Invasive Species Mapping at Mary S. Young State Park

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Project Background

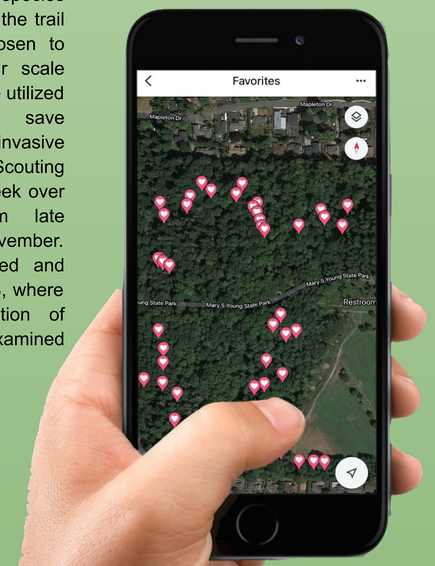
Mary S. Young Park State Park is located in West Linn, Oregon, parallel to the Willamette River. It houses ~128 acres of biodiverse habitat, 5-8 acres of hiking trails, and is home to a variety of Oregon's native species.

Invasive species management remains a difficult task for many parks and natural areas which rely on volunteer effort and stewardship. Invasive species management at Mary S. Young is imperative because of the park's location on the Willamette River; if invasions move beyond the park toward the riparian habitat on the banks of the Willamette and across the watershed, future invasions are significantly more likely to establish and cause greater ecological and economic harm. Park stewards utilize citizen science and community-based management for their ongoing eradication efforts, including the volunteer organization SOLVE Oregon. Volunteers operate bi-weekly to remove invasive or undesirable species, plant native species, and engage the local community with invasive species through education. However, there was no current utilization of mapping techniques which would improve management efficiency and delineate historic species distributions.

A key question led our research: **how can we make volunteer invasive species management more efficient and effective?** The need has emerged for a better invasive species mapping system and more extensive community outreach. Our two goals were to:

1) **Map and analyze invasive species distributions in the west end of the park, building a framework for future mapping**
2) **Encourage community outreach through the creation of volunteer educational materials**

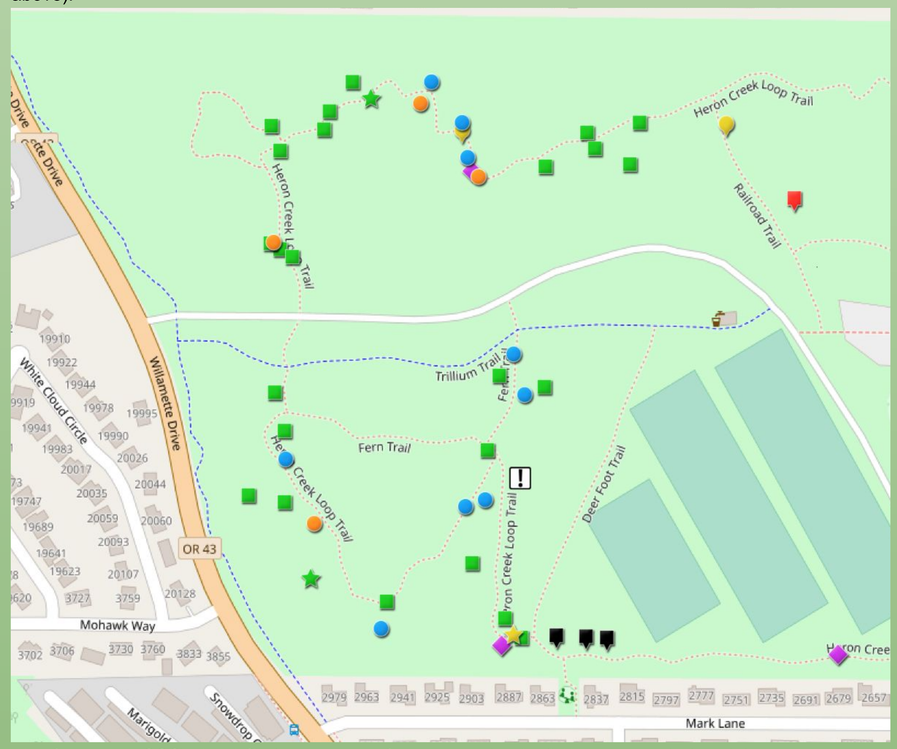
To answer this question, we posited that volunteers would be able to create personal maps on their phone that they could then send to a Google account where the data points could be aggregated and analyzed using GIS. In order to test this process and develop resources to fill the need for invasive species mapping, we spent three weeks in the Fall of 2020 hiking along the west end of the park's Heron Creek Loop trail and identified invasive species outbreak sites along the trail 7 species were chosen to scout to control our scale (see above right). We utilized Google Maps to save coordinates of invasive species locations. Scouting was done once a week over three weeks from late October to early November. Data was aggregated and uploaded into ArcGIS, where the spatial distribution of species could be examined in more depth.



Primary Species Identified and ArcGis StoryMap Creation

Once the Google maps were created, we uploaded species coordinates into ArcGIS where we could analyze the distribution of species. Our ArcGIS StoryMap was created along with an invasive species identification guide and interactive map. A QR code (top right above) was made to link the StoryMap and ID guide, and ensures a paperless park environment which can be shared and accessed easily with a mobile device. A GSuite account was additionally created for the park to receive citizen science GIS data and to engage with the community. Our finished ArcGIS StoryMap features interactive symbology that identifies the different species identified during scouting. These species were (from left above):

A. Portugal Laurel (*Prunus lusitanica*)
B. English Laurel (*Prunus laurocerasus*)
C-D. English Holly (*Ilex aquifolium*),
E-F. English Hawthorn (*Crataegus monogyna*)
G-H. Black Locust (*Robinia pseudoacacia*)
I-J. Wild Cherry (*Prunus avium*)
K. English Ivy (*Hedera helix*)



Map of species in ArcGIS StoryMap (left) with legend showing frequency percentage (right). Map is overlaid with study site trail.

Based on the data collected, English Holly was the invasive species with the highest frequency (24-49%) at the park, and is an emergent threat to the native habitat along the Heron Creek Loop Trail:

Legend

Symbol	Species Identified	Fall 2020 Frequency
	English Holly	24 – 49%
	Portugal Laurel	9 – 18%
	English Laurel	4 – 8%
	Black Locust	3 – 6%
	English Hawthorne	3 – 6%
	English Holly *Seeded	2 – 4%
	English Ivy	2 – 4%
	English Ivy *Seeded	1 – 2%
	Invasive Blackberry	1 – 2%

Discussion

Beyond discovering English Holly as the most frequently identified species, seeded English Holly has been identified in the north- and southwest regions of the park which will likely propagate over the next couple of years, creating additional challenges to eradication efforts. Additionally, English Holly could potentially spread further via transport vector such as bird or trail hikers. The spread of English Holly to the banks of the Willamette would likely damage the essential and delicate riparian habitat along the river basin. Early eradication of areas where there have been English Holly sightings is thus highly recommended.

The utilization of GIS and citizen science data introduces an evidence-based approach to invasive species management. Our research may identify the need for additional efficient invasive species methods within the framework of Early Detection Rapid Response (EDRR), including a consistent GIS mapping strategy across Oregon's parks. Utilizing citizen science for invasive species education, scouting, and species removal can cultivate a knowledgeable community of stewards prepared to assist with invasive species management and care for Oregon's environment.

We acknowledge this research is only a small case-study out of the numerous citizen science efforts that have occurred in recent years. As our climate changes, more research will need to be done to understand the response of biological invasions and their impacts.

We strongly advocate for greater student engagement in this crucial field as world environmental changes influence changes in biological invasions, thereby impacting local economies and communities, as younger generations of scientists will be increasingly confronted with these impacts.

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References

Ben Legler, Richard Old, Rasbak, & others. (2018). King County Weed Identification photos. https://www.kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-identification.aspx

Benning, J. (2020). Tree Guide Photos. http://www.tree-guide.com/

Bixby, M. (2020). Integrated Weed Maintenance Fall 2020. Oregon Invasive Species Council.

Lesh, J. (2019). Woody Weeds of Clackamas County. WeedWise Program, Clackamas Soil and Water Conservation District. Oregon City, OR.

State of Oregon Department of Agriculture. (2019). Oregon Noxious Weed Profiles. https://www.oregon.gov/oda/programs/Weeds/OregonNoxiousWeeds/Pages/AboutOregonWeeds.aspx

West Linn Parks & Recreation. (2020). Mary S. Young Park. City of West Linn Oregon Official Website. https://westlinnoregon.gov/parksrec/mary-s-young-park-0