

Conservation Matters: Contributions from the Conservation Committee

Managing Habitat for Lupines and Rare Butterflies

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To preserve crucial habitat for rare plants and butterflies, a group of conservationists in central New York has been focusing on habitat maintenance and restoration in the nearby Rome Sand Plains (RSP). The RSP is a patchwork of high sand dunes covered with pitch pines, water-logged swales between the dunes that support sphagnum moss and pitcher plants, a swamp with highbush blueberry and huckleberry, and occasional open sandy patches with populations of wild blue lupine, *Lupinus perennis*. The sand is a remnant of glacial times; when the last glacial advance melted around 12,000 years ago, water covered much of central New York, forming glacial Lake Iroquois. After thousands of years of the water eroding underlying rocks, the lake finally drained, leaving behind a barren landscape. Sand from the lake bed was blown into dunes, and the RSP is a remnant dune field from that time, lying over a high local water table.

The geological background explains why sand plains occur here so far from the ocean, but of greater interest is what lives in the RSP. Besides providing beauty, the lupine serves as the larval host for frosted elfin, *Callophrys irus*, butterflies. Little lupine remains, however; in the absence of disturbance, especially the natural fires that once opened up the vegetation, white pine trees have invaded the open lupine patches and pitch pine stands. A single large lupine stand remains in the center of the area, although small patches of lupine can still be found beneath canopy cover in several nearby places.

A significant population of frosted elfins occurs at the main lupine patch. Modified Pollard walks at this site have given peak counts of up to 30 frosted elfins in a single 12-minute transect, along with an occasional Eastern pine elfin. Pollard walks are censuses along established transects during which one counts all individuals of focal species seen within a certain distance; the counts provide measures of relative rather than absolute abundance, but they indicate the sizes of resident populations. No confirmed records exist of the federally endangered Karner Blue butterfly in the RSP, a species that uses the same lupine as a larval host, but they likely lived here in the past when the vegetation was more open and the lupine more abundant (Karner Blues, *Plebejus melissa samuelis*, are found in the Albany Pine Bush just 100 miles to the East). Given the presence of lupine, the Federal Recovery Plan for Karner Blues has designated the RSP as a potential recovery site. Other uncommon sand barrens species, such as rare tiger beetles, may also occur here.

The special characteristics of the RSP led to a collaborative effort starting more than 10 years ago. Spearheaded by The Nature Conservancy (Central and Western New York chapter), a Rome Sand Plains Management Team was formed to consider overall management of the area. In addition to The Nature Conservancy, this collaboration has included the New York State Department of Environmental Conservation, the city of Rome, Oneida County, the local chapter of the

Izaak Walton League, faculty from nearby Hamilton College, and others.

A specific goal of the collaborating partners is to expand the lupine population (any project like this is complex enough to require extensive collaboration). With greater lupine coverage, frosted elfins could increase in abundance, and we might be able to introduce Karner Blues. Two approaches are being taken towards these ends.

The first approach is to plant lupine seedlings, and we're doing so in open sand areas that have been bought by TNC and then transferred to the state of New York. Each summer TNC staff collect lupine seeds from our existing dense stand; each following spring botanists from nearby Morrisville State College germinate the seeds in peat plugs in their greenhouses; and six weeks later, work crews of volunteers plant the seedlings under the direction of TNC staff and the Hamilton College biologists. We then monitor the survival and growth of the seedlings to see what conditions lead to the greatest survival. We can collect enough seed to grow and plant seedlings, but we don't have enough for broadcast sowing of ungerminated seeds. Financial support for this effort has come from The Nature Conservancy and the National Wildlife Federation (Species Recovery Fund); we also have the full support and cooperation of staff from the NYS Dept. of Environmental Conservation.

What have we accomplished so far? Expanding lupine coverage is not easy.



Volunteers endeavor to manage habitat to encourage populations of Frosted Elfins (*Callophrys irus*)

Fig. 1. Frosted Elfin (*Callophrys irus*) on lupine in the Rome Sand Plains. **Fig. 2.** Part of the large natural lupine patch in the Rome Sand Plains, with moss and lichen encrusted sand. **Fig. 3.** Volunteers planting lupine seedlings. **Fig. 4.** A new patch of lupines in flower two years after planting seedlings.



Existing vegetation can overwhelm and outcompete lupine seedlings, particularly if the soil is nutrient rich. Where succession has led to trees growing on sandy substrate, removal of the trees can be challenging. Our group began careful planting of lupine seedlings in 2003, and except for one year, we've planted up to 1500 plugs each summer. By now we've established several new patches of lupines around the outskirts of the original large patch, and frosted elfins have dispersed to at least one of these new sites. We've created a metapopulation of lupine habitat at this site: a cluster of lupine patches separated by forest but connected by open corridors for dispersal, all within an area small enough that a few butterflies can readily move among these patches.

We've had even greater success two miles away at the site of an old sand mine. The open sand pits have provided ideal habitat for planting sand-dependent species like lupine, and seedlings that we planted in 2006 have grown into small dense patches. This area is comprised of two connected open sand areas, each about 3 acres in size, and with connections to additional nearby sites, the sand mine provides a potential second metapopulation site within the RSP.

We've learned a few things along the way. The first year we planted seedlings in three types of habitats: bare sand, sand covered with a moss and lichen crust, and vegetated sand. We quickly found that no seedlings survived among the grasses and sedges of vegetated sand. Next, because the summer is hot and dry, we thought that planting in the fall might give the seedlings a better chance to establish deep roots before the desiccation of the following summer. Deer quickly defeated that plan,

however; with little other fresh vegetation to eat at that time of year, they readily consumed all our fall-planted seedlings. More recently we've found that seedlings establish better if we first add wood ash to the sand, a treatment that raises the pH and adds nutrients. A question still to be answered is what limits nodule formation by nitrogen-fixing symbiotic bacteria on lupine roots. Next year the state will bulldoze a nearby field to open up more sand habitat for planting.

The second direction of our conservation efforts has been a study of habitat management in the RSP. With support from The Nature Conservancy, two ecologists from nearby Hamilton College (Bill Pfitsch, a plant ecologist, and I, a butterfly ecologist) and summer research students have been studying the growth of lupine and the ecology of frosted elfins. The main lupine patch is being invaded by Eastern white pines, and we wanted to measure the effect of this vegetative change on our focal species. We quantified lupine growth and use by frosted elfins near 18 white pines, and then in the winter of 2002-03, state foresters removed the nine of the 18 trees that we had randomly selected for removal.

We examined our nine removal plots and nine control plots over the following five years. We found that, where the canopy had been removed, lupine plants grew to larger sizes and produced more flowers; furthermore, frosted elfin abundance increased, and male elfins established several new mating territories in the newly opened plots right where we had removed trees. But tree removal was not a perfect solution; no new lupine plants became established. (This study has just been published in the journal *Restoration Ecology*.) We're now looking at whether

lupine growth is limited by insufficient micronutrients, nitrogen-fixing bacteria, or mutualistic fungi (mycorrhizae).

Conservation efforts in the RSP continue. Each year we plant more seedlings, and each year more patches of flowering lupines are visible. While their numbers fluctuate from year to year, frosted elfin numbers remain substantial, and they make use of more of the total lupine patch than before we removed the white pines. But despite heavy seed set in the original and planted lupine patches, little natural establishment of new lupines is taking place. Our research continues on lupine growth and the ecology of frosted elfins. Perhaps in a few more years we'll have the needed number of interconnected lupine patches to introduce Karner Blues into the RSP. After 10 years of conservation work, one important point stands out: all the successes to date, as well as those yet to come, have depended on the good-spirited collaboration of multiple partners, each of which has contributed expertise and support towards a common goal.

