National SCIENCE Challenges

SUSTAINABLE SEAS

Ko ngā moana whakauka

Ecosystem models: Atlantis
model exploration and evaluation

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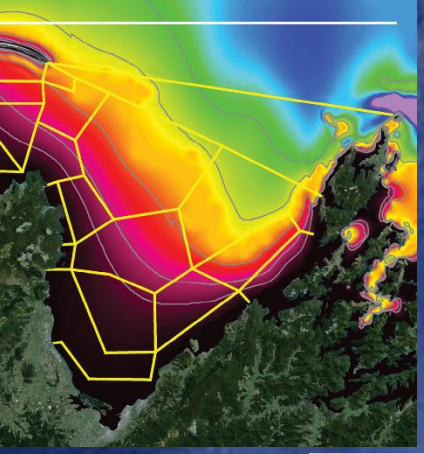
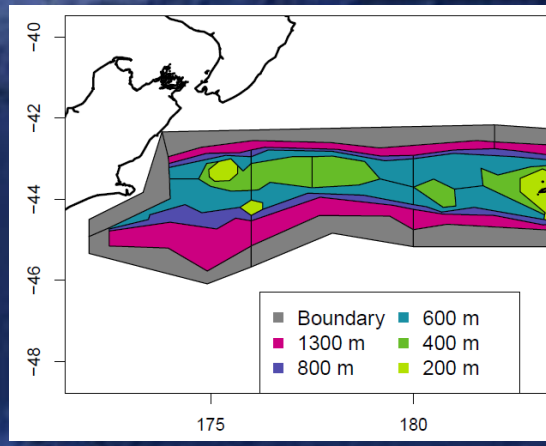
NZ Atlantis models



Tasman and Golden Bays

Chatha

narios exploring ‘what-if’ type questions
tom-up (e.g. climate change) *and* top-down
. fishing) controls
e of the best in the world
lications in Australia, the United States, Europe,
South Africa



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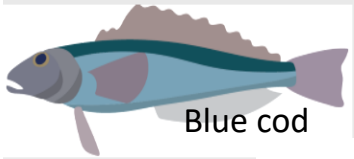
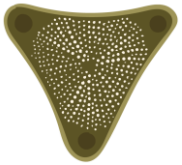
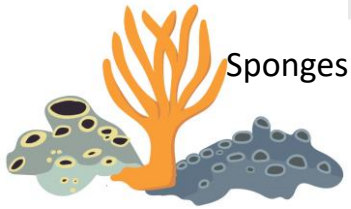
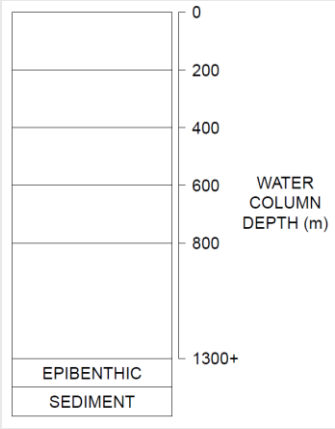
Understanding our model: it's more than validation

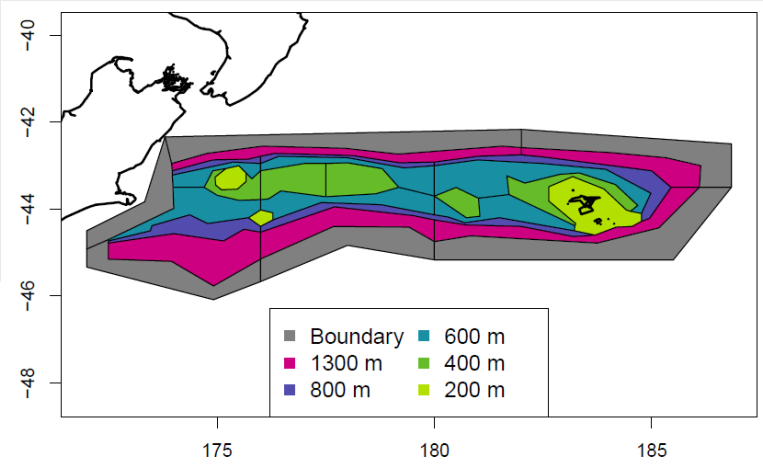
- Analyse importance of knowledge gaps
  - Model dynamics and results
- Sensitivity analyses
  - Bottom-up variability
  - Interaction effects
- Comparisons & skill assessments
  - Single-species models
  - Trawl surveys
  - Diet studies











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Predator-prey checks

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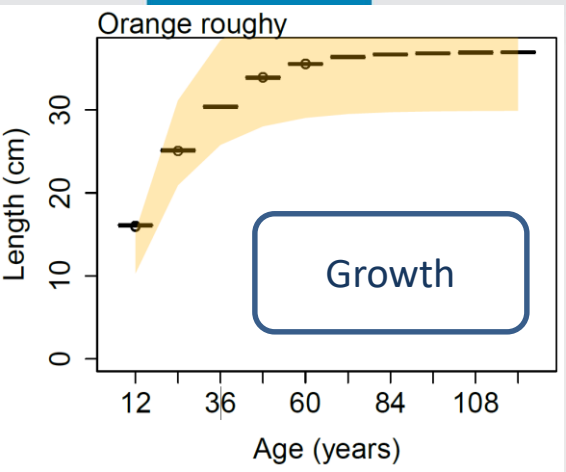

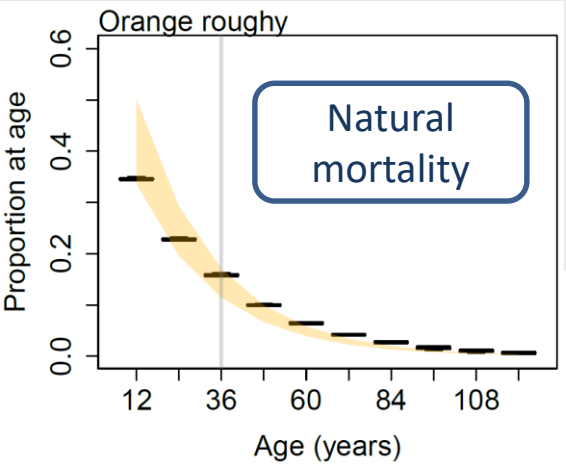

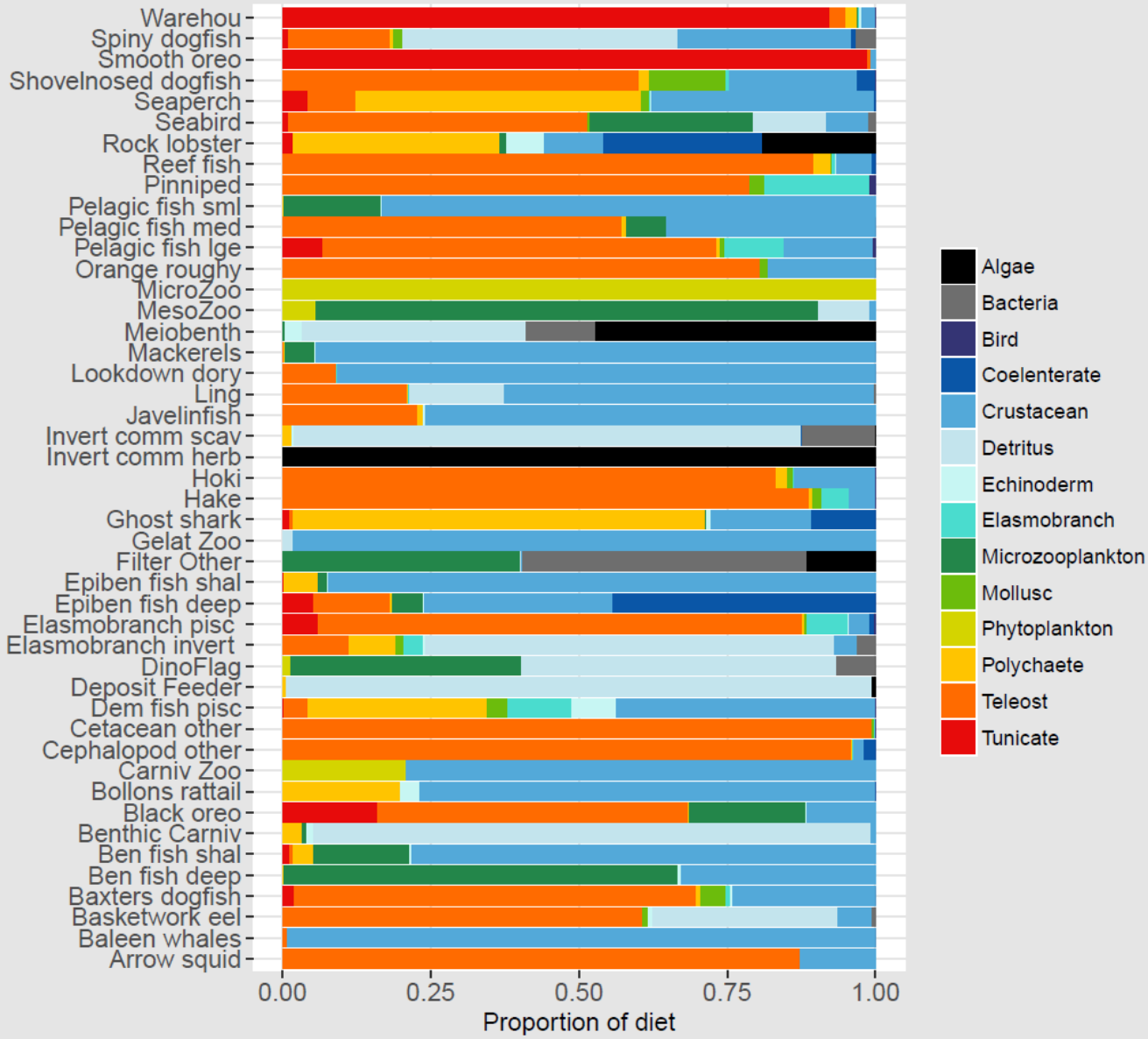

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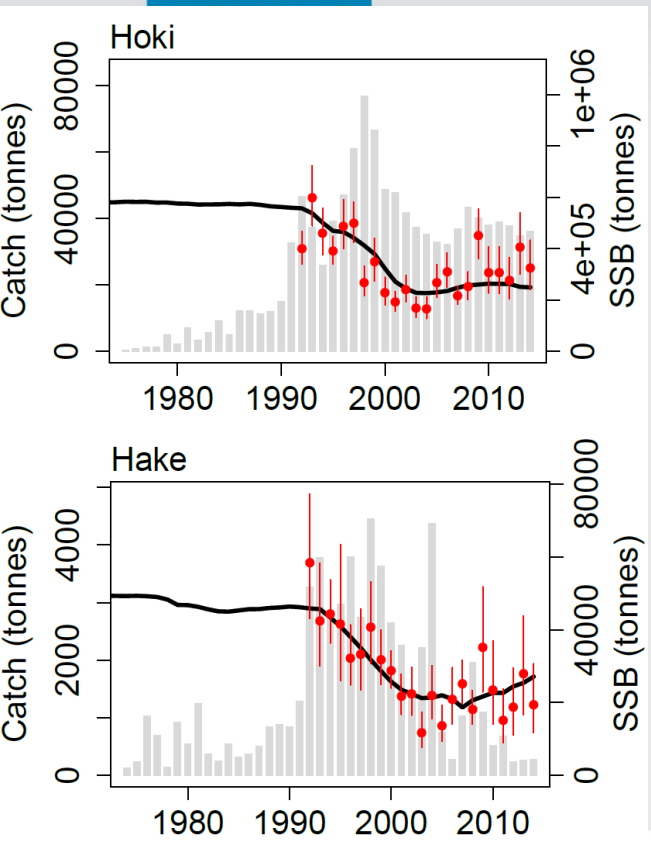
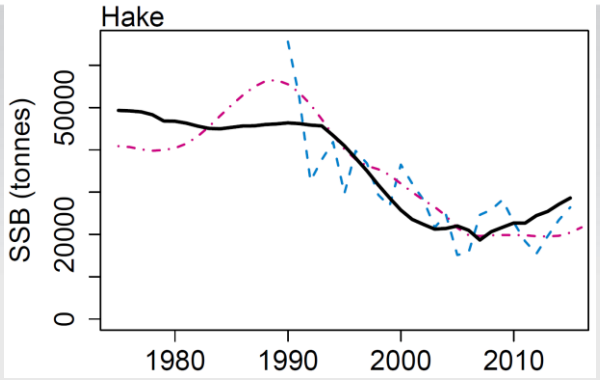
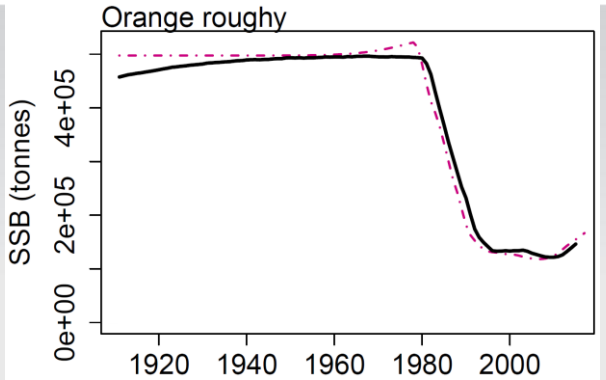
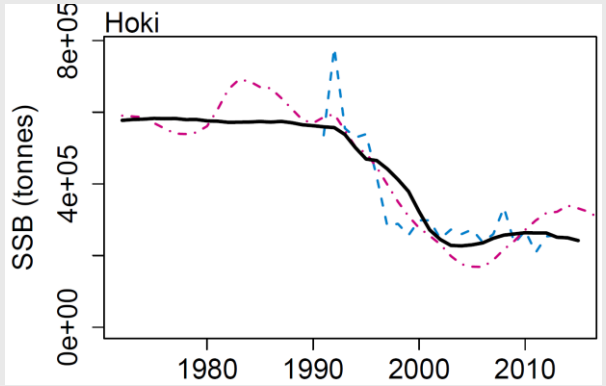
Responding to fishing mortality

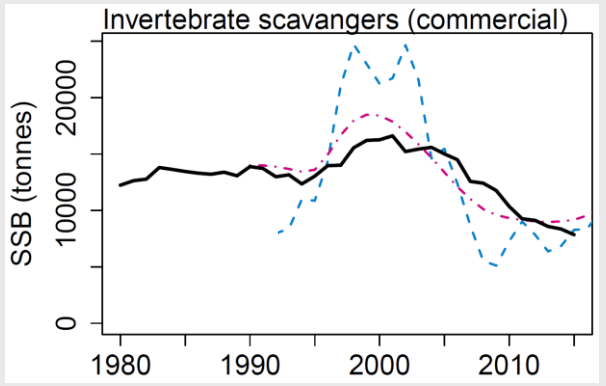


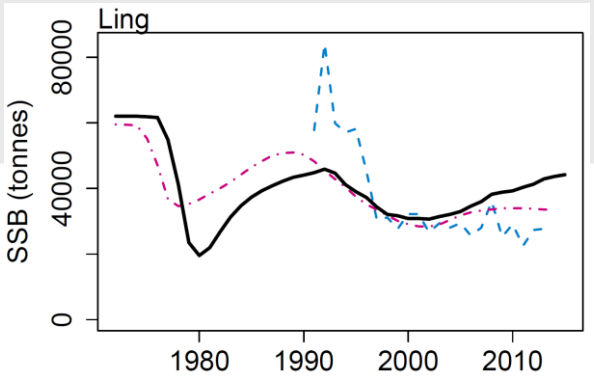
Catches (forced)
Model estimated biomass
Trawl survey estimated biomass











Atlantis
CPUE
Stock assessment

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Sensitivity analysis: Connectivity and influence

Between species groups

- **Most influential (keystoneness):** hoki, orange roughy, spiny dogfish, myctophids

- **Most responsive:** myctophids, smooth oreo, scampi, barracouta

Bottom-up variability

- **Most responsive:** Diatoms, zooplankton, detritus, bacteria, and scampi

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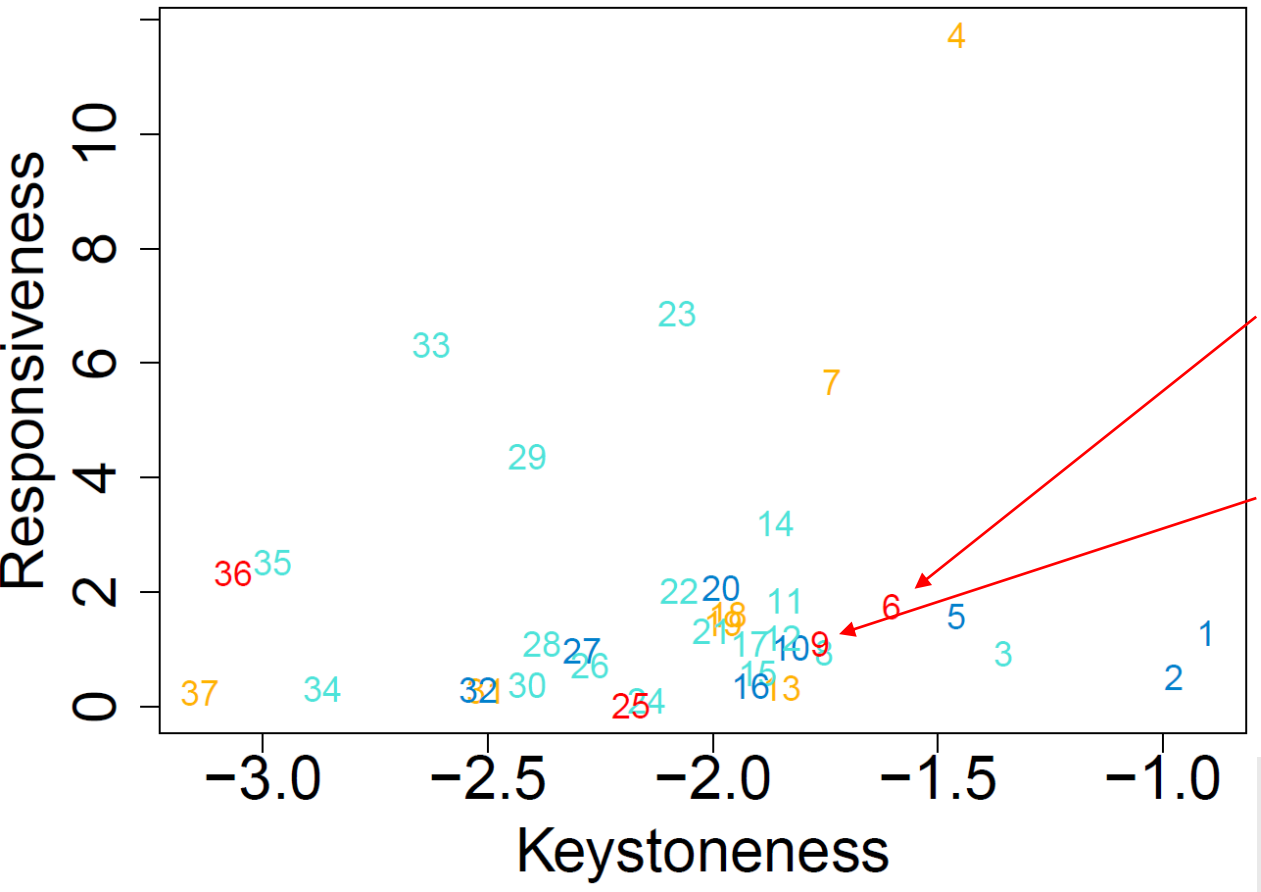
Bringing it together



1 Hoki
2 Orange roughy
3 Spiny dogfish
4 Pelagic fish sml
5 Ben fish shal
6 Seabird
7 Pelagic fish med
8 Epiben fish shal
9 Cetacean other
10 Hake
11 Ling
12 Shovelnosed dogfish
13 Mesopel fish Invert

No data gaps, performed well, abundance index available
Slight data gaps and/or poor performance
Some data gaps and/or poor performance
Poorly specified

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Next steps

- Testing model for climate change scenarios
  - Primary production, sea temperature, nutrients
- Is it chaotic? How sensitive to initial conditions
- Carry out similar analyses with TBGB Atlantis model
- Comparisons with alternative ecosystem models

Thank you

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