Balancing rare plant restoration and the protection of existing diversity

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Introduction

Historic gravel quarry, now a refuge for vernal pool plants

Site: 35 acre vernal pool grassland in Sonoma Valley

Landscape context: long history of agriculture which continues to expand, but also many active conservation partners in the region

Historic and current challenges:
- Nitrogen deposition;
- Reference condition and components unknown;
- Vernal pool complex was bisected by highway;
- Grassland was once irrigated

Project timeline: 2007-2009

Project goals

➢Provide a home for rare, threatened and **endangered species**, particularly extant habitat specialists, experienced /experiencing significant habitat loss;

➢Maintain or increase diversity of native **vernal pool species** and the native **grassland species** found in the surrounding uplands;

➢Answer these **questions**: Were the areas of shallow water accumulation once deeper, filled in by silt from historic land use? Is removal of soil appropriate?

➢Participate in regional vernal pool **conservation**

Prescribed fire used to control invasive medusahead grass

Methods

➢**Broadcast seeds** of specialist forbs in vernal pools and plant propagated native grasses in surrounding uplands.

➢Introduce endangered county endemic **Sonoma sunshine** (*Blennosperma bakeri*);

➢Control invasive species and reduce accumulated biomass with these tools: cattle **grazing**, prescribed **burning**, **mowing** around pools, **scraping** away soil in pools with accumulated weed seeds, **spraying** herbicide on specific invasives;

➢**Inventory and monitor**: hydrology, vegetation, aquatic invertebrates, includes rare vp specialist dwarf downingia (Downingia pusilla)

➢**Soil profile analysis** conducted by vernal pool consultant Steve Talley.

➢**Participate** in regional collaborations and host vernal pool symposium.

Results

Sonoma sunshine successfully propagated in vernal pool

➢**Sonoma sunshine** successfully introduced: over 300 plants flowered in spring 2008. Currently there are new seedlings sprouting in those areas.

➢The rare vernal pool forb **dwarf downingia** (*Downingia pusilla*) found growing in 2 previously undocumented locations.

➢**Plant restoration** goals of project- so far on target, but true measure of success will be long term persistence, e.g. still unknown.

➢These **invasive species reduced** to low numbers: tall wheatgrass (*Thinopyrum ponticum*), medusahead grass (*Taeniatherum caput-medusae*) (Fig. 2), pennyroyal (*Mentha pulegium*). Continued control necessary.

➢Over 35 species of **aquatic invertebrates** were found living in the pools (Table 1). Invertebrate inventory was initiated as a minor component of the project, but ended up important in decision making.

➢Hydrology data and soil profiles show no evidence of silt accumulation, rather they indicate that we have **different types of wetlands**: vernal pools, primarily precipitation-fed, and wet meadows, primarily fed by groundwater (Fig. 1). However, experience of vernal pool consultants who have successfully created Sonoma sunshine-dominated pools suggests that removing about 6" of soil from pools will create the best environment for Sonoma sunshine and best ensure that the species thrives in this location.

➢We are a part of a **network** of Sonoma county vernal pool practitioners—we contribute to and draw from this expertise.

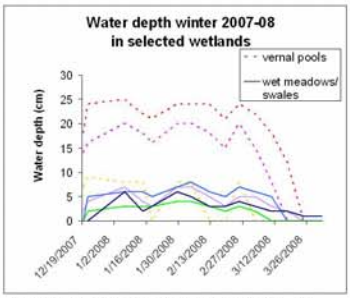

Figure 1: Hydrology data revealed 2 types of wetlands at the site. A dashed line is used for vernal pools and a solid line is used for wet meadows/ swales. Dashed lines tend to drop between precipitation events (for example late January and mid-February), indicating that water in these locations is primarily from precipitation. In contrast, solid lines do not drop much during the course of the winter, indicating that water in these locations comes primarily from subsurface flow.

Dwarf downingia found growing in pool after prescribed burn

Table 2: Native plant species found in wetlands (listed from most abundant to least abundant)

Pleuropogon californicus
Crassula aquatica
Limnanthes douglasii
Psilocarphus brevissimus
Plagiobothrys stipitatus
Juncus xiphioides
Eleocharis acicularis
Downingia pusilla
Ranunculus aquatilis
Montia fontana
Pilularia americana
Juncus bufonius
Elatine heterandra
Juncus sp.
Eremocarpus setigerus
Lilaea scilloides
Eryngium aristulatum
Gratiola ebracteata
Navarretia intertexta
Isoetes howellii
Callitriche marginata
Veronica peregrina
Deschampsia danthonioides
Downingia concolor
Eleocharis macrostachya
Lotus purshianus
Epilobium ciliatum
Cardamine oligosperma
Trifolium variegatum
Asclepias fascicularis
Hordeum branchyantherum
Lepidium nitidum
Alopecurus saccatus
Mimulus guttatus
Rorippa palustris
Trifolium depauperatum

Volunteers help propagate native grasses

Conclusions

➢Vernal pool management is driven by endangered species legislation. This powerful legal tool has the negative impact of causing us to focus on single species. As land managers we need to remember that **there are many values we manage for**.

➢We set out to restore an endangered species. It became clear that what was best for that species was scraping away top soil to limit competition from grasses whose seeds permeate the soil. At the same time we learned that there are over 35 species of aquatic invertebrates living in these pools, including many that over-summer as cysts in the soil. **We took a middle path** of scraping away a few inches of soil in a few locations, providing spots within each pool for the establishment of the rare plant, and other spots were left undisturbed as reservoirs of invertebrate propagules.

➢While there is good information available on how to create vernal pools dominated by a few endangered species, **information on how to create a home for rare species without sacrificing existing diversity is scarce.**

Seasonal rotational cattle grazing at the site

Figure 2: Medusahead grass monitoring data from inside and outside a June 2007 prescribed burn, comparing pre-burn GIS data collected in 2006 and post-burn GIS data collected in June of 2008. Net area refers to the area of each patch multiplied by the estimated percent cover of the species in that patch.

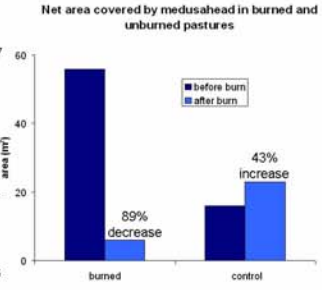

Table 1: Over 35 taxa of aquatic invertebrates found at site including:

6 species of crustaceans:
- CA fairy shrimp
- seed shrimp
- all 3 orders of copepod
- water flea

23 species of insect including:
- predaceous diving beetles
- water scavenger beetle
- riffle beetle
- back swimmers
- water mite
- water boatmen
- mosquito
- water midge

Meadowfoam (*Limnanthes douglasii*) dominates a wet area of the site, a measuring tape is stretched across the patch in preparation for vegetation monitoring

Acknowledgments

We thank these organizations for their generous support of grassland management at the Bouverie Preserve:

Rockey Family Foundation

Community Foundation of Sonoma County

US Fish and Wildlife Service Private Stewardship Grant Program