SOUTH SLOUGH RESERVE MANAGEMENT COMMISSION

April 30, 2021

158th REGULAR MEETING 9:00 A.M. - 12:00 P.M.

*** Due to COVID-19 restrictions, this meeting will occur virtually. Commissioners will receive a link by email to join the meeting.

PUBLIC PARTICIPATION:
To receive the Zoom link, please email Katherine Andreasen, South Slough Reserve Administrative Assistant, at katherine.andreasen@dsl.state.or.us by noon on April 29. If you would like to testify, please provide your name, address, and organization/affiliation, if any. Testimony will be heard in the order that requests for the meeting link are received.

Written comments may be submitted until 12 p.m. on Thursday, April 29, 2021 by emailing them to: katherine.andreasen@dsl.state.or.us

AGENDA

I. Call-to-Order

II. Introductions

III. Review of Meeting Minutes
   1. 157th regular meeting minutes from December 3, 2020

IV. Public Input*

V. Old Business
   1. Legislative Updates

VI. New Business/Presentations
   1. Wasson Upland Forest Plan – Action Item
   2. Staff Presentation – Pampas Grass Removal Project – Alice and Deborah

VII. Information Reports
   1. Administration/Facilities
   2. Education
   3. Coastal Training
   4. Science
   5. Stewardship
   6. Friends of South Slough

VIII. Next scheduled meeting: July 15, 2021 at 1pm

IX. Adjourn

*Limited to 5 minutes each unless arranged in advance of the meeting.
Table of Contents

Minutes of the previous meeting 3

Old Business

  Legislative Updates 8

New Business

  Wasson Upland Forest Plan 10

Information Reports

  Administration/Facilities 54
  Education
  Coastal Training
  Science/Stewardship
  Friends of South Slough verbal report
The meeting was called to order at 1:04 p.m. by Vicki Walker Director of the Department of State Lands and Chair of the Commission.

INTRODUCTIONS

Meeting participants introduced themselves. Chair Walker congratulated Commissioner Main on his re-election to the Coos County Board of Commissioners.
APPROVAL OF THE MINUTES OF THE PREVIOUS MEETING

Chair Walker asked if there was a motion to approve the minutes of the previous meeting. Commissioner Hatfield moved to approve and Commissioner Main seconded. The motion carried.

PUBLIC INPUT

There was no input from the public.

OLD BUSINESS

Transfer of Management of the Reserve

In early 2018, the State Land Board asked Director Walker to complete the ongoing work to evaluate alternative management options for the Reserve. Based on the findings over the last two years, outlined in the memo and report, Director Walker recommended to the State Land Board on October 13, 2020 that DSL continue serving as the state partner to the South Slough National Estuarine Research Reserve. There were no objections.

Chair Walker said she was very pleased with the outcome of her recommendation and thanked all those involved in the lengthy research process. She reiterated that the South Slough Reserve should remain with the Department of State Lands/Common School Fund for many reasons.

Commercial Kayaking Report for 2020

Bree Yednock presented the report from South Coast Tours as detailed in the briefing packet. Commercial tours were limited due to COVID-19 restrictions, but the eight tours that were completed served a wide range of people from cities all over the northwest. Dave Lacey of South Coast Tours received training in June 2020 from staff of South Slough Reserve staff and the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians. Rebecca Muse said that the Reserve plans a March or April deadline for the 2021 application which will allow time for processing and approval before the tour season starts.

Chair Walker commended the efforts of the Commission and staff in setting up and organizing the process for commercial tours on the Reserve.
NEW BUSINESS

Legislative Concept and Boundary Expansion

Under the direction of the South Slough Reserve Management Commission and with approval from the State Land Board, the South Slough National Estuarine Research Reserve (SSNERR) has acquired over 1,500 acres since its last boundary adjustment in 1995. These lands were acquired by the Department of State Lands (DSL) to be managed by the Reserve, with the expectation that they would be brought into the formal boundary of the SSNERR.

Bree Yednock reported that staff are currently working with the National Oceanic and Atmospheric Administration (NOAA) to outline the process for completing a boundary expansion to bring the acquired lands into the SSNERR boundary. Currently, only a subset of the acquired lands can be included in a boundary expansion until a state statute is amended.

Oregon Revised Statute (ORS) 273.553 specifies the State of Oregon shall maintain the South Slough, from Valino Island southward, as a national estuarine research reserve. Because some of the acquired lands are located north of Valino Island, DSL is submitting a Legislative Concept to amend ORS 273.553 so that lands north of Valino Island can be included in future SSNERR boundary expansions. The proposed statute change is being submitted for the Oregon Legislature’s 2021 session.

Chair Walker said that staff have reached out to the Tribes for their involvement and support of the Legislative Concept and she recommended receiving support from the South Slough Reserve Management Commission.

Chair Walker made a motion that the South Slough Reserve Management Commission support the Legislative Concept being brought forward to the 2021 session to amend ORS 273.553 so that lands north of Valino Island can be included in future SSNERR boundary expansions. The motion passed with all in favor.

Chair Walker asked if anyone on the Commission would like to speak to the motion. Commissioner Main asked the Chair if she wanted the Coos County Board of Commissioners to weigh in or just him. Chair Walker thanked him and said she’d like the County Commission to submit a letter to the Legislature; Chair Main said he would bring it up in January. Chair Walker thanked him and replied that she would like the South Slough Reserve Commission to draft a letter and that the Legislative Concept going forward would be distributed to the members of the Commission.
Application for NOAA Procurement, Acquisition and Construction Grant

Rebecca Muse provided information on the proposed application for the NOAA Procurement, Acquisition and Construction Grant

The South Slough Reserve is requesting approval to apply for grant funding from the NOAA Procurement, Acquisition, and Construction (PAC) program for renovations at the Visitor Center. The renovations will serve to enhance access and educational experiences while improving ADA accessibility and creating a self-led learning experience within the exhibits at South Slough NERR.

The budget will include approximately $300,000-400,000 in federal dollars, with a non-federal match requirement in the range of $128,000-172,000. The actual project budget will be based on quotes and estimates from contractors. Match will include staff salary/fringe in managing project as well as volunteer hours.

Goals for the grant will include: Renovate the public restrooms at the Visitor Center to current ADA requirements and allow for gender neutrality; Replace and install multiple ADA-compliant exterior doorways to allow access for all abilities; Update and renovate the Visitor Center exhibits, which will require an exhibit plan, renovation, and installation of exhibits to make the self-led learning experience more engaging, inclusive, and accessible to all audiences; Replace all exterior siding on the Visitor Center and roofing to match the restrooms and provide increased fire protection.

Chair Walker asked if there was a motion to approve the staff recommendation to submit a grant proposal to NOAA’s Procurement, Acquisition, and Construction Fund by the February 12, 2021 deadline.

Commissioner Brainard moved and Commissioner Hatfield seconded. The motion was approved with all in favor.

Staff Presentation

Eelgrass Declines in the South Slough Estuary

Ali Helms, Estuarine Monitoring Coordinator at the Reserve hosted an effective, organized presentation on the decline of eelgrass in the South Slough estuary. She detailed the efforts of staff and other researchers in determining some of the possible factors for the decline. The information on the past and present status of the eelgrass beds, as well as information on the extensive monitoring and experimental plots set up in the Reserve, engaged and informed Commission members and generated much discussion and questions.
Information Reports

Staff shared highlights and progress within their program areas. Commissioner Wall shared a link from NOAA that provides training in facilitating virtual meetings: [https://coast.noaa.gov/digitalcoast/training](https://coast.noaa.gov/digitalcoast/training)

The Friends of South Slough reported on their activities. Chair Walker thanked the Friends for their letters of support, and she said she greatly appreciated the continuing efforts of the FOSS Board on the behalf of the Reserve. Chair Walker said she is looking forward to planning activities for the 50th year anniversary of the South Slough Reserve, once the renovations are completed at the Visitor Center.

Next scheduled meeting: TBA

ADJOURNMENT

A motion to adjourn was requested by the Chair. Commissioner Brainard moved and Commissioner Main seconded. The meeting was adjourned at 3:20 p.m.
Legislative Updates

I. Senate Bill 126

At its December 3, 2020 meeting, the Management Commission approved a Legislative Concept (now Senate Bill 126) prepared by the Department of State Lands (DSL) and Reserve staff related to the management area of the South Slough National Estuarine Research Reserve (SSNERR). If successful, Senate Bill 126 will amend ORS 273.553 so that lands managed by the Reserve that are located north of Valino Island can be included in future expansions of the administrative boundary of the SSNERR. The bill does not change the SSNERR boundary, it only specifies the area that can be included within the boundary. Adjusting the SSNERR boundary requires a subsequent Federal process in coordination with the National Oceanic and Atmospheric Administration.

February 2-3: South Slough Reserve hosted virtual information sessions to provide a summary of SB 126 for members of the public and local stakeholders and to answer questions.

February 8: SB 126 received a public hearing with the Senate Committee on Natural Resources and Wildfire Recovery. Letters of support were submitted as testimony from the Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians; the Coquille Indian Tribe; the League of Women Voters; and the Friends of South Slough. The Port of Coos Bay submitted a letter indicating they needed more time to review the bill.

February 24: The Senate Committee on Natural Resources and Wildfire Recovery voted to move SB 126 to the floor for a vote. A joint letter of support was submitted, signed by DSL Director Walker and the Port of Coos Bay CEO John Burns to state DSL and the Port of Coos Bay will enter into a Memorandum of Understanding (MOU) prior to the Reserve’s next formal boundary adjustment through NOAA. The MOU will outline the intention of the boundary adjustment and how our two entities will work together.

March 18: SB 126 passed the Oregon Senate Chamber. The bill was carried by Senator Prozanski.

April 1: SB 126 had its first reading by the House on April 1 and was referred to the Speaker’s desk.

April 7: SB 126 was referred to the House Committee on Agriculture and Natural Resources.

II. Senate Bill 5539

Senate Bill 5539 is the proposed budget for the Department of State Lands, including the South Slough Reserve, for the 2021-2023 biennium.

March 30: Director Walker presented an overview of the proposed budget to the Joint Committee on Ways and Means Subcommittee on Natural Resources.
March 31: SB 5539 received a public hearing with the Joint Committee on Ways and Means Subcommittee on Natural Resources. Letters of support were submitted by the Friends of South Slough and seven teachers in support of funding South Slough Reserve’s programs.
New Business Agenda Item 1 – Action Item
Approval of Wasson Uplands Restoration Plan

SUBJECT
Enhancing forest health and reducing wildfire risk in the forested uplands of the Wasson Creek watershed managed by South Slough Reserve

ISSUE
Whether the Commission should approve the South Slough Reserve to begin implementation of the restoration actions as outlined in the Wasson Uplands Restoration Plan.

AUTHORITY
ORS 273.553; relating to the management policy of the Reserve and the authority of the Management Commission

ORS 273.554; relating to the authority of the Management Commission to conduct day-to-day operation and management of the Reserve

SUMMARY
Since 2015, South Slough Reserve has been developing a holistic ridgetop to estuary restoration plan for the Wasson Creek Watershed. Prior to state ownership the lowlands of the watershed were drained and used as pastureland, while the upland forests were harvested with no forest management during regrowth. As a result, the lowlands have been colonized with invasive plants, such as reed canary grass, and there is no connection between the ditched channels and the floodplain. The upland forests are now overly dense with closed canopies, few large trees, and sparse understories.

The Reserve’s full restoration plan for the Wasson watershed consists of three main parts:

- Wasson Creek Channel Design
- Wasson Creek Vegetation Restoration Plan
- Wasson Uplands Restoration Plan

South Slough Reserve is requesting approval to begin implementing the Wasson Uplands Restoration Plan, which was recently updated through active engagement by a technical advisory team, grant-supported contractors, and Reserve staff. The plan’s completion coincides with a $64,203 funding opportunity from the US Fish and Wildlife Service to begin project implementation. South Slough Reserve is partnering with the Friends of South Slough who will receive and administer funds.

Work is ongoing to complete the remaining parts of the full watershed restoration plan and will be presented to the Commission as they are completed.
BACKGROUND INFORMATION

Project Area
The Wasson Creek Watershed Project Area (PA) is 530 acres of forested uplands, palustrine wetlands, and remnant pasturelands within the South Slough of the Coos Estuary (see Plan included as Appendix A). The uplands were once dominated by Sitka spruce, Port-Orford-cedar, and western hemlock, with heterogeneous stand structure and diverse understories. Successive timber harvests over the last century (prior to state ownership), without follow-up forest management (e.g. thinning), have caused the uplands of the PA to become overly dense, closed canopy forests with few large trees and sparse understories. These conditions result in reduced habitat potential and high fuel loads that create increased risk of wildfire to the area.

Project Goals
The Wasson Uplands Restoration Plan includes the following goals:

- Conduct an inventory of upland ecological attributes in the Wasson PA, including tree species and general size, understory, and dead wood characteristics
- Prioritize upland stands in need of active restoration
- Develop stand-specific treatments to improve forest health and heterogeneity
- Incorporate the Wasson watershed into ongoing Port-Orford-cedar (*Chamaecyparis lawsoniana*) conservation actions
- Determine road/access needs for upper watershed restoration prescriptions and evaluate the potential for eliminating remnant logging roads
- Incorporate wildfire risk planning and identify strategies to support resilient ecosystems in the case of a fire disturbance
- Determine the potential for improving spawning habitat in Wasson Creek headwater tributaries

The Wasson Uplands Restoration Plan supports several research and stewardship goals in the South Slough Reserve’s 2017-2022 Management Plan and augments regional restoration and planning efforts such as the 2009 Upper Watershed Restoration Action Plan and the 2010 Oregon Watershed Enhancement Board’s Strategic Plan. The initial work to develop the Wasson Uplands Restoration Plan was provided by a technical assistance grant through the Oregon Watershed Enhancement Board in collaboration with the Coos Watershed Association.

RECOMMENDATION
South Slough Reserve recommends the Commission authorize staff to begin implementing the Wasson Uplands Restoration Plan with funding from the US Fish and Wildlife Service administered through the Friends of South Slough Reserve, Inc. and to seek additional funding for implementing the full plan.
Appendix D.

Contents

1 Introduction .....................................................................................................................................................4
2 Description of the Wasson Creek Project Area ................................................................................................6
   Location..........................................................................................................................................................6
   Access and Use...............................................................................................................................................7
   Forest Conditions .............................................................................................................................................7
   Streams ............................................................................................................................................................8
   Soils and Slope .................................................................................................................................................8
3 Overview of Reserve Uplands ....................................................................................................................... 10
4 Methods ........................................................................................................................................................ 11
   Stand Delineation.......................................................................................................................................... 11
   Forest Inventory and Baseline Data Collection ............................................................................................. 11
   Restoration Prioritization.............................................................................................................................. 12
   Upland Forest Modeling................................................................................................................................ 13
5 Current Ecological Conditions of Wasson Project Area ................................................................................. 14
   Dominant Overstory and Understory Species ............................................................................................... 14
   Stand Canopy Characteristics ........................................................................................................................ 15
   Tree Size: Diameter at Breast Height (DBH) .................................................................................................. 15
   Age of Stand .................................................................................................................................................. 17
   Density: Trees Per Acre (TPA) ....................................................................................................................... 17
6 Case for Variable Density Thinning (Drop and Leave) ................................................................................... 18
7 Restoration Actions for the Wasson Uplands by Stand ................................................................................. 19
   Stand Prioritization and Prescriptions........................................................................................................... 19
   Planting and regeneration ............................................................................................................................ 21
   Wood and slash management ....................................................................................................................... 21
   Mid and high priority stands ....................................................................................................................... 22
   Stand 2 – 56.8 Acres, High Priority (Figure 22) ............................................................................................. 22
   Stand 3 – 52.4 Acres, High Priority (Figure 24) ............................................................................................. 23
   Stand 10 – 39.2 Acres, High Priority (Figure 26) ........................................................................................... 24
   Stand 7 – 4.83 Acres, Mid Priority (Figure 28) .............................................................................................. 26
   Stand 6 – 20.0 Acres, Mid Priority (Figure 30) .............................................................................................. 27
   Stand 11 – 54.8 Acres, Mid Priority (Figure 32) ............................................................................................ 28
   Stand 5 – 15.8 Acres, Mid Priority (Figure 34) .............................................................................................. 30
   Stand 4 – 9.2 Acres, Mid Priority (Figure 36) .............................................................................................. 31
Appendix D.

Stand 9 – 34.8 Acres, Mid Priority (Figure 38) .............................................................................................. 32
Low priority stands........................................................................................................................................... 33
Stand 19 – 23.9 Acres, Low Priority............................................................................................................... 33
Stand 20 – 35.9 Acres, Low Priority............................................................................................................... 34
Stand 15 – 12.1 Acres, Low Priority............................................................................................................... 34
Stand 16 – 5.0 Acres, Low Priority............................................................................................................... 35
Stand 13 – 22.5 Acres, Low Priority............................................................................................................... 36
Stand 14 – 11.1 Acres, Low Priority............................................................................................................... 36
Leave stands.................................................................................................................................................. 36
Stand 17 – 10.9 Acres, Leave ........................................................................................................................ 36
Stand 12 – 13.2 Acres, Leave ........................................................................................................................ 36
Stand 8 – 10.0 Acres, Leave – Riparian Management Area ......................................................................... 38
Stand 1 – 40.9 Acres, Leave – Riparian Management Area ........................................................................ 38
Stand 18 – 27.0 Acres, Leave – Riparian Management Area ........................................................................ 38
Stand 21 – 3.4 Acres, Leave – Riparian Management Area ........................................................................ 39

8 Literature Cited ............................................................................................................................................. 40
9 Appendix A – Species List .......................................................................................................................... 43
1 Introduction

The Wasson Creek Watershed Project Area (PA) is 530 acres of forested uplands, palustrine wetlands, and remnant pasturelands within the South Slough of the Coos Estuary (Figure 1). The eastern half of the PA has been part of the South Slough National Estuarine Research Reserve (Reserve) since 1974, while the western portion of the PA was acquired by the Reserve in 2011. The entire Wasson PA is managed under the same management directives as all Reserve lands (ORS 273.553 through 273.558 and OAR 142-001 through 142-015); which are to maintain the integrity of the estuary, protect its natural dynamic processes, and preserve the area for long-term scientific and education uses.

Figure 1: Wasson project area location in the South Slough Watershed

This plan details upland ecological conditions and restoration activities for habitat restoration implementation in the PA. Restoration actions described here will be implemented to achieve site-specific restoration needs as well as Reserve-wide goals for landscape management. To inform this plan, an upland ecological inventory was conducted by collecting field data in 2015. The restoration actions detailed in this plan are based on an analysis of the site data and current restoration and ecological research.
Site-Specific Upland Goals Addressed in this Plan

- Conduct an inventory of upland ecological attributes in the Wasson PA, including tree species and general size, understory, and dead wood characteristics
- Prioritize upland stands in need of active restoration
- Develop stand-specific treatments to improve forest health and heterogeneity
- Incorporate the Wasson watershed into ongoing Port-Orford-cedar (*Chamaecyparis lawsoniana*) conservation actions
- Determine road/access needs for upper watershed restoration prescriptions and evaluate the potential for eliminating remnant logging roads
- Incorporate wildfire risk planning and identify strategies to support resilient ecosystems in the case of a fire disturbance
- Determine the potential for improving spawning habitat in Wasson Creek headwater tributaries

Reserve-Wide Goals & Objectives Addressed in this Plan

- Continue to build the ridgetop to estuary habitat restoration program at the Reserve
- Develop a ridgetop to estuary restoration plan for the Wasson Creek Watershed
- Assess and monitor habitats in the Coos Estuary in order to characterize conditions and changes in habitat use and availability
  - Increase public awareness of Reserve stewardship practices, habitat-related research, and habitat protection
  - Contribute to the scientific community in habitat restoration techniques
  - Evaluate, manage, and restore habitats and ecosystem processes

In addition to these site-specific and Reserve-wide goals, this plan will augment regional restoration and planning efforts such as the 2009 Upper Watershed Restoration Action Plan, the 2017-2022 Reserve Management Plan, and the 2010 Oregon Watershed Enhancement Board’s Strategic Plan.

The Wasson Uplands Restoration Plan is part of a larger planning effort to provide for holistic ridgetop to estuary restoration in the Wasson Creek Watershed. Together with the Wasson Creek Channel Design and the Wasson Creek Vegetation Restoration Plan, this plan functions to compose the ridgetop to estuary ecological restoration plan for the Wasson Creek Watershed.
2 Description of the Wasson Creek Project Area

Location
The Wasson Creek Watershed is located on the South Slough inlet of the Coos Estuary on the southern Oregon coast; near the fishing port of Charleston, Oregon. The watershed drains into Winchester Creek, the largest of the two main tributaries of the South Slough (Figure 2). The Wasson Project Area (PA) is approximately 530 acres and comprised primarily of upland forest (Table 1). Within Township 26S Range 14W, Sections 34 and 35; the center of the parcel is at approximately 43.16°N, 124.20°W.

Table 1: Location, size, and zoning determination of Wasson Project Area

<table>
<thead>
<tr>
<th>Township, Range and Section</th>
<th>T 26S, R 14W, S 34 &amp; 35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parcel Center Latitude / Longitude</td>
<td>43.16° N, 124.20° W</td>
</tr>
<tr>
<td>Total Acres</td>
<td>530</td>
</tr>
<tr>
<td>Acres of Forested Uplands</td>
<td>507</td>
</tr>
<tr>
<td>Zoning</td>
<td>Forest</td>
</tr>
</tbody>
</table>

Figure 2: U.S. Geological Survey map with Wasson Project Area
Access and Use
The PA is in the southwestern corner of the South Slough Reserve and is bounded by Seven Devils Road and Hinch Road to the north, West Beaver Hill Road to the west, Winchester Creek to the east, and a forested ridgeline to the south (Figure 3). Remnant roads from previous timber harvests provide access into the PA from these established roads, but they are in varied states of functionality. Beginning near the confluence of Wasson Creek with Winchester Creek there is a 0.5-mile loop trail that receives moderate human use. The entire watershed is open to hunting.

Forest Conditions
Historically, the floodplain was composed of tidal and forested wetlands before conversion to pasture in the early 1900s. The uplands were once dominated by Sitka spruce, Port-Orford-cedar, and western hemlock, with heterogeneous stand structure and diverse understories. Successive timber harvests over the last century, without follow-up forest management (e.g. thinning), have caused the upland forests of the PA to become overly dense, closed canopy forests with few large trees and sparse understories.
Appendix D.

Streams
The upland reaches of the Wasson Creek Watershed include numerous fish and non-fish bearing streams. Fish bearing streams support populations of several estuarine-dependent fish species such as sea-run cutthroat trout (*Oncorhynchus clarki clarki*), Pacific Lamprey (*Entosphenus tridentatus*) and Western book lamprey (*Lampetra planeri*) (Figure 4). This watershed has the potential of supporting coho salmon (*Oncorhynchus kisutch*) and winter steelhead (*Oncorhynchus mykiss*), which are both present in Winchester Creek.

![Figure 4: Fish bearing and non-fish bearing streams in the Wasson Project Area (red outline)](image)

Soils and Slope
Soils in the project area are comprised predominately of Templeton silt loam (Figure 5). These are deep, well drained soils present at benches, broad ridgetops and side slopes of mountains. These soils are characteristic of the western slopes of the Coast Range in the region. Slopes in the Wasson uplands range from flat to 75% or greater in some headwater regions. Information derived from digital elevation models shows there are several areas in the upper watershed of the PA that have a high likelihood of shallow landslides (Figure 6).
Appendix D.

Figure 5: Soils in the Wasson Project Area

Figure 6: High landslide hazard areas in the Wasson Project Area
3 Overview of Reserve Uplands

The Wasson Project Area (PA) is in the Sitka spruce zone; a variant of the Western hemlock coastal forest type (Franklin and Dyrness, 1973). The Sitka spruce zone is characterized by its proximity to the ocean, with significant moisture delivered to uplands in the form of summer fog. Plant communities are typical of nutrient-poor, well-drained soils (Franklin and Dyrness, 1973; Schultz, 1990). Disturbance regimes in the Sitka spruce zone are characterized by infrequent stand replacing fires on intervals ranging from 200-1,000 years (Agee, 1993) and patch mortality caused by windthrow (Harcombe, 1986).

The environmental setting of the South Slough Reserve and its uplands is well summarized in other documents, namely the Site Profile of the South Slough National Estuarine Research Reserve (Rumrill, 2006) and the Upper Watershed Restoration Action Plan (Robinson, 2009). While the Reserve has acquired over 1,000 acres (including part of the PA) since these plans were completed, the overall upland assessments are still applicable and now augmented by this plan.

Upland forests comprise ~77% of the Reserve and have not been actively managed since the inception of the Reserve in 1974 (Cornu et al., 2012; Graybill, 2006). Prior to 1974, the uplands experienced significant overstory removal (Carey et al., 1991), with virtually all areas having been harvested at least once and up to three times in the past 100 years. Most uplands acquired since 2011 are less than 30 years old. Many stands were homogenously replanted, especially those acquired since 2011, and are consequently densely stocked. Overall, the uplands in the Reserve are dominated by 15-40-year-old mixed conifer trees with brushy slopes, and there are relatively few isolated stands greater than 80 years old (Figure 7). No unmanaged old growth stands remain (Graybill, 2006; Rumrill, 2006). Much of the upland forests in the Reserve need restoration thinning due to the density of remnant plantations (Sheridan, 2001).

The management directive of the Reserve is to develop late-seral stage forest habitat in the uplands (Robinson, 2009). In the Sitka spruce zone, late-seral habitats have several key components: high numbers of large trees, elevated levels of horizontal and vertical heterogeneity, foliage distributed along the boles of large trees, well-developed understory shrub and herb communities, one or more codominant tree layers, mortality caused gaps in the canopy and substantial amounts of snags and downed woody debris (Deal, 2002; Franklin et al., 2002; Muir et al., 2002; Peet and Christensen, 1987). This plan is focused on prioritizing stands for restoration actions that will promote the development of these desired forest conditions.
4 Methods

Stand Delineation
An initial stand delineation was done using LiDAR data, Google Earth aerial imagery, and data from field assessments in the PA conducted in 2008 and preliminary data collected in early 2015 as a pilot study for this project. The imagery and LiDAR were used to characterize canopy height and age of last harvest, resulting in the delineation of 21 forest stands (Figure 8).

Forest Inventory and Baseline Data Collection
A forest inventory was conducted in the PA from May through September 2015. Data were collected in 207 plots (Figure 9). Each plot was 0.05 acre with a fixed radius of 26.3 feet. Plots were spaced evenly across the PA, with one plot per 2.5 acres. In each plot, trees were recorded by species, diameter at breast height (down to 1 inch), height, position in canopy, and percent live crown.

Snag data (diameter, height, decay) was collected in each plot, along with percent cover of the top three dominating understory species. Downed woody debris was noted along a 100’ transect from plot center, directionally to the next plot. Downed woody debris diameter, length and decay class were noted.
The total number of trees per acre (TPA) was calculated for each stand as follows:

\[
(0.05 \text{ acre}) \times \text{number of plots in stand} = \text{total area sampled}
\]

\[
\frac{\text{Number of trees in area sampled}}{\text{total area sampled}} = \text{Trees Per Acre (TPA)}
\]

**Restoration Prioritization**

Data from the forest inventory were used to characterize the overall diversity and composition of each upland forest stand in the PA. Stands were then ranked by TPA (descending), average DBH (ascending), and maximum DBH (ascending). Land use history and aerial imagery were used to estimate the age of each stand. These parameters were then used to rank the priority level (high, mid, low) for each stand. Stands in riparian areas were classified as Riparian Management Areas and therefore excluded from prioritization. In general, young, densely stocked stands with a high TPA and relatively small DBH were classified as high priority.
Upland Forest Modeling

The United States Forest Service Forest Vegetation Simulator (FVS) was used to model forest thinning scenarios to evaluate different thinning prescriptions (Figure 10). Data from the forest inventory were used to inform the model of current average trees per acre, species composition, and size of stand (acreage). General constraints were placed on the model to not cut big leaf maple or all of one species and to reduce levels of cascara.

Three scenarios were modeled:

1. No Action
2. Thin from below to 250 trees per acre, no species constraints (out to the year 2050)
3. Thin to 100 trees per acres, focusing on Douglas-fir removal (out to the year 2050)

Figure 10: Example of Forest Vegetation Simulator modeling for Stand 2
5 Current Ecological Conditions of Wasson Project Area

Dominant Overstory and Understory Species
The overstory plant community, across the Wasson Project Area (PA), is largely occupied by Sitka spruce and Douglas-fir. The remaining overstory community consists largely of cascara, Port-Orford-cedar and western hemlock, with very little representation of western red cedar and willow (Figure 11). The dominant understory species (incl. salmonberry, red elderberry, salal, evergreen huckleberry and sword fern) on average cover around 30% of the survey area (Figure 12).
Stand Canopy Characteristics

One indicator of tree vigor is the percentage of tree height occupied by live crown (percent live crown). Greater percent live crown values indicate greater vigor. Average percent live crown in the PA ranged from 17-65% per stand, with over half of the stands averaging <30% (Figure 13).

Tree Size: Diameter at Breast Height (DBH)

One measure of tree size is the stem diameter at 4.5-feet (diameter at breast height or DBH). Maximum DBH per stand ranged from 6.5-in (Stand 4) to 72.1-in (stand 18), with 51% of the plots in the 12.1-24-in range (Figure 14). For 50% of the plots average DBH was in the 5.1-10-in range (Figure 15 & 16).
Appendix D.

Figure 15: Average tree DBH at each survey plot in the Wasson Project Area.

Figure 16: Average DBH in inches of stands in the Wasson Project Area.
Appendix D.

Age of Stand

Approximate age of stands ranged from 15 to over 50 years (Figure 17). Older stands occupy the eastern portion of the PA, which has been under Reserve management since its inception.

![Figure 17: Estimated age of stands in the Wasson Project Area](image)

Density: Trees Per Acre (TPA)

High tree density dominate the western portion of the PA, with stand averages up to 395 TPA (Figure 18&19). As stem diameters <4-in DBH were excluded from analysis some stands may have much greater densities.

![Figure 18: Trees per acre at each survey plot in the Wasson Project Area](image)
6 Case for Variable Density Thinning (Drop and Leave)

The stands targeted for restoration actions in the Wasson Watershed were planted for timber production - with high densities of merchantable conifer species. These stands were planted densely with the assumption that thinning would take place before the stand was harvested. It is clear based on field surveys that thinning is needed not only to release the planted trees from being overstocked, but to reintroduce heterogeneity, promote biodiversity and increase the overall ecological function of the landscape.

Timber management in the Pacific Northwest has simplified forest ecosystems since the arrival of Europeans (Franklin, 1993a, 1993b; Carey et al., 1999a, b). This shift has led to the rise in exotic species (Hobbs and Humphries, 1995; Halpern et al., 1999; Thysell and Carey, 2001), an imbalance in biotic communities (Aubry, 2000; Carey, 2000; Haveri and Carey 2000; Wilson and Carey 2000; Carey and Harrington, 2001), reduced prey availability for predators (Carey et al., 1992) and poorly functioning food webs (Carey et al., 1996, 1999a, 2002; Colgan et al., 1999). Forest stands managed exclusively for timber production have also been shown to lack various structural attributes associated with late-seral forests such as large canopy trees, a diversity of tree size-classes, a lack of coarse woody debris such as snags and downed wood, variation in crown structure and a shade-tolerant mid story (Franklin and Spies, 1991; Spies, 2004; Zenner, 2004; Bauhus et al., 2009).

The management direction of the South Slough Reserve is to develop late-successional forest ecosystems (Robinson, 2009). To this end, forest management can promote the biocomplexity associated with these ecosystems (Carey et al., 1999a, b) and promote biodiversity on the landscape, the fundamental guiding principle of ecologically sound forest practices (Larsson and Danell, 2001; Lindenmayer and Franklin, 2002). Generally, forest management practices that restore structural
heterogeneity and species diversity will help the Reserve meet its objectives for the development of late-seral forests on the Reserve.

Variable density thinning is an emerging forest practice that restores heterogeneity in dense second growth stands by creating “skips and gaps” within a stand. By creating more availability to resources such as light, water, nutrients and space to understory vegetation, this thinning method reintroduces the variability associated with old-growth forests into a regenerating stand (Carey, 2003; Carey and Johnson, 1995; Carey et al., 1999a; Comfort et al., 2010). “Skips” are patches that receive no treatment; “gaps” are areas that are cleared of overstory trees. Generally, a matrix of lightly thinned forest is left between skips and gaps that comprises much of the remainder of the stand (Figure 20).

This thinning practice has been applied in a wide variety of applications in the Olympic Peninsula since the 1990s. The US Forest Service has found that the practice was easy to apply, resulted in insignificant damage to residual trees, induced a positive response in tree growth rates of all size classes in as little as five years and increased the variation in plant cover and tree regeneration (Harrington, 2009). To mitigate risk to upland forests from wind damage, it is recommended that gaps not be created in wind-prone areas such as ridgetops. Additionally, created gaps should be smaller than the height of the tree canopy to avoid wind funneling.

7 Restoration Actions for the Wasson Uplands by Stand

Stand Prioritization and Prescriptions
Stands were prioritized for restoration based on the number trees per acre (TPA), tree size, and age of stand (Table 2 & Figure 21). The densest stands (i.e. highest TPA) and smallest trees (i.e. lowest DBH) were identified as the highest priority stands for thinning. Stands in riparian areas were not ranked and left as Riparian Management Areas (RMAs).
Table 2: Ranking and prioritization of forest stands in the Wasson Project Area. TPA=Trees Per Acre, DBH = Diameter at Breast Height and RMA = Riparian Management Area.

<table>
<thead>
<tr>
<th>Rank</th>
<th>TPA</th>
<th>Avg DBH</th>
<th>Max DBH</th>
<th>Age</th>
<th>Stand</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>339</td>
<td>7.7</td>
<td>14.1</td>
<td>~25</td>
<td>2</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>294</td>
<td>8.2</td>
<td>42</td>
<td>~20</td>
<td>3</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>395</td>
<td>8.8</td>
<td>18.2</td>
<td>~25</td>
<td>4</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>300</td>
<td>7.3</td>
<td>23.5</td>
<td>~40</td>
<td>10</td>
<td>Mid</td>
</tr>
<tr>
<td>5</td>
<td>260</td>
<td>7.9</td>
<td>18.5</td>
<td>~15</td>
<td>7</td>
<td>Mid</td>
</tr>
<tr>
<td>6</td>
<td>164</td>
<td>16.1</td>
<td>38.6</td>
<td>50+</td>
<td>8</td>
<td>Leave - RMA</td>
</tr>
<tr>
<td>7</td>
<td>347</td>
<td>9.8</td>
<td>23.6</td>
<td>~25</td>
<td>11</td>
<td>Mid</td>
</tr>
<tr>
<td>8</td>
<td>335</td>
<td>7.4</td>
<td>19</td>
<td>~15</td>
<td>5</td>
<td>Mid</td>
</tr>
<tr>
<td>9</td>
<td>149</td>
<td>14.1</td>
<td>35.2</td>
<td>50+</td>
<td>12</td>
<td>Leave - RMA</td>
</tr>
<tr>
<td>10</td>
<td>230</td>
<td>15.1</td>
<td>33.5</td>
<td>50+</td>
<td>16</td>
<td>Low</td>
</tr>
<tr>
<td>11</td>
<td>147</td>
<td>17.8</td>
<td>72.1</td>
<td>50+</td>
<td>18</td>
<td>Leave - RMA</td>
</tr>
<tr>
<td>12</td>
<td>140</td>
<td>5.4</td>
<td>6.5</td>
<td>~15</td>
<td>4</td>
<td>Mid</td>
</tr>
<tr>
<td>13</td>
<td>316</td>
<td>8.1</td>
<td>43</td>
<td>~25</td>
<td>9</td>
<td>Mid</td>
</tr>
<tr>
<td>14</td>
<td>160</td>
<td>14.2</td>
<td>50.2</td>
<td>50+</td>
<td>13</td>
<td>Leave</td>
</tr>
<tr>
<td>15</td>
<td>296</td>
<td>11.5</td>
<td>37.4</td>
<td>50+</td>
<td>20</td>
<td>Low</td>
</tr>
<tr>
<td>16</td>
<td>183</td>
<td>13.6</td>
<td>48</td>
<td>50+</td>
<td>15</td>
<td>Low</td>
</tr>
<tr>
<td>17</td>
<td>124</td>
<td>14.9</td>
<td>43.5</td>
<td>50+</td>
<td>14</td>
<td>Low</td>
</tr>
<tr>
<td>18</td>
<td>133</td>
<td>17.4</td>
<td>30.5</td>
<td>50+</td>
<td>19</td>
<td>Low</td>
</tr>
<tr>
<td>19</td>
<td>185</td>
<td>12.8</td>
<td>29.8</td>
<td>50+</td>
<td>17</td>
<td>Leave</td>
</tr>
<tr>
<td>20</td>
<td>224</td>
<td>16.0</td>
<td>75</td>
<td>50+</td>
<td>12</td>
<td>Leave</td>
</tr>
<tr>
<td>21</td>
<td>80</td>
<td>34.5</td>
<td>48.7</td>
<td>50+</td>
<td>21</td>
<td>Leave - RMA</td>
</tr>
</tbody>
</table>

Figure 21: Prioritization of numbered forest stands in the Wasson Project Area
Restoration prescriptions for the high and mid priority stands were determined based on existing TPA, species diversity, and composition. Modeling results indicated most high and mid priority stands should be initially thinned to 150 TPA, with some stands requiring a secondary thinning 20-25 years later. Stand descriptions and detailed prescriptions are included in subsequent pages.

**Planting and regeneration**
Variable density thinning allows for the natural recruitment of species already within the system, it also provides an opportunity to facilitate recruitment of species that are underrepresented, have been disproportionately impacted (e.g. by disease) or that are culturally important. Several species, including the disease resistant Port-Orford-cedar, are recommended for planting in thinned areas and gaps following treatment (Table 3).

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port-Orford-cedar</td>
<td>Chaemecyparis lawsoniana</td>
<td>Drier sites</td>
</tr>
<tr>
<td>Western red cedar</td>
<td>Thuja plicata</td>
<td>Moist to wet seepage and alluvial</td>
</tr>
<tr>
<td>Big leaf maple</td>
<td>Acer macrophyllum</td>
<td>Dry to moist gaps at lower elevations</td>
</tr>
<tr>
<td>Vine maple</td>
<td>A. circinatum</td>
<td>Moist to wet forest gaps</td>
</tr>
<tr>
<td>Beargrass</td>
<td>Xerophyllum tenax</td>
<td>Well drained, sunny hillside, dappled light</td>
</tr>
<tr>
<td>Giant chain fern</td>
<td>Woodwardia fimbriata</td>
<td>Moist areas, springs</td>
</tr>
<tr>
<td>Beaked hazelnut</td>
<td>Corylus cornuta</td>
<td>Moist but well drained gaps and stream edges</td>
</tr>
<tr>
<td>Black gooseberry</td>
<td>Ribes lacustre</td>
<td>Stream banks or forested slopes, rotted wood</td>
</tr>
<tr>
<td>Trailing black current</td>
<td>Ribes laxiflorum</td>
<td>Moist forest gaps at low to mid elevations</td>
</tr>
</tbody>
</table>

**Wood and slash management**
The Oregon Administrative Rules, that govern the South Slough Reserve, prohibit commercial timber harvesting; therefore, trees felled during restoration thinning are unable to be sold. Several factors are considered when determining the fate of materials from the thinning prescriptions, including fuel and wildfire risk, habitat value, nutrient cycling, carbon sequestration and output, and use within the stream restoration component. Materials from the thinning will be processed in the following ways:

**Lop and scatter**: trees limbed, to accelerate decay, and left in place. Due to fuel loading any material left on site will be spaced to avoid continuous high fuel areas

**Habitat piles**: trees limbed and piled within gaps

**Biochar**: use biochar kilns to lock up carbon, products can be scattered on site or used in wetland restoration plantings

**Used in stream restoration**: medium-large trees (>12” DBH and >40’ length) can be use as large wood structures, while smaller trees (<8” DBH) can be used for nurse cribs and beaver dam analogs

**Mulching and chipping**: Where on ground machinery is accessible smaller trees and limbs can be chipped and scattered on site. To reduce fire risk chip lays will not exceed 2” depth

**Burn piles**: Burn piles will be used only when necessary and limited to fine fuels

**Stewardship contracting**: offset costs by trading wood for services. This will be limited by availability of merchantable trees and will depend on regulatory allowances.
Mid and high priority stands

Stand 2 – 56.8 Acres, High Priority (Figure 22)

Stand 2 – Description

This stand was clear cut in approximately 1994. The stand of replanted Douglas-fir and likely naturally regenerated Sitka spruce (Figure 23) is now 20-25 years old, with an average DBH of 8” and 339 TPA. There is a predominantly northern and western aspect, with a northeastern aspect on the east side of the stand. A narrow, steep drainage is on the west of the stand, which will need to be considered during thinning (Figure 6). Further buffering of the two narrow drainages on the east side of the stand is also recommended. Remnant logging roads exist along the southern and eastern boundaries with one remnant spur into the center of the stand which may be reopened temporarily for operational use (Figure 3). Stewardship contracting may be an option due to the ease of access and merchantability of trees but a stand exam to establish volume estimates in treatment areas would be needed to determine the viability of the project.

Figure 23: Species composition of trees in Stand 2. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = willow, TSHE = western hemlock
Appendix D.

Stand 2 – Prescription

On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 6 acres total), ½-acre to ¼-acre gaps (up to 9 acres total) and a thinning matrix between the skips and gaps. Gaps should be located strategically to minimize wind damage (i.e. not on ridgetops) where possible and skips could include areas within the steep ravine. Treatments will preferentially remove Douglas-fir, leave trees over 12” DBH and leave allsnags over 12” DBH. Underplanting of disease-resistant Port-Orford-cedar seedlings in thinned areas and gaps following treatment is encouraged, especially in relatively flat areas or in higher elevations. In areas of higher moisture, underplanting of western red cedar is recommended. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 15-20 years. Re-entry will likely involve commercially viable thinning.

Stand 3 – 52.4 Acres, High Priority (Figure 24)

This stand was clear cut in approximately 2000. The stand of replanted Douglas fir and likely naturally regenerated Sitka spruce is now 17-20 years old, with an average DBH of 8” and 294 trees per acre. There are many small (<4” DBH) Cascara (Rhamnus purshiana) in the stand which are not expected to persist following treatment (Figure 25). There is a predominantly southern aspect. Two narrow steep drainages in the center of the stand and one creek on the west side of the stand will need to be buffered to mitigatedebris flow risk following thinning (Figure 6). There are no remnant roads into this stand, access will be by foot. This stand is adjacent to the Spruce Ranch and shop buildings, making it an attractive option for recreation or education development such as an interpretive trail to demonstrate restoration forestry practices at the South Slough Reserve. Based on soil type, aspect, and accessibility this stand may be suitable for establishing a population of beargrass (Xerophyllum tenax).
Appendix D.

Stand 3 – Prescription

On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 6 acres total), ½-acre to ¼-acre gaps (up to 9 acres total) and a thinning matrix between the skips and gaps. Gaps should be located strategically to minimize wind damage (i.e. not on ridgetops) where possible. Treatments will preferentially remove Douglas fir, leave trees over 12” DBH and leave all snags over 10” DBH. Underplanting of disease-resistant Port-Orford-cedar seedlings in thinned areas and gaps following treatment is encouraged. This stand should be assessed for planting beargrass in a gap with dappled sunlight, potentially amongst sparse cascara trees. Fire breaks and education trails should be considered for this site. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 15-20 years. Re-entry will likely involve commercially viable thinning.

Stand 10 – 39.2 Acres, High Priority (Figure 26)

Figure 26: Location of stand 10 within Wasson project area

Figure 25: Species composition of trees in Stand 3. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara
Appendix D.

**Stand 10 – Description**

This stand was clear cut in approximately 1994. The stand of replanted Douglas fir with lesser amounts of native tree regeneration mixed throughout is now 20-25 years old, with an average DBH of 9” and 395 trees per acre. There are many small (<4” DBH) Cascara in the stand which are not expected to persist following treatment (Figure 27). There is a predominantly northwestern aspect, with a small portion of southeast segment on the northern end of the stand. There is a small stream running through the middle of the unit that may need to be buffered to mitigate debris flow risk following thinning, as well as most of the northern section of the unit (Figure 6). There is a remnant logging road running down the ridge on the southern boundary of this unit which may be temporarily reopened for operational access (Figure 3). Stewardship contracting may be an option due to the ease of access and merchantability of trees but a stand exam to establish volume estimates in treatment areas would be needed to determine the viability of the project. Re-entry will likely involve commercially viable thinning.

![Species composition of trees in Stand 10. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = willow, TSHE = western hemlock](image)

**Figure 27: Species composition of trees in Stand 10. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = willow, TSHE = western hemlock**

**Stand 10 – Prescription**

On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 5 acres total), ½-acre to ¼-acre gaps (up to 6 acres total) and a thinning matrix between the skips and gaps. Gaps should be located strategically to minimize wind damage (i.e. not on ridgetops) where possible. Treatments will preferentially remove Douglas fir, leave trees over 12” DBH and leave all snags over 10” DBH. Underplanting of disease-resistant Port-Orford-cedar in drier areas and western red cedar in wetter areas is recommended. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 15-20 years.
Appendix D.

Stand 7 – 4.83 Acres, Mid Priority (Figure 28)

Figure 28: Location of stand 7 within Wasson project area

Stand 7 - Description

This stand was clear cut in approximately 1994. The stand is mixed with replanted Douglas fir and native tree regeneration ranging from 20-60 years old, with an average DBH of 7” and 300 trees per acre. There are many small (<4” DBH) Cascara in the stand which are not expected to persist following treatment (Figure 29). There is a very slight northeastern aspect on the eastern edge of the stand, but otherwise it is relatively flat. There is a short remnant spur road into southern boundary of this unit which may be temporarily reopened for operational access (Figure 3). Stewardship contracting may be an option due to the ease of access and merchantability of trees but a stand exam to establish volume estimates in treatment areas would be needed to determine the viability of the project. Re-entry will likely involve commercially viable thinning.

Figure 29: Species composition of trees in Stand 7. PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = willow, TSHE = western hemlock
Appendix D.

**Stand 7 – Prescription**

On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing one ½-acre skip, two ¼-acre gaps and a thinning matrix between the skips and gaps. Due to the proximity to West Beaver Hill Road, a 100 ft buffer strip may be placed along the road instead of creating skips within the stand itself. Treatments will preferentially remove Douglas fir, leave trees over 12” DBH and leave all snags over 10” DBH. Underplanting of disease-resistant Port-Orford-cedar is encouraged. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 15-20 years.

**Stand 6 – 20.0 Acres, Mid Priority (Figure 30)**

![Figure 30: Location of stand 6 within Wasson project area](image)

**Stand 6 – Description**

This stand was clear cut in approximately 2003. This 15-year-old stand is mixed with replanted Sitka spruce and diverse native tree regeneration (Figure 31), with an average DBH of 8” and 260 trees per acre. Our analysis excluded saplings under 4” in calculations of trees per acre – but due to the age of this stand there will likely need to be thinning of the many young trees to accelerate development of late seral conditions and avoid the stand developing into a dense plantation. The southwestern portion of the stand contains steep slopes along the headwaters of two small streams (Figure 3) and may need to be buffered to mitigate debris flow risk following thinning (Figure 6). There is a remnant logging road through the middle of the unit which may be temporarily reopened for operational access (Figure 3).
Appendix D.

Stand 6 – Prescription

Due to age of stand and ease of access, this will be one of the first stands to implement forest management. On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 2 acres total), ¼-acre to ¼-acre gaps (up to 3 acres total) and a thinning matrix between the skips and gaps. Due to the proximity to West Beaver Hill Road, a 100 ft buffer strip may be placed along the road instead of or in addition to creating skips within the stand itself. Treatments will preferentially remove Sitka spruce, leave trees over 12” DBH and leave all snags over 10” DBH. Underplanting of disease-resistant Port-Orford-cedar is encouraged. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 20-25 years.

Stand 11 – 54.8 Acres, Mid Priority (Figure 32)

Figure 31: Species composition of trees in Stand 6. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = willow, THPL = western red cedar, TSHE = western hemlock
Appendix D.

Stand 11 – Description

This stand was clear cut in approximately 1994. This 20 to 25-year-old stand is mixed with replanted Sitka spruce and Douglas fir and limited native tree regeneration (Figure 33), with an average DBH of 10” and 347 trees per acre. The center of the stand is on a bench, with steep slopes falling off to the west, south and east sides of the stand. The southwestern portion of the stand and the drainage in the northeastern portion of the stands may need to be buffered to mitigate debris flow risk following thinning (Figure 6). There is a remnant logging road through the middle of the unit which may be temporarily reopened for operational access (Figure 3). Stewardship contracting may be an option due to the ease of access and merchantability of trees but a stand exam to establish volume estimates in treatment areas would be needed to determine the viability of the project. Re-entry will likely involve commercially viable thinning.

![Species composition of trees in Stand 11. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, THPL = western red cedar, TSHE = western hemlock](image)

**Figure 33: Species composition of trees in Stand 11. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, THPL = western red cedar, TSHE = western hemlock**

Stand 11 – Prescription

On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 6 acres total), ½-acre to ¼-acre gaps (up to 8 acres total) and a thinning matrix between the skips and gaps. Due to the proximity to West Beaver Hill Road, a 100 ft buffer strip may be placed along the road instead of or in addition to creating skips within the stand itself. Treatments will preferentially remove Sitka spruce, leave trees over 12” DBH and leave all snags over 10” DBH. Underplanting of disease-resistant Port-Orford-cedar in drier areas and western red cedar in wetter areas is recommended. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 20-25 years.
Appendix D.

Stand 5 – 15.8 Acres, Mid Priority (Figure 34)

Stand 5 – Description

This stand was clear cut in approximately 2003. This 15-year-old stand is mixed with replanted Sitka spruce and diverse native tree regeneration (Figure 35), with an average DBH of 7.5” and 335 trees per acre. Our analysis excluded saplings under 4” in calculations of trees per acre – but due to the age of this stand there will likely need to be thinning of the many young trees to accelerate development of late seral conditions and avoid the stand developing into a dense plantation. The seasonal stream along the eastern boundary of the stand and the steep slopes in the northeastern area of the stand will need to be considered during thinning (Figure 6). Most of the stand has a southeastern aspect. There is a remnant logging road along the western boundary of the unit which may be temporarily reopened for operational access (Figure 3).

Figure 34: Location of stand 5 within Wasson project area

Figure 35: Species composition of trees in Stand 5. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, THPL = western red cedar, TSHE = western hemlock
Appendix D.

Stand 5 – Prescription

Due to age of stand and ease of access, this will be one of the first stands to implement forest management. On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 2 acres total), ½-acre to ¼-acre gaps (up to 3 acres total) and a thinning matrix between the skips and gaps. Due to the proximity to West Beaver Hill Road, a 100 ft buffer strip may be placed along the road instead of or in addition to creating skips within the stand itself. Treatments will preferentially remove Sitka spruce, leave trees over 12” DBH and leave all snags over 10” DBH. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 20-25 years.

Stand 4 – 9.2 Acres, Mid Priority (Figure 36)

![Figure 36: Location of stand 4 within Wasson project area](image)

Stand 4 – Description

This stand was clear cut in approximately 2003. This 15-year-old stand is mixed with replanted Sitka spruce and diverse native tree regeneration (Figure 37), with an average DBH of 5” and 140 trees per acre. Our analysis excluded saplings under 4” in calculations of trees per acre – but due to the age of this stand there will likely need to be thinning of the many young trees to accelerate development of late seral conditions and avoid the stand developing into a dense plantation. The stand is flat and has very low risk of debris flow following treatment (Figure 6). There is a remnant logging road along the eastern boundary of the unit which may be temporarily reopened for operational access (Figure 3). This stand has easy access and would make a good location to develop recreational or educational resources such as interpretive signs and trails to demonstrate restoration forestry practices at South Slough.
Appendix D.

Stand 4 – Prescription

Due to age of stand and ease of access, this will be one of the first stands to implement forest management. On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing a 1-acre skip, two ¾ -acre gaps and a thinning matrix between the skips and gaps. Due to the proximity to West Beaver Hill Road, a 100 ft buffer strip may be placed along the road instead of or in addition to creating skips within the stand itself. Treatments will preferentially remove Sitka spruce, leave trees over 12” DBH and leave all snags over 10” DBH. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 20-25 years.

Stand 9 – 34.8 Acres, Mid Priority (Figure 38)

Figure 38: Stand 9 within Wasson project area

This stand was clear cut in approximately 1994. This 20 to 25-year-old stand is mixed with replanted Sitka spruce and Douglas fir and limited but diverse native tree regeneration (Figure 39), with an average DBH of 8” and 316 trees per acre. The aspect is northern with two steep drainages making up the middle of the stand (Figure 3), parts of which will need to be buffered to mitigate debris flow risk following thinning (Figure 6). There are three short spur roads reaching to the top of the ridge in the middle of the stand which may be temporarily reopened for operational access (Figure 3). Stewardship
contracting may be an option due to the ease of access and merchantability of trees but a stand exam to establish volume estimates in treatment areas would be needed to determine the viability of the project. Re-entry will likely involve commercially viable thinning.

**Figure 39:** Species composition of trees in Stand 9. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = willow, TSHE = western hemlock

**Stand 9 – Prescription**

On the initial entry, thin to 150 trees per acre (17 ft spacing between leave trees), utilizing ½-acre to 1-acre skips (up to 4 acres total), ½-acre to ¼-acre gaps (up to 6 acres total) and a thinning matrix between the skips and gaps. Due to the proximity to West Beaver Hill Road, a 100 ft buffer strip may be placed along the road instead of or in addition to creating skips within the stand itself. Treatments will preferentially remove Sitka spruce, leave trees over 12” DBH and leave all snags over 10” DBH. Underplanting of disease-resistant Port-Orford-cedar in drier areas and western red cedar in wetter areas is recommended. Restoration actions and timing for a second entry should be determined with follow-up monitoring, but further thinning to roughly 70 TPA (25 ft spacing) and creation of snags and downed woody debris will likely be needed in 20-25 years.

**Low priority stands**

**Stand 19 – 23.9 Acres, Low Priority**

Stand 19 was harvested prior to 1974 and is currently mixed conifer with 133 TPA which (Figure 40). Survey data is based on 11 plots of data. Comprises a flatter area above drainage on the north side of the Wasson Watershed, while the main component of the stand is predominantly an eastern aspect and sloped. The northeastern tip of the stand joins up with Hinch Road, which provides good access to the stand.

**Figure 40:** a) Stand 19 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock

**Stand 19 – Prescription**
Stand could be thinned for demonstration purposes. Remove up to 20% of conifer trees (down to ~150/acre, considering cascara component). Leave all trees over 20’’ DBH and all snags over 10’’ DBH. Cable operation likely needed in steep drainages; creation of 12’ corridors needed for extraction, with minimum spacing of 150’. Merchantable wood could be used for stewardship contracting. Skips in patches of larger trees (3 acres remain untouched) and gaps in densest areas (total not to exceed 3.5 acres).

**Stand 20 – 35.9 Acres, Low Priority**
Stand 20 was harvested prior to 1974 and is currently mixed conifer with 296 TPA which (Figure 41). Survey data is based on 12 plots of data. This stand is relatively flat and includes the head of multiple smaller creeks that drain into the northern part of the Wasson drainage. Hinch Road borders the stand to the north and provides good access. Generally, a southern aspect.

**Stand 20 – Prescription**
Stand could be thinned for demonstration purposes. Remove up to 45% of trees (down to ~200/acre), half in the 5-12” DBH class, half in the 12-24” DBH class. Leave all snags over 10” DBH. Cable operation likely needed in steep drainages; creation of corridors needed for extraction. Merchantable wood may be used for stewardship contracting. Skips should be located in patches of larger trees (4 acres remain untouched) and gaps in densest areas (total not to exceed 5.5 acres). Port-Orford-cedar thickets are present.

**Stand 15 – 12.1 Acres, Low Priority**
Stand 15 was harvested prior to 1974 and is currently mixed conifer with 183 TPA which (Figure 42). Survey data is based on 7 plots of data.

---

**Figure 41:** a) Stand 20 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock

**Figure 42:** a) Stand 15 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, SALIX = Willow, TSHE = western hemlock
Appendix D.

**Stand 15 – Prescription**

Stands 15 and 16, will supply large wood to the stream restoration component of the project (Appendix B). Approximately 300 pieces of large wood (12-16” DBH and 40-60’ long) will be extracted across both stands. Small corridors, maximum width 12’ with minimum spacing of 150’, will be used to extract trees with minimal impact using a yarder and cable system. Seeps and wet drainages will be considered for planting giant chain fern.

**Stand 16 – 5.0 Acres, Low Priority**

Stand 16 was harvested prior to 1974 and is currently mixed conifer with 230 TPA which (Figure 43). Survey data is based on 4 plots of data.

![Figure 43: a) Stand 16 location and b) species composition. CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock.](image)

**Stand 16 – Prescription**

Stands 15 and 16, will supply large wood to the stream restoration component of the project (Appendix B). Approximately 300 pieces of large wood (12-16” DBH and 40-60’ long) will be extracted across both stands. Small corridors, maximum width 12’ and minimum spacing of 150’, will be used to extract trees with minimal impact using a yarder and cable system. Seeps and wet drainages will be considered for planting giant chain fern.
Appendix D.

**Stand 14 – 11.1 Acres, Low Priority**
Stand 14 was harvested prior to 1974 and is currently mixed conifer with 124 TPA which (Figure 45). Survey data is based on 5 plots of data.

![Figure 45: a) Stand 14 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock](image)

**Leave stands**

**Stand 13 – 22.5 Acres, Leave**
Stand 13 was harvested prior to 1974 and is currently mixed conifer with 160 TPA which (Figure 44). Survey data is based on 8 plots of data.

![Figure 44: a) Stand 13 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock](image)

**Stand 17 – 10.9 Acres, Leave**
Stand 17 was harvested prior to 1974 and is currently mixed conifer with 185 TPA which (Figure 46). Survey data is based on 4 plots of data.

![Figure 46: a) Stand 17 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock](image)

**Stand 12 – 13.2 Acres, Leave**
Stand 12 was harvested prior to 1974 and is currently mixed conifer with 224 TPA which (Figure 47). Survey
Appendix D.

data is based on 5 plots of data.

Figure 47: a) Stand 12 location and b) species composition. ALRU = red alder, PISI = Sitka spruce, THPL = western red cedar
Appendix D.

Stand 8 – 10.0 Acres, Leave – Riparian Management Area
Stand 8 was harvested prior to 1994, likely left as buffer for ~1994 harvests, and currently has 164 TPA (Figure 48). Located deep in the lower parts of the upper watershed this stand buffers Wasson creek on both the north and the south (dual aspect based on side of creek). Not likely to need or be accessed for active management. Five plots were surveyed in this stand.

![Figure 48: a) Stand 8 location and b) species composition. ALRU = red alder, PISI = Sitka spruce, PSME = Douglas-fir, THPL = western red cedar](image)

Stand 1 – 40.9 Acres, Leave – Riparian Management Area
Stand 1 was harvested prior to 1994, probably older than 1974 and consists of a relatively flat square stand of hardwoods (149 TPA; Figure 49) that borders Wasson Creek on both sides. Crosses Wasson Creek and consequently includes both northern and southern aspects. The remnant logging road, runs from the ridgeline through stand 2 accesses the southeast corner of the stand. Sixteen plots were surveyed in this stand.

![Figure 49: a) Stand 1 location and b) species composition. ALRU = red alder, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, TSHE = western hemlock](image)

Stand 18 – 27.0 Acres, Leave – Riparian Management Area
Stand 18 was harvested prior to 1974 and is currently mixed conifer with 147 TPA which (Figure 50). Survey data is based on 11 plots of data.

![Figure 50: a) Stand 18 location and b) species composition. ALRU = red alder, CHLA = Port-Orford-cedar, PISI = Sitka spruce, PSME = Douglas-fir, RHPU = Cascara, THPL = western red cedar, TSHE = western hemlock](image)
Appendix D.

Stand 21 – 3.4 Acres, Leave – Riparian Management Area
This small stand was harvested prior to 1974 and is currently dominated by Sitka spruce with 80 TPA which (Figure 51). Survey data is based on a single plot of data.

Figure 51: a) Stand 21 location and b) species composition. PISI = Sitka spruce
Appendix D.

8 Literature Cited


Harcombe, P.A. 1986. Stand Development in a 130 year old Spruce-Hemlock Forest Based on Age Structure and 50 Years of Mortality Data. *For. Ecol. and Manage.* 14, 41-58


Appendix D.


## 9 Supplementary Information A – Species List

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<th>Latin Name</th>
<th>Abbreviated Latin</th>
<th>4-Letter Code</th>
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<td>A. grandis</td>
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<tr>
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<td>C. lawsoniana</td>
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<td>P. contorta</td>
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<tr>
<td>Sitka spruce</td>
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<td>P. sitchensis</td>
<td>PISI</td>
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<td>Douglas fir</td>
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<td>P. menzeseii</td>
<td>PSME</td>
</tr>
<tr>
<td>Coastal redwood</td>
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<td>S. sempervirens</td>
<td>SESE</td>
</tr>
<tr>
<td>Western red cedar</td>
<td>Thuja plicata</td>
<td>T. plicata</td>
<td>THPL</td>
</tr>
<tr>
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<td>Big leaf maple</td>
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<td>A. macrophyllum</td>
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<tr>
<td>Red alder</td>
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<td>A. rubra</td>
<td>ALRU</td>
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<tr>
<td>Cascara</td>
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<td>R. purshiana</td>
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<tr>
<td>Willow</td>
<td>Salix, spp.</td>
<td>S. spp.</td>
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<tr>
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<td>Slough sedge</td>
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<tr>
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<td>G. shallon</td>
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<td>Himalayan (Armenian) blackberry</td>
<td>Rubus armeniacus</td>
<td>R. armeniacus</td>
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Administrative/Facilities Report

Staff: Bree Yednock, Reserve Manager  
Rebecca Muse, Operations Manager  
Michael Allman, Facilities Lead  
Jonathan Forth, Park Ranger Assistant  
Patrick Juarez, Procurement/Contract Assistant  
Katherine Andreasen, Administrative Assistant  
Ed Oswald, Information Systems Technician

COVID-19 Update

The Visitor Center remains closed to the public until at least September 1.

Administrative

Attached are the state budget reports for the 2019-2021 biennium through January 2021.

Winter has been normal in terms of Reserve’s operations, administrative and facilities staff. Facility staff have continued working onsite as normal with extra cleaning and security rounds.

During the reporting period administrative and facilities staff continued work on three NOAA Procurement, Acquisition, and Construction (PAC) awards, which include a land acquisition and two construction grants.

The FY20 land acquisition PAC award will be used to purchase a 1.14-acre property at the entrance to the Visitor Center from Coos County. Reserve Manager Yednock has been coordinating with DSL Real Property staff to complete a Phase I Environment Assessment. This report is expected in mid-May. Barring any issues, we expect to proceed with closing after that.

Staff submitted another NOAA Procurement, Acquisition, and Construction application for upgrades to the Visitor Center in February. These upgrades will include ADA accessible doors and thresholds installed in multiple areas throughout the facility and a complete renovation to ensure ADA accessibility to the public restrooms. This grant will also include a full renovation and updates of the exhibits. Total Federal ask was $500,000. Results came out the week of April 12th and it has been fully funded. Work and planning will start July 2021.

Staff also submitted the FY21 NOAA operations grant that will cover July 2021 through December 2022. During the grant writing, we determine how our
federal budget will be used as well as any special projects that NOAA can fund. Management allocated as much NOAA funding as possible towards payroll.

Facilities

Facilities staff have continued to work onsite during the COVID-19 closure. Since the closure began in March, there have been additional impacts to the trail system with more cleanup than usual. Daily cleanings are still happening to the public restrooms to keep them open to the public. Staff are also working on the trail system doing the routine maintenance as everything starts to grow.

The FY19 PAC construction award from NOAA includes the expansion of the maintenance compound to include a pole barn to store our paddle crafts and add a RV host site. Facilities staff have continued through the maze of DEQ processes to get the utilities hooked up for the RV site. Staff have also started the process to get the pole barn built and are working through the quote process. A procurement was completed, and a signed contract is in place to update all the siding on the current maintenance building. This work will be completed in the next couple of months. And lastly, a brand-new motorized gate system was installed in February on the maintenance access gate.

The FY20 PAC construction award from NOAA includes renovations to boardwalks/bridges and updates to the trail system including new kiosks and a hands-free, refillable water fountain at the Visitor Center. To kick off the work on the trail system, we had a trails group from the North Cascades National Park come and do a full trails assessment in October. We received our finalized assessment in February and staff have started to work through the suggestions and next steps. Staff did an on-site walk through of the suggested updates to the transition between the North Creek and Tunnel Trails in April. This work will include rerouting the current trail to reduce the incline and make the climb safer for hikers. Work on this transition will be done by staff and CFPA crews and start in mid May 2021.

In November it was noted that our Hidden Creek 9 bridge was damaged and needed replacement. This is a 16 ft. long bridge traversing over Hidden Creek, one of our larger bridges. Maintenance staff completed a temporary fix until it could be replaced. Staff considered all options on this replacement and decided to have a custom aluminum bridge built to replace the old wooden bridge. The bridge was paid for out of the FY20 NOAA PAC trails grant. The custom bridge will solve multiple issues including having a non-slip surface, lower long-term maintenance, and a permeable surface where water and debris can go through the walking surface. These were all issues that were brought up in our trails assessment and are ongoing issues for the Reserve. The custom bridge was installed during the month of April using maintenance staff and CFPA crews.
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<th>Biennium To November</th>
<th>December</th>
<th>January</th>
<th>February</th>
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<td>66,713</td>
<td>55,827</td>
<td>962,377</td>
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<td>13</td>
<td>10,529</td>
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<td>10,987</td>
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<td>0</td>
<td>0</td>
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<td>1,600</td>
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<td>0</td>
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<td>FUELS AND UTILITIES</td>
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<td>27,504</td>
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<td>6,192</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10,025</td>
<td>0</td>
<td>10,025</td>
<td>100.00%</td>
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<td>0</td>
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<td>0</td>
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<td>NA</td>
</tr>
<tr>
<td>Total: CAPITAL OUTLAY</td>
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<td>0</td>
<td>0</td>
<td>2,567</td>
<td>84,193</td>
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<td>61,466</td>
<td>89,900</td>
<td>68,586</td>
<td>1,338,185</td>
<td>2,137,957</td>
<td>291,673</td>
<td>1,090,445</td>
<td>44.88%</td>
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SSNERR Education Program update

Staff:  Jaime Belanger, Education Coordinator/Lead
        Eric Dean, Education Specialist
        Deborah Rudd, Public Involvement Coordinator
        Daniel Dobrosielski, Seasonal Education Specialist

Nov 7 – April 16, 2021

The Reserve Visitor Center remained closed to visitors throughout this reporting period due to the COVID-19 pandemic. The health crisis continued to have a significant impact on education efforts. Most in-person education events were not operating for the majority of this reporting period. However, interpretive programming for small groups of up to 6 people, as well as volunteer assistance, were able to happen intermittently, when rates of COVID-19 were lower. At the end of March, the Reserve received permission to resume in-person programs for school students, which are normally our largest spring audience. The Reserve will offer watershed hikes from the Visitor Center for classes of up to 20 students or work with one cohort of students at a time outdoors in their schoolyard or nearby habitat. Education staff continue teleworking whenever possible and follow all guidelines for safety when working on site or with public audiences. The team was able to deliver some programs virtually during this time as well. The virtual program planning often requires extra time, since new content must be developed and technical skills practiced. These skills will serve the education team well in the future, so we can still provide distancing learning to audiences across the state.

Staff training, innovations, and COVID-19 work

The education team completed virtual CPR and First Aid training, as well as the OSHA COVID-19 safety training this winter. The team also attended an in-depth training from the science team about some of the most visible and long-term projects happening in the Reserve. The education team also had opportunities to join the science team in the field and contribute to their work during this period.

Jaime Belanger worked on the exhibit portion of the NOAA PAC proposal for funding to improve accessibility at the Visitor Center. She also submitted an application to host an 11-month AmeriCorps member, and a proposal to the Pacific Power Foundation through the Friends
of South Slough to help support the member, with help from the education team. Jaime participated in two trainings, “Growing up Wild” and “Trauma-informed Care,” offered by the Oregon Natural Resources Education Program (ONREP). Jaime joined the NERRS Diversity, Equity, Inclusion and Justice (DEIJ) Strategic Committee and is serving on its Learning Team. She also helped plan and attended the NERRS Education Sector Virtual Meeting in March. She is currently serving as the education sector representative on the NERRA Board and as a member of the Oregon Coast STEM Hub Leadership Council.

Eric Dean contributed to the development of the PAC proposal submitted to NOAA to increase accessibility to the Visitor Center and restrooms. He also helped outline the “Watershed Investigations” video. He led in-person community education programs including nature hikes on the Visitor Center trails, introduction to estuary crustaceans and crabbing in Charleston, and guided birding excursions at the Millicoma Marsh Trail and Charleston Marina.

Deborah Rudd regularly attended webinars and trainings to build skills in video, graphics and Diversity, Equity & Inclusion in the Reserve. Deborah attended the virtual programming sessions of the NERRS Education Sector Annual Virtual Meeting. She is also serving on the Multicultural Awareness Committee at DSL.

Daniel Dobrosielski’s seasonal position ended December 19th, 2020 and resumed March 10th, 2021. He continues to develop virtual content for the Reserve to engage students all over the state. He created the “Watershed Investigations” video with help from other staff that is being used by teachers and students. Daniel is collaborating with other staff on the restructuring effort of the Reserve’s YouTube page. Daniel applied his newly developed skills in video and graphic design to science outreach and communication products for the Reserve. Daniel is also applying what he has learned to develop a training for Reserve staff about how to create effective videos that engage the public. Daniel is continuing to work to increase accessibility and inclusivity throughout our programming, especially our virtual content.

**Education Program Metrics.**
Between November 7, 2020 – April 16, 2021, the Reserve hosted 27 education programs for 229 people of all ages. The Reserve offered both in-person and virtual programs that resulted in 364 hours of learning. 30 hours were committed to program planning, reflection and post-program
cleaning. The education team has worked hard to adjust programs in order to both offer distance learning, as well as adapt to new policies and procedures to reduce health risks during in-person programs. This summary accounts for all education, interpretation, training, and outreach provided directly by the Reserve’s education staff.

These summary data are also submitted twice a year to NOAA, along with information about the presentations conducted by the science staff, as one of the required performance indicators to the National Estuarine Research Reserve’s performance measures database.

Visitation and Visitor Services
The Reserve Visitor Center remained closed through this reporting period, while the trails and waterways remained open. The Reserve does not have the capacity to count the number of visitors who walk the trails, but staff members working on site can provide anecdotal information about visitation. The winter season appeared to have lower visitation than previous reporting periods, which is common.

Formal Education & Training
The Reserve categorizes education program areas based on audiences and learning goals. “Formal education” includes programs provided to pre-K-12 students, undergraduates, graduate students or teachers and teachers-in-training. Formal education for students and teachers has been greatly reduced during the pandemic. In-person programming for K-12 classes resumed at the end of March 2021, with new precautions to reduce health risks.

The education coordinator worked with a partner from the Oregon Natural Resources Education Program (ONREP), the Southern Oregon Land Conservancy, to offer a 2-day virtual teacher workshop via Zoom in February for 17 teachers around the state, resulting in 50 contact hours. The workshop occurred the weekend of the ice/snowstorm, and several teachers were unable to participate in the second day due to power outages.

The education team lead outdoor lessons for 5th grade students at the Millicoma Marsh Trail adjacent to their school. 62 students spent 1.5 hours outside learning about life-cycles and
habitats in the watershed resulting in 93 in-person contact hours. Additional visits to schools and field trips at the Reserve are planned for the spring. The education coordinator, public involvement coordinator and stewardship coordinator presented virtual monthly learning for students enrolled in an English language learning course at Southwestern Oregon Community College, reaching 14 students from diverse cultures.

The Reserve released a “Watershed Education” video on our YouTube channel, which teachers have used with their students in the classroom. The education team has continued sharing existing resources with teachers and administrators and is developing some virtual field trip content to supplement in-school and at-home learning.

**Community Education, Interpretive & Outreach Activities**

The Reserve continued to offer in-person and virtual programs for general audiences. In-person programs were paused around the holidays due to an increase in coronavirus cases in the community, but those that were able to operate were very successful. 16 programs were offered for 136 people.

The Reserve provided 2 virtual Storytime episodes read through YouTube Live.

The education specialist continued limited in-person community programs in outdoor settings around the watershed, which are greatly appreciated by the attendees. Participation is limited to 6 individuals, who follow safe physical distancing and masking requirements. Offerings have included a mix of birding, nature hikes and crabbing. 60 people attended these programs in all, resulting in 140 hours of estuary learning for people of all ages.

The stewardship and public involvement coordinators worked together to organize two stewardship days for local scout groups. 9 youth contributed 18 hours to removal of invasive species and planting of native species.
Public Involvement

Volunteers/Internships

Volunteers were re-instated with some safety restrictions the latter part of 2020.

A total of 18 volunteers, one intern, including a local scout group put in 110 hours valued at $2,897 from November 7, 2020 through April 16, 2021.

The program category breakdown included 108 research/stewardship and 2 administration hours.

The Reserve recruited three new volunteers and is in process of onboarding eight interns to help with Reserve education and science projects, so next quarter there will be more volunteer and internship hours.

The newly recruited Reserve volunteers are Dane Base, Florence resident who will be helping with the Wasson bird surveys, Gianna Paden, an OIMB student who will be helping with the young of the year European green crab inventory, and Mathew Lewis, recent Washington State University graduate and part-time U.S. Forest Service staffer who has been helping with the eelgrass transplant and Wasson beaver surveys.

This summer, the Reserve will be hosting one Margaret Davidson Fellow (MAD), three NOAA Hollings Scholars, one Oregon State University (OSU) Sea Grant Summer Scholar, one Friends of South Slough (FOSS) Science Education intern, two National Science Foundation (NSF) Research Experiences for Undergraduates (REU) interns, and is applying for one NOAA National Center for Coastal and Ocean Science (NCCOS) Intern.

As of this reporting period, two of the three Hollings Scholars, and the Sea Grant Summer Scholar have been approved to work in person. The Sea Grant Summer Scholar will be on-site if they can secure housing. The FOSS Education internship will also be in-person if a suitable candidate is recruited.
Due to the Oregon State restrictions on public buildings, Reserve housing is unavailable for interns this summer. As a result, the FOSS board sent out a notice to members in their newsletter requesting assistance with housing interns. Some members have generously offered spaces as they had availability. Other interns are seeking short term home and vehicle rentals since housing will not be available on Reserve grounds this season. This poses quite a challenge and some of the internships may be virtual or not occur at all if housing and transportation needs are not supported. Additionally, this predicament makes Reserve internships even less equitable as only those interns who have the finances to pay for housing and vehicle rentals can participate.

Outreach/Marketing

The annual South Slough Reserve Year in Review has been finalized and is available for Reserve staff to communicate Reserve benefits and achievements with government officials and other members of the public.

Recent public media promotions have included the stewardship project to remove pampas grass led by Reserve Stewardship Coordinator, Dr. Alice Yeates, and the European green crab study led by Reserve Research Coordinator, Dr. Shon Schooler.

Public Involvement staff continue to work with DSL communications staff to move forward with a Reserve outreach and communications plan and website upgrade. Liane O’Neill has helped develop a comprehensive social media plan that will streamline the process for these types of communications. Once the plan has been thoroughly tested, it will be rolled out to remaining staff that help post Reserve updates to social media channels. Currently the Reserve hosts Facebook, Instagram, Twitter, and a YouTube.

Additionally, Public Involvement supported the following outreach efforts during this quarter: monthly radio call-in interviews to promote virtual programming, press releases and social media posts to the public with updates and messaging, and a collaborative community Earth Week education and stewardship campaign.
Coastal Training Program, January – March 2021

Sabra Comet, CTP Coordinator

CTP workshops and trainings

The Coastal Training Program is required by NOAA to complete five trainings per annual cycle; one training has been completed since the last update to the commission:

**Introduction to Cultural Resources**, January 19th. This two-hour webinar featured Kassandra Rippee, Tribal Historic Preservation Officer and Archaeologist at Coquille Indian Tribe as the main speaker; the primary audience was Department of State Land (DSL) staff who have responsibilities either on or overseeing projects with a land disturbance component. Ms. Rippee covered a brief history of policies and laws governing tribal artifacts, current policies and laws, and expanded to other types of cultural resources. This included soft remains that can leave imprints, middens, cultural landscapes and important plants, and a brief summary of resources if possible cultural resources are discovered. A lengthy Q and A session concluded the training.

The Unclaimed Properties division at DSL requested a follow-up training that will deal more specifically with items they may come across, and what to do with said items if they may be considered Cultural Resources. This training is scheduled for May 2021.

Two additional trainings are scheduled for before the end of the annual cycle on June 30th: Tips and Tools for Facilitating Virtual Meetings and Fire Management and Defensible Space. This will fulfill the five trainings requirement for NOAA.

**Diversity, Equity, and Inclusion (DEI) initiatives that address regional and local concerns, utilizing experiences across the national CTP network.**

**South Slough Diversity, Equity, and Inclusion Committee (SS DEIC):** The SSDEIC has been building a Land Acknowledgement practice for SSNERR; a training for staff was conducted in February to introduce the concept and allow for questions. Next, partners from Coquille Indian Tribe and the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians participated in small group discussions with the SS DEIC to go over best practices and recommendations for implementation. The CTP coordinator is working to get a representative from the Confederated Tribe of Siletz Indians; after all three tribes have been consulted there will be a follow up training with SSNERR staff.

The CTP coordinator was asked to join the NERR DEIJ working group on Indigenous Knowledge and Resource Management. The next meeting will take place in early May.
Staff: Shon Schooler, Research Coordinator  
Alice Yeates, Stewardship Coordinator  
Ali Helms, Estuarine Monitoring Coordinator  
Jenni Schmitt, Watershed Monitoring Coordinator  
Keary Howley, GIS Specialist  
Adam DeMarzo, Monitoring Technician

MONITORING

NERRS System-Wide Monitoring Program (SWMP)  
Ali Helms and Adam DeMarzo continued to operate the water quality, weather, and nutrient components of SWMP.

SWMP Data:  
Science staff completed monthly field and lab work associated with the water quality, meteorological and nutrient long-term primary monitoring stations. This included monthly and quarterly station maintenance, data uploads, instrument cleanings and calibrations, and data submissions to the NERRS SWMP Centralized Data Management Office (CDMO). Quarterly submissions for water quality and meteorological data were submitted February 2021. Annual 2020 weather and water quality data submissions were completed April 2021. SWMP data submissions include data that have undergone several levels of quality assurance and quality control (QA/QC) procedures, metadata development, calibration and field logs, and instrument and sensor inventories. Data reviews for 2019 water quality were completed April 2021 and those data are authenticated, having undergone tertiary review and are now available as final authoritative data. System-Wide Monitoring Program data for the SSNERR and all other Reserves are accessible online at nerrsdata.org.

The science staff completed monthly weather station maintenance, data downloads, and field logs for December 2020 – April 2021 at Tom’s Creek marsh. The SWMP weather station (sostcmet) real-time data are available at nerrsdata.org/get/realTime.cfm.

Science staff relocated the Charleston Bridge SWMP station in Spring 2019 due to the failing pier infrastructure. The new site is a nearby piling with boat access only. Deployments at the station resumed May 2019. A telemetry package (Storm 3) provided from the CDMO for equipment upgrades is being prepared for installation at this new site.

The science staff completed monthly collection, processing, and analysis for Total Suspended Solids (TSS), a nutrient parameter added to the routine SWMP nutrient dataset, for a NERRS Science Collaborative Sediment Hydrodynamic Model project. TSS data collection will continue 2021-2025 with funds from the NERRS Science Collaborative project (Sutherland, UO): Buried or Fried? Understanding sedimentation
and temperature effects on native species restoration in the South Slough National Estuarine Research Reserve and the Coos estuary.

The science staff completed monthly field deployments, retrievals, and calibrations for three Coos estuary SWMP water quality stations, and data were uploaded using the non-SWMP tool provided by the CDMO.

Real-Time Data: As a participant in the US Integrated Coastal Ocean Observing System (IOOS)/Northwest Association of Networked Ocean Observing System (NANOOS), we operate telemetry systems at all four of the core SWMP water quality stations and the weather station to provide real-time data available at nvs.nanoos.org/Explorer.

CDMO Data Management:
The Centralized Data Management Office (CDMO) is the technical support team dedicated to data management activities associated with the SWMP data collected at the 29 reserves. Recent activities of the CDMO include supporting data management for Sentinel Site vegetation monitoring datasets, releasing a new telemetry application for internal troubleshooting use, updating SWMP station images, and updating data management processes for older datasets allowing them to be included in Annual SWMP status reports. Staff attended the annual NERRS Technician Training Workshop held virtually for the first time on March 8-12, 2021 hosted by the CDMO.

SWMP Status Reports:
The Reserve system developed tools for creating Annual Status Reports on water quality, nutrient, and weather summaries for each Reserve. The CDMO provides the R software package for download and updates files annually. The Reserve responded to Office for Coastal Management requests for updates for Reserve specific preferences for the status reporting software (last updated 2016) for running the 2020 reports, including options for parameter units and thresholds, how nutrient parameters are calculated, and station names and labels. The NERRS are working on the 2019-2020 datasets for future reports.

Estuary pH Monitoring:
Field deployments of the Sami \( pCO_2 \) and SeapHOx pH monitoring instruments near the Valino Island SWMP station were completed September 2019. The final batch of water grab samples used to check sensor performance and calibrate the pH data were completed August 2020 by Burke Hales’ lab at Oregon State University for analysis of carbonate chemistry parameters. Data analyses for the \( pCO_2 \) and pH time series (2015-2019) at Valino are being coordinated with datasets collected at the Charleston Bridge station for Caitlin Magel’s research (Postdoctoral researcher, University of Washington-Tacoma, Puget Sound Institute).

Bacteria Monitoring:
Staff continued monthly monitoring of fecal indicator bacteria (total Coliforms and \( Escherichia coli \)) at the four SWMP nutrient monitoring stations. The bacteria data are of interest for the Coos Bay Estuary Data Source, Oregon Department of Environmental
Quality for Total Maximum Daily Load standards and to Oregon Department of Agriculture as they conduct commercial and recreational shellfish bacteria assessments.

Volunteers from the Surfrider Foundation temporarily discontinued use of the lab for their monthly monitoring of fecal indicator bacteria (Enterococcus sp.) at four local beach sites (Bastendorff Beach, Lighthouse Beach, and two Sunset Bay locations: Big Creek and Sunset Bay proper) due to COVID-19 restrictions.

**Climate Reference Network:**
The NOAA Climate Reference Network station at Frederickson Marsh continued hourly data transmissions and staff completed maintenance for the station rain gauges. Annual station maintenance (usually Summer but delayed due to COVID-19) will be rescheduled for completion by NOAA staff. Data are available for this station (OR Coos Bay 8 SW) at: ncdc.noaa.gov/crn/current-observations.

**SeagrassNet Monitoring:**
SSNERR science staff completed quarterly eelgrass sampling at Valino Island in January and April 2021 using the SeagrassNet sampling protocol. SeagrassNet is an international monitoring program established to document the status and health of seagrasses. Eelgrass has been declining at the permanent monitoring plots at Valino Island since 2016 and science staff and collaborators are working on projects and research proposals to understand factors that may be contributing to the declines in eelgrass in South Slough, eelgrass habitat suitability and restoration.

**Northwest Association of Networked Ocean Observing Systems (NANOOS):**
The SSNERR is a participant in a partnership project that provides real-time water quality data for stakeholders in Oregon, Washington, and Alaska through the NANOOS Visualization System (NVS): nvs.nanoos.org.

The NANOOS proposal for the next 5 year award (FY21-25) to sustain the Pacific Northwest component of the US IOOS, including South Slough, OR Estuary Observations, was submitted 12/31/20 and was selected for funding but award amounts and timing are still pending decisions. The progress report for Oregon estuary observations for 6/1/2020-11/30/2020 was submitted December 2020. A one year no cost extension was granted for current NANOOS FY20 funds due to time and details associated with the new award contracts that are still being determined.

We partner with one of the local tribes, Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) to provide telemetry equipment for their North Spit BLM sonde station in lower Coos Bay. The data are available to end-users through the NANOOS Visualization System (http://nvs.nanoos.org).

**NERRS Sentinel Sites Monitoring:**
The NERRS Sentinel Sites program pairs the long-term SWMP water quality and water level data with physical and biological data quantifying other factors (e.g., marsh elevation, plant community, vertical accretion, soil salinity, groundwater level) to help
interpret long term changes in emergent marsh plant communities, eelgrass beds, and Sitka spruce forest.

Water level and temperature loggers were deployed into groundwater wells in January 2020 at Metcalf Marsh and Valino Marsh with data downloaded quarterly. Data loggers at those sites were retrieved in January 2020 and data was QA/QC’d. Water level, temperature and salinity loggers were deployed into groundwater wells in January 2021 at the Winchester Spruce Swamp sentinel site, ahead of summer 2021 biomonitoring. The data loggers were temporarily pulled from wells in April to calibrate the salinity sensors.

Staff and volunteers completed beaver surveys in April at Winchester Spruce Swamp and Winchester Marsh sites. Beaver surveys were added to these sites since they are tidal freshwater systems and beaver can dramatically affect the hydrology at these sites. Data was recorded on beaver dams, lodges and other beaver activity.

A tide gauge with water level sensor will be deployed in Winchester Creek, near the Hidden Creek marsh sentinel station to collect high-precision (mm) water level data to meet requirements of the South Slough’s Reserve Sentinel Sites project goals. Staff are working with NOAA tide gauge engineers and Yellow Spring Instruments to obtain quotes for purchasing the Nile microwave radar sensor. Staff are planning tidal benchmark locations based on requirements for distance between marks.

**Wasson Watershed Monitoring:**
Science staff are completing baseline monitoring of the Wasson Creek lowlands, in preparation for anticipated restoration work. Groundwater levels are being continuously collected from groundwater wells at both Wasson Creek (19 locations) and Tom’s Creek (4 locations). Data is downloaded and wells are maintained quarterly. Staff captured winter images at Wasson Creek photo points to assess restoration progress through time at fixed points.

**Anderson Creek Monitoring:**
Staff began a reassessment of Anderson Creek, the site of a wetland restoration project completed in 2003, with the goal of monitoring restoration effectiveness nearly 18 years later. Groundwater level data collection was finalized December 2020. Data will be quality checked and then analyzed to understand changes to hydrology since restoration was complete. Plant cover data collected summer 2020 will also be assessed.

**Indian Point Monitoring:**
Staff continue to monitor western lily populations and track changes to herbaceous, shrub and tree cover metrics related to the restoration work. Staff continue to collect water level and temperature data of the groundwater at the restoration site and nearby control site in order to gauge how tree thinning affected groundwater levels in the treatment area. Groundwater data are retrieved and wells maintained quarterly.
Lamprey Monitoring:
South Slough watershed hosts at least two native species of lamprey; however, we do not have adequate data to evaluate the status of lamprey anywhere in the Coos watershed. In summer of 2018, staff and partners set up permanent plots at three locations on Winchester Creek to help determine status and long-term population trends of each species. These plots are now monitored annually in summer months.

In addition, the Reserve is currently leading a citizen science project (funded from a USDA-USFS grant) that is starting to map lamprey species distributions in watersheds of Oregon’s south coast using environmental DNA (eDNA) methods. The project is currently on hold due to COVID-19. However, staff are using the time to refine site access and selection methods and data collection tools for anticipated data collection in 2021. Schooler and Schmitt are part of a statewide Lamprey Technical Workgroup.

RESEARCH

SSNERR Projects

Invasive European Green Crabs in the Coos Estuary:
South Slough is leading the monitoring and research on European green crabs in the Coos Estuary, including South Slough. We are currently planning our 2021 annual sampling of 10 sites around South Slough and Coos Bay including monthly sampling of juvenile crabs using crayfish traps from May to September and adult crabs using Fukui traps from June through August. The overall goals of the work are to: 1) compare the relative abundance of green crabs and native crabs in the estuary across years and locations, 2) examine linkages between environmental conditions and green crab abundance, 3) study the potential impacts of green crabs on native species, 4) better understand the life-cycle of green crabs in Oregon estuaries, and 5) generally reduce green crab abundance through consistent and repeated sampling. We are currently collaborating with a Masters student, Elissa Connolly-Randazzo (PSU, advisor Catherine de Rivera). She is using SSNERR green crab data to look at correlations among environmental conditions and green crab abundance in order to predict green crab abundance in habitats throughout Coos Bay.

DNA Methods to Monitor Invasive Species and Biodiversity in Estuarine Systems:
The Reserve is partnering on a research project funded through the NERRS Science Collaborative to use DNA collected from environmental samples (known as eDNA) to characterize fish biodiversity in estuaries. The project includes researchers from University of New Hampshire and from the Great Bay (NH), Apalachicola (FL), He‘eia (HI), Hudson (NY), and Wells (ME) NERRs. In 2019 we created a sample design to look at the most effective method to use eDNA to annually monitor South Slough fish diversity. However, we had difficulty with the metabarcoding analysis due to interference from bacterial DNA. We are currently waiting on final results of modified DNA analyses to determine the use of this method to monitor fish species presence and diversity in South Slough over time.
Eelgrass Pilot Transplant at Valino Island, South Slough estuary:
Science staff began a pilot eelgrass transplant experiment July 20-22, 2020 to test eelgrass transplant survival and abundance along an elevation gradient and planting during different seasons, to understand the potential to restore eelgrass to South Slough. Staff and interns harvested eelgrass plants from Clam Island, Coos estuary and transplanted adult vegetative (20 shoots per plot) and flowering (3 shoots per plot) eelgrass shoots into 12 plots at Valino Island, South Slough estuary. There were 4, 0.25m² plots planted within each of 3 elevation transects (mid, low, and intertidal-subtidal edge) in July 2020. Additional plots were transplanted in different seasons to test effects of planting season on eelgrass establishment. In September and December 2020, 12 plots were transplanted at the mid and low elevations and in March 2021, 9 plots were transplanted (3 per elevation). The plots will be monitored quarterly for shoot survival and density.

Preliminary results from monitoring transplanted plots are showing a stable or increasing percent cover and shoot density trend for the lower elevation transects after nine months, where cover and density of plots remained stable at the intertidal-subtidal edge and increased at the low elevation plots. The mid elevation plots are decreasing in cover and density.

Margaret A. Davidson Fellow Research:
Three data modeling projects, prioritized by the Eelgrass Recovery Advisory Committee (established 2019 through NSC Capacity Building) to understand drivers of the eelgrass declines before implementing larger scale restoration projects, are utilizing SWMP weather and water quality data to understand what environmental factors may be contributing to the declines. These graduate students are being partially supported by funds from the 2019 NERRS Margaret A. Davidson graduate research fellowship program.

Maria Jose Marin Jarrin, a graduate student from University of Oregon (Dave Sutherland’s lab) in interested in connectivity between Coos Bay and South Slough estuary, and the role of water residence time on abundance of species like native oysters, crabs, and eelgrass. For eelgrass, she is exploring retention time of anomalously warm air and water temperatures and low river discharge contributing to the eelgrass losses. She submitted an abstract with co-authors Dave Sutherland and Ali Helms for the Pacific Estuarine Research Society conference April 2021 with a summary of her work on Temperature variability in the Coos Estuary and its potential links to eelgrass loss.

Winni Wang, a graduate student from Oregon State University (Mueller lab) who recently defended her PhD in Sept 2020, is applying MAXENT species distribution modeling to understand environmental drivers of the eelgrass declines. Keary Howley (GIS Specialist) has contributed GIS expertise related to the modeling package and other aspects of the project. Winni has completed runs of the model at 1 m resolution, testing the “before eelgrass declines/healthy eelgrass” 2005 eelgrass presence with 2010 environmental data and is running the model with 18 environmental parameters to compare eelgrass distribution during eelgrass declines in 2016 and after eelgrass declines.
Caitlin Magel, a graduate student from OSU who completed her PhD in Sept 2020 (Sally Hacker/Francis Chan labs) examined environmental “regime” relationships to predict eelgrass vulnerability. She showed summer eelgrass and macroalgae biomass were negatively associated with water and air temperature, water column turbidity and watershed disturbance and eelgrass declines were likely caused by thermal stress, light limitation, and other effects associated with watershed disturbance. Macrophyte biomass was also positively associated with pH and dissolved oxygen (DO), through photosynthesis effects on water quality. Undergraduates from her lab will continue analysis of eelgrass seed samples she collected for her project.

Taylor Dodrill (Portland State University) is our 2020-2023 Margaret A. Davidson Graduate Fellow. She will conduct research that will help us predict the occurrence and negative effects of harmful algal blooms in South Slough and Coos Bay. She started September 2020 and visited South Slough in October 2020. Staff have assisted with monthly sampling at 4 sites in South Slough from November 2020 through April 2021. She will start her complete sampling program in April 2021. She regularly attends the South Slough Research fortnightly Zoom meetings.

Partner Projects

Partnership for Coastal Watersheds (PCW):
The PCW is a local group of civic-minded community members that includes representatives of South Slough Reserve, Coos County Planning Department, Cities of Coos Bay and North Bend (planning and city council), Coquille Indian Tribe, Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians, South Coast Development Council, Stuntzner Engineering (planning), Coos Watershed Association, Department of Land Conservation and Development, Southwestern Oregon Community College, Oregon Department of Fish and Wildlife, US Fish and Wildlife Service, International Port of Coos Bay, Oregon Department of Environmental Quality, and citizens at large.

The PCW meets monthly. The PCW is currently working towards several goals concurrently:

- The group is steering the development of a coastal hazards vulnerability assessment for the Coos Bay area. Local organizations are seeking to understand their vulnerabilities to a range of local coastal hazards (e.g., sea level rise, ocean acidification, coastal erosion, etc.) and consider adaptation strategies that coordinate local responses to those threats. Work is being completed through FEMA Cooperating Technical Partners funding and by University of Oregon’s Institute for Policy Research and Engagement. Additional funding by the National Fish and Wildlife Foundation was awarded to Department of Land Conservation and Development to augment this coastal hazards work by focusing on adaptation planning.
• Exploring mitigation banking options for the Coos estuary. The PCW formed a mitigation subgroup that is working with DSL mitigation specialists to understand various mitigation bank processes, scope, and potential opportunities in this area. The group is currently working on a case study for an in lieu fee program for the Coos estuary.

• Developing and refining a restoration inventory for the Coos estuary. This project is identifying tidal wetlands that could benefit from restoration, as well as historically restored sites and reference wetlands that have remained relatively untouched. Funding for this project is from PEW Charitable Trusts to Coos Watershed Association and work is being completed by Craig Cornu (Institute for Applied Ecology).

• Continue to leverage the PCW collaborative process. The PCW continues to be a sounding board for researchers doing work around the Coos estuary. Most recently the group has been engaged by University of Oregon professor Dave Sutherland’s modeling work (see “Hydrodynamic Model of Coos estuary” below) and a collaborate project funded by NOAA’s Ecological Effects of Sea Level Rise (EESLR) to model impacts to wetlands.

• For more on the PCW and its current work, visit their website: http://www.partnershipforcoastalwatersheds.org

Ocean Acidification (OA)
The Reserve is continuing to work with Caitlin Magel (University of Washington), Francis Chan, and Burke Hales (Oregon State University) on ocean acidification (OA) data analyses for Charleston Bridge and Valino Island sites. SAMI CO2 and SeapHOx sensors were deployed from 2016-2019, collecting 15 min time series of partial pressure of carbon dioxide and pH.

The Tillamook Bay Ocean Acidification and Hypoxia (OAH) Monitoring OWEB project is continuing to establish baseline information on carbonate chemistry and spatiotemporal patterns of OAH in Tillamook Bay, OR. Collaborative partners include Oregon State University, Environmental Protection Agency, Oregon Department of Fish and Wildlife, and the South Slough Reserve. York Johnson (TEP and DEQ) leads fieldwork for SeaFet pH sensor deployments in Tillamook Bay with field deployments temporarily suspended due to Covid-19 but will be resuming Spring/Summer 2021.

Hydrodynamic Model of Coos Estuary:
A series of projects, led by Dr. David Sutherland (University of Oregon) have resulted in a hydrodynamic model for the Coos estuary to characterize present-day sediment distribution, surface and bottom salinity, sediment flux, and circulation and current patterns in the estuary. SSNERR is involved in collecting sediment data, providing data from water quality and Sentinel Site stations, selecting sampling sites, and facilitating end-user discussions between the project team, end-users (e.g., Coos County, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, Oregon
Institute of Marine Biology, Coquille Indian Tribe, Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, Department of State Lands), and other stakeholders through the Partnership for Coastal Watersheds. The newest suite of products are modeling scenarios by graduate student Maria Jose Marin Jarrin (See Margaret A. Davidson Fellow above).

The team recently received NERRS Science Collaborative Research funding to continue the project, this time with the focus on better understanding sediment and temperature effects on native oysters and eelgrass in the Coos estuary. This newest project began January 2021. Reserve staff are included on the project team to help coordinate engagement with end users and stakeholders, present results to regional and national audiences, provide local technical knowledge, collect monthly grab samples for Total Suspended Sediment (TSS) analysis, and assist with data acquisition as needed.

National Synthesis of Tidal Marsh Response to Sea Level Rise:
This recently funded NSC project is led by Chris Peter (Great Bay NERR, NH) in collaboration with team members across the Reserve system, including staff at South Slough Reserve. This project will be a national scale synthesis of marsh vegetation community data, leveraging our Sentinel Site and SWMP programs. The synthesis will examine shifts in species ranges, patterns of diversity across latitudes and biogeographic regions and quantify climate-induced shifts to marsh systems. The team had their kick-off meeting in April 2021 to discuss roles, responsibilities and timeline.

Native Olympia Oyster Collaborative (NOOC, https://olympiaoysternet.ucdavis.edu): This collaborative group, formed through a NERRS Science Collaborative catalyst project led by Kerstin Wasson and April Ridlon (Elkhorn Slough NERR), completed a synthesis of success of past Olympia oyster restoration projects to share lessons learned and to identify the practices and environmental conditions that predict the best restoration outcomes. The NOOC published the Olympia oyster restoration synthesis summary and results in Estuaries and Coasts April 2021: Conservation of Marine Foundation Species: Learning from Native Oyster Restoration from California to British Columbia. The NOOC in partnership with the Pew Charitable Trusts is creating maps of current and historical oyster distributions across the range of the Olympia oyster to inform conservation and restoration strategies.

Planet Pilot Project:
Multiple state agencies in Oregon participated in a pilot project with Planet, a company that provides daily global satellite data. South Slough Reserve joined a pilot project led by Department of Land Conservation and Development’s Coastal Management Program to see how useful the products would be for eelgrass and kelp detection on Oregon’s coast. Oregon’s Department of Administrative Services (DAS) paid for the costs of the pilots and will review pilot results to assess suitability for a future subscription for Oregon agencies.
Grant proposals
The Reserve collaborated on two Pacific Marine and Estuarine Fish Habitat (PMEP) Proposals. One project, *Eelgrass restoration by seeding in WA & OR with rapid assessment protocol for site suitability*, led by Sylvia Yang (Padilla Bay NERR) with Reserve staff Ali Helms and additional collaborators Sandy Wylie-Echeverria, University of Washington, and Mike Ramsey, San Juan Island Conservation District was not selected for 2021 funding but was selected for resubmission for 2022 funds and project collaborators are working on edits due for submission April 2021. The second project, *Eelgrass-Ocean Acidification Ecosystem Services Assessment*, led by South Slough Reserve and collaborators Francis Chan and Burke Hales at OSU, John Schaefer at CTCLUSI, and Caitlin Magel, University of Washington-Tacoma, Puget Sound Institute was not selected for funding.

The Reserve, the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians, and NANOOS collaborated with the Central and Northern California Ocean Observing System (CenCOOS) on a NOAA Sea Grant pre-proposal submitted 12/15/20 to develop tools from the ocean observing data streams for the shellfish aquaculture industries in WA, OR, and CA. The project team led by Alex Harper (CenCOOS) and Gary Fleener (Hog Island Oyster Co.) submitted a full proposal on 3/17/21 for the project: Oyster Dashboards: Web-based decision support tools for managing shellfish aquaculture in the face of multiple stressors.

The Reserve collaborated with George Waldbusser (OSU) on a NOAA Sea Grant pre-proposal submitted 12/15/20 to understand the effects of a mud blister worm and ocean acidification stressors on Pacific oyster growth and shell persistence. The team submitted a full proposal 3/17/21.

South Slough staff collaborated with Dr. Chris Janousek (OSU) to submit a pre-proposal to Oregon Sea Grant for assessing several historically restored tidal wetland sites in Oregon many years after restoration occurred. One site, Kunz Marsh, is a wetland restored in the South Slough Reserve in the mid 1990’s. The team has been invited to submit a full proposal, due in May 2021.

The Reserve collaborated with Scott Heppell (OSU), Fiona Tomas-Nash (OSU), and Steve Rumrill (ODFW) on an Oregon Sea Grant pre-proposal submitted on 2/26/21 to understand the effects of eelgrass restoration on fish communities and whether restored eelgrass bed serve the same habitat function for fishes. The pre-proposal was invited to submit a full proposal and the team collaborators are working on the project details for final submission 5/21/2021.

The Reserve collaborated with Ryan Mueller, Fiona Tomas-Nash, and Susanne Brander at OSU, and Jim Kaldy at EPA on an Oregon Sea Grant pre-proposal submitted 2/26/21 to understand the combined effects of temperature and herbicides on seagrass health and microbiome function.
The Reserve submitted a letter of support for Oregon Sea Grant pre-proposal submitted 2/26/21, led by Elise Granek (PSU) for her project addressing emerging stressors on shellfish aquaculture through development of a Pacific Northwest aquaculture environmental health community of practice.

**Research Support**

Reserve staff are collaborating with Caitlin Magel (UW), Francis Chan (OSU), and Burke Hales (OSU) to analyze pCO2/pH time-series from sensors in South Slough estuary deployed near the Charleston Bridge and Valino Island SWMP stations.

The SSNERR is a field location for Oregon Department of Fish and Wildlife’s adult mosquito abundance trapping program, to be used as a reference comparison to restored marshes in the Coquille valley. Trapping began in June 2018 and is expected to continue through 2022. ODFW staff have also agreed to sample Wasson Creek for the SSNERR restoration project at SSNERR staff request. This sampling will help us understand the effect of marsh restoration projects on mosquito populations.

SSNERR has several sites that will be used for a collaborative project between OSU, Institute for Applied Ecology, and UO to model west coast tidal wetlands’ impact to sea level rise. The work is being funded by NOAA’s Ecological Effects of Sea Level Rise (EESLR) program.

In conjunction with the EESLR project listed above, the Reserve is collaborating on a NERR Science Collaborative (2020-2023) project that continues carbon flux research, called Phase 2 Blue Carbon Research. The project is being led by Craig Cornu (Institute of Applied Ecology) with numerous collaborators from Oregon State University, University of Oregon, Western Washington University, Pacific Northwest National Laboratory, and the Padilla Bay NERR. This research is primarily aimed at measuring methane emissions from estuarine wetlands along salinity, temperature, and land-use gradients. The study includes sites in South Slough and Coos Bay.

South Slough is assisting researchers on a collaborative 1-year project funded by the NERR Science Collaborative titled “Developing and Integrating Social Measures of Estuarine Restoration Success”. Project collaborators are Paul Engelmeyer (Wetlands Conservancy), Catherine de Rivera and Melissa Haeffner (Portland State University), and Edwin Grosholz and Julie Gonzalez (University of California Davis). Using South Slough NERR and The Wetlands Conservancy restoration projects as case studies, this project includes a three-pronged approach to improve estuarine restoration success. The team will: 1) synthesize long-term NERR monitoring data to derive commonly used ecological metrics and to compare these with manager and public perceptions of restoration success, 2) conduct focus groups to examine how the presence and outreach activities of South Slough NERR influence public perception of restoration, and 3) conduct interviews with managers involved in restoration to understand the efficacy of the ecological metrics used to determine restoration progress. The project will produce a summary of values and perceptions associated with estuarine restoration,
recommendations for including social and ecological metrics in project design and assessment, and an assessment of the social value of a long-term NERR. This project will help to improve coastal restoration project design and should lead to more inclusive and effective communications surrounding estuarine restoration.

SSNERR is the site for the Forest Inventory Analysis (FIA) program, a congressionally mandated mission to collect, compile, summarize, and make available high-quality data on the forest resources of the United States. FIA plots are monitored every 10 years and Alice assisted field agents in their 2020 survey.

In April 2021, we provided PhD student Jake Ephron (Florida State University) with shell samples of Pacific and Olympia oysters from the Coos Bay estuary for his PhD research project. The purpose of the project is to look at oyster growth rates along the west coast of North America.

We are continuing to work with Dr. Carolyn Tepolt of Woods Hole Oceanographic Institute by providing green crabs of selected sizes for an international genetic analysis. The purpose of the project is to identify and track different genetic populations of green crabs along the west coast of North America. In 2018-2020 we collected and posted samples as per sampling protocols. Additional samples will be collected in 2021.

SSNERR staff have been collecting shallow sediment cores for Dr. Emily Eidam’s lab (UNC) at multiple locations in South Slough and Coos Bay. The samples are shipped to Dr. Eidam’s lab to undergo isotope analysis for short term deposition rates. Results will help inform the sediment dynamics portion of the hydrodynamic model project (see Hydrodynamic Model of Coos Estuary under Partner Projects above).

**STEWARDSHIP**

**Wasson and Upland Research:**

Dr. Alice Yeates (Stewardship Coordinator) has secured a total of $64,203 from US Fish and Wildlife Service for partial implementation of the Wasson Creek forest management. Friends of South Slough Reserve will be administering the grant, which will be available from 2021-2025. This will cover approximately 36-acres of the 287-acres of mid and high priority stands. Yeates continues to search for funding opportunities to implement the Wasson Creek Watershed Restoration Plan. The Technical Advisory Team has resumed meetings to discuss addition of new information into the restoration plan and to develop an implementation plan. The Wasson Uplands Restoration Plan (Appendix D) has been reviewed by the Advisory Team and submitted for Commission approval at this meeting. During the summer of 2021 Staff will work within a Hollings Scholar (Anna Liang) to establish permanent forest monitoring plots to track changes within different forest management prescription areas.

**Invasive Species:**

Staff and volunteers continue to both map and remove invasive species from within Reserve managed lands. In January 2021 Reserve staff worked with Coos Forest
Protective Association (CFPA) to remove over 5000 pampas grass plants from around the Reserve. This effort was followed up by a media campaign, asking for the removal of this species from landscaping along the Oregon Coast. Staff are designing and testing an ArcGIS Collector project, which will standardize data collection and track invasive species management. Staff continue to engage with local weed specialists; e.g. Coos Watershed Association ran an adjacent social media campaign about Pampas grass and provided links to Reserve postings. Staff are developing a Trails Stewardship Team to assist with invasive plant removal along Reserve trails. Staff worked with a local scout group (troop 156) to remove invasive species (Scotch broom, Himalayan blackberry and biddy-biddy) and plant native strawberry on Reserve land.

**Native, Endangered and Culturally Significant Species:**
See Indian Point Monitoring section above regarding the endangered western lily restoration.

Staff continue to consult partners from the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians (CTCLUSI) and the Coquille Indian Tribe (CIT) on culturally significant plant management within the Reserve. Culturally significant species plantings are included in the Wasson Restoration plan (e.g. bear grass, giant chain fern, camas) and a camas trial is underway at Indian Point. A total of 175 camas bulbs were donated by CTCLUSI, 130 of which were planted as part of a trial examining the potential of establishing a camas meadow. Bulbs were planted in November 2020 at different densities and were either protected or open to deer browsing. The population was monitored in February 2021 and will be monitored again during the flowering period. In February 48% of bulbs had emerged and of these 8% had been browsed.

**Trash and Marine Debris:**
Staff continue to monitor sites as part of the Mission-Aransas NERR’s Nurdle Patrol program. Nurdle Patrol is a citizen science program that monitors coastlines and railroad lines for nurdles (plastic pellets forming the raw material used in the manufacture of plastic products). The Reserve held an information and training session to fill the information gap along Oregon’s coastline for coastal partners and volunteers in December 2020. Staff continue to remove trash from within the Reserve and are developing a Trails Stewardship Team to assist with trash cleanup on Reserve trails.

**Fire Management:**
Staff continue to develop a fire management plan and are working with the CTP Coordinator to develop a Fire Preparedness Workshop. The fire management plan aims to summarize the risks and benefits of fire in the landscape, run a spatial wildland fire analysis to guide forest management recommendations, and update the emergency response plan. The removal of the invasive pampas grass was driven by the fire risk it posed to both the Reserve and to adjacent landowners. Permanent forest monitoring plots throughout the Reserve will provide information on fuel loads and moisture content within different stand types. Monitoring is in the design phase and past data is being located, monitoring will commence in the Summer of 2021, in conjunction with Wasson forest monitoring efforts.
**INTERNSHIPS**

*NOAA Ernest F. Hollings Scholars:*
After a competitive interview process, two scholars were selected for their summer 2021 internship at South Slough Reserve. Petra Zuniga (Amherst College, MA) and Anna Liang (U. of Virginia, B.S. in Environmental Science) will work with Jenni Schmitt and Alice Yeates respectively for their onsite internships.

*Research Experience for Undergraduates (REU) Program (National Science Foundation):*
The OIMB REU Exploration of Marine Biology on the Oregon Coast program was cancelled for 2020 due to COVID-19, but the program is expected to continue in 2021. The Reserve science program will mentor two undergraduate students for the Summer 2021 OIMB REU program. The 4 year college student, Reagan Thomas (Portland State University, OR) will work with Ali on eelgrass and sediment dynamics. The 2-year college student, Jordan Pantoja (Ventura College, CA) will work with Shon on green crab research projects.

*Friends of South Slough GIS/RTK Internship:*
Chris Choi (UC Berkley, CA) worked virtually with mentors Keary Howley and Jenni Schmitt. The internship was planned as a field experience but, due to COVID-19 restrictions, took place virtually. Chris worked on two GIS analysis projects to support the Reserve’s mission and ongoing research within the Coos estuary and Oregon’s south coast. One project focused on sample site accessibility for the lamprey mapping project described under the Lamprey Monitoring section. The project rated the sites accessibility by distance from the nearest road, maximum slope, and elevation gradient. The ratings were combined into an overall access difficulty rating and identified sites requiring potential relocation. The sites will be available in a web map for the use by the citizen science team. The second project analyzed three possible locations for wetland mitigation sites. Chris analyzed the sites for potential to restore each area to elevation gradients conducive to wetland restoration and analyzed the effects of sea level rise on the sites. The maps produced have started to inform the PCW discussions around establishing a mitigation site.

**COMMITTEES AND WORKGROUPS**

*SWMP Oversight Committee:*
Shon Schooler continues to serve on the SWMP Oversight Committee. This committee provides oversight of SWMP plans and can intervene if SWMP protocols are not being met by individual Reserves.

*SWMP Guidance Committee:*
Ali Helms serves on the SWMP Guidance Committee (current members: Dwight Trueblood, Mary Culver, Suzanne Shull, Chris Kinkade, Jennifer Harper, Joan Muller, Matt Ferner, Ali Helms, Robin Weber, and Steve Baird) formed in 2010 to provide strategic planning and oversight of the SWMP program.
NERRS Sentinel Site Application Module (SSAM-1) Oversight Committee:
Jenni Schmitt and Ali Helms are on this NERRS committee, which was formed to develop SSAM-1 outreach strategies, review outreach products from the Marsh Resilience (MARS) report card, integrate remote sensing/habitat mapping into Sentinel Sites, review Sentinel Site plans, develop Centralized Data Management Office (CDMO) data templates for vegetation and sediment data, and manage inventory of SSAM-1 equipment, capacity building and data acquisition. The group has most recently been focused on developing a funding strategy for the Sentinel Site program, including articulating expectations for minimum monitoring protocols to standardize datasets for site, regional and national synthesis, and justifying the need to financially support on-site monitoring, data analysis, and data maintenance and dissemination through Centralized Data Management Office (CDMO). A strategic concept related to this was brought in front of NERRS managers at their March 2021 meeting to elicit feedback.

Sentinel Site Biomonitoring Workgroup:
Jenni Schmitt is part of this workgroup, which develops and oversees implementation of national vegetation monitoring protocols and reviews vegetation monitoring datasets submitted to the CDMO.

Sentinel Site Submerged Aquatic Vegetation (SAV) Biomonitoring and Mapping Workgroup:
Ali Helms joined this workgroup Summer 2020 to develop and provide input on protocols for implementing national vegetation, mapping, and mudflat sediment dynamic monitoring in SAV (i.e. eelgrass) habitats. The workgroup presented the strategic plan for advancing SSAM SAV to the Reserve System at the Annual meeting and Ali co-delivered the presentation with Chris Kinkade, Nina Garfield, and Sylvia Yang (Padilla Bay NERR).

NERRS Habitat Mapping and Change Classification Review Team:
Jenni Schmitt is part of this team to apply a three-tiered review system for habitat mapping products submitted by each reserve. Habitat maps standardize the way high-resolution land cover data (wetland, aquatic, and upland habitats) are classified within the NERRS.

NERRS Strategic Committee:
Jenni Schmitt is on the NERRS Strategic Committee representing the SC/GIS sector. The committee met multiple times early 2021 to review and discuss NERRS National Product proposals and NERRS Strategic Concepts and provide recommendations for moving forward.

NERRS Bivalve Working Group:
Shon Schooler continues to serve on the NERRS Bivalve Working Group with Brandon Puckett, North Carolina NERR; Nikki Dix, Guana Tolomato NERR; Kerstin Wasson, Elkhorn Slough NERR; and Jeff Crooks, Tijuana NERR.
NERRS Coastal and Ocean Acidification (COA) workgroup:
Ali Helms participated in the NERRS COA workgroup, formed in December 2019, to share ideas, resources, best practices for monitoring, and partnerships to collaborate on ocean and estuarine acidification monitoring activities across the Reserve system. The workgroup is led by Kari St Laurent at the Delaware NERR and calls were held February and March 2021.

Pacific and Estuarine Research Society (PERS) Board:
Jenni Schmitt is the Oregon at-large representative for PERS. PERS is the regional chapter of the Coastal and Estuarine Research Federation (CERF). The committee has met several times fall 2020 and early 2021 to plan a joint virtual conference between PERS and the California Estuarine Research Society (CAERS). The conference will take place April 22nd-24th.

Pacific Marine and Estuarine Fish Habitat Partnership (PMEP) Eelgrass Advisory Committee:
Ali Helms joined this regional workgroup in July 2020 for providing technical input and expertise from an Oregon perspective related to eelgrass habitats. The Committee is reviewing the draft report for an Eelgrass Restoration Techniques Synthesis project in April 2021 that was funded through the Pew Charitable Trusts and administered by the Friends of South Slough.

Oregon Lamprey Technical Workgroup:
Shon Schooler and Jenni Schmitt sit on this advisory committee of the Conservation Agreement for Pacific lamprey in Oregon. The group meets several times a year to discuss updates on conservation initiative, subgroup updates (tagging, contaminants, ocean, engineering criteria, genetics/eDNA, BMPs for minimizing impacts during stream disturbing activities, and restoration), standardizing white paper formats, lamprey terminology and larval lamprey survey and salvage protocols.

South Coast Lamprey Working Group:
Jenni Schmitt and Shon Schooler are on the steering committee for this workgroup, which works to help identify key information for lamprey management at regional, state, and local scales and identify opportunities for future work.

DSL GIS User’s Group:
Keary Howley is the South Slough representatives of this team, which is tasked with identifying GIS and geospatial technology needs and solutions for DSL. The GIS User Group and the DSL IT team are developing and implementing an Enterprise GIS (EGIS) with the use of ArcGIS Portal. The EGIS will more efficiently allow access to authoritative GIS data across all DSL divisions, support DSL business processes, enable easy to use mobile data collection apps like ArcGIS Collector and Survey123, and provide web mapping capabilities for internal and public use. The first publicly accessible web map is due to come online by January 2021.
Coos Watershed Association Technical Advisory Committee: Jenni Schmitt, Alice Yeates, Shon Schooler, and Ali Helms participate on this committee to provide technical feedback on a variety of upcoming or ongoing restoration projects.

South Slough Safety Committee: Alice is the Science Program representative on the SSNERR Safety Committee. They are updating the Disaster Plan and Fire Safety/Evacuation Plan.

Coastal Native Seed Partnership Committee: Alice is on the Coastal Native Seed Partnership Science Program steering committee, where the Reserve recently became a partner entity.

Oregon Marine Science and Educator Alliance (ORSEA) Scientist: Jenni Schmitt was selected as a scientist to participate in an Oregon Sea Grant/National Science Foundation alliance between scientists and educators. This program connects math and science educators with scientists to create and pilot lessons centered around marine-focused anchoring phenomena. Schmitt is working with two teachers from Lincoln County to create lessons centered around South Slough wetlands restoration data.

Diversity, Equity, Inclusion Committee: Alice Yeates is the Science Program representative on the DEI Committee. This committee is assessing and identifying ways to improve diversity, equity and inclusion in all areas of the Reserve. The committee is working on a road map to identify interest areas, deliverables and goals. The committee has consulted with CTCLUSI and CIT and reached out to the Confederated Tribes of the Siletz Indians to develop land acknowledgement statements which will be included in future communications.

Wild Rivers Land Trust: Conservation Committee: Alice Yeates is on the Wild Rivers Land Trust board of directors and the associated Conservation Committee. The Wild Rivers Land Trust aims to conserve and steward natural spaces from Tenmile Lakes to Brookings, OR.

NERRS Upland Stewardship and Monitoring Working Group: Alice Yeates is on the NERRS uplands working group which aims to enhance communication between Reserves and to share information on upland monitoring, management, research and outreach.

NERRS Indigenous Engagement Working Group: Alice Yeates is on the NERRS indigenous engagement working group, which aims to improve engagement with indigenous peoples and communities in Reserve stewardship.

PRESENTATIONS

Alice Yeates, Mar. 9th, 2021, Invasive Species in South Slough Reserve, Southwestern Oregon Community College (SWOCC)
Alice Yeates, Mar. 16th, 2021, A watershed Tour of South Slough Research and Stewardship, Shoreline Education for Awareness (SEA)

Reserve staff participated in a South Slough Science Day on 3/12/21 to engage education and coastal training staff and volunteers about monitoring and research projects and translating science information for education communication. Science staff developed one-page summaries and delivered presentations for projects, including SWMP, sentinel sites, Western lily, Wasson creek restoration, eelgrass, and green crabs.
Date: 26 April 2021
From: Board of Directors, Friends of South Slough Reserve (FOSS)
To: South Slough Management Commission meeting April 30, 2021
Re: Activities Report to Commission and Interested Public

In the first quarter of 2021, the Friends of South Slough Reserve (FOSS) has continued to provide important support for the South Slough Reserve. The following provides highlights of our activities.

Financial Support for Land Acquisition:
We followed the progress of the land acquisition of a key property segment at the entrance of the reserve from Seven Devils Road. We are ready to provide our pledged $25,000 donation as match to support the Reserve’s proposal when all of details are finalized. We plan to work with SSNERR to determine ways to provide additional funding to secure a smaller adjacent property.

Eelgrass Restoration Synthesis
FOSS’s contract with the Pew Charitable Trusts is near completion. The project goal is to prepare a report to synthesize best practices for eelgrass restoration and protection on the West Coast (California, Oregon, and Washington), and to identify those environmental, policy, and regulatory conditions that provide the best chances for success. The evaluations of the draft documents provided by subcontractors are underway, with plans for the final report to be delivered to Pew by May 31, 2021. The Pacific Marine and Estuarine Fish Habitat Partnership (PMEP) will be hosting the information on their web for use by all interested parties.

Internships, Citizen Science Activities, and Research Opportunities
One of the key roles of FOSS is to financially support research and educational outreach internships for people to work with the SSNERR staff. Generous donations from FOSS members will be used to support program needs. FOSS donations and grant support provided through FOSS are key assets adding to the impact of Reserve programs. Support from interns and local citizens assists staff meet program objectives, but the participation enriches the community understanding of coastal ecosystems.

We submitted grant proposals to Pacific Power Foundation and are now going to be able to execute the USFS Citizen Science Funding this year, after a pause last year due to COVID-19. FOSS has recently secured funding from the US Fish and Wildlife Service to provide opportunities to continue a collaborative restoration activity in the Wasson Creek Watershed.

Because of COVID restrictions, traditional dormitory housing was not available for interns in 2020 and will likely not be available for 2021. After a request was sent to our membership, local FOSS members volunteered housing for two interns. We are most grateful for these generous members of our community.
Visitor Center Bookstore:
Our bookstore redesign has progressed, and the Bookstore Committee is working to identify our initial retail products including guidebooks and t-shirts, and outerwear. We purchased a Square terminal that will include credit card use by customer without secondary handling. The Reserve has provided a plexiglass barrier for the sales area. Our redesign will comply with guidance from the state of Oregon for retail operations.

Letters of Support:
FOSS submitted letters of support during the first quarter of 2021 for:

RE: National Estuarine Research Reserve System (NERRS) and Acquisition and Construction Program for Fiscal Year 2021. Funding Opportunity Number: NOAA-NOS-OCM-2021-2006713. (Successfully obtained!)

RE: Support for State of Oregon Senate Bill 5539, Department of State Lands Budget.

RE: NERRA’s FY22 funding request.