

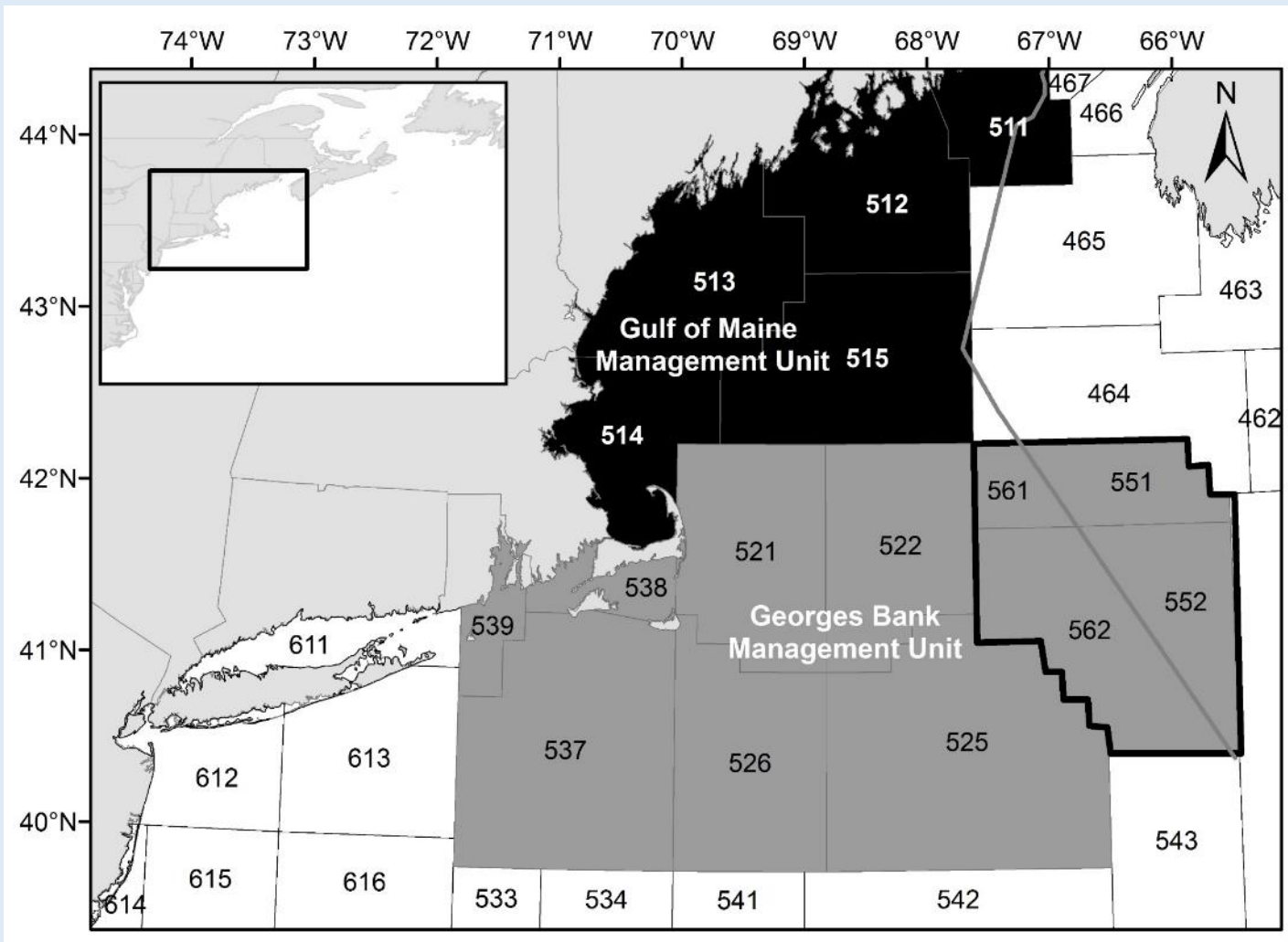


# A quick review of Atlantic cod stock structure working group results

- **The Atlantic Cod Stock Structure Working Group (ACSSWG)**
- **Presenter: Richard McBride, NOAA Fisheries**
- **Atlantic Cod Stock Structure Workshop**

ACSSWS, June 1 – July 1, 2021

# Introduction: existing management units



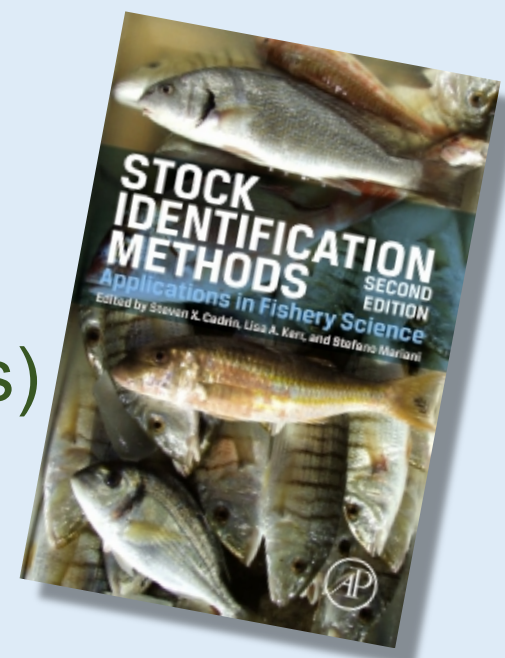
Since ~ 1970s  
(North-South)

- 2 US stock units
- Transboundary
- Subunits (areas)

*The question:*  
How do these geographic management units relate to biological stock structure of Atlantic cod?

# Methods: an interdisciplinary approach

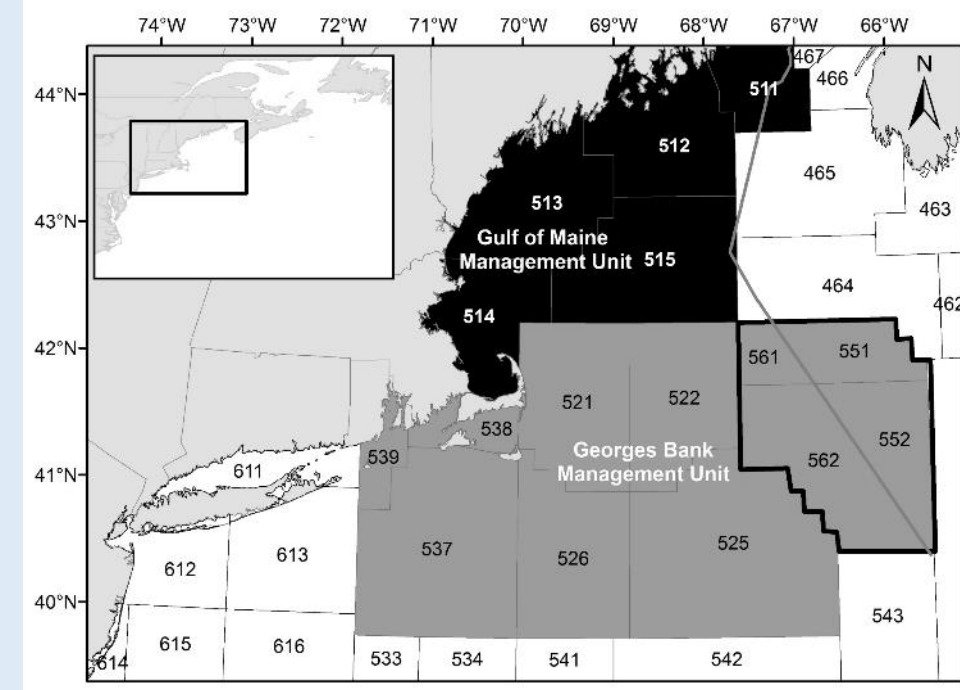
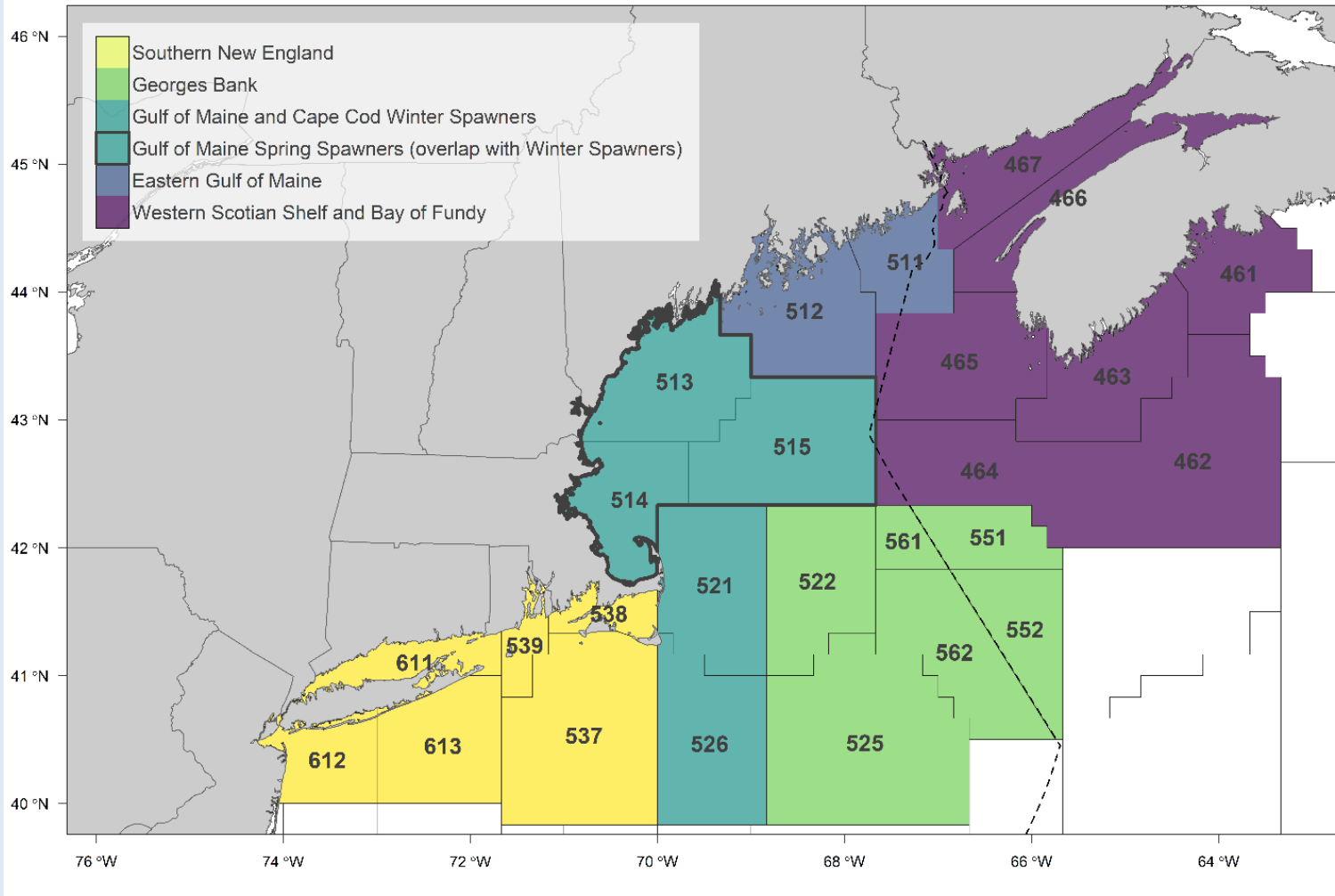
1. Fishermen's ecological knowledge (structured interviews)
2. Early life history (spawning–settlement)
3. Genetic markers (including adaptive markers and genomics)
4. Life history (48 years of the NEFSC bottom trawl survey)
5. Natural markers (otoliths, parasites, color morphs, etc.)
6. Applied markers (200,000 tagged cod; 12,000 recaptures [1923-2013])



# Results: interdisciplinary highlights

- 1) Notable phenotypic and genetic variability among statistical areas
  - Cod not well mixed in either US management unit
- 2) Extensive movements by adults
  - exchange between US-US management units
  - as well as between US-Canada management units
- 3) Larval dispersal around Cape Cod
  - one-way connectivity between US-US management units
- 4) Two sympatric, genetically differentiated stocks in SW Gulf of Maine
  - adaptive differences between winter- and spring-spawning cod

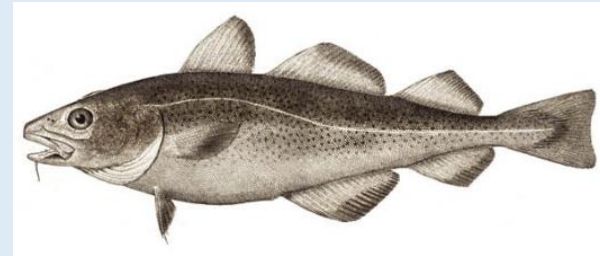
# 5 US cod stocks proposed



This proposal accounts for:

- Within unit variation
- Between unit connectivity
- Winter/spring sympatry

# Acknowledgements



## The working group

Ames, Ted  
Andrushchenko, Irene  
Cadrin, Steve  
Cournane, Jamie  
Dean, Micah  
DeCelles, Greg  
Kerr, Lisa  
Kovach, Adrienne  
McBride, Rich (co-chair)  
Overgaard Therkildsen, Nina  
Puncher, Greg  
Smedbol, Kent (co-chair)  
Wang, Yanjun  
Zemeckis, Doug

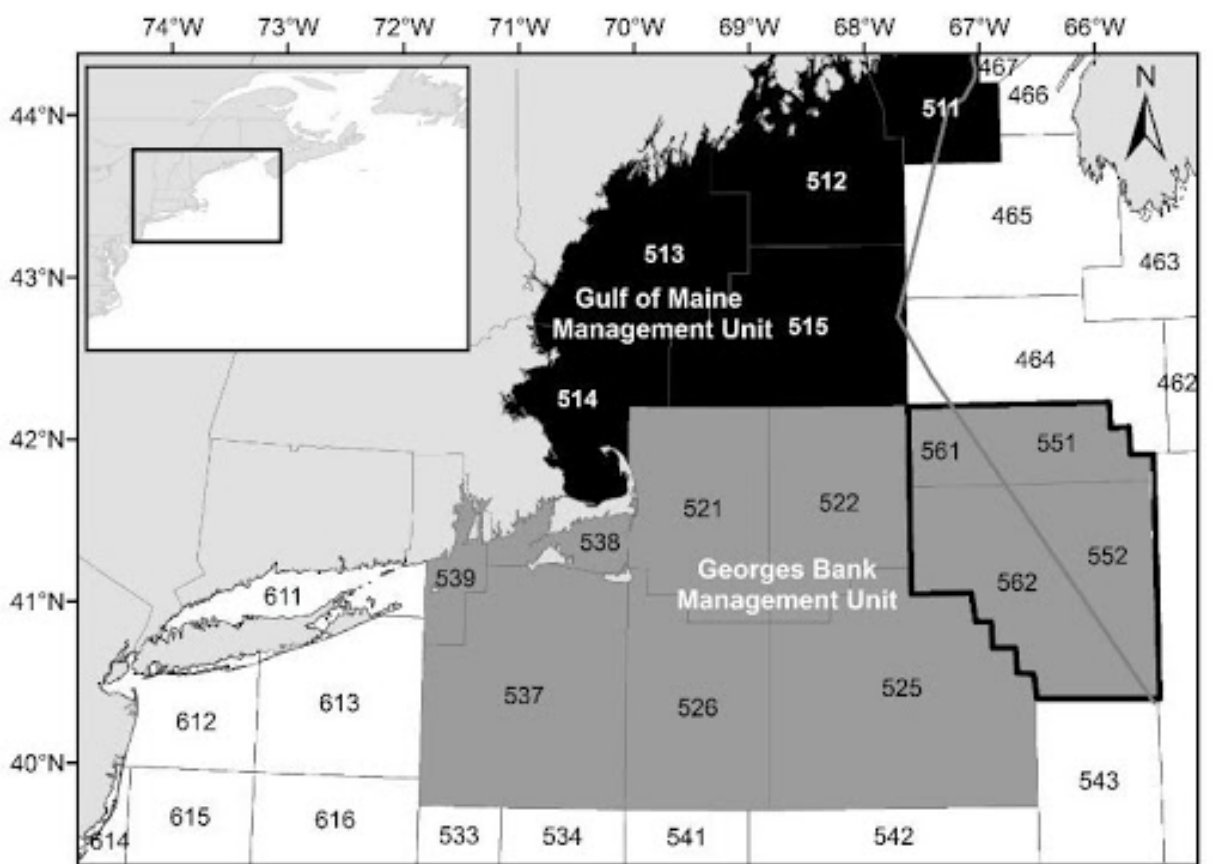
Bowdoin College & MCCF Founding Board  
Canadian Department of Fisheries & Oceans  
University of Massachusetts Dartmouth, SMAST  
New England Fishery Management Council  
Massachusetts Division of Marine Fisheries  
Massachusetts Division of Marine Fisheries  
Gulf of Maine Research Institute  
University of New Hampshire  
Northeast Fisheries Science Center  
Cornell University  
University of New Brunswick  
Canadian Department of Fisheries & Oceans  
Canadian Department of Fisheries & Oceans  
Rutgers University

New England Fishery Management Council  
NOAA's Northeast Fisheries Science Center  
New Hampshire Sea Grant  
Maine Fishermen's Forum

<https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/analyzing-cod-populations-atlantic>

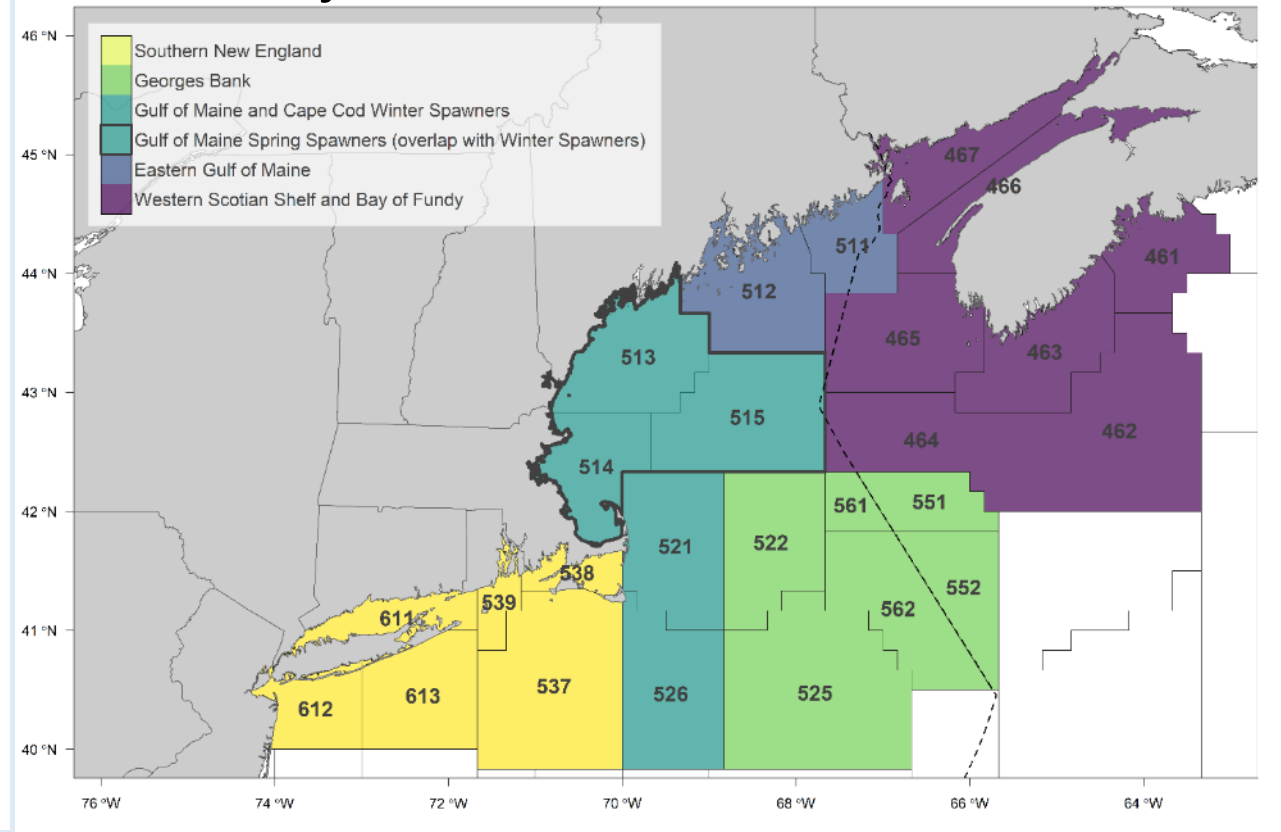


## Existing 2 US stock model



Black polygons = Gulf of Maine  
 Gray polygons = Georges Bank  
 Gray chevron = Hague line

## Proposed 5 US stock model + adjacent Canada stock



Outlined polygons = TRAC assessed area  
 Div. 6 (600s), catches included with GB  
 Div. 4 (400s), Canada management unit



# What is a biological stock?

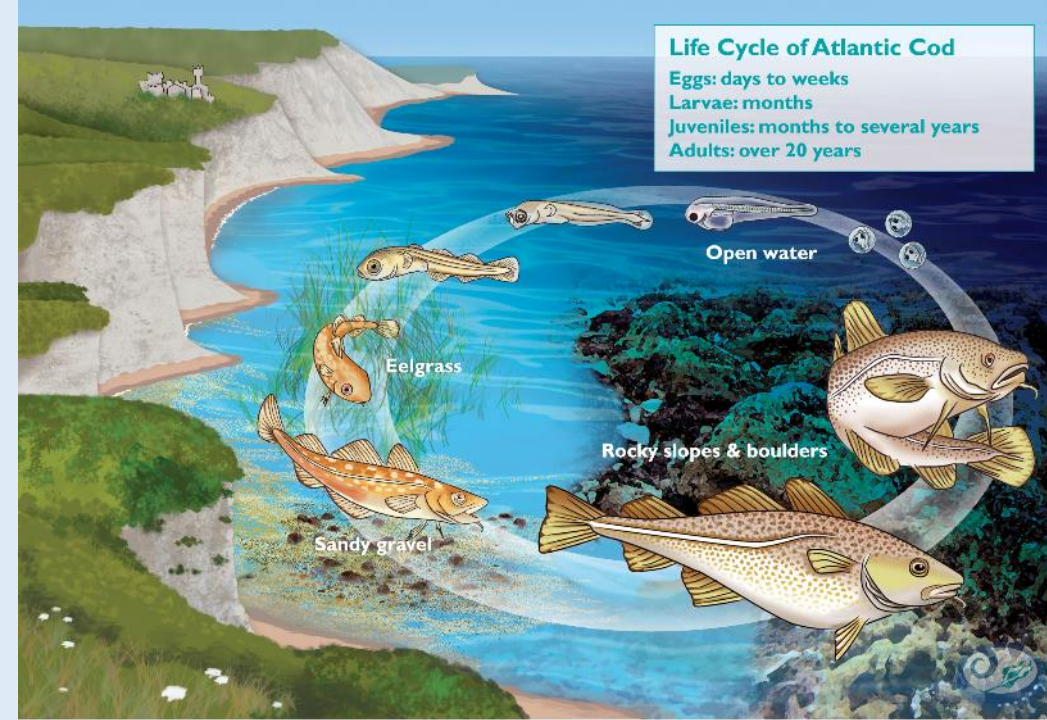
Consider a group of individuals where...

Source of new recruits comes from within

- reproductive isolation

Demographics – growth, mortality, maturity, fecundity – are similar by age, size, or sex (i.e., dynamic pool)

Abundance estimates are representative of the stock well mixed



The Atlantic cod uses many habitats throughout its life. Open water, eelgrass beds, sandy and gravel areas, kelp, boulder fields and steep rocky ledges are important for growth and survival during different life stages of this fish.

Art by Molly Thomson

# What is the ACSSWG?



## Atlantic cod stock structure working group

- Experts (members & partners) working collaboratively
- using an interdisciplinary approach
- to characterize the biological stock structure of cod
- for eventual consideration in monitoring, assessment and management of US Atlantic cod

# The broader timeline

You  
Are  
Here →

