



SUNTRUST PIER 225

California sea lions are currently experiencing an unusual mortality event. This means that the species is facing an increase in pups being stranded due to weaning before they are fully able to care for themselves. One part of the issue is that nursing mothers are primarily eating four types of prey to get essential nutrients: sardines, anchovies, market squid and rockfish. Anchovies and sardines are particularly important as they have more calories and a higher fat content that mothers need to sustain both themselves and their pups. There are several factors impacting the limited availability of these fish. Human fishing in particular is leading to an increase in competition for these fish because they are a large part of the economy in coastal areas. The importance of these fish leads to competition between the humans in that area as well as the sea lions. This competition isn't just between these two species, there are other species, such as humpback whales, that also hunt for anchovies.

Based on how anchovy and sardine populations are affecting sea lions, how could the limited populations of these fish be impacting the ecosystem? How does human activity impact this situation?



DOLPHIN COAST

The common bottlenose dolphin is found in temperate and tropical waters. Some dolphins travel great distances, possibly following food sources, while other dolphins stay in an area of about 42 (mi2). Bottlenose dolphins need to consume 5-7% of their body weight in fish everyday and will use a variety of hunting techniques to catch their prey. The need to acquire the energy necessary for survival means dolphins hunt frequently and must utilize speed and acceleration to accomplish these different techniques. Adult dolphins swim at an average of 3-7 miles per hour (mph) while at leisure and while hunting. Dolphins have been recorded swimming up to 18 mph to catch particularly fast fish, but they can only maintain that speed for short distances. One hunting technique is to encircle a large school of fish and herd the fish into a small, dense mass then take turns rushing in and eating.

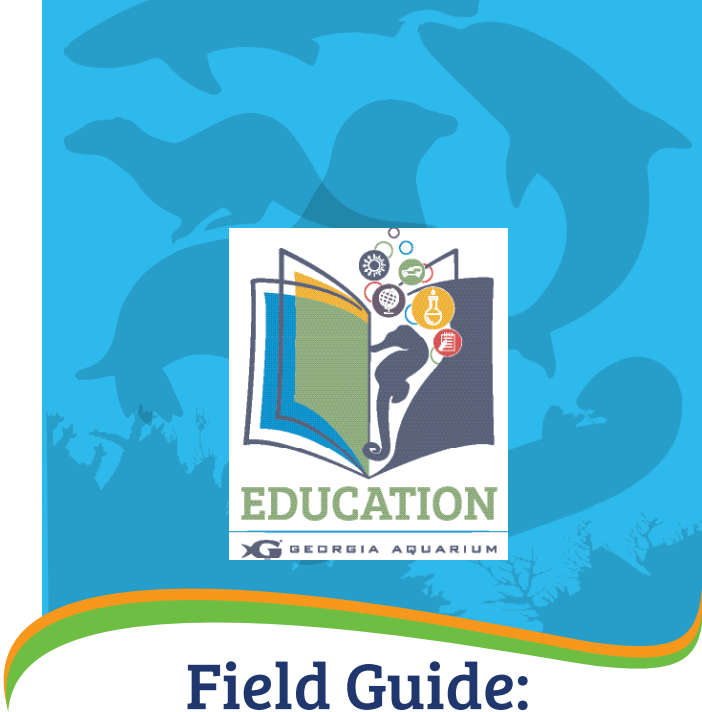
If a dolphin is traveling north at max speed, what is the velocity? Acceleration is a change in direction in velocity, if a dolphin is using the encircling technique, how frequently are they accelerating? Different kinds of relationships can be observed throughout Georgia Aquarium. Use the space below to make notes about the different relationships.

RELATIONSHIP NOTES



Checkout these resources for more information!

- <https://gpb.pbslearningmedia.org/resource/midlit11.sci.splgrav/forces-of-gravity-and-air-resistance/>
- https://www.teachengineering.org/activities/view/van_troll_lesson02_activity1



Field Guide:
Commotion in the Ocean
Grades 6-8

Water plays an incredibly important role in our lives and the lives of other organisms. Water also has the power to alter environments and landscapes. Erosion caused by water can particularly impact shorelines, which lack natural systems to prevent erosion. Water can also aide animals in moving vast distances. The changing tides and currents can impact a great deal of wildlife and the areas they inhabit, including the areas humans fish. This change in habitat for fish can lead to increased competition between humans and local wildlife. Many governments are making conservation efforts a priority to help prevent the negative impacts that result from the competition between humans and wildlife. As waters and environments are altered due to a variety of reasons, some animals are able to adapt to their changing environments. These adaptations can be seen in new phenotypes over many generations. Take a quick dip into these concepts with some fascinating species housed at Georgia Aquarium.



TROPICAL DIVER

Coral reefs are some of the most beautiful habitats in the world. While coral reefs promote ocean diversity, corals themselves have substantial genetic diversity. There are a few ways coral can reproduce, but one way in particular is dependant on ocean currents. That method is called broadcast spawning. Corals release their gametes into the water where they will float to the surface to join together to form a planula. Planula will swim for a bit then sink to the bottom, anchoring to a hard surface. This method depends upon the surface currents to carry the planula to other points in the ocean to successfully reproduce. Surface currents are influenced by the Coriolis effect. The Coriolis effect is the deflection caused by a force that acts on objects that are in motion relative to a rotating object. In this case, the object in motion would be the ocean wave and the rotating object would be the earth. Due to only a single rotation per day, the Coriolis effect is usually small, but the effect is more noticeable for motions over large distances and a long period of time. It is also strongest near the poles where the rate of change of the earth's surface is greatest. This effect causes ocean currents to rotate clockwise north of the equator and counter clockwise, south of the equator.

If a coral broadcast spawns near India (south of the equator), which direction would ocean currents take the gametes, left or right? How is the information helpful for researchers studying coral reproduction?



OCEAN VOYAGER:
BUILT BY THE HOME DEPOT

Along the tunnel of Ocean Voyager, are reef balls (large hole-filled rock formations). These man made objects are used as a home for fish and as additional shelter in the habitat. Outside of Ocean Voyager these reef balls are used to help prevent shore erosion in parts of the world and help boost biodiversity. Shore erosion is a natural process brought on by waves, currents and tides. The waves and tides help both build and tear away the sediments that make up a shoreline. Erosion happens when sediments are being pulled away quicker than they can be replaced, leading to a slow reduction of the shore. The reef balls, such as those seen in this gallery, can be used to help build mussel populations which can act as a wavebreak, weakening the strength of the waves and preventing more sediments from being washed away.

How can the build up of mussel populations through reef balls help improve biodiversity? What risks would shore erosion pose for people living along the coast? If shore erosion is a natural process, why would this be more of an issue now than in the past?



COLD WATER QUEST

Beluga whales use sounds to navigate the dark waters they live in. This action is called echolocation. Echolocation occurs when an organism produces sound waves and sends them out into the environment. The sound waves bounce off solid objects and return to the organism, helping it understand the location of those objects in reference to itself. Beluga whales make whistles and other sounds utilizing special nasal cavities near their blowhole and then use their melon, a fatty deposit on their head, to aim the direction of the sounds. Sound, just like light, travels in waves meaning it is impacted by both the pressure and the density of the medium it is traveling through. If a sound is presented in something of the same pressure but a different density, it will change how far and how intense the sound wave is. For instance in water, a sound wave can travel much further and more intensely than in air. This is because water is more dense, giving more for the waves to bounce off of. Water also reduces the amount of energy needed for waves to travel greater distances. However, sound will not travel in space as it is a vacuum. In space, there is nothing for the sound waves to bounce off of, and there is no medium to carry the waves through the vacuum. Pressure also makes a difference in the distance a sound wave can travel. If a beluga whale is near the surface of the water, it's sound wave would travel much further than if it was 100 meters deep due to pressure at that depth.

Based on the information above, if both are traveling under the same pressure would a bat or beluga whale "see" further? Under what conditions would the opposite animal be able to "see" further?



SOUTHERN COMPANY RIVER SCOUT

The red-eared slider is native to western Georgia. However, they can be found all over the state and are considered an invasive species. Not only are they invasive to parts of Georgia, but they have invaded habitats all over the world. This is due to the red-eared slider being a popular pet choice and later being released into non-native habitats for various reasons. All turtles have genetic coding to have a carapace, the top part of their shell, but each species inherits from their parents' a specific carapace shape, size and pattern. The environment the turtles live in also has an effect on their physical characteristics. When these physical characteristics are affected by genes and an animal's environment, it is known as a phenotype. The red-eared slider is more likely to experience melanism, or fully black body coloration, in specific locations thus exhibiting the relationship between genes and environment to produce a phenotype.

What is another genetic characteristic of the red-eared slider? Can you name another example of a phenotype among animals?