will not increase the habitat payment.

We include both an aquatic value (presented in Appendix D) and a terrestrial value for riparian habitats (presented in this Appendix). In discussing riparian habitats, in addition to discussing their value for fish and other aquatic organisms, the Oregon Conservation Strategy notes: “riparian habitats often have high species diversity and are critical for wildlife. These habitats are important to species that prefer moist shrubby or forested habitats. Riparian areas provide essential wintering habitat and travel corridors for birds, amphibians, reptiles, mammals, and other wildlife. In arid areas, such as the Blue Mountains and Columbia Plateau ecoregions, riparian habitats can provide abundant insects, plants, and moisture throughout the year. Riparian meadows include natural spring-seep habitats that are extremely important for a wide variety of species, including Greater Sage-Grouse chicks and butterflies” (Oregon Department of Fish and Wildlife, 2016). As such, this methodology includes both a value for terrestrial habitat and value for aquatic habitat for riparian areas.

## FORESTS AND GRASSLANDS HABITAT VALUE

A meta-analysis of 12 US studies conducted in 2008 (Randall, Kidder, & Chen, 2008) examined 23 valuations of terrestrial habitat to estimate the value of the Conservation Reserve Program (now referred to as the Conservation Reserve Enhancement Program), a program of the US Department of Agriculture that removes land from agricultural production in order to enhance habitat, water quality, and soil quality.<sup>37</sup> The study found that the average value per acre per year of each type of service provided by this type of land, in 2023 dollars, is \$85 for open space provision, \$66 for aesthetic viewing, and \$100 for habitat. For habitat, the confidence interval was \$30 to \$330 per acre per year. We focus on the habitat benefit alone as open space and aesthetic benefits may accrue from all farmlands and may not increase with habitat-enhancing conservation practices.

Similarly, a 2022 global review of the value of grassland ecosystem services estimated the value of habitat services from temperate grasslands at \$262 per acre per year (Liu, Hou, Kang, Nan, & Huang, 2022). This value is based on the genetic diversity value of habitat. Other types of ecosystem services separately valued in this study (and therefore are not encompassed in the \$262 per acre per year value) include services related to water quality, water quantity regulation, climate regulation, soil fertility and food supply, and recreation.

Specific to forestland, an analysis of the habitat value (among many other ecosystem services) of private forestland in Georgia found that habitat services may vary from approximately \$0 to acre to \$346 per acre per year, depending on forest characteristics. This value includes values for overall biodiversity but does not include the value of habitat in terms of maintenance of game species and the associated recreation benefit. A review conducted for valuation of forests in Europe concluded that forestland value for habitat may have a mean value of \$167 to \$229 per acre per year.

Actual payments in Oregon by the Conservation Reserve Enhancement Program (CREP)<sup>38</sup> vary by county based on soil type and dryland cash rent values. In 2023, the CREP rental rate in Oregon was as high as \$117 per acre (and as low as \$13 an acre) (Farm Service Agency, US Department of Agriculture, 2023). Since these cash rents are based on the value of land in agricultural uses, they don't directly reflect the value of conserving the land for wildlife habitat. However, the payments do indicate that the state and federal governments are willing to pay at least \$117 for the habitat and other ecosystem service benefits that accrue from these lands.

Table E-2 summarizes the habitat value of grassland and forestland estimated in these data sources. Based on these sources, we propose a conservative habitat value of \$100 per acre per year.

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<sup>37</sup> With the aim of improving soil and water quality and wildlife habitat, the CRP "removes environmentally sensitive land from agricultural production and plants species that improve environmental health and quality" (Farm Service Agency, US Department of Agriculture, 2023).

<sup>38</sup> CREP is a collaboration between state and federal governments and is part of the Conservation Reserve Program. CREP is only applicable in certain states, including Oregon.

Table E-2: Trees/Shrubs/Grassland Habitat Values by Source (2023 Dollars)

Source	Year	Location	Study Type	Habitat	Habitat / Biodiversity Services (\$/Acre/Year)	Other Services Separately Valued <sup>1</sup>
Randall et al. <sup>2</sup>	2008	US	Meta-Analysis	Terrestrial	\$100	Aesthetics, Open Space
Liu et al. <sup>3</sup>	2022	Global	Meta-Analysis	Grassland	\$253 (Genetic Diversity)	Water treatment, recreation, food and water supply, climate regulation
Farm Service Agency (Conservation Reserve Enhancement Program in Oregon)	2023	Oregon	Cash payments for grasslands	Grassland	\$13 to \$117	N/A
Moore, et al.	2011	Georgia	Survey	Forests	\$0 to \$346	Timber products, recreation, water quantity, water quality, soil stabilization/formation, pollination, aesthetic/cultural/passive use
Grammatikopoulou and Vackarova	2021	Forests in Europe	Meta-Analysis		\$167 to \$229 (mean values)	Timber, air quality, climate regulation, leisure, erosion control, water quantity/quality

Sources: (Randall, Kidder, & Chen, 2008), (Liu et al. 2022) (Farm Service Agency, 2023), (Briceno et al 2023), (Moore, Williams, Rodgriguez, & Hepinstall-Cymmerman, 2011), (Grammatikopoulou & Vackarova, 2021)

1/Separately valued and not included in the habitat value.

## WETLANDS HABITAT VALUE

Values of wetland habitat from the economic literature vary broadly, ranging from a few dollars per acre up to hundreds of thousands of dollars per acre. Value varies depending on the type and location of the wetland, types of ecosystem services provided, and study methodology. In general, the highest values provided by wetlands are associated with the provision of the following ecosystem services: a) water quality enhancement (as discussed in Appendix C), b) carbon storage (as discussed in Appendix B), and biodiversity and habitat (discussed in this Appendix). Other key benefits of wetlands include flood regulation and storm buffering and aesthetic views and open space. Depending on the population, socioeconomic activities, and land uses near the wetland location, habitat and biodiversity ecosystem services from wetlands can translate into economic, social, and cultural benefits related to recreation, food provision (e.g., from hunting), and the scenic amenity of habitat. Additionally, many people directly value habitat function and species preservation. The following section summarizes the magnitude of these values as estimated in the natural resource economics literature.

One 2008 review and meta-analysis of US wetland valuation studies aimed to use values from the economics literature to quantify the economic benefits of U.S. agricultural conservation programs (Randall, Kidder, & Chen, 2008). For wetland habitat, the study identified 72 valuations of wetland habitat from 34 US studies. This study found that the average value per acre per year of all services provided by freshwater wetlands was approximately \$600 per acre per year.

A 2006 review of 215 wetland value observations obtained from 80 studies found an *average* value of habitat and nursery services from wetlands of approximately \$4,700 annually, but a much lower *median* value of approximately \$270 per acre per year (Brander, Raymond, Florax, & Vermaat, 2006). Further, a 2001 review of 39 wetland valuation studies estimated average wetland value for habitat services per acre at \$630 per acre per year (Woodward & Wui, 2001), with a 90 percent confidence interval of \$200 to \$2,000 per acre per year.

As another approach, we review the value per acre that the NRCS is paying for wetlands as part of the Wetland Reserve Easement (WRE) program. As part of its Agricultural Conservation Easement Program, NRCS purchases WRE on private farmland. The easement value is based on the lowest of the following three values: an appraisal, a Geographic Area Rate Cap (GARC), or a landowner offer. In Oregon for Fiscal Year 2024, the GARC for WRE payment for a permanent easement in Oregon is \$5,000 per acre (Natural Resources Conservation Service, 2023). However, payment may exceed this cap if there is a high likelihood of successful restoration that will provide habitat needs for federally listed Threatened and Endangered species. Converting the one-time payment value of \$5,000 per acre to an annual value (over 50 years using a 3% discount rate), indicates that NRCS is willing to pay approximately \$195 per acre per year for an acre of wetland in Oregon. This payment is based on the agricultural value of the land but indicates that NRCS expects that the value of all ecosystem services from wetlands on farms is at least \$195 per acre.

WRE payments are intended to compensate landowners for the value of their land in exchange for restoring habitat areas; by enrolling in the WRP, landowners sell most of their use rights with the exception of hunting, fishing, and other recreational use. In other words, WRE payments do not represent the value of the wetland habitat, but rather the difference in the market value of the land with and without the easement. However, the WRE payments nonetheless indicate government agencies' willingness to pay for the habitat and other benefits provided by wetlands.

As another approach, we review the price of credits in regional wetland mitigation banks. Wetland mitigation banks are wetlands that have been created or restored to offset the loss of wetlands elsewhere in the region due to development or other causes. The price of wetland mitigation banking provides a useful reference point because it indicates the cost of providing wetland benefits through alternative means. Because wetland mitigation is typically required by law to ensure continued provision of ecosystem services, the public policy of requiring mitigation indicates that the perceived value of benefits of ecosystem services provided by mitigated wetlands outweigh the costs of mitigation.

The Oregon Department of State Lands (DSL) administers the State's wetland mitigation program and provides a calculator to compute the costs of DSL-provided wetland mitigation for payment-in-lieu of mitigation. According to this calculator, the cost of purchasing DSL-provided wetland mitigation credits that fund restoration projects throughout the State ranges from roughly \$34,000 to \$65,000 per acre, assuming 1 mitigation credit per acre (Oregon Department of State Lands, 2021).<sup>39</sup> The value range reflects different costs of restoration in different basins of Oregon where the restoration occurs. Amortizing over 50 years at a 3 percent discount rate, this equates to a cost of approximately \$1,300 per acre per year to \$2,500 per acre per year.

Table E-3 summarizes the values described above from the literature. As noted above, wetlands differ in type and quality, and both ecological and economic benefits from their protection vary by location. In addition, wetland benefits are not constant for every acre, but vary depending on size and configuration. The values presented in Table E-3 however indicate that the proposed value for habitat services from wetlands, \$150 per acre per year, is likely a conservative estimate of habitat value.

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<sup>39</sup> This calculation is based on a real market value of land conservatively set at \$900 per acre, which is the 2022 value of pasture in the state (cropland was valued at an average of \$3650 per acre in 2022). As with other values in this report, the mitigation cost in the calculator was adjusted for inflation to 2023 dollars using the GDP Implicit Price Deflator. The default value in the calculator is 3.5 for the number of mitigation credits for each mitigated acre; we converted this to 1 to show the cost of restoring 1 acre.

Table E-3: Wetland Values from Economic Literature, 2023 dollars

Source	Year	Location	Study Type	Service Valued	Value (\$/Acre/Year)
Randall et al.	2008	US	Meta-Analysis	All wetland services	\$360 (10 <sup>th</sup> percentile value) \$600 (average value) \$1,000 (90 <sup>th</sup> percentile value)
Brander et al.	2006	Global	Meta-analysis	Habitat and nursery services	\$270 (Median value) \$4,700 (Average value)
Woodward & Wui	2001	US	Meta-Analysis	Habitat	\$200 (10 <sup>th</sup> percentile value) \$630 (Average value) \$2,000 (90 <sup>th</sup> percentile value)
NRCS	2023	Oregon	GARC Payment for Permanent Wetland Easement, Annualized	All services	\$195
Oregon Department of State Lands	2021	Oregon	In-Lieu Payment / Cost per Acre of Wetland Mitigation	All Services	\$1,300 (lease cost basin) \$2,500 (max cost basin)

Sources: (Randall, Kidder, & Chen, 2008) (Woodward & Wui, 2001) (Brander, Raymond, Florax, & Vermaat, 2006) (Natural Resources Conservation Service, 2023) (Oregon Department of State Lands, 2021)

## APPENDIX F: POTENTIAL ROLE OF THE CMP REVIEW COMMITTEE: PRIORITIZATION OF FUNDING/PROJECT SELECTION

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Only practices on farms and ranches vetted and approved through the OAHP Conservation Management Plan (CMP) advisory committee are expected to receive funding. While the valuation methodology establishes a flat value for each eligible conservation practice, site-specific factors and the role of the proposed practices in addressing known conservation issues and challenges could be considered in the CMP review process. We recommend that the committee take the following site-specific factors into account:

- **Practice implementation specifics.** A given conservation management practice may have many implementation options, with differing levels of value provided. For example, riparian buffers can be planted using bare-root trees or large container trees. Large container trees are more expensive but would be expected to provide environmental benefits and economic value much more quickly. Further, pasture and hay planting or range planting can establish a non-native or native stand. CMP advisory committee discretion in selecting and funding of the most appropriate implementation level of a given practice will enhance value provided per conservation dollar.
- **Additionality.** To what extent would OAHP funding increase environmental benefits provided? What would likely happen without OAHP funding of practices? The methodology allows payment for practices that are already in place to allow compensation of early adopters and current environmental stewards, but the program effect on environmental outcomes may be more limited if many payments are made to support existing practices or land uses.
- **Existing conditions of the farm/ranch.** Certain sites may be particularly degraded and provide opportunities for the greatest environmental uplift from a given practice. For example, for water quality, a small proportion of lands often have an outsized effect on water quality. Paying for water quality-related practices on these lands will have the greatest environmental benefit and economic value. Similarly, implementing habitat enhancement practices on sites currently providing little habitat value would be expected to provide higher environmental uplift and associated economic value, all else equal. Similarly, soils with low current carbon content may provide the greatest opportunity for increased soil carbon from a given practice.
- **Site-specific/location value considerations.** For habitat and water quality, certain sites may have a much greater potential value per acre. For habitat, properties in key migratory corridors or providing scarce habitat types may have higher value for habitat restoration or enhancement. For water quality, farms and ranches located in watersheds with threatened/endangered fish bearing streams, high recreation values, or municipal water supply values that are impacted by water quality impairments may have higher economic value for a given level of environmental benefit.



- **Regional considerations / cumulative effects.** For habitat and water quality, the role and importance of the proposed conservation practices in each CMP relative to the cumulative restoration actions being conducted at the watershed level or regional level should also be considered. CMP's that play a key role in supporting a larger-scale restoration or conservation effort will likely have greater value.

This type of review process will enhance cost effectiveness and benefit maximization as the review committee will have the discretion to prioritize funding to practices on farms and ranches that are expected to provide the most environmental benefit for the conservation dollar.

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**Virtual Commission Meeting  
September 11, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

### September 11, 2024

<b>Business Meeting</b>	<b>September 11, 2024</b>	<b>4:00 pm – 5:00 pm</b>
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### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA). There may be a slight delay when streaming the meeting content.
- **Zoom:** <https://us02web.zoom.us/j/83713463709?pwd=OQvBANbVeVhzrbiBr53kX7ZlIbzyHC.1>

### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#). The deadline for submitting written comments and requests to make verbal comments is **4:00 pm Monday, September 9, 2024**.

Verbal comments:

- Limited to three minutes
- Will be heard in the public comment period

Provide the following information for virtual verbal comments:

- Your first and last name
- The topic of your comment
- The phone number you will use when calling the meeting.

If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

### Agenda

#### A. Welcome & Introductions (4:00 pm)

#### B. Public Comment (4:05 pm)

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

#### C. [Review and Approve Minutes \(4:15 pm\)](#)

The Minutes from the July 9<sup>th</sup>, 2024, OAHC meeting will be presented for Commission approval. *Action Item*

#### D. [Spending Plan Rebalance \(4:20 pm\)](#)

The commission will have an opportunity to add recaptured funds to the current OAHF spending plan. *Action item.*

#### E. [Economic Values to Support an OAHF Payment for Ecosystem Services Program \(4:40 pm\)](#)

Staff will present a final draft of the “Economic Values to Support an OAHF Payment for Ecosystem Services Program” from Highland Economics and answer clarifying questions from the Commission. *Information item.*

**F. Other Business (4:55 pm)**

This time is reserved for other business that may come up before the Commission. *Information item*

**Contact Information**

*OAHP Program Coordinator* – Taylor Larson

[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

*OAHP Conservation Easement Specialist* – Robin Meacher

[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)



Agenda Item B

## **Public Comment**

Commission Meeting September 11, 2024



Oregon Agricultural Heritage Commission  
Submitted Written Public Comments  
September 11, 2024

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**Written Public Comment**

<b>Name</b>	<b>Topic</b>
Andrea Kreiner, Oregon Association of Conservation Districts	Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices
Anthony Myint, Zero Footprint	Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices
Megan Kemple, Oregon Climate and Agricultural Network	Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices
Thomas O'Neill, The Habitat Institute	Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices



July 5, 2024

To: Oregon Agricultural Heritage Commission and OAHP Staff  
From: Andrea Kreiner, Executive Director, Oregon Association of Conservation Districts (OACD)

Re: Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices

I am providing comments from OACD on the final Methodology to Value Benefits of Agricultural Conservation Practices included in the meeting materials for Agenda Item E: [Economic Values to Support an OAHP Payment for Ecosystem Services Program](#).

In order to avoid duplication, we concur with the comments submitted from the Oregon Climate and Agriculture Network (ORCAN) regarding the attributes of a payment methodology, desired outcomes, practice-based valuation, eligibility alignment with the Oregon Climate Action Commission's [Natural and Working Lands Final Report](#), and suggestion regarding the use of modeling tools, such as COMET-Farm.

We also have concerns about the recommendation to base the value for carbon on the current voluntary market value of carbon credits. We agree that the social cost of carbon (\$43/ton) is more appropriate, both based on public valuation and effectiveness as an incentive.

OACD would like to be involved as OWEB and the Commission move forward in developing the related implementation processes. We strongly encourage a listening session to be held with the Soil and Water Conservation Districts, who are a key assistance provider on conservation management plans and implementation. And, we encourage listening sessions to be held as soon as possible, since time is of the essence in beginning to get Natural and Working Lands Funds out the door.

Sincerely,

Andrea Kreiner

Executive Director

**From:** [oregon-gov-web-services@egov.com](mailto:oregon-gov-web-services@egov.com)  
**To:** [BETTINARDI Nicole \\* OWEB](#)  
**Cc:** [REPPLINGER Linda \\* OWEB](#)  
**Subject:** Public Comment  
**Date:** Wednesday, July 3, 2024 5:34:06 PM

First and Last Name	Anthony Myint
Phone Number	510-599-2999
Email Address	anthony@zerofoodprint.org
I wish to provide (select one):	written comment
If you are providing VERBAL comment, how do you plan to attend the meeting (select one):	
I want to provide comment at (select one):	Other (please provide more information in the comment section below)
Agenda Topic / Item Letter	July 9, 2024, Oregon Agricultural Heritage Commission Meeting ITEM E – Economic Values to Support an OAHP Payment for Ecosystem Services Program
	<p>Thank you to the staff and OAHP for embarking on a program to accelerate the implementation of agricultural climate solutions in OR. I am a resident and also Executive Director of a 501c3 leading collaborations with the CA Department of Food and Ag and CA Air Resources Board, and the CO Dept of AG to similarly accelerate the adoption of climate smart/regenerative agriculture projects. We have awarded \$2.6M to 113 projects and are on pace to deploy \$20 million in the coming years. We have just launched our OR/Northwest program and so I'm excited to collaborate and find synergies and interoperability with your eventual program. As someone who has designed and implemented agricultural grant programs, in collaboration with multiple stakeholder groups, I'm thoroughly impressed by the research and consideration that has informed the program design. If my cursory review is correct, then I believe the framework can be described as payment for practices, wherein the pay</p>

Type Comment  
Here (comments  
may also be  
uploaded  
below):

rates are determined by outcome valuations. I have one small set of corrections and then one larger consideration. But first I will preface that we made a different choice in overall system design, in case it's useful to your process. I'm not suggesting you should change your system, but just pointing out a tradeoff that may or may not have been considered. As we designed our program with CA Resource Conservation Districts, Farmers, Policy Makers and Stakeholders, we ultimately chose a reverse auction/competitive bid style instead of a standardized pay for practice program. A reason for this was 1) the desire to meet the farming community where they were at and pay for the full or partial cost that was truly needed to incentivize implementation. We were concerned around interest and adoption rate, and I think since these pay rates are below or at the low end of EQIP rates, there is a valid concern as well. The #2) reason was that standard pay rates intrinsically mean every project is over or under paying producers. The reasons to make the choices the staff have made are also good ones and are explained in the document, so again just food for thought. Okay here are the two specific comments: 1) Small data items: Table 4-1 is confusing because in the first three rows the \$5 for carbon sequestration seem to be omitted, arithmetically from the total. Please correct. I also don't see the value in foregrounding data for tons C per hectare in addition to tons CO<sub>2e</sub> per acre. The latter is the stat in common use in the US. 2) Sorry this is a bigger concern and more philosophical, but the carbon valuation of \$10 per metric ton, based on voluntary carbon market prices, is not comparable with the program goals, and therefore, not the correct basis for valuation. The staff have identified that CA compliance market has a price of \$30 per ton and the federal price is \$51. Recent studies in Nature suggest it should be \$185 per ton is appropriate (<https://apnews.com/article/science-climate-and-environment-government-politics-4c1e8783694201355f88012079367f27>). My suggestion is that the voluntary market is merely a suggestion of what buyers are willing to pay, not the value of the carbon outcomes. In reality, state funds will not be used for Midwest fertilizer reduction projects or cookstoves in Africa, etc. so these are not valid. Furthermore, for example, the average price Americans are willing to pay for gym memberships per capita, is not a valid reflection on how much a health initiative should be willing to pay to incentivize participation in fitness programs. The incentivize is meant to incentivize, not serve as a market indicator reflecting the poor decisions of society. I'm not trying to nitpick carbon pricing but rather, just suggesting that the program may be undersubscribed in general, because your compensation rates are comparatively modest, and so a higher carbon valuation may a) create closer alignment between incentives and your goals while b) boosting participation. Our program has ended up organically paying about \$30 per ton of modeled CO<sub>2e</sub> based on the prices farmers are requesting to implement projects. We are skewed toward the thrifty side, since we are funding only the most cost-effective carbon sequestration projects and so I'd suggest the CA or Federal price of \$30 or \$51 per ton as the

	<p>more appropriate considerations and both are entirely defensible and more pertinent than the artificially discounted voluntary carbon market prices. Regardless, our organization, Zero Foodprint is standing by to provide further producer cost-share to optimize outcomes and ensure equity and access, and so in some respects, our different approaches could strengthen the complementarity. We will award ~\$1 million to OR farms and ranches in the coming 3 years with funds from the USDA, matched by New Seasons, Tillamook, Organically Grown Co. Bob's Redmill and many other businesses, and we are closely involved with other state and local governments on interoperable grant programs for climate smart and regenerative agriculture, and so I hope to present our work before your program is finalized, but before it's announced or open to the public. I have met with Stephanie Page/OWEB, but I've not met with OAHP staff. Please contact me at <a href="mailto:anthony@zerofoodprint.org">anthony@zerofoodprint.org</a> As I've stated, I fully endorse this program as-is, and I believe it is excellent, rigorous and defensible, but I am concerned that you will be undersubscribed and that the pay rates undervalue carbon sequestration.</p>
<p>Request physical, language, or other accommodations</p>	

Uploaded Files:

- [Business Healthy Soils Challenge Invite Letter .pdf](#)

**Submission ID:** f74204b0-a51b-4355-b0e6-3ec1802eb045

**Record ID:**



**REGENERATIVE  
RECOVERY**  
COALITION

As a leader in the food industry, you know Coloradans care about where their food comes from and how it's grown. **Join Zero Foodprint, The Colorado Department of Agriculture, The CO Restaurant Association and The Alliance Center to lead the healthy soil challenge!**

[Restore Colorado](#) teams up with restaurants, food businesses and corporate and philanthropic donors to work with farmers and ranchers across Colorado to advance soil health practices. Our goal is to raise \$5 million per year by 2025. **The money we raise in Colorado will be reinvested in Colorado food production – this is the start of a regenerative agriculture movement and we need your help!**

Through your partnership, Restore Colorado will team up with the state's farmers and ranchers to plant cover crops, apply compost, manage rotational grazing and more. Regenerative agriculture improves soil health, water quality, water retention, resilience, yield and the nutrient value of the food we eat, while removing emissions from the atmosphere.

**Even if we transition to 100% renewable energy today, we'd still need to take carbon out of the atmosphere and the best way to do this is through building healthy soil.**

As we continue to experience severe drought, intense precipitation and year round wildfire, actionable partnerships between consumers and producers will be critical to the future of our food systems. "If you are not part of the solution, you are part of the problem" and we're offering you a way to engage in transformative solutions with a low lift and a BIG impact.

**Join Zero Foodprint to lead this movement and build healthy soils across Colorado!**

Becoming a member of Zero Foodprint means:

- Contributing 1% of Net Sales to Restore Colorado. You can add a 1% surcharge for customers (they can opt out), or generate the 1% however it works best for you!
- Maximize your competitive advantage as 88% of consumers demand more climate smart practices from the businesses they support.
- Convenient and low time commitment from you and your team with a BIG impact!

You can learn more about the program at [RestoreColorado.Org](https://RestoreColorado.Org). Please reach out to [info@zerofoodprint.org](mailto:info@zerofoodprint.org) for more information and ways you can support Restore Colorado.

*Sincerely,*

*Kate Greenberg  
Commissioner  
CO Dept of Agriculture*

*Anthony Myint  
Executive Director  
Zero Foodprint*

*Brenna Simmons-St. Onge  
Executive Director  
The Alliance Center*



July 5, 2024

To: Oregon Agricultural Heritage Commission and OAHP Staff

From: Megan Kempe, Executive Director, Oregon Climate and Agriculture Network (OrCAN)

Re: Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices

I'm commenting on the final Methodology to Value Benefits of Agricultural Conservation Practices included in the July 9th OAHC business meeting materials for Agenda Item E: [Economic Values to Support an OAHP Payment for Ecosystem Services Program](#).

I appreciate the Report's recognition of the following desired attributes of a payment methodology:

- Easy and inexpensive to implement.
- Transparent and easy to understand.
- Flexible and adaptable to diverse practices and farms.
- Consistent with Natural Resources Conservation Service (NRCS) conservation practice definitions.

And the following desired outcomes:

- Provide certainty (in payment value and terms) for landowners.
- Encourage participation by farmers and ranchers by making participation as easy as possible.
- Incentivize cost-effective and environmentally beneficial outcomes, such that significant environmental benefit is delivered per conservation dollar.

I appreciate the practice-based vs. outcome based valuation, because I agree that an outcome-based valuation would result in uncertainty for landowners (as payments are not guaranteed), be less easy to understand, and be more costly and resource-intensive to implement. In particular, the monitoring needed for an outcome based system would be costly and resource-intensive for producers and technical service providers to implement.

I appreciate the exclusion of structural practices (facilities/infrastructure) and the focus instead on natural climate solutions/ conservation practices which aligns with OAHP's purpose and is a more effective use of funds.

I'm pleased to see the recognition of soil health enhancement as a key policy objective to enhance the productivity and resiliency of Oregon's agricultural lands. Soil health practices have multiple benefits including carbon sequestration, water efficiency, water quality, and plant health supporting increased profitability and climate resilience for producers. I hope soil health enhancement can be used to demonstrate the impact of the funding.

## Carbon sequestration

I appreciate that carbon has a different requirement for eligibility (a 3, 4, or 5 rating vs. a 4 or 5 rating) to increase the consistency between the proposed methodology and the recommended practices to reduce greenhouse gas emissions and sequester carbon in Oregon's natural and working lands sectors included in the Oregon Climate Action Commission's [Natural and Working Lands Final Report](#).

*I have serious concerns about the Report's recommendation to base the value for carbon on the current voluntary market value of carbon credits from agricultural lands and other nature-based credits, including the cost of carbon offsets. A market value is inappropriate and inconsistent with the Report's determination of public value of ecosystem services. The \$5-\$10 per acre, recommended in the Report, does not reflect the public benefit of the carbon sequestration. Furthermore, it is widely recognized that the voluntary carbon market is not compensating farmers at a level that is meaningful or incentivizing. Prices in the voluntary carbon market are too low-- they aren't high enough to be worth farmers' time/effort and they aren't incentivizing implementation of carbon sequestering practices. This is especially true for small and mid-sized farms where low payment rates per acre definitely do not pencil out. We recommend using the social cost of carbon (currently \$51 a ton according to the [Brookings Institute](#)) is more reflective of public value and would be more effective as an incentive.*

Overall, I hope the Commission and Agency will consider whether these dollar values are going to be significant enough to encourage producers to participate in the OAHF Conservation Management Plan grant program and both reward early/existing adopters and incentivize new practices. I am concerned that the carbon sequestration valuation will not.

I would also like to encourage inclusion of greenhouse gas (GHG) emissions reductions as a benefit. There are a number of practices such as reduced tillage and cover cropping that can result in reduced GHG emissions. It would make sense to combine carbon sequestration and reduction of GHG emissions into one benefit category: Climate Mitigation.

I think modeling tools such as COMET-Farm can be effective tools for valuing climate benefits. California's Healthy Soils Program requires producers to use COMET-Planner to generate their expected CO<sub>2</sub> outcomes, which they submit with their applications. But I generally agree with the Report's recommendation against them because, as the Report notes, relying on outputs from these tools may lessen the certainty and simplicity of a payment system and may lessen the perceived fairness of the payment system as difference in modeled outcome does not necessarily mean difference in delivered outcome for a given conservation practice.

Table 2-4: Summary of Estimated Average Carbon Quantification and Value Per Practice Type includes a practice type which I find confusing and inconsistent with the rest of the table and report. The first practice in the table is "Soil Sequestration Practices (In-Field Practices/ Grassland)" This is not a practice, but instead a benefit. I also find the inclusion of grassland twice in the chart confusing. I'd suggest changing Soil Sequestration Practices (In-Field Practices/ Grassland)" to "In-Field Practices" and separating out grasslands.

## Missing practices

Utilization of cover crops should be included, if not for its carbon sequestration benefit, then for climate mitigation and water quality benefits. Nitrogen fixing cover crops can reduce reliance on nitrogen fertilizers. And living roots in the ground both increase water infiltration and water holding capacity and reduce erosion.

Prescribed/rotational grazing should be considered as a qualifying practice based on its carbon sequestration and water quality benefits.

## Other comments

I noticed that section in Section 4 ESTIMATED VALUE BY PRACTICE an explanation that Table 4-1 provides per-acre cost share rates used by a USDA program, the Environmental Quality Incentives Program (EQIP) for comparison purposes. I'm curious to know why EQIP was used rather than USDA's Conservation Stewardship Program (CSP), which supports conservation practices or activities with benefits of cleaner water and air, healthier soil and better wildlife habitat.

## Implementation

The science is evolving and as was noted in the Report, research results vary widely. We appreciate the utilization of Natural Resources Conservation Service (NRCS) physical effects ratings and the effort to align with Oregon Climate Action Commission's [Natural and Working Lands Final Report](#) as a starting point and hope that OWEB will continually evaluate and revise this valuation based on evolving science and feedback from stakeholders.

Similarly, qualifying practices should be periodically reviewed and updated based on evolving science.

As was noted at a recent OAHC meeting carbon sequestration is only one of the four environmental benefits, but the current source of funding is the Natural Climate Solutions Funding, so there will need to be work to determine how projects with carbon sequestration benefits will be prioritized.

It may also be helpful to clarify the role of the OAHP Conservation Management Plan (CMP) Advisory Committee and their discretion to prioritize funding to practices on farms and ranches that are expected to provide the most environmental benefit per conservation dollar. I hope the Advisory Committee will not be doing additional valuation. It will be important that guidance documents related to valuation are straightforward and easy for producers and technical assistance providers to understand and rely on.

## Next Steps

My understanding, based on conversations with OAHP's Program Coordinator, is that the next step is public engagement and then creation of guidance documents related to how to apply and guidance for creation of Conservation Management Plans. I recommend the agency convene listening sessions with interested parties to get input on qualifying practices and valuation of those practices, grant timelines, process and guidance documents. OrCAN will engage in those discussions and will engage our network of farmers/ranchers and farm service providers in the process. Several of our partners in the Natural Climate Solutions Coalition will be interested in engaging as well.

It is critical for the success of the OAHP CMP Program, which currently relies on renewal of Natural Climate Solutions Funds, that we demonstrate *demand and success* by the time the Legislature considers renewal of these funds during the 2025 legislative session. *Time is of the essence for community engagement and implementation.*

OrCAN and our partners look forward to working with OWEB to roll this Program out as quickly as possible.

Thank you so much for your consideration of these comments.

A handwritten signature in black ink that reads "Megan Kemple". The signature is written in a cursive, flowing style with a long horizontal stroke at the end.

Megan Kemple, Executive Director  
Oregon Climate and Agriculture Network (OrCAN)



September 5, 2024

Oregon Watershed Enhancement Board  
Oregon Agricultural Heritage Program  
Advisory Committee

RE: Meeting September 11, 2024 - Economic Valuation Methodology to Support Implementation of Conservation Management Plans.

Dear Advisory Committee:

I have just become aware of the September 11, 2024 meeting of the Advisory Committee and their interest in Methodologies for Valuing Agricultural Conservation Management Actions. My comments are specific to the Fish and Wildlife Habitat Valuation (Section 4.4) and related Biophysical Quantification (Section 4.4.1).

Since 1998, The Habitat Institute has been working in this field developing and employing a fish and wildlife habitat valuation method for Oregon and other western states. Our approach called, Combined Habitat Assessment Protocols (CHAP), has taken years to develop, undergone a number of independent scientific reviews and has been used by states (e.g. Oregon), federal (e.g. U.S. Army Corps of Engineers), tribes (e.g. Confederated Tribes of Grand Ronde), and private organizations (e.g. SAIC). For instance, the Oregon Department of Fish and Wildlife (ODFW) has used CHAP to obtain a \$150-million-dollar settlement from Bonneville Power Administration (BPA) called the Willamette Wildlife Mitigation Program to be funded from 2010-2025. Further, U.S. Corps of Engineers has used it on 15 projects and it help them obtain nearly \$1 billion in public funding for their projects. Additionally, BPA used the Institute's data system to develop and maintain their Columbia River Subbasin Planning program from 2004-2012. The Institute's single species method was used by ODFW to help delisted the first listed Endangered fish species (Oregon Chub) in U.S. The information that built CHAP involved over 600 people and published in "Wildlife-Habitat Relationships in Oregon and Washington" book that can be found within the Smithsonian Library.

Regarding the paper, the Advisory Committee is currently considering, "Review & Feasibility Determination of Methodologies for Valuing Agricultural Conservation Management Actions" it appears lacking in completeness. As there is no mention of the Institute's method that has been used throughout the Willamette Valley and the Western States Region from 2007 to Present (2024).

To my knowledge, the approaches discussed in the above review and feasibility report, strive to obtain functional habitat acre value yet lack the inclusion of any functional redundancy profiles. That is, they look at habitat absent of the multiple species that perform functions within those habitats. Further, the current Oregon Conservation Strategy that is used for their guidance, is

misaligned with the “best available science”. Our method used the “best available science” and takes the approach of building a continuous value scale based on evaluating 100’s of species, habitat components and functions concurrently. Our approach has been used in Oregon, Washington, California, Idaho, and New Mexico and has undergone substantial independent reviews including the National Academy of Sciences process, Battelle Pacific Northwest National Laboratory, and a number of independent science review groups. The CHAP approach makes the process visual by using GIS that incorporates what we know about our fish and wildlife habitat relationships. The Institute uses an Ecological Accounting System to arrive at a per-acre habitat functional value. Our approach gives us the ability to document the information into standard formats that thereby allows us to Trust but also the ability to Verify the information. CHAP values all habitats as an indicator of Ecosystem Resiliency and can show net benefit or uplift. Our multiple species assessments give a mean functional redundancy unit value on a continual scale (not on a 0-1 or 1-100) for baseline and future conditions. CHAP’s functional redundancy unit has been used for market trading and to assess cost-benefit of project(s).

For more information about CHAP method, please see: <https://www.habitatinstitute.org/scientific-method/chap/> . I am also willing to forward to the Advisory Committee a copy of the CHAP User Guide upon their request.

For an example of CHAP projects in Oregon and elsewhere, please see: <https://www.habitatinstitute.org/portfolio/chap-portfolio/>

I thank you for your time, and I am willing to talk and/or meet to further discuss the Institute’s approach as needed.

Sincerely,

A handwritten signature in blue ink that reads "Thomas O'Neill". The signature is fluid and cursive, with the first name "Thomas" and the last name "O'Neill" clearly legible.

Thomas A. O'Neill  
Director

Other information developed to inform/teach the CHAP method are:  
CHAP Habitat Measurement Techniques Protocol  
CHAP Field Data Key Protocol  
CHAP Quality Control Protocol  
CHAP General Documentation  
CHAP User Guide  
CHAP GIS User Guide  
CHAP Sensitivity Analysis



Agenda Items C

**Approval of July 2024 Meeting  
Minutes**

Commission Meeting September 11, 2024



# Oregon Agricultural Heritage Commission

## Meeting Minutes: July 9, 2024

MINUTES ARE NOT FINAL UNTIL APPROVED BY COMMISSION

This meeting was held virtually.

Recording at: [https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA)

### OAHC Members Present

Boyer, Barbara  
 Contreras, Ed  
 Duhnkrack, Nancy  
 Krahrmer, Doug  
 Loop, Lois  
 Lowe, Amanda  
 Masterson, Laura  
 Taylor, Bruce

### OWEB Staff Present

Bettinardi, Nicole  
 Davis, Renee  
 DeBardelaben, Theresa  
 Ingamells, Ellen  
 Larson, Taylor  
 Meacher, Robin  
 Page, Stephanie

### Others

Kemple, Megan  
 Kincaide, Ivor  
 McAdams, Nellie  
 Wong, Amy  
 Wyse, Barbara

The meeting was called to order at 4:00 pm by Vice-Chair Bruce Taylor.

### A. Welcome and Introductions, and Commissioner Updates

Vice-Chair Bruce Taylor welcomed the commission and public. Commissioners and staff introduced themselves.

### B. Public Comment

This time was reserved for the commission to hear general public comments and review the written public comment submitted for the meeting. There were no written public comments submitted for this meeting. The following people provided verbal comments. *Information item.*

- Megan Kemple, OrCAN
- Ivor Kincaide, Oregon Agricultural Trust

### C. Review and Approval of Minutes

The minutes of the June 5, 2024, meeting were presented for commission approval. *Action item.*

Doug Krahrmer moved the commission approve the meeting minutes as presented, seconded by Ed Contreras. Motion passed unanimously.

### D. 2024 Working Land Conservation Easement Technical Committee Structure

Robin Meacher, Conservation Easements Specialist, updated the commission on the proposed review and evaluation structure that will be used for the 2024 OAHP Conservation Covenant and Easement grant solicitation. *Information item.*

### E. Economic Values to Support an OAHP Payment for Ecosystem Services Program

Barbara Wyse of Highland Economics presented a final draft of the "Economic Values to Support an OAHP Payment for Ecosystem Services Program" and answered clarifying questions from the Commission. *Information item.*

### F. Other Business/Next Meeting

This time is reserved for other business that may come up before the Commission. *Information item*

The meeting adjourned at 5:00 pm.



Agenda Item D

## **Spending Plan Adjustments**

Commission Meeting September 11, 2024



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

September 11, 2024 OAHP Commission Meeting



Tina Kotek, Governor

### ITEM D – Spending Plan Adjustments

**To:** Oregon Agricultural Heritage Commission

**From:** Taylor Larson, Oregon Agricultural Heritage Program Coordinator

Robin Meacher, Oregon Agricultural Heritage Program Conservation Easement Specialist

#### Introduction

The Oregon Agricultural Heritage Commission has a total of \$261,580 in funding to add to this biennium's Oregon Agricultural Heritage Program (OAHP) spending plan. These additional funds result from the recapture of \$223,056 from a cancelled grant (223-7102-22523) and an additional amount of \$38,524 unallocated from the 2021-2023 funding appropriation.

#### Background

At the July 2024 OWEB Board meeting, the Board approved adding \$261,580 to the OAHP spending plan line item in the OWEB 2023-2025 spending plan. Now that the board has amended the OAHP line item of their spending plan, the Commission can amend its spending plan to allocate the funds to a specific grant program. Staff recommend that the Commission add these additional funds to the Conservation Covenant and Easement Grant line item of the OAHP spending plan. This recommendation is based on past discussions by the Commission about demand for the easement program.

The OWEB Board will likely consider adding additional funds to the OAHP spending plan at their October 2024 meeting to reflect another recently cancelled grant agreement. As a result, the Commission may be asked to again update its spending plan in November 2024.

#### Recommendation

Staff recommend the Commission add \$261,580 to the Conservation Covenant and Easement Grant line item of the 2023-2025 OAHP spending plan, increasing the amount available for the current easement grant cycle from \$4,541,680 to \$4,803,260.



Agenda Item E

**Economic Values to Support an  
OAHP Payment for Ecosystem  
Services Program**

Commission Meeting September 11, 2024



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

September 11, 2024, Oregon Agricultural Heritage Commission Meeting



Tina Kotek, Governor

## ITEM E – Economic Values to Support an OAHP Payment for Ecosystem Services Program

**To:** Oregon Agricultural Heritage Commission (OAHC)  
**From:** Taylor Larson, OAHP Program Coordinator  
Renee Davis, OWEB Acquisitions and Special Programs Manager

### Introduction

This staff report provides context to the commission for the delivery of a final draft Conservation Management Plan (CMP) Implementation Valuation Methodology by Highland Economics **(Attachment A)**.

### Background

The Oregon Agricultural Heritage Program (OAHP) has authority to recommend grants funding the development, implementation and monitoring of CMPs as described in [ORS 541.989](#) and [OAR 698-010-0080](#).

At the recommendation of the OAHC, when the program was initially developed, the decision was made to structure OAHP incentives for CMP implementation as payments for the ecosystem services associated with the practices.

In 2022, staff solicited grant applications to fund Conservation Management Plan development, resulting in two grant awards. OWEB is expected to open a new grant solicitation to fund the development and implementation of CMPs in early 2025 following an outreach and engagement process. The 2025 solicitation will be funded with natural and working lands funding allocated to OWEB as a result of House Bill 3409 during the 2023 Legislative session and has a focus on projects that have carbon sequestration and greenhouse gas emissions reduction benefits. In order to determine the payment levels for ecosystem services supported by the CMP grants, Highland Economics has conducted the economic analyses described below.

In 2019, on behalf of OWEB, [Highland Economics](#) completed a [Review & Feasibility Determination of Methodologies for Valuing Agricultural Conservation Management Actions](#) as a first step toward the development of CMP implementation methodology. In 2022, staff began working with Highland Economics to develop methodologies for OWEB to pay for the implementation of CMPs. In May and June 2024, Highland Economics presented updates to the commission on progress made and solicited feedback.

Staff will provide the commission with a brief overview of the final draft of the Economic Values to Support an OAHP Payment for Ecosystem Services Program, with a focus on revisions made to the methodology report based on Commission input and public comment.

### **Next Steps**

The methodology will be published along with a guidance document and other program materials associated with the upcoming CMP grant solicitation.

### **Recommendation**

This is an information item only.

### **Attachments**

A. Economic Values to Support an OAHP Payment for Ecosystem Services Program

# Methodology to Value Benefits of Agricultural Conservation Practices

July 2024



*Prepared for:*

Oregon Agricultural Heritage Program



*Prepared by*



*About Highland Economics:*

Highland Economics is a small, woman-owned firm specializing in the economics of natural resources and the environment, business planning and feasibility assessment, and the socioeconomic impact of industries, policies, or management actions. We are a team of five economists, based in Oregon and Montana. We work with non-profits, agricultural interests, tribes, water districts, private companies, and local, state, and federal agencies on a wide range of land, air, water, recreation, agriculture, and habitat issues. This study was led by principal and senior economist Barbara Wyse, who has nearly 20 years of experience analyzing the economics of agricultural production and the socioeconomic impacts of proposed actions or regulatory changes. We aim to provide rigorous, even-handed analysis that uses economic insights to transform complex data into clear and actionable information. We often serve as expert witnesses on economic issues, including numerous cases on agricultural economics and demographic analysis for the U.S. Department of Justice.

*This analysis was prepared for:***Oregon Agricultural Heritage Program (OAHP)**

The Oregon legislature established the OAHP to provide voluntary incentives to farmers and ranchers to support practices that maintain or enhance both agriculture and natural resources. OAHP helps farmers and ranchers protect and maintain or enhance conservation on working land. Oregon Watershed Enhancement Board (OWEB) administers the program. Federal matching funds come from the Natural Resources Conservation Service's Agriculture Conservation Easement Program. OAHP currently funds four grant programs: working land conservation easements and covenants, conservation management plans and activities, succession planning education, and technical assistance for support organizations.

*Highland Economics is solely responsible for the contents of this report. We thank the following reviewers who improved the report through their comments:*

Dr. David Lewis, Professor, Oregon State University  
Louis Landre, State Agricultural Economist, Oregon Natural Resources Conservation Service  
Rose Graves, Conservation & Climate Scientist, The Nature Conservancy, Oregon Chapter



# 1 TABLE OF CONTENTS

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- 1 Introduction ..... 1
  - 1.1 Purpose ..... 1
  - 1.2 Target Public Benefits ..... 1
  - 1.3 Payment Program Desired Attributes and Outcomes ..... 2
  - 1.4 Valuation Process & Data Sources ..... 3
  - 1.5 Practice-Based vs. Outcome-Based Valuation ..... 4
- 2 Overview of Valuation Methodology ..... 6
  - 2.1 Valuation Structure ..... 6
  - 2.2 Types of Eligible Practices ..... 8
  - 2.3 Required Effectiveness of Eligible Practices ..... 8
  - 2.4 Annual Value By Benefit Type ..... 10
- 3 Eligible Practices ..... 14
- 4 Estimated Value by Practice ..... 18
- Appendix A: NRCS Physical Effects Rating ..... 22
- Appendix B: Data to Support Carbon Values ..... 31
  - Effectiveness of Conservation Practices (Level of Carbon Sequestration) ..... 32
  - Carbon Value ..... 39
- Appendix C: Data to Support Water Quality Values ..... 44
  - Effectiveness of Conservation Practices ..... 46
  - Overview of Water Quality Benefits & Current Water Quality in Oregon ..... 50
  - Value of Nutrient Water Quality Improvements ..... 54
  - Value of Sediment Water Quality Improvements ..... 56
  - Value Per Acre of Wetland Water Purification Services ..... 57
- Appendix D: Data to Support Aquatic Habitat Values ..... 59
  - Effectiveness of Riparian Conservation Practices ..... 59
  - Conservation Value of Aquatic Habitat & Fish ..... 62
  - Recreation Fishing Value of Aquatic Habitat & Fish ..... 65
- Appendix E: Data to Support Terrestrial Habitat Values ..... 69
  - Forests and Grasslands Habitat Value ..... 71
  - Wetlands Habitat Value ..... 73



Appendix F: Potential Role of the CMP Review Committee: Prioritization of Funding/Project Selection ..... 76  
References ..... 78

## 1 INTRODUCTION

Agricultural lands have long been recognized in Oregon as providing a host of benefits to the public. Oregon's land use laws and the efforts of numerous organizations around the state have protected working lands for the many values they provide, including provisioning of food and

### PAYMENT FOR ENVIRONMENTAL SERVICES: OAHP PROGRAM GOALS

1. INCENTIVIZE COST-EFFECTIVE AND ENVIRONMENTALLY BENEFICIAL PRACTICES ON OREGON FARMS AND RANCHES BY PAYING FOR ENVIRONMENTAL OUTCOMES.
2. ENCOURAGE PROGRAM PARTICIPATION BY:
  - A. MAKING PARTICIPATION AS EASY AS POSSIBLE.
  - B. PROVIDING CERTAINTY (IN PAYMENT VALUE AND TERMS) FOR LANDOWNERS.

fiber, open space amenities, and fish and wildlife habitat. Agricultural lands also play a large role in the quality and quantity of water in our waterways and have recently been recognized for their important role in sequestering and storing carbon. Given the importance of agricultural lands and practices on a diverse array of ecosystem services, there is a large body of research from scientists in our state and throughout the Nation on environmental effects of agricultural land management and the ecological benefits of specific agricultural conservation practices. To a lesser extent, there is research on the social and economic value of these ecological effects and associated ecosystem services resulting from conservation practices.

### 1.1 PURPOSE

In recognition of the importance of agricultural land management on the level and quality of ecosystem services available for public enjoyment and benefit,

the Oregon Agricultural Heritage Program (OAHP) is developing a payment program to compensate farmers and ranchers for environmental outcomes that provide value to the public (i.e., ecosystem services). Building on a feasibility analysis completed in 2019, this report documents a methodology for valuing conservation practices that provide desired environmental outcomes. The methodology is based on the value to the public of ecosystem services provided by each conservation practice.

### 1.2 TARGET PUBLIC BENEFITS

The purpose of the proposed OAHP payment program is to incentive conservation outcomes with public benefit. The key outcomes providing public benefit that OAHP aims to incentivize with this payment program are:

- Water quality enhancement,
- Aquatic habitat provision,
- Terrestrial habitat provision, and
- Carbon sequestration/reduced emissions.

Water conservation practices and water transactions are not included in the methodology. They are an important project type in other OWEB grant programs, which cover both permanent and short-term water conservation activities. Other OWEB grant programs require that increased irrigation efficiency or other on-farm practices translate to reduced total on-farm water use, increased availability of water for instream flows or other uses, or water quality improvements. Several studies on the effects of increased irrigation efficiency on total farm water use indicate that efficiency improvements can translate into higher crop production per unit of water use (and higher farm income) but the same level of overall agricultural water use (see, for example, (Ward & Pulido-Velazquez, 2008) (Perez-Blanco, Hrast-Essenfelder, & Perry, 2020)). As such, farm conservation practices that enhance water irrigation efficiency have benefits but may not provide direct public benefit in terms of enhanced instream flows. The purchase or transfer of water rights, such as those completed by non-profit organizations engaged in water transactions, is expected to be the most certain and permanent way to ensure desired environmental outcomes regarding instream flows.

Several conservation practices reduce air contaminants or odors and can thus improve air quality, which is a public benefit. However, improved air quality was not identified by OAHP or key partners as having as high a priority as improvements to habitat, carbon, and water quality, and was thus not included in the valuation methodology.

### 1.3 PAYMENT PROGRAM DESIRED ATTRIBUTES AND OUTCOMES

Interviews with conservation specialists and planners, OAHP Commissioners, and other stakeholders identified a set of desirable attributes and outcomes of a payment for ecosystem services program. Specifically, OAHP and key partners identified the following desired attributes of a payment methodology:

- Easy and inexpensive to implement.
- Transparent and easy to understand.
- Flexible and adaptable to diverse practices and farms.
- Perceived as fair by a broad array of partners.
- Consistent with Natural Resources Conservation Service (NRCS) conservation practice definitions.

Further, OAHP and key partners identified the following payment methodology desired outcomes:

- Provide certainty (in payment value and terms) for landowners.
- Encourage participation by farmers and ranchers by making participation as easy as possible.
- Incentivize cost-effective and environmentally beneficial outcomes, such that significant environmental benefit is delivered per conservation dollar.
- Identify reasonable and conservative payment values commensurate with the benefits to the public of each eligible practice, recognizing that payment for practices is a new approach that OAHP aims to explore and adaptively manage over time.

As noted in the last bullet, the purpose of the payment program is to compensate and provide incentives to agricultural landowners and managers for voluntary practices that provide value (in terms of enhanced ecosystem services) to the *public* at large. The value of *private* benefits to the farmer or rancher of a conservation practice are not included in the valuation methodology.

#### 1.4 VALUATION PROCESS & DATA SOURCES

Developing the methodology to value the public value of ecosystem services provided by conservation practices in Oregon required four steps. These four steps, and the data sources and important limitations for each step, are:

- 1) **Identify agricultural conservation practices that result in habitat, carbon, and water quality improvements.** The primary data source for this step is the NRCS physical effects rating for conservation practices. Interviews with conservation practice professionals in Oregon, including experts at NRCS, regional soil and water conservation districts, and Oregon Department of Agriculture also informed this step.
- 2) **Quantify the biophysical or environmental effect expected from implementation of each conservation practice in terms of changes in ecosystem services** (e.g., tons of reduced sediment conveyed to waterbodies or change in carbon dioxide equivalents in the atmosphere). The primary data sources for this step included published scientific literature in peer-reviewed journals, in government publications, and agricultural extension publications. The estimated effects on ecosystem services of a given conservation practice can vary substantially by data source due to a) differences between studies in how ecosystem services are measured (i.e., methodological differences) and b) differences in the level of ecosystem services produced by a practice in any given location due to variation in site-specific conditions and practice implementation/management effects. The estimates of ecosystem service effects by practice presented in this document are intended to reflect average expected ecosystem service effects throughout the State. The actual level of ecosystem service provided at any one site will likely differ from the values estimated in this report.
- 3) **Quantify the economic value of the expected effects on habitat, carbon, and water quality.** Published economic literature in peer-reviewed journals, government publications, and agricultural extension publications were the primary data sources for this step. This step was also supported by analysis of existing payment for ecosystem service values and methodologies. As with measurement of ecosystem service effects, the economic value of changes in ecosystem services varies by study, due to a) methodological differences in studies (how value is measured) and b) differences between sites and locations in the value of a given level of ecosystem service provision.
- 4) **Value benefits of the ‘final’ ecosystem services directly enjoyed by people that result from enhanced habitat, water quality, and carbon sequestration.** Biophysical or environmental changes from conservation practices are most easily measured in terms of sediment, nitrogen, carbon, and such measurements. However, what provides

benefit to people and economic value is the effect of these measures on ‘final’ ecosystem services people directly care about such as fish populations or drinking water purity in downstream areas. Since there are not data available that directly link and quantify the effects of conservation practices on these ‘final services’ (e.g., there are not data that indicate how many more salmon are produced for every acre of additional riparian habitat), for each type of benefit the methodology estimates value by extrapolating data from available studies together with reasonable assumptions and professional judgement. In this process, one pitfall of not being able to directly quantify and value final ecosystem services such as fish populations is that double counting can occur if the methodology values several intermediate services based on the same final service: for example, if both water quality improvements and aquatic habitat improvements are valued based on the same expected fish population effects.<sup>1</sup> To address this, the methodology aims to separate the types of benefits and associated final ecosystem services that are valued due to changes in habitat versus water quality versus carbon. The methodology also aims to separate the incremental effects of different intermediate services on final services such as fish populations (i.e., the effects of nutrients versus temperature or sediment). Finally, to avoid double counting or overestimating, the methodology also uses conservative assumptions and estimates. This last step in the valuation process enables the benefit values derived for water quality, habitat, and carbon to be added together.

Unless otherwise noted, all dollar values presented in this report are in 2023 dollars. Values from earlier years were adjusted for inflation using the Gross Domestic Product Implicit Price Deflator (GDPIPD).

## 1.5 PRACTICE-BASED VS. OUTCOME-BASED VALUATION

While grounded in expected outcomes, the proposed methodology is a practice-based valuation system. A purely outcome-based valuation system would require measurement of environmental outcomes, and payments would only be made to farms and ranches that achieve a measurable change in environmental outcomes. In contrast, the proposed practice-based valuation system provides a uniform value for a given practice.<sup>2</sup>

The primary goal of the OAHP program is to pay for environmentally beneficial outcomes, with payments commensurate to the benefit of environmental outcomes. This seems to indicate that the methodology should be outcome-based, where payments are only made once environmentally beneficial outcomes are achieved and quantified. The outcome-based approach,

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<sup>1</sup> Double counting would not occur in there were data available for the independent effects of sediment vs nutrients vs riparian shading on fish populations.

<sup>2</sup> The exception is for some practices where payments are higher if the practice is implemented in a riparian zone. For example, if trees and shrubs are established outside the riparian zone, the payment is lower than if they are planted in a riparian zone. Table 2-3 summarizes payments by practice type and shows that payments for practices in riparian zones may be eligible for a higher per acre payment due to higher expected benefits.

however, has multiple challenges and drawbacks that are counter to the desired features of the payment methodology identified in Section 1.3. Namely, a purely outcome-based approach is expected to result in uncertainty for landowners (as payments are not guaranteed), be less easy to understand, and be more costly and resource-intensive to implement.

The practice-based methodology was also chosen as there are practical challenges to base payments on measured outcomes. For many types of environmental benefits, the desired environmental outcomes of a given conservation practice may not accrue until numerous years after the practice is implemented. For example, riparian forest buffers may require years to reach a certain level of maturity before water quality benefits may be experienced. As another example, it can take years (e.g., 6 to 10 years) for conservation practices that enhance soil carbon to have a measurable effect (Smith, 2004), and there can remain significant uncertainty in the ability to measure year-to-year change, which would be necessary in an outcome-based annual payment program. Similarly, for water quality, as noted by the Oregon Department of Agriculture (ODA) regarding measurements of water quality: “Many factors make it difficult to assess a specific land use’s nonpoint source contribution to water quality impairment, or to document improvements in water quality” (Oregon Department of Agriculture, 2017).<sup>3</sup>

It is possible for a payment scheme to be based on modeled outcomes, rather than field measurement of outcomes. There are several NRCS-sponsored tools (Nutrient Tracking Tool and Comet-FARM) available to estimate the environmental outcomes in terms of changes in water quality or carbon of a conservation practice. For a given conservation practice the estimates of environmental benefit in these tools are typically based on a wide array of factors including the specific crops grown (historically and currently), the soil type of the parcel, the past management practices on the parcel (such as tillage and nutrient use), irrigation application, slope, and the precipitation patterns. The quantified environmental effects in these tools are estimates of environmental change based on these site-specific variables, many of which are management variables that may vary from year to year. The modeled outcomes can vary significantly based on these management variables. A payment system based on modeled outcomes would thus require historic and current management data to run the model to estimate outcomes, and modeled outcomes could vary from year to year. Thus, relying on outputs from these tools may lessen the certainty and simplicity of a payment system. Additionally, relying on modeled output may lessen the perceived fairness of the payment system as difference in modeled outcome does not necessarily mean difference in delivered outcome for a given conservation practice.

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<sup>3</sup> “Confounding factors include: • Natural variability. • Multiple human and natural sources of pollutants • Localized increases and decreases in pollutant levels (or changes that occur over short periods of time) that are not detected by existing monitoring. • Legacy effects, such as stream channelization or flow modification, that may prevent water quality from achieving standards. • Upstream conditions that prevent downstream reaches from achieving water quality goals.”

## 2 OVERVIEW OF VALUATION METHODOLOGY

The desired attributes and outcomes outlined in Section 1.3 drove the methodology development process and shaped the key features of the methodology. This section provides an overview of these key features, including valuation structure, types of practices valued, required level of practice effectiveness, and the expected role of the conservation management plan review committee in prioritizing and selecting projects for funding. There are tradeoffs between valuation complexity and certainty in delivering benefits versus program ease and cost of program administration.

### 2.1 VALUATION STRUCTURE

To meet the desired methodology features that payments be easy to understand, provide certainty and ease for the landowner, be easy and inexpensive to implement by OAHP, and be perceived as fair by landowners, the proposed methodology provides a guaranteed payment for each eligible practice.

To maximize the value of environmental benefits provided per dollar invested in conservation practices and ensure payments are commensurate with benefits, the valuation methodology has the following structure:

- **Valuation is based on expected environmental outcomes**, in terms of changes to carbon, water quality, and habitat.
- **Expected environmental outcomes are quantified** using the following metrics:
  - Carbon: metric tons of carbon dioxide equivalent,
  - Water quality: tons of sediment and kilograms of nitrogen,
  - Terrestrial habitat: acres of habitat, and
  - Aquatic habitat: acres of riparian habitat (that benefits aquatic habitats).
- **Environmental outcomes for each practice type are estimated based on comprehensive review of the scientific literature**; due to expected variation in outcomes (between sites and through time) the methodology applies a conservative estimate of average benefits per acre. Direct measurement of environmental outcomes is not required in the methodology, so a conservative estimate of average benefits is used.<sup>4</sup> Environmental outcomes are estimated on a per acre basis, and value is also estimated on a per acre basis.

#### KEY METHODOLOGY ELEMENTS

1. VALUATION STRUCTURE
2. TYPES OF PRACTICES VALUED
3. REQUIRED EFFECTIVENESS OF VALUED PRACTICES
4. PRIORITIZATION OF PRACTICE FUNDING

<sup>4</sup> Not requiring measurement and monitoring reduces certainty in the outcomes delivered but is expected to result in significant cost savings. For carbon payment programs, in some cases the cost of precisely measuring the change in carbon stocks may exceed the value of the increase in carbon stock (World Agroforestry Centre, n.d.)<sup>4</sup> As an example of a monitoring protocol, the CarbonNow market for

- **Only the most effective practices are valued.** The valuation methodology uses strict eligibility criteria such that the only practices with high reliability and high effectiveness in providing benefits are valued.
- **Practices with multiple types of benefits have higher value,** based on the expected value of each type of benefit provided. By incentivizing practices with multiple benefits, the likelihood of the program delivering environmental benefits commensurate with payments is higher. With multiple types of benefits provided, even if one type of benefit underperforms expectations, another type of benefit may outperform expectations and still deliver benefits commensurate with payments.
- **Values for each type of benefit are intended to be conservative.** The proposed values err on the conservative (lower value) side, while still aiming to provide a healthy incentive for practice adoption. Environmental outcomes can vary significantly between sites, and the economic and social value of even the same environmental outcome can also vary significantly between sites. Recognizing this variation, the valuation methodology aims to use reasonable but conservative estimates of both environmental benefit delivered and economic valuation of the expected environmental benefit, considering the full range of potential environmental outcomes and associated economic value.
- **The OAHP Conservation Management Plan (CMP) advisory committee is expected to review each farm or ranch funding application and only plans and associated practices that are approved by the committee will receive funding.** While the valuation methodology proposed a value per acre for each eligible conservation practice, site-specific factors and the role of the proposed practices in addressing known conservation issues and challenges will be considered in the CMP review process. This review process will enhance cost effectiveness and benefit maximization as the review committee will have the discretion to prioritize funding to practices on farms and ranches that are expected to provide the most environmental benefit per conservation dollar.

All values presented in this report are in 2023 dollars, unless noted otherwise.<sup>5</sup>

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soil organic carbon requires three to five years of historical data and annual soil organic carbon and bulk density tests at 12 inch depth along with carbon modelling in its outcome-based program (LOCUS Agriculture, 2023). Costs can also be high for water quality monitoring. An analysis of transaction costs for eight projects in the Medford water quality trading program to reduce stream temperature estimated that average transaction costs amounted to 85% of total project costs (Guillozet, 2016). By minimizing the measurement and monitoring costs, the proposed payment methodology can dedicate funding to achieve environmental benefits and increase total acreage covered by the program.<sup>4</sup> On balance, with the safeguards and limits in place to enhance cost effectiveness of the program, the hope is that the proposed payment methodology will be the most cost-effective methodology for delivering benefits for a given dollar investment.

<sup>5</sup> Values from prior years have been converted to 2023 dollars using the Gross Domestic Product Implicit Price Deflator (GDIPIPD).

## 2.2 TYPES OF ELIGIBLE PRACTICES

In consultation with the OAHP, the scope of the valuation methodology covers the following types of conservation practices. These are the types of practices that are expected to be eligible for payments (and for which this valuation methodology has estimated a public value per acre of implementation):

- Rangeland and agricultural lands practices, but not forestland practices or in-stream restoration practices.
- Practices that have beneficial impacts on water quality, aquatic or terrestrial habitat, and/or carbon sequestration/reduced emissions.
- Non-structural practices (i.e., practices related to facilities/ infrastructure or equipment are not included).

Partners interviewed at the outset of the analysis differed on whether equipment or facilities/infrastructure should be eligible. In keeping with a focus on incentivizing outcomes and maximizing environmental benefits for a given conservation dollar, funding of equipment is not included, as the acquisition of the equipment does not guarantee environmental outcomes (rather the use of the equipment in a conservation practice provides the environmental outcome). Therefore, the methodology focuses on the value of practices.<sup>6</sup> Further, practices related to facilities/infrastructure are not included as the up-front costs of these practices is generally quite high and OAHP determined that it was preferable to have more numerous, lower-cost projects than deplete program funds on a limited number of infrastructure projects.

## 2.3 REQUIRED EFFECTIVENESS OF ELIGIBLE PRACTICES

As noted in Section 1.3, numerous conservation professionals and partners interviewed at the outset of the methodology development process indicated that it was important for the methodology to be consistent with NRCS practice definitions. NRCS has defined 167 conservation practices. For each of these conservation practices, NRCS has also developed a “physical effects” rating for the expected benefit of the practice in 45 categories of environmental outcomes. The types of outcomes evaluated are related to soil health, water conservation, habitat, water quality, air quality, livestock health, and erosion. NRCS rates practices on a scale from -4 (moderate to substantial worsening) to 5 (substantial improvement), as shown in Table 2-1.

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<sup>6</sup> For instance, environmental outcomes of a no till drill would depend on the acreage that converts to no till conservation practice. Therefore, instead of paying for the drill, the methodology pays for acreage that is converted to no till.

Table 2-1: NRCS Physical Effects Rating Categories

NRCS Physical Effects Rating	Description of Physical Effect Level
5	Substantial Improvement
4	Moderate to Substantial Improvement
3	Moderate Improvement
2	Slight to Moderate Improvement
1	Slight Improvement
0	No Effect
-1	Slight Worsening
- 2	Slight to Moderate Worsening
- 3	Moderate Worsening
- 4	Moderate to Substantial Worsening

In the methodology, only practices with at least a moderate to substantial expected average benefit rating (i.e., a 4 or 5 rating) per the 2023 NRCS Physical Effects rating matrix are valued for water quality, aquatic habitat, or terrestrial habitat improvements. For carbon practices, the methodology establishes a value for all practices with a rating of moderate improvement or higher (3, 4, or 5 rating). Carbon has a different requirement for eligibility to increase the consistency between the proposed methodology and the practices eligible for payment under the Oregon Global Action Commission's recommended practices to reduce greenhouse gas emissions and sequester carbon in Oregon's natural and working lands sectors.

Of the 45 environmental outcomes rated in the NRCS Physical Effects matrix, the methodology focuses on the ratings for eight outcomes that careful review indicated are the most pertinent to the environmental benefits (water quality, terrestrial habitat, aquatic habitat, and carbon/greenhouse gases) that OAHP aims to incentivize through the program. Table 2-2 summarizes the NRCS benefit categories that are used to identify which practices qualify for payment for providing carbon, water quality, or habitat benefits. If there are two qualifying categories, then the highest rating in each of the two categories is used.

The last row of Table 2-2 also shows the two NRCS physical effects categories that are used to determine whether a practice provides moderate to substantial soil health benefits. Payments are proposed for practices that enhance soil health only as they provide benefit to the public through improved water quality, carbon storage, and habitat. However, as soil health enhancement is a key policy objective to enhance the productivity and resiliency of Oregon's agricultural lands, information regarding the effects of practices on soil health is included.

**Table 2-2: NRCS Physical Effects Criteria Used for Each Environmental Benefit**

Environmental Benefit Type	NRCS Physical Effect Qualifying Category 1	NRCS Physical Effect Qualifying Category 2
Carbon	Emissions of Greenhouse Gases – GHG's <sup>1</sup>	
Water Quality – Sediment	Sediment Transported to Surface Water	
Water Quality – Nutrients	Nutrients Transported to Surface Water	Nutrients Transported to Groundwater
Aquatic Habitat	Elevated Water Temperature	Aquatic Habitat for Fish and other Organisms
Terrestrial Habitat	Terrestrial Habitat for Wildlife and Invertebrates	
Soil Health <sup>2</sup>	Organic Matter Depletion	Soil Organism Habitat Loss or Degradation

1/This rating category also includes sequestration of greenhouse gases, such as through tree or shrub establishment or soil sequestration.

2/Payments are proposed for practices that enhance soil health only as they pertain to water quality, carbon, and habitat, which are captured in the other benefit categories. However, as soil health enhancement is a key policy objective to enhance the productivity and resiliency of Oregon's agricultural lands, information regarding the effects of practices on soil health is included.

## 2.4 ANNUAL VALUE BY BENEFIT TYPE

Table 2-3 summarizes the estimated annual per acre value for each type of environmental benefit. The number of years that the practice will receive payment will be determined by OAHF and the CMP advisory committee.

Practices are only valued for a benefit type if they qualify as providing at least a “moderate to substantial” benefit (except for carbon, which qualifies with a moderate or better rating), as described in Section 2.3. As shown in Table 2-3, value of a practice differs based on whether a practice is an edge-of-field practice or if it is an in-field practice. For edge-of-field practices, values also differ based on the type of habitat provided in the edge of field area, whether it is trees/shrubs, wetlands, or grass/shrub habitat.

As highlighted in the introduction to this report, there is uncertainty in quantifying the ecosystem services provided by agricultural conservation practices and in estimating the value of the ecosystem services. Our knowledge and understanding of the effects and value of practices continues to evolve, and more research is being conducted in Oregon and elsewhere to further our understanding. We recognize that numerous factors will affect the value of any given practice in any given location. Rather than predicting the exact value that can be expected from a conservation practice in any one location, the values in Table 2-3 are intended to be defensible and conservative values that are representative of expected average outcomes from conservation practices across the State of Oregon.

**Table 2-3: Per Acre Per Year Value for Eligible Agricultural Conservation Practices**

Type of Eligible Practice	Water Quality (Sediment) <sup>1</sup>	Water Quality (Nutrients) <sup>1</sup>	Carbon	Aquatic (Fish) Habitat	Terrestrial Habitat	Maximum Value (if all services provided)
In-Field Practice	\$6	\$9	\$15		\$100	\$130
Edge-of-Field Practice						
Trees/Shrubs	\$90	\$135	\$30	\$150 (if riparian)	\$100	\$505 (if riparian), \$355 (if not riparian)
Wetland			\$15		\$150	\$390
Grass/shrub habitat			\$15		\$100	\$340

Note: For edge of field practices, multiple practices do not increase the maximum value per acre (e.g., for an acre of riparian forest restoration, the value per acre would be \$505, not \$505 for riparian forest buffer plus \$505 for tree/shrub establishment.) Acreage for edge of field is estimated as the acreage of land exclusively covered by the conservation practice and exclusively dedicated to the conservation practice (such as the area planted in trees and shrubs).

1/To avoid overestimating the value of benefits related to fish abundance (which are captured under aquatic habitat but are also related to sediment and nutrients), water quality benefits from reduced sediment and nutrients are focused on benefits related to on aesthetics, drinking water quality, avoided water treatment costs, and non-fish related recreation benefits of water quality. Conservative values are also used to avoid overestimating.

For water quality, an edge-of-field practice can trap nutrients and sediments from all lands draining through the edge-of-field area. As such, the value is higher for an edge-of-field practice than an in-field practice. The literature indicates that a catchment area ratio of 20:1 (20 acres draining through each acre of the edge-of-field area) is a reasonable estimate. To be conservative, water quality benefits of edge-of-field practices are estimated at 15 times the value of in-field practices (see Appendix B for a more in-depth discussion). So, for an in-field practice with physical effects ratings that qualify it only as providing water quality-sediment benefits, the value would be \$6 per acre per year. For an edge-of-field practice with physical effects rating that qualifies the practice as providing only water quality-sediment benefits, the value would be \$90 per acre per year (20 times higher than the in-field practice). For an in-field practice that provides sediment and nutrient water quality benefits, the water quality-related value would be \$15 per acre, while for an edge-of-field practice that provides sediment and nutrient water quality benefits, the water quality-related value would be \$225 per acre (15 times higher).

If that same edge of field practice includes planting trees/shrubs and qualifies as providing a carbon benefit, it would receive an additional \$30 per acre value, and if it also qualifies as providing terrestrial habitat it would also receive a \$100 per acre value. Finally, if this edge-of-field practice is in the riparian zone (such as a riparian forest buffer) and qualifies as a practice benefiting aquatic habitat, it would also qualify for an extra \$150 per acre. Adding together the values for this edge of field practice providing all types of benefits, the water quality (\$225), carbon (\$30), aquatic habitat (\$150), and terrestrial habitat (\$100) equals \$505 per acre per year. Riparian habitat areas can qualify as enhancing both aquatic habitat (through shade/temperature regulation of waterways and other effects) and terrestrial habitat.

For edge of field practices, only one practice will be valued per acre (such that stacking associated practices such as riparian buffer and tree/shrub establishment is not allowed). As such, the maximum value per acre per year would be \$505.

Appendix B through Appendix E provide detailed information on the research and economic analysis supporting all values in Table 2-3. Tables 2-4 and 2-5 provide more detail on the value per unit of environmental improvement and estimated effectiveness of each qualifying carbon and water quality practice, respectively. For habitat, no additional detail is provided as the methodology provides a flat value per acre, with no differentiation in effectiveness.

**Table 2-4: Summary of Estimated Average Carbon Quantification and Value Per Practice Type**

Practice Type/Vegetation Type	Tons C / Hectare / Year	Tons CO <sub>2</sub> e / Acre / Year	Value per Metric Ton of CO <sub>2</sub> e <sup>7</sup>	Value Per Acre/Year	Eligible Practices
Soil Sequestration Practices (In-Field Practices/Grassland)	0.35	0.5	\$30	\$15	Conservation Cover, Pasture/Hay Planting, Soil Carbon Amendment, Range Planting, No Till Management, Reduced Till Management, Nutrient Management
Habitat-Based Practices					
Grassland	0.35	0.5	\$30	\$15	Wildlife Habitat Planting
Tree/Shrub	0.7	1.0	\$30	\$30	Tree/Shrub Establishment, Windbreak/Shelterbelt, Riparian Forest Buffer, Forest Stand Improvement
Wetland	0.35	0.5	\$30	\$15	Wetland Creation, Wetland Restoration

<sup>7</sup> The economic value of reduced carbon dioxide is based on the reduction in damages across the globe associated with global warming and is known as the social cost of carbon (SCC). The SCC has recently been estimated at approximately \$220 (in 2023 dollars) by the US Environmental Protection Agency. To value carbon storage in agricultural conservation practices we do not use the SCC. Rather, we use a lower value based on market values of carbon (in markets where the quantity of additional carbon storage is measured and verified and deemed to be long-term). There is uncertainty in carbon quantification, permanence, and additionality from agricultural conservation practices participating in the OHAP program. As the OHAP program is not expected to include measurement of carbon, there is uncertainty in the additionality and the permanence of increased carbon stored due to agricultural conservation practices. Due to this uncertainty, the proposed value for carbon is not the SCC value.



**Table 2-5: Estimated Effectiveness and Value for Water Quality Conservation Practices**

Water Pollutant	Unit	Estimated Reduced Pollutant Loading Per Acre of Practice		Value Per Unit	Eligible Practices
		In-Field Practices	Edge-of-Field Practices		
Sediment	Ton /Acre	1	15	\$6	Riparian Forest Buffer, No Till, Critical Area Planting, Riparian Herbaceous Cover, Grazing Land Mechanical Treatment, Grassed Waterway, Forest Farming, Filter Strip, Vegetative Barrier, Constructed Wetland
	Value / Acre	\$6	\$90		
Nitrogen	Kilogram / Acre	0.75	11.25	\$12	Riparian Forest Buffer, Nutrient Management, Conservation Cover, Riparian Herbaceous Cover, Vegetated Treatment Area, Filter Strip, Constructed Wetland, Saturated Buffer
	Value / Acre	\$9	\$135		
Value / Acre, Sediment & Nutrient Qualifying Practices		\$15	\$225	N/A	



### 3 ELIGIBLE PRACTICES

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As shown in Table 3-1 below, there are 14 practices for which values have been estimated for carbon. Practices with carbon value are those that have an NRCS physical effects rating for greenhouse gas emissions reduction of 3, 4, or 5 (practices meeting this rating are highlighted in green in the table for the carbon column). All but four of these practices have other benefits related to water quality or habitat, which increase the total practice value. Table 3-1 also identifies an additional 15 practices that do not qualify as a carbon practice but that are expected to be eligible as a water quality and/or habitat practice. Practices eligible for water-quality or habitat-based payments must have an NRCS physical effects rating of a 4 or 5; these practices are highlighted in green in the table for the water quality and habitat columns. Table 3-2 provides a crosswalk of the OAHP carbon eligible practices, and the Oregon Climate Action Commission's (OCAC) recommended practices to reduce greenhouse gas emissions and sequester carbon in Oregon's natural and working lands sectors.

There are several practices that provide at least moderate terrestrial habitat improvements according to the NRCS physical effects rating but are not valued at this initial valuation stage. These include access control, prescribed burning, pest management, and herbaceous weed control. The estimated value for terrestrial habitat is based on providing additional quantity of habitat, and all these practices are related to quality of habitat. To be conservative, these in-field practices were consequently not included. The valuation methodology could be applied to these or other practices that OAHP desires to be eligible in the future. Feed management is another practice that is not included. This practice can be effective at reducing greenhouse gas emissions; it was not included in the carbon valuation as it is not conducive to a per acre payment methodology. In the future, a per cow carbon value could be developed.

Table 3-1: NRCS Practices Qualifying for Payment by Benefit Category (Based on NRCS Physical Effects Rating)

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat for Fish & Invertebrates)	Terrestrial Habitat (Habitat for Wildlife and Invertebrates)	Soil Health (Max of Organic Matter, Soil Organism Habitat)
<b>Carbon Eligible Practices</b>							
Conservation Cover	327	Qualifying	Qualifying	Qualifying			Qualifying
Pasture and Hay Planting	512	Qualifying				Qualifying	Qualifying
Tree/Shrub Establishment	612	Qualifying			Qualifying	Qualifying	Qualifying
Windbreak/Shelterbelt Establishment and Renovation	380	Qualifying			Qualifying		Qualifying
Nutrient Management	590	Qualifying		Qualifying			
Residue and Tillage Management, No Till	329	Qualifying	Qualifying				Qualifying
Riparian Forest Buffer	391	Qualifying	Qualifying	Qualifying	Qualifying	Qualifying	Qualifying
Wildlife Habitat Planting	420	Qualifying			Qualifying	Qualifying	
Soil Carbon Amendment	336	Qualifying					Qualifying
Forest Stand Improvement	666	Qualifying					
Range Planting	550	Qualifying					Qualifying
Residue and Tillage Management, Reduced Till	345	Qualifying					
Wetland Creation	658	Qualifying					
Wetland Restoration	657	Qualifying					

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat for Fish & Invertebrates)	Terrestrial Habitat (Habitat for Wildlife and Invertebrates)	Soil Health (Max of Organic Matter, Soil Organism Habitat)
<b>Water Quality or Habitat Eligible Practices</b>							
Critical Area Planting	342		Qualifying				Qualifying
Grazing Land Mechanical Treatment	548		Qualifying				
Riparian Herbaceous Cover	390		Qualifying	Qualifying			Qualifying
Upland Wildlife Habitat Management	645					Qualifying	
Constructed Wetland	656		Qualifying	Qualifying			
Filter Strip	393		Qualifying	Qualifying			
Forest Farming	379		Qualifying		Qualifying		
Grassed Waterway	412		Qualifying				
Restoration and Management of Rare or Declining Habitats	643				Qualifying	Qualifying	
Vegetated Treatment Area	635			Qualifying			
Vegetative Barrier	601		Qualifying				
Wetland Wildlife Habitat Management	644					Qualifying	
Early Successional Habitat Development/Mgt.	647					Qualifying	
Saturated Buffer	604			Qualifying			
Stormwater Runoff Control	570		Qualifying				

Table 3-2: Qualifying Practices, Crosswalk with USDA and Oregon Climate Action Commission (OCAC)

Practices	NRCS "GHG Emissions" Improvement Rating	Included in USDA Climate Smart Practices?	Included in the Oregon NWL Recommended Practices	
			Agricultural Lands	Rangelands
Tree/Shrub Establishment	Moderate to Substantial	Yes	Yes	
Conservation Cover	Moderate to Substantial	Yes	Yes	
Pasture and Hay Planting	Moderate to Substantial	Yes	Yes	
Windbreak/Shelterbelt Establishment and Renovation	Moderate to Substantial	Yes	Yes	
Soil Carbon Amendment	Moderate to Substantial	Yes	Yes?	
Riparian Forest Buffer	Moderate	Yes	Yes	
Range Planting	Moderate	Yes		Yes
Forest Stand Improvement	Moderate	Yes	Yes (forest lands)	
Wetland Creation	Moderate			
Wetland Restoration	Moderate	Yes	Yes (tidal wetland)	
Residue and Tillage Management, No Till	Moderate	Yes	Yes	
Wildlife Habitat Planting	Moderate	Yes	Yes	
Nutrient Management	Moderate	Yes	Yes	
Residue and Tillage Management, Reduced Till	Moderate	Yes	Yes	



## 4 ESTIMATED VALUE BY PRACTICE

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Table 4-1 applies the values described in Section 2 to the 167 NRCS conservation practices. Values range from \$505 per acre per year for riparian buffers to \$15 per acre per year for some in field practices that are only expected to be eligible for carbon-related payment.

For comparison purposes, the table also provides per-acre cost share rates used by a USDA program, the Environmental Quality Incentives Program (EQIP). EQIP is a conservation program administered by NRCS that offers farmers and ranchers financial cost-share and technical assistance to implement conservation practices. For comparison, the final column in Table 4-1 provides information on the fiscal year 2024 Environmental Quality Incentives Program (EQIP) reimbursement rate for Oregon per acre (or other unit as indicated in the column) based on the cost to implement practices (Natural Resources Conservation Service, 2024). Generally, EQIP may provide up to 75% cost share (or up to 90% cost share for socially disadvantaged farmers) for materials and services to implement a conservation practice.

Table 4-1: Payments by Practice Per Acre Per Year

Conservation Practice	NRCS Practice Code	Edge of Field Habitat Type	Edge of Field	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic (Habitat (if Riparian Trees)	Terrestrial Habitat	Annual Payment per Acre		EQIP Oregon Cost Share per Acre
									If Riparian	If not Riparian	
<b>Carbon Eligible Practices</b>											
Conservation Cover	327	Grass/Shrub	Yes	\$15	\$90	\$135			\$240	\$240	\$117 to \$848
Pasture & Hay Planting	512	Grass/Shrub	No	\$15				\$100	\$115	\$115	\$102 to \$684
Tree/Shrub Establishment	612	Tree/Shrub	Yes	\$30			\$150	\$100	\$280	\$130	\$294 to \$5,380
Windbreak/Shelterbelt Establishment and Renovation <sup>1</sup>	380	Tree/Shrub	Yes	\$30			\$150		\$180 (\$2.30/tree)	\$30 (\$0.38/tree)	\$0.55 to \$7.58/ tree
Nutrient Management	590		No	\$15		\$9			\$24	\$24	\$8 to \$38
Residue & Tillage Management, No Till	329		No	\$15	\$6				\$21	\$21	\$16 to \$42
Riparian Forest Buffer	391	Tree/Shrub	Yes	\$30	\$90	\$135	\$150	\$100	\$505	\$355	\$1,882 to \$7,536
Wildlife Habitat Planting	420	Grass/Shrub	Yes	\$15			\$150	\$100	\$265	\$115	\$399 to \$4892
Soil Carbon Amendment	336		No	\$15					\$15	\$15	\$72 to \$2,000
Forest Stand Improvement	666	Tree/Shrub	Yes	\$30					\$30	\$30	\$113 to \$2,265
Range Planting	550		No	\$15					\$15	\$15	\$127 to \$379
Residue & Tillage Management, Red. Till	345		No	\$15					\$15	\$15	\$20 to \$43
Wetland Creation	658	Wetland	Yes	\$15					\$15	\$15	\$3,428 to \$4,055
Wetland Restoration	657	Wetland	Yes	\$15					\$15	\$15	\$932 to \$4123

Conservation Practice	NRCS Practice Code	Edge of Field Habitat Type	Edge of Field	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic (Habitat (if Riparian Trees)	Terrestrial Habitat	Annual Payment per Acre		EQIP Oregon Cost Share per Acre
									If Riparian	If not Riparian	
<b>Water Quality or Habitat Eligible Practices</b>											
Critical Area Planting	342		Yes		\$90				\$90	\$90	\$332 to \$1,231
Grazing Land Mechanical Treatment	548		No		\$6				\$6	\$6	\$13 to \$97
Riparian Herbaceous Cover	390		Yes		\$90	\$135			\$225	\$225	\$817 to \$9,315
Upland Wildlife Hab Mgmt.	645		Yes					\$100	\$100	\$100	\$10 to \$309
Constructed Wetland	656		Yes		\$90	\$135			\$225	\$225	\$8,117 to \$13,924
Filter Strip	393		Yes		\$90	\$135			\$225	\$225	\$174 to \$244
Forest Farming	379		No		\$6		\$150		\$156	\$6	\$4 to \$6
Grassed Waterway	412		Yes		\$90				\$90	\$90	\$1,259 to \$2,497
Restoration and Management of Rare or Declining Habitats	643		Yes				\$150	\$100	\$250	\$100	\$16 to \$2,906
Vegetated Treatment Area	635		Yes			\$135			\$135	\$135	\$7,989 to \$17,793
Vegetative Barrier <sup>2</sup>	601		Yes		\$90				\$90 (\$0.005/ft)	\$90 (\$0.005/ft)	\$0.14 to \$1.13/ft
Wetland Wildlife Habitat Mgmt.	644		Yes					\$100	\$100	\$100	\$10 to \$504
Early Successional Habitat Development/Mgmt.	647		Yes					\$100	\$100	\$100	\$29 to \$360
Saturated Buffer	604		Yes			\$135			\$135	\$135	N/A
Stormwater Runoff Control	570		Yes		\$90				\$90	\$90	N/A

1/Conversion from per acre values to per tree values for windbreak / shelterbelt establishment or renovation is based on NRCS suggested spacing between trees and 17.5 feet between rows (NRCS suggests 15 to 20 feet spacing between rows), and 2 rows of trees for approximately 78 trees per acre. Dividing the per acre payment values by this many trees provides the payment per tree.

2/Conversion to per foot values assumes a 2-foot-wide barrier, so an estimated 21,780 feet length is required to make an acre of coverage.



## APPENDIX A: NRCS PHYSICAL EFFECTS RATING

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Table A-1 below shows for all NRCS practices (not just ones eligible for payments in this methodology as shown in Table 3-1), the physical effects ratings for each benefit category, as well as for soil health. If the CMP advisory committee chooses to provide payments for practices not qualifying as eligible for payment in Table 3-1, then payment according to the values in Table 2-3 could be made for every benefit type (such as water quality-sediment or aquatic habitat) that the CMP advisory committee concludes would result in a “moderate to substantial” improvement.

Table A-1: Physical Effects Rating for NRCS Practices by Benefit Category

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Carbon Eligible Practices</b>							
Conservation Cover	327	4	4	4	1	3	5
Pasture and Hay Planting	512	4	1	1	0	4	4
Tree/Shrub Establishment	612	4	3	1	4	5	5
Windbreak/ Shelterbelt Establishment and Renovation	380	4	1	1	4	3	5
Nutrient Management	590	3	0	5	0	0	2
Residue and Tillage Management, No Till	329	3	4	2	0	1	4
Riparian Forest Buffer	391	3	5	5	5	5	5
Wildlife Habitat Planting	420	3	1	1	4	5	0
Soil Carbon Amendment	336	4	1	1	0	0	4
Forest Stand Improvement	666	3	0	1	1	2	1
Range Planting	550	3	2	1	1	2	4
Residue and Tillage Management, Reduced Till	345	3	3	2	0	1	3
Wetland Creation	658	3	2	3	0	2	2
Wetland Restoration	657	3	2	3	0	2	1
<b>Water Quality or Habitat Eligible Practices</b>							
Critical Area Planting	342	2	4	2	1	2	5
Grazing Land Mechanical Treatment	548	2	4	3	0	1	3
Riparian Herbaceous Cover	390	2	4	5	2	2	4
Upland Wildlife Habitat Management	645	2	2	0	0	5	0
Constructed Wetland	656	1	5	4	0	0	0
Filter Strip	393	1	5	5	2	1	1

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Water Quality or Habitat Eligible Practices (Continued)</b>							
Forest Farming	379	1	4	1	4	3	3
Grassed Waterway	412	1	5	2	1	1	3
Restoration and Management of Rare or Declining Habitats	643	1	2	0	5	5	0
Vegetated Treatment Area	635	1	2	4	0	0	3
Vegetative Barrier	601	1	4	1	1	1	1
Wetland Wildlife Habitat Management	644	1	3	0	0	5	0
Early Successional Habitat Development/Mgt.	647	0	0	0	0	5	0
Saturated Buffer	604	0	0	5	0	0	0
Stormwater Runoff Control	570	0	4	2	0	0	1
<b>Other NRCS Practices, Not Eligible for Payments (Insufficient Benefits)</b>							
Alley Cropping	311	2	3	3	2	3	5
Cover Crop	340	2	2	2	0	1	2
Energy Efficient Agricultural Operation	374	2	0	0	0	0	0
Prescribed Grazing	528	2	2	1	1	2	4
Recreation Area Improvement	562	2	1	0	0	0	1
Silvopasture	381	2	3	3	3	2	3
Amendments for Treatment of Agricultural Waste	591	1	0	2	0	0	1
Brush Management	314	1	2	0	0	3	0
Conservation Crop Rotation	328	1	3	3	0	1	4
Contour Buffer Strips	332	1	3	2	1	1	1
Contour Orchard and Other Perennial Crops	331	1	3	2	1	0	2
Cross Wind Trap Strips	589C	1	1	1	0	0	1

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Other NRCS Practices, Not Eligible for Payments (Insufficient Benefits) (Continued)</b>							
Drainage Water Management	554	1	0	1	0	0	2
Emergency Animal Mortality Management	368	1	0	2	0	0	0
Field Border	386	1	3	1	2	1	4
Field Operations Emissions Reduction	376	1	0	0	0	0	0
Firebreak	394	1	-1	0	1	1	-2
Fuel Break	383	1	-1	0	0	0	0
Hedgerow Planting	422	1	0	2	1	2	2
Herbaceous Wind Barriers	603	1	1	1	1	1	1
Irrigation Water Management	449	1	2	2	0	0	1
Salinity and Sodic Soil Management	610	1	0	0	0	0	0
Waste Recycling	633	1	0	2	0	0	1
Waste Treatment	629	1	0	2	0	0	1
Wetland Enhancement	659	1	2	3	0	2	1
Woody Residue Treatment	384	1	1	0	0	0	1
Amending Soil Properties with Gypsum Products	333	0	0	-2	0	0	0
Clearing & Snagging	326	0	-2	0	0	0	0
Contour Farming	330	0	2	2	1	0	1
Controlled Traffic Farming	334	0	0	0	0	0	2
Cross Wind Ridges	588	0	1	1	0	0	1
Deep Tillage	324	0	0	0	0	0	0
Dust Control on Unpaved Roads and Surfaces	373	0	1	-1	0	0	0
Dust Management for Pen Surfaces	375	0	0	1	0	0	0
Forage Harvest Management	511	0	0	1	0	1	3

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Other NRCS Practices, Not Eligible for Payments (Insufficient Benefits) (Continued)</b>							
Groundwater Testing	355	0	0	0	0	0	0
Heavy Use Area Protection	561	0	2	1	0	0	0
Irrigation and Drainage Tailwater Recovery	447	0	1	2	0	0	0
Mulching	484	0	2	2	0	1	2
Row Arrangement	557	0	2	-2	0	0	1
Spoil Disposal	572	0	2	0	0	0	1
Spring Development	574	0	1	0	0	0	0
Stripcropping	585	0	3	2	1	1	2
Surface Drainage, Field Ditch	607	0	1	-2	0	0	0
Surface Drainage, Main or Lateral	608	0	-1	-2	0	0	0
Surface Roughening	609	0	3	0	0	0	0
Terrace	600	0	2	2	0	0	2
Tree/Shrub Pruning	660	0	0	1	1	2	2
Tree/Shrub Site Preparation	490	0	-1	0	0	0	-1
Water Harvesting Catchment	636	0	0	0	0	0	0
Land Clearing	460	-1	-1	-1	-1	-2	-3
Recreation Land Improvement and Protection	566	-1	2	0	0	-2	1
<b>Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable</b>							
Anaerobic Digester	366	4	0	2	0	0	0
Feed Management	592	4	0	2	0	0	0
Roofs and Covers	367	4	0	0	0	0	0
Prescribed Burning	338	2	1	2	0	4	1
Access Control	472	1	3	1	3	4	1
Fishpond Management	399	1	0	0	5	0	0

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)							
Herbaceous Weed Treatment	315	1	1	1	0	4	1
Land Reclamation, Abandoned Mined Land	543	1	4	0	1	1	3
Land Reclamation, Currently Mined Land	544	1	4	0	0	0	3
Stream Habitat Improvement and Management	395	1	2	2	5	3	0
Anionic Polyacrylamide (PAM) Erosion Control	450	0	4	2	0	0	0
Aquatic Organism Passage	396	0	0	0	5	2	0
Bivalve Aquaculture Gear and Biofouling Control	400	0	0	2	4	0	0
Fish Raceway or Tank	398	0	0	-1	4	0	0
Land Reclamation, Landslide Treatment	453	0	4	0	0	0	2
Lined Waterway or Outlet	468	0	5	0	0	-1	0
Pest Management Conservation System	595	0	2	0	2	4	2
Pond	378	0	2	2	4	2	0
Sediment Basin	350	0	4	5	0	-1	0
Shallow Water Development and Management	646	0	2	1	0	5	1
Structure for Water Control	587	0	1	0	4	0	0
Structures for Wildlife	649	0	0	0	3	4	0
Trails and Walkways	575	0	2	0	4	0	0
Water and Sediment Control Basin	638	0	4	0	0	2	0
Watering Facility	614	0	2	4	1	2	0
Short Term Storage of Animal Waste and Byproducts	318	-1	0	4	0	0	1

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)							
Waste Storage Facility	313	-1	0	4	0	0	1
Waste Treatment Lagoon	359	-3	0	4	0	0	1
Air Filtration and Scrubbing	371	2	0	0	0	0	0
Combustion System Improvement	372	2	0	0	0	0	0
Energy Efficient Building Envelope	672	2	0	0	0	0	0
Animal Mortality Facility	316	1	0	2	0	0	0
Composting Facility	317	1	0	2	0	0	0
Fence	382	1	0	0	1	1	1
Irrigation System, Microirrigation	441	1	1	2	0	0	0
Irrigation System, Surface & Subsurface	443	1	0	1	0	0	0
Mine Shaft & Adit Closing	457	1	0	0	0	0	0
Pumping Plant	533	1	0	0	0	0	0
Road/Trail/Landing Closure and Treatment	654	1	3	1	1	1	5
Rock Wall Terrace	555	1	2	0	0	0	0
Sprinkler System	442	1	1	2	0	0	0
Streambank and Shoreline Protection	580	1	2	1	2	2	0
Waste Facility Closure	360	1	0	0	0	0	0
Waste Separation Facility (no)	632	1	0	2	0	0	1
Access Road	560	0	1	0	0	0	1
Agrichemical Handling Facility	309	0	0	0	0	0	0
Aquaculture Ponds	397	0	0	-2	2	0	0
Channel Bed Stabilization	584	0	1	0	1	0	0
Dam	402	0	2	0	2	1	1
							1
Dam, Diversion	348	0	0	0	-1	-1	0

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)							
Dike and Levee	356	0	0	0	0	0	0
Diversion	362	0	2	3	0	0	0
Dry Hydrant	432	0	0	0	0	0	0
Energy Efficient Lighting System	670	0	0	0	0	0	0
Forest Trails and Landings	655	0	0	1	1	0	-1
Grade Stabilization Structure	410	0	2	0	1	1	2
High Tunnel System	325	0	-1	0	0	0	0
Hillside Ditch	423	0	2	-1	0	0	0
Irrigation Canal or Lateral	320	0	0	-2	0	0	0
Irrigation Ditch Lining	428	0	1	1	0	0	0
Irrigation Field Ditch	388	0	0	0	0	0	0
Irrigation Land Leveling	464	0	1	2	0	0	0
Irrigation Pipeline	430	0	1	1	0	0	0
Irrigation Reservoir	436	0	2	0	0	0	0
Land Reclamation, Toxic Discharge Control	455	0	0	0	0	0	0
Livestock Pipeline	516	0	0	0	0	0	0
Livestock Shelter Structure	576	0	0	3	0	0	0
Monitoring Well	353	0	0	0	0	0	0
Obstruction Removal	500	0	0	0	0	0	1
On-Farm Secondary Containment Facility	319	0	0	0	0	0	0
Open Channel	582	0	0	-1	0	0	0
Pond Sealing or Lining - Geomembrane or Geosynthetic Clay Liner	521	0	0	2	0	0	0

Conservation Practice	NRCS Practice Code	Carbon	Water Quality - Sediment	Water Quality - Nutrients	Aquatic Habitat (Max of Water Temperature OR Aquatic Habitat)	Terrestrial Habitat	Soil Health (Max of Organic Matter, Soil Organism Habitat, Compaction)
<b>Ineligible Infrastructure or Construction-Related or In-Stream Practices, or Per Acre Estimated Payment Potentially Not Applicable (Continued)</b>							
Pond Sealing or Lining, Compacted Soil Treatment	520	0	0	2	0	0	0
Pond Sealing or Lining, Concrete	522	0	0	2	0	0	0
Roof Runoff Structure	558	0	1	2	0	0	0
Sinkhole Treatment	527	0	2	2	0	0	0
Stream Crossing	578	0	2	1	1	0	0
Subsurface Drain	606	0	2	-2	0	0	2
Underground Outlet	620	0	0	-1	0	0	0
Vertical Drain	630	0	1	1	0	0	0
Waste Transfer	634	0	0	2	0	0	0
Water Well	642	0	0	0	0	0	0
Waterspreading	640	0	0	2	0	0	1
Well Decommissioning	351	0	0	0	0	0	0
Denitrifying Bioreactor	605	-1	0	3	0	0	0
Precision Land Forming and Smoothing	462	-1	1	1	0	0	-2

## APPENDIX B: DATA TO SUPPORT CARBON VALUES

This appendix presents the data and sources for the values for carbon sequestration practices. Carbon dioxide is the most prevalent greenhouse gas (GHG) emitted by human activity, but other GHGs also contribute to climate change. These other GHGs are converted into CO<sub>2</sub>e based on their global warming potential compared to carbon dioxide. For example, in terms of global warming potential, one ton of methane is equivalent to approximately 25 tons of carbon dioxide, so one ton of methane is equal to 25 tons of carbon dioxide equivalent, or CO<sub>2</sub>e. Throughout this appendix we present sequestration by conservation practice as the metric tons of carbon sequestered per hectare per year, as this is the metric most often used in the literature. We then convert this to tons of CO<sub>2</sub>e per acre per year, as carbon prices are typically expressed in terms of dollars per metric tons of CO<sub>2</sub>e.

As shown in Table B-1, we establish carbon values based on an estimated annual sequestration rate of approximately 0.35 to 0.7 metric tons carbon (C) per hectare per year, or 0.5 to 1.0 metric tons CO<sub>2</sub>e per acre per year.<sup>8</sup> We couple this with a carbon value of \$30 per metric ton of CO<sub>2</sub>e to estimate a carbon value per acre that varies from \$15 to \$30 per acre. The sections below provide the supporting data for this value level; as with all other values used in the methodology, the carbon value aims to be a reasonable but conservative estimate of public benefits of conservation practices.

**Table B-1: Summary of Carbon Quantification and Values Per Practice Type**

Practice Type/Vegetation Type	Tons C / Hectare / Year	Tons CO <sub>2</sub> e / Acre / Year	Value per Metric Ton of CO <sub>2</sub> e	Value Per Acre/Year	Eligible Practices
Soil Sequestration Practices (In-Field Practices/Grassland)	0.35	0.5	\$30	\$15	Pasture/Hay Planting, Soil Carbon Amendment, Range Planting, No Till Management, Reduced Till Management, Nutrient Management
Habitat-Based Practices					
Grassland	0.35	0.5	\$30	\$15	Wildlife Habitat Planting, Conservation Cover
Tree/Shrub	0.7	1.0	\$30	\$30	Tree/Shrub Establishment, Windbreak/Shelterbelt, Riparian Forest Buffer, Forest Stand Improvement
Wetland	0.35	0.5	\$30	\$15	Wetland Creation, Wetland Restoration

<sup>8</sup> This conversion is based on a conversion ratio of 3.67 tons of CO<sub>2</sub>e for every ton of carbon, and 2.47 acres for every hectare.

### EFFECTIVENESS OF CONSERVATION PRACTICES (LEVEL OF CARBON SEQUESTRATION)

Table B-2 summarizes key sources of literature on the effectiveness of agricultural conservation practices in enhancing soil and woody vegetation carbon sequestration. In-field practices, such as no-till, conservation cover, establishment of grassland (range planting or pasture/hay planting), or wetlands can increase soil carbon storage. The average annual soil organic carbon (SOC) sequestration rate is estimated at 0.35 tons of carbon per hectare per year based on a variety of sources. Different studies of soil carbon sequestration rates on farmland and in grassland/wetland ecosystems vary widely in their estimates of annual sequestration, both in terms of magnitude and in terms of sequestration rate over time.

Table B-2: Summary of Data on Carbon Sequestration by Practice Type, Metric Tons C per Hectare per Year

Practice	Biardeau et al. (from COMET-Planner), 2016	Soil Carbon Chambers et al., 2016 (NRCS review)	Canqui et al., 2022 (Meta-Analysis)	Cai et al., 2022 (Meta-Analysis)	Fargione et al., 2018 (Natural Climate Solutions)	Gattinger et al., 2012 Meta Analysis	US EPA Greenhouse Gas Inventory, 2022	Oregon Forest Carbon Inventory	USDA Forest Carbon Data
Riparian forest buffers & tree/shrub establishment or afforestation	1.5 to 1.7							0.5 to 1.5 <sup>B</sup>	0.2 to 0.7 <sup>C</sup>
Other tree/shrub establishment, including hedgerow/alley cropping/multi-story cropping	1.2 to 1.4								
Herbaceous Cover (conservation cover, herbaceous wind barriers, vegetative barriers, contour buffer strips, field borders, etc.)	1.2	0.42 to 0.96			1.2 <sup>D</sup>		0.3 <sup>A</sup>		
No Till	0.3	0.15 to 0.27		~0					
Cover crops (Not Eligible)	0.3	0.15 to 0.22	.12						
Forage and biomass planting	0.3	.02 to 0.17							
Prescribed grazing (Not		0.17 to 0.44							
Range planting		0.22 to 0.35							
Organic soil amendments (replacing synthetic fertilizer)	1.8					0.27 to 0.45 <sup>E</sup>			
Mulching (Not eligible)	0.2	0.07 to 0.18							

A/Estimated annual average flux (net sequestration) throughout the US for cropland converted to grassland.

B/Data on annual average above ground flux (net sequestration) in all Oregon forests, excluding corporate ownership.

C/Data on average annual carbon sequestration (soil and all above ground biomass) in first 10 years of afforestation for different Oregon tree types.

D/Estimated annual average flux (net sequestration) throughout the US for cropland converted to native grassland.

E/Estimated differences in a meta-analysis of conventional versus organically farmed soils. (Gattinger, et al., 2012)

Much of the literature focuses on soil carbon sequestration on agricultural lands (soy and corn cropping) in the Midwest, which may have very different SOC sequestration rates than agricultural lands in Oregon. The rate at which SOC stocks change is a function of climate, cropping history, type of plants seeded, landscape position, hydrology, soil characteristics, and time. Table B-2 presents carbon sequestration values from different meta-analyses of agricultural management practices, as well as data from national and Oregon carbon inventories. Data from other studies is also presented in the text below.

For establishment of grass cover, estimates are highly varied for sequestration rates. However, one review of available studies by NRCS concluded that conversion of cropland to grassland on Conservation Reserve Program lands results in carbon sequestration rates of approximately 0.22 to 0.45 tons per acre per year (Natural Resources Conservation Service, 2012).<sup>9</sup> Within this range, the 2022 US EPA National Greenhouse Gas Inventory estimates an annual sequestration rate of 0.3 metric tons carbon per hectare for lands converted from agricultural land use to grassland (Environmental Protection Agency, 2022).<sup>10</sup> These studies support a value of approximately 0.35 metric tons carbon per hectare sequestered per acre of grass cover, the value used in the payment methodology.

Estimates are more varied for studies of in-field practices. Some studies show a significant effect on soil organic matter from no till, while others show little effect. A 2006 EPA review concluded that published carbon sequestration rate estimates for conversion of cropland from conventional tillage to no-till range from 0.22 to 0.33 ton per acre per year, with an estimated saturation time range<sup>11</sup> of 15 to 50 years (US Environmental Protection Agency, 2006). However, a recent review of 144 studies over the past 50 years (including 1,061 pairs of published data on till and no-till) found that no till increases SOC at shallow soil depths in the first years of practice implementation, but that these gains may be offset by diminishing amounts of carbon stored in deeper soil depths (ranging from 0.28 to 2.29 metric tons C per hectare) (Cai, et al., 2022).<sup>12</sup> This study found that over 14 years the net change in soil carbon approached zero, indicating that no till is not a guaranteed solution from increasing SOC in agricultural soils.

Similarly, another recent review of 77 cover crop comparisons in the United States found that only 29% (22 of the 77) resulted in an increase in SOC (0.41 metric ton C per hectare per year); taking into account all 77 comparisons, the average increase in SOC was 0.12 metric tons per hectare, or 0.05 metric tons C per acre (note that cover cropping is not included as an eligible carbon practice). Increased SOC from cover cropping was correlated with more cover crop biomass (greater than 2 metric tons per acre) in the cover crop, a longer timeframe of practice

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<sup>9</sup> This is based on the following study: Follet, R.F., Pruessner, E.G., Samson Liebig, S.E., Kimble, J.M. and Waltman, S.W., 2001. Carbon sequestration under the Conservation Reserve Program in the historic grassland soils of the United States of America. I R. Lal, ed. Carbon Sequestration and Greenhouse Effect. Soil Science Society of America Special Publication No. 57. pp. 27 – 40

<sup>10</sup> EPA. 2022. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2020. U.S. Environmental Protection Agency, EPA 430-R-22-003. <https://www.epa.gov/ghgemissions/draft-inventory-us-greenhouse-gas-emissions-and-sinks-1990-2020>.

<sup>11</sup> Saturation time range refers to the number of years of increased soil carbon sequestration before SOC has reached maximum or saturation levels.

<sup>12</sup> Cai, A., Han, T., Ren, T., Sanderman, J., Rui, Y., Wang, B., Smith, P. and Xu, M., 2022. Declines in soil carbon storage under no tillage can be alleviated in the long run. *Geoderma*, 425, p.116028.

implementation (more than five years of cover cropping), and low baseline SOC (Blanco-Canqui, 2022), (Jordon, et al., 2022). Several meta-analyses of soil organic carbon have also found that SOC concentrations often accrue over time and that there are additive effects of multiple BMPs on SOC and soil health, with SOC responding to combining of conservation practices (such as no-till, cover cropping, and organic amendments) (Crystal-Ornelas, Thapa, & Tully, 2021)(Allam et al., 2022). As a potential example of additive effects, one study in eastern Oregon compared the combined effects on soil carbon of winter cropping and no-till compared to conventionally tilled and winter fallow, and estimated a change in soil carbon of 1.7 to 2.6 metric tons C per hectare per year in the soil zone of 0 to 40 cm (Machado, et al., 2006).<sup>13</sup>

Permanence of carbon storage is an issue with all soil or plant-based carbon sequestration (as trees can release carbon through wildfire events or harvest, or soils can be disturbed and release carbon). However, permanence is particularly an issue for in-field soil carbon practices as changes in annual management practices (such as introducing till on formerly no-till lands) can result in release of carbon stored in prior years. Based on these types of uncertainties, we establish a conservative estimate of value for soil-based carbon sequestration practices of 0.35 metric tons carbon per hectare, the same value used for grassland.

Wetlands, which store the majority of carbon in soils, are designated the same level of carbon sequestration (0.35 metric tons C per hectare per year) as in-field management practices and grassland establishment. For wetlands, we review values from four different publications on carbon stocks in US wetlands (Nahlik & Fennessy, 2016) (Tan Z. , Liu, Sohl, & Young, 2015), and compare these against values from a different set of five studies on carbon stocks in US agricultural lands (see Tables B-3 and B-4). These data indicate carbon stocks in wetlands vary substantially, but in the western US may average approximately 200 tons of carbon per hectare (with tidal saline wetlands averaging approximately 350 tons of carbon per hectare), while agricultural land may average approximately 40 tons per hectare. One study estimates that it can take wetlands 20 to over 60 years to return to natural conditions (Tangen & Bansal, 2020). Peatland in particular accumulates carbon very slowly. For example, one recent study estimated that the average time for a degraded wetland to move from a carbon source to a carbon sink through restoration could be 141 years (for a non-peatland wetland) to 525 years (for a peatland wetland) (Schuster, Taillardat, Macreadie, & Malerba, 2024). A 50-year period to move from 40 metric tons carbon per hectare to 200 to 350 metric tons carbon per hectare equates to approximately 3 to 6 metric tons carbon per hectare.

However, several assessments of annual wetland carbon sequestration indicate that approximately 0.35 metric ton to 1 metric ton carbon per hectare may be more accurate (see Table B-5). A study of wetlands in the Prairie Pothole Region of the US estimated sequestration rates on wetlands ranging from 0.35 to 1.1 tons of carbon per hectare per year (Tangen & Bansal, 2020). Another study of restoring peatland ecosystems through the United States estimated that restored peatlands in the Western US would result in total annual storage of 0.95 ton of carbon equivalent per hectare (after accounting for carbon dioxide and methane flux) (Fargione,

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<sup>13</sup> Machado, S., Rhinhart, K., & Petrie, S. (2006). Long-term cropping system effects on carbon sequestration in eastern Oregon. *Journal of Environmental Quality*, 35(4), 1548-1553.

et al., 2018). Similarly, a 2022 study of carbon sequestration on restored freshwater, mineral soil wetlands in an agricultural landscape in Ontario, Canada, found organic carbon sequestration rates of 0.89 metric tons per hectare per year, with soil restored over 40 years. Although several of these studies indicate higher levels of carbon storage in wetland, we take into account that methane emissions from wetlands may rise with increased warming (although wetlands are still expected to provide a net benefit in mitigating climate change, see (US Geological Survey, 2023)), so we use an estimate of 0.35 tons per carbon per hectare per year for wetlands. Given the uncertainty in timing for wetlands to become carbon sinks, this rate of sequestration may not occur immediately after practice implementation.

**Table B-3: Estimated Carbon Stock of Wetlands, Metric Ton Carbon per Hectare**

Study	Geography	Data Year	Carbon Stock (Metric Ton Carbon Per Hectare)
Tan et al., 2015	National, federal forest	2001 to 2005 average	151
	National, federal forest	2050	138
	National, nonfederal forest	2050	<b>206</b>
Nahlik and Fennessy, 2016	Tidal Saline	2011	345
	Coastal Plains	2011	197
	E Mts & Upper Midwest	2011	477
	Interior Plains	2011	194
	West	2011	<b>214</b>
	National	2011	299
Adhikari et al. 2019	Wisconsin	1990 to 2010	243

Sources: (Adhikari, et al., 2019) (Nahlik & Fennessy, 2016) (Tan Z. , Liu, Sohl, & Young, 2015)

**Table B-4: Estimated Carbon Stock of Cropland Soils, Metric Ton Carbon Per Hectare**

Study	Geography	Data Year	Carbon Stock (Metric Ton Carbon Per Hectare)
Spawn et al. 2019, inferred from % change	US Croplands	2008 to 2012	23
Lal 2004, inferred	Global	2000	45
Tan et al., 2015 (cropland/agricultural may include grassland, pasture, hay, and other land uses)	National, federal cropland	2001 to 2005 average	37
	National, federal agricultural land	2050	40
	National, nonfederal agricultural land	2050	48
Dangal et al. 2022 (Calibrated model with sampling of US	US Croplands	2001 to 2005	35

cropland soils)			
USGS 2011	Great Plains Region agricultural land	2001 to 2005	37

Sources: Highland Economics analysis of (Spawn, Lark, & Gibbs, 2019); (Zhang, Lark, Clark, Yuan, & LeDuc, 2021), (Tan Z. , Liu, Sohl, Wu, & Young, 2015), (Dangal, et al., 2022) (Bouchard, et al., 2011)

**Table B-5: Data on Annual Carbon Sequestration by Wetlands**

Study	Year	Location	Metric Ton Carbon / Hectare / Year
Creed et al.	2022	Ontario	0.89
Tangen and Bansal	2020	Prairie Pothole Region	0.35 to 1.1
Fargione et al.	2018	Western Wetlands	0.95
Estimate Used for Oregon Payments for Carbon			0.35

Sources: (Creed, et al., 2022), (Fargione, et al., 2018), (Tangen & Bansal, 2020)

For practices with tree establishment, we use values from the US Forest Service on average carbon stocks in afforestation projects (Hoover, Bagdon, & Gagnon, 2021) and data from the Oregon Forest Carbon Inventory (US Forest Service, Oregon Department of Forestry, 2019). The US Forest Service estimates metric tons of carbon stocks stored per afforested hectare by tree type and by region (the Pacific Northwest is divided into two subregions: East and West). The estimated carbon stocks per hectare of forest are estimated at year 0 and then at selected later decades of tree age (Year 10, Year 30, Year 50, and Year 100). Estimates are provided for the amount of carbon stored in live trees, in other aboveground biomass (including standing dead trees, understory, down dead wood, and the forest floor) as well as for soil carbon, see Table B-6.

**Table B-6: Metric Ton Carbon Stock Per Afforested Hectare Per Year**

Tree Type/Region	Aboveground (Non-Soil) Stock Metric Ton Carbon / Hectare / Year			Soil Stock Metric Ton Carbon / Hectare / Year			Total Metric Ton Carbon / Hectare / Year		
	Year 0	Year 10	Year 30	Year 0	Year 10	Year 30	Year 0	Year 10	Year 30
Western Pacific Northwest									
Alder/Maple	2.7	6.3	77.8	86.4	87.6	95.1	89.1	93.9	172.9
Douglas Fir	2.7	5.7	140.9	71.1	72	78.2	73.8	77.7	219.1
Douglas fir, high productivity	2.7	6.7	193.2	71.1	72	78.2	73.8	78.7	271.4
Eastern Pacific Northwest									
Douglas Fir	1.1	7.1	77.7	71.1	72	78.2	72.2	79.1	155.9
Lodgepole Pine	1.1	4.5	39.4	39	39.5	42.9	40.1	44	82.3
Ponderosa Pine	5.4	7	34.8	38	38.5	41.8	43.4	45.5	76.6

Source: Highland Economics analysis of (Hoover, Bagdon, & Gagnon, 2021)

We use the total aboveground and belowground carbon stock estimates at each point in time, and then subtract out the total carbon stock estimates at Year 0 to estimate total accumulation

through time. To convert this to an annual average carbon sequestration estimate for the first decade of afforestation, we then divide the estimate total increase in carbon stock by the age of the forest to estimate average annual carbon accumulation during the first decade after planting (years 0 to 10). We also estimate the average annual carbon accumulation in the second two decades after planting (years 10 to 30) and cumulatively across the first three decades after planting (years 0 to 30), see Table B-7. We conservatively rely on the data on the total annual average carbon sequestration in approximately the first ten years after planting, which varies from 0.2 to 0.7 metric tons of carbon per hectare, depending on the tree type and region within the Pacific Northwest. For riparian vegetation, it is primarily deciduous trees and shrubs (which tend to have lower carbon levels) that dominate throughout most of the state, while conifers are predominant at higher elevations.<sup>14</sup> We assume that conservation practices that are establishing forest/tree shrubs are using plants slightly older than seedlings, such that the sequestration levels achieved during the CMP payment period is slightly greater than the average during years 0 to 10. **As an average value, we assume 0.7 metric tons of carbon per afforested hectare, which equates to 1.0 metric ton of CO<sub>2</sub>e per afforested acre in Oregon.**<sup>15</sup> If the conservation practice is continued such that the trees mature (and if trees are the majority of vegetation rather than shrubs), then on average over 30 years, the annual average carbon sequestration achieved per acre would be much higher. However, we use the conservative value of 0.7 metric tons per hectare per year as this is the approximate expected sequestration during the period of the payments for newly established trees/shrubs.

**Table B-7: Average Annual Sequestration Per Afforested Hectare**

Tree Type/Region	Annual Average Sequestration (Metric Ton Carbon / Hectare / Year)		
	Year 0 to 10	Year 10 to 30	Year 0 to 30
Western Pacific Northwest			
Alder/Maple	0.5	4.0	2.8
Douglas Fir	0.4	7.1	4.8
Douglas fir, high productivity	0.5	9.6	6.6
Eastern Pacific Northwest			
Douglas Fir	0.7	3.8	2.8
Lodgepole Pine	0.4	1.9	1.4
Ponderosa Pine	0.2	1.6	1.1

Source: Highland Economics analysis of (Hoover, Bagdon, & Gagnon, 2021)

<sup>14</sup> (Oregon Department of Fish and Wildlife, 2016)

<sup>15</sup> There are 2.47105 acres in a hectare and 3.67 metric tons of CO<sub>2</sub>e per metric ton of carbon.

**Table B-8: Oregon Forest Ecosystem Carbon Inventory Report (2019), Net Annual Change in Aboveground Live Tree carbon between 2001-2006 and 2011-2016<sup>1</sup>**

Forest Ownership	Annual Average Sequestration	
	Metric Ton CO <sub>2</sub> e / Acre / Year	Metric Ton Carbon / Hectare / Year
Private – Corporate	0.18	0.12
Private-Noncorporate	0.95	0.64
Other Federal	2.29	1.54
State and Local Gov.	0.79	0.53
National Forests	1.17	0.79
All Ownerships	1.04	0.70

<sup>1</sup>/Accounts for growth, harvest, and mortality from fire, insects/disease and natural factors.

Source: Table 4.4 in the Oregon Forest Carbon Ecosystem Carbon Inventory Report (Christensen, Gray, Kuegler, & Yost, 2019).

## CARBON VALUE

This section summarizes information on the value of GHG reduction. This value, often referred to as the price of carbon, is typically expressed as dollars per metric ton of CO<sub>2</sub>e. The economic value of reduced GHG is the value of avoiding damages caused by climate change, which is often called the ‘social cost of carbon’ (SCC). There is substantial variation in the available estimates of SCC. This is due to the numerous uncertainties affecting SCC value, including 1) the timing and magnitude of climate change effects, 2) society’s ability to mitigate climate change effects, 3) the difficulty in expressing in monetary terms the many environmental and social change impacts of climate change, and 4) the difficulty in expressing future costs in today’s dollars (related to the discount rate chosen).

SCC damage values used by federal agencies have varied over the years. At first, federal agencies developed and applied their own estimates. Then, the Office of Management and Budget convened an Interagency Working Group (IWG) on the Social Costs of Greenhouse Gases, which in 2013 developed a set of SCC estimates that could be used across federal agencies (Interagency Working Group on Social Cost of Greenhouse Gases, 2013). In February 2021, the IWG updated its estimates of the SCC. They estimated that in the year 2022, at a 3-percent discount rate, the SCC value was \$51 per metric ton in 2020 dollars (Interagency Working Group on Social Cost of Greenhouse Gases, 2021). Adjusting this value for inflation equates to roughly \$60 per metric ton in 2023 dollars using the Implicit Price Deflator for Gross Domestic Product (IPDGDGP) (Bureau of Economic Analysis, 2023). More recently, the U.S. Environmental Protection Agency (EPA), a member of the IWG, released in November of 2023 a new estimate of the social cost of carbon emissions occurring in the year 2020 at \$120 to \$340 per metric ton, with a central value of \$190 (in 2020 dollars) (Environmental Protection Agency, 2023). The U.S. EPA central value of \$190 per metric ton for emissions in 2020, equates to approximately \$220 per metric ton in 2023 dollars.

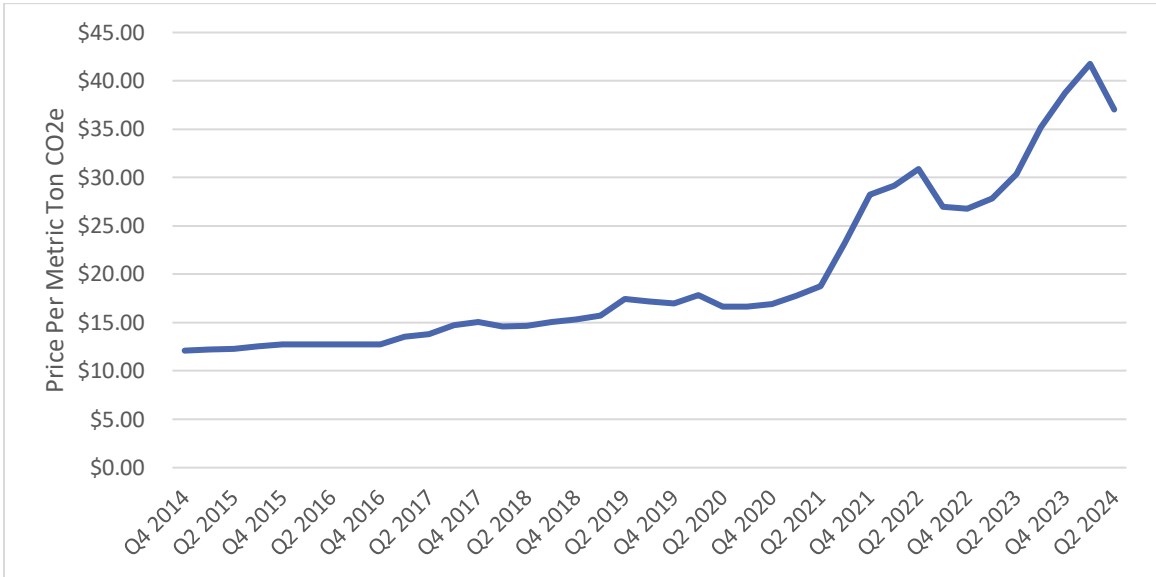
Market prices for carbon are not based on the SCC but rather are generally based on the cost of carbon abatement (reduced emissions) or cost of increased carbon sequestration, as well as the level of demand for carbon credits. Carbon prices also vary substantially based on the type of carbon credit offered (reducing emissions or increasing sequestration), whether it is a voluntary carbon credit or a credit in a compliance market, the volume of carbon traded at a time, the geography of the project, the year of credit delivery, and other factors. Credits are also typically evaluated based on the following factors to be eligible for sale in a carbon market:

- **Additionality:** the carbon is removed from the atmosphere because of the market and is additional to the emissions reduction or carbon sequestration what would happen without the market,
- **Quantification Certainty:** the amount of carbon removed from the atmosphere is measured and certain,
- **Permanence:** the amount of carbon removed won't be released back into the atmosphere soon.

For several reasons we base our value for carbon on the current market value of carbon credits from agricultural lands and other nature-based credits, including the cost of carbon offsets from other types of carbon sequestration projects such as afforestation, as well as the current market price of the California cap and trade carbon market. These costs represent the costs to the State of Oregon of investing in other nature-based carbon sequestration projects, such as timber offsets in the State of Oregon. Further, we use the lower carbon prices from carbon markets rather than the SCC values as the market prices reflect uncertainty in carbon quantification, permanence, and additionality from agricultural conservation practices. As we are not requiring measurement of carbon in the proposed methodology, and as there is uncertainty in the additionality and the permanence of carbon stored in agricultural conservation practices, we propose a value of \$30 per metric ton of carbon as a reasonable value for compensation of agricultural landowners.

A value of \$30 per metric ton is slightly less than the value currently being paid in the California compliance market. Recent average prices in this market, which is a cap-and-trade market mandated by regulation, have averaged approximately \$35 per metric ton of CO<sub>2</sub>e in 2023 and the first half of 2024, see Figure B-1. This is the price paid for emission credits traded amongst regulated entities. In the California carbon market, a small percentage of a regulated entity's compliance obligation may be met with reduced emissions or sequestered carbon in the agricultural or forestry sectors. These agricultural or forestry sector offsets must be quantifiable enforceable, permanent (100 years+), and additional reductions of GHGs, as verified by a third-party.

Figure B-1: 2023 California Carbon Market Auction Settlement Price, \$/CO<sub>2</sub>e



Source: (California Air Resources Board, 2024)

Prices in the voluntary compliance markets, which sell carbon credits to non-regulated entities, are much lower. Figure B-2 summarizes data on voluntary carbon market pricing for different types of projects as of July 2023. As shown in the figure, prices in the voluntary market vary from approximately \$2 to \$11 per credit (metric ton of CO<sub>2</sub>e).

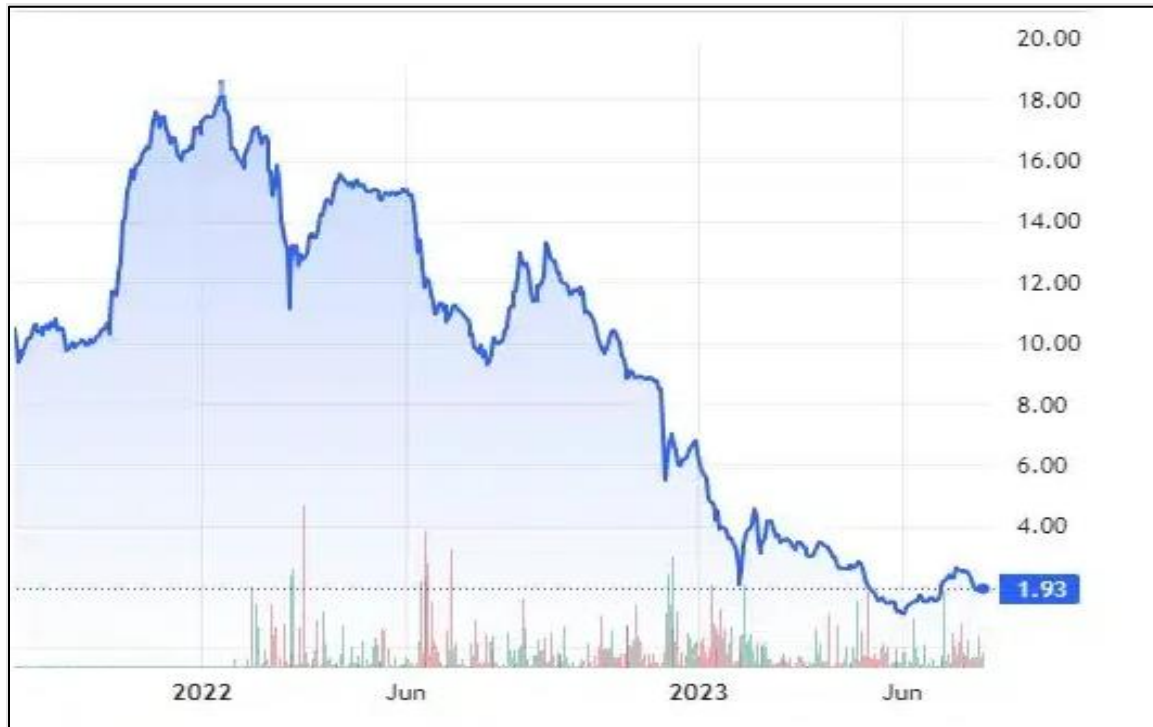
Figure B-2: 2023 Voluntary Carbon Market Credit Price Range, 2023

Carbon Credit Pricing by Type			
Project Type:	Volume Sold (MICO <sub>2</sub> e):	Average Price:	Price Range:
Wind	12.8	\$1.9	\$0.3 - \$18
REDD+	11	\$3.3	\$0.8 - \$20+
Landfill methane	7.9	\$2	\$0.2 - \$19
Tree planting	3	\$7.5	\$2.2 - \$20+
Clean cookstoves	3	\$4.9	\$2 - \$20+
Run-of-river hydro	1.5	\$1.4	\$0.2 - \$8
Water/purification	1.2	\$3.8	\$1.7 - \$9
Improved forest management	0.8	\$9.6	\$2 - \$17.5
Biomass/biochar	0.7	\$3	\$0.9 - \$20+
Energy efficiency - industrial-focused	0.7	\$4.1	\$0.1 - \$20
Biogas	0.6	\$5.9	\$1 - \$20+
Energy efficiency - community-focused	0.6	\$9.4	\$3.3 - \$20+
Transportation	0.5	\$2.9	\$2.2 - \$6.8
Fuel switching	0.5	\$11.4	\$3.5 - \$20+
Solar	0.3	\$4.1	\$1 - \$9.8
Livestock methane	0.2	\$7	\$4 - \$20+
Geothermal	0.1	\$4	\$2.5 - \$8
Agro-forestry	0.1	\$9.9	\$9 - \$11

Source: (Opanda, 2023)

Recent trends in the voluntary nature-based carbon offset market are shown in Figure B-3 below. Nature-based carbon credits have diminished in price in the last year, with some analysts concluding that the timing of the decline in prices is related to some news stories criticizing the validity and effectiveness of rainforest carbon projects (CarbonCredits.Com, 2023).

Figure B-3 Recent Trends in Pricing for Nature-Based Carbon Offsets



Source: (CarbonCredits.Com, 2023)

The cost of alternative carbon sequestration projects is also pertinent because it represents the cost to Oregonians of other methods to sequester an equivalent amount of carbon. In other words, if Oregon were not to pay for agricultural conservation practices, what price would Oregon have to pay instead to purchase afforestation or other carbon sequestration credits to remove an equivalent level of carbon dioxide from the atmosphere? One analysis (Sohngen & Brown, 2008) published in 2008 estimated that the cost to extend timber rotations in some Pacific Northwest forests to increase carbon sequestration was approximately \$10 per metric ton CO<sub>2</sub>e.<sup>16</sup> A 2017 study in Washington state reported that ten-year historic prices for forest carbon credits sold in voluntary markets were also approximately \$10 per credit, or per metric ton CO<sub>2</sub>e (Fischer, Cullen, & Ettl, 2017). However, this same analysis indicated that the breakeven price to compensate landowners for increasing timber rotations by 20 years (from 45

<sup>16</sup> The original study value was \$7 per metric ton, converted from 2008 to 2023 dollars, this is roughly equivalent to \$10 per metric ton.



to 65 years) would be approximately \$62 per metric ton of CO<sub>2</sub>e.<sup>17</sup> Our proposed value of \$30 per metric ton falls a bit under the mid-point of this range.

Specific to agricultural carbon markets, there are several carbon payment programs active in the American Midwest to pay farmers for conservation practices. These programs pay approximately \$3 to \$45 per acre for increased soil carbon storage. Indigo Agriculture pays an estimated \$3 to \$12 per acre, with 0.1 to 0.4 credits expected on average for tillage, cover cropping, and nitrogen inputs. Indigo Agriculture values carbon at \$30 per credit (metric ton) (Indigo, 2021), similar to our proposed rate. Another program, Carbon Now, guarantees farming payments of \$12 per acre per year (Locus Agriculture, 2020). Farmers are paid \$15 per verified metric ton of CO<sub>2</sub>e. For comparison, as shown in Table B-1, the proposed value is \$15 per acre per qualifying practice for in-field practices using a value of \$30 per metric ton of CO<sub>2</sub>e. As such, the proposed valuation methodology is in the same ballpark of value as the agricultural carbon payment schemes in the Midwest that require measurement and in-field verification of increased carbon storage.

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<sup>17</sup> The original value in 2017 was \$50 per metric ton.

## APPENDIX C: DATA TO SUPPORT WATER QUALITY VALUES

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The methodology values two types of water quality pollutants that are related to agriculture: sediment and nutrients. Agricultural runoff can erode agricultural soils, resulting in sediment, nutrients, and other contaminants being transported to adjacent streams and other waterbodies. Reducing sediment loading to waterbodies is important to reduce clogging of stream channels, silting up of reservoirs and reductions in reservoir capacity, deterioration of water clarity/aesthetics/recreation, and adverse impacts on fish, including salmonids.<sup>18</sup> Sediments can also carry nutrients and pesticides to waterbodies, further reducing water quality. Nutrients are important as excess nutrient levels (primarily nitrogen and phosphorus) can lead a eutrophication and excess algal growth which can smell and look bad, adversely impact aquatic habitat conditions (including low levels of dissolved oxygen), and release toxins detrimental to human health.

The Oregon Department of Environmental Quality provides an annual assessment of water quality throughout the state. The 2022 Integrated Report found that for assessment units throughout the state for which there are data, 87% are impaired by one or more pollutants. The greatest number of impairments are for temperature, dissolved oxygen (related to nutrients), and *E. coli*. In terms of beneficial uses of waterbodies, fish and aquatic life use impairment is the most common unsupported beneficial use (largely driven by nonattainment of temperature criteria) (Oregon Department of Environmental Quality, 2023). The value of conservation practices (specifically riparian buffers) to improve aquatic habitat and regulate water temperatures is addressed in the next section.

Because reducing water-borne erosion is the primary mechanism to reduce sediment and nutrient loading in waterways, the methodology focuses on quantifying the change in water quality based on the effectiveness of conservation practices in reducing erosion and filtering water-borne sediment and nutrients. The methodology for quantifying water quality benefits includes the following steps:

1. Estimate the average annual reduction in sediment and nutrient loading from each acre of conservation practice implemented, focusing on two categories of practices: in-field soil erosion control practices and edge of field buffer practices. This requires combining data from three sub-steps:
  - a. Quantify average water-related erosion rates on agricultural land in Oregon, and the associated average annual per acre nutrient and sediment loading to waterways.
  - b. Estimate the effectiveness (in terms of percent reduction) of various conservation practices in reducing water-related erosion and loading.
  - c. Estimate the drainage area for edge of field practices that filter sediment and nutrients and reduce the loading to waterways from multiple acres (as opposed

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<sup>18</sup> Soil removed from fields also has costs to the farm, as it results in lost topsoil, nutrients, and can affect agricultural fertility and productivity.

to in-field practices that reduce erosion and loading only from the acreage on which the practice is implemented).

2. Estimate the economic value of improved water quality per ton of reduced sediment loading per kilogram of reduced nutrient loading.
3. Combine the data from Step 1 and 2 to estimate the economic value (dollar per acre per year) of each type of conservation practice. In other words, multiply the unit value of reducing loading (dollar per ton or per kilogram) from Step 2 by the estimated reduction in sediment and nutrient loading from each type of conservation practice (tons or kilograms per acre per year) from Step 1.

Findings from this process are summarized in Table C-1. As shown in the table, for in-field practices, **the annual per acre value is \$6 for practices eligible as sediment loading reduction practices and is \$9 for practices eligible as nutrient loading reduction practices, for a combined potential value of up to \$15 for eligible in-field water quality practices.** For edge-of-field practices, we estimate that each acre of practice filters and reduces sediment and nutrients from 15 acres (i.e., the drainage area is 15 acres for each acre of practice). As such, for each acre of edge of field practice, we estimate a 15-fold value of the in-field practices. **The annual per acre payment is \$90 for edge-of-field practices eligible as sediment loading reduction practices and is \$135 for edge-of-field practices eligible as nutrient loading reduction practices, for a combined potential payment of up to \$225 for eligible edge-of-field water quality practices.**

**Table C-1: Summary of Water Quality Quantification and payment Per Acre Values**

Column	Practice Type/Vegetation Type	Water-Related Sediment Erosion Tons/Acre	Nitrogen Loading per Acre (Kg/Acre/Year)	Phosphorus Loading per Acre (Kg/Acre/Year)
A	Loading Per Cropland Acre Per Year	2	3	0.2
B	BMP Effectiveness (% Reduction in Loading)	50%	25%	25%
C= A*B	Reduction in Loading Per Acre Covered by Practice	1	0.75	.05
D	Value Per Unit Load Reduction	\$6	\$12	To avoid possible overestimation of value, we do not value phosphorus in addition to nitrogen as many studies focus on the value from nutrient reduction rather than separate values for P and N.
E = C *D	Value per Covered Acre, In Field Practice	\$6	\$9	
F	Covered Acres (Drainage Area) per Edge of Field Buffer	15	15	
G= E*F	Value per Acre of Edge-of-Field Practice	\$90	\$135	

Source: Highland Economics analysis, data sources provided in sections below.

Table C-2: Value by Practice Per Acre Per Year

Practice Type/Vegetation Type	Value per Acre for Sediment Reduction	Value per Acre for Nutrient Reduction	Total Value per Acre	Eligible Practices (Based on NRCS Physical Effects Rating)
<b>In-Field Practices</b>				
Sediment Loading Reduction Only	\$6	N/A	\$6	Residue and Tillage Management, No Till; Grazing Land Mechanical Treatment; Critical Area Planting; Forest Farming
Nutrient Loading Reduction Only	N/A	\$9	\$9	Nutrient Management
<b>Buffer/Edge-of-Field Practices</b>				
Sediment Loading Reduction Only	\$90		\$90	Grassed Waterway, Vegetative Barrier, Stormwater Runoff Control
Nutrient Loading Reduction Only		\$135	\$35	Saturated Buffer, Vegetated Treatment Area
Sediment & Nutrient Loading Reduction	\$90	\$135	\$225	Riparian Forest Buffer, Riparian Herbaceous Cover, Conservation Cover, Filter Strip, Constructed Wetland

Source: Highland Economics analysis, data sources provided in sections below.

## EFFECTIVENESS OF CONSERVATION PRACTICES

As noted above, sediment and nutrient pollutant loading of waters is closely tied to rates of erosion.<sup>19</sup> We first present data on total erosion rates from agricultural lands, and then the level of sediment and nutrients loading to waterways from agricultural lands (see Table C-3). We then present data on the effectiveness of conservation practices in reducing sediment and nutrient loading to waterways (see Table C-4).

To estimate sediment and nutrient loading from agricultural lands with and without conservation practices, we rely on data on erosion on Oregon agricultural lands and data on total phosphorus and nitrogen loading from a variety of sources. Table C-3 summarizes available data on agricultural land erosion in Oregon and the Pacific Northwest and associated sediment and nutrient loads. Erosion rates vary widely throughout the state depending on such factors as rainfall, slope, vegetation, soil characteristics, and tillage and irrigation management practices.

Based on the data sources presented in Table C-4, we establish water quality value based on an estimated annual erosion rate of approximately 5 tons per cropland acre per year (Oregon State

<sup>19</sup> It can also be related to livestock presence, however the NRCS physical effects rating does not highly rate access control or other livestock conservation practices as highly or moderately effective in reducing transport of sediment or nutrients to surface waterways.



University Extension, 2003). Of this, we estimate that 40%<sup>20</sup>, or 2 tons is carried to waterways, consistent with estimates from the National Resources Inventory on the average water-related erosion from cultivated cropland in Oregon (U.S. Department of Agriculture, 2020). We further estimate, on an average annual basis per acre of cultivated cropland *without conservation practices*, that the nutrient loading from each acre of cropland is approximately 3 kilograms of nitrogen and 0.2 kilograms of phosphorus per acre per year.

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<sup>20</sup> This sediment delivery ratio is consistent with data from US Department of Agriculture, see [https://efotg.sc.egov.usda.gov/references/public/IA/Erosion\\_and\\_sediment\\_delivery.pdf](https://efotg.sc.egov.usda.gov/references/public/IA/Erosion_and_sediment_delivery.pdf).

Table C-3: Data on Erosion Rates and Loading from Agricultural Lands

Source	Publication Year	Location	Total Sediment Erosion (Tons/Acre/Year)	Water-Related Sediment Erosion (Tons/Acre/Year)	Nitrogen Loading (Kg/Acre/Year)	Phosphorus Loading (Kg/Acre/Year)
USDA, Natural Resources Inventory	2020 (based on 2017 data)	Oregon Statewide: Cultivated cropland	3.92	2.13		
USDA, Natural Resources Inventory	2020 (based on 2017 data)	Oregon Statewide: CRP Land	1.1	1.1		
Oregon State Extension	2003	Oregon Statewide	Less than 1 to over 15, medium rate of 4 to 6 tons per acre per year			Medium value of 0.1 <sup>a</sup>
Wise and Johnson	2011 <sup>b</sup>	Oregon and Washington, estimated average stream nutrient loading per agricultural acre			1.5 to 6.0	0.15 to 0.4
Schillinger et al.	2010	Columbia Basin and Columbia Plateau, furrow irrigated	35 to 55 tons			
Schillinger et al.	2010	Columbia Basin, conservation tillage, water erosion	11 to 13 tons			
Kok et al.	2009	Dryland Inland PNW	5 to 20 tons, depending on tillage system			

Sources: (U.S. Department of Agriculture, 2020), (Oregon State University Extension, 2003), (Wise & Johnson, 2011), (Schillinger, Papendick, & McCool, 2010), (Kok, Papendick, & Saxton, 2009)

a/Oregon State Extension publication provides data (based on oil test values) that the concentration of phosphorus in agricultural soils varies across the state, but that medium levels are 60 mg/kg in soils west of the Cascades and 40 mg/kg in soils east of the Cascades. We assume 50 mg/kg on average for agricultural soils statewide. Applying this concentration to an estimated 2 tons of water-related erosion results in an estimated 0.1 kilogram per acre per year of P loading.

b/ Note that these data are from 2011 (See Table 6 in Wise and Johnson), but a recent USDA review of nutrients from agricultural lands notes that nutrient loading has increased nationwide over the last decade, so these estimates may be less than current values.

The literature indicates that the effectiveness of conservation practices can vary widely by site based on factors such as topography, field and crop type, sediment characteristics, climatic conditions, soil water content, surface versus overland flow of water, and buffer vegetation type and width (Helmets, Isenhardt, Dosskey, Dabney, & Strock, 2006). Based on numerous literature sources (see Table C-4), we assume an average effectiveness of OAH program eligible conservation practices in reducing loading of waterbodies by 50% for sediment and 25% for nutrients.

**Table C-4: Data on Effectiveness of Conservation Practices in Reducing Erosion and Loading from Agricultural Lands**

Source	Publication Year	Location	Practice Type	% Sediment Removal	% Total Nitrogen Removal
Environmental Protection Agency	2021	Nationwide	Riparian Forested Buffer, Grass Buffer, Filter Strips	75% to 97%	25% to 91%
Environmental Protection Agency	2021	Nationwide	Reduced Tillage Systems	55%	45% to 55%
Helmets et al.	2015	Nationwide	Riparian Herbaceous or Forest Buffers, Vegetative Filter Strips, Vegetative Barrier, Grassed Waterways	41% to 100%, average of approximately 50%	7% to 100%
Natural Resources Conservation Service	2007	Nationwide	Filter Strip, Riparian Forest Buffer, Riparian Herbaceous Cover Buffer	40% to 70% are typical	10% to 100%
The Nature Conservancy	2021	Nationwide	Vegetated buffer, Prairie Strip, Saturated Buffer, Wetland, Grassed Waterway	22% to 96%	44% to 84.5%
National Resources Inventory	2020	Oregon	Vegetation Cover (forest planting and critical area planting)	50% <sup>a</sup>	
Salceda et al.	2022	Michigan	Tree and grass buffers on grazed slopes		62% to 85%
Srivastava et al.	2023	Review of Studies	No Till	48% to 72%	
Srivastava et al.	2023	Review of Studies	Filter strips, field borders, grassed waterways	40% to 45%	Up to 80%
Seitz et al.	2019	Switzerland	Reduced tillage in organic farming	61%	
USDA, Rust and Williams		Columbia Plateau, dryland	No till	~50% to nearly 100%	

Source	Publication Year	Location	Practice Type	% Sediment Removal	% Total Nitrogen Removal
Schilling and Wolter	2009	Illinois	Nutrient Management Plan		38%
Hu et al.	2007	Ohio	Nutrient Management Plan		43%
Srivastava et al.	2023	Review of Studies	Nutrient Management Plans		30%

Sources: (Helmets, Isenhardt, Dosskey, Dabney, & Stroock, 2006); (Oregon Department of Agriculture, 2012) (Environmental Protection Agency, 2021), (Natural Resources Conservation Service, 2007), (The Nature Conservancy, Meridan Institute, Soil and Water Conservation Society, 2021), (U.S. Department of Agriculture, 2020), (Seitz, et al., 2019); (Srivastava, Basche, Traylor, & Roy, 2023), (Rust & Williams)

a/Calculated based on the average reduction in the soil erosion rate reported from cultivated cropland versus CRP lands, assuming that these lands are comparable in other characteristics.

For edge of field buffers that filter sediments and nutrients from a broader drainage area, we estimate that each acre of buffer installed will effectively reduce sediment and nutrient loading from 15 acres at the same level of effectiveness as an in-field conservation practice on 1 acre (i.e., each acre of an edge of field buffer practice will reduce the same amount of sediment and nutrients reaching waterways as 1 acre of in-field practice). Studies on the effectiveness of buffers often vary greatly in the upslope drainage area to buffer area ratio, ranging from 50:1 to 1.5:1 (Helmets, Isenhardt, Dosskey, Dabney, & Stroock, 2006). The US Department of Agriculture Manual for the design of conservation buffers notes that “lower ratios (e.g., 20:1) can provide substantially greater pollutant removal than higher ratios (e.g., 50:1) in many cases” (USDA National Agroforestry Center, 2008). **We conservatively assume 15 acres of upland drainage area for every 1 acre of buffer, or a ratio of 15:1.** This implies that each acre of buffer provides the same level of water quality benefit as 15 acres of an in-field conservation practice.

## OVERVIEW OF WATER QUALITY BENEFITS & CURRENT WATER QUALITY IN OREGON

Improved surface-water quality has many benefits to Oregonians, including:

1. Human health and well-being value from high quality drinking water and household water supplies. People value access to high quality residential water supplies that are both odorless and clear, and do not pose a health threat. Water quality contaminants that pose a health threat include nitrates and heavy metals. High particulates and turbidity can also treatment costs, and if very high, can result in residential and municipal diverters ceasing to draw from a surface water supply, disrupting urban water supplies (McFadin, 2019).
2. Recreational and aesthetic values of clean water bodies. People value clean water bodies, particularly when participating in water-based and shoreline recreation and other shoreline activities where they can see the water. Clean water increases these aesthetic and recreational values.
3. Enhanced income from economic activities reliant on high quality water supplies. This includes the economic value of good quality water for agriculture, and for industrial or commercial activities. Poor quality water, such as high levels of salinity or particulates,

can reduce crop yields, increase treatment costs to industrial or commercial users, and increase costs related to maintenance of reservoirs and rivers (sediment can clog stream channels and reduce storage capacity of reservoirs).

People also value species that are dependent on clean water supplies. This includes the intrinsic value to people of biodiversity, including endangered species, as well as the human use values for species that are commercially important (e.g., for fishing etc.). Fish abundance benefits related to water temperature and other riparian habitat effects are discussed in Appendix D. This section focuses on the non-fish habitat value of water quality listed in points 1 through 3 above in an effort to avoid over-estimating the combined value of water quality and riparian habitat in enhancing fish abundance. To the extent that fish habitat benefits are included in this section, the focus is on nutrient and sediment-specific benefits.

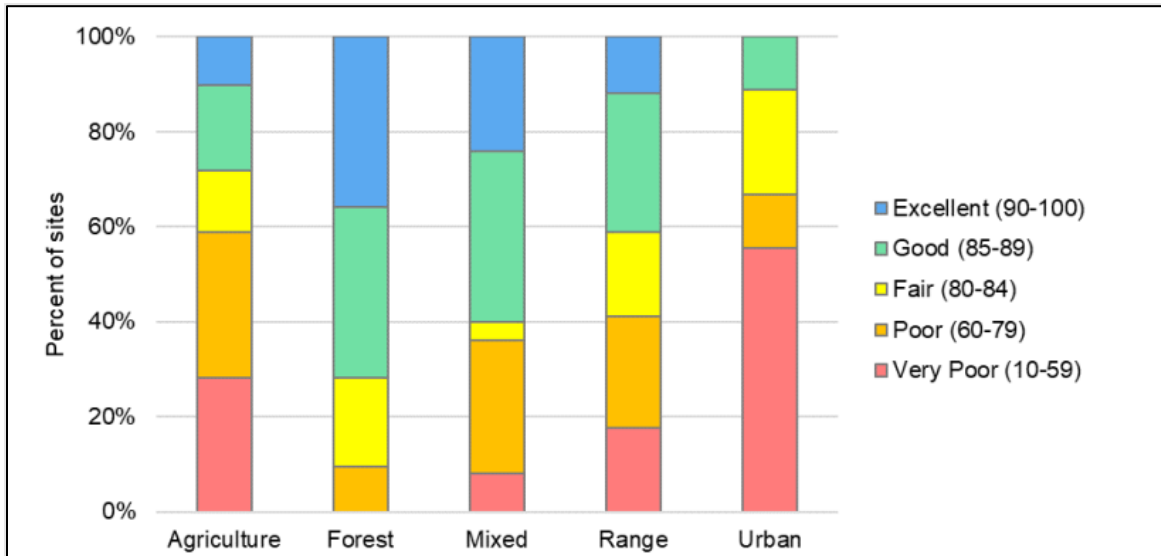
Most studies of the value of water quality improvements are based on the benefits provided by a certain percent improvement in water quality or a change in a water quality index at the watershed level. Nearly all study findings indicate that:

- Americans are willing to pay (through taxes or other measures) for water quality improvement.
- Americans care about water quality because it affects aesthetics of water bodies, aquatic habitat quality and species diversity/abundance, drinking water quality and treatment costs, and recreation opportunity and quality.
- People value local water quality improvements most highly (i.e., water quality improvements in their own watershed), although they also highly value water quality improvements throughout their own state as well as in other states.
- The value of water quality improvements varies depending on the baseline water quality in surface waters; the lower the current quality of water, the more people are generally willing to pay to improve water quality.

As noted in the last bullet above, the value of water quality improvements is typically greatest when water quality is currently impaired. According to the Oregon Department of Environmental Quality, nearly 60% of sites in agricultural areas have an Oregon Water Quality Index rating of “poor” or “very poor”, see Figure C-1. Further, according to a 2014 report on Oregon’s nutrient management program, the “presence of hazardous algal blooms, primarily in lakes and reservoirs, is an emerging issue at least partially related to excess nutrients in Oregon”. The report notes that “while there are no widespread nutrient concerns in the state, excess nutrient loads contribute to localized water quality issues in certain streams, lakes and estuaries. DEQ’s overarching objective is to address nutrient inputs where they are contributing to water quality impairments for nuisance algal blooms, dissolved oxygen, chlorophyll and pH.” DEQ has developed nutrient load reduction goals for at least 16 waterbodies (with at least two more in development) through development of total maximum daily loads. DEQ identified 32 lakes and reservoirs as impaired due to algal blooms in its 2010 Integrated Report. Table C-5 summarizes current impairments in Oregon waterbodies. These data indicate that water quality improvements in Oregon would likely have significant value.



Figure C-1: Influence of Land Use on Oregon Water Quality Index Scores



Source: From (Oregon Department of Environmental Quality, 2023)

Table C-5: Number of Waterbodies by Basin on Oregon Impaired Waterbody List (303d) by Water Quality Impairment Category

Basin	Number of Waterbodies on 303-List by Impairment									
	BioCriteria	Dissolved Oxygen-Spawning	Dissolved Oxygen-Year-Round	Harmful Algal Blooms	Nitrates-Human Health Criteria	pH	Phosphorus-Aquatic Life Criteria	Sedimentation	Temperature-Spawning	Temperature-Year-Round
Columbia River	0	0	1	0	0	2	0	0	1	13
Deschutes	23	16	8	7	0	18	10	14	5	119
Goose & Summer Lakes	7	2	2	0	0	0	1	0	0	52
Grande Ronde	10	3	2	0	0	0	1	19	24	105
Hood	9	3	0	0	0	0	0	9	10	16
John Day	36	0	0	0	0	3	0	45	25	159
Klamath	5	0	2	2	0	2	0	17	0	1
Malheur	8	0	2	0	0	0	0	2	0	37
Malheur Lake	8	2	5	0	0	2	0	0	0	45
Mid Coast	34	23	7	3	0	3	0	12	40	107
North Coast	43	12	10	0	0	0	0	0	0	7
Owyhee	0	3	1	0	0	1	1	1	0	16
Powder	2	7	5	0	0	1	1	12	0	59
Rogue	23	3	21	6	0	2	1	10	35	147
Sandy	5	2	1	0	0	0	0	0	14	24
South Coast	27	9	17	1	0	6	0	0	8	139
Umatilla	5	12	3	1	4	0	3	1	1	18
Umpqua	61	0	0	7	0	0	0	0	52	202
Willamette	93	91	39	16	1	12	3	7	77	281
Total	399	188	126	43	5	52	21	149	292	1547

Source: Highland Economics analysis of impaired waterbodies in Oregon's 303d list, accessed at: <https://www.oregon.gov/deq/wq/tmdl/pages/default.aspx>.

### VALUE OF NUTRIENT WATER QUALITY IMPROVEMENTS

Several studies conducted within the last 10 years regarding U.S. household willingness to pay for water quality improvements related to nutrients are summarized in Table C-6 below. **While the values estimated range widely, these studies indicate that the public generally values reducing nutrients to maintain or improve water quality by at least \$100 on average per household per year.** As of 2022, there were an estimated 1,726,340 households in Oregon (US Census Bureau, 2022). As such, we expect that, in total, Oregon households value nutrient-related water quality maintenance or improvement (and are willing to pay for it) by at least \$172.6 million annually. Given that several values in Table C-6 are for a 25% reduction in nitrogen, this value may equate to a 25% reduction in nitrogen loading in the State of Oregon.

**Table C-6: Value to the Public of Water Quality Benefits from Nutrient Reduction (Household Willingness to Pay), 2023 Dollars**

Study	Year	Location	Improvement Being Valued	Value per Household per Year
Parthum & Ando	2020	Upper Sangamon River Basin, Illinois	Reduce algal blooms, meet nutrient target, and increase fish populations/diversity	\$100
Jakus et al. <sup>a</sup>	2013	Utah	Improve water quality through statewide nutrient reductions in Utah waters (paid for through increased water bill)	\$104 to \$404
Jakus et al. <sup>a</sup>	2013	Utah	Maintain nutrient conditions/water quality in Utah waters (paid for through increased water bill)	\$46 to \$190
Yau-Huo and Zhan	2022	Iowa	25% less nitrate in source water, 50% less algal toxin detected in source water and HAB-related beach closure, 10% increase in lake water clarity	\$180

Sources: Highland Economics analysis of (Parthum & Ando, 2020), (Jakus, et al., 2013), (Shr & Zhang, 2022)  
 a/ Original values were \$35 to \$142 per household per year to maintain water quality and \$78 to \$303 per year to improve water quality in 2011 dollars. These values were derived by taking the total annual value in Table 5-11 in the report and dividing by the total number of households (user plus non-user) for both the lower bound and the upper bound.

Based on this value, we estimate the potential value to Oregonians of reduced nutrient loading. To reduce possible double counting (since phosphorus and nitrogen have similar types of effects on water quality), we focus on one nutrient: nitrogen. Several of the studies in the literature presented in Table C-6 above are based on a 25% decrease in nitrogen. We use data on the total nitrogen aggregated load (load being defined as exceeding the assimilative capacity of the state's watersheds) in Oregon from the Environmental Protection Agency (EPA)<sup>21</sup> to estimate how many kilograms of nitrogen would equate to a 25% reduction in loading. The EPA estimates that there are 58.5 million kilograms of nitrogen aggregated load in Oregon waterways (US

<sup>21</sup> The EPA website notes that these data are from a US Geological Survey model known as SPARROW.

Environmental Protection Agency, 2023). A 25% reduction of this load would be approximately 14.6 million kilograms less of aggregated nitrogen load entering Oregon waterways.

To estimate the value per kilogram of reduced load, we use the estimate we derived above for the potential value to Oregon residents of a 25% nutrient reduction: \$172.6 million. Dividing the \$172.6 million value by 14.6 million kilograms of nitrogen yields a value of approximately \$12 per kilogram of reduced nitrogen load. This value is similar to a value estimated in a study in Virginia of the value of floodplains in retaining nitrogen of approximately \$16 per kilogram per year; with this value based on the minimum cost of alternative methods (by wastewater treatment plants) to reduce nitrogen in waterways (Hopkins, et al., 2018).<sup>22</sup>

Although we don't separately and additively value phosphorus nutrient reduction (to avoid the potential for double counting), we apply the same methods to compare our approach to values from the literature for phosphorous reduction. Using the same methods as for nitrogen, we estimate the water quality value of phosphorus based on 7.97 million kilograms of phosphorus aggregate load in Oregon watersheds statewide (US Environmental Protection Agency, 2023). A 25% reduction in phosphorus would equal approximately 2 million tons of reduced phosphorus entering Oregon waterways. Dividing \$172.6 million by 2 million kilograms yields a value of approximately \$88 per kilogram of reduced phosphorus load. This is very similar to the benefit value of approximately \$83 per kilogram per year estimated in a study in Wisconsin of reducing phosphorus by improving manure management (Sampat, Hicks, Ruiz-Mercardo, & Zavala, 2021).<sup>23</sup>

Finally, another method of valuing reduced nutrient loading is to examine the cost of alternative methods of nutrient load reduction. According to the Environmental Protection Agency (EPA) and other sources, average costs of reducing nutrient runoff from agriculture and urban areas may vary from \$4 to \$29 per kilogram of nitrogen reduction and can be approximately \$99 for phosphorus, see Table C-7 (US Environmental Protection Agency, 2015) (Shaik, Helmers, & Langemeier, 2002).<sup>24</sup>

**Based on the consistency between our estimated value and other values from the literature, we estimate a value of \$12 per kilogram of nitrogen nutrient reductions from conservation practices.**

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<sup>22</sup> Original value was \$12.69 in 2014 dollars.

<sup>23</sup> Original value was \$74.50 in 2021 dollars.

<sup>24</sup> Original values were \$1 in 2002 dollars to \$9 per pound of nitrogen in 2015 dollars, and \$35 per pound of phosphorous in 2015 dollars. These were converted to values per kilogram and expressed in 2023 dollars.

Table C-7: Value of Reduced Nutrient Loading (Per Kg Per Year, 2023 Dollars)

Author	Year	Location	Type of Benefit Analyzed	Cost per kg N	Cost per kg P
Hopkins et al.	2018	Virginia	Sediment/nutrient retention on floodplain, minimum cost of wastewater treatment for N	\$16	
Sampat et al.	2021	Wisconsin	Recreation/aesthetic/health benefit of reduced algal blooms from better management of livestock manure		\$83
Environmental Protection Agency	2015	Nationwide	Minimum cost of urban nitrogen pollution prevention in stormwater	\$29	\$99
Shaik et al.	2002		Cost of nitrogen pollution abatement in Nebraska	\$4 to \$9	

Sources: (US Environmental Protection Agency, 2015), (Shaik, Helmers, & Langemeier, 2002) (Sampat, Hicks, Ruiz-Mercardo, & Zavala, 2021), (Hopkins, et al., 2018)

### VALUE OF SEDIMENT WATER QUALITY IMPROVEMENTS

In 2008, the Economic Research Service of the US Department of Agriculture published a study estimating the value of agricultural soil conservation and reduced erosion (Economic Research Service, US Department of Agriculture, 2008). Their study, entitled “Economic Measures of Soil Conservation Benefits: Regional Values for Policy Assessment” estimates values specific to each region of the country for 14 benefit economic categories. Despite capturing wide-ranging benefits, the study does not include several key types of benefits: those related to endangered species, coastal recreational activities, and people’s willingness to pay to know that water quality is improved. Another caveat to using the values from this study is that several categories of benefits were estimated several decades ago, and while the values have been adjusted for inflation, the level of benefit may have changed through time. That said, this study is one of the only available direct estimates of the value of sediment reduction and was developed specifically to value the benefits of agricultural conservation, so we use it as the basis for our valuation.

Table C-8 summarizes the values for the Pacific region, which includes Oregon, Washington, and California. As shown in the bottom row of the table, **reduction in water-related erosion in the Pacific region is valued at approximately \$6 per ton per year**. This is the value we use in the methodology for the water quality benefit of reduced sediment loading. As a second source, we draw from a 1987 study of the avoided costs in the Willamette Valley of reduced sedimentation (Moore & McCarl, 1987). This study quantified fewer benefit categories, focusing on benefits related to dredging, roads, ditches, water treatment plants, and hydropower, and estimated a value of approximately \$2 per ton per year. For comparison to the 2008 US Department of Agriculture study, we sum only the values from the benefit categories in the 2008 study that were included in McCarl and Moore’s estimate of \$2 per ton per year. Summing the values from the 2008 study for ‘irrigation ditches and canals’, ‘road drainage ditches’, ‘municipal water

treatment’, and ‘steam power plants’ results in a corresponding value of \$2.90 per ton per year, which is fairly compatible with the \$2 per ton per year estimate from the Willamette Valley study. While these two studies were either completed several decades ago or partially rely on data that is several decades old, the similarity of findings gives some reassurance that our estimate of \$6 per ton per year for reduced sediment loading may be approximately accurate.

**Table C-8: Value of Reduced Sediment Loading (Per Ton Per Year, 2023 Dollars)**

Category	Pacific Region Estimated Value (ERS, USDA, 2008)
Irrigation ditches and canals	\$1.71
Road drainage ditches	\$0.34
Municipal water treatment	\$0.79
Flood damages	\$0.55
Marine fisheries	\$0.71
Freshwater fisheries	\$0.00
Marine recreational fishing	\$0.82
Municipal and industrial use	\$0.29
Steam powerplants	\$0.07
Soil productivity	\$0.67
Dust cleaning	\$1.91
Total wind-related	\$2.59
Total water-related	\$5.94

Source: (Economic Research Service, US Department of Agriculture, 2008)

### VALUE PER ACRE OF WETLAND WATER PURIFICATION SERVICES

Finally, as an alternative reference point, we estimate value based on findings in the literature on the value of water quality services provided by wetlands, as constructed wetlands are an eligible water quality conservation practice. Numerous economic studies have estimated the value of wetlands, with many of them focusing on the value of water quality services provided by these areas – typically based on the replacement cost of alternative water quality treatment facilities or surveys of the value that households are willing to pay for clean water. Two meta-analyses indicate that the value of wetlands for water quality varies tremendously from study to study. A 2001 review of 39 studies estimated that with 90% confidence, the value of water quality enhancement from wetlands likely ranges between approximately \$260 and \$2,800 per acre per year, with an average value of \$560 per acre (Woodward & Wui, 2001). A 2006 review of 80 studies found an even larger range of water quality values from wetlands: approximately \$120 to \$30,000 per acre per year (Brander, Raymond, Florax, & Vermaat, 2006).<sup>25</sup> As noted by one of the studies, “From our analysis it is clear that the prediction of a wetland’s value based

<sup>25</sup> The \$120 per acre per year value (in 2023 dollars) was a median value of wetland services in literature Brander et al. and presented in the original study as approximately \$26 per hectare per year in 1995 values. Woodward and Wui (2001) cited values of \$126, \$417, and \$1,378 per acre per year in 1990 dollars for the lower limit, average, and upper limit values, respectively, which were adjusted to 2023 values.



on previous studies is, at best, an imprecise science” (Woodward & Wui, 2001). While predicting a single wetland’s value using the available literature is highly uncertain, these two literature reviews indicate that our estimated value of up to \$225 per acre for wetlands and other similar practices that provide water filtration services is a reasonable and conservative value.

## APPENDIX D: DATA TO SUPPORT AQUATIC HABITAT VALUES

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Numerous NRCS conservation practices can be effective for aquatic habitat. However, most of these are in-water restoration measures that are not expected to be eligible practices in the proposed payment for ecosystem services program. The primary land-based conservation practice that is most relevant for aquatic habitat value is riparian restoration. This includes riparian forest buffers, as well as the following practices, if they are in the riparian zone: windbreak/shelterbelt establishment and renovation, tree/shrub establishment, restoration and management of rare or declining habitats, forest farming, and wildlife habitat planting. These are the practices that the NRCS physical effects system rated as providing substantial improvement (a 5 rating) or moderate to substantial improvement (a 4 rating) for 'elevated water temperature' or for 'aquatic habitat for fish and other organisms'.

This section focuses on the effectiveness and value of riparian habitat to provide shade/ lower stream temperatures and provide key stream inputs such as large woody debris to support fish and other aquatic species. Riparian buffers also provide (and are valued for, as discussed in Appendix C) nutrient and sediment reductions that improve water quality and provide aquatic habitat benefits. So as to not over-value the combined benefit of buffers related to water quality and aquatic habitat, we use a conservative value of \$150 per acre to estimate the additional habitat value (i.e., additional to sediment and nutrient water quality benefits) provided by practices that establish riparian forest vegetation.

There is strong precedent for public investments in riparian preservation and restoration. The State of Oregon has invested significantly in conserving riparian habitats to enhance and preserve aquatic habitat. As a recent example, the program costs of the 2022 draft Habitat Conservation Plan for western Oregon State forests is estimated at \$3.6 million annually, or a total of \$250 million over the 70-year permit term; this plan covers 10 species of fish, 2 birds, 3 salamanders and 2 mammals (ICF, 2022). Riparian zones are the focus for fish species while habitat conservation areas are the primary focus for other species.

### EFFECTIVENESS OF RIPARIAN CONSERVATION PRACTICES

The Oregon Conservation Strategy defines flowing water and riparian habitat together as a strategy habitat because their "conservation roles are interconnected". As noted in the Strategy, healthy riparian vegetation "protects banks from erosion, influences in-channel aquatic habitats, maintains favorable water temperature for fish through shading, filters runoff, and provides nutrients to support terrestrial and aquatic life (Oregon Department of Fish and Wildlife, 2016)."

A separate publication about riparian areas from the Salmon and Trout Enhancement Program of the Oregon Department of Fish and Wildlife notes that "shade created by the riparian vegetation moderates water and air temperatures...Stream food chains depend on organic debris for nutrients. In small headwater streams, 99% of the energy for organisms comes from the vegetation along the stream, and only 1% from photosynthesis. The leaves, needles, cones, twigs, wood, and bark dropped into a stream are a storehouse of readily available organic

material that is processed by aquatic organisms and returned to the system as nutrients and energy” (Oregon Department of Fish and Wildlife).

Several entities in Oregon are restoring riparian vegetation with the goal of reducing stream temperatures and improving aquatic habitat. These efforts follow on the heels of an innovative program in the Tualatin River watershed. In 2004, the Oregon Department of Environmental Quality approved a plan for a wastewater and stormwater utility to invest in the restoration of 35 river miles of riparian habitat to meet a temperature water quality requirement. The utility discharges effluent from four wastewater treatment plants into the Tualatin River. Restoration included planting riparian forests (of 45-foot buffer width on each side of the stream) to provide shade to water upstream of the wastewater facilities and to augment stream flows. Comparatively, installing and operating two water chillers would have cost the utility \$93.7 million; as such riparian restoration provided cost savings of \$75.8 million<sup>26</sup> (Niemi, Lee, & Raterman, 2006).

While people value many aspects of healthy aquatic habitats, fish population diversity and abundance are of key importance for many Oregonians. As such, this analysis focuses on the effectiveness of riparian vegetation conservation practices in enhancing fish populations, and the associated value to the public of fish population diversity and abundance as indicated by surveys of household values and data on the value of recreational fishing.

The scientific literature indicates that there is a strong link between riparian vegetation, water temperature, and fish abundance. Additionally, several studies in the Pacific Northwest have noted the increasing importance of riparian vegetation to help mitigate adverse effects on cold water fishes such as salmonids of rising temperatures from climate change. Table D-1 summarizes findings from several studies conducted in the Pacific Northwest evaluating how riparian buffer restoration in the Pacific Northwest influences fish abundance. As shown in the table, fish abundance response varies by species, timeframe of restoration, and type restoration. However, several studies indicate that for every one percent of riparian area restoration in a basin or river, some salmon species respond with an approximate one percent increase in fish abundance, or even greater.

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<sup>26</sup> The source cited cost savings of \$50.5 million in 2005 dollars; this study adjusted value to 2023 dollars.

Table D-1: Summary of Literature: Fish Abundance Response to Riparian Buffer Restoration

Study	Year	Geography	Riparian Restoration Area	Fish Population Response
Justice et al.	2017	Upper Grande Ronde River, OR	Buffers in entire watershed at full maturity (benefits increase most dramatically in first 25 years)	(Spring Chinook) 46,000 fish to 222,000, (377% increase)
			Buffers in highest 25% priority riparian areas at full maturity	(Spring Chinook) 46,000 to 93,000 (100% increase)
		Catherine Creek	Buffers in entire watershed at full maturity	(Spring Chinook) 55,000 to 88,000 (61% increase)
			Buffers in highest 25% priority riparian areas at full maturity	(Spring Chinook) 55,000 to 71,000 (30% increase)
Battin et al. <sup>a</sup>	2007	Snohomish River Basin, Western WA	Riparian restoration on 30% or less of watershed (to bring buffers to 40% to 84% of riparian area), off-channel habitat, barrier removal,	Baseline of ~6100 fish. Increase of 49% to 58% in population over no restoration scenario with climate change
Opperman & Merenlender <sup>b</sup>	2004	Mendocino County, CA	Riparian restoration and exclusionary fencing	Improved large woody debris, temperature, channel morphology
Lewis et al.	2022	Salmon River, Oregon Coast	Barrier removal, off channel habitat area, hatchery removal on 50 miles	0.79% increase in statewide coho salmon population
Sievers et al.	2017	Global meta-analysis	Riparian restoration (livestock exclusion, large woody debris); Too limited data to draw conclusion on riparian revegetation	Average increases: 87.7% trout increase for livestock exclusion; 66.6% trout increase for large woody debris
Fullerton et al.	2022	Snoqualmie River, WA	Full or partial riparian restoration for shading	~30% increase in mass of potential Chinook yearlings under climate change around Year 2090. ~12% to 15% increase in mass of potential yearlings under historical climate (1995-2005). Very limited effect on sub yearlings.



Study	Year	Geography	Riparian Restoration Area	Fish Population Response
Fogel et al.	2022	Chehalis River Basin, WA	Riparian tree planting and protection for temperature reduction	All populations expected to decline by mid-century (spring Chinook, fall Chinook, steelhead, and coho) due to climate change. Relative to current population size, riparian restoration reduced the adverse impact of climate change on populations by ~5% to 30%.
Jones et al.	2006	Georgia	Riparian buffers (30 m versus 15 m)	Wider buffers have lower temperatures, less fine sediment and higher trout populations (expected 87% higher population).

Sources: Highland Economics analysis of (Justice, White, McCullough, Graves, & Blanchard, 2017), (Battin, et al., 2017) (Opperman & Merenlender, 2004), (Sievers, Hale, & Morrongiello, 2017), (Fullerton, Sun, Baerwalde, Hawkins, & Yan, 2022), (Fogel, et al., 2022), (Jones, Poole, Meyer, Bumback, & Kramer, 2006), (Lewis, Kling, Dundas, & Lew, 2022)

a/ The study estimated effects on salmon population with two models. In one model, the starting population was 6,096 fish, which the study modeled would decrease by 40% under climate change but with restoration would decrease by 5%. The other model starting population was 6,174 fish, and under climate change and no restoration would decrease by 20%, but with restoration and climate change would increase by 19%. Applying these percents to the starting population and comparing the projected future salmon population with and without restoration, we estimate results in a 49% salmon population increase in one model (7,347 fish compared to 4939 fish) and a 58% population increase in the other model (5,865 fish compared to 3,704 fish).

b/ This study noted that positive riparian change may attract fish from elsewhere rather than increase total population.

### CONSERVATION VALUE OF AQUATIC HABITAT & FISH

Table D-2 summarizes the value to households of a few recent water quality studies that focus on the value to households of improving aquatic habitat conditions. As shown in the table, the values in these studies range from approximately \$130 to \$300 per household per year. If we assume that this value includes the value for nutrient-related water quality of \$100 per household per year discussed in Appendix C, then the non-nutrient value to households may be approximately \$30 to \$200 per household per year of minimum to 25% improved aquatic conditions statewide.

**Table D-2: Value to the Public of Improving Aquatic Habitat Conditions or Fish Populations (Household Willingness to Pay, \$2023)**

Study	Year	Location	Improvement Being Valued	Value per Household per Year (2023 values)
<b>Habitat Conditions</b>				
Vossler et al.	2023	Midwest	One-level improvement in biological condition gradient (a water quality index) through a multi-state study area	\$300
Vossler et al.	2023	Midwest	Achieve minimum water quality statewide to support biological uses	\$268
Haefen et al.	2023	North Carolina	Urban stream water quality improvement through 25% increase in urban stream canopy and decreased runoff	\$127
<b>Fish Abundance</b>				
Lewis et al.	2022	Oregon and Washington	One year increase in Coho abundance in Pacific Northwest by 1,000 fish, or a 0.67% increase in fish abundance	\$0.08 (no college degree) to \$0.19 (college degree)

Sources: (Vossler, et al., 2023) (Haefen, et al., 2023) Highland Economics analysis of (Lewis, Kling, Dundas, & Lew, 2022).

a/Derived based on a value of \$252 per mile, assumption of a 50-foot buffer on each side of the river for 12 acres per river mile, applied to the population of the county in the year 2000.

Table D-2 also showcases a recent study of Pacific Northwest households that valued an increase of 1,000 fish (0.67 percent increase) in coho salmon populations at \$0.08 (no college degree) to \$0.19 (four-year college degree) per household per year. Focusing specifically on Oregon, we apply Census data that approximately 36 percent of Oregonians older than 25 years have a four-year college degree and estimate a weighted average value to Oregon households of \$0.12 per household per year per 1,000 coho fish. As noted above in Appendix C, there are approximately 1,726,000 households in Oregon as of 2022. Thus, this study indicates that Oregon households would value an annual increase of 1,000 coho fish (or a 0.67% increase) at approximately \$206,000 annually.

Several older studies have also examined the value of fish to residents of the Pacific Northwest. In Olsen *et al.* (1991), researchers surveyed residents on their values for salmon and steelhead in the Pacific Northwest. Households that do not fish had an average willingness to pay of approximately \$65 per year to double the population of fish, while households that do fish had an average willingness to pay of approximately \$180 (Olsen, Richards, & Scott, 1991).<sup>27</sup> While

<sup>27</sup> The study’s original values (\$26.52 and \$74.16, respectively, in 1989 dollars) were updated to 2023 dollars using the GDP price deflator.

this was roughly one-third the willingness to pay of fishing households, the study indicates that non-anglers in the Pacific Northwest still value improvements to fish populations.

In 1996, Loomis measured the value to survey respondents of removing two dams on the Elwha River in Washington State, which would restore an anadromous fishery. Surveyed households included those in the dams' host county (Clallam), those in the State of Washington, and those in the rest of the country. Households were asked if they would be willing to vote for a referendum that would increase their taxes to pay for the dams' removal, effectively measuring their willingness to fund efforts to restore the fish population. Results indicated that Clallam County residents would be willing to pay approximately \$120 per year, Washington residents would be willing to pay approximately \$145 per year, and US residents outside of Washington would be willing to pay an average of approximately \$135 per year (Loomis, 1996).<sup>28</sup>

In 1998, Layton *et al.* surveyed over 1,600 Washington State households to elicit household values for programs that increase the populations of migratory, freshwater, and saltwater fish in the Columbia River and the Puget Sound area. The results showed that Washington households, on average, were willing to pay approximately \$20 to \$60 per month to increase fish populations by 50 percent (Layton *et al.*, 1999).<sup>29</sup> In Bell *et al.* (2003), researchers surveyed five coastal communities in Oregon regarding their willingness to pay for local coho salmon enhancement programs. Findings indicate that households were willing to pay approximately \$70 to \$200 per year to prevent the species from going extinct to \$140 to \$210 per year to double the population, depending on the community and the household income (Bell *et al.*, 2003).<sup>30</sup>

In summary, these studies show that households may be willing to pay from approximately \$50 to over \$200 per year for increasing local, regional, or state-wide populations of all migratory fish populations by 50 percent to 200 percent (Bell, Huppert, & Johnson, 2003; Layton, Brown, & Plummer, 1999). In contrast, the value estimated just for Coho from the more recent 2023 study by Lewis *et al.* would estimate a value of \$8 to \$30 per household of an improvement of 50 percent to 200 percent of coho populations. Comparing these studies indicates that the value to Oregonians of increased abundance for all salmonid species may be much higher than the value estimated by Lewis *et al.* for just coho species abundance.

To apply these estimated conservation values to potential fish population increases that would result from riparian restoration is highly uncertain. However, doing so will give a sense of the potential magnitude of value to Oregon households of riparian restoration. **Considering all the values presented above regarding the potential value to households of improved aquatic habitat conditions and salmonid fish abundance, we estimate that the habitat value to households of riparian restoration throughout the state may be approximately \$75 per**

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<sup>28</sup> The study's original values (\$59, \$73, and \$68, respectively, in 1994 dollars) were updated to 2023 dollars using the GDP price deflator.

<sup>29</sup> The study's original values (\$9.92 and \$31.28, respectively, in 1998 dollars) were updated to 2023 dollars using the GDP price deflator.

<sup>30</sup> The study's original values (\$41.13, \$115.54, \$78.15, and \$121.81, respectively, in 2000 dollars) were updated to 2023 dollars using the GDP price deflator.

**household per year.** Applying this value to the estimated 1.73 million households in the state translates to approximately \$129.5 million in value annually.

To express this value on a per acre basis for riparian areas, we first approximate the potential riparian acreage in Oregon, assuming all streams are buffered at 25 feet on both sides or 50 feet on one side. According to the Department of Fish and Wildlife, there are approximately 106,400 miles of rivers and streams in Oregon (Oregon Department of Fish and Wildlife, 2003). Assuming a riparian buffer width of 50 feet there are 6 acres of buffer per river mile, such that statewide there would be approximately 645,000 acres of riparian buffer. Dividing the estimated \$129.5 million value to Oregon households by this acreage translates to approximately \$200 per acre per year for the aquatic habitat benefit to salmonids of riparian areas; to account for the fact that some of this value may be captured in the water quality estimate for sediment and nutrients, **we propose a value of \$150 per acre per year for additional aquatic habitat value from riparian restoration.** Also, as noted above, relatively high values are still held by households that do not fish, indicating that a relatively high portion of this value is for conservation value and not recreational value.<sup>31</sup>

This value per acre of riparian habitat is within the range of several other values from the economics literature. One study found that households were willing to pay an average of \$443 per year<sup>32</sup> to restore a 45-mile section of the Platte River in Colorado, which would provide benefits of dilution of wastewater, natural purification of water, erosion control, habitat for fish and wildlife, and recreation (Loomis, Kent, Strange, Fausch, & Covich, 2000). A survey of households in North Carolina indicated that households were willing to pay around \$60 per year<sup>33</sup> to restore just a six-mile section of the upper Little Tennessee River (to enhance presence of game fish, water clarity, wildlife habitats in the riparian buffer, recreational opportunities, and ecosystem integrity (Holmes, Bergstrom, Huszar, Kask, & Orr III, 2004).

## RECREATION FISHING VALUE OF AQUATIC HABITAT & FISH

As another approach to estimating the value to society of improved aquatic habitat, we examine the value of recreational fishing in Oregon. Numerous studies have found that the value of recreational fishing generally increases with increased abundance of fish (because per trip value is higher or because total trips taken is higher) and with enhanced scenery (Melstrom, Lupi,

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<sup>31</sup> These non-use or existence values are generally higher for rare habitats or species (such as those classified as Threatened or Endangered), due to their relative scarcity, than for abundant species or habitats. Additionally, existence values are higher for iconic species, such as salmon. People's non-use values for salmon may be based on personal beliefs and moral ethics (i.e., believe enhancing salmon populations is the right thing to do), altruism (i.e., believing salmon should be abundant so that others can use it or benefit from salmon), and/or a desire to bequest the resource (i.e., believing salmon should be abundant for future generations). The most common way to measure value of a species such as salmon to people is through surveys in which people are asked about their willingness to pay to protect the species. These surveys are highly challenging to develop and implement well, and results from different surveys aiming to measure similar changes in resources can be highly variable.

<sup>32</sup> The source cited a value of \$252 per year in 1998 dollars; this study adjusted value to 2023 dollars.

<sup>33</sup> The source cited a value of \$34 per year in 1998 dollars; this study adjusted value to 2023 dollars.

Esselman, & R, 2014) (Solomon, et al., 2020). Both these attributes can be enhanced by riparian vegetation.

We estimate the total value of fishing trips in Oregon based on data on the number of fishing trips taken and the value per fishing trip. Table D-3 summarizes the estimated number of fishing trips in Oregon for salmon, steelhead, and trout fishing based on existing survey data and previous studies. Freshwater fishing trips are based on data from the following two studies: the 2011 US Fish and Wildlife Service Survey of Hunting, Fishing, and Wildlife Viewing in Oregon and a 2008 study sponsored by ODFW on Fishing, Hunting, Wildlife Viewing, and Shellfishing in Oregon. Using these studies, we estimate that there are approximately two million fishing trips annually for freshwater salmon/steelhead fishing and approximately the same number for trout fishing. For saltwater salmon angling, we use the estimate developed by the Oregon Ocean Salmon Management Program at ODFW: 67,000 annual saltwater salmon fishing trips.

**Table D-3: Oregon Recreational Fishing Effort, Angler Trips (2023 Dollars)**

Data	Source			Estimated Total Trips
	US Fish and Wildlife Service Survey, 2011 (Anglers 16+)	Dean Runyan Associates Survey (for ODFW), 2008	Ocean Salmon Management Program, ODFW, 2010-2020	
Salmon & Steelhead Fishing (Freshwater)	2,396,000 <sup>a</sup>	1,859,000		2,000,000
Trout Fishing	2,175,000 <sup>a</sup>	1,713,000		2,000,000
Salmon Fishing (Saltwater)	270,000 <sup>b</sup>	328,000	67,000	67,000 <sup>c</sup>

Source: Highland Economics analysis of (Ocean Salmon Management Program, Oregon Department of Fish and Wildlife, 2020), (Dean Runyan Associates, 2009) (Pacific Fishery Management Council, 2021).

a/ Data were presented as fishing days; this is converted to the estimated number of trips based on the average number of days fishing on all freshwater fishing trips for all species.

b/ Data were presented as fishing days; this is converted to the estimated number of trips based on the average number of days fishing on all saltwater fishing trips for all species.

c/ ODFW Ocean Salmon Management Program data is expected to be more accurate than the other sources, which are surveys of licensed anglers. Note that relative to freshwater fishing, where there are many more anglers and fishing days, the % error of margin in surveys for saltwater fishing estimates is expected to be larger.

There is a large body of literature estimating the net economic value of recreational fishing trips to anglers. This analysis focuses on studies of angling in the Pacific Northwest. The value of a fishing trip or a fish caught can vary widely depending on the target species, the abundance of fish and associated catch rate, the aesthetics and quality of the surrounding environment, and the characteristics and demographics of the angler. The economics literature generally presents the net value of recreational fishing two ways: the extra value to the angler for each additional fish caught, and the value to the angler per fishing day or per fishing trip. We focus on the economic value to the angler per fishing trip.

Estimates of the economic value of recreational angling in the Pacific Northwest tend to fall between \$70 and \$90 per day. For example, a 2017 review conducted for the US Forest Service of diverse types of outdoor recreation found that across many studies of different target species,

bodies of water and angling techniques, the average value estimated for the recreation net benefit of freshwater fishing in the Pacific Northwest is \$89 per day (Rosenberger, White, Kline, & Cvitanovich, 2017).<sup>34</sup> Similarly, a 2018 study sponsored by the Oregon Parks and Recreation Department used a value of approximately \$97 per fishing day<sup>35</sup> (saltwater and freshwater) to estimate the net economic value of fishing participation in Oregon (Rosenberger, 2018). A 2008 study sponsored by WDFW estimated the value of a salmon/steelhead fishing day (freshwater and saltwater) at approximately \$85 per day, and the value of trout fishing at approximately \$75 per day<sup>36</sup> (TCW Economics, 2008).

Most fishing trips in the Pacific Northwest are day fishing trips, so the value per trip is similar (although slightly higher since some fishing trips are multiple days) than the value per fishing day. We conservatively assume that the value per Oregon fishing trip is similar to the per day values cited above and apply a mid-range value per fishing trip of \$85 per salmon/steelhead fishing trip and \$75/trout fishing trip. With these data, we estimate that recreational fishing in the State of Oregon has an annual net value to recreators of approximately \$320 million (see Table D-4).

**Table D-4: Estimated Annual Net Value to Anglers of Recreational Fishing in Oregon**

Type of Fishing Trip	Estimated Value per Trip	# of Annual Trips	Estimated Current Annual Net Economic Value to Anglers
Salmon/Steelhead	\$85	2,000,000	\$170,000,000
Trout	\$75	2,000,000	\$150,000,000
Total		4,000,000	\$320,000,000

Source: Highland Economics analysis of (Ocean Salmon Management Program, Oregon Department of Fish and Wildlife, 2020), (Dean Runyan Associates, 2009) (Pacific Fishery Management Council, 2021), (TCW Economics, 2008), (Rosenberger, White, Kline, & Cvitanovich, 2017).<sup>37</sup>

We assume that statewide recreational fishing value would increase with additional riparian restoration and the associated fish abundance increase. In other words, we expect that fishing value increases with fish abundance and that fish abundance increases with riparian restoration. As presented above in Table D-1, the data indicate that at least for some fish species, there may be a 1:1 ratio of the percent riparian area restored and the percent increase in fish abundance in a basin (i.e., for every 1% increase in riparian area there may be a 1% increase in fish abundance). As the precise relationships is not known, in Table D-5 we present potential combinations of statewide riparian restoration acreage with increases in statewide fishing value. Depending on the relationship between recreational fishing value and riparian restoration, the value may be as low as \$50 per acre of riparian (if there is only a 5% increase in fishing value from 50% of riparian areas statewide restored) to over \$1,200 (if there is a 25% increase in

<sup>34</sup> The study value was \$71.52 in 2017 dollars.

<sup>35</sup> The study value was \$81.37 in 2018 dollars.

<sup>36</sup> The study values were \$58 per day and \$50 per day in 2006 dollars for salmon/steelhead and trout fishing, respectively.

<sup>37</sup> The study value was \$71.52 in 2017 dollars.

fishing value from 10% of statewide riparian buffers are restored). As highlighted in bold values in the table, **an increased value to recreational anglers of approximately \$150 to \$500 per restored riparian acre per year restored appears reasonable** (assuming a 1% increase in recreational fishing value for every 2% to 4% of statewide riparian area restored). This provides further support for the estimated \$150/riparian acre/year value used for additional aquatic habitat benefits, over and above benefits related to nutrients and sediment.

**Table D-5: Approximate Potential Sport Fishing Value Per Acre per Year of Riparian Buffer Restoration (2023 Dollars)**

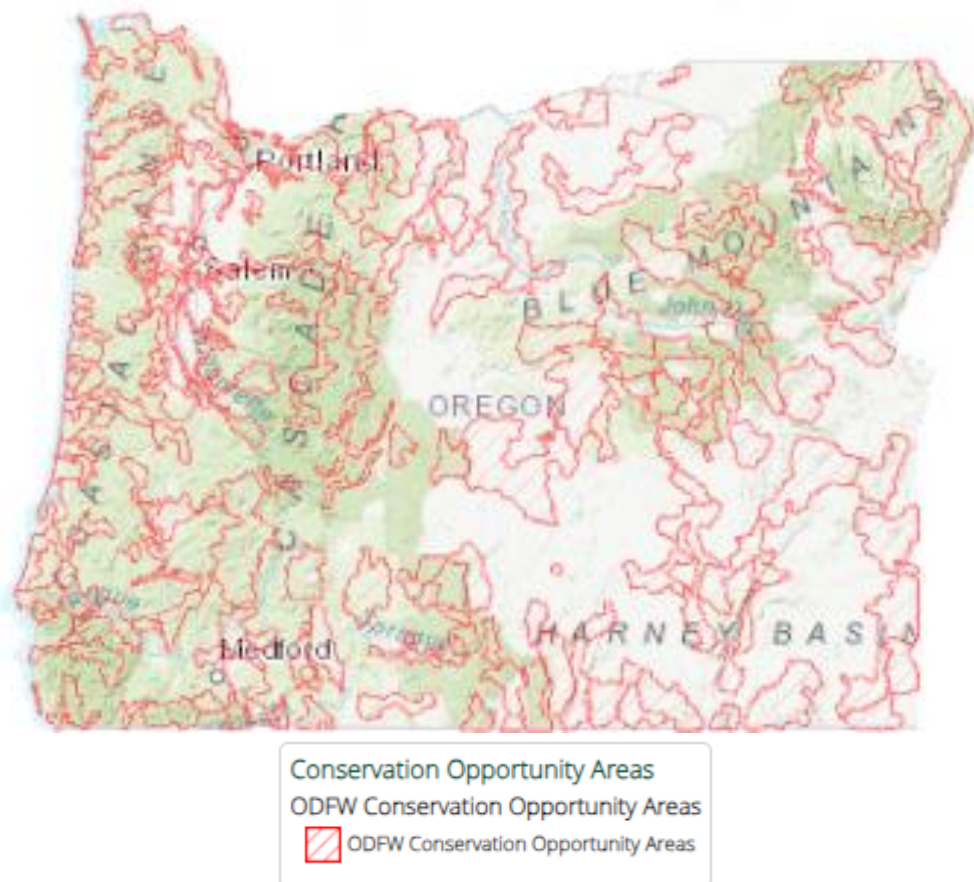
% Riparian Buffers Restored on Oregon Streams and Rivers (Increased Riparian Acreage)	Potential % Increased Sport Fishing Value (Increased \$ value)				
	5% (\$16,000,000)	10% (\$32,000,000)	15% (\$48,000,000)	20% (\$64,000,000)	25% (\$80,000,000)
<b>10%</b> (64,485 acres)	<b>\$248</b>	<b>\$496</b>	\$744	\$992	\$1,241
<b>20%</b> (128,970 acres)	\$124	<b>\$248</b>	<b>\$372</b>	\$496	\$620
<b>30%</b> (193,455 acres)	\$83	<b>\$165</b>	<b>\$248</b>	<b>\$331</b>	\$414
<b>40%</b> (257,939 acres)	\$62	\$124	<b>\$186</b>	<b>\$248</b>	\$310
<b>50%</b> (322,424 acres)	\$50	\$99	\$149	<b>\$198</b>	<b>\$248</b>

Source: Highland Economics analysis.

## APPENDIX E: DATA TO SUPPORT TERRESTRIAL HABITAT VALUES

The Oregon Conservation Strategy identifies 11 native strategy habitats of conservation concern and 249 species of greatest conservation need. Habitats of conservation concern include aspen woodlands, coastal dunes, estuaries, flowing water and riparian habitats, grasslands, late successional mixed conifer forests, natural lakes, oak woodlands, ponderosa pine woodlands, sagebrush habitats, and wetlands. These habitats and species are distributed across the state, with 206 priority conservation areas identified across the state, as shown in red in the figure below from the Oregon Conservation Strategy. Each of Oregon's eight ecoregions has at least four habitats of conservation concern that provide important benefits to strategy species (Oregon Department of Fish and Wildlife).

Figure E-1: Oregon Habitat Conservation Opportunity Areas



Source: <https://www.oregonconservationstrategy.org/conservation-opportunity-areas/>

As shown in Table E-1, conservation practices expected to be eligible for payment are practices that either establish or maintain vegetated habitat areas, and that the NRCS physical effects rating identifies as providing 'moderate to substantial improvement' or 'substantial improvement'. Several NRCS conservation practices that are rate highly for effectiveness for

terrestrial habitat that do not establish or maintain natural vegetation areas are not included. As such, this methodology focuses solely on areas managed for terrestrial habitat.

**Table E-1: Proposed Habitat Value for Eligible Agricultural Conservation Practices**

Type of Eligible Practice	Aquatic (Fish) Habitat	Terrestrial Habitat	Maximum Habitat Value	Eligible Practices
In-Field Practice		\$100	\$100	Pasture and Hay Planting
Edge of Field Practice				
Riparian Trees/Shrubs	\$150	\$100	\$250	Riparian Forest Buffer, Tree/Shrub Establishment, Wildlife Habitat Planting, Forest Farming, Restoration and Management of Rare or Declining Habitats
Riparian Trees/Shrubs	\$150			Windbreak/Shelterbelt Establishment and Renovation, Wetland Wildlife Habitat Management
Non-Riparian Trees/Shrubs		\$100		Wildlife Habitat Planting, Restoration and Management of Rare or Declining Habitats
Wetland		\$150	\$150	Wetland Creation, Wetland restoration
Grass/shrub habitat		\$100	\$100	Wildlife Habitat Planting, Upland Wildlife Habitat Management, Wetland Wildlife Habitat Management, Restoration and Management of Rare or Declining Habitats, Early Successional Habitat Development/Mgt.

Note: Estimated habitat value per acre is equal to the maximum value listed in Table E-1; multiple habitat practices implemented on one acre will not increase the habitat payment.

We include both an aquatic value (presented in Appendix D) and a terrestrial value for riparian habitats (presented in this Appendix). In discussing riparian habitats, in addition to discussing their value for fish and other aquatic organisms, the Oregon Conservation Strategy notes: “riparian habitats often have high species diversity and are critical for wildlife. These habitats are important to species that prefer moist shrubby or forested habitats. Riparian areas provide essential wintering habitat and travel corridors for birds, amphibians, reptiles, mammals, and other wildlife. In arid areas, such as the Blue Mountains and Columbia Plateau ecoregions, riparian habitats can provide abundant insects, plants, and moisture throughout the year. Riparian meadows include natural spring-seep habitats that are extremely important for a wide variety of species, including Greater Sage-Grouse chicks and butterflies” (Oregon Department of Fish and Wildlife, 2016). As such, this methodology includes both a value for terrestrial habitat and value for aquatic habitat for riparian areas.

## FORESTS AND GRASSLANDS HABITAT VALUE

A meta-analysis of 12 US studies conducted in 2008 (Randall, Kidder, & Chen, 2008) examined 23 valuations of terrestrial habitat to estimate the value of the Conservation Reserve Program (now referred to as the Conservation Reserve Enhancement Program), a program of the US Department of Agriculture that removes land from agricultural production in order to enhance habitat, water quality, and soil quality.<sup>38</sup> The study found that the average value per acre per year of each type of service provided by this type of land, in 2023 dollars, is \$85 for open space provision, \$66 for aesthetic viewing, and \$100 for habitat. For habitat, the confidence interval was \$30 to \$330 per acre per year. We focus on the habitat benefit alone as open space and aesthetic benefits may accrue from all farmlands and may not increase with habitat-enhancing conservation practices.

Similarly, a 2022 global review of the value of grassland ecosystem services estimated the value of habitat services from temperate grasslands at \$262 per acre per year (Liu, Hou, Kang, Nan, & Huang, 2022). This value is based on the genetic diversity value of habitat. Other types of ecosystem services separately valued in this study (and therefore are not encompassed in the \$262 per acre per year value) include services related to water quality, water quantity regulation, climate regulation, soil fertility and food supply, and recreation.

Specific to forestland, an analysis of the habitat value (among many other ecosystem services) of private forestland in Georgia found that habitat services may vary from approximately \$0 to acre to \$346 per acre per year, depending on forest characteristics. This value includes values for overall biodiversity but does not include the value of habitat in terms of maintenance of game species and the associated recreation benefit. A review conducted for valuation of forests in Europe concluded that forestland value for habitat may have a mean value of \$167 to \$229 per acre per year.

Actual payments in Oregon by the Conservation Reserve Enhancement Program (CREP)<sup>39</sup> vary by county based on soil type and dryland cash rent values. In 2023, the CREP rental rate in Oregon was as high as \$117 per acre (and as low as \$13 an acre) (Farm Service Agency, US Department of Agriculture, 2023). Since these cash rents are based on the value of land in agricultural uses, they don't directly reflect the value of conserving the land for wildlife habitat. However, the payments do indicate that the state and federal governments are willing to pay at least \$117 for the habitat and other ecosystem service benefits that accrue from these lands.

Table E-2 summarizes the habitat value of grassland and forestland estimated in these data sources. Based on these sources, we propose a conservative habitat value of \$100 per acre per year.

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<sup>38</sup> With the aim of improving soil and water quality and wildlife habitat, the CRP "removes environmentally sensitive land from agricultural production and plants species that improve environmental health and quality" (Farm Service Agency, US Department of Agriculture, 2023).

<sup>39</sup> CREP is a collaboration between state and federal governments and is part of the Conservation Reserve Program. CREP is only applicable in certain states, including Oregon.

Table E-2: Trees/Shrubs/Grassland Habitat Values by Source (2023 Dollars)

Source	Year	Location	Study Type	Habitat	Habitat / Biodiversity Services (\$/Acre/Year)	Other Services Separately Valued <sup>1</sup>
Randall et al. <sup>2</sup>	2008	US	Meta-Analysis	Terrestrial	\$100	Aesthetics, Open Space
Liu et al. <sup>3</sup>	2022	Global	Meta-Analysis	Grassland	\$253 (Genetic Diversity)	Water treatment, recreation, food and water supply, climate regulation
Farm Service Agency (Conservation Reserve Enhancement Program in Oregon)	2023	Oregon	Cash payments for grasslands	Grassland	\$13 to \$117	N/A
Moore, et al.	2011	Georgia	Survey	Forests	\$0 to \$346	Timber products, recreation, water quantity, water quality, soil stabilization/formation, pollination, aesthetic/cultural/passive use
Grammatikopoulou and Vackarova	2021	Forests in Europe	Meta-Analysis		\$167 to \$229 (mean values)	Timber, air quality, climate regulation, leisure, erosion control, water quantity/quality

Sources: (Randall, Kidder, & Chen, 2008), (Liu et al. 2022) (Farm Service Agency, 2023), (Briceno et al 2023), (Moore, Williams, Rodgriguez, & Hepinstall-Cymmerman, 2011), (Grammatikopoulou & Vackarova, 2021)

<sup>1</sup>/Separately valued and not included in the habitat value.

## WETLANDS HABITAT VALUE

Values of wetland habitat from the economic literature vary broadly, ranging from a few dollars per acre up to hundreds of thousands of dollars per acre. Value varies depending on the type and location of the wetland, types of ecosystem services provided, and study methodology. In general, the highest values provided by wetlands are associated with the provision of the following ecosystem services: a) water quality enhancement (as discussed in Appendix C), b) carbon storage (as discussed in Appendix B), and biodiversity and habitat (discussed in this Appendix). Other key benefits of wetlands include flood regulation and storm buffering and aesthetic views and open space. Depending on the population, socioeconomic activities, and land uses near the wetland location, habitat and biodiversity ecosystem services from wetlands can translate into economic, social, and cultural benefits related to recreation, food provision (e.g., from hunting), and the scenic amenity of habitat. Additionally, many people directly value habitat function and species preservation. The following section summarizes the magnitude of these values as estimated in the natural resource economics literature.

One 2008 review and meta-analysis of US wetland valuation studies aimed to use values from the economics literature to quantify the economic benefits of U.S. agricultural conservation programs (Randall, Kidder, & Chen, 2008). For wetland habitat, the study identified 72 valuations of wetland habitat from 34 US studies. This study found that the average value per acre per year of all services provided by freshwater wetlands was approximately \$600 per acre per year.

A 2006 review of 215 wetland value observations obtained from 80 studies found an *average* value of habitat and nursery services from wetlands of approximately \$4,700 annually, but a much lower *median* value of approximately \$270 per acre per year (Brander, Raymond, Florax, & Vermaat, 2006). Further, a 2001 review of 39 wetland valuation studies estimated average wetland value for habitat services per acre at \$630 per acre per year (Woodward & Wui, 2001), with a 90 percent confidence interval of \$200 to \$2,000 per acre per year.

As another approach, we review the value per acre that the NRCS is paying for wetlands as part of the Wetland Reserve Easement (WRE) program. As part of its Agricultural Conservation Easement Program, NRCS purchases WRE on private farmland. The easement value is based on the lowest of the following three values: an appraisal, a Geographic Area Rate Cap (GARC), or a landowner offer. In Oregon for Fiscal Year 2024, the GARC for WRE payment for a permanent easement in Oregon is \$5,000 per acre (Natural Resources Conservation Service, 2023). However, payment may exceed this cap if there is a high likelihood of successful restoration that will provide habitat needs for federally listed Threatened and Endangered species. Converting the one-time payment value of \$5,000 per acre to an annual value (over 50 years using a 3% discount rate), indicates that NRCS is willing to pay approximately \$195 per acre per year for an acre of wetland in Oregon. This payment is based on the agricultural value of the land but indicates that NRCS expects that the value of all ecosystem services from wetlands on farms is at least \$195 per acre.

WRE payments are intended to compensate landowners for the value of their land in exchange for restoring habitat areas; by enrolling in the WRP, landowners sell most of their use rights with the exception of hunting, fishing, and other recreational use. In other words, WRE payments do not represent the value of the wetland habitat, but rather the difference in the market value of the land with and without the easement. However, the WRE payments nonetheless indicate government agencies' willingness to pay for the habitat and other benefits provided by wetlands.

As another approach, we review the price of credits in regional wetland mitigation banks. Wetland mitigation banks are wetlands that have been created or restored to offset the loss of wetlands elsewhere in the region due to development or other causes. The price of wetland mitigation banking provides a useful reference point because it indicates the cost of providing wetland benefits through alternative means. Because wetland mitigation is typically required by law to ensure continued provision of ecosystem services, the public policy of requiring mitigation indicates that the perceived value of benefits of ecosystem services provided by mitigated wetlands outweigh the costs of mitigation.

The Oregon Department of State Lands (DSL) administers the State's wetland mitigation program and provides a calculator to compute the costs of DSL-provided wetland mitigation for payment-in-lieu of mitigation. According to this calculator, the cost of purchasing DSL-provided wetland mitigation credits that fund restoration projects throughout the State ranges from roughly \$34,000 to \$65,000 per acre, assuming 1 mitigation credit per acre (Oregon Department of State Lands, 2021).<sup>40</sup> The value range reflects different costs of restoration in different basins of Oregon where the restoration occurs. Amortizing over 50 years at a 3 percent discount rate, this equates to a cost of approximately \$1,300 per acre per year to \$2,500 per acre per year.

Table E-3 summarizes the values described above from the literature. As noted above, wetlands differ in type and quality, and both ecological and economic benefits from their protection vary by location. In addition, wetland benefits are not constant for every acre, but vary depending on size and configuration. The values presented in Table E-3 however indicate that the proposed value for habitat services from wetlands, \$150 per acre per year, is likely a conservative estimate of habitat value.

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<sup>40</sup> This calculation is based on a real market value of land conservatively set at \$900 per acre, which is the 2022 value of pasture in the state (cropland was valued at an average of \$3650 per acre in 2022). As with other values in this report, the mitigation cost in the calculator was adjusted for inflation to 2023 dollars using the GDP Implicit Price Deflator. The default value in the calculator is 3.5 for the number of mitigation credits for each mitigated acre; we converted this to 1 to show the cost of restoring 1 acre.

Table E-3: Wetland Values from Economic Literature, 2023 dollars

Source	Year	Location	Study Type	Service Valued	Value (\$/Acre/Year)
Randall et al.	2008	US	Meta-Analysis	All wetland services	\$360 (10 <sup>th</sup> percentile value) \$600 (average value) \$1,000 (90 <sup>th</sup> percentile value)
Brander et al.	2006	Global	Meta-analysis	Habitat and nursery services	\$270 (Median value) \$4,700 (Average value)
Woodward & Wui	2001	US	Meta-Analysis	Habitat	\$200 (10 <sup>th</sup> percentile value) \$630 (Average value) \$2,000 (90 <sup>th</sup> percentile value)
NRCS	2023	Oregon	GARC Payment for Permanent Wetland Easement, Annualized	All services	\$195
Oregon Department of State Lands	2021	Oregon	In-Lieu Payment / Cost per Acre of Wetland Mitigation	All Services	\$1,300 (lease cost basin) \$2,500 (max cost basin)

Sources: (Randall, Kidder, & Chen, 2008) (Woodward & Wui, 2001) (Brander, Raymond, Florax, & Vermaat, 2006) (Natural Resources Conservation Service, 2023) (Oregon Department of State Lands, 2021)

## APPENDIX F: POTENTIAL ROLE OF THE CMP REVIEW COMMITTEE: PRIORITIZATION OF FUNDING/PROJECT SELECTION

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Only practices on farms and ranches vetted and approved through the OAHP Conservation Management Plan (CMP) advisory committee are expected to receive funding. While the valuation methodology establishes a flat value for each eligible conservation practice, site-specific factors and the role of the proposed practices in addressing known conservation issues and challenges could be considered in the CMP review process. We recommend that the committee take the following site-specific factors into account:

- **Practice implementation specifics.** A given conservation management practice may have many implementation options, with differing levels of value provided. For example, riparian buffers can be planted using bare-root trees or large container trees. Large container trees are more expensive but would be expected to provide environmental benefits and economic value much more quickly. Further, pasture and hay planting or range planting can establish a non-native or native stand. CMP advisory committee discretion in selecting and funding of the most appropriate implementation level of a given practice will enhance value provided per conservation dollar.
- **Additionality.** To what extent would OAHP funding increase environmental benefits provided? What would likely happen without OAHP funding of practices? The methodology allows payment for practices that are already in place to allow compensation of early adopters and current environmental stewards, but the program effect on environmental outcomes may be more limited if many payments are made to support existing practices or land uses.
- **Existing conditions of the farm/ranch.** Certain sites may be particularly degraded and provide opportunities for the greatest environmental uplift from a given practice. For example, for water quality, a small proportion of lands often have an outsized effect on water quality. Paying for water quality-related practices on these lands will have the greatest environmental benefit and economic value. Similarly, implementing habitat enhancement practices on sites currently providing little habitat value would be expected to provide higher environmental uplift and associated economic value, all else equal. Similarly, soils with low current carbon content may provide the greatest opportunity for increased soil carbon from a given practice.
- **Site-specific/location value considerations.** For habitat and water quality, certain sites may have a much greater potential value per acre. For habitat, properties in key migratory corridors or providing scarce habitat types may have higher value for habitat restoration or enhancement. For water quality, farms and ranches located in watersheds with threatened/endangered fish bearing streams, high recreation values, or municipal water supply values that are impacted by water quality impairments may have higher economic value for a given level of environmental benefit.



- **Regional considerations / cumulative effects.** For habitat and water quality, the role and importance of the proposed conservation practices in each CMP relative to the cumulative restoration actions being conducted at the watershed level or regional level should also be considered. CMP's that play a key role in supporting a larger-scale restoration or conservation effort will likely have greater value.

This type of review process will enhance cost effectiveness and benefit maximization as the review committee will have the discretion to prioritize funding to practices on farms and ranches that are expected to provide the most environmental benefit for the conservation dollar.

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**Virtual Commission Meeting  
October 21, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

### October 21, 2024

Business Meeting	October 21, 2024	10:45 am – 12:00 pm
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#### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](https://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA). There may be a slight delay when streaming the meeting content.
- **Zoom:** <https://us02web.zoom.us/j/83937353641>

#### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#).

The deadline for submitting written comments and requests to make verbal comments is **5:00 pm Thursday, October 17, 2024**.

Verbal comments:

- Limited to three minutes
- Will be heard in the public comment period

Provide the following information for virtual verbal comments:

- Your first and last name
- The topic of your comment
- The phone number you will use when calling the meeting.

If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

#### Agenda

##### A. Welcome & Introductions (10:45 am)

##### B. Public Comment (10:50 m)

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

##### C. [Review and Approve Minutes \(11:05 am\)](#)

The Minutes from the September 11<sup>th</sup>, 2024, OAHC meeting will be presented for Commission approval. *Action Item*

##### D. [Preparation for November Meeting \(11:10 am\)](#)

Staff will review the role of the Commission in evaluating projects and making funding recommendations to the OWEB board ahead of the November 7, 2024 meeting at which the Commission will consider 10 conservation easement applications. *Information item.*

##### E. [Program Implementation Concerns and Opportunities for Refinement \(11:40 am\)](#)

Staff will highlight a handful of programmatic topics that have been raised in public comment, with a focus on requirements regarding management plans in OAHP funded conservation easements. The Commission will be asked to weigh in on this programmatic topic to inform program refinements. *Information item.*

**F. Other Business (11:55 am)**

This time is reserved for other business that may come up before the Commission. *Information item*

**Contact Information**

*OAHP Program Coordinator* – Taylor Larson

[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

*OAHP Conservation Easement Specialist* – Robin Meacher

[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)

## Agenda Items C

# **Approval of Meeting Minutes**

Commission Meeting October 21, 2024



# Oregon Agricultural Heritage Commission

## Meeting Minutes: September 11, 2024

MINUTES ARE NOT FINAL UNTIL APPROVED BY COMMISSION

This meeting was held virtually.

Recording at: <https://www.oregon.gov/oweb/grants/oahp/Pages/OAHC/2024-Sep-OAHC.aspx>

### OAHC Members Present

Contreras, Ed  
Duhnkrack, Nancy  
Krahmer, Doug  
Loop, Lois  
Lowe, Amanda  
Masterson, Laura

### OWEB Staff Present

Davis, Renee  
Ingamells, Ellen  
Larson, Taylor  
Meacher, Robin  
Page, Stephanie

### Others

Bellis, Natasha  
McAdams, Nellie

The meeting was called to order at 4:00pm by co-chair Doug Krahmer.

### A. Welcome and Introductions, and Commissioner Updates

Vice Chair Doug Krahmer welcomed the commission and public. Commissioners and staff introduced themselves.

### B. Public Comment

This time was reserved for the commission to hear general public comments and review the written public comment submitted for the meeting. There were four written public comments submitted for this meeting. No guests present provided verbal comments. *Information item.*

### C. Review and Approval of Minutes

The minutes of the August 7, 2024, meeting were presented for commission approval. *Action item.*

Amanda Lowe moved the commission approve the meeting minutes as presented, seconded by Nancy Duhnkrack. Motion passed unanimously.

### D. Spending Plan Rebalance

Taylor Larson, OAHC Program Coordinator, updated the Commission on the funds available in the Agricultural Heritage Fund. *Action item.*

Nancy Duhnkrack moved the commission allocate funds from the Agricultural Heritage Fund to the Conservation Easement/Conservation Covenant spending plan line item, seconded by Lois Loop. Motion passed unanimously.

### E. Economic Values to Support an OAHP Payment for Ecosystem Services Program

Staff presented a final draft of the "Economic Values to Support an OAHP Payment for Ecosystem Services Program" from Highland Economics and answered clarifying questions from the Commission. *Information item*

### F. Other Business/Next Meeting

This time was reserved for other business that may come up before the Commission. *Information item*

The meeting adjourned at 4:40 pm.

Agenda Item D

**Preparation for  
November Meeting**

Commission Meeting October 21, 2024



## STAFF REPORT

### *Oregon Agricultural Heritage Program*

October 21, 2024 OAHP Commission Meeting



Tina Kotek, Governor

## ITEM D – Preparation for the November Meeting

**To:** Oregon Agricultural Heritage Commission  
**From:** Taylor Larson, *OAHP Program Coordinator*  
Robin Meacher, *OAHP Conservation Easement Specialist*  
Renee Davis, *Acquisitions and Special Programs Manager*

### Introduction

This staff report provides an overview of the 2024 OAHP Conservation Covenant and Easement grant solicitation and outlines the commission's role in making funding recommendations at the November 7, 2024 meeting for consideration by the OWEB board at its January 2025 meeting.

### OAHP Conservation Covenants and Easements – 2024 Solicitation Background

The 2024 legislative session resulted in a \$5.161 million general fund appropriation to the Oregon Agricultural Heritage Fund (\$4,541,680 for grants and \$619,320 for operations) through Senate Bill (SB) 5701. At the April 2024 OAHC meeting, the commission voted to allocate all funding from SB 5701 to the OAHP Conservation Covenant and Easement Program. Since that time, additional funds became available to the commission due to carry over from the previous biennium and a canceled grant agreement. At the September 2024 OAHC meeting, the commission voted to add these funds (\$261,580) to the OAHP Conservation Covenant and Easements Program, resulting in a total amount available of \$4,803,260.

The OAHP Conservation Covenant and Easement grant solicitation opened in May 2024 and closed on June 28<sup>th</sup>, 2024. Ten applications were received, requesting a total of \$8,878,709. All applications requested funds for the purchase of perpetual conservation easements; there were no applications for termed covenants. OWEB staff shared the grant applications with OAHC members via OWEB's online grant system.

Applications were made available to OWEB's due diligence contractors and to the technical reviewers (group of seven ranging from soils, rangeland, fish and wildlife, ag land use, and agronomy expertise). The due diligence contractors provided feedback in written form on the project elements related specifically to the transaction's soundness, as well as the applicant's capacity to purchase and steward the easement. This feedback was summarized and presented by OWEB staff during the technical review team meeting where technical reviewers discussed and ranked the 10 applications. Their discussion for each project will be summarized by staff and presented in the evaluations ahead of the November OAHC meeting.

At the November OAHC meeting, staff will facilitate a discussion of each project grounded in the technical review team ranking and evaluation based on the criteria established in rule, and then ask the commission to vote on a formal funding recommendation to the OWEB board.

### **Role of the Commission**

Prior to the November OAHC meeting, evaluations for each proposed project will be published and provided to commissioners. The evaluations summarize input received during a technical review team (TRT) meeting and from OWEB's due-diligence contractors. The commission will also receive a project ranking from the TRT rooted in the extent to which each project application meets the established evaluation criteria. The commission will have a chance to ask clarifying questions from staff and discuss the merits of each project. The commission will then hear public comment prior to entering deliberations around a funding recommendation to the OWEB board. Commissioners are encouraged to come to the November OAHC meeting having read each application and accompanying evaluation in order to facilitate a robust discussion and informed funding recommendation.

At the October OAHC meeting, staff will briefly review the application process and role of the OAHC, along with describing several grant-making best practices applied more broadly across OWEB's granting programs.

## Agenda Item E

# **Program Implementation Concerns and Opportunities for Refinement**

Commission Meeting October 21, 2024



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

October 21, 2024 OAHP Commission Meeting



Tina Kotek, Governor

### ITEM E – Program Implementation Concerns and Opportunities for Refinement

**To:** Oregon Agricultural Heritage Commission  
**From:** Taylor Larson, *OAHP Program Coordinator*  
Robin Meacher, *OAHP Conservation Easement Specialist*  
Renee Davis, *Acquisitions and Special Programs Manager*

#### Introduction

This staff report precedes a discussion at the October OAHC meeting regarding several topics raised by program partners over the previous year. This discussion may result in the commission recommending policy refinements at the meeting.

#### Program Implementation Topics

Over the previous year, the commission and staff have received feedback from program partners through various channels including public comment, one-on-one meetings, emails, and facilitated small group feedback sessions with staff. Following these discussions, staff adjusted the program's use of conservation easement template language, adjusting to providing an example document that includes required OWEB administrative language, rather than a template document. This adjustment also included clarification on the program's approach to water rights, clarifying that the program recognizes the variable approaches and needs to water rights for agricultural properties. Additionally, staff made changes to the application based off feedback from reviewers, the OAHC, and applicants. Staff continue to solicit feedback from program participants on the application format.

Another topic that has been raised is the requirement that all OAHP funded easement projects include an OWEB approved management plan that is referenced in the final conservation easement with language that includes an OWEB review requirement for plan updates or amendments.

In response to this feedback, staff previously modified the approval process for updates or amendments to management plans associated with OAHP funded easements to reduce potential for delay in implementation of management practices that may result from OWEB approval timelines. However, staff have continued to hear from some applicant/grantee organizations that the requirement that all OAHP funded easements include a management plan is reducing demand for the program and are unnecessary to meet the intent of the program (e.g., resulting in uncertainty for landowners about program expectations due to funder approvals).

#### Proposed Refinement to Program Implementation for Management Plans

Given the management plan topic described above and subsequent discussions among OWEB staff and local partners, staff will facilitate a discussion with the commission around the role of

management plans in OAHP funded conservation easements and seek their direction on potential process refinements. Prior to the October 21, 2024 OAHC meeting, an updated staff report will be provided that details potential changes to the process for requiring management plans (forthcoming Attachment A to this staff report). The proposed refinement will aim to strike a balance between streamlined program implementation and accountable grantmaking for this dual-benefit program.



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**Virtual Commission Meeting  
November 7, 2024**

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# Oregon Agricultural Heritage Commission

## Meeting Agenda

### November 7, 2024

Business Meeting	November 7, 2024	9:15 am – 4:00 pm
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#### Virtual Meeting

The public is welcome to watch or listen to the meeting through the following methods:

- **YouTube Streaming/Recording:** [www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa\\_OA](http://www.youtube.com/channel/UC0dl-TOWlt4Sp--i1KEa_OA). There may be a slight delay when streaming the meeting content.
- **Zoom:** <https://us02web.zoom.us/j/83713463709?pwd=OQvBANbVeVhzrbiBr53kX7ZlBzxyHC.1>

#### Public comment

The OAHC welcomes written and verbal public comments on any agenda item. Written comments submitted by the deadline will be provided to the commission before the meeting.

Written comments and requests to make verbal comments should be submitted using the online [Public Comment Form](#). The deadline for submitting written comments and requests to make verbal comments is **5:00 pm Tuesday, November 5, 2024**.

Verbal comments are limited to three minutes and will be heard in the public comment period. For additional information on providing public comment, please refer to our website <https://www.oregon.gov/oweb/about-us/Pages/board/meetings.aspx>. If physical, auditory, language, or other accommodations are needed for this meeting, please contact [Nicole Bettinardi](#) as soon as possible, and at least 48 hours before the meeting.

#### Agenda

**A. Welcome & Introductions (9:15am)**

**B. General Public Comment (9:25 am)**

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

**C. [Review and Approve Minutes \(9:35 am\)](#)**

Minutes from the October 21, 2024, OAHC meeting will be presented for Commission approval. *Action Item.*

**D. [Spending Plan Update \(9:40 am\)](#)**

The commission will have an opportunity to add recaptured funds and amend the current OAHF spending plan. *Action item.*

**Break (10:00 am)**

**E. [Conservation Easement Application Review and Funding Recommendation \(10:15 am\)](#)**

Staff will provide an overview of the 2024 OAHF working lands conservation covenant and easement grant offering solicitation process. *Information item.*

**Public Comment for Agenda Item E. (10:45)**

This time is reserved for the commission to hear public comments and review written public comments submitted before the meeting pertaining to Agenda Item E. *Information item.*

**Conservation Easement Application Review and Funding Recommendation Continued (11:15 pm)**

Staff will provide an overview the technical review team rankings, and evaluation summaries and answer clarifying questions from the Commission. *Information item.*

**Lunch (12:00 pm)**

**Conservation Easement Application Review and Funding Recommendation Continued (1:00)**

The commission will make a funding recommendation to the OWEB board for consideration at its January 2025 meeting. *Action item.*

**F. Other Business (3:00)**

This time is reserved for other business that may come up before the Commission. *Information item.*

**Contact Information**

OAH Program Coordinator – Taylor Larson  
[Taylor.Larson@OWEB.oregon.gov](mailto:Taylor.Larson@OWEB.oregon.gov)

OAH Conservation Easement Specialist – Robin Meacher  
[Robin.M.Meacher@OWEB.oregon.gov](mailto:Robin.M.Meacher@OWEB.oregon.gov)



# Oregon Agricultural Heritage Commission

## Meeting Minutes

### October 21, 2024

Business Meeting	October 21, 2024	10:45 am – 12:00 pm
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MINUTES ARE NOT FINAL UNTIL APPROVED BY COMMISSION

This meeting was held virtually.

Recording at: <https://www.youtube.com/watch?v=dHWsPleE46c>

#### **OAHC Members Present**

Bigelow, Dan  
Contreras, Ed  
Duhnkrack, Nancy  
Krahmer, Doug  
Loop, Lois  
Lowe, Amanda  
Masterson, Laura  
Taylor, Bruce

#### **OWEB Staff Present**

Davis, Renee  
DeBardelaben, Theresa  
Ingamells, Ellen  
Larson, Taylor  
Meacher, Robin

**The meeting was called to order at 10:45 am by Chair, Doug Krahmer**

#### **A. Welcome & Introductions**

Chair Doug Krahmer welcomed the commission and public. Commissioners introduced themselves.

#### **B. Public Comment**

This time is reserved for the commission to hear general public comments and review the written public comments submitted before the meeting. *Information item.*

No written or verbal public comment was provided.

#### **C. Review and Approve Minutes**

The minutes from the September 11, 2024 OAHC meeting were presented for Commission approval. *Action Item.*

Bruce Taylor corrected Doug Krahmer's title from "Vice chair" to "Chair" in the September minutes.

Bruce Taylor moved to approve the minutes. Lois Loop seconded. The minutes were approved unanimously.

#### **D. Preparation for November Meeting**

Staff reviewed the role of the Commission in evaluating projects and making funding recommendations to the OWEB board ahead of the November 7, 2024 meeting at which the Commission will consider 10 conservation easement applications. *Information item.*

#### **E. Program Implementation Concerns and Opportunities for Refinement**

Staff highlighted a handful of programmatic topics that have been raised in public comment, with a focus on requirements regarding management plans in OAHP funded conservation easements. The Commission was asked to weigh in on this programmatic topic to inform program refinements. Staff will utilize this input to further refine the requirements and expectations for management plans in open, pending, and future grants. *Information item.*

#### **F. Other Business**

This time was reserved for other business that may come up before the Commission. *Information item.*

**Bruce Taylor moved to adjourn the meeting. Lois Loop seconded. The meeting adjourned at 12:15 pm.**



Agenda Item B

## **Public Comment**

Commission Meeting November 7, 2024



Oregon Agricultural Heritage Program  
Submitted Written Public Comments  
November 7, 2024

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**Written Public Comment**

<b>Name</b>	<b>Topic</b>
Oregon Climate and Agriculture Network	Methodology to Value Benefits of Agricultural Conservation Practices
William Albertson	Support and further details for the Albertson Family Limited Partnership application
Jon Muir, Oregon Department of Fish and Wildlife	Support for the Albertson Ranch application
Marc Hudson, Oregon Agricultural Trust	Program application and ranking process, and support and further details for OAT submitted projects (Albertson Family Limited Partnership, Albertson Ranch, Ginochio Ranch, Seely Farms Phase 2, and Country Heritage Farms)
Karsyn Kendrick, Coalition of Oregon Land Trusts	Feedback on the ranking and evaluation process for Conservation Easement applications, and advocacy updates for additional OAHP funding in the upcoming legislative budget
Renee Myers, Wild Rivers Land Trust	Feedback on indirect cost allocation rules in programming



November 5th, 2024

To: Oregon Agricultural Heritage Commission and OAHP Staff

From: Oregon Climate and Agriculture Network (OrCAN)

Re: Public Comment on Methodology to Value Benefits of Agricultural Conservation Practices

We are providing general public comment on the most current version of the [Methodology to Value Benefits of Agricultural Conservation Practices](#).

We appreciate the consideration that the Commission and staff gave to our previous comments. We urge the Commission and OAHP staff to consider the inclusion of key practices, cover cropping and rotational grazing, in the payment for practice methodology. These practices should qualify based on their water quality and/or carbon sequestration benefits.

Prescribed/rotational grazing should be considered as a qualifying practice based on its carbon sequestration and water quality benefits.

Utilization of cover crops should be included, if not for its carbon sequestration benefit, then for water quality and other benefits. Living roots in the ground both increase water infiltration and water holding capacity and reduce erosion. Other co-benefits of nitrogen fixing cover crops include reducing reliance on nitrogen fertilizers, decreasing GHG emissions.

We plan to provide additional justification for the inclusion of these practices before the OAHP RAC meeting in December or January.

Thank you for your consideration of these comments.

November 4, 2024

Dear Commission Members,

The Albertson Family Limited Partnership was established 25 years ago. There are two general partners that make all the decisions including the purchasing and selling of property, equipment, easements and the day-to-day business decisions. The other seven limited partners have non-voting positions but are in full agreement to move forward with this conservation easement.

The Partnership was set up to protect the Yocum Valley property, it has been in this family for 110 years. There is a strong family commitment to the legacy of Yocum. In 1913 it was homesteaded by our grandfather. The original homestead was 160 acres but as other homesteaders left the valley, he bought their parcels and eventually put together this 1300-acre high mountain ranch. Our grandfather and his siblings built the first stage of Albertson Reservoir using a horse team and fresno to construct the dam in the 1940s. Our father and his siblings doubled the size of the reservoir in 1953-54 using dozers and scrapers making it the size that it is today. It currently irrigates 1200 acres of native meadows. The reason the reservoir is not included in the easement application is because the Albertson Family Limited Partnership has a 2/3 ownership of the water and the 80-acre parcel that it sits on. The remaining 1/3 is owned by 3 cousins who are not part of this easement application.

In regard to any future development on the reservoir property it would not affect the water right that goes with the lands that are included in this conservation easement application. The water is permitted through the Oregon Water Resource Department to be applied for irrigation only to the specific acres that are identified by the certificate.

The water supply for irrigation out of the reservoir is limited. The irrigation water supply ends in mid to late June when most of the cattle are turned out onto a Forest Service permit and do not return until October 1. This current grazing plan has allowed the meadows to improve along with native plant species. We have developed 5 solar wells and spring fed water tanks to disperse the cattle off of wet areas. These tanks have made it possible for the cows to utilize alternate forage. They also provide watering sites for pronghorn antelope, mule deer, elk, and black bears.

The easement will ensure that there is no fragmentation of ownership so the water control structures including headgates, ditches and dikes are easily accessible and maintained regularly. It is the only remaining property in the area that has not been sub-divided due to generational split.

A conservation easement will keep this ranch intact and under single ownership. It will preserve the wet meadows, provide wildlife habitat and wide-open spaces.

Sincerely,

William Albertson



# Oregon

Tina Kotek, Governor

## Department of Fish and Wildlife

Lakeview Field Office  
East Region  
18560 Roberta Road  
Lakeview, Oregon 97630  
(541) 947-2950  
FAX (541) 947-4632



Oregon Watershed Enhancement Board  
Oregon Agricultural Heritage Program  
775 Summer St NE #360  
Salem, OR 97301  
c/o Robin Meacher

RE: Albertson Ranch Conservation Easement

Dear Oregon Agricultural Heritage Program Board of Reviewers:

The purpose of this letter is to offer Oregon Department of Fish and Wildlife (ODFW) support for the application presented to you on behalf of the Albertson Ranch in Lake County, Oregon. This ranch has a long history of management actions aimed at benefiting both ranching sustainability and wildlife habitat, and in my view, fits the intent and purpose of your program completely.

As noted in the application packet, the Albertson Ranch is located within the Southern Oregon Northeast California (SONEC) flyway, and as such, offers critical seasonal habitats for migratory shorebirds and waterfowl species. Initial review of the project application noted a lack of specificity regarding particular species benefits. Below please find description of my personal observations on this ranch as well as conservation benefits from current management practices that can be applied generally.

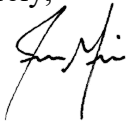
The Albertson properties in question offer a unique series of wetlands created by Mr. and Mrs. Albertson. Because of their efforts, I have observed large flocks of white faced ibis (*Plegadis chihi*) using shallow water estuaries that previously had not stopped over in the Goose Lake basin in recorded memory. Additionally, the Albertson ponds have provided critical roost water and feeding sites for the endangered population of Tule White-fronted geese (*Anser albifrons elgasi*) endemic to this region. Further, the property owner and I have observed large numbers of black necked stilts (*Bimantopus mixicanus*), American avocet (*Recurvirostra americana*), willet (*Tringa semipalmata*), lesser yellow leg (*Tringa flacipes*), Wilson's phalarope (*Phalaropus tricolor*), and greater sandhill crane (*Crus canadensis tabida*), not to mention an abundance of waterfowl species and other shorebirds too numerous to name. The reason for these large congregations is the unique location and nature of the wetlands and shallow ponds created by Mr. and Mrs. Albertsons work and would simply not be present without this ranch being intact and preserved as wildlife habitat.

Of particular note with regards to the conservation value of this ranch is the fact that the owners installed a large capacity well in the early 2000's in partnership with Ducks Unlimited. This well allows deep source ground water to be pumped to the surface in sever drought years when sheet water and emergent wetland habitats are particularly scarce, filling the shallow ponds that have been created on this ranch. When viewed as a mitigation measure against the effects of climate change in a critical flyway, the ability to maintain wetland habitats becomes of paramount importance. One need only look to water levels in Goose Lake and Abert Lake to the north over the past decade to understand the value of maintained wetlands in this flyway during drought conditions.

While the primary conservation value of this ranch remains in its ability to provide emergent wetland and seasonal flooded acres to migratory bird species, it should not go unmentioned that it also provides critical habitats for other sensitive species such as gray wolf (ODFW has confirmed wolf tracks on this ranch in recent years) and stream habitat for endangered fish species such as the Goose Lake lamprey. Additionally, the ranch offers healthy winter range for mule deer, which continue to experience population declines across their range, in part, due to continued human development of winter range landscapes.

ODFW fully supports the Albertson Ranches' enrollment in the Agricultural Heritage program. Should any questions regarding its value to wildlife or the history of wildlife use on the property emerge during review, please do not hesitate to contact myself for further information.

Sincerely,

A handwritten signature in black ink, appearing to read "Jon Muir". The signature is fluid and cursive, with a prominent initial "J" and "M".

Jon Muir  
Supervising Fish and Wildlife Biologist



November 4th, 2024

## **Comments to the Oregon Agricultural Heritage Commission on Oregon Agricultural Trust's Applications**

We provide the following comments to the Oregon Agricultural Heritage Commission (OAHC), to both support those projects submitted by Oregon Agricultural Trust (OAT) and indicate areas where grant ranking and reporting process can be improved for future cycles. We thank the staff, technical review committee and the OAHC for their time spent reviewing the grant applications, producing the ranking report, and considering our applications. We are happy to work with OAHP to produce a process where land trust partners only bring competitive projects that meet the goals of the program.

### **Regarding Program Application and Ranking Process**

#### *Subjective Ranking Criteria.*

As applicants, we find it difficult to understand how projects are being reviewed against the criteria, and how the different criteria affect the final ranking. This causes two problems - it creates uncertainty for landowners who are not able to interpret what made their project good or bad. For the same reasons, it makes it difficult for applicants like OAT to determine which projects to bring forward to OAHP and what aspects of those projects to highlight in our application. We work hard to ensure that we present what we feel are our best projects to the OAHC, while maximizing our own staff capacity, and not wasting landowners' time or building unrealistic expectations. However, the subjective ranking and review process currently used in OAHP grantmaking makes it difficult for us to understand which projects are likely to be funded and which aspects of those projects will be of greatest interest to decision makers. If OWEB were to adopt NRCS's method for ACEP-ALE of using a scoring rubric that sets a numeric value for each question, that would provide clarity and assist our organization with engaging farmers and ranchers who have projects that score well. It would also make the review and scoring process easier for OWEB staff and review teams. Scoring rubrics are used by the vast majority of other easement grant programs that we are aware of, and we are happy to advise on how to rank criteria.

#### *Anonymous Review Committees.*

There are several instances in the technical review committee's comments where the reviewer's opinion was inconsistent with state determinations on wildlife and habitat issues. For example, and discussed in-depth below, the reviewers appeared to disregard the critical habitat designation for the Seely property. It is much easier to have confidence in the opinion of the review committee if we are aware of the credentials of the reviewers. Over multiple reviews it was also asked how we would manage conflicts between grazing and wildlife. The beauty of the circumstances of these properties is that ongoing flood irrigated pasture managed for



sustainable grazing also supports multiple wildlife and habitat program goals. OAHP was designed to emphasize the mutual benefits of agriculture and conservation, and it is inconsistent with this philosophy to presume that the two are in conflict.

*Unclear Application Questions/Standards Leading To Unclear Review.*

There is an extremely critical question we must ask now - is the purpose of the program to support a property's current resources and existing management strategies, or the the management practices that are relevant to and described in the conservation easement? Reviewers seemed to rank our grazing properties lower for not describing grazing conflicts with the resources. However, while we considered current management strategies, we did not want to lock landowners into a singular management strategy via a conservation easement. The grant program pays for conservation easements, and so we focused only on those activities controlled by the easement.

We also believe there may be ongoing confusion as to the role of a management plan. In multiple instances it was expressed that reviewers wished we had described our strategy for developing management plans. Through significant conversations with OWEB it has been our understanding that the management plans are meant to be descriptive to ensure that landowner's management strategies don't conflict with the letter of the easement. They are not supposed to be restrictive outside of the direct requirements of the conservation easement, so it is unclear to us how or why knowing the strategy for management plan development would significantly impact thinking or decisions as to how the property will be managed.

*Definition of Significance:* One area that seems lacking in clarity is how to define a "significant" agricultural property. The Country Heritage Farm application is a great example of this challenge. In the review we were both credited for making sure the "agricultural values were well articulated", while at the same time criticized for "lacking detail describing the significance of this parcel of land..." OAT uses a conservation easement lens when understanding properties, and therefore our understanding of significance has to do with enduring resources, such as soils, water, habitat, cultural and historic resources etc... While innovative management strategies are a good thing, they are temporal, and for our purposes indicate nothing about property significance, and are instead a metric as to landowner sophistication in dealing with complex documents like conservation easements, and their violation risk being low by way of showing dedication to the land. Innovative strategies are also hard to make into conservation easement terms, as that same innovation may also entail risk, or low likelihood of absorption by next generation landowners.

The tendency to focus on the temporal and innovative over the long-term and standard shows up multiple times, including in the description of Ginocchio property as "generic." In many ways, they are generic, but that's a good thing. The Ginochios are engaging in a very well supported and understood form of agriculture with much lower levels of risk, and therefore higher market



resiliency. The contribution of “generic” ranching in the region is extremely significant, as that is what supports the agricultural economy upon which local communities rely. We had imagined insignificance to mean the agricultural use is de minimus to the overall property’s operation, or out-of-context or out-of-touch with the regional agricultural economy. In comparing potential properties to what is potentially “insignificant” all of our projects put forward are significant, in that they are all bonafide farmers and ranchers contributing meaningfully to the local agricultural economy, and are managed in ways that ensure ongoing productivity far into the future.

### **Project Specific Comments:**

#### *Albertson Family Limited Partnership:*

For the Albertson Family Limited Partnership application we would like to clarify the following:

- Regarding the commentary over potential grazing conflicts and habitat values, the current flood irrigation practices promote most of the wildlife values by recreating and supporting the wet meadow ecosystem native to the Yocum Valley. Currently, livestock are brought to the property in May/June for a short period depending on access, then released to nearby forest permits for the summer, and aren’t returned until September/October for a month prior to removal. The limited duration grazing is possible because the current family member leasing it has access to significant nearby forest permits, and may not be retained with a different grazer and/or a different grazing strategy.
- The Albertson Reservoir was not included in the application because they are not the sole owner of the reservoir - a 1/3 interest is held by a family member, a subdivision of interest that was caused by incomplete estate planning in the past. Though the Albertson Family Limited Partnership holds a controlling interest, it is both not possible to apply for federal funds without all interest holders agreement, and sale of an easement could precipitate a lawsuit between the parties. That said, the report conclusions are incorrect to the legal reality of the future use of the reservoir. You may not build around an irrigation reservoir in a manner which harms the water right holder’s interest in the irrigation water - they would have a superior interest in ensuring that they gain their water. It is highly unlikely a party unrelated to the irrigation interest will ever own it, as they will, in the process, have incurred the de-facto responsibility of providing unlimited access to the Albertsons water for irrigation purposes and for the infrastructure associated with it for maintenance. Whether building around the reservoir degrades the habitat qualities in the reservoir is immaterial, and as the reservoir is non-adjacent to the subject tract, we fail to see how recreational development would harm the conservation easement property in a manner greater than the general recreational use already allowed in the surrounding national forest. As the habitat values on the easement area are largely maintained by the delivery of irrigation water, we fail to see the relevancy of these concerns.
- Regarding the soundness review, we have agreement of all of the family members, though decisions are able to be made by the two managing members involved with the



application. In terms of comfort on a member by member basis with all aspects of the deal, we do not consider it sound practice, nor necessarily ethical to insert ourselves into a family conversation, or a corporate decision making process, unless invited. The managing members wished to handle the conversation amongst themselves, an offer was made and accepted. That is all that is needed and to insert ourselves further would be inappropriate. Regarding the review comment referring to the relationship of the water rights to the offsite control structure, there are countless irrigation rights across the state where control structures are offsite in conditions not under direct control of the water rights holder. The comment here is vague and unclear as intent and necessity.

#### *John Albertson*

Regarding the technical teams comments we have the following:

- It was noted that we did not provide a list of the potential waterfowl species benefited by the property. We have attached a letter of support from the local ODFW fish and wildlife biologist which details the species incidentally observed by him in his visits there. However, an exhaustive list of species was precluded because the migratory birds which likely, or could, be benefitted by the property ranges into the dozens, and it is a character limited application. We often use the SONEC (Southern Oregon, Nevada, California) as a stand in for these multiple species benefits.

#### *Ginochio Ranch*

As described in the application's Agriculture and Natural Resources section, the Ginochio property is a high quality grazing property for the region due to its irrigation resources. Over one-third of the property has water rights for irrigation: 302.5 acres of groundwater rights with a 1969 priority date which is old according to groundwater usage history in the area, and an additional 10 acres of surface water rights through the Lakeview Water Users Inc. Regarding the provided the technical teams commentary, we have the following comments:

- Regarding the technical team's comments as to the ranch being "a generically described ranch generally common to the region," we at OAT see that as a good thing, as it indicates they are working within a proven economic model without having to engage in extraneous or experimental management regimes to be successful.
- The technical team regretted a lack of detail of the riparian resources. We assumed that the ODFW designation of Priority 1 for aquatic habitat by ODFW's Crucial Habitat database should have been sufficient evidence of its significance, as the state wildlife agency is much more reputable and qualified in comparison to our own meager opinions. Beyond that, there are a multitude of potential ways of describing riparian systems, but none of them seemed more significant than this land being affirmed as adding to the Oregon Conservation Strategy.
- Similarly, we believe there may be some misunderstanding of the winter mule deer and waterfowl range maps. Those maps were made with full understanding of what the existing land use is, so the primary benefit is in preservation. While habitat



improvements may exist across the designated winter or migratory range areas, the ability to do so is conditionally dependent on either expanded flood irrigation rights, or range improvements. The potential flood irrigation area on the property is restricted to its current footprint, and the range improvements in the removal of juniper and other NRCS partnered activities, were described. Otherwise, we did not believe it necessary to make 'evidence of absence' arguments.

- Further improvements, such as invasive grass treatments, are a priority for the landowners, but are not typically a conditional requirement of the easement, as their spread mostly falls under the "force majeure" exception common to almost all conservation easements. Regardless, the intentional spread or negligent failure to treat those grasses is a violation of state law OAR 603-052-1200 and it is most certainly the intent of the landowner to follow the law, a condition we don't often have to explain on grant applications.

### *Warren Seely*

For the Seely application we have the following responses to the technical committee's comments:

- It is difficult to know how to complete a future application differently in a manner which would satisfy the reviewers. For example, findings were that "would have liked to see the suitability for high value agriculture on the property better articulated in the application" but this application has presented to OAHP a farm with NRCS-defined Prime Farm Soils, dependable water rights, and investment and support for irrigation and drainage rivaling most farms. In the application, this was articulated in the question on soils (page 7) and the surface water and irrigation question on page 8. There is simply no better way to describe "suitability for high-value agriculture" than articulating that a farm has prime farm soils and dependable irrigation and drainage. A review of the "Evaluation Criteria" in OAR 698-015-0090 makes no mention of "high-value" agriculture. While the Seely's innovative mint-oil and direct to market chocolates is valuable, we again ask whether temporal conditions, such as a farmers direct to market strategy (which they could easily shift to lease ground for growing, or drop entirely) is more significant than the inherent value of the farmland itself in considering the application.
- We strongly disagree with the dismissal of the property as significant to Columbia White-Tailed Deer. In respect to the comments, dismissing critical area designations undermines state and federal designations generally, and there are regions across the state where ODFW and USFWS have designated agricultural land as significant for a number of species, either as corridors and areas of transmission or as beneficial forage and habitat areas in their own right. According to all published research, the Seely property serves both. Though the Seely properties may not be pre-Columbian quality habitat, we wouldn't expect any working farm or ranch to perfectly meet that standard. The Species Recovery Plan indicates that managed pastures, for which the Seely's rotate use, are utilizable forage and habitat areas so long as they are within 250 meters



of woodland or brushy cover. All of the Seely parcels meet that description. The Washington Department of Fish and Wildlife also indicated grasslands are a usable habitat type. The USFWS, BPA and the Lower Columbia River Estuary Partnership developed a new habitat model methodology in 2014. The peer reviewed “Columbia White-Tailed Deer Habitat Model and Methodology” provides cultivated crops and pastureland a relative significance of 2 as a habitat cover on a -1 to 3 point scale, and the properties are rated medium-high suitability in that model. Only two years ago, it was determined that for the NextEra facility expansion, the Port would need to provide habitat mitigation for Columbia White-Tailed Deer on similar, adjacent pieces of agricultural land. All of which would have been fully explained if we had reason to believe the reviewers would have dismissed the USFWS’s legally and regulatorily valid Critical Area designation.

- Finally, the reviewers skepticism that the Seelys would be able to do native species establishment on the wet ditches on site, despite the fact that those are specifically the activities that have been engaged as cost-share habitat improvements on similar sites within the Lower Columbia River Basin. It is especially unclear how the reviewers could come to such a conclusion with no site-visit to the Property. We also don’t know how to understand the question regarding the hydrological connection to the Columbia River. Is this being asked in the context of fisheries, wetlands, flood and other risk abatement and mitigation, etc... The property is within a drainage district, for which drained water is returned to the Columbia River. To further discuss the hydrologic connectivity we would significantly more direction as to the reviewers expectations ahead of time.

#### *County Heritage Farms - Sweeney*

We are generally happy with the staff consideration of the Sweeney project, except for the concern about how significant, or high value agriculture, is defined, the arguments around which were detailed above.

We thank you once again for your time and efforts in reviewing our applications. We look forward to future program development and more applications in the future with you all. And of course, more beneficial working farms and ranches are protected across Oregon.

Thanks

Marc Hudson  
Land Program Director  
Oregon Agricultural Trust



November 5<sup>th</sup>, 2024

Oregon Agricultural Heritage Commission  
521 SW 6<sup>th</sup> Street  
Redmond, OR 97756

Chair Krahrmer, Vice Chair Taylor, and Members of the Commission:

On behalf of the Coalition of Oregon Land Trusts (COLT), thank you for the opportunity to provide public comment at the November Oregon Agricultural Heritage Commission meeting. Our statewide coalition and the many partners that work to protect our valuable farm and ranch lands thank you for your service on the Commission. We are thrilled to be here today as this Commission makes recommendations about funding the next round of working lands conservation easements through the Oregon Agricultural Heritage Program (OAHP).

COLT is a nonprofit membership organization that serves and strengthens the land trust community in Oregon by building connections and advancing policies that help protect our natural world – including our working lands. We represent 31 members across the state, including land trusts, soil and water conservation districts, and statewide conservation organizations that work closely with private landowners to protect farm and ranch lands from fragmentation and conversion.

COLT and our partners worked incredibly hard during the 2024 legislative session to secure additional grant funds for OAHP, and we are pleased to see continued demand for this program as evidenced by the 10 projects submitted for conservation easement funding. Earlier this year, we circulated a survey throughout the COLT land trust community which identified a strong pipeline of projects that could be realized with full biennium funding (2025-2027). In total, we identified 25 projects in the pipeline that would protect over 38,000 acres of working lands.



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**24 MEMBER ORGANIZATIONS:** Blue Mountain Land Trust • Center for Natural Lands Management • Columbia Land Trust  
Deschutes Land Trust • Ducks Unlimited • Forest Park Conservancy • Friends of the Columbia Gorge Land Trust  
Greenbelt Land Trust • Klamath Lake Land Trust • Lower Nehalem Community Trust • McKenzie River Trust  
North Coast Land Conservancy • Northwest Rangeland Trust • Oregon Agricultural Trust • Oregon Desert Land Trust  
Pacific Forest Trust • Southern Oregon Land Conservancy • The Conservation Fund • The Nature Conservancy in Oregon  
The Trust for Public Land • The Wetlands Conservancy • Wallowa Land Trust • Western Rivers Conservancy • Wild Rivers Land Trust

**8 ASSOCIATE MEMBER ORGANIZATIONS:** Black Oregon Land Trust • Cerro Gordo Land Conservancy • Clackamas Soil & Water  
Conservation District • East Multnomah Soil & Water Conservation District • Helvetia Community Association  
Tualatin Soil & Water Conservation District • View the Future • Yamhill Soil & Water Conservation District

This robust pipeline and our continued work to secure funding for the program are some of the reasons we are grateful for OWEB and the Commission's investment in improving program delivery through rulemaking. We want to thank you all for bringing your expertise to the table throughout the rulemaking process and incorporating feedback from program applicants and private landowners that reduces barriers to program participation.

One piece of feedback we would like to share today is that we would have liked to see more detailed ranking information under each of the OAHP categories for Item E. It was incredibly helpful last cycle to see the detailed ranking information for all projects seeking grant funding. We understand from staff this was a result of changing the review process between this cycle and the last, but it would be more helpful for applicants to weigh in on the Commission's deliberations if Item E contained more project details. We also want to take this opportunity to share the following COLT updates with the Commission:

### **COLT Welcomes Joe Buttafuoco as Executive Director!**

COLT is thrilled to announce that after an extensive search process, our Board of Directors have officially hired Joe Buttafuoco to lead our coalition as the Executive Director! Joe comes to COLT after 14 years at the Nature Conservancy, ending his tenure as the Associate Director of Stewardship.

Joe brings over 20 years of experience in land conservation to his role with COLT, caring for conservation lands and managing stewardship programs and teams in Oregon and New York. He has years of experience connecting people to nature and building community around our shared role as stewards of natural places. Joe is committed to the ongoing work of the Oregon Land Justice Project and efforts to build relationships in service of Indigenous peoples and their efforts to reclaim lands and culture.

Joe officially started with COLT last week and will work to connect with COLT's memberships and partners in the coming months. We look forward to Joe's leadership for our Coalition and ask that this Commission joins us in giving him a heartfelt welcome to his new role with the COLT community!

### **Advocacy Updates**

#### *Oregon Agricultural Heritage Program*

As we prepare for the 2025 Oregon legislative session, we would like to share the work completed so far this year around advocacy and education for the Oregon Agricultural Heritage Program. Over the summer I worked closely with Nellie McAdams, Executive Director of the Oregon Agricultural Trust (OAT), to meet with legislators and plan legislative tours focused on working lands protection and opportunities through OAHP. Between June and August, we met



with over 40 Oregon legislators to talk about the importance of funding OAHP in the 2025 legislative session.

We also hosted three legislative tours in September. Our first tour featured Creswell Oaks, a 1,610-acre ranch property in Lane County that contains hundreds of acres of oak woodlands and hosts the valley's largest population of Oregon Vesper Sparrows. We hosted a virtual tour of Carman Ranch in Wallowa County, where participants heard from rancher Cory Carman about how she hopes to use the OAHP to protect her land and improve her business viability. Finally, we brought legislators and agency staff to Washington County to hear about Adelante Mujeres's Regenerative Agriculture program and their work to improve farmland access. We would like to thank the OWEB staff that participated in each of these legislative tours and the program expertise they provided to our attendees. Thank you!

During September legislative days, we worked with Representatives Helm and Owens to submit our legislative concept to fund OAHP during the 2025 legislative session. We are asking for \$17.3 million for the biennium, funding that includes \$14.5 million for OAHP conservation easements, \$1 million for the other grant programs through OAHP, and 12% for OWEB administrative needs. We will continue to work closely with our legislative champions, conservation partners, and coalition members to advocate for this funding as the 2025 legislative session begins.

Thank you for the time you invest on this Commission, and for the time today to provide comments.

In partnership,

Karsyn Kendrick  
Conservation Director  
Coalition of Oregon Land Trusts



**From:** [oregon-gov-web-services@egov.com](mailto:oregon-gov-web-services@egov.com)  
**To:** [BETTINARDI Nicole \\* OWEB](#)  
**Cc:** [REPLINGER Linda \\* OWEB](#)  
**Subject:** Public Comment  
**Date:** Tuesday, November 5, 2024 4:50:34 PM

First and Last Name	Renee Myers
Phone Number	971-271-1486
Email Address	<a href="mailto:renee@wildriverslandtrust.org">renee@wildriverslandtrust.org</a>
I wish to provide (select one):	both written and verbal comment
If you are providing VERBAL comment, how do you plan to attend the meeting (select one):	in person (when available)
I want to provide comment at (select one):	Oregon Agricultural Heritage Commission (OAHC)
Agenda Topic / Item Letter	OAHP Conservation Covenant Easement Grant Offering
Type Comment Here (comments may also be uploaded below):	<p>First, I want to thank the OAHP Committee and OWEB for the willingness to ask for, listen to and request partner feedback on the OAHP program and then take that feedback and quickly respond to many of the issues raised by proposing changes that once approved, would take effect in the near future. The focus of these comments pertain to the proposed Wild Rivers Land Trust specific project, but applicable to other projects on this and future grant cycles. The indirect cost allocation is only applicable to staffing and contract expenses and cannot include any portion of the cost of the conservation easement. On larger, complex, multi-year projects, with multiple partners and funding sources, there can be significant costs an organization incurs that are unexpected which indirect costs help to cover. For smaller organizations that are unable to absorb these costs, it can leave a significant gap in financial resources spent on the project vs financially resources coming in to cover these costs. If</p>

	indirect costs could include even a portion of the conservation easement funds requested, it would go a long way in helping organizations recoup financial resources spent on the project. Thank you for your time and consideration.
Request physical, language, or other accommodations	no
Verification	I am not a robot

**Submission Date:** 11/05/2024 06:50 PM CST

**Submission ID:** 000d51e7-c693-48f4-84dd-5f8acedc6b23

**Record ID:**



# STAFF REPORT

## *Oregon Agricultural Heritage Program*

November 7, 2024 OAHP Commission Meeting



Tina Kotek, Governor

### ITEM D – Spending Plan Update

**To:** Oregon Agricultural Heritage Commission

**From:** Taylor Larson, Oregon Agricultural Heritage Program Coordinator  
Robin Meacher, Oregon Agricultural Heritage Program Conservation Easement Specialist

#### Introduction

The Oregon Agricultural Heritage Commission has a total of \$277,776 in funding to add to this biennium's Oregon Agricultural Heritage Program (OAHP) spending plan. These additional funds result from the recapture from a cancelled grant (223-7101-22522). Staff are requesting the Commission allocate this recaptured funding and rebalance the spending plan to address current and anticipated program demands. Staff are also requesting the Commission consider rebalancing their spending plan in order to meet demand for the Conservation Management Plan (CMP) grant program.

#### Background

At the October 2024 OWEB Board meeting, the Board approved adding \$277,776 resulting from the recapture of cancelled grant 223-7101-022522 to the OAHP spending plan line item in the OWEB 2023-2025 spending plan. Now that the board has amended the OAHP line item of the spending plan, the Commission can amend its spending plan to allocate the funds to a specific grant program. Staff recommend that the Commission add these additional funds to the Conservation Covenant and Easement Grant line item of the 2023-2025 OAHP spending plan. This recommendation is based on ongoing discussion by the Commission about demand for the easement program.

At the April 2024 OAHC meeting, the Commission allocated \$250,000 to Technical Assistance (TA) grants and \$500,000 to Conservation Management Plan (CMP) grants for an early 2025 solicitation using funds allocated to the program through the Natural and Working Lands Fund. Since that time staff engaged with potential grantees and found a high level of interest in the CMP grant program. Given the anticipated demand for the CMP grants and the lack of certainty around future funding, staff are recommending the commission reallocate \$250,000 from the TA grant program into the CMP grant program.

#### Recommendation

Staff recommend the Commission add \$277,776 to the Conservation Covenant and Easement Grant line item of the 2023-2025 OAHP spending plan, increasing the amount available for the current easement grant cycle from \$4,803,260 to \$5,081,036. Staff also recommend the Commission adjust the spending plan by moving \$250,000 from Technical Assistance to Conservation Management Plan grants increasing the amount available for the current CMP grant cycle from \$500,000 to \$750,000.



## STAFF REPORT

### *Oregon Agricultural Heritage Program*

November 7, 2024 OAHP Commission Meeting



Tina Kotek, Governor

## ITEM E – June 2024 OAHP Conservation Covenant and Easement Grant Offering

**To:** Oregon Agricultural Heritage Commission  
**From:** Taylor Larson, OAHP Program Coordinator  
Robin Meacher, OAHP Conservation Easement Specialist  
Renee Davis, OWEB Acquisitions and Special Programs Manager

### Introduction

This staff report provides an overview of the June 2024 Oregon Agricultural Heritage Program (OAHP) Conservation Covenant and Easement grant solicitation and outlines staff recommendations for commission consideration.

### OAHP Conservation Covenants and Easements – June 2024 Offering Background and Summary

The 2024 legislative session resulted in a \$5.161 million general fund appropriation to the Oregon Agricultural Heritage Fund (\$4,541,680 for grants and \$619,320 for operations) through Senate Bill (SB) 5701. In its April 2024 meeting, the Oregon Agricultural Heritage Commission (OAHC) allocated \$4,541,680 to the OAHP Working Lands Conservation Covenant and Easement grant offering in its 2023-2025 OAHP spending plan. At its September 2024 meeting, the OAHC added \$261,580 to the Conservation Covenant and Easement Grant line item of the 2023-2025 OAHP spending plan, increasing the amount available for the current easement grant cycle from \$4,541,680 to \$4,803,260. With the recommended addition of \$277,776, pending OWEB board action on October 22, from the recapture of funds due to the cancellation of Grant No. 223-7101-22522, the total funds available for the 2024 Conservation Covenant and Easement Grant offering is \$5,081,036.

The conservation covenant and easement grant solicitation opened in May 2024 and closed on June 28, 2024. Ten applications were received, requesting a total of \$8,878,709. All applications requested funds for the purchase of perpetual conservation easements. There were no applications for termed covenants.

### Application Review Process

The working land conservation easement applications were reviewed in accordance with administrative rules for the program, adopted in 2019. Per OAHP's statute and rules, staff's role in the application review is to facilitate a process where applications are evaluated and ranked by a technical review team (TRT) with expertise relevant to the evaluation criteria for the grant offering. The review team does not make "fund/do not fund" recommendation on submitted applications based on merits of the proposed projects relative to the evaluative criteria. Rather, the review team's ranking signals their expert opinion on alignment of proposed projects with program intent. Staff present the OAHC with the application ranking from the review team and the evaluations, along with a funding recommendation. The OAHC,

per statute, reviews and considers these rankings and recommendations in the development of the commission's recommendation to the OWEB Board. Given this decisional space for OAHC, the recommendation from staff simply articulates for the commission where the line of available funding falls in the TRT's ranking.

Site visits to each project site were conducted by OWEB staff through July/August/September. The purpose for the site visits was for staff to verify information presented in the application, and gain context and clarification on application elements to bring to the review team meeting. Staff also gave technical reviewers the opportunity to present staff any clarifying questions prior to the site visits. None were provided.

Applications were reviewed by OWEB's due diligence contractors and the OAHP Conservation Covenant and Easement Grant Offering Technical Review Team. Project soundness review was provided to OWEB staff in written form on the project elements related more specifically to the transaction's soundness, as well as the applicant's capacity to purchase and steward the easement. This feedback was summarized and presented by OWEB staff during the TRT meeting. The technical reviewers did not provide written feedback; rather they convened in a review team meeting to discuss and rank the 10 applications. This process refinement between the first and second grant cycles was implemented to better align with statute and program rules and address feedback received and discussion that occurred during the 2022-2023 grant cycle. The review team discussion of each project was summarized by staff and is presented in the evaluations in Attachment A. The review team ranking is in Attachment B.

The review team generally found that all projects were "qualified" in terms of meeting basic OAHP CE program requirements and thresholds. They noted, however, that more detailed information in some applications about the significance of the specific parcels and the specific benefits—such as agricultural, natural resource, and fish and wildlife—that the projects aim to protect, as well as how they plan to achieve those benefits would have been helpful during the evaluation. The team stated during its discussion of the multiple projects that a more thorough description of the management currently taking place and intended to continue (or change) as a result of the project would have better enabled them to evaluate whether the highlighted resources are appropriately being addressed by the proposed conservation easement or an accompanying management plan.

Those applications that ranked the highest were considered to have provided the most well-articulated and well-documented rationale for why the property and its values were significant, how they would be protected, and the threat facing the property. Higher ranking applications also were considered to address all the evaluation criteria for the OAHP conservation covenant and easement program to the best and broadest extent among the applications. The applications in the bottom tier of the ranking, though acknowledged as meeting basic requirements for the program, were forwarded to the Commission with some qualifiers. The TRT noted that these applications lacked sufficient justifications to persuade them that the property and the resources were significant to the point of warranting limited public funds be allocated to these projects ahead of higher ranked applications for which alignment with program intent was exceptional.

Per administrative rule 698-015-0120, staff provided the governing bodies of cities and counties with jurisdiction in the area of the proposed covenant or easement acquisition, as well as affected governmental agencies and tribes, with written notice of the Commission's intent to consider written and oral comments provided at the meeting where the applications are considered. All testimony, including any oral testimony received by the Commission will be summarized in the staff report to the OWEB Board at the January 22-24, 2025, meeting.

### **Recommendation**

Staff recommend the Commission consider the ten OAHP Working Lands Conservation Covenant and Easement grant applications as described in the technical review committee's rankings paired with available total funding and the staff evaluations in Attachments A and B.

### **Attachment A**

OAHP Working Land Conservation Covenant and Easement 2024 Application Evaluation Summaries

### **Attachment B**

OAHP Working Land Conservation Covenant and Easement 2024 Application Ranking

### **Attachment C**

Map of 2024 OAHP Working Land Conservation Covenant and Easement Applications

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7104-23844	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Albertson Family Limited Partnership		
<b>Applicant:</b>	Oregon Agricultural Trust		
<b>Region:</b>	Central Oregon	<b>County:</b>	Lake
<b>OWEB Request:</b>	\$337,603	<b>Total Cost:</b>	\$ 1,177,361

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

The project is in the Yocum Valley in Southwest Lake County and is an inholding in the Fremont-Winema National Forest. The property is held in a family partnership with a large number of members, where those ownerships could be even more split as family members pass and the next generation inherits. This broadening of the family ownership has already forced one actual subdivision of the property, resulting in the loss of a third of the former land area. The family would like to ensure the property is retained in its whole going forward. The goal is the acquisition of a conservation easement, where NRCS ACEP-ALE Grasslands of Special Significance funding has already been awarded and we are seeking matching funds from the heritage program. As such, the project will be led by Oregon Agricultural Trust, with NRCS acting as a funding partner for the acquisition.

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness and capacity review from OWEB due diligence contractors and OWEB staff based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

Reviewers noted that the large size of the proposed tract and its ability to provide critical summer grazing ground is significant by keeping livestock off lower elevations and allowing that vegetation to mature. Fragmentation of the property could pose a risk to the functionality of the property's wet meadows by complicating coordinated management of the water control structures, irrigation, and overall hydrology. If water management is not continued, it could jeopardize the forage production and the natural resource benefits provided by the meadow's plant communities. Reviewers noted that more detail related to how the project would accommodate the specific wetland plant communities and wildlife utilizing the property would have provided more foundation to determine the project's natural resource benefits. Reviewers were concerned that application lacked detail about how a grazing management plan may be prepared and utilized for the property, as wet meadows can be sensitive to the impacts of grazing, as can forage production. The application made a compelling case for the value of wet meadow for habitat and summer range, but lacked a discussion of the interaction of the two uses and any potential conflicts.

Reviewers agreed that the proposed property's location is compelling for conservation, given its proximity to Forest Service land. It was acknowledged that landscape management of property adjacent to public lands is easier with fewer landowners and that managing for fire and other conservation goals would be enhanced by keeping the property intact. The distance from population centers and transmission infrastructure may decrease the immediacy of any threat of residential or solar development. Reviewers stated that the application adequately explained how an easement on the property would facilitate management of the property for agriculture and conservation in the long run. They were concerned, however, that the nearby reservoir that is the source of the irrigation water and appears to be a significant resource, was not included in the proposed easement (while acknowledging the application's statement that the reservoir is owned in a different structure than the subject property). Reviewers were concerned that areas around the reservoir could be developed and damage the agricultural and conservation values on the property, including facilitating additional recreation development that could conflict with the agricultural uses of the subject property. Reviewers appreciated the application's thorough depiction and acknowledgement that the threat of fragmentation is primarily associated with succession issues and that the proposed project could help facilitate an agreeable resolution for all involved parties, while keeping the property available for agriculture and conservation.

### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Oregon Agricultural Trust is a relatively young organization that has had success in completing working lands easements over the last three years. OAT includes the protection of working lands in its organizational documents. The application states that the organization has completed three working land easements in the past year protecting 29,872 acres of agricultural lands through a variety of funding mechanisms. OAT is not yet accredited with the Land Trust Alliance but provided documentation of policies and procedures comparable to an accredited organization. OAT currently has three full-time staff working on land protection projects, two with over a decade of land trust experience managing conservation projects, including significant experience with NRCS and other federal match funding partners.

The ownership structure for the property in the proposal is a nine-member limited partnership. More detail would have been beneficial to understand the formal decision-making authority required by the partnership agreement, the level of commitment of the full membership, and the level of agreement needed to move forward on certain project components (e.g., easement terms, acceptable purchase price, timelines, etc.). The water management structures (dam on Albertson Reservoir) related to irrigation rights pertinent to the property is not included in the easement, but it is identified as owned and maintained by the landowners through a different ownership entity. Confirmation of this relationship and rights to maintain water uses and infrastructure necessary to do so will be requested.

The property appears to be free of complicated or outstanding severed mineral interests, though the applicant noted a search of the Mineral Information Layer for Oregon (a database maintained by the Oregon Department of Geology and Mineral Industries) which provided some limited information regarding the use of historic surface excavation of the property for cinders. There applicant will need to confirm that there are no outstanding rights associated with this use.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7104-23844	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Albertson Ranch		
<b>Applicant:</b>	Oregon Agricultural Trust		
<b>Region:</b>	Central Oregon	<b>County:</b>	Lake
<b>OWEB Request:</b>	\$198,573	<b>Total Cost:</b>	\$1,068,084

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

The Albertson Ranch sits in the Goose Lake/Thomas Creek Valley outside of Lakeview, in Lake County. As a ranch property, the Albertsons have put significant efforts into creating a multi-purpose use ranch which mutually benefits livestock grazing and wildlife in a manner which is productive to both purposes. They are at the point of retirement, however, and the property contains numerous lots of record which would allow for subdivisions in excess of what would benefit the resources and even EFU lot minimums. Therefore they are pursuing a conservation easement to help preserve the land in perpetuity.

The easement as proposed is a straightforward working lands conservation easement, co-funded by a North American Wetlands Conservation Act (NAWCA) Grant acquired in partnership with Ducks Unlimited. As the grant recipient Ducks Unlimited will be overseeing the administration of those funds while Oregon Agricultural Trust will manage the acquisition itself and the acquisition of the match funding.

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness review from OWEB due diligence contractors based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

Reviewers noted that the property has strong agricultural and natural resource values. The importance of the property for migratory birds and lamprey habitat was appreciated and the current landowner's large investments in enhancing its ecological importance was valuable. The habitat investments made by the landowners represent decades of investment, and maintaining the habitat structure could be challenging, if not improbable, if the property were broken into different ownerships. The easement would safeguard these investments and help maintain the management of the habitat structures. The property's inclusion of the lower reach of Drew's Creek is significant, as this stretch provides important habitat for Goose Lake Lamprey and other aquatics. The property's location within the Southern Oregon Northeast California (SONEC) flyway is important, and the reviewers concurred that the property offers prime habitat to support migrating birds. However, reviewers found the detail in the application about how the project would benefit specific species was lacking, but rather provided a generic list of strategy species in the area.

The reviewers concurred that there was some level of threat of conversion and fragmentation facing the property, primarily from solar development. Residential development seemed less likely as an immediate threat, due to the wetlands present on property. However the trend of approval for and development of non-farm dwellings in Lake County is real and demonstrable.

***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Oregon Agricultural Trust is a relatively young organization that has had success in completing working lands easements over the last three years. The states they have completed three working land easements protecting 29,872 acres of agricultural lands through a variety of funding mechanisms. OAT is not yet accredited with the Land Trust Alliance, but provided documentation of policies and procedures comparable to an accredited organization. OAT currently has three full-time staff working on land protection projects, two with over a decade of land trust experience managing conservation projects, including significant experience with NRCS and other federal match funding partners.

Review of the title documents, the ownership vesting information, and due diligence items did not result in any concerns. It was noted that documents on title show that Lake County has outstanding rights related to roadways and minerals, and while the applicant's narrative related to this issue noted these rights are rarely exercised, it will be prudent clarify the applicability of these rights to the subject property, and if necessary to subordinate or extinguish.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7107-23849	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Box T Ranch		
<b>Applicant:</b>	Blue Mountain Land Trust		
<b>Region:</b>	Mid Columbia	<b>County:</b>	Grant
<b>OWEB Request:</b>	\$1,092,008	<b>Total Cost:</b>	\$2,092,008

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

Box T Ranch is a 3,697-acre property located in Mt. Vernon, Oregon. Blue Mountain Land Trust (BMLT) is proposing to purchase a working lands conservation easement from the Ediger family, permanently protecting its grazing uses and natural resource values. The landowners have stewarded their property to balance agricultural, wildlife habitat, and conservation values in the 107 years of family ownership. The Box T Ranch utilizes a rotational grazing plan to support healthy grasslands and has participated in numerous programs to improve the property's infrastructure and habitats. The Box T Ranch supports significant fish and wildlife habitat, including 0.7 miles of the John Day River, important habitat for anadromous fish, including summer steelhead, mid-Columbia Spring Chinook, and John Day River bull trout, and 4 miles of McClellan Creek, a historic salmon-bearing creek.

The landowners plan to pass the ranch to the next generation of their family, utilizing a conservation easement to preserve the ranch as a whole and keep the property viable for continued ranching and contributions to the local agricultural land base.

BMLT is securing matching funds for a Natural Resources Conservation Service (NRCS) Agricultural Lands Easement (ALE) conservation easement through the Regional Conservation Partnership Program (RCPP). Partners on this project are the Edigers, Blue Mountain Land Trust, NRCS and OWEB.

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness and capacity review provided by OWEB due diligence contractors and OWEB staff based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

The review team appreciated that the property is of a size appropriate to sustain itself for agricultural production as a grazing property long-term, support a diversity of habitats, and that the elevation gradient on the site supports topo-climatic diversity, which correlates with climate resilience by providing suitable habitats for species and rangeland as the climate changes, facilitating climate adaptation for a variety of species and forage production. The configuration and shape of the property also allows for utilization by an operation with other land in the area, helping make the property viable on its own, but also appealing for addition into

another operation. Water rights on the northern part of the property, near the John Day River, are very valuable for irrigated pasture that facilitates use of the property for winter grazing on the same property as summer grazing. Reviewers noted that the fact that the farm is a designated Century Farm that has been under management by the same family for multiple generations helps demonstrate that the land is able to support a viable agricultural operation. In addition, the size and location of the building envelopes appeared reasonable.

Reviewers appreciated that the landowners have invested in juniper and invasive annual grass removal, as this will support agricultural production through facilitating the availability of grazing ground. More specific detail about how the landowners will continue to address weeds and invasive grasses going forward would have been beneficial to the application. The reviewers noted the significance of the steelhead stream on the property, including a confluence area with the John Day River. Reviewers appreciated the inclusion of a focus on grazing practices compatible with salmonid habitat and protection of riparian areas, while remarking that detail on specific management practices that are either occurring or would result as part of the project was somewhat lacking. Reviewers were concerned that there was no mention of a forest management plan, or specific forest management practices to achieve the stated forest resilience and health goals that could be included in the easement. More detail in this regard would have helped the reviewers fully understand how the project would achieve the forest health benefits described.

Reviewers noted the property was at fairly low risk of fragmentation from external pressures and that the threat appeared more internal related to potential succession considerations. The risk to the agricultural use of the property from any future division was not overly concerning to the review team. Smaller acreages that still meet the minimum acreage requirements for agricultural zoning in the county did not present as a major threat to ongoing compatible agricultural use of the property because dwellings are unlikely to be approved in the immediate term. Grant County does not have an established track record of approval of non-farm dwellings on agricultural-zoned lands. The threat to the property for energy (solar) facility siting was noted, but considered minimal as Grant County has not been a target for such development because of the significant distance to electrical transmission infrastructure.

### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Blue Mountain Land Trust is an experienced land trust with a solid track-record of implementing land conservation transactions in the Blue Mountain ecoregion in Eastern Oregon and Southeastern Washington. BMLT is accredited by the Land Trust Alliance. According to the application, over the past 25 years, BMLT has completed 20 conservation easements and one fee title purchase, totaling 23,300 acres of protected land. BMLT appears to have the capacity and ability to handle the complexity of this transaction.

A number of clarifications and additional detail and analysis related to title matters are suggested. There is a discrepancy between the vesting deed provided and the ownership information identified in the title documents that needs to be clarified and resolved. Clarification of the legal description of the property that will be encumbered by the conservation easement is needed, and a boundary survey should be required. The number and nature of severed mineral interests was of concern, primarily for the project's ability to stay within timelines required by funders. For mineral interests held by private parties, of which there are several identified, the applicant will need to make a reasonable effort to extinguish or acquire the rights. BMLT did not provide a pathway to resolving the privately held interests other than the contracting with a geologist to assess the mineral resource potential and determine if the likelihood of mineral extraction is so remote as to

be negligible. A remoteness assessment will satisfy the evaluation needed for the identified federally held mineral interests and may be a satisfactory resolution for the private rights once all reasonable attempts to acquire or extinguish have been made. Further analysis and confirmation that all the access agreements and deeds regarding access points from US Highway 26 are legal is needed.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7101-2383	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Carman Ranch		
<b>Applicant:</b>	Wallowa Land Trust		
<b>Region:</b>	Eastern Oregon	<b>County:</b>	Wallowa
<b>OWEB Request:</b>	\$793,410	<b>Total Cost:</b>	\$1,572,009

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

The Carman Ranch Project in Wallowa Co. aims to protect a vital agricultural landscape from the growing threat of development. The project addresses the urgent need to safeguard the area's agricultural heritage and natural resources, placing a conservation easement on 1,946 acres of the Carman Ranch.

The easement will preserve priority rangeland, critical for maintaining the long-term viability of the local livestock industry, beyond the current operation. The ranch's grasslands provide essential habitat for diverse wildlife species, and the easement ensures these habitats remain intact. By limiting non-agricultural uses and development, the easement supports the continued use of the land for livestock production and promotes regenerative practices that benefit both the environment and the ranch's long-term productivity.

The inclusion of a building zone within the easement boundary supports the ongoing potential of the land to sustain an agricultural operation beyond the current landowner's needs, allowing for the necessary infrastructure to maintain a viable agricultural enterprise in perpetuity.

This project highlights the symbiotic relationship between agriculture and conservation. Carman Ranch's commitment to regenerative land management, including rotational grazing and soil health enhancement, shows how agricultural practices can support the conservation of natural resources. Protecting the land's agricultural value will in turn help preserve the ecological integrity of the region.

This project embodies the importance of collaboration between landowners and conservation organizations in protecting working lands and preserving the unique character of rural communities. The Carman Ranch Project contributes to the broader effort to maintain the agricultural vitality and ecological health of the region, serving as a model for how conservation and agriculture can work together to create a sustainable future for both the land and the people who depend upon it.

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness and capacity review from OWEB due diligence contractors and OWEB staff based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

## ***TECHNICAL REVIEW***

Reviewers appreciated that the application was well developed and provided a compelling case that the size of the ranch is adequate to sustain a viable ranching business. In addition, a comprehensive and informative description of the management plans and management practices already in place to support resilient systems is provided, along with a helpful discussion of management considerations with varying future climate scenarios. Reviewers concurred with the application's assertion that the property is significant and valuable for ranching and wildlife habitat and connectivity and noted that the application's description of these benefits was thorough and well documented. Reviewers also concurred with the application's description of Carman Ranch's leadership in the state when it comes to adding value to ranching products.

Reviewers noted that the property supports valuable deer and elk habitat and fits within the Zumwalt Prairie conservation area. The application would have benefitted from additional detail on the property's proximity and connection to the Zumwalt Prairie preserve. Reviewers noted that the ongoing access provided to Tribes for first foods collection and the public through ODFW's Access and Habitat program helped demonstrate the importance and significance of the property in the region.

Reviewers noted and concurred with the application's description of the high demand for property in the immediate area and region, and the conversion from agricultural uses to luxury recreational use is a bona-fide and documented threat, given the number of people coming to the area for recreation.

## ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Wallowa Land Trust is an established, Land Trust Alliance accredited organization, with a history of acquiring and managing conservation easements on working lands. Project personnel have the necessary experience and expertise to manage and conclude a project of this nature. Other members of the project team, including consultants and legal counsel, are identified as already engaged in the project, which bodes well for quick identification and resolution of project soundness components. Wallowa Land Trust has completed 11 projects, two of which were NRCS ACEP-ALE funded (which is also match funding on this proposal).

Ownership of the property to be encumbered by the proposed conservation easement is vested in a single member LLC, which greatly facilitates decision-making. However, the articles or operating agreement for the LLC were not apparent, and confirmation of authority to enter into real estate negotiations and sell LLC property interest is needed.

Additional and detailed title review is warranted to confirm the legal description of the parcels included in the easement are accepted by the title company, as the application noted a series of property line adjustments that complicate the property's legal descriptions. The applicant has contracted with a specific surveyor to conduct a survey and finalize the legal status of the property line adjustments. Further review of the title exceptions was identified as "ongoing" in the application materials and OWEB's concurrence with, and acceptance of any proposed resolutions is recommended as a funding condition.

No reference to severed mineral interests was included in the application and severed interests were not apparent in the title documentation, but a confirmation from the applicant of a specific mineral rights search is suggested.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7104-23844	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Country Heritage Farm		
<b>Applicant:</b>	Oregon Agricultural Trust		
<b>Region:</b>	Willamette Valley	<b>County:</b>	Yamhill
<b>OWEB Request:</b>	\$1,260,478	<b>Total Cost:</b>	\$2,475,927

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#### APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]

1) Located in Dayton, Yamhill County, the 304-acre Country Heritage Farms “Home Farm” property proposed is a third generation, Food Alliance-certified farm operated by the Sweeney family. 2) Farmed by the family since 1942, the Home Farm is a well-established, diversified Willamette Valley Farm with 242 acres of row crops and hazelnuts and over sixty acres of riparian forest habitat. This farm has 80 years of investment in equipment, irrigation, erosion control, and three generations of family farm knowledge of successful regional crops, markets, and farming techniques. With residential neighborhoods across the street, the property abuts the urban growth boundary (UGB) of the city of Dayton and Sam Sweeney, the sole trustee of the farm property would like to see this entire farm stay together, in agricultural production, as a single property without new residential or industrial development. 3) The proposed work is to finalize the draft conservation easement, complete a management plan and baseline documentation report, contract appraisal(s), survey, and other necessary due diligence required to purchase a working lands conservation easement on this farm with funding from the USDA NRCS Agricultural Land Easement program together with OAHF funding. If funded, this acquisition would take place during 2025/26. The ALE application to OR NRCS has already been completed for this farm and reviewed by OR NRCS staff. It is a strong candidate for ALE funding in the coming fall 2024 Oregon ranking due to a combination of high development pressure, 88% prime farm soils (low slope with water rights) and a proven track record of farm resiliency through diversified crop/market strategies and decades of investment in equipment, drainage and irrigation. 4. Oregon Agricultural Trust is the project manager and will be the long-term conservation easement holder. A private foundation and the farm will each make contributions to funding the permanent easement stewardship cost.

#### REVIEW

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness review from OWEB due diligence contractors based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### TECHNICAL REVIEW

Reviewers noted that the property is a highly valuable farm property in the region, with prime agricultural soils and associated water rights that can be used to support a variety of crops. However, the application was lacking detail describing the significance of this parcel of land, which was expanded upon by the expertise and experience of the review team. The level of threat facing the property from urban expansion and energy siting were well articulated in the application, noting the proximity to the Urban Growth Boundary of a growing city

and nearby power transmission infrastructure. Reviewers agreed that this project is the embodiment of what the program is seeking to address – high value farmland under significant threat of conversion, with the accompanying benefits to wildlife habitat and protection of soil resources.

Reviewers agreed that the agricultural values were well articulated, though the application lacked detail on specific conservation benefits for fish and wildlife habitat and would have benefited from expansion on the natural resource components of the project. The cursory discussion of the habitat related to the perennial creek on the property in the application was especially noted during the discussion.

Reviewers were impressed with soil conservation efforts through erosion control strategies currently in place across the property. The application's description of the property's contribution to water quality benefits was well articulated. Reviewers also noted that the demonstrated ability of the land to produce a variety of crops in the past boded well for the future viability of the land to support an agricultural business.

The project will combine five parcels that could potentially be sold independently, addressing potential concerns related to property succession and facilitating the transfer of land to the next generation. Reviewers concurred with the application's assertion of the of substantial pressure of conversion in the area, specifically from solar development given the property's proximity to transmission infrastructure. The interest in water rights acquisition for municipal use was also noted as a substantial threat to the long-term agricultural viability of the property, which would threaten the property's contribution to the region's agricultural land base. Reviewers noted that a conservation easement on the property would protect the highly productive farmland in a strategic way where land use planning allows for urban development and pressure for urban infrastructure as the city of Dayton expands.

#### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Oregon Agricultural Trust is a relatively young organization that has had success in completing working lands easements over the last three years. The application states they have completed three working land easements protecting 29,872 acres of agricultural lands through a variety of funding mechanisms. OAT is not yet accredited with the Land Trust Alliance, but provided documentation of policies and procedures comparable to an accredited organization. OAT currently has three full-time staff working on land protection projects, two with over a decade of land trust experience managing conservation projects, including significant experience with NRCS and other federal match funding partners.

Ownership of the property appears to be simple, in a trust with one trustee. However, this should be confirmed for confidence in decision-making authority for the project. The property's title is relatively normal for a farm of this nature, with no significant concerns noted. An updated report, specific to the easement property, will be required and OAT has indicated that it will research and resolve any title anomalies.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7103-23838	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Ginocchio Ranch		
<b>Applicant:</b>	Oregon Agricultural Trust		
<b>Region:</b>	Central Oregon	<b>County:</b>	Lake
<b>OWEB Request:</b>	\$425,113	<b>Total Cost:</b>	\$802,771

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

The project is an 871 acre ranch located in Lake County, Oregon, with legal access from Highway 140. The property is located within the Goose Lake Basin, the highest altitude agricultural valley in the state, where dryland range and flood irrigated pasture are the dominant forms of agricultural production.

The property is part of a large area of ranching properties that are threatened by subdivision, and also represents the highest-value habitat for migratory wildlife throughout the state. The property is mixed native rangeland and irrigated pasture, with 72% soils of statewide importance and prime soils, and secure irrigation rights for 302.5 acres, in addition to 10 acres of flood-irrigated pasture. Private ranchlands in the region, like the Ginocchio Ranch, are essential to supporting migratory wildlife. The eastern portion of the property is ranked as “most crucial” for aquatic habitat, is entirely within the winter mule deer range, and a large extent of the property is included within ODFW Priority Wildlife Connectivity Areas. However, subdivision pressure in the region is threatening both the agricultural economy and the wildlife habitat it supports, as evidenced by subdivision of adjacent parcels.

The conservation easement will protect the land for agricultural purposes, preventing subdivision and development. The conservation easement will ensure that the landowner maintains the natural resource values of the property that support agriculture, including its soil quality and water resources. The landowner has invested significantly in irrigation improvements, and is undergoing a removal of 500 acres of juniper to improve the overall pasture conditions of the property. This work will also maintain the natural resources that support the crucial wildlife habitat on the property.

Oregon Agricultural Trust is the project manager and will be the conservation easement holder.

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness and capacity review from OWEB due diligence contractors and OWEB staff based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

Reviewers noted that protecting the property would help maintain the land as valuable winter range that can support a viable agricultural operation. The associated protection of the water rights for agricultural use would be beneficial, as anticipated water policy changes in the basin could limit future availability of water in the region. Reviewers noted that the application's description of the property's attributes appeared to generically describe ranch property generally common in the region and lacked detail regarding why this property was itself significant.

Additional detail on the creek and surface water identified in the application would have provided more foundation for the reviewers to determine the project's strength in protecting and enhancing water quality, fish and wildlife habitat and other natural resource values. Without this detail, the reviewers noted they struggled to determine whether the project was addressing these values. Similarly, invasive grasses were described as present on the property, but the application does not speak to specific management strategies to address this issue, which could complicate the availability of quality range into the future. There are also notable benefits to mule deer and waterfowl, but how this specific easement would benefit those species beyond preventing conversion was not well articulated. Reviewers noted, however, that mule deer range is declining across the state, and any benefits to habitat connectivity is valuable.

Regarding investment and threat considerations, reviewers were encouraged that the juniper treatments that have been complete in partnership with NRCS demonstrate a commitment to setting up the property for future agricultural use and providing habitat enhancements. Reviewers agreed with the application's assertion of the threat posed from non-farm dwelling development in Lake County and that "ranchette" development is a plausible threat to the immediate landscape and is observable nearby.

#### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Oregon Agricultural Trust is a relatively young organization that has had success in completing working lands easements over the last three years. The application states they have completed three working land easements protecting 29,872 acres of agricultural lands through a variety of funding mechanisms. OAT is not yet accredited with the Land Trust Alliance, but provided documentation of policies and procedures comparable to an accredited organization. OAT currently has three full-time staff working on land protection projects, two with over a decade of land trust experience managing conservation projects, including significant experience with NRCS and other federal match funding partners.

Ownership of the property appears to be simple. However the trust documents for the trust that holds the property should be reviewed to understand composition/trustees, authorities, etc. to confirm confidence in decision-making authority for the project. An updated report, specific to the easement property, will be required, and OAT has indicated that it will research and resolve any title anomalies. The title exceptions for "oil, gas and mineral interest separation" warrant further evaluation and documentation to determine the nature of the interests (e.g., leases versus reservations/conveyances). Further, many of these interests are identified as privately held, and OWEB will require the applicant provide documentation that it made a reasonable effort to acquire or extinguish these rights prior to accepting a mineral remoteness assessment.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7101-23836	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Long Hollow Ranch		
<b>Applicant:</b>	Deschutes Land Trust		
<b>Region:</b>	Central Oregon	<b>County:</b>	Deschutes
<b>OWEB Request:</b>	\$340,407	<b>Total Cost:</b>	\$924,014

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#### **APPLICATION DESCRIPTION [PROVIDED BY THE APPLICANT]**

The proposed Long Hollow Ranch Conservation Easement (Project or LHR) is located in Deschutes County between the City of Sisters and the community of Terrebonne, Oregon. Although much land surrounding the Project remains in agricultural production, it is located within a fast-growing area of the county where land ownership is becoming increasingly fragmented due to its proximity to the Cities of Sisters, Redmond and Bend, the low proportion of private lands available in the County, and the retiring population of farmers.

2T Sustainable Land & Cattle Co. (2T) are the controlling shareholders of LHR and this Project builds on the Land Trust's 170-acre conservation easement on 2T's neighboring ranch, Pitchfork T (OWEB grant no 223-7105-22611). The Project is adjacent to additional protected land including land managed by the Bureau of Land Management (BLM), the U.S. Forest Service (USFS), and two Deschutes Land Trust Preserves (Rimrock Ranch and Whychus Canyon, see attached map). The Property is also located within a core wildlife migration area for elk and a declining mule deer population and is mapped as having a relatively high probability of use during migration.

Development or fragmentation of the Project area would degrade wildlife habitat, impeded wildlife movement and compromise Deschutes County's rural, agricultural community. The Deschutes Land Trust will work with LHR to implement a conservation easement on 450 acres that will prohibit development of the property and include a management plan that promotes the regenerative grazing and farming practices of LHR. The Project, along with the neighboring easement, builds a solid conservation "foothold" in the area on which the Land Trust can build on through additional easement acquisitions. Project partners include Natural Resources Conservation Service (NRCS), Metolius Winter Range Working Group, and Deschutes Soil and Water Conservation District

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness review from OWEB due diligence contractors based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

## ***TECHNICAL REVIEW***

The reviewers noted that the proposed project builds on previous state and federal investments -- the proposed conservation easement is adjacent to an OAHF working lands conservation easement grant awarded funding in 2023, though that project is still in progress. The 2023 OAHF grant was also able to leverage funds from the ACEP-ALE program. The property's adjacency to Bureau of Land Management and Forest Service land, which results in a connection to protected land along Whychus Creek, was one of the application's most convincing articulation of the property's significance. Reviewers agreed that a conservation easement on the property would help maintain an important habitat corridor for elk and mule deer—especially if fencing were upgraded to more wildlife friendly designs. Reviewers added that it would have been useful if the application had included more detail regarding specific ongoing management practices, such as the timing of migration with the grazing rotation schedule, to illustrate how the project would support both the agricultural production and grazing values, as well as the identified soil health values and ungulate use of the property.

Reviewers were not convinced by the application that the property was significant in terms of its contributions to regional agricultural viability and fish and wildlife habitat. Without the adjacent lands functioning under coordinated management with the same operation, the property in the application may struggle to support a viable agricultural business in the long term. The property was identified as being in fair to poor condition in terms of habitat and rangeland quality, and will require ongoing conservation and restoration to fulfill agricultural and habitat potential. While the agritourism component of the property is compatible with the agricultural use and could benefit the community through education around the importance of agricultural conservation, reviewers were concerned about the long-term impacts on the property's ability to stay in viable agricultural production.

The application describes a complicated ownership structure for the land and the 90-acre event space carved out of the middle of the property, which reviewers feared could complicate future management. Reviewers noted that the threat from the development of non-farm dwellings is especially high in the area, and placing a conservation easement on the agricultural land surrounding the event center would be beneficial by removing the option to further expand non-farm development. Overall, reviewers determined that the application could have benefited from a more detailed and convincing explanation of how the easement footprint corresponds with the protection of the conservation values, including how this configuration supports wildlife migration. The review team did not feel that the application provided sufficient context on how the proposed easement's boundary configuration will protect the identified conservation and agricultural uses, especially if the two spaces are under different management.

## ***ORGANIZATIONAL CAPACITY AND SOUNDNESS REVIEW***

DLT has been an accredited land trust with the Land Trust Alliance since 2009 and includes working land preservation in its organizational documents. The land trust has completed several land acquisition and easement transactions since 1995, including many with OWEB funding. The project team includes experienced land conservation and stewardship professionals with a track record of successfully completing and stewarding OWEB-funded projects. The land trust has 5 dedicated stewardship staff.

The property is owned by a multi-member LLC, which has the potential to complicate decision-making regarding the easement transaction. However, the LLC includes a majority share owner that could lessen the risk. The land trust has examined the title circumstances and there are few items that need additional consideration, including a partially severed mineral interest for which the land trust will need to make reasonable acquisition or extinguishment of the interest prior to resorting to a mineral remoteness

determination. The property's boundary circumstances need further review to resolve questions regarding the boundary location between the property and adjacent BLM land. The land trust plans to complete a boundary survey, which will help identify if any additional resolution is needed regarding potential encroachment.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7107-23850	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Union Orchards		
<b>Applicant:</b>	Blue Mountain Land Trust		
<b>Region:</b>	Eastern Oregon	<b>County:</b>	Union
<b>OWEB Request:</b>	\$773,045	<b>Total Cost:</b>	\$1,048,094

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

Union Orchards is a 93-acre property located in Union, Oregon. Blue Mountain Land Trust (BMLT) is proposing to purchase a working lands conservation easement from Andrea and Tony Malmberg, permanently protecting its grazing uses and natural resource values. The property is managed for cattle and sheep grazing, and the Malmbergs' holistic grazing management has improved the property's grassland production, plant communities, and soil water storage capacity and reduced their dependence on irrigation. The landowners manage their property for long-term agricultural and financial viability of their grass-fed cattle and sheep business, as well as for long-term soil health and ecological resilience.

In addition to protecting agricultural viability, the conservation easement will structure a permanent instream transfer of water. Union Orchards holds 88.56 acres of senior surface water rights from Catherine Creek, a major tributary to the Grande Ronde River. With an 1874 priority date, these rights are among the most senior in the basin. Under the easement, the landowners will transfer 69.4 acres of these water rights permanently in-stream. Increased in-stream water enhances water temperature, maintains flows, and activates fish habitat, directly benefiting Oregon Conservation Strategy species such as mid- Columbia summer steelhead (Federal Threatened), Grande Ronde bull trout (Federal Threatened), mid-Columbia Spring Chinook (State Sensitive), and Pacific lamprey (State Sensitive). Consequently, the easement will protect, maintain, and improve flows in Catherine Creek.

BMLT has secured matching funds for a Natural Resources Conservation Service (NRCS) Agricultural Lands Easement (ALE) conservation easement. Partners on this project would be the Malmbergs, Blue Mountain Land Trust, NRCS and OWEB

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness and capacity review from OWEB due diligence contractors and OWEB staff based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

Reviewers appreciated the applications quantitative description of current grazing management practices on the property and description of how improvements in soil health have led to a reduction in irrigation needs. Reviewers acknowledged the high-quality soils present on the property that, in addition to supporting the current ranching operation, have supported row crop, orchard, and dairy production in the past. Ultimately, however, the review team was concerned that the proposed permanent instream transfer of a significant amount of the water rights associated with the property would limit the ability of the land to support alternative agricultural production in the future, reducing the agricultural benefits of the high quality soils and effectively restrict the property's use to forage production and grazing. This was especially a concern for the ongoing agricultural viability given uncertainties associated with climate change.

The potential benefits to the availability of water for salmonids from the permanent water transfer were well articulated, but the review team noted that the permanence of the water rights instream transfer was discordant with the agricultural viability and diminished the significance of the property's agricultural resources.

Reviewers noted that the property's size was a limiting factor in the potential to support a viable ranching business on its own, though its utility to either be used in conjunction with other land to support an operation or function independently if combined with off-farm income was acknowledged. The house on the property makes it more valuable both in terms of discrete property value and in providing an opportunity for an owner-operator, but may also reduce the property's appeal to another operator that is looking to expand its agricultural land base. The property has significance in its use and availability to serve as a demonstration farm, providing co-learning opportunities on-farm for other agricultural operators.

The expansion of the City of Union's urban growth boundary was a well-documented threat of fragmentation and conversion, though the reviewers noted that Union currently has plenty of undeveloped land within its UGB, resulting in the threat of expansion being more distant than immediate. The use of a conservation easement to address the potential expansion proactively was acknowledged.

### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Blue Mountain Land Trust is an experienced land trust with a track-record of implementing land conservation transactions in the Blue Mountain ecoregion in Eastern Oregon and Southeastern Washington. BMLT is accredited by the Land Trust Alliance. According to the application, over the past 25 years, BMLT has completed 20 conservation easements and one fee title purchase, totaling 23,300 acres of protected land. BMLT appears to have the capacity and ability to handle the complexity of this transaction.

The property's ownership status appears simple, but updated title documents that confirm the vesting information is correct for the two tracts of land that constitute the entire property will be needed. The ownership structure does not present concerns about decision-making authority. The title documentation provided presents a relatively clean and uncomplicated title.

BMLT researched the BLM General Land Office (GLO) database to find that the land grant to the State of Oregon applicable to the property. did not include any mineral reservations, and confirmation and documentation substantiating this will be requested, as it was identified as an exception on the title documents. Moreover, BMLT will need to confirm that any additional reservations in the land grant to the State of Oregon do not impact the conservation goals of the property.

It was noted in review that there is a platted “paper” street that bisects the property into the western and eastern tract. While it appears that the landowners use this right of way as if it were their own land, and that no other adjacent owner uses this paper street for access, additional analysis would be required as to the county’s rights and willingness to potentially vacate this platted street since the property would be bound as one unit of land by the conservation easement.

After noting the permanent instream transfer references in the project application, OWEB staff initially suggested to the applicant that it could explore separating the permanent instream water transfer transaction from the conservation easement, as the OAHP cannot compensate a landowner for completion of the administrative process of transferring a water right instream. The applicant clarified that the proposal is to fund one transaction, a conservation easement that will encumber a portion of the property’s water rights for instream use and the land for agricultural and conservation purposes. The compensation for the conservation easement proposed for OAHP funding would be determined through standard appraisal procedures for conservation easements that include an encumbrance of water rights. The applicant stated the conservation easement would restrict how the water can be used by identifying the portion of the water proposed for instream use water as a habitat value and an in-stream transfer as a beneficial use. This approach would not accomplish a permanent transfer of the water instream, as water rights can only be transferred through an administrative process with the Oregon Water Resources Department. However, the applicant intends to facilitate the formal administrative transfer of the applicable water rights through the process required by Oregon Water Resources Department concurrently within the due diligence timeframe of the conservation easement project. The potential separation discussion was presented to the review team as part of the soundness considerations for the project to clarify the applicant’s use of the term “transfer” related to the water right.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7110-23855	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Seely Farm Phase 2 Warren Seely		
<b>Applicant:</b>	Oregon Agricultural Trust		
<b>Region:</b>	North Coast	<b>County:</b>	Columbia
<b>OWEB Request:</b>	\$404,670	<b>Total Cost:</b>	\$727,801

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

1. The 484-acre Warren Seely Farm conservation easement project is located in Clatskanie, Columbia County. Adjacent to the existing OAHP/NRCS funded Seely Farm Phase I Harbormaster Beef conservation easement project, if funded, OAHP and OAT will have protected 869 acres of farmland in the Beaver Drainage Improvement Company (aka Beaver Drainage District.) 2. A combination of high-quality soils, location on the lower Columbia River, well-maintained irrigation infrastructure, and sufficient water rights makes farms in the BDIC highly versatile and resilient. The Warren Seely Farm, like many neighboring properties, is threatened by the rezoning of local farmland to industrial use by Columbia County for use by Port Westward, an entity of the Port of Columbia County. Port Westward, which has been a prospective site for coal export terminals, oil-by-rail shipment facilities, a fracked gas-to-methanol refinery, and - currently - a biofuel refinery and export terminal. Each of these development proposals and associated re-zonings jeopardize the farming community in the BDIC. This conservation easement will permanently preserve an additional 484 acres of high value farmland and keep it in active agricultural production. In addition to ongoing production of agricultural products, this conservation easement will protect the habitat for the Lower Columbia white-tailed deer, a Federally-threatened species. The property also contributes to the network of protected lands in the lower Columbia River region of the Pacific Flyway used by 150,000 migrating shorebirds for migratory and breeding habitat. Oregon Agricultural Trust is the project manager and will be the long-term conservation easement holder. 3. Proposed work is purchasing a conservation easement. 4. Project partner is the USDA Natural Resources Conservation Service, who has already funded the matching contribution for the CE purchase. (See attached ALE funding letter.)

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness review from OWEB due diligence contractors based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

Reviewers noted that the property is unique and has highly productive soils which contributes to the area's appeal for high value agricultural crop production. Reviewers also noted they would have liked to see the suitability for high value agriculture on the property better articulated in the application, rather than relying on the knowledge and experience of review team members. The reviewers acknowledged that while Columbian white-tailed deer are likely moving through the property, the presence of high-quality habitat that

would support extensive use is lacking. Reviewers appreciated the detail provided about the aspirational desired future conditions of ditches on the property, but questioned whether native species would be able to establish even if the landowner was able to “lift” the wet ditch areas of the property as articulated in the application. Also, reviewers would have liked to see a discussion of the property’s hydrological connection to the Columbia River. Similarly, the application noted that the property is in the Pacific Flyway, but lacked detail as to how it functions to support migratory bird species and how the proposed easement would guarantee any articulated benefits.

The review team concurred with the application’s description of the threat posed by the ongoing expansion proposed and accomplished by the adjacent industrial use. The application’s articulation of the threat was well documented. The threat to the areas agricultural land base posed by this expansion was also well documented, with the application’s description of how the ongoing loss of agricultural use on property in the drainage district could result in the loss of a critical mass of productive land to support the work of the drainage district. This is a threat to the specific property in the application, but also was noted as a threat to the viability of all farmland within the district.

### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Oregon Agricultural Trust is a relatively young organization that has had success in completing working lands easements over the last three years. OAT includes the protection of working lands in its organizational documents. The application states the organization has completed three working land easements protecting 29,872 acres of agricultural lands through a variety of funding mechanisms. OAT is not yet accredited with the Land Trust Alliance, but provided documentation of policies and procedures comparable to an accredited organization. OAT currently has three full-time staff working on land protection projects, two with over a decade of land trust experience managing conservation projects, including significant experience with NRCS and other federal match funding partners.

An updated title report will be required, along with confirmation that the property is solely owned by the single landowner identified in the application. OAT indicated that the title circumstances are complex, due to mineral rights held by the state of Oregon and private entities, lease agreements and pipeline easements, and other items that will need to be resolved. The mineral interests held by the State and private entities will need to be clarified and OAT will be required to demonstrate that it made reasonable efforts to extinguish or acquire the severed mineral rights prior to OWEB accepting a mineral resource assessment. Boundary and access rights appeared well documented, but a survey and confirmation of legal access will be required.

# Spring 2024 OWEB Grant Offering

## Oregon Agricultural Heritage Program

### Conservation Covenants and Easements

<b>Application No.:</b>	225-7103-23838	<b>Project Type:</b>	Conservation Easement
<b>Project Name:</b>	Wahl Ranch		
<b>Applicant:</b>	Wild Rivers Land Trust		
<b>Region:</b>	Southwest Oregon	<b>County:</b>	Curry
<b>OWEB Request:</b>	\$3,253,809	<b>Total Cost:</b>	\$10,551,414

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#### **APPLICATION DESCRIPTION [ABSTRACT PROVIDED BY THE APPLICANT]**

The Wahl Ranch Conservation Easement Project is the purchase of a conservation easement on a 775-acre portion of the Wahl Ranch, located on the southern Oregon coast in the lower Elk River watershed. The Ranch is located about three miles north of Port Orford, about ½ mile west of Hwy 101, and immediately southeast of Cape Blanco, which is the western most point in Oregon and one of the most western points in the contiguous United States of America. The Project will perpetually protect 775 acres, including ~263 acres of fish and wildlife habitat priority area, ~1.1 miles of the Elk River including the Elk River estuary, large portions of two tributaries to Elk River, several wildlife ponds, and 0.6 miles of Oregon coastline.

This project presents an opportunity to protect, in perpetuity, a large family ranch and an ecologically critical piece of a 20 mile stretch of scenic coastline referred to by sailors as the “dark coast” for its lack of lights and development. It is the last and longest remaining stretch like it that is left on the Oregon coast, consisting of ten ranches, owned by eight families. interspersed with public parks and natural areas. For four generations, despite increasing pressures by residential and commercial development, not one of the ten ranches has converted out of agriculture. This project will also ensure investments made by public agencies, organizations, and the Ranch to restore and protect ecological areas supporting fish and wildlife are secured, including major restorations on Cedar and Swamp Creeks, with additional restoration work planned for both.

Partners on this project include the Wahl Ranch, Wild Rivers Land Trust, The Conservation Fund, the Natural Resources Conservation Service and the Oregon Agricultural Heritage Program. The project supports the recommendations of the Southern Oregon Northern California Coast recovery plan, Elk River Strategic Action Plan for Coho Salmon Recovery and the Oregon Conservation Strategy.

#### **REVIEW**

The review below is feedback provided by the application review technical committee during a review committee meeting and project soundness review from OWEB due diligence contractors based on the evaluation criteria described for conservation easement applications in OAR 698-015-0090.

#### **TECHNICAL REVIEW**

Reviewers noted the family legacy of ranching and farming on the land: Wahl Ranch has been in the family 150 years, is Curry County’s first Century Farm, and serves as a regional example of prosperous and responsible land stewardship in the context of agricultural production. The Ranch is the largest operating sheep ranch on

the south coast, and reviewers were impressed with the unique and special qualities of the property and the landscape it sits in. The Property has irrigation water rights, and maintaining water rights tied to agricultural land on the Oregon coast for agricultural use, was determined to be significant by the review team. Streams on the property--including Cedar Creek, Swamp Creek and the Elk River--offer overwintering and rearing habitat for coho salmon. The 0.6 miles of beach included in the project provide nesting habitat for western snowy plover, listed as threatened under the Endangered Species Act.

Reviewers noted that the application thoroughly explained the landowners' and land trust's approach to a project that includes working lands and fish and wildlife benefits in a complementary manner. Agricultural and habitat management zones reflect current land uses across the property, and all management zones, including the residential building zone and the agricultural building zone, appear to adequately and appropriately protect and guarantee ongoing agricultural uses and fish and wildlife habitat. Water rights on the property are currently leased instream for flow, benefitting fish habitat and water quality, while maintaining the ability to resume use for irrigation in the future if the need arises. This lease is possible due to reduced irrigation needs resulting from the current approach to grazing. Reviewers noted the easement would secure investments made on Swamp Creek to improve fish passage and habitat.

Reviewers commented that soils on this property are not especially high value for agriculture, despite "soil of statewide importance designation." This reduces the potential for the land to support alternative agricultural systems in the future. Currently, soil health is maintained through composting and innovative grazing that utilizes cell/mob grazing that has also proven highly effective at addressing invasive species presence, such as gorse. Reviewers noted that the long-time operational viability of the ranch made a strong case for the lands ability to support a viable agricultural operation into the future.

Reviewers concurred with the application's characterization of the threat facing working lands in the region, and specifically the property proposed for protection in the application. Pressure from recreational and residential development was demonstrated through notable encroachment from the north and south. The conservation easement was noted as a strategy for the multiple members of the LLC (LLC is described in the application as consisting of eight siblings) to secure the conservation and working lands uses of the property into the future as part of succession planning.

Reviewers noted the importance of OWEB's current investment through the OAHP and the secured NRCS matching funds, and indicated it was important to capitalize on OWEB's prior investment to bring the project to completion.

### ***ORGANIZATIONAL CAPACITY AND PROJECT SOUNDNESS REVIEW***

Wild Rivers Land Trust is the main land trust that serves Oregon's south coast and is accredited through the Land Trust Alliance. WRLT includes the protection of working lands in its organizational documents. While WRLT's Executive Director and Conservation Director are relatively new to their respective positions, they both have considerable experience working with land conservation in Oregon. WRLT has partnered with The Conservation Fund to assist with acquisition management and funding, which is helpful based on the size and complexity of the project.

The project's structure appears relatively sound from the application. Ownership of the property is vested in an LLC with eight members, though formal decision-making authority and procedure was not apparent in the application and will need to be documented. The property's title circumstances appear relatively clear for a rural property of this size. The conservation easement's management zones configuration, while it reflects current land uses across the property, are non-linear in places and will require more administrative and stewardship time to avoid inadvertent violations.

# ITEM E, Attachment B



## Oregon Agricultural Heritage Program

November 7, 2024 OAHP Commission Meeting



Tina Kotek, Governor

The following table shows the review team ranking of each OAHP Conservation Easement grant application. The review team generally found that all of the following projects were "qualified" in terms of meeting basic OAHP CE program requirements and thresholds. The staff report for this agenda item describes some of the qualities of the highest and lowest ranked applications.

The table shows the amount requested for each project, and in the far right hand column, the total amount of grant funds that would be cumulatively committed depending on the location of the funding line.

<i>Rank</i>	<i>App #</i>	<i>Application Name</i>	<i>Applicant</i>	<i>OWEB Ask*</i>	<i>Running Total Request</i>
1	225-7108-23853	Wahl Ranch	Wild Rivers Land Trust	\$3,253,809	\$3,253,809
2	225-7101-2383	Carman Ranch	Wallowa Land Trust	\$793,410	\$4,047,219
3	225-7105-23848	Country Heritage Farms	Oregon Agricultural Trust	\$1,260,478	\$5,307,697
4	225-7106-238849	Box T Ranch	Blue Mountain Land Trust	\$1,092,008	\$6,399,705
5	225-7103-23839	Albertson Ranch	Oregon Agricultural Trust	\$198,573	\$6,598,278
6	225-7102-23838	Ginochio Ranch	Oregon Agricultural Trust	\$425,113	\$7,023,391
7	225-7109-23855	Seely Farms Phase 2	Oregon Agricultural Trust	\$404,670	\$7,428,061
8	225-7104-23844	Albertson Family Limited Partnership	Oregon Agricultural Trust	\$337,603	\$7,765,664
9	225-7100-23836	Long Hollow Ranch	Deschutes Land Trust	\$340,000	\$8,105,664
10	225-7107-23850	Union Orchards	Blue Mountain Land Trust	\$773,045	\$8,878,709
				<b>GRAND TOTAL:</b>	<b>\$8,878,709</b>

Spending Plan Target\*\*: \$5,081,036

Difference from Total Amount Requested \$3,797,673

## ITEM E, Attachment B

\*Final OWEB ask numbers may be adjusted based on final OWEB fiscal budget review.

\*\* Pending recapture of funds from cancelation of grant #223-7101-22522.

