Outline

Monitoring at WMSWCD

- Goals
- The Team
- Timeline
- Understory Seeding
- Unified Monitoring Protocol
- Survival Monitoring
- Conclusion
Goals for Monitoring

- Track & document project progress
- Feedback for adaptive management
- Quality-check contractor work
- Catch issues early
  - weeds, animal damage, disease
- Program reporting
- Outreach – Success stories
Monitoring Teams

- Rural (HSP/SH, Forestry)
  - Pollinators
    - Laura
- Urban
  - Ari, Mary
- Water Quality
  - Scott
- EDRR
  - Michelle, Ari

Intens
Rural Project Monitoring: Healthy Streams & Habitats

Forestry

Spring
Unified Monitoring Protocol (UMP)

Spring + Summer
Understory Seeding

Laura + Interns

Fall
Survival Monitoring

Spring - Fall
Pollinator Monitoring
2019 Monitoring Activities

- Spring Unified Monitoring Protocol (UMP)
- Understory Seeding
- Pollinators (OR Bee Atlas)
- Maintenance needs
- Contractor QC
- Fall Survival Monitoring
Understory Seeding

Collaborative Research Project
Metro, Portland BES, CWS
NRCS funded
Conservation Innovation Grant
Project Background

- **Biodiversity**
- **Replacing ivy, garlic mustard, invasive geraniums, etc**
- **Understory Species Increase Project (USIP)**
  - Survey to EcoUnite listserv
- **NRCS Conservation Innovation Grant (CIG)**
- **Tualatin Watershed**
Vinca removal
Blackberry removal
Ivy removal
Ivy removal
Thinning + BB removal
Forest thinning
Forest thinning
Ivy removal
Ivy removal
Ivy removal
CIG Focus Area
West Multnomah SWCD
Big Questions

- Effectiveness of establishing native understory plants from seed

- What species perform best?

- Are different species especially suited to certain conditions?
  - If so, what are these associations?
Study Design

- 8 Sites
  - Ivy or Vinca Removal
  - Blackberry Removal
  - Forest Thinning
- 6 plots per site
- 3 Treatments
  - Raked, Unseeded Control
  - Raked, Seeded
  - Unraked, Seeded
Raking & Seeding

See Appendix A for species mix
Study Plots & Monitoring

- Circle plots
  - Large-scale trends
- Sub-plots
  - Full plant inventory
- Buffer around plots
  - Presence of seeded species
- Environmental Conditions
  - Forest canopy
  - Slope
  - Aspect
  - Soil
  - Worms

Subplot centered at 2'9" N 5.5 feet
Monitoring

- June 2018: Baseline
- April 2019: Spring Germination
- June 2019: Full leaf-out
- June 2020: Establishment
Seedlings

Fringe cup & Large-leaved avens  Inside-out flower  Sweet cicely
Raked Seeded Plots

June Average: 19 plants/sub-plot
Dominated by native seeded species
Raked Unseeded Plots

June Average: 9 plants/sub-plot
Dominated by introduced disturbance-loving species
Unraked Seeded Plots

June Average: 5 plants/sub-plot
Seeded species sparsely patchy
Next Steps

- Follow-up monitoring June 2020
- BIG data set
- Professional analysis
- Monitoring Fact Sheet

Managing a healthy forest is not just about having healthy trees.

Foresters, scientists, and private woodlot owners have an interest in what is growing on the forest floor. A healthy understory can often:

- Flowers for native pollinators
- Food for wildlife
- Create diversity in forest service
- Offer erosion control by forming microhabitats
- Create material to build healthier soil
- Build soil that does not compete for water
- Be beautiful while reducing issues in the forest.

Just like taking inventory of the forest, measuring tree diameters and spacing, it is also important to monitor the changes over time on the forest floor.

Herbaceous forest plants tend to reach their peak bloom when the forest floor is clear of competing spring plants. It is important to monitor forest understory consistently at the time of year.

There are dozens of ways to monitor the understory plants in a forest. Two effective methods are described here.
Goal for Final Products

Monitoring Fact Sheet

2nd Fact Sheet – Soils?

Technical Report

... Coming Sept 2020
Unified Monitoring Protocol (UMP)

A Collaboration with the Greater Forest Park Conservation Initiative (GFPCI)
Questions

- How effective is our weed treatment?

- What plants are returning? How much?
  - Other invasives?
  - Natives?
  - Diversity?

- How is forest structure changing?
  - Live trees: size, spacing
  - Coarse woody debris: Logs & Snags
Forestry, Healthy Streams, & Special Habitats Sites
Monitored using the UMP 2015 - 2019

Legend
- Forestry Monitoring Sites (32)
- HSP & SH Monitoring Sites (9)
- Forest Park
- Forest Park Conservancy - Ancient Forest Preserve
- FPC Conservation Easements
- Metro Properties
- Major Streets
- GFPCi Boundary
- WMSWCD Boundary

Feet
Methods

- Point-intercept transect
  - Understory vegetation
  - Year 0, 2, 5, 10

- Zig-zag transect, Wood
  - Forest structure
  - Year 0, 10
Example Results

Vegetation Cover of Three Ivy Treatment Sites 2017 - 2019

- Site 1: Ivy 2
- Site 2: Ivy, Blackberry
- Site 3: Ivy, RCG

% Cover of Vegetation

Native, 2017 - Native, 2019 - Invasive 2017 - Invasive 2019
Photo Monitoring

Site 1: Ivy 2

Site 2: Ivy, Blackberry

2017

2019
Example Results

Change in Native Plant Cover 2017 - 2019

Change in Native Plant Diversity 2017 - 2019
Next Steps

- Improve analysis & reporting

- Follow-up on older projects

- Share results
  - Partners
  - Land owners
  - Public
Fall Survival Monitoring

Monitoring for Success
Goals

- Monitor plant survival & growth
  - Replanting

- Track project success & threats
  - Document project status
  - Weed treatments
  - Plant protection

- Inform future work
Revegetation Trajectory

![Graph showing the trajectory of revegetation over project years. The graph indicates a decrease in level of input from implementation to stewardship over time.](image)
## Project Performance Goals

### Criteria for Establishment Phase

<table>
<thead>
<tr>
<th>Plant Community Type</th>
<th>Initial Stems/Acre</th>
<th>Target Stems/Acre</th>
<th>Native Aerial Cover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian Forest</td>
<td>2600</td>
<td>≥1600</td>
<td>≥ 60 woody</td>
</tr>
</tbody>
</table>

### Criteria for Stewardship Phase

<table>
<thead>
<tr>
<th>Plant Community Type</th>
<th>Invasive Species (%)</th>
<th>Composition/Diversity/Structure (# native sp.)</th>
<th>Canopy</th>
<th>Native Aerial Cover (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riparian Forest</td>
<td>≤ 20</td>
<td>≥ 5 shrubs, ≥ 3 trees, ≥ 5 herbaceous</td>
<td>≥85 %</td>
<td>NA</td>
</tr>
</tbody>
</table>
Methods

- Qualitative Survey of the Project
  - Weeds
  - Native plant health, growth
  - Plant damage, mortality
  - Beaver & other wildlife activity

- Quantitative Sample Plots
  - Native plant survival count
  - Cover of all plant species
  - Shade

- Photo monitoring
Scope

- Healthy Streams & Special Habitat Sites
  - ~30 Sites / Year
  - 1/2 Quantitative

- Forestry Sites
  - 7 to 12 Sites / Year
  - All Quantitative
Example Results
Sauvie Island Healthy Streams Project

Area Covered by Plant Type

Native woody plants
Native herbaceous plants
Target Invasives
Bare soil

Native Trees & Shrubs

Canopy Cover at Photo Points

% Canopy Shade
Photo Points
Sauvie Island Healthy Streams Project

2011 - Baseline
2012 - Planted
2014 - Establishment
2019 - Stewardship
Land Owner Engagement
Annual Summaries

Date: November 15, 2018

Dear,

Below is a summary of your Healthy Streams Project for FY 2018:

Work and cost committed fiscal year (FY) July 1, 2017 – June 30, 2018

<table>
<thead>
<tr>
<th>Amount (Fiscal Benefit to You)</th>
<th>$5,146.79</th>
</tr>
</thead>
</table>


2018 Project Summary: No new planting was done in 2018. Maintenance included a fall spray in October and a mow in November of 2017, and a spring spray treatment in March and a mow in April of 2018.

Full monitoring by WMWCD revealed that the installed native plants are healthy and thriving on average, with low levels of plant mortality. Plant health is somewhat lower toward the southwest end of the project and closer to the stream channel where weeds are more difficult to manage. The black cottonwood, Pacific willow, and black hawthorn are especially successful and are now reaching 7 to 13 feet tall. A total of 17 native plant species were observed. Native woody plant cover has increased from 0% when measurements began in 2015 to 40% in 2017 when last measured. Native woody plant density was 1,533 stems per acre at that time compared to the 1,003 stems per acre noted in our earlier records, and within a comfortable range of our mid-term goal of 1,600 stems per acre.

Competition from invasive weeds and deer rubbing damage appear to be the main sources of stress for the planted native species. Target invasive weed cover (such as morning glory, reed canarygrass, and Armenian blackberry) was at >70% in 2017 when last measured, a significant drop from the 90% cover observed when the project started. A new ‘Early Detection Rapid Response’ (EDRR) weed called Pole weed was found in the northeast end of the project.

Average canopy cover at photo points remains at 10%, still a significant way from our mid-term goal of at least 85%.

A Snapshot of Restoration Progress

**Native trees & shrubs**

<table>
<thead>
<tr>
<th>Species with some mortality:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black cottonwood</td>
</tr>
<tr>
<td>Red-ovar dogwood</td>
</tr>
</tbody>
</table>

**Species with early mortality:**

<table>
<thead>
<tr>
<th>Species with early mortality:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon white oak</td>
</tr>
<tr>
<td>Ponderosa pine</td>
</tr>
</tbody>
</table>

**Threatened plant species:**

<table>
<thead>
<tr>
<th>Species with threatened status:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon ash</td>
</tr>
<tr>
<td>Red elderberry</td>
</tr>
<tr>
<td>Pacific sumac</td>
</tr>
<tr>
<td>Cluster rose</td>
</tr>
<tr>
<td>Red-ovar dogwood</td>
</tr>
<tr>
<td>Snowberry</td>
</tr>
<tr>
<td>Pacific crab apple</td>
</tr>
<tr>
<td>Black hawthorn</td>
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**Moderately successful species:**

<table>
<thead>
<tr>
<th>Species with moderately successful status:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ponderosa pine</td>
</tr>
<tr>
<td>Oregon ash</td>
</tr>
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<tr>
<td>Pacific crab apple</td>
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<tr>
<td>Black hawthorn</td>
</tr>
</tbody>
</table>

Whale and plant observations of interest:

- Native tall fescue grass establishing and replacing weeds
- Ponderosa pine with deer damage

Next Steps:

No new planting is planned for the winter of 2018-2019 since plant densities are near our targets and the weeds (especially morning glory) need to be further controlled, especially given by stream channel. Rapid treatment of the poleweed and continued spot spraying of morning glory, Armenian blackberry, and reed canarygrass is recommended. WMWCD will continue to monitor the project and maintain invasive weeds. Continue to promote the value of this project and like projects to the Food Alliance and other farm landowners with water bodies.

Thank you for your continued commitment to this conservation project!

Sincerely,

Sandy Sam-Kent
Healthy Streams Program Manager, samkent@wmwcd.org, 503-289-4775 x3018
Conclusion

- **Strengths:**
  - Valuable quality information
  - Feedback for Staff & Land Owners
  - Accountability

- **Challenges:**
  - Time intensive
  - Limited capacity for reporting
Discussion - Questions?
### Appendix A: Seed Mix

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Latin Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>pathfinder</td>
<td>Adenocaulon bicolor</td>
</tr>
<tr>
<td>western columbine</td>
<td>Aquilegia formosa</td>
</tr>
<tr>
<td>Columbia brome</td>
<td>Bromus vulgaris</td>
</tr>
<tr>
<td>slender-foot sedge</td>
<td>Carex leptopoda</td>
</tr>
<tr>
<td>enchanter's-nightshade</td>
<td>Circaea alpina</td>
</tr>
<tr>
<td>miner's-lettuce</td>
<td>Claytonia perfoliata</td>
</tr>
<tr>
<td>Siberian miner's-lettuce</td>
<td>Claytonia sibirica</td>
</tr>
<tr>
<td>blue wildrye</td>
<td>Elymus glaucus</td>
</tr>
<tr>
<td>western fescue</td>
<td>Festuca occidentalis</td>
</tr>
<tr>
<td>large-leaved avens</td>
<td>Geum macrophyllum</td>
</tr>
<tr>
<td>Pacific waterleaf</td>
<td>Hydrophyllum tenuipes</td>
</tr>
<tr>
<td>small-flowered nemophila</td>
<td>Nemophila parviflora</td>
</tr>
<tr>
<td>sweet-cicely</td>
<td>Osmorhiza berteroi</td>
</tr>
<tr>
<td>broad-leaved penstemon</td>
<td>Penstemon ovatus</td>
</tr>
<tr>
<td>fringecup</td>
<td>Tellima grandiflora</td>
</tr>
<tr>
<td>piggyback plant</td>
<td>Tolmiea menziesi</td>
</tr>
<tr>
<td>inside-out flower</td>
<td>Vancouveria hexandra</td>
</tr>
</tbody>
</table>