HORSE ROCK RIDGE HABITAT ASSESSMENT

SECOND YEAR REPORT

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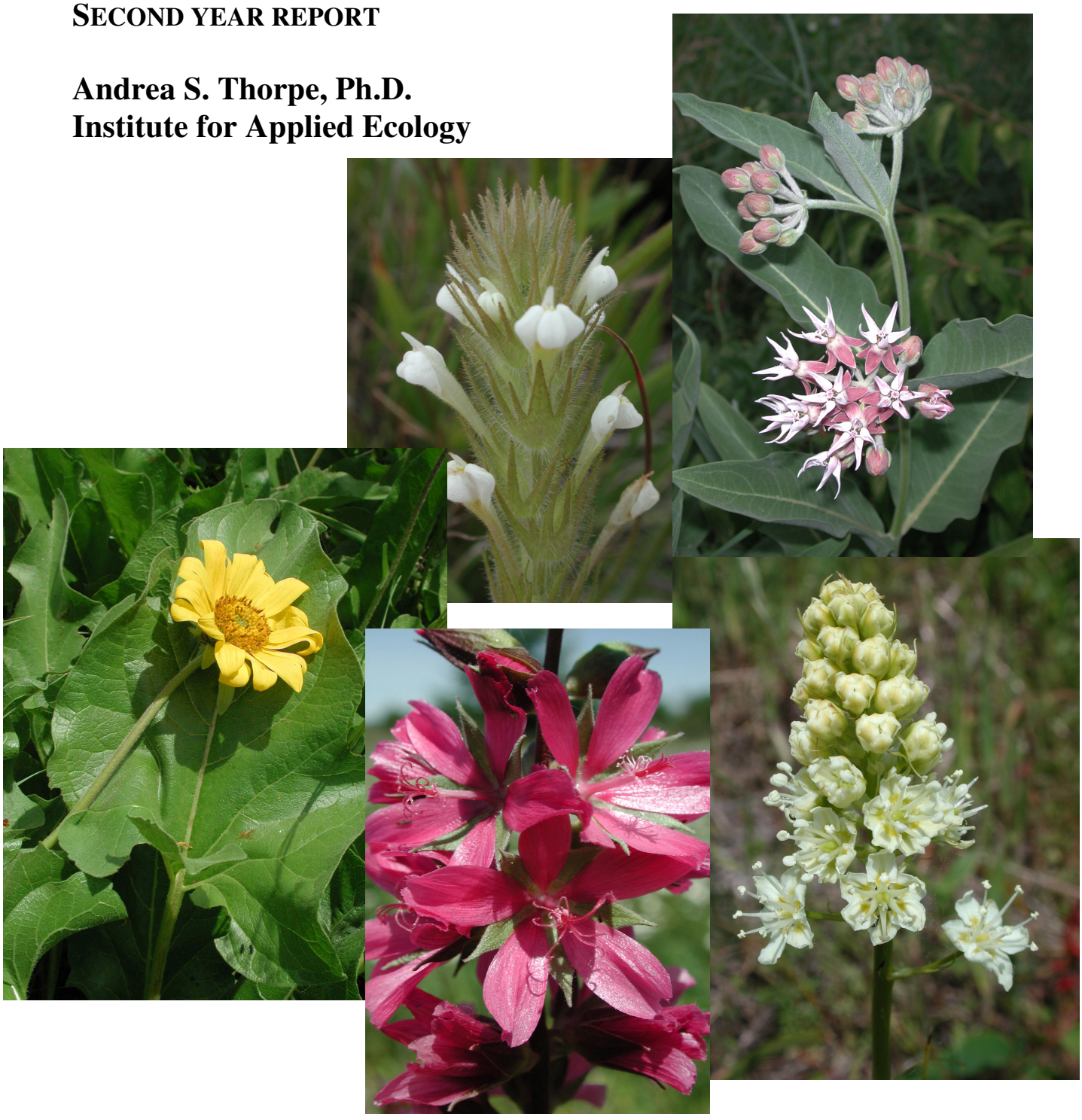

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PREFACE

This report is the result of a cooperative Challenge Cost Share project between the Institute for Applied Ecology (IAE) and a federal agency. IAE is a non-profit organization dedicated to natural resource conservation, 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. Our current activities are concentrated on rare and endangered plants and invasive species.

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Cover photographs: (clockwise from top) *Orthocarpus hispidus, Asclepias speciosus, Zygadenus venenosus, Sidalcea cusickii, Balsamorhiza deltoidea*. Photos by T.N. Kaye.

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INTRODUCTION

This report describes the first year of a three-year project at Horse Rock Ridge Area of Critical Environmental Concner/Research Natural Area (ACEC/RNA; Figure 1). The purpose of this project is to assess the current condition of high-priority ecosystems in the Horse Rock Ridge and prioritize native plant communities and invasive species for management action. The following description of Horse Rock Ridge is taken largely from Sawtelle 2006.

Figure 1. Horse Rock Ridge ACEC/RNA. Photo by A.S. Thorpe.

Horse Rock Ridge ACEC/RNA is a 378-acre (153-ha) area located in Linn County within the Upper Willamette Resource Area. The site is within the Coburg Hills on the divide between the Calapooya and Mohawk River drainages on the eastern edge of the Willamette Valley in western Oregon. Horse Rock Ridge was designated as Area of Critical Environmental Concern (ACEC) in 1984 and a Research Natural Area (RNA) in 1995 . This protection was given primarily in order to preserve an example of a grassy bald (treeless area) and forest mosaic on the western margin of the Cascade Mountains.

The topography of Horse Rock Ridge is rugged with rock outcroppings and steep slopes. Approximately two-thirds of the area has a southern exposure; the rest of the area lies on the northslope. The elevation of Horse Rock Ridge ranges from 1,550 to 2,864 feet.

Horse Rock Ridge fills the natural area cell or element described in the Oregon Natural Heritage Plan (2003) as: *West Cascades Ecoregion/Shrub and Grassland Type/Blue wildrye or Roemer's fescue grass bald communities*. The area consists of a mosaic of open grasslands, young-growth forest and old-growth forest. The grassland balds are surrounded by old-growth *Pseudotsuga menziesii/Tsuga heterophylla* (Douglas-fir/western hemlock) forest. The site is recognized for the considerable diversity of plant species that includes both Willamette Valley plants as well as plants more often found in the montane zone of the Cascade Range. There are also several plant species present at the site that are normally found east of the Cascade Range.

Three primary communities found within the ACEC/RNA. Within each of these communities, there are a number of plant associations:

- Grasslands occupy the open, south-facing slopes, usually occurring in areas with shallow soils. The grassland community consists of three distinct plant associations: *Elymus glaucus* (blue wildrye) association; *Festuca roemeri*

(Roemer's fescue) association; and *Stipa lemmonii/Racomitrium canescens* (Lemmon's needlegrass/moss) associations (Vanderschaff, 1993).

- The forest community is classified as a *Pseudotsuga menziesii/Tsuga heterophylla* (Douglas-fir/western hemlock) association with an understory dominated by small *Berberis nervosa* (Cascade Oregongrape), *Gaultheria shallon* (salal), and *Symphoricarpos albus* (snowberry). The forest occurs on the deepest soils within the natural area (Vanderschaff, 1993).
- Stands of *Quercus garryana* (Oregon white oak) can be found around the edges of the grass balds.

Horse Rock Ridge Research Natural Area Guidebook, Supplement 27 (Curtus 2003), provides detailed information on geology, soils, hydrology, vegetation, fauna, research and disturbance history (Refer to Appendix B, Horse Rock Ridge Research Natural Area, Guidebook Supplement 27).

COMMUNITY MAPPING

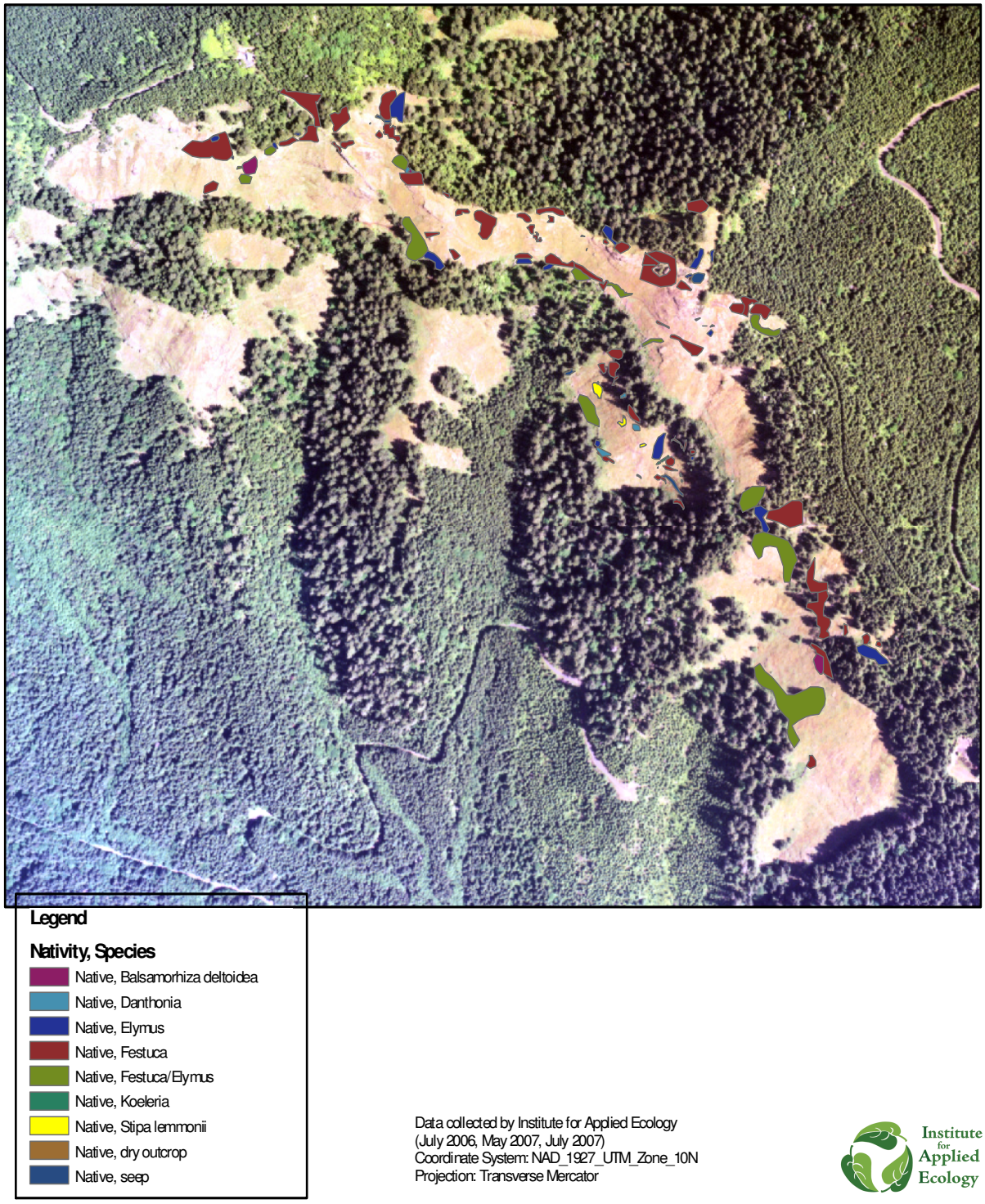
Community surveys at Horse Rock Ridge were conducted August 2006, May 2007, and June 2007. We mapped communities and patches both using a GPS and by delineating on magnified aerial photos. Based on field notes, patches of native and exotic species within Horse Rock Ridge (HRR) were on-screen digitized in ArcMap 9.0 and saved to the HRR communities shapefile. This file includes several classes of native and exotic vegetation types. A natural color, orthorectified aerial photograph (BLM file name "73_2_47") was used for interpretation and mapping purposes.

The majority of the grassland at Horse Rock Ridge is dominated by the exotic grass, *Cynosurus cristata*. Several native forbs commonly co-occur with *C. cristata*, including *Eriophyllum lanatum* and *Allium amplectans.* Due to its extent, this community type, which I refer to as the matrix community was not mapped; any meadow not covered by a polygon should be assumed to be occupied by this community.

Native species classes (Figure 1): Meadow communities were initially based on the associations defined by Vanderschaff (1993): *Elymus glaucus* association, *Festuca roemeri* association, and *Stipa lemmonii* association. In general, native grasses, particularly *Elymus glaucus* and *Festuca roemeri* were more abundant in wetter areas and areas that fell under the canopy of trees. Rocky outcrops and other areas with low soil depth tended to be dominated by the *Stipa lemmonii/Racomitrium canescens* (Lemmon's needlegrass/moss) associations. Both *Danthonia californica* and *Koeleria cristata* commonly co-occured with *E. glaucusi* and *F. roemeri*. When these species were found in dense patches, they were mapped individually.

Invasive species classes (Figure 2): we mapped patches and individuals of all invasive species found in the meadows (Table 1). When invasive species co-occurred with *Cynosurus cristata* in the matrix community, they were not mapped.

Figure 2. Native species communities at Horse Rock Ridge ACEC/RNA. Areas not mapped on either the invasive or native community maps were classified as the matrix community type, which was dominated by invasive annual grasses.



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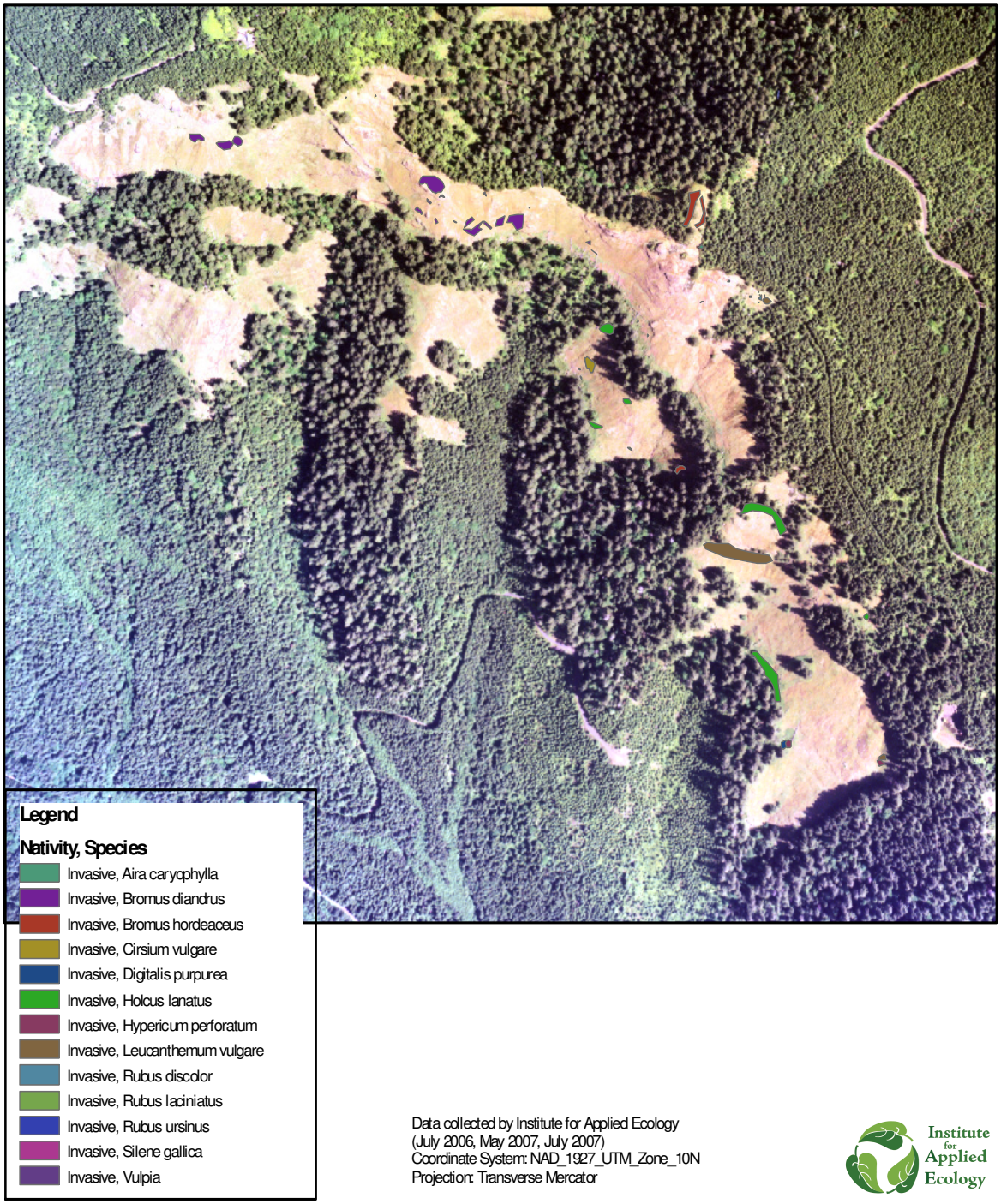

Table 1. The extent of invasive species mapped in the meadow communities at Horse Rock Ridge.

Species	Distribution
Aira caryophylla	Occurs both distributed through-out the matrix community and occasionally in dense patches.
Bromus diandrus (*B. rigidus*)	Typically occurs in relatively dense strips that parallel trails and rocky outrcrops.
Bromus hordeaceus	Occurs both distributed through-out the matrix community and occasionally in dense patches.
Cirsium vulgare	Infrequent individuals.
Digitalis purpurea	Infrequent individuals and small patches.
Holcus lanatus	Somewhat distributed through-out the matrix; occurs in dense patches near tree-line.
Hypericum perforatum	Relatively large numbers found in meadows with more soil development; co-occurs with *Leucanthemum vulgare*.
Leucanthemum vulgare (*Chrysanthemum leucanthemum*)	Relatively large numbers found in meadows with more soil development. Co-occurs with *Hypericum perforatum*.
Rubus discolor	Found in meadows with greater soil development and just inside forest edges.
Rubus laciniatus	Found in meadows with greater soil development and just inside forest edges.
Rubus ursinus	Found in meadows with greater soil development and just inside forest edges.
Silene galica	A few individuals found.
Vulpia bromoides	Occurs both distributed through-out the matrix community and occasionally in dense patches.

In 2007, we found three species not included in the 2002 species list, *Silene galica* (invasive) and *Panicum scribneria* (native).

In 2008, we will finalize our mapping by ground-truthing the areas mapped in 2006-2007 and mapping areas that were not covered during previous efforts.

WEED CONTROL

Based on the identity and extent of weed species identified at Horse Rock Ridge 2006 – 2007, we plan the following treatments for weeds in 2008:

1. Pull or grub weeds that are in small, individual patches (for example: thistles, *Senecio jacobeae*, *Digitalis purprea*).
2. *Leucanthemum vulgare* and *Hypericum perforatum*
    a. Issue: these species co-occur and cover relatively large areas that are characterized by good soil development
    b. In order to determine the most effective control methods for the species, we will set-up 30 1m^2 experimental treatment plots. Ten plots each will be assigned to one of the following treatments,
        i. ***Clear plastic***: this treatment will kill any existing plants and stimulate germination from the seed bank. New germinants will subsequently be killed by the treatment. This clear plastic will be secured with a combination of cement glue and staples. In 2009, the plastic will be removed and the plots will be seeded extensively with native species.
        ii. ***Carbon addition:*** by stimulating microbial activity, carbon addition limits the amount of soil nutrients available for plant growth (particularly nitrogen and phosphorus). Several studies have indicated that native species are more capable of tolerating low nutrient conditions than exotic species. We will sprinkle 2 kg carbon m^{-2} (as sucrose) on each plot in spring 2008. These plots will be seeded with appropriate native species in fall 2008.
        iii. We will also establish ten ***control*** plots in order to assess the effectiveness of these treatments.
3. "Matrix" community, including *Cynosurus echinatus*, *Aira caryophylla*, and *Bromus hordeaceus*
    a. Issue: this community type covers relatively large areas that are characterized by poor soil development. Although this community type occurs throughout the meadows, the invasive species are more dense in areas with higher soil development. Although this community type is dominated by exotic grasses, several native forbs are relatively common.
    b. In order to determine the most effective control methods for the species, we will set-up 30 1m^2 experimental treatment plots. Ten plots each will be assigned to one of the following treatments,
        i. ***Seed addition***: The majority of the invasive species in the matrix are annuals that produce a large quantity of seeds each year. The low competitive ability of native species may be due to a low number of seeds compared to the invasive seeds. To test this, we will add native seeds (including *Festuca roemeri*, *Plectritis congesta*, *Allium ampletans*, and *Eriophyllum lanatum*) to ten test plots.

ii. ***Carbon and seed addition :*** we will sprinkle 2 kg carbon m^{-2} (as sucrose) on each plot in spring 2008. These plots will be seeded with appropriate native species in fall 2008.
iii. We will also establish ten ***control*** plots in order to assess the effectiveness of these treatments.

4. *Rubus laciniatus*, *Rubus armeniacus* (*Rubus discolor*)
    a. Issue: these are aggressive species that easily grows back after disturbance
    b. We will remove all aboveground biomass using loppers at base of plant three times (spring, summer, and fall) each year.

SUMMARY OF FUTURE ACTIONS

In 2008, we will

- finish mapping by ground-truthing the areas mapped in 2006-2007 and mapping areas that were not covered during previous efforts;
- establish 30 plots to test methods to remove *Leucanthemum vulgare* and *Hypericum perforatum*;
- remove the aboveground biomass of *Rubus* spp. in spring, summer, and fall;
- remove all small patches of invasive species,
- collect native seed and distribute in areas treated for invasive weeds; and
- utilize the information from the mapping procedure and experimental weed treatment plots to write a Restoration Plan for Horse Rock Ridge.

LITERATURE CITED

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