

GOM Cod and Haddock Recreational Bioeconomic Model

- Joint Mid-Atlantic and New England Council SSC review conducted in 2012
- Used to develop management options for GOM cod and haddock each year since 2013
- Lee, Min-Yang, Scott Steinback, Kristy Wallmo. 2017. "Applying a Bioeconomic Model to Recreational Fisheries Management: Groundfish in the Northeast United States." *Marine Resource Economics* 32:2.

Annual Management Objectives

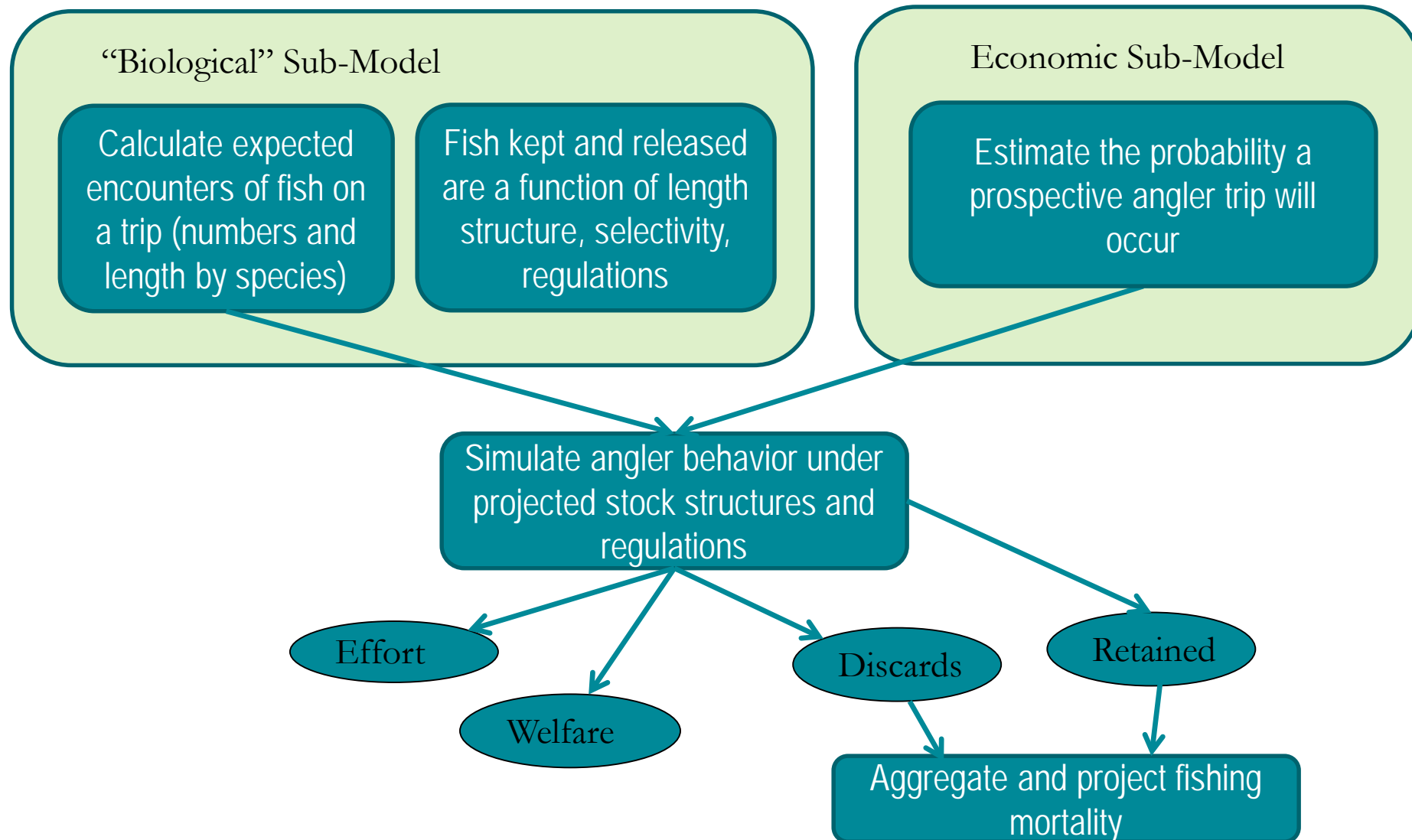
Predict how proposed management measures for GOM cod and haddock will affect:

- 1) Angler fishing effort
- 2) Angler welfare
- 3) Recreational fishing mortality

Management goal: “achieve but not exceed the sub-ACLs”



Bioeconomic Model Overview



How Accurate is the Model?

| GOM Cod | ACL (mt) | Actual | Model |
|---------|----------|--------|-------------------|
| FY 2013 | 486 | 639 | 409 (36% lower) |
| FY 2014 | 486 | 623 | 422 (32% lower) |
| FY 2015 | 121 | 85 | 132 (55% higher) |
| FY 2016 | 157 | 286 | 132 (54% lower) |
| FY 2017 | 157 | 246 | 147 (40% lower) |
| FY 2018 | 220 | 147 | 193 (31% higher) |
| FY 2019 | 220 | 77* | ~120 (56% higher) |

*Preliminary



How Accurate is the Model?

| GOM Had | ACL (mt) | Actual | Model |
|---------|----------|--------|--------------------|
| FY 2013 | 74 | 232 | 57 (407% lower) |
| FY 2014 | 87 | 659 | 80 (824% lower) |
| FY 2015 | 372 | 382 | 323 (13% lower) |
| FY 2016 | 928 | 1,031 | 709 (32% lower) |
| FY 2017 | 1,160 | 795 | 1,160 (46% higher) |
| FY 2018 | 3,358 | 595 | 916 (54% higher) |
| FY 2019 | 3,194 | 398* | ~990 (149% higher) |

*Preliminary

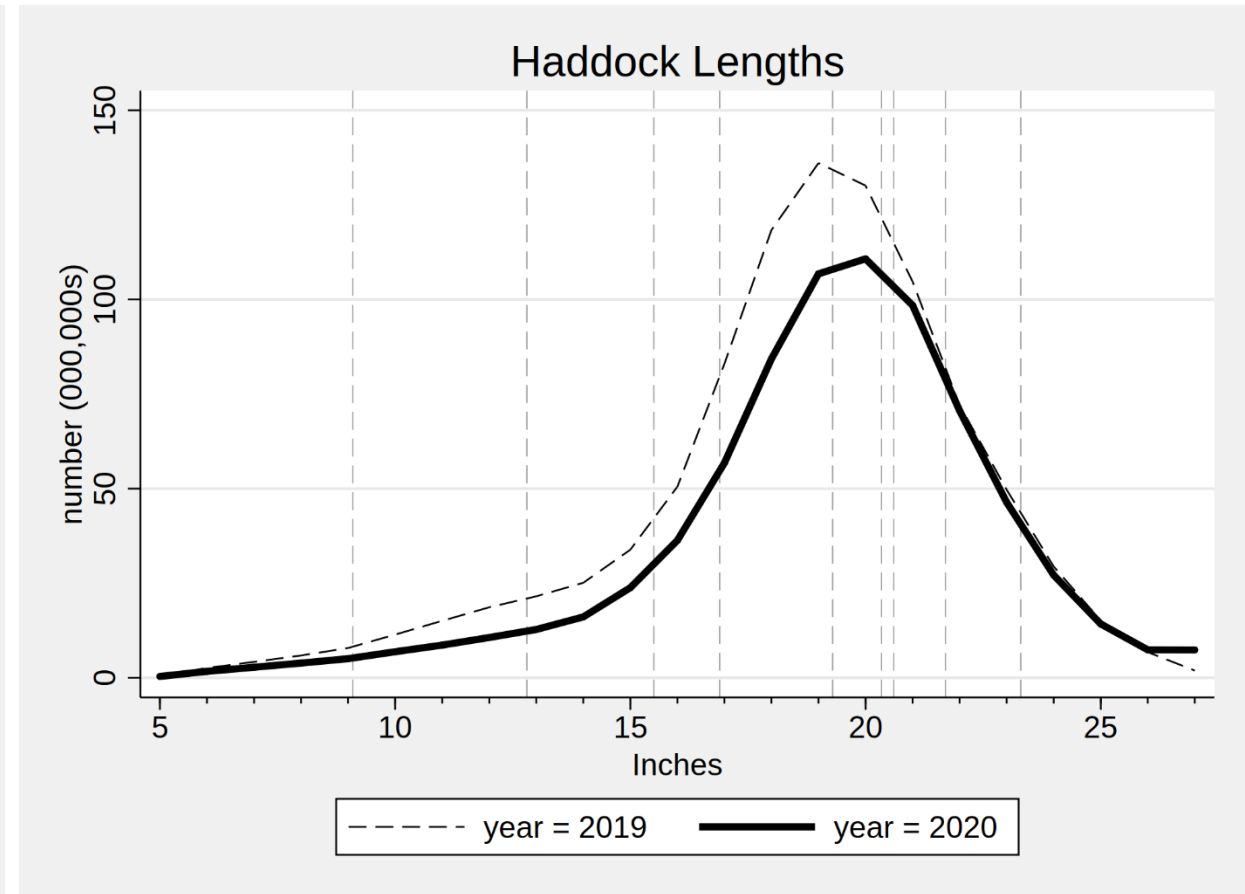
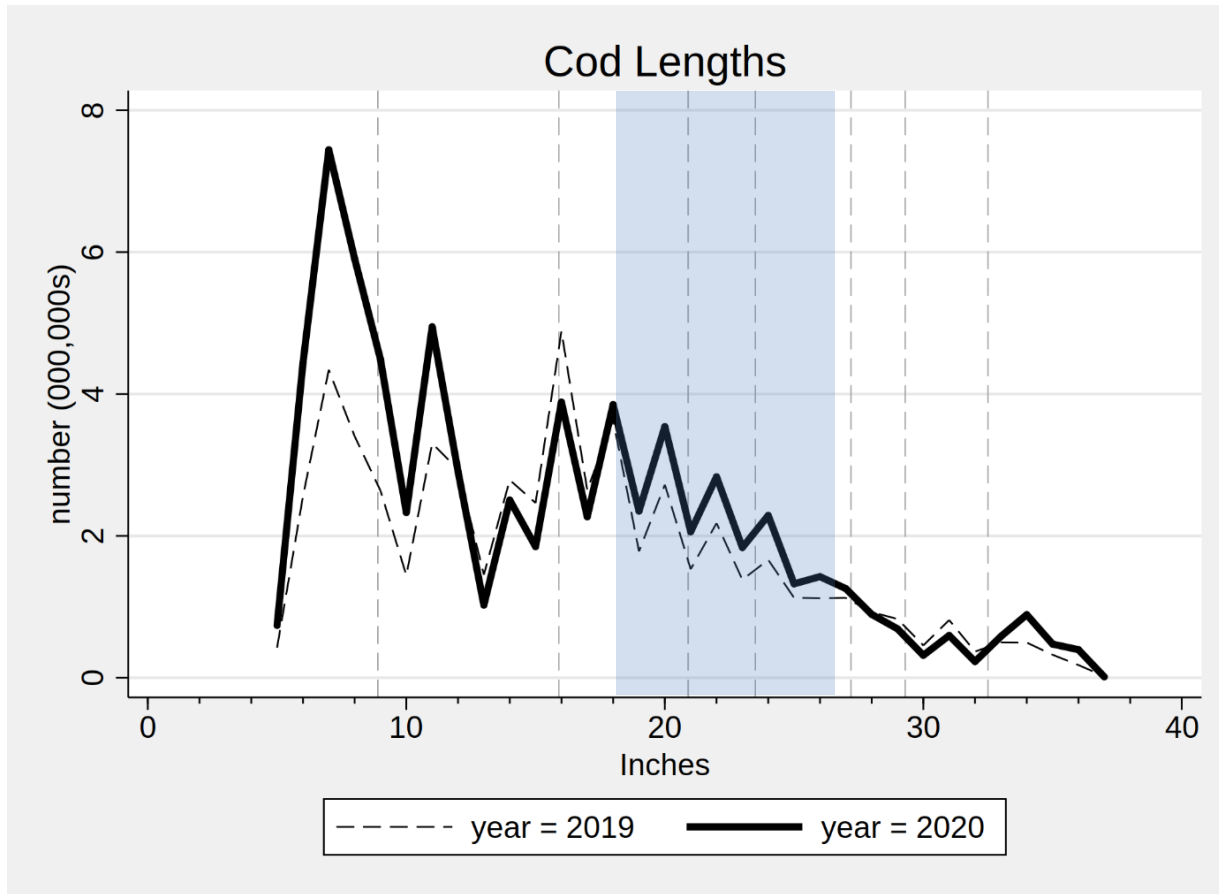


FY 2020 Bioeconomic Modeling Steps

- Incorporated available MRIP data (new estimates) and 2020 biological assessment projections
 - Projections developed from the 2019 Operational Assessments
- Calibrated the model to approximate FY 2019 effort and catch
- Evaluate how status quo and alternative measures affect mortality in FY 2020



Numbers-At-Length Assessment Projections



FY 2020 Mortality Projections

| Option | Cod | | | | Haddock | | | | Angler Trips (Median) | % Under Cod ACL (out of 100 Simulations) | % Under Had ACL (out of 100 Simulations) |
|---------------------------|--------------|-------------|----------------------------|---|--------------|-------------|------------------------------|---|-----------------------------|--|--|
| | Cod Limit | Cod Size | Cod Open Season | Cod Total Mortality mt (Median) | Had Limit | Had Size | Had Open Season | Had Total Mortality mt (Median) | | | |
| 1 (Status Quo) | 1 | 21" | Sep 15-Sep 30 | 185 | 15 | 17" | May-Feb 28, Apr 15-Apr 30 | 1,092 | 273,930 | 67 | 100 |
| 2 (Open Cod Apr 15-30) | 1 | 21" | Sep 15-Sep 30 Apr 15-30 | 187 | 15 | 17" | May-Feb 28, Apr 15-Apr 30 | 1,094 | 273,998 | 65 | 100 |

FY 2020 rec sub-ACLs:

cod = 193 mt

haddock = 6,210 mt

Options considered, but rejected because % under cod sub-ACL < 50%:

- 3) Increase cod limit (from 1 to 2 fish)
- 4) Open cod Sep 1-Sep 30 (1 fish, 21")
- 5) Open cod Sep 1-Sep 30 (1 fish, slot limit of 21" - 24")
- 6) Open cod Sep 1 -Sept 30 (1 fish, slot limit of 22" - 25")
- 7) Close cod Sep 15-Sep 30, open cod May 1-May 15 (1 fish, 21")
- 8) Close cod Sep 15-Sep 30, open cod May 16-May 31 (1 fish, 21")
- 9) Close cod Sep 15-Sep 30, open cod Aug 16-Aug 31 (1 fish, 21")
- 10) Close cod Sep 15-Sep 30, open cod Sep 1-Sep 14 (1 fish, 21")
- 11) Open cod May 1-May 15 and Sept 15-Sep 30 (1 fish, slot limit of 22" - 25")

