The Ecological and Economic Impacts of Estuarine Habitat Change *in the* Middle Peninsula, Virginia

Tom Ihde[1]

with

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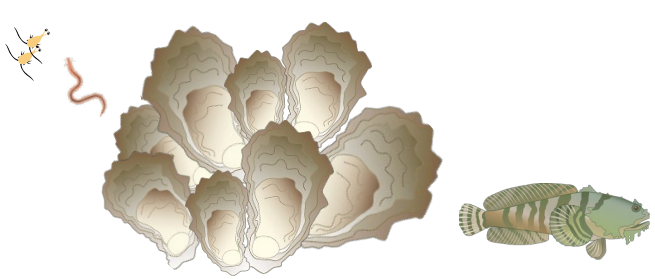
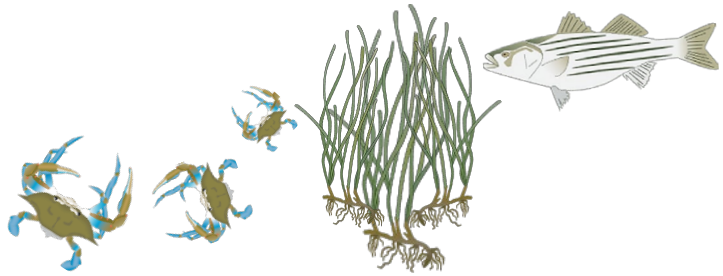
[2] ERT, Inc., *for* NOAA Fisheries Office of Habitat Conservation





*Illustrations courtesy of: ian.umces.edu/symbols/

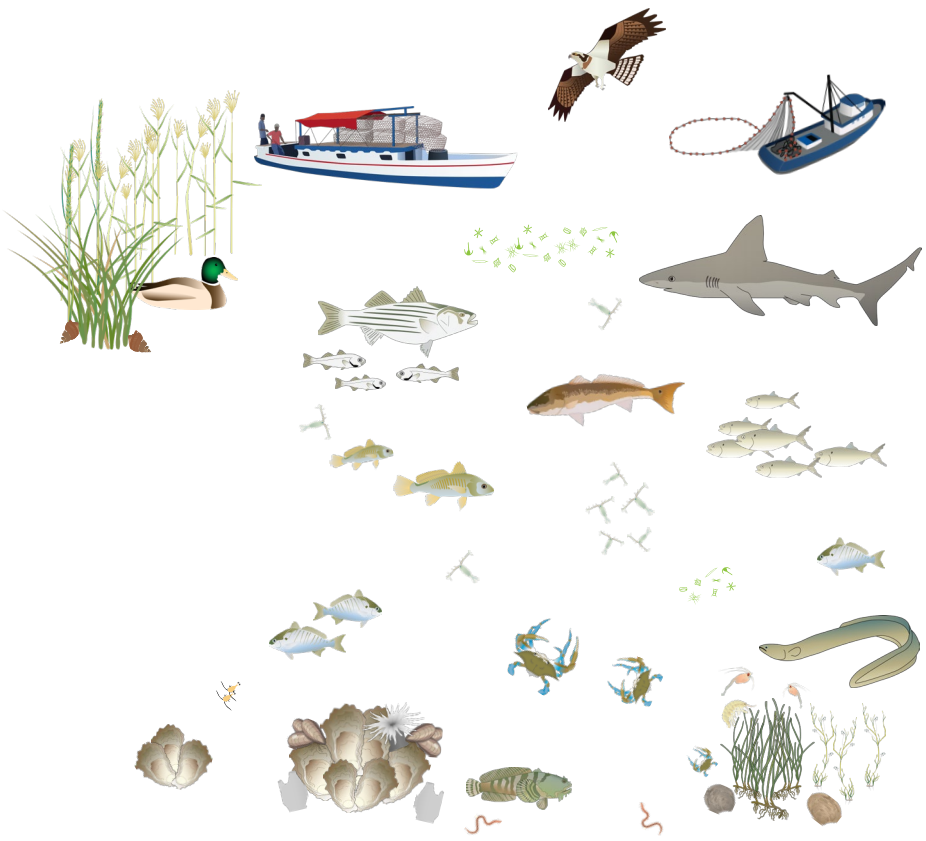
Project Goals

Use ecological and economic models to estimate the change in commercial fisheries harvests & the resulting regional economic impacts generated by Oyster reef restoration & concurrent SAV losses in tributaries of the Middle Peninsula, VA

Ecosystem Model: Ecopath with Ecosim

Trophic (food web) model:

- Mass balance approach (all groups have enough food) that is projected forward in time
- Population dynamics (49 groups)
  - ❖ Biomass, density, mortality, consumption rates, diets
- Environmental variables
- Fisheries harvests
- Living habitats (Oyster reef & SAV)
  - ○ Simulate change singly & in combination
- Translate harvests into regional economic impacts with IMPLAN



SCENARIO RUNS

Calibration:

Fit to time series

- Input time series and environmental variables
  - Indices of abundance
  - ChlA – phytoplankton

Input environmental responses

- Temperature, salinity, dissolved oxygen

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Oysters

Pre-restoration

Young Reef (current)
Restored levels

Mature Reef
4.7% annual increase

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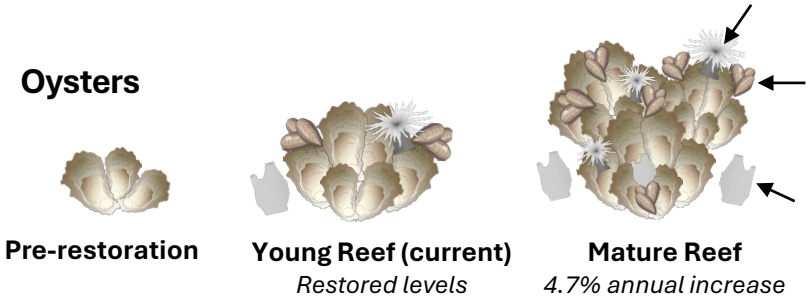

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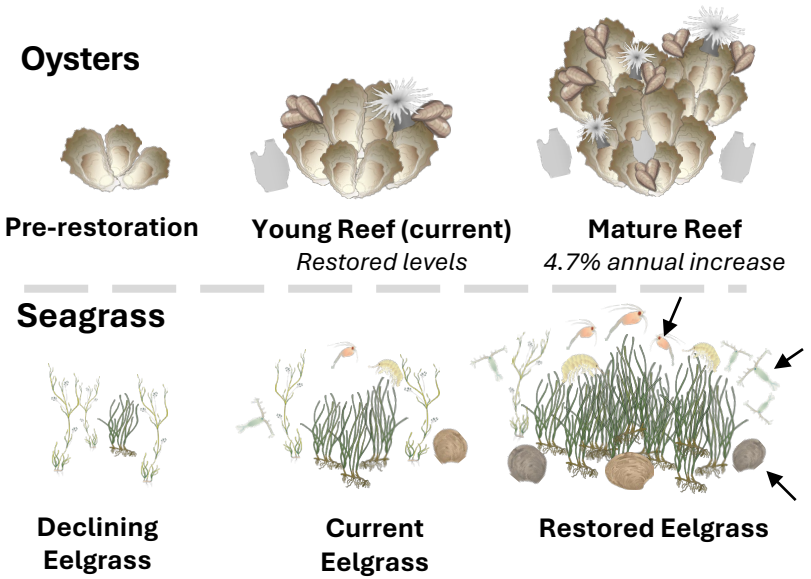

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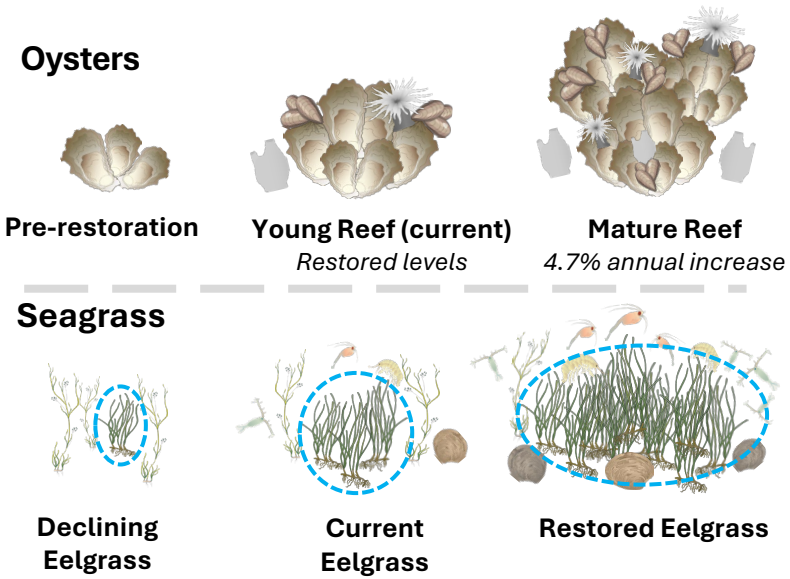

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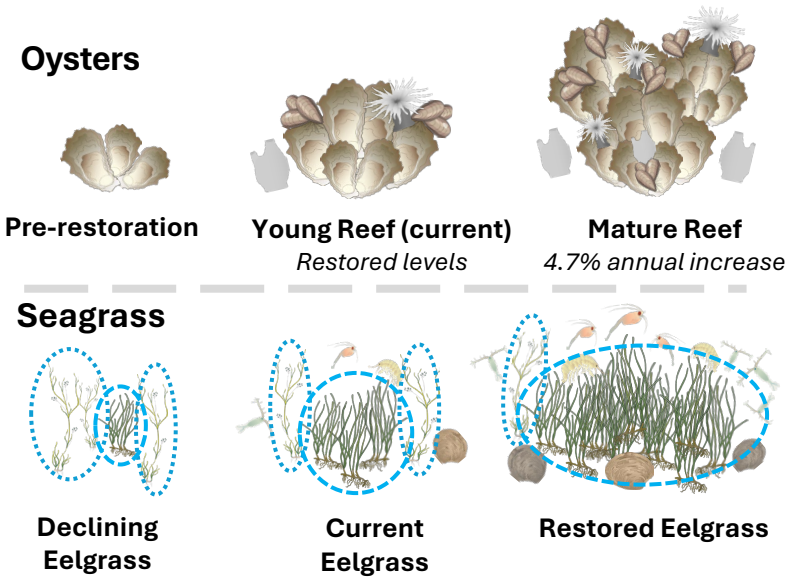

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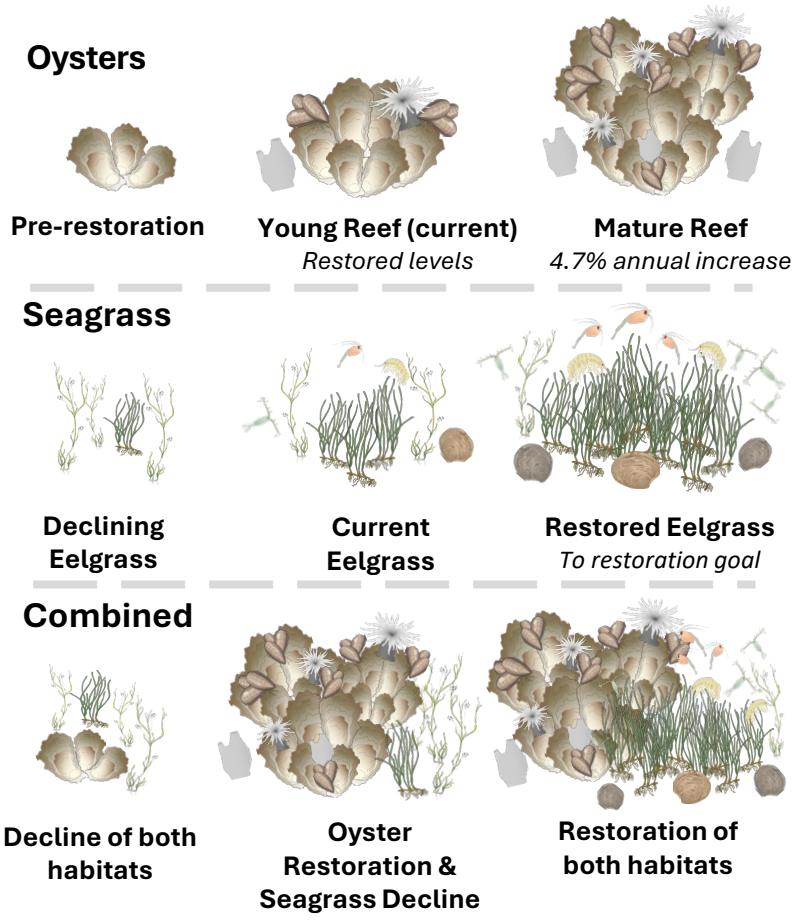
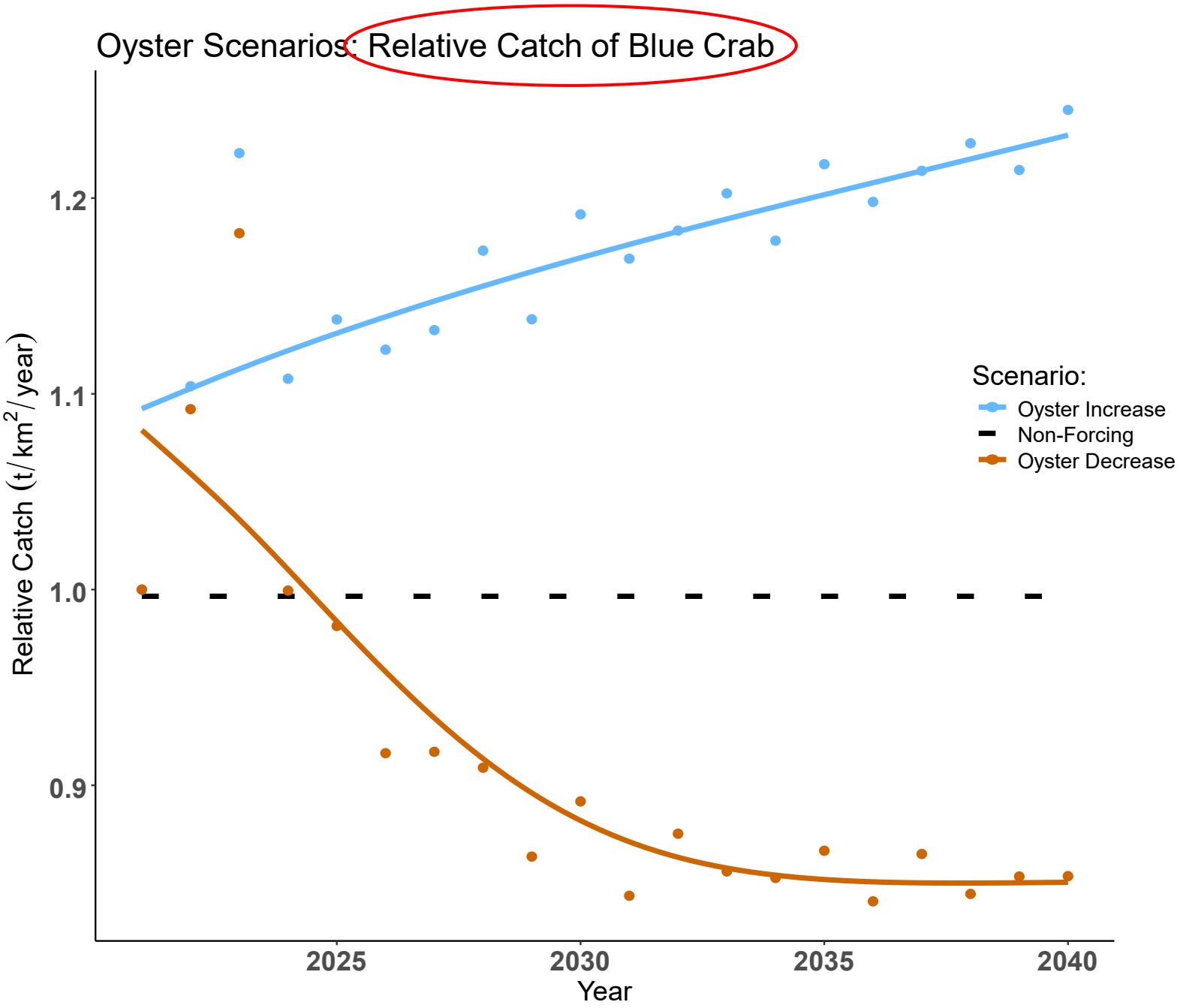
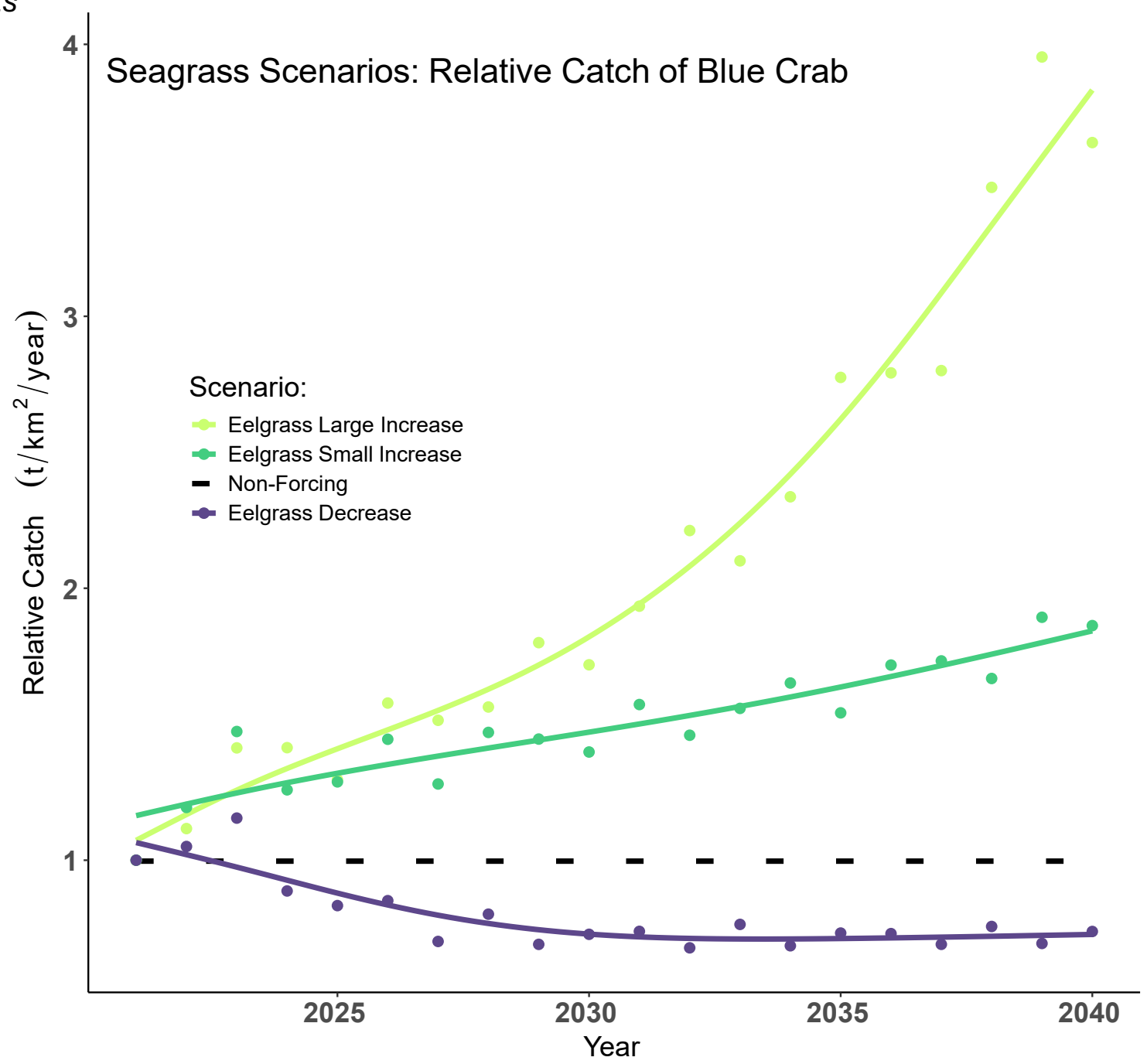
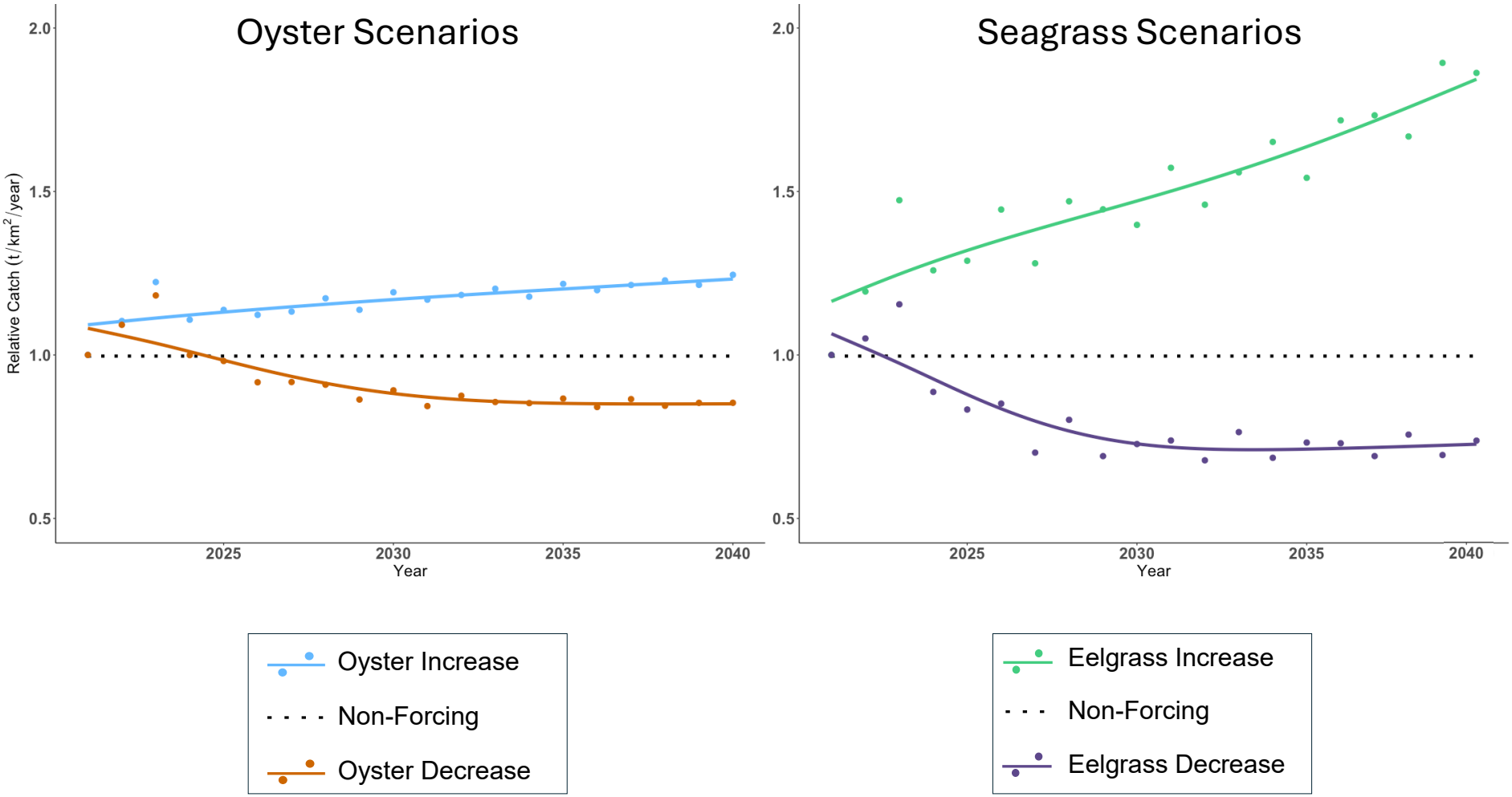



Oyster Scenarios: Relative Catch of Blue Crab
Relative Catch (t/km²/year)
1.2
1.1
1.0
0.9
2025
2030
2035
2040
Year
Scenario:
Oyster Increase
Non-Forcing
Oyster Decrease


Seagrass Scenarios: Relative Catch of Blue Crab
Relative Catch (t/km^2/year)
4
3
2
1
Scenario:
Eelgrass Large Increase
Eelgrass Small Increase
Non-Forcing
Eelgrass Decrease
2025
2030
2035
2040
Year

Relative Catch of Blue Crab



Linking Ecology and Economics

Ecopath with Ecosim

No fish is an island

Output:
Fisheries Landings/ Revenue

Economic (Industry)
- Custom Cost Functions

IMPLAN

Output:
Employment, Sales, Income

Socio-economic Impact:

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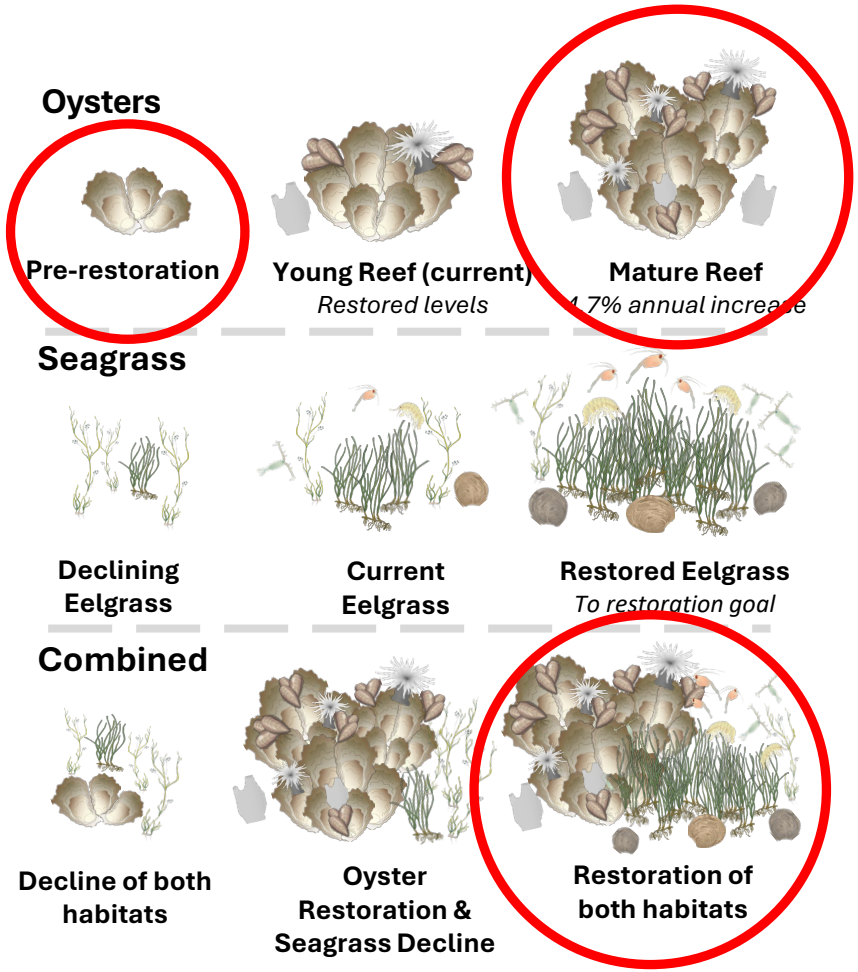
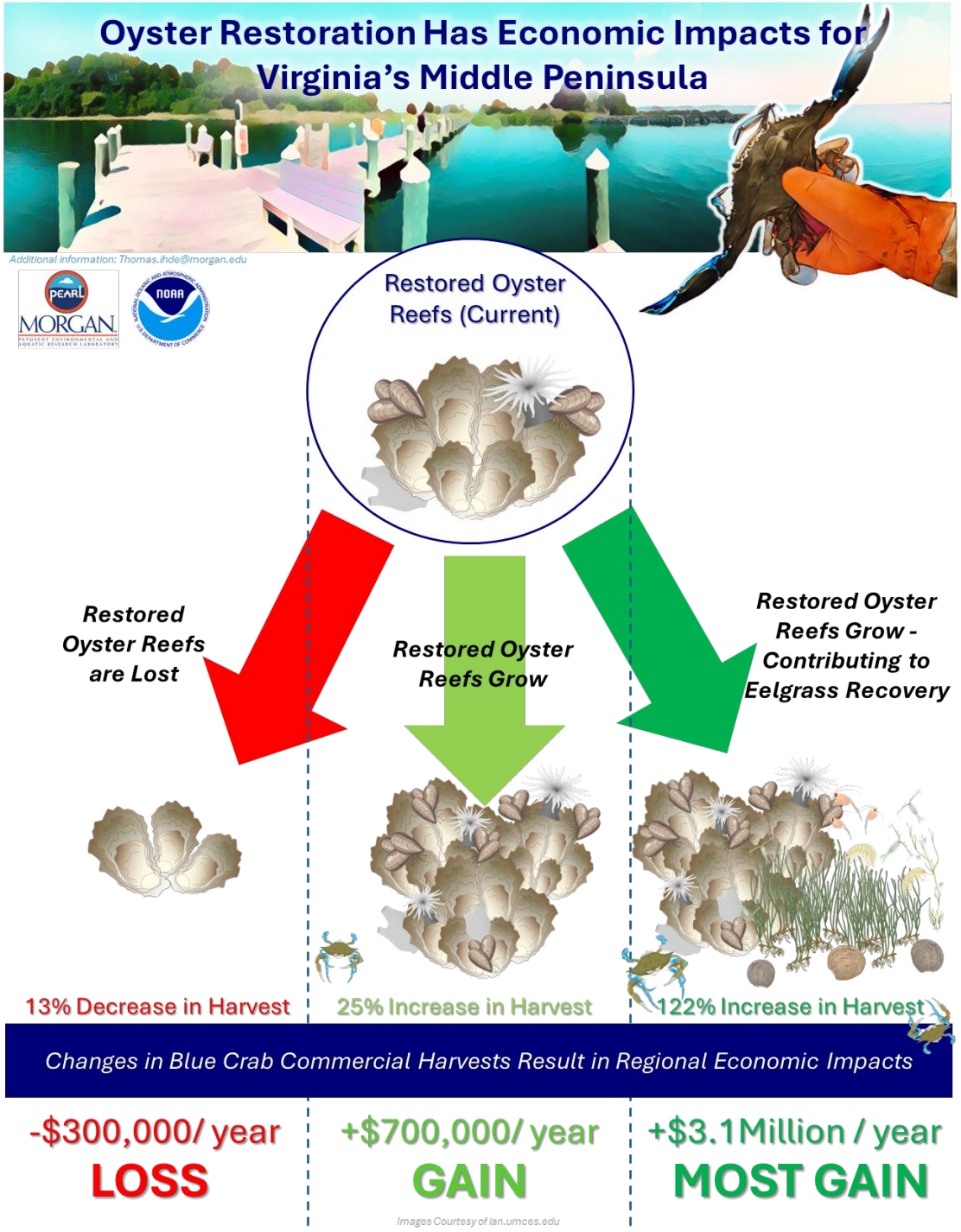


Results


Oyster Restoration Has Economic Impacts for Virginia's Middle Peninsula
Additional information: Thomas.Ihde@morgan.edu
PEARL
MORGAN
NOAA
Restored Oyster Reefs (Current)
Restored Oyster Reefs are Lost
Restored Oyster Reefs Grow
Restored Oyster Reefs Grow - Contributing to Eelgrass Recovery
13% Decrease in Harvest
25% Increase in Harvest
122% Increase in Harvest
Changes in Blue Crab Commercial Harvests Result in Regional Economic Impacts
-$300,000/ year
LOSS
+$700,000/ year
GAIN
+$3.1Million / year
MOST GAIN
Images Courtesy of ian.umces.edu

Thank You!

Federal Award No. NA21NMF4570527

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- Advisory Panel

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Virginia Institute of Marine Science

- Molluscan Ecology Lab
- Seagrass Lab
- ChesMMAP survey
- Center for Coastal Resources Management
- Juvenile Trawl Survey
- Lisa Kellogg

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Questions?

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Extra Slides

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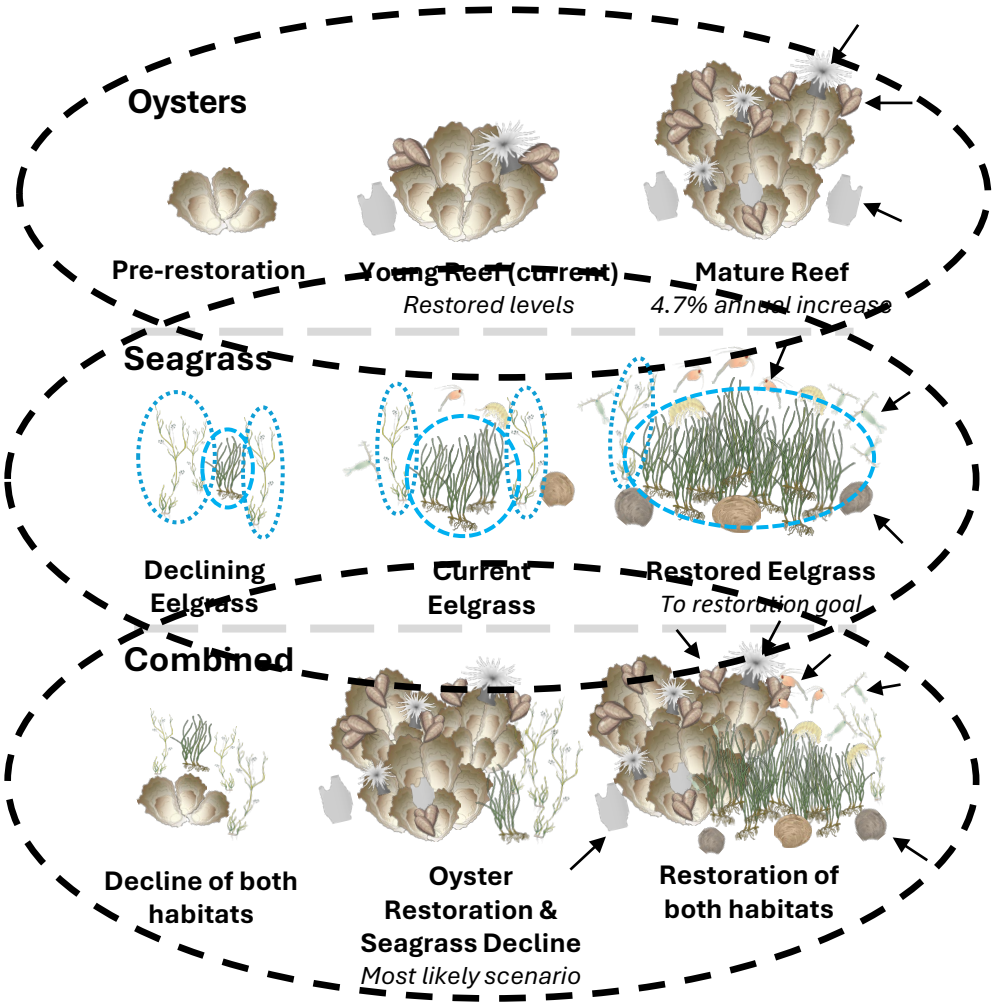

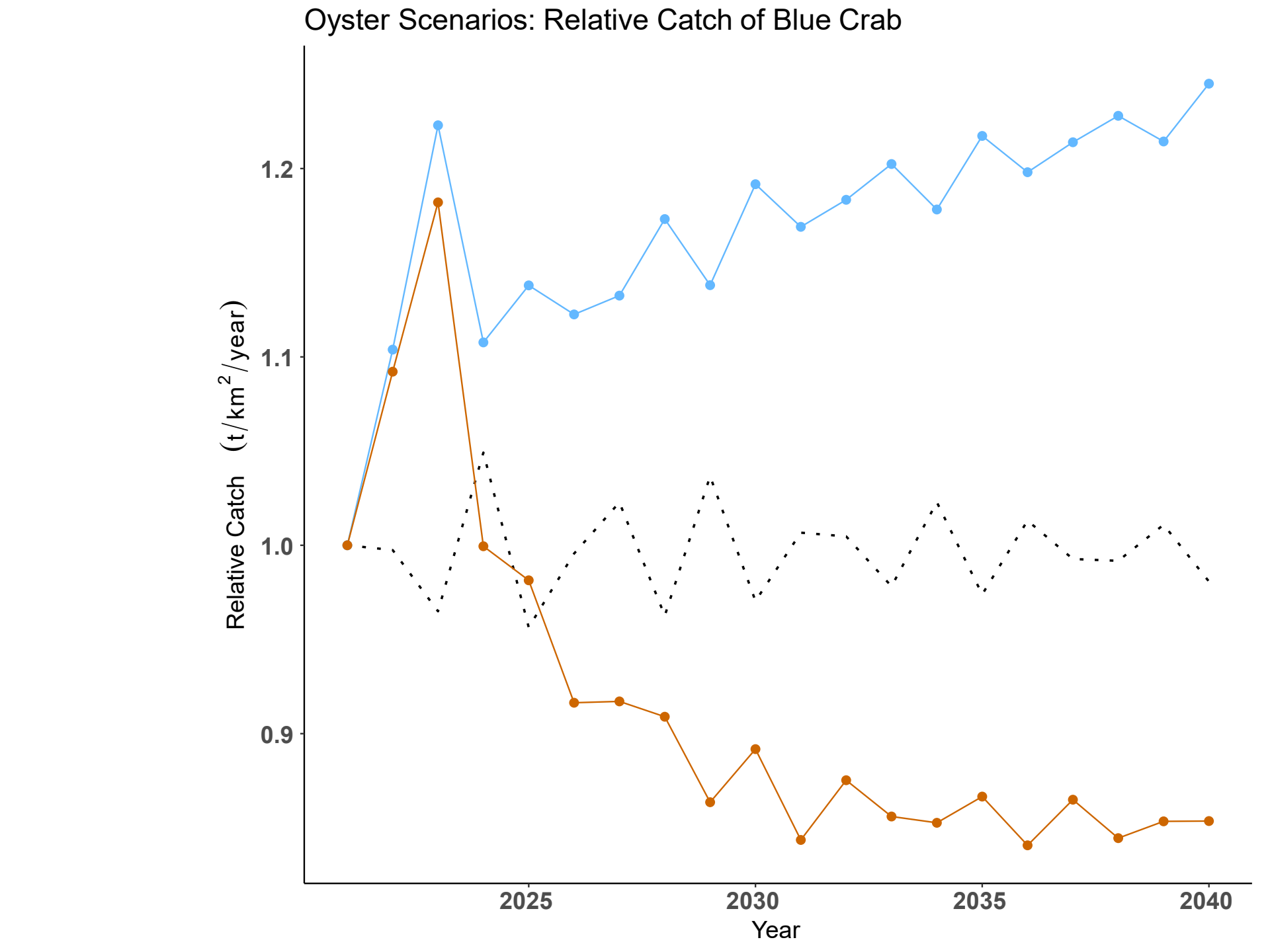
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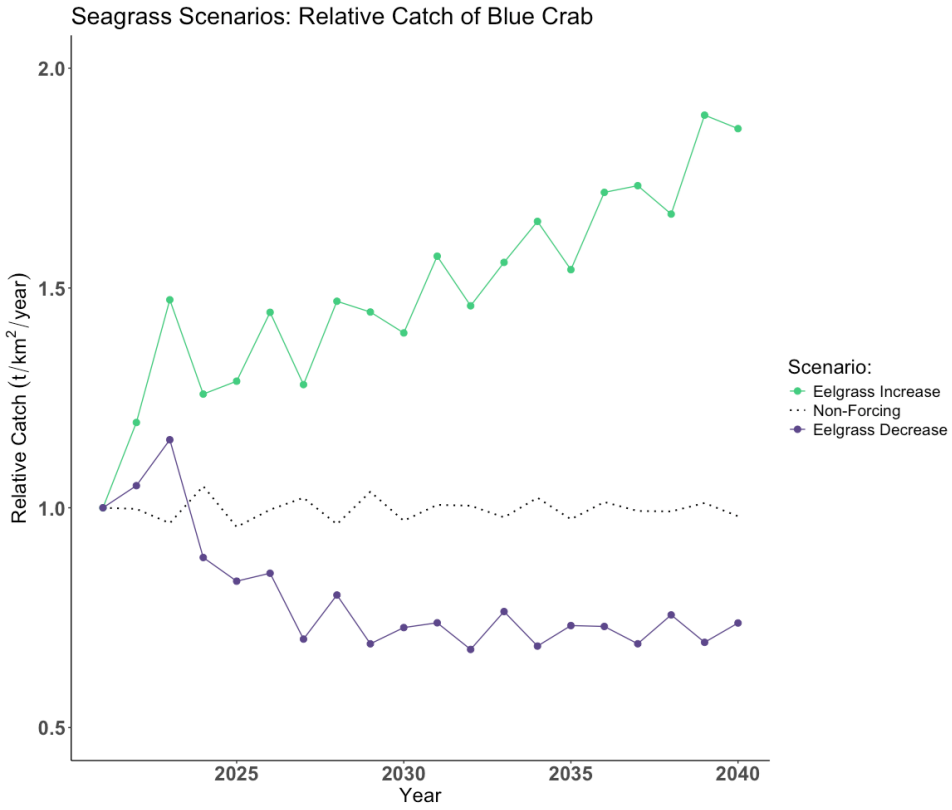
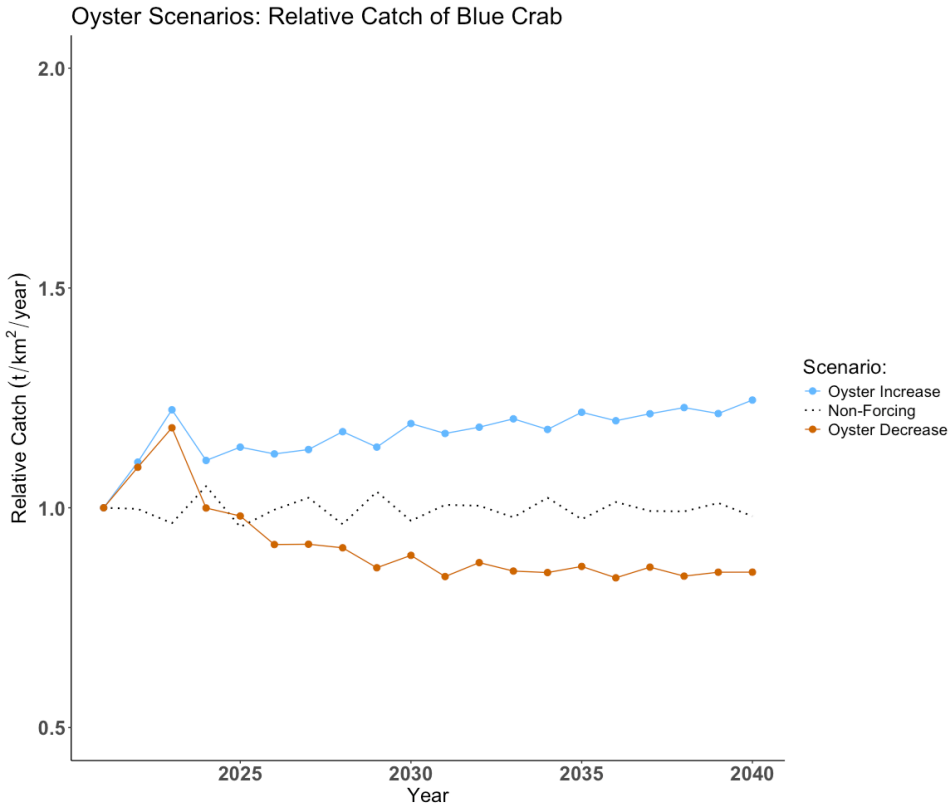

Seagrass Scenarios: Relative Catch of Blue Crab
Relative Catch (t/km^2/year)
2.0
1.5
1.0
0.5
2025
2030
2035
2040
Year
Scenario:
Eelgrass Increase
Non-Forcing
Eelgrass Decrease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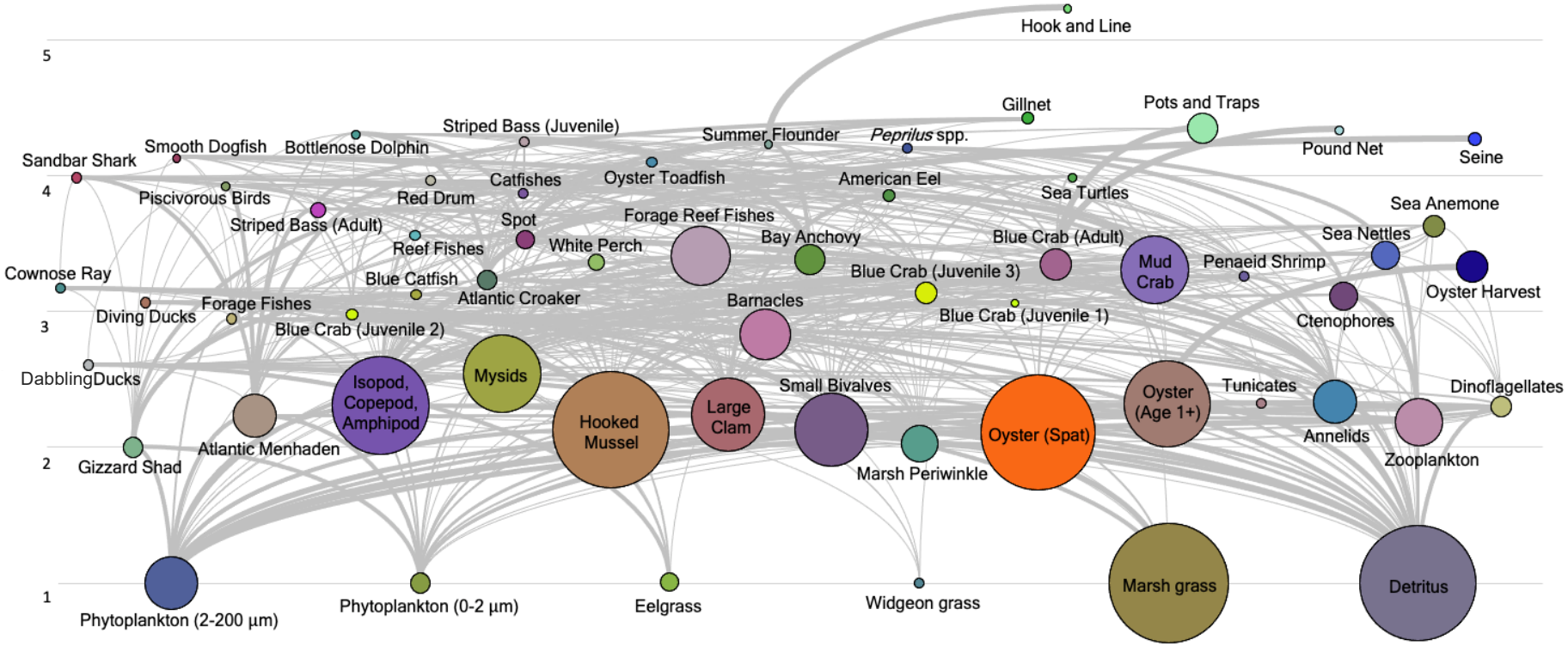
Results: Ecopath

YORK RIVER: Ecopath Food Web



- 49 groups + fisheries