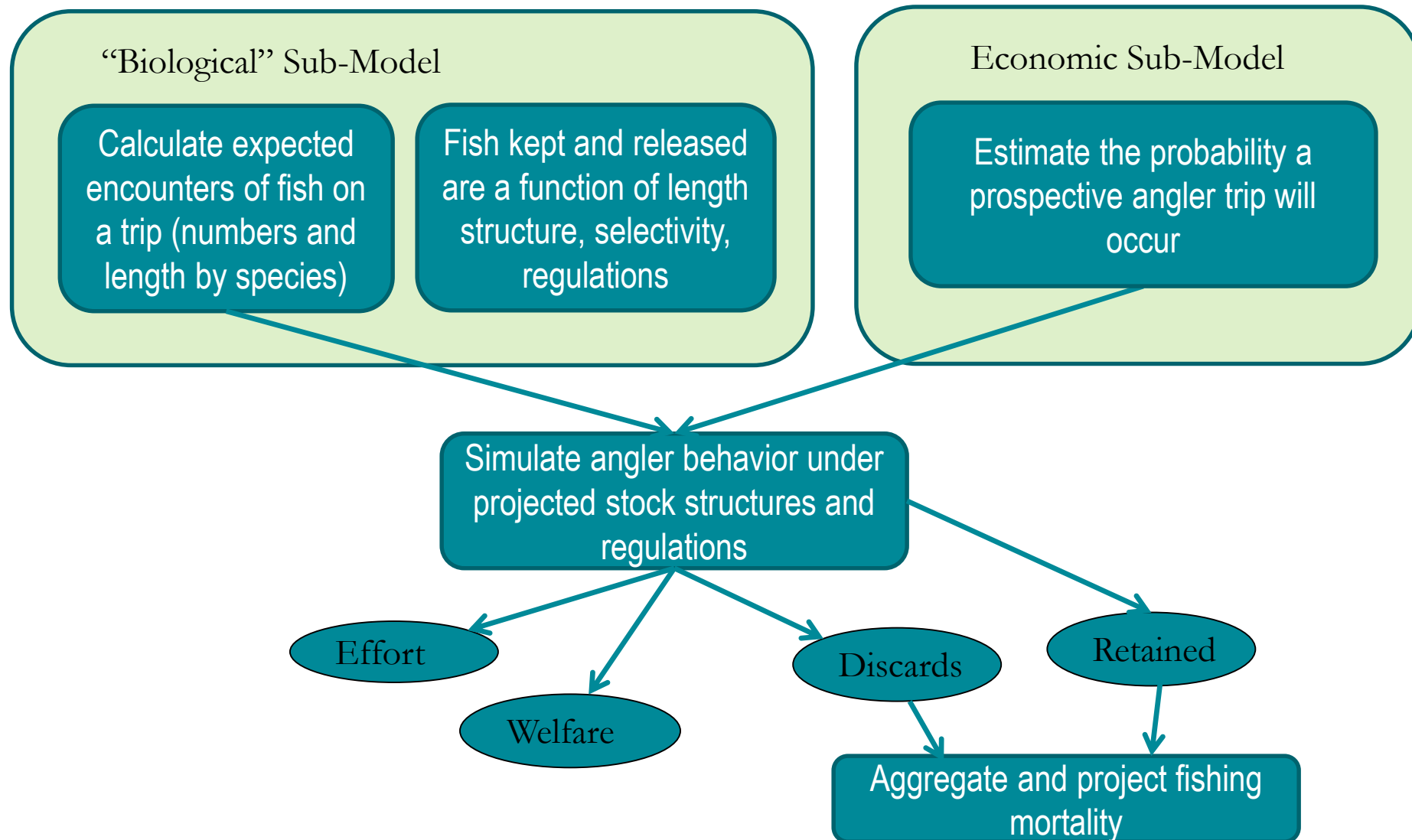# Bioeconomic Model Overview

Model

- Used to develop recreational measures 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*.

Bioeconomic Modeling

- Incorporate available MRIP data and 2018 biological assessment projections

- Incorporate new post-release haddock mortality rates

- Evaluate how status quo measures affect mortality in FY 2018

- Evaluate how alternative measures affect mortality in FY 2018

Gulf of Maine haddock post-release mortality estimates for the recreational fishery by season and size class (Mandelman *et al. 2017*)

Season	Waves	Size Class	Estimated Mortality
Spring	1, 2, 3	Small (<50 cm)	0.321
		Large (≥50 cm)	0.113
Fall	4, 5, 6	Small (<50 cm)	0.742
		Large (≥50 cm)	0.459

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	244*	147 (40% lower)
FY 2018	220 - payback		

*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	740*	1,160 (56% higher)
FY 2018	3,358		

*Preliminary

FY 2018 Mortality Projections

FY 2018 Gulf of Maine Cod and Haddock Simulation Projections

Option	Haddock				Cod			Angler Trips (Median)	% Under Had ACL (out of 100 Simulations)	% Under Cod ACL (out of 100 Simulations)
	Had Limit	Had Size	Had Closed Season	Had Total Mortality mt (Median)	Cod Limit	Cod Closed Season	Cod Total Mortality mt (Median)			
0 (Status Quo)	12	17"	Mar-Apr 14, Sep 17 - Oct 31	920	0	May-Apr	226	155,733	100	19
1 (Status Quo, no MA Cod Possession)	12	17"	Mar-Apr 14, Sep 17 - Oct 31	916	0	May-Apr	193	155,160	100	56
2 (Additional May Had Closure)	12	17"	Mar-Apr 14, May, Sep 17 - Oct 31	822	0	May-Apr	194	150,713	100	57

FY 2018 rec sub-ACLs: haddock = 3,358 mt, cod = 220 mt - payback