History and Ecology of Alewives in the St Croix Watershed

Anadromous Life History

egg

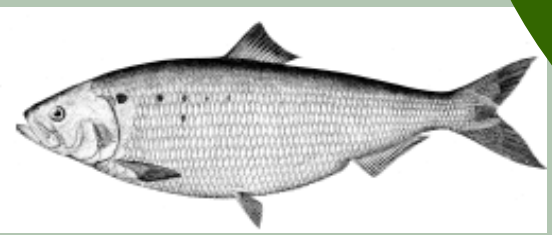
1 summer

Juvenile

FRESHWATER

SALT WATER

Adult

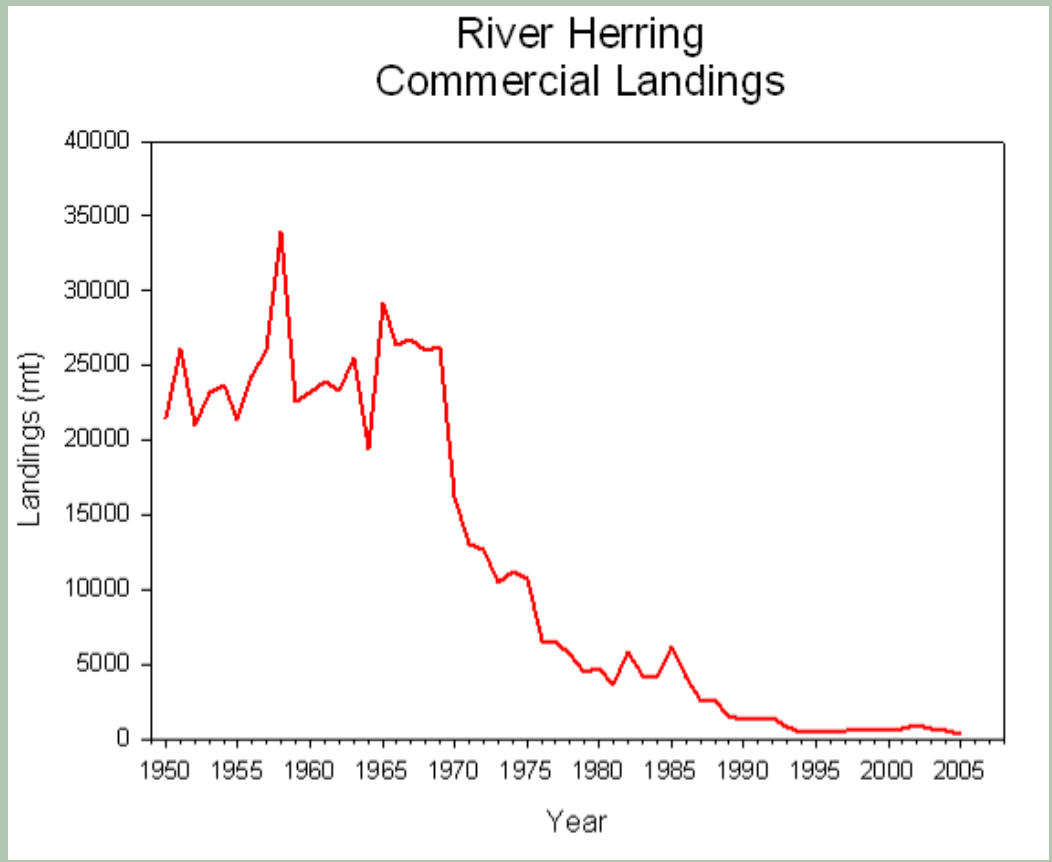


Repeat Spawners

4-6 years

on St Croix

Status of Stocks
East Coast United States



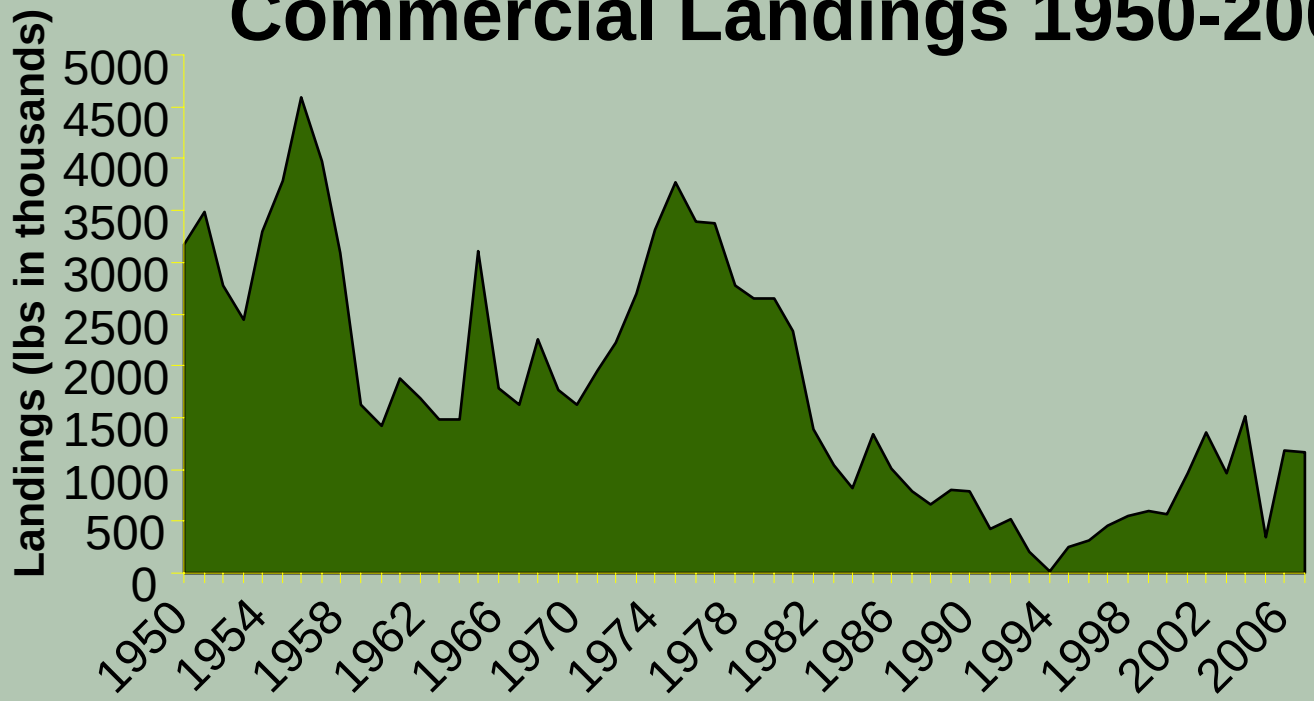
NOAA Fisheries Data

Populations well below mid-20th century levels.

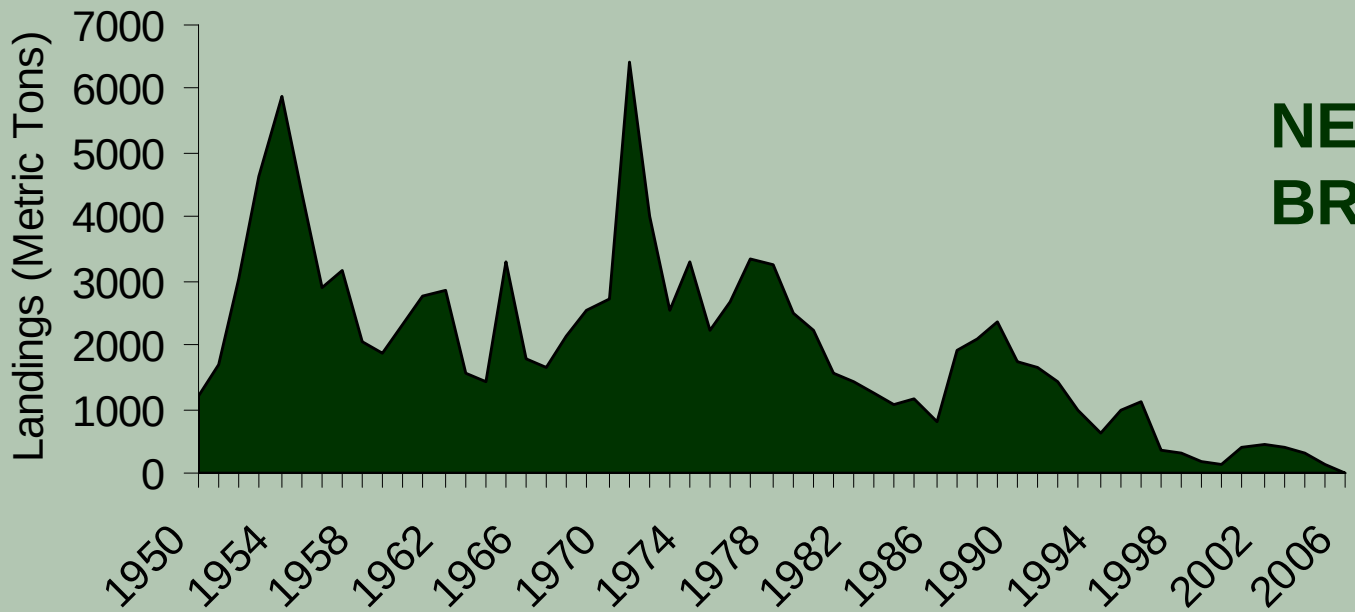
1) overfishing
2) habitat destruction
3) predation

NOAA has listed river herring (alewife and blueback herring) as Species of Concern

Commercial Landings 1950-2007



MAINE



NEW BRUNSWICK

Mud Lake Stream Archeological Site
17 alewife bones – 4,000 ± 100 yrs ago

Photo courtesy St. Croix Waterway Commission

C. Atkins

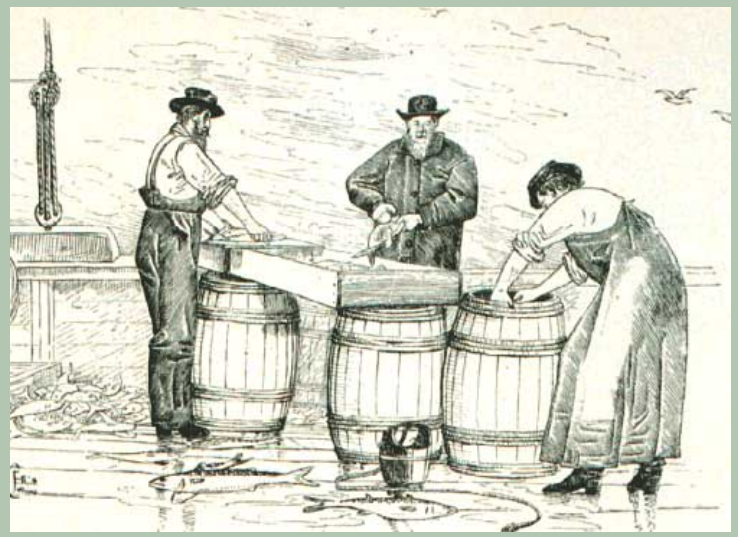
St. Croix River - 1887

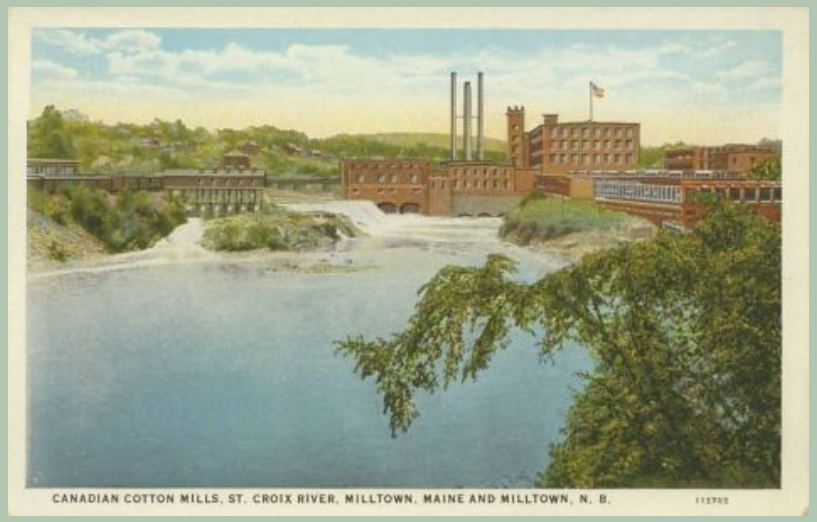
Up until 1825 St Croix River – 100 to 150 ton RI vessels never left without full cargoes

- Exports of 1,500 to 2,000 barrels of alewives annually

Alewives, shad, and salmon passed Salmon Falls

Fish weir at low tide.





ST. CROIX.

The St. Croix was formerly very productive of salmon, shad and alewives. Perley, in his report on the fisheries of New Brunswick, states that the average catch of salmon at Salmon falls, in Calais,

70 1867 FISH COMMISSIONERS' REPORT.

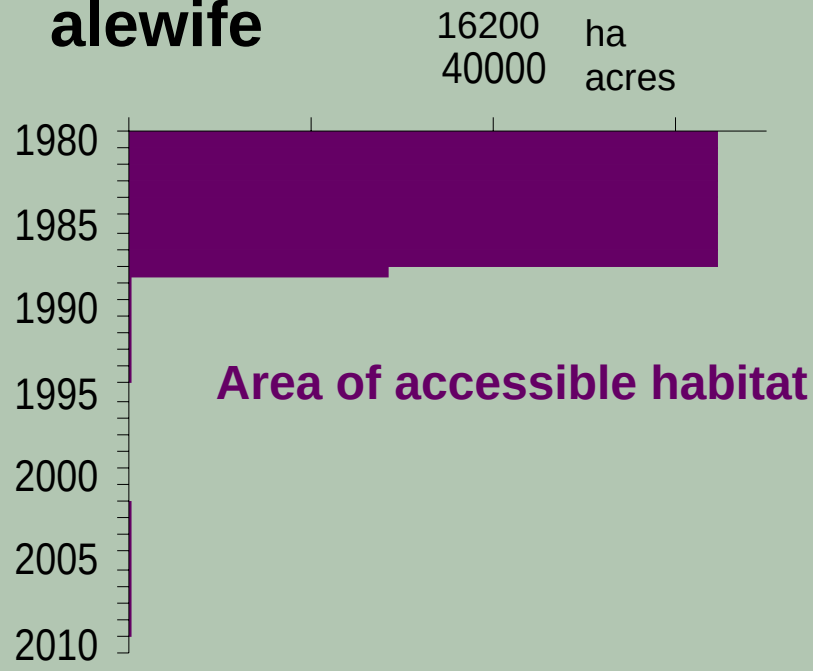
was 18,000 annually. Gaspereaux (alewives) came in such quantities that it was supposed they could never be destroyed. The number of shad were almost incredible. The fisheries did not diminish up to 1825. Until that time the dams had fishways; but in that year the Union dam was built without a fishway, and the fisheries instantly fell off. We have the testimony of Mr. Ferdinand

1825 – Union Dam – blocked passage until 1869 – fish passage – breached 1923
1881 – Milltown Dam - fishway 1883 to 1926
~1890's Smallmouth Bass Introduced
1906 – Woodland Dam
1915 - Grand Falls Dam

1915 - International St. Croix River Board of Control established - IJC Orders issued in 1915, 1923, 1931, 1934, 1965 and 1982 (build and repair fishway)

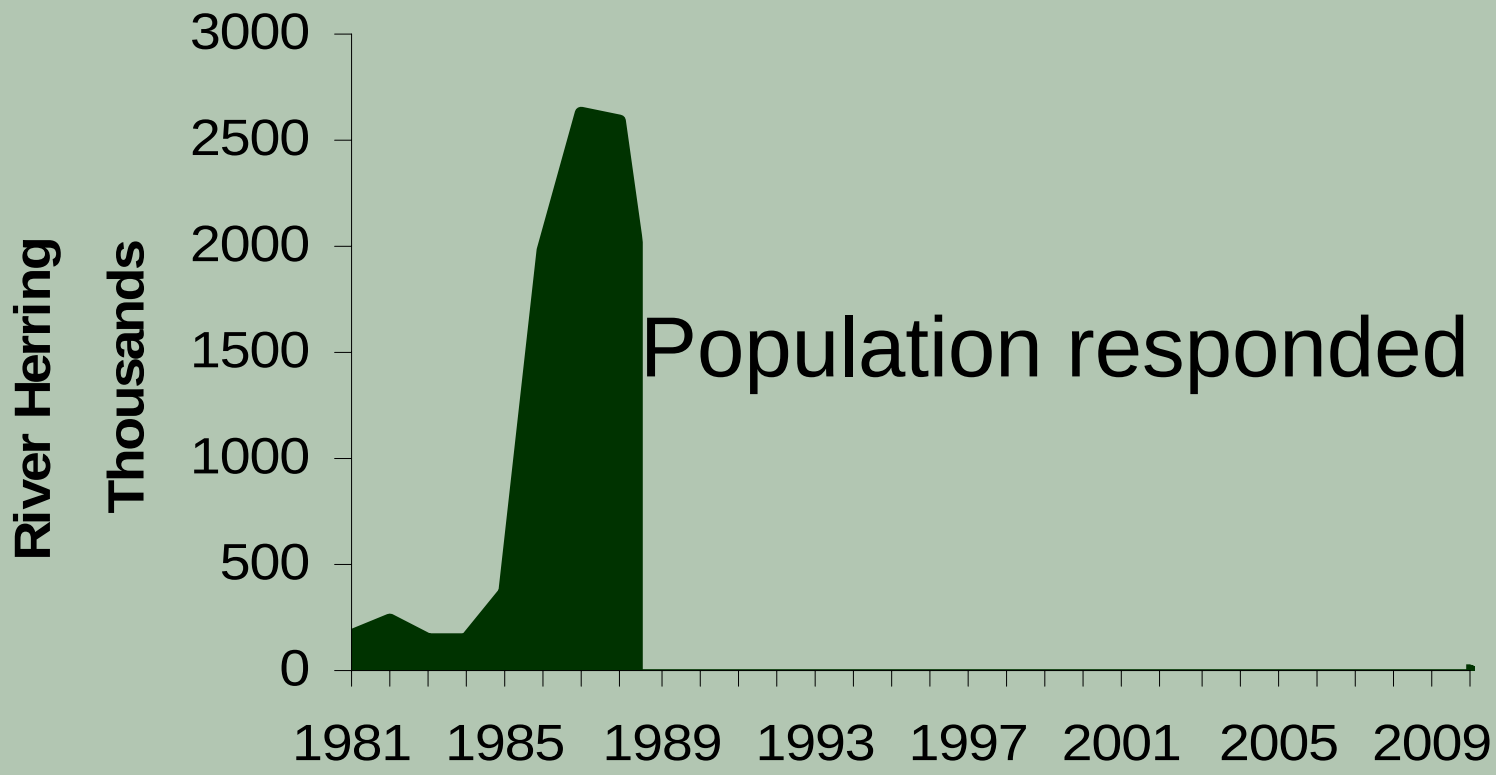
By 1981

most of the watershed accessible to alewife



1965 – fishways Woodland and Grand Falls Dams
1967 – rebuilt Vanceboro Dam and fishway
1968 – Forest City Dam and fishway rebuilt
1980 – modern fishway at Milltown Dam

St. Croix River



Forest City guides blame decline of Spednic Lake smallmouth bass fishery on alewife (recruitment failure)

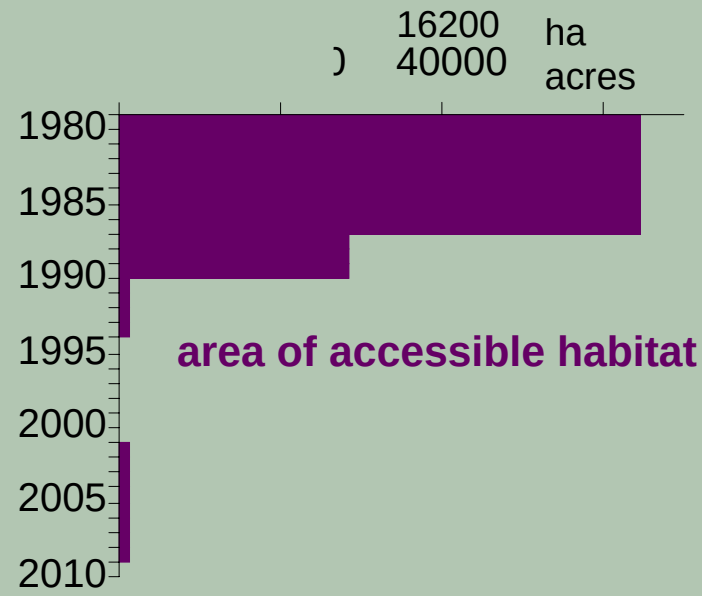
St. Croix River Fisheries Steering Committee – ME, NB, USFWS, DFO cooperative investigation and management

1988 Alewife blocked at Vanceboro fishway

1990 Alewife blocked at Grand Falls fishway

1991-92 Alewife passage above Grand Falls

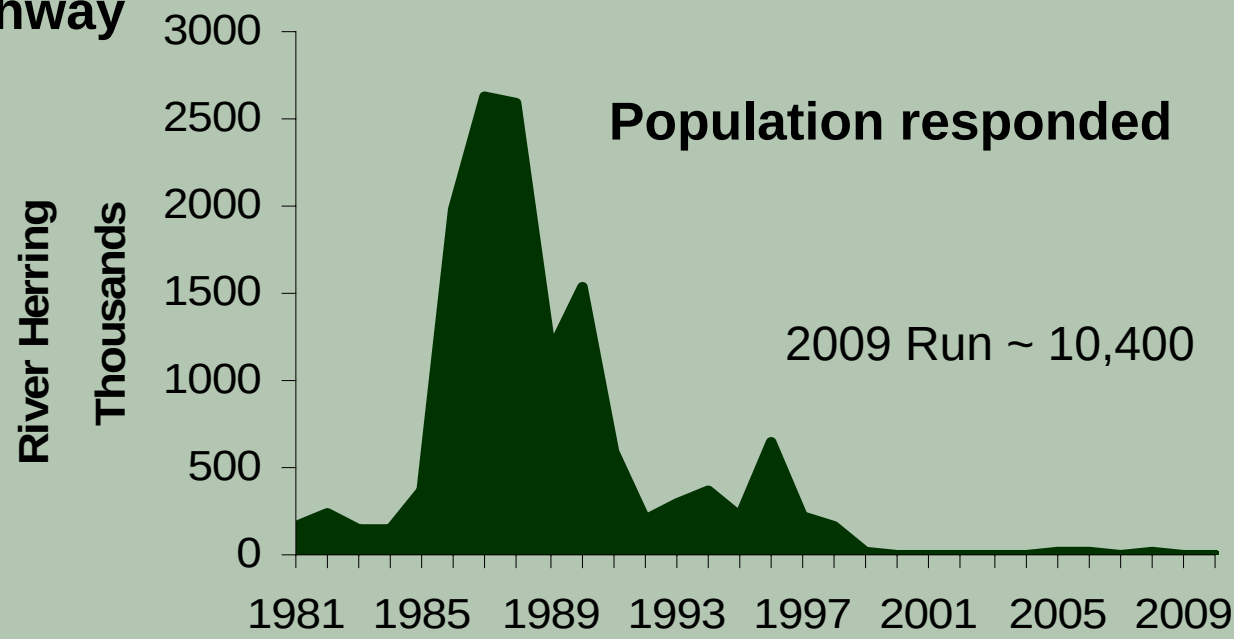
1993 Alewife blocked at Grand Falls fishway



1995 Maine Legislature - Alewife passage blocked at Grand Falls and Woodland fishway

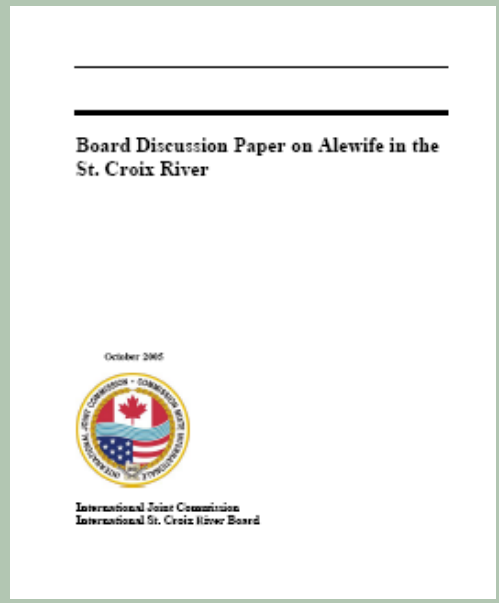
~ 1997 – landlocked alewives **illegally** introduced to watershed

2001-2007 DFO trucks alewife above Woodland



International St. Croix River Board
International St. Croix River Watershed Board

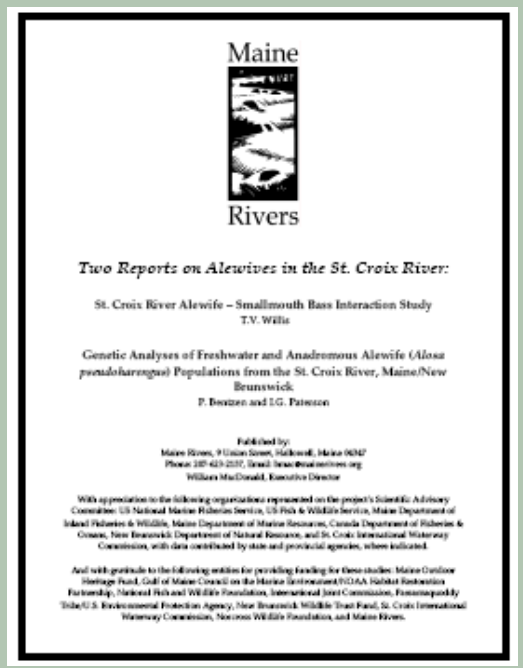
Unbiased and scientifically sound information related to alewife access dispute



Board Discussion Paper on Alewife in the St. Croix River

October 2005

International Joint Commission
International St. Croix River Board



Maine Rivers

Two Reports on Alewives in the St. Croix River:

St. Croix River Alewife – Smallmouth Bass Interaction Study
T.V. Wills

Genetic Analyses of Freshwater and Anadromous Alewife (*Alosa pseudoharengus*) Populations from the St. Croix River, Maine/New Brunswick
P. Bentzen and J.G. Paterson

Published by:
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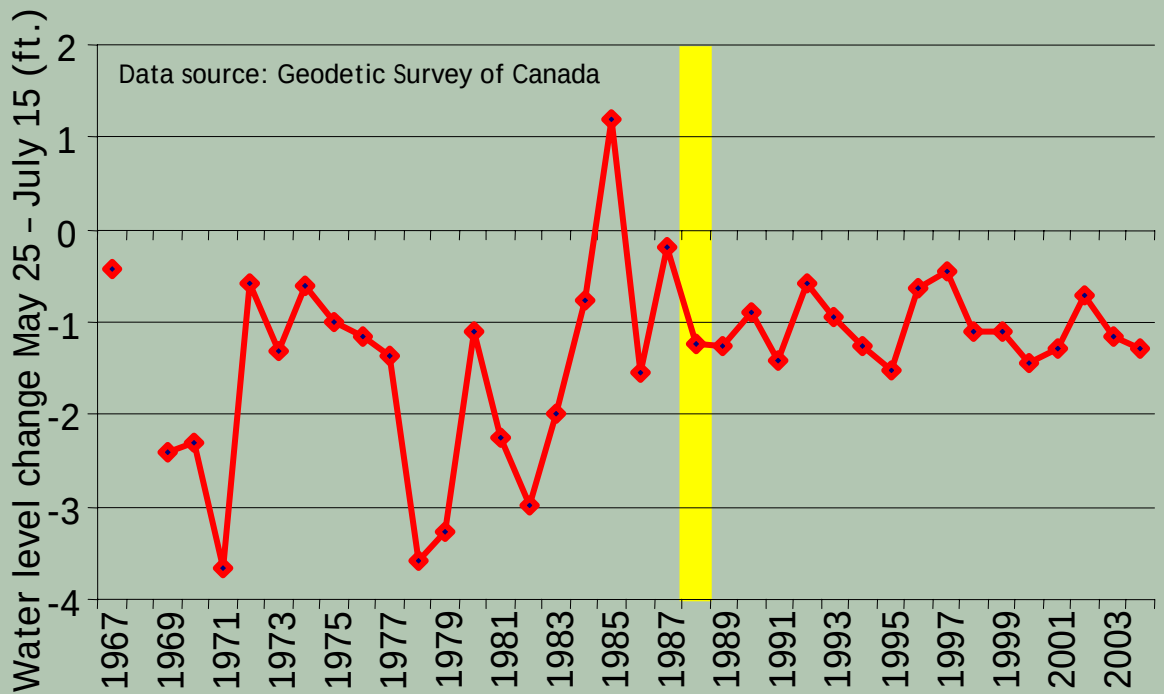
And with gratitude to the following entities for providing funding for these studies: Maine Outdoor Heritage Fund, Gulf of Maine Council on the Marine Environment/NOAA Habitat Restoration Partnership, National Fish and Wildlife Foundation, International Joint Commission, Passamaquoddy Tribe/U.S. Environmental Protection Agency, New Brunswick Wildlife Trust Fund, St. Croix International Waterway Commission, Norcross Wildlife Foundation, and Maine Rivers.

Actions:
1990's – Supported the Fisheries Steering Committee
2002 – Commissioned a scientific literature survey
2005 – Prepared a Discussion Paper
2004 – 2006 Supported Maine Rivers Study

Maine Rivers
Alewife - Smallmouth Bass Study

Was not a study in Spednic Lake

- NO data before multiple management changes in 1988
- NO way to separate possible factors affecting bass recruitment

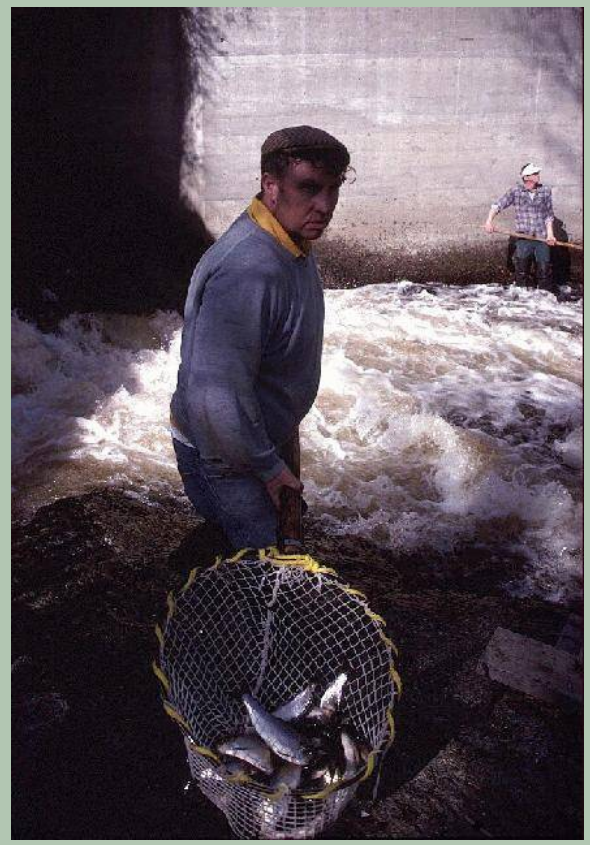


- Angling regulations
- Annually variable water temperature
- Water level fluctuations
- Fish community changes

Maine Rivers
Alewife - Smallmouth Bass Study

Compared ecology of lakes with bass in the region with and without alewife

1. Adult Anadromous alewife diet in freshwater contains very small portion of fish
2. YOY alewife and YOY bass did not have significant diet overlap in most study lakes
3. Alewife presence did not result in lower bass condition or growth



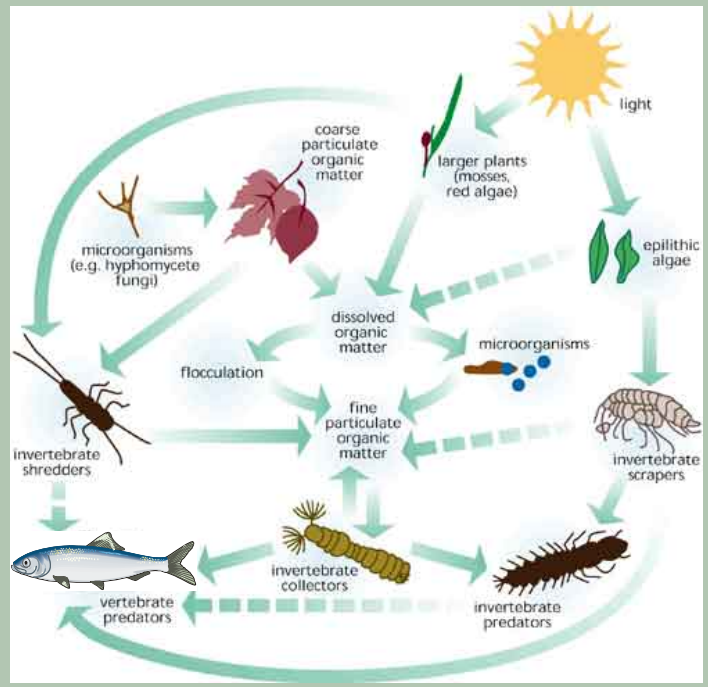
2008 **Maine Legislature - Alewife passage opened at Woodland fishway but not Grand Falls**

2009 **Letter to IJC for resolution of passage in the system**

Alewife Ecological Roles

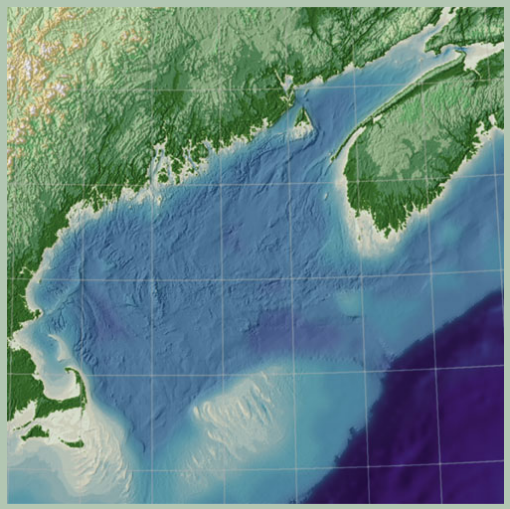
- Marine Derived Nutrients
  - to freshwater
- Prey in FW and SW
  - Fish, birds, mammals, reptiles
- Buffer Predation
  - Salmon smolts, shad, smelt
- Freshwater mussel host
  - Alewife floater alternate host

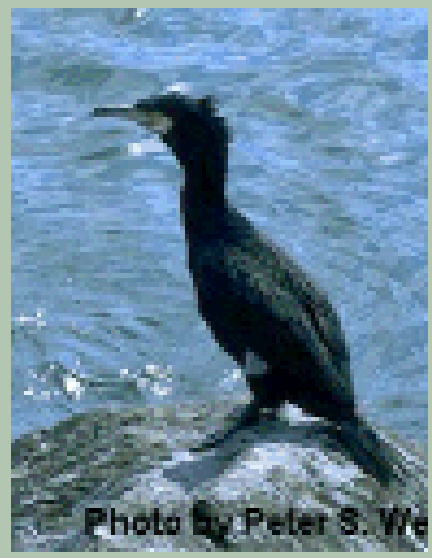
Durbin et al. 1979 “most important ecological result” of the alewife spawning run was labile N and P contributing to bacterial breakdown of leaf litter.



In freshwater alewives are FOOD for other fish species and :

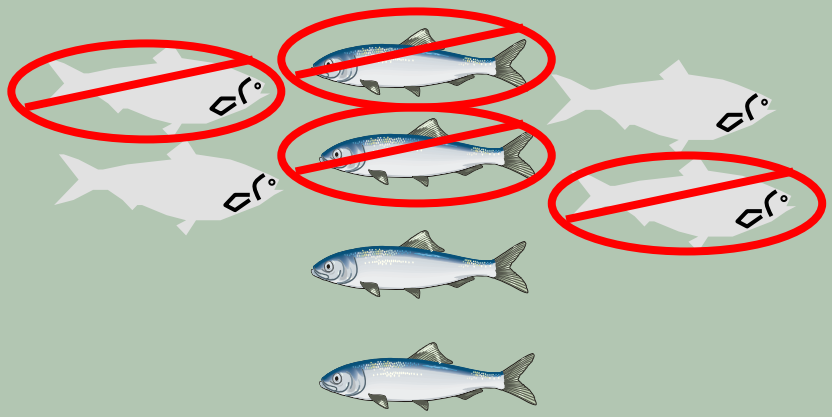
In the estuary and Gulf of Maine alewives are FOOD for :





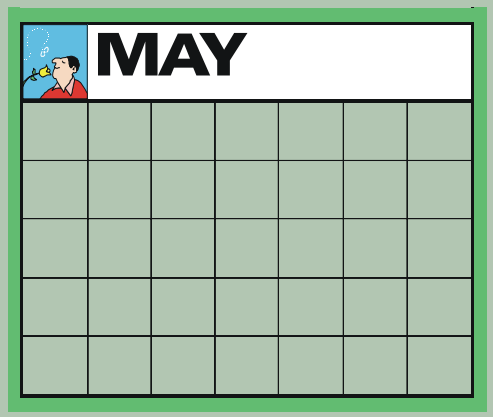
ME Fish Commissioners' Report (1872) recognized the connection between anadromous fish decline and near-shore demersal fish declines

Prey Buffering



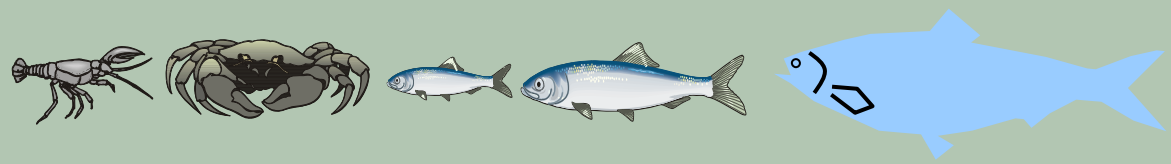
If <u>one</u> predator eats 4 fish a day,
it's effect on a prey species may be less if more prey species <u>overlap in time and space</u> with the predator

Estuarine prey community is complex and temporally variable

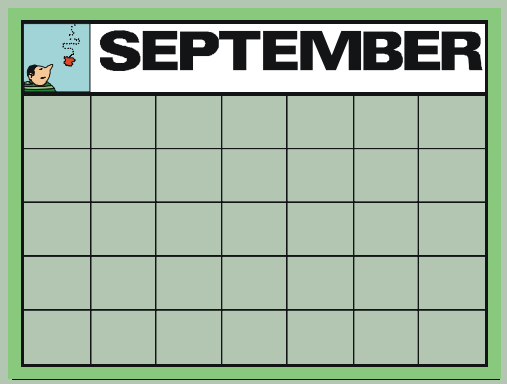


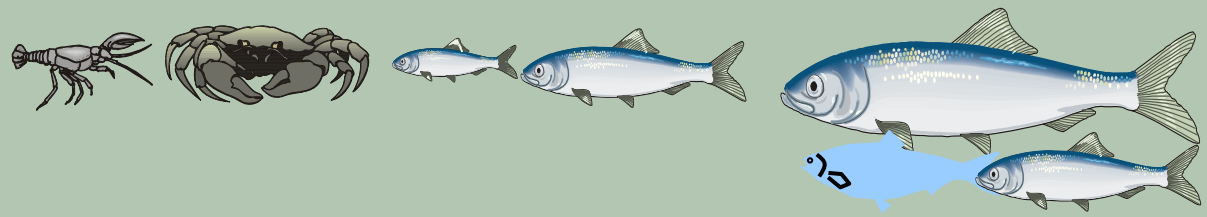
Resident Prey

Seasonal Prey



Shrimp Crab Larval fish Juvenile/ small fish Adult river herring Salmon smolts

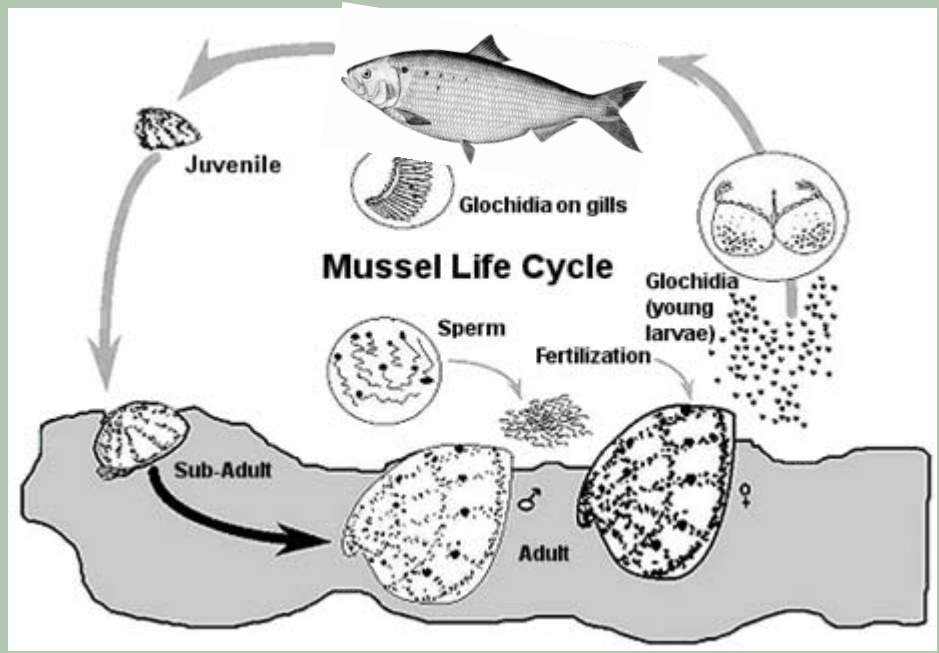




Menhaden,
Silversides
Juvenile herring
Sand lance

Alewife is the only host species for this freshwater mussel (range extends into Spednic Lake)

Alewife Floater



St Croix Watershed
99,200 acres (40,147 ha) alewife production area
less than 2 % accessible in 2009

Photo courtesy St. Croix Waterway Commission