SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY
UNIVERSITY OF HAWAI'I AT MĀNOA

NOAA OCEAN ACIDIFICATION PROGRAM

Ecosystem Modeling with Atlantis

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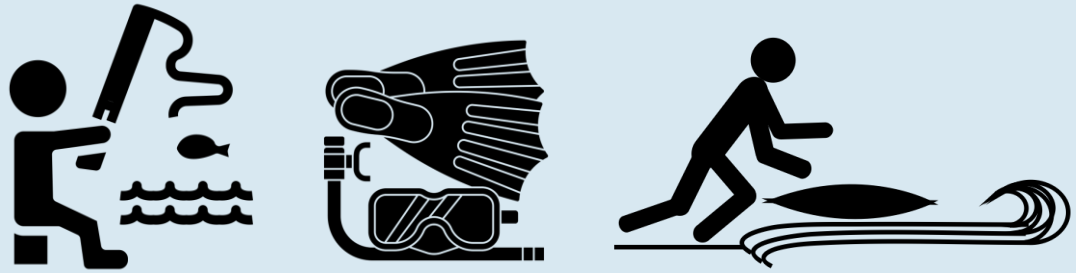
Atlantis Developer: Elizabeth Fulton

PROJECT OBJECTIVES

Produce high-resolution oceanographic projections

Assess flow of goods and services & vulnerabilities



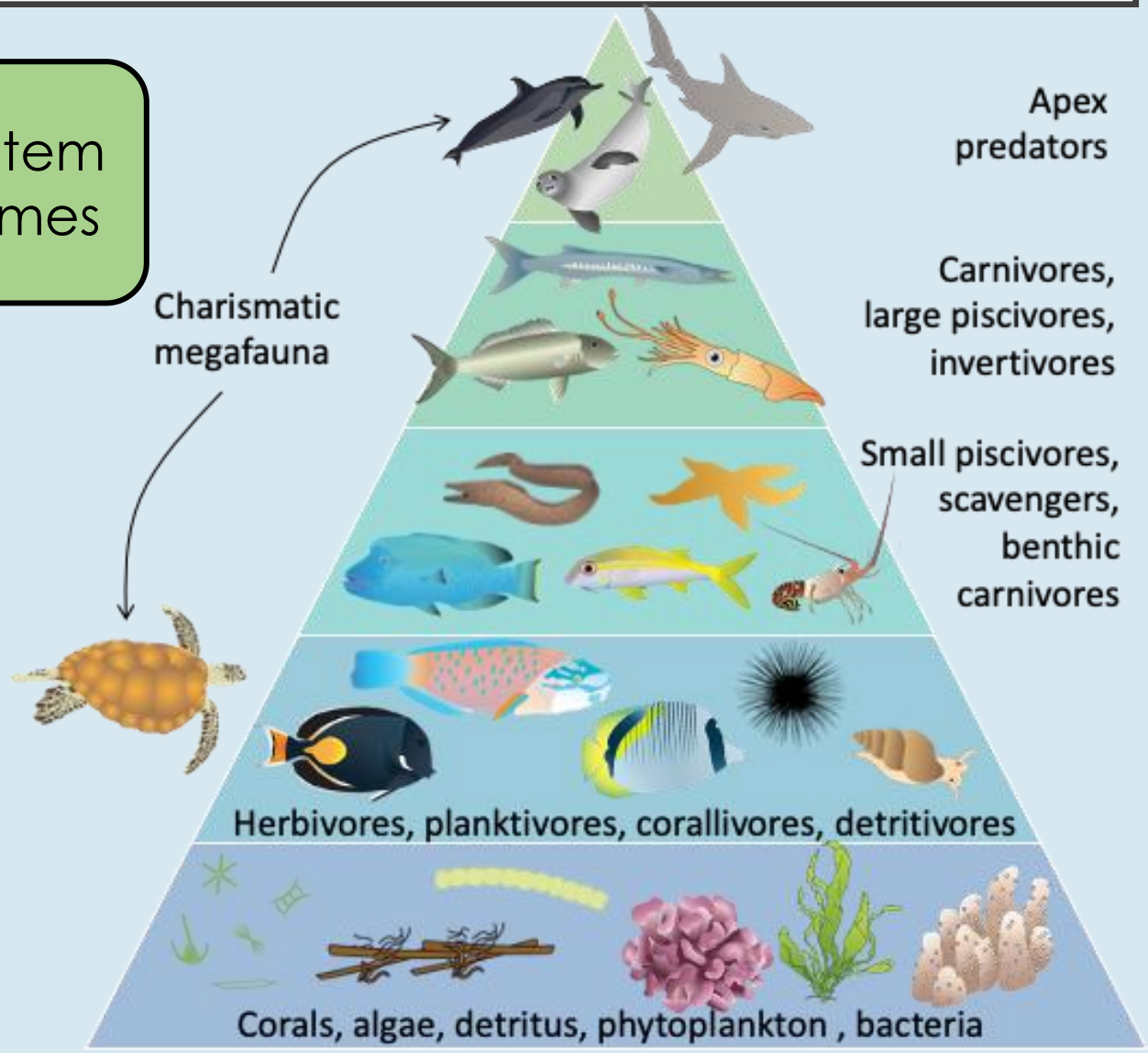
OCEANOGRAPHY TEAM

SOCIAL-ECOLOGICAL TEAM

ATLANTIS MAIN HAWAIIAN ISLANDS MODEL

ROMS/ COBALT model → Climate & ocean conditions → *Atlantis model* → Ecosystem outcomes

- Three climate scenarios
  - SSP1-2.6, SSP2-4.5, and SSP3-7.0
- Food-web based functional groups
  - Feeding and habitat
  - Important fish, coral, and megafauna species



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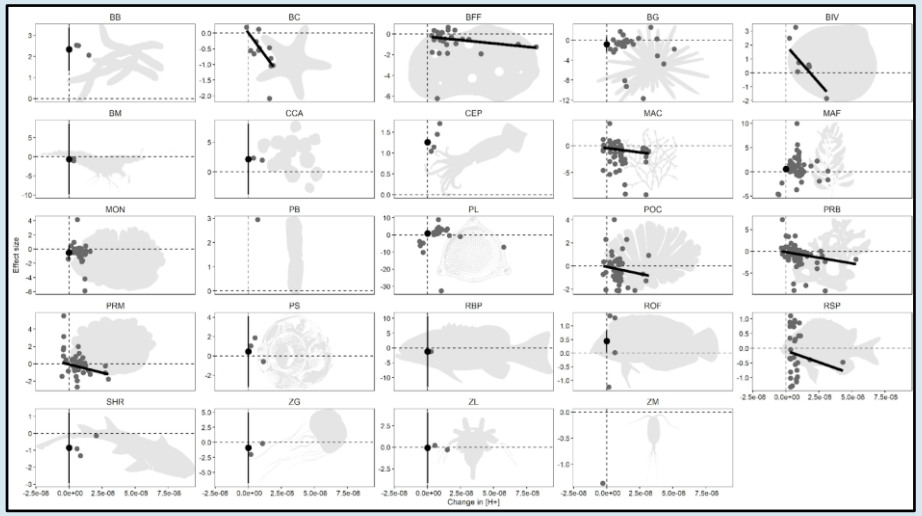
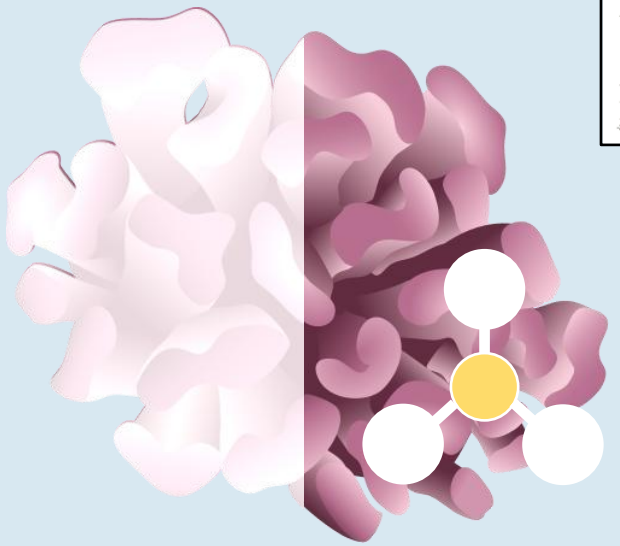
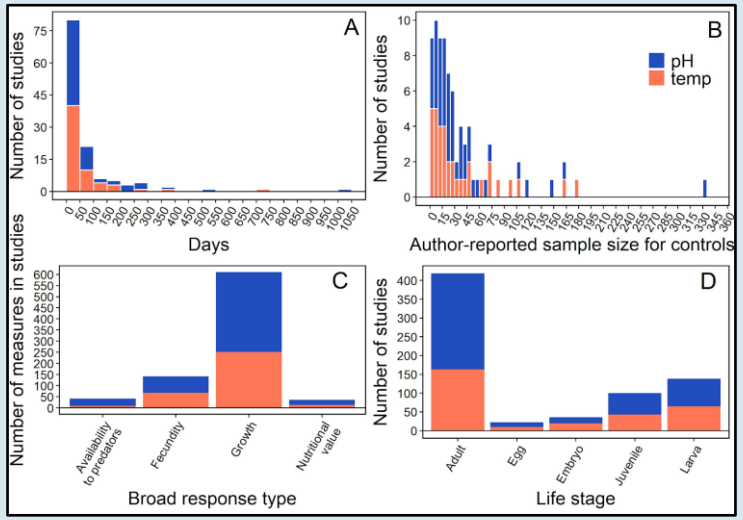


Bleaching threshold: 28°C

0.2°C shift per decade



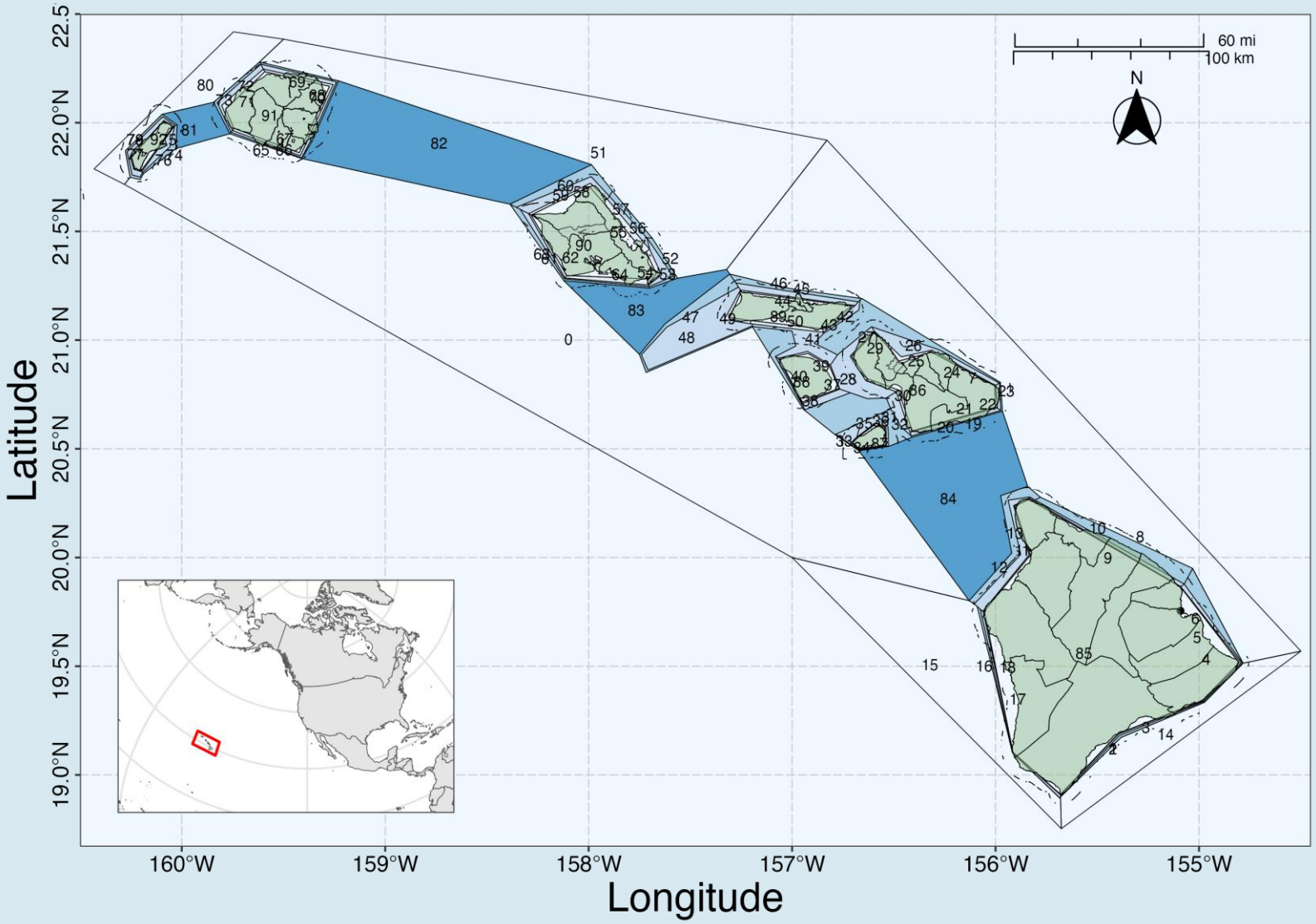


Lowder et. al, In Prep

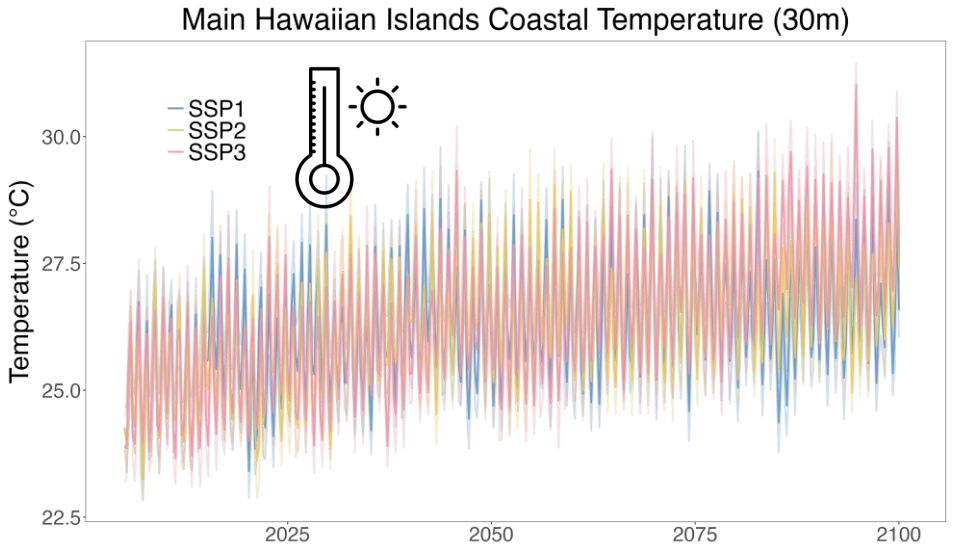
ATLANTIS MAIN HAWAIIAN ISLANDS MODEL

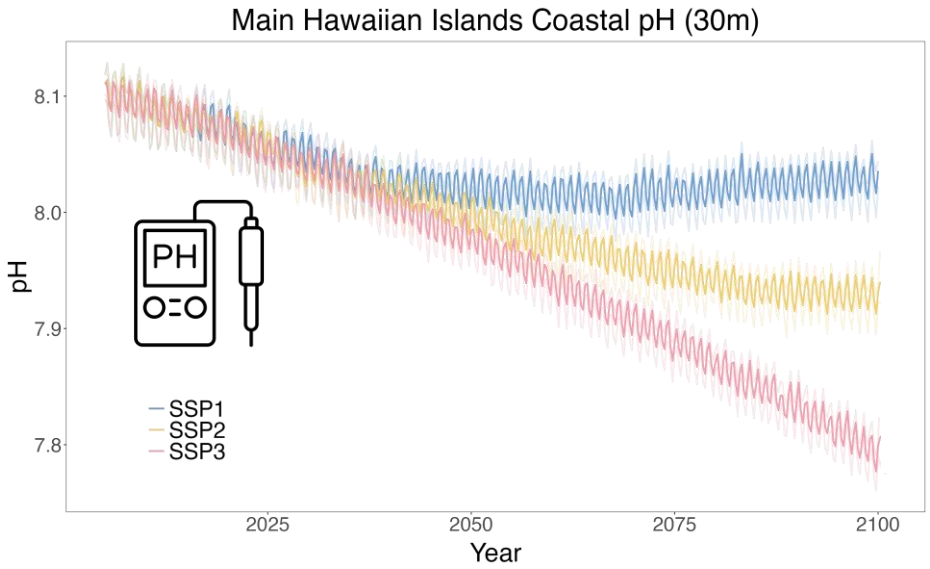
Model geometry

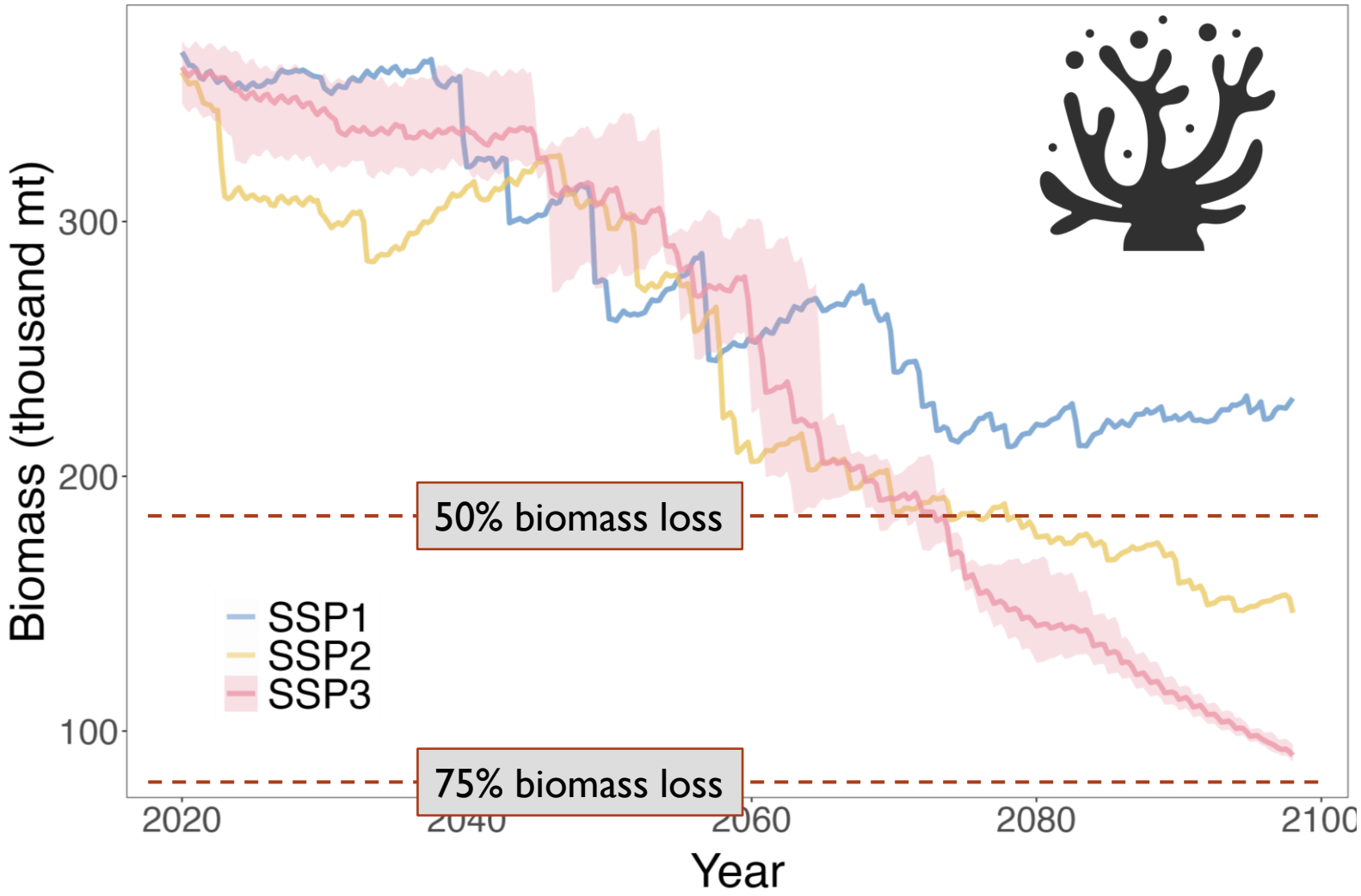
- 93 boxes(cells)
  - 79 dynamic boxes
  - 14 non-dynamic
    - 8 island
    - 6 boundary
- 4 depth layers
  - 30 m
  - 150 m
  - 400 m
  - sediment



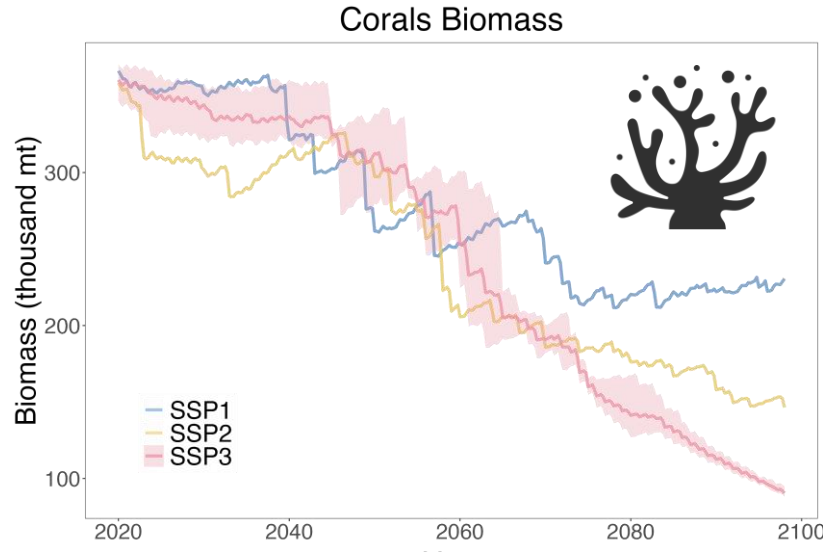
RESULTS: CORALS

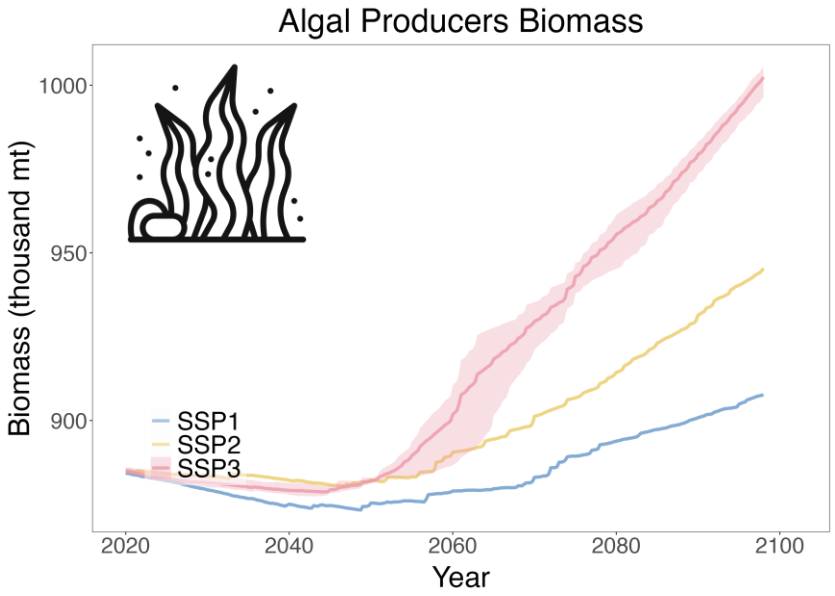


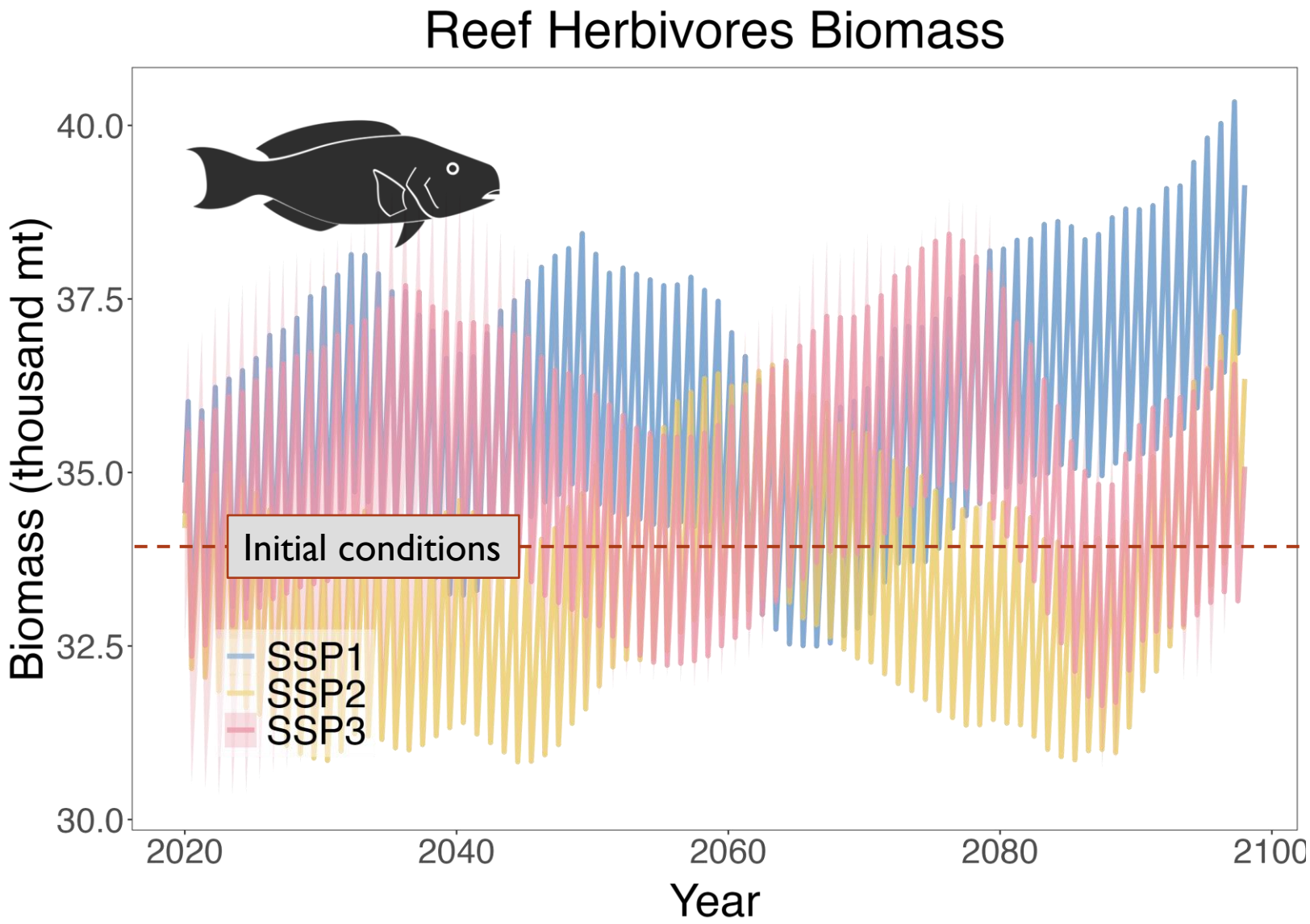




RESULTS: REEF HERBIVORES







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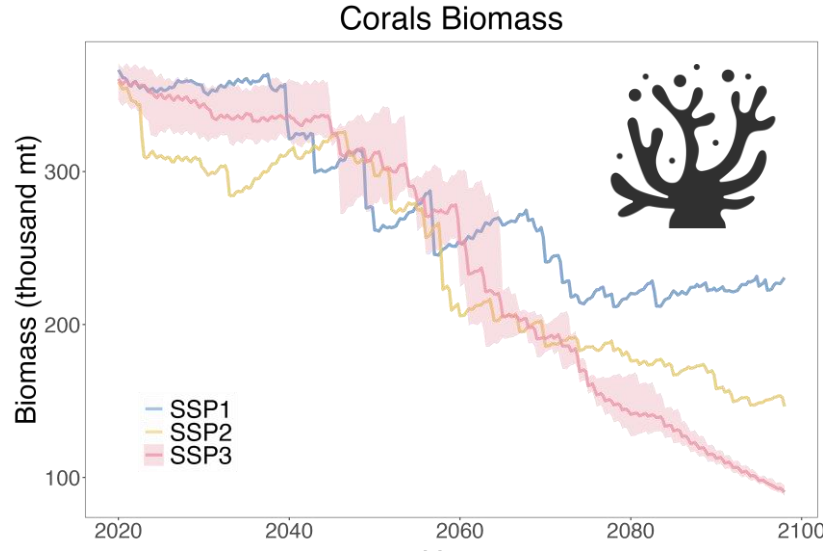
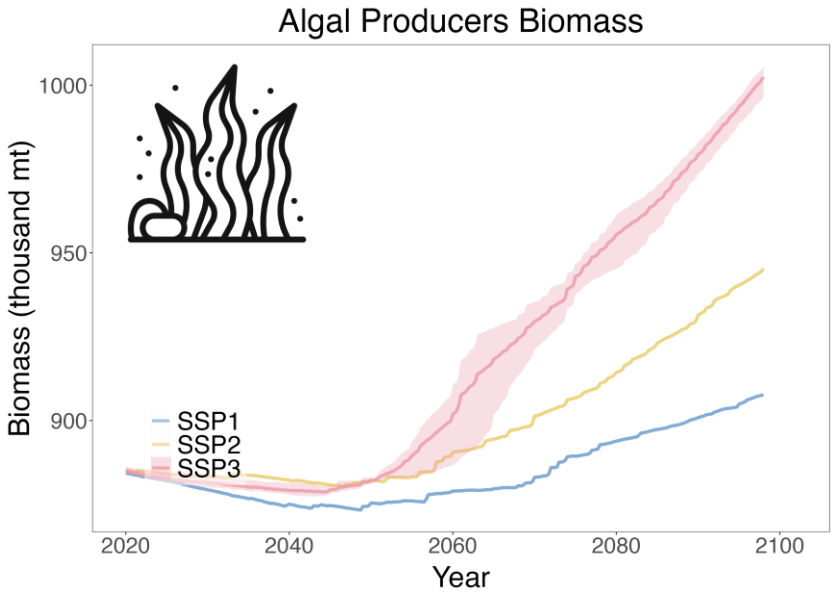
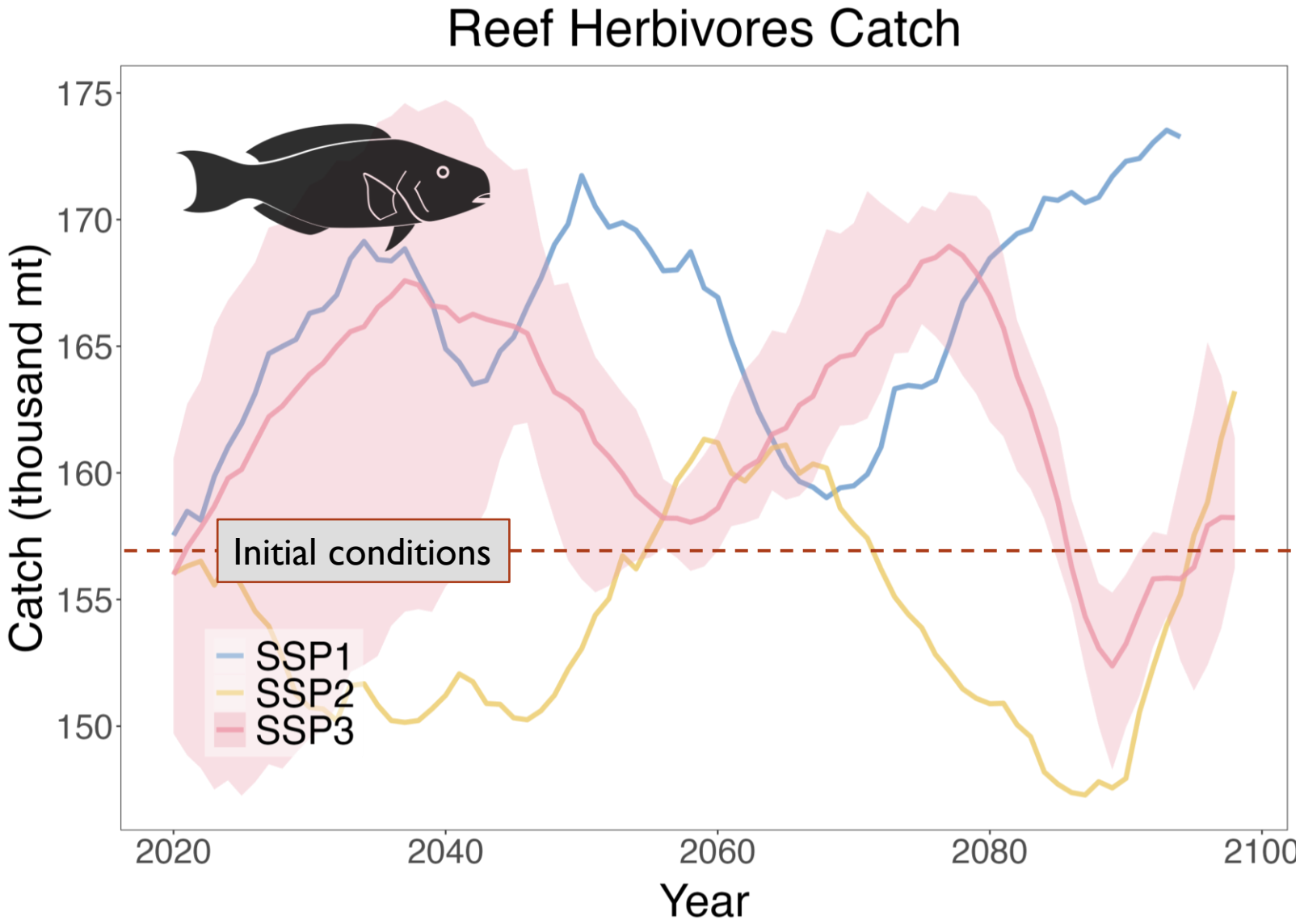
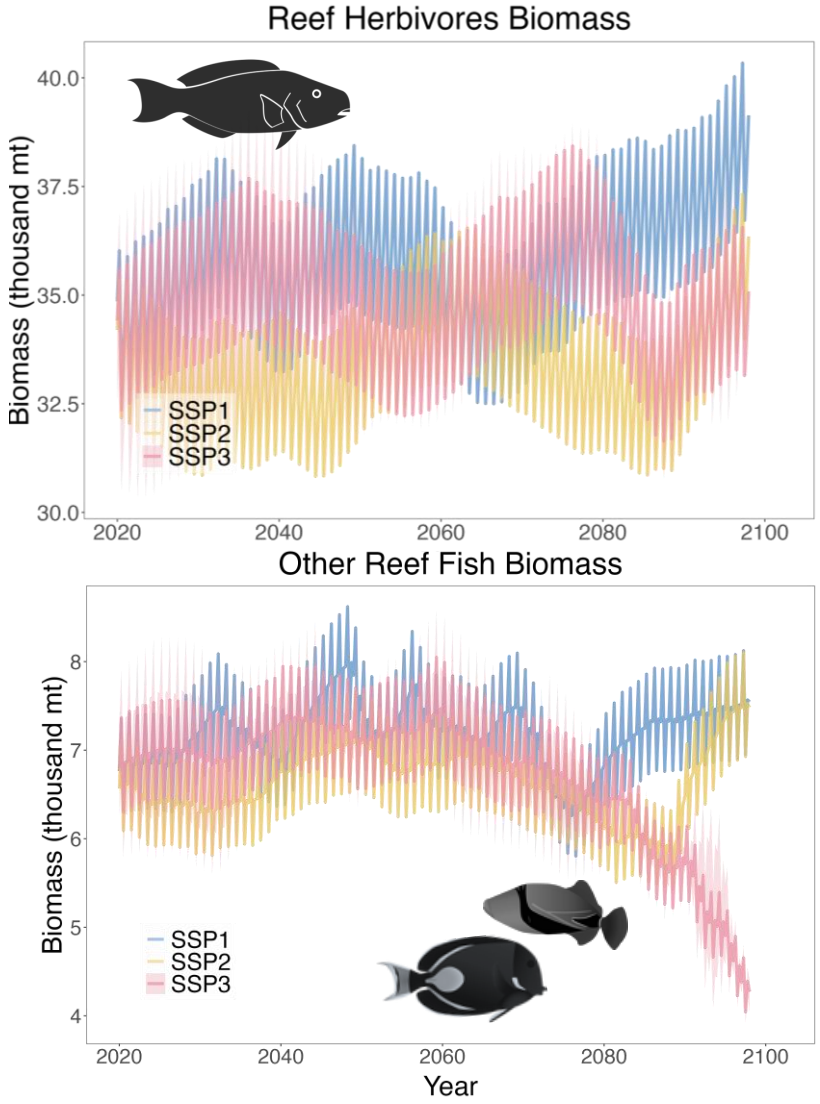
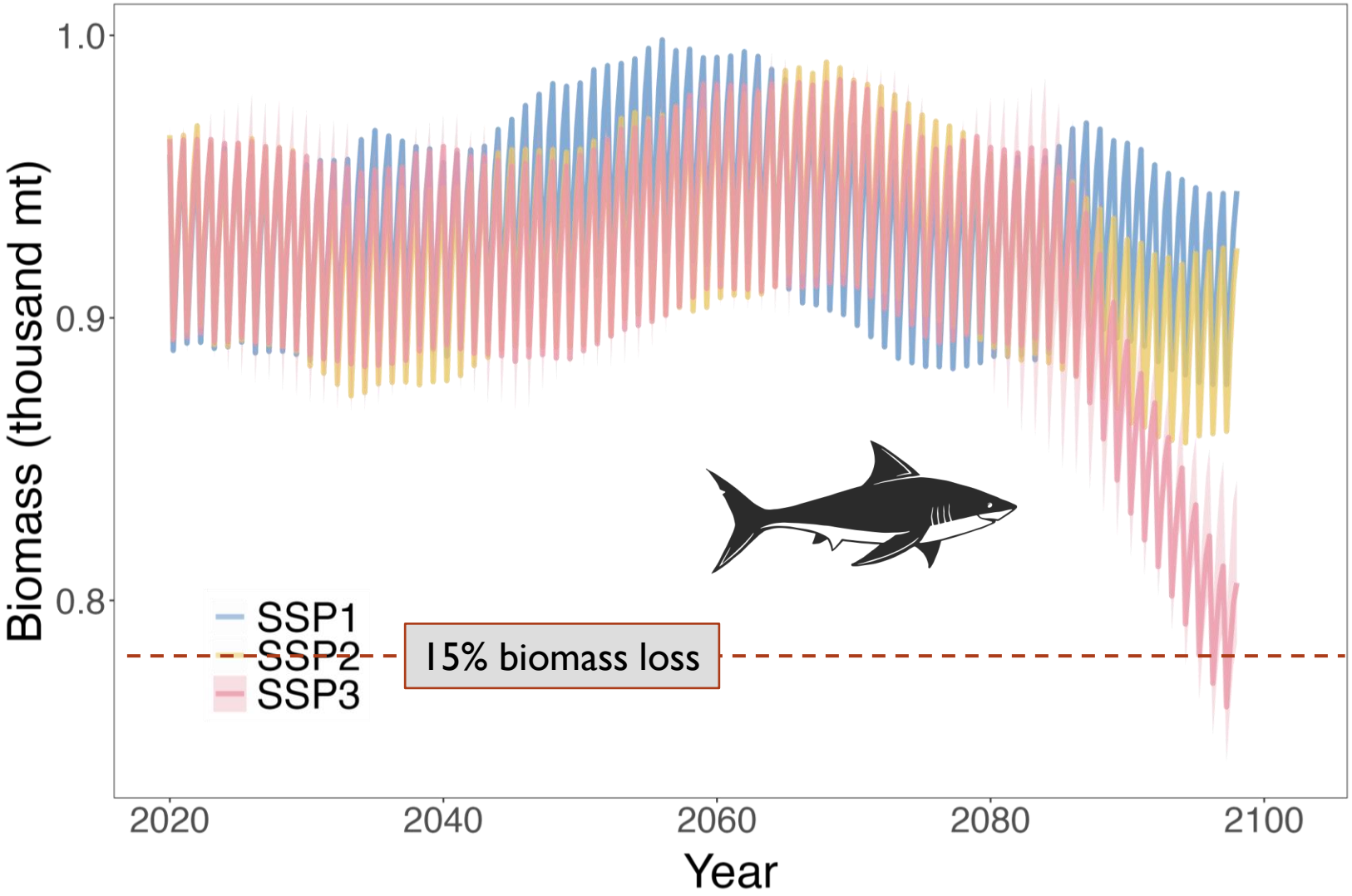




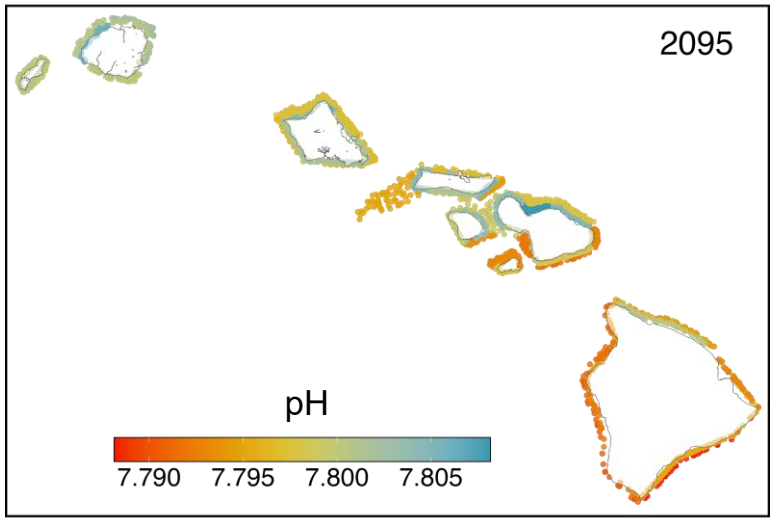


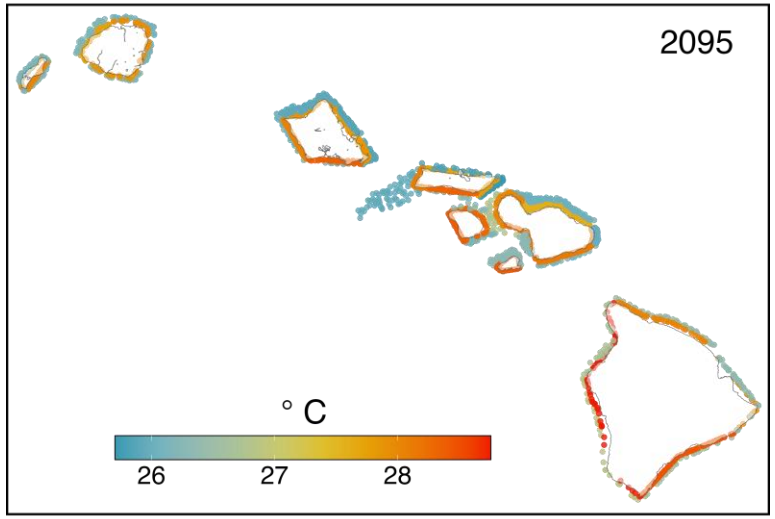
RESULTS: APEX PREDATORS

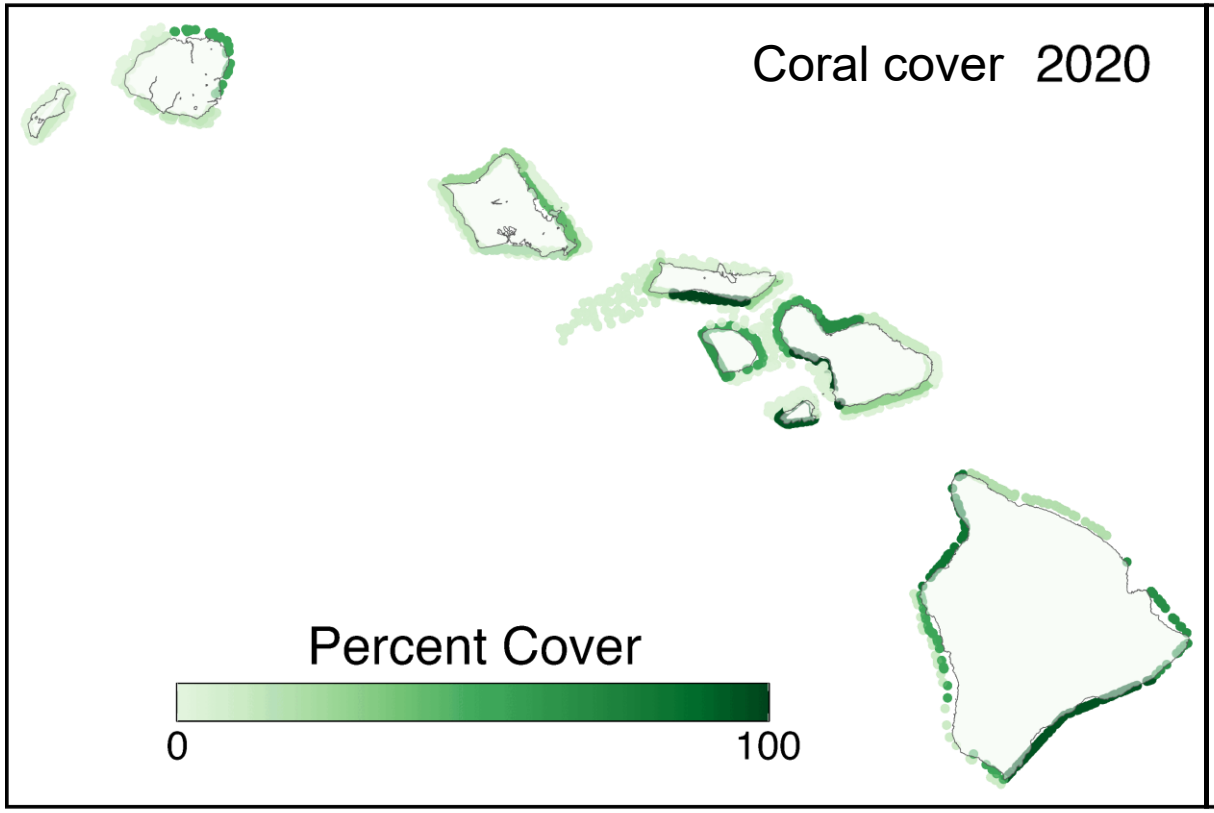


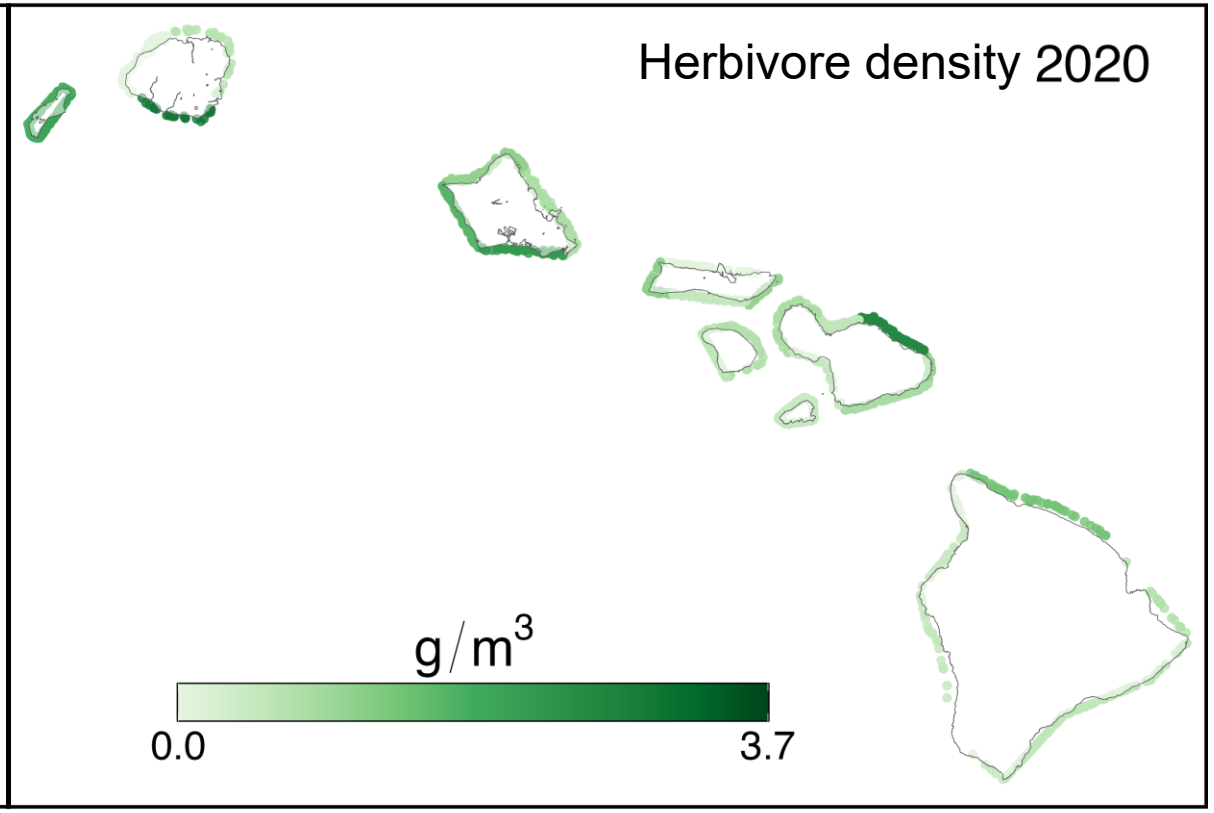


SPATIAL PATTERNS: SSP3









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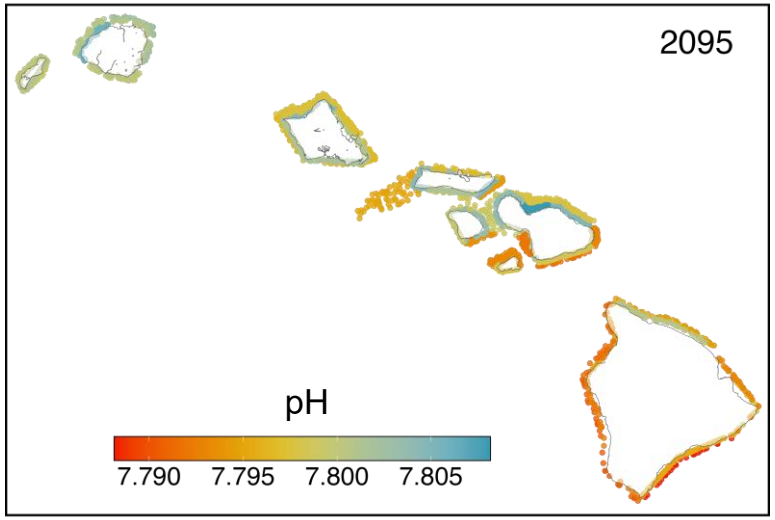

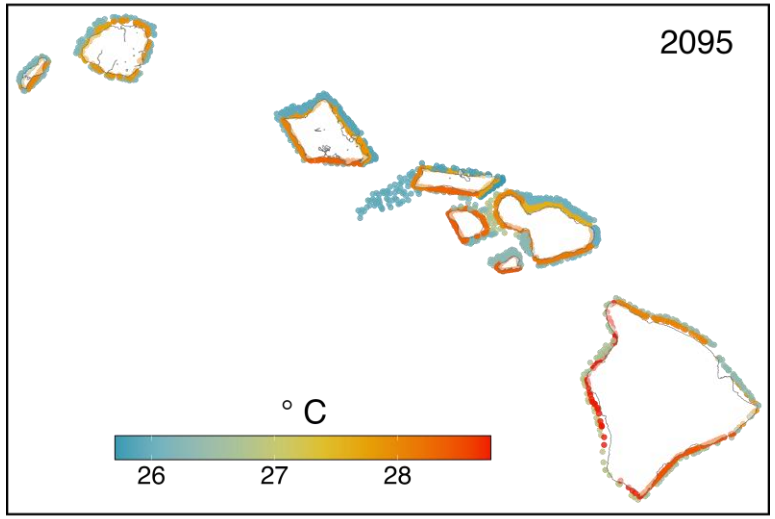

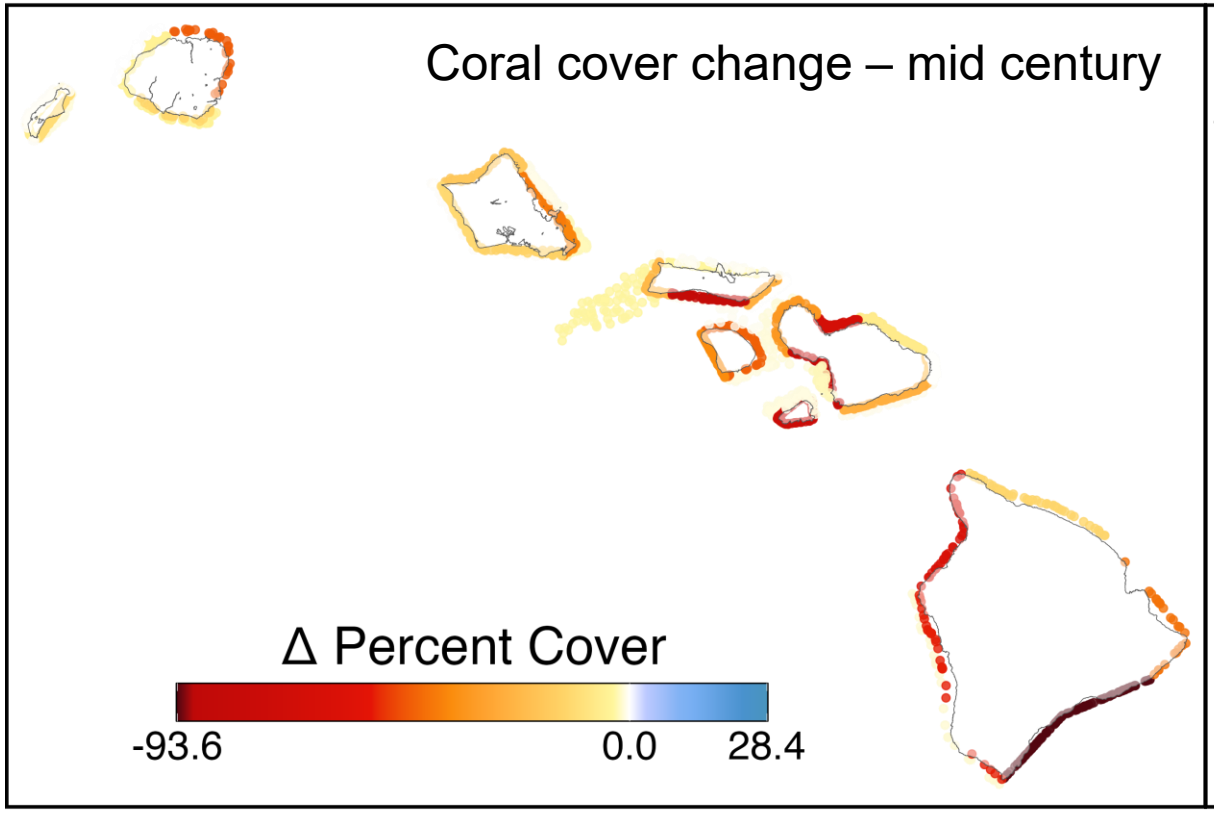

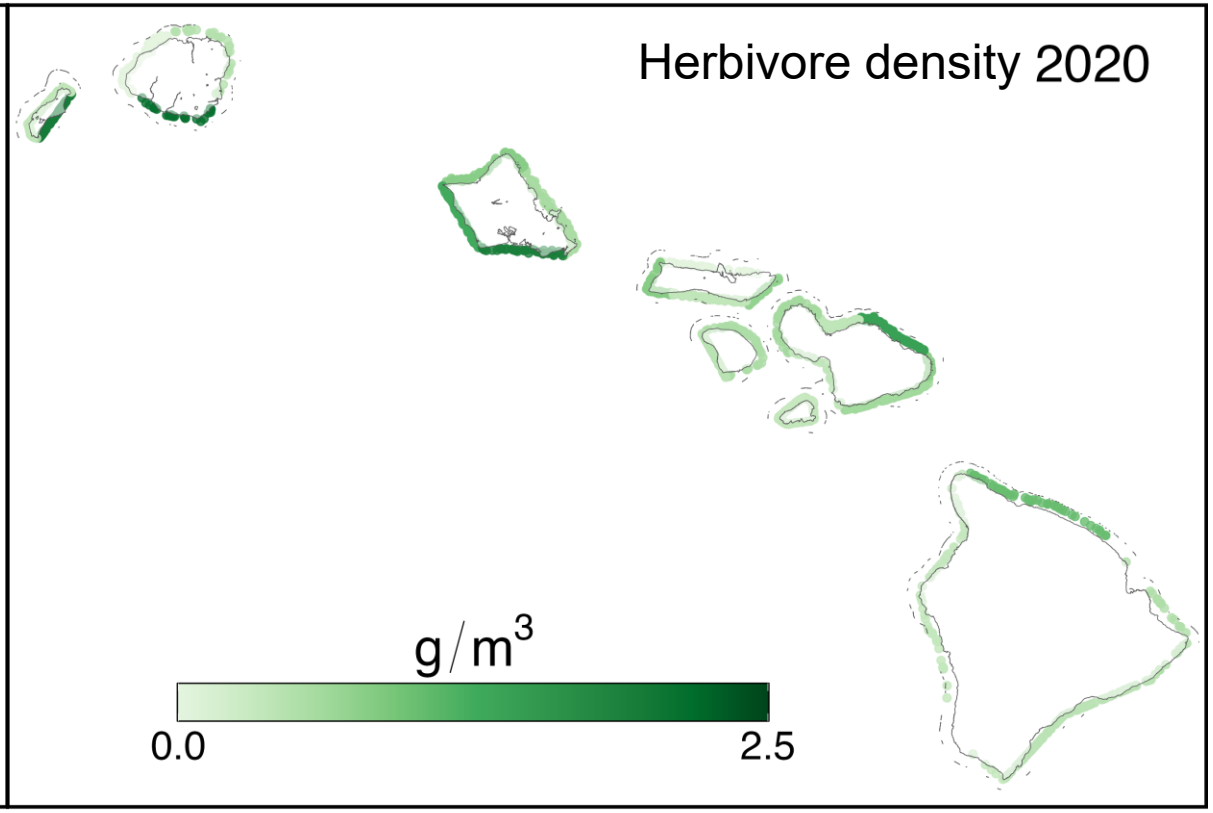

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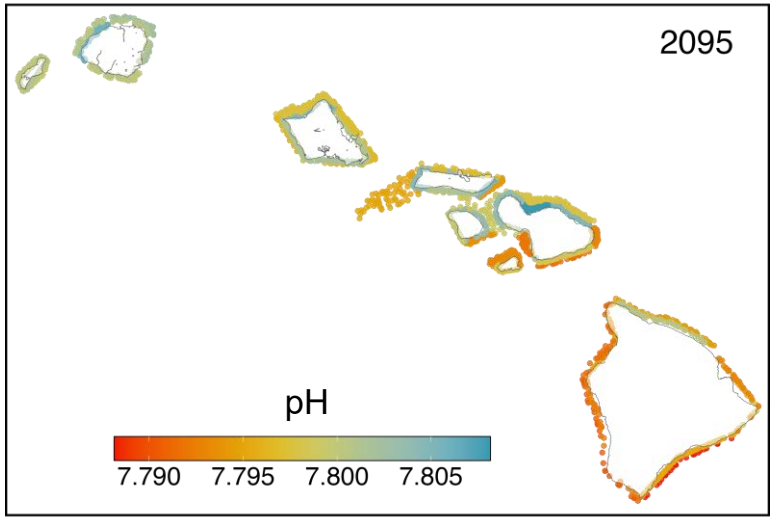

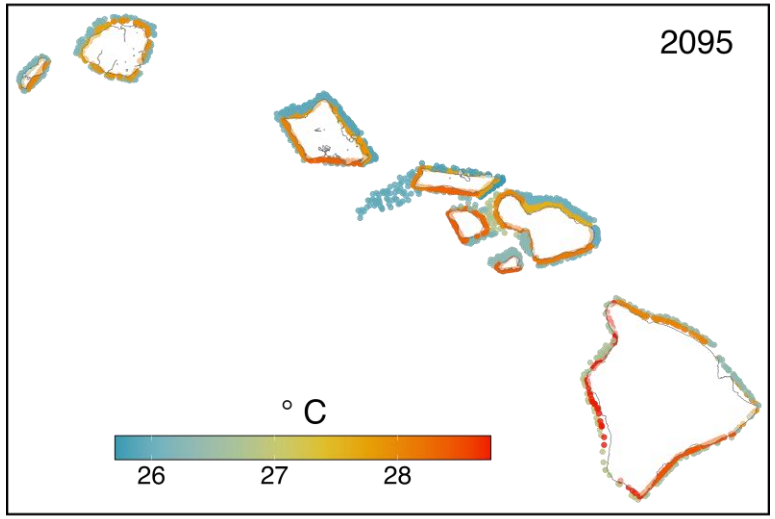

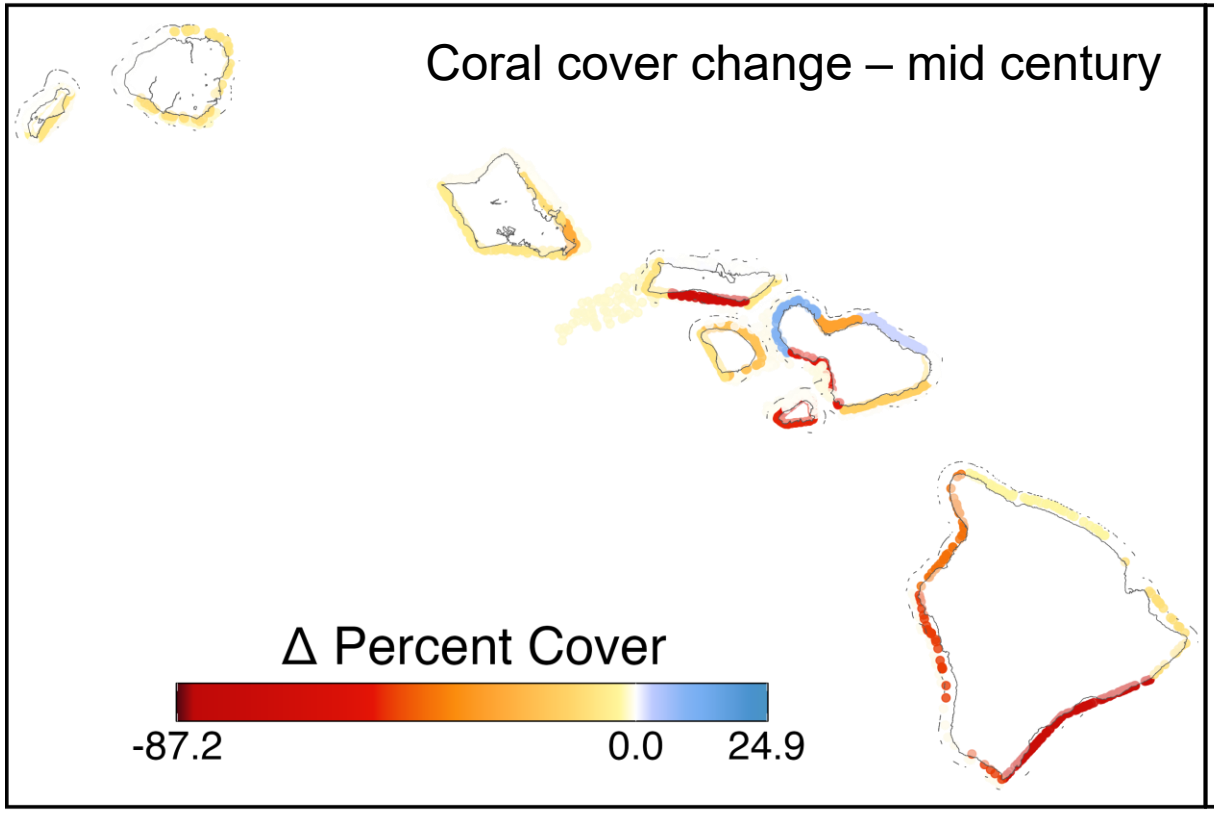

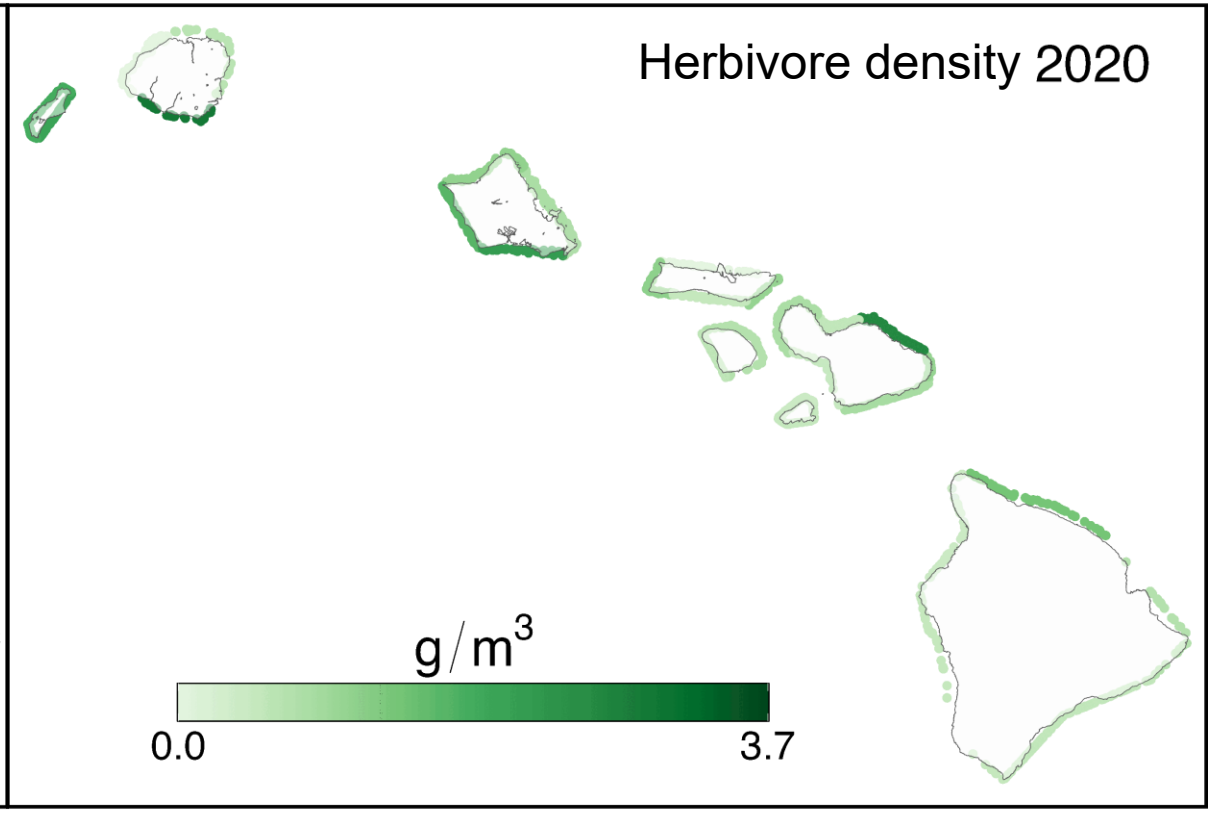

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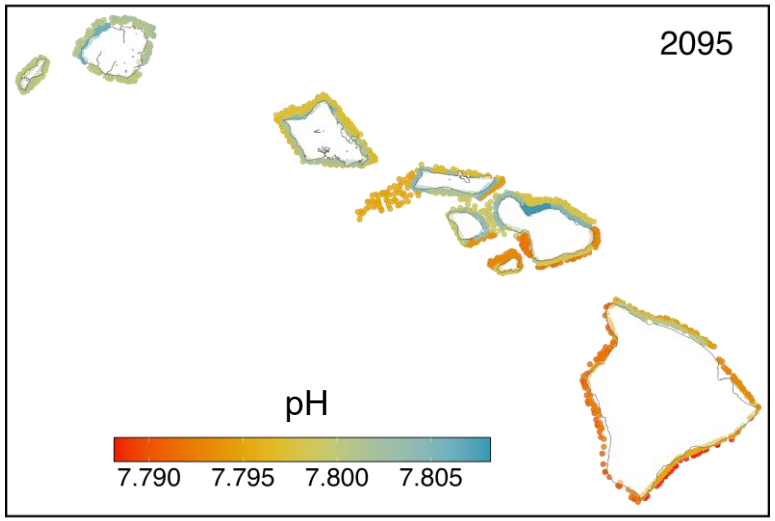

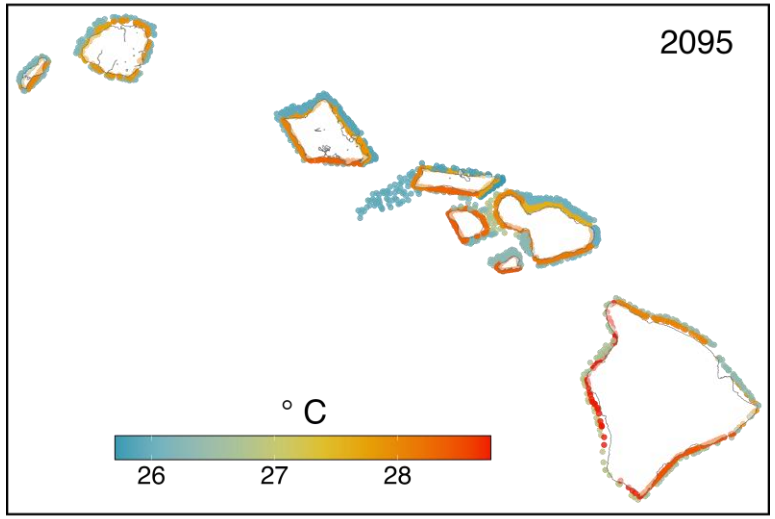

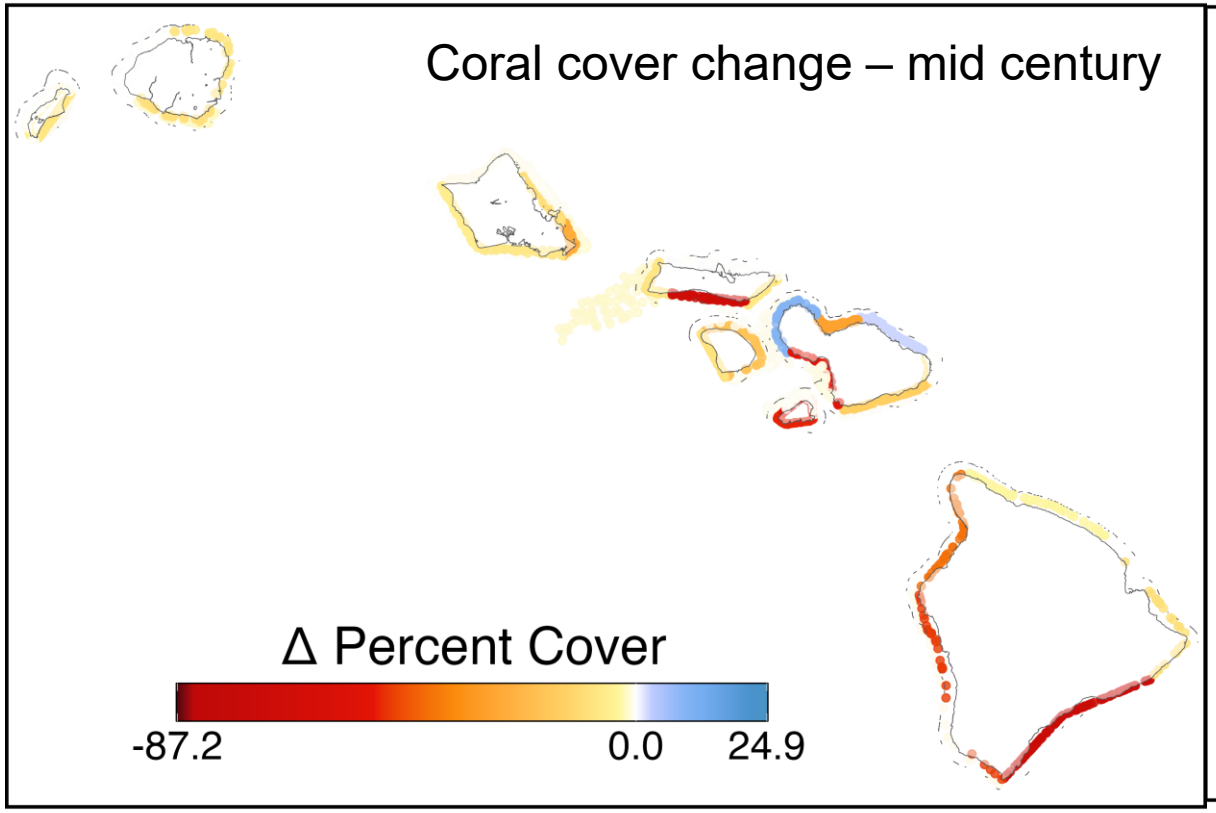

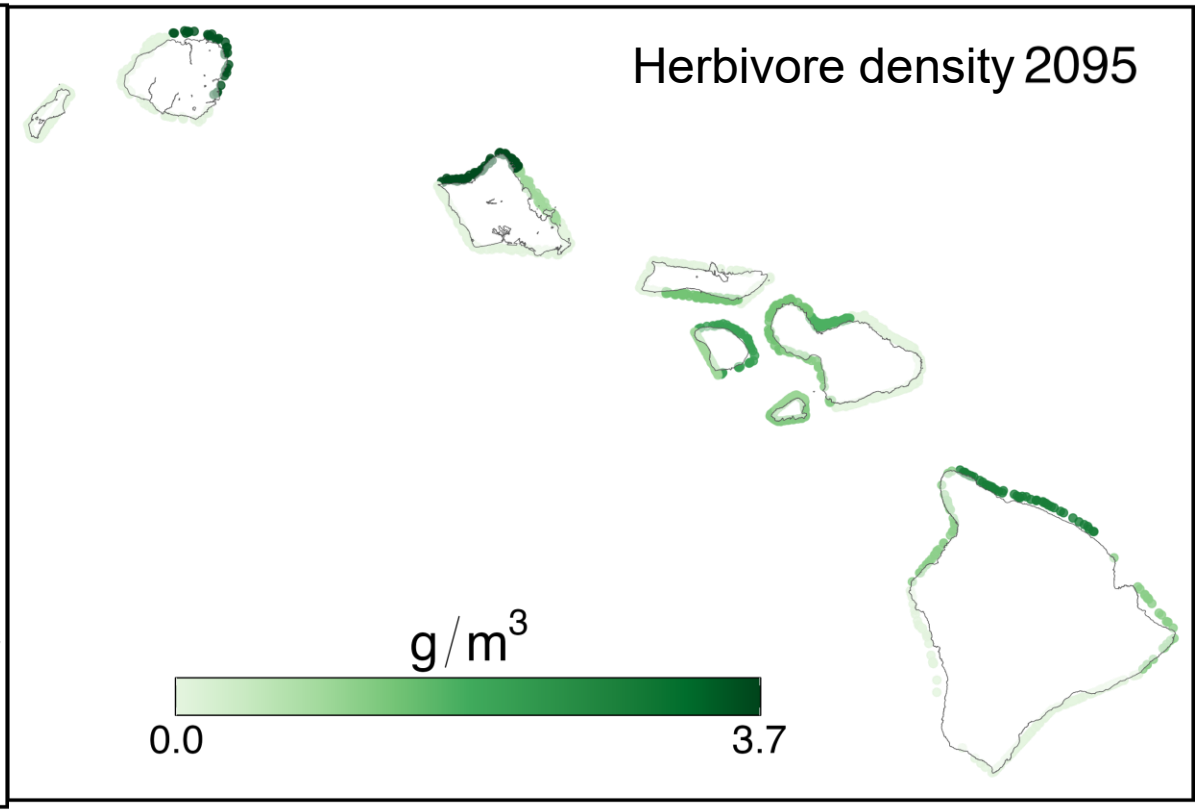

SUMMARY

- Coral decline dependent on climate intensity
- Herbivores highest in SSP1
- Predators lowest in SSP3
- Spatial variability follows climate trends