

## **The Natural Turnpike (FR54) 2007 population reintroduction**

**Project Investigator:** Laura Hill, University of Vermont

**Project Volunteers:** Connie Tedesco, Bill Brumback (New England Wildflower Society), Alison Brody, Joe Roman, Sarah Friend, Debbie Krug, Jonathan Smith, Susan Tucker

### **Site description:**

The reintroduction site was chosen based on its location and habitat characteristics. *Polemonium vanbruntiae* is known to occur at multiple sites along FR 54 (“The Natural Turnpike”), although 3 Blue Banks subpopulations have gone extinct within the past 10 years (i.e., Blue Banks A, Blue Banks B, Blue Banks F). The site is a wet swale with a fully open-canopy that is located adjacent to FR54 but potential habitat extends to 160’ back from the roadside to the woods-edge. Plant community is similar to existing natural sites where *P. vanbruntiae* is found. See the EO report for a full list of associated plant species. The site is approximately 0.2 miles south of the existing Blue Banks subpopulation C owned by the Spruce Lodge Association. See EO report for further site description and GPS units.

### **Reintroduction protocol**

#### **I. Lab germination trials:**

Laura Hill collected seeds from 60 individuals at Abbey Pond, 72 individuals at Blue Banks subpopulation C, and 30 individuals at Forest Rd. 233 in 2004. Ten percent of seeds from all 3 sites were kept for lab germination following the guidelines listed in the Threatened and Endangered Species permit. The remaining 90% of seeds were returned to each respective population and dispersed as naturally as possible around the parent plant. In the University of Vermont Brody laboratory, seeds underwent a 40-day stratification period at 4°C following existing protocols (Brumback, 1989). Germinated seedlings were grown under fluorescent lights in lab growth chambers and raised to adulthood. In winter 2006, the remaining seeds collected in 2004 were germinated following the above protocol.

#### **II. Transplanting to FR54:**

The reintroduction of juvenile and adult plants took place at the FR54 site on October 20, 2007. At the time of reintroduction, juvenile plants were approximately 1-year old and adult plants were 2-years old. Adult plants were grown outside in 5-gallon pots at the University of Vermont Horticultural Research Station from June – October 2007. Juvenile plants were grown inside under fluorescent lights from June – October and were hardened-off outside 3 days prior to transplanting into the reintroduction site.

At the site, all lab-raised plants were spaced approximately 2m apart and planted with the help of 5 volunteers. All plants were watered and fertilized with a 2:3:1 organic liquid fertilizer after planting. Each juvenile and adult plant was assigned an aluminum numbered tag and wire flag. The spatial location of all plants was noted for relocation purposes. The height and number of leaves of all adult and juvenile plants was noted at time of reintroduction.

#### **III. Seed grid planting and analysis:**

Seeds were donated by Bill Brumback from the *Polemonium vanbruntiae* seed bank of the New England Wildflower Society from seeds collected from Geary Rd., Lincoln Vermont in 1988. Connie Tedesco, researcher at SUNY Oneonta, collected seeds from the Lordsland

Preserve (TNC-owned property) population in Otsego County, NY in 2006. All seeds had undergone dry, cold stratification before the reintroduction. On May 10, 2007, a total of 1475 seeds were sown in 16 marked seed grids (**Table 1**). Successful seed germination noted on June 15, 2007 in 7 of 16 of the seed grids. Seed germination at the site was relatively low in June 2007 at ~2%, but fell within the range of germination in natural populations (range: 0 – 32% germination; average: 18% germination). Therefore, the reintroduction proceeded in fall 2007.

On June 11 and 12, 2008, each seed grid and plant was revisited to assess initial reintroduction success. Additional seed germination must have taken place during the summer of 2007 because a total of 106 immature or 1<sup>st</sup> year plants (i.e. seedlings that overwintered successfully) were detected in June 2008. We also found 79 new seedlings in the 16 seed grids, which represents seeds that did not initially germinate in summer 2007, overwintered in the seed bank, and remained viable for germination in spring 2008.

An interesting result is that only 2 out of 240 seeds from the NEWFS seed bank have successfully germinated to-date (**Table 1**). The seeds were collected from the Geary Rd. site in 1988 and may have lost viability over time. If this trend continues, it may be cautious to test the viability of the *Polemonium vanbruntiae* seeds in the NEWFS or refresh the seed bank on a regular cycle (i.e., every 5-10 years). Laura Hill collected seeds from Geary Rd. in 2007 for storage in the NEWFS seed bank.

**Table 1:** Seed germination rates in seed grids (SG) at Natural Turnpike reintroduction site. Seeds were sown on May 10, 2007 and seed germination data were collected on June 15, 2007.

SG#	Original site location	Original # sown	# germinants	June 07 % germination	June 08 % germination
1	Lordsland Preserve	100	1	1	26
2	Lordsland Preserve	100	1	1	4
3	Lordsland Preserve	100	0	0	14
4	Lordsland Preserve	100	6	6	14
5	Lordsland Preserve	88	3	3.4	24
6	Geary Rd.	100	0	0	0
7	Geary Rd.	50	0	0	2
8	Geary Rd.	90	0	0	0
9	Lordsland Preserve	100	6	6	18
10	Lordsland Preserve	100	6	6	31
11	Lordsland Preserve	100	0	0	5
12	Lordsland Preserve	100	0	0	29
13	Lordsland Preserve	100	6	6	15
14	Lordsland Preserve	100	0	0	0
15	Lordsland Preserve	97	0	0	6
16	Lordsland Preserve	50	0	0	2

**Soil analysis:** Five soil samples were collected at various locations within reintroduction site and are currently under analysis at the UVM Ag lab. Reports will be sent to NNHP upon receipt.

**Future monitoring:**

All plants will continue to be monitored annually by Laura Hill and growth, survival, and fitness data for all genets will be collected. These data will be used to construct a matrix population model, which will be used to project future population growth rates and probability of persistence. The model will provide a realistic scenario of future population persistence and reintroduction success.

**Acknowledgements:**

Alison Brody, Joe Roman, Sarah Friend, Debbie Krug, Jonathan Smith, and Susan Tucker helped plant seeds, juvenile and adult plants at reintroduction site. Members of the Flora Advisory Council provided helpful comments and critiques of the reintroduction plan during project presentation in the Pringle Herbarium at the University of Vermont. The state of Vermont Nongame and Natural Heritage Program and the USDA Forest Service Green Mountain National Forest provided permits for this reintroduction project.

**References:**

Brumback, W. E. 1989. Notes on propagation of rare New England species. *Rhodora* 91, 154-162.