National Science Challenges

SUSTAINABLE SEAS

Ko ngā moana whakauka

Managed Seas: Ecosystem Models

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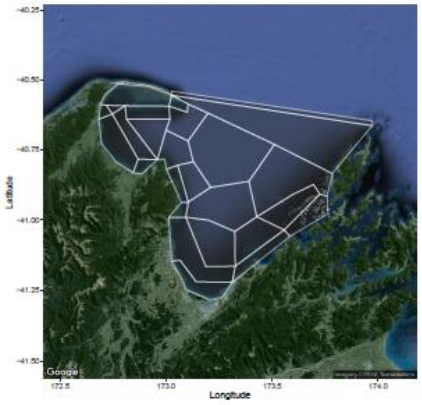
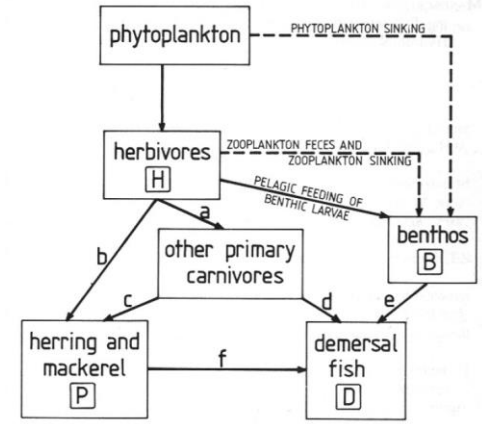
Objectives

Build “end to end” models to assist in decision making.



***Atlantis* model for Tasman and Golden Bays**

Develop model, apply environmental and management scenarios



Alternative ecosystem models

Explore the models, and the *implications of their assumptions*

Model comparison approaches

Validate and compare approaches to determine most appropriate / useful for particular situations

Team members

Ian Tuck (NIWA)

Matt Dunn (NIWA)

Richard Arnold (VUW)

Nokuthaba Sibanda (VUW)

Videette McGregor (NIWA)

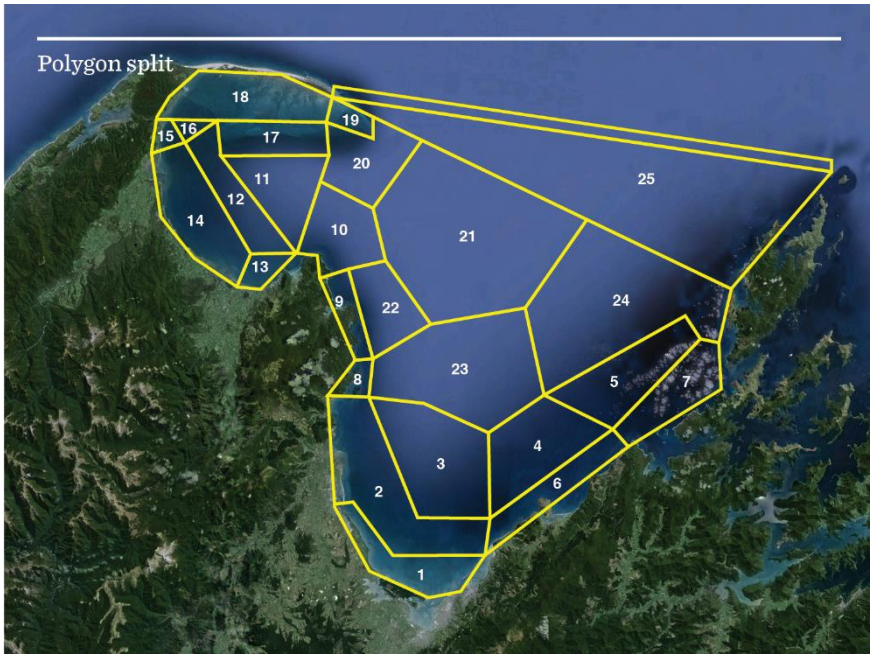
Beth Fulton (CSIRO)

Michelle Masi (NIWA)

Monique Ladds (VUW)

Plus various VUW (Alberto Rovellini, Kim Maxwell)

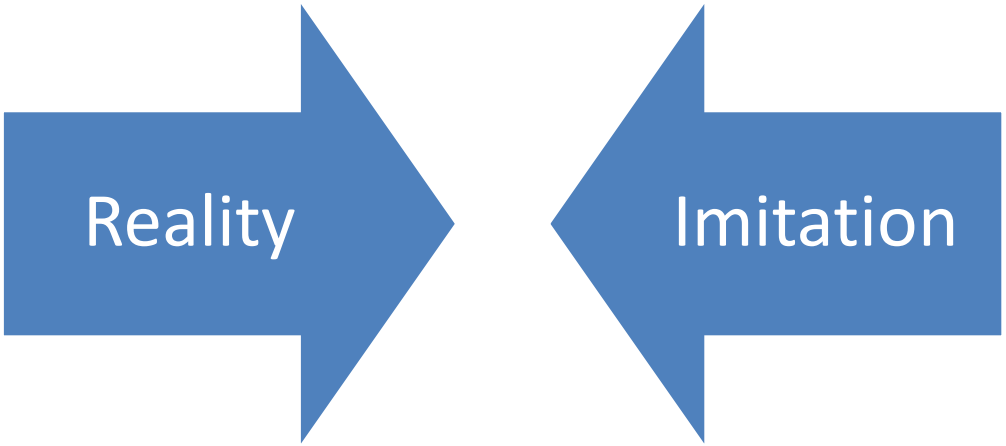
We have an ATLANTIS model…



Final stages of parameterization taking place now.

Not without some problems though…

The model perspective



Modelers will take the simplest assumption necessary to “fake” reality. This shapes the requirements for data inputs.

A lot of knowledge is being accumulated during the Challenge. We may want to extend Atlantis to allow more detail (perhaps extend the source code). If this looks likely, then dialogue will be required as soon as possible.

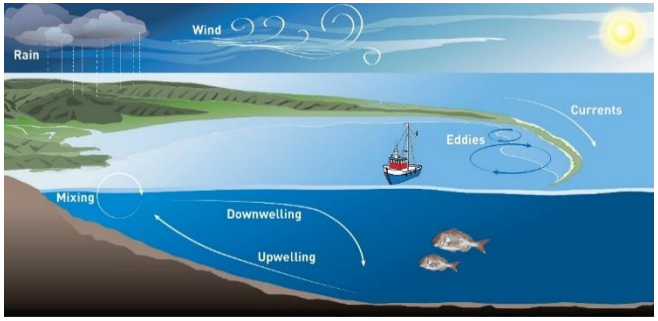
Model validation and credibility

The grand illusion…

Validation is difficult. Often all of the information is used in the model creation.

Credibility of population models for providing management advice has arisen from their use.

For now, we are trying to break the model, by (1) conducting sensitivities, (2) trying alternative models, and (3) estimating model uncertainty.



Food-web observations

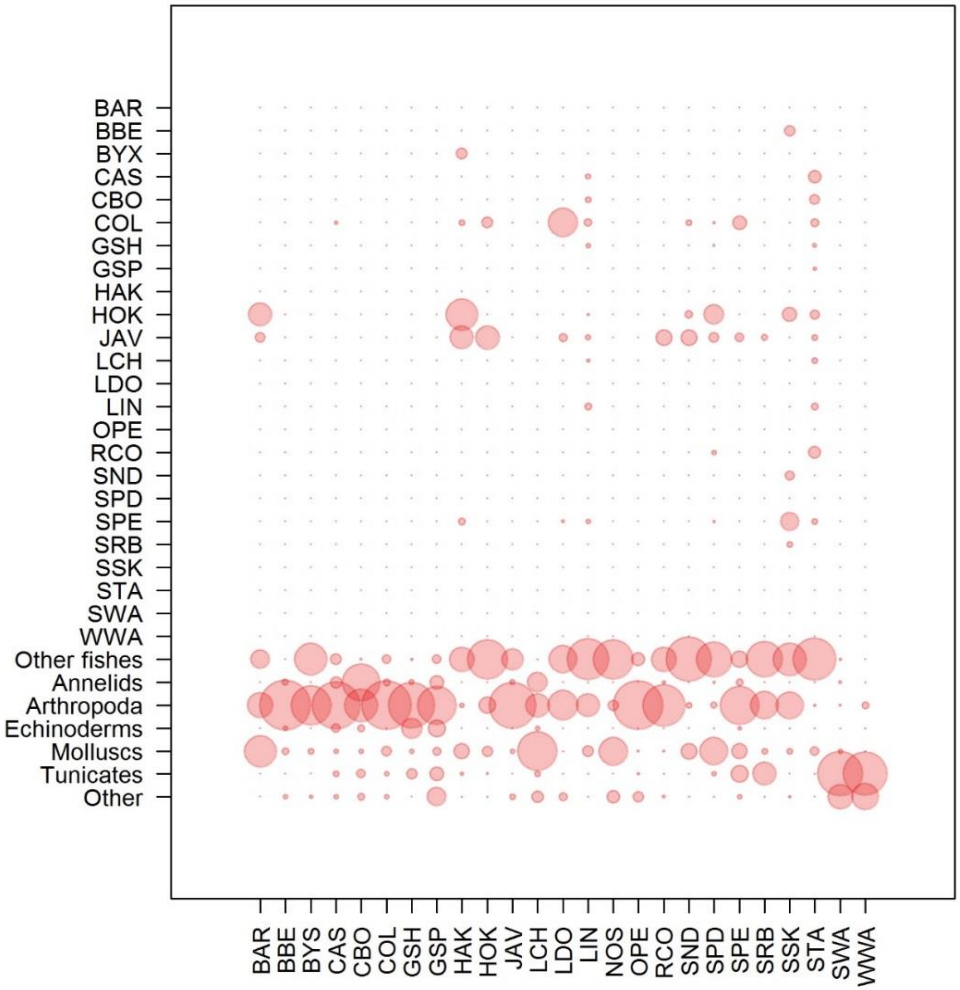
We have some large datasets. Nevertheless, there are some interesting knowledge gaps.

Some species are apparently “immortal”?

Trophic guilds might be biased.

Obtaining representative samples may be tough and/or expensive.

Our models must have flexibility in assumptions.



Building food-webs

We have focused the construction of the food web around commercially important species (QMS species).

Other species aggregated into “functional groups”.

But clustering based on morphological, biological, and ecological characteristics (not diet data) gives a quite different picture. We aim to find out how important these assumptions are.

Model uncertainty

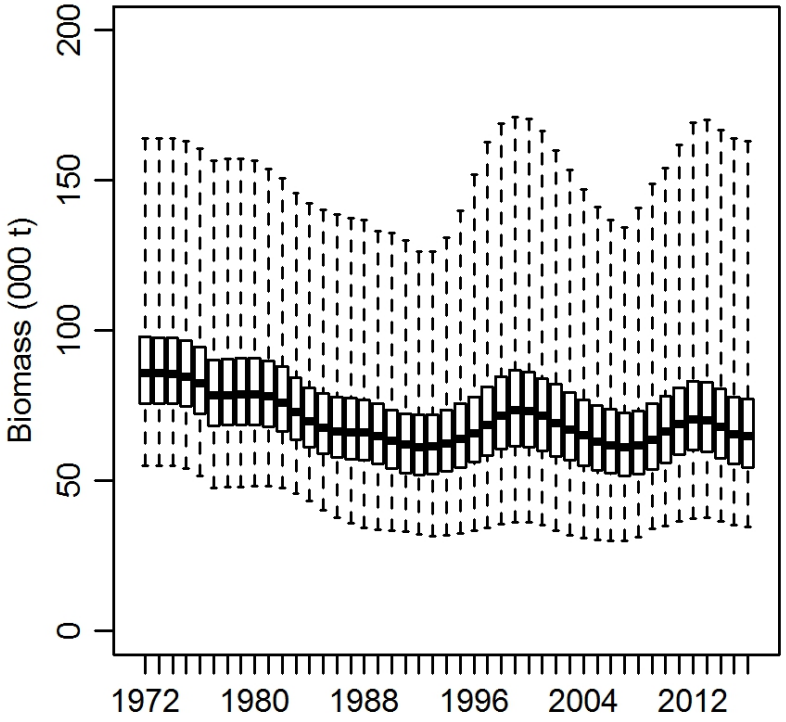
Allowing for uncertainty is important:

(1) To know if a prediction represents a significant change, or could simply have happened by chance.

(2) To express outcomes in terms of their probability; some predictions will be more certain than others.

Developing statistically fitted models ("MICE") are reserved for the second phase of the Challenge.

Doing this for an end-to-end model like Atlantis is novel.



Breakout session

Focused on what the Atlantis model looks like and does.

With some more discussion of problem areas:

- Data

- Dynamics

- Structure

- Uncertainty

Next steps

Validation of the TBGB Atlantis model is now a key activity.

More evaluation of alternative assumptions and models. This will include developing simplified models (e.g., size-spectrum models).

Extending Atlantis (within existing code base): Terrestrial impacts, socio-economics.

Agree and run scenarios.

Communication and collaboration.