The Mattawamkeag and Piscataquis Rivers are both tributaries to the Penobscot, entering in the vicinity of Lincoln, Maine. They are nearly identical in terms of drainage area and average annual discharge. Both rivers contribute high quality water to the Penobscot, though the Piscataquis River has a history of degraded water quality, supports the larger human population base and has one significant municipal-industrial discharge.

Introduction

Geography

The Mattawamkeag River basin covers 1,507 square miles. The West Branch of the Mattawamkeag River begins on Mud Lake and Duck Pond in the township of T6R6 on the Penobscot-Aroostook County border. It flows north-northeast for a short distance and then turns south through undeveloped territory before passing through the town of Island Falls. It continues moving southeast to Haynesville, draining Upper and Lower Mattawamkeag Lakes and extensive wetlands along the way. The East Branch originates approximately 14 miles northeast of the W. Branch headwaters in the township of T7R3. It flows in a southerly direction through Smyrna Mills and Oakfield, passes through the Pleasant Lake watershed, and then continues on through undeveloped territory before joining the W. Branch at Haynesville. The mainstem flows south-southwest through several small towns and extensive wetlands for approximately 47 miles before joining the Penobscot River in the town of Mattawamkeag.

The Piscataquis River basin covers 1,459 square miles. Both the East and West Branches of the Piscataquis River begin in wetlands several miles southwest of Greenville. Both flow south for a short distance through wetlands and undeveloped land before joining at Blanchard. The mainstem flows through developed regions continuing southeast to Guilford-Sangerville, and easterly through Dover-Foxcroft and Milo before joining the Penobscot at Howland. The total length of the mainstem is approximately 62 miles

Basin Summary Statistics

Biomonitoring Activities in the Basin	Period of Record: 1984-1997 Waterbodies Sampled: 12 Established Stations: Mattawamkeag R. sub-basin: 2; Piscataquis R sub-basin: 17 Number of Sampling Events: 33
Wastewater Discharges	Mattawamkeag R. Basin: 2 municipal treatment plants serving a population of approx. 3000 and one starch manufacturing facility; Piscataquis R. Basin: 4 municipal treatment plants serving a population of approx. 10,400, including one major municipal-industrial plant in Guilford-Sangerville, discharging to the Piscataquis River, that receives effluent from a textile mill.
Other Sources	One aquaculture discharge to Schoodic Stream near Milo; agriculture in the lower Piscataquis basin.
Flow Regulation	Mattawamkeag R. Basin --Water level controlled by 8 dams: No FERC licensed hydro-projects. Piscataquis R. Basin--Water levels in the basin controlled by approximately 28 dams including 1 FERC licensed project at the confluence of the Piscataquis and the Penobscot Rivers (Howland Dam). Most dams are less than 2000 KW (total capacity).
Quality	Predominantly high quality for both basins though the Piscataquis does not attain dissolved oxygen standards in the impoundment at Dover Foxcroft.

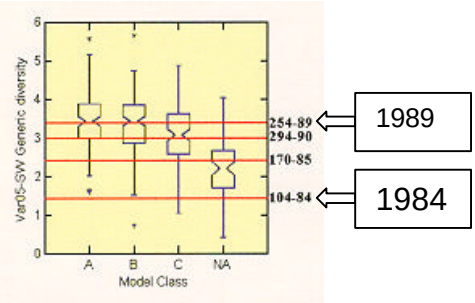
Drainage area	Average Annual Discharge	Wastewater Flow Volume (Major Industrial and all Municipal discharges)	Mainstem Average Dilution
Mattawamkeag R.: 1,418mi^2 (near Mattawamkeag)	Mattawamkeag R: 2,512 cfs (near Mattawamkeag)	Mattawamkeag R: 0.17 mgd (0.26 cfs)	9,662:1
Piscataquis R.: 1,162mi^2 (at Medford)	Piscataquis R: 2,362 cfs (at Medford)	Piscataquis R: 2.1 mgd (3.3 cfs)	716:1

Overview of Biological Monitoring Activities

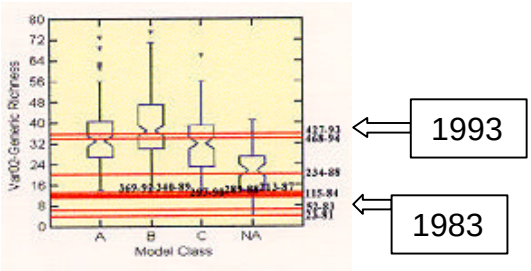
Both sampled stations in the Mattawamkeag River basin exceed assigned Class B standards and attain Class A standards (Stas. 88 and 89). Much of the Mattawamkeag basin was upgraded from Class B to Class A in 1999. Of fifteen stations in the Piscataquis River basin, one third exceed the aquatic life standards of their assigned statutory classification (Basin Table 2, p. 136; Basin Map 2, p. 162). All remaining stations, except 3 (Stas. 94; 281; 286), attain classification standards. Of the three non-attaining stations, two are in the vicinity of Katahdin Iron Works (KIW), an historic site of iron mining and smelting activity. Blood Brook (Sta. 281) drains the region of the iron ore deposit and is essentially devoid of life. It does not attain the minimum aquatic life standards for the State. Although there has been no mining activity in this area for many decades, Blood Brook still shows very high levels of iron and sulfate. Station 286 is downstream of Blood Brook and the old

KIW smelter on the W. Br. of the Pleasant River. The statutory classification of the West Branch is Class AA but this station only attains Class B standards. The cause may either be lingering contamination from the mining activity or mild enrichment of the river from an upstream lake or from forest cutting activity. The third station (Sta. 94) is also in non-attainment of Class A standards but does attain Class B standards. Station 94 is located at the outlet of Sebec Lake and attainment is no doubt affected both by enrichment from release of plankton from the lake as well as habitat effects (deep, slow-moving outlet stream).

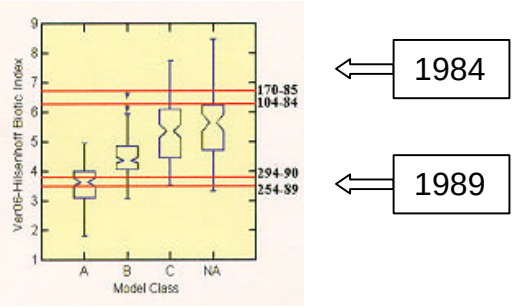
The Piscataquis River near Guilford is a remarkable success story. In the early 1980's the river received untreated manufacturing waste from a local textile mill, as well as untreated domestic sewage. Benthic macroinvertebrate samples collected in 1984 and 1985, downstream of the textile mill (Stas. 84 and 85) revealed a severely degraded community, dominated by highly pollution tolerant organisms such as *Cricotopus* (Diptera: Chironomidae), *Physa* (Gastropoda: Physidae), and Tubificidae (Oligochaeta). Pollution sensitive taxa such as stoneflies (Plecoptera) and mayflies (Ephemeroptera) were absent. The site did not attain the lowest aquatic life standards allowed by the state, according to the Department's statistical decision model. In 1988 a new sewage treatment plant was completed to treat mill manufacturing waste, as well as domestic sewage. The textile mill waste comprises nearly 75% of the total discharge volume of the treatment plant. The mill effluent was found to be very toxic with a 'no observed acute effect level' (NOAEL) of less than 1% effluent in 1984. The new treatment plant lagoons were constructed to have a very long retention time (70 days) to allow for breakdown of toxic components in the effluent. The average annual discharge of the river allows for a dilution ratio of about 14:1. The combination of long retention time and adequate dilution precludes the necessity for any special treatment techniques to reduce toxicity. The result of these efforts was an immediate, dramatic improvement in the downstream benthic communities (Fig. 13). The three measures shown are used, along with 6 other variables, by MDEP in the First Stage linear discriminant model to assign aquatic life classification attainment (see Appendix 2 for an interpretation of box plot data). By the next summer following improved treatment, pollution-sensitive taxa were found to be abundant, including four taxa recognized as indicators of the highest water quality class: Ephemeroptera : *Serratella (*Ephemerellidae); *Leucrocuta* (Heptageniidae); Trichoptera: *Brachycentrus* (Brachycentridae) and *Glossosoma* (Glossosomatidae). The number of different types of organisms in the pollution-sensitive orders Ephemeroptera, Plecoptera and Trichoptera (EPT) had increased from zero in 1984 to 17 in 1989. The statistical decision model for the 1989 samples revealed that the downstream site had improved by *three classes*, from non-attainment of minimum Class C standards to attainment of Class A aquatic life standards. Recovery of this segment was hastened by the presence of high quality (Class A) waters above this reach. Upstream locations presumably served as a refuge for pollution intolerant organisms that rapidly recolonized the area through drift. The segment from Guilford to Dover Foxcroft was upgraded from Class C to Class B in 1999.



Generic Diversity



Generic Richness



Hilsenhoff Biotic Index

Fig. 13. Box plots showing values for 3 biological community variables from Sta. 84, the Piscataquis River below Guilford, between 1984 and 1990, as compared to the distribution of all values for all sites within a given class in the MDEP Biological Monitoring Program database