Behavior, Reproductive and Social Strategies

- The behavior and social structure of *L. weddellii* varies seasonally and is characterized by the combination of inhabiting a terrestrial and aquatic environment.
- The behavioral ecology of *L. weddellii* is tied heavily to the species' reproductive and feeding habits. The species is highly polygynous, and paternal care is nonexistant (Shero et.al).
- Weddell Seals mate underwater, utilizing a harem mating strategy.
- The species is highly polygynous, and paternal care is nonexistant (Shero et.al)
- The reproductive females form colonies on the ice with other reproductive females to birth and nurse their young. Despite this group dynamic, there is little alloparenting (HÜCKSTÄDT 2018).
- Weddell seals have distinct foraging and reproductive seasons. Females maintain a more individual dynamic during the foraging period and form colonies during their reproductive, nursing season.
- Males maintain a spread out social structure throughout all seasons and their interactions with females are mostly limited to mating. Males do not congregate with other males and the interactions they do have are mostly aggressive or territorial (HÜCKSTÄDT 2018).

- The hybrid structure of being in a group dynamic during mating and nursing and more individual behavior in the foraging season allows *L. weddellii* to reap the benefits of both social structures during different points in the year. A group social structure has advantages such as maximizing limited space, defense of resources, some alloparental care (although allonursing is actively avoided ((HÜCKSTÄDT 2018)), and division of labor (Litt 2022a). By also frequently inhabiting an aquatic environment in less of a group structure, *L. weddellii* is able to limit some of the disadvantages of group structures while experiencing the benefits of a more individual social structure. They have less interspecific competition for food and resources when they are less social. Less social animals often experience the advantage of being able to avoid predators (Litt 2022a). Foraging individually rather than in groups renders the weddell seal less conspicuous to their predator which are mainly killer whales (Orcinus orca) (HÜCKSTÄDT 2018).

Communication

- Auditory communication is used frequently in the Weddell seal species. This includes making sounds such as sneezes, snorts and coughs as well as vocalizations (Charrier and Casey 2022)
- Vocalization is particularly important to Weddell Seals. Visual, olfactory and tactile communication is also used, especially between mother and pups but is arguably less of a factor in their overall behavioral ecology (HÜCKSTÄDT 2018).
- Vocalizations are utilized to facilitate mating by males and used by females and pups as a means to recognize and relocate each other (Charrier, Casey 2022).
- It has been recently identified that weddell seals are able to produce ultrasonic vocalizations (Cziko et. al 2020). Nine different recurring calls have been observed in the species that are composed of eleven vocal elements spanning the ultrasonic range (Cziko et al. 2020).
- Much of underwater communication is facilitated by males for mating purposes and defending territory (Charrier and Casey 2022).
- Because the vocalizations of *L. weddellii* are a relatively novel research topic, there is still little known about the sensory used in reception of calls. It has been hypothesized that these sounds could be used as a form of echolocation, similar to what is used by some other marine mammals such as dolphins and some whale species (Cziko et al. 2020)

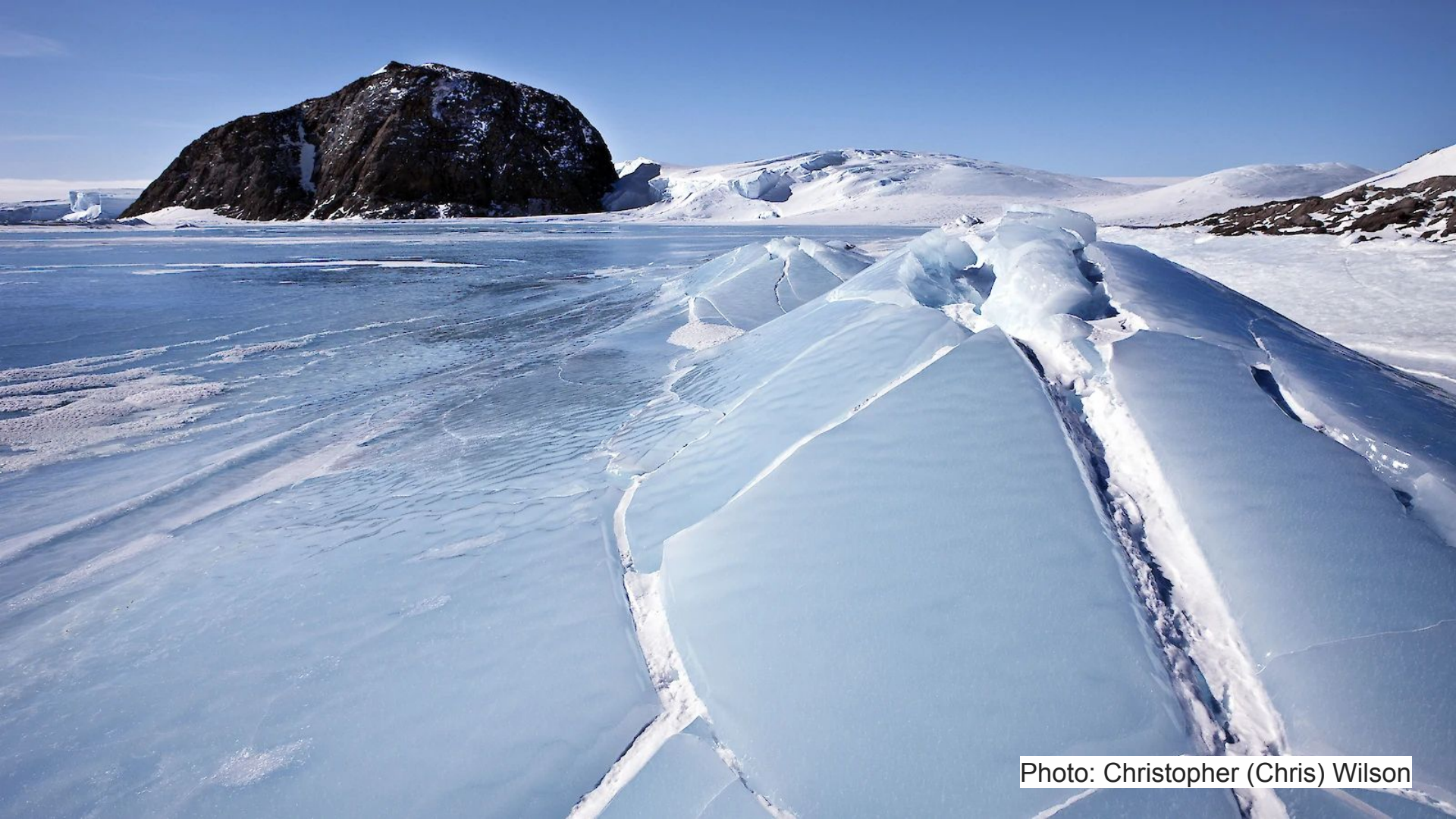


Photo: Christopher (Chris) Wilson

Photo: BBC

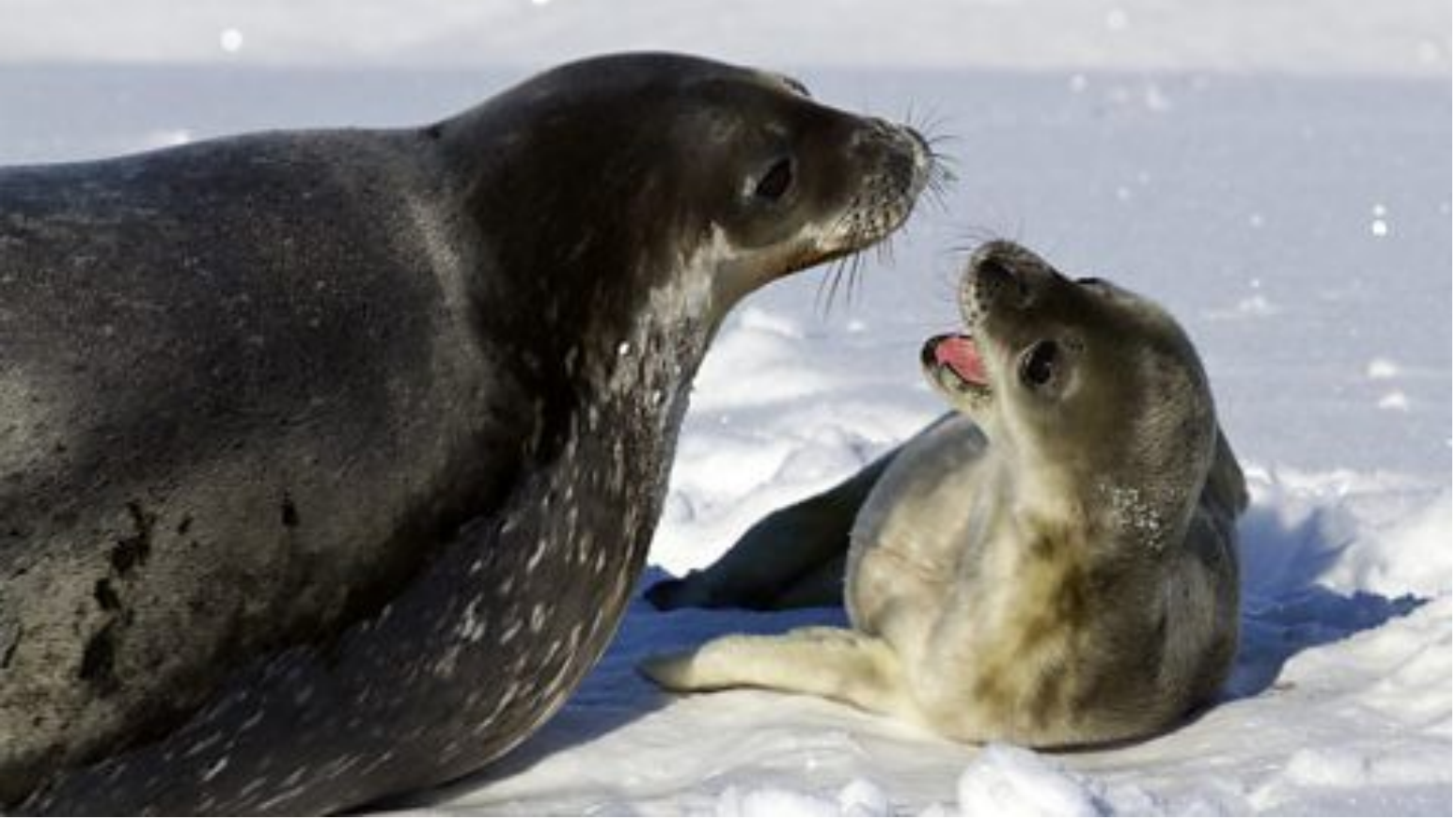


Photo: BBC

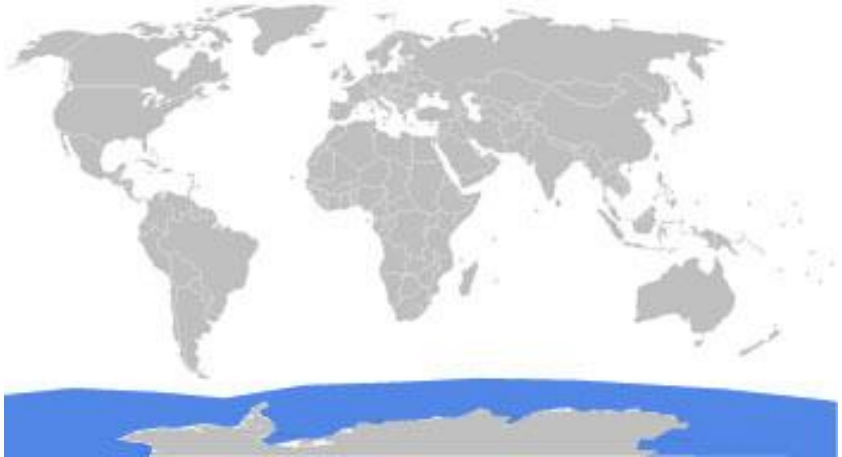
Common Names: Weddell Seal, Antarctic Seal

Class: Mammalia

Order: Carnivora

Family: Phocidae

Range:



Average Lifespan: 25 years

Size: This species is large in size ranging in weight from 400-600 kg and 2.5 to 3.5 meters in length with the females generally being slightly larger than the males (HÜCKSTÄDT 2018).

Habitat: *L.Weddellii* inhabit an area with some of the harshest conditions on Earth; the fast ice areas surrounding Antarctica

Diet: Weddell seals feed on a variety of fish species but have shown a preference for species in the *Trematomus* genus and *Dissostichus mawsoni* as this comprises approximately 50% of the seal's diet (Rumolo et al. 2020)

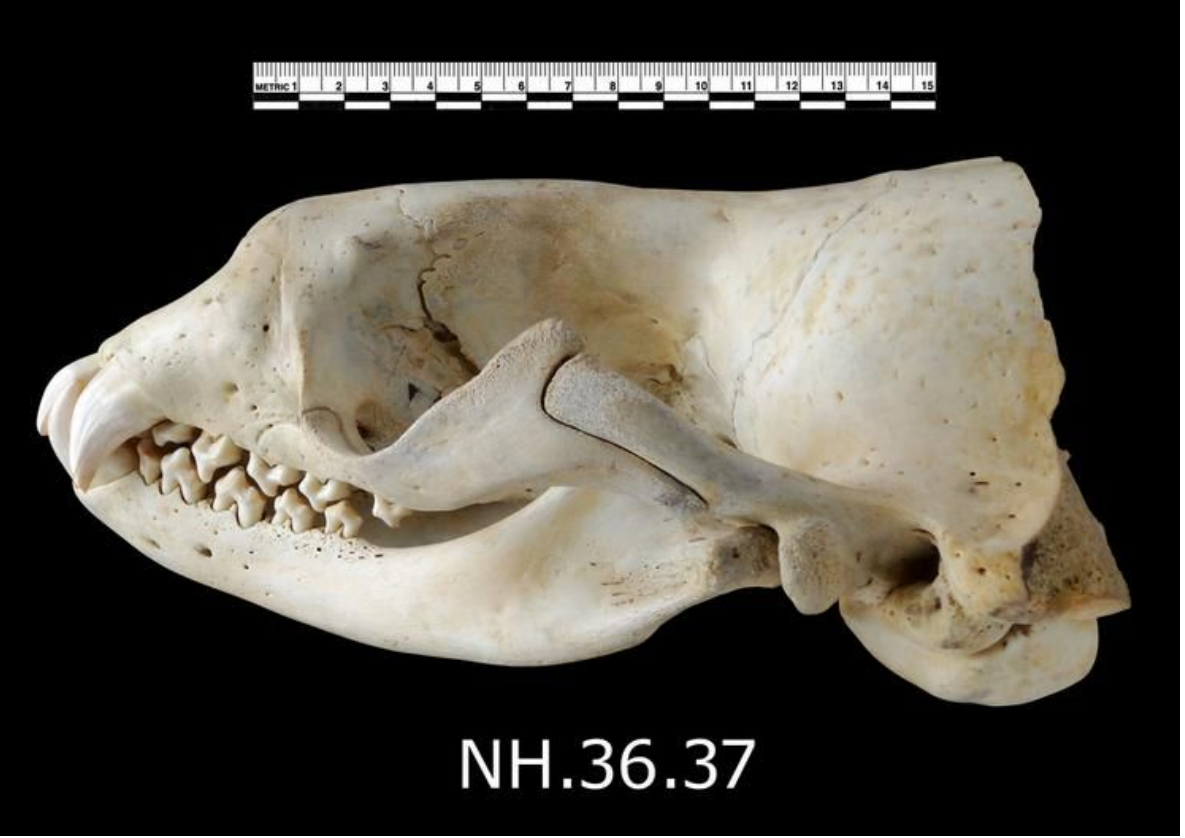


Photo: Horniman Museum and Gardens

Skull Features

Dental Formula: 2/2, 1/1, 4/4, 1/1

Skull adaptations: The large canines and robust zygomatic arch allow the Weddell seal to bore and maintain holes in fast ice which allow them to resurface for oxygen while hunting

The detention also assist the species in maintaining their carnivorous diet. The large canines and shearing teeth are indicative of their diet.

Conservation Status

- *L. Weddelli* is listed as a species of “least concern” but should not be overlooked when looking at the impacts of climate change. Warming temperatures have a direct effect on the freezing and thawing patterns in the fast-ice areas that the Weddell Seal inhabits. Changes in these patterns will likely have both direct and indirect impacts on the Weddell Seal.
- The species, in addition to other Antarctic seals are protected by the Convention for the Conservation of Antarctic seals (SeaWorld Parks & Entertainment).

Locomotion

- Weddell seals dive at to extremely deep depths that leave them submerged for over 60 minutes at a time (Kanatous et al. 2002)
- This species' anatomy is highly adapted to accommodate its locomotive behaviors and its physiology is regularly referenced to as a model species when studying deep diving mammals
- The respiratory system of the Weddell seal is adapted to accommodate their deep dives. Like many marine mammals, the lungs undergo compression collapse at depths over 70 meters. There is hyaline cartilage in the thacheo-bronchial tree extending to the terminal bronchioles. Additionally, there are large amounts of smooth muscle surrounding the most distal bronchioles (Boyd 1975).
- Weddell Seals have several common limb and body adaptations to move efficiently through water such as a fusiform shape, flattened tail, flippers and buoyancy-providing fat
- They utilize their hind flippers by moving in a horizontal plane to propel through the water.
- The Weddell seal moves most swiftly in its aquatic environment but their terrestrial locomotion is also vital to their survival and reproduction. The seals utilize their limited terrestrial locomotion to surface for air and the birth and wean their pups. They crawl supported by their abdomen or roll to move on the ice. They also have large claws on their front flippers that aid in gripping on the ice (HÜCKSTÄDT 2018).

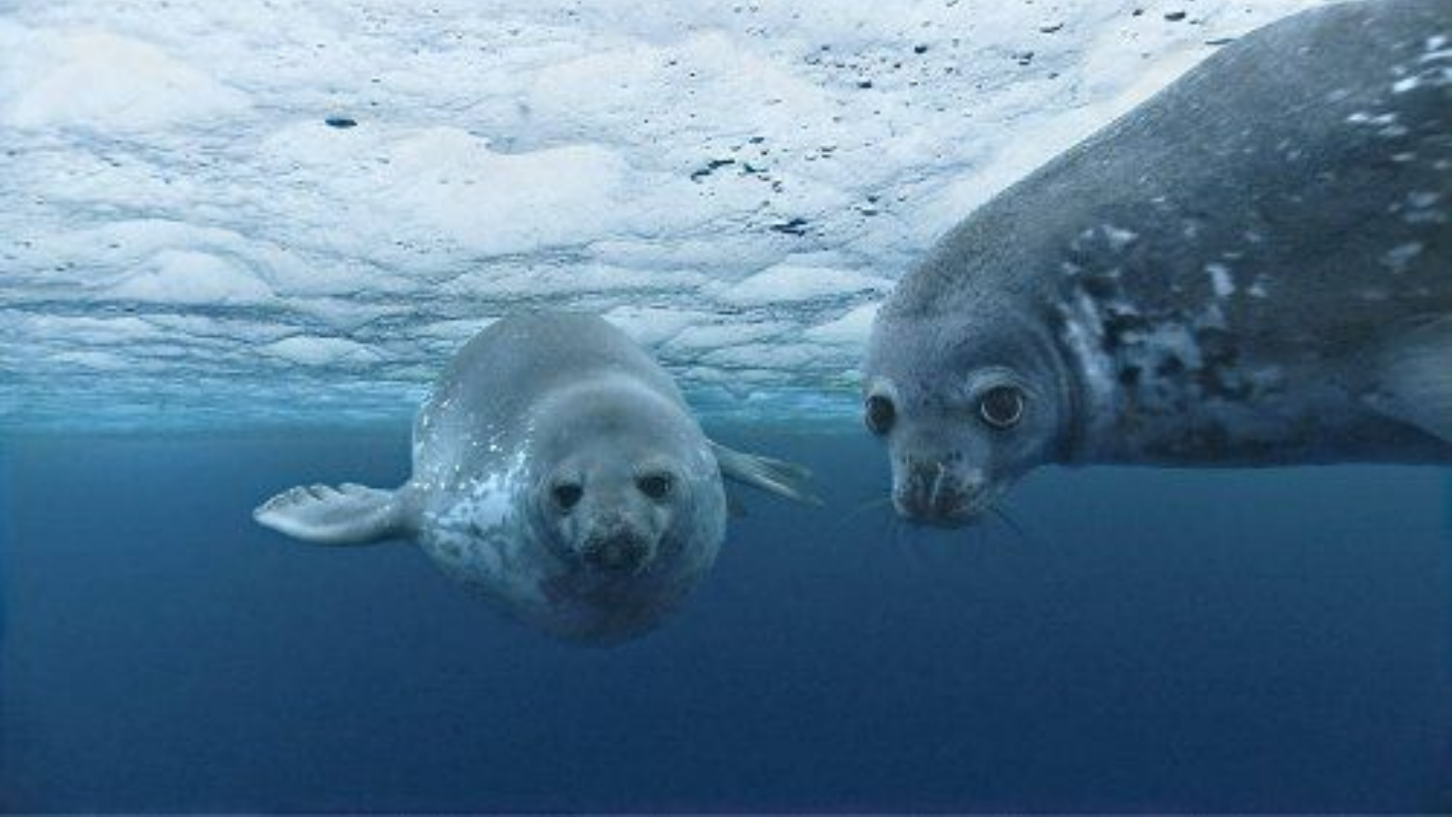


Photo: Knowledge Era

Thermoregulation

- Common to many mammals that inhabit extreme environments, the large body size of *L. Weddellii* creates a low surface area to volume ratio. Because heat is lost through the skin's surface and heat loss is proportional to the skin surface area, the large body size results in a more efficient metabolism (Litt 2022 B)
- *L. Weddellii* utilizes a thick lipid layer (blubber) beneath the skin to provide insulation from extreme cold temperatures. These anatomical traits render the Weddell Seal incredibly hardy to extreme cold temperatures and conversely, very poor in warm environments. The Weddell seal utilizes vasoconstriction and dilation as well for heating and cooling (HÜCKSTÄDT 2018).