

Engaging citizen scientists to research best management practices for increasing the abundance of *Spiranthes romanzoffiana* Cham. in Hoyt Arboretum, Portland, Oregon, U.S.A.

Tu, M., Riggs, E., Nicholson, M., Alongi, D., Brooks, L., Carr, P., Ficken, P., Kuhn, U., Pollock, K., Salomon, D., Schapira, Z., Schreiber, B., Skadsen, E., Skinner, M., Sweeney, A. and R. Wexler. Hoyt Arboretum, 4000 SW Fairview Blvd., Portland, Oregon 97221.



Methods

- Citizen scientists were trained in plant identification and data collection methods.
- Study area is approximately 16m x 16m in size, nearly encompassing the one population of *S. romanzoffiana* that occurs on a sunny, exposed hillslope.
- Thirteen belt transects were established in the area, perpendicular to the hillside slope. Quadrats 1.0 square meter in size were placed along each transect (random start).
- Each month during the growing season, trained citizen scientists collected data from each quadrat, including: vigor and phenophase of *S. romanzoffiana*, percent vegetative cover, and plant presence-absence in nested frequency.



Conclusions

Summary of data (so far)...

- Our study site is largely dominated by exotic, perennial grasses.
- S. romanzoffiana* continues to persist in highly disturbed (by repeated mowing) sites.
- Transplanted protocorms showed promise early in the growing season, but all died during the dry, summer season.
- First leaves of *S. romanzoffiana* have been recorded as emerging as early as mid-February, flowering from early-June through mid-August, with flower senescence typically starting in late-August.

Citizen scientists appreciated...

- The opportunities to be outside
- Learning how to identify plants, especially grasses
- To learn about plants/ecology
- To contribute to scientific research and conservation
- To contribute to our city's parks and green spaces
- To observe nature, meet people with similar interests & to have fun!

Citizen scientists spent...

- Approximately 20 to 100 hours per year on this project, in trainings, learning plant identification, and (mostly) in data collection.

Citizen scientists would like to see improved...

- Better identification guides
- More communications (protocols, updates, analyses, etc.)

Staff/researchers:

- Need to contribute time to get project started, detailed training & instructions, need to be available for any questions that arise
- The more-detailed (data collection protocols, reasoning behind methods, etc.), the better
- Be aware of citizen scientist time and efforts! Make sure their contributions are not wasted.
- Don't overkill with too much complexity! (on data collection, scientific names, etc.)

Introduction

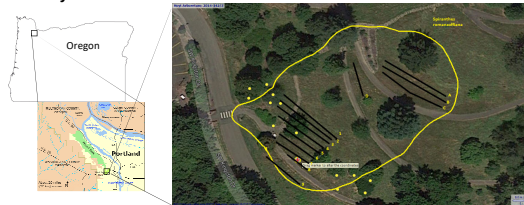
Background

- In 2011, three populations of *Spiranthes romanzoffiana* were discovered in Hoyt Arboretum natural areas.
- Staff and citizen scientists decided to study the species: monitoring the populations, mapping their extents, and to describe their associated vegetation.

Overall project goals

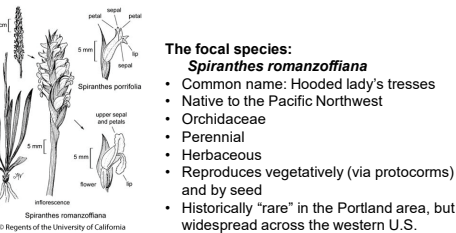
- Involve and engage local citizen scientists in a meaningful, educational, plant-related project.
- Build community and interest in natural areas conservation.
- Learn about the scientific process for creating and collecting research data.
- Learn about the biology & ecology of *S. romanzoffiana*.
- Investigate the plant community characteristics of our local population of *S. romanzoffiana*.
- Investigate the best management practices for increasing the population of *S. romanzoffiana*.
- Identify what motivated citizen scientists to join this project.
- Assess how well the project fulfilled participants' needs.

Study Site



Results

- In all years (2014 to 2016), there were more exotics than natives, and more perennials than annuals, in both frequency and percent vegetative cover.
- The frequency of forbs versus grasses were not significantly different each year, but the site appears to be largely dominated by grasses when evaluating percent vegetative cover.
- Trends over time do not necessarily suggest replacement of one group over the other.



The focal species: *Spiranthes romanzoffiana*

- Common name: Hooded lady's tresses
- Native to the Pacific Northwest
- Orchidaceae
- Perennial
- Herbaceous
- Reproduces vegetatively (via protocorms) and by seed
- Historically "rare" in the Portland area, but widespread across the western U.S.

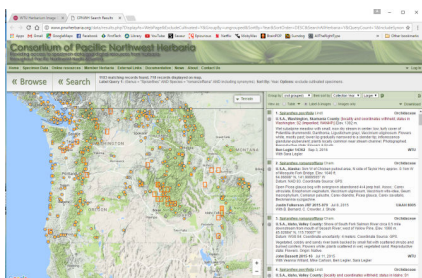


Figure 1. Mapped locations of *S. romanzoffiana* as verified by herbarium voucher specimens. Screen printed from the Consortium of Pacific Northwest Herbaria website, <http://www.pnwherbaria.org>.

Species	2014	2015	2016
<i>Artemisia tridentata</i>	4.35	4.35	4.35
<i>Carex sp.</i>	1.47	1.47	1.47
<i>Plantago sp.</i>	0.98	0.98	0.98
<i>Rudbeckia sp.</i>	0.98	0.98	0.98
<i>Sedum sp.</i>	0.98	0.98	0.98
<i>Trifolium sp.</i>	0.98	0.98	0.98
<i>Yucca sp.</i>	0.98	0.98	0.98

Table 1. Percent vegetative cover by species, averaged across all quadrats for the study site, by year. E represents an exotic species, N for native.

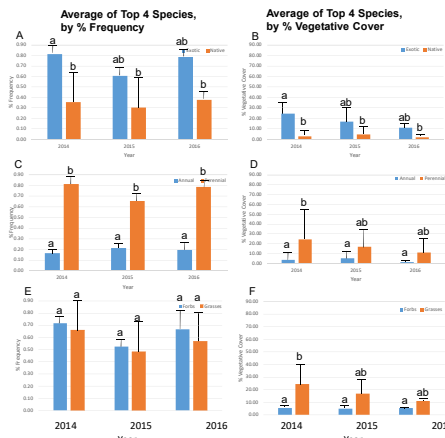


Figure 2. Bars indicate average changes for the top four species in frequency (left-side) and percent vegetative cover (right-side) over three years time, error bars indicating S.D. 2A & 2B display proportion of exotic vs. native species, 2C & 2D show proportion of annuals vs. perennials, and 2E & 2F display proportions of forbs vs. grasses. Lower-case letters above each bar indicate significant differences in means as evaluated by ANOVA and post-hoc Tukey HSD tests, at p < 0.05.



Acknowledgements

Funding for supplies and equipment provided by a grant from the Native Plant Society of Oregon.

