Pāua catch-per-unit-effort from GPS dive-loggers

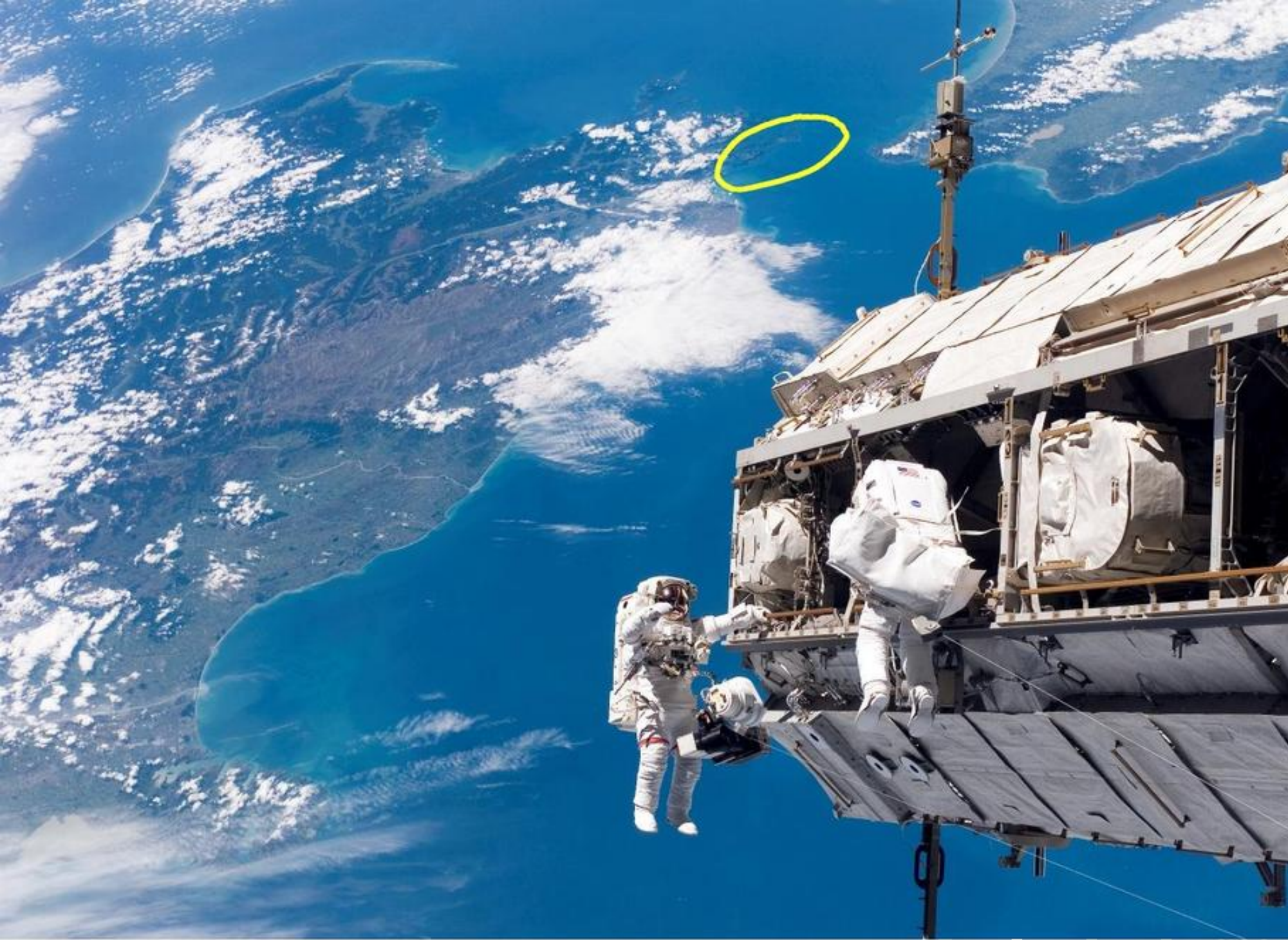
Edward Abraham, Jeremy Cooper

edward@dragonfly.co.nz

International Abalone Symposium, Hobart, 9 May 2012

Paua Industry Council Ltd

SEAFOOD INNOVATIONS LTD

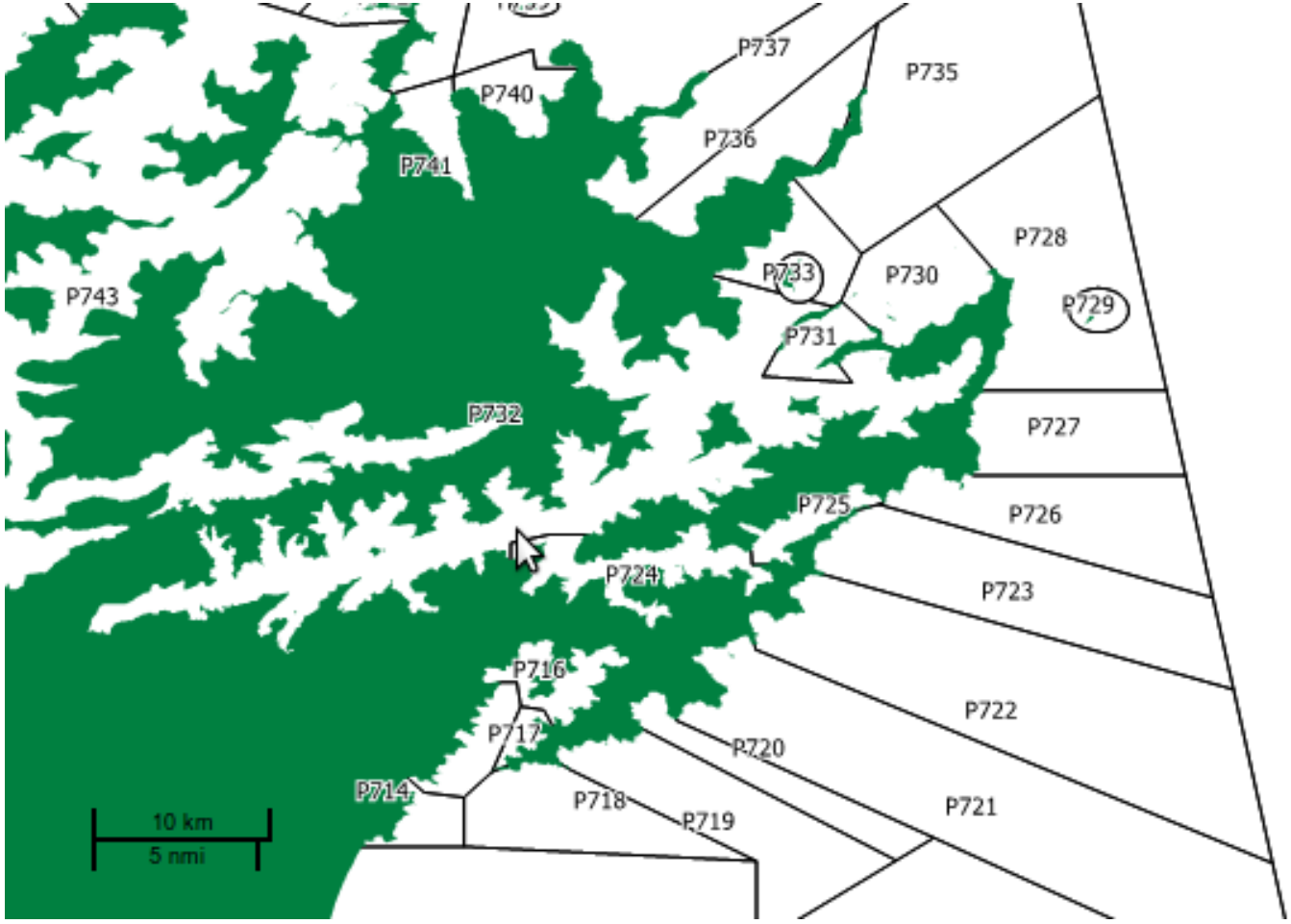


S116E05983

Outline

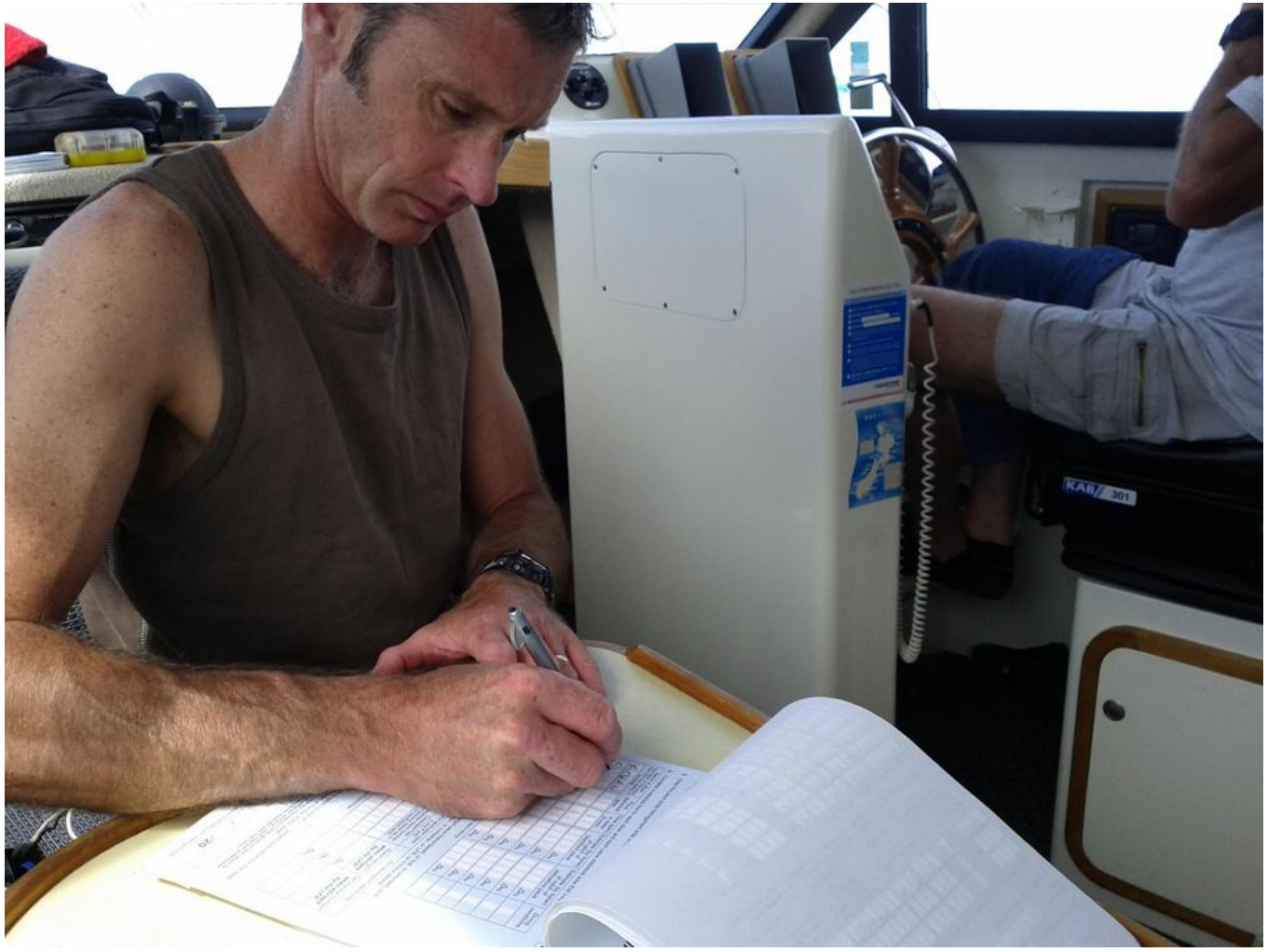
Large areas

Pāua statistical areas, within the Pāua 7 Management Area



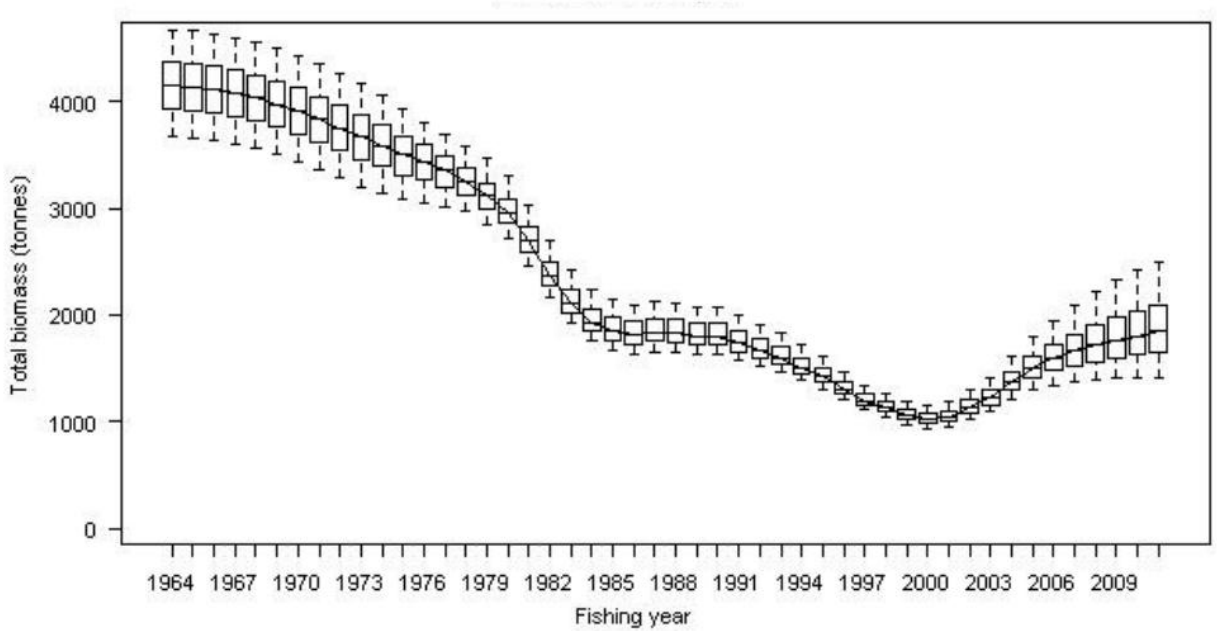
Paper based reporting

Jason Baker does his homework



Stock assessments

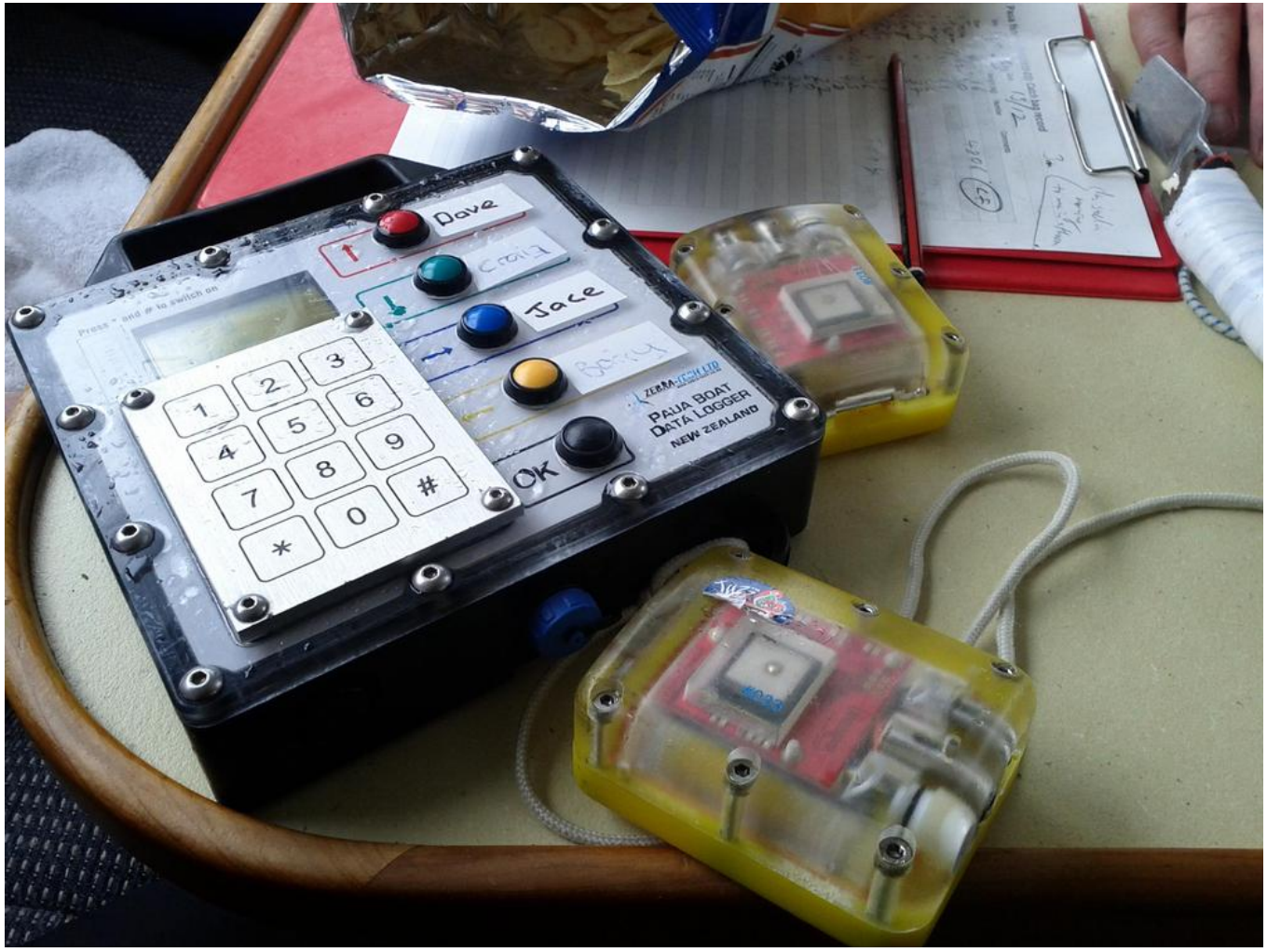
Pāua 7 biomass, McKenzie & Smith (2009)



Towards responsive, informed management

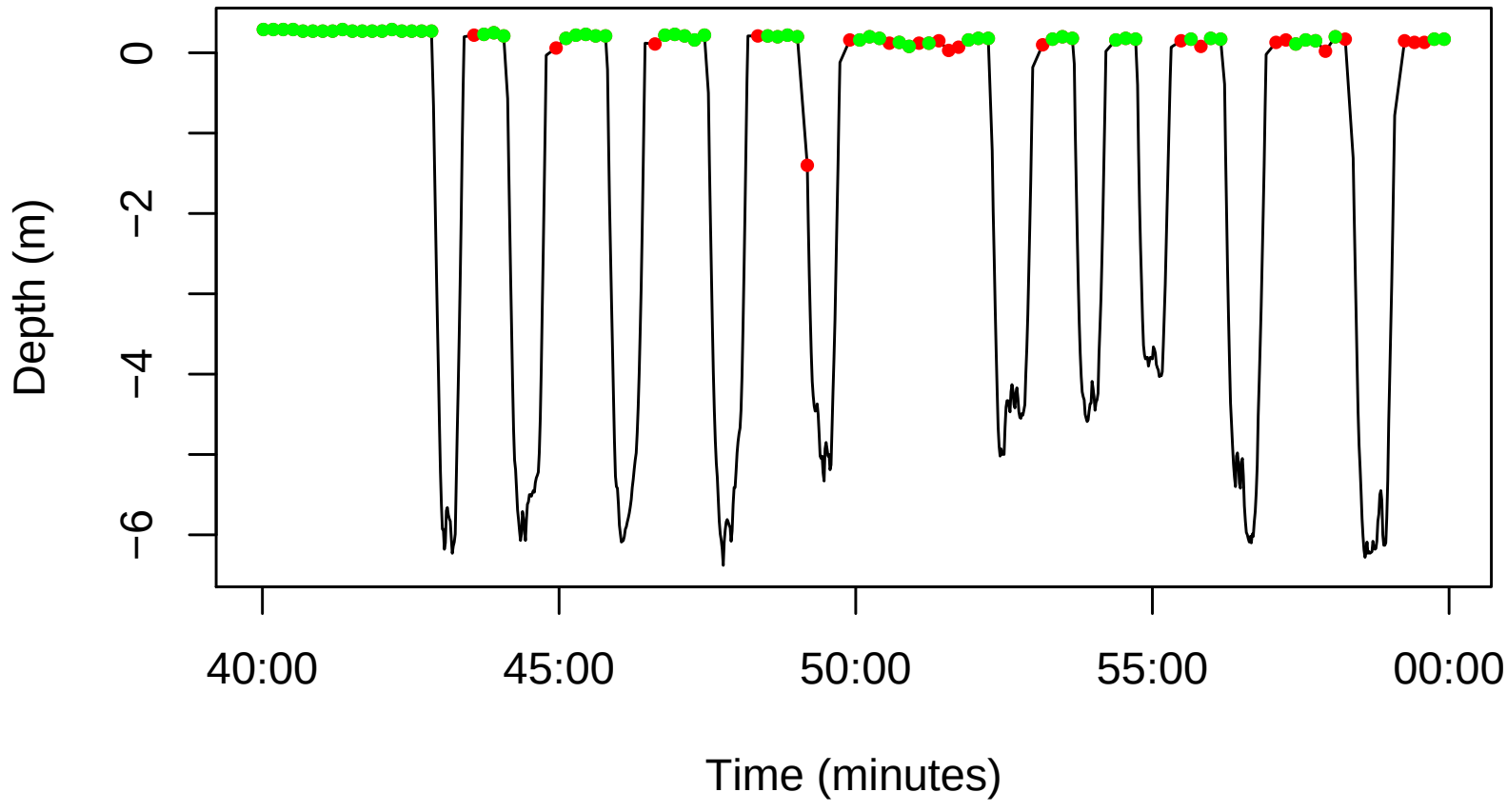
Dive-loggers

Boat and turtle units, made by Zebratech (NZ)



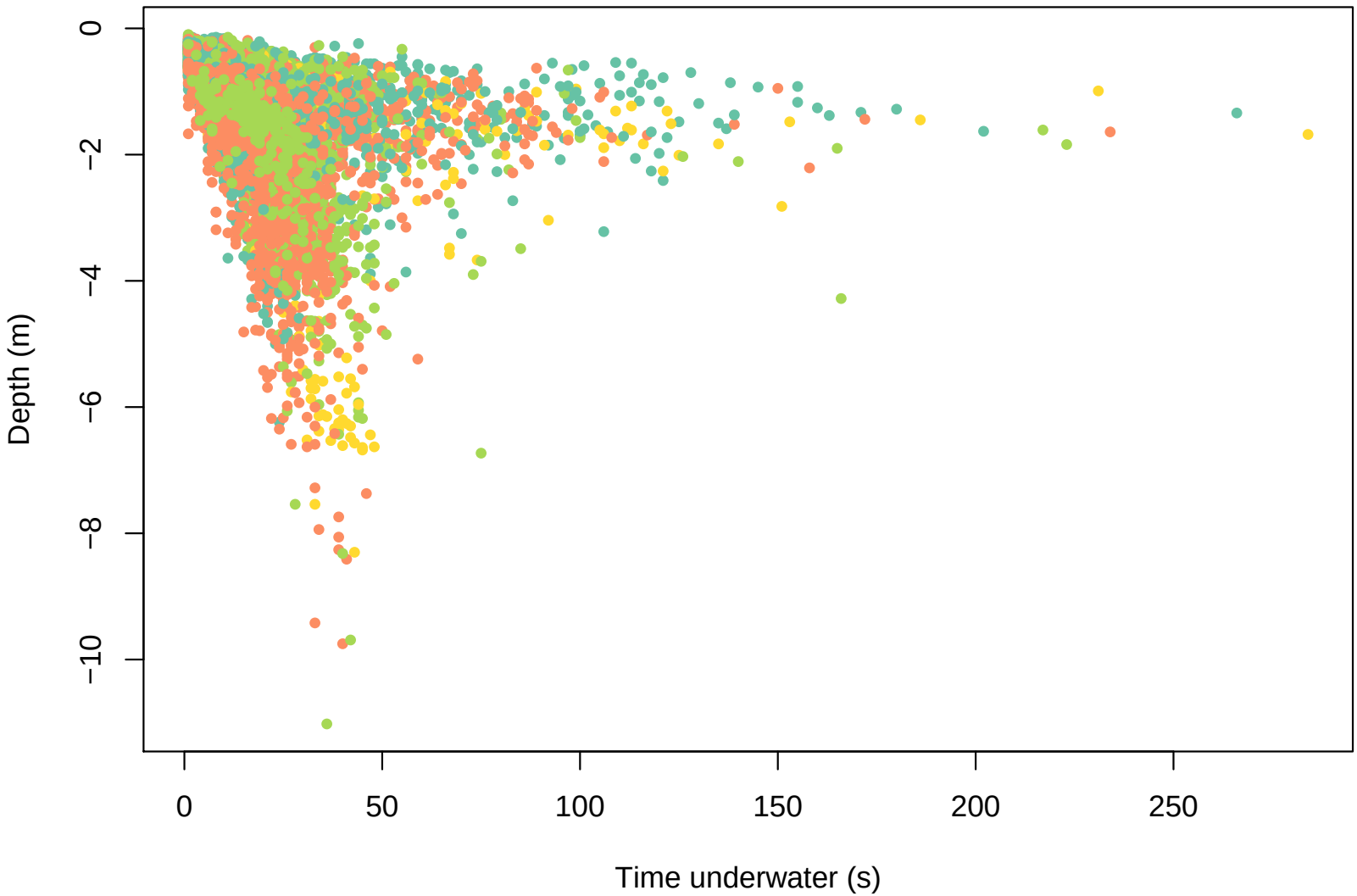
Dive profile

Twenty minutes of free-diving for pāua



Dive depth

Free-diving has its limits

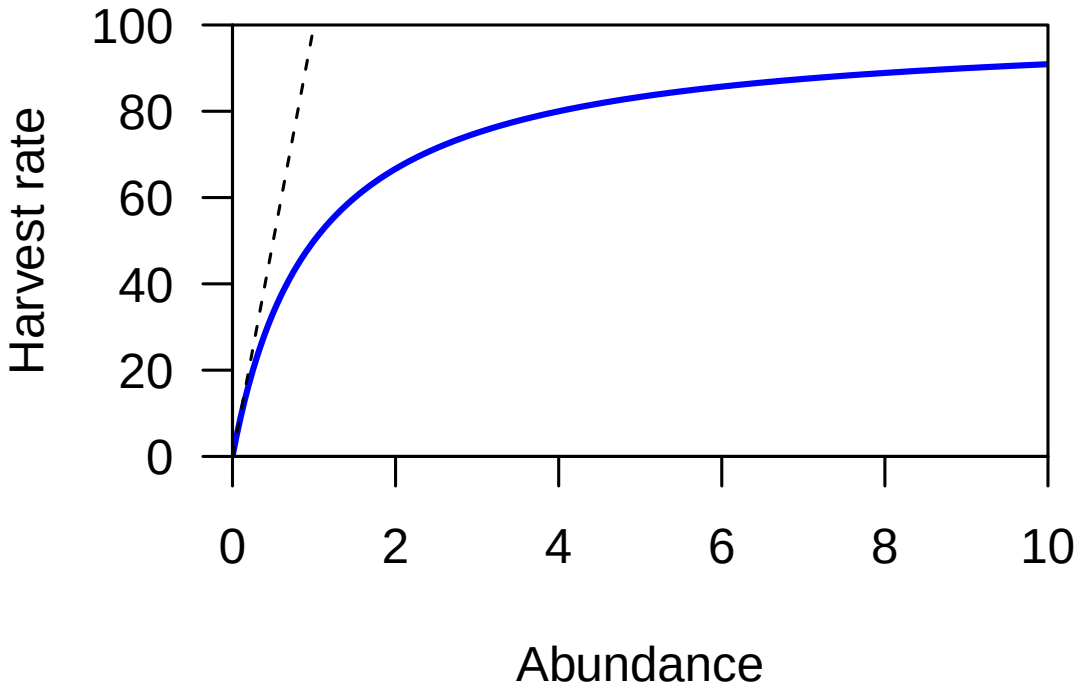



Google
5 km
2 mi

Pāua abundance and CPUE

Holling disk equation

Relating abundance to harvest rate



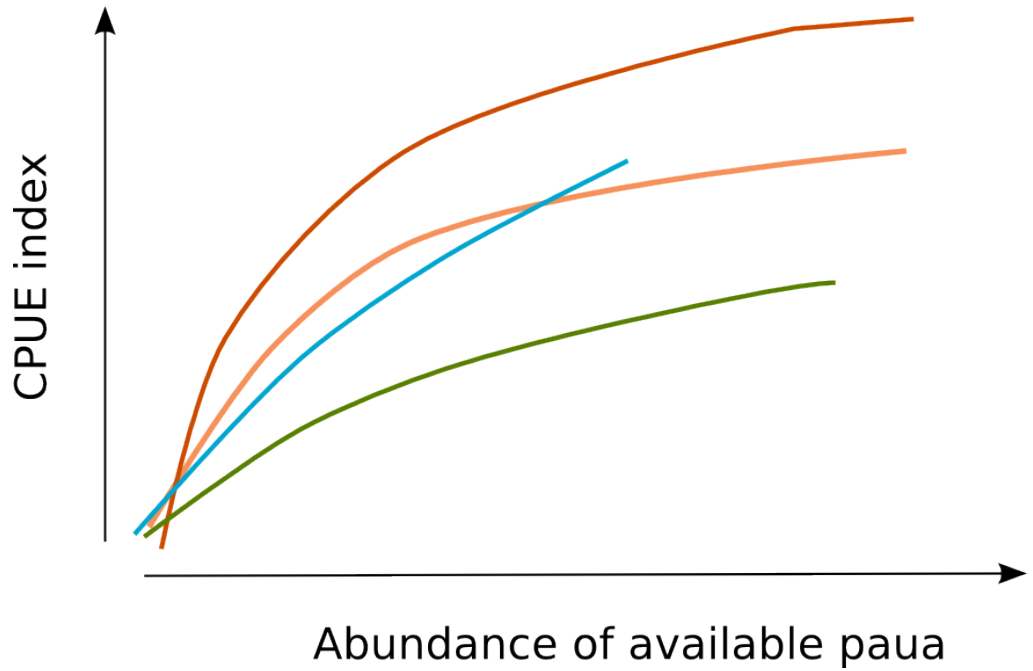
Buzz Holling, photo CC-BY Simon Fraser University

Student mathematical biology lab, Utah University

Abundance and logger CPUE

Schematic

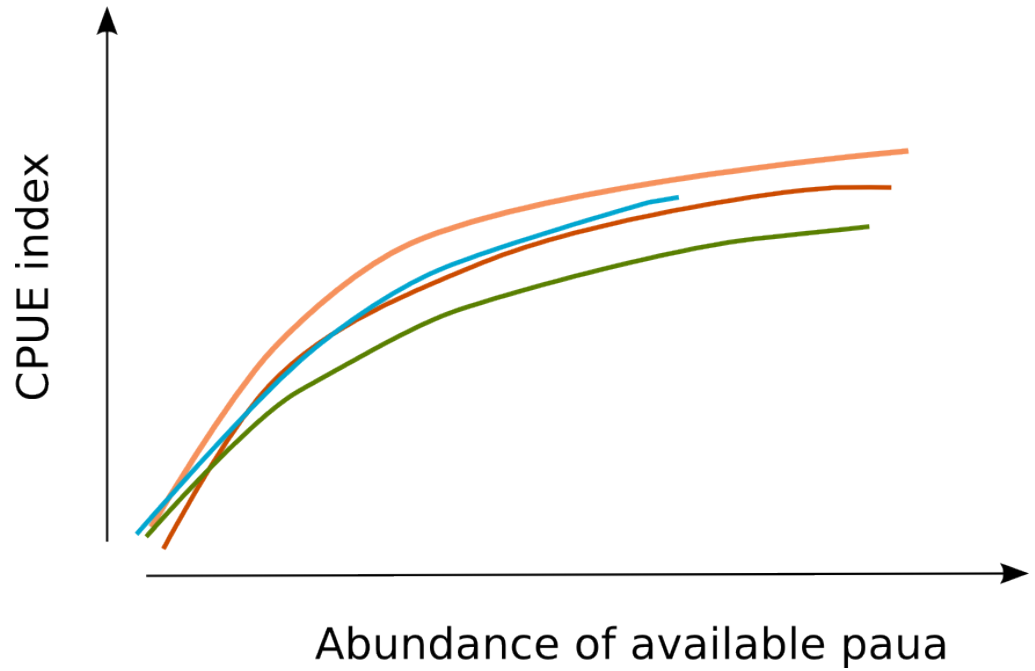
Raw index:



Abundance and logger CPUE

Schematic

Corrected for differences between sites and divers:



Measures of Fishing effort

- Time underwater
- Total time fishing (swimming on surface, and underwater)
- Area fished

Fishdown experiment

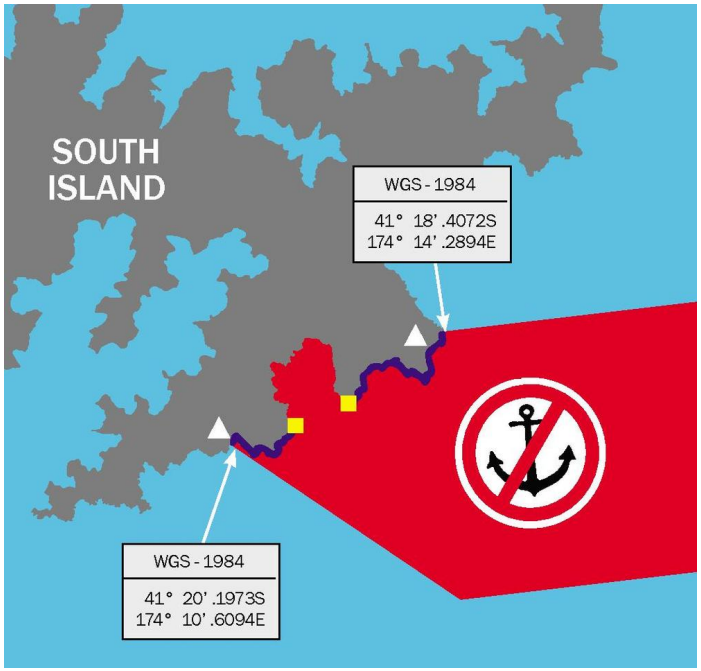
Determine relationships between logger CPUE and absolute abundance

1. A diver or team fishes a reef for a day, recording logger data and catch
2. Wait some time (weeks)
3. Repeat fishing on the same reef, with the same divers
4. Continue until there are no legal size pāua left

Fighting Bay

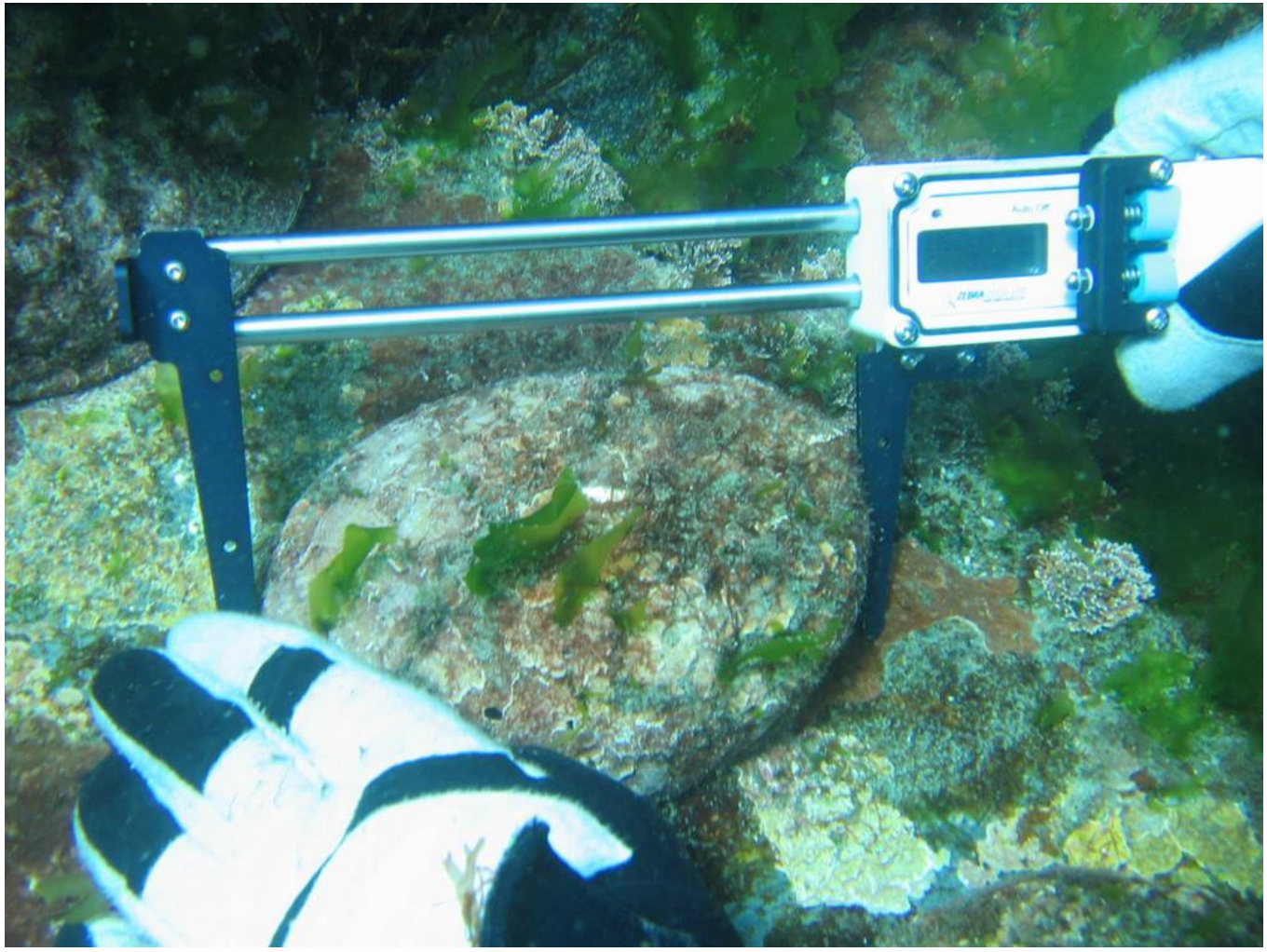
Fighting Bay

Closed to fishing since 1996



Pre-fishdown survey

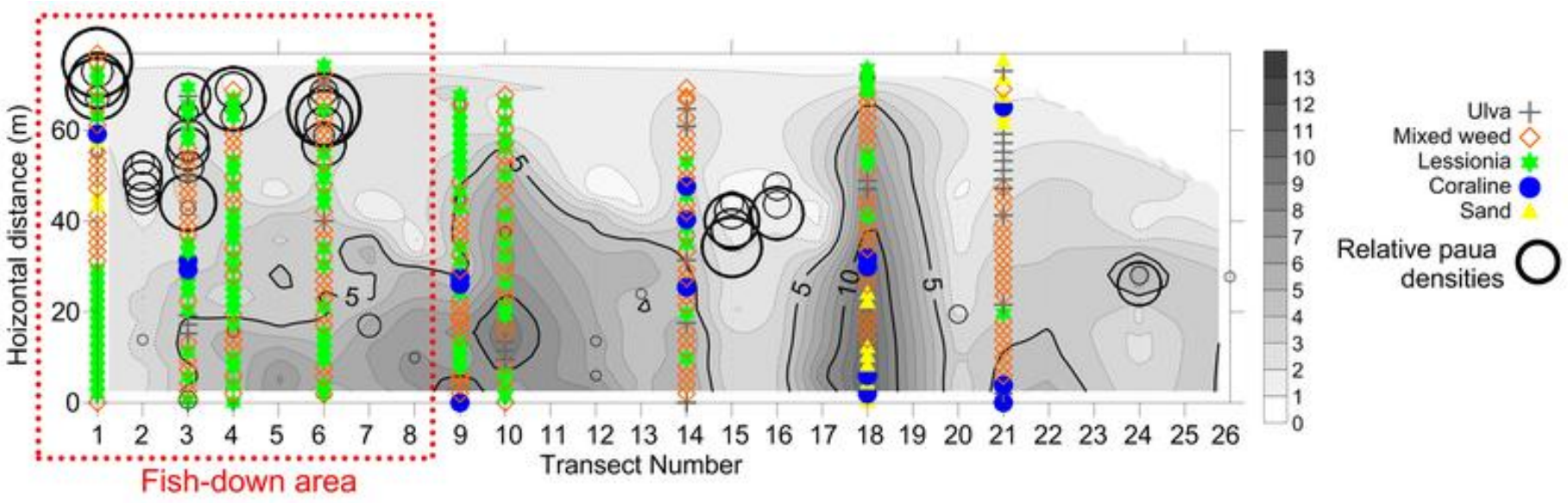
Pāua length and habitat recorded on underwater calipers (Zebratech, NZ)



Survey results

Pāua patchy, in shallow water

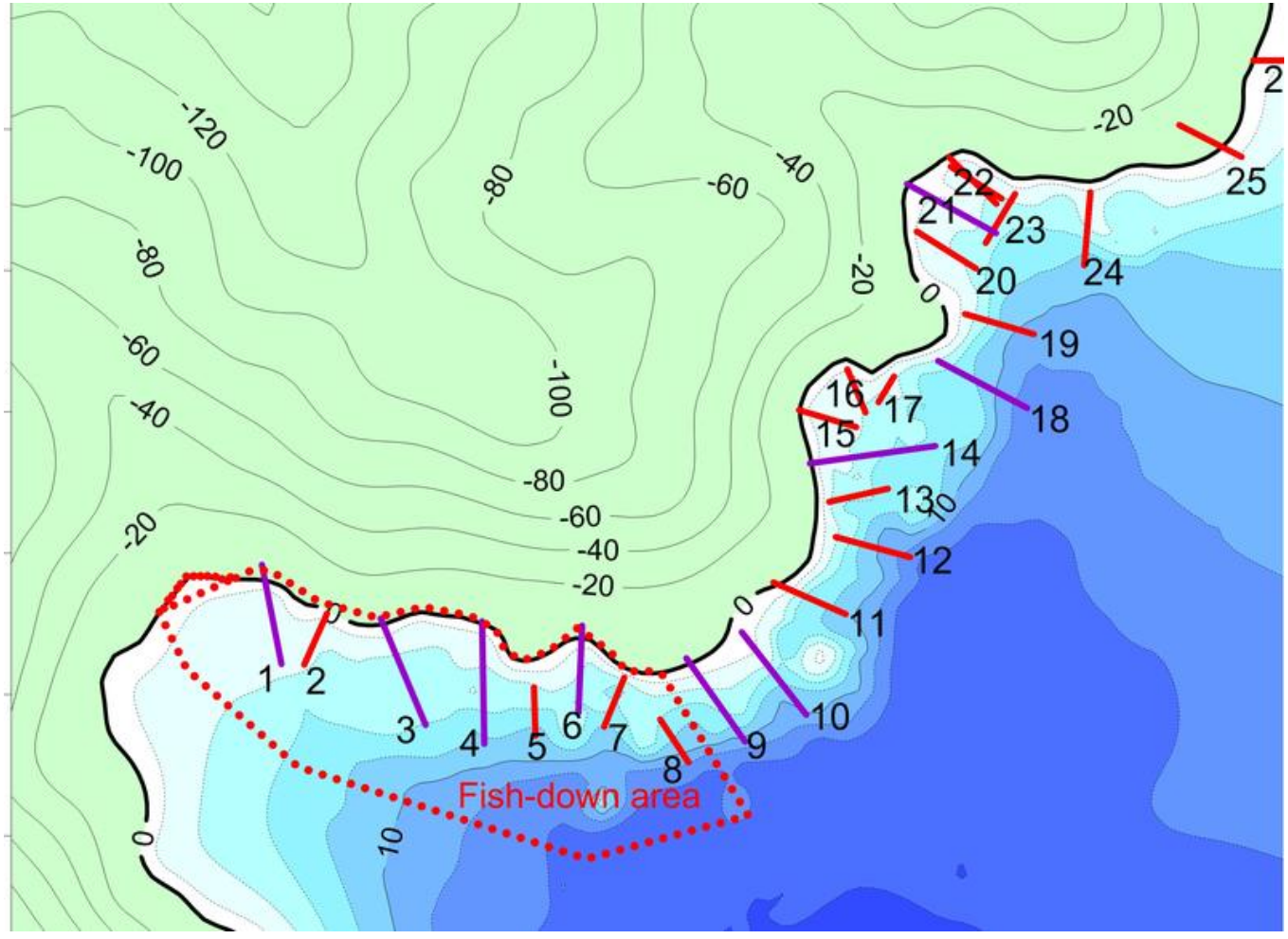
Shallow



Deep

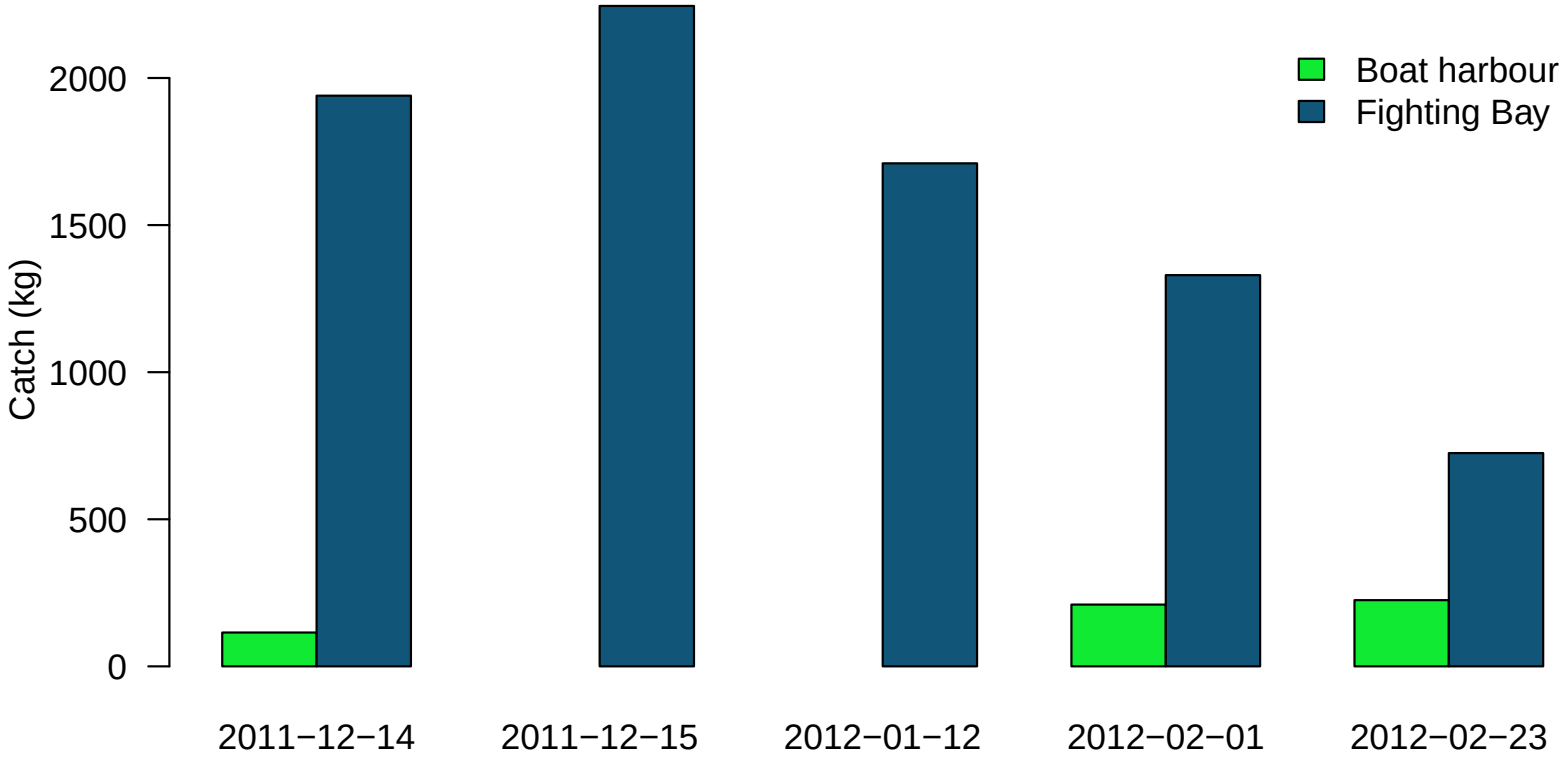
Site choice

Small section (around 400 m long) chosen for the fishdown



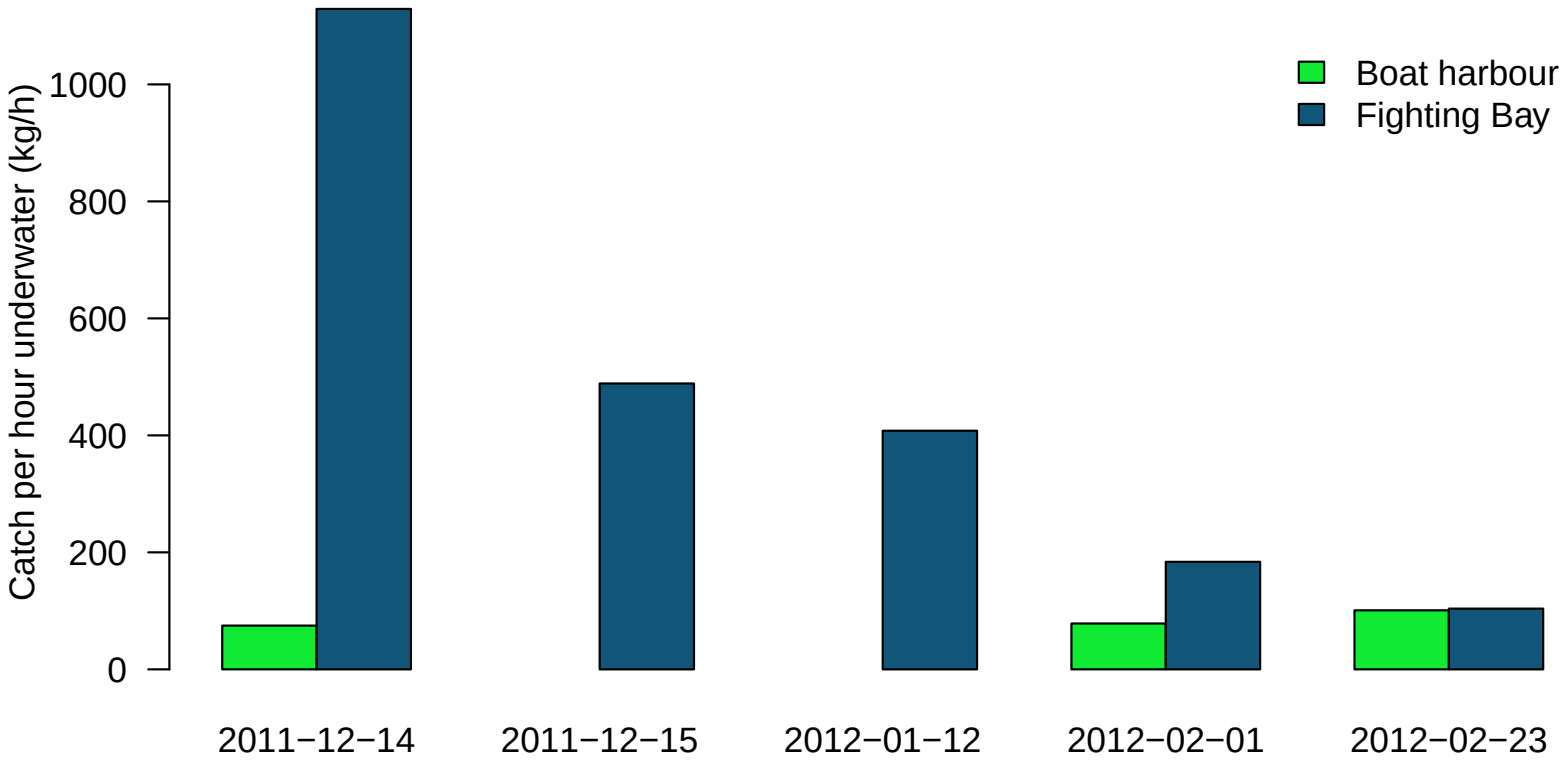
Experiment catch

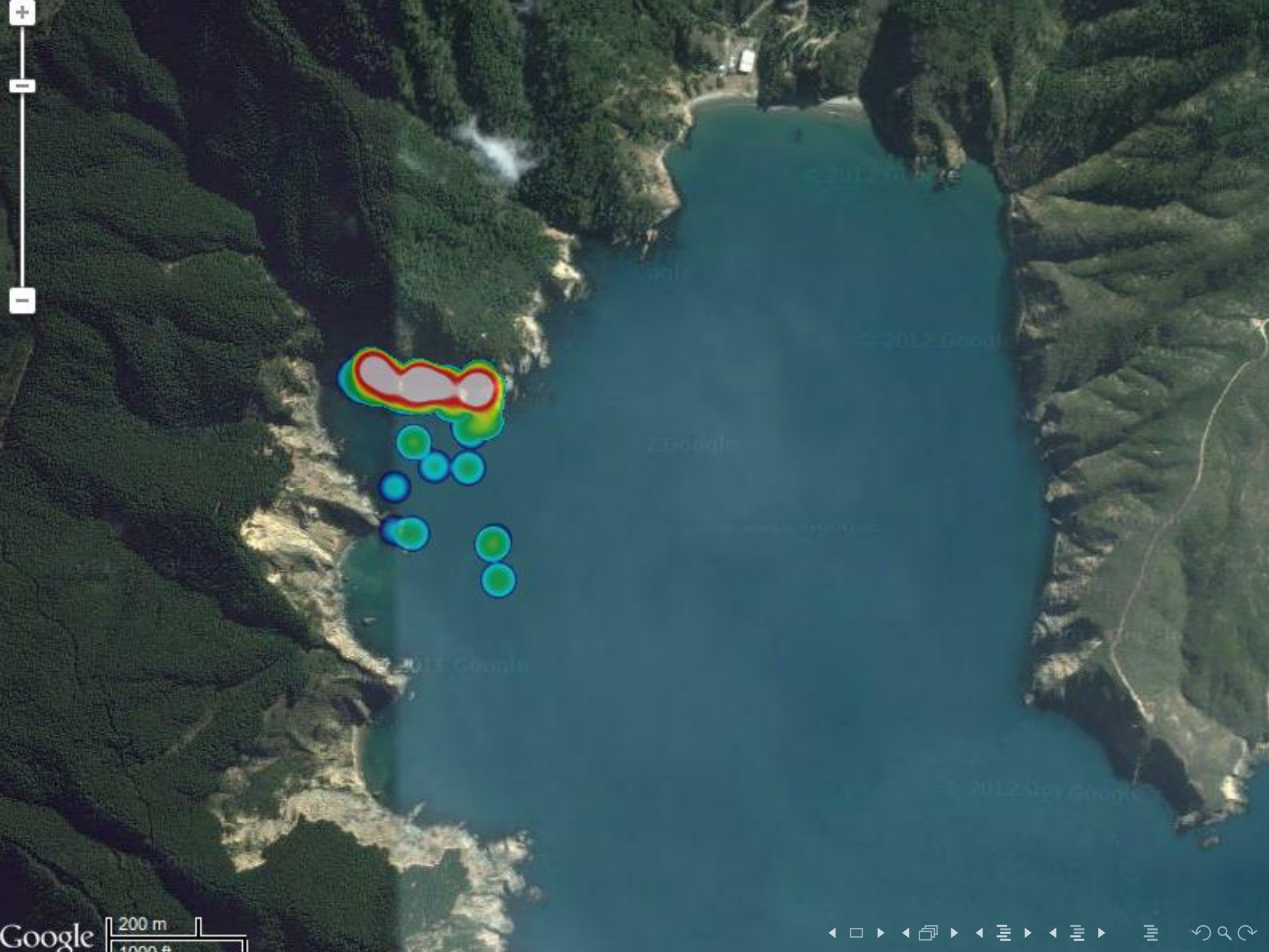
8 tonnes Fighting Bay, 500 kg Boat Harbour

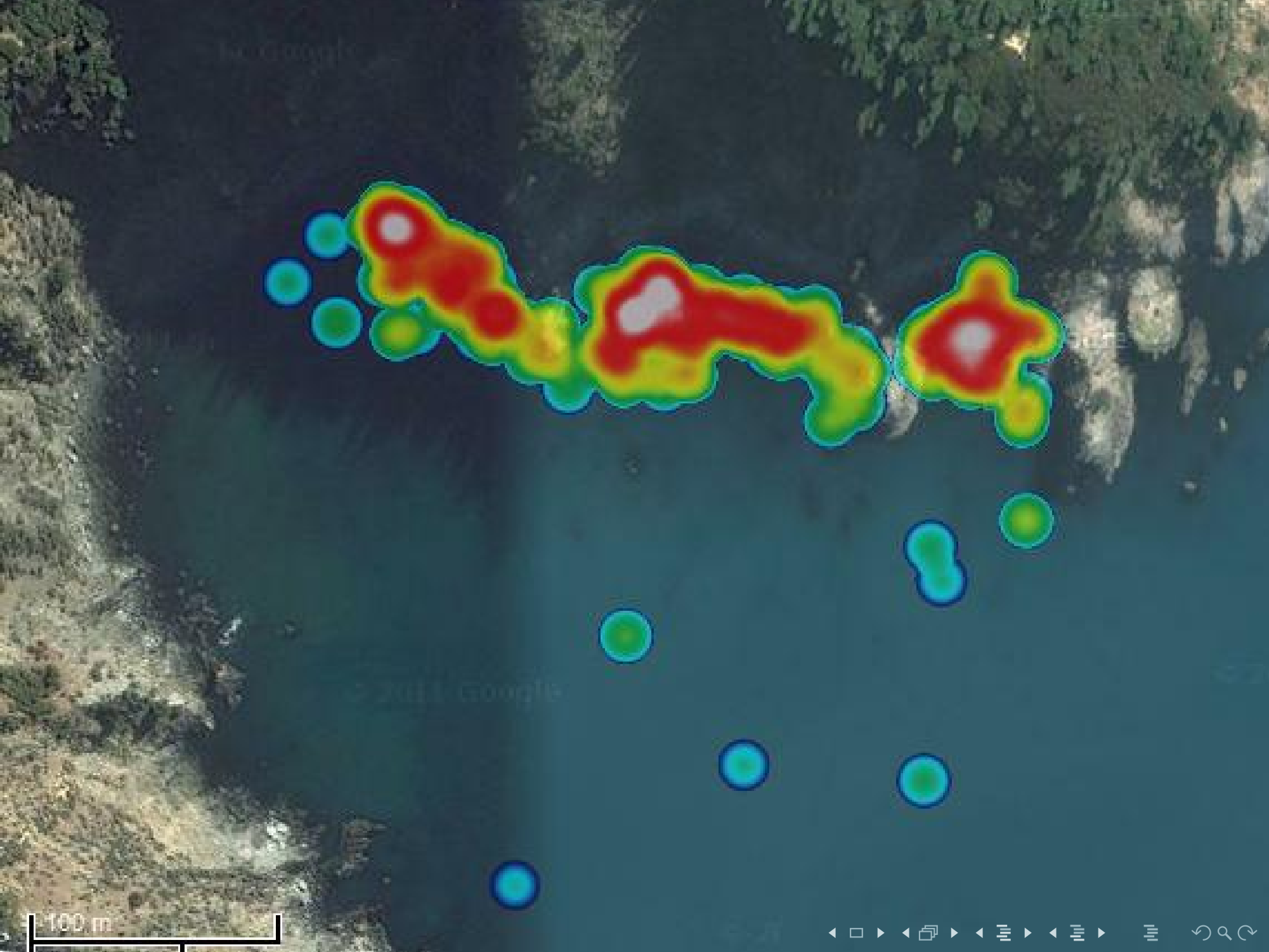


CPUE

Similar CPUE by the end of the experiment

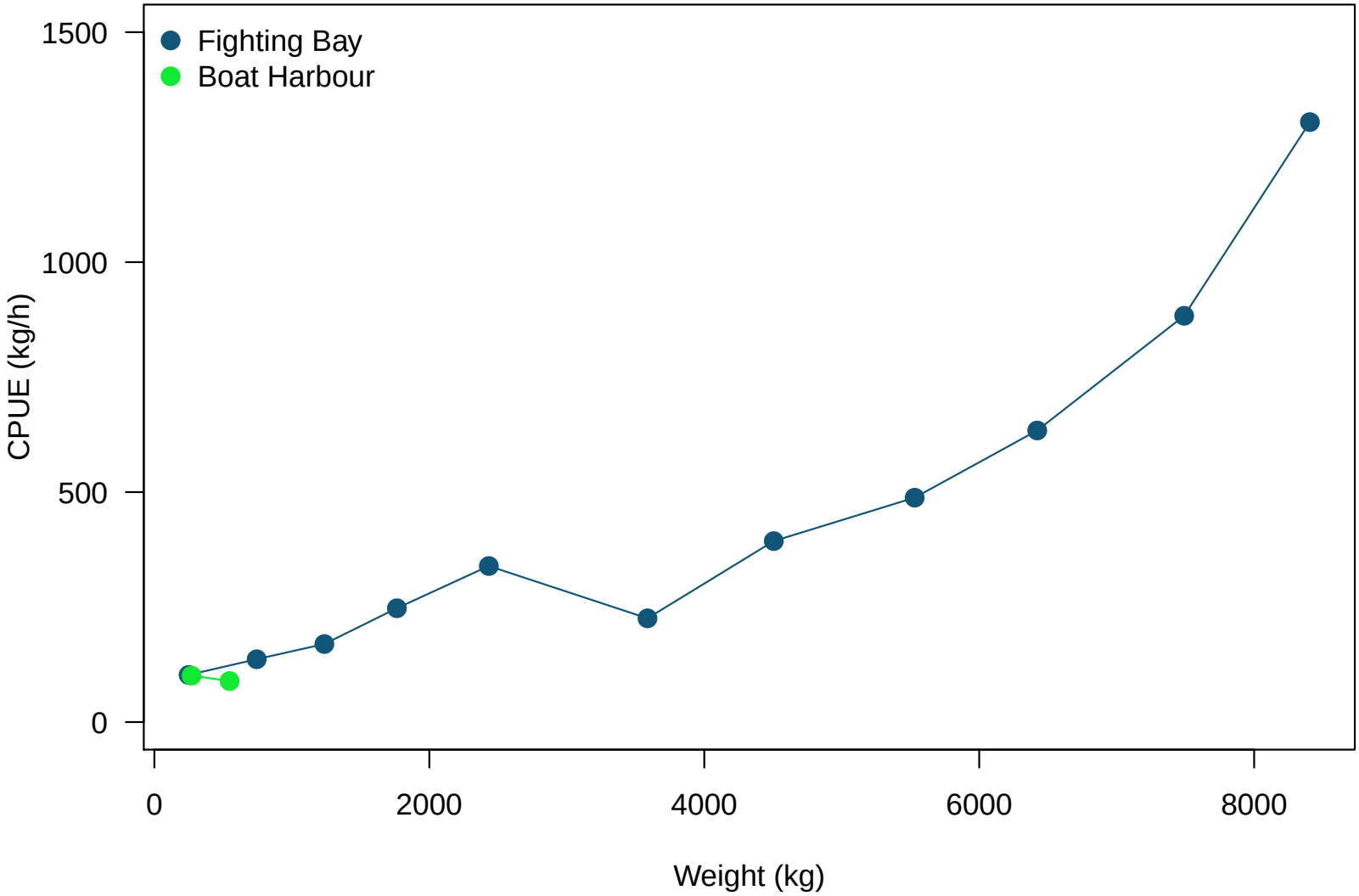



Google
200 m


100 m

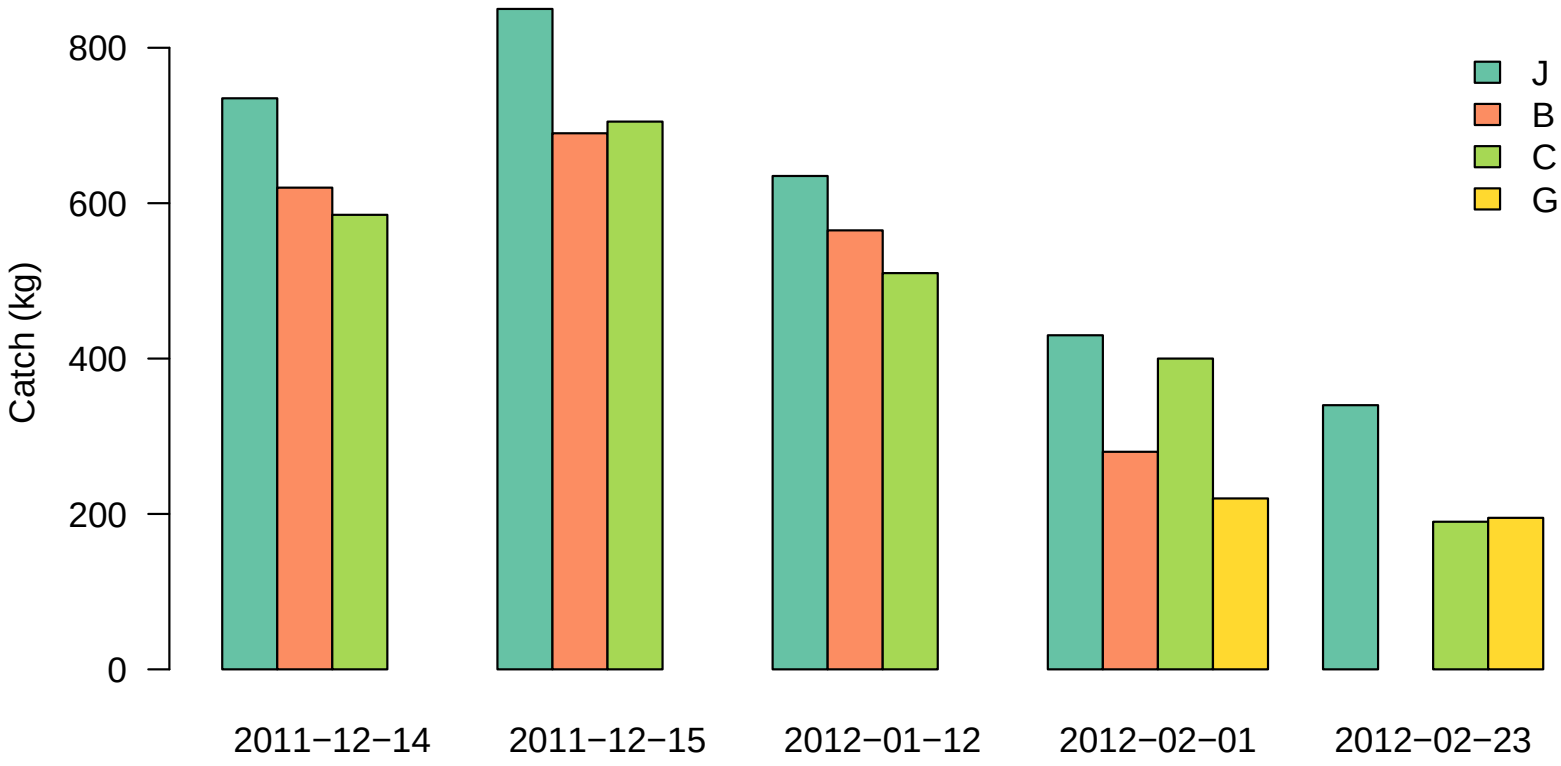
Abundance and CPUE

CPUE defined as amount harvested over time underwater



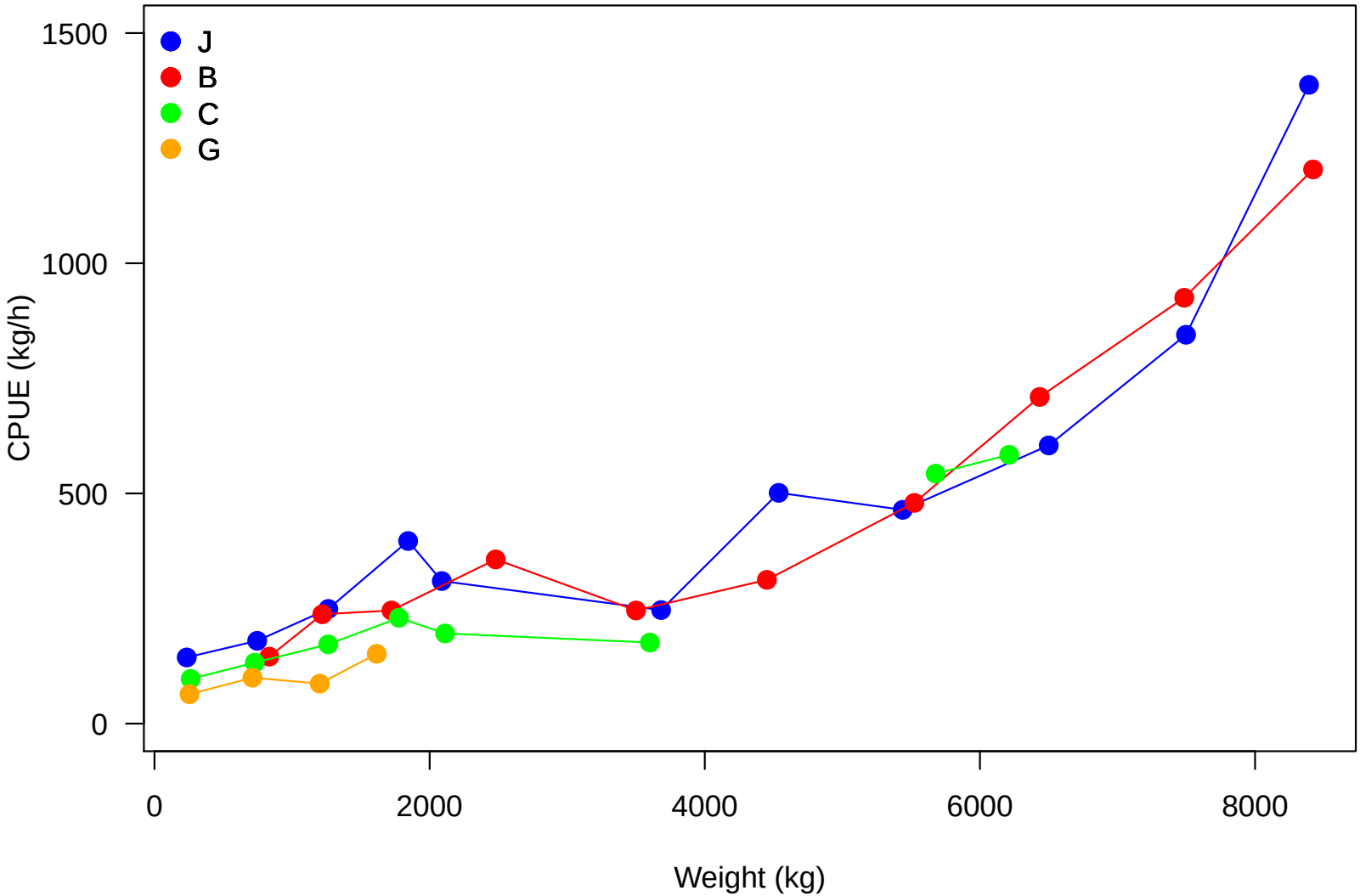
Diver catch

Diver J consistently higher than the other divers



Abundance and CPUE by diver

Fighting Bay CPUE calculated separately for each diver



Next steps

Ongoing work

- Apply CPUE metric to the non-experimental data
- Develop grooming procedures for the diver GPS data
- Area-based CPUE analysis
- Statistical analysis (CPUE standardisation)
- Make the analysis available to industry participants

Thanks!

Special thanks to Dave and Sandra Baker and the First Light team; to Julie Hills and the MPI people who pushed for the fishdown to go ahead; to Nigel Keeley and Ellie Watts from Cawthron for the site survey; and to Transpower and the SeaPatroller for letting us in to Fighting Bay.