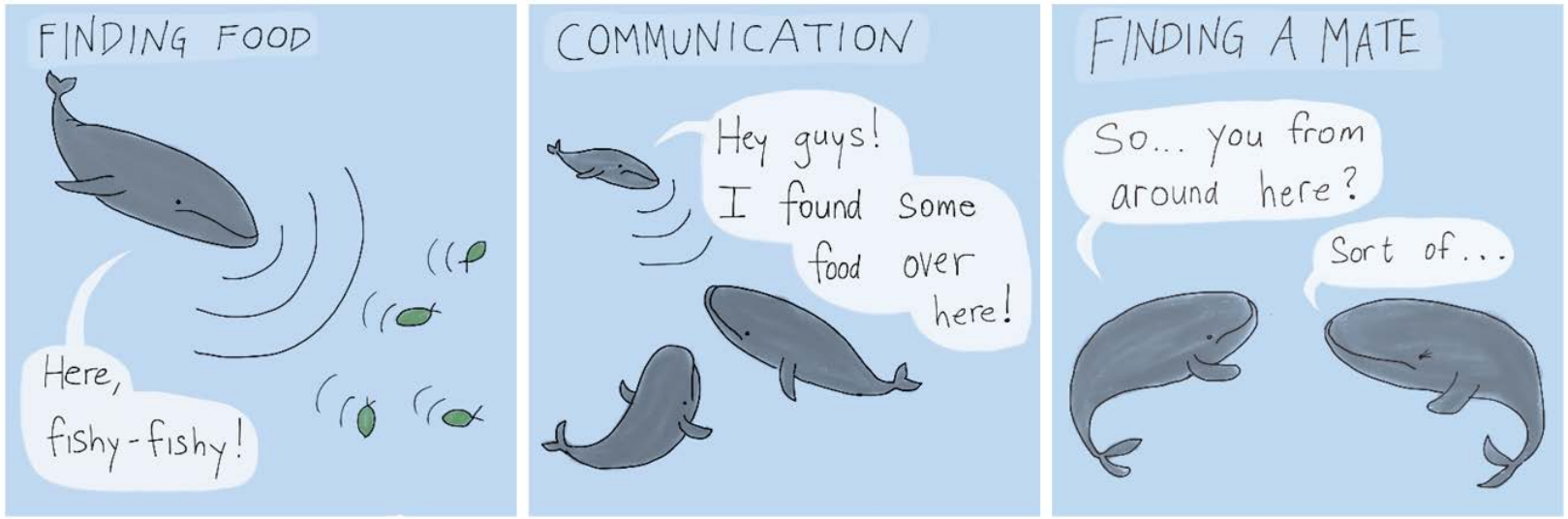
"Passive acoustic monitoring of the Hauraki Gulf"

Rosalyn Putland

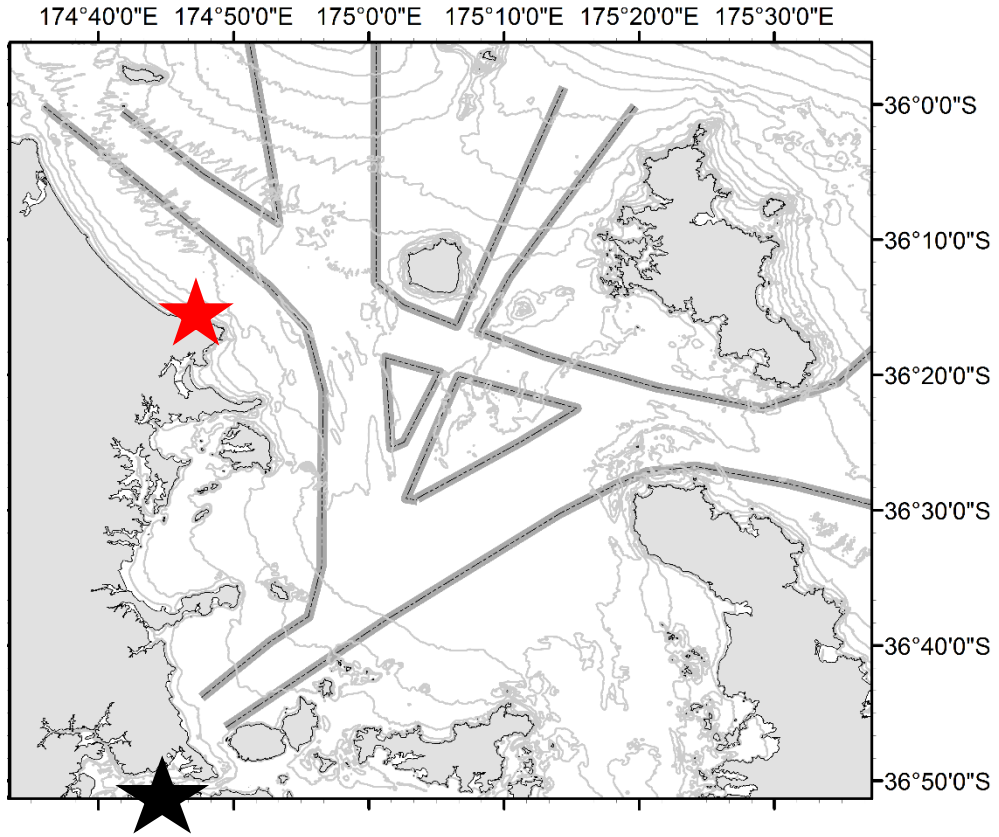
Supervisors: Dr Craig Radford and Dr Rochelle Constantine

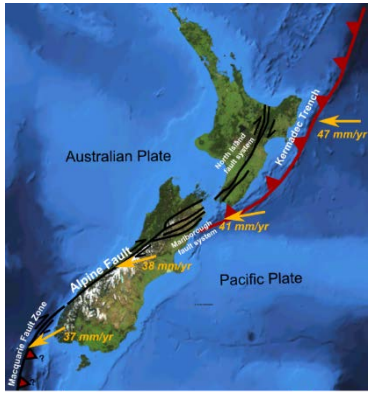
What is passive acoustic monitoring?

Acoustics – study of sound
Passive – non invasive method
Monitoring – linking sound to science

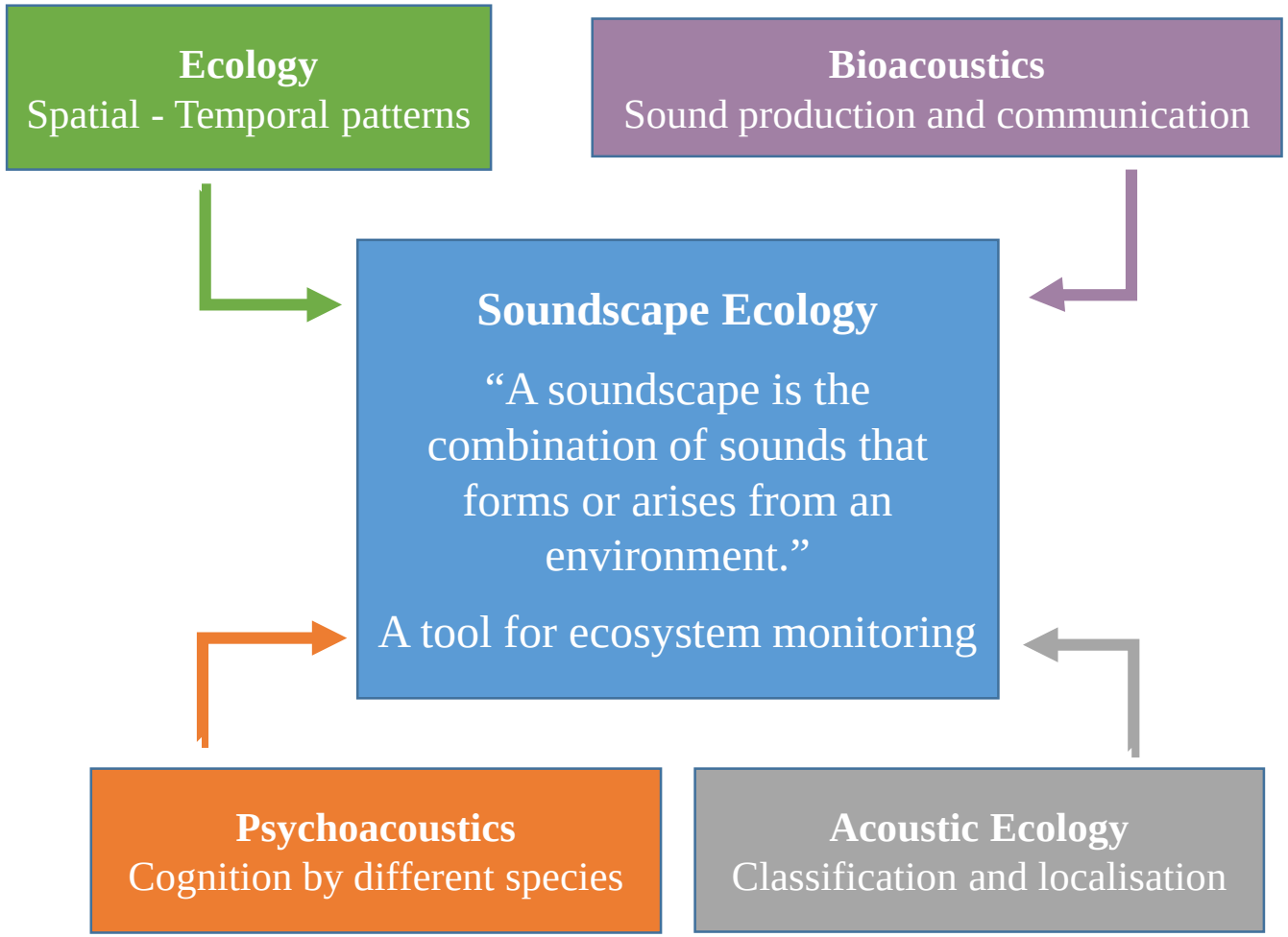


Why listen to the Hauraki Gulf?





- 22 species of whale and dolphin sighted
- Wide variety of sound producing fish and invertebrates
- Three major shipping routes into Ports of Auckland
- Industrial and recreational fishing
- Earthquake zone!



Adapted from Pijanowski *et al.* 2011

Research Questions

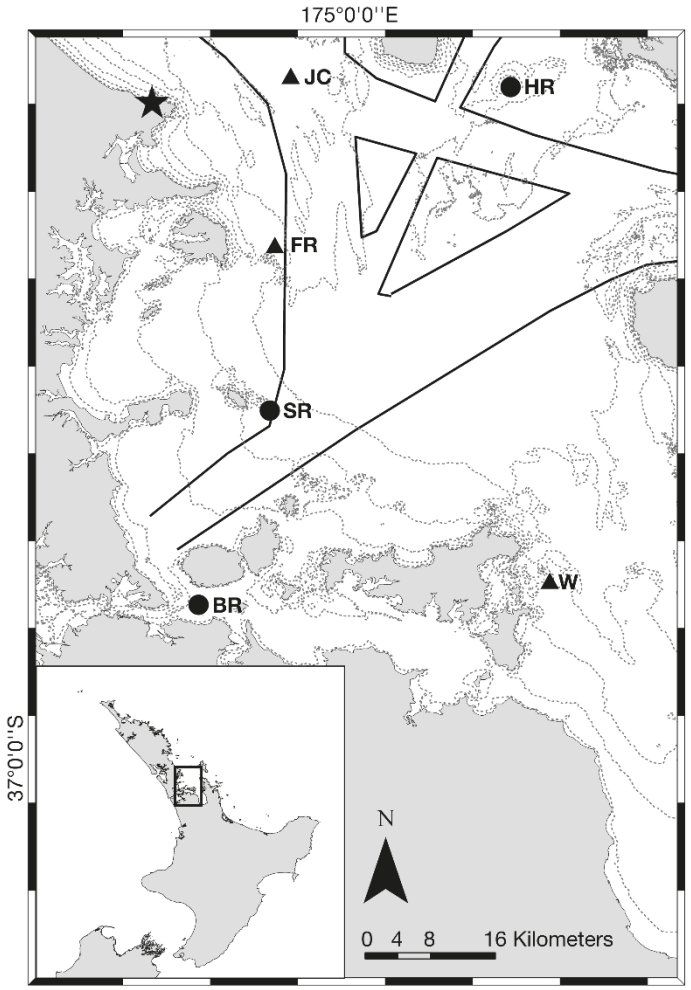
1. What are the spatial and temporal patterns of ambient sound in the HG?

2. Compare detection methods for biological sounds in the HG: (dolphins, fish and Bryde's whales)

3. How is shipping noise affecting the communication space of marine fauna in the HG?


ONeNEWS

Methods



Salinity Meter
Boat Communications

6 – 54 m

Sub - Surface Buoy

Temperature Logger

Hydrophone

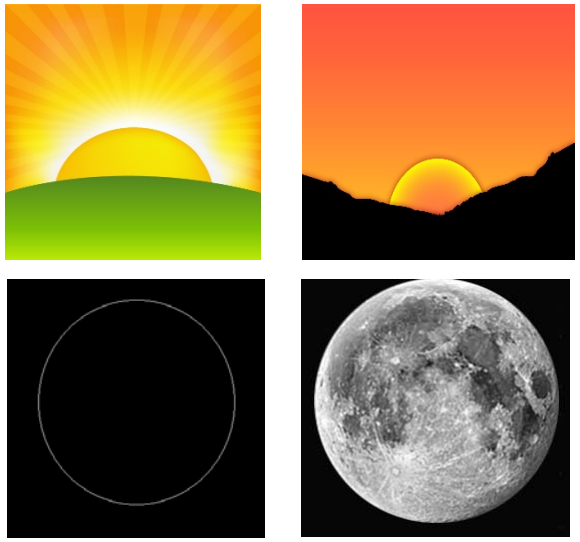
Weight

Weight

10m

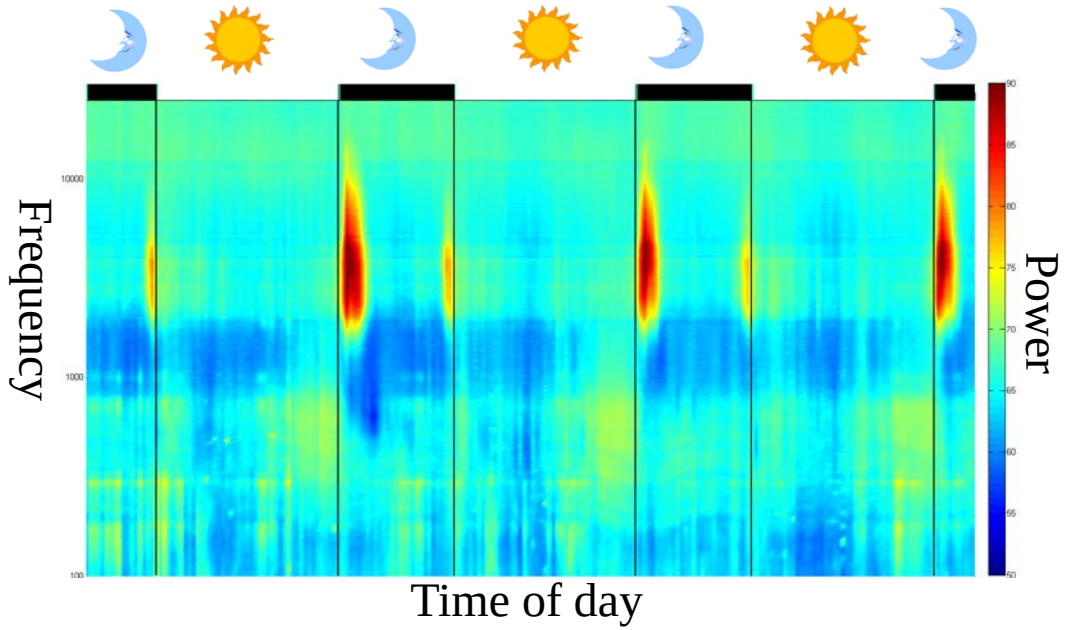
2 minutes every 20 minutes for over a year and at 6 sites
= over 500,000 minutes of sound

Chapter 1 Results – How does sound change with time?

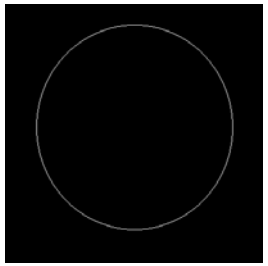


Daily Cycle –
loudest at dawn and dusk

Monthly Cycle –
loudest at new moon and quietest at full moon



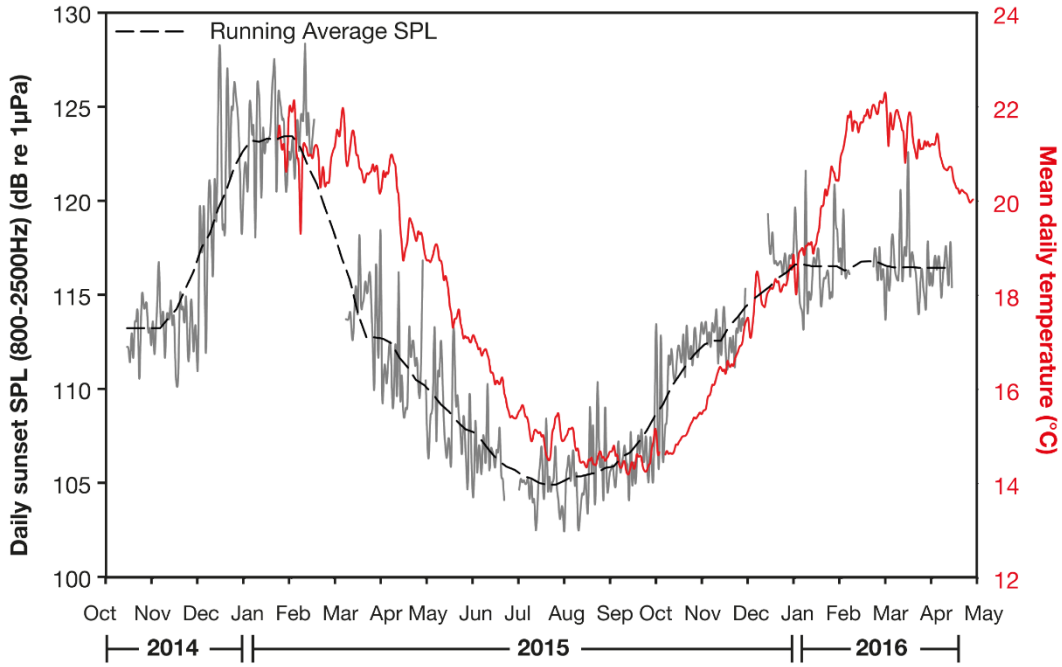
Chapter 1 Results – How does sound change with time?



Daily Cycle –
loudest at dawn and dusk

Monthly Cycle –
loudest at new moon and quietest at full moon

Annual Cycle –
loudest in summer and quietest in winter



Chapter 2 Results – Biological Soundscape - Invertebrates

Urchins

Crabs

Snapping Shrimp

Chapter 2 Results – Biological Soundscape - Fish

Red gurnard

John Dory

Bigeye

Chapter 2 Results – Biological Soundscape – Marine Mammals

NZ Endangered ~ 1000 individuals 50 in HG

Bottlenose dolphin

Common dolphin

Pilot whale

Orca

NZ Critically Endangered ~ 70 individuals in catalogue

Bryde's whale

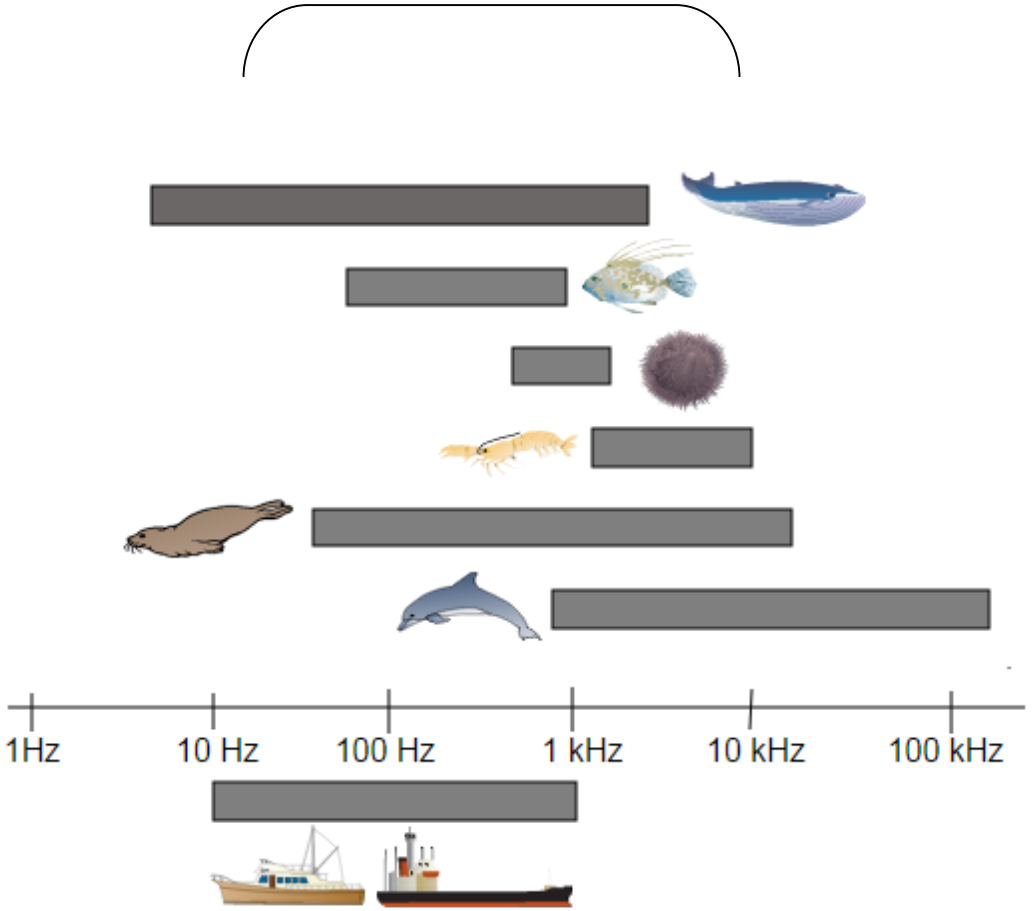
Sounds A.Gill and R.Putland.2013/14 Photographs R.Putland 2014

Why is passive acoustic monitoring important?

Net ‘pingers’ – high frequency
(used to deter dolphins and seals)

Shipping – low frequency
Engine, propeller and machinery noise

Human hearing range 10 – 15000Hz



Renewable energy – low frequency
Construction and boat noise

Aquaculture farms – low frequency
Machinery Noise

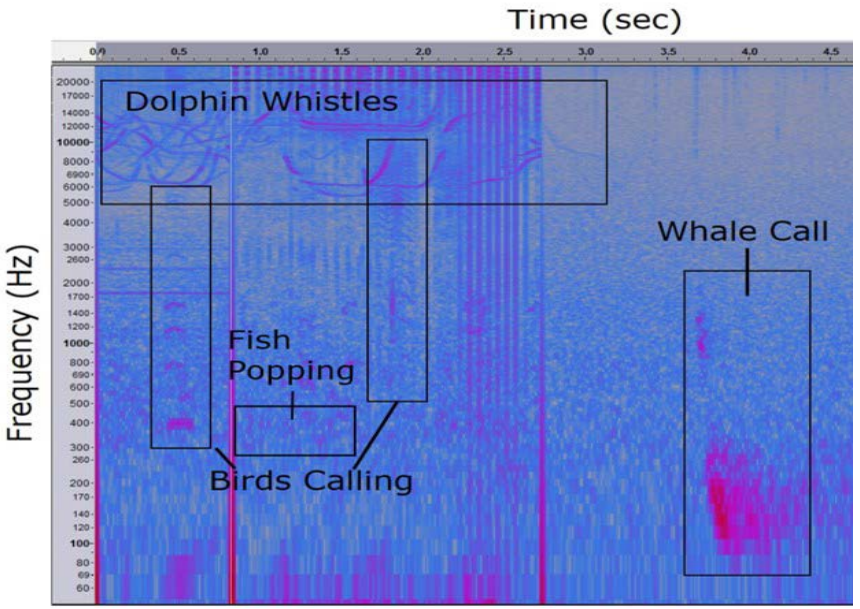
Summary of my research

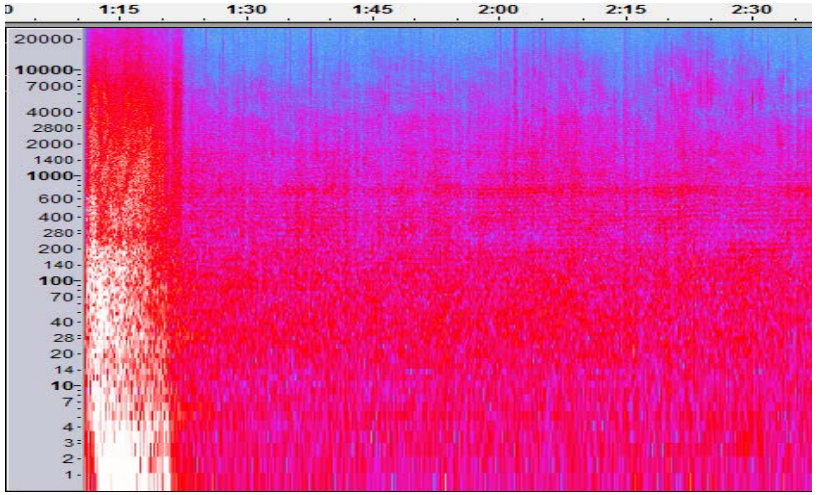
- Temporal and Spatial patterns in the HG
- Loudest at sunset, new moon and in summer
- Different soundscape according to habitat and human use

- Lots of new and exciting sounds have been discovered
  - John Dory
  - Bryde's whale

- Biological detection of many different sounds possible

- Shipping noise poses a problem for future management










Citizen Science









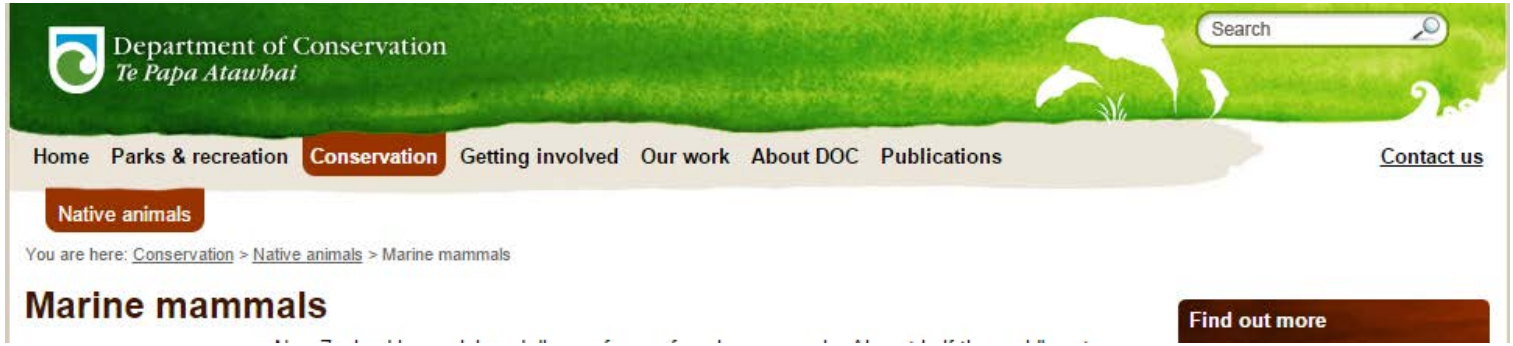
Citizen Science





Reporting marine mammal sightings

- **Report any marine mammal sightings/ take photographs = SIGHTINGS FORM**
- **Respect marine mammals when you see them = SHARING OUR COASTS**



Department of Conservation
http://www.doc.govt.nz/

Hauraki Gulf Marine Spatial Plan
http://www.seachange.org.nz/

Marine Mammal Research Group
University of Auckland
http://mmeg.wordpress.fos.auckland.ac.nz/

Questions???

Acknowledgements
Louis Ranjard (Australian National University), Nathan Merchant (CEFAS, UK), Adrian Farcas (CEFAS, UK)

Technical Assistance: John Atkins, Peter Browne and Brady Doak

Divers: Caitlin, Christine, James, Lucy, Sydney

Photographs: Rochelle Constantine, Lucy van Osteroom
Sound Files: Allison Gill, Craig Radford