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## A Survey and Census of the Endangered Furbish Lousewort, *Pedicularis furbishiae*, in New Brunswick

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Known Canadian locations of the endangered plant Furbish Lousewort (*Pedicularis furbishiae*) were explored and a census indicated there were 546+ Canadian plants contributing to a world total of approximately 5546. This is about 146 more Canadian plants than previously reported. Plants were most common on moist, disturbed, morning-shaded riverbank habitat. Insects associated with this plant were identified and both American and Canadian sites were mapped.

**Key Words:** *Pedicularis furbishiae*, Furbish Lousewort, census, habitat, endangered species, New Brunswick.

Furbish Lousewort, *Pedicularis furbishiae* S. Wats., occurs predominantly on moist, disturbed banks of the St. John River through its northern drainage of the State of Maine and Province of New Brunswick. This species is a perennial herb that produces 3–6 leaves by the first week in June. Leaves are often tinged with an anthocyanin-red at this time. Racemes are produced on most large plants in early June and these begin to flower around 10 July. Seed is dispersed by wind or water during autumn and winter and some seed may be retained in the capsules late into

the following summer in sites undisturbed by river flood. In the early growth stages Furbish Louseworts must make haustorial root contact with a host plant or die (Macior 1980). By carefully unearthing mature plants Macior (1978) found no root contact with surrounding plants. The obligatory parasitism must therefore be considered a temporary juvenile characteristic.

I have observed that if the microclimate remains favourable and there are no major disturbances for three or more years, flowering stalks usually will be



produced. If, however, there is too much shade the plants remain in a vegetative state.

### Habitat Description and 1981 Census

During the summer of 1981 a survey and census of Canadian Furbish Lousewort populations was completed. (Day, R. T. 1981. New Brunswick Ecological Reserves 1981 Field Work and Plant Collecting. Internal Report, Department of Natural Resources, Lands Branch, Ecological Reserves Program. Centennial Building, Fredericton, New Brunswick. 18 pp). The location of populations is given in Figures 1 and 2.

Site 1 was discovered by Mr. H. Hinds in 1977 near a railway embankment ( $46^{\circ}44'N$ ,  $67^{\circ}43'W$ ), at the confluence of the Saint John and Aroostook Rivers. This habitat was atypical for this species. Here the plants were found along 25 meters of a steep bank beside a railway track. Brush cutting by a railway crew was evident from the remaining tree stumps. The removal of shrub and tree growth seemed to benefit the herbaceous layer by reducing deep shade. My 1981 census gave a total of 80 plants (all age classes included). Stirrett (1980) reported "about 33 plants" from a 1978 count.

Site 2 is along the east bank of the Saint John River immediately south of the Little River delta ( $46^{\circ}52'N$ ,

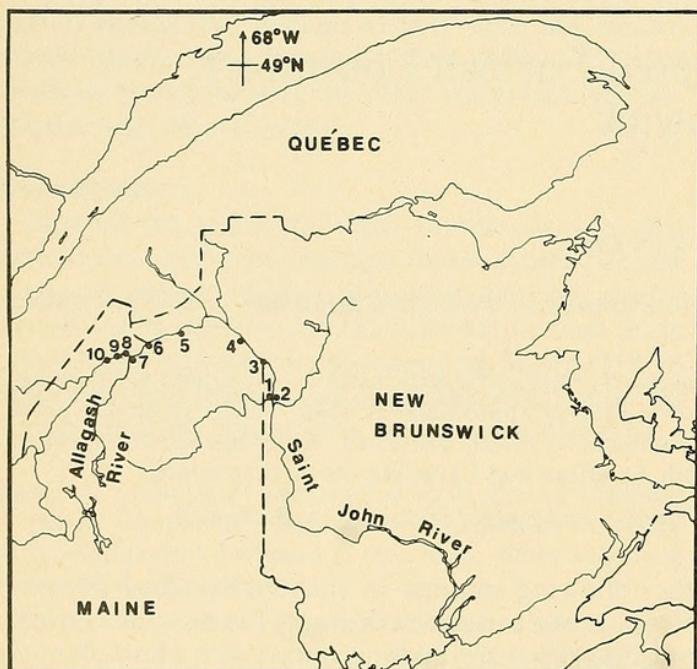


FIGURE 1. Distribution of *Pedicularis furbishiae*. Sites 1 to 3 in Canada (Day 1981), 3 to 10 in the United States (Dyer 1981): 1 = confluence of Saint John and Aroostook Rivers, 2 = near confluence of Saint John and Little River, 3 = spans the Maine - New Brunswick border near Hamlin and Grand Falls, 4 = Van Buren, 5 = Fort Kent, 6 = St. Francis, 7 = Allagash, 8 to 10 = Townships T14R13, T15R13 and T16R12 on the Saint John River.

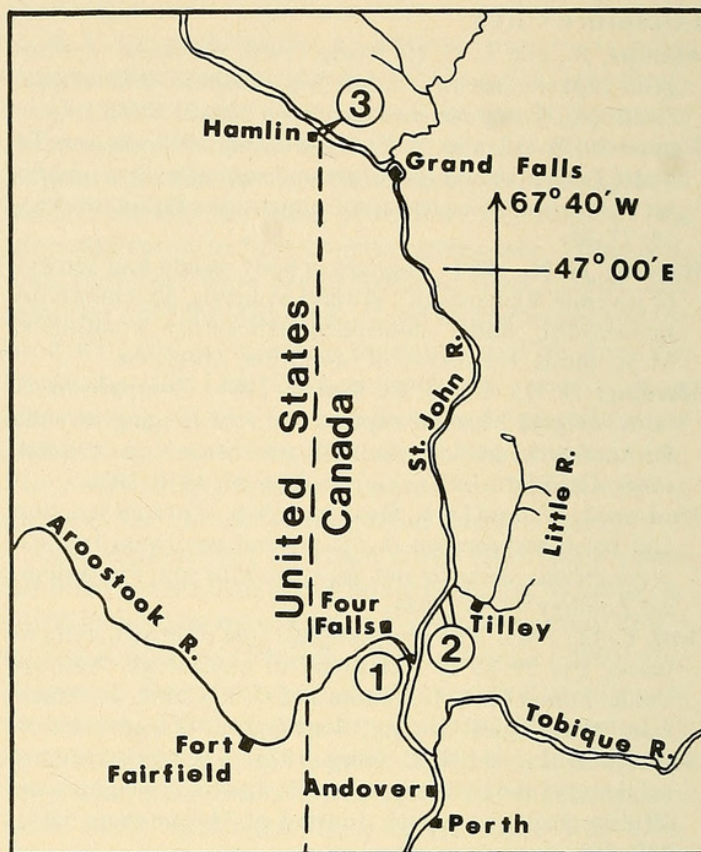


FIGURE 2. Locations of Furbish Lousewort within New Brunswick, Canada: an enlargement of part of Figure 1, showing sites 1, 2, and 3.

$67^{\circ}41'W$ ), near North Tilley. Here the Furbish Louseworts occur in a narrow linear zone along the Saint John riverbank. The plants are found only along the upper riverbank between the edge of the stable forested slope and the lower riverbank where seasonal flooding and ice-push cause disturbance to soil and plants. Plants usually grow in river-deposited calcareous silt. Stirrett and Tribe found "about 70+ plants of *Pedicularis furbishiae* scattered along 0.8 miles of riverbank" (Stirrett, G.M. 1977. Report on Investigations of the Flora of Northern Maine and Northern New Brunswick with Particular Reference to *Pedicularis furbishiae* and other Rare Plants. Report on Contract No. DACW 33-77-M-0885. U.S. Department Army, Corps of Engineers. Waltham, Massachusetts. 61 pp.). In 1979 a total of "115 or 69 mature flowering plants and about 46 young plants" were counted (Stirrett 1980). Prolonged searching during my 1981 census led to the discovery of 212 plants along 1.5 km of the riverbank south of the Little River delta.

Site 3 is at the Maine-New Brunswick border ( $47^{\circ}04'N$ ,  $67^{\circ}47'W$ ), at the base of a very steep slope. Plants were usually growing within one meter of the water's edge on nearly vertical carpets of moist Feather Moss, *Pleurozium schereberi*, at the base of



the stable forested slope. My 1981 census produced a total of 102 plants. In 1977, Stirrett and Tribe made a more extensive survey of this site along 1.2 miles of the riverbank and they found "about 254+ plants": 154 flowering plants and 100 young non-flowering plants. (Stirrett 1977, 1980). There has been little disturbance to these populations since 1977, and therefore 254+ plants is probably the best estimate of current numbers.

All three sites were at the base of fairly steep slopes where seepage water kept the soil near saturation. Many of the plants of Site 3 rooted in moss, however, exhibited moisture stress on 17 July as indicated by their flaccid leaves. The three sites were shaded by the trees and steep banks until approximately 1130-1200 h.

In 1980, a survey of U.S. populations was completed by Richard Dyer in which only flowering stems were counted. From approximately 2055 flowering plants counted (R. W. Dyer, personal communication) he makes a rough total population estimate of 5000 American plants (Dyer 1981). This estimate assumes a 1:1 relationship between flowering and non-flowering plants, and an additional 20 percent factor for colonies that may not have been observed.

My 1981 census has increased the Canadian total by 146 plants from approximately 402 (Stirrett 1980) to 546+. The Furbish Lousewort 1981 total world population is therefore  $(254+) + (80) + (212) = 546+$  Canadian plants and approximately 5000 American plants = 5 546+.

The results of the 1982 New Brunswick census were: site 1 = 125, site 2 = 213, site 3 = 117, a total of 455 plants (Don Brown, personal communication, 4 August 1982. Wildlife, Department of Natural Resources, New Brunswick). There appears to be a considerable increase in numbers at the railway embankment Site 1, from 80 in 1981 to 125 in 1982.

### Site Disturbance

Because of the water seepage and steepness of the banks at Sites 2 and 3, the soil with its vegetation cover periodically slips downslope onto an unstable part of the riverbank where the plants are destroyed by flood and wave action. On more stable rocky and sunnier parts of the riverbank competing vegetation grows more vigorously over time, thus, the Furbish Louseworts are suppressed by the heavy shade that develops. Site 1 is temporarily maintained as a good Furbish Lousewort habitat because of brush cutting by railway crews. On this seepage slope, soil slippage was not evident.

In summary, the Furbish Lousewort usually inhabits unstable, morning-shaded, seepage slopes where the competitive effects of associated plants are

reduced. Because of the unstable nature of the sites (river erosion, steep slipping banks) new Furbish Lousewort habitat is being created while old patches are being destroyed. Thus the Furbish Lousewort is a typical "fugitive species" (Grime 1979) occupying temporary habitats which are periodically destroyed.

At Site 2 a Groundhog (*Marmota monax* (L.)) had clipped a number of Furbish Lousewort flower stalks from several plants. The following herbivorous insects were present at all sites: two species of Spittlebug (Cercopidae), *Aphrophora gelida* (Wlk.) and nymphs, probably *Neophilaenus lineatus* (L.), were often observed to stunt and deform the flowering stems (see Macior 1978) and lepidopterous larvae fed on the leaves. These larvae died in rearing trials because they had been parasitized by Ichneumon Wasps (*Macrocentrus* sp.). Forest Tent Caterpillars (*Malacosoma disstria* Hbn.) were frequently collected on Furbish Louseworts during their population boom in the summer of 1981 but were never observed to cause damage to the leaves.

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