

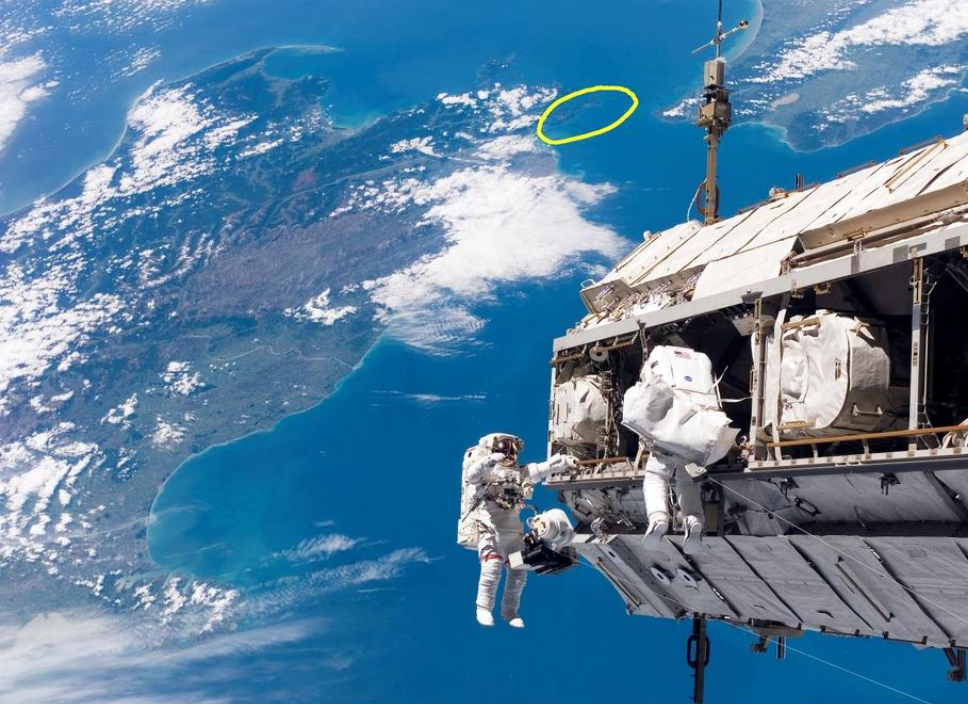
Pāua catch-per-unit-effort from GPS dive-loggers

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International Abalone Symposium, Hobart, 9 May 2012







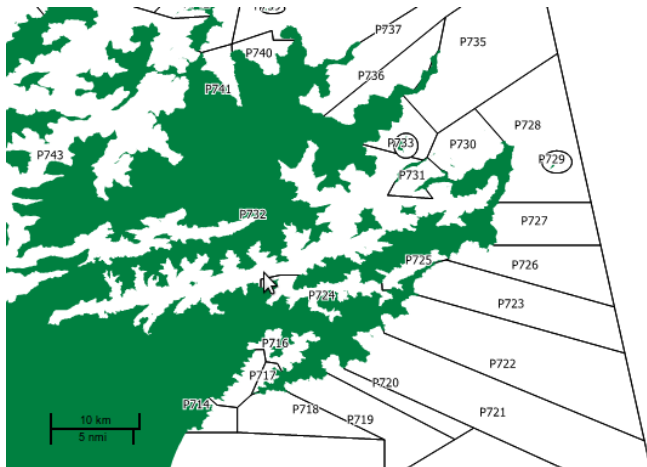


Outline

- 1 Old-fashioned management
- 2 Dive-loggers
- 3 Pāua abundance and CPUE
- 4 Fishdown experiment
- 5 Summary

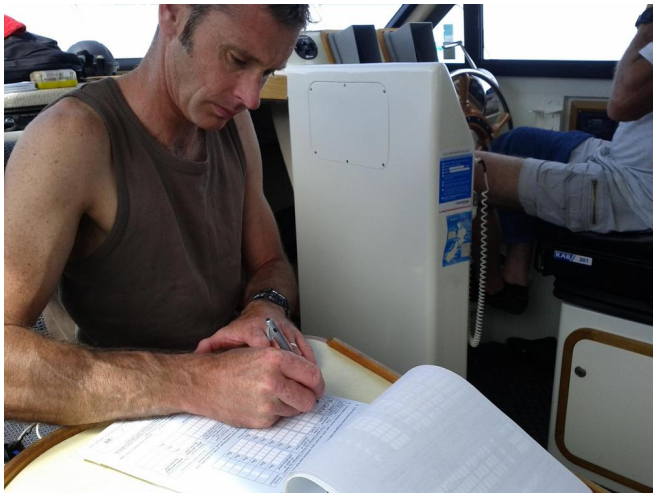
Large areas

Pāua statistical areas, within the Pāua 7 Management Area



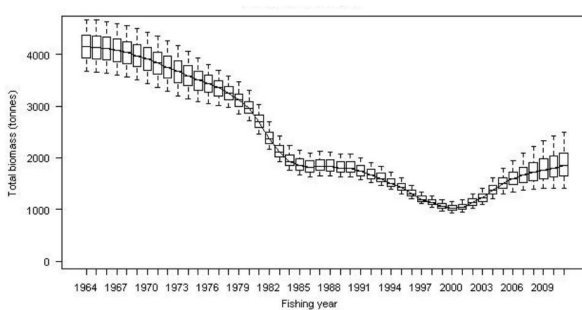
Paper based reporting

Jason Baker does his homework



Stock assessments

Pāua 7 biomass, McKenzie & Smith (2009)



Towards responsive, informed management

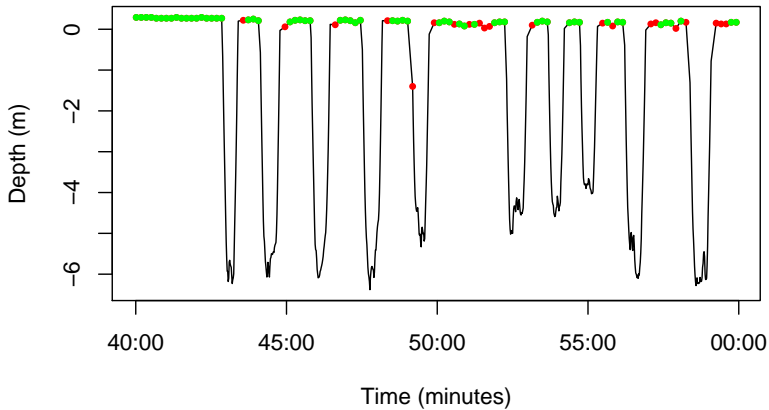
Dive-loggers

Boat and turtle units, made by Zebratech (NZ)



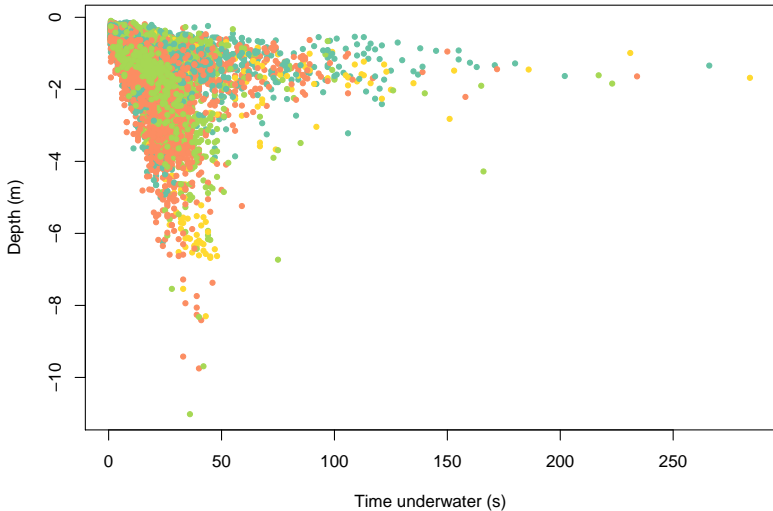
Dive profile

Twenty minutes of free-diving for pāua



Dive depth

Free-diving has its limits

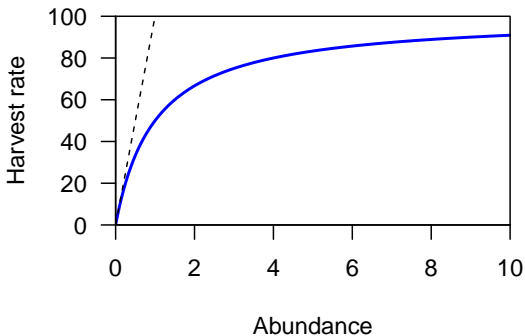




Pāua abundance and CPUE

Holling disk equation

Relating abundance to harvest rate



Buzz Holling, photo CC-BY Simon Fraser University

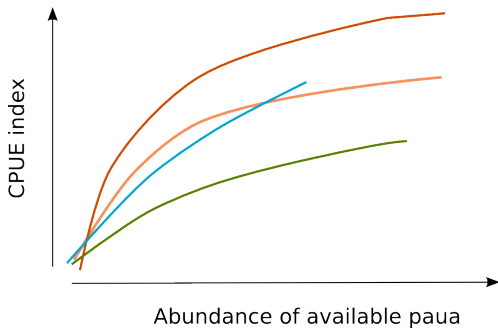


Student mathematical biology lab, Utah University

Abundance and logger CPUE

Schematic

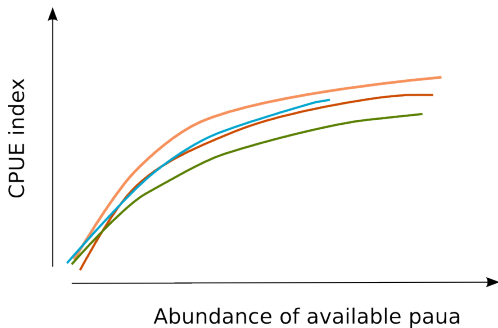
Raw index:



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

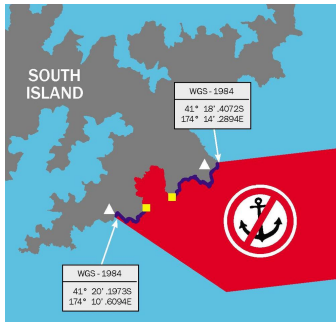
Determine relationships between logger CPUE and absolute abundance

- 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

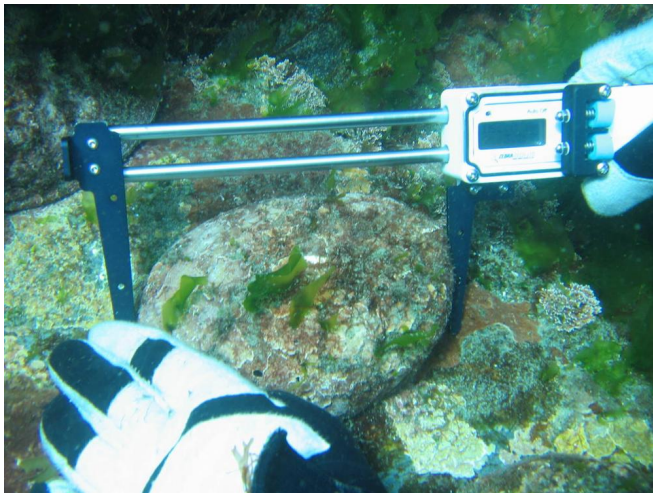
Closed to fishing since 1996





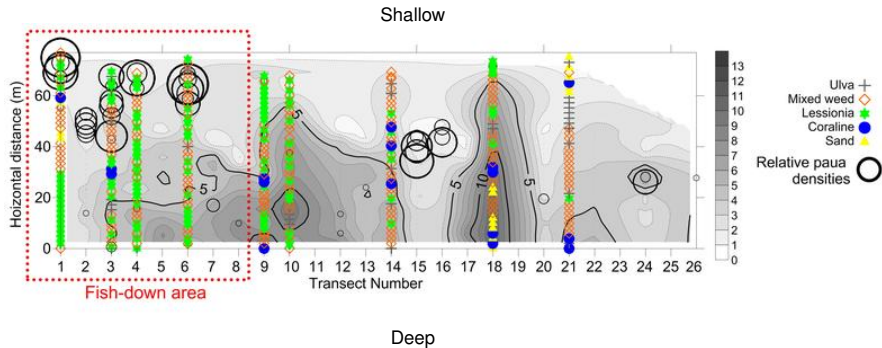
Pre-fishdown survey

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



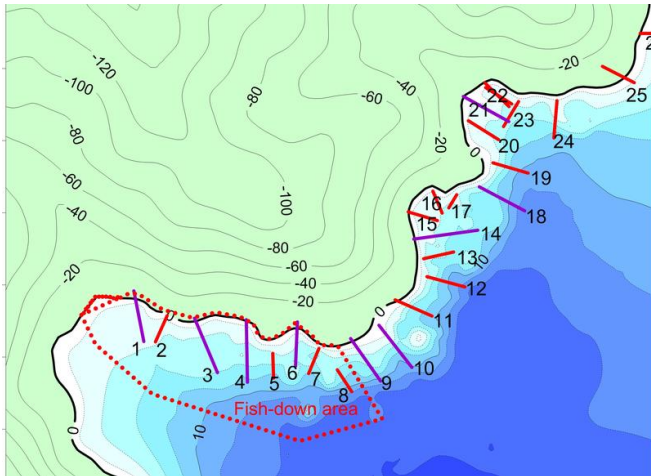
Survey results

Pāua patchy, in shallow water



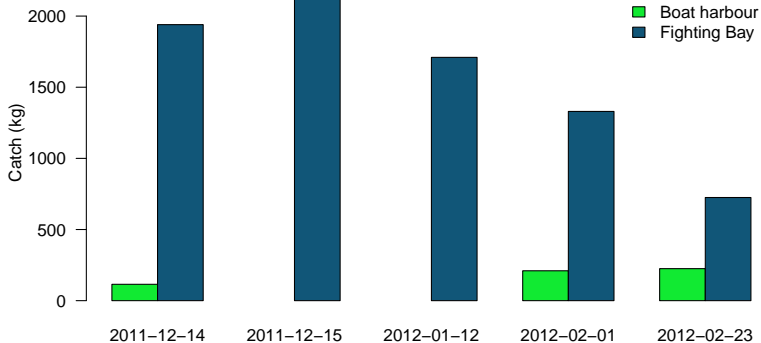
Site choice

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



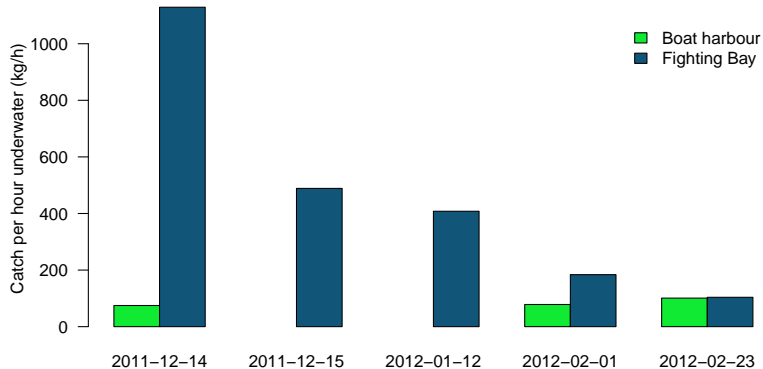
Experiment catch

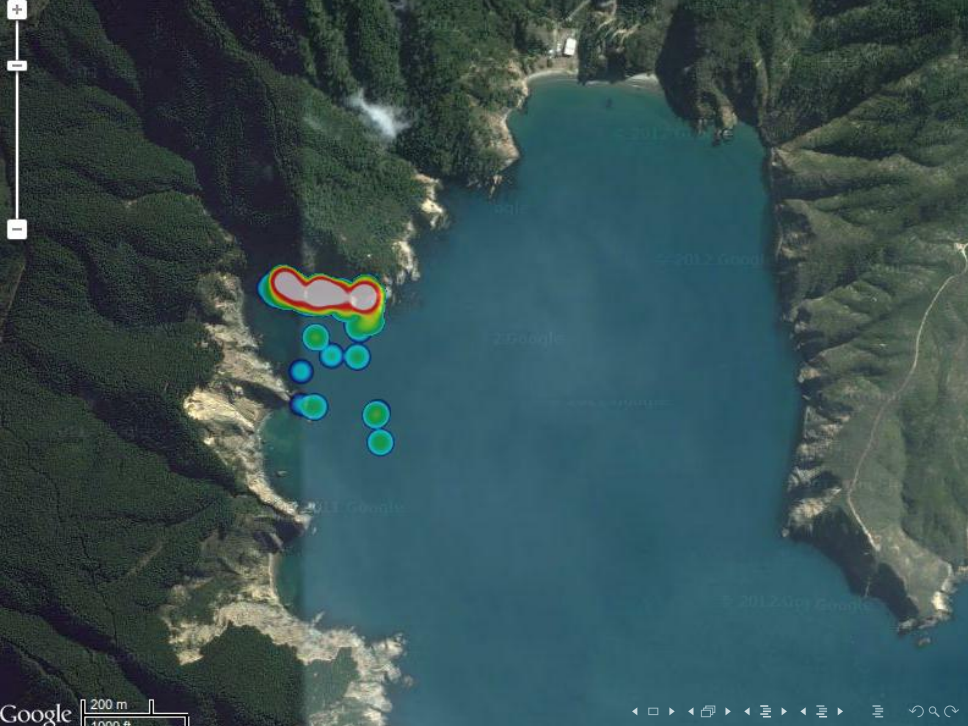
8 tonnes Fighting Bay, 500 kg Boat Harbour

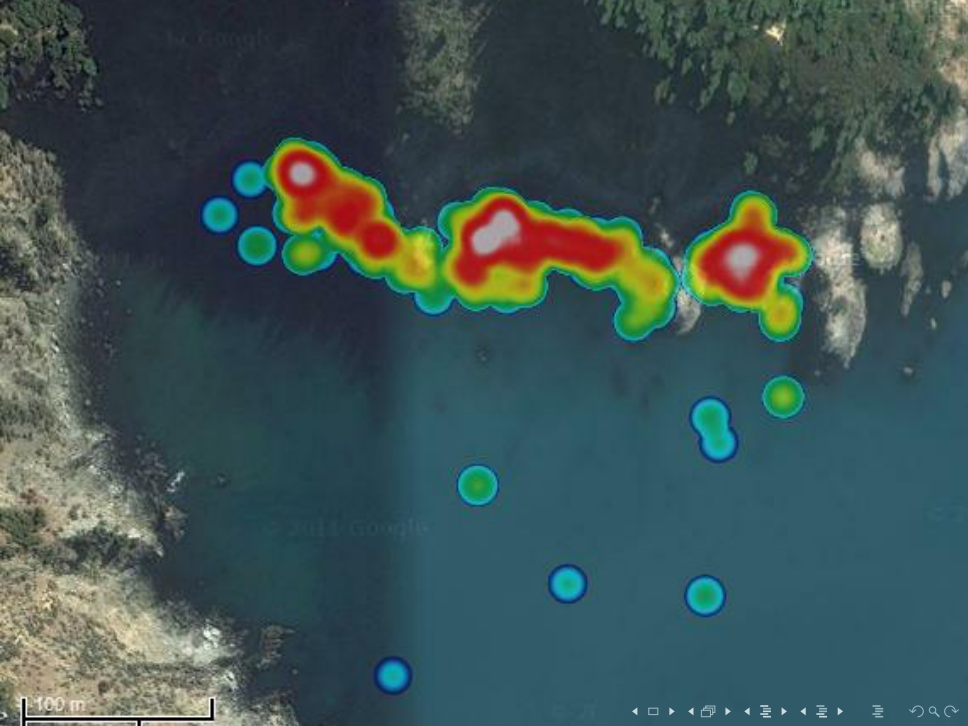


CPUE

Similar CPUE by the end of the experiment

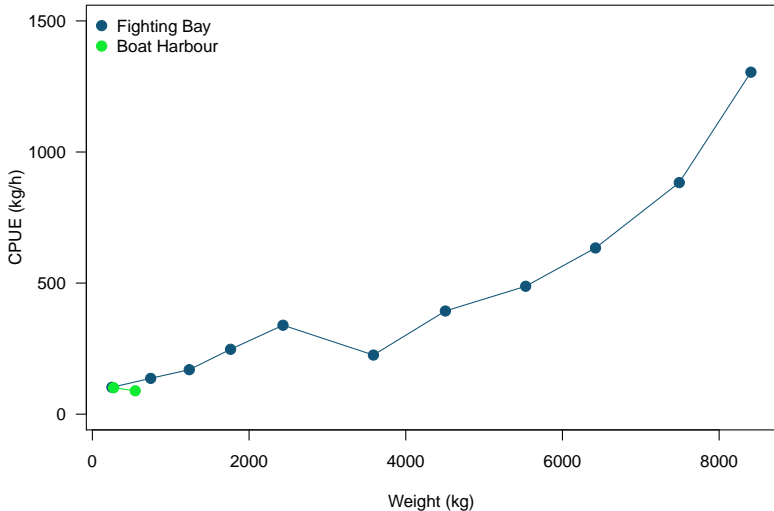






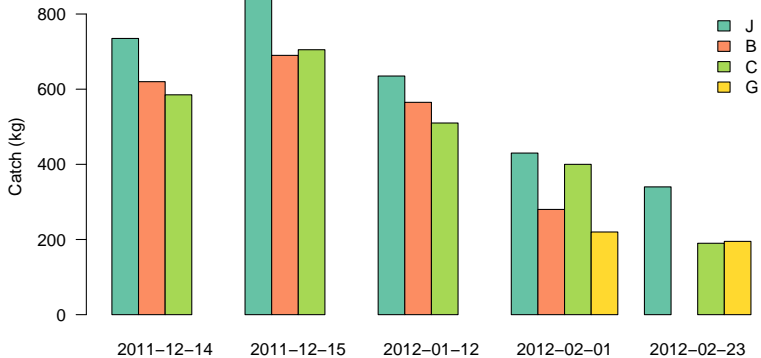
Abundance and CPUE

CPUE defined as amount harvested over time underwater



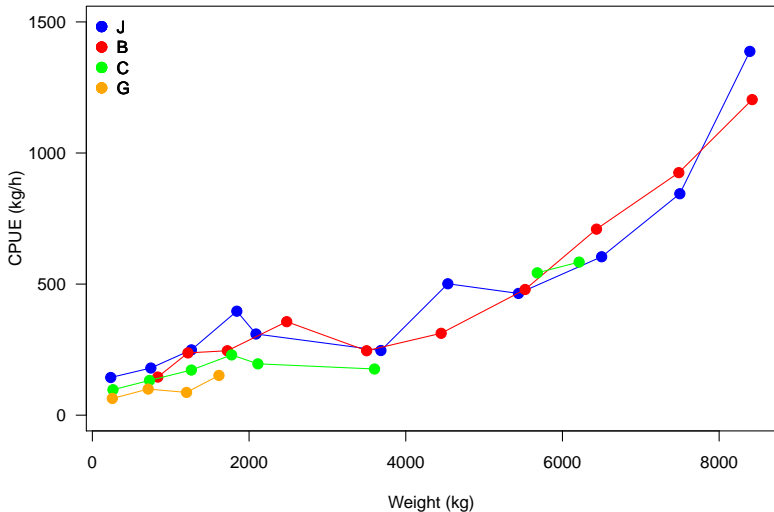
Diver catch

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.