

Habitat restoration and monitoring of shaggy horkelia at Twin Prairie: 2017 annual report- Web version



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PREFACE

IAE is a non-profit organization whose mission is conservation of native ecosystems through restoration, research and education. IAE provides services to public and private agencies and individuals through development and communication of information on ecosystems, species, and effective management strategies. Restoration of habitats, with a concentration on rare and invasive species, is a primary focus. IAE conducts its work through partnerships with a diverse group of agencies, organizations and the private sector. IAE aims to link its community with native habitats through education and outreach.



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Cover photographs: Looking west over Twin Prairie. *Photo by Jenny Getty.*

SUGGESTED CITATION

Esterson, A. 2018. Habitat restoration and monitoring of shaggy horkelia at Twin Prairie: 2017 Annual Report. Unpublished report prepared for the Bureau of Land Management, Northwest Oregon District. Institute for Applied Ecology, Corvallis, Oregon.

SPECIAL NOTE

This report has been modified from its original format by removing maps and/or appendices that include information on the location of rare and sensitive species.

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1. EXECUTIVE SUMMARY

In 2017, the Institute for Applied Ecology (IAE) conducted habitat restoration and monitored the shaggy horkelia (*Horkelia congesta* ssp. *congesta*) population at Twin Prairie, a BLM-owned site southeast of Eugene, Oregon. Management actions focused on removing Douglas-fir (*Pseudotsuga menziesii*) and madrone (*Arbutus menziesii*) trees along the northwest section that were encroaching on shaggy horkelia habitat. All observed Scotch broom (*Cytisus scoparius*) was removed. Shaggy horkelia surveys indicate there was a slight decrease in total number of individuals between 2016 and 2017, but total stems and flowering stems increased by 62% and 31%, respectively, in the same period.

2. INTRODUCTION

Twin Prairie is a mid-elevation meadow owned and managed by the Bureau of Land Management (BLM), Northwest Oregon District, and located in southern Lane County, Oregon, south of Cottage Grove. The meadow supports a large population of shaggy horkelia (*Horkelia congesta* ssp. *congesta*), a rare species endemic to Oregon. Shaggy horkelia is a BLM Sensitive Species and a State of Oregon Candidate (Oregon Department of Agriculture 2017). The Oregon Biodiversity Information Center (ORBIC) designates shaggy horkelia as a “List 1” species that “contains taxa which are endangered or threatened throughout their range or which are presumed extinct” (ORBIC 2016). Management that bolsters shaggy horkelia populations is necessary to prevent the listing of this species under the federal Endangered Species Act. In 2017, the Institute for Applied Ecology (IAE) was contracted to perform habitat restoration in the prairie and monitor the shaggy horkelia population.

3. 2017 RESTORATION ACTIONS

In 2017, restoration actions targeted encroaching Douglas-fir and madrone trees along the northern border of the prairie and Scotch broom removal (Table 1). Specifically, Douglas-fir and madrone trees between shaggy horkelia plots 1-7 were either limbed or removed (Figure 1). All woody debris was cut into small pieces and placed in the adjacent woods. In addition, five Scotch broom individuals (the only ones observed) located in the south east corner of the site were removed.

Table 1. Restoration actions completed at 2017

| Date | Task | Personnel |
|-----------|----------------------------|-----------------|
| 5/3/2017 | Scotch broom removal | IAE |
| 6/16/2017 | Shaggy horkelia monitoring | IAE |
| 6/21/2017 | Shaggy horkelia monitoring | IAE + BLM staff |
| 9/27/2017 | Tree limbing/removal | IAE |



Figure 1. Conifer encroachment in the vicinity of shaggy horkelia plot 1 prior to removal (left), after conifer removal (center), and Anna Ramthun (Institute for Applied Ecology) limbing conifer adjacent to shaggy horkelia plot (right)

4. SHAGGY HORKELIA MONITORING

4.1. Background and methods

Shaggy horkelia monitoring began in 2013. Survey units were specific patches of shaggy horkelia individuals. A patch represents a geographically unique population of shaggy horkelia. All patches are located with a map (Appendix A) and GPS unit. In 2013, 19 patches were surveyed, however, in subsequent years three new patches were identified bringing the total number of surveyed patches to 22. Patches three, four and five are now indistinguishable, thus they are considered one patch. In 2013, the number of flowering stems was the only datum collected. Since 2014, additional data was collected including the total number of individuals, reproductive status (rosette or flowering), and the number of

browsed stems. Individual plants were defined as basal rosettes not obviously connected to a single crown, usually a minimum of 1-2 inches apart (Alverson 2013).

In 2015, 220 shaggy horkelia plugs were planted in two locations (Appendix 1); these plots are monitored annually but data is kept separate from the naturally occurring shaggy horkelia data.

4.2. Results

In 2017, 1,257 shaggy horkelia were observed; of those, 66% were flowering, 23% were vegetative and 10% were seedlings (Figure 2, Table 2). In total, 2,129 stems were counted, and of those, 43% were browsed. Between 2013 and 2017, the mean number of individuals fluctuated around 1,200. Although the total number of individuals decreased by 6.5% between 2016 and 2017 (1345 to 1257 individuals, respectively), the number of stems and flowering stems increased by 62% and 31%, respectively (Appendices B and C).

Shaggy horkelia plugs planted in 2015 were not monitored. 2016 survey results indicate that less than 50% of plugs survived the first growing season.

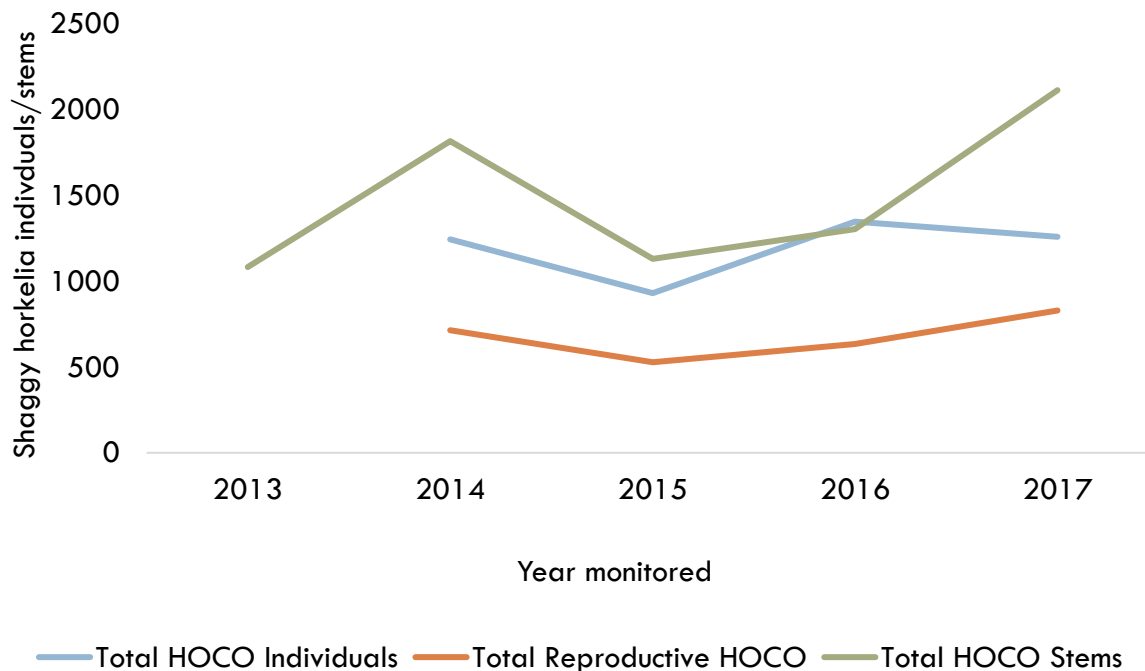


Figure 2. Shaggy horkelia population data from 2013 – 2017. Data suggest there have been fluctuations to the shaggy horkelia population at Twin Prairie, but overall, the population has remained relatively stable and individual plants are getting larger and producing more inflorescences.

Table 2. 2017 shaggy horkelia monitoring results

| Patch | Unbrowsed stems | Browsed stems | Total individuals | Total flowering | Total rosettes | Number of seedlings |
|---------------|-----------------|---------------|-------------------|-----------------|----------------|---------------------|
| 1 | 56 | 0 | 20 | 15 | 5 | 0 |
| 2 | 14 | 0 | 5 | 5 | 0 | 4 |
| 3-5, summed | 423 | 634 | 576 | 408 | 168 | 124 |
| 6 | 41 | 0 | 23 | 16 | 7 | 0 |
| 7 | 84 | 7 | 46 | 33 | 13 | 0 |
| 8 | 99 | 23 | 52 | 41 | 11 | 0 |
| 8a | 3 | 0 | 2 | 2 | 0 | 0 |
| 9 | 5 | 0 | 2 | 2 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10a | 1 | 1 | 1 | 1 | 0 | 0 |
| 11 | 6 | 15 | 7 | 6 | 1 | 0 |
| 12 | 80 | 23 | 50 | 39 | 11 | 0 |
| 12a | 1 | 0 | 1 | 1 | 0 | 0 |
| 13 | 1 | 0 | 2 | 1 | 1 | 0 |
| 14 | 14 | 0 | 8 | 6 | 2 | 0 |
| 15 | 83 | 19 | 84 | 58 | 26 | 0 |
| 16 | 239 | 136 | 211 | 159 | 52 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18 | 57 | 35 | 31 | 27 | 4 | 0 |
| 19 | 15 | 14 | 8 | 8 | 0 | 0 |
| Totals | 1222 | 907 | 1257 | 828 | 301 | 128 |

5. DISCUSSION

5.1. Habitat management

A variety of trees, including Douglas-fir, madrone, bigleaf maple (*Acer macrophyllum*) and ash (*Fraxinus latifolia*), along with manzanita (*Arctostaphylos* sp.) and Scotch broom shrubs, continue to encroach into the prairie. Limbing and/or removing any of the aforementioned species that encroach into shaggy horkelia habitat is a priority. Unfortunately, in 2017 removing trees/shrubs was limited to one day because of access issues (no BLM lock on gate).

A second priority is to reduce non-native species cover in and around shaggy horkelia plots. Acting on this task is difficult, however, because of herbicide restrictions, limited budget and rough terrain. Using properly trained volunteers will help alleviate budget concerns, but traveling 1.5 hours from Corvallis and working eight hour days will certainly limit the number of qualified volunteers (must be able to identify plants so shaggy horkelia is not removed). Using string trimmers or mowers to cut flowering plants before seed-set is possible, but caution must be used because of steep, rocky slopes in some areas.

Himalayan blackberry (*Rubus armeniacus*) continues to invade the southern margins of Twin Prairie. Removal is challenging and somewhat dangerous because of steep slopes. During a 2017 site visit with BLM and IAE staff, it was determined that blackberry removal was not currently a high management priority since there are no shaggy horkelia populations in the southern part of the site. However, blackberry should be cut back when possible to reduce encroachment.

In previous years, after non-native species removal, a native seed mix was broadcast in disturbed areas. The mix consisted of Roemer's fescue (*Festuca roemerii*), Oregon sunshine (*Eriophyllum lanatum*), and California oatgrass (*Danthonia californica*). This seed was grown in partnership with the BLM and The Nature Conservancy (TNC), and provided for restoration use at no cost to the project; however, there was only a limited amount of seed available. Moving forward, seed collections from Twin Prairie may be beneficial as mid-elevation seed can be expensive and not readily available.

5.2. Shaggy horkelia

Data collected between 2013 and 2017 suggest that the shaggy horkelia population at Twin Prairie is relatively stable. Population decreases may be associated with seedling mortality, mature plants dying, herbivory, competition, and/or unsuitable growing conditions (e.g., dry spring, hot summer). Population increases may be associated with wet springs, moderate summer heat and limited herbivory.

Of the listed factors associated with shaggy horkelia population reductions, plant competition and herbivory are two that can be managed for. If future management efforts aim to reduce non-native species, mainly grasses and trees, the shaggy horkelia population should benefit and positive population growth is expected. If herbivory continues to be high and is determined to have a negative impact on the shaggy horkelia population, fencing off plots may be considered; however, this may be cost prohibitive.

Increasing the genetic diversity of the shaggy horkelia population may help it persist into the future. Relatively new forests have isolated the Twin Prairie shaggy horkelia population from neighboring populations, thus limiting gene flow. Population information collected by Kaye and Gisler in 1993

reported 20 known populations of shaggy horkelia. Permission should be sought to collect seed from public and private mid-elevation sites. Collected seed can be used to establish seed producing beds at the IAE native plant seed production farm.

6. 2018 RECOMMENDATIONS

- **Remove encroaching vegetation:** Encroaching trees should continue to be cleared back from the prairie edge, mainly where shaggy horkelia patches are located. Removing conifers will also improve the longevity of surrounding Oregon white oaks (*Quercus garryana*).
- **Manage weedy brush:** Efforts should continue to control invading blackberry when possible. Continued monitoring and removal of Scotch broom will be critical to ensure that the population does not rebound.
- **Locate and remove non-native prairie species:** Surveys should be conducted in spring to determine where large patches of non-native prairie species occur. The most aggressive species should be targeted for removal by hand weeding or mowed with a string trimmer to reduce the amount of seed being produced.
- **Collect mid-elevation native seed:** Native plant seed, e.g., California fescue (*Festuca californica*), blue wildrye (*Elymus glaucus*) and Junegrass (*Koeleria macrantha*), should be collected and stored to use for future prairie seeding, especially in areas where woody material has been removed.
- **Monitor shaggy horkelia:** Monitoring shaggy horkelia should continue in 2018 to determine if this population is expanding, contracting or remaining stable. Continued monitoring of the plugs planted in 2015 will allow for an evaluation of the success of population augmentation.
- **Collect shaggy horkelia seed:** To increase genetic diversity of shaggy horkelia seed should be collected from other mid-elevation wild populations.

7.0 REFERENCES

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APPENDICES

Appendix A. Twin Prairie site map

Map has been removed from web version of this report

Appendix B. shaggy horkelia flowering stem data from 2013-2017

| Patch | 2013 | 2014 | 2015 | 2016 | 2017 | Notes |
|------------------------------------|-------------|---------------------|--------------------|--------------------|---------------------|---|
| 1 | 12 | 12 (24) | 27 | 6 | 56 | |
| 2 | 13 | 10 (6) | 8 (3) | 1 (1) | 14 | |
| 3-5, summed | 489 | 212 (315) | 325 (168) | 88 (409) | 423(634) | Plots 3-5 considered all part of plot 4 |
| 6 | 27 | 5 (25) | 20 | 11 (17) | 41 | |
| 7 | 77 | 51 (63) | 51 (11) | 30 (38) | 84(7) | |
| 7a | 0 | 2 | 0 | 0 | 0 | No plants found this year |
| 8 | 61 | 39 (54) | 24 | 44 (39) | 99(23) | |
| 8a | 0 | 0 | 2 | 0 | 3 | |
| 9 | 3 | 3 (1) | 2 | 2 | 5 | |
| 10 | 9 | 6 | 0 | 0 | 0 | No plants found this year |
| 10a | 0 | 0 | 1 | 1 | 1(1) | |
| 11 | 2 | 8 | 6 (16) | 1 (9) | 6(15) | |
| 12 | 17 | 113 (79) | 54 (23) | 33 (86) | 80(23) | |
| 12a | 0 | 0 | 5 | 6 (2) | 1 | |
| 13 | 19 | 2 (12) | 11 | 2 (9) | 1 | |
| 14 | 6 | 3 (4) | 1 (2) | 3 | 14 | |
| 15 | 4 | 43 (56) | 43 (27) | 42 (38) | 83 | |
| 16 | 229 | 205 (287) | 111 (98) | 83 (185) | 239(136) | |
| 17 | 4 | 2 | 2 | 0 | 0 | No plants found this year |
| 18 | 102 | 66 (68) | 48 (4) | 10 (85) | 57(35) | |
| 19 | 7 | 8 (29) | 35 | 3 (17) | 15(14) | |
| Total unbrowsed + (browsed) | N/A | 790 + (1023) | 776 + (352) | 359 + (935) | 1222 + (907) | |
| TOTAL stems | 1081 | 1813 | 1128 | 1301 | 2110 | |
| Proportion of browsed stems | N/A | 56% | 31% | 72% | 42% | |

Appendix C. shaggy horkelia abundance from 2014-2017

| Patch | # of total plants + (seedlings) | | | | # of reproductive plants | | | | Notes |
|--------------|---------------------------------|------------|-------------|-------------|--------------------------|------------|------------|------------|---|
| | 2014 | 2015 | 2016 | 2017 | 2014 | 2015 | 2016 | 2017 | |
| 1 | 12 | 11 | 17 | 20 | 12 | 9 | 5 | 15 | |
| 2 | 7 | 5 | 1 | 5 + (4) | 7 | 5 | 1 | 5 | |
| 4 | 407 | 406 | 503 | 576 + (124) | 235 | 216 | 263 | 408 | Plots 3-5 considered all part of plot 4 |
| 6 | 20 | 16 | 18 | 23 | 10 | 9 | 13 | 16 | |
| 7 | 62 | 35 | 42 | 46 | 50 | 30 | 30 | 33 | |
| 7a | 1 | 0 | 0 | 0 | 1 | 0 | 0 | | No plants found this year |
| 8 | 68 | 12 | 58 | 52 | 35 | 12 | 37 | 41 | |
| 8a | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 2 | No plants found this year |
| 9 | 3 | 1 | 1 | 2 | 3 | 1 | 1 | 2 | |
| 10 | 1 | 0 | 0 | 20 | 1 | 0 | 0 | 0 | No plants found this year |
| 10a | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | |
| 11 | 5 | 9 | 11 | 7 | 4 | 8 | 6 | 6 | |
| 12 | 104 | 67 | 112 + (5) | 50 | 64 | 37 | 56 | 39 | |
| 12a | 0 | 2 | 2 | 1 | 0 | 2 | 2 | 1 | |
| 13 | 3 | 6 | 7 | 2 | 3 | 5 | 5 | 1 | |
| 14 | 1 | 1 | 2 | 8 | 1 | 1 | 2 | 6 | |
| 15 | 92 | 80 | 99 | 84 | 45 | 37 | 43 | 58 | |
| 16 | 355 | 216 | 222 + (81) | 211 | 184 | 116 | 125 | 159 | |
| 17 | 2 | 2 | 0 | 0 | 2 | 2 | 0 | 0 | No plants found this year |
| 18 | 76 | 44 | 44 + (60) | 31 | 46 | 24 | 36 | 27 | |
| 19 | 15 | 14 | 9 + (50) | 8 | 10 | 11 | 7 | 8 | |
| Total | 1242 | 929 | 1345 | 1257 | 713 | 527 | 633 | 828 | |