Rare Plant Occurrence Reporting Form Addendum for *Polemonium vanbruntiae*
Laura Hill, June 9, 2008

Laura Hill has studied the mating system, pollination ecology, and population demography of 9 sites of *Polemonium vanbruntiae* in Lincoln and Ripton VT for her doctoral dissertation at the University of Vermont (2003-2008). Fieldwork began at sites Blue Banks C, FR 233, and Abbey Pond in June 2004. Laura began monitoring the additional 6 sites listed below in June 2005. Population monitoring will continue through a contract with the USDA Forest Service to determine the effect of forest management activities on populations of *P. vanbruntiae*. The contract is written for 3-5 years of monitoring (through 2013) pending available funding.

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***Polemonium vanbruntiae* sites reported:**

1. Blue Banks subpopulation C
2. Blue Banks subpopulation D
3. Blue Banks subpopulation E
4. Abbey Pond
5. North Branch subpopulation E
6. North Branch subpopulation F
7. Camel's Hump State Forest
8. Duclos Rd./FR 298
9. FR 233/Popp reintroduction site 1990

Biology

Phenology: *Polemonium vanbruntiae* generally begins to leaf-out during the first week of May. By mid-May, one is able to assign ramets as vegetative or flowering, because flowering ramets begin to produce flowering stalks indicated by leaves alternately arranged along the stalk. Flowering ramets begin to produce flower buds in early June and ramets generally begin to flower around mid-June. Flowering extends until mid-July. In late-August/early-September, fruit began to dry, turn brown and crack open. Seeds have a smooth seed coat and weigh an average of .008g.

Seed dispersal is assumed to be passive. Roadside populations, if mowed when *P. vanbruntiae* seeds are ripe and dispersing, may be an alternate method of dispersal, although this is speculation. Additionally, white-tailed deer commonly browse flowering and fruiting stalks of *P. vanbruntiae*. It is unknown whether *P. vanbruntiae* seeds can survive the digestive process, but if so, deer may provide a long-distance mode of dispersal when browsed at the appropriate time (i.e., when fruits are ripe) and deposited in suitable habitat (i.e., moderate to saturated soils, open canopy to partially-open canopy). Sabourin (2002) noted that seeds may be dispersed by winter winds and spring floodwaters.

*Sabourin, A. 2002.COSEWIC assessment and update status report on the van Brunt's Jacob's ladder *Polemonium vanbruntiae*. Committee on the Status of Endangered Wildlife in Canada. Ottawa.

Survey methods:

Population area (length and width) was measured with a Sonin Electronic Distance device with receiver to the nearest 0.01m. Population areas were converted to ft^2 for EO reporting forms.

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Population size (# ramets, # genets) was estimated using $0.5m^2$ grids placed haphazardly throughout the entire population.

- Duclos Rd/FR 298: in the small area on the south-end, all plants were counted; on the north-end, 3 grids were placed in various locations
- Blue Banks E and North Branch F: all planted were counted, grids were not necessary due to small size and number of plants in population
- FR233: 5 grids
- Blue Banks C: 5 grids
- Blue Banks D: 2 grids
- Abbey Pond: 4 grids
- Camel's Hump State Forest: 5 grids

Within each grid, I assigned each ramet to a life-history stage, based either on stage or size as follows:

- seedlings = cotyledons present
- immature = 0.1 – 25cm, cotyledons absent
- 1 year = "medium-sized" vegetative plant, 25.1 – 60cm
- Mature = flowering ramets (generally 60cm+)

The grid method may overestimate total # ramets and genets in each population if the site is not uniformly dense with *P. vanbruntiae*. However, I was careful to place grids in various locations representing various densities of *P. vanbruntiae* within each site. When the site was small enough and plants were patchily distributed, the grid method was not used and instead I counted each ramet in the population.

Senescent plants were not counted in the grids. However, I was able to estimate % senescent plants from my demographic analysis of genets in May 2008. The % senescent is in addition to the life-history stages represented in each population, so % seedling + % immature + % 1st year + % mature = 100%. "% senescent" is in addition to the total percent life-history stages represented. This estimate represents genets that have died since they were originally tagged either in 2004 or 2005, and thus were categorized as "old" or "senescent".

Number of genets was estimated by assigning ramets to genets of all permanently tagged plants in each population in early May 2008. When the plants are first emerging in the early spring and stalks are small, it is possible, with close scrutiny, to trace the rhizomes and visibly detect the ramets that are attached to a single rhizome. At this time, I counted the average number of ramets per genet for each demographic population and used this estimate to approximate total # genets for each site.

Age/stage structure was determined by dividing # ramets represented by each life history stage (seedling, immature, 1st year, mature) by total number of ramets to yield a percentage for each life history stage.

Soil samples were collected at all sites on August 18th and 19th, 2005 and analyzed at the Agricultural and Environmental Testing Laboratory in the University of Vermont Plant and Soil Science Department.