

# Dolphin tales: studying the who, when, and where of habitat use



ONMS Webinar Series  
June 2018



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Postdoctoral Fellow



# Overview

- Toothed whale 101
- Habitat Use: Who, When, Where
- Technology for studying habitat use
- Applications

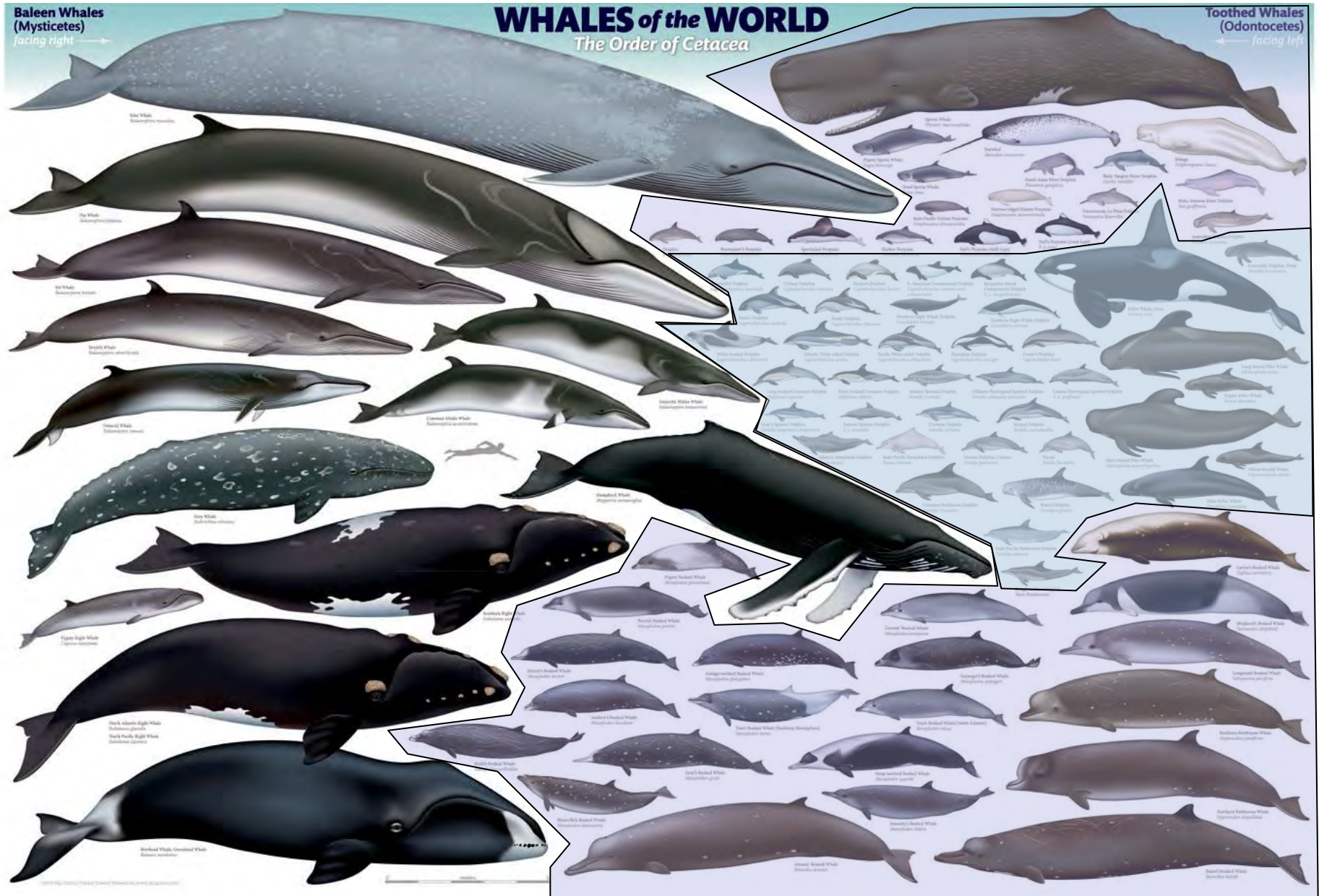


# WHALES of the WORLD

The Order of Cetacea

**Baleen Whales (Mysticetes)**  
facing right

**Toothed Whales (Odontocetes)**  
facing left



Blue Whale  
*Balaenoptera musculus*

Fin Whale  
*Balaenoptera physalus*

Humpback Whale  
*Megaptera americana*

Sperm Whale  
*Megaptera americana*

Gray Whale  
*Megaptera americana*

Gray Whale  
*Megaptera americana*

Pygmy Right Whale  
*Diaploicea americana*

North Atlantic Right Whale  
*Diaploicea americana*

North Pacific Right Whale  
*Diaploicea americana*

Black Whale, Common Whale  
*Diaploicea americana*

Common Minke Whale  
*Balaenoptera acronotus*

Common Minke Whale  
*Balaenoptera acronotus*

Leah's White Whale  
*Megaptera americana*

Leah's White Whale  
*Megaptera americana*

Pygmy Right Whale  
*Diaploicea americana*

North Pacific Right Whale  
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*Diaploicea americana*

Orca  
*Orcinus orca*

Spinner Dolphin  
*Stenella attenuata*

Black and White Dolphin  
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NECWA



Theguardian.com



NECWA



NMFS



NOAA



Theguardian.com



MMC



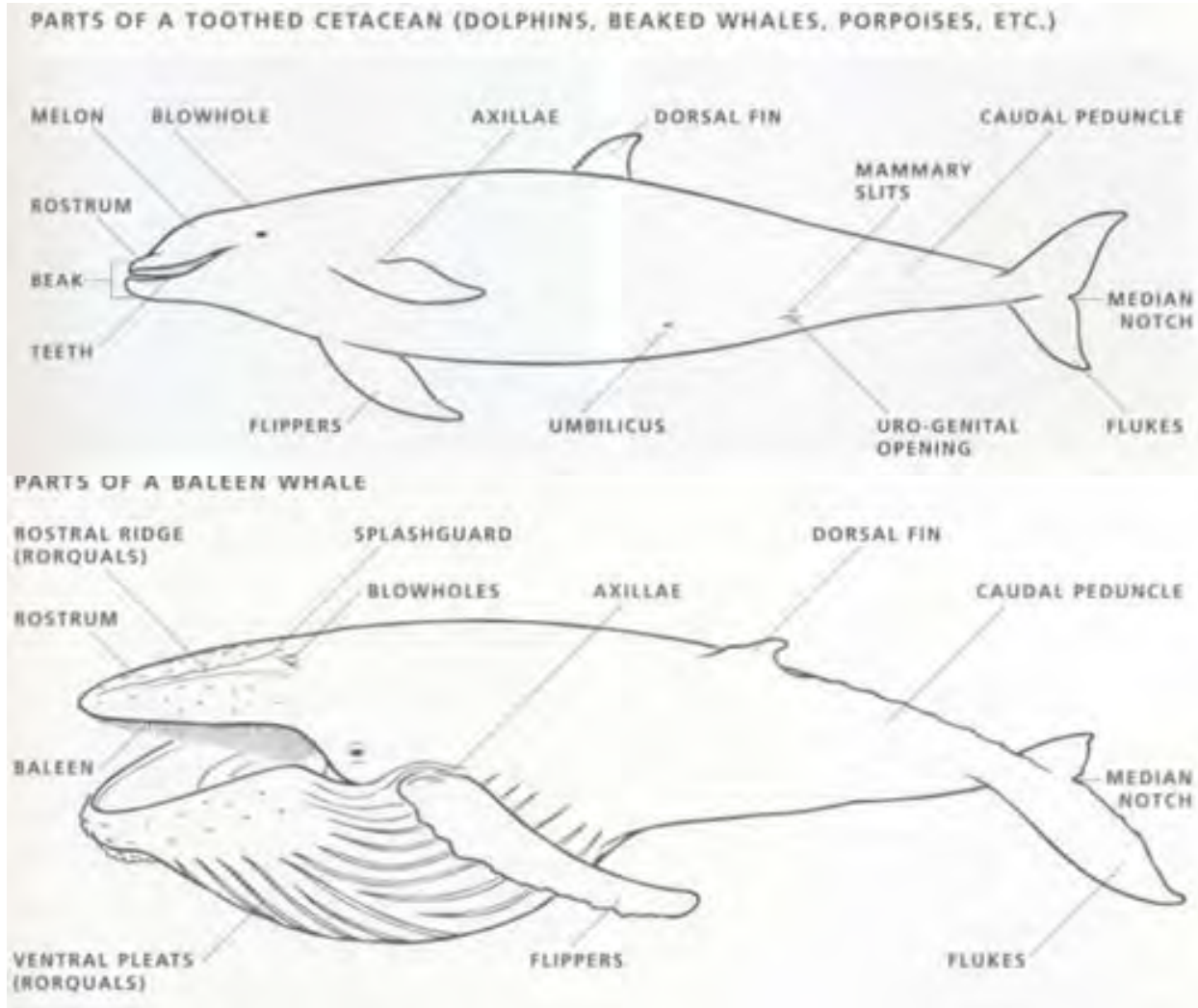
Waza.org



# Dentition



# Anatomy

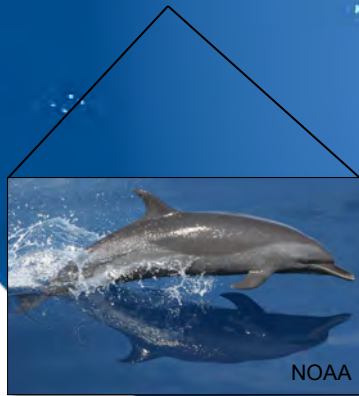
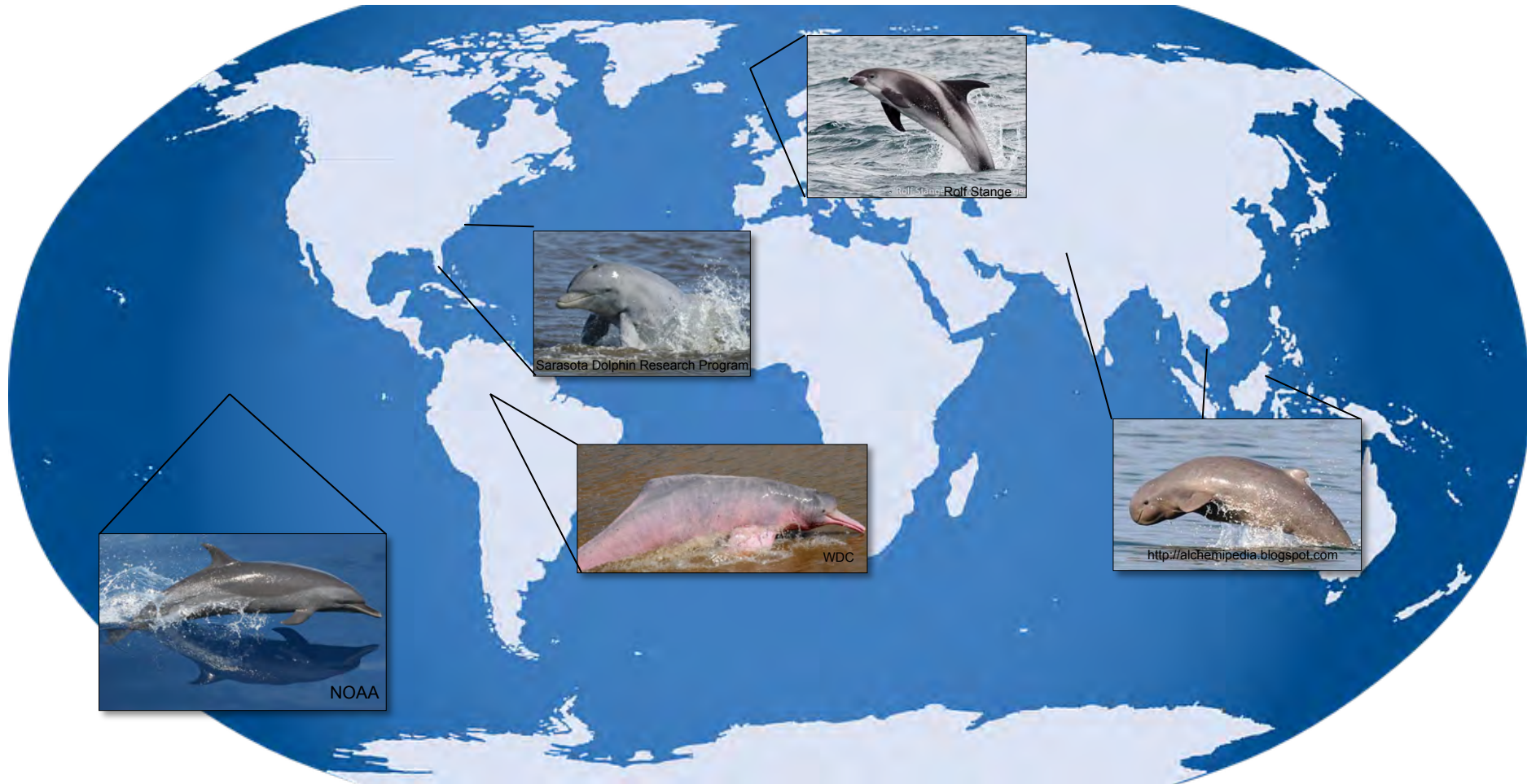


# Distribution





# Habitat





# NATIONAL MARINE SANCTUARY SYSTEM



Scale varies in this perspective. Adapted from National Geographic Maps.

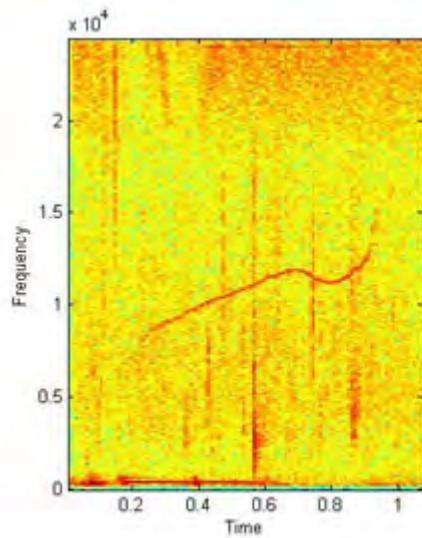
# Social Structure





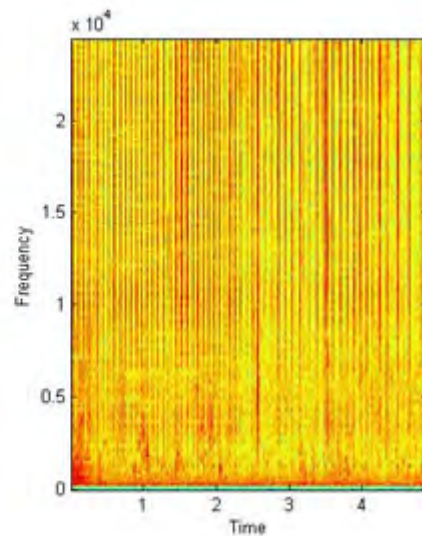
# Communication

## Whistles

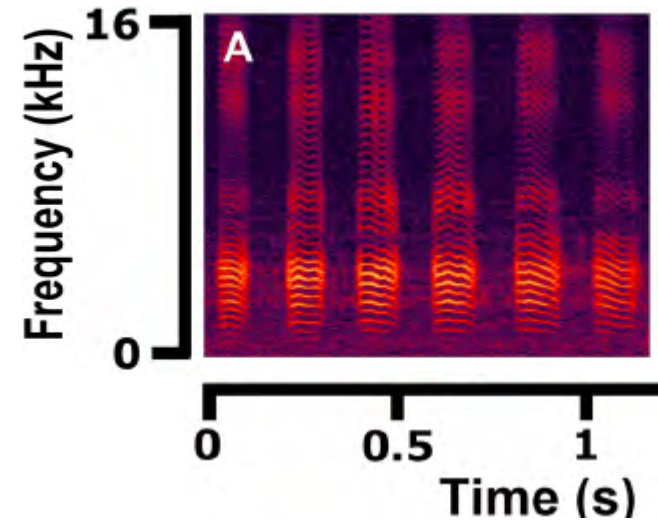


<http://sarasotadolphin.org/wp-content/uploads/2010/07/whistle-n-clicks01.mp3>

## Echolocation clicks

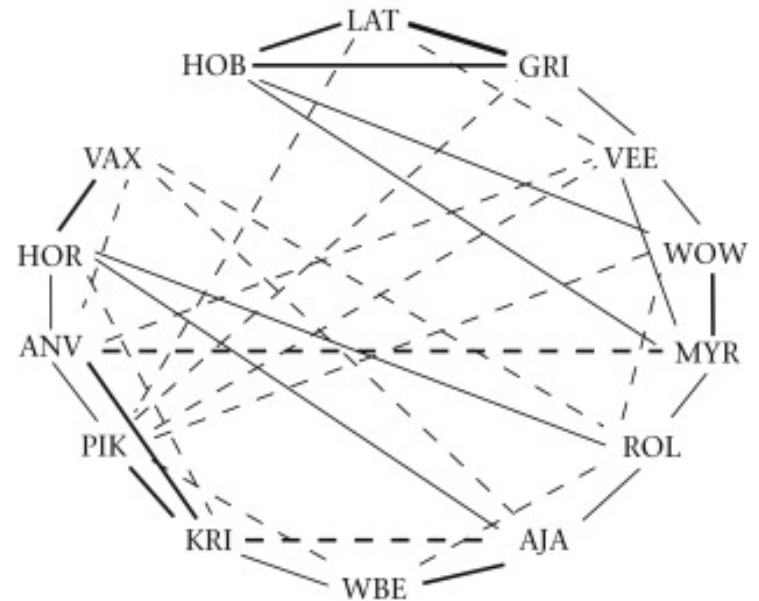


## Burst pulses



Vaughn-Hirshorn et al. (2012) *JASA*

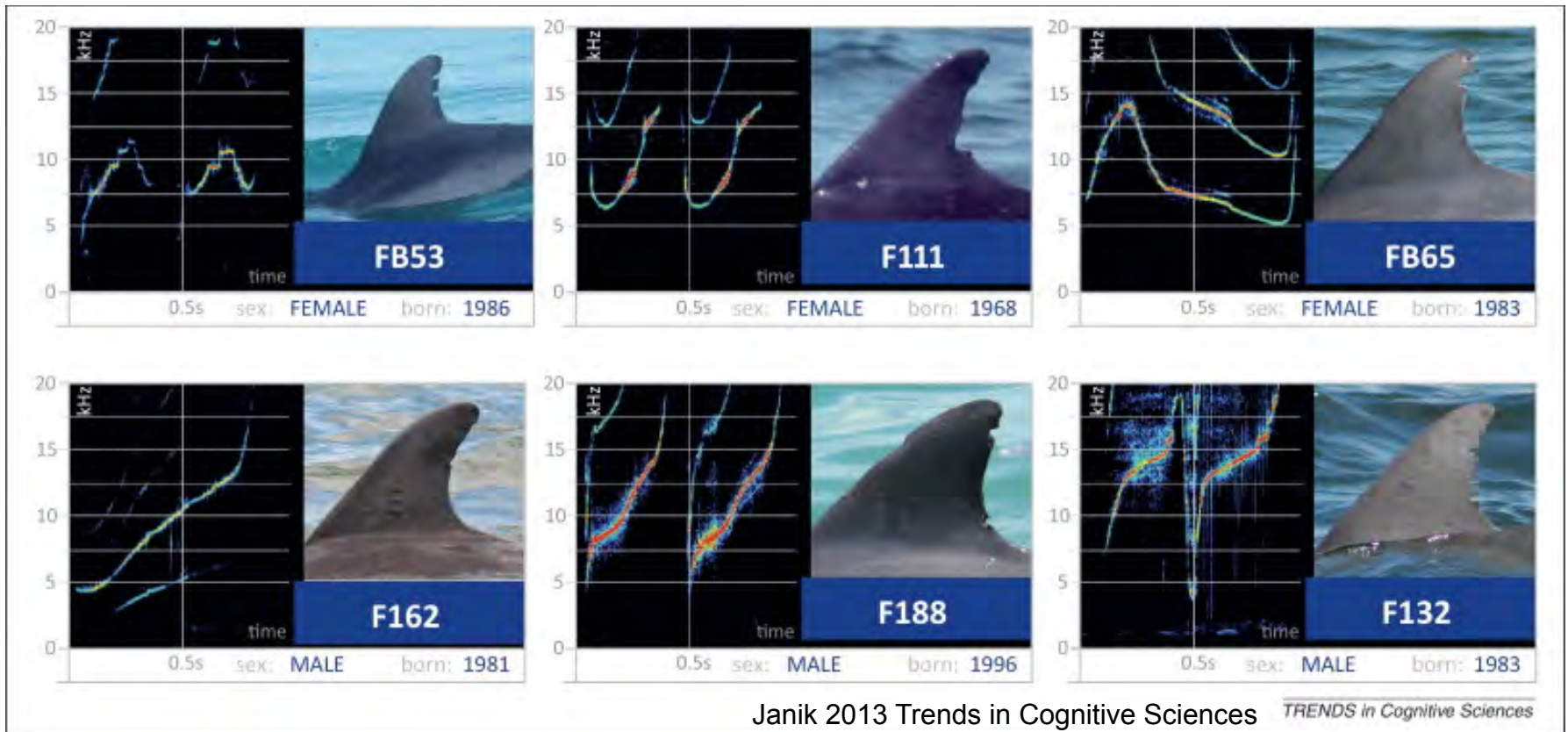
# Bottlenose dolphins – open social network



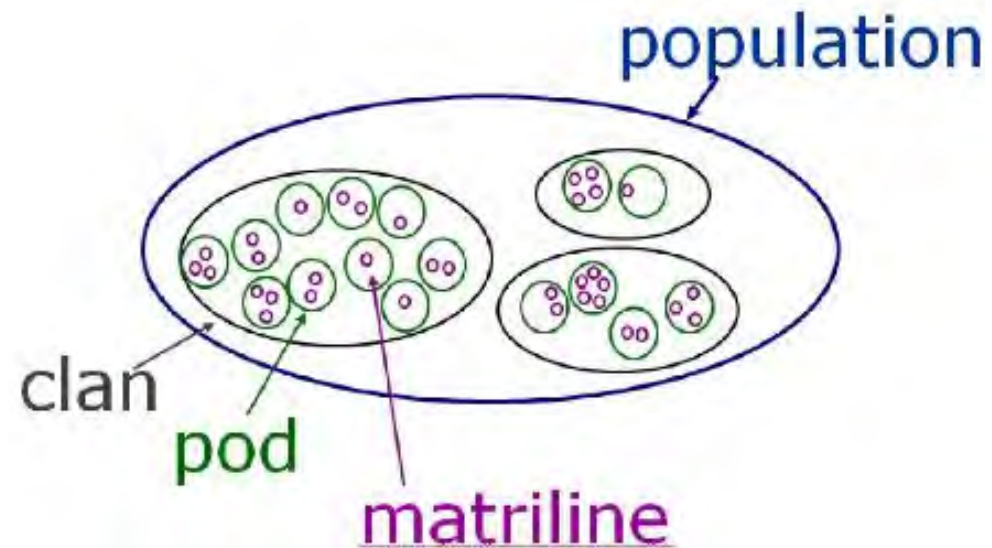
Connor et al. 1999



# Signature whistles



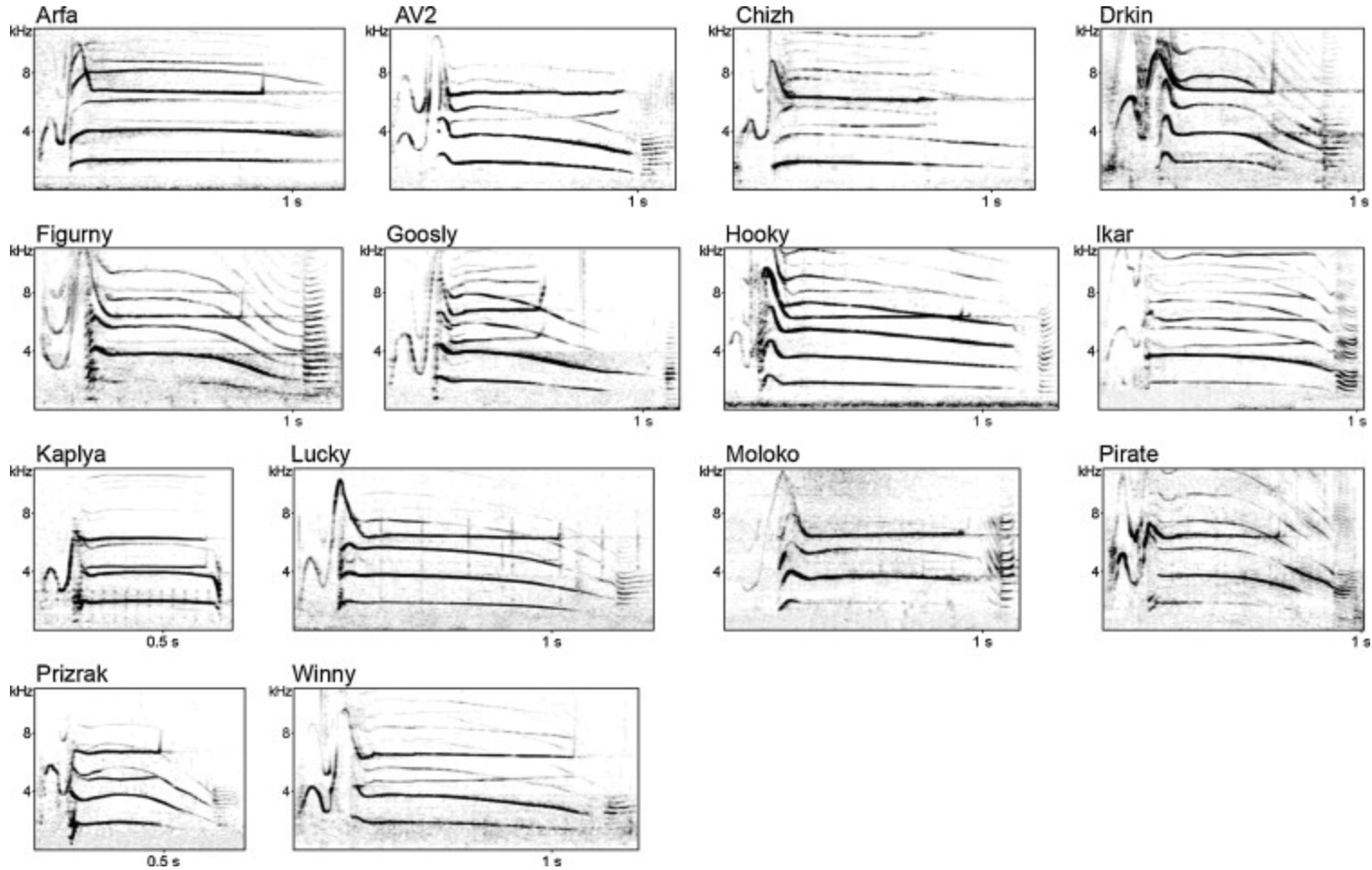
# Killer whales – matrilineal society



<http://wildwhales.org/2011/09/16/paternity-revealed-in-the-southern-resident-killer-whale-population/>



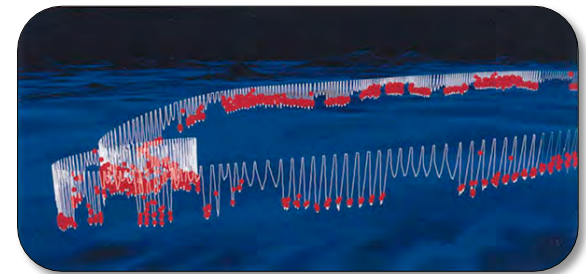
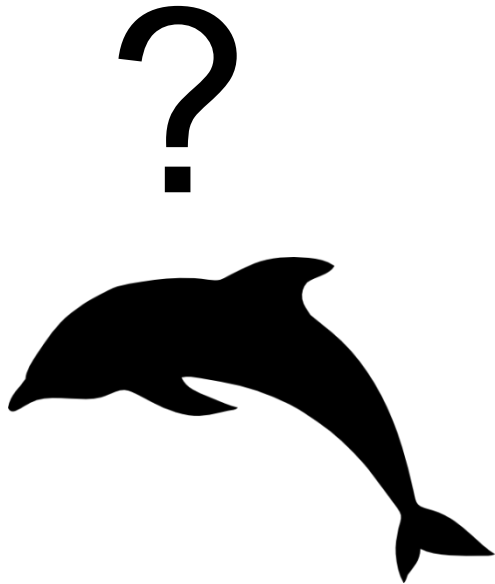
# Shared calls



# Foraging strategies

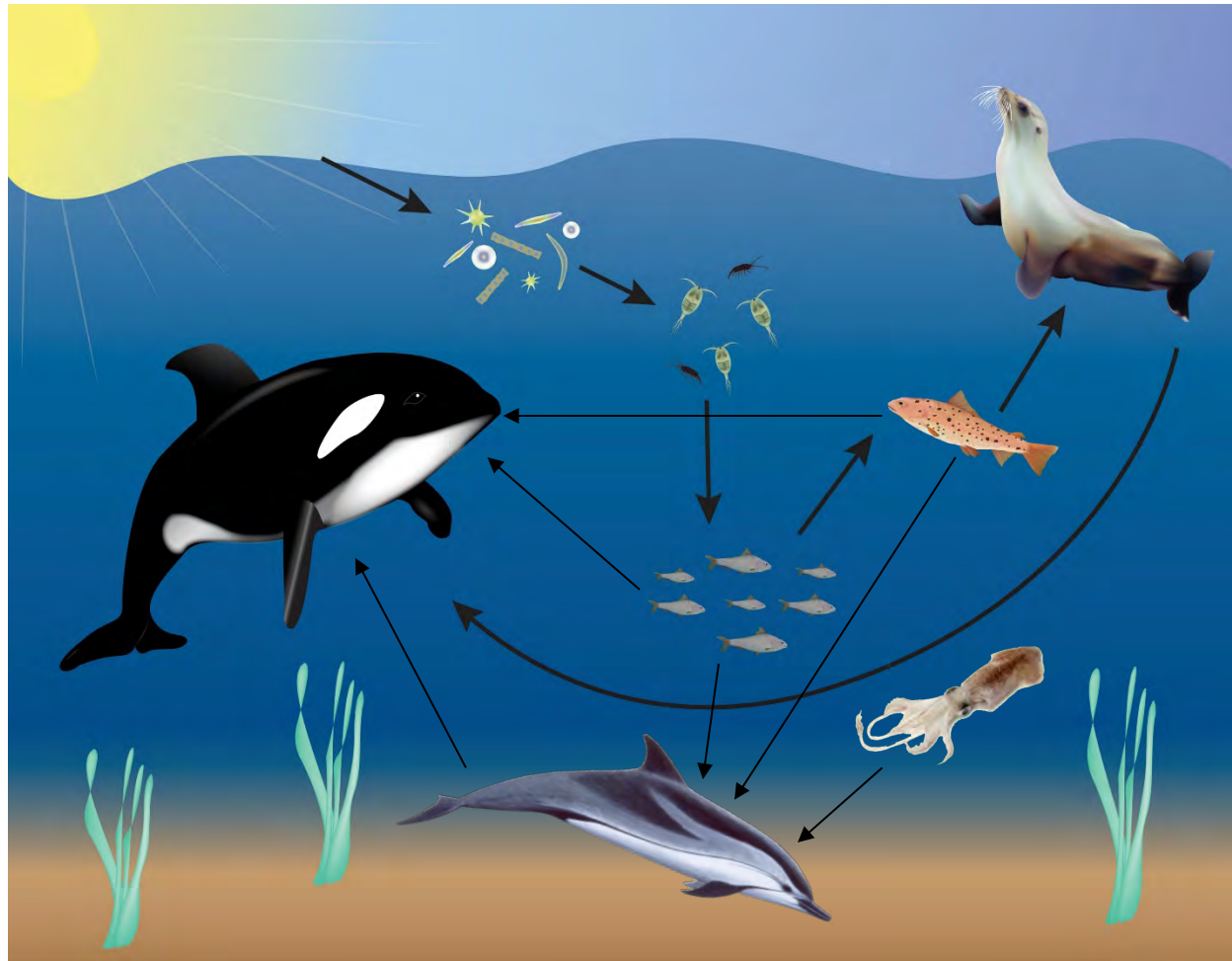


# Habitat Use: Who, When, & Where

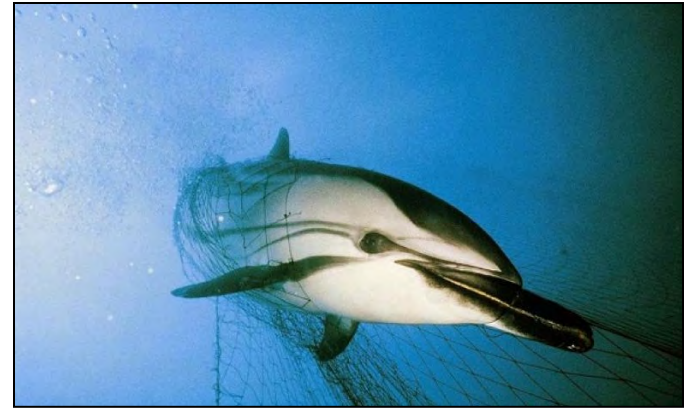




# Toothed whales play key roles in ecosystems



# Toothed whales are vulnerable to human activity



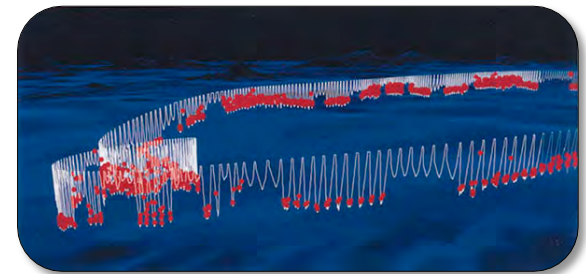
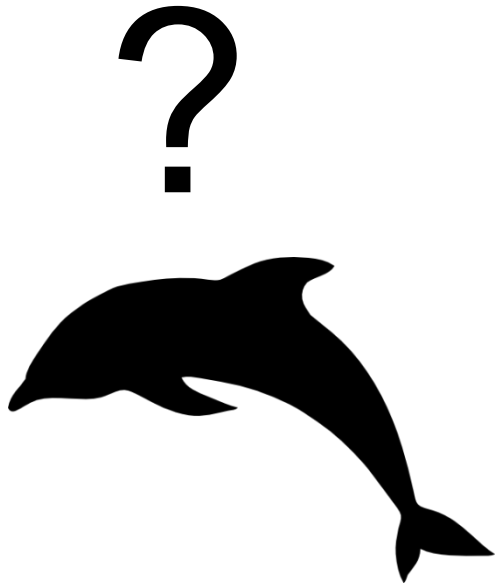


**Dolphins are hard to study!**

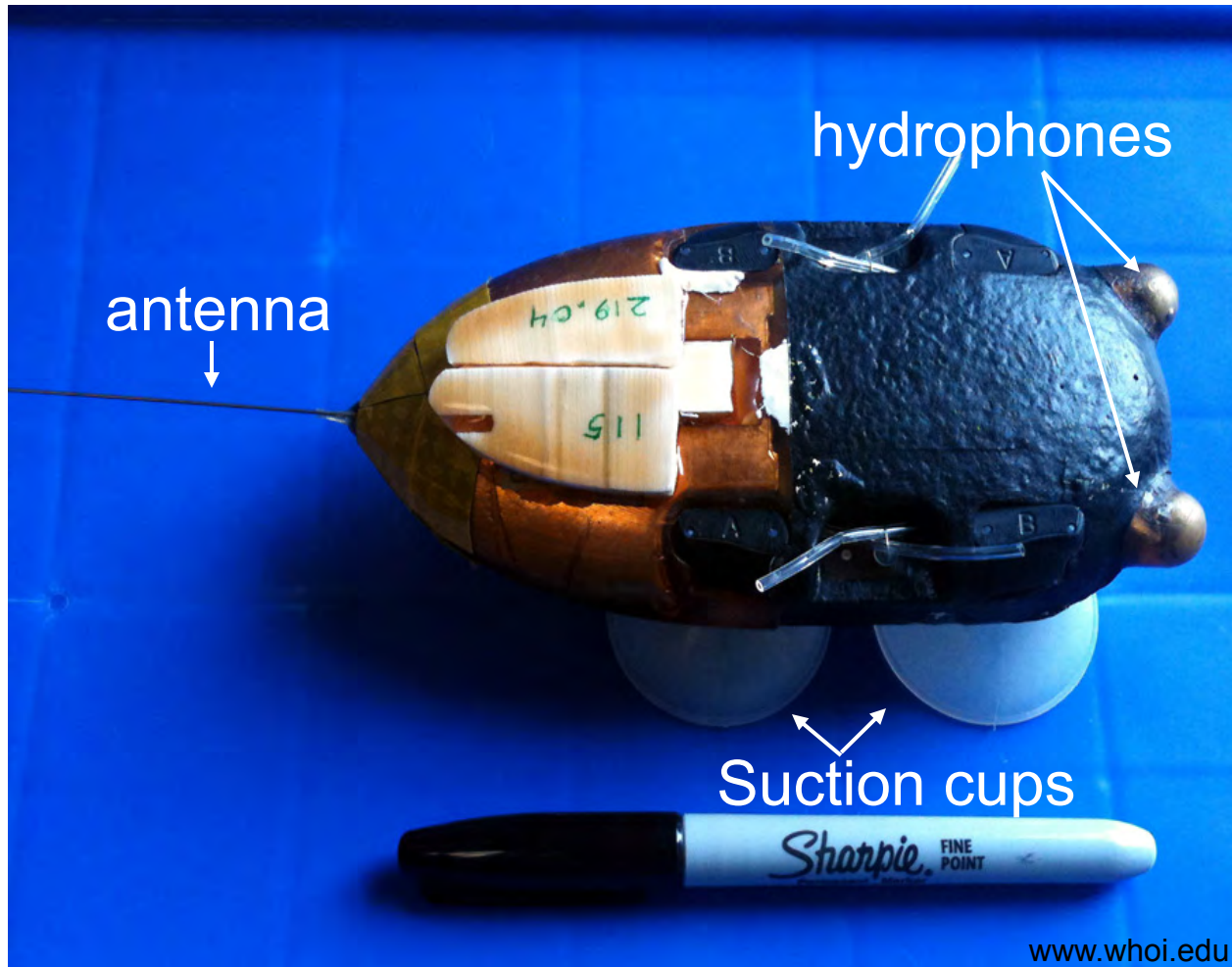




# Habitat Use: Who, When, & Where



# Digital acoustic recording tags (DTAGs)



- Sensors:
  - Pressure (depth)
  - 3-D movement

# Tagging spotted dolphins



Silva et al. 2016 JASA

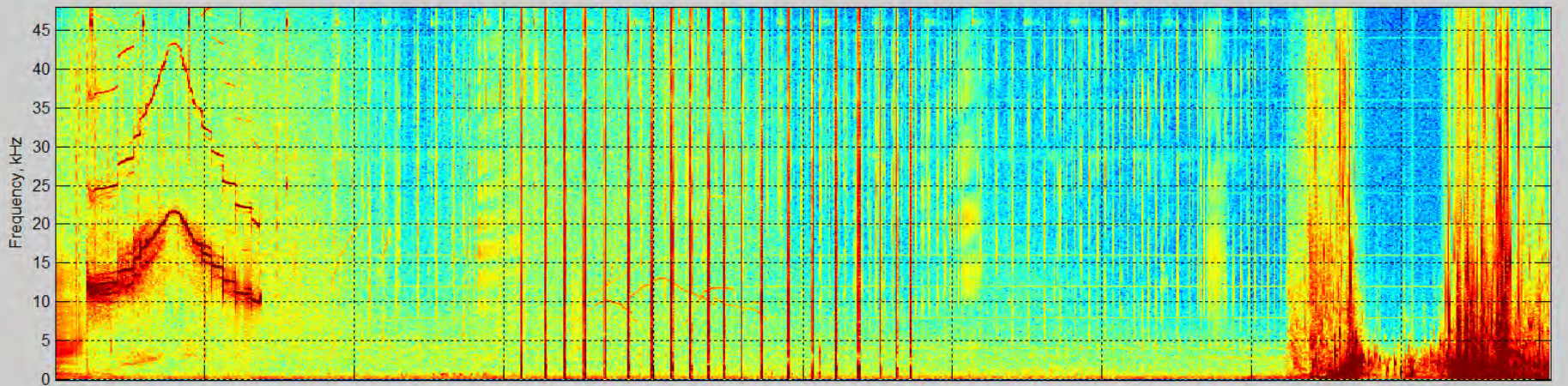


# DTAG data

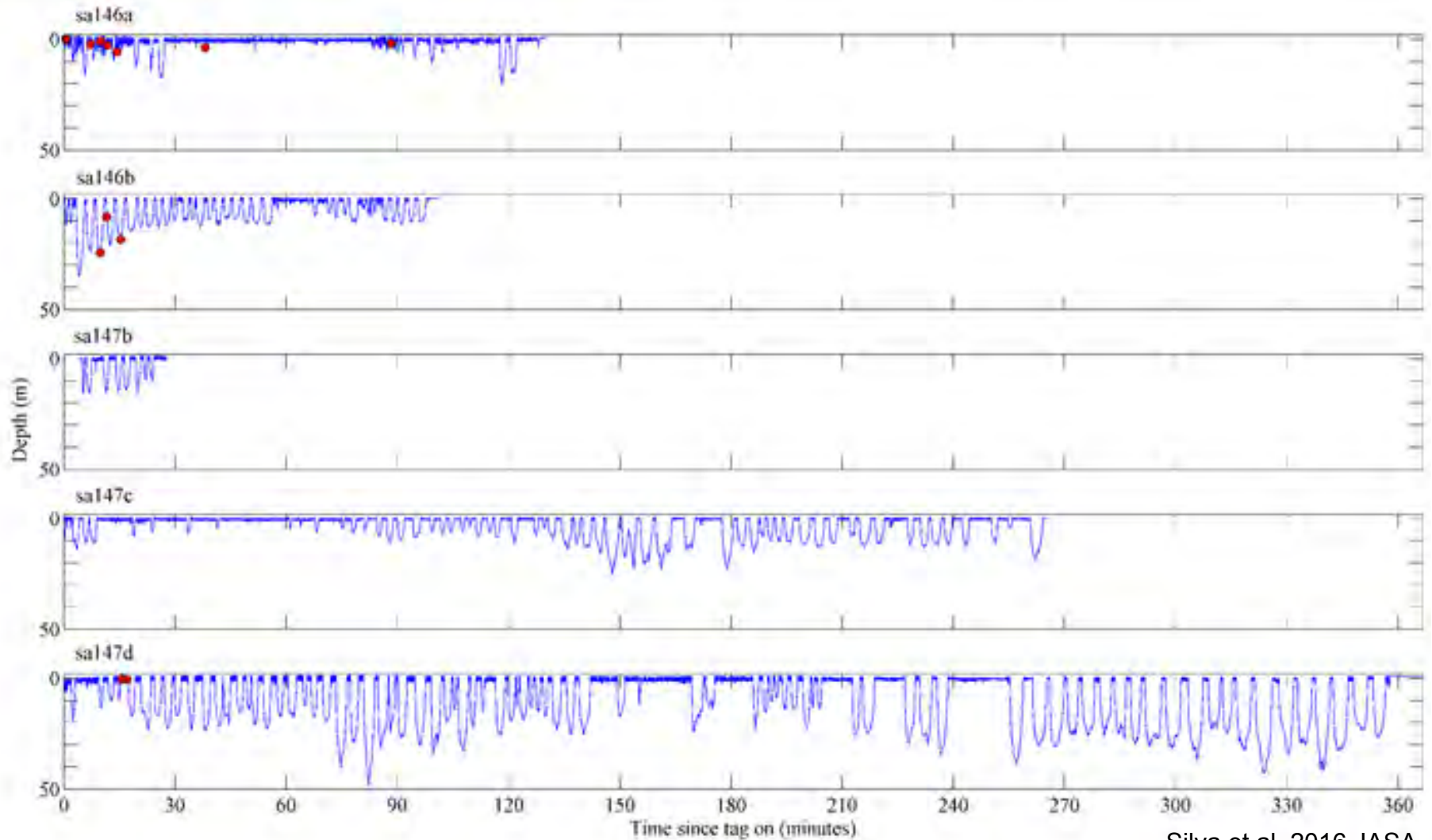
Whistle

Echolocation clicks

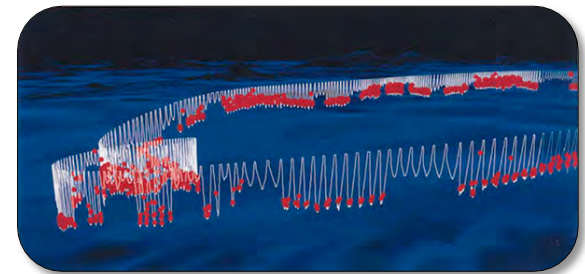
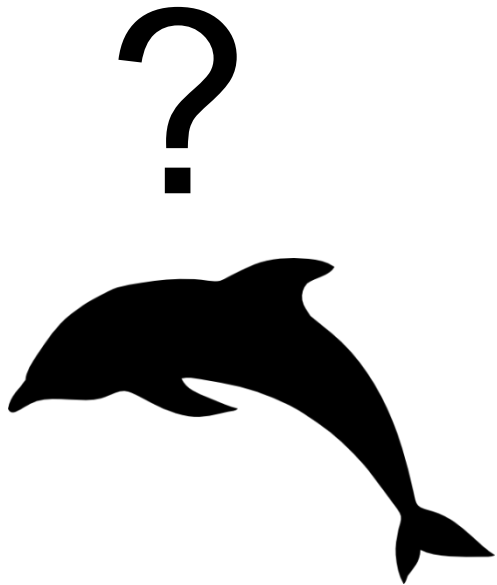
Breath



# DTAG data



# Habitat Use: Who, When, & Where



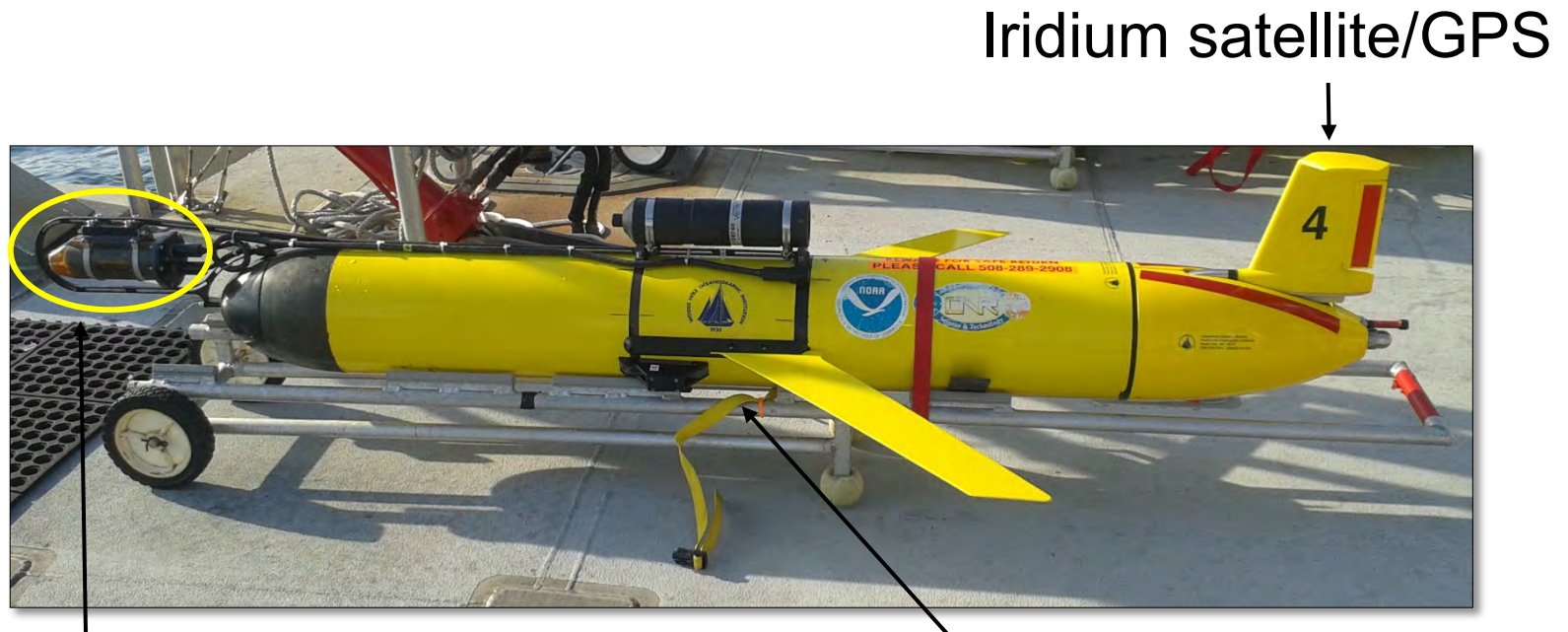


# Passive acoustic monitoring

- Surveys 24/7
- Long-time scales
- Poor weather
- Less expensive
- Autonomous underwater vehicles



# Ocean gliders are tools for habitat studies



Iridium satellite/GPS

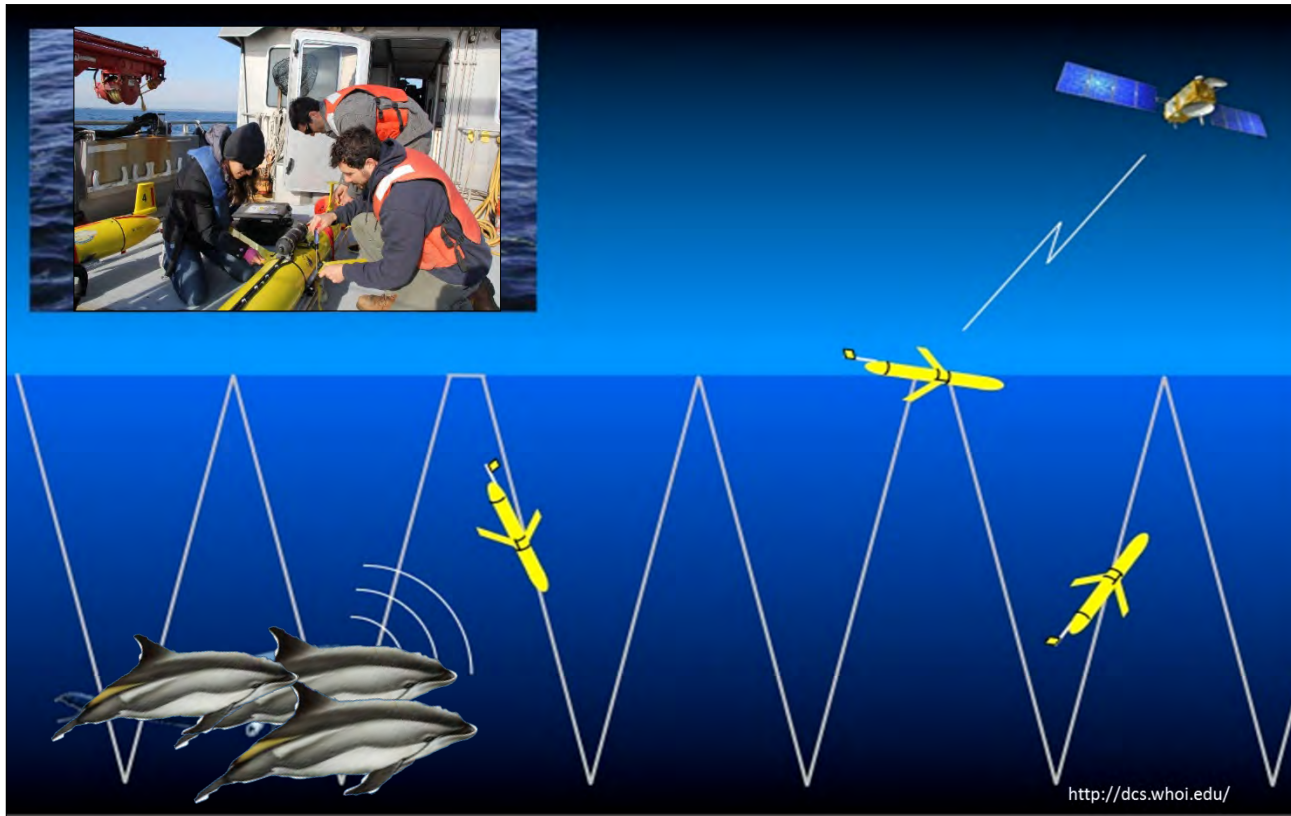
DMON

Digital monitoring device

CTD

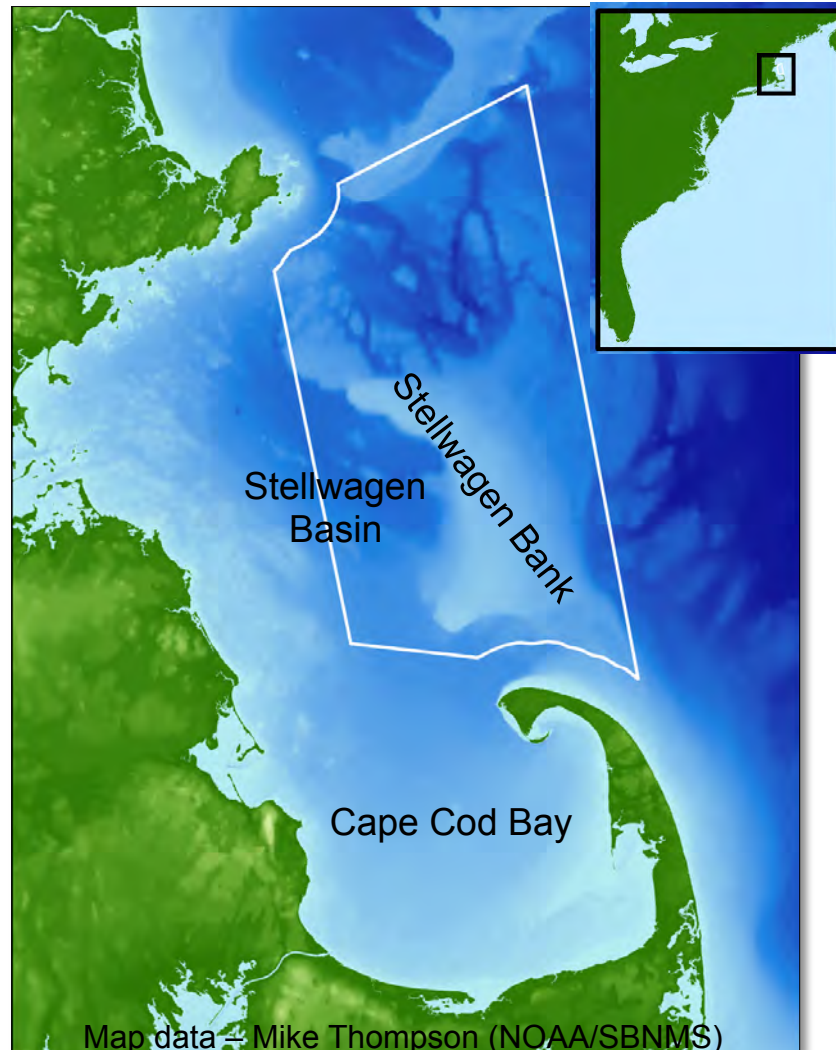
Conductivity, temperature, depth

# Glider deployments

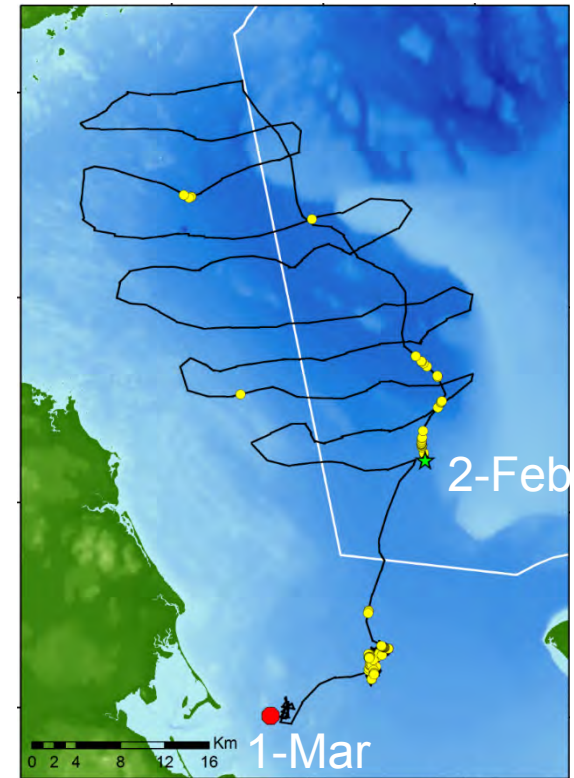
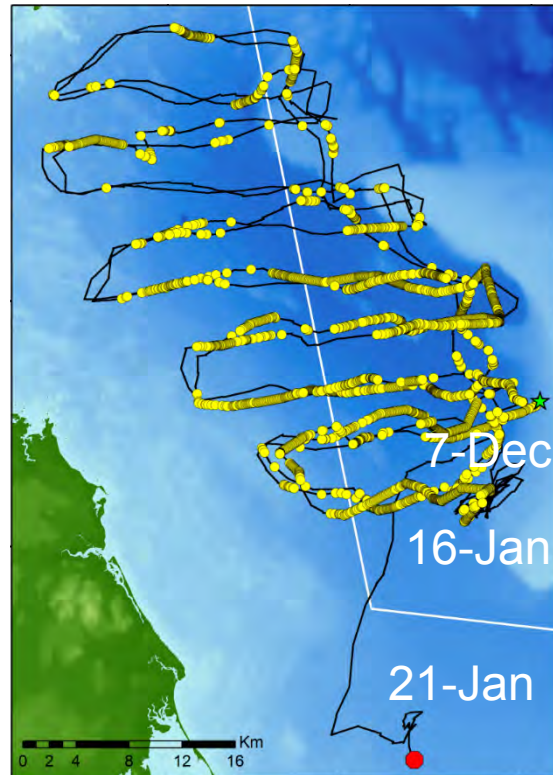
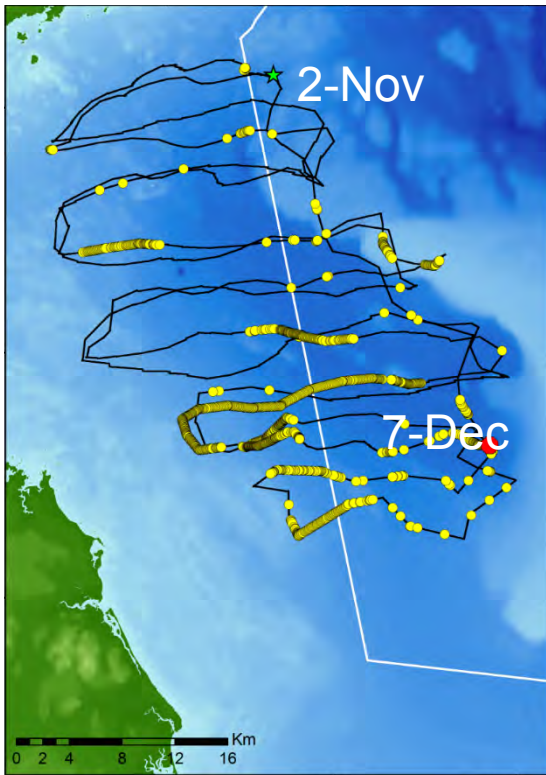




# Stellwagen Bank National Marine Sanctuary

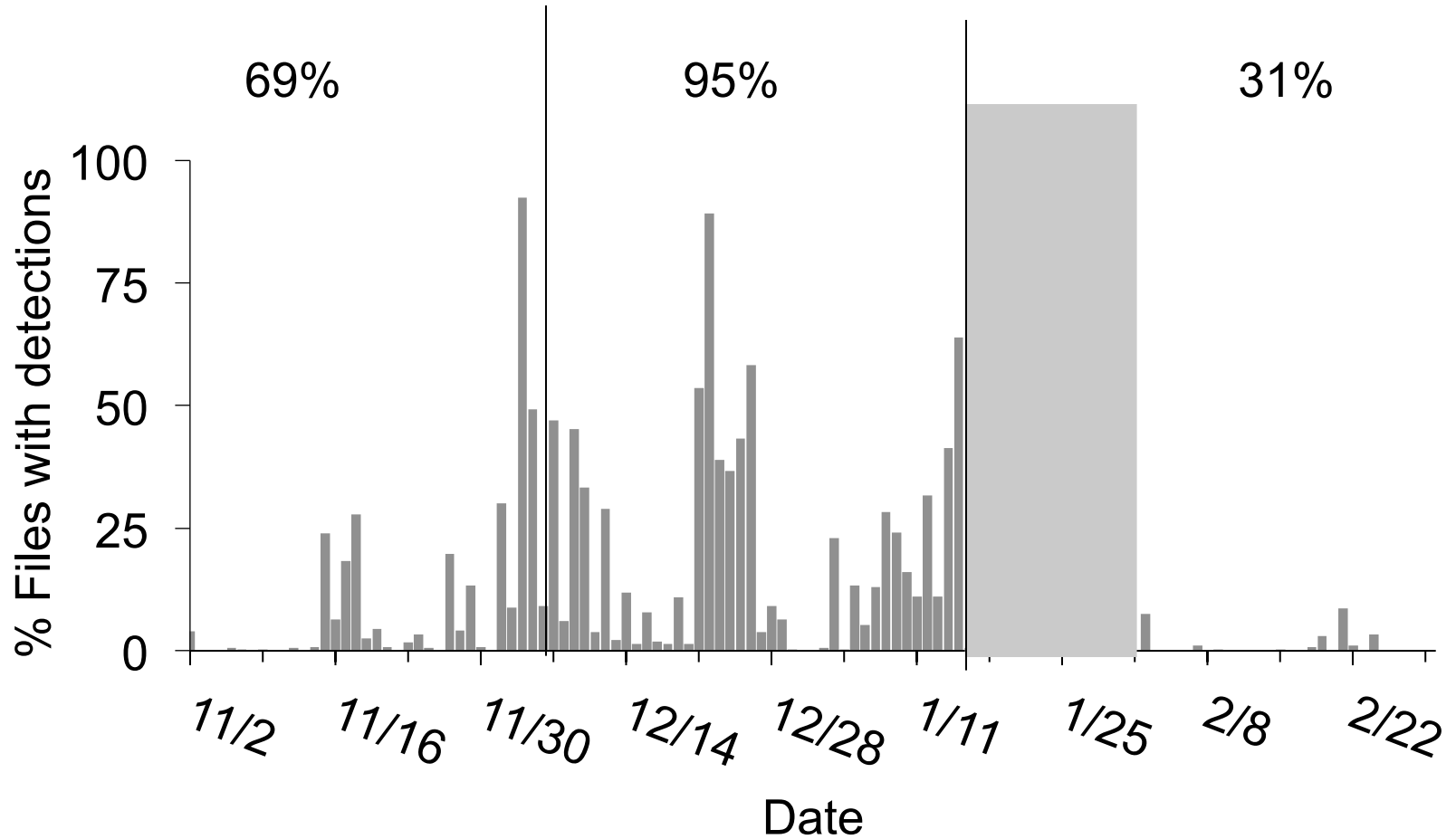


# Spatial distribution



Map data – Mike Thompson (NOAA/SBNMS)

# Temporal distribution





# Acoustic identification of species

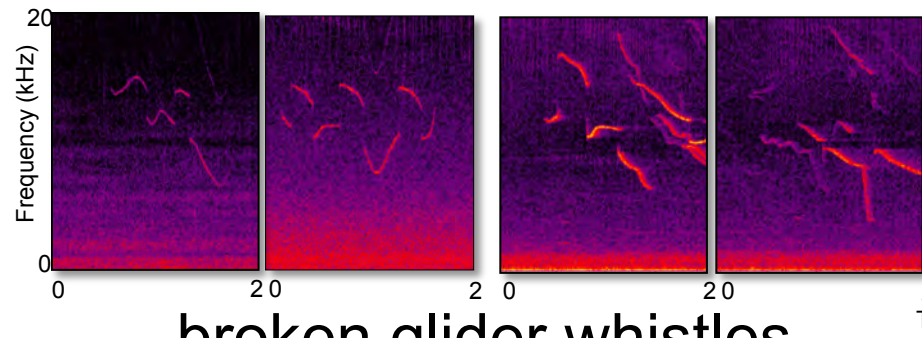
## Atlantic white-sided dolphins

*Lagenorhynchus acutus*

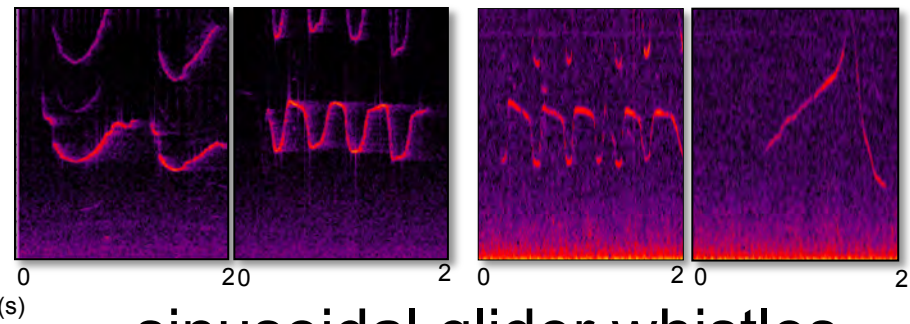


## common dolphins

*Delphinus delphis*



broken glider whistles

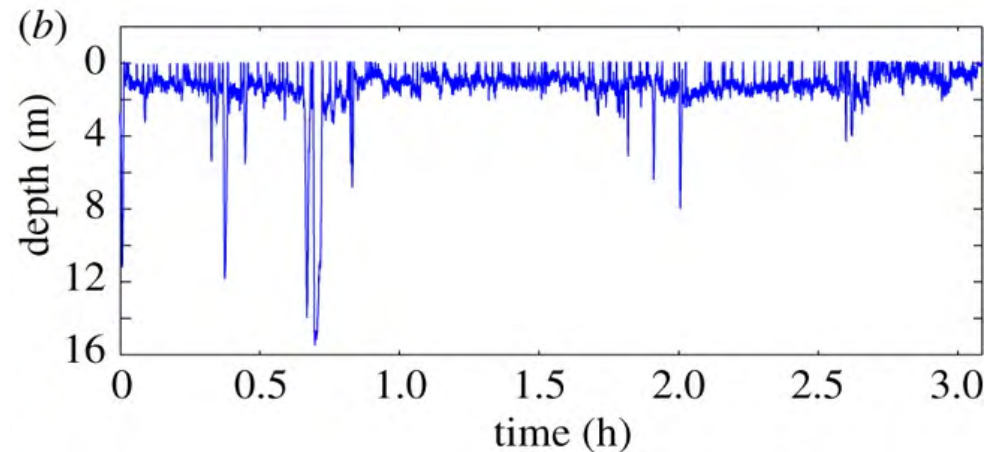


sinusoidal glider whistles

# Applications



<http://www.listenforwhales.org>



Parks et al. 2011

# Summary

- Dolphin species are abundant and highly diverse.
- Habitat use studies are important for understanding and managing ecosystems and mitigating human activities.
- Technology is increasing our ability to study dolphins and their habitat use.



# More Information

- NOAA Dolphins and Porpoises Species Cards
- <https://www.fisheries.noaa.gov/dolphins-porpoises>
  
- Discovery of sound in the sea (DOSITS)
- <https://dosits.org/>
  
- Watkins Marine Mammal Sound Database
- <http://cis.who.edu/science/B/whalesounds/index.cfm>
  
- Orcasound
- <http://www.orcasound.net/>
  
- Robots 4 Whales
- <http://dcs.who.edu/>

# Educational Resources

- NOAA Alaska Fisheries Science Center Elementary Killer Whale Curriculum
- [https://www.afsc.noaa.gov/education/Activities/springer\\_curriculum.htm](https://www.afsc.noaa.gov/education/Activities/springer_curriculum.htm)
- NOAA Fisheries Killer Whale activities
- [http://www.westcoast.fisheries.noaa.gov/education/killer\\_whale.html](http://www.westcoast.fisheries.noaa.gov/education/killer_whale.html)
- NOAA Fisheries - Killer Whale Fin matching activity
- [http://www.westcoast.fisheries.noaa.gov/publications/education/fin\\_matching.pdf](http://www.westcoast.fisheries.noaa.gov/publications/education/fin_matching.pdf)
- Channel Islands National Marine Sanctuary Marine Mammal Sightings Database
- <http://www.cisanctuary.org/mammals/>
- Sarasota Dolphin Research Program
- <http://www.sarasotadolphin.org/educational-programming/school-curricula/>