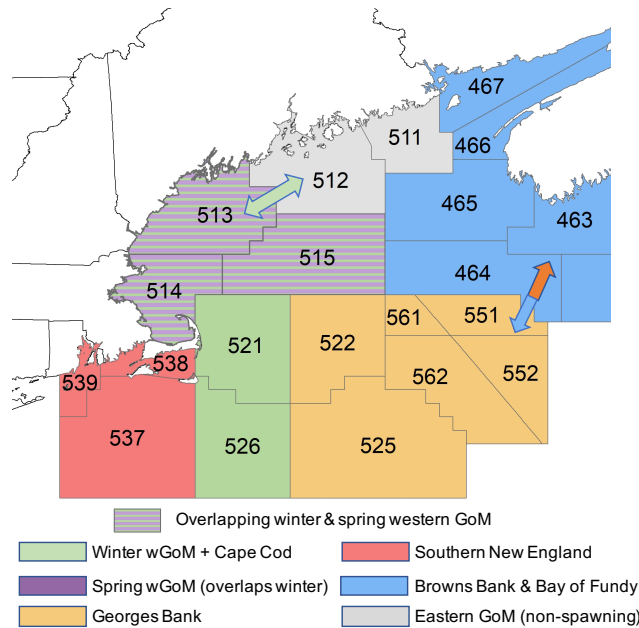


## Genetic Markers Working Group Summary

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### Synthesis Map of Cod Genetic Structure



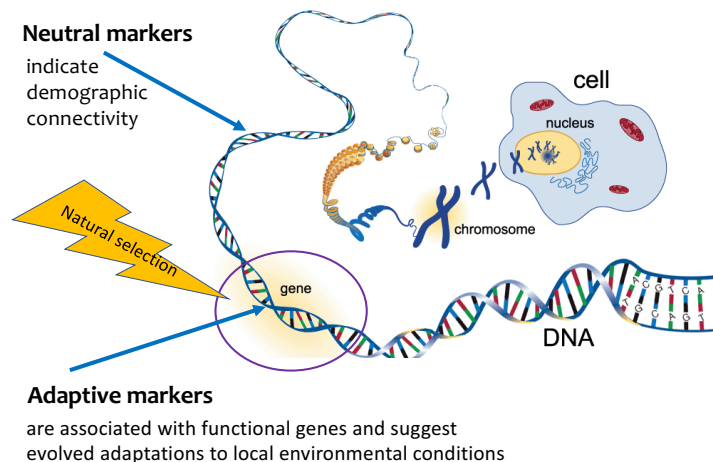
### Highlights

- Heterogeneity within Gulf of Maine: 2 genetically distinct groups of cod spawn in 513 & 514 in spring and winter
- High connectivity between western GoM (winter) and Cape Cod/Nantucket Shoals
- Differentiation of Southern New England from other areas
- Differentiation of Georges Bank from Cape Cod and Southern New England
- Connectivity between Georges Bank and Browns Bank
- Differentiation of Bay of Fundy from GoM and Georges Bank

### Uncertainties

- Where is the geographic separation of Georges Bank from wGoM/Cape Cod?
- Was the eastern GoM a genetically distinct spawning location?

### Two Kinds of Genetic Variation



### Adaptive & Neutral Variation in Cod

- ❖ Adaptive variation largely drives the patterns of genetic differentiation, suggesting ecological, life history, physiological or behavioral differences.
  - Genes associated with temperature, salinity, depth, oxygen, and stationary/migratory ecotypes differentiate the populations
  - Hormone receptor genes underlie differences between winter & spring spawners in wGoM
  - Thermal tolerance genes vary along a latitudinal cline and differentiate the southern New England cod
- ❖ Neutral variation among populations is slight, suggesting adaptation in the face of some ongoing or recent gene flow.