

1  **Sirenia, Pinnipedia, Carnivora**

2  **Name and give examples of the 4 marine orders of mammalia**

- 1. Carnivora
  - Sea otters
- 2. Pinnipedia
  - Sea lions, seals, walruses
- 3. Sirenia
  - Manatees, dugongs & sea cows
- 4. Cetacea
  - Suborder Mysticeti: filter feeding baleen whales
  - Suborder Odontoceti: toothed whales, porpoises and dolphins, all other whales

3  **Species of Sirenia**

- *Trichechus manatus* (also *T. Senegalensis*-W.Africa, *T. Inunguis*-Amazon)
- 3 species manatees and 1 species dugong in Sirenia
- seacows/mermaids

4  **Explain how the lifestyle of the manatee contribute to its extinction today.**

- Feed near surface; move slowing
- Live at edges of water
- Senses adequate for lifestyle, but not for detection and evasion of motor boats
- pneumonia, humans abused them
- Indians-food, skin leather, blubber cooking and lighting, bones carvings
- Manatees killed by hunting, disease (pollution too), flood control gates, cold water, human vandalism, collisions w boats
- predators: sharks, alligators, crocodiles, and man

5  **Morphology of manatees**

- fat, round body
- broad, flat tail
- little hair
- 15' 2000 lbs. Lives 50 years
- no sexual dimorphism

6  **Manatee**

7  **Marine or freshwater**

- needs water 65oF
- live in fresh or marine when move into fresh to stay warm, barnacles die leaving
- Mottled spots
- Stay in warm water until March

8  **reproduction**

- bear young 3-5 years apart, gestation 1 year, 1-2 calves per birth

- brings calf to surface to breathe
- 77 lbs newborn , slate gray to pinkish color
- nurses, eats small green plants at a month-w nursing for 2 years

9  **Manatee senses**

- adequate eyesight
- Mucous glands cont. Lubricate the cornea
- good sense hearing=squeals/squeaks
- Calves birdlike adults raspy
- 13 distinct vocal sounds

10  **Manatee Feeding Behaviors**

11  **Feeding Behaviors**

- feeds 7-8 hours/day on sea grass/aquatic plants; feed in herds
- 80-100 lbs. vegetation / day
- exp w water hyacinth-manatees eat ½ mile a day but algae made sick, some cold
- no incisors just molars- new teeth replaced by old
- pulls in grasses with lips or front flippers
- Feed in herds

12  **Respiration**

- breathes every few minutes while swimming
- if resting, breathes 10-15 minutes
- can lower heart rate during diving or resting (30 beats /min)
- lungs and diaphragm extend the length of the body cavity
- (Bouyancy)
- replaces 90% air in lungs-like whales

13  **Describe their current population and geographical range and explain the limitations to their population size and geographical range**

- fewer than 1800 in FL death rate exceeds birth rate 193 died in 1994
- 256 manatees outside of FL

14  **Studying manatees**

- research
- aerial
- electronic tracking

15  **Past determines fate of manatees**

- Belize
- locals ate them
- Catholics ate them-fish during Lent when really red meat
- tourism more profitable than eating them or farming

16  **Why difficult to protect**

- protecting them difficult
- populations wander across political boundaries
- have long distance directed movements
- hug shoreline and travel from food resources to another

17  **Protecting manatees**

- Crystal River largest natural manatee sanctuary in FL
- have been bred in captivity-lack survival skills to live on own
- 1978 FL manatee sanctuary Act

18  **Dugongs**

- -*Dugong dugon*
- Stellar's seacow (*Hydrodamalis gigas*) extinct Commander Islands (AK)
- 1741 Danish explorer Vitus Bering sailors lived on seacows
- Told Russians
- in 27 years no seacows

19  **Dugong**

20  **Protecting remaining dugongs**

- CITES is the Convention on International Trade in Endangered Species.
- Australia home to last few; protected now by CITES
- In remote parts of Western Australia and the Northern Territory it is thought to be surviving in good numbers whereas in the southern Great Barrier Reef it is severely endangered.

21  **Compare sea lions and seals**

1

- Sea Lions
- Have ears
  - powerful front flipper 1/4 body length
  - back flippers rotate forward, well developed hips
  - can walk on all 4 flippers

2

- Seals
- Ear holes
  - Short weak front flippers
  - Permanently backward flipper
  - Humps back to walk

22  **Sea Lions and Seals**

23  **Seal or Sea Lion?**

24  **Seal or Sea Lion?**

25  **Sea Lions**

- Zalophus californianus
- Brit Columbia to Mexico
- In 1920's pop was 1500 now 150,000 ~170,000
- live from Puget sound to Mexico
- demand for blubber and pelts slowed in 1940's
- 1972 Marine Mammal Protection Act saved them

26  **Marine Mammal Protection Act 1972**

- basis for policies preventing the harassment, capture, injury, or killing of all species of whales, dolphins, seals, and sea lions, as well as walruses, manatees, dugongs, sea otters, and polar bears
- management to reduce marine mammal mortalities and injuries in their interactions with fisheries (gear entanglement, etc.)
- regulates scientific research in the wild
- establishes basic requirements for public display of captive marine mammals
- addresses issues specific to the tuna fishery in the eastern tropical Pacific Ocean where dolphins associate with tuna and are harassed, injured, and sometimes killed by fishing practices there

27  **Marine Mammal Protection Act 1972**

- creates a management regime for native subsistence hunting of marine mammals in Alaska
- regulates the import and export of marine mammals and their products
- agency responsible for enforcing the MMPA is the National Marine Fisheries Service (NMFS)
- NMFS is responsible for the management and conservation of whales and dolphins (cetaceans) and pinnipeds other than the walrus.
- Walruses, manatees and dugongs (sirenians), sea otters, and polar bears are under the jurisdiction of the U.S. Fish and Wildlife Service (FWS), in the Department of the Interior

28  **Sexual Dimorphism in California Sea Lions**

1

- Males 8'
- 600-800 lbs
- Dk brown
- sagittal crest

2

- Females
- 6'
- 200 lbs.
- Tan
- No sagittal crest

29  **California Sea Lions**

30  **Describe the social structure of sea lions**

- social animals lg groups called rookeries
- lot of body contact
- very vocal produce loud barking noises
- females call pups by barking
- pups have high degree of vocalizations w mother
- polygamous males claim territories and harem in June just after last year's pups are born
- bulls maintain territory by cont barking; charge at intruding males
- even in battle are careful not to hurt pups

- 31  **Male social structure**
- males make the first cut among themselves, but females choose selection not fully understood
  - only few of bulls do most of the mating
  - young bulls practice holding territories after mating season when the territories not defended
  - most bulls do not mate in any given year, as grow older some will hold territories and mate
- 32  **Describe life history of sea lions**
- males bulls sex maturity at 5 yrs not likely to breed until 8 yrs old
  - cows at 3 years mate at 4-5 years old bear single pup until well into their teens
  - during good times that is pop growth of 8% / yr
  - gestation 1 yr 1 pup/litter
  - pup swims at 2 wks, nurses 5-6 mo
  - mothers leave after a week to hunt for food for as much as 48 hrs at a time recognize each other by barks begin immediately after birth to bark in the pup's face until begin to recognize bark
- 33  **Feeding Behavior**
- feeds solids food-fish at 3-4 mo
  - feed on fishes, octopus, squid, and shellfishes
  - contributing to depletion of salmon during runs
  - feed both night and day
  - feed especially when schooling fish present
  - males don't eat when defending territory
  - El Nino poor fishing most pregnancies don't last-no food and pups don't survive well w mother's hunting for food and not nursing
  - Population reduced from 41,000 in channel islands to less than 14,000 pups during El Nino
- 34  **Swimming and migration**
- sea lions stay close seldom range more than 10 miles from shore
  - can travel greater distances if population too large
  - excellent swimmers-move front flippers up and down
  - like they are flying in the water
  - max speed 15-20 mph
  - dive to great depths-300'
  - breathe 1-5 minutes can stay under for 10 min
- 35  **Senses**
- sense of hearing is acute-better above water than below water
  - eyesight is acute above and below the water best below water
  - constantly protected by efficient tear ducts
  - have spherical lenses like fish for underwater; tapetum like cat for searching in dark water
- 36  **Intelligence**
- very smart-can classify objects into groups
  - recognizes numbers that indicate letters and numbers as numbers work in wild can recog bulls by sound, smell, and sight all mean same thing
  - can distinguish fishing boats and their catches boat for herring different from salmon boats
  - learn very quickly where fish are some learned that steelheads had to climb fishlocks to spawn and waited at end of fish ladders to eat them as they came over
  - many have learned to eat hooked fish before fisherman can bring them in
  - have language (can learn sign language)
- 37  **Explain how sea lions utilize their flippers to maintain their body**

## temperature

- Sea lions like beach front so they can get in water to cool off
- flippers are highly vascular
- used for thermoregulation
- if cool, hold flipper out of water in warm air to warm body
- if cool sea lion will immerse its flippers in cool water

### 38 Describe seals

- true seals family Phocidae
- 18 living species
- 13 genera
- 10 extinct genera
- 125 cm-6.5 m 4'-21' length 90 kg to 3.5 metric tons 200 lbs to 8,000 lbs
- smallest are ringed seals, *Pusa* largest are elephant seals *Mirounga*
- most seals are found at latitudes greater than 40o

### 39 Ringed Seal & Elephant Seal

### 40 Describe mechanisms to keep seals warm

- found in cold water of Arctic and Antarctic
- in addition to blubber, have thick epidermis, numerous oil glands over the skin
- flattened hairs that make up a dense double layer of fur

### 41 Describe seal lifestyle

- propelled through water by hind flippers
- seals utilize echolocation
- most seals feed on fish
- leopard seal, *Hydruga leptonyx* feeds on seals and penguins
- seals few natural predators-sharks, killer whales, polar bears

### 42 Leopard Seal

### 43 Seal Notables

- *Halichoerus grypus* is a temperate coastal seal
- Alaskan fur seal is not a seal, it is an eared seal, or sea lion *Callorhinus ursinus*
- best diver is Weddell Seal, *Leptonychates weddelli* - stay submerged 70 minutes to 600m, 2000'
- Crabeater seals have most unusual teeth

### 44 Grey Seal, temperate waters

### 45 Identify only seal in our area

- the only common seal in N Atl is *Phoca vitulina concolor*
- harbour seal
- shy
- more time on land and shallow waters than any other seal

### 46 Harbor Seal

47  **Fur seal !!!!**

48  **Best Diver: Weddell Seal**

49  **Crabeater Seal**

- consumers of krill, about 80 million tons a year
- five-pointed teeth, the upper and lower rows of which interlock to form a strainer

50  **Monk Seals**

- Mediterranean Monk Seal is endangered Monachus monachus
- only genus in tropical areas
- Range used to be Pacific, Caribbean, and Mediterranean
- Columbus reported seeing it in 1700's over hunted
- Last Caribbean seen in 1952 extinct
- Phocaea city in Asia minor named for seal
- Med monks-scared by humans motorboats and airplanes fishing and tourist
- threat by pollutants, plastics, fish lines
- chased into ocean when beach go to give birth
- Turkey Greece Algeria Sardinia and Madeira
- Isolated spots caves
- Hawaiian monk seals 1300 are protected live in reserve decline at 6%/yr

51  **Hawaiian monk seal**

52  **Hunting seals**

- licensed to harvest seals 8,900 licenses in E. Canada alone
- Inuits and Indians need no license
- sealing vital source income to isolated communities live off the land

53  **Harp Seal**

- harp seal Pagophilus groenlandicus is one of most numerous
- feeds on herring , codfish, and groundfish as well as planktonic shrimp
- feeds on capelin the cod are 10-20 cm long (1-2 yr old fish)
- Commercial fisherman take older fish
- consumption up 3.6 mill tons 1981 to 6.9 mill tons in 1994
- med abundance
- migrates Arctic and sub Arctic to Gulf of St. Lawrence or S. Labrador and N. Newfoundland
- males slightly larger than females, 1.6 m and 130 kg
- whelp on ice in White Sea near Jan Mayer Island in NW Atlantic

54  **Harp Seal**

55  **Explain the relationship between sea otter morphology and their lifestyle**

- Sea otters-Enhydra lutris
- much like terrestrial counterparts
- evolved 1.5 mA
- 
- Otters eat 7-9 kg / d (15-20 lbs)
- Weigh 25-35 kg (60-80 lbs)

- Voracious appetites

56  **Sea Otter Geographic Range**

- Historical geographical range was from Japan, to Nam AK to Baja, CA
- Now found in isolated areas primarily off CA few Aleutian islands
- Live in kelp beds
- Russian fur traders protected in 1911
- Also protected by Marine mammal protection act 1972

57  **How Sea Otters Stay Warm**

- have no blubber, have thick warm fur thickest of all mammals
- No water gets to skin
- Blow air into fur continuously
- swim and dive lg flattened tails wide flipperlike hind feet
- have excellent eyesight but feed by probing with sensitive paws

58  **Feeding patterns**

- fisherman not thrilled otters eat crabs, mussels, and abalone human resources

59  **Explain why kelp bed communities need sea otters to survive**

- feed on sluggish benthic invertebrates
- Use tools-float on back; put rock on abdomen; crack open shells of sea urchins, crabs, mussels also feed on abalone
- Kelp beds w/o otters disappeared off CA not return
- Otters ate urchins no otters >>urchins ate everything down to some red corals; some remained and may be living off wastewater prevent kelp from returning
- Otters feed on urchins, kelp community balanced

60  **Define a keystone species**

- A predator that feeds on a variety of prey in such a way that the ecosystem remains balanced and is able to perpetuate itself

61  **Describe walrus and their lifestyle**

- Odobenus rosmarus
- exclusively in N polar seas
- 1800 kg 2 tons agile swimmers
- use both front and hind flippers for propulsion
- skin is thick and wrinkled, thick layer of blubber
- some body hair
- upper canine teeth of males and females develop into large tusks used to hoist them onto ice and dig clams and mussels in water 91 m (300 ') deep

62  **Defend polar bears' classification as marine mammals or terrestrial mammals**

- polar bears family Ursidae Thalarctos maritimus
- distributed throughout Arctic live on pack ice or wander on tundra during summer
- solitary nomadic animals
- 
- hunt primarily by surprising seals and other animals that are quicker and more agile than they are in water

63  **Morphological features**

- white fur
- wait near hole for seal to surface and then smash the seal w paws
- sometime cut off escape route
- possess few adaptations to living in ocean
- have thick fur
- layer of insulating hair on paws
- thick layer of blubber
- gen shape more streamlined than other bears
- swim don't dive

64  **In your opinion, is it wrong to harvest seals, bears, and other marine mammals?**

- pups are known as white coats molts at 3 weeks
- hunted since 1900's 250,000 animals/yr
- Dropped to 150,000/yr 1939
- 450,000 in 1951
- 300,000 ave 1945 to 1966 used large vessels
- increase in population 5%/yr
- Pup production in 1994 ~703,000 +/- 127,000
- in spite of regulations from the 80's (imposition of European bans) banning seal hunts,
- 57,000 seals have been killed every year between 1983 and 1994 in Canada
- 1983 European ban on white coats European Economic Community

65  **Harp seal hunting**

- allowed to kill seals (pups) for own use, called young of the year
- Canada calls adults but aren't, range in age from 10 days to few mos old
- go out on ice fields in long liners 65' or smaller boats and shoot w rifles
- say necessary to check Harp seal population to get fishery recovery, but no evidence for that
- no evidence of impact on fish stock or recovery of fish stocks
- are caught in groundfish gill nets

66  **Why harvested?**

- kill but not use whole animal
- Meat market ltd-meat is usually wasted
- Asian market for raw seal skin small and pay under price
- Driving force is male sex organs \$200 for penis w testicles attached
- species hunted are grey and harp seals
- neither are on endangered list
- Crash in ground fish population may affect food web interactions including seal population
- ~ 3 mill no evidence to show is population is growing, decreasing or staying the same
- (NWH fisheries Center
- Dept of Fisheries and Oceans
- P.O. Box 5667
- ST. John's Newfoundland A1C 5X1)