

**Willamette Water Supply**  
*Our Reliable Water*

March 24, 2025

Oregon Department of Environmental Quality  
700 NE Multnomah Street, Suite 600  
Portland, OR 97232

**Attention:** Brian Creutzburg

**Subject:** Willamette Water Supply System Commission Annual Report

Dear Mr. Creutzburg,

The Willamette Water Supply System (WWSS) Commission is providing the attached annual report, consistent with the requirements of Oregon Administrative Rule 340-039-0017(3). The intent of this report is to document activities conducted in 2024 and to date in 2025 towards obtaining the credits required to offset the thermal impact of the WWSS withdrawal, as documented in the WWSS Thermal Trading Plan, which was approved by the Oregon Department of Environmental Quality in 2020. This annual report documents activities including maintenance of existing plantings, as well as initial plantings in new areas. The WWSS will continue to document progress towards obtaining the required credits prior to startup of the WWSS in 2026.

Sincerely,



Christina Walter, Permitting and Outreach Manager, WWSP

**Enclosed:**

Geosyntec Consultants, Inc. 2025. Thermal Trading Annual Report for 2025.

## Memorandum

Date: March 25, 2025  
To: Christina Walter and Jill Chomycia, Willamette Water Supply Program  
From: Maral Razmand and Jacob Krall, Geosyntec Consultants, Inc.  
Subject: Thermal Trading Annual Report for 2025

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### INTRODUCTION

The Willamette Water Supply System Commission (WWSS Commission) is an Oregon intergovernmental entity formed by Tualatin Valley Water District (TVWD), the City of Hillsboro, and the City of Beaverton. The WWSS Commission was formed to build the Willamette Water Supply System (WWSS) in response to planned growth in their service areas. The WWSS will provide an additional resilient water supply for Washington County. When complete, the WWSS will be one of Oregon's most seismically-resilient water systems—built to better withstand natural disasters, protect public health, and speed regional economic recovery through restoring critical services more quickly.

The Willamette River, one of Oregon's largest rivers, is the WWSS's new supply source. The raw water intake is located at the Willamette River Water Treatment Plant in Wilsonville. From there, raw water will be pumped to the WWSS Water Treatment Plant, a new state-of-the-art water filtration plant where multiple treatment processes will produce high quality drinking water. Drinking water will be pumped to reservoir facilities on Cooper Mountain, then will be gravity-fed to additional storage and customers in the TVWD, Hillsboro, and Beaverton service areas. The new system will be completed by 2026. The TVWD is the managing agency for the WWSS commission. In this role, the TVWD operates the Willamette Water Supply Program (WWSP) to plan, design, and construct the WWSS.

On October 23, 2020, the Oregon Department of Environmental Quality (DEQ) approved a Thermal Trading Plan (TTP) to fulfill the temperature offset requirement of the Clean Water Act (CWA), Section 401 Water Quality Certification (WQC) as it pertains to the WWSS. The approved TTP modeled the required thermal offset to be:

- 30.2 million kilocalories per day (MMKcal/day).

This annual report describes trading activities conducted since the last annual report (Geosyntec, 2024).

## **SUMMARY OF ACTIVITIES SINCE MARCH 2024**

All 2024 activities listed below are regarding Molalla River State Park, as part of a restoration project which the WWSP refers to as the Molalla River State Park Floodplain Forest and Riparian Area Health Restoration Project.

### **Accidental Mowing Event**

In July 2024, a 3.3-acre portion of the Phase 2 planting area was mistakenly mowed by a third party conducting property maintenance on behalf of the landowner. WWSS plantings were damaged or destroyed. WWSS promptly notified DEQ of the event and is providing additional information in this annual report.

Oregon Parks and Recreation Department (OPRD) hires a third-party park host whose responsibilities include mowing a field adjacent to the planting area. The park host on duty in July mowed a portion of the area. After the July mowing event, Ash Creek Forest Management (Ash Creek), who conducts restoration plantings, monitoring, and maintenance on behalf of WWSP through a contract with Molalla River Watch, first identified the damage and brought it to the attention of the Molalla River State Park Manager, Molalla River Watch, and WWSP. The Park Manager spoke with the host and informed them that the area was not to be mowed. Ash Creek began developing an estimate of the damage and a plan for addressing the damage.

In early August 2024, a second mowing event occurred. A new park host mowed the remainder of the planted area adjacent to the field. Ash Creek again notified the Park Manager, Molalla River Watch, and WWSP; and began revising the plan to address the damage.

Later in August 2024, WWSP met with the Park Manager and Molalla River Watch to discuss measures to avoid further damage.

Several actions were taken to prevent a similar event from recurring in the future:

- The Park Manager installed signs along the area adjacent to the field to indicate that the area is under restoration and is not to be mowed.
- The Park Manager developed a “mow map” to better indicate where park hosts are to mow and will provide this to new park hosts as part of orientation.
- The Park Manager directed the host coordinator to make new hosts aware of the protected plantings and explain the mow map as part of new host orientation.

The mowed area is scheduled for replanting early 2025 as discussed later in this annual report. Together with preventative measures by OPRD, WWSP believes this plan will fully address the damage and prevent further damage due to mowing.

## **Maintenance**

Ash Creek conducted the following maintenance activities in 2024: Additional detail can be found in the Ash Creek annual report (Ash Creek, 2025, reproduced as Appendix A).

- **January 4-5, 2024:** Cut Himalayan blackberry patches in Phase 2, Zone A (areas missed in previous cutting).
- **March 21-22, 2024:** Sprayed Himalayan blackberry regrowth in Zone A; brushcut dead Himalayan blackberry. Stump treated scotch broom and holly in the upland area of Phase 2 Zone A.
- **April 12, 2024:** Seeded the entry path where the blackberry was treated. Installed wetland Seed into Zone A (both Phases I and II; see Figure 1).
- **July 26-30, 2024:** Sprayed the Phase 1 and Phase 2 zones for knotweed control.
- **August 19-26, 2024:** Cut Himalayan blackberry across all of Phase 2.
- **August 27-30, 2024:** Mashed and sprayed Himalayan blackberry and Knotweed in Phase 1 and Phase 2 zones.
- **August 30-September 25, 2024:** Systematically cut Himalayan blackberry throughout Phases 1 and 2 as it died back from herbicide treatment.
- **November 26-December 9, 2024:** Sprayed Himalayan blackberry.

Maintenance activities were not conducted in Phase 1, Zone 4, because of high success rates from the 2022 planting and knotweed removal activities. However, Phase 1, Zone 4 will be monitored during 2025 to ensure continued success of the restoration.

## **Planting**

Ash Creek conducted the following plantings in 2024: Detailed quantities can be found in Appendix B.

- Seeding in Zone A (Phases 1 and 2, forest floodplain area): 45 total pounds.
- Bare-root planting in Phase 2, Zone A (forest floodplain area): 5,850 plants.
- Seeding in Phase 2 (upland area): 38 total pounds.
- Bare-root planting in Phase 2, Zone A (forest floodplain area): 8,400 plants.

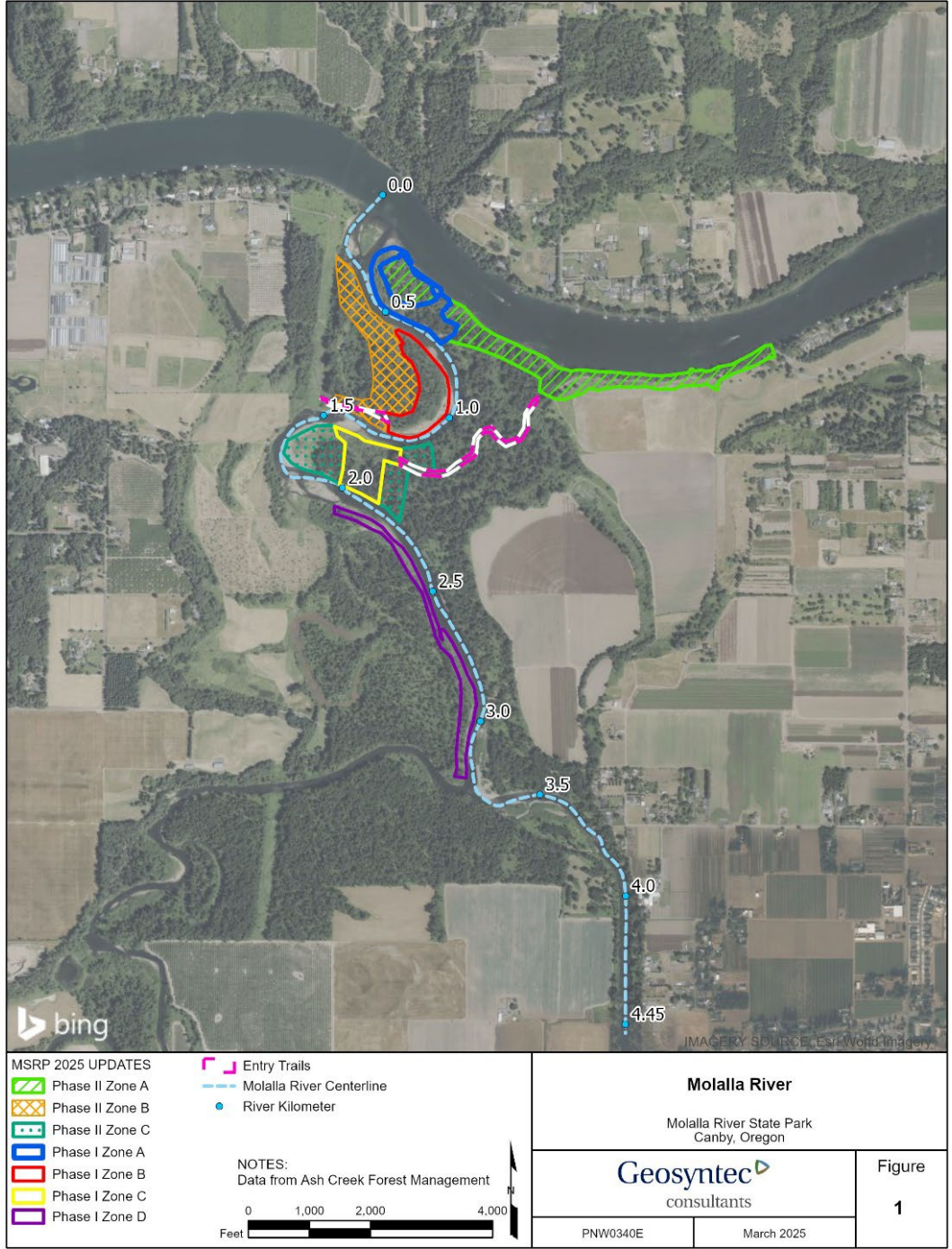


Figure 1. Planting and Monitoring Zones. Data provided by Ash Creek Forest Management.

### **Monitoring**

Ash Creek conducted quantitative monitoring of site performance for the areas indicated in Figure 2.

Ash Creek monitored a total of 55 locations and found the following primary takeaways:

- 75.6% survival of woody stem plantings (down from 87% in 2023; but meeting the monitoring goal of 70% survival)
- 55% average canopy cover (up from 48% in 2023) in Phase 1, and 59% canopy coverage in Phase 2 (up from 47%).
- 21% bare substrate in Phase 1 (unchanged from 2023) and 21% bare substrate in Phase 2 (down from 28%).

The Ash Creek (2025) monitoring report also notes improved species richness in both Phase 1 and Phase 2 relative to 2023.

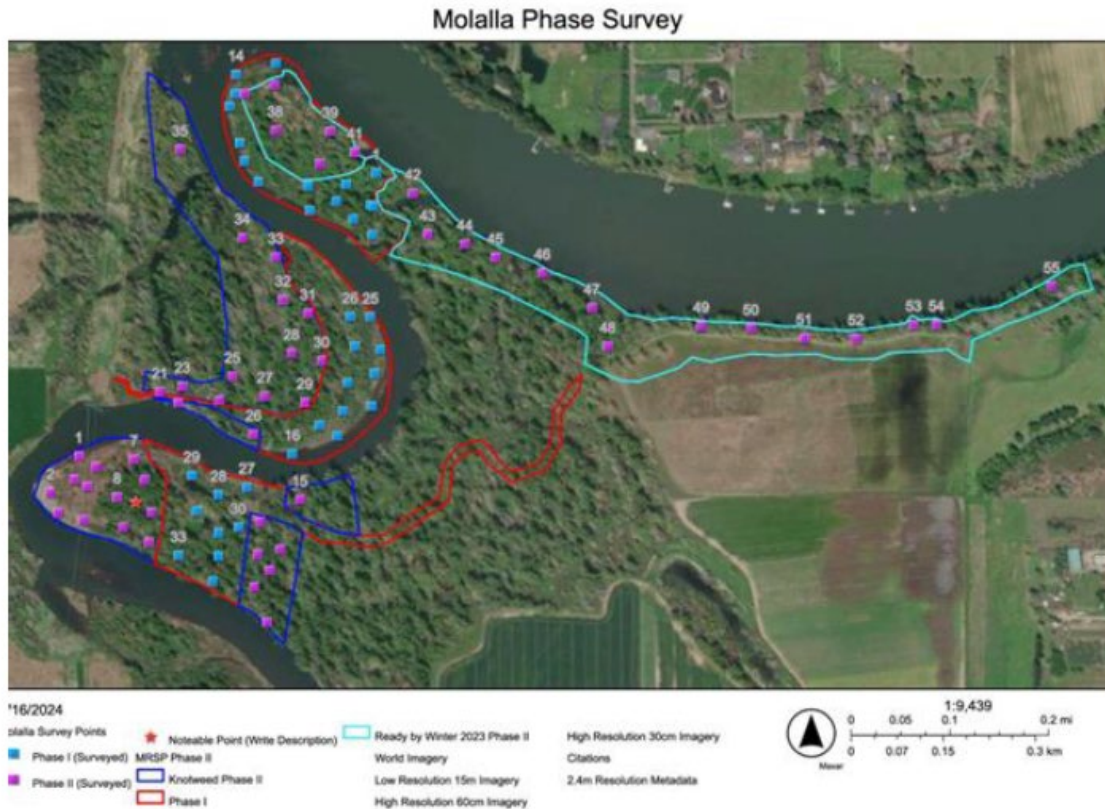


Figure 2. Monitoring locations evaluated by Ash Creek in 2024. Figure reproduced from Ash Creek (2025).

## FUTURE WORK AT MOLALLA RIVER STATE PARK

Additional planting and maintenance activities will occur during 2025 at the Molalla River State Park site, including ongoing treatment to prevent regrowth of invasive Himalayan blackberry and knotweed. Specifically, the following planting activities are scheduled for early 2025 (a detailed table is provided in Appendix C):

- 3,100 plants in Phase 2, Zone A, upland area (replanting of mowed area).
- 5,450 plants in Phase 2, Zone A, floodplain area (initial planting)
- 3,000 plants in Phase 2, Zone B (initial planting).
- 5,450 plants in Phase 2, Zone C (initial planting).

Activities during the remainder of 2025 and beginning of 2026 will be documented in the next annual report.

## **UPDATE ON SHADE CREDIT GENERATION**

The Molalla River State Park Floodplain Forest and Riparian Area Health Restoration Project includes planting that will provide shade to both the Molalla and Willamette Rivers. The Molalla River is a tributary which enters the Willamette River approximately 3 miles downstream of the WWSS intake, and upstream of the point of maximum impact for the withdrawal (WWSS, 2020), meaning shading on both the Molalla and Willamette Rivers will offset heat load impact of the withdrawal.

An updated calculation of shading credits is presented here for the Molalla River, including planting in the Phase 2 areas adjacent to the Molalla River, which have not previously been simulated.

### **Molalla River**

The updated calculation presented here used Version 9.0.0b14 of the Heat Source Model. For the restored conditions scenario, the model inputs were updated for the Phase 2 areas adjacent to the Molalla River (Phase 2, areas B and C in Figure 1).

Figure 3 shows the baseline conditions and restored conditions (following full growth of the Phase 1 and Phase 2 zones along the Molalla River) based on output from the shade component of Heat Source version 9.0.0b14. The x-axis shows the River Kilometer along the Molalla River, with River Kilometer 0 being the confluence with the Willamette River. The amount of solar radiation blocked for baseline and restored conditions is shown in Figure 4.



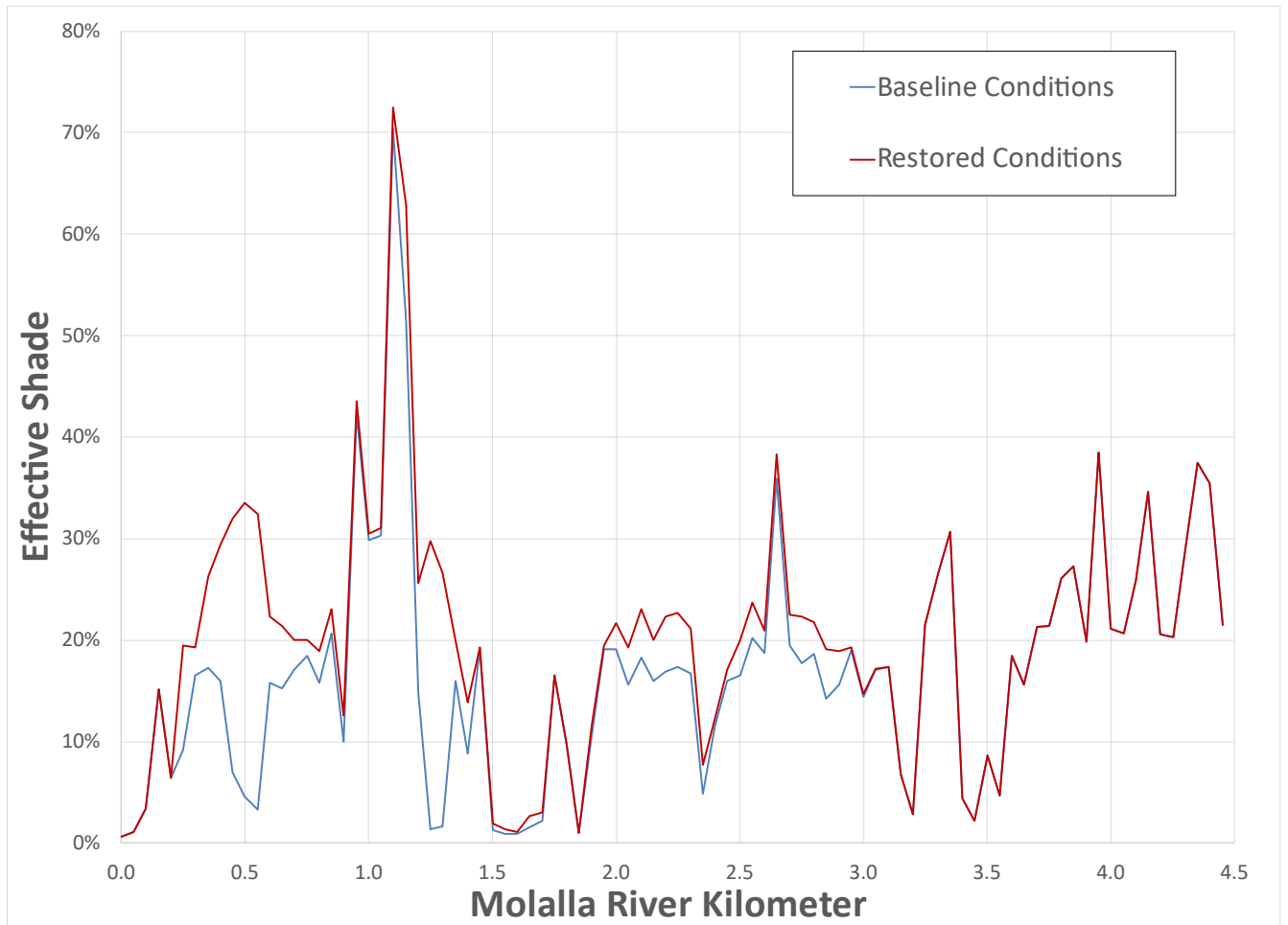


Figure 3. Modeled Effective Shade for the Phase 1 and 2 planting areas along the Molalla River at Molalla River State Park.

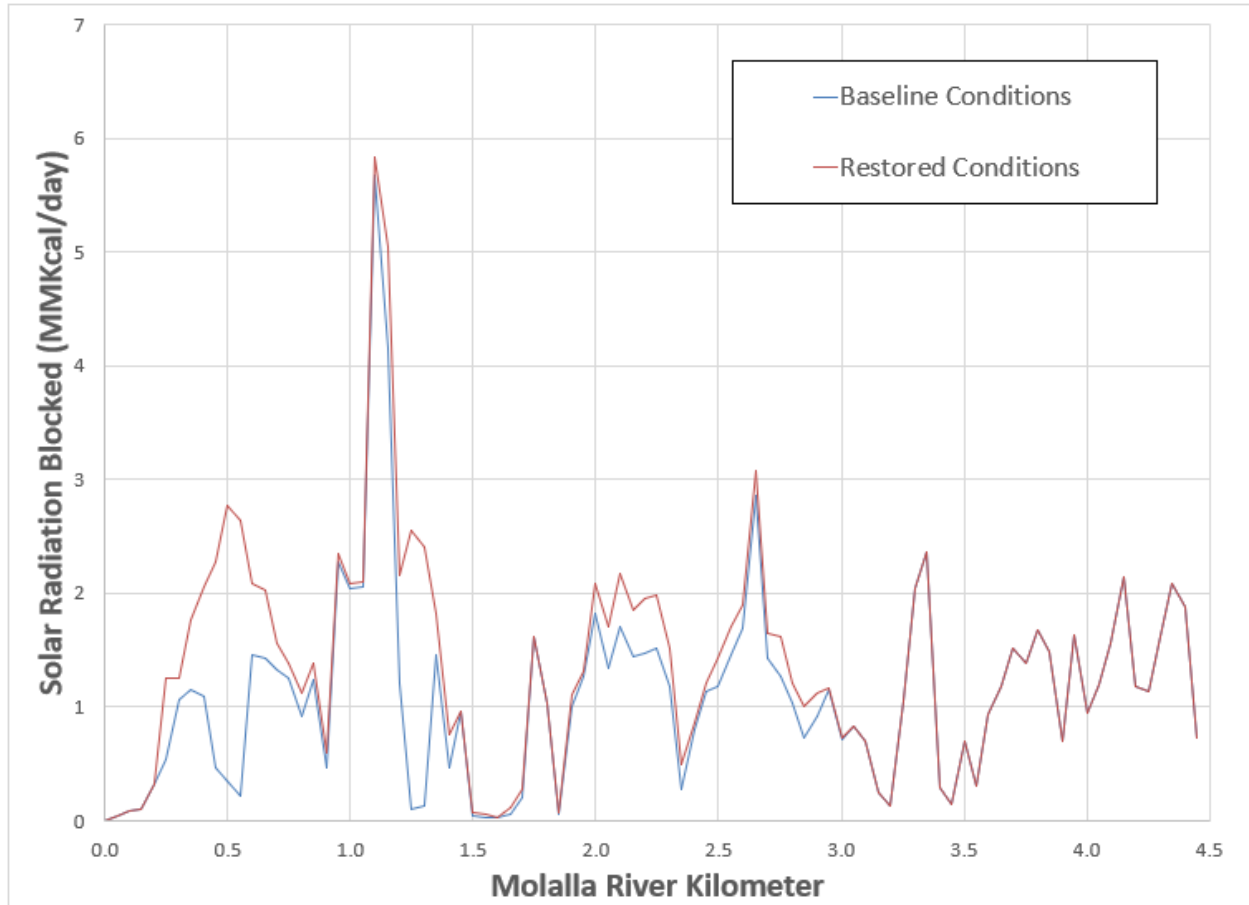


Figure 4. Modeled solar radiation blocked for the Phase 1 and 2 planting areas along the Molalla River at Molalla River State Park.

Based on the results shown in Figure 3 and Figure 4:

- 100.20 million kilocalories per day (MMKcal/day) are blocked for current (baseline) conditions
- 123.36 MMKcal/day are blocked for future (full growth) conditions

Taking the 2:1 trading ratio into account, as required under the WWSS thermal trading plan, this means that:

- $(124.61-100.20)/2 = 12.20$  MMKcal/day credits will be generated at this site based on planting in the Phase 1 and Phase 2 areas.

**Willamette River**

An update to the Willamette River shading calculation is not provided here since the planting areas have not changed. The previous annual report included the following credit calculations:

- $(51.64-46.71)/2 = 2.46$  **MMKcal/day** credits have been generated at this site based on planting in the Phase 1 area.
- $(62.00 - 46.71)/2 = 7.65$  **MMKcal/day** credits will be generated at this site including both the Phase 1 and Phase 2 (Zone A) areas. These credits include the 2.46 MMKcal/day from the Phase 1 planting described above.

**Total Shading Credits Generated**

The total amount of shading credits generated in the Phase 1 and Phase 2 areas is  $12.20+7.65 = 19.85$  MMKcal/day, which is 65.7% of the 30.2 MMKcal/day thermal load calculated in the WWSS thermal trading plan, required once full capacity of the WWSS withdrawal is reached. The credits achieved are summarized in Table 1, below. The allowable withdrawals based on the credits estimated in Table 1 are 122.6 million gallons per day (MGD), including the previously authorized 70 MGD, and 65.7% of the additional 80 MGD expected under the fully permitted conditions.

*Table 1. Summary of credits expected to be achieved based on plantings at Molalla River State Park.*

<b>Project/Phase</b>	<b>Thermal Credits Achieved (MMKcal/day)</b>	<b>Percentage of Credits Required at Full Capacity</b>
Molalla Confluence Project, Molalla River area	12.20	40.4%
Molalla Confluence Project, Willamette River area, Projected	7.65	25.3%
<b>Total</b>	<b>19.85</b>	<b>65.7%</b>

**REFERENCES**

Ash Creek Forest Management LLC (Ash Creek), 2025. Molalla River State Park- Phase I/II Monitoring Report 2024.

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March 2025  
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Willamette Water Supply System (2020). Thermal Trading Plan. October 23.

## **APPENDICES**

Appendix A: Molalla River State Park- Phase I/II Monitoring Report 2024.

Appendix B: Molalla River State Park 2024 Treatment Reports

Appendix C: Molalla River State Park 2025 Planned Planting Table

## **Appendix A:**

### **Ash Creek Forest Management**

### **Molalla River State Park- Phase I/II Monitoring Report 2024**



## **Molalla River State Park - Phase I/II**

### **Monitoring Report 2024**

#### **Introduction**

The purpose of this report is to summarize restoration goals, actions, and progress on 32 acres of floodplain forest in Phase I and 50 acres of floodplain forest and upland habitat in Phase II of Molalla River State Park. The goal of restoration is two-fold: removal and control of monoculture-forming, invasive knotweed spp., and reestablishment of reproductive, native tree and shrub canopy that will provide stream shading among other ecological benefits.

#### **Background**

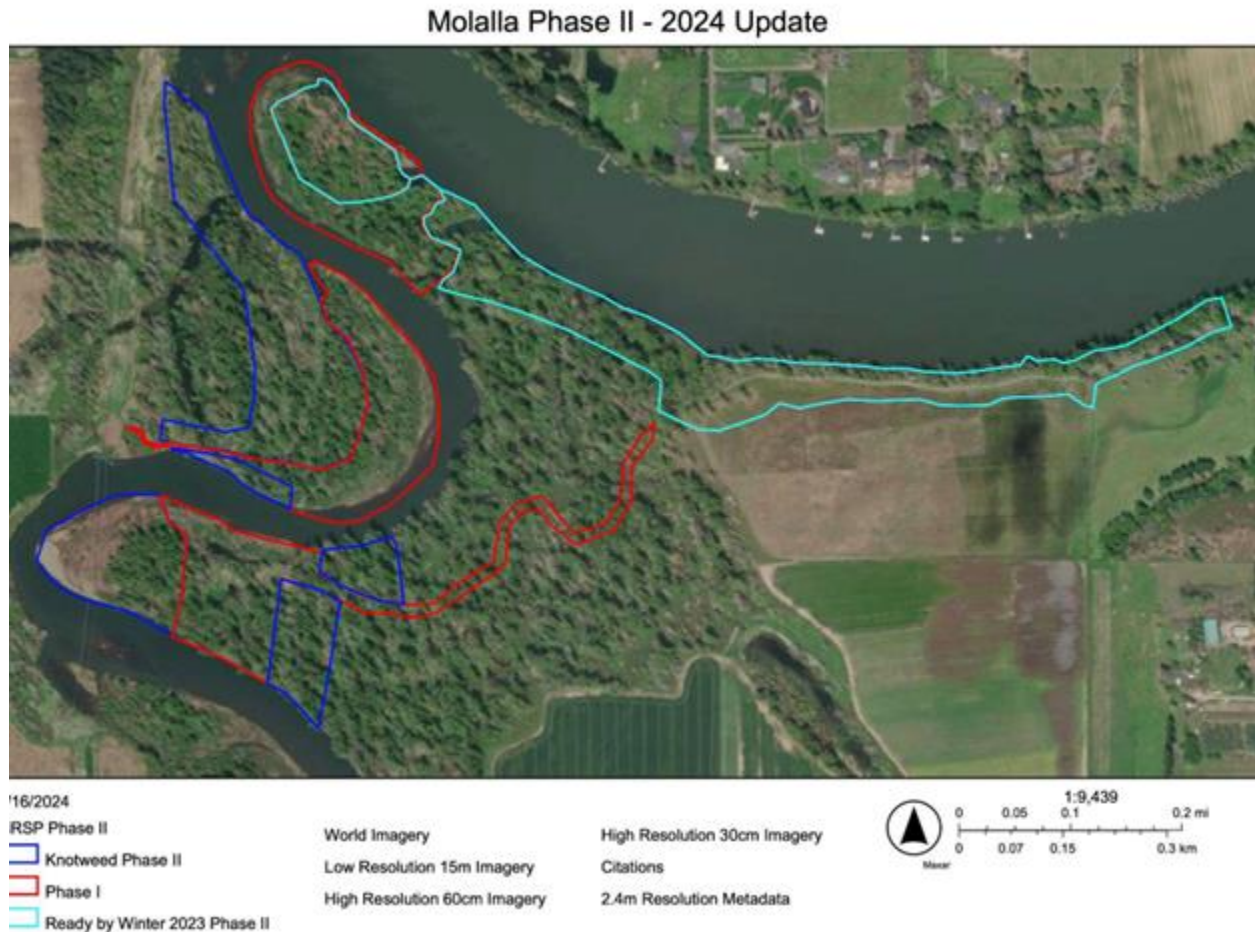
Molalla River State Park is a 567-acre natural area located at the Pudding River and Molalla River confluence, stretching north to the Molalla River and Willamette River confluence. The site is a floodplain cottonwood forest that supports one of the largest great blue heron rookeries in the Willamette Valley. The forest understory and canopy layer in the park were suppressed by a monoculture of Japanese knotweed (*Polygonum cuspidatum*) and Bohemian knotweed (*Polygonum × bohemicum*). To achieve restoration targets, Ash Creek has used a combination of yearly mash and spray treatments (from 2019-2021) to remove the highest density knotweed monocultures. In 2022, Zone D was removed due to high success rate and access issues. These acres were replaced by expanding Zone A (see Map 1), where additional knotweed was discovered in 2020. New acres in Zone A received treatment after discovery of knotweed in 2020 but were not included in the initial planting in 2022.

From the winter of 2021-2022 to present day, Ash Creek has installed 94,000 bareroots, willow stakes, and cottonwood poles across the three zones. Site preparation throughout phase II began in summer of 2023 including extensive cutting of Himalayan blackberry (*Rubus*

*armeniacus*) and spraying regrowth. Initial planting took place in only the Upland Zones of Phase II and sections of Zone A's floodplain in the winter of 2023/2024.

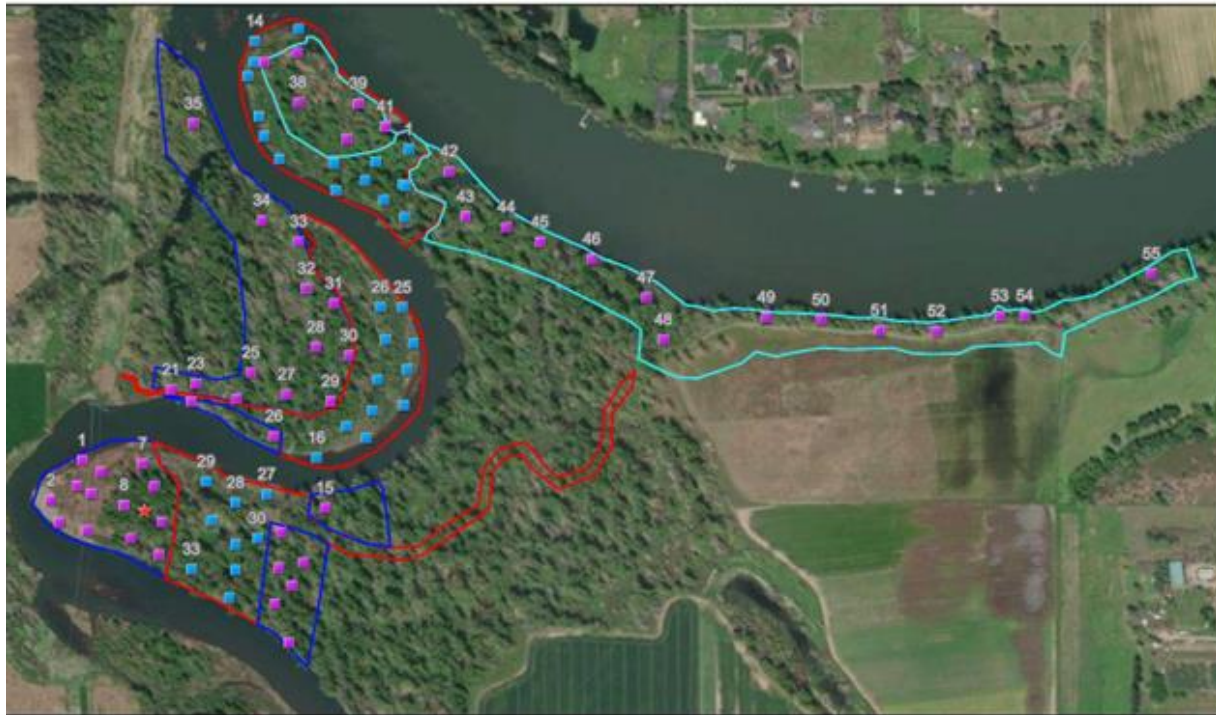
## Project Maps

Map 1: Molalla Phases I and II



Map 2: Monitoring Plots

## Molalla Phase Survey



1/16/2024

Molalla Survey Points

Phase I (Surveyed)  
Phase II (Surveyed)

★

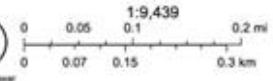
Noteable Point (Write Description)  
MRSP Phase II  
Knowweed Phase II  
Phase I

□

Ready by Winter 2023 Phase II  
World Imagery  
Low Resolution 15m Imagery  
High Resolution 60cm Imagery

High Resolution 30cm Imagery

Citations  
2.4m Resolution Metadata



## Planting Tables

### Bare-roots Phase II Zone A (Forest Floodplain)

Species	Common Name	Quantity
<i>Alnus rubra</i>	Red Alder	950
<i>Calocedrus decurrens</i>	Incense Cedar	400
<i>Cornus stolonifera</i>	Red osier dogwood	1000
<i>Crataegus gaylussacia</i>	Klamath hawthorn	500
<i>Malus fusca</i>	Western Crabapple	550
<i>Physocarpus capitatus</i>	Pacific Ninebark	1500
<i>Salix piperi</i>	Piper Willow	1000
<i>Salix sitchensis</i>	Sitka Willow	1000
<i>Spiraea douglasii</i>	Douglas spiraea	1000
<i>Thuja plicata</i>	Western Red Cedar	500
		<b>8400</b>



### Bare-roots Phase II Zone A (Upland Near Entry Trail)

Species	Common Name	Quantity
<i>Alnus rubra</i>	Red Alder	750
<i>Amelanchier alnifolia</i>	Serviceberry	1250
<i>Calocedrus decurrens</i>	Incense Cedar	200
<i>Ceanothus velutinus</i>	Snowbrush ceanothus	450
<i>Crataegus gaylussacia</i>	Klamath hawthorn	500
<i>Malus fusca</i>	Western Crabapple	500
<i>Oemleria cerasiformis</i>	Osoberry	200
<i>Pseudotsuga menziesii</i>	Douglas fir	500
<i>Rhamnus purshiana</i>	Cascara	500
<i>Sambucus racemosa</i>	Red Elderberry	1000
		<b>5850</b>

### Monitoring Methods

Monitoring is conducted in the summer of every year during peak growth. A total of 1% of the total project area is surveyed in accordance with BLM monitoring guides. Parameters surveyed include plant survival, invasive species cover, and canopy cover. In the summer of 2023, surveyors established randomly placed monitoring plots throughout project areas, 35 in Phase I and 55 in Phase II, each 20' x 20' (see Map 2). For continuity across years of data collection, and to be able to track change, the same established monitoring plots are used. Note, some stakes denoting plots are lost, particularly in open floodplain areas, and these plots are reestablished using ArcGIS and prior plot photos.

Surveyors take photos of each plot facing the river and of the canopy from the center of the survey point. Shrubs and trees are documented by living stem count. Functional groups including native and non-native trees/shrubs, forbs, and graminoids are documented by percentage cover. Additionally, we quantified percent cover of bare substrate and invasive species of concern including knotweed spp. and Himalayan blackberry. Canopy photos are used to quantify percent canopy cover through digital analysis.

### Monitoring Goals and Parameters

1. 70% native planting survival
  - 14250 native bareroots installed in winter 2023-24 across 22.97 acres
  - Expected stem count across planting acres is compared to monitoring stem count across monitoring plot acreage
  - Some natural recruitment will occur and count toward restoration success

- 2. Less than 20% cover of invasive species
  - Measured by average percent cover across monitoring plots

**Monitoring Results**

Planting survival rate: 75.6%

Figure 1: Phase I Percent Cover by Functional Group

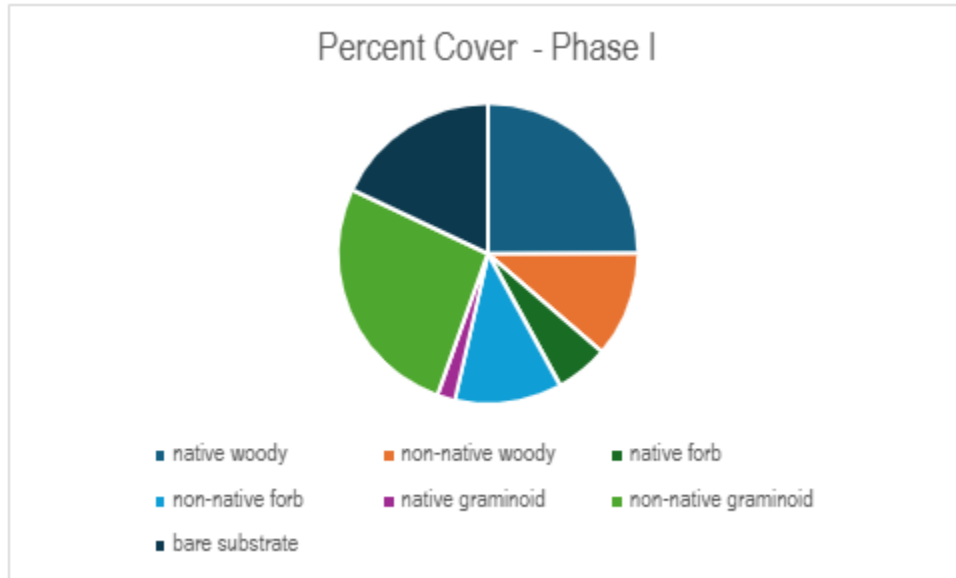


Figure 2: Phase II Percent Cover by Functional Group

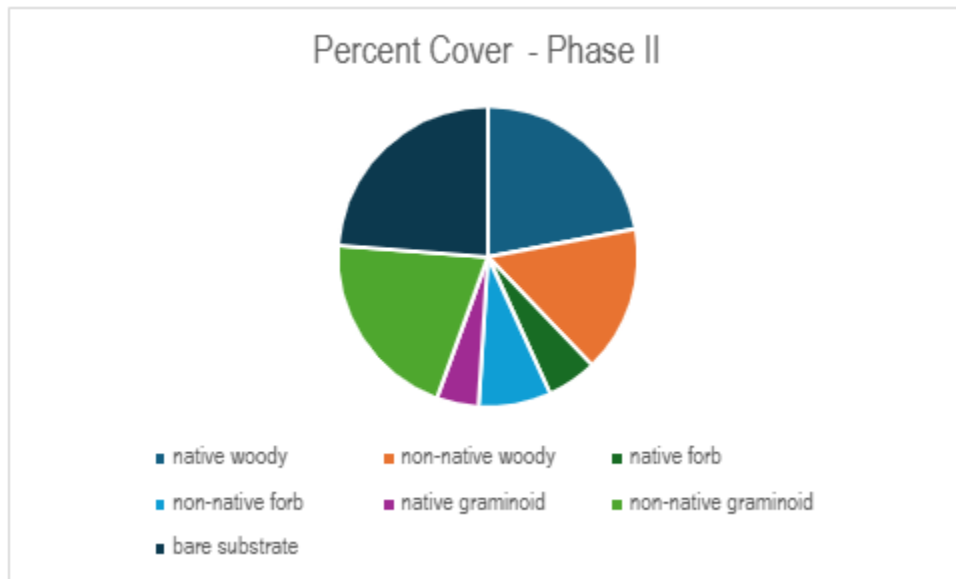


Figure 3: Percent Cover Invasives of Concern Phase I & II

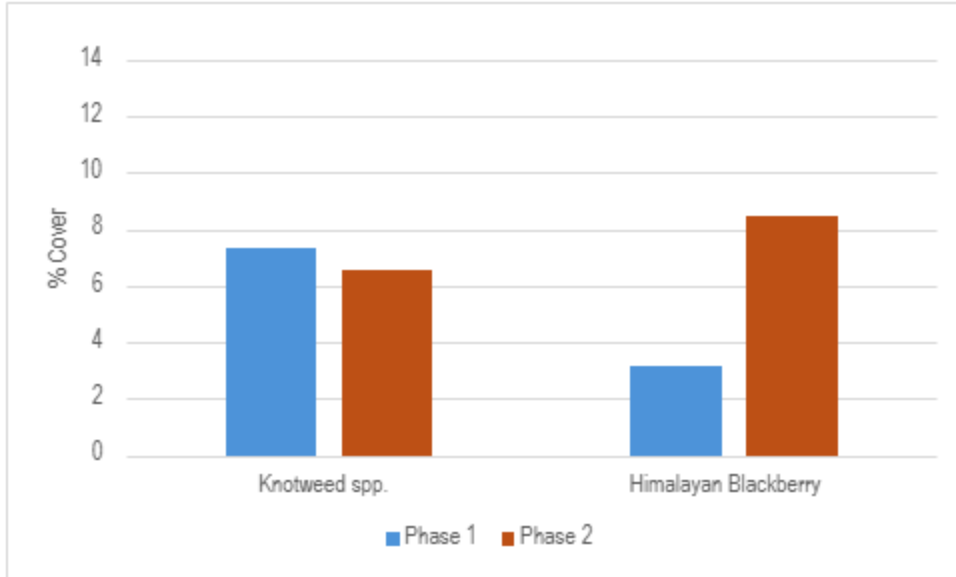


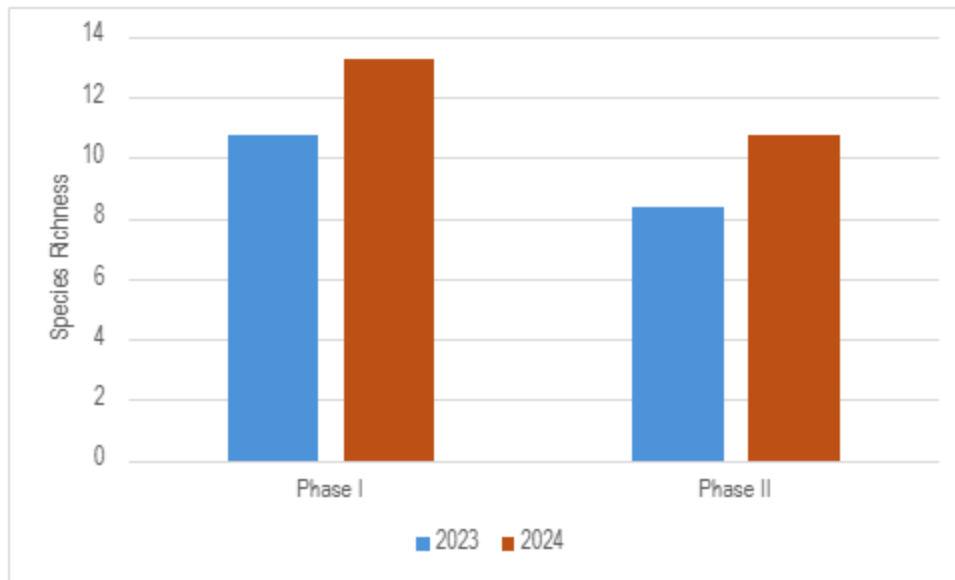
Table 3: Percent Canopy Cover Averages by Year

	2023	2024
Phase 1	48%	55%
Phase 2	47%	59%

Table 5: Percent Cover by Functional Group Averages by Year

Functional Group	2023	2024
native shrub/tree	15%	23%
non-native shrub/tree	9%	14%
native herbaceous	7%	9%
non-native herbaceous	48%	32%
bare substrate	21%	21%

Figure 4: Species Richness by Phase and Year



## Conclusions

In comparison to 2023 baseline monitoring, our metrics display improvement across both phases in habitat diversity in function. Notably, species richness has increased in phase I and phase II by 25 and 29%, respectively (Figure 4). Additionally, canopy cover increased in both phases, with phase II showing a slightly higher percent cover than phase I (Table 3).

Phase II continues to exhibit a higher percent cover of Himalayan blackberry, reflecting a shorter history of site preparation than phase I. Phase I has a marginally higher percent cover of knotweed than phase II (Figure 3).

In terms of percent cover by functional group, both native woody and herbaceous groups have increased since 2023 (Table 4). However, the dominant non-native functional group continues to be graminoids, namely with reed canary grass (*Phalaris arundinaceae*) spreading through native and disturbed areas alike.

## Future Recommendations

While our mechanical and chemical treatments of noxious weeds have shown reduction in their population sizes, monocultures of the extent found at Molalla River State Park will require years of repeated treatment to reestablish native habitat. Both the well-established seed bank of Himalayan blackberry and the extensive rhizomatous growth of knotweed would impede native recruitment and establishment without continued intervention. Additionally, while rated as lower concern by Oregon Department of Agriculture, reed canary grass can quickly out-compete any existing native herbaceous layer and prevent successful growth of planted and volunteer shrubs and trees. Chemical treatment of reed canary grass will need to be followed up with seeding a native herbaceous layer to prevent further invasion of noxious weeds to the former reed canary grass monocultures. Finding ways to work around bird nesting season to allow for invasive treatments in the spring season would have significant impacts on the success of long

term invasives management, especially for Himalayan blackberry and reed canary grass. While the growing cycle of knotweed lends itself to annual treatments reed canary and Himalayan blackberry demonstrate year-round growth and can recover from past treatments and overgrow past a point where they can be effectively managed if treated only once a year. It is recommended that invasives removal should be followed up with additional planting and native seeding. To combat impacts of the emergence of Emerald Ash Borer, we recommend underplanting as soon as possible with other native canopy species wherever Oregon Ash (*Fraxinus latifolia*) is the dominant canopy species.

### Site Photos



Phase I Plot 7: *knotweed monoculture persists*



Phase 1 Plot 30 (2023 left, 2024 right): *reduction of reed canary grass, healthy elderberry midstory canopy*



Phase II Plot 6 (2023 left, 2024 right): *reduction of the size of zone C's knotweed monoculture*



Phase II Plot 39 (2023 left, 2024 right): *treatment of Himalayan blackberry brambles leaving bare substrate*

## Supplemental Figures

Supplemental Table 1: 2024 Monitoring Raw Data

Point	Native woody	non-native woody	native forb	non-native forb	native graminoid	non-native graminoid	bare substrate	knotweed	HBB	English holly	species count	canopy	notes
1_1	20	7.5	17.5	0	5	2.5	42.5	3.5	1	0	11	80	
1_2	7.5	15	2	3	0	72.5	0	0	12.5	0	7	70	
1_3	22.5	12.5	12.5	15	7.5	22.5	7.5	3	8.5	0	19	68	
1_4	45	6.5	2.5	8	0	8	30	1.5	5	0	12	78	
1_5	57.5	4	2.5	15	0	1.5	19.5	1	3	0	13	88	
1_6	7.5	10.5	4.5	8.5	0	41.5	27.5	7	5.5	0	24	65	
1_7	2	90	0	0	0	0	8	86.5	3.5	0	3	91	
1_8	23.5	9	3.5	10	0	42.5	11.5	1	8	0	24	76	
1_9	19.5	4.5	4.5	44	0	18.5	9	1	4	0	21	17	
1_10	89	0	1	3.5	0	6.5	0	0	0	0	14	60	
1_11	26.5	17.5	2	31.5	0	22.5	0	10	6.5	0	11	65	
1_12	27.5	0	1.5	28.5	0	27.5	15	0	0	0	17	8	
1_13	5	77.5	6.5	3	0	8	0	77.5	4.5	0	6	0	
1_14	32	4.5	7.5	41.5	0	9.5	5	4	0	0	17	81	
1_15	71.5	2	6	14.5	0	6	0	2	0	0	18	30	
1_16	70	0	0	4	0	7	20	0	0	0	13	0	

1_17	15	0	3	7	0	75	0	0	0	0	13	79
1_18	0	0	2	5	0	3	90	0	0	0	13	0
1_19	35	5	2	5	0	43	10	2	3	0	15	97
1_20	30	0	2	5	1	59	3	0	0	0	13	83
1_21	1	1	0	2	0	1	95	1	0	0	11	0
1_22	6	1	25	30	0	38	0	1	0	0	15	0
1_23	20	12.5	15	12.5	0	40	0	6	5	0	11	32
1_24	29	1	10	40	0	17	3	1	0	0	22	0
1_25	60	2	2	8	0	8	20	2	0	0	17	96
1_26	27.5	1	10	9	0	47	6	1	0	0	17	71
1_27	7.5	10	4	8.5	17.5	52.5	0	1.5	0	0	9	85
1_28	3.5	3	1.5	2	0	90	0	3	0	0	6	12
1_29	7.5	7.5	3.5	6	5	5	65.5	4.5	0.5	0	8	94
1_30	25	14	5	5	10	11.5	21	2	1.5	0	9	98
1_31	2	4.5	2	0	0	92	0	3	2	0	5	18
1_32	50	2.5	5	5.5	4.5	32.5	5	1	1	0	10	95
1_33	1	15.5	20	12.5	3.5	0	47.5	13.5	1	0	13	64
1_34	4	35.5	3	5	5	0	52.5	8	30	10	13	66
1_35	23.5	19	10	6	8.5	17.5	15	8	5	0	13	50
2_1	5.5	12	9	11.5	2.5	20	39.5	9.5	2.5	0	16	0
2_2	0	0	1	0	0	1	98	0	0	0	2	0
2_3	13.5	62.5	12.5	3.5	0	2	6	62.5	0	0	11	0
2_4	0	0	6.5	6	0	7.5	80	0	0	0	19	0
2_5	0	5	5	7.5	0.5	9	73	2.5	2	0	21	0
2_6	0	4.5	7.5	4	0	27.5	56.5	4.5	0	0	9	0
2_7	1	49	15	10	0	25	0	35	14	0	11	0
2_8	7.5	37.5	1.5	2	0	0	51.5	37.5	0	0	6	81
2_9	4	69.5	2	2	0	0	22.5	68.5	5.5	0	10	83
2_10	22.5	20	5	10	17.5	7.5	15	12.5	2.5	0	13	68
2_11	10	8.5	4	25	7.5	5	40	5	2	0	12	70
2_12	0	35	19	13.5	0	25	7.5	33.5	1.5	0	14	0
2_13	20	27.5	3.5	12	0	33.5	3.5	30	11	0	16	82
2_14	37.5	10	12.5	0	10	2.5	32.5	9	0	0	7	63
2_15	25	12.5	3.5	4	20	7.5	27.5	0	7.5	0	10	75
2_16	3.5	30	5	1.5	7.5	17.5	30	10	10	0	5	58
2_17	20	3.5	21.5	7.5	5	2.5	40	3.5	2	0	12	74
2_18	25	10	12.5	10	20	7.5	15	7.5	5	0	12	57
2_19	20	10	15	5	10	10	30	8	2	0	12	80
2_20	12.5	5	0	0	0	0	82.5	2	3	0	6	84

surrounded by out of  
bounds knotweed



2_21	40	0	7	6.5	0	36.5	10	0	0	0	18	77	
2_22	17	1	2.5	2	10	64	3.5	0	1.5	0	6	65	
2_23	1.5	0	3.5	6	7.5	77.5	4	0	0	0	10	51	
2_24	25	17.5	6	5	0	42.5	4	0	17.5	0	11	62	
2_25	5	0	0	1.5	0	93	0.5	0	0	0	4	46	
2_26	15	22	1	2	0	53	7	2	20	0	12	25	
2_27	56.5	6	3	12	0	12.5	10	0	6	0	11	92	
2_28	15	50	2	5	5	20	3	2	48	0	9	65	
2_29	2	20.5	1	24.5	0	52.5	2	0	20.5	0	16	71	
2_30	7.5	0	5	39	5	40	3.5	0	0	0	14	60	knotweed just outside plot
2_31	12.5	17.5	3	9.5	2.5	51	4	5	12.5	0	11	63	
2_32	7	30	0	0	0	63	0	0	27.5	0	4	15	
2_33	26.5	4	0	1.5	0	67.5	0.5	0	3.5	0	7	50	
2_34	10	0	0	0	0	87	3	0	0	0	3	52	
2_35	20	10	0	0	30	2.5	30	0	10	0	8	91	
2_36	31.5	28.5	0	4	0	11.5	25	1.5	22.5	0	12	69	
2_37	37.5	27.5	0	8.5	0	26.5	0	0	27.5	0	9	69	
2_38	22	13.5	1.5	4	0	7	52	1	12.5	0	13	75	
2_39	22.5	35.5	3.5	6.5	4.5	6	21.5	0	35.5	0	19	69	
2_40	18	27	1	4	0	50	0	2	25	0	9	22	
2_41	20.5	0	3	37.5	0	37.5	1.5	0	0	0	7	66	
2_42	15	85	0	0	0	0	0	5	80	0	5	24	
2_43	36	3.5	5.5	1	3	0	51	0	1.5	0	9	97	
2_44	65	0	0	3.5	0	0	31.5	0	0	0	6	92	
2_45	65	3.5	0	0	0	0	36.5	0	4	0	6	84	
2_46	27.5	0	12.5	2.5	35	0	22.5	0	0	0	6	99	
2_47	25	0	7.5	0	2.5	0	65	0	0	0	4	99	
2_48	37.5	0	5	32.5	4	1	20	0	0	0	9	94	
2_49	80.75	3	3.75	4.25	0	3	1.25	0	2	0	14	60	
2_50	70	5	7.5	10	0.5	0	7	0	0	0	14	80	decent amount of Eng. ivy
2_51	15	6	6.5	6	9	2.5	50	0	4.5	0	20	60	
2_52	30	5	15	32	3	0	15	0	0	0	14	84	
2_53	55	10	17.5	10	0	0	7.5	0	8.5	0	10	63	
2_54	23.33	10	5	6.67	25	13.33	16.67	0	3	0	23	78	
2_55	22.5	11.25	5	5.5	0	0	46.25	0	0	1.75	15	75	English ivy

## **Appendix B:**

# **Ash Creek Forest Management Planting and Treatment Conducted in 2024**

# Planting Conducted in 2024

## Bare-roots Phase II Zone A (Forest Floodplain)

Species	Common Name	Quantity
<i>Alnus rubra</i>	Red Alder	950
<i>Calocedrus decurrens</i>	Incense Cedar	400
<i>Cornus stolonifera</i>	Red osier dogwood	1000
<i>Crataegus gaylussacia</i>	Klamath hawthorn	500
<i>Malus fusca</i>	Western Crabapple	550
<i>Physocarpus capitatus</i>	Pacific Ninebark	1500
<i>Salix piperi</i>	Piper Willow	1000
<i>Salix sitchensis</i>	Sitka Willow	1000
<i>Spiraea douglasii</i>	Douglas spiraea	1000
<i>Thuja plicata</i>	Western Red Cedar	500
		<b>8400</b>

## Bare-roots Phase II Zone A (Upland Near Entry Trail)

Species	Common Name	Quantity
<i>Alnus rubra</i>	Red Alder	750
<i>Amelanchier alnifolia</i>	Serviceberry	1250
<i>Calocedrus decurrens</i>	Incense Cedar	200
<i>Ceanothus velutinus</i>	Snowbrush ceanothus	450
<i>Crataegus gaylussacia</i>	Klamath hawthorn	500
<i>Malus fusca</i>	Western Crabapple	500
<i>Oemleria cerasiformis</i>	Osoberry	200
<i>Pseudotsuga menziesii</i>	Douglas fir	500
<i>Rhamnus purshiana</i>	Cascara	500
<i>Sambucus racemosa</i>	Red Elderberry	1000
		<b>5850</b>

## Seed Phase II Zone A (Upland Near Entry Trail)

Species	Common Name	Quantity (lbs)
<i>Bromus carinatus</i>	California brome	10
<i>Deschampsia cespitosa</i>	Tufted hairgrass	8
<i>Elymus glaucus</i>	Blue wildrye	20
		<b>38</b>

## Seed Phase I & II Zone A (Forest Floodplain)

Species	Common Name	Quantity (lbs)
<i>Alopecurus geniculatus</i>	Water foxtail	7
<i>Bromus sitchensis</i>	Sitka brome	10
(See breakdown below)	Butler Mitigation Wet Mix	20
<i>Hordeum brachyantherum</i>	Meadow barley	8
		<b>45</b>

## Butler Mix (Quantities not measured, nor is this a complete list)

Species	Common Name	
<i>Allium amplexans</i>	Narrowleaf onion	
<i>Agrostis exarata</i>	Spike bentgrass	
<i>Beckmannia syzigachne</i>	American Slough Grass	
<i>Bidens coronaria</i>	Crown Brodiaea	
<i>Calochortus tolmiei</i>	Tolmie Star-tulip	
<i>Camassia leichtlinii</i>	Greater Camas	
<i>Camassia quamash</i>	Common Camas	
<i>Carex cusickii</i>	Cusick's sedge	
<i>Carex densa</i>	Dense Sedge	
<i>Carex deweyana</i>	Dewey's Sedge	
<i>Carex kelloggii</i>	Kellogg's Sedge	
<i>Carex obnupta</i>	Slough Sedge	
<i>Carex patchytachia</i>	Chamisso Sedge	
<i>Carex sitchensis</i>	Sitka Sedge	
<i>Carex stipada</i>	Sawbeak Sedge	
<i>Carex unilateralis</i>	One-Sided Sedge	
<i>Carex vulpinoidea</i>	Fox Sedge	
<i>Deschampsia cespitosa</i>	Tufted hairgrass	
<i>Deschampsia elongata</i>	Slender Hairgrass	
<i>Eleocharis palustris</i>	Creeping Spike-rush	
<i>Eriophyllum lanatum</i>	Oregon Sunshine	
<i>Grindelia integrifolia</i>	Puget Sound Gumweed	
<i>Hordeum brachyantherum</i>	Meadow barley	
<i>Iris tenax</i>	Oregon Iris	
<i>Juncus bolanderi</i>	Bolander's Rush	
<i>Juncus effusus</i>	Common Rush	
<i>Juncus ensifolius</i>	Dagger-leaved Rush	
<i>Juncus patens</i>	Bluish Rush	
<i>Juncus tenuis</i>	Slender rush	
<i>Lupinus polyphyllus</i>	Large-leaved Lupine	
<i>Madia gracilis</i>	Slender Tarweed	
<i>Mimulus guttatus</i>	Seep Monkeyflower	
<i>Plagiobothrys figuratus</i>	Fragrant Popcornflower	
<i>Sidalcea campestris</i>	Field Checkermallow	
<i>Sisyrinchium idahoense</i>	Blue-eyed grass	
<i>Solidago canadensis</i>	Golden Rod	

2024 Treatment Reports

Phase I

Date	Task	Notes
4/12/2024	Seed Application	Install Upland Seed by the entry path where the blackberry was treated. Install Wetland Seed into Zone A (both Phases I and II)
7/26/2024-7/30/2024	Spray	Spray Knotweed across all of Phase I
8/27/2024-8/30/2024	Mash & Spray	Mash Himalayan Blackberry and Knotweed prior to spray to trigger a stress response in plants.
8/30/2024-9/25/2024	Cutting	Systematically cut Himalayan Blackberry as it dies back from herbicide treatment. Goal is to trigger one final regrowth before the end of the year in order to spray a significantly weakened plant.
11/26/2024-12/9/2024	Spray	Spray himalayan blackberry regrowth across site.

## 2024 Treatment Reports

## Phase II

Date	Task	Notes
1/4/2024-1/5/2024	Cutting	Cut himalayan blackberry patches missed in Zone A due to bees during the larger cutting entry.
2/13/2024	Planting	Install Bare-Root Native Plants. Rained out on 2/13.
2/23/2024-2/28/2024	Planting	Install bare-roots across site (see plant tables)
3/21/2024	Spray	Spray Himalayan Blackberry regrowth across Zone A
3/22/2024	Stump Cut / Cutting	Brushcut dead himalayan blackberry across site. Stump treat scotch broom and holly in the uplands of Zone A
4/12/2024	Seed Application	Install Upland Seed by the entry path where the blackberry was treated. Install Wetland Seed into Zone A (both Phases I and II)
7/26/2024-7/30/2024	Spray	Spray Knotweed across all of Phase II
8/19/2024-8/26/2024	Cutting	Cut himalayan blackberry across all of Phase II
8/27/2024-8/30/2024	Mash & Spray	Mash Himalayan Blackberry and Knotweed prior to spray to trigger a stress response in plants.
8/30/2024-9/25/2024	Cutting	Systematically cut Himalayan Blackberry as it dies back from herbicide treatment. Goal is to trigger one final regrowth before the end of the year in order to spray a significantly weakened plant.
11/26/2024-12/9/2024	Spray	Spray himalayan blackberry regrowth across site.

## **Appendix C:**

### **Ash Creek Forest Management Planting Planned for 2025**

# Planned Planting for 2025

Common Name	Scientific Name	Type	Total Number	Phase II Zone A - Upland (along the path)	Phase II Zone A - Floodplain	Phase II Zone B	Phase II Zone C Floodplain
Grand Fir	Abies grandes	bare-root	250			250	
Red Alder	Alnus rubra	bare-root	2800	300	1000	500	1000
Incense Cedar	Calocedrus decurrens	bare-root	250	250			
Pacific dogwood	Cornus nuttallii	bare-root	100		100		
Red Osier dogwood	Cornus stolonifera	bare-root	1750		750	250	750
Oceanspray	Holodiscus discolor	bare-root	1250	1000		250	
Western Crabapple	Malus fusca	bare-root	250			250	
Osoberry	Oemleria cerisiformis	bare-root	500	250		250	
Pacific ninebark	Physocarpus capitatus	bare-root	1500	250	500	250	500
Ponderosa Pine	Pinus ponderosa	bare-root	500	250			250
Black Cottonwood	Populus trichocarpa	bare-root	1250		750	250	250
Black Cottonwood	Populus trichocarpa	Poles	1000	50	450	0	450
Doug fir	Psuedostuga menziesii	bare-root	250	250			
Cascara	Rhamnus purshiana	bare-root	500			250	250
Piper Willow	Salix piperi	bare-root	750		250		500
Salix piperi	Piper Willow	cuttings	900		400		500
Sitka Willow	Salix sitchensis	bare-root	250				250
Pacific Willow	Salix lucida	bare-root	250				250
Douglas Spirea	Spiraea douglasii	bare-root	1000	250	250	250	250
Spiraea or Snowberry Cuttings		bare-root	500		500		
Western Red Cedar	Thuja plicata	bare-root	250		250		
Viburnum	Viburnum ellipticum	bare-root	1000	250	250	250	250
Total:			17050	3100	5450	3000	5450