Tales of Urban Whales

San Francisco Bay’s Cetacean Restoration

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Golden Gate Cetacean Research

UCMP
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Harbor Porpoise
*(Phocoena phocoena)*

- length: 1.5 - 2 m
- weight: 50 - 70 kg
- avg. lifespan: 10 - 11 yr
- males smaller than females

Courtesy of Uko Gorter
Porpoises & Dolphins

Porpoises: small, often appears dark triangular dorsal fins no ‘beak’ blunt teeth (“porpoise” from Latin for “pig fish”)

Dolphins: larger, often appears gray curved dorsal fin beak (‘bottle-nose’) pointed conical teeth (“dolphin” from Greek)
Harbor porpoises have re-occupied San Francisco Bay

They returned in 2008 after an absence of 60+ years

- cleaner bay environment
- oceanic regime shift
Emeryville Shellmound: 400 to 2700 BP
Specimen Catalog

Point Richmond, San Francisco Bay, Contra Costa County, California

June 14, 1939

Muscle specimen + strips of skin in alcohol.

Phocaena phocoena

6561

Length (nose to notch of fluke) 147 cm.
Circumference behind flippers 84 cm.
Width of flukes 38 cm.
Weight of fin 12 cm.

Weight, 46.7 kilos (103 lbs)

Stomach empty. Blubber about 25 cm thick.
World War II Harbor Defenses

from Brian Chin, Artillery at the Golden Gate, 1994, Pictorial Histories Publishing Co. Inc.
Submarine and torpedo nets
1941-1945

courtesy Belvedere-Tiburon Landmark Society
The Reber Plan
to dam and fill the bay
Why Do We Still Have A San Francisco Bay?

- Three women:
  - Catherine Kerr
  - Esther Gulick
  - Sylvia McLaughlin

- Grassroots effort—the first of its kind in the nation—changed the fate of the Bay
Study Platform:
Golden Gate Bridge
pedestrian walkway
70 m above sea level

Key Results:
- 176 surveys over 4 years
- Porpoises sighted on 100% of surveys at high tide
- 10% calves
- 34 porpoises/survey

Stern et al., 2017
Aquatic Mammals, 43(6)
Key Results:

- Porpoises sighted on **100%** of surveys at high tide
- **10%** Calves
- **34.4 +/- 29.2** porpoises/survey

*High count = 175
February 20, 2012*

*Stern et al., 2017
Aquatic Mammals, 43(6)*
Photo-ID Effort

Longest time span between sightings: 5 years
Pigmentation

White Porpoise
“Mini-Moby”

2011 – 2013

Keener et. al, 2011. JMATE
Spinal Deformity

SFB 224 “Scoliosis”

12 sightings
Foraging
Reproduction

Gestation: 10.5 months
Born in summer
IBI: every other year?
Mating Behavior -- first observation
Research Background:

Harbor porpoises are characterized by:

- short life span (~10-12 years)
- synchronized seasonal breeding
- sexual dimorphism: males average ~10% smaller than females
- seasonal enlargement of testes
- relatively large penis (~0.5 m) for a small odontocete
- promiscuity (multiple mates)
- probable sperm competition
Laterality in Sexual Approach

- **Contact Attempt**
- **Non-contact Attempt**
- **Display**

### N = 34 videos

- Left: 41%
- Behind: 9%
- Under: 18%
- Right: 32%

### N = 142 videos/photos

- Left: 100%

**Position of Male Relative to Female at Initial Approach**

**Position of Male Relative to Female at Closest Point of Approach**

Keener et al. 2018. Aquatic Mammals, 44(6)
142 mating events photographed:

in 100% male approaches female on her left side

Keener et al. 2018. Aquatic Mammals, 44(6)
Exclusive Left Side Mating Contact: Unique Among Mammals?

Hypotheses:

1. Male Asymmetry
   - Brain hemisphere, biosonar
   - Skeletal: flippers, pelvic bones
   - Reproductive organ

2. Female Asymmetry
   - Reproductive tract

3. Co-evolution of Behavior/Anatomy
Porpoise density increases in the Golden Gate
Bottlenose Dolphin
(*Tursiops truncatus*)

- **length**: 2 – 3.5 m
- **weight**: 150-250 kg
- **avg. lifespan**: 40-50 yr

Courtesy of Uko Gorter
Bottlenose Dolphins in San Francisco Bay

Bill Keener / Golden Gate Cetacean Research
Northward range expansion from SoCal since 1983

Adapted from NOAA Stock Assessment Report
Unique fin profiles

“Gumpy”
Rodeo Beach, Marin Co.
GGCR Catalog = 97 Adults

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SFB T 25
New Opportunities: a change in the SF Bay food web

Feeding on salmon

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Mothers & Calves

Calf with fetal folds

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Dolphin/Porpoise Interactions

From Cotter et al., Porpicide in California. 2011. Marine Mammals Science: 28(1)
SF Bay’s Resident Dolphin: Kaimi

Solitary Dolphin
off Alameda in the East Bay
Humpback Whale
(Megaptera novaeangliae)

length: 45 - 50 ft
lifespan: 50 + yr
diet: fish or krill
Last Whaling in the US: Richmond Station (closed 1971)
Whale-apalooza off SF! Unprecedented numbers of humpbacks

Is La Nina driving them close to shore?

By Mike Moffitt  Updated 8:18 am, Tuesday, July 5, 2016
From the Golden Gate Bridge

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Research Questions:

1. What is their habitat in SF Bay?
2. How many humpbacks & who?
3. What attracts them to SF Bay?
4. Why now?
5. Where do they come from (breed)?
6. Conservation & risks?
What is their habitat?
SF Bay Humpback whale sighting areas
How Many Whales and Who?

SF Bay Whale Photo ID Catalog:
65 individuals
Unconventional Marks

SF Whale Tours

GGCR Research Boat

Repeat Visits in Different Years

2016 2017 GGCR GG Bridge

GGCR GG Bridge
Tracking Whales across the Pacific

Mother & calf

Joey Meuleman / San Francisco Whale Tours
Where Do They Breed?

- SF Bay
  - 11 June 2018

- Monterey Bay
  - 2009 - 2017

- Happywhale.com
  - 1550 miles (2500 km)

- Puerto Vallarta
  - 27 Feb 2018

female CRC-12420 & calf
3½ months
What Attracts the Whales to SF Bay?

Lunge Feeding
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21,000 Protected Humpback Whales

Why Now?

1966: Whaling moratorium
1978: 1,400 (North Pacific)
1991: 10,000
2007: SPLASH Study = 20,000
2018: Approx. 22,000 and Increasing
Threatened and Endangered Populations

Hawaii (about 3,000)

Mexico (about 400)

Central America (about 400)

Distinct Population Segments (DPS):
- Endangered
- Threatened
- Not at Risk

NOAA 2016
Conservation & Risks: potential for ship strikes
Desalination Plant
Marc L'Italien

SeaGen Tidal Power Installation

The Future?
Humpbacks in SF Bay save the planet in the 23rd Century!
Questions?

Thanks to:

- Cascadia Research Collective
- San Francisco Whale Tours
- The Marine Mammal Center
- National Wildlife Federation
- American Cetacean Society, SF Bay
- Cal Academy of Sciences
- SFSU Estuary & Ocean Science Center
- Greater Farallones Nat. Marine Sanctuary
- Oceanic Society
- Golden Gate Raptor Observatory

Activities Authorized by NOAA Fisheries permits # 20386 and 21678

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