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SEA OTTERS: A KEYSTONE SPECIES STRUGGLES TO SURVIVE

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Sea otters, scientifically known as Enhydra Lutris, are marine mammals with webbed feet and water-resistant fur. The sea otter also has a large nose, expressive eyes, and a plush coat of fur, attributes that contribute to its widespread appeal (*Sea Otter*, n.d.). Despite their charm, these endearing creatures are endangered due to historical factors such as the Fur Trade, driven by the demand for their pelts. However, over time, a growing awareness of the

sea otters' significance led to a shift in perspective. Consequently, the end of the Fur Trade was accompanied by increased protection efforts by animal rights organizations, ensuring the safeguarding of these marine mammals. This protection is paramount because sea otters play an enormous role in maintaining balance in the marine ecosystem. They play an essential role in marine ecosystems by preying on creatures that disrupt the balance of underwater areas, such as kelp forests, embayment, and estuaries. This unique role designates them as *keystone species* that significantly impact their environment more than other species (*Sea Otter*, 2022).

Background

The term keystone species was coined by Dr. Robert Paine, an ecologist, who conducted experiments involving starfish removal from a shoreline rock in Washington. He observed that starfish were natural predators of mussels and wanted to explore the effects of

predator presence on the ecosystem. In 1963, the prevailing belief was that producers determined the entire food chain's population. However, Dr. Paine's experiment revealed a different reality. Over time, the absence of the starfish drastically transformed the ocean landscape, leaving only mussels. This discovery led Dr. Paine to conclude that certain species hold more significance than others due to their influence on other species' populations, deeming them keystone species. Without keystone species, there would be a devastating imbalance, also known as trophic cascades. Each species occupies a specific trophic level in a trophic cascade, with keystone species typically positioned at the top and producers at the bottom. When a top-level species faces challenges, the trophic level immediately below it can experience an overpopulation, affecting species at the lowest trophic level. This dynamic illustrates the intricate connections between different species within an ecosystem and underscores the importance of keystone species in

maintaining ecological harmony (Biointeractive, 2016; *Sea Otters Are Ecosystem Superheroes*, n.d.; Fanucci, 2017).

Sea otters exemplify this ecological principle. They serve as a check on sea urchin populations, which can disrupt the stability of kelp ecosystems. By uprooting or devouring *holdfasts*, – the kelp's anchoring structures resembling roots – sea urchins hinder kelp's ability to thrive. Though lasting around a decade, holdfasts allow for new kelp growth during their four-week lifespan (Kennedy, 2019; *What Lives in a Kelp Forest*, n.d.). The role of sea otters in controlling sea urchin numbers is critical. Left unchecked, sea urchins would reproduce rapidly and can decimate holdfasts, impeding kelp growth (Schueman, 2023).

Sea Otter Advantages

Beyond direct predation effects, the mere presence of sea otters is advantageous. Sea urchins retreat to evade sea otter consumption, avoiding kelp regions and

consuming floating debris instead (Schueman, 2023). Although some studies argue that sea otters may not drastically impact kelp forests, their substantial dietary requirements suggest otherwise, with adults needing a quarter of their body weight in food (McKie, 2016). For instance, sea otters in the southern Pacific Ocean weigh as much as 50 pounds for females, while males can weigh in at 70 pounds, and consume 12.5 and 17.5 pounds, respectively – a stark contrast to human consumption of 3 to 5 pounds daily. Sea otters in the North are heavier, consequently needing a higher food intake (*Sea Otter*, n.d.; CSCS, 2009). Therefore, the potential consequences of even a minor decline in sea otter populations are significant. Especially as a keystone species is intricately woven into ocean ecosystems, their impact reverberates widely. Paine's seminal research on starfish offers scientific support for the vital role of keystone species in ecosystem stability. This reinforces the imperative of safeguarding the

sea otter population to ensure the health and equilibrium of marine environments.

Besides sea urchins, crabs also constitute a significant portion of the sea otter's diet. The consumption of crabs by sea otters holds significance, as an excessive crab population can lead to excessive hole-digging and destabilizing underwater banks. Various ecosystem elements, like slugs, kelp forests, and algae, depend on sea otters to eat crabs because steady banks give the sand a secure form, making stable homes for these species (Schueman, 2023). Additionally, an overabundance of crabs negatively impacts eelgrass as well, as the crabs' prey, sea slugs, are needed to consume the algae covering eelgrass (*Sea Otters Are Ecosystem Superheroes*, n.d.). The vitality of eelgrass lies in its role in the management of aquatic conditions, the strength of coastal edges, and the supply of shelter and sustenance for diverse species. It also serves as a "shallow nursery habitat for fish and other

marine species" (McGowan et al., 2020, p. 10). Furthermore, eelgrass contributes to carbon sequestration by transferring carbon in the air and moving it to its interior, such as inside sediments or roots. This supports the contention that sea otters not only benefit the ocean but also play a vital role in global ecology by lowering atmospheric carbon dioxide levels (McGowan et al., 2020). This is of global importance because kelp forests, similar to eelgrass, serve as carbon dioxide absorbers, which can reduce the greenhouse effect that creates climate change.

Sea Otter's Challenges

Despite the sea otter's essential role in maintaining the marine ecosystem, they continue to struggle to survive as a species. This struggle traces back to the Fur Trade, which was a period when the international exchange of furs for other goods was popular. The Fur Trade started in 1741 when Vitus Jonassen Bering, a Danish sea captain, found sea otter fur to be valuable along with its meat, which

Bering and his crew had to eat to survive when their ship crashed onto the islands. Later, Bering's ship traveled to Vancouver Island to get otter pelts, which yielded substantial profits. News of their success spurred New England and France to join the hunt for sea otters in the late 1700s. After 1777, prices of sea otter pelts initially decreased because of a large supply, then surged again in the mid-19th Century because of sea otter scarcity.

In the 1820s, California's sea otter population declined significantly to the point of extinction due to overhunting. After 1807, big enterprises hunted sea otters until the 1830s, when the sea otter population collapsed due to careless hunting practices, mirroring earlier experiences (Im, 2013). Before the "mid-1700s, "the sea otter population, once numbering "150,000 to 300,000… in coastal waters throughout the North Pacific Ocean," dwindled to "a few thousand" due to commercial hunting. (*Southern Sea Otter*, n.d., para. 1).

Then, the Northern Fur Seal Treaty between Britain, Russia, and America was signed in 1911, curbing impetuous hunting (Im, 2013). Furthermore, enacting the Marine Mammal Protection Act in 1972 provided additional protection for marine mammals. By 1977, the U.S. Fish and Wildlife Service declared 1982 as a year to restore the sea otter population, which was threatened by oil pollution. However, the number of sea otters decreased in 2017 for unknown reasons (*Southern Sea Otter*, n.d.). The sea otter is now regarded as an endangered species, with the number of them proceeding to decline (*Sea Otter*, 2010).

The decline in sea otter populations is due to many factors including uncontrollable elements like shark attacks or interactions with other animals (Southern Sea Otter, n.d.). However, this does not imply that humans are entirely blameless. Dr. Tim Tinker, a biologist specializing in fauna studies, emphasizes that land-based pollution

poses a significant danger to sea otters (*Sea Otter Conservation*, n.d.).

Discussion

There are actionable steps to help protect the sea otter population. Reducing dumping into the ocean products harmful to sea otters, such as oil and chemicals, is crucial. Properly disposing of such pollutants prevents their entry into the ocean through storm drains and sewer systems, safeguarding sea otters from harm or death. Also, choosing eco-friendly alternatives to the automobile, like biking, carpooling, or taking public transportation helps reduce oil usage, as does recycling used oil. Harmful substances like household chemicals, pet waste, and fertilizers, should be disposed of correctly to prevent accidental contamination of the ocean. (*Sea Otter Conservation*, n.d., paras. 5 & 7). For instance, proper disposal of cat waste is essential due to the risk of

toxoplasmosis transmission to sea otters, as sewage treatment plants do not eliminate the infection's eggs.

Wetlands near the coast intercept and sponge up pollutants and instill hope for conservation efforts. Therefore, contributing to juridical initiatives and resident projects aimed at wetland enhancement, and other courses of action advocating for sea otter protection are meaningful actions (*Sea Otter Conservation*, n.d.).

Conclusion

Sea otters have significant importance as a keystone species. Their role goes beyond maintaining the marine ecosystem balance by preying on disruptive animals and preventing trophic cascades. By regulating destructive species, sea otters stimulate the expansion of the bottom trophic level. The thriving producers, in turn, aid in carbon dioxide sequestration, contributing to mitigating global warming. However, despite this, sea otters confront a critical challenge as an endangered species, starting from

the overhunting during the Fur Trade, persisting to this day. Fortunately, opportunities are available to help these animals, considering our significant impact on their survival. Supporting organizations dedicated to sea otter conservation, particularly those focusing on wetlands, can significantly contribute. Additionally, responsibly managing and reducing pollutants before they find their way into ocean waters can help prevent otters from falling ill. Collective efforts can greatly contribute to restoring sea otter populations.

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