

Sixty years after Fernald:  
Observations on the coastal plain flora of the Tusknet River valley.



Summary:

This is the best available public account of a ten day canoe trip made in August 1982 with the objective of providing a proper inventory for the rare shoreline plants of the Tusknet River Valley. Although Fernald and his coworkers documented the existence of rare coastal plain plants in the area, there was no lake by lake accounting for these species. Here it is, in Table 1. It was on this trip that we first became aware of the great significance of Wilsons Lake, and identified a property that was later to be purchased and protected as the Tusknet River Nature Reserve. It was also on this trip that we were able to document the importance of lakes that were directly connected to the river, and hence, subject to significant changes in water level within and among years. This produces distinctive “wet meadows” which are now known to be typical of other shorelines including those of the Great Lakes.

Suggested citation:

Keddy, P.A. and C.J. Keddy. 1982/1983. Sixty years after Fernald: Observations on the coastal plain flora of the Tusket River valley. Parts 1 and 2. Halifax Field Naturalists Newsletter 29:11 and 30:16-18.

Acknowledgements:

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Associated publications:

For a more technical description of the trip, and within-lake distributions of *Coreopsis rosea* and *Sabatia kennedyana* some, you can consult Keddy, P.A. 1985. Lakeshore plants in the Tusket River Valley, Nova Scotia: the distribution and status of some rare species including *Coreopsis rosea* and *Sabatia kennedyana*. **Rhodora** 87:309-320. These maps have since been updated in COSEWIC status reports.

For a general description of wet meadows, with specific reference to the Tusket River, including a colour plate, you can consult this book: Keddy, P.A. 2010. *Wetland Ecology: Principles and Conservation* (2<sup>nd</sup> edition). Cambridge University Press, Cambridge, UK. The Tusket River is mentioned in Section 2.2.6, pages 270-271 and Figure 1.7b. This figure is reproduced on the preceding page.

# reports

Halifax Field Naturalists Newsletter. Number 29 (September-November 1982): page 11.

## REPORT ON THE TUSKET RIVER LAKES AREA (Part I) -

Paul and Cathy Keddy, long-time HFN members now working in Ottawa, have sent us a copy of their recent paper entitled "Sixty Years after Fernald: Observations on the Coastal Plain Flora of the Tuskent River Lakes".

For some years past the Keddys have tried to generate interest in conservation of the coastal plain flora in Yarmouth County, and following preliminary field work in 1979 a 10-day canoe trip down the Tuskent River last August confirmed their impressions gained from Fernald's published reports that this region "must hold some secrets of profound importance to a clear understanding of life in eastern North America" (Fernald 1921, p93.).

In this Newsletter we are using the section on prospective ecological reserves, but plan to include the main part of the Keddy manuscript in our next issue.

"...We also looked for some sites which could be candidate ecological reserves. We had three criteria for evaluating shorelines: (1) whether the shoreline had typical vegetation representative of the Tuskent River system; (2) whether the shoreline supported rare or threatened coastal plain species; and (3) whether the shoreline was relatively undisturbed by cottaging, boat ramps and off-road vehicle trails.

There are two areas which stood out according to these criteria - one because of the number of species occurring abundantly in a small

area, the other because it represents the tremendous vegetation variation in the shoreline of this area.

The first site is in Wilson's Lake, in the northwestern bay. Here, gently-sloping sand and gravel shorelines support a rich coastal plain community. We estimated more than one thousand Plymouth Gentians in flower, several hundred flowering Pink Coreopsis, and the bay had as much Water Pennywort at Floating Heart. The abundance of these species was unparalleled elsewhere in the Tuskent River system, and all occurred along just several hundred metres of shoreline. This area of Wilson's Lake as well typified the cobble and gravel shores of the Tuskent River valley. There was a particle-size gradient from large cobbles at the top of the shore to sand in the shallow water areas. As well, organic content peaked in peat beds with Twig Rush (*Cladium mariscoides*) just at the water line. Species such as Meadow Beauty and Long-leaved Panic Grass occurred at the upper portions of this gradient, whereas Water Pennywort and Floating Heart composed the floating-leaved aquatic association. Since cottages are spreading along the north end of the lake, here is an ideal and important site for acquisition as an ecological reserve.

The other area was outstanding for its rare species and complex array of vegetation types. It includes the northern and eastern sides of Kegeshook Lake. A much larger area than the one on Wilson's Lake, the Gillfillan-Kegeshook complex includes a peat-clay meadow with well over five hundred flowering Plymouth Gentians, gravel shores with Pale Orchis, and sand and peat meadows with the largest Panic Grass-Meadow Beauty communities we saw anywhere. Along these shores one could find virtually every shoreline type seen in our 10-day trip. Only the Pink Coreopsis and Water Pennywort were absent from these shores. "

REPORT ON THE TUSKET RIVER LAKES AREA  
(continued) ... Part II

Following is the main section of a paper entitled "Sixty Years After Fernald: Observations on the Coastal Plain Flora of the Tusket River Lakes", by Paul and Cathy Keddy, HFN members now working in Ottawa.

The report is the result of a recent 10-day canoe trip down the Tusket River, which confirmed the findings of the preliminary field work done by the Keddys in 1979.

"It is more than 60 years since M.L. Fernald, professor of Botany at Harvard University, and a foremost authority on the flora of eastern North America, explored the vegetation of southwest Nova Scotia. During 1920 and 1921 Prof. Fernald and his team of botanists made many interesting discoveries probably the most dramatic being the discovery of plants previously thought to occur only as far north as Cape Cod! These species occur along the flat, poorly drained coastal plain of the United States, with its many bogs, pools and barrens. The coastal plain flora of southwest Nova Scotia particularly impressed Fernald - one centre of abundance being the cobble and gravel shorelines of lakes in the Tusket River valley. In fact, several of his most exciting discoveries - the showy pink-flowered Plymouth Gentian and Pink Coreopsis - were known only from lakes along the Tusket River!

Since then additional botanical study culminating in the Flora of Nova Scotia (Roland & Smith 1969) and published by the provincial museum, has indicated that many of these coastal plain species had very restricted distributions, the Tusket River valley still being the only region supporting some. There have been many changes since Fernald's time, including the flooding of the lower lakes in the Tusket River system by the N.S. Power Corporation for the Tusket Falls Generating Station, and the proliferation of cottages in the area. Scattered

visits have indicated that the rich flora still persists, but we know of no systematic exploration of the Tusket River system since Fernald's time. Hence our 10-day canoe trip down the Tusket in August 1982. Our objectives were -

- (1) to verify our impression from Fernald (1921,1922) and Roland and Smith (1969), that coastal plain species drop out progressively up the Tusket watershed;
- (2) to determine whether some species were indeed restricted to the Tusket system by checking nearby lakes of similar size to the Tusket River lakes;
- (3) to check the current status of the Tusket River coastal plain element.

On August 10, 1982, we were dropped off at South Wallace Lake by Paul Tufts of the N.S. Dept. of Lands and Forests, and ten days later were picked up at Gavelton. At each lake we searched for (i) coastal plain species considered by Maher et al (1978) to be rare or threatened in Nova Scotia; (ii) some typical coastal plain species and (iii) some species widespread in Nova Scotia lakes. Where possible we canoed the entire perimeter of the lake, but where we had to walk to the lake we covered at least a kilometre of shoreline being certain to visit a variety of exposures and substrate types. The first half hour on a lake usually yielded almost all the species encountered.

All the lakes visited were those through which the Tusket River flowed directly, or were close to the Tusket system but not actually part of the river. The latter often drained into the Tusket or were separated from it by less than a kilometre. Table I shows the lakes examined listed from left (down stream) to right (upstream), and the species looked for. The Table shows that coastal plain species

such as the Pink Coreopsis and Plymouth Gentian progressively disappear from lakes upstream in the river. As Vaughn, Gavel and Kings Lakes near the mouth of the Tusket are reservoirs, they are excluded from the table. At the time of our trip the reservoirs were drawn down revealing expanses of mud and rock with few shoreline plants except for widely scattered individuals of species such as Pipewort and White Water Lily. Lakes immediately adjacent to these Tusket lakes have many of the same species, but almost completely lack the rare coastal plain species - the one exception being Kegeshook Lake which we will discuss shortly.

The table also suggests the current status of some species may be precarious, e.g., only two lakes contained Pink Coreopsis, which is restricted to sand and gravel bays. On both Bennetts and Wilsons Lakes, such bays are the sites selected for cottage developments. Bays not directly affected by cottage development showed damage from vehicles driven along the beaches during low water levels. Similarly, Water Pennywort occurred only in Wilsons Lake, where Fernald had collected a single fragment in 1920.

Explaining the distribution of species remains difficult. At first, their restriction to the Tusket River valley suggested migration problems. They probably reached southwest Nova Scotia when the continental shelf was exposed during the Ice Age, and while they reached the lower reaches of the Tusket River, perhaps they were unable to migrate overland (e.g. by seed). But if migration only occurred along streams, why did they not migrate into Mill Lake or Canoe Lake, which also drain into the Tusket? Here the anomaly of Kegeshook Lake becomes important. The Plymouth Gentian occurs in Kegeshook Lake which is connected to Gillfillan Lake by a narrow brook, where the species also occurs. The present drainage pattern may not help explain

the observed distribution but it may be that past drainage patterns, perhaps associated with retreating glaciers, were different in some way and played a role in determining the current distribution.



Coreopsis rosea

An alternative explanation is that there is some special factor about the present environment provided by lakes joined by the Tusket River which these rare species absolutely require. One possibility is that they all require gently-sloping sand and gravel shorelines. Lakes such as Mill, Clearwater, Canoe and Kempt Snare have little or no such habitat; instead they have almost entirely boulder shorelines, which may reflect the complex geological history of the Yarmouth area (Grant 1977). In lakes within the Tusket River (and Kegeshook Lake) such shorelines are common. Fernald's collections repeatedly mentioned cobble and gravel shorelines, but these alone may not be sufficient, unless the water level fluctuates ensuring a broad expanse of open shoreline where these species can grow.

In lakes without such fluctuations (such as Kempt Snare) shrubs grow right down to the water-line, covering any sand or gravel that might provide habitat. Keddy and Reznicek

(1982) showed that relict coastal plain species in an Ontario lake are associated with fluctuating water levels. So the fluctuating levels of the Tusket River may be another factor which makes the Tusket River lakes different. During low water years there are large expanses of open gravel, sand and peat available for the coastal plain species; before shrubs can invade these areas and crowd out the coastal plain flora, water levels rise again. Kegeshook also appears to have fluctuating levels, which, combined with gravel and sand shores, may explain its similarity to lakes like Gillfillan which are actually part of the Tusket River.

It appears therefore that the rich flora of the lower Tusket River results from the coincidence of several factors, two of which may be gravel shorelines and fluctuating water levels. The absence of one (or both) of these conditions may explain the absence of shoreline species like Pink Coreopsis and Plymouth Gentian from other lakes in the southwest.

... In conclusion, this inventory sixty years after Fernald's studies confirms our impressions gained from his published reports that this region "must hold some secrets of profound importance to a clear understanding of life in eastern North America".

Table 1: The lakes visited on this trip and the species found in them

Species Name		Lakes Visited															
		Part of Tusket River						Adjacent to Tusket River									
Common	Scientific	Bennetts	Wilsons	Gillfillan	Third	Pearl	Travis	South Wallace	Clearwater	Mill	Rushy	Canoe	Kempt Snare	Beaverhouse	Sunday	Churchills	Kegeshook
Pink Coreopsis	<i>Coreopsis rosea</i>	✓	✓														
Water Pennywort	<i>Hydrocotyle umbellata</i>		✓														
Pale Orchis	<i>Habenaria flava</i>	✓	✓	✓													✓
	<i>Eupatorium dubium</i>	✓	✓	✓													✓
Plymouth Gentian	<i>Sabatia kennedyana</i>	✓	✓	✓	✓	✓	✓										✓
Long-leaved Panic Grass	<i>Panicum longifolium</i>	✓	✓	✓	✓	✓	✓							✓			✓
Sayonet Rush	<i>Juncus militaris</i>			✓	✓	✓			✓	✓	✓	✓	✓	✓			✓
Meadow Beauty	<i>Rhexia virginica</i>		✓	✓	✓	✓				✓							✓
Water Goldenrod	<i>Solidago galetorum</i>	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Yellow-eyed Grass	<i>Xyris difformis</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lance-leaved Violet	<i>Viola lanceolata</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Golden Pert	<i>Gratiola aurea</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Virgate Panic Grass	<i>Panicum virgatum</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Swamp candles	<i>Lysimachia terrestris</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Water Lobelia	<i>Lobelia dormanna</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pipewort	<i>Eriocaulon septangulare</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Floating Heart	<i>Nymphoides cordata</i>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

