



Name _____ Date _____

Elephant Seal Adaptation Cards

Activity Sheet

A

Elephant Seal Adaptation:

Fasting

Adult male elephant seals do not eat for up to 3 months while they are on land trying to establish and maintain dominance over other males. If they were to leave their harem, other males might mate with the females. Female elephant seals fast for a month while they give birth, nurse their pups, and mate. Weaners will fast for 1 to 2 months after weaning. This is an advantage because it postpones the time they need to search for food until they have learned to swim.

B

Elephant Seal Adaptation:

Concentrated Urine

Animals need to flush out wastes that are formed by digesting food for energy. One type of waste formed through digestion is urine. Urine helps to flush out toxins and excess water. Elephant seals have large and powerful kidneys, an adaptation that concentrates large amounts of toxins into a small amount of urine. This helps them to save precious water all the time, but especially while fasting. Elephant seal urine is thick and brightly colored.

C

Elephant Seal Adaptation:

Energy from Fat

In adult males, blubber may account for nearly 50 percent of an adult male's weight at the beginning of the breeding season. By the end of breeding season adult elephant seals (of both sexes) lose about one-third of their weight. Blubber is an adaptation for animals that fast. When they are fasting, elephant seals use their blubber as stored energy. As they use their blubber for "food" a chemical by-product of their metabolism is water. This is how they can produce enough energy and water while fasting.





Elephant Seal Adaptation Cards

D

Elephant Seal Adaptation:

Thermoregulation: Keep Cool, Stay Warm

Elephant seals have “shunts” in their circulatory systems. A shunt acts like a valve, diverting blood flow in one direction or another. When in the water, they shunt blood away from their body surface in order to keep their core and vital organs warm. When on land, they cool off by sleeping with a front flipper raised straight up in the air. They shunt blood to the surface and heat is “dumped” into the air. Blubber helps them stay warm in cold water. It insulates like a wetsuit. Imagine that a human wetsuit is a quarter-inch thick, and an elephant seal blubber layer may be 6 inches thick. So much blubber makes it hard to stay cool on land. Sometimes elephant seals sleep in tidepools or rain puddles. This is a good adaptation for staying cool and losing less water to evaporation. Elephant seals also flip cold, damp sand on their backs to reflect the sun away and stay cool.

E

Elephant Seal Adaptation:

Chest Shields

As a secondary sex trait (like a man’s beard), male elephant seals develop a hard chest shield of thickened skin and scar tissue. It begins to develop when the animal is about 2 to 3 years old. By the time the male is a fully developed bull, about 8 to 9 years old, the shield covers most of the chest. It grows up to slightly above the level of the male’s eyes, almost forming a type of “necklace.” The chest shield protects them from major injuries during fights with other males.

F

Elephant Seal Adaptation:

Big Noses/ Proboscis

As a secondary sex trait (like a man’s deepening voice), male elephant seals develop a large bulblike snout known as a proboscis. Females and young males are very hard to tell apart. But when a male is about 2 years old, and the nose starts to grow, they can easily be distinguished. By the time a male reaches sexual maturity, at about 4 years, its nose may be a foot long. A fully developed bull, age 8 or 9 years old, may have a nose 2 feet long. The size of the snout and the loudness of the vocal threat will often discourage a challenge and allow a male to save energy by avoiding actual battles.





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G

Elephant Seal Adaptation:

Delayed Implantation

Most adult female elephant seals mate and have a pup each winter. A pup is born 11 months after its mother mates. But a female elephant seal does not become pregnant immediately after mating. Fetal development stalls for 2 to 3 months; then the embryo implants on the wall of the uterus and the active gestation period of 8 to 9 months begins. Delayed implantation allows the pregnant female to build her strength back up (after fasting) before the new fetus begins to develop. This adaptation also makes it possible for birthing and mating to occur close together while large numbers of mature animals are on the same beach.

H

Elephant Seal Adaptation:

Female Choice in Mates

Female elephant seals have some choice in deciding with which male they will mate. If they are not ready to mate they protest, resist, and try to escape. When approached by a male other than the dominant bull, the female will usually protest loudly to alert the dominant bull of the other male's presence. These behavioral adaptations enable the biggest, strongest males to mate with females. Sometimes, however, less dominant males do succeed in mating with a receptive female, and often females mate with nondominant males as they leave the colony.

I

Elephant Seal Adaptation:

Deep Continuous Diving at Sea

Elephant seals dive deeper and longer and more often than any other marine mammal. The average adult dive is about 1,500 feet, but they often dive over 5,000 feet deep (about a mile)! They stay down an average of 22 minutes but may remain underwater for more than 90 minutes. They spend 3 to 5 minutes resting at the surface and then dive again. They do this continuously, spending 85 to 90 percent of their time underwater. Scientists are not sure why elephant seals are able to accomplish this, but they suspect that at such great depths elephant seals have almost no competition for their food. They are also safer from their primary nonhuman predator, the great white shark. Scientists are not absolutely certain about what elephant seals eat, but it is likely that they feed on octopus, squid, rays, hake, salmon, and rockfish.





Elephant Seal Adaptation Cards

J

Elephant Seal Adaptation:

Vocalizations

The sounds made by elephant seals are distinctive, meaningful, and play a role in their social order. Males rear up, throw back their heads, open their mouths wide and trumpet to advertise challenges and threats. Females use different sounds to discourage unwanted suitors and to warn other females away from their pups. Each mother and pup have special vocalizations that are instantly recognized by each other. These help to keep the female and pup together during the first week of nursing. Scientists have determined that different colonies even have different dialects.

K

Elephant Seal Adaptation:

Molting

All mammals lose and replace their hair. For example, dogs and humans shed their hair. Similarly, elephant seals molt. Once a year elephant seals lose and replace all their hair over a period of just a few weeks. They slough off their fur in patches and this is called a radical molt. This process reduces insulation, due to hair loss, and requires increased blood flow to the skin's surface in order to supply nutrients to the newly growing hair. Because heat loss occurs more rapidly in water than on land, elephant seals haul out onto beaches while the radical molt occurs.

L

Elephant Seal Adaptation:

Black Pup Fur

Pups are born with soft, black fur attached to skin that is extremely loose and wrinkled. A newborn has no blubber, but gains weight very rapidly, nursing on milk that is up to 50 percent fat (human mother's milk is 4 percent fat). Until the pup has accumulated blubber, its black fur, which absorbs heat, helps the pup keep warm. The black coat begins to molt within 3 to 4 weeks, and is replaced by silvery-tan hairs, in a process that takes 2 to 3 weeks to complete.





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M

Elephant Seal Adaptation:

Sleep Apnea/ Breath Holding

Elephant seals' nostrils have the ability to remain closed when the animal is at rest. This allows the seal to sleep at sea without drowning. It also means the animal is not breathing while sleeping (sleep apnea). Upon waking, the nostrils must be snorted open. The apnea duration varies according to age, but can last between 4 and 10 minutes. Sleep apnea is a great strategy for conserving energy and water loss while on land.

N

Elephant Seal Adaptation:

Locomotion

The flippers of seals are different from those of sea lions, and therefore they move differently on land and in the ocean. Seals have shorter front flippers they hold close to their bodies as they swim, using powerful hip muscles and their rear flippers to propel them. Seals cannot rotate their rear flippers forward under their bodies. When moving on land they move with their front flippers and heave their bodies forward, undulating like an inchworm. Their rear flippers drag uselessly behind. Because they are not able to climb onto rocks, they haul out on low sloped, sandy beaches. When necessary, elephant seals can move very quickly for short distances.

O

Elephant Seal Adaptation:

Thermoregulation: Size Matters

Elephant seals are BIG. Males grow up to be 15 feet long and may weigh more than 5,000 pounds. Females grow to 9 feet long and weigh about one-third as much as adult males. Pups are 3 to 4 feet long and weigh 60 to 80 pounds at birth. Elephant seals' blubber accounts for much of their weight and is an adaptation to help them stay warm. The bigger an animal is, the less surface area (or skin exposed to the air) it has in relation to its volume, so it loses less heat.





Elephant Seal Adaptation Thermoregulation: Size Matters



Elephant Seal Bull
13-18 feet



Elephant Seal Cow
8-10 feet



Elephant Seal Pup
3-4 feet