American Eels in Canada

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Department of Fisheries and Oceans

pre-CITES Workshop

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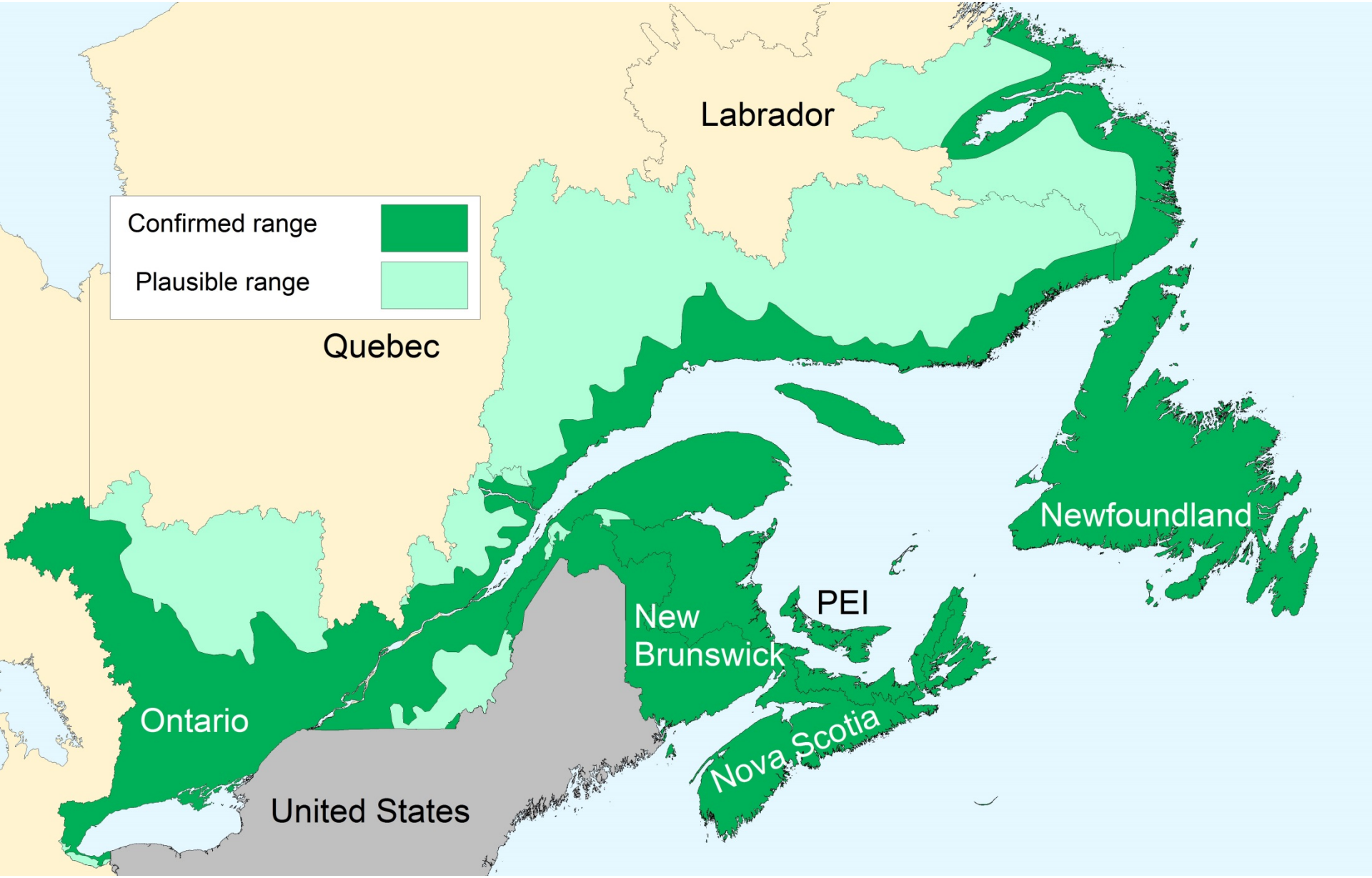
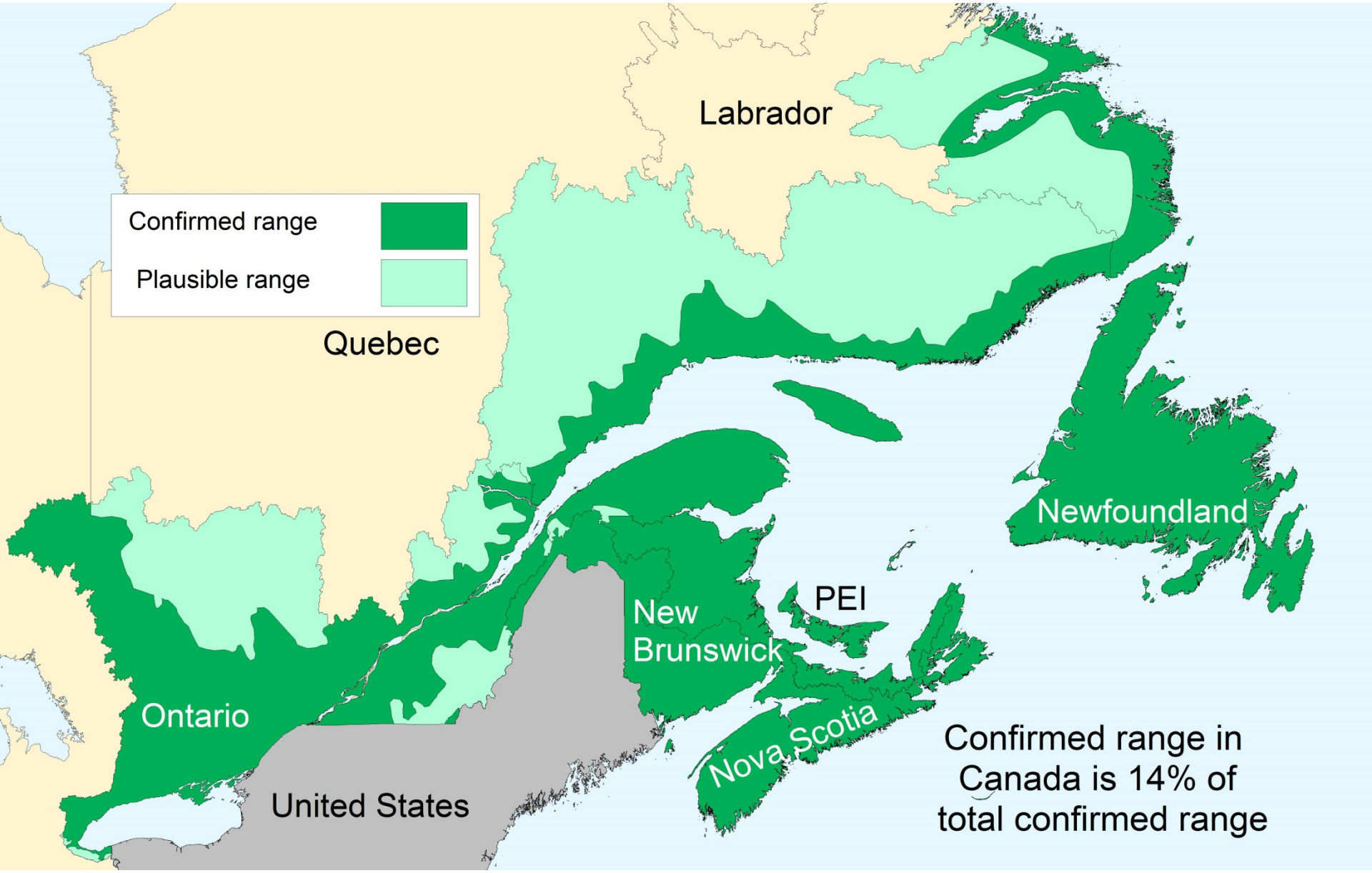
Canada


Labrador
Quebec
Newfoundland
PEI
New
Brunswick
Ontario
Nova Scotia
United States


Labrador
Quebec
Newfoundland
PEI
Ontario
United States
Maritimes
Region


Confirmed range
Plausible range
Labrador
Quebec
Ontario
United States
New Brunswick
PEI
Nova Scotia
Newfoundland


Confirmed range
Plausible range
Labrador
Quebec
Ontario
United States
New Brunswick
PEI
Nova Scotia
Newfoundland
Confirmed range in Canada is 14% of total confirmed range

Anthropogenic impactors

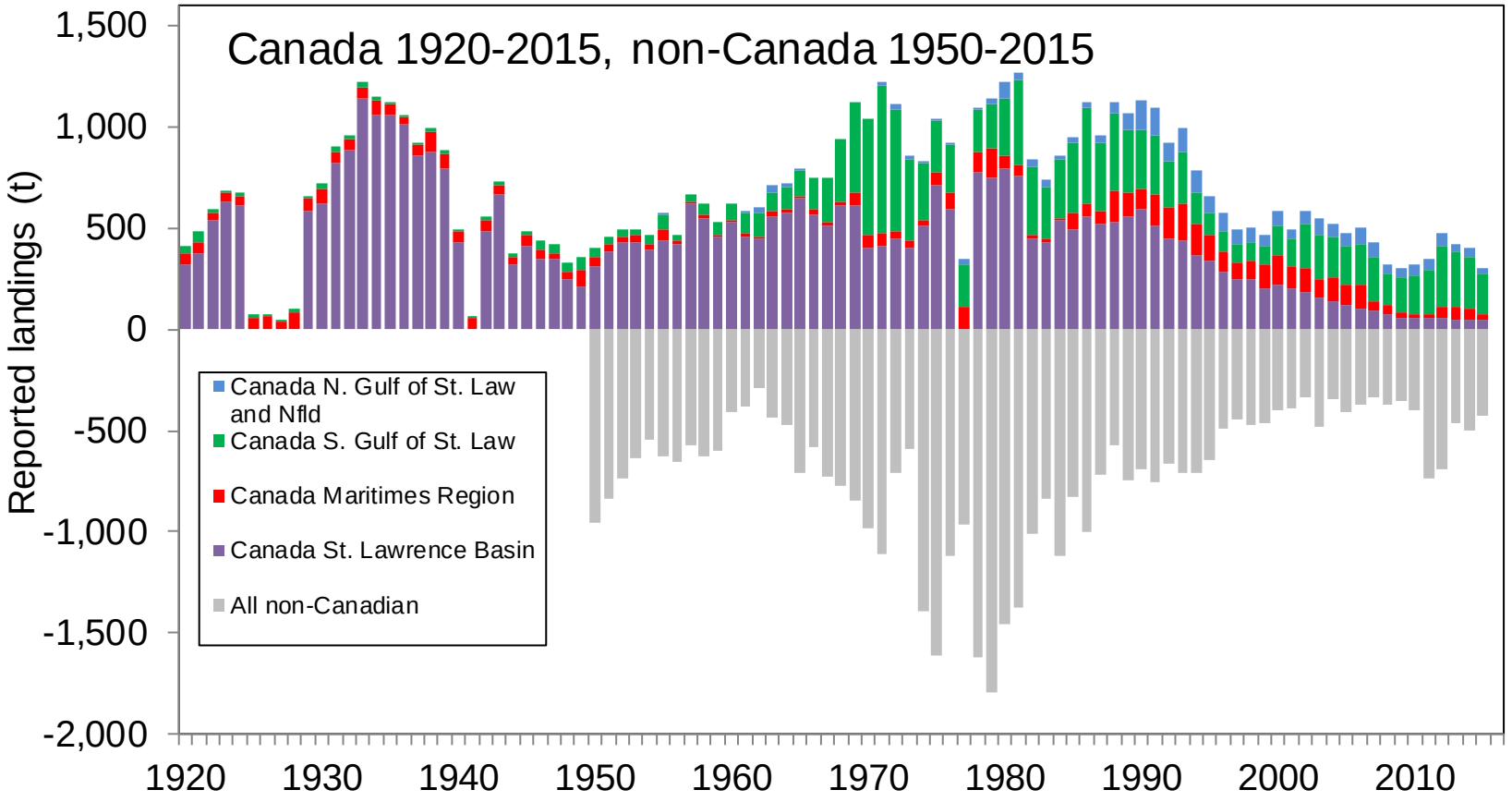
Fisheries

Dams

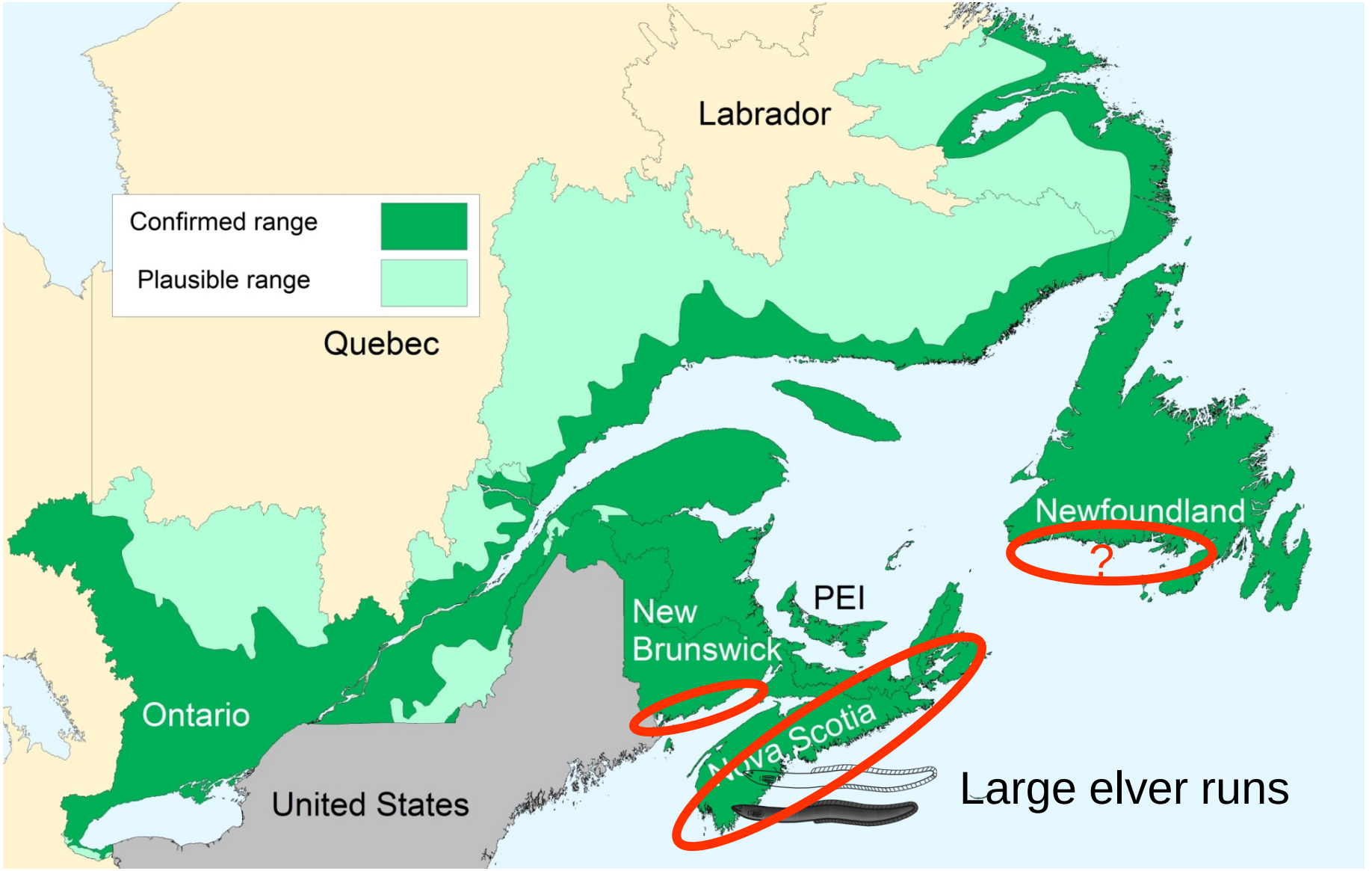
Invasive parasites (*A. crassus*)

Toxic chemicals

Anthropogenic impactors



Fisheries are dominated by yellow eels except for . . .



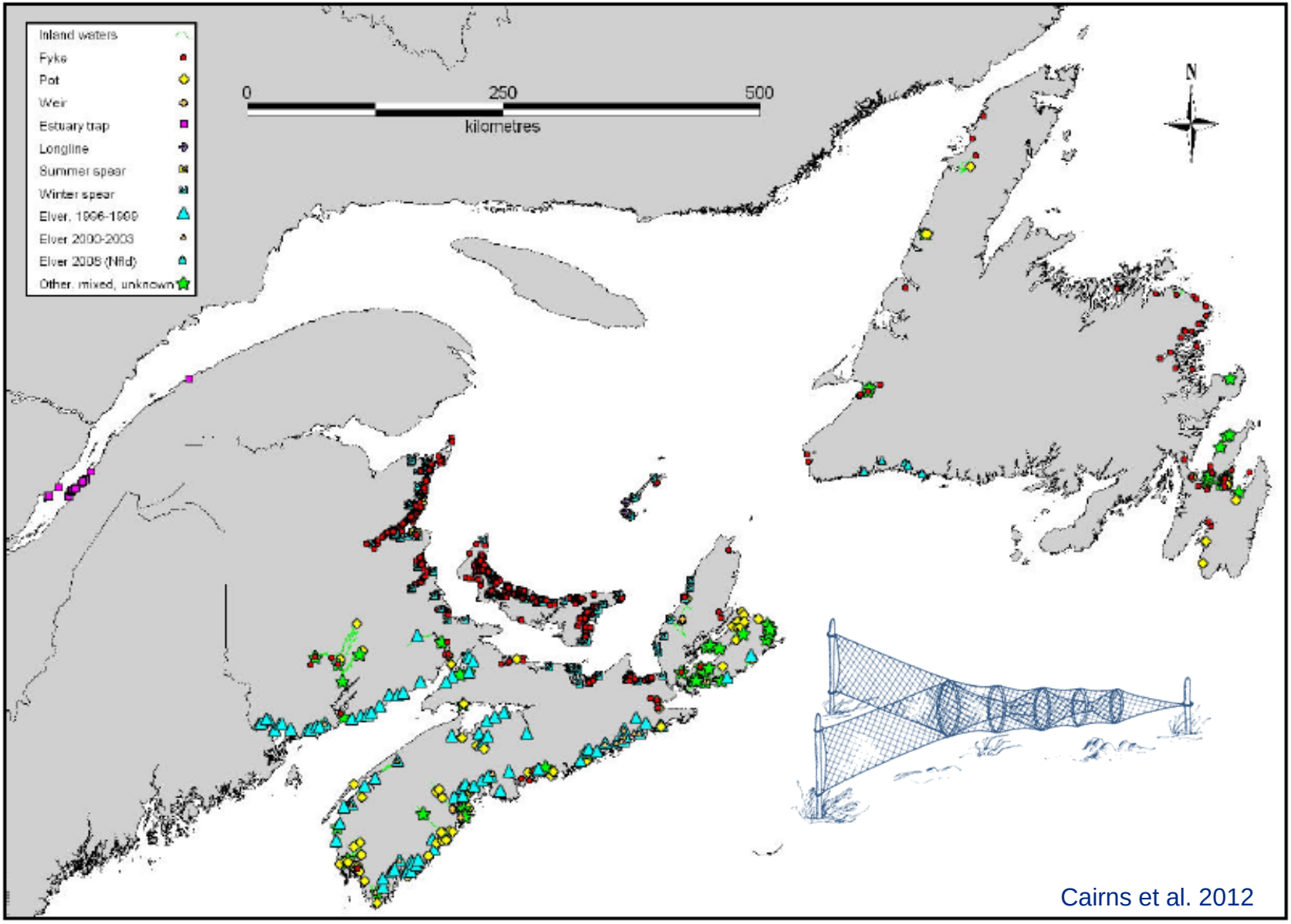
Mean elver landings for 2010-2015 are 4.6 t.

Elvers are 1.3% of Canadian landings, but the great majority of landed values.

Fisheries are dominated by yellow eels  except for . . .

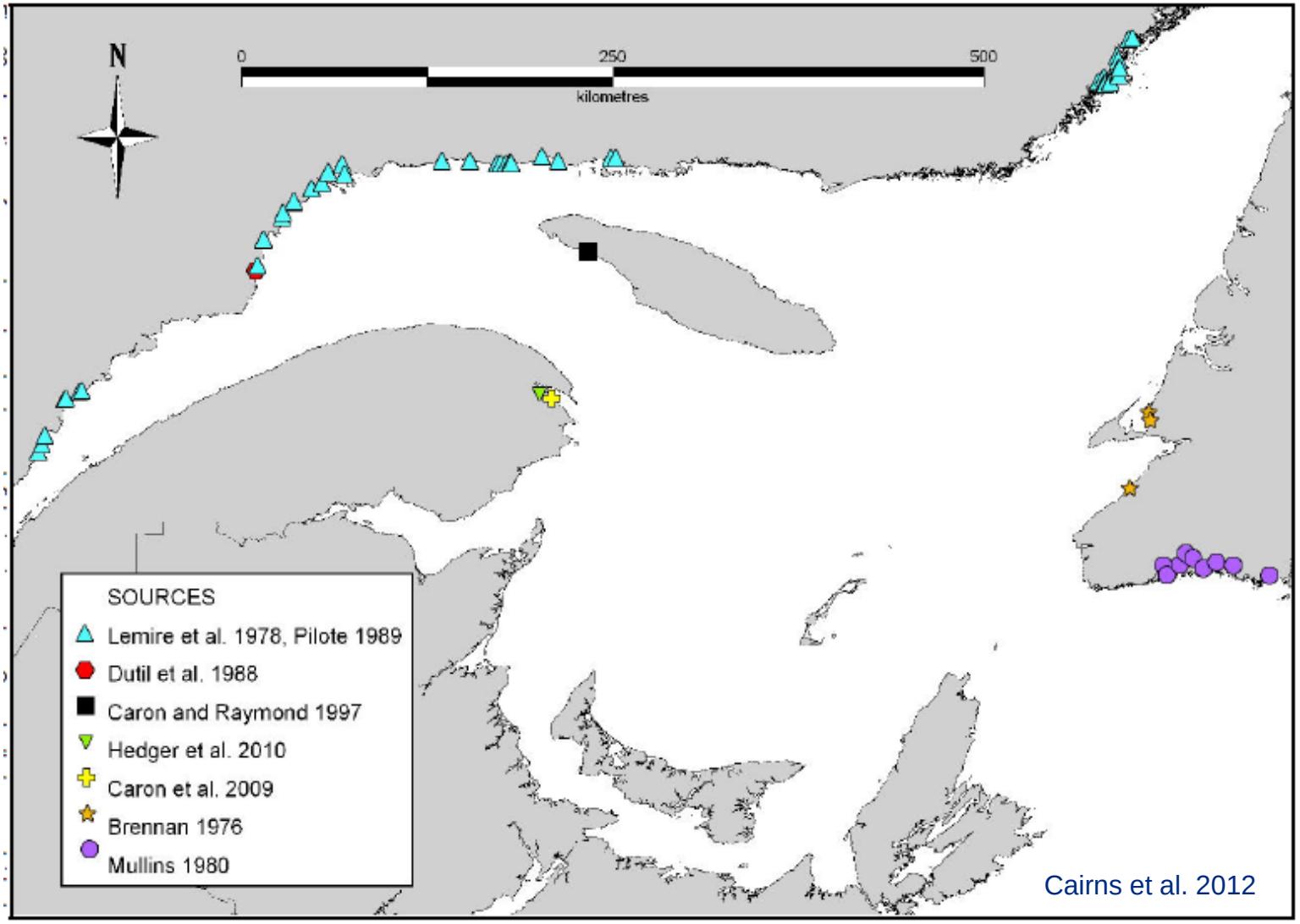
the large but declining silver eel fishery in the St. Lawrence estuary.

Fishing locations in eastern Canada



Cairns et al. 2012

Research fishing locations in eastern Canada



Eels are widespread and abundant in waters that are not fished for eels.

Most eel habitat in interior and coastal waters is not fished for eels.

Anthropogenic impactors

Dams

- Blockage of access for upstream migrants
- Turbine mortality for downstream migrants

The St. Lawrence Basin

The St. Lawrence Basin

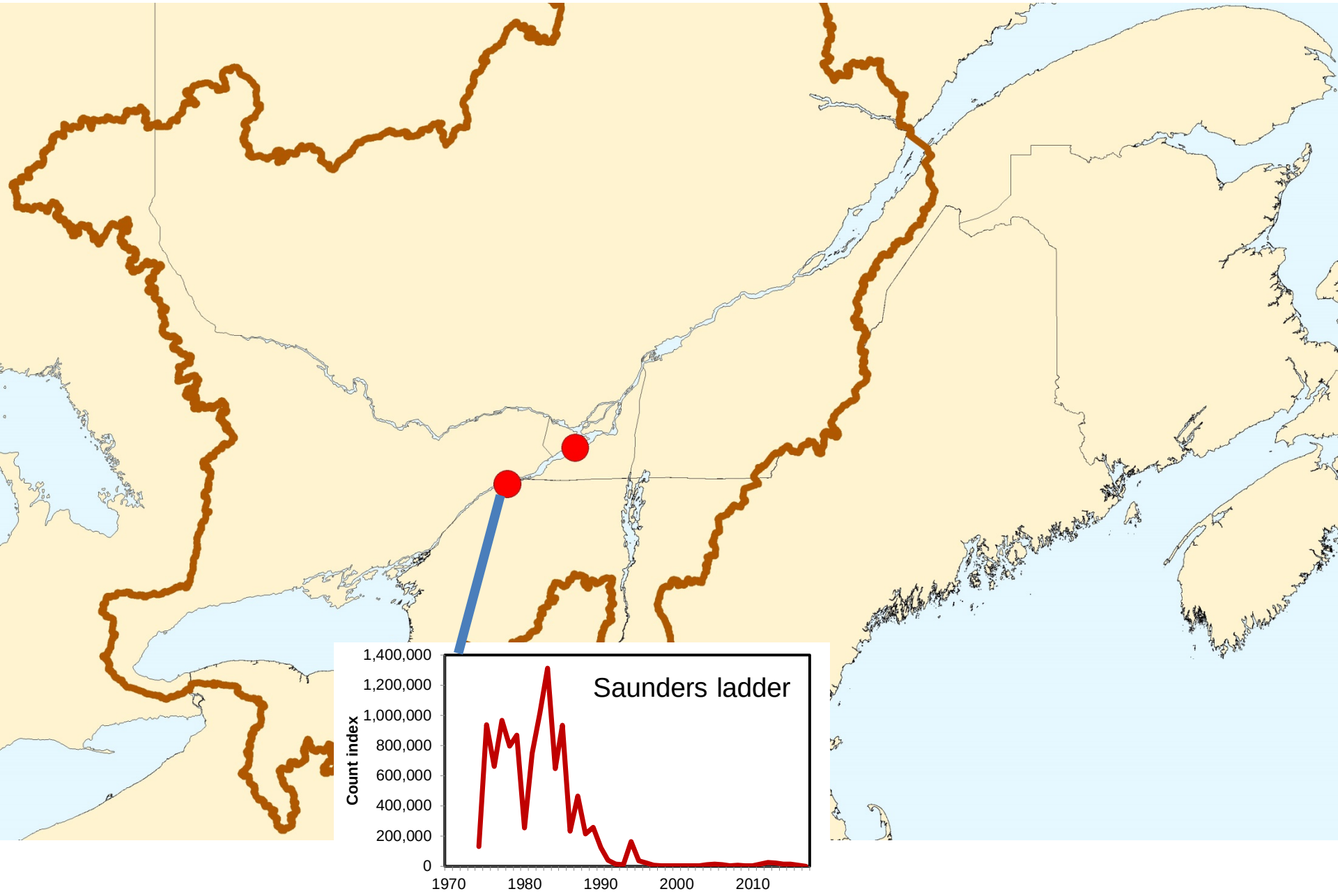
Many dams

Dams

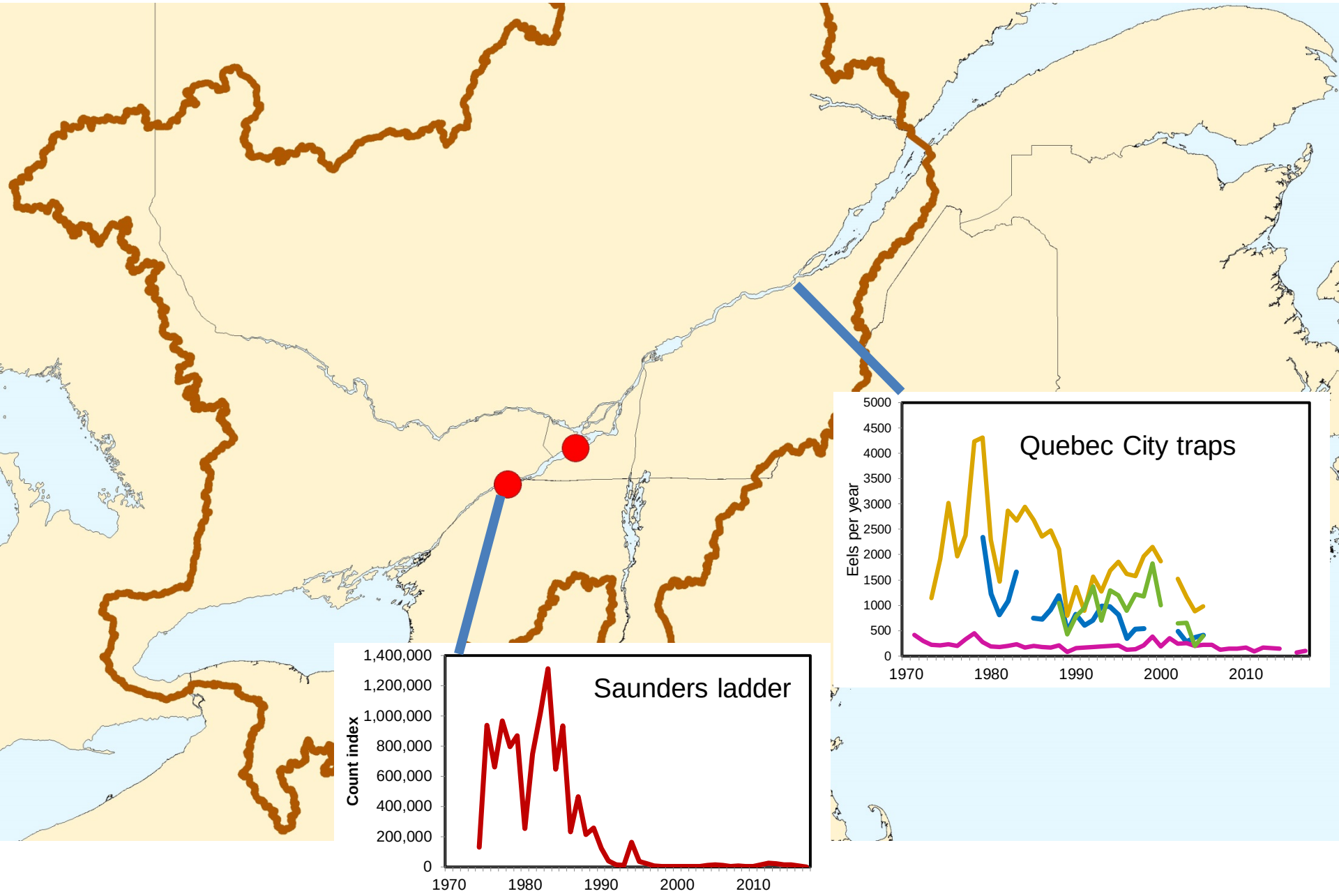
Beauharnois

Moses-Saunders

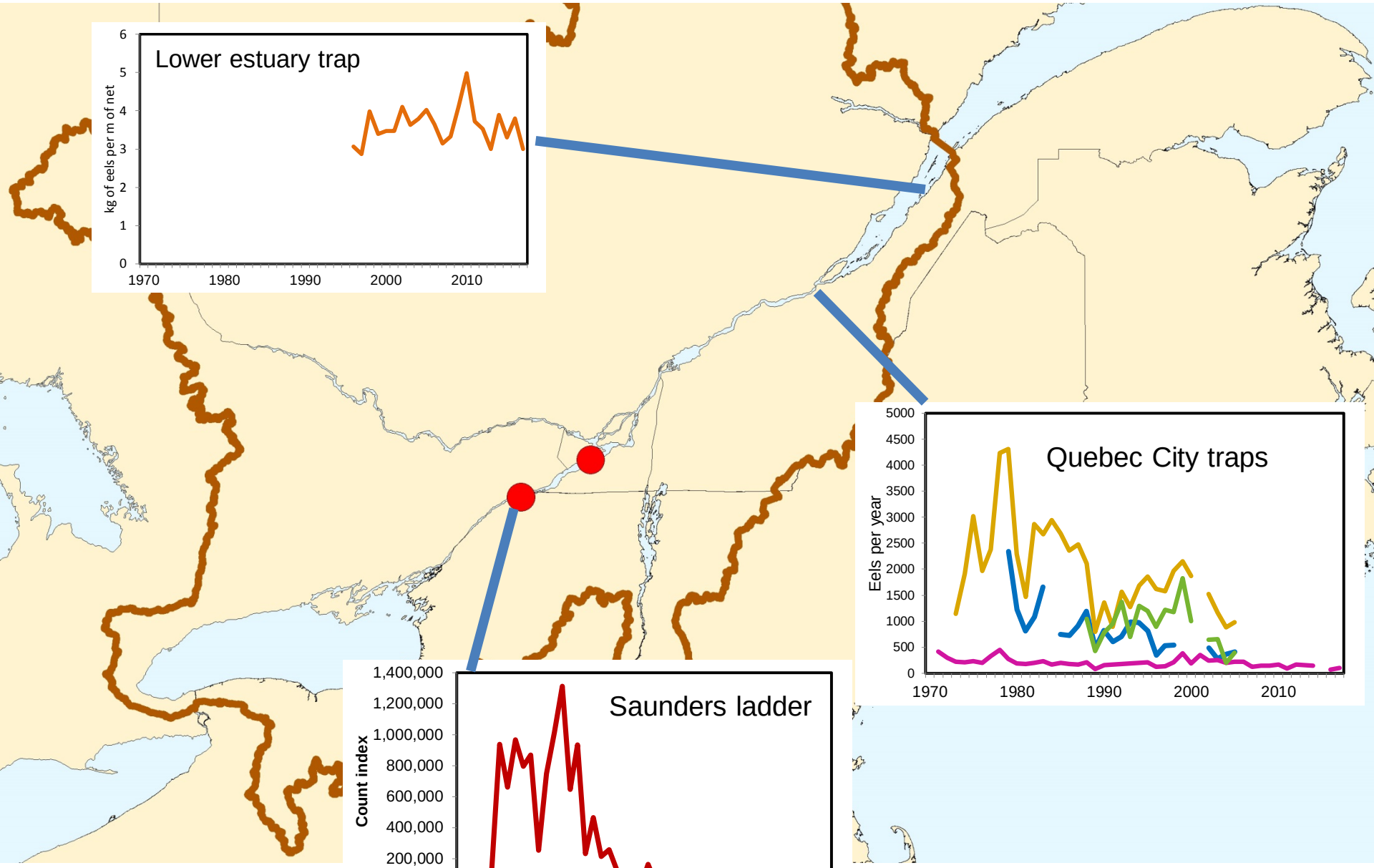
The St. Lawrence Basin



The St. Lawrence Basin



The St. Lawrence Basin



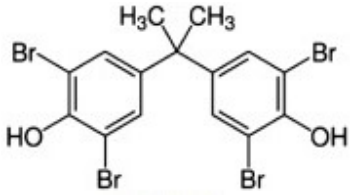
Anthropogenic impactors

Invasive parasites (*A. crassus*)

Anthropogenic impactors

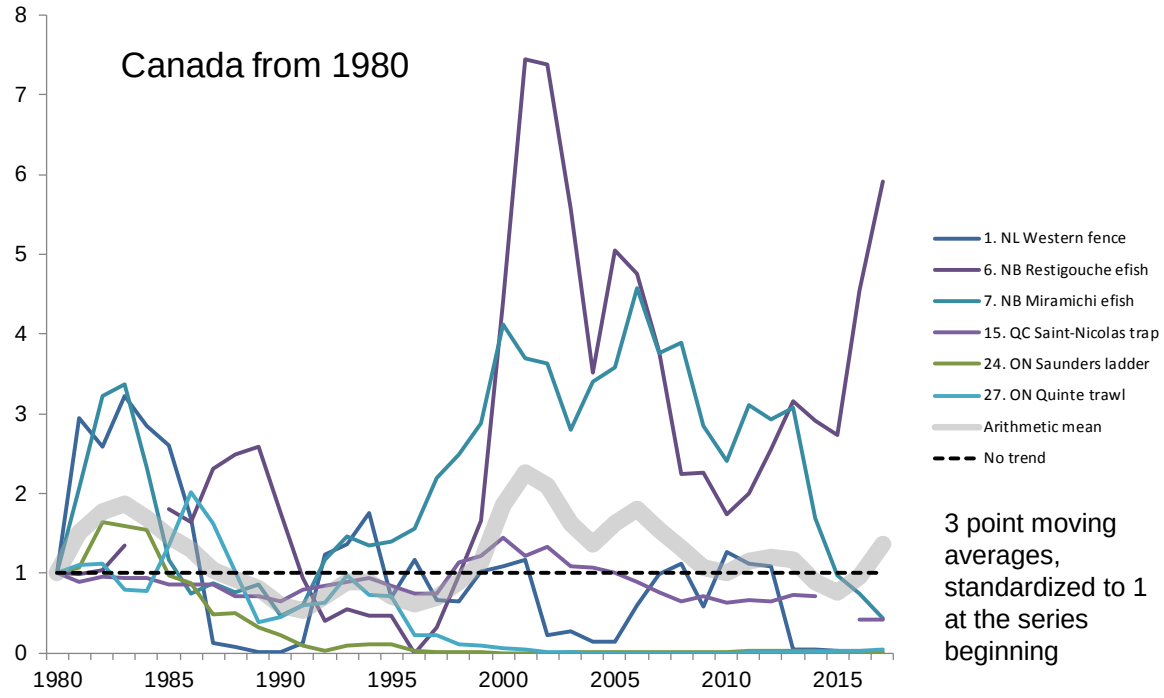
Invasive parasites (*A. crassus*)

Toxic chemicals



Abundance trends

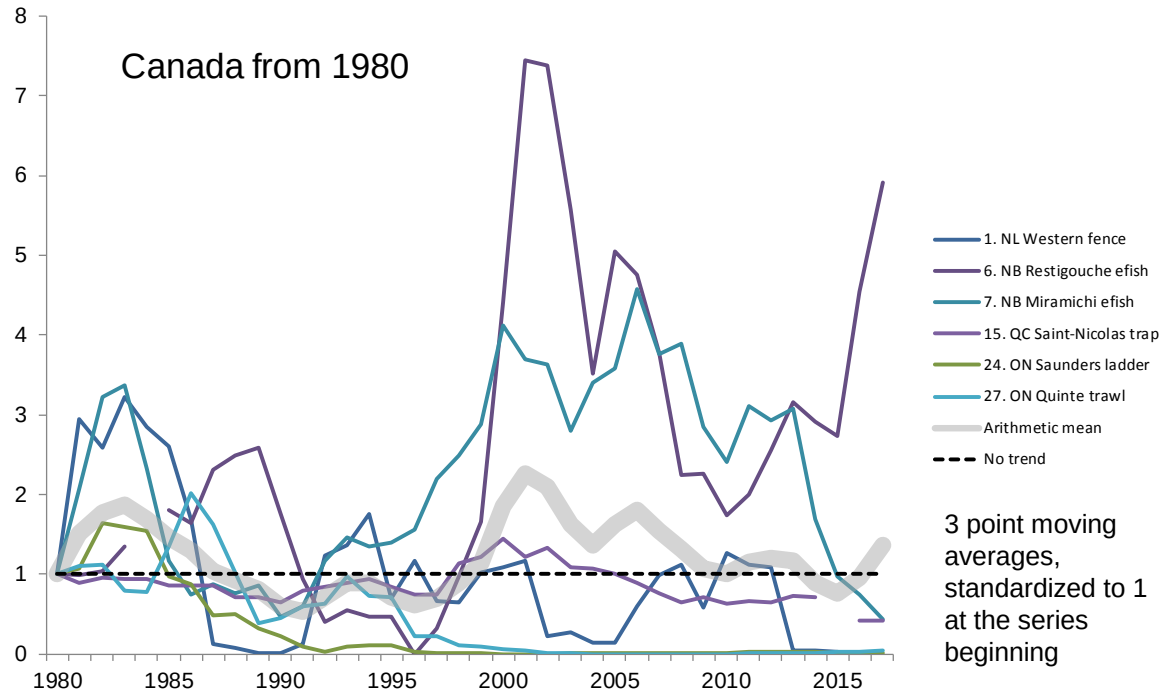
Abundance series in Canada have been updated but not analyzed



3 point moving averages, standardized to 1 at the series beginning

Abundance trends

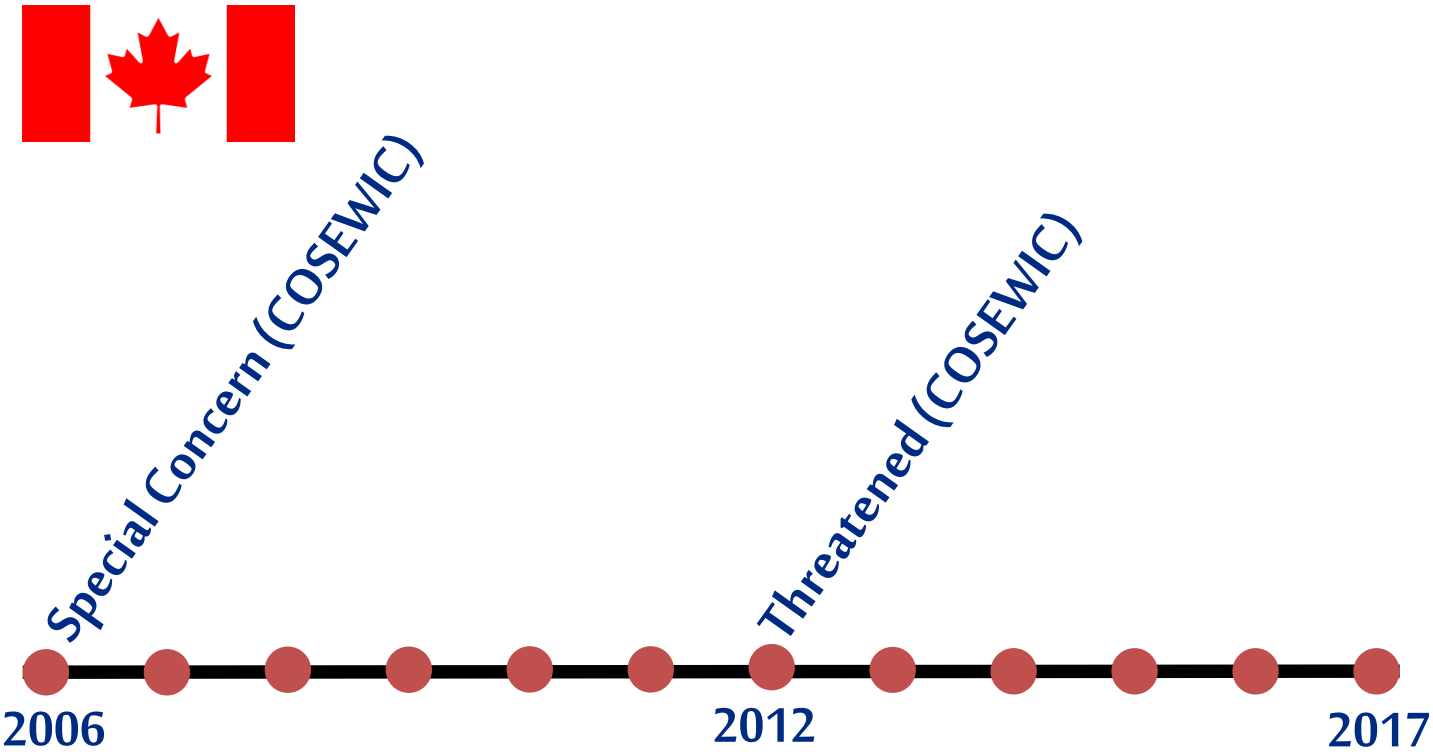
Abundance series in Canada have been updated but not analyzed



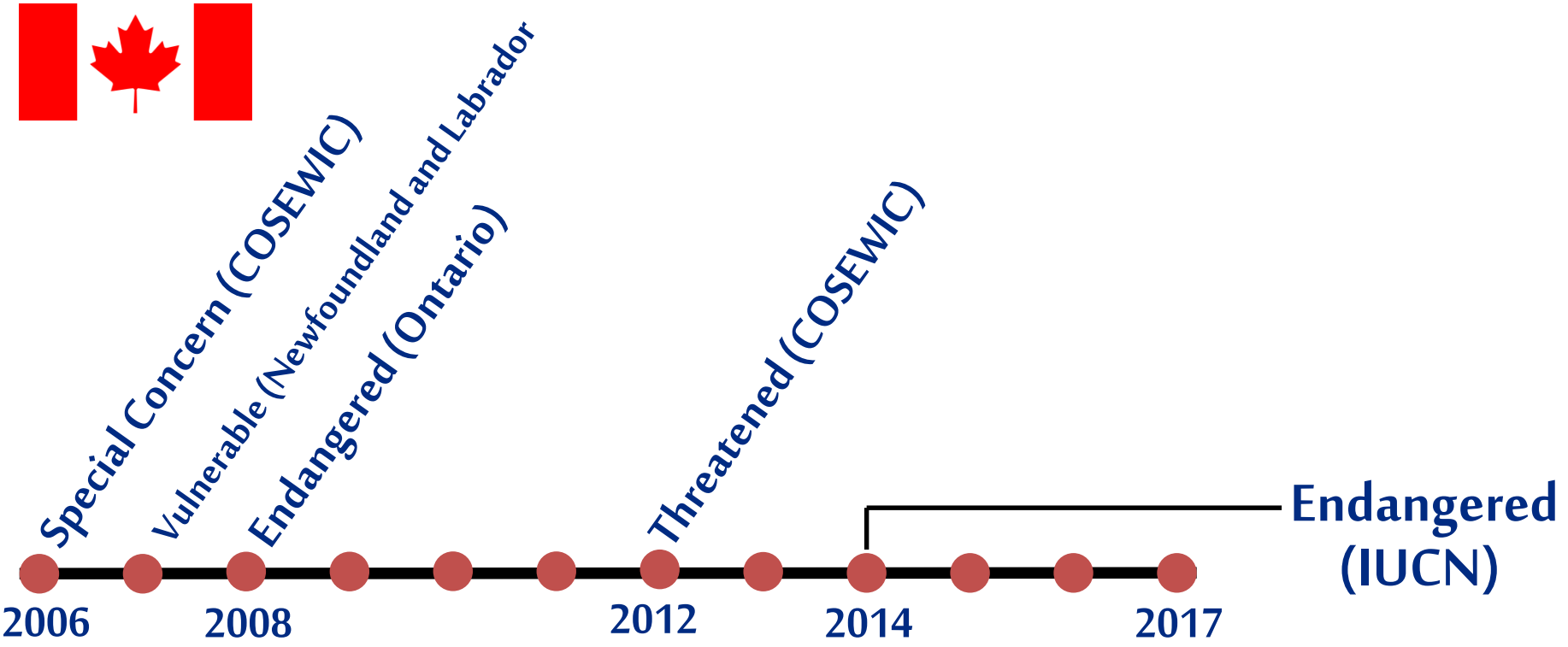
Analysis by DFO 2014, using data up to 2012:

- For 32 year timeframe, 60% of series show significant declines.
- For 16 year timeframe, series are equally divided among increasing, stable, and decreasing trends.

American eel status



American eel status



American eel status

Special Concern (COSEWIC)

Vulnerable (Newfoundland and Labrador

Endangered (Ontario)

Threatened (COSEWIC)

Endangered (IUCN)

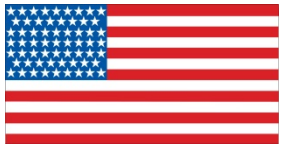
2006 2007 2008 2012 2014 2015 2017

No category (USFWS)

Depleted (ASMFC)*

No category (USFWS)

Depleted (ASMFC)



*Unclear if Depleted refers to all US eels, or only those subject to exploitation

Overview of the American Eel Assessment Framework for Maritimes Region

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Population Ecology Division, Science Branch,
Fisheries and Oceans Canada,
P.O. Box 1006, Dartmouth, N.S.
B2Y 4A2

November 18, 2016

Stock assessments: to support fisheries and habitat management objectives

Quantify to the extent possible:

- losses arising from human activities:
  - Large eel and elver fisheries, hydroelectric developments
    - Relative to Limit and Upper Stock Reference Points
- Prevalence of *Anguillicoloides* crassus

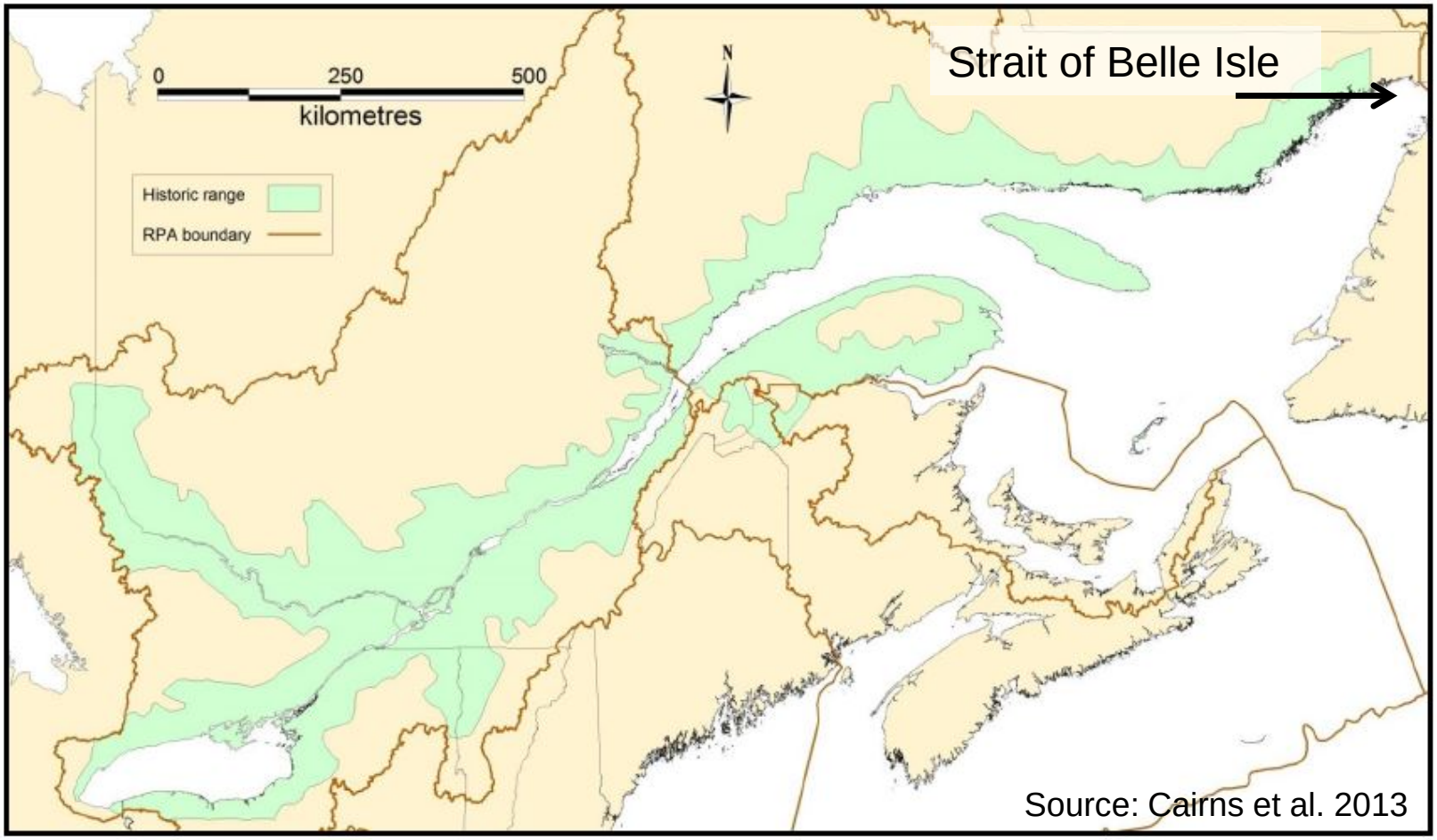
Advise on impact of losses to silver eel escapement:

- Regional level (contribution to panmixia)
- Watershed level (biodiversity, ecosystem integrity, important cultural fisheries)

Advise on current status relative to status in past years

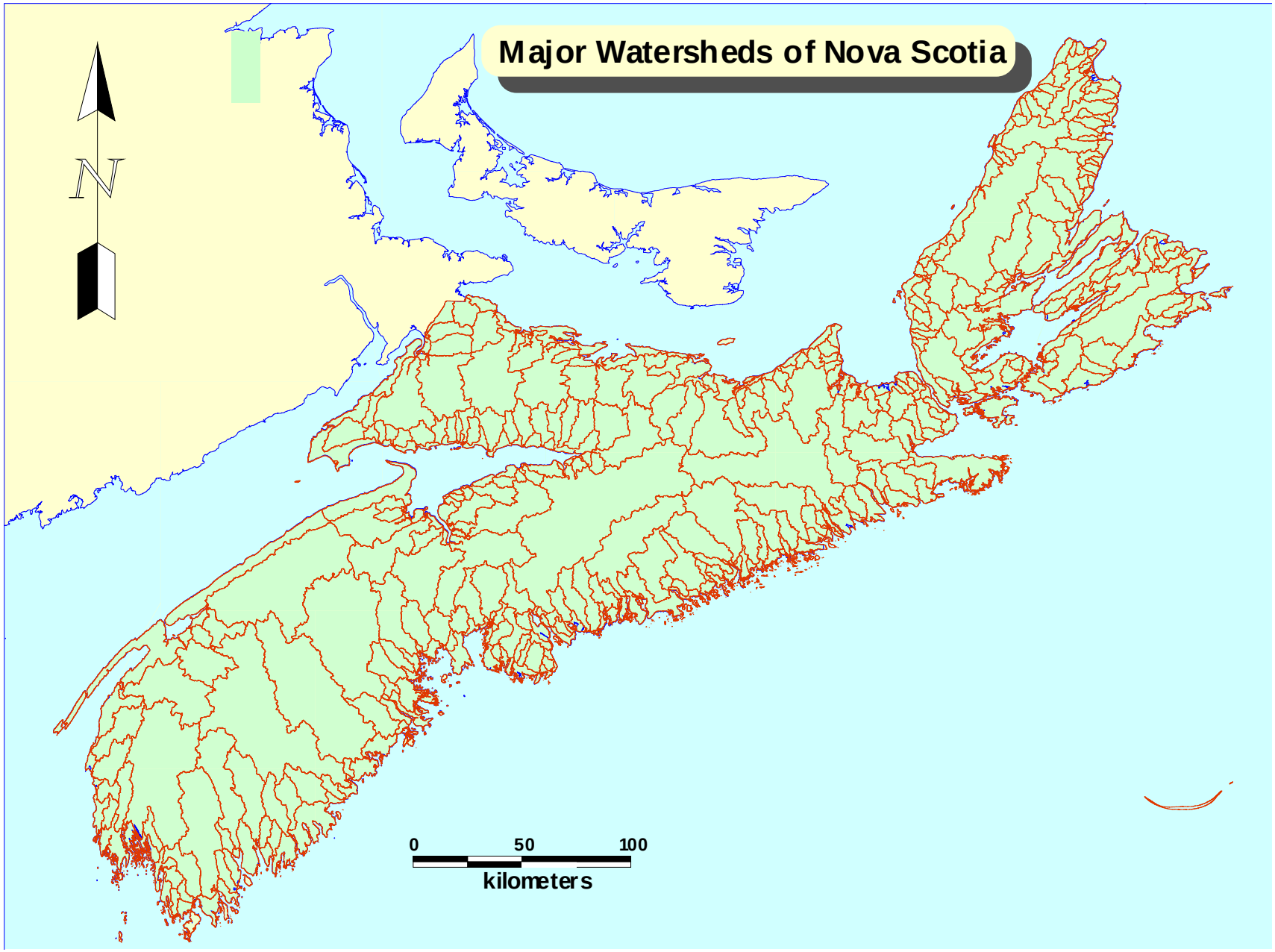
Data Sources:

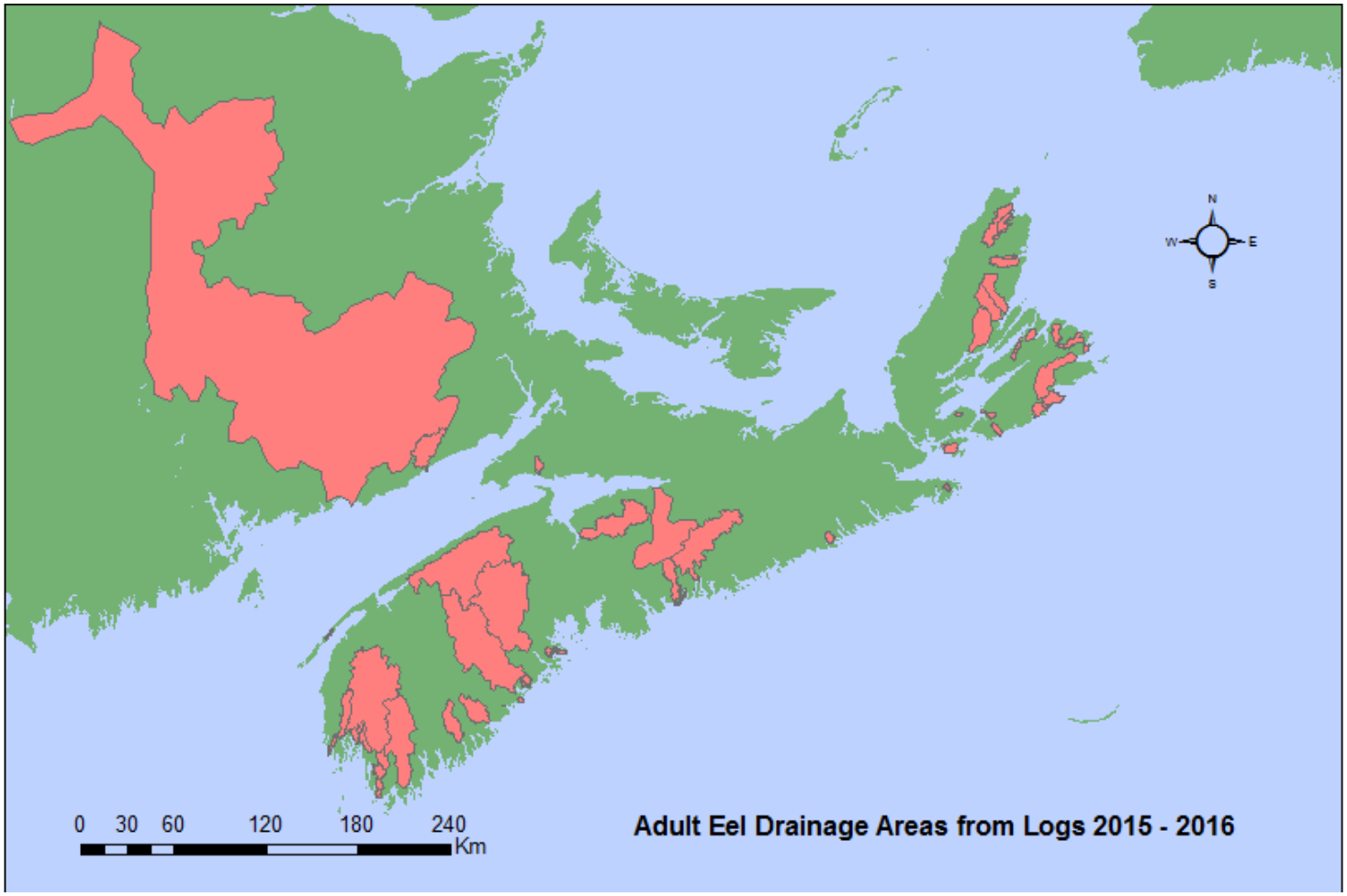
- Area of extent of potential impact
- Fishery dependent: commercial eel and elver fisheries
- Fishery independent: elver index, electrofishing data

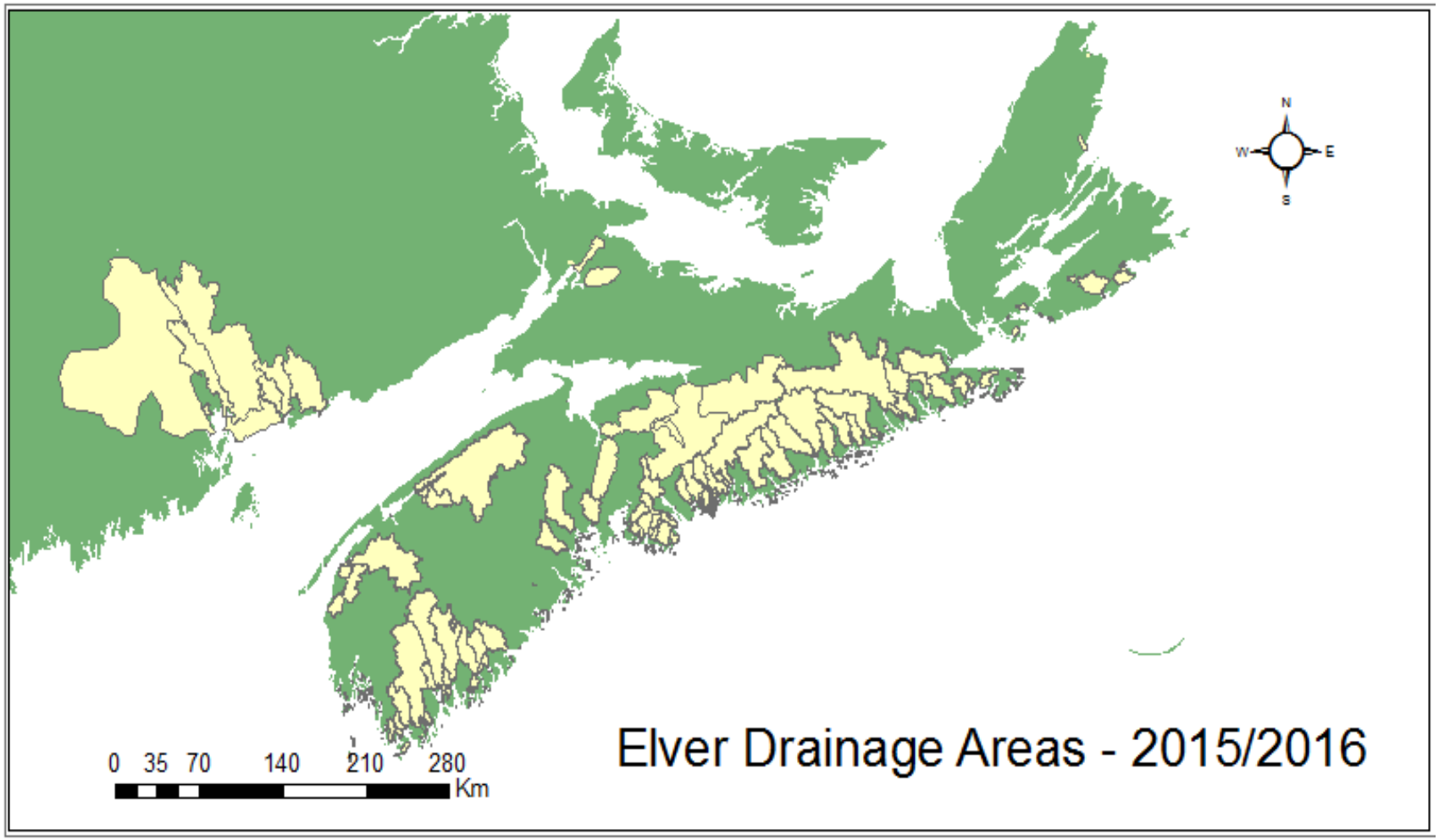


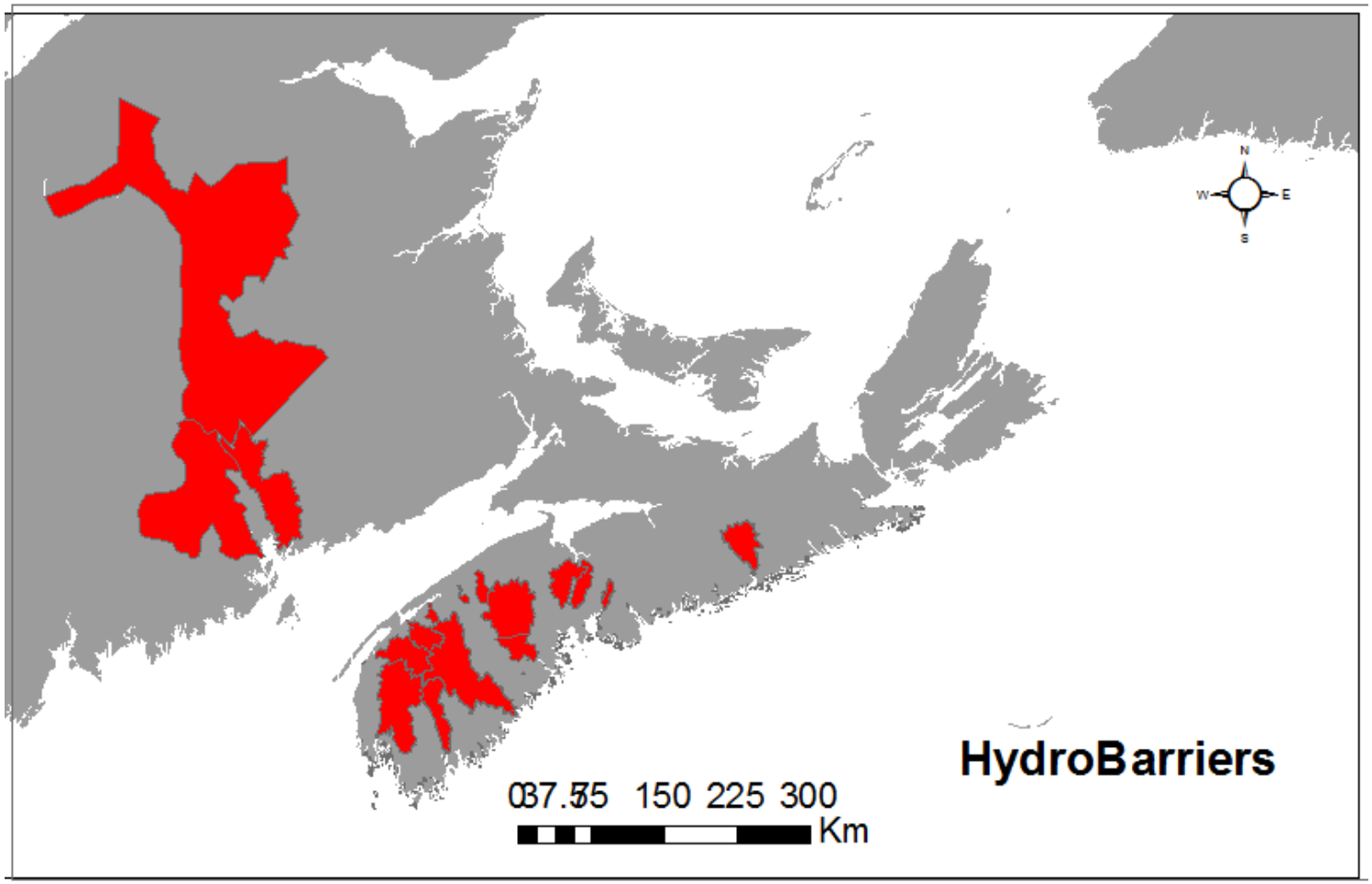
Catchment Area exiting via Maritimes Region = 118,846 km^2

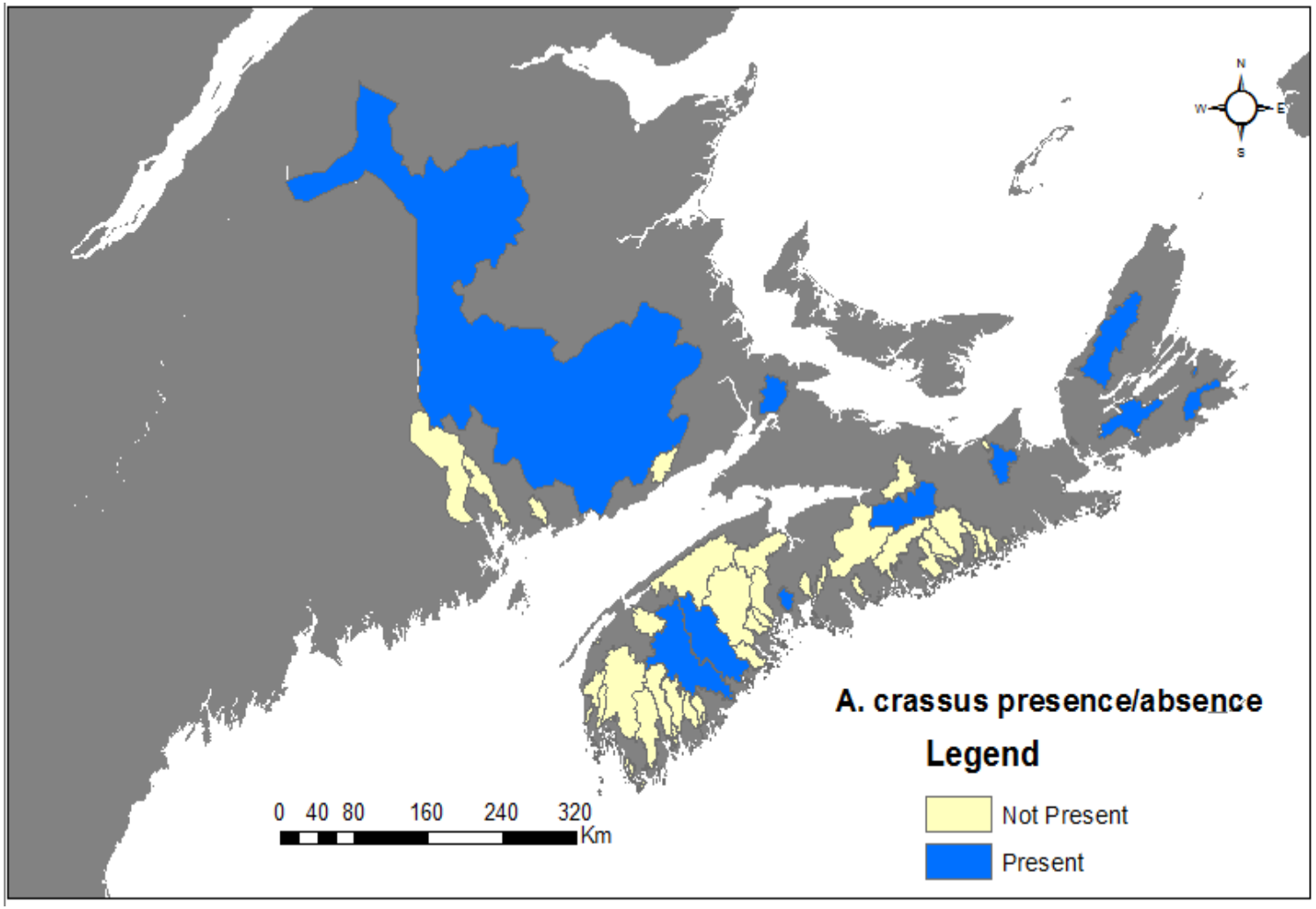
- % Eastern Continental NA below SBI =6.27
- % Eastern Continental Canada below SBI = 10.65


Major Watersheds of Nova Scotia
N
0
50
100
kilometers

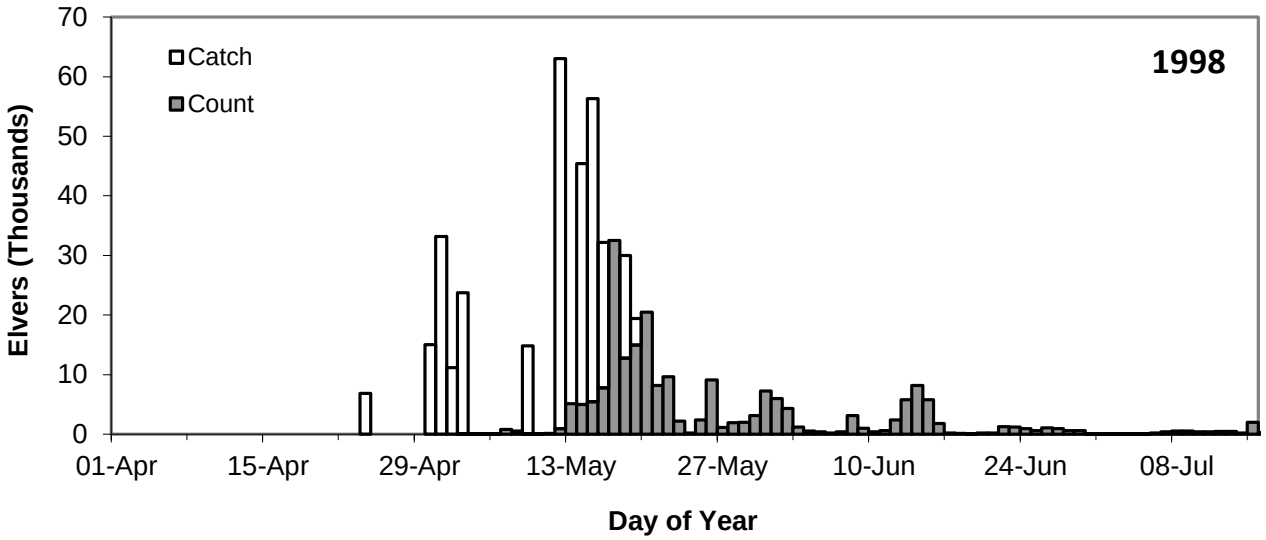

N
W
E
S
0 30 60 120 180 240
Km
Adult Eel Drainage Areas from Logs 2015 - 2016

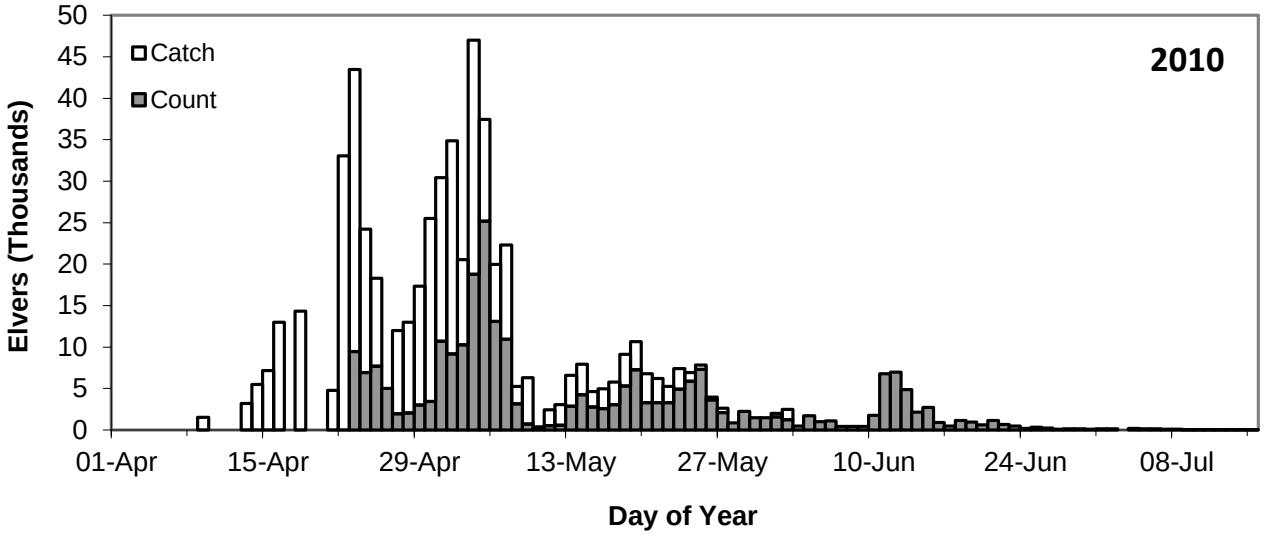

N
W
E
S
0 35 70 140 210 280
Km
Elver Drainage Areas - 2015/2016

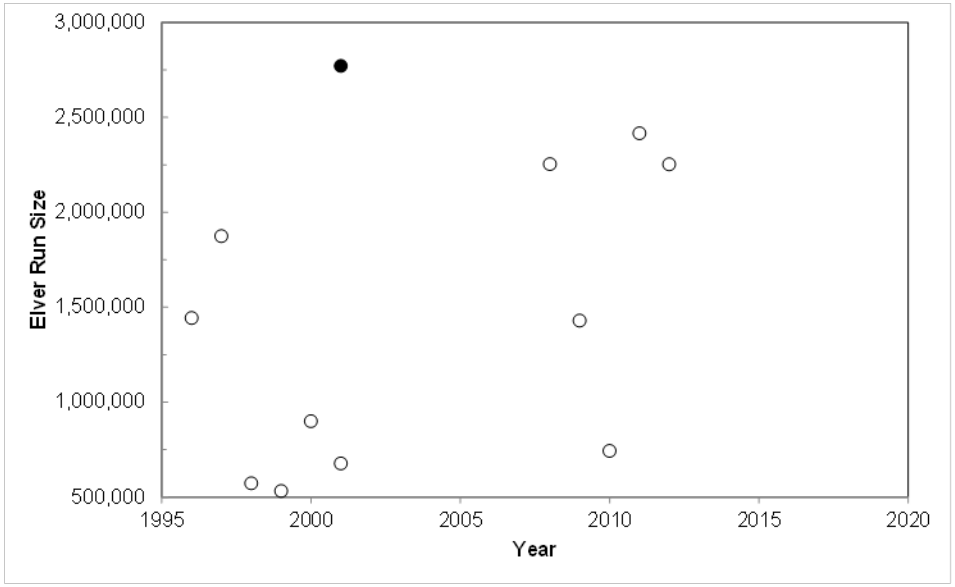

N
W
E
S
HydroBarriers
0 37.5 75 150 225 300
Km


N
W
E
S
0 40 80 160 240 320
Km
A. crassus presence/absence
Legend
Not Present
Present

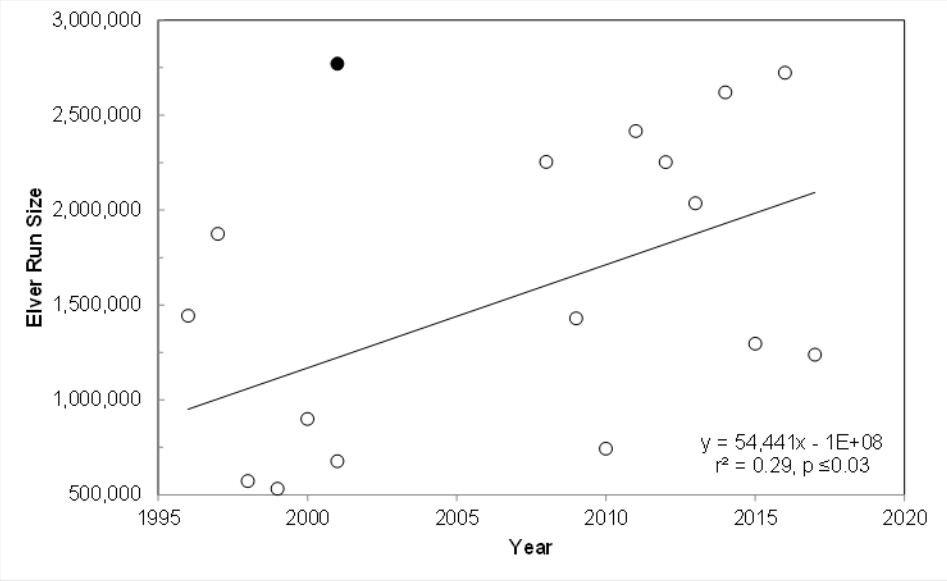
Elver Runs to East River-Chester, Nova Scotia







Upper Panel: Annual elver run size to East River-Chester for the years 1996-2001, 2008-2012. The 2002 estimate is considered inaccurate and is excluded. No significant trend with time is evident.



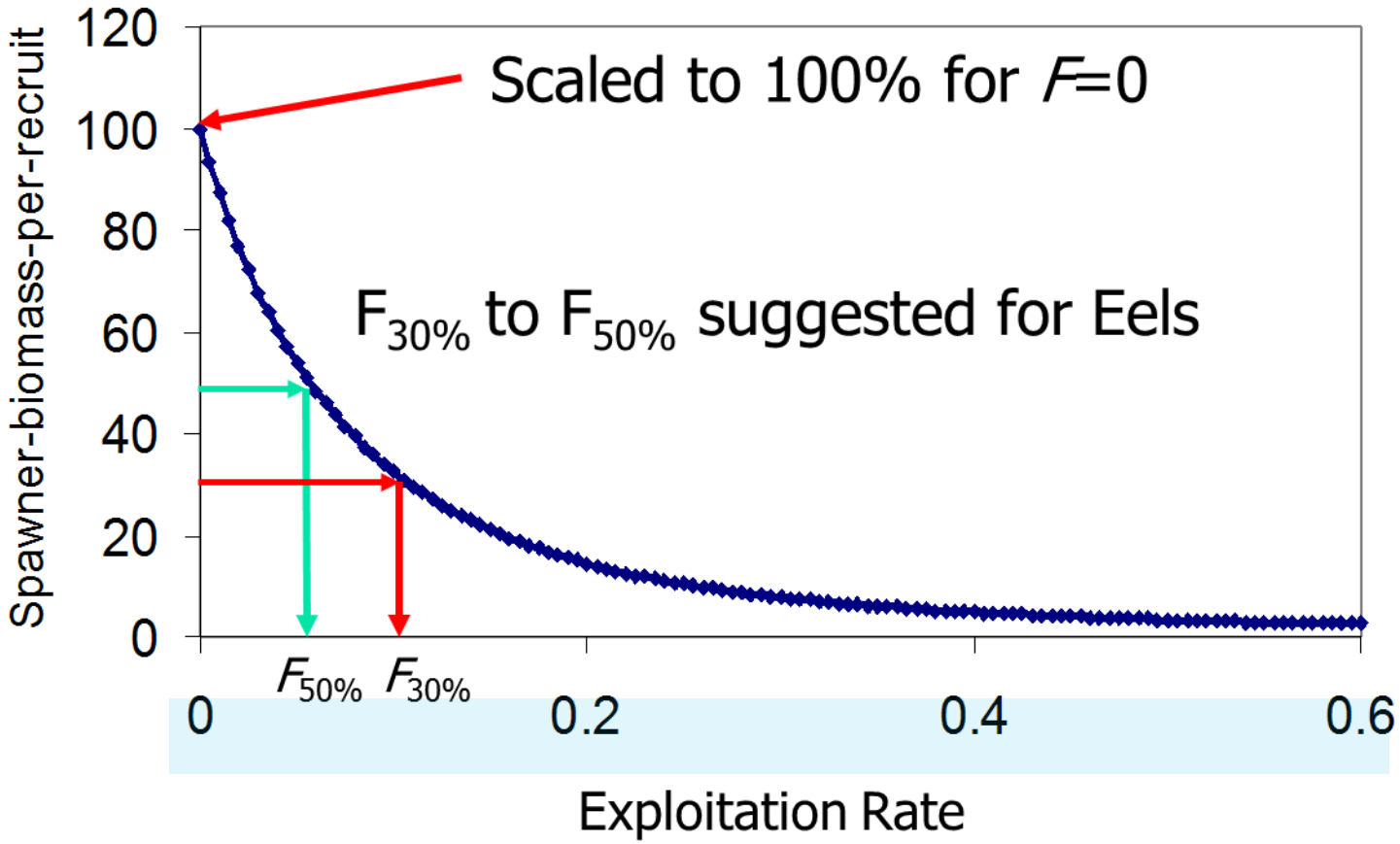
Lower Panel: Annual elver run size to East River-Chester for the years 1996-2001, 2008-2017. The 2002 estimate is considered inaccurate and is excluded. A statistically significant increase in annual elver run size with time is evident.

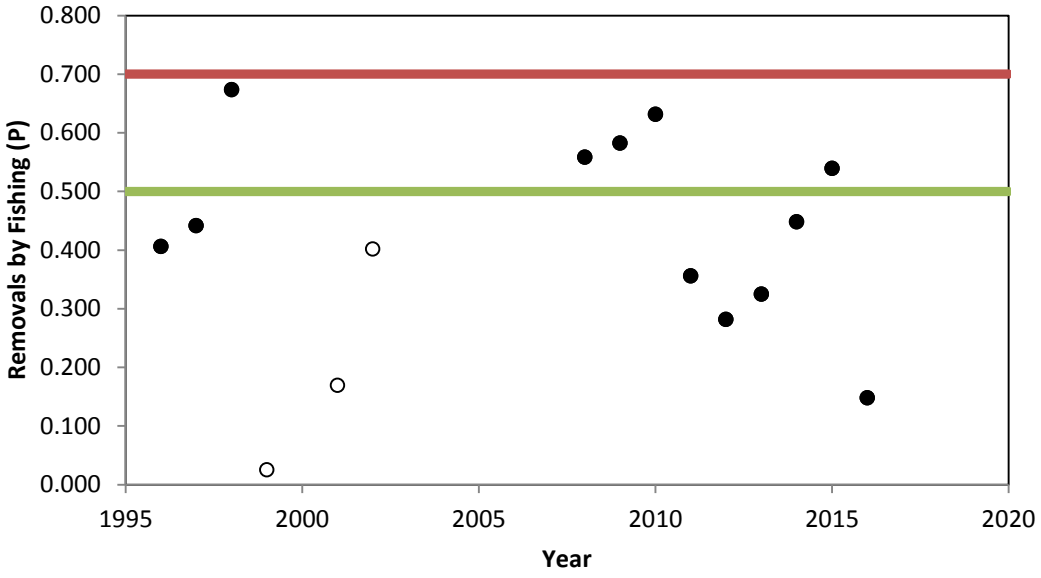
East River-Chester

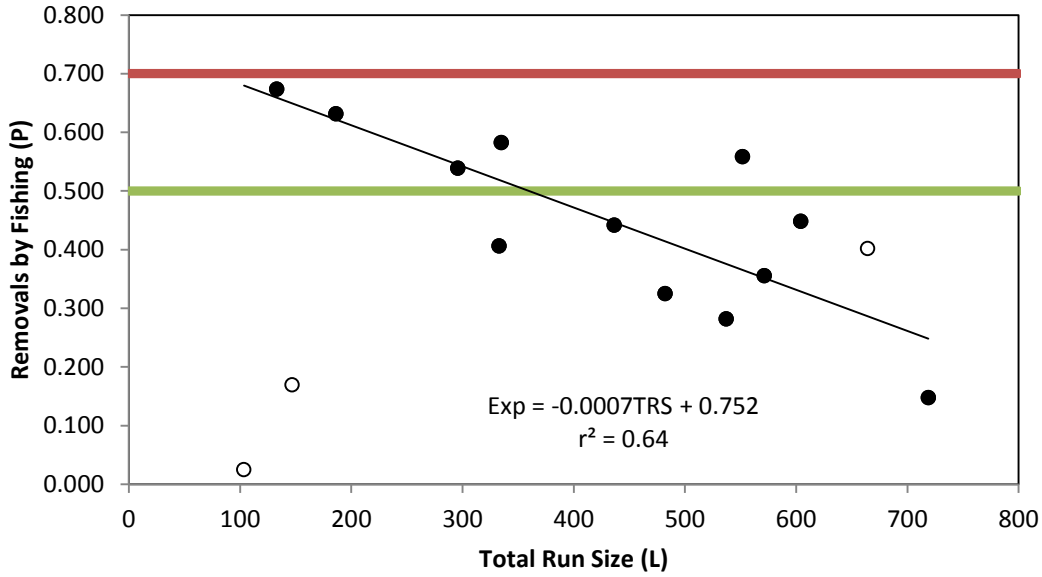
Area = 134 km^2

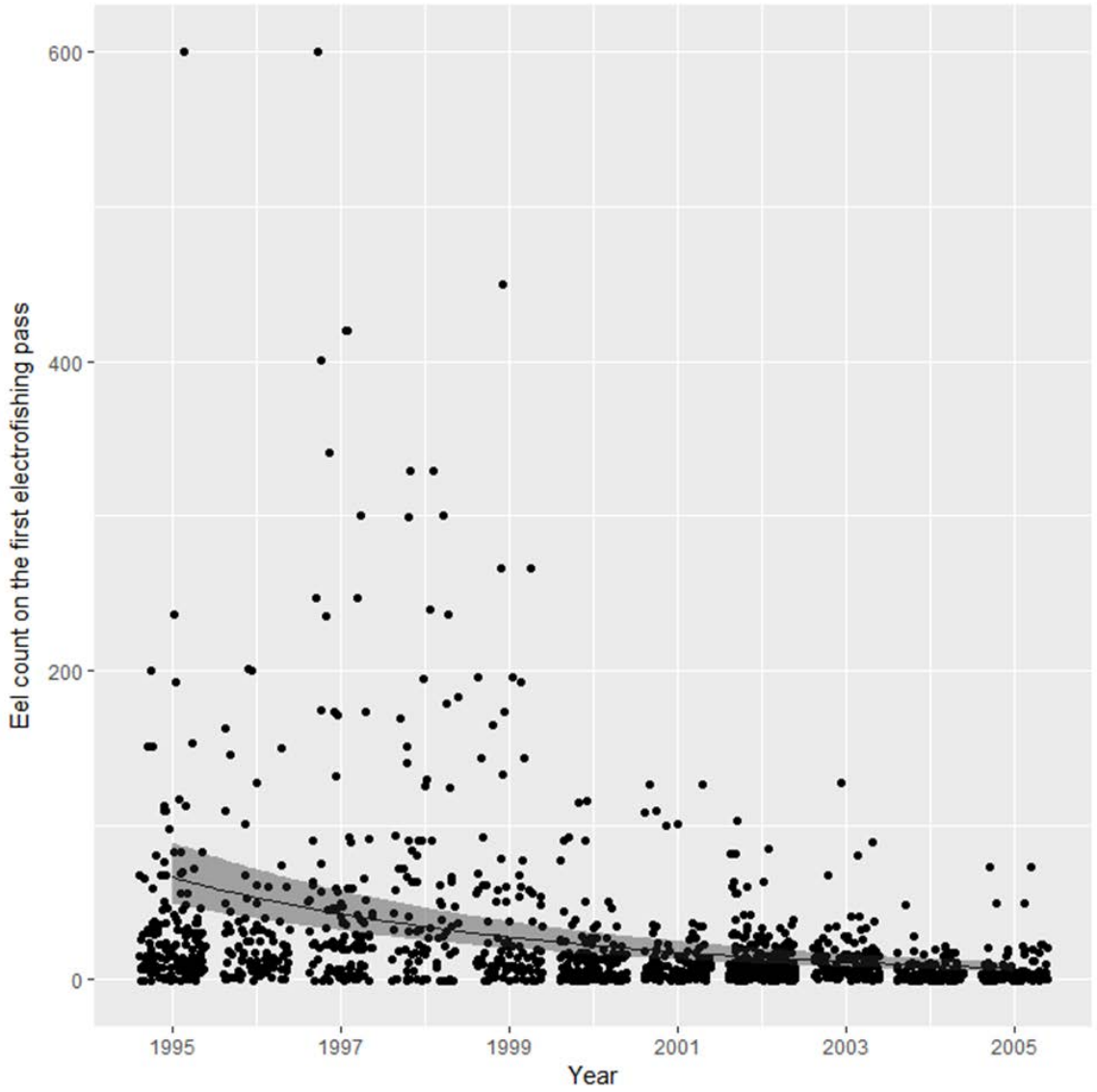
<u>Annual Run-Size</u>
n = 16 Years
Low ~0.5 million
High ~2.5 million

<u>Average Increase per Year</u>
~55,000 elvers


Spawner-biomass-per-recruit
120
100
80
60
40
20
0
Scaled to 100% for F=0
F30% to F50% suggested for Eels
F50%
F30%
0
0.2
0.4
0.6
Exploitation Rate


0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Removals by Fishing (P)
1995
2000
2005
2010
2015
2020
Year


0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Removals by Fishing (P)
Exp = -0.0007TRS + 0.752
r² = 0.64
0
100
200
300
400
500
600
700
800
Total Run Size (L)



Predicted fit and 95% CI for the decline in first-pass counts of American eel during 1995 to 2005 from the chosen zero-truncated negative binomial GLMM. Individual points are spread out slightly along the x-axis to be visible. Data combined for 29 NS rivers.