# POPULATION SURVEYS AND AUGMENTATION OF THIN-LEAVED PEAVINE: 2014 ANNUAL REPORT

2015

Report to the Bureau of Land Management
Agreement # L09AC16049-0045 and L13AC00098-25

Report prepared by Ian Silvernail

*Institute for Applied Ecology*

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## PREFACE

This report is the result of agreement numbers L09AC16049-0045 and L13AC00098-25 between the Institute for Applied Ecology (IAE) and the Bureau of Land Management. Projects under both agreements provided funds for the activities describe herein. IAE is a non-profit organization whose mission is the conservation of native ecosystems through restoration, research and education. Our aim is to provide a service to public and private agencies and individuals by developing and communicating information on ecosystems, species, and effective management strategies and by conducting research, monitoring, and experiments. IAE offers educational opportunities through 3-4 month internships.


Questions regarding this report or IAE should be directed to:

Ian Silvernail, Botanist/Restoration Ecologist

Institute for Applied Ecology

PO Box 2855

Corvallis, Oregon 97339-2855

phone: 541-753-3099 ext 122

fax: 541-753-3098

email: ian@appliedeco.org

## ACKNOWLEDGMENTS

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**Cover photograph**: *Lathyrus holochlorus* flowers. *Photo by Ian Silvernail.*

## SUGGESTED CITATION

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# POPULATION SURVEYS AND AUGMENTATION OF THIN-LEAVED PEAVINE: 2014 ANNUAL REPORT

REPORT TO THE BUREAU OF LAND MANAGEMENT

## INTRODUCTION

The thin-leaved peavine (*Lathyrus holochlorus)* is a rare member of the Fabaceae. It is a Bureau of Land Management Sensitive Species, a USFWS Species of Concern, and an Oregon Biodiversity Information Center (ORBIC) List 1 species. It is found throughout the Willamette Valley and south toward Roseburg. A few small populations are also found in Lewis County, Washington. The thin-leaved peavine is most commonly found along roadsides, fencerows, or scattered in deciduous woodlands. Most of the remaining populations are along roadsides and unmowed fencerows, where it is commonly associated with Oregon white oak (*Quercus garryana*), common snowberry (*Symphoricarpos albus*), various species of rose (*Rosa* sp.), and poison oak (*Toxicodendron diversilobum*). Many populations are threatened by improper mowing and herbicide use.

The thin-leaved peavine is a rhizomatous perennial, and many populations are likely composed of a single, self-incompatible genetic clone. Most small populations consistently do not produce any viable seed; very few large populations remain.

The intention of this project is to assess historic populations, collect seed, reintroduce nursery-grown plugs, and assess the success of population augmentation efforts. This report includes information about Phase 2 of a four phase project. Phases 1 and 2 of the project included field surveys of historic populations, seed collection, germination testing, and some plug production.

## 2014 ACTIONS

In 2014, activities included field assessments of known populations, seed collection, germination testing, and container plant growth.

## Field surveys

In 2014, IAE continued work on Phase 2 by engaging in extensive field surveys of known locations. Location data from the Oregon Biodiversity Information Center (ORBIC) and the US Fish and Wildlife Service (USFWS) was used. Both maintain location records for the species, but neither of them is complete. Some botanists in the Willamette Valley have also maintained personal lists of known species locations. Combining all location data yields 109 total historic location records.

IAE partnered with the Native Plant Society of Oregon (NPSO) to complete surveys. One NPSO volunteer, Julie Gibson, visited *L. holochlorus* populations in 2012 and 2013. The data she collected was combined with the data collected by IAE staff to yield a picture of the current species status across a broader portion of its range.

Between May 9 and June 20, 2014 IAE staff assessed 40 populations of *L. holochlorus*. In 2012 and 2013, Julie Gibson visited 26 sites. In 2013, IAE staff assessed 36 populations. For various reasons, some populations were assessed more than once. The total number of populations assessed through the duration of the project was 90 of the 109 known locations, or 83%.

### Field methods

Upon arriving at a site, historic records were used to narrow the search area. Areas of potential habitat adjacent to the historic locations were frequently searched as well. The data sheet found in Appendix 1 lists all of the information gathered at each site.

Population size was assessed by censusing the total number of individual stems arising from the ground. Since the plant is a rhizomatous perennial, this is unlikely to represent the actual number of individual, genetically-distinct plants. It is however, the most common monitoring method used for this species. Stems were classified as either vegetative, flowering, or fruiting. Data was taken on the relative abundance of associated species in the area where the *L. holochlorus* occurred. The geographic location of all plant patches at each population was recorded in decimal degrees with a handheld Garmin GPSmap 60Cx unit. Patches of plants were recorded by drawing a polygon; outliers were noted by recording an individual waypoint. At least one photopoint was recorded at each population and the geographic location of the point was noted as a waypoint in decimal degrees. The bearing of each photograph was recorded.

### Results

Due to the location sensitivity of the information, individual site reports will be presented in a different document. However, some summary information is presented here.

Figure 1 shows the number of populations assessed by county. *Lathyrus holochlorus* plants were relocated at 53 of the 90 (59%) populations that were assessed. Table 1 summarizes population size data.

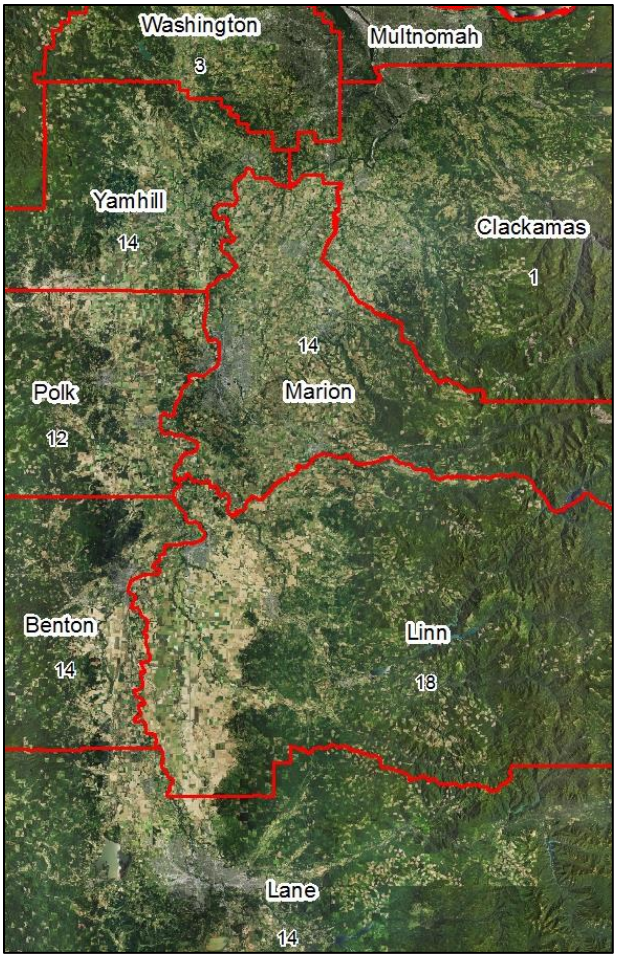


**Figure 1:** Number of populations of *Lathyrus holochlorus* that were assessed in each county.

**Table 1:** Population size by county. Numbers in the top row represent the number of individual stems of *Lathyrus holochlorus*. Other numbers represent the number of populations in each population size category.

| County | ≤ 10 | 11-100 | 101+ | Total |
|---|---|---|---|---|
| **Benton** | 4 | 2 | 3 | 9 |
| **Clackamas** | 0 | 1 | 0 | 1 |
| **Lane** | 4 | 5 | 2 | 11 |
| **Linn** | 6 | 3 | 5 | 14 |
| **Marion** | 0 | 4 | 1 | 5 |
| **Polk** | 0 | 2 | 1 | 3 |
| **Washington** | 0 | 2 | 1 | 3 |
| **Yamhill** | 3 | 4 | 0 | 7 |
| **Total** | 17 | 23 | 13 | 53 |
| **% of sites** | 32% | 43% | 25% | |

Of the 53 extant populations, 43 (81%) are in plant communities composed of more than 50% native plants. The most common plant associates were snowberry (*Symphoricarpos albus*), poison oak (*Toxicodendron diversilobum*), and various species of roses (*Rosa* sp.).

## Seed collection

A total of 126.2 grams of seed was collected from 20 different populations during July and August. Seed quantities were heavily weighted toward the largest populations, with the three largest populations yielding 50.1% of the total collected seed by weight. Table 2 below shows the quantity of seed collected by county and the number of populations from which that seed was collected. Most of the populations we surveyed set little to no seed.

**Table 2:** Seed collected by county.

| County | number of populations where seed collection occurred | seed collected (grams) |
|---|---|---|
| Benton | 3 | 29.3 |
| Lane | 4 | 8.9 |
| Linn | 6 | 45.6 |
| Marion | 2 | 23.9 |
| Polk | 1 | 6.3 |
| Washington | 1 | 2.6 |
| Yamhill | 3 | 9.6 |
| Total | 20 | 126.2 |

## Germination

In October 2013, germination testing was initiated. Period of cold-moist stratification of scarified seed was the primary variable tested. Previous information presented by Steven Broich (personal communication, 2013) suggested that scarification is necessary to promote germination. Given limited seed resources, we chose to scarify most of the seed. However, in order to gather anecdotal evidence of the necessity of scarification, one sample for each duration of cold-moist stratification was left unscarified. Table 3 below shows the treatment matrix.

Seeds were placed in a dark walk-in cooler held at 4°C at the Oregon State University Seed Lab. Seeds were placed in the cooler at different intervals so that all groups were removed from treatment together on January 13, 2014. Upon removal from cold-moist

**Figure 2.** Developing *Lathyrus holochlorus* fruits found on June 11, 2013.

stratification, seeds were placed in an alternating temperature room held at 25˚C during the light day and 15˚C during the dark night. The number of germinants in each sample was recorded upon removal from cold-moist stratification and weekly thereafter for 4 weeks.

**Table 3:** Treatment matrix for germination testing.

| | Weeks of cold-moist stratification | | | | | |
|---|---|---|---|---|---|---|
| | 0 | 2 | 4 | 6 | 8 | 12 |
| Scarified | 5 replicates of 20 seeds in each stratification treatment | | | | | |
| Unscarified | 1 sample of 20 seeds in each stratification treatment | | | | | |

Results of germination testing are presented in Table 4. One-way ANOVA shows a difference in percent germination at different weeks of cold-moist stratification ($p = 0.000$). While there were differences between several of the periods of cold-moist stratification, there was no significant difference between the two periods of stratification (8 and 12 weeks) that yielded the highest percent germination. Additionally, at 8 and 12 weeks of cold-moist stratification, there was no difference between mean germination percentage at the end of the stratification period and mean germination percentage after 4 weeks in a warm, alternating temperature environment subsequent to cold-moist stratification.

**Table 4:** Percent germination after different periods of cold-moist stratification.

| weeks cold-strat | Mean % germination ± SD (scarified seed only) | Mean % germination at end of cold-strat period but prior to 4 weeks in warm, alternating temperature environment (scarified seed only) | Fisher's LSD Multiple Comparison Test results; this treatment different than results of the cold-strat treatments listed (scarified seed only) | Percent germination (unscarified seed only) |
|---|---|---|---|---|
| 0 | 0.0 | 0 | 4,6,8,12 | 0 |
| 2 | 10.0 ± 7.1 | 0 | 4,6,8,12 | 0 |
| 4 | 25.0 ± 13.8 | 22 | 0,2,6,8,12 | 0 |
| 6 | 57.0 ± 12.5 | 53 | 0,2,4,8,12 | 5 |
| 8 | 76.0 ± 11.6 | 75 | 0,2,4,6 | 15 |
| 12 | 85.0 ± 8.4 | 85 | 0,2,4,6 | 15 |

While no statistically significant data could be generated due to the low number of seeds available, in general, unscarified seed resulted in very low germination (Table 4).

As a result, it is recommended that seed be scarified and subjected to 8 weeks of cold-moist stratification at 4˚C in order to stimulate germination.

### Plug Production

Germinated seeds were planted in the greenhouse to anecdotally assess the impact of different cultivation conditions on plant growth and vigor. Treatments included the presence or absence of 10% native soil in the planting medium, the inoculation of seeds with symbiotic bacteria, and fertilization with phosphorus.

Due to the variability in the timing of germination and seedling emergence, we decided to wait until a period later in the growth season to assess the different treatment groups. However, several plants spread throughout treatment groups senesced early, making the assessment of the treatment groups challenging. Anecdotally, it did not appear that there were differences between treatment groups in plant growth and vigor, but true differences may have been masked by the seemingly random differences between individuals.

## EXPENSES

Table 5 is a summary of all costs associated with the 2014 activities described in this report.

**Table 5.** Summary of all expenses.

| **Activity** | |
|---|---|
| Project Coordination | $5297 |
| Field surveys | $4761 |
| Seed collection | $1005 |
| Germination and grow out | $555 |
| Data Management | $2949 |
| Equipment and Materials | $1239 |
| Transportation | $1377 |
| Contract grow out (NRCS Plant Materials Center) | $1,092 |
| Admin | $3951 |
| **Total** | $22,226 |

## SUCCESSES AND CHALLENGES

We were successful in visiting a large number of historic populations and gathering accurate population and plant community data. By partnering with the Native Plant Society and by developing a rapid population assessment methodology, we were able to expand the scope of field surveys to assess 83% of known locations in the Willamette Valley.

Based on recommendations from other botanists, we visited all seed collection sites a second time after the initial assessment to place pollination bags over the developing fruits so as to catch the seeds if the pods opened. We visited populations a third time to collect the bags. Upon opening the seed bags, we found that none of the seed pods had dehisced. Seed pods sat in a warm room in open cardboard trays for an additional month before cleaning, and still had not dehisced. From this, we learned that an additional trip to each seed collection site to install pollination bags is unnecessary.

The assessment of container plant growth and vigor was challenged by the fact that seed germinated at different times, making it difficult to be sure that all plants were on the same growth schedule. Additionally, plants appeared to exhibit different rates of establishment and subsequent growth that did not appear to be related to the cultivation treatment group. This further challenged assessment of treatment groups. In the future, an accurate assessment of *ex situ* cultivation needs for *Lathyrus holochlorus* should begin by germinating seeds for all treatment groups at the same time.

## FUTURE ACTIONS

In 2015, outplantings of a total of 1000 plants will occur at 3-5 locations. Each planting will require successful partner coordination, planning, pre-planting data collection, and site preparation. Ongoing efforts to secure funding to support monitoring and maintenance of outplanted populations will also occur. Further wild seed collection will occur to balance the current accessions. A seed increase bed will be maintained in order to decrease future harvest of wild seed.

## APPENDIX 1

Included are datasheets used at all *L. holochlorus* survey sites.

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***Lathyrus holochlorus* – Population Census Data Sheet**

Observation Date: _____

Observers: _____

_____

FID (USFWS): _____ Site Name (USFWS): _____

EO ID (ORBIC): _____ Site Name (ORBIC): _____

ID # (other): _____ Site Name (other): _____

County: _____ Land Ownership: _____

Contact Person: _____ Contact Information: _____

Waypoints and Track Logs (WGS 1984): _____

_____

Directions to site: _____

_____

_____

_____

Photopoints: For each photopoint, list the coordinates or waypoint number, bearing, picture number and description.

_____

_____

_____

_____

_____

Comments (include threats to persistence of population): _____

_____

_____

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_____

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_____

Target Species Population Data: (count the total number of stems arising from the ground)

| WP/TL | Occupied Area ($m^2$) | # Vegetative | # Flowering | # Fruiting | Total |
|---|---|---|---|---|---|
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| Site Totals | | | | | |

**Plant Community:** For each patch of *Lathyrus holochlorus*, list the three most abundant species (based on percent cover, not number of individuals) in each functional group in order from most abundant to least.

| | | | | | | Ratios | |
|---|---|---|---|---|---|---|---|
| **WP/TL** | **Forbs** | **Grasses** | **Shrubs** | **Trees** | **Other species** | **Shrub:: Forb:Graminoid** | **Native: Non-native** |
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