

ACOUSTIC WORKING GROUP



Why

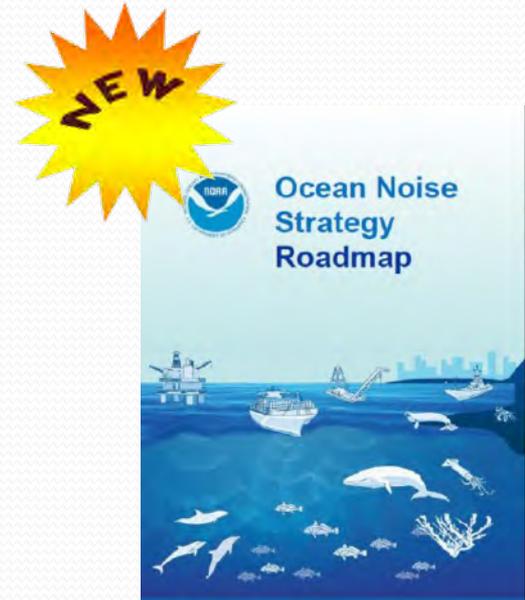
- *Is there a need for regulatory/non-regulatory strategies for ocean noise?*
- *Secondary: What are noise impacts/threats in MBNMS? What does MBNMS need to know?*

Who

- Carol Maehr- At Large
- Clifton Herrmann-College
- PJ Webb- At Large
- Mike Bekker- Tourism
- Rich Hughett-Recreational Fishing
- Gary Hoffman- At Large
- Bart Selby- Recreation
- *Staff Liaison- Andrew DeVogelaere, PhD*

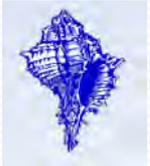
How

1. Review Noise Roadmap
2. Review Citizen Input
3. Seek expert opinions
4. Ask questions
5. Summarize findings
6. Query Enforcement
7. Re-summarize findings



Who- the experts we talked to...

- Marjolaine Caillat, PhD- Marine Acoustic Researcher
- D. Benjamin Reeder, PhD- CDR USN (Ret.) Research Associate Professor, NPS
- Charles Wahle, PhD- NOAA, contributed to Ocean Noise Roadmap
- Brandon L. Southall, PhD-Environmental Associates, UC Santa Cruz
- Michael Weise, PhD –Office of Naval Research, Marine Mammal & Biology
- Leila Hatch, PhD- NOS/ONMS/Stellwagen Bank National Marine Sanctuary
- Dayna Matthews, West Coast Enforcement Co-ordinator- NOAA Fisheries

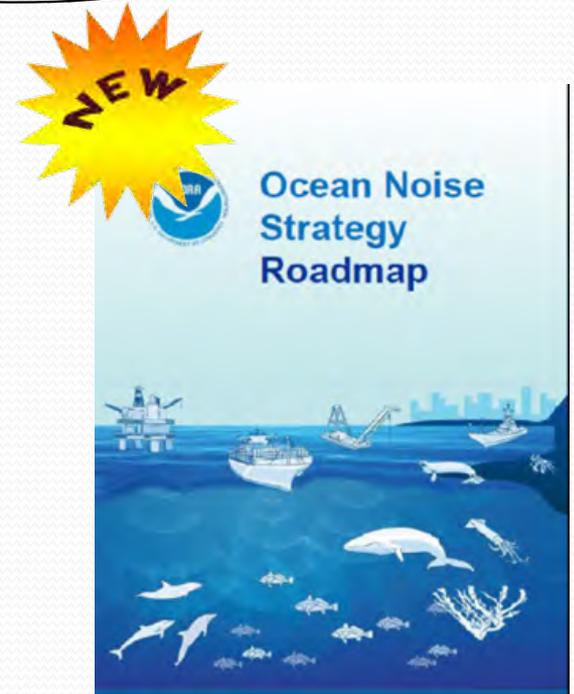


Institute of Marine Sciences
an Organized Research Unit
at UC Santa Cruz



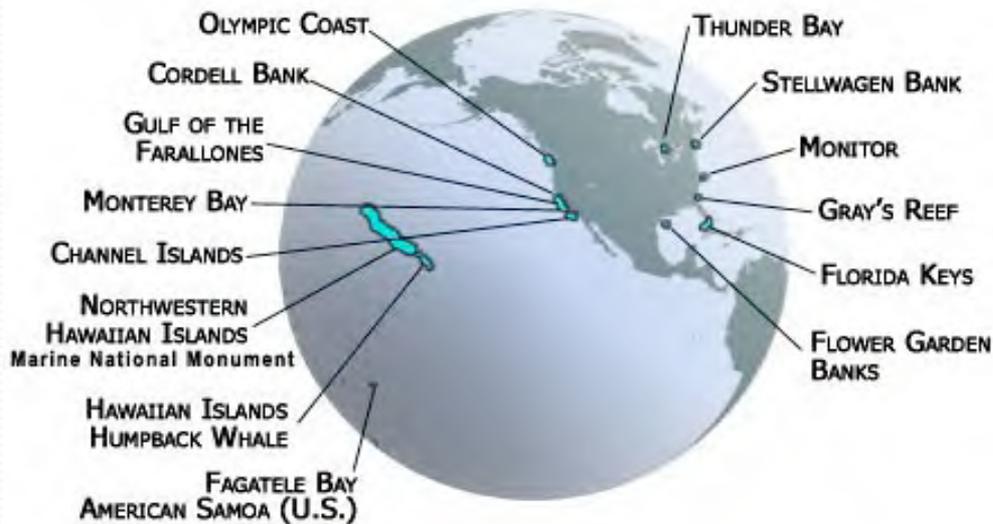
Ocean Noise Roadmap

- Released 2016
- 138 pages
- Goal- address chronic effects and conserve quality of acoustic habitat
- Understand effects of noise on species
- Includes case study of ship noise in Channel Islands
- Stellwagen, Olympic, Cordell and Channel Islands monitoring sound
- Appendix B- tools NOAA has- authority to request monitoring, MMPA, ESA, and more





NATIONAL MARINE SANCTUARIES



*Noise is a **rising concern for sanctuary resource protection** due to its ability to travel long distances, transit jurisdictional boundaries and result in potential impacts to a wide variety of the acoustically-active marine species that inhabit sanctuaries*

*The introduction of noise is **not currently prohibited** in any of the 14 areas in the National Marine Sanctuary System.*

*Noise is an increasingly common consideration in **sanctuary consultations under the National Marine Sanctuaries Act (NMSA)** because of its potential to adversely affect sanctuary resources.*

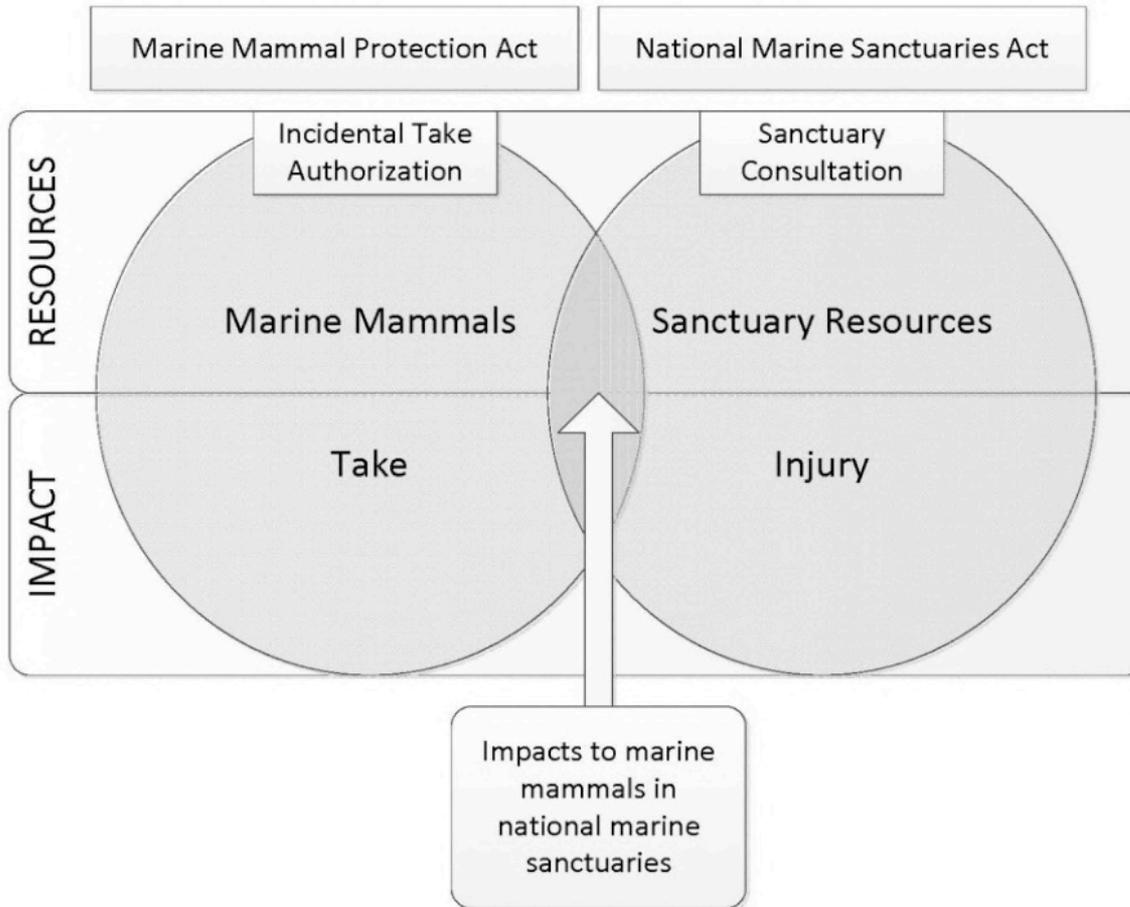
Managing noise impacts in protected areas



National Marine Sanctuary legislation *indirectly* addresses management of noise if activities are likely to injure (or may affect) sanctuary resources

- Identifies purpose of NMSs to include “to protect, and, where appropriate, restore and enhance, ***natural habitats***, populations, and ***ecological processes***” (301b)

from L. Hatch



Coordination within NOAA to address noise impacts in sanctuaries, examples:

- ***MMPA **incidental** take authorizations & NMSA consultation***
 - ***[separate coordination to address directed research takes]***
- ***NMSA consultation & ESA Section 7 consultations***
- ***NMSA consultation & EFH consultations***

A few definitions

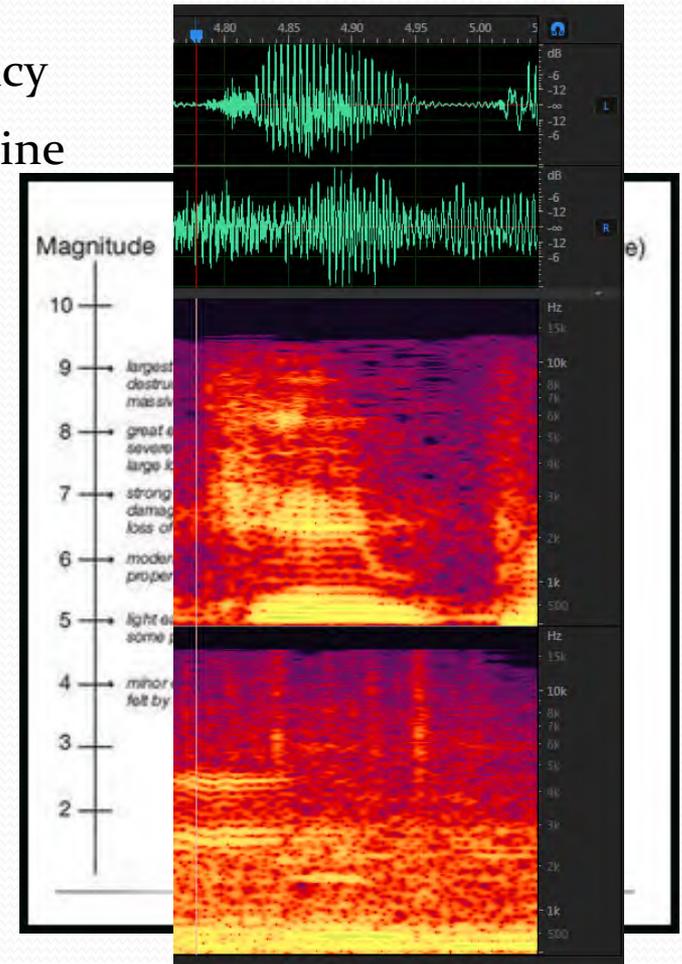
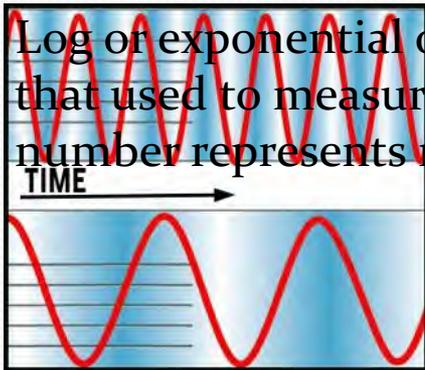
Hertz (Hz)- cycles per second, a measure of frequency

Sine wave- a wave that rises and falls about a centerline

Amplitude- a measure of power in a wave system

Decibel- a measure of sound energy, a log scale

Log or exponential or logarithmic- a scale, like that used to measure earthquakes, where the next number represents much more power, non-linear



Importance is relative

Pup



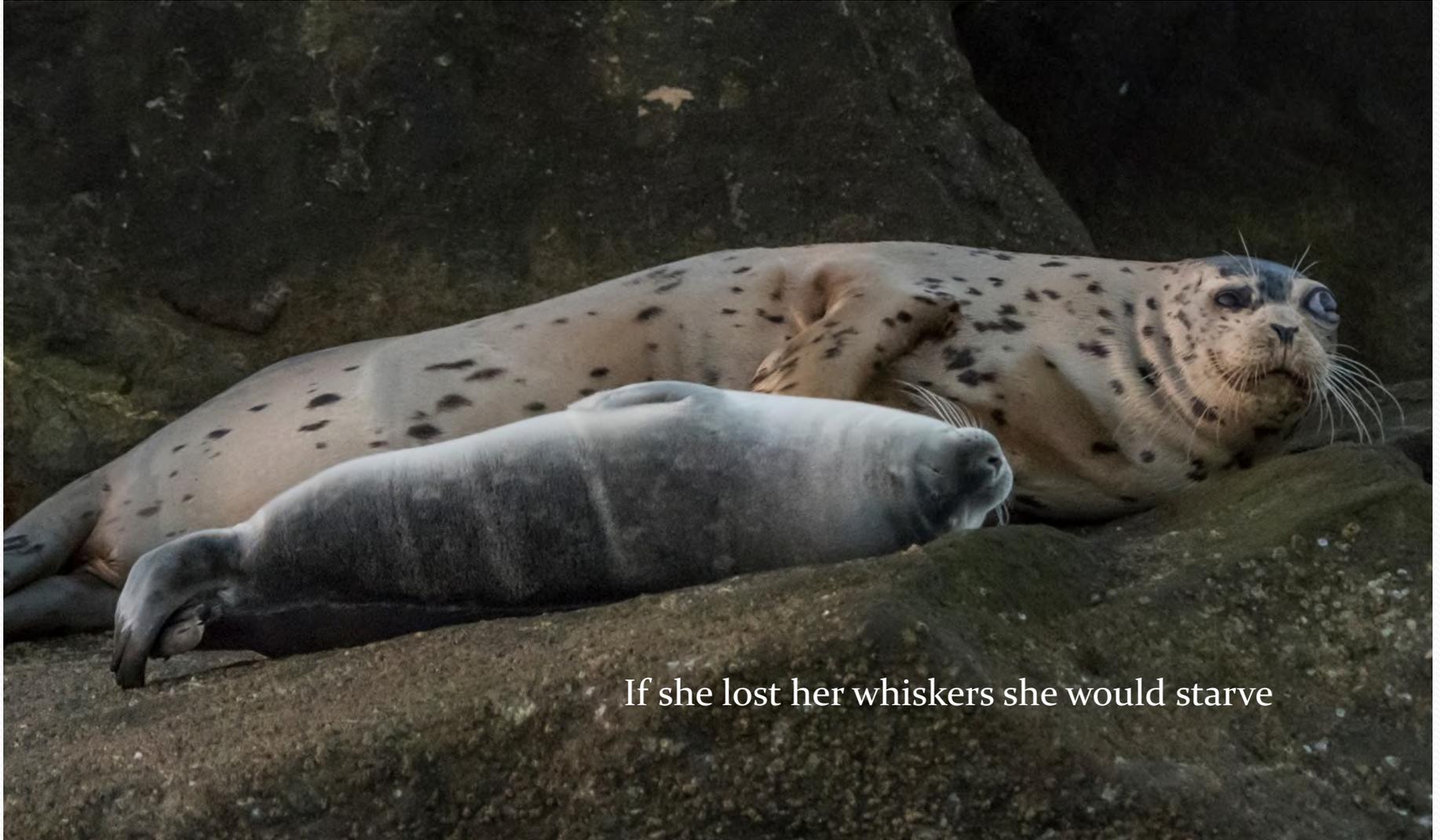
April 6, 2016, Pillar Point Harbor

Importance is relative



April 9, 2017

Importance is relative



If she lost her whiskers she would starve

April 20, 2017

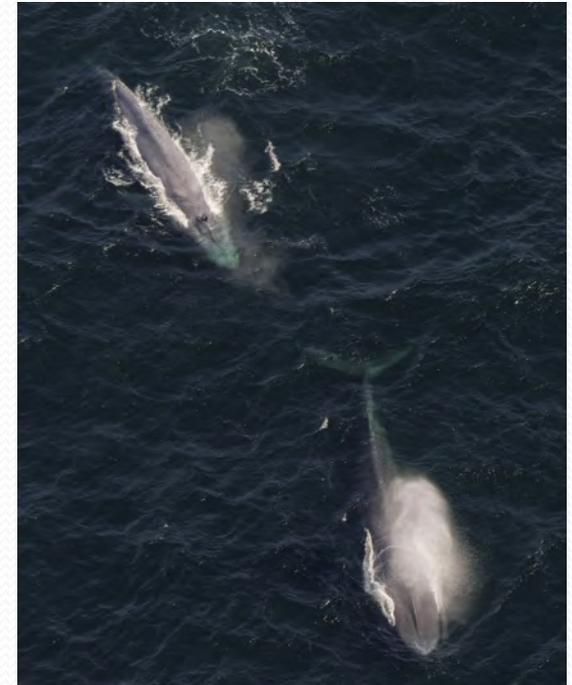
Whales imperceptible to their ears

- Whales use their eyes...
 - Visibility often less than 60'
 - 10 mph = 3 seconds
 - Dark below 150' feet, active all night
 - Eyes on sides of heads



Tule Fog

To not run into each other...

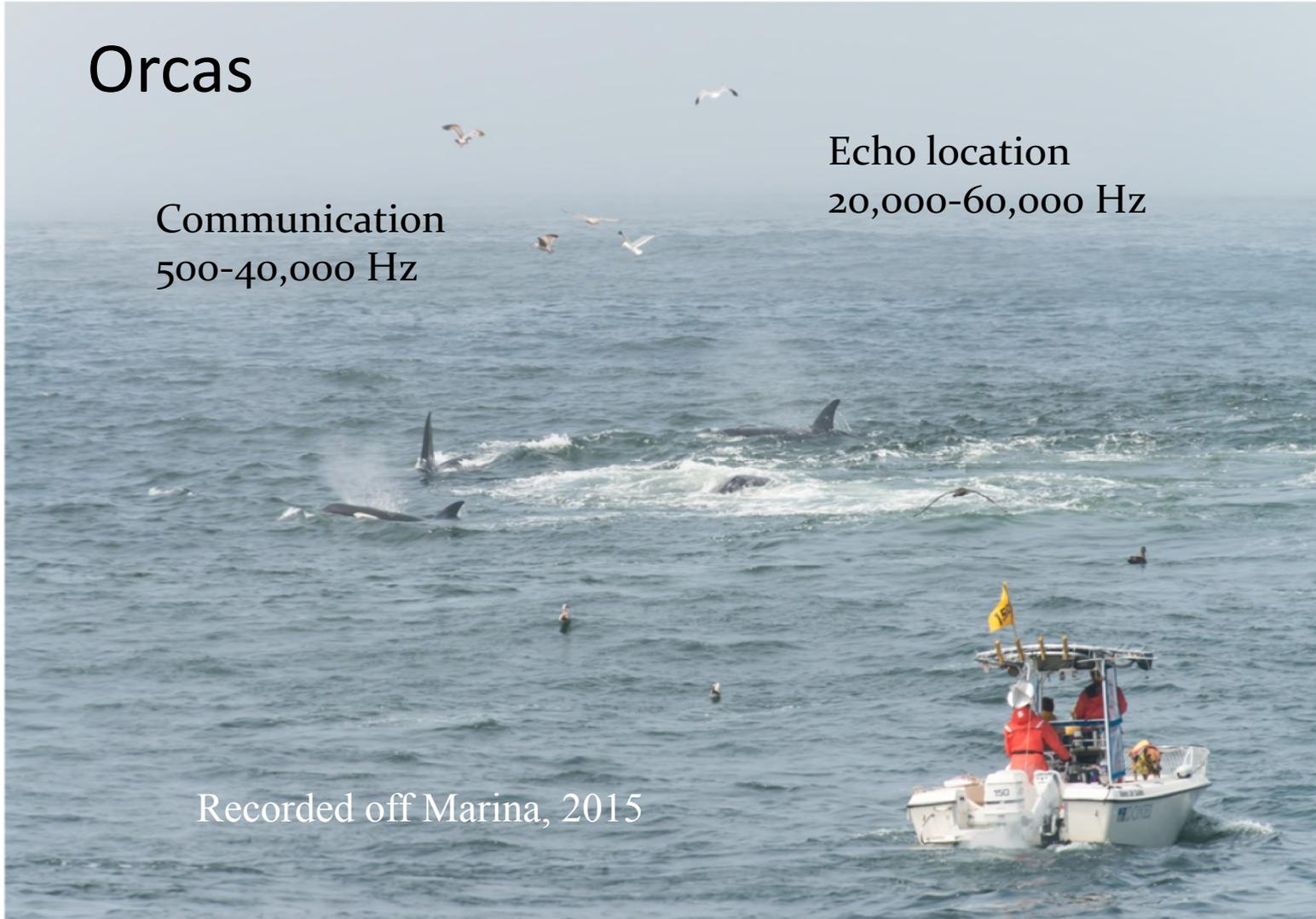


Orcas

Communication
500-40,000 Hz

Echo location
20,000-60,000 Hz

Recorded off Marina, 2015



Range, Frequency

33- 350 Hz



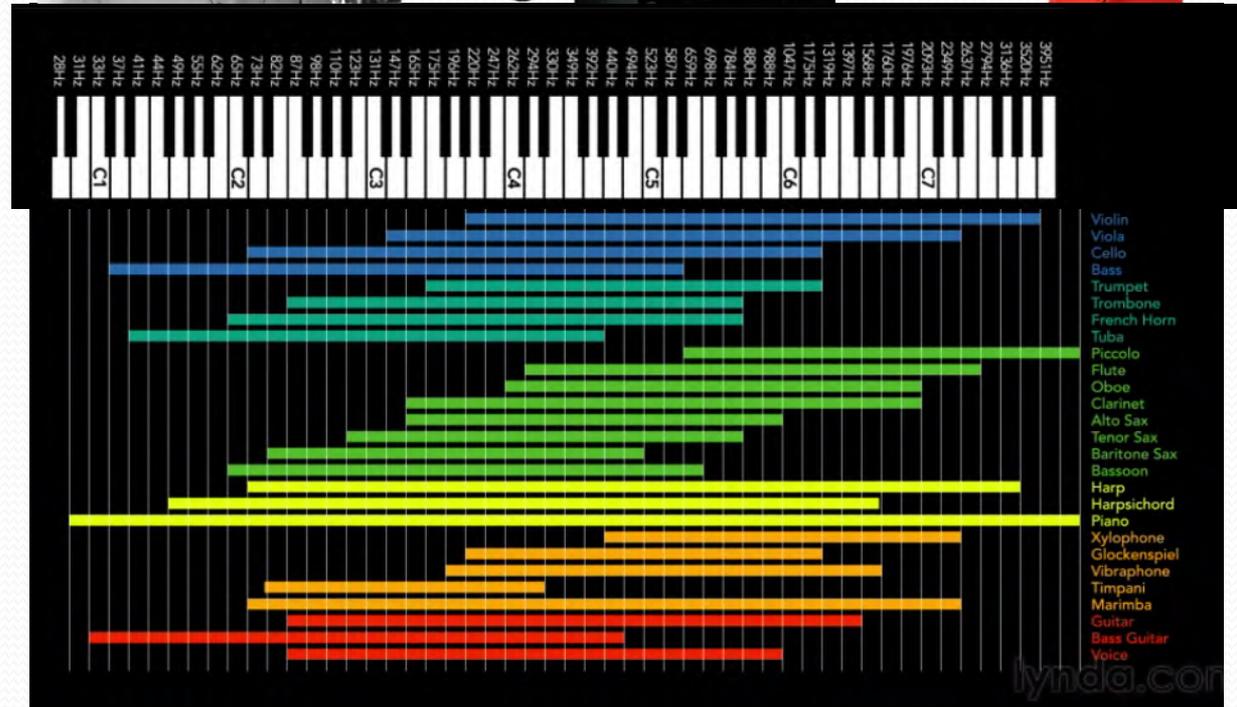
78-578 Hz



130-700 Hz



260-2349 Hz



28 Hz

3951 Hz



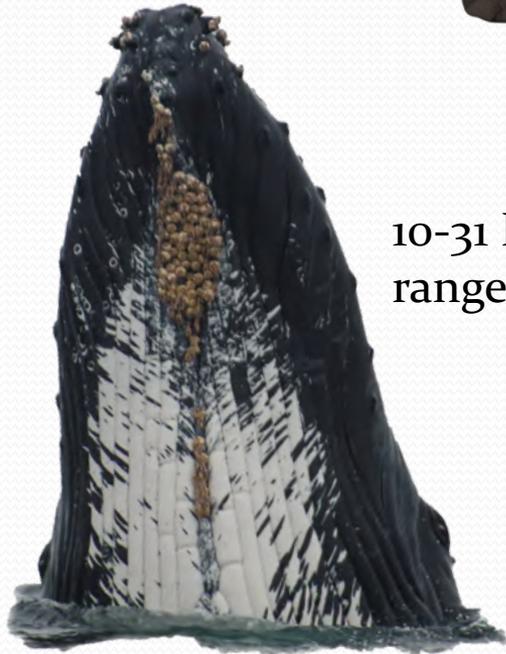
15-35 Hz
range~6 miles



Up to 100,000 Hz
range~ a few miles



1,000-91,000 Hz
range~tens of feet



10-31 Hz
range~ 100s of miles



60-20,000 Hz
voice 65-880 Hz
range ~yards

Whistle

oo
oo

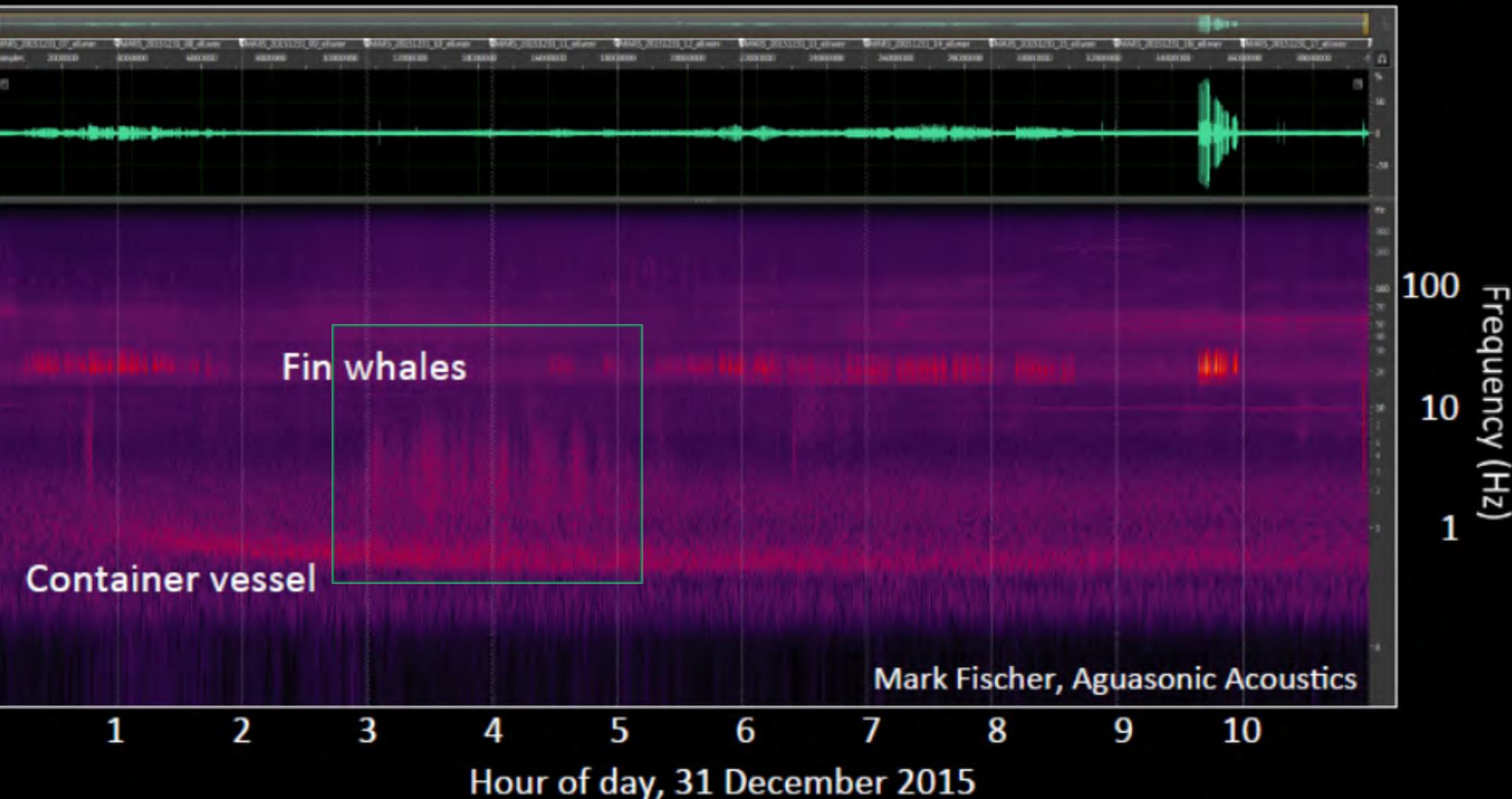


60,000 Hz, range 100 yards

Signal to Noise



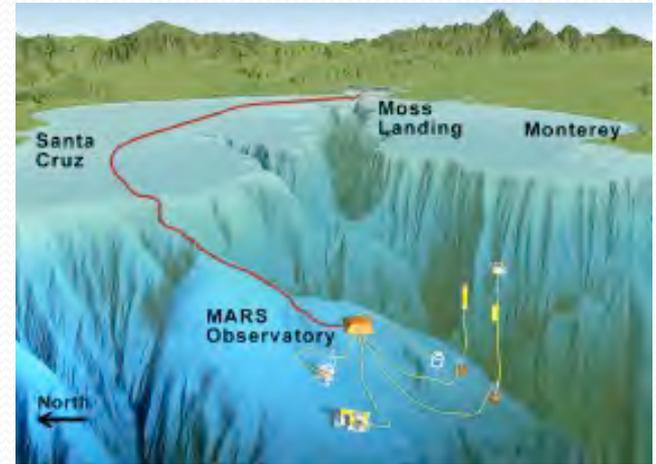
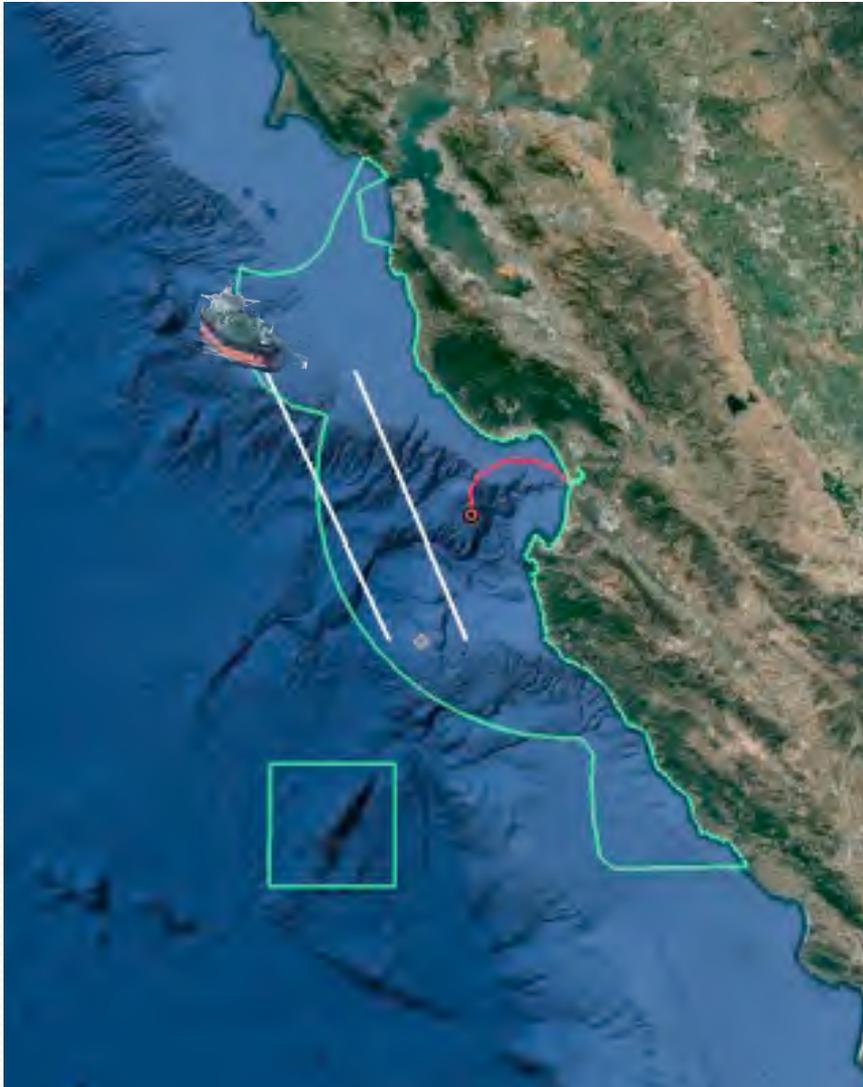
Signal to Noise



Working with National Marine Sanctuary Program and MBNMS (L. Hatch, A. DeVogelaere, M. Caillat) toward comparative analysis of noise in different regions

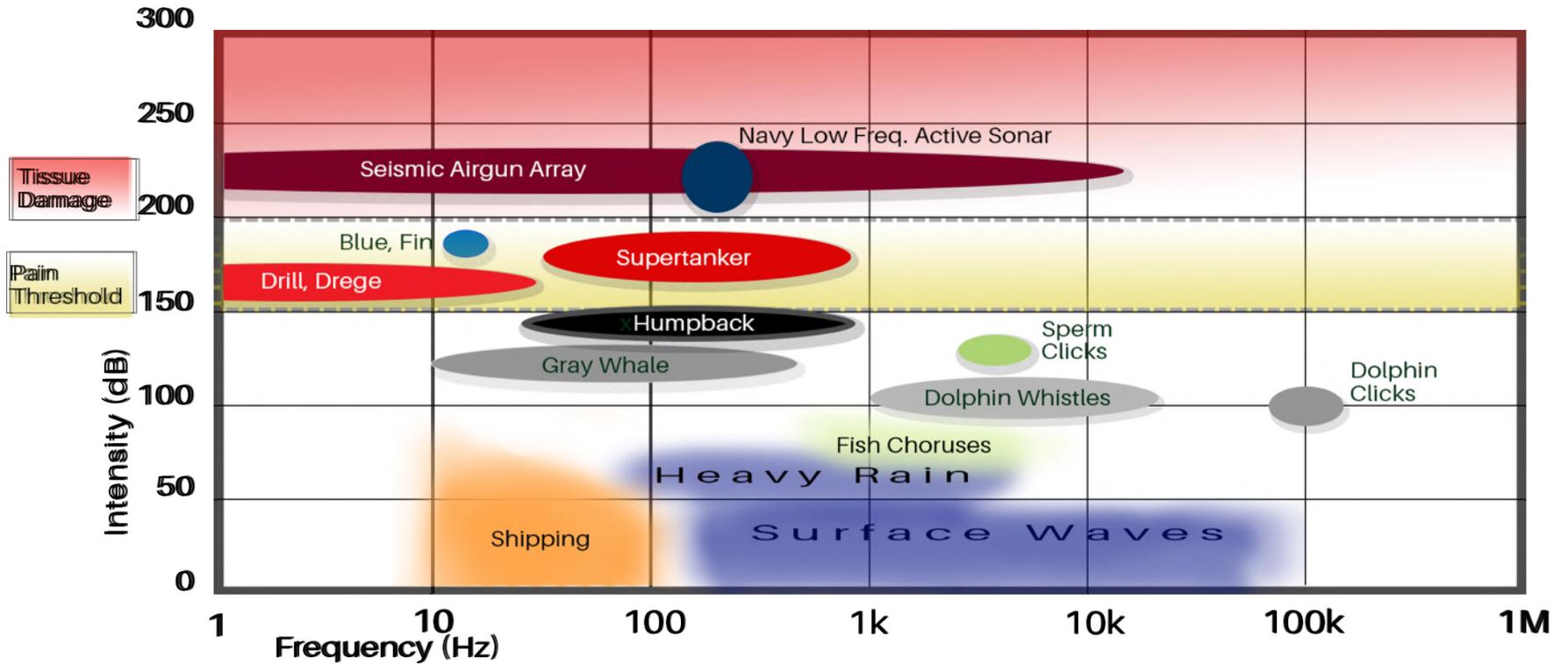
Southall- Adapted

MARS Hydrophone- Real Time Data



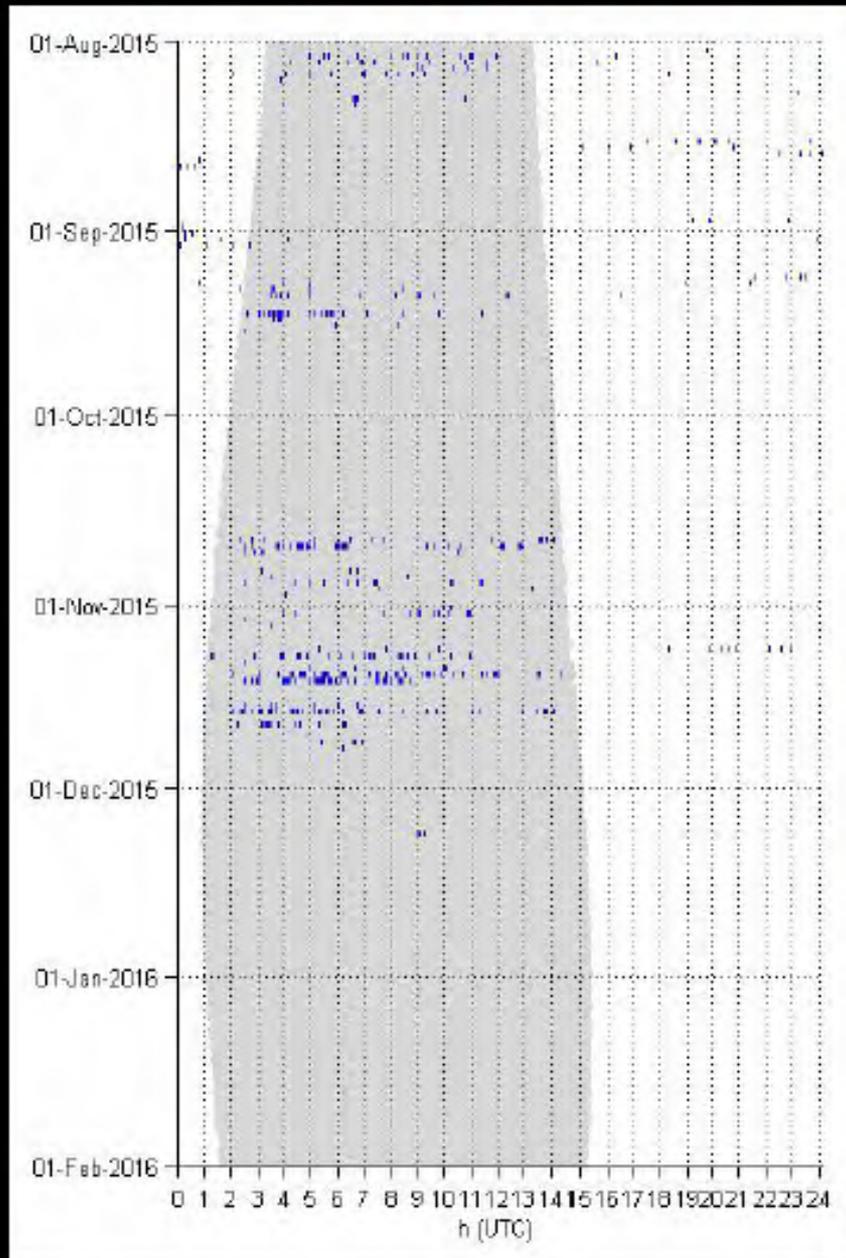
from B. Southall

OCEAN SOUNDSCAPES – LAST 60 YEARS



adapted from M.Caillat

Anthropogenic noise: explosions



August 2015: 448

September 2015: 486

October 2015: 386

November 2015: 976

December 2015: 11

January 2016: 1

Total: 2308

from B. Southall

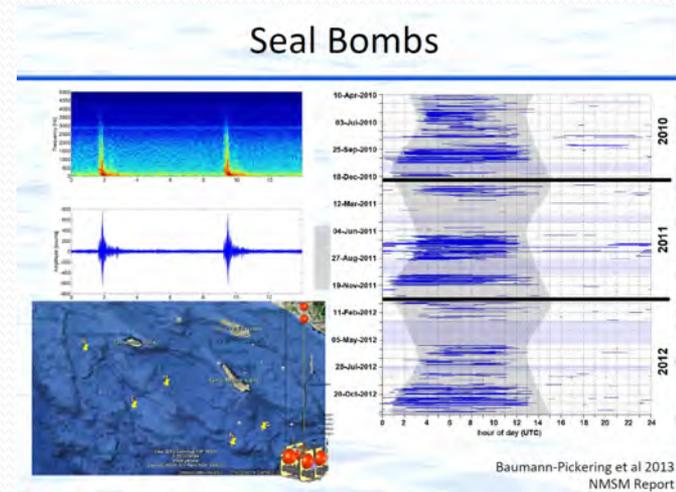


Baseball Bat

1) Seal bombs can (physically) injure cetaceans

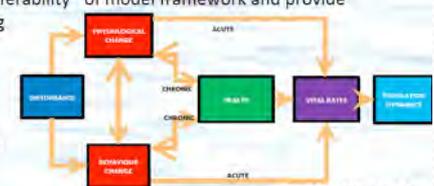
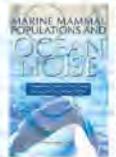


2) All disturbance affects population mortality



Population Consequences of Disturbance

- **Purpose** – Translate the conceptual NRC PCAD model into a mathematical framework, and inform *Negligible Impacts Determination*
- **Plan:** Working Group - 2009-12; 2012-15
 - Phase I - Explore if/how to translate the conceptual model into a mathematical framework
 - Phase II – Complete case studies and model development
 - Phase II – Assess ‘transferability’ of model framework and provide guidance for monitoring
- **Case Studies**
 - Elephant Seals (N/S)
 - Bottlenose Dolphins
 - N. Atlantic Right Whale
 - Beaked Whale



⌈ http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/detering_qa.html

- **Q. What limits or constraints apply to the public when deterring Pacific harbor seals, California sea lions, and eastern stock Steller sea lions?**

A. Deterrence of Pacific harbor seals, California seal lions, and eastern stock Steller sea lions may not result in the following:

- Serious Injury or Mortality – The MMPA authorizes deterrence using non-lethal methods only. Deterrence cannot result in the death or serious injury of marine mammals. NOAA Fisheries Service has [defined "serious injury"](#) in regulations to include an injury that is likely to lead to the death of the affected marine mammal.
- Violation of Federal or State Laws or Local Ordinances – The use of some deterrence methods may be prohibited or restricted by federal, state or local governments. For example, a city or county may prohibit the use of, or require special permits for, pyrotechnics. It is your responsibility to check with appropriate authorities to ensure that any deterrence methods used comply with local, state and federal requirements.
- Risk to Human Safety – Some of these techniques may cause injury to you and/or other people. If you deter a seal or sea lion in such a manner that you cause injury to anyone, you may be liable for your actions.
- **Taking of Non-Target Marine Mammals – Deterrence is not authorized if it will result in the death, serious injury, or harassment of non-target marine mammals (i.e., individuals other than those causing damage to private property, gear or catch).**

Notes from enforcement discussion

- They are aware of the issue
- Squid and forage fish are managed by the state
- Check for state laws regarding explosives
- Difficult to enforce
 - Likely requires a 'departmental finding of harm'
- Have been shorthanded, that is changing
- Have tools to help if is a priority
- Suggest education as a first step

Summary

- Minimal military sonar, no oil and gas extraction/exploration
- Low frequency sound is the issue- threatens whales
- **Three most important things**
 1. Adult Supervision-Manage and Educate
 2. Data, Data, Data-*find money for research*
 3. Greatly Reduce Seal Bombs

Our Final Recommendations:

- *Soundscapes are a critical part of the sanctuary environment. Because the sonic environment is of critical importance to the well-being of marine mammals in our sanctuary-*
 1. We recommend increasing research efforts, including CeNCOOS (Central and Northern California Ocean Observing System) monitoring sound as a core variable tracked over time, and work to integrate the project into similar NOAA efforts. We recommend collaboration with and support for the MBARI real time cable hydrophone and adding additional nodes so it can precisely locate sounds.
 2. We recommend sound be featured in the Sanctuary's visitors centers- utilizing exhibits, events and outreach programs describing sound in the marine environment that will reveal how sound is used by animals in the ocean and that manmade sound can have impacts.
 3. We recommend Sanctuary staff consult with appropriate agencies and fishing industry representatives to catalog current uses of seal bombs and where applicable encourage continued enforcement by appropriate agencies.
 4. We recommend the Sanctuary convene collaborative groups of stakeholders with the goal of developing strategies to both minimize future seal bomb use and developing effective alternatives in the Sanctuary.