Marine Mammals of California

Stewards 2019
Sarah Allen
National Park Service
Outline

- What are marine mammals
- What species are in California
- Focus on Pinnipeds
- Marine Mammal Conservation
- Eastern boundary coastal upwelling ecosystem
  - California Current
  - One of 4 most productive marine ecosystems globally

- Coastal upwelling

  45 marine mammal species
Ocean Ecosystems

Bioregions

- Latitude
- Onshore-offshore
What is a marine mammal?

Morphology

- Streamlined body shape
- Modified appendages
- Modified feeding forms
What is a marine mammal?

Physiology

- Breathing
- Body temperature
  - Unique blubber
  - Counter current heat exchangers

![Photo Robert Pitman](Image)

(a) Tongue of gray whale

Cross section of blood vessels of tongue

- Arteries are surrounded by veins in each bundle
- Longitudinal section of blood vessels in tongue
  - Artery transports blood to tongue: warm to cool
  - Vein returns blood to body: warm to cool

Photo by John Craighead George
Marine Mammal Extremes
In extreme habitats

- **Largest** animals on earth = 100 ft = blue whales
- **Oldest** mammals = > 200 years = Bowhead whales
- **Thickest fur of any mammal** = sea otter = 1 million hairs / sq in
- **Longest migration** = 14,000 miles = humpback and gray whales
- **Deepest divers** >6,000 ft = sperm whales and beaked whales
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Ron LeValley
Marine Mammals in Three Taxonomic Orders

Cetaceans
- Baleen whales - *Mysticeti*
- Toothed whales - *Odontoceti*

Carnivores
- *Pinnipedia*
  - seals and sea lions
- *Mustelidae*
  - sea and river otters

Sirenians
Absent
Baleen whales

- Baleen not teeth
- unique feeding
- two blow holes
- forage on krill & fish
- Females larger than males

3 families – 8 species
- *Eschrichtiidae*
- *Balaenopteridae*
- *Balaenidae*
How baleen whales eat?
Blue Whale *Balaenoptera musculus*

- Largest animal on earth
- Calf is >20 ft
- Baleen 3ft
- Feed on fish and krill
Blue Whale *Balaenoptera musculus*

Population estimate for eastern Pacific from NOAA in 2013 is 1,647
Fin Whale *Balaenoptera physalus*

- 2nd Largest Whale – 85 ft
- Greyhounds of the sea
- Bi-coloration of jaw/baleen
- Eat mostly fish

NOAA
Humpback Whale - *Megaptera novaeangliae*

- Humpback- distinct arching back
- Large wing-like flippers
- Ballerinas of the sea
- Longest single migration of any animal ~ 14,000 miles
- True singing whales – ½ hr and repeated for days
Humpback Whale

Population estimate for eastern Pacific from NOAA in 2016 is \textbf{1,876}
Humpback whales *invade* SF Bay in May 2016

*Humpback whales invade the bay in numbers not seen before*

Photo Bill Keener; Golden Gate Cetacean Research Group
Gray Whale *Eschrichtius robustus*

- One of longest migrations ~13,000 m
- Shortest baleen
- No dorsal fin
- Friendly whales
- Ecological engineer
Gray Whale
Gray Whale Migration 2018
American Cetacean Society

How Does The 2017/2018 Season Compare to Other Seasons?

- Southbound Whales
- Northbound Whales

2017/2018 Season

Observation Posts
- Red dots are Gray Whale Observation Posts where people are watching as the whales migrate along the Pacific coast. Click red dots for information and news.

Mating and calving grounds
Feeding grounds

Cow Calf Gray Whale
Bodega Head January 17, 2016
Gray Whale

Population estimate for eastern Pacific from NOAA in 2014 ~20,125
Toothed whales - Odontoceti

- Teeth not baleen
- One blow hole
- Feed on fish, squid, or mammals
- Biosonar organ to echolocate

Sperm whales are largest toothed whale – 60 ft
Toothed whales - Odontoceti

Biosonar - Asymmetrical skull & pan jaw bone

- Identify objects depending on species
  360 ft – 10 miles
- Melon organ – adipose (fatty) tissue – magnifies sound
- Pan jaw bone receives sound
Sperm Whale - *Physeter macrocephalus*

- Largest of toothed whales
- Likely deepest diver – 6890 ft record
- Habitat is deep sea and offshore

WE CAN ONLY IMAGINE THEIR HABITAT
**Orcinus orca**

Other names
- Killer whale
- Blackfish
- Asesina ballenas
Orcinus orca

- Strong sexual dimorphism
- Ecolocate prey – detect to size of a bean
- Age – female >90 yrs; male – 60 yrs
- Highly social
  - Pods have distinct dialects
  - Cooperative feeding
Orca Ecotypes

3 Ecotypes in California Current
But....maybe more

Southern Resident FISH

Transient (Bigg’s) MAMMALS

Offshore SHARKS

© Sophie Webb
Ecotypes prey on different food - marine mammals, fish (mostly chinook salmon) AND ….SHARKS
Medium to small cetaceans

DOLPHINS – Delphinidae – 15 species
- Beak
- Conical teeth

PORPOISES – Phocoenidae – 2 species
- Round head
- Spade teeth
Pacific White-sided Dolphin
Lagenorhynchus obliquidens

- Mostly ocean dolphin
- Bow rider
- Join groups of thousands of mixed species
Short-beaked Common Dolphin
Delphinus delphisus

- Worldwide and iconic species
- Leap 20 ft out of water
- Bow ride exuberantly
- Deep scattering layer prey – mid-water fish and squid

© Sophie Webb
Bottlenose Dolphin *Tursiops truncatus*

Population estimate - **453**

Range extends to Mendocino County

- Biosonar organ-detect a pin 300 ft
- Signature whistle for individual
- Range expanding north
Bottlenose Dolphin

Exchange between Sonoma and San Francisco Bay
Dall’s Porpoise – *Phocoenoides dalli*

- Endemic to North Pacific
- Fastest – 35 mph
- Bow ride exuberantly
- Schooling fish and squid
Harbor Porpoise *Phocoena phocoena*

- Smallest cetacean in CC
- Does not bow ride
- Coastal
- Northern hemisphere
- Eats schooling fish and squid
- Abundant in Golden Gate

Photo Marc Weber

Photo Bill Keener
Fissipeds

Sea Otters
River Otters

River Otters – Galen Leeds

Sea Otter – Drakes Estero
Sea Otter – *Enhydra lutris*

- Thickest fur - 1 million hairs/in
- Smallest marine mammal
- Almost entirely pelagic
- Single pup annually in water
- Eat mostly shellfish
Sea Otter – Morro Bay Harbor 2017

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- Eat mostly shellfish
- Associated with BIOGENIC habitats
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Pinnipeds

Order Carnivora
Sub-order Pinnipedia = wing-footed

ALL pinnipeds give birth on land

Much variation of species based on:

• Morphology
  • Specialized body forms
  • Modified appendages
  • Modified teeth

• Physiology
  • Heat retention (fur/blubber)
  • Length of nursing period
  • Molt on land or at sea
Dual life – marine and terrestrial
Pinniped Colonies in Central CA

Legend
- Northern Fur Seal Colonies
- Northern Elephant Seal Colonies
- Steller Sea Lion Colonies
- Harbor Seal Colonies

Largest colonies
Otariidae

California Sea Lion
Steller Sea lion
Northern Fur seals
Guadalupe Fur seal

• External ear flap
• Articulated hips
• Long front & rear flipper
• Sexual dimorphism
Sea lions and fur seals - Otaridae

Guadalupe Fur Seal

Northern Fur Seal

California Sea Lion

Steller Sea Lion

© Sophie Webb
California Sea Lions (*Zalophus californianus*)

**Behavior**
- Gregarious
- Barking
- Swim with front flippers
- Eat mostly schooling fish

**Breed**
- May-June
- Channel Islands, Año Nuevo, Farallon Islands

**Size**
- Sexual dimorphic
- male @ 800 lbs
- female @ 250 lbs
California Sea Lions

Population: Growing at 5.4 %

\[ \sim 153,337 - 296,750 \text{ in 2013} \]

NMFS Assessment 2011

\[ \star = \text{Seal Lion Sites} \]
California Sea Lion

**Zalophus californianus**

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Males haul out in region in fall - spring
Steller Sea Lion
Steller Sea Lions (Eumetopias jubatus)

Behavior
- Males roar like lion
- Mostly, non-migratory
- Haul out on rocky areas such as Bodega Rock, PRH
- Year round but low numbers

Breed
- May-June
- Farallon Islands, Año Nuevo & Fort Ross

Size
- Sexual dimorphism
- male-1500 lbs
- female-700 lbs
Steller Sea Lions

Population:
Declining in CA by > 50%
Delisted Threatened
34,485 - 57,966 -2013 (US)
2,781 in California

= Steller sea lion sites
Phocidae

Northern Elephant seal (*Mirounga angustirostris*)

- No external ear flap
- No articulated hips
- Short front flipper

Harbor Seal (*Phoca vitulina*)

Sue VanDerWal
Phocidae

Harbor Seal

Northern Elephant Seal
Pacific Harbor Seals (*Phoca vitulina*)

**Behavior**
- Year round resident, individuals migrate
- Rest onshore every day
- Mostly eat small schooling fish

**Breeding**
- March-June
- Maritory – territory in water
- @ 20% California mainland population breeds in Marin Co.

**Size**
- Little sexual dimorphism
- Adults 200-300 lbs
Harbor seals

Population 2011: Stable
NOAA estimate = 30,196
Point Reyes = 20% of state

= seal haul out sites
Marin - 55% adults; 71% pups
Population estimate ~7,000
Movement between sites (Harvey & Goley 2005)

Tagged sites
Haul out sites visited
Northern Elephant Seal (*Mirounga angustirostris*)

**Behavior**
- Longest migration (males - 14,000 miles)
- Deep dives (males - > 5,000 ft)
- Eat bottom fish and pelagic squid
- Fast up to 3 months during breeding

**Breed**
- Winter Dec-March
- Farallon Is, Año Nuevo & Point Reyes

**Size**  Extreme sexual dimorphism
- male-5,000 lbs
- female-900 lbs
Year in the Life of an Elephant Seal

Spend Most of Their Life At Sea Underwater

• Travel up to 14,000 miles in 2 foraging trips per year
• Different Routes for Males & Females
• Individual spends 80-90% of life at sea diving and under water
Northern Elephant Seals

Population:
- Growing at 8.3%
- ~124,000 in 2005 (CA)
- ~3,000 at Point Reyes

= Elephant seal sites
Maximum Pup Estimate Point Reyes

This Year
Point Reyes

- Elephant seals documented in 1800s
- Recolonized in 1981
- Expanded over 35 yrs

Photo Robert Campbell
Seal Expansion into Public Spaces
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Ron LeValley
Conservation

- Over exploitation for oil, fur, food etc.
- Ship strikes and military sonar
- Pollutants (oil, plastics, pathogens)
- Fisheries interactions
- Habitat loss development

From Springer et al. 2003
Climate Change Challenge
Uncertainty of potential effects

Oceanographic disruptions

- Change in ocean currents due to warming
  - More intense El Niño events
  - Harmful algal blooms - domoic acid poisoning
- Ocean acidification – thinning invertebrate shells
SnotBot – **UAV** (drones) collect whale breath to analyze DNA, hormones and microbiomes
Conservation of Marine Mammals

- Conservation Ethic – Captain Scammon in 1800s
- Marine Protected Areas – Guadalupe Island – 1920s
- Legislation such as Marine Mammal Protection Act – 1972
- Protection through education and inspiration
THANKS TO ....

Many dedicated volunteers who monitor seals
Sarah Codde, Pinniped Coordinator Point Reyes
Photographers who shared images....