Fisheries Science:
A quick tour

Keith Michael

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Overview

- Scope of NIWA science
- Fisheries Science
  - What is fisheries science?
  - What we do?
- Some examples of my research

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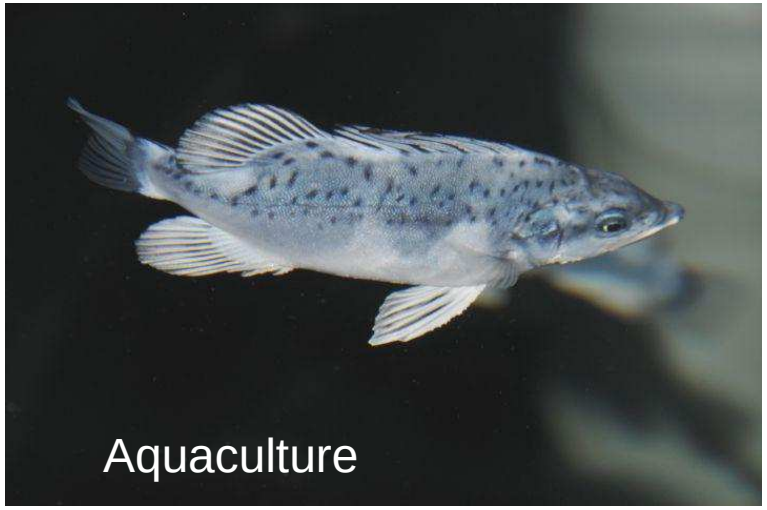
NIWA science centres



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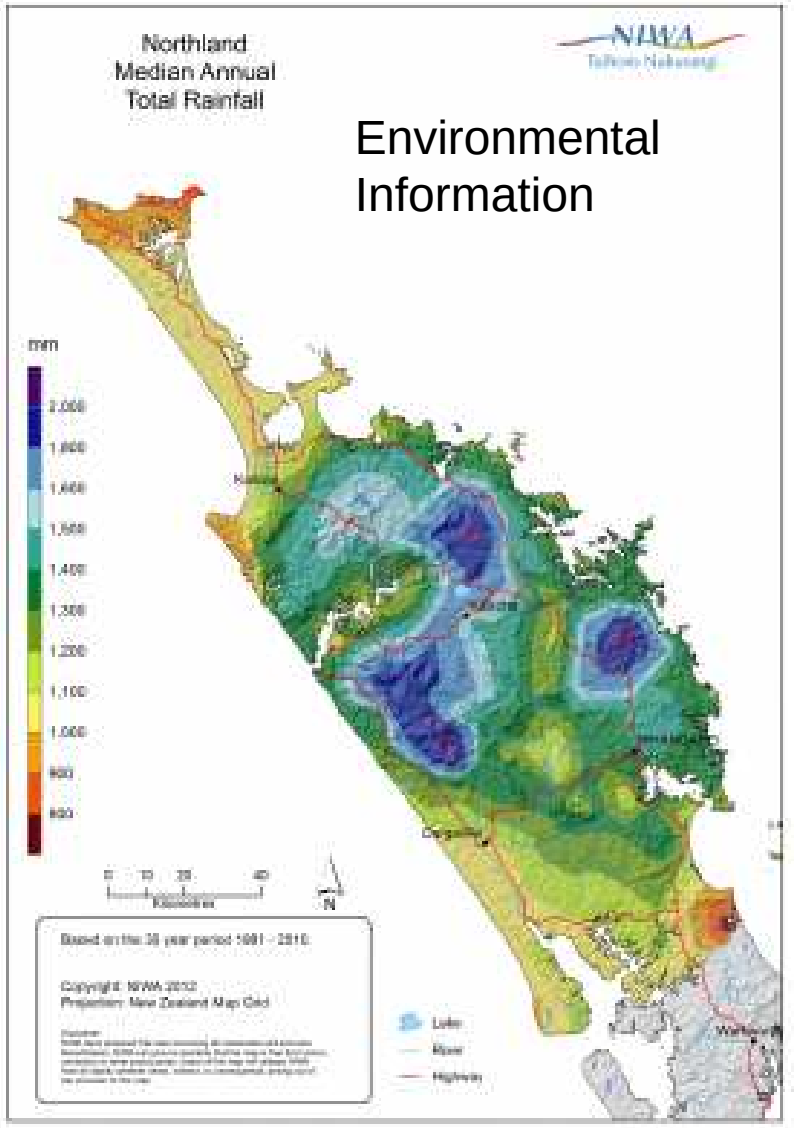

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IWA
Nukurangi

RV Tangaroa

RV Ikatere

RV Kaharoa

High performance computing

Fisheries Science

- Research to better understand and manage fisheries:
  - To maximise their production, sustainability, and value
  - To inform the conservation of the ecological systems from which they are fished
- Provide peer reviewed science to managers and regulators

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What we do?

- Stock assessments and monitoring
- Improve fishing gears and methods
- Develop new fisheries
- Understand how animals and habitats are affected by fishing

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National Fisheries Centre

- Fish abundance and productivity
- Population modelling and risk analysis
- Estimation of sustainable harvest levels
- Fish ageing, biology and ecology
- Impact on non-target species
- Recreational and customary catches
- Environmental impacts and mitigation strategies
- Ecosystem approaches to fisheries
- Data management

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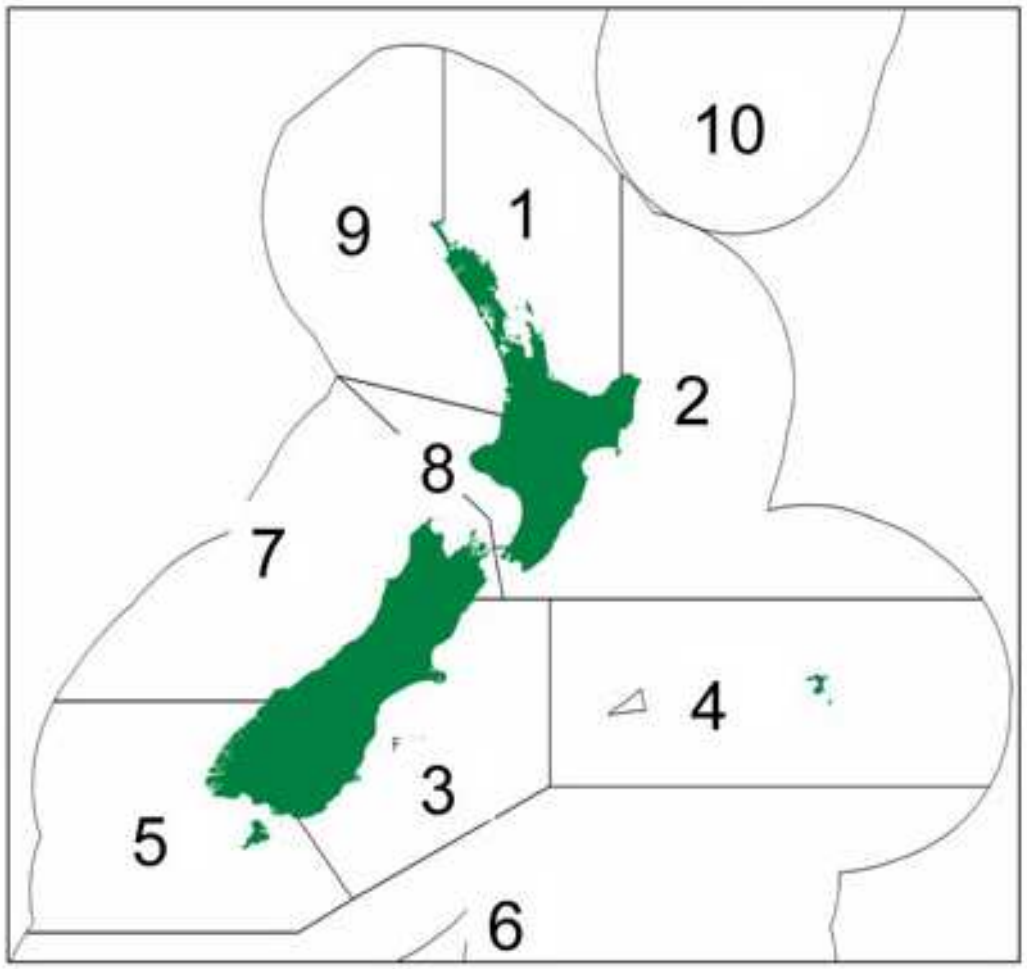
Stock assessments: what is a stock?



- NZ 200 mile EEZ divided into FMAs
- Each species managed by FMA
- 96 species in the QMS, 346 stocks

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Stock assessments: what is an assessment?

- Uses biological and fisheries data to determine the size and status of the stock against reference points
- Provides estimates of safe harvest levels that underpin setting of quotas that are allocated by fisheries regulators between commercial, recreational and customary fishers
- More powerful computers have allowed sophisticated mathematical models to be employed

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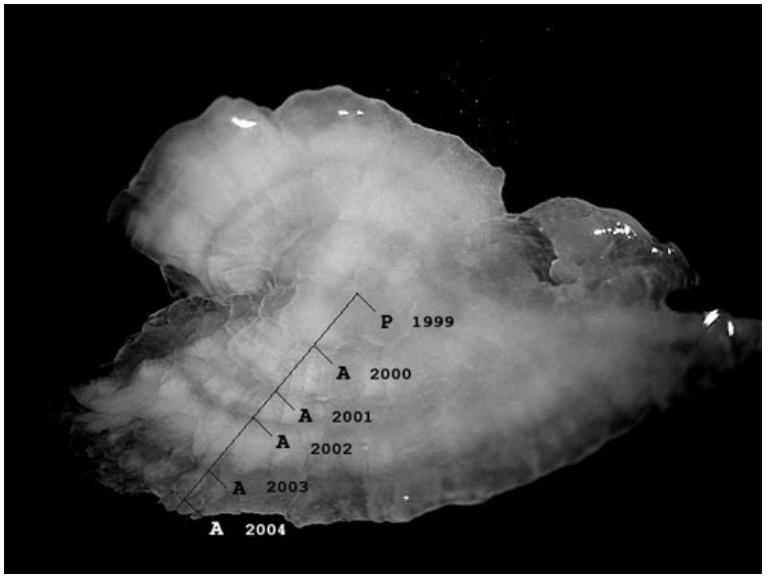
Biological data



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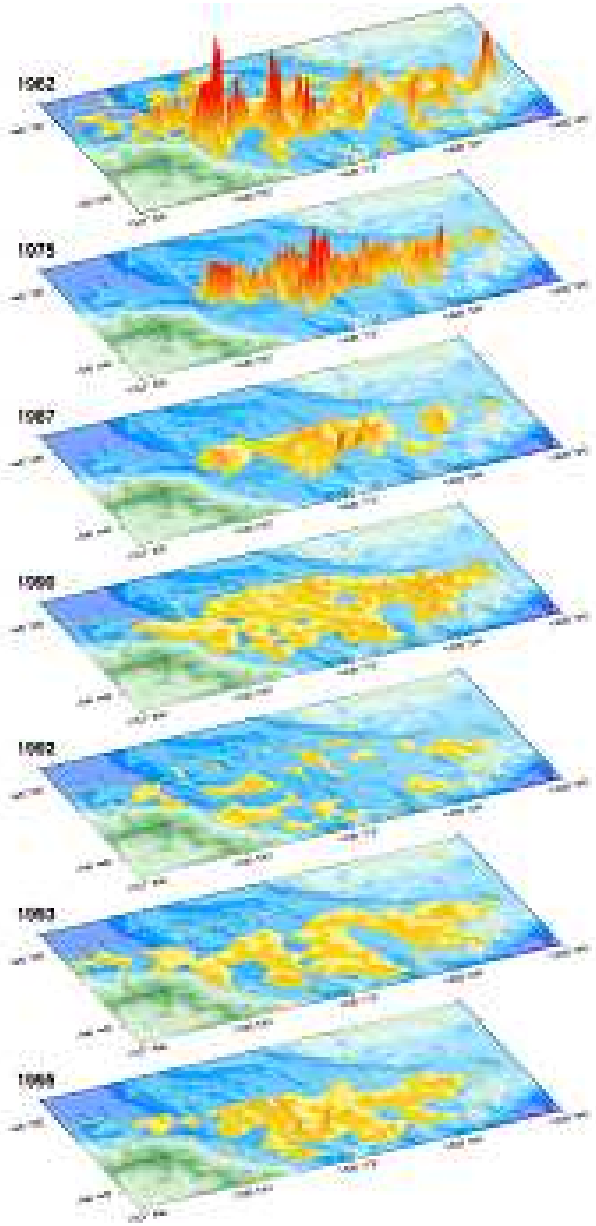
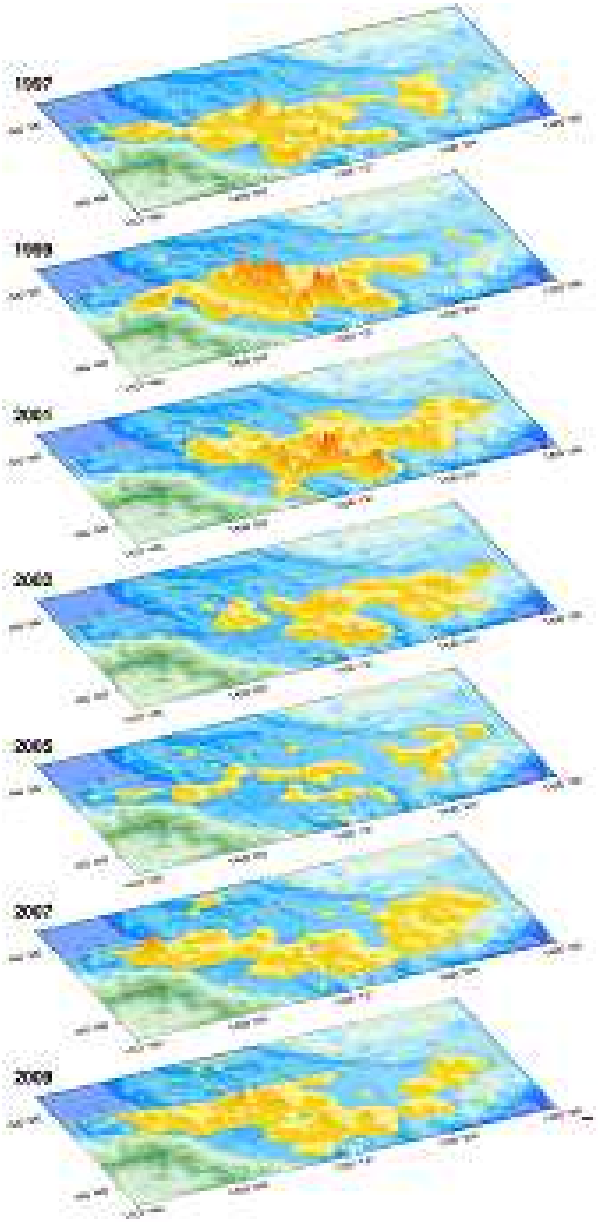
Survey data


1962
1975
1987
1998
2002
2003
2005


1967
1989
2001
2003
2005
2007
2009

Stock assessments: stock status

- Species and information dependent
- Surveys to give current status, else use fisheries data
- Status = additions and losses
- Models together with a good time series of data allows us to make projections of future stock size
  - Enables management to progress from reactive to proactive

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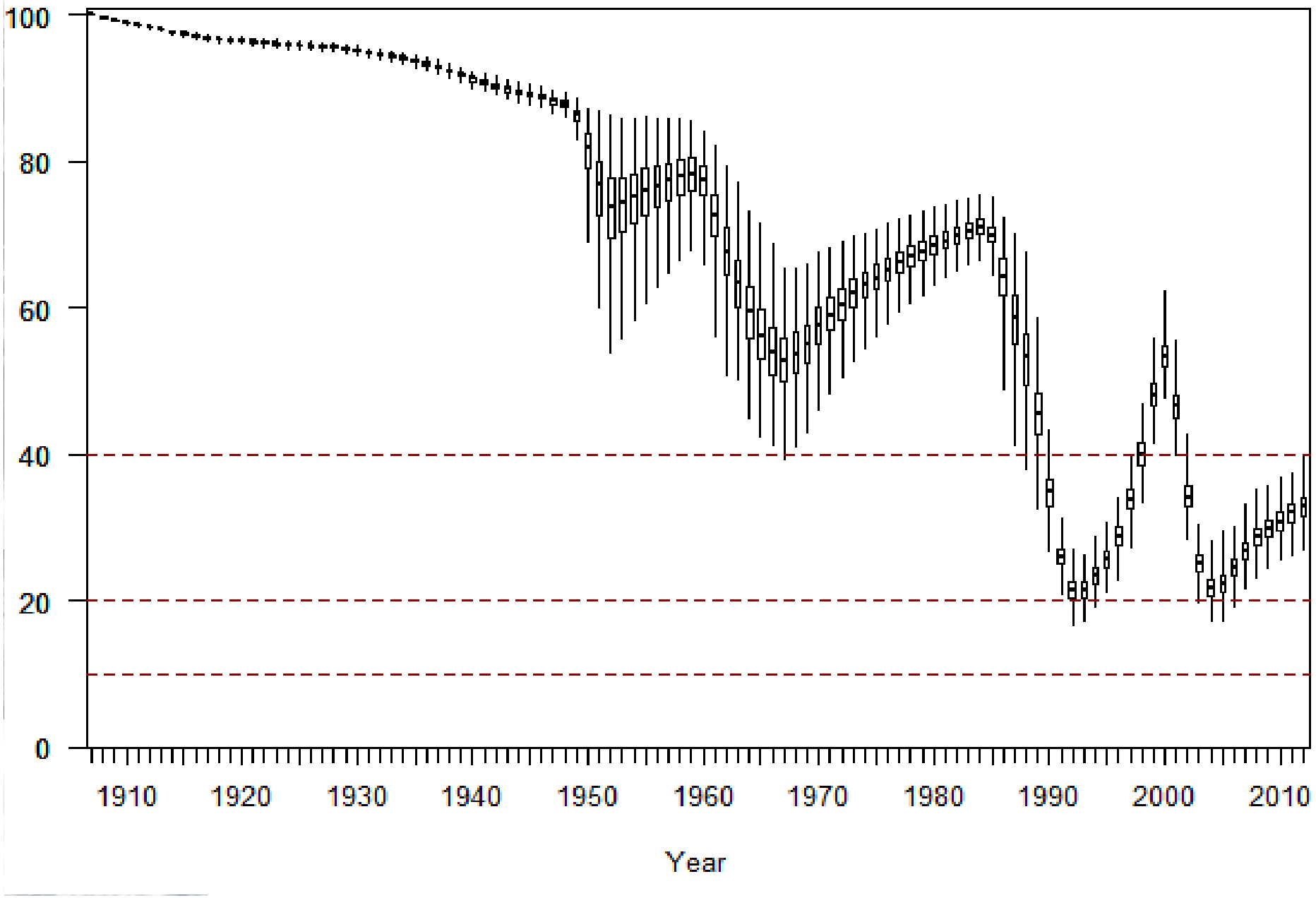
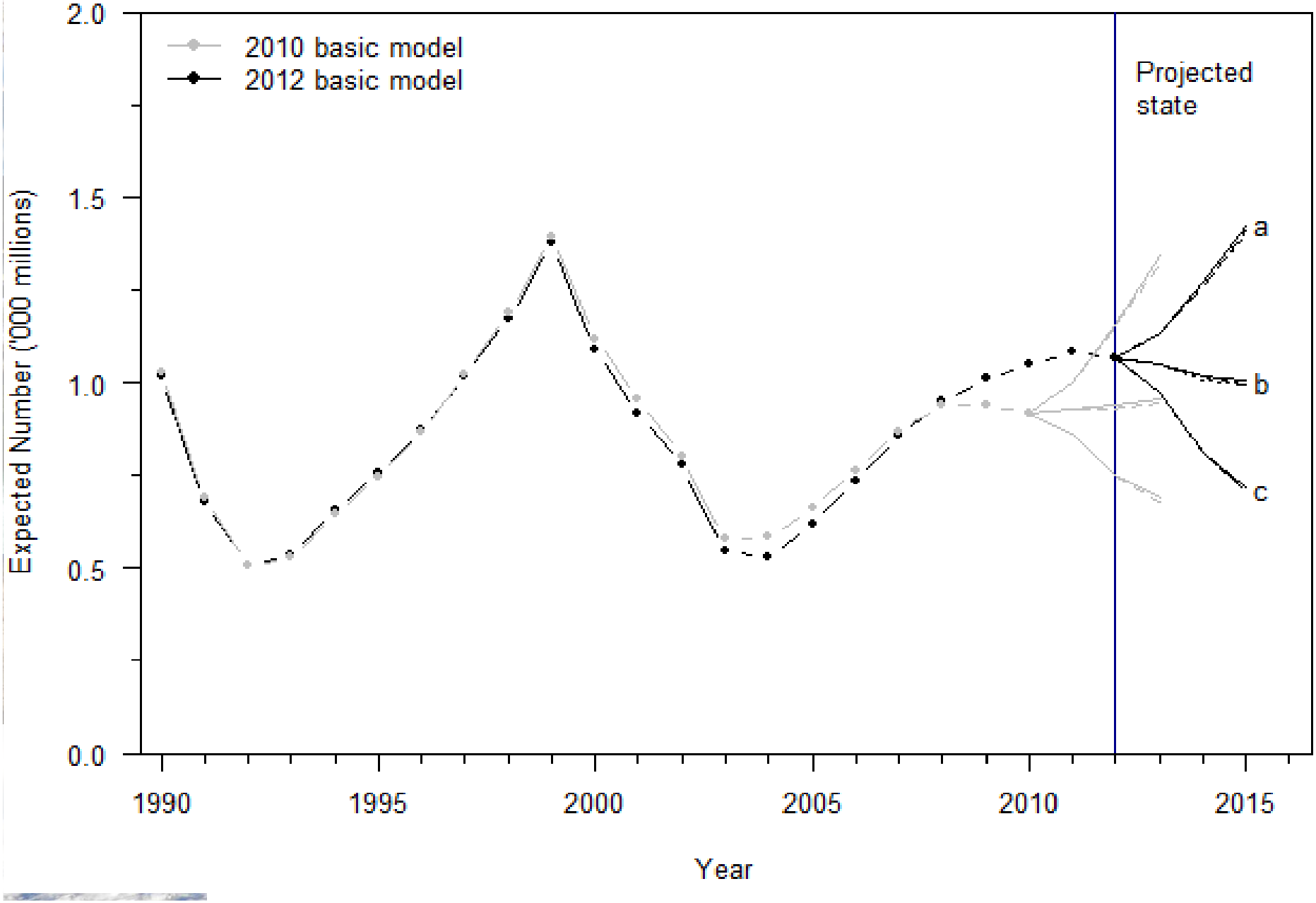
Model estimates of population size (shown as a percentage of the pre-fishing population)



Projections of future stock size for different levels of catch and disease mortality



Stock assessments: Future

- End to end ecosystem models
- Marine systems have considerable value, worldwide ecosystem services ~$40 trillion
- Sustainability requires balancing of social, economic, and environmental objectives
- Requires more knowledge and powerful tools to model complex relationships

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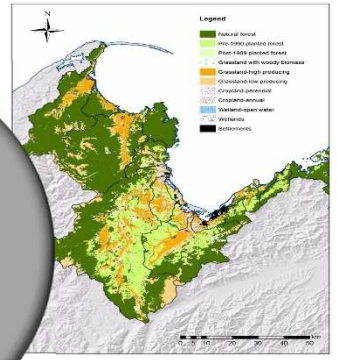
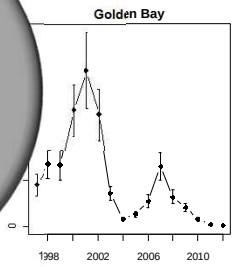
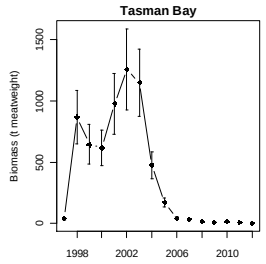
Drivers of shellfish production







Oceanography

Nutrients

Sediments

Model of Tasman & Golden Bay shellfish

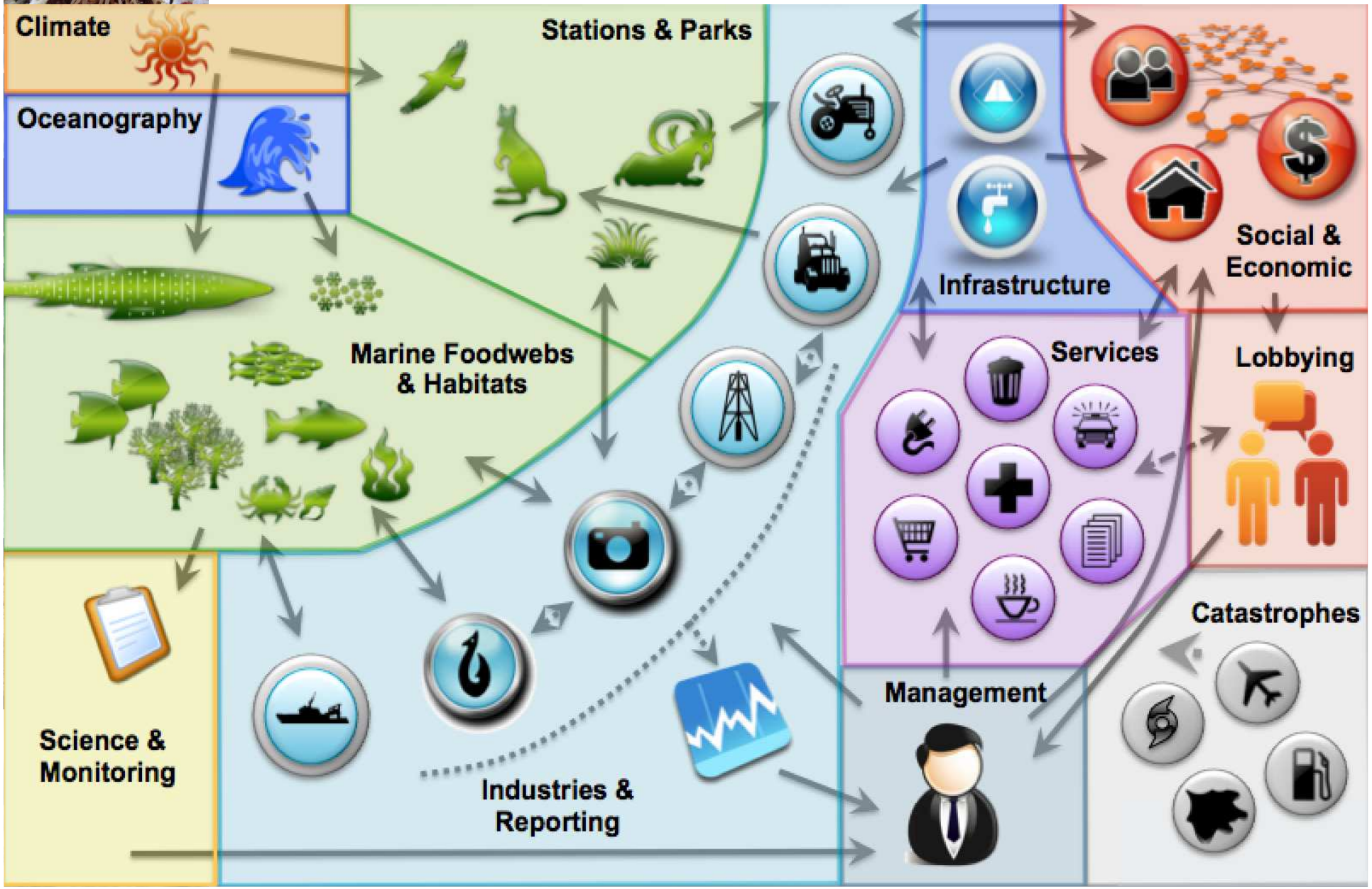
Enhancement

Shellfish Biology

Disease Harmful Algal blooms Toxins

Fishing

Complex relationships



Research interests

- Broad spectrum of research
- Interests in:
  - Collaborative research
  - Science communication
  - Bottom up management
  - Applied research
- Best team approach
- Strategic research

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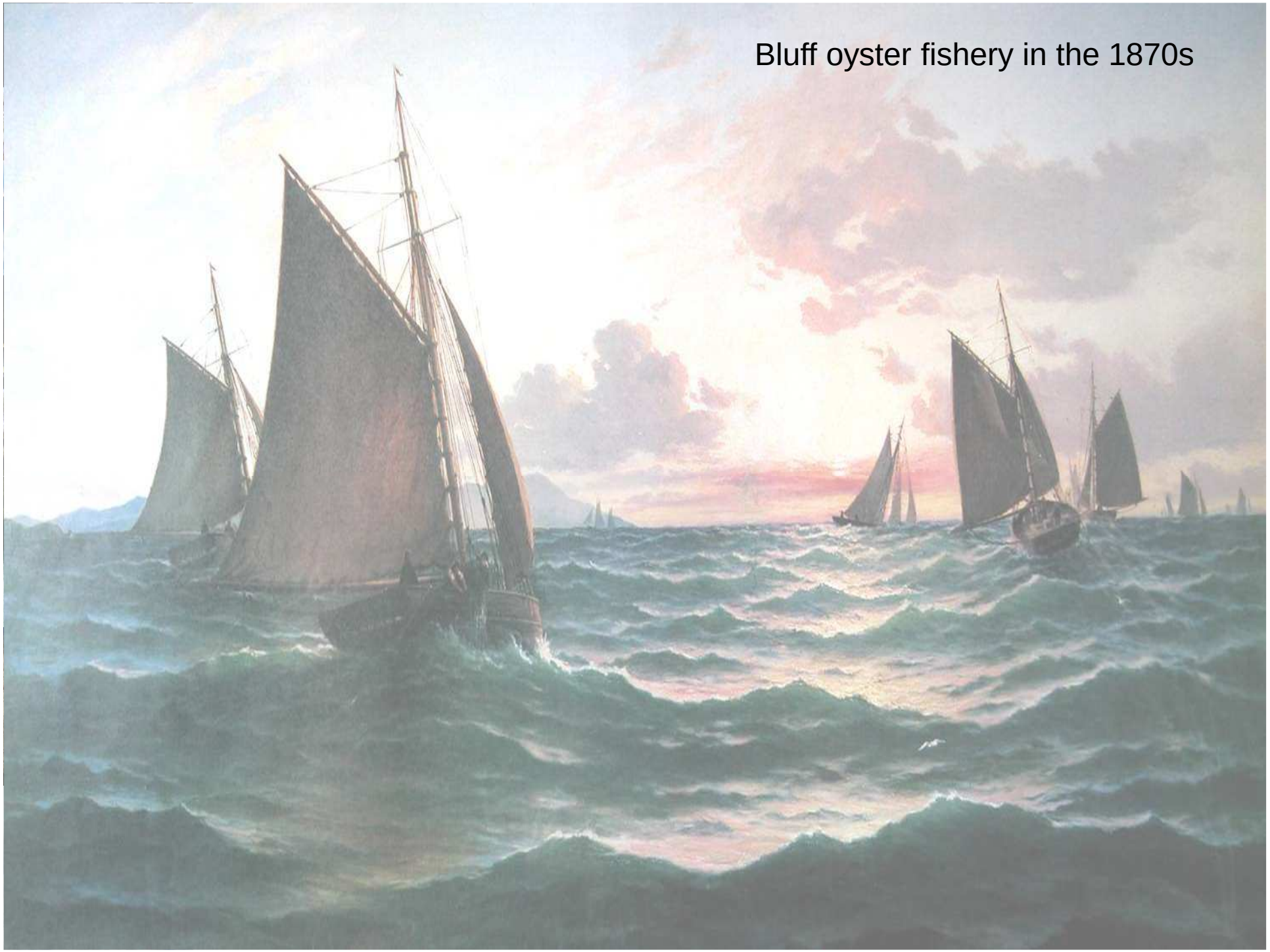
Bluff oyster fishery in the 1870s


Bluff oyster fishery in 2015

Collaboration with fishers

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Building capability

Joint industry NIWA research projects

Science communication

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Specialist scientific diving

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Underwater still and video cameras

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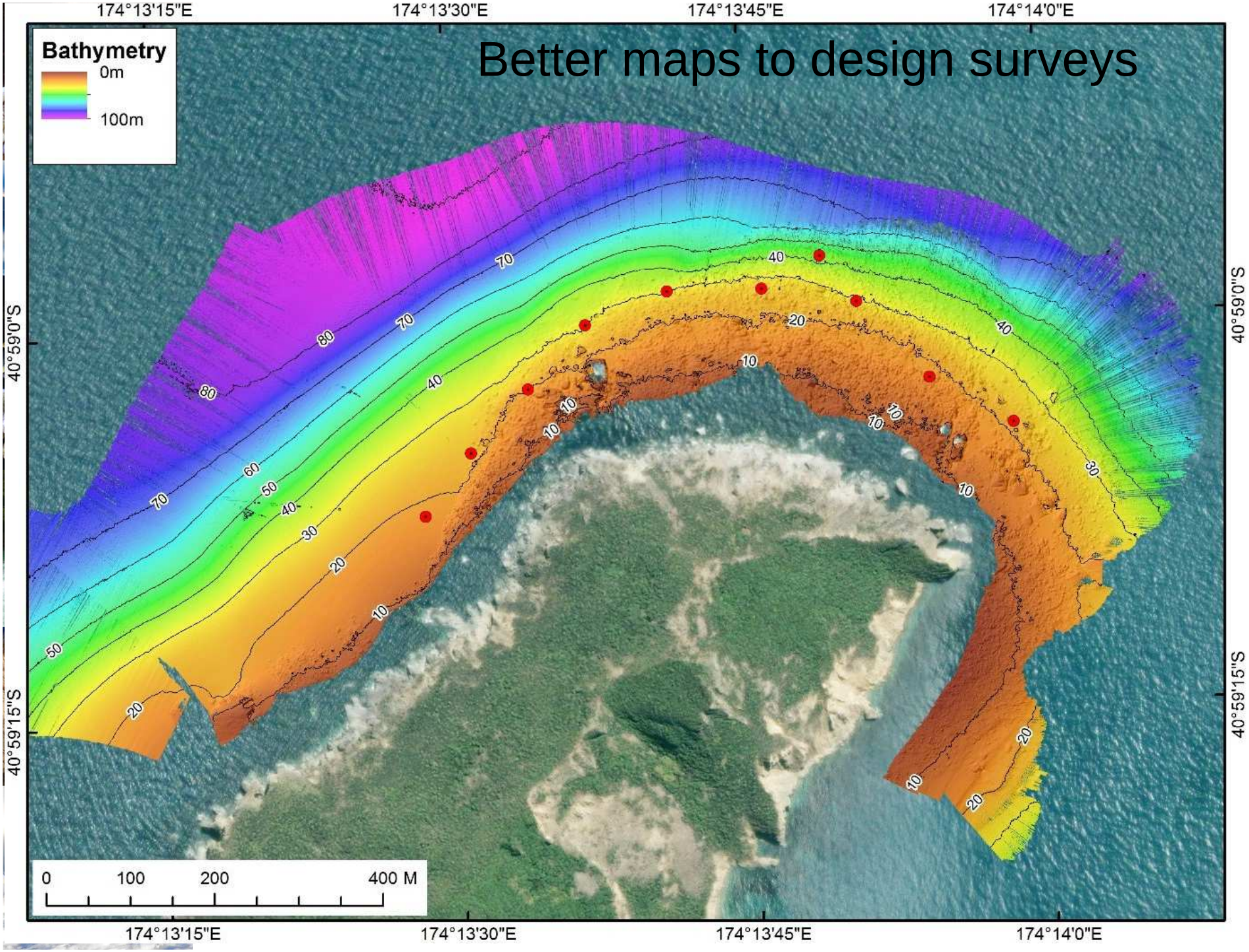
Multibeam mapping of the seabed


Better maps to design surveys
Bathymetry
0m
100m
174°13'15"E
174°13'30"E
174°13'45"E
174°14'0"E
40°59'0"S
40°59'15"S
0
100
200
400 M

An ability to sample in shallow water

Blue cod potting surveys

Hydraulic surf clam dredge

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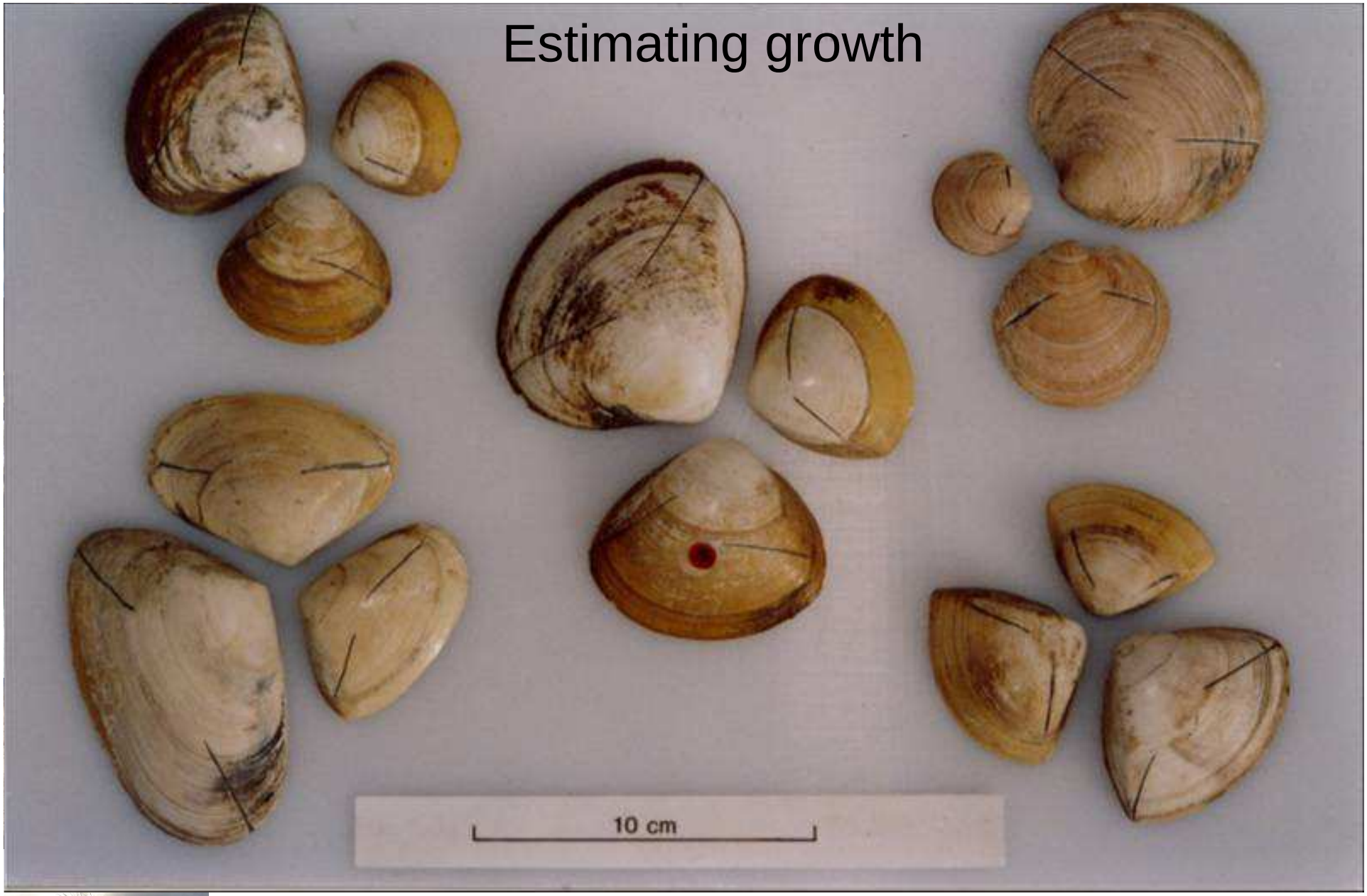
Estimating growth



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Surf clam dredge fishing on the seabed

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Golden Bay Tasman Bay scallop fishery

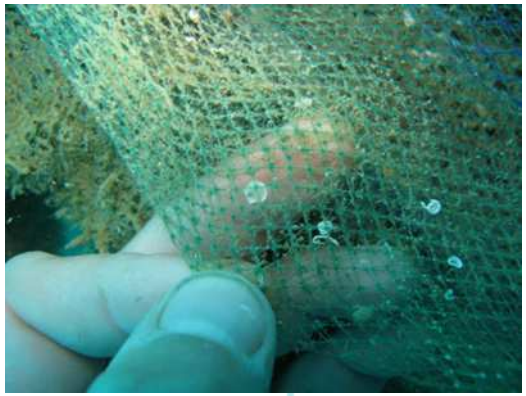
Scallop











Scallop enhancement (catching spat)

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Working in the UAE, ranger station on Bu Tinah Island

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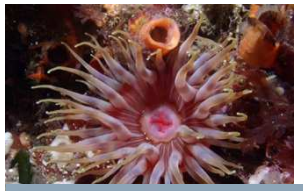
Can’t complain about the weather



Our taxi to Bu Tinah Island

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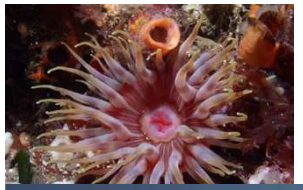
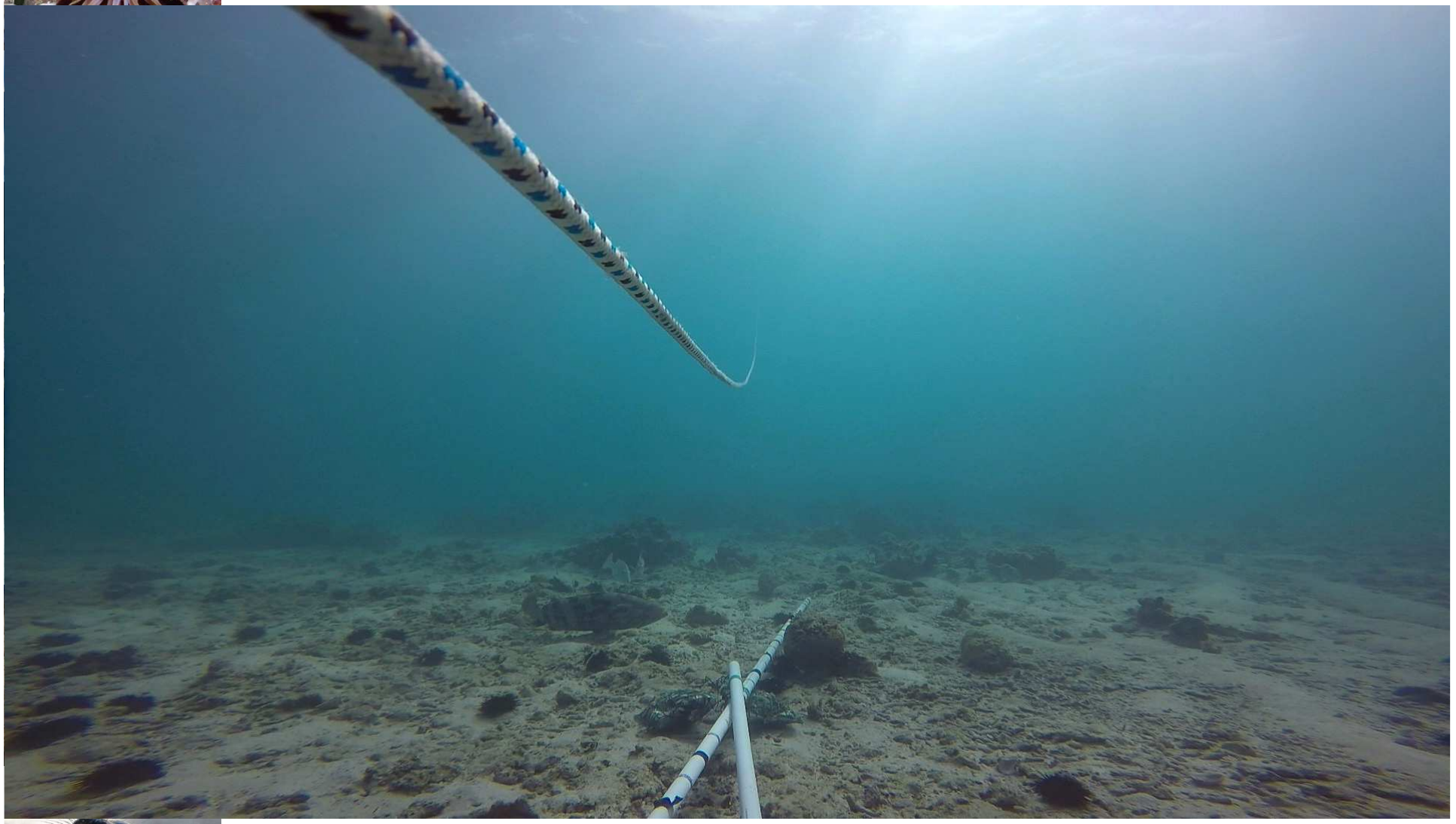
We could have done with a larger research vessel



Camera systems to tell us how many fish there were and how big



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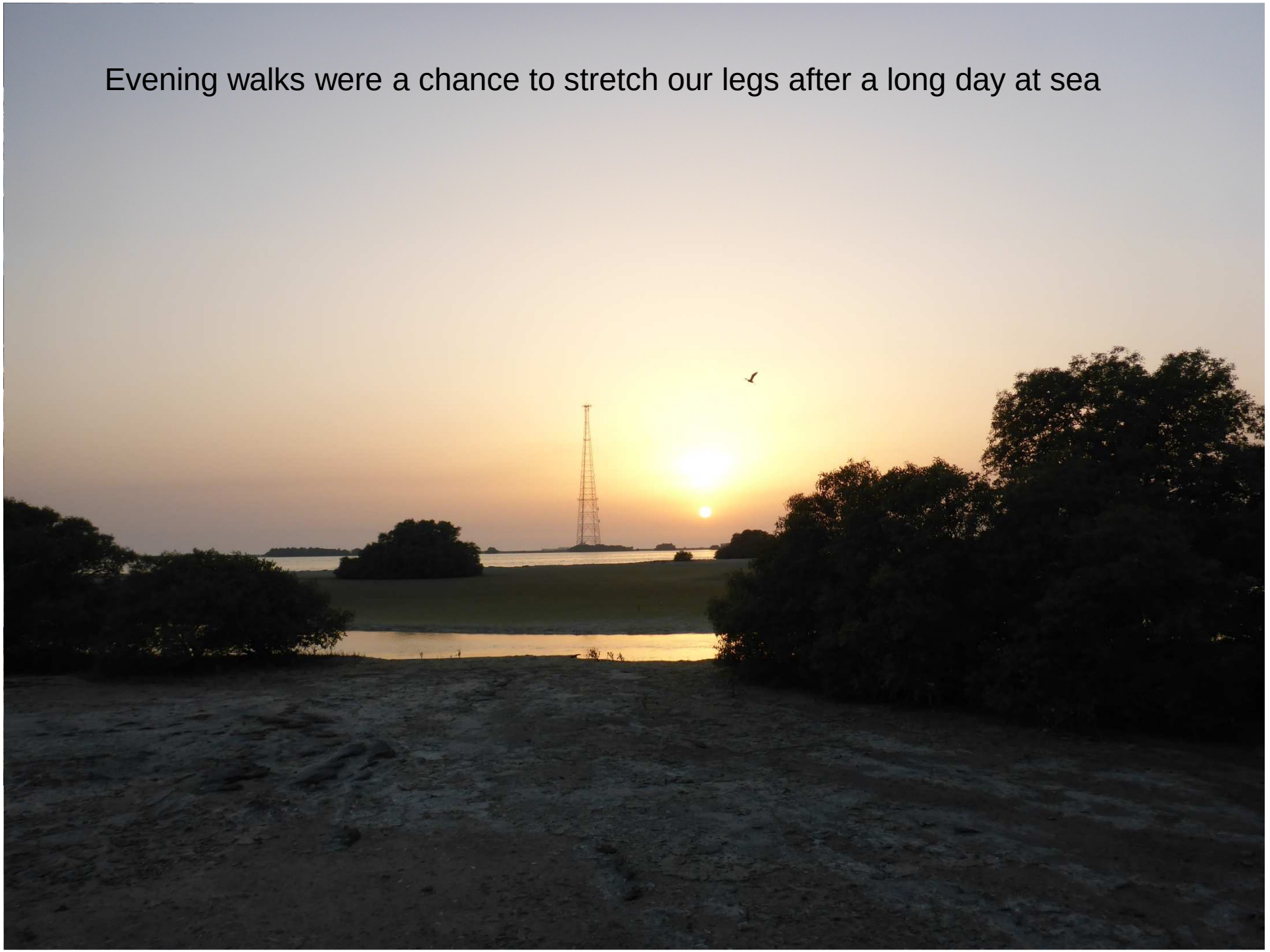
Cameras on the outside and inside of the traps show us what fish are doing. Turtle has a good scratch on the trap.


Evening walks were a chance to stretch our legs after a long day at sea

Elevated platforms to provide nesting sites for sea eagles (Ospreys)

Turtle tracks and nesting site

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Turtle laying her eggs

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Acknowledgments

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