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The ship calmly edged its way through the dark night, its gray knife-like bow slicing through the black water with silent ease. In the ship's wake, dolphins surfed the powerful surges of water, cameras glinting from their fins, while handlers on board monitored the dolphin's movements on computer screens. The GPS beeped once, twice. A handler on the boat's side gave the signal, and the boat engine stilled. The dolphins dove into the water, clicking and darting forward, disappearing into the ebony waters.

These dolphins may have been trained to find and recover American swimmers, alert their handlers to enemy presences, identify underwater mines, or even plant explosives on enemy ships. They are difficult to thwart, as all of their natural adaptations make them the perfect marine asset.

The US Navy Marine Mammal Program has trained dolphins and sea lions as military assets, and these animals have been used successfully for security details and other important purposes. However, there is a potential for so much more.

There are four taxonomic marine mammal groups: cetaceans, pinnipeds, sirenians, and marine fissipeds. These groups include many different whales, seals, manatees, sea otters, and other creatures native to North America. Currently, the military publicly makes use of two. If the American military were to expand its marine mammal program, it would find valuable resources in the ranks of American species, as well as create many exciting STEM careers in its branches.

Currently, Navy-backed research on harbor seals utilizes GPS monitoring to record more complete and accurate information. The seals are tracked using GPS tags that have been adhered to their fur using epoxy. Whenever the seals surface, and there is a clear, cloud-free sight line from the tag to the orbiting satellite, more data on the harbor seal's movements - data which includes recordings on depths, temperatures, and wetness levels - is sent back to scientists, for interpretation. Using this method, scientists can gather more effective data on the whereabouts of harbor seals, and can keep tabs on the animals. Radio waves cannot penetrate through water, so it is key that harbor seals surface and spend time on land, as it allows the collected information to be relayed to the satellite.

This tagging system could be applied and expanded to other marine mammals, as they must surface at regular intervals to breathe, making tracking them more feasible and reliable. Additionally, utilizing this advanced tracking system to monitor animal behaviors, such as shifts in movement patterns and habitat preferences, can alert scientists to oncoming natural disasters or other environmental disturbances. This discovery could be taken a step farther, and be used in the monitoring of American coastlines for unnatural activity or potential foreign threats by watching animal movement patterns.

The glue-on tags used to track harbor seals are designed to fall off when the seal molts its fur. Further tech development could result in cost-effective biodegradable tags, so that the technology cannot negatively impact the environment, and the tag design could not be stolen and misused by enemies or non-military industries in times of war. Such a need for technological development would create more STEM-oriented careers in this field in the military.

An expansion of marine mammals in military operations would also require scientific behavioral specialist careers. Current research has demonstrated that harbor seals exhibit an awareness of approaching disasters and environmental change, as mentioned before. Behavioral specialists could discern the meaning behind certain animal patterns, and interpret their actions to draw conclusions on

what the behavior is warning of. Additionally, scientists studying harbor seals have noted that their behaviors could be translated to apply to other marine mammals, demonstrating how behavioral specialists could help the military make use of the diverse array of nature's skill set; applying harbor seal's behavior to understand that of whales, otters, seals, dolphins, and more.

Scientist Monica DeAngelis, presenter of The Science of Seal Tracking informational video, is an inspirational example. As a woman in science, she has achieved success in several aspects of biology - working as a lab technician, conducting genetic and photogrammetry studies, advocating for marine mammals, and now working as a marine mammal biologist for the Navy. Her impressive career reminds me to never stop exploring and learning, as well as demonstrates the many specialties that marine mammal biology involves. Her work illustrates the unique careers the Navy stands to gain from the increased inclusion of marine mammal studies.

In addition to making increased use of the unique resources found in American waters, the integration of marine mammals into military endeavors would correlate with an increase in civilian conservation efforts, due to military interest. Currently, marine life faces threats from pollution, overfishing, and a rising acidity and temperature in the oceans, which affects both food resources and habitat for many marine creatures - all issues that can be combated, with the cooperation of the public and the government. By recognizing and devoting more research to the potential of our unique ecosystems, America would make better use of her natural resources, placing higher value and priority on marine life and thereby taking better care of it.

It is important for the American military to adapt to incorporate marine mammals in military operations, and remain at the forefront of military evolution. In 2019, a beluga whale with a Russian harness strapped to its body was discovered off the coast of Norway. The animal was dubbed Hvaldimir by the Norwegians and is thought to have been part of a Russian research program. Satellite images depict pens outside of Russian naval bases filled with marine mammals, presumably being trained. As foreign nations forge on in discovery, so should America. It is time to discover what skills our unique set of marine mammals from three bordering oceans have to offer.

By 2040, the world may have quantum computing, orbiting satellites providing wireless connections everywhere on earth, facial recognition in policing systems, extensive online spyware, and even flying skateboards that float using magnetism. We could also be suffering from heightened global temperatures, endangered or extinct wildlife and their broken food webs, extreme weather events, and growing foreign threats. Starting now, we can bring more attention to our struggling ecosystem by placing value on it, and begin training marine mammals to help us face the threats of the future. Starting now, we can build the greatest collaborative maritime military the future has ever seen.