Impacts of halibut bycatch and wastage on halibut coast-wide yield and spawning biomass

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Outline

Objectives

Provide an alternative investigation into the effects of halibut bycatch and wastage in the GOA and BSAI groundfish fisheries.

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Research Question:

What are the impacts of bycatch reductions on future estimates of halibut **biomass**, **yield**, **spawning biomass** and **wastage** by age–size categories over a fifteen year time horizon?

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To answer this question:

Developed a deterministic sex/age-structured simulation model using IPHC assessment outputs to parameterize the model.

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Simulation model overview

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- Commercial fishery share: CEY - (other removals).
- Reduction in bycatch translates to increase in commercial catch.

Model outputs

Exploitable Biomass (EBio):

Start of year biomass vulnerable to the commercial gear.

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Commercial Yield (YBio):
Weight of commercial landings (excluding wastage).

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Weight of dead discarded undersized fish in commercial fishery.

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Weight of dead discarded undersized fish in commercial fishery.

Lost Yield (LBio):
Difference between YBio with *no* bycatch & *with* bycatch.

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Weight of commercial landings (excluding wastage).

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Weight of dead discarded undersized fish in commercial fishery.

Lost Yield (LBio):
Difference between YBio with *no* bycatch & *with* bycatch.

Yield Loss Ratio (YLR):
Ratio between the yield loss and the bycatch.

Outline

Growth & Recruitment Scenarios (states of nature)

1. Poor (60% below average recruitment)
2. Average
3. Good (60% above average recruitment)

Growth:

Growth & Recruitment Scenarios (states of nature)

Growth:

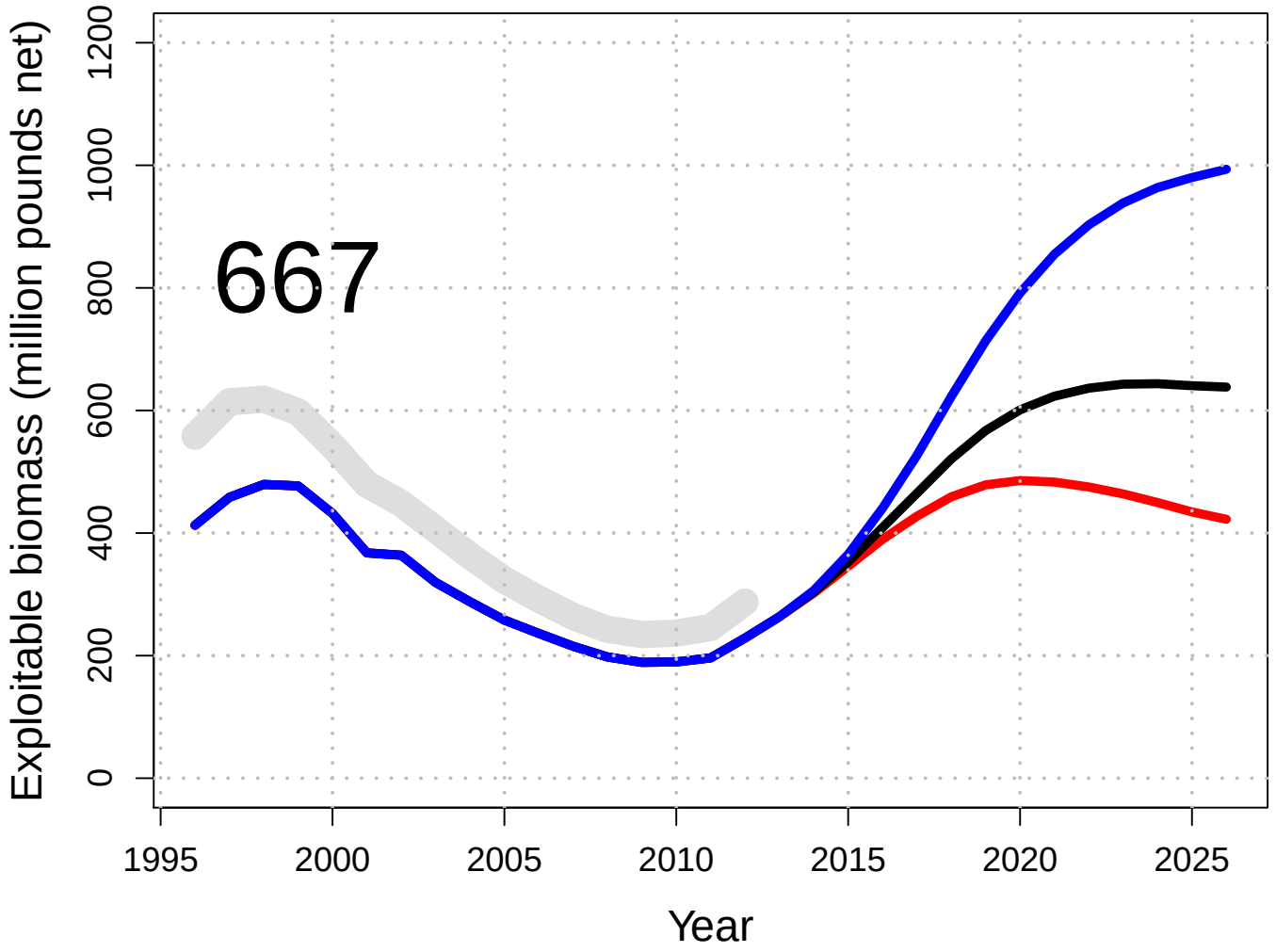
1. Density-independent (using 2011 average length-at-age)
2. Density dependent.

Policy Scenarios

Three alternative policies:

1. Status quo: 2011 BSAI bycatch levels
2. 50% Reduction in BSAI bycatch (4ABCDE)
   - decrease from 5.535 million lb to 2.765 million lb.
3. 50% Reduction in GULF bycatch (3AB)
   - decrease from 5.752 million lb to 2.876 million lb.

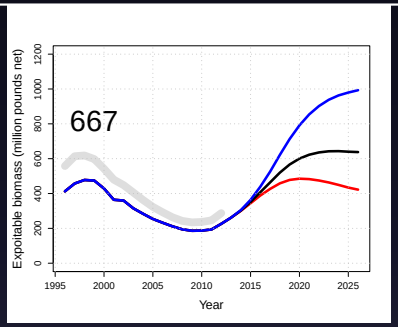
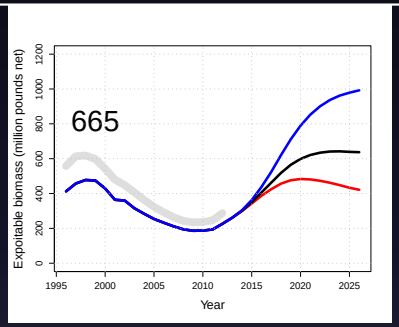
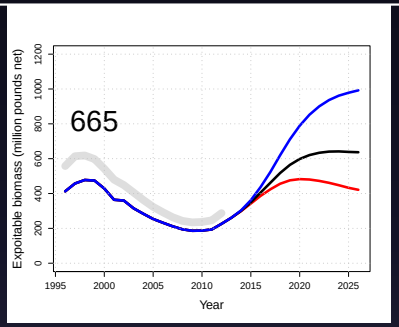
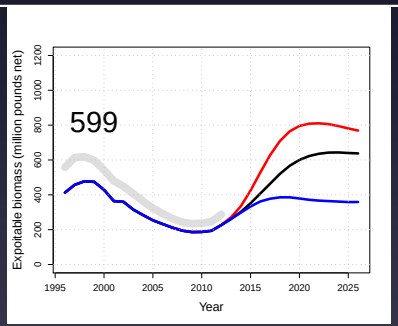
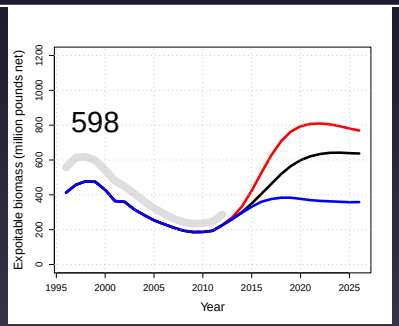
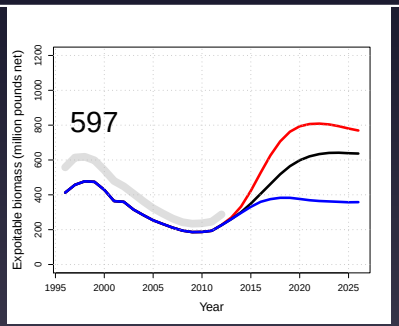
Summary plots



Outline

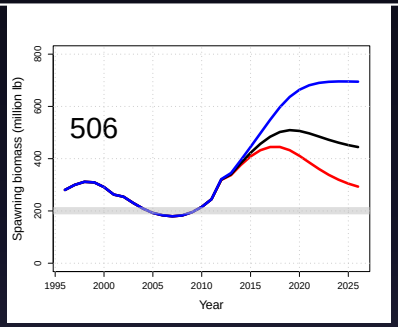
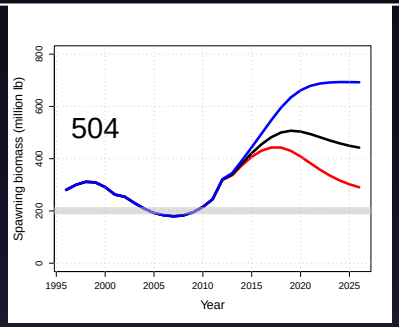
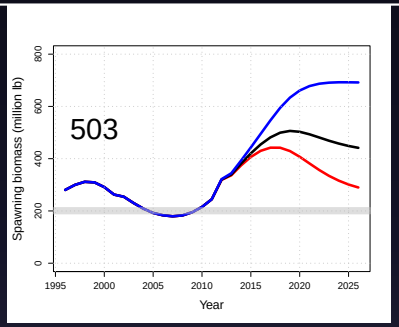
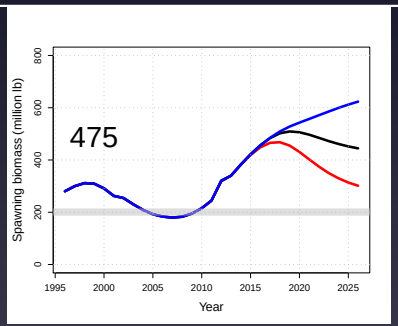
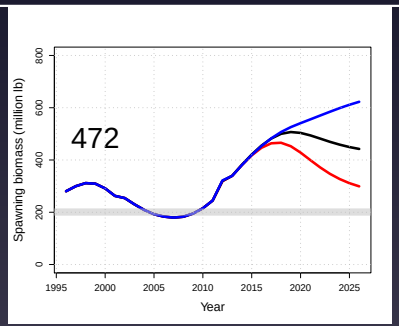
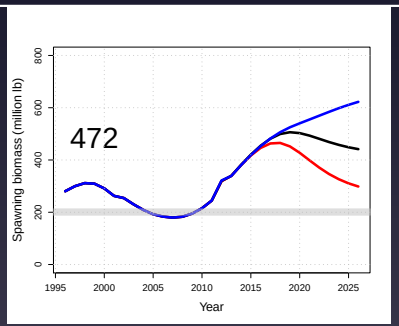
Decision table: EBio

Effect of bycatch reduction on Exploitable Biomass

Policy	Status quo	50% BSAI	50% GULF
DI Growth			
DD Growth			
Average	633	631.5	631

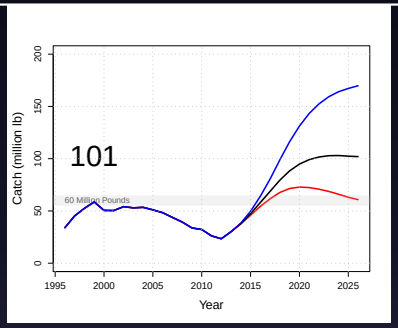
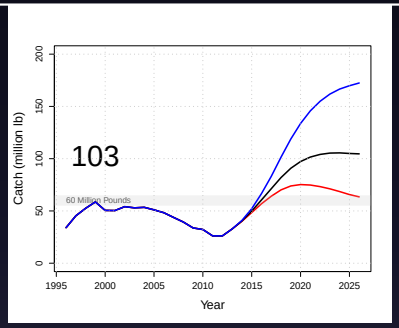
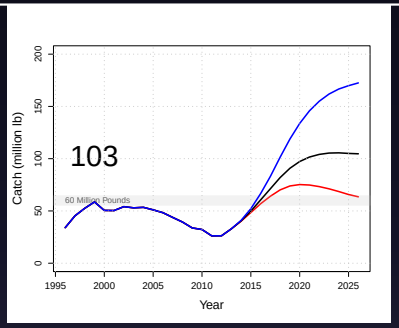
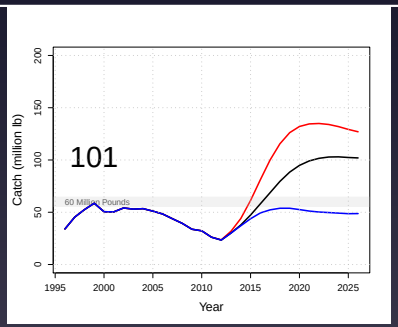
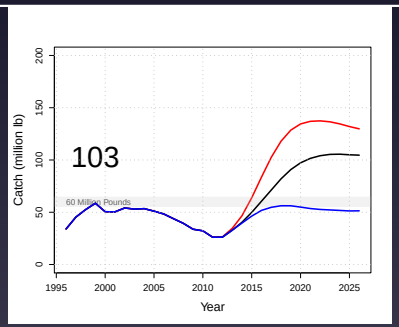
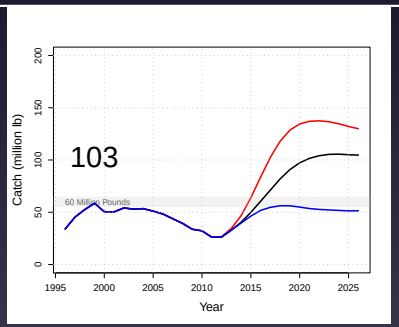
Decision table: SBio

Effect of bycatch reduction on Female Spawning Biomass

Policy	Status quo	50% BSAI	50% GULF
DI Growth			
DD Growth			
Average	490.5	488	487.5

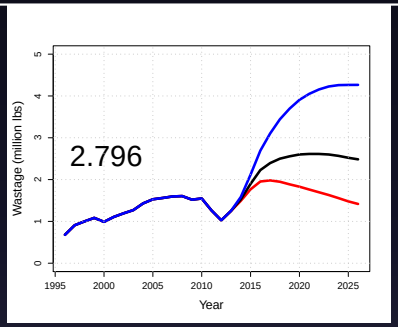
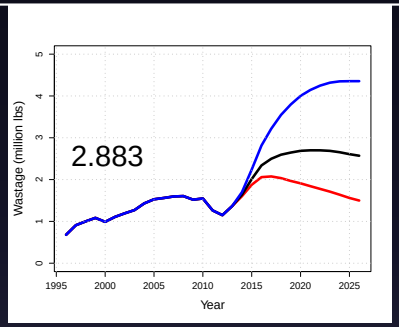
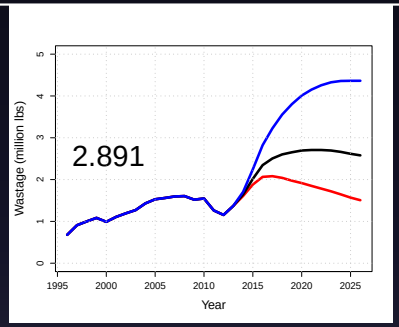
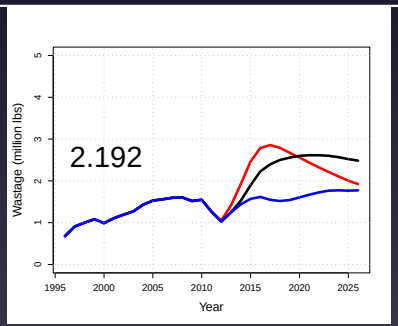
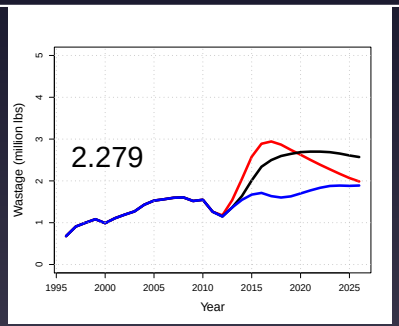
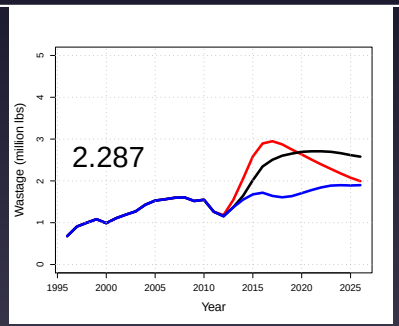
Decision table: Commercial Yield

Effect of bycatch reduction on Commercial Yield

Policy	Status quo	50% BSAI	50% GULF
DI Growth			
DD Growth			
Average	101	103	103

Decision table: Comm. Wastage

Effect of bycatch reduction on Commercial Wastage

Policy	Status quo	50% BSAI	50% GULF
DI Growth			
DD Growth			
Average	2.494	2.581	2.589

Decision table: Yield Loss Ratio

Effect of bycatch reduction on Yield Loss Ratio

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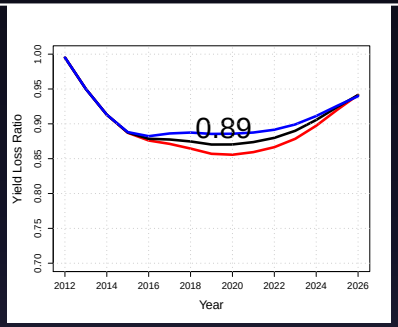
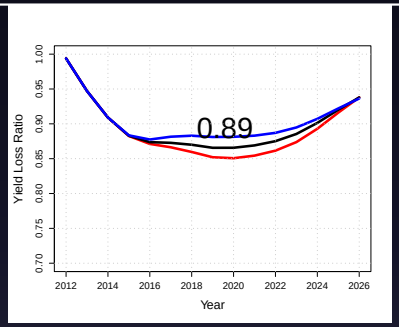
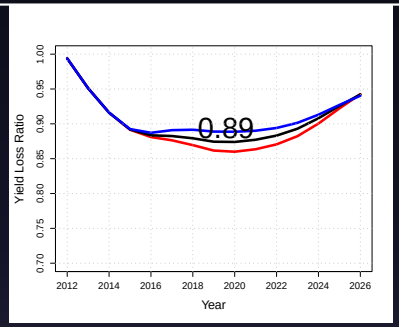
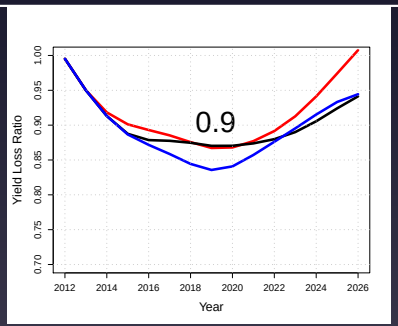
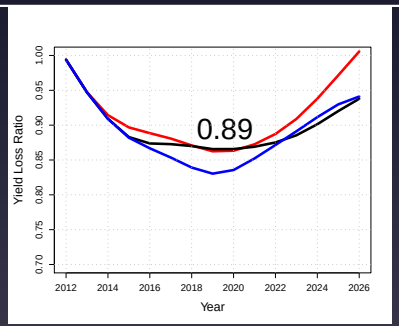
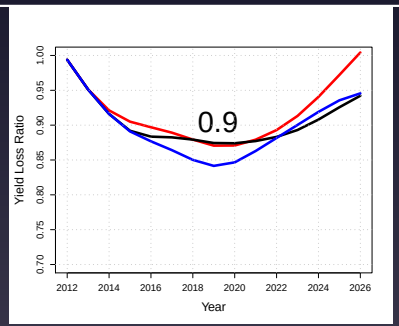
DI Growth			
DD Growth			
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Simulation model

Scenarios

Results

EBio
SBio
YBio
Wastage
Yield Loss Ratio

Summary

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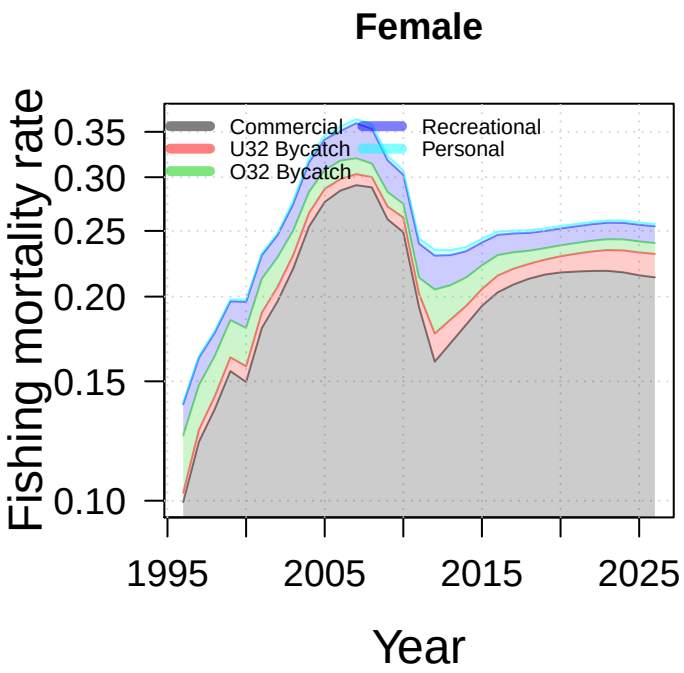

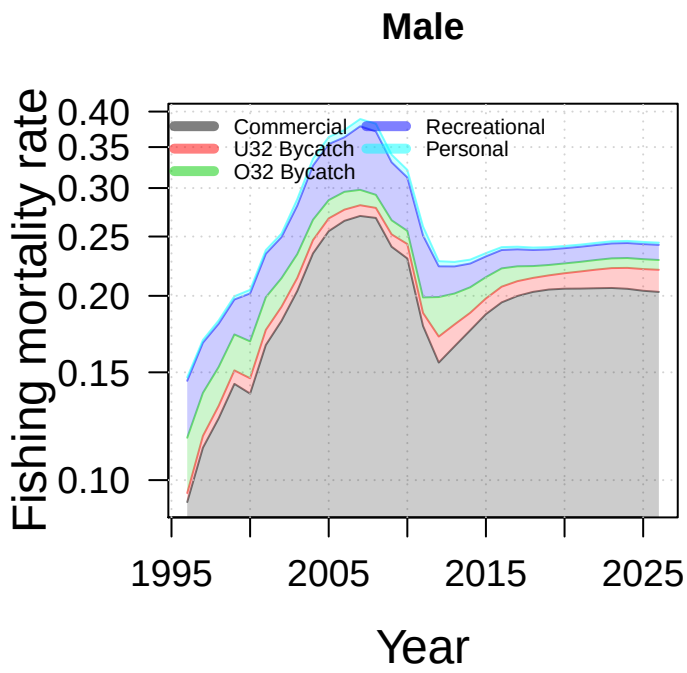

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- Exploitable and spawning coastwide biomass are largely insensitive to BSAI and GULF bycatch.
- Fishing mortality is dominated by the directed commercial fishery.
- Reducing bycatch in BSAI or Gulf by 50% ($\approx$ 2.7 million lb) results in a $\approx$ 2 million lb yr^{-1} increase in the directed fishery.

Acknowledgments

IPHC staff
At-sea Processors Association
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Groundfish Fourm
Alaska Whitefish Trawlers