



# Overview of River Herring in the Maritime Provinces

Jamie Gibson

Fisheries and Oceans Canada

Bedford Institute of Oceanography

Dartmouth, Nova Scotia



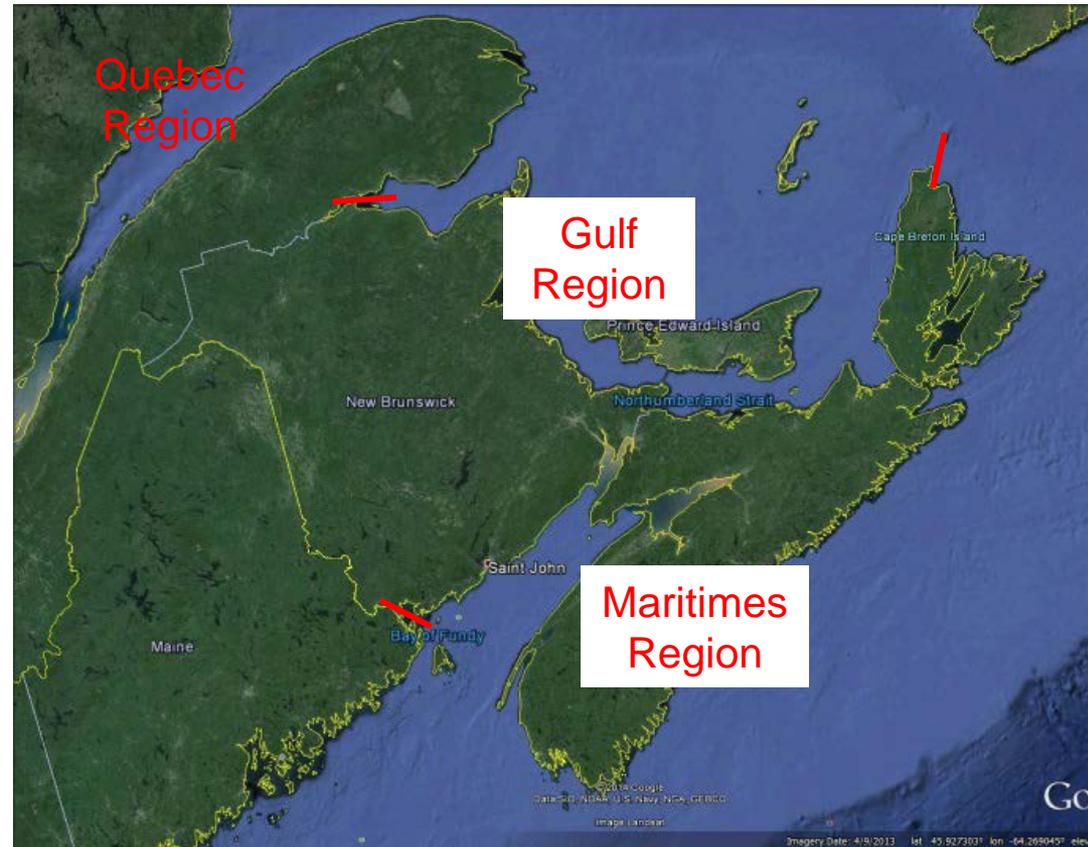
# Topics

- DFO organization
- River herring distribution
- Fisheries
- Hydroelectric development
- Monitoring and data
- Stock assessments (past and future)



# DFO Regions: Maritime Provinces

- Fisheries and Oceans Canada (DFO) has 6 administrative regions nationally
- Two are in the Maritime Provinces:
  - Maritimes Region: from the Maine – New Brunswick border to the northern tip of Cape Breton
  - Gulf Region: from the north tip of Cape Breton to the New Brunswick – Quebec border
- Most of Canada's diadromous river herring populations are in the Maritime Provinces





## Distribution

- Not updated since Rulifson (1994)
- Number of rivers with river herring populations (Rulifson 1994):
  - Gulf of St. Lawrence (NB, NS): 13 rivers
  - Atlantic coast of Nova Scotia: 69 rivers
  - Nova Scotia Bay of Fundy coast: 30 rivers
  - New Brunswick Bay of Fundy coast: 30 rivers
- Both species are present in PEI (Cairns 1997: DFO Res. Doc. 97/74)



# Fisheries

- Fisheries take place primarily in near-shore marine habitat; in estuaries and in rivers; by-catch
- DFO is the lead agency for the management of river herring fisheries
- Management based on: scientific advice, formal stakeholder consultation via advisory committees, formal consultation with First Nations
- Management tools: limited entry into fishery, yearly closed times, weekly closed times, gear restrictions, variation orders
- Fisheries and regulations quite variable throughout region
  - stock status, nature of fishery, gear, markets, etc.



# Examples of Fishing Gear

Tip trap (Margaree River, NS)



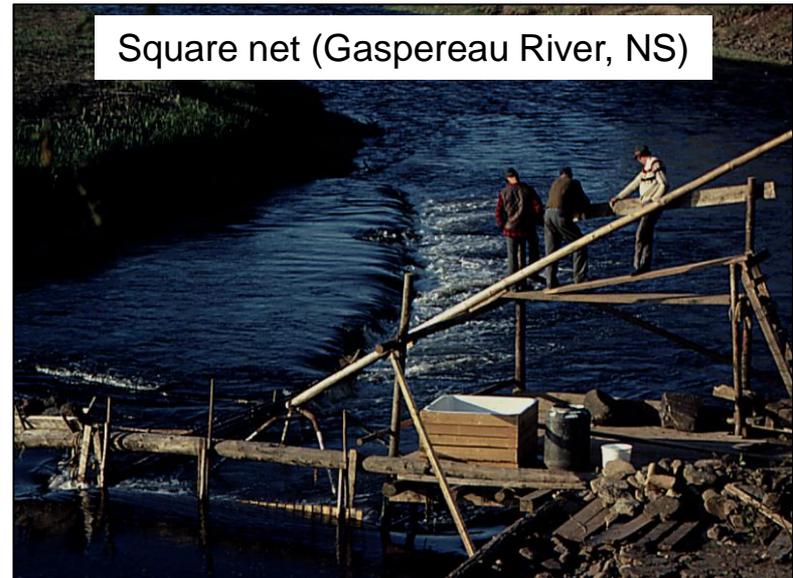
Trap net (Miramichi River, NB)



Dip stand (Tusket River, NS)



Square net (Gaspereau River, NS)





# Comparison of Gaspereau Landings from Three Areas in the Maritime Provinces

Gaspereau Landings (t)

Time Period:	70-79 Avg.	80-89 Avg.	90-99 Avg.	1997	1998	1999	2000
Southern Gulf	3,704	4,848	3,945	3,030	4,222	3,795	1,944
Atlantic Coast of Nova Scotia	1,279	893	907	989	918	586	n/a
Bay of Fundy	4,184	1,836	1,580	1,551	1,780	1,724	n/a
Total	9,167	7,914	6,427	5,670	6,920	6,105	n/a

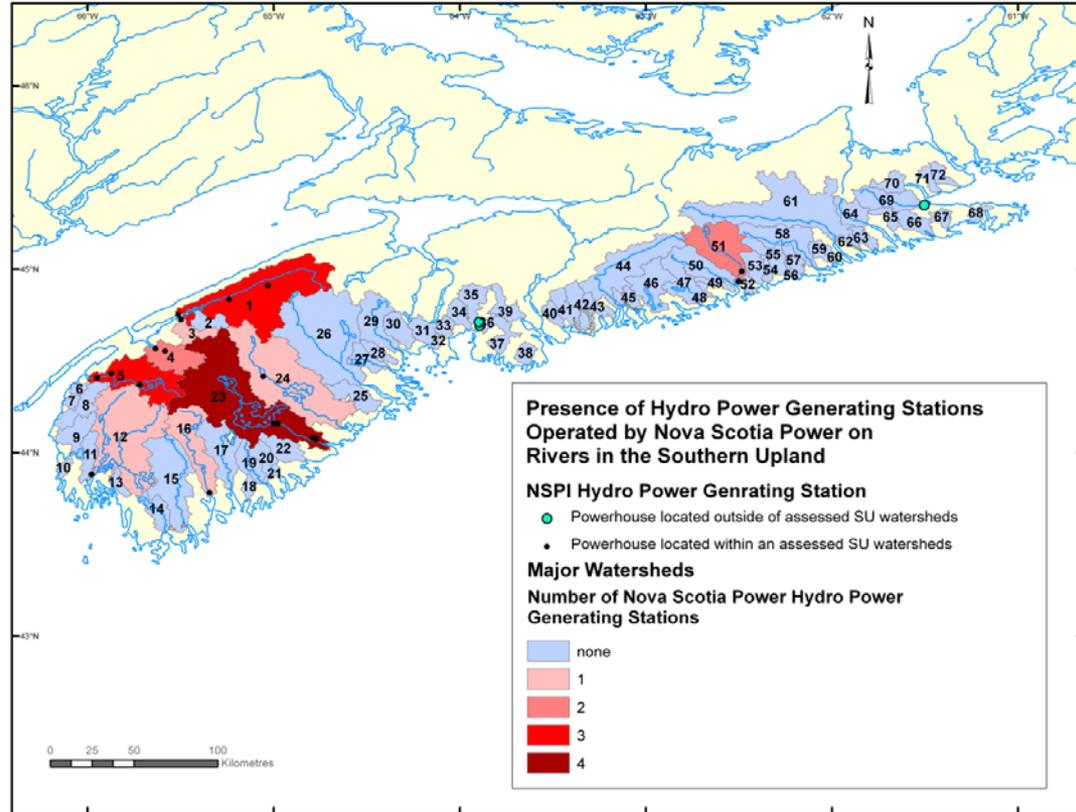
from: DFO Science  
Stock Status Report D3-17 (2001)



# Hydroelectric Development

- Map shows prevalence of hydro development in Southwest NS
- Also hydro development in:
  - NS Bay of Fundy region (e.g. Gaspereau River; Avon River)
  - Southwest New Brunswick (e.g. St. John River, Magaguadavic River)
- Much less development in Cape Breton and Gulf of St. Lawrence
- Mactaquac Dam (Saint John River)
  - <http://canadianriversinstitute.com/research/mactaquac-aquatic-ecosystem-study/>

Hydro Development on Nova Scotia's Southern Upland Salmon Rivers

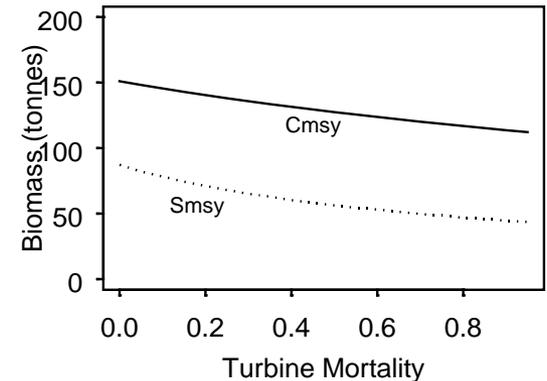
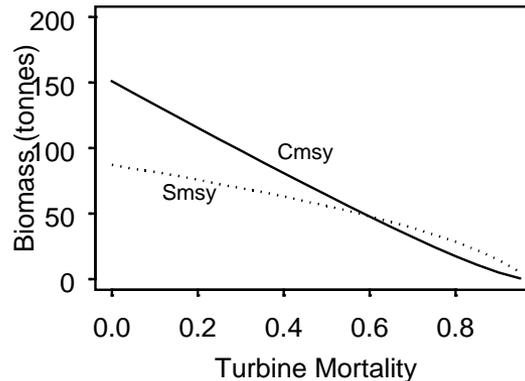
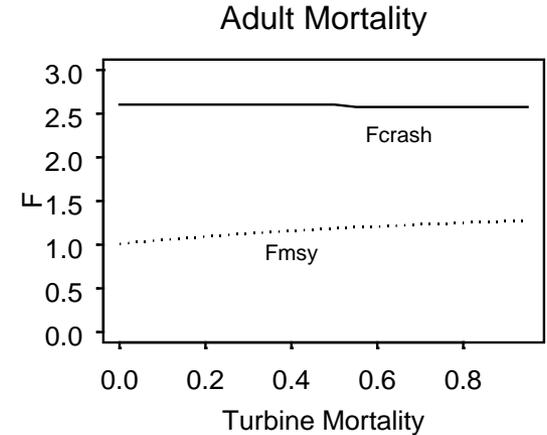
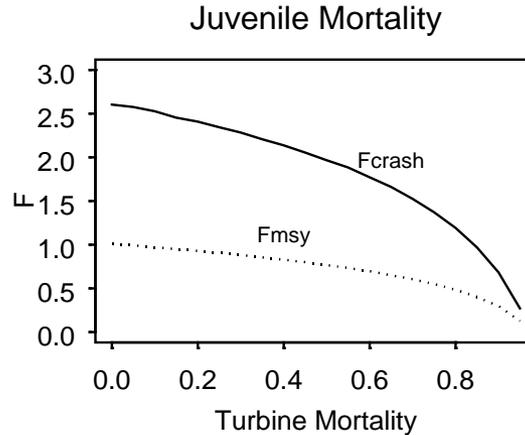


From: Bowlby et al. 2014, DFO res. doc. 2013/006



# Relationships between Fishery Reference Points and Turbine Mortality

- Example from Gaspereau River
- Juvenile turbine mortality occurs before fishing and reproduction
- Adult turbine mortality occurs after reproduction
- Lack information about survival at hydro facilities in our region

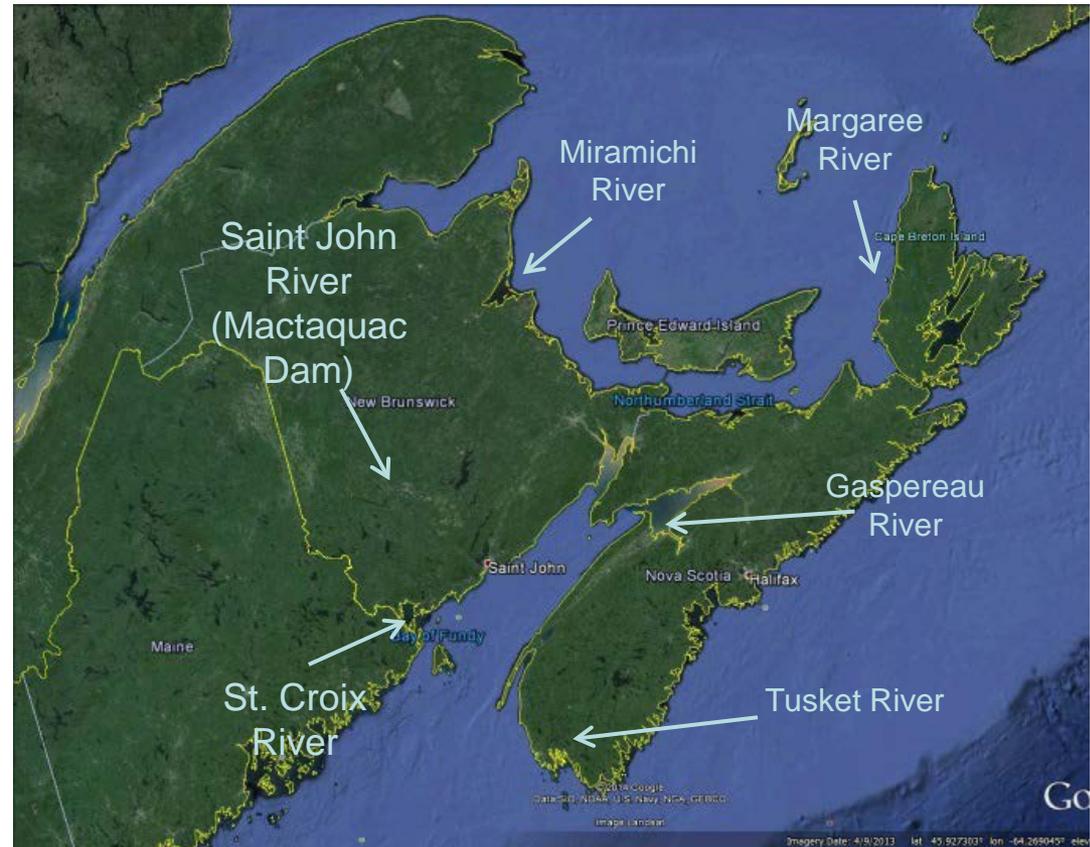


Adapted from Gibson and Myers (2001)  
DFO res. doc. 2001/061



# River Herring Monitoring and Data

- Roughly 6 rivers where river herring data has been collected
- Collections highly variable from year, from:
  - no data collection
  - counts, commercial harvests, biological characteristics of the stock
- Some monitoring occurs intermittently elsewhere (e.g. Petitcodiac River – opening of the causeway)
- Commercial landings
  - recent change in the reporting system – consistency with older data under evaluation (Maritimes Region)





# Assessments of Status (Past and Future)

- Last peer-reviewed assessments were in 2001 (exception: Gaspereau River 2007): DFO Science Stock Status Report D3-17 (2001)
- Maritimes Region:
  - framework assessment planned for early 2016 (tentative)
  - review of status of river herring populations in the Tusket River, NS
  - options for monitoring and assessment for other populations
- Gulf Region:
  - A status assessment is being planned, but timing not yet determined

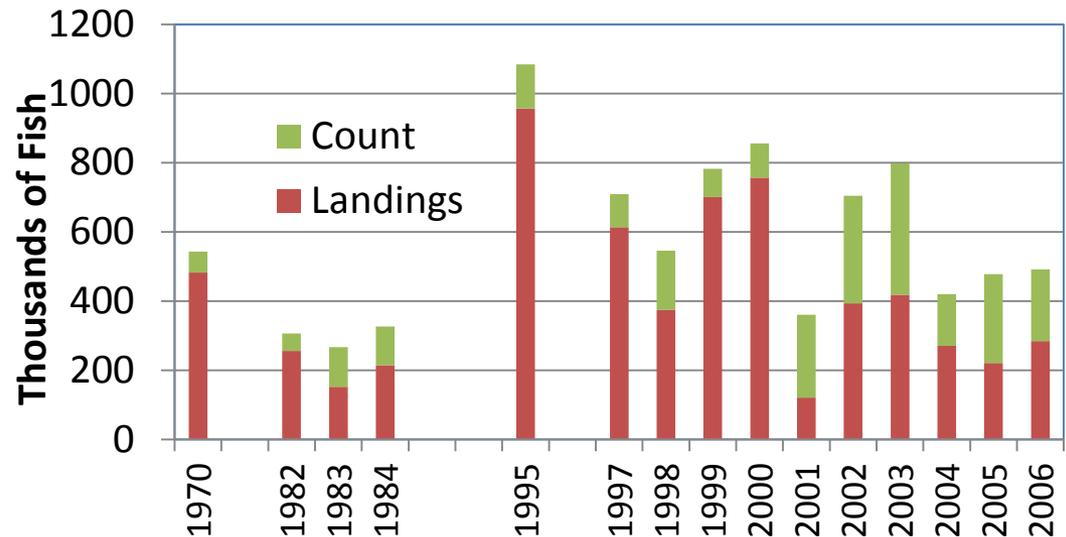


## Gaspereau River Alewife (to 2006)

- Hydroelectric development
- Commercial fishery for alewife
- Data (past) included: landings, fishway counts, and biological characteristics
- Assessment (2001) indicated low spawner escapement relative to the landings
- Weekly closures increased from 2 to 3 days
- New fishway constructed
- Spawning escapement increased, but was too early to evaluate whether abundance is increasing



White Rock  
Generating  
Station  
and “old  
fishway”





## Towards a Framework Assessment (Maritimes Region)

- Currently evaluating stock status for river herring on the Tusket River
- 1<sup>st</sup> time river herring status has been formally assessed in this watershed (other than trends in landings)
- Known to have a large river herring fishery
  - both blueback herring and alewife
- Hydroelectric development
  - new fishways





# Tusket River Monitoring and Assessment

- Monitoring in collaboration with:
  - Nova Scotia Power (video monitoring)
  - Tusket River Environmental Protection Association (biological sampling)
- Two years of monitoring planned (year 1 completed)
- Assessment likely to include:
  - Stock status based on exploitation rate estimates and SPR reference points
  - Escapement relative to carrying capacity or  $B_{msy}$  for alewife (Gibson and Myers 2003)





# Options for Monitoring and Assessment for Other Populations (Maritimes Region)

- Path forward presently unclear
- Many options being considered, e.g.:
  - monitor a population for 2 years, and then move to another area
    - advantages: detailed population level information; disadvantages: no long-term time series, long time periods between assessments
  - broader scale assessments, likely based off landings
    - advantages: longer time series; disadvantages: lack of detailed population data; lack of species specific information; lack of fisheries independent data; interpretation of trends
  - others
- Decision will be resource-dependent
- Currently evaluating options and working on interpretation of commercial landings data

