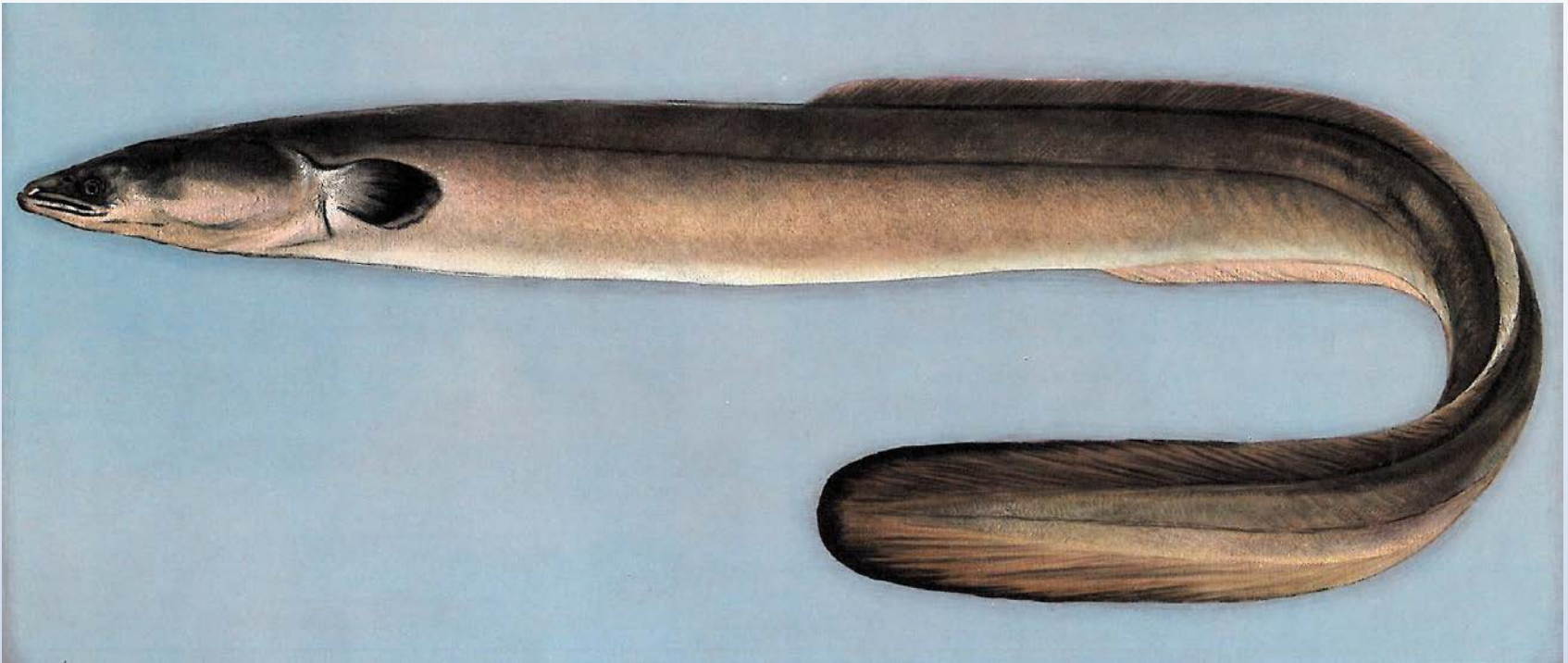


The Geography of American Eels



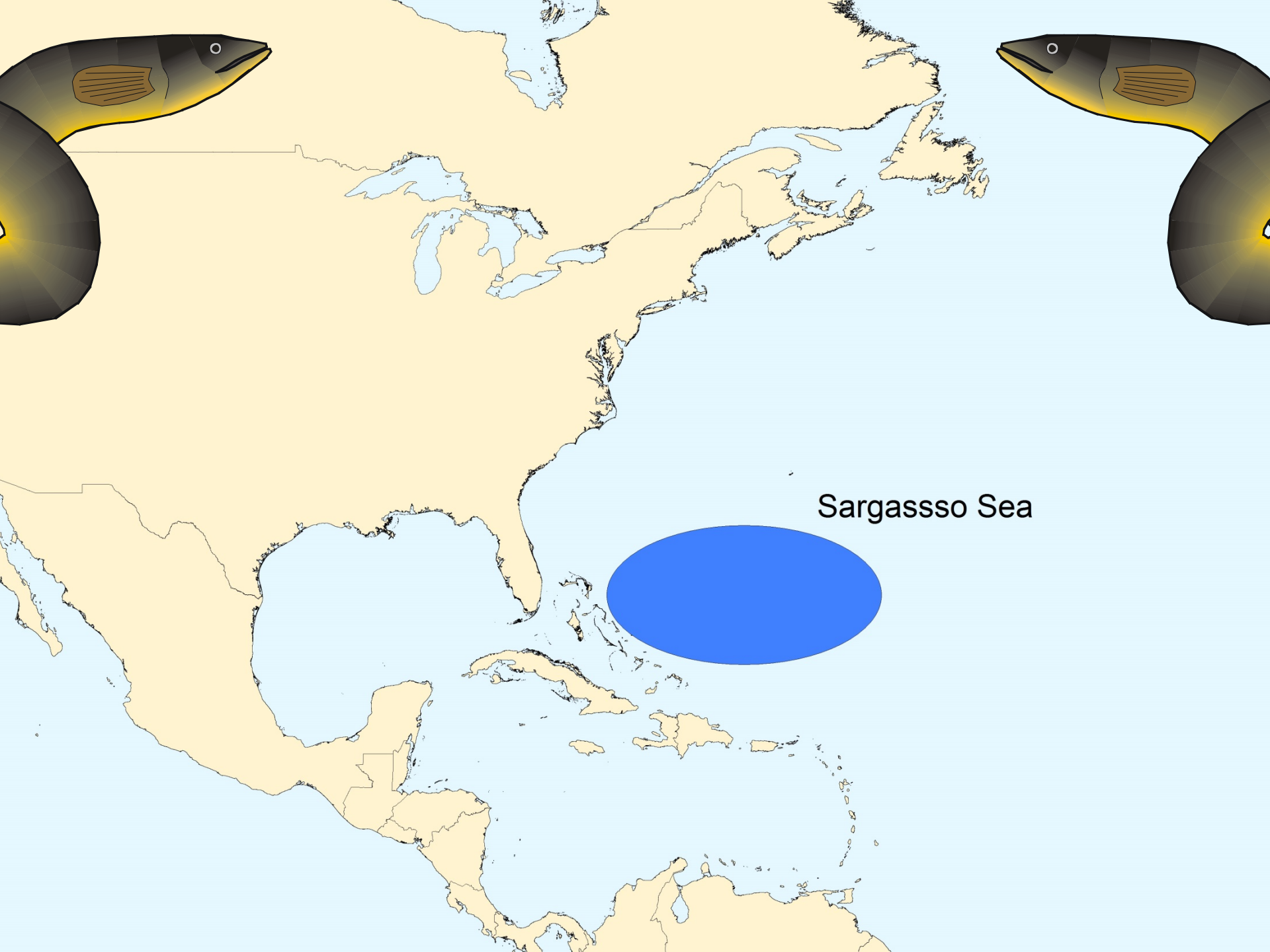
David Cairns

Department of Fisheries and Oceans

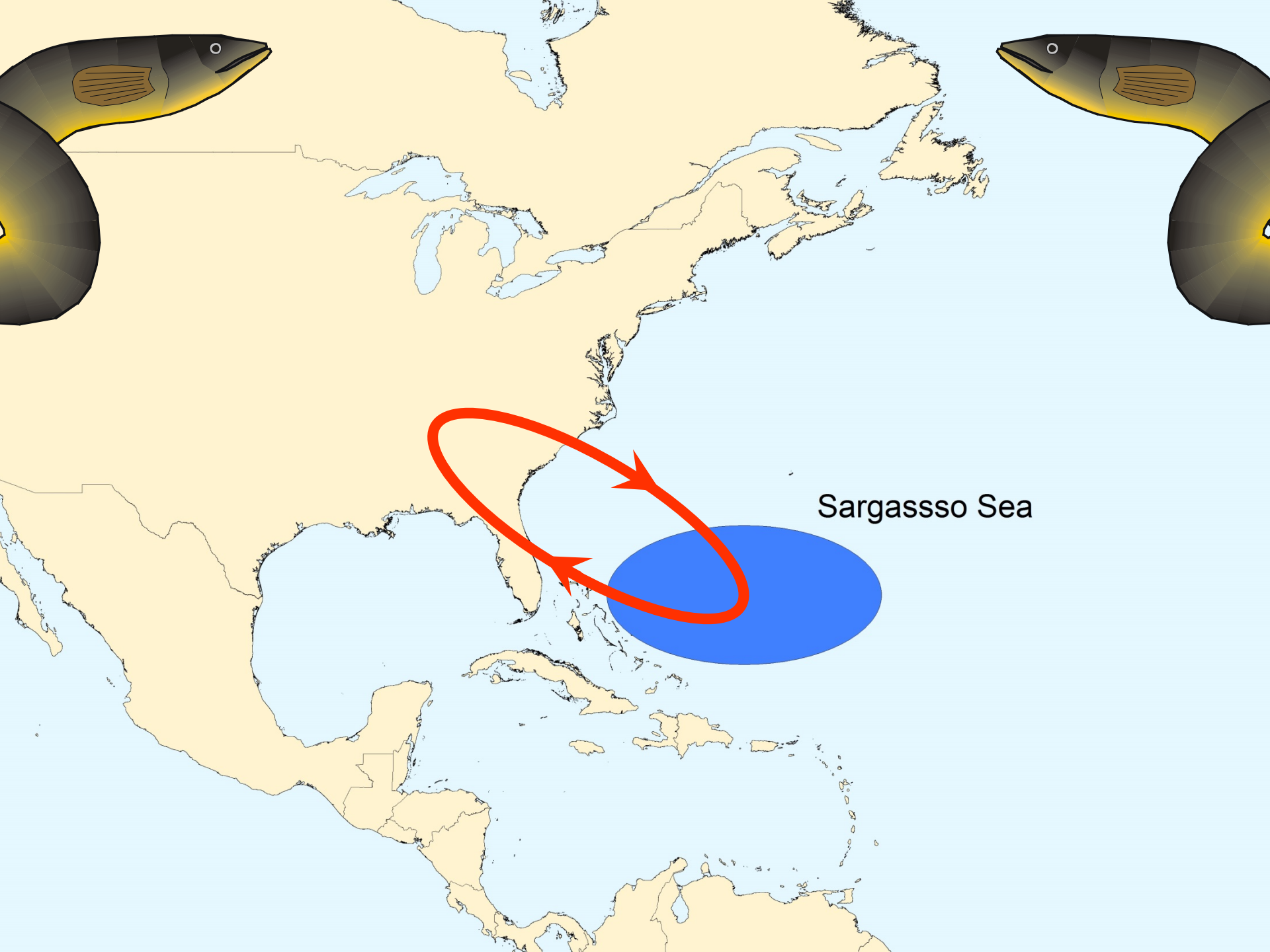
pre-CITES Workshop

Santo Domingo, Dominican Republic, 4-6 April 2018

Canada 



Sargasso Sea



Sargasso Sea

CONTINENTAL LIFE

OCEAN LIFE

Freshwater, estuaries, bays

Continental shelf

Deep ocean

Eggs



Leptocephalus



CONTINENTAL LIFE

OCEAN LIFE

Freshwater, estuaries, bays

Continental shelf

Deep ocean

Eggs



Leptocephalus



Glass eel



Elver



CONTINENTAL LIFE

OCEAN LIFE

Freshwater, estuaries, bays

Continental shelf

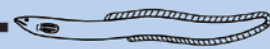
Deep ocean



Yellow eel



Elver



Glass eel



Eggs



Leptocephalus



CONTINENTAL LIFE

OCEAN LIFE

Freshwater, estuaries, bays

Continental shelf

Deep ocean



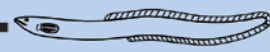
Silver eel



Yellow eel



Elver



Glass eel



Eggs

Leptocephalus



CONTINENTAL LIFE

OCEAN LIFE

Freshwater, estuaries, bays

Continental shelf

Deep ocean



Silver eel



Yellow eel



Elver



Glass eel

Eggs

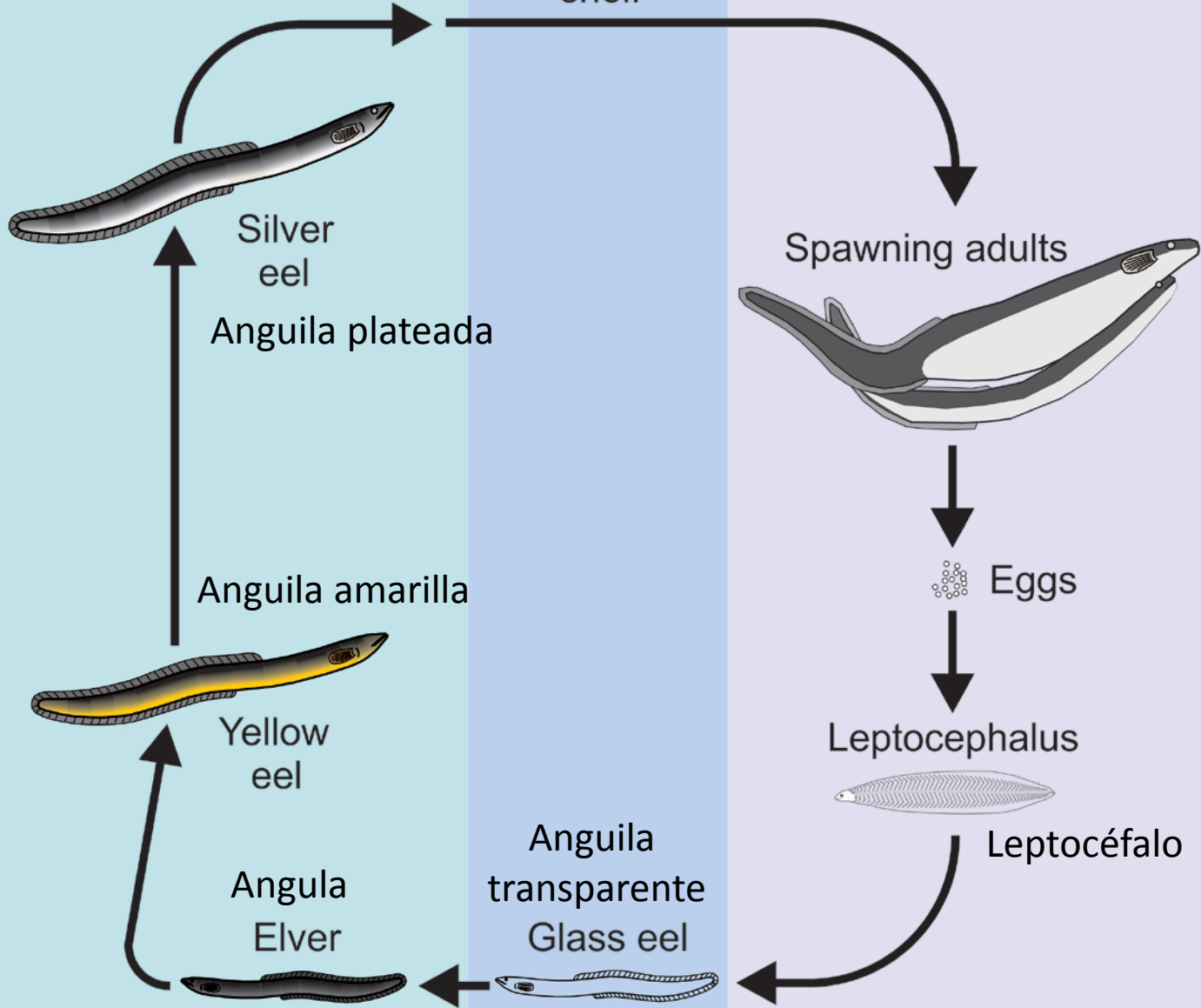
Leptocephalus



Freshwater, estuaries, bays

Continental shelf

Deep ocean



Silver eel
Anguilla plateada

Spawning adults

Anguilla amarilla

Eggs

Yellow eel

Leptocephalus

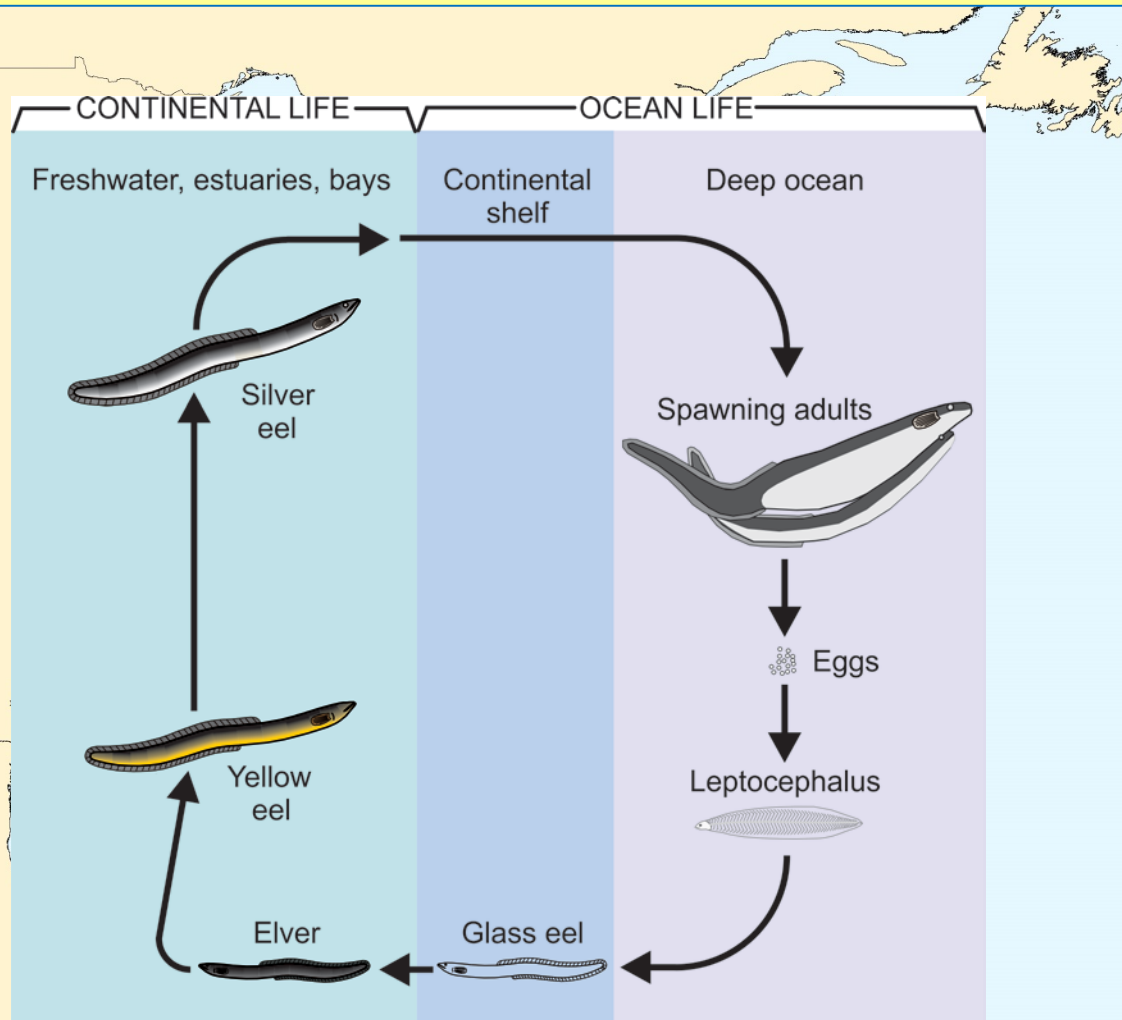


Leptocéfalo

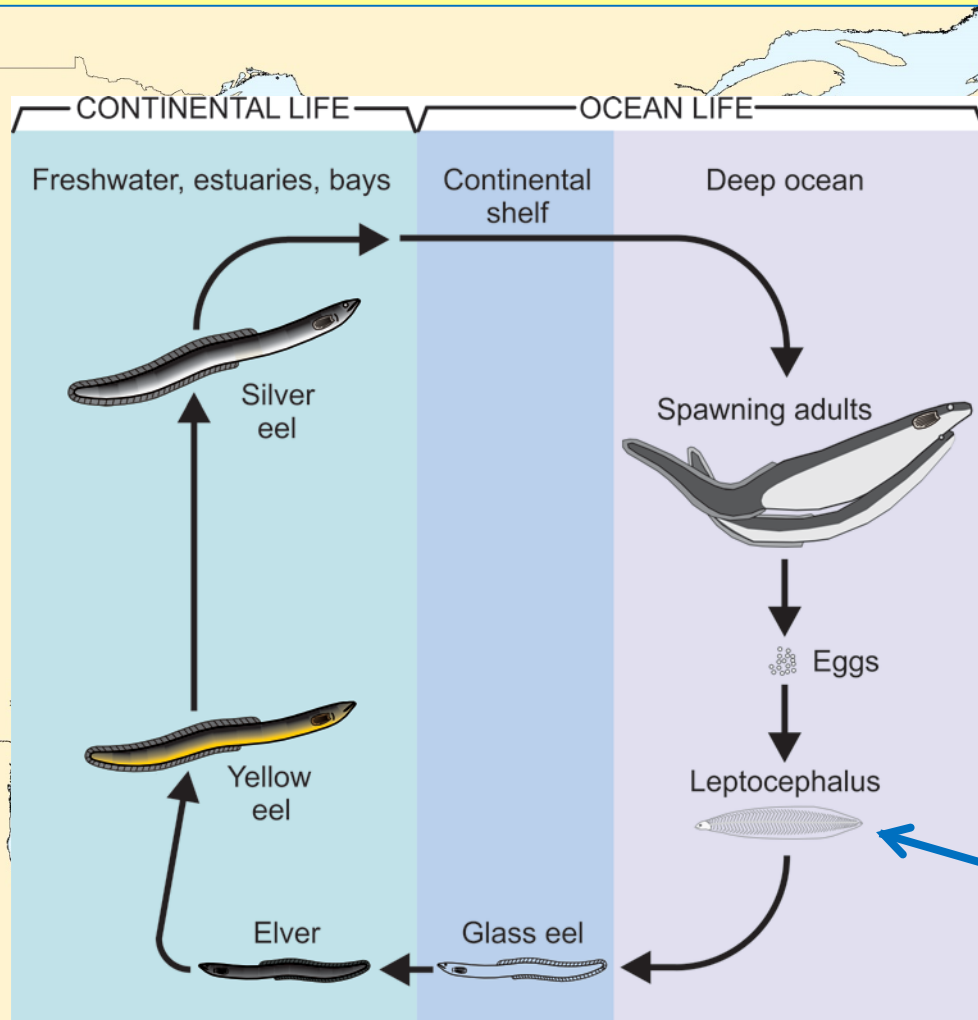
Anguilla Elver

Anguilla transparente
Glass eel

Why are eels so successful?

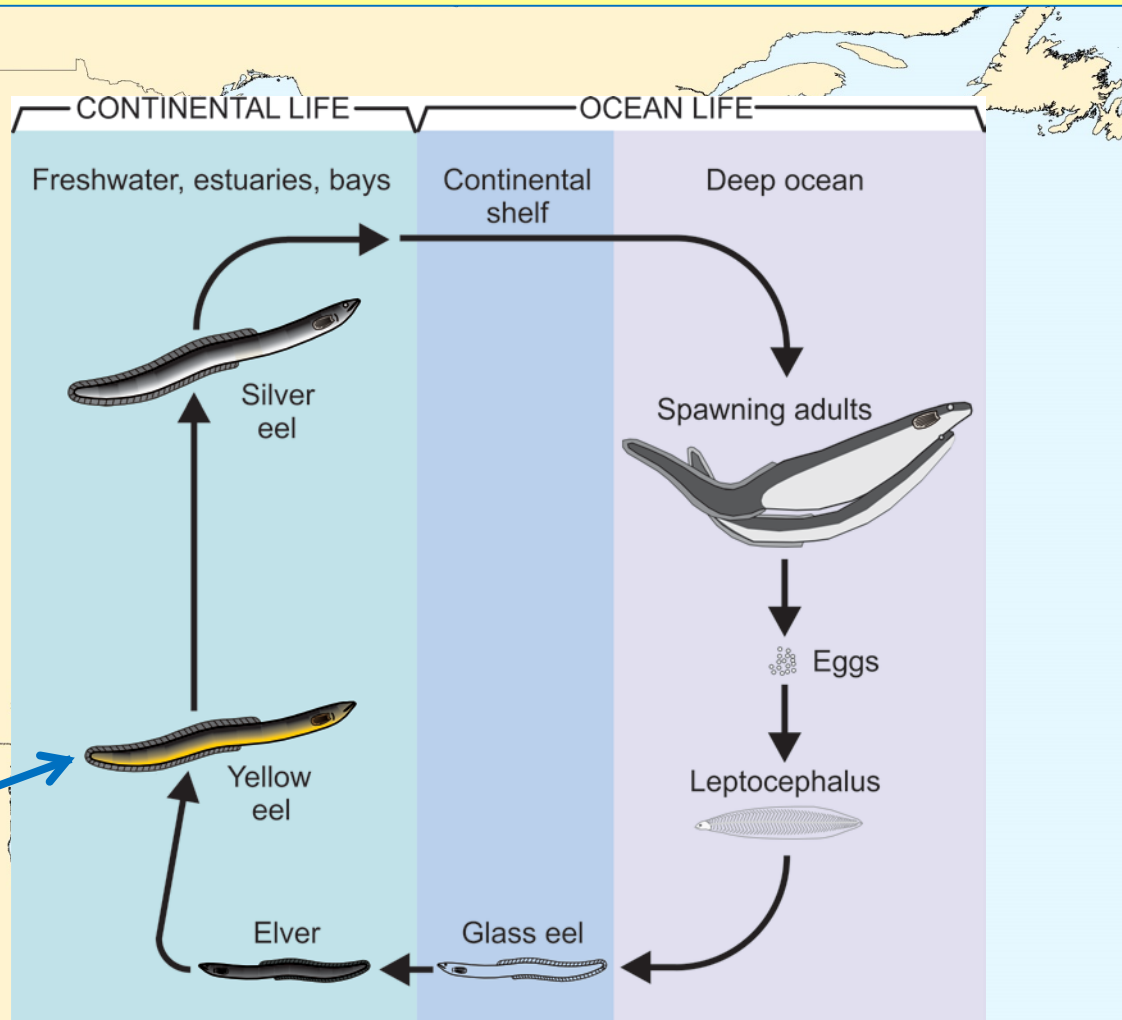


Why are eels so successful?



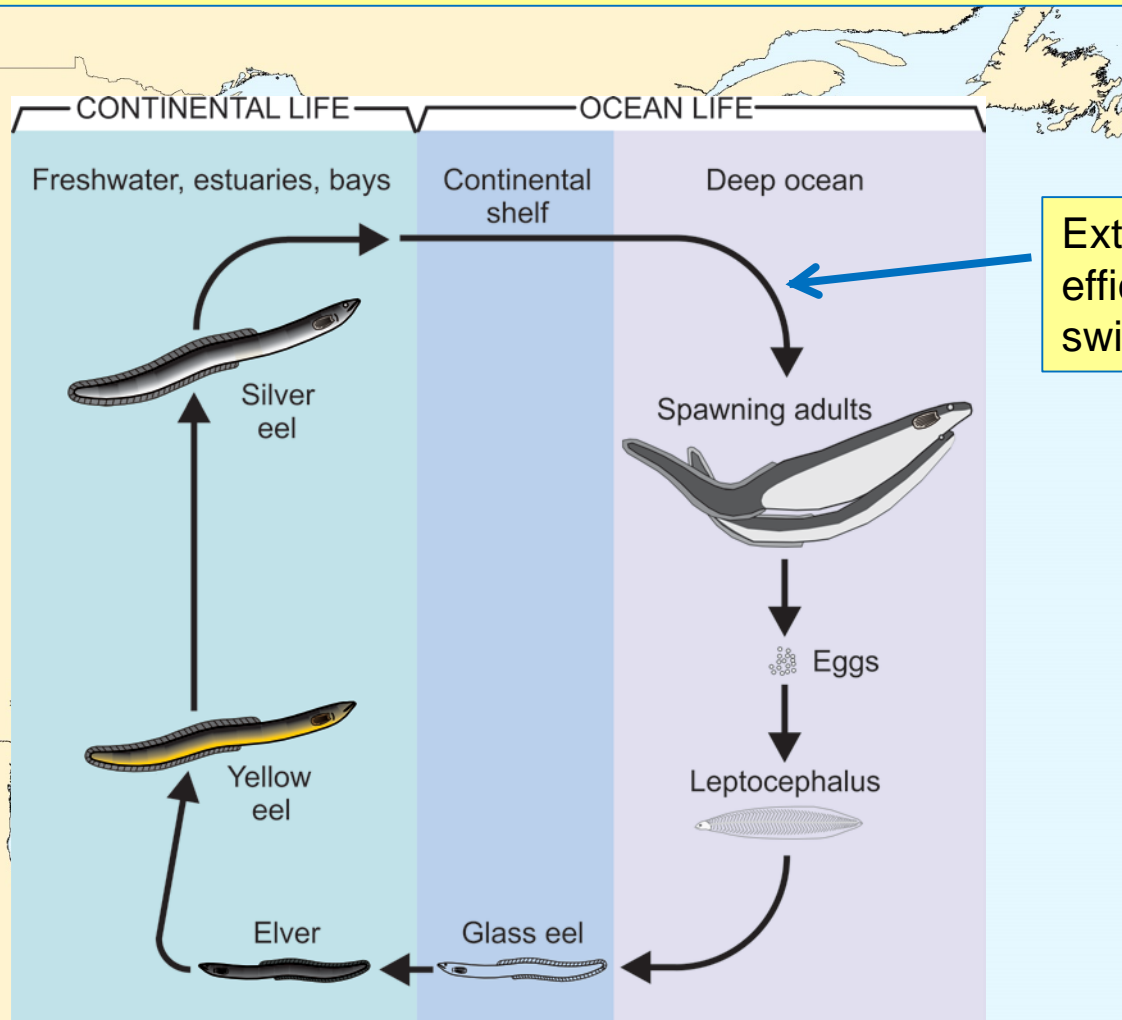
Transparent, hard for predators to detect

Why are eels so successful?

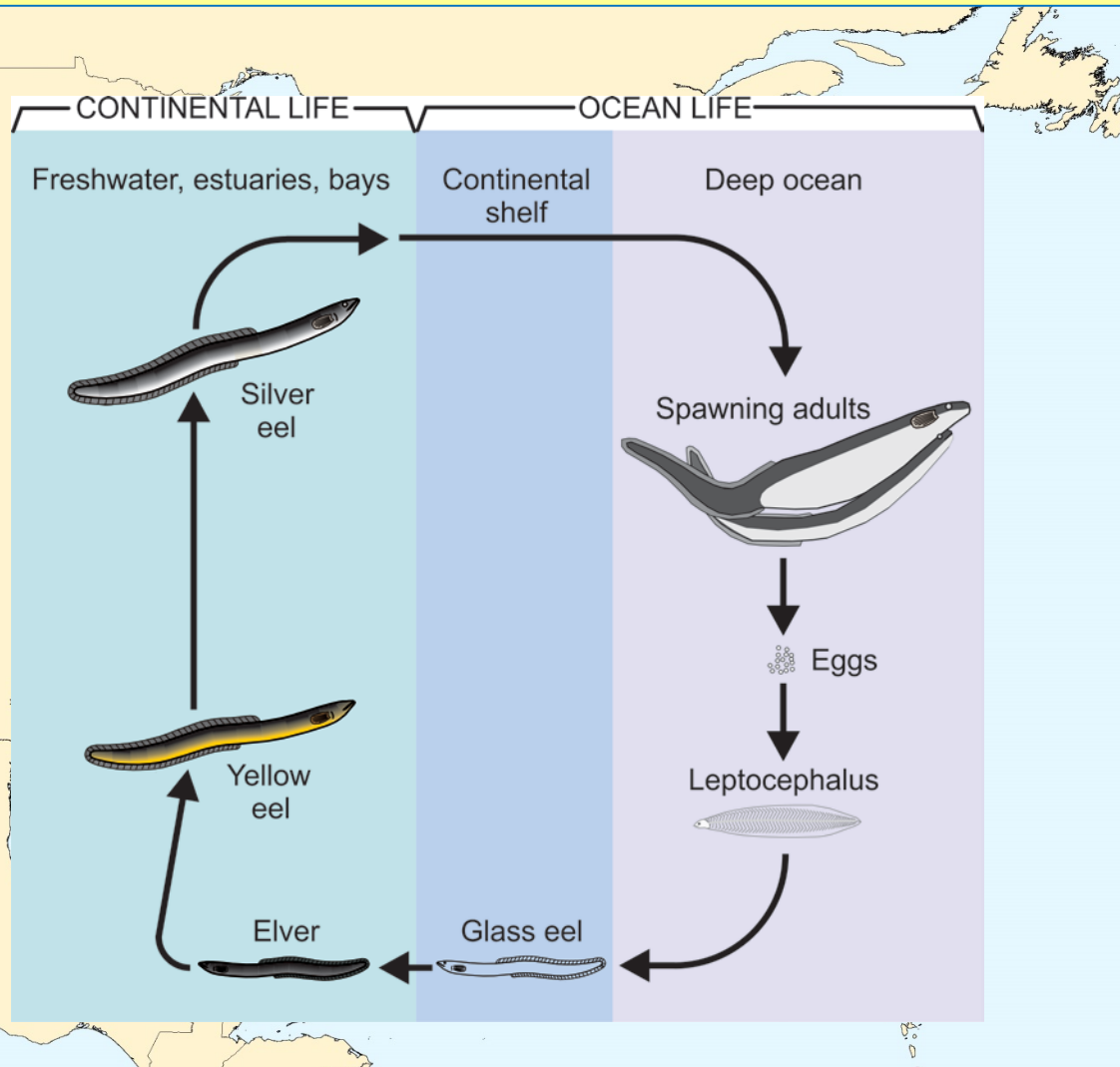


Nocturnal,
burrows in mud

Why are eels so successful?



Why are eels so successful?



The eel's strategy: Avoid predation risk, long period to maturity, high survivorship



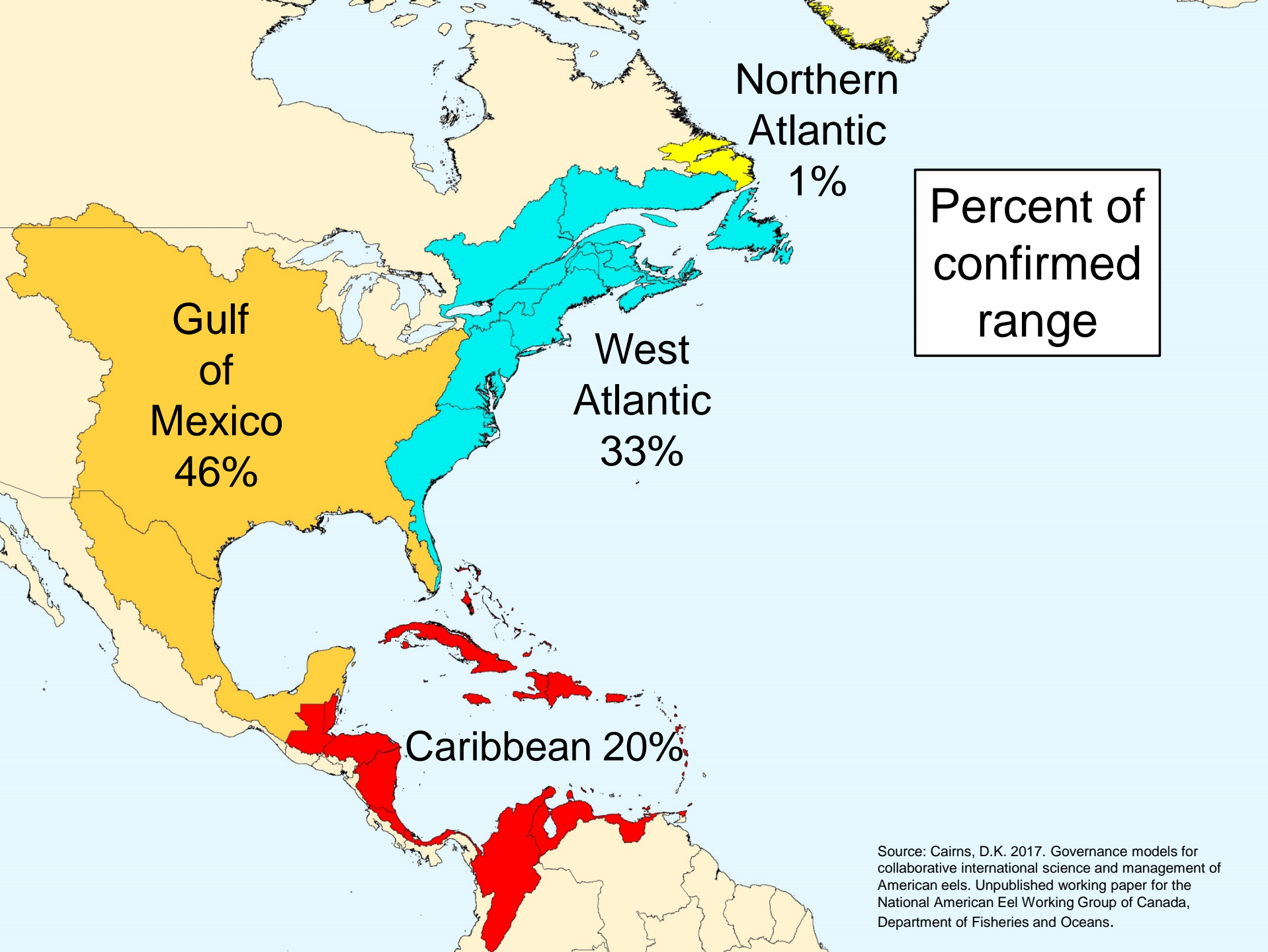
Native range

Confirmed

Plausible

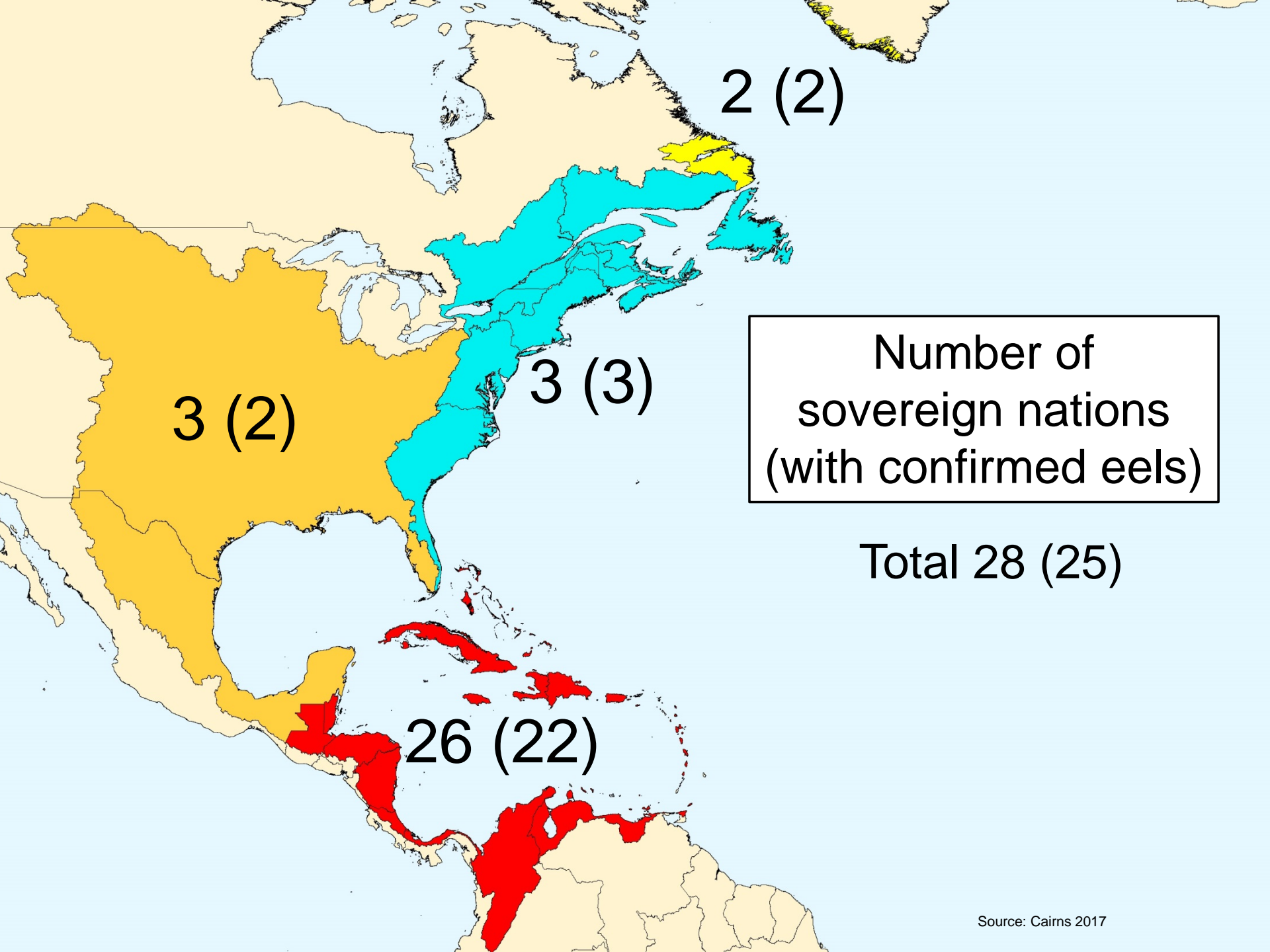
American eel x
European eel
hybrids

Sargasso Sea

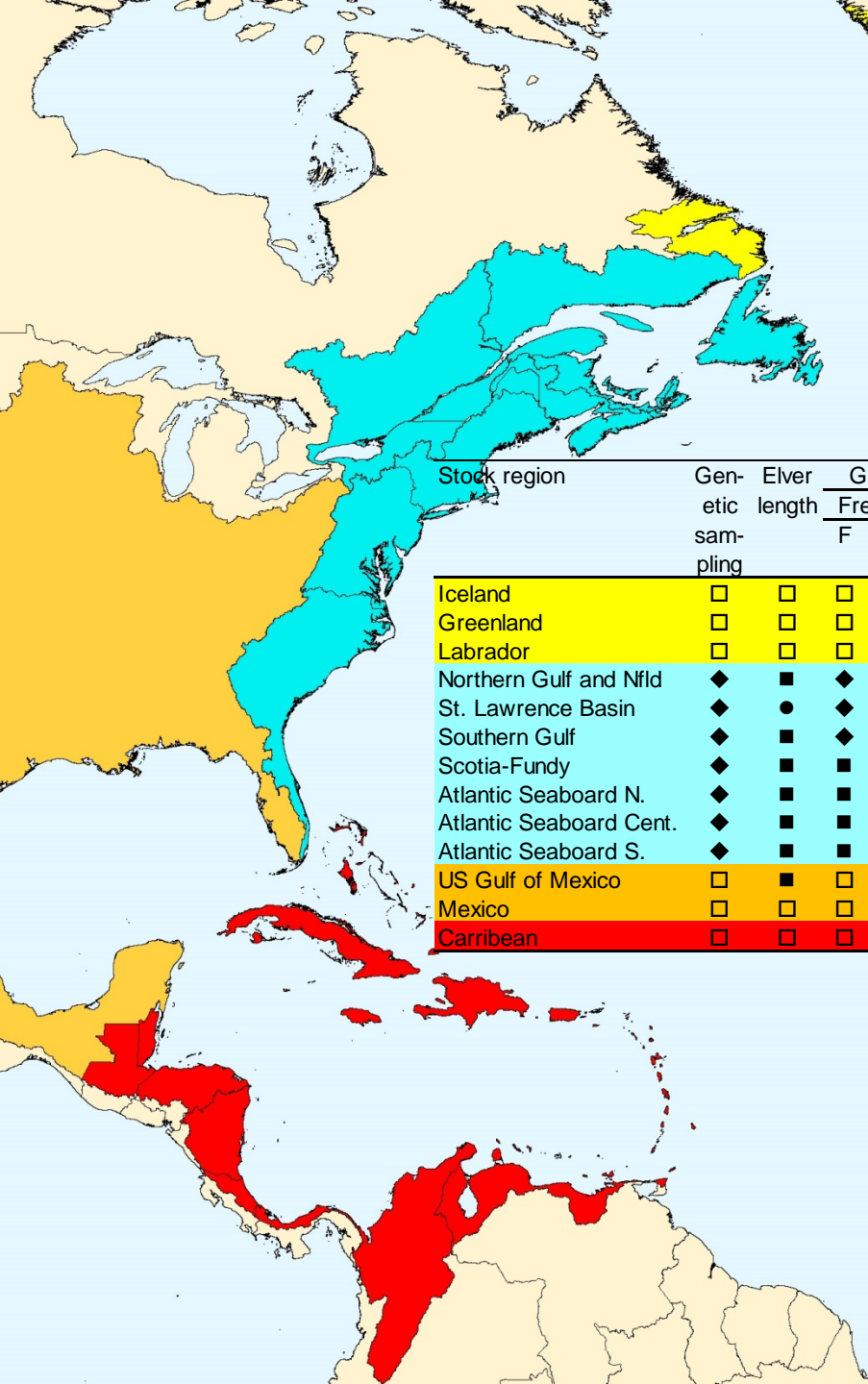


Percent of confirmed range

Source: Cairns, D.K. 2017. Governance models for collaborative international science and management of American eels. Unpublished working paper for the National American Eel Working Group of Canada, Department of Fisheries and Oceans.

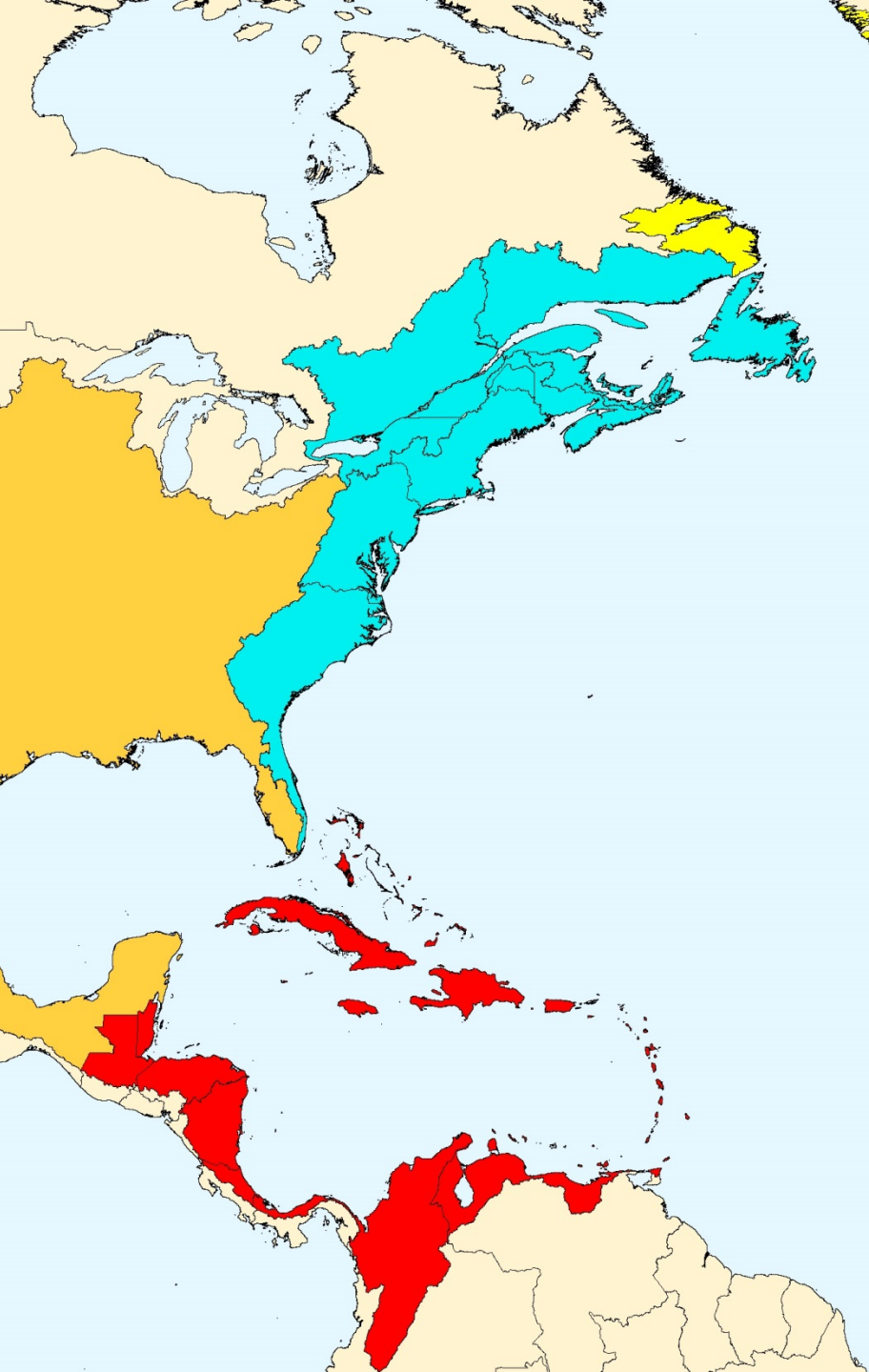


Nearly all data are from the West Atlantic Region



Stock region	Gen-etic sam-pling	Elver length	Growth rate				Silver eel length				Silver eel age				Sex ratio		Fecundity		Nat. mort.		Density		
			Fresh		Saline		Fresh		Saline		Fresh		Saline		Fre-sh	Sa-line	Fre-sh	Sa-line	Fre-sh	Sa-line	Fre-sh	Sa-line	
			F	M	F	M	F	M	F	M	F	M	F	M	F	M	sh	line	sh	line	sh	line	sh
Iceland	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Greenland	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Labrador	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Northern Gulf and Nfld	◆	■	◆	◆	□	□	■	■	□	□	■	◆	□	□	◆	◆	◆	□	◆	□	◆	◆	◆
St. Lawrence Basin	◆	●	◆	□	□	□	■	■	□	□	■	□	□	□	◆	□	◆	□	◆	□	◆	□	□
Southern Gulf	◆	■	◆	◆	□	□	■	■	□	□	■	◆	□	□	◆	□	◆	□	◆	□	◆	◆	◆
Scotia-Fundy	◆	■	◆	◆	◆	◆	◆	◆	◆	◆	■	◆	□	□	◆	□	□	□	◆	□	◆	◆	□
Atlantic Seaboard N.	◆	■	■	■	□	□	◆	◆	□	□	■	■	□	□	◆	◆	◆	□	◆	◆	◆	◆	◆
Atlantic Seaboard Cent.	◆	■	■	■	◆	□	◆	◆	◆	□	■	■	◆	□	◆	◆	□	□	□	◆	◆	◆	◆
Atlantic Seaboard S.	◆	■	■	□	◆	◆	◆	□	◆	◆	■	□	◆	◆	◆	◆	□	□	□	□	◆	◆	◆
US Gulf of Mexico	□	■	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Mexico	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Carribean	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	◆	□

Source: DFO. 2017. An American eel science framework for Canada: a roadmap towards international science collaboration and stockwide assessment. Report by the National American Eel Working Group of Canada to the Department of Fisheries and Oceans Science Executive Committee.

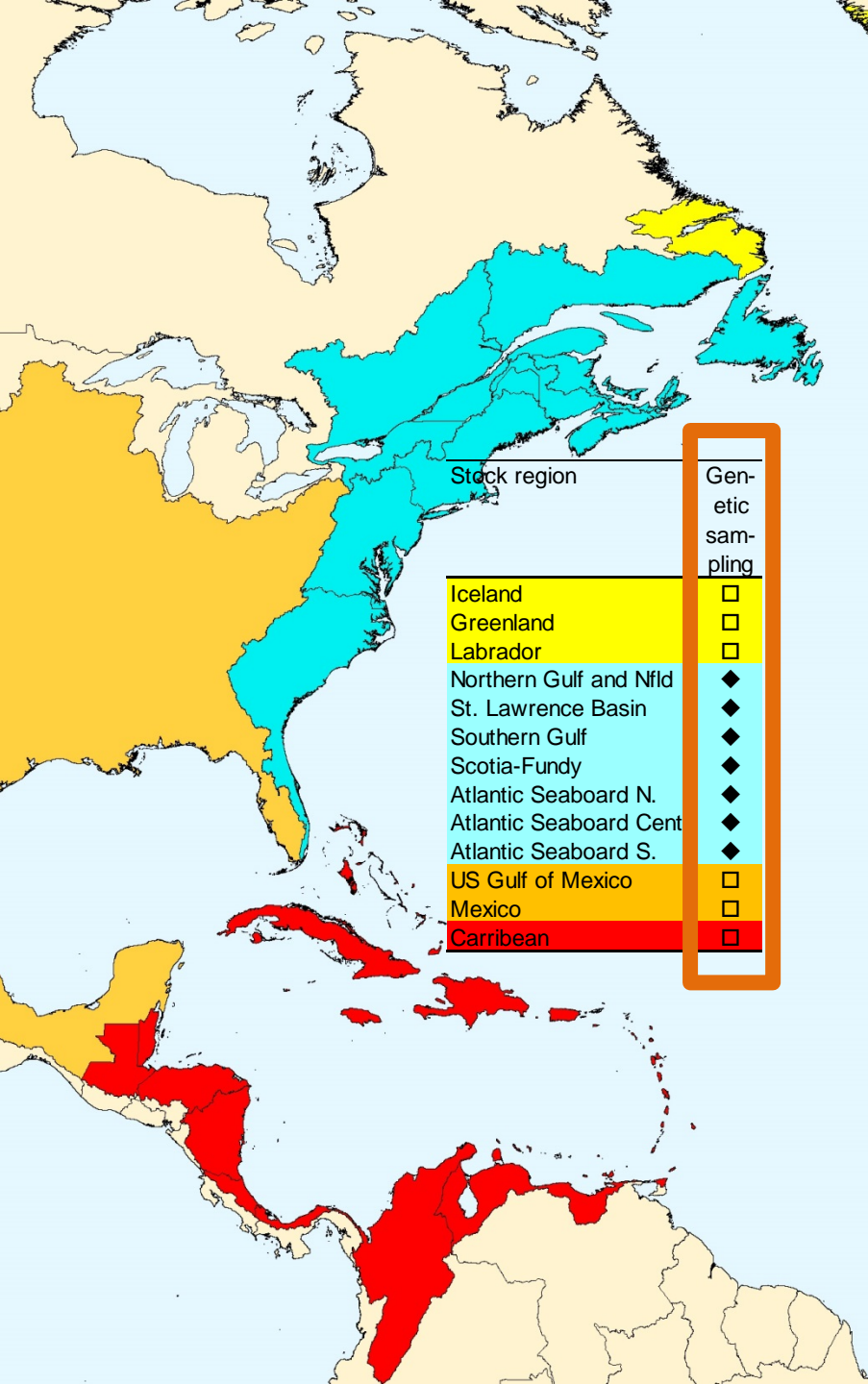


Panmixia:

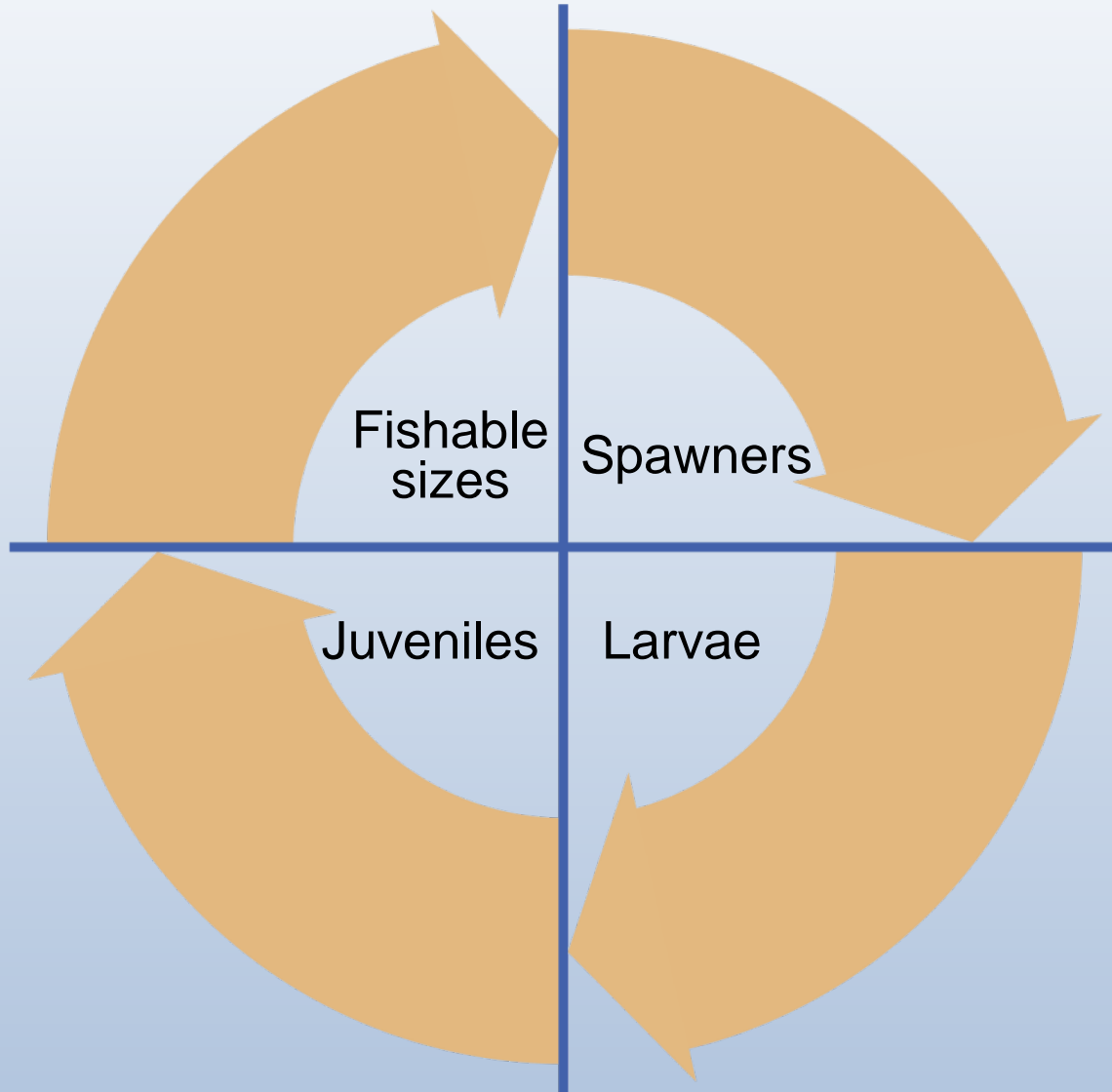
A breeding system where the entire species forms a single genetic stock.

Panmixia:

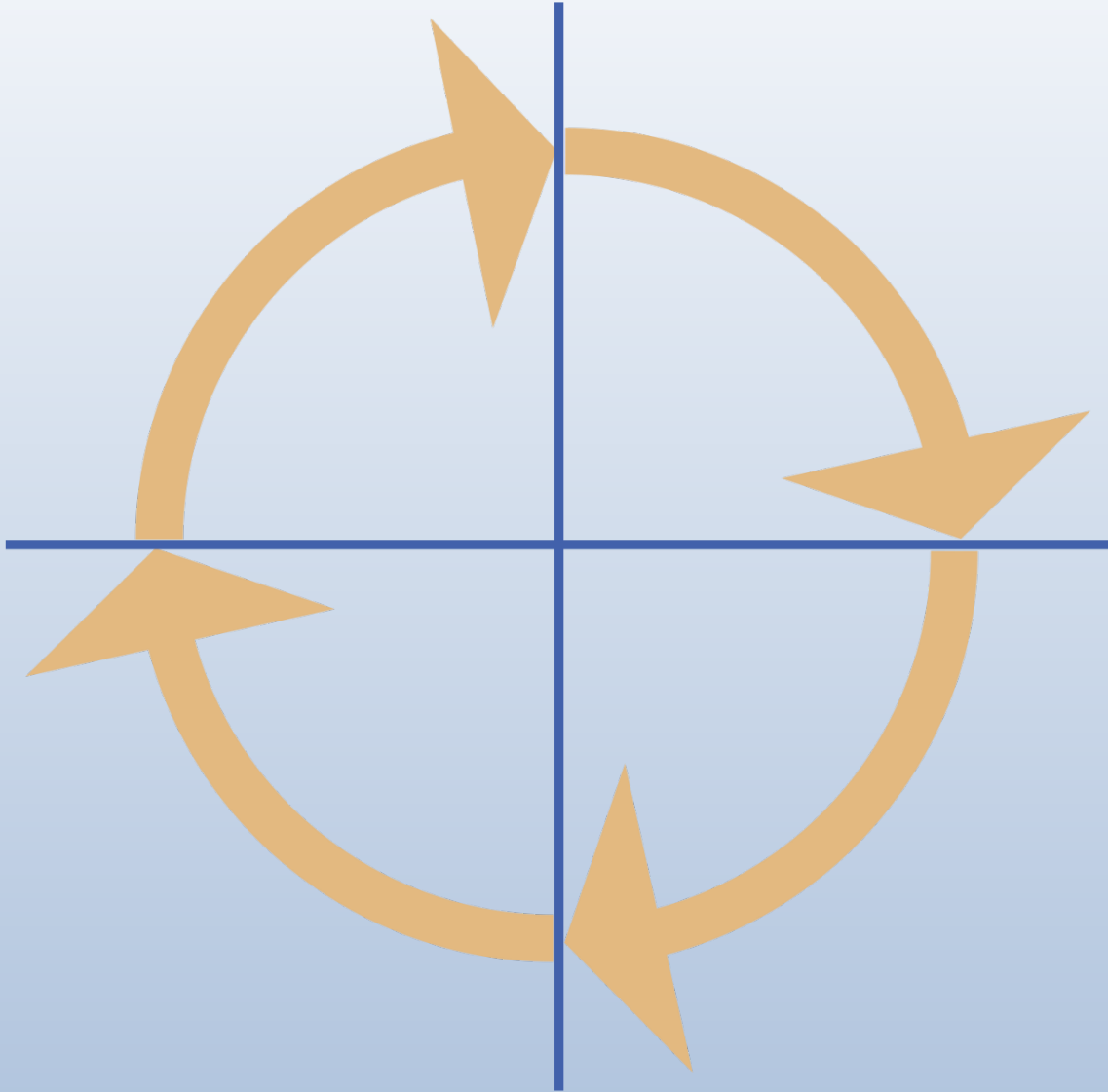
A breeding system where the entire species forms a single genetic stock.



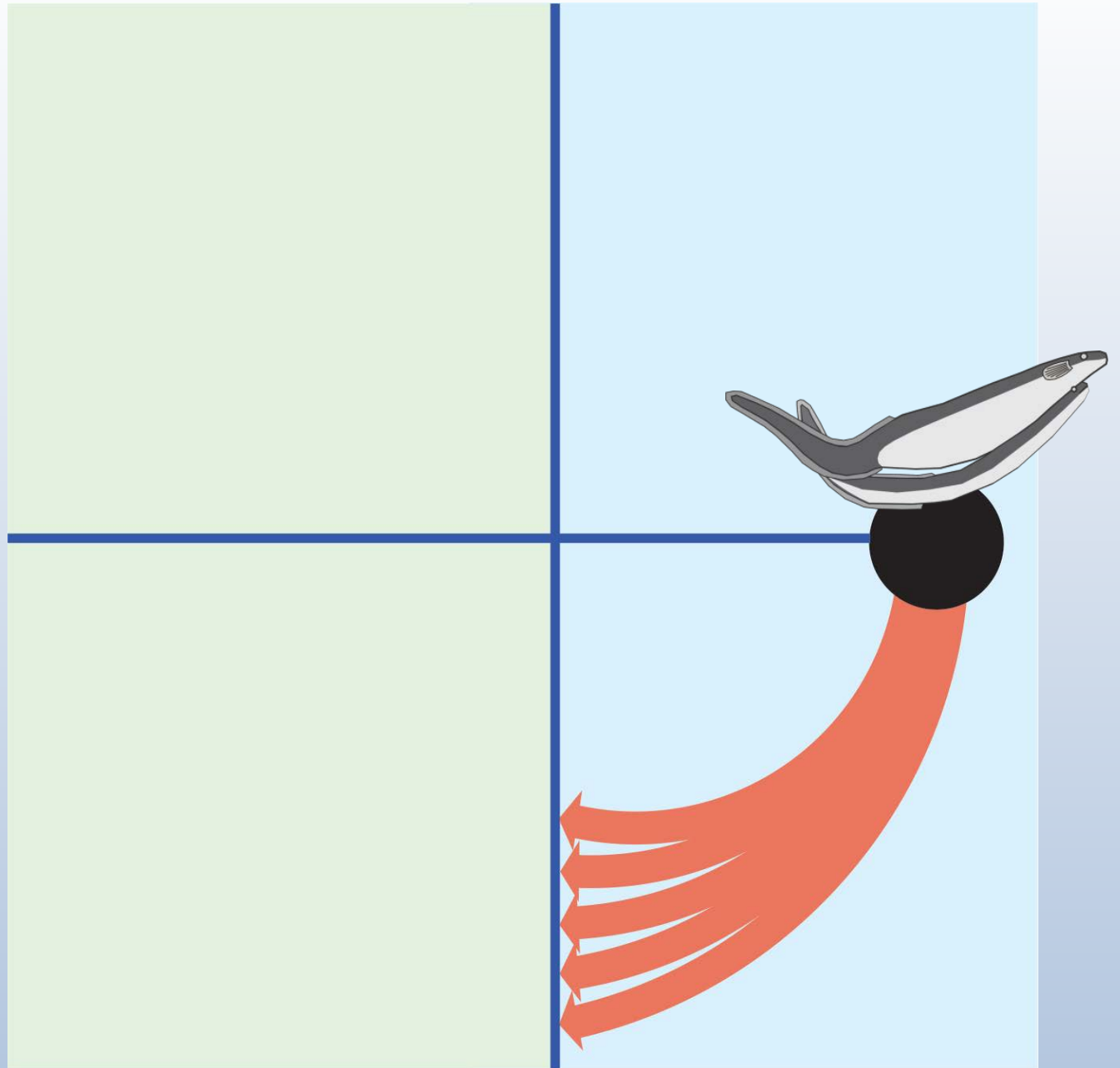
Life cycle of a typical fish stock

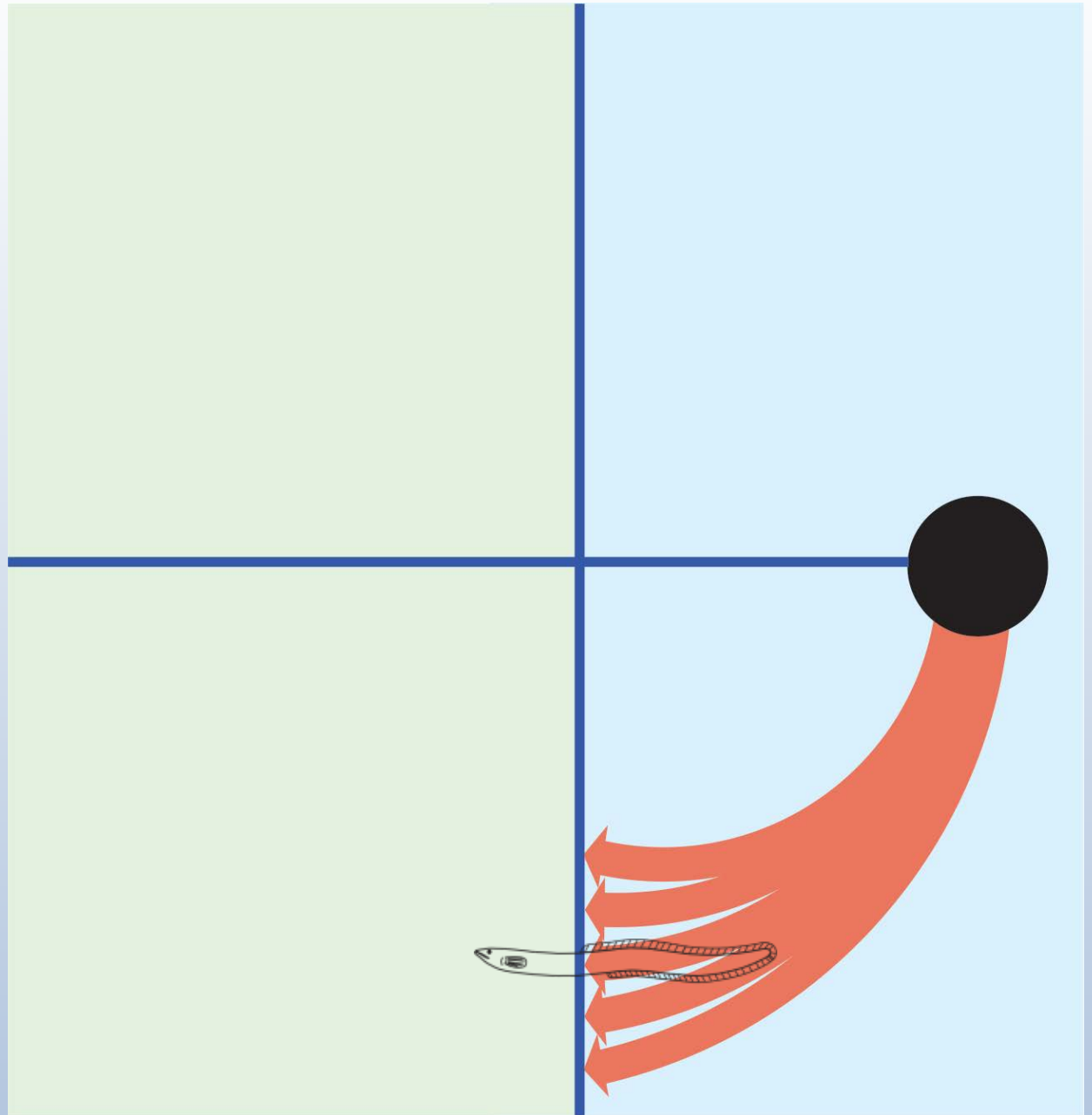


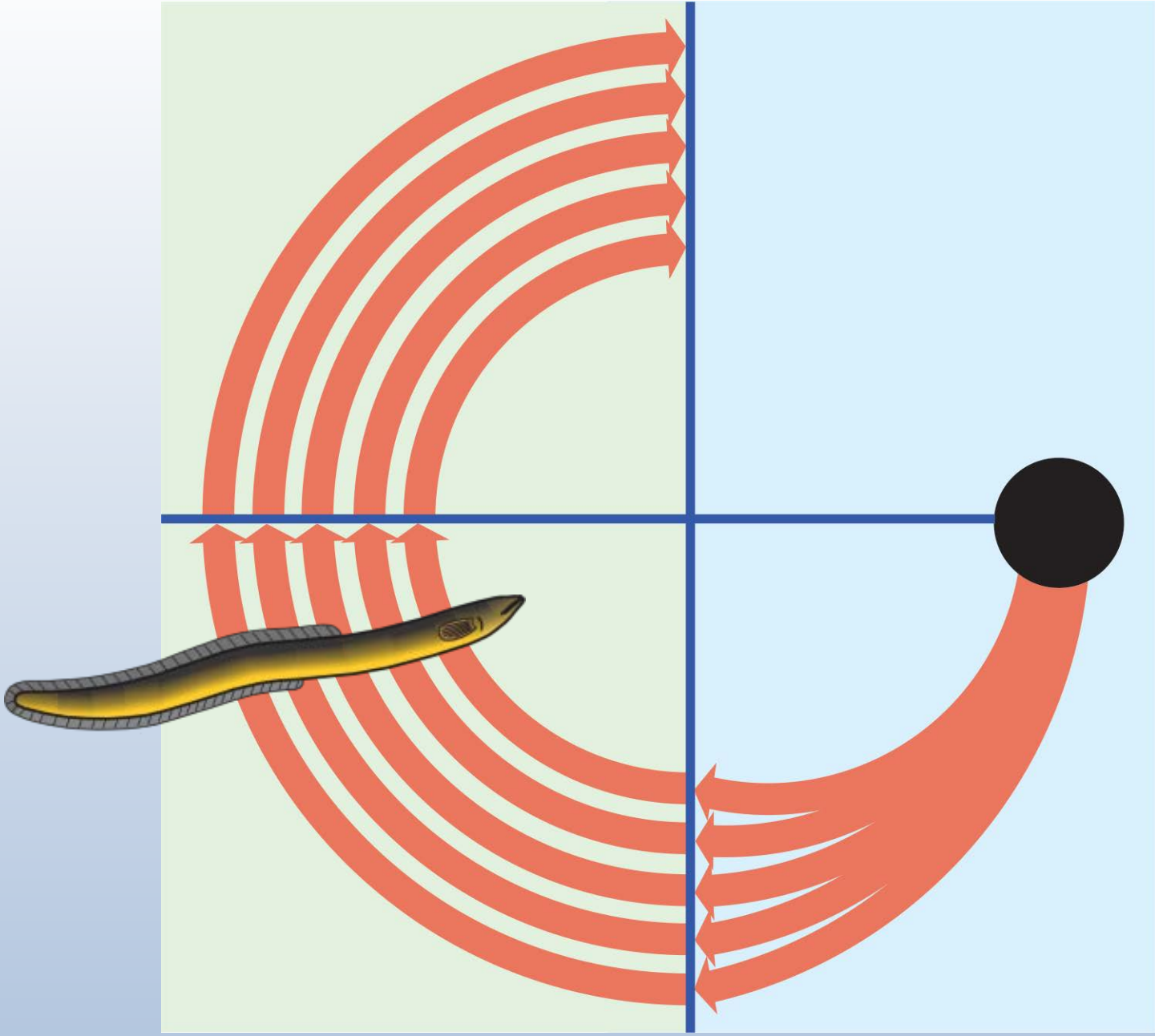
Life cycle of a typical fish stock

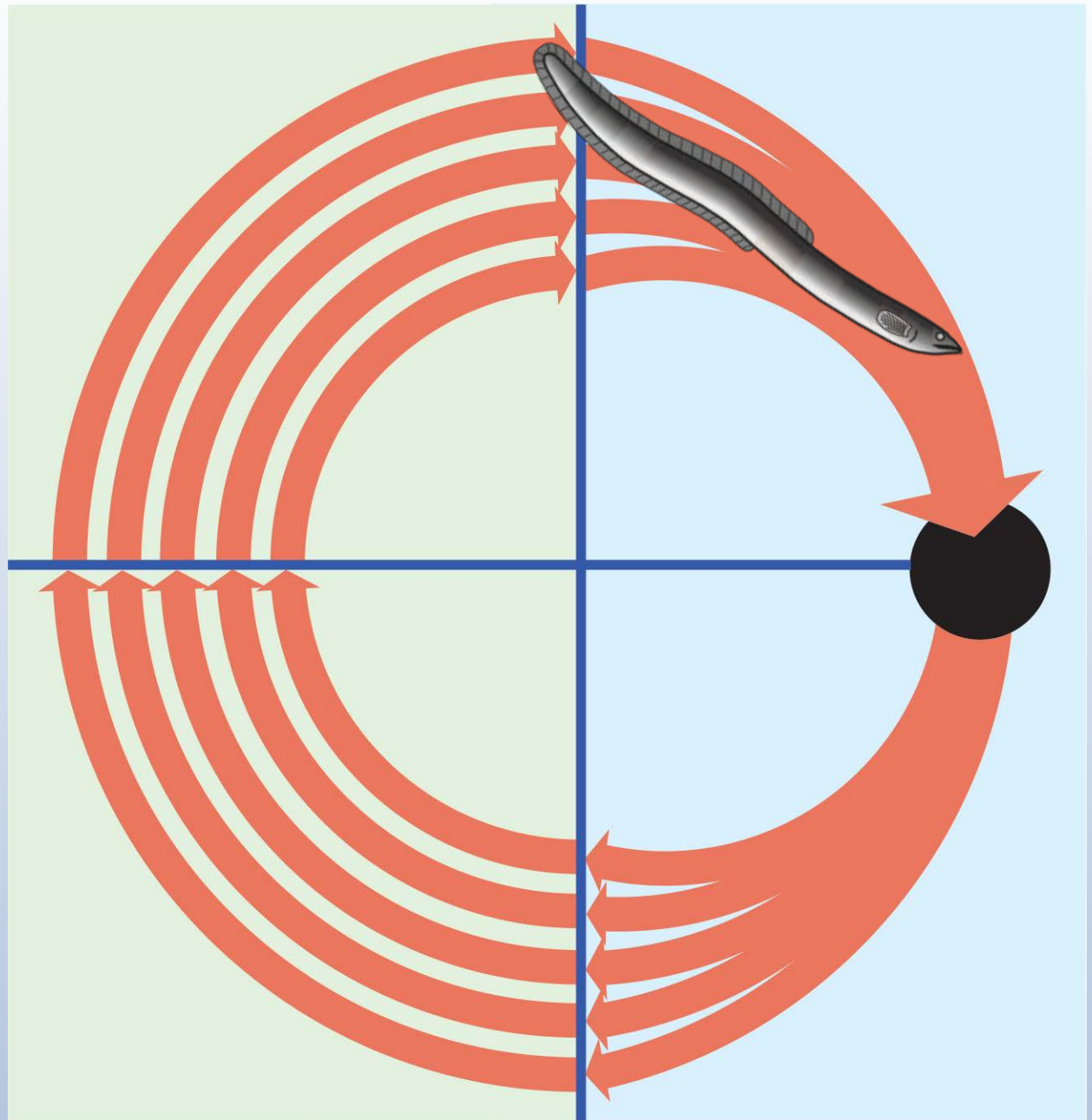


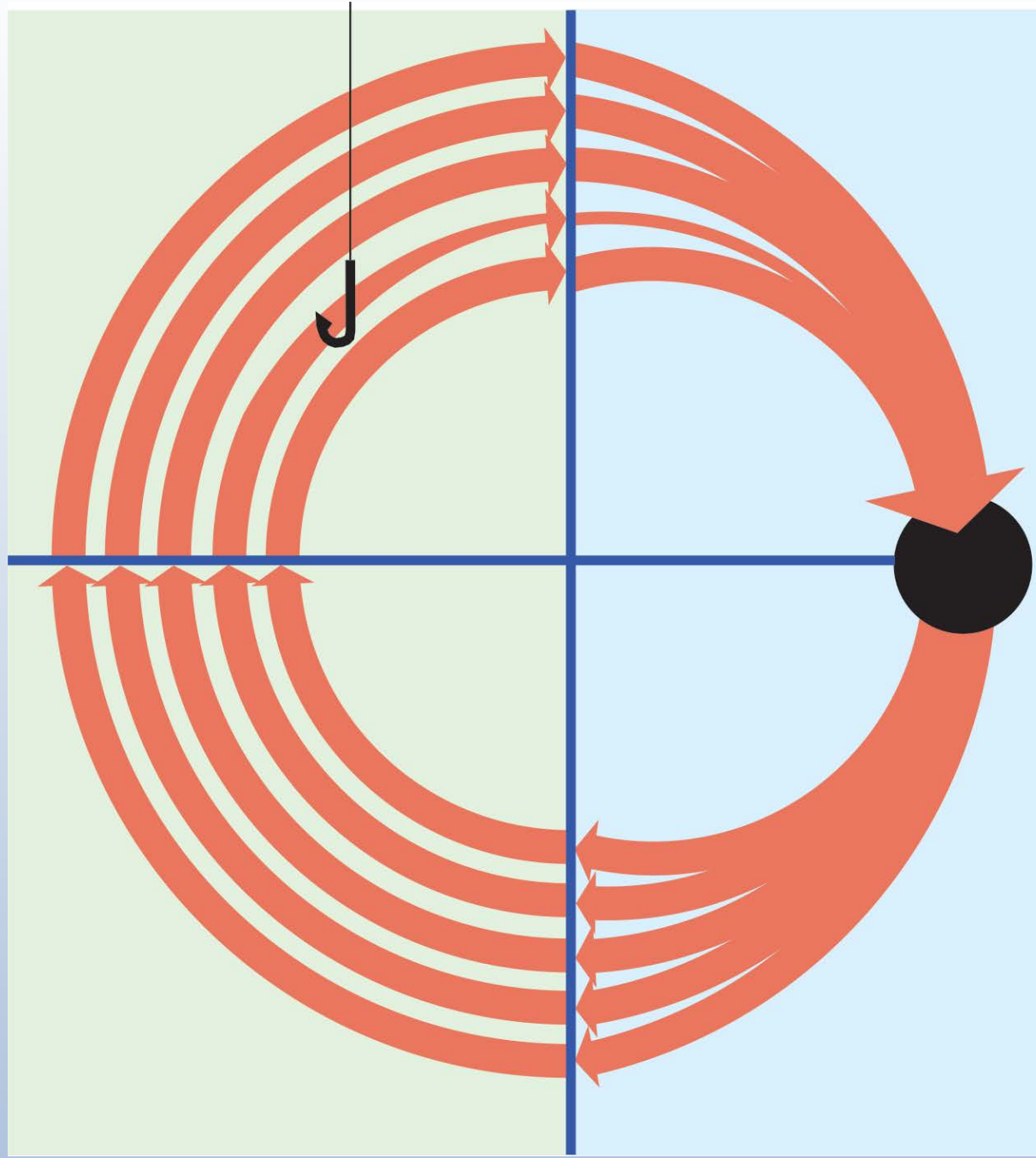
Eel life cycle under panmixis



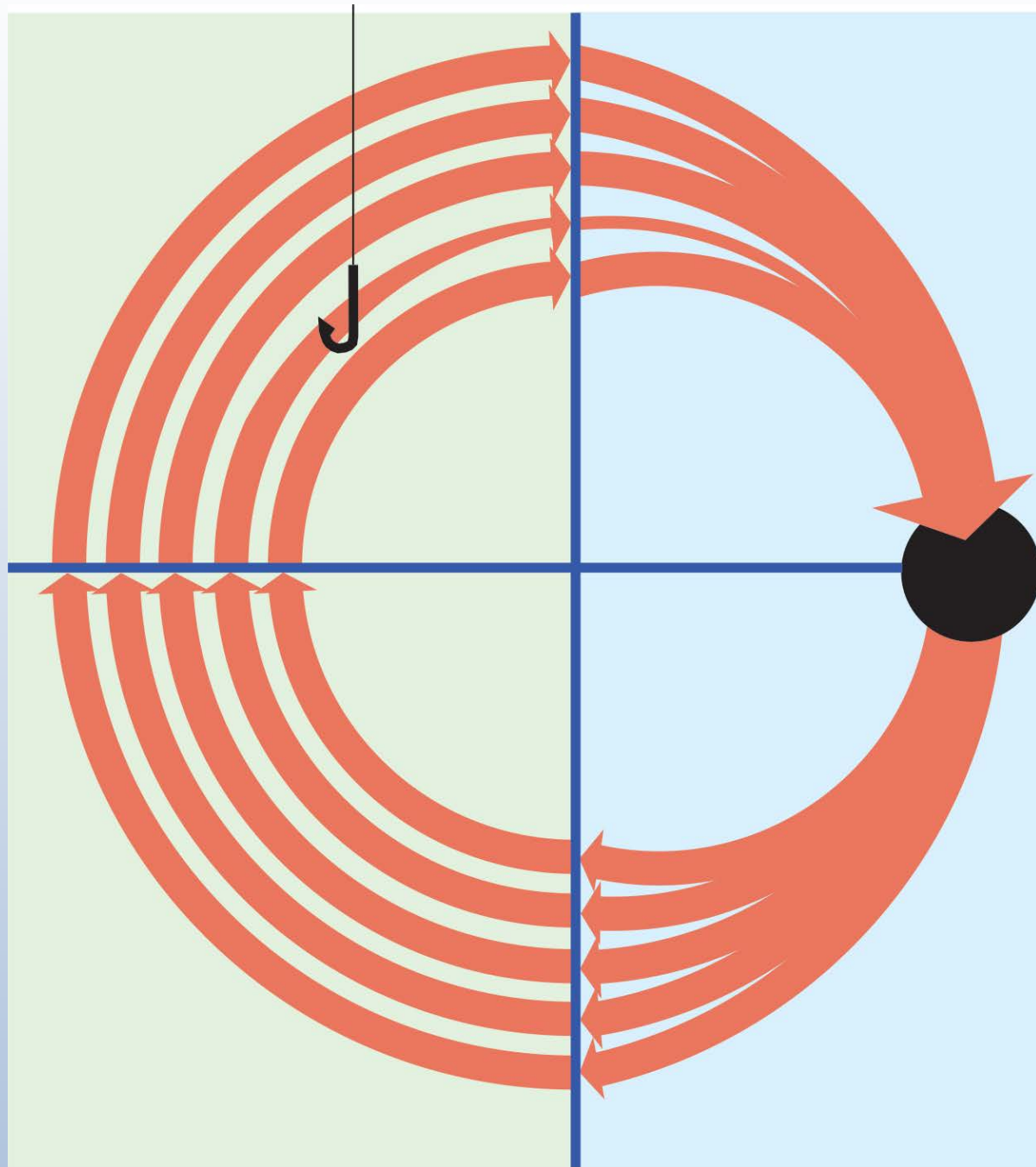








Depletion of one local population will produce no discernable effect on the overall stock.



PhD student seeks genetic samples.

Purpose:

To determine the genetic status of American eels in the Gulf of Mexico and the Caribbean.

gabriela.ulmo-diaz.1@ulaval.ca



UNIVERSITÉ
LAVAL

How to assess *American eel* status

1. Evaluate threats

How to assess American eel status

1. Evaluate threats

Dams

Habitat
degradation

Parasites

Contaminants

How to assess American eel status

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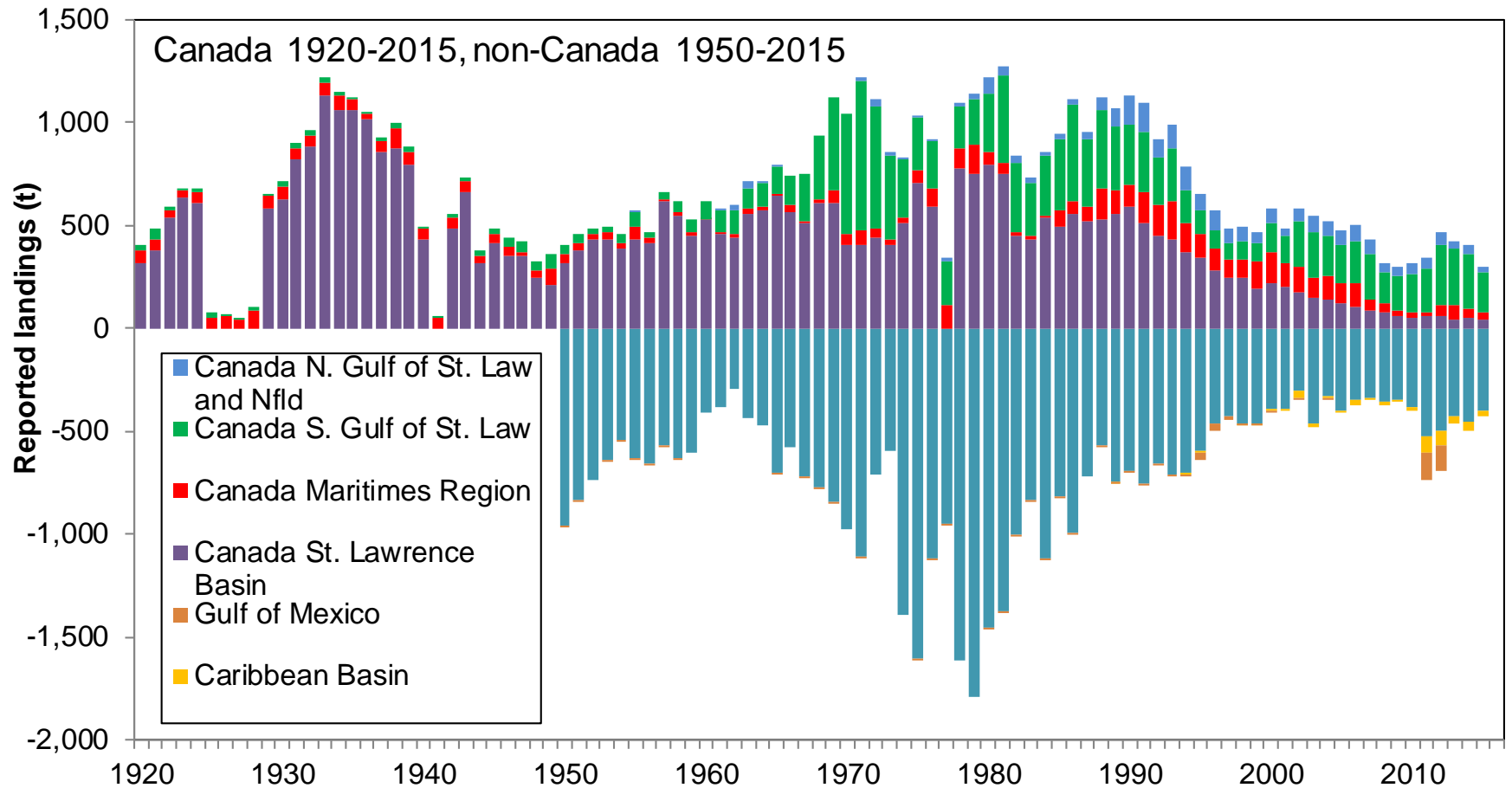


How to assess *American eel* status

2. Analytical stock assessment

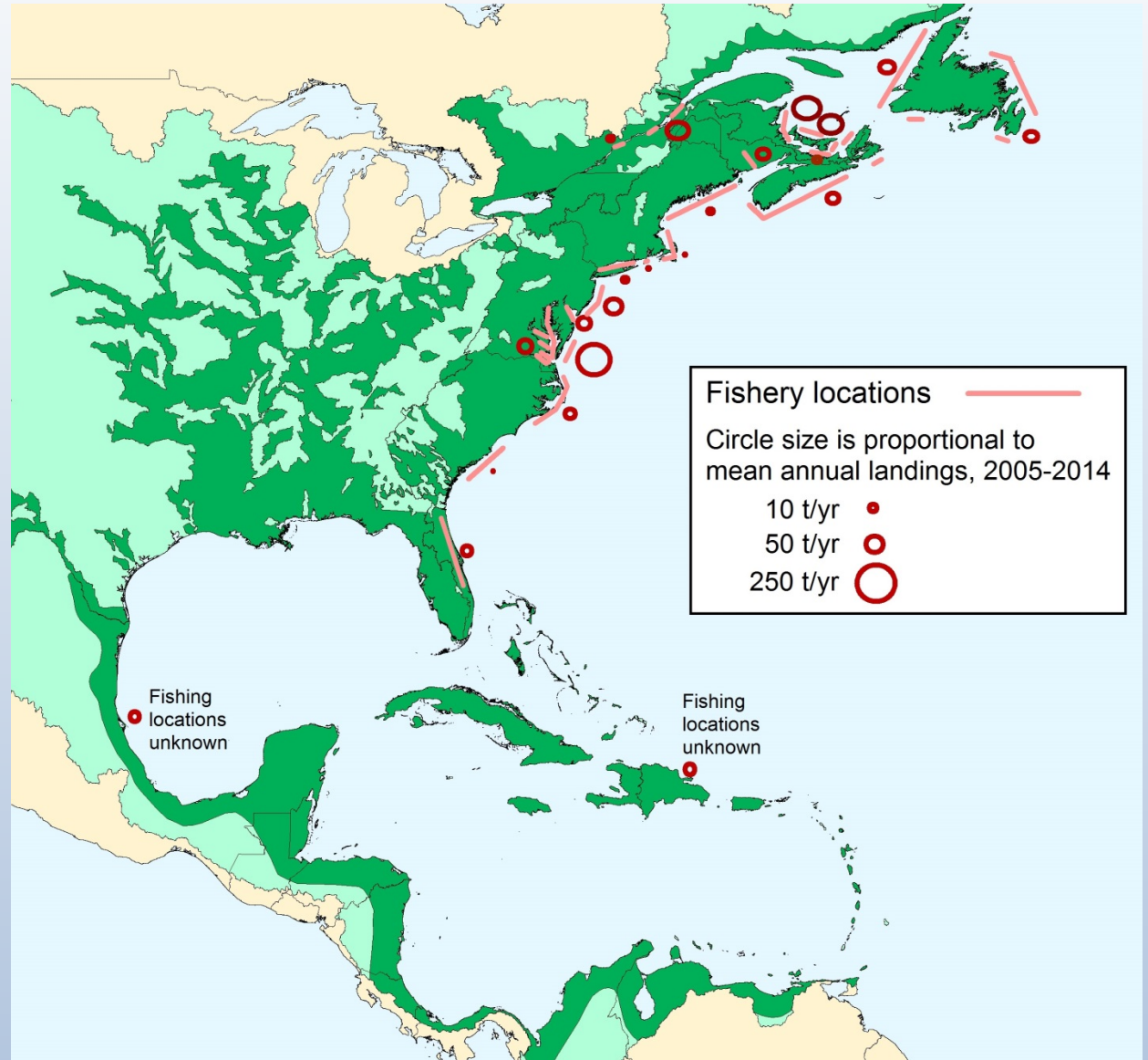
How to assess American eel status

2. Analytical stock assessment



How to assess American eel status

2. Analytical stock assessment



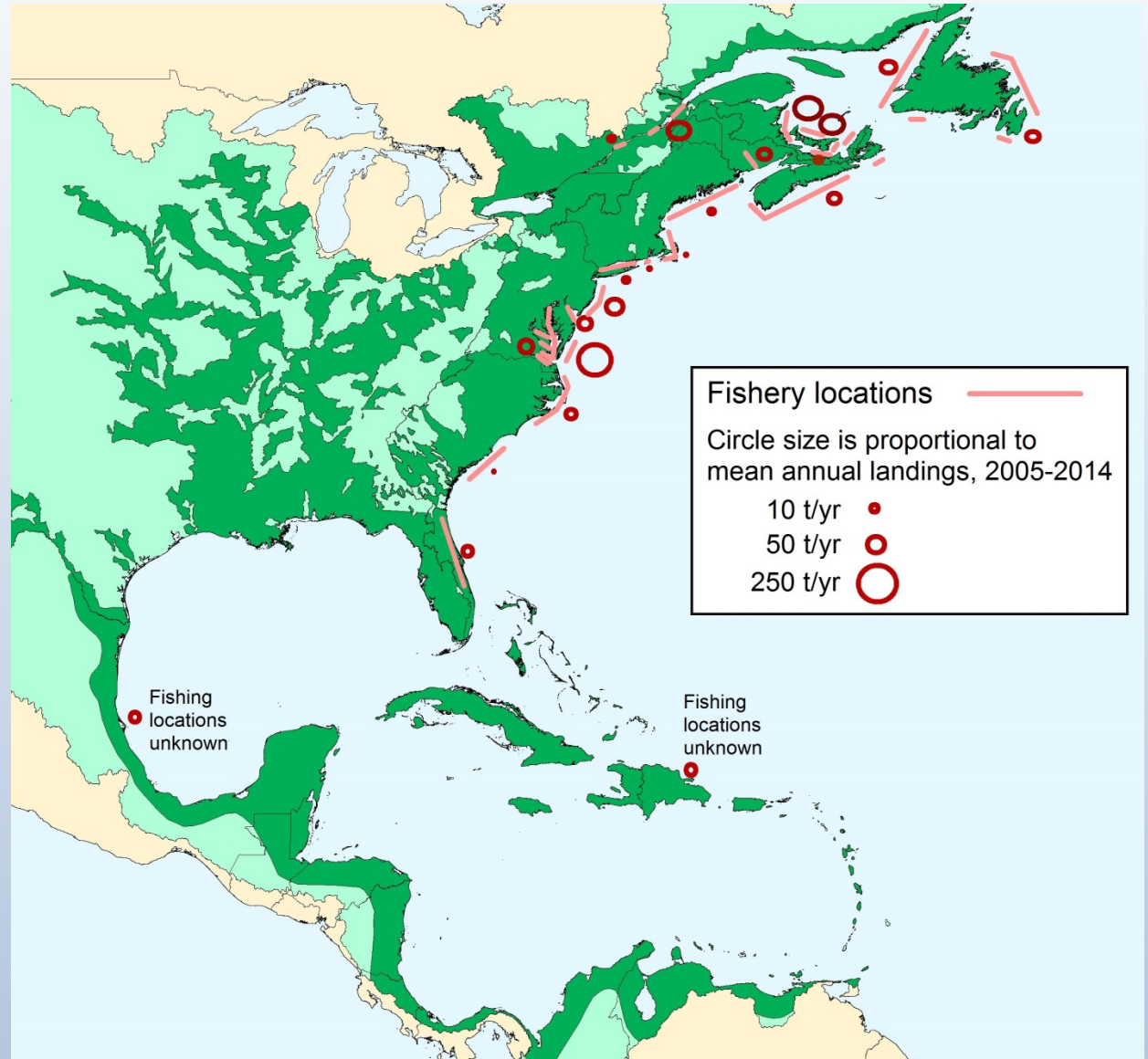
How to assess American eel status

2. Analytical stock assessment

Challenges:

Most of range is unfished

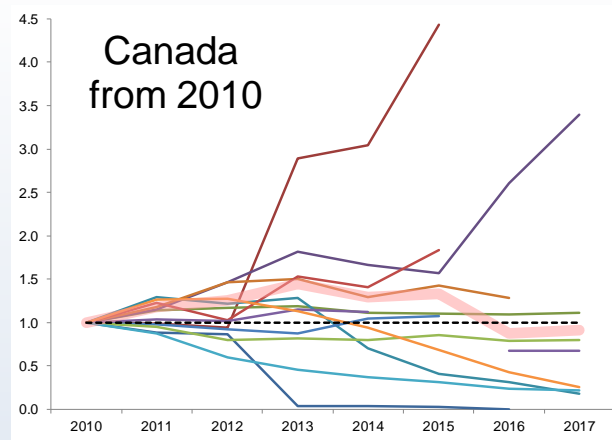
Most of range has no demographic data



How to assess *American eel* status

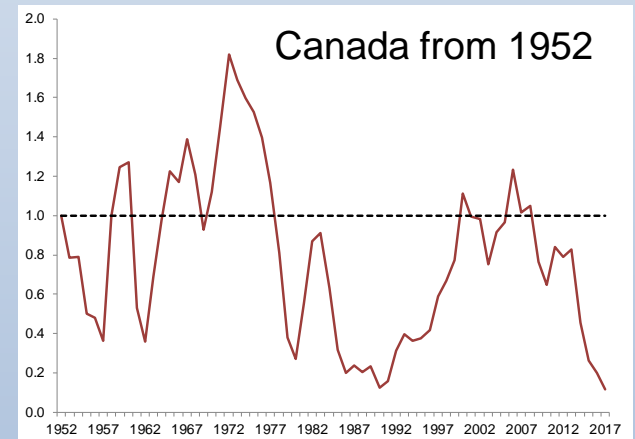
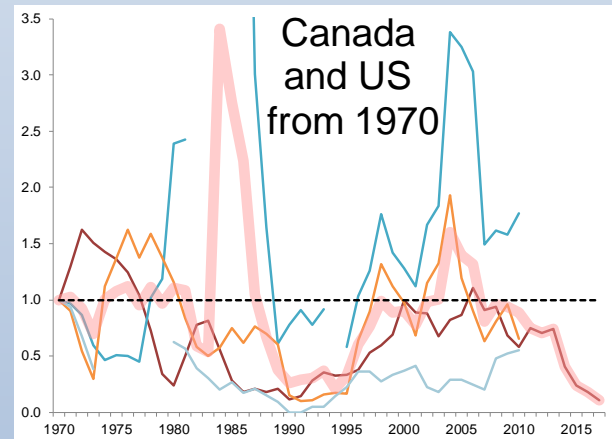
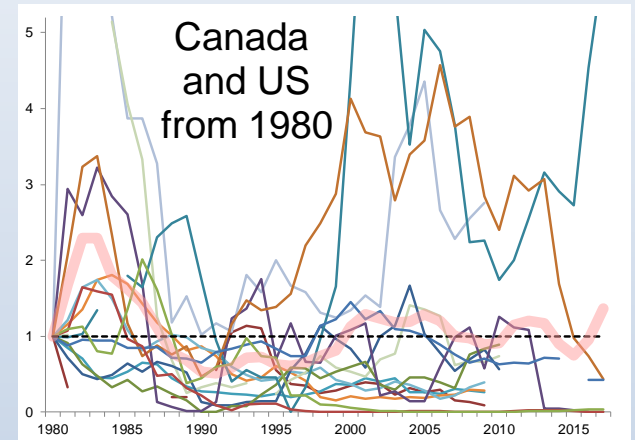
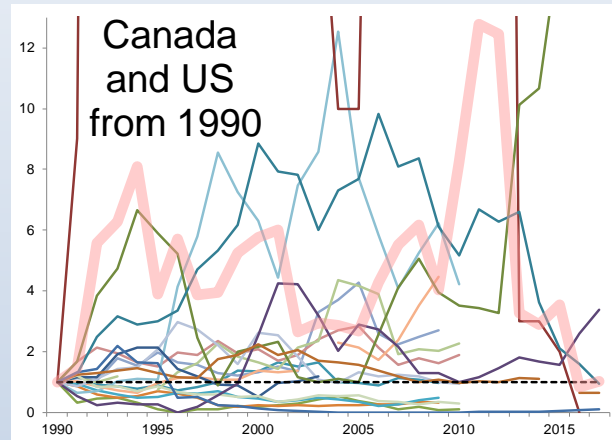
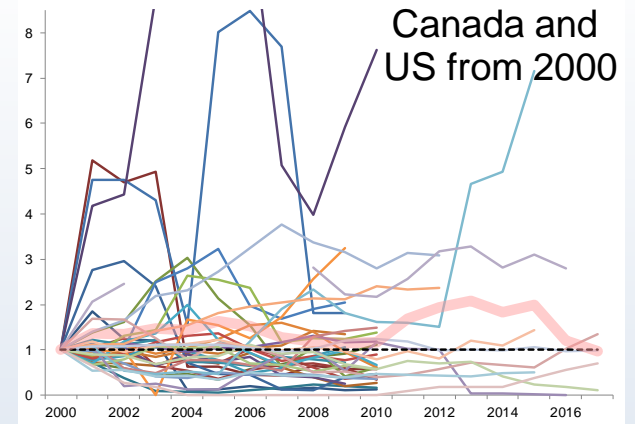
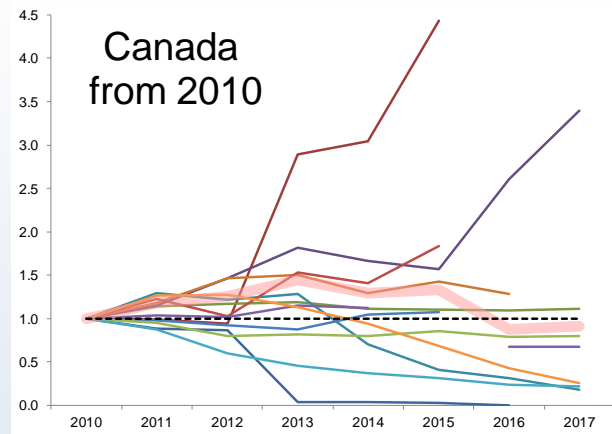
3. Trend analysis

3. Trend analysis



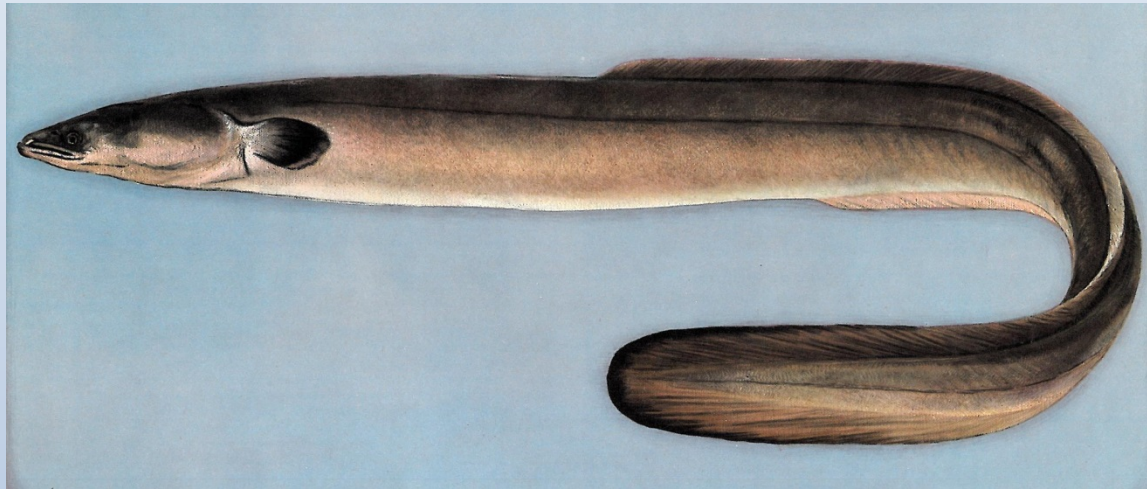
3 point moving averages,
standardized to 1 at
the series beginning

3. Trend analysis



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

Post-doctoral fellow seeks international collaborators in American eel assessment science.



maelle.cornic@dfo-mpo.gc.ca



Fisheries
and Oceans

Pêches
et Océans