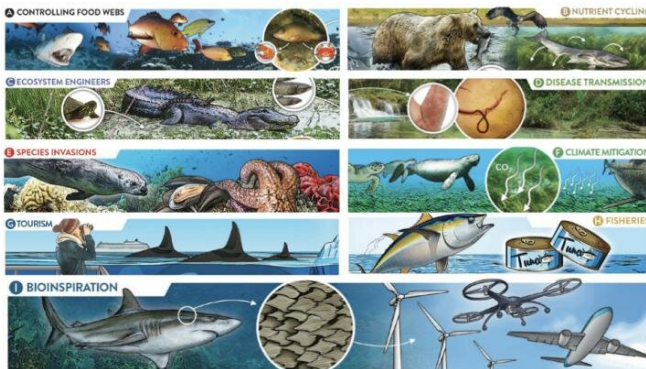


New study explores impacts of marine and freshwater predators on ecosystems and society

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Evolution). Credit: Hiram Enriquez

A new study from a team of leading scientists reports on the diverse ways that aquatic predators, such as sharks and alligators, can impact ecosystems and also benefit human society. The study shows how these important ecological processes and ecosystem services to society can break down or recover from population losses and recoveries of aquatic predators.

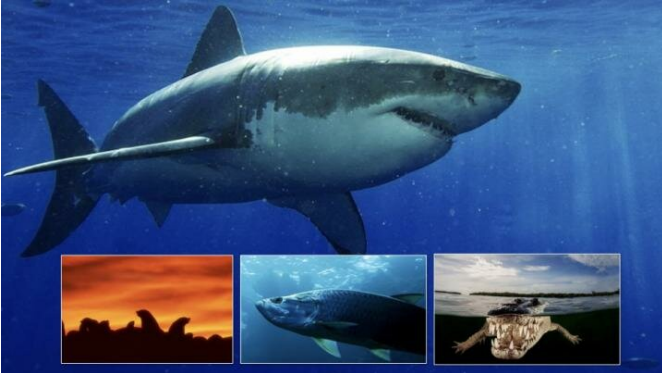
Aquatic predators can affect both their ecosystems and the human societies that depend on them in numerous ways. (A) Controlling food webs: sharks alter the abundance, diversity, behavior, diet, and shape of coral reef fishes they consume. (B) Nutrient cycling: spawning migrations of Pacific salmon effectively transfer nutrients from oceans to rivers, streams and lakes, via nutrient excretion, salmon consumption by predators, and through decomposition of carcasses post spawning. (C) Ecosystem engineers: in wetlands, alligators bulldoze sediments and vegetation, creating water-filled "alligator holes", which serve as critical habitat for fishes and turtles and sources of drinking water for birds and small mammals. (D) Disease transmission: in tropical rivers, predatory prawns eat the snails that are hosts for human schistosomiasis. (E) Species invasions: off the Pacific Northwest, sea otters and large starfish selectively feed on native mussels, facilitating the invasion of an exotic bryozoan by reducing competition for space. (F) Climate change mediation: in Western Australia, the presence of tiger sharks appears to cause dugongs and sea turtles to limit their consumption of seagrass, which increases primary production, CO₂ uptake, and maintains sediment carbon stocks. (G) Tourism: viewing of toothed-whales creates jobs and supports local economies (H): Fisheries: humans depend on fish as a source of food, recreation (angling), and jobs. (I) Bioinspiration: novel materials engineered with shark skin-mimicking surfaces are being used to design more aerodynamic drones, planes, and wind turbines. Image modified from Figure 1 in Hammerschlag et al. (2019, Trends in Ecology &

"Aquatic predators can influence their ecosystems by keeping prey populations in check, controlling the flow of nutrients, preventing the spread of diseases and invasive species, and even creating new habitats for other organisms," said lead study author Neil Hammerschlag, a research associate professor at the University of Miami (UM) Rosenstiel School and Abess Center for Ecosystem Science & Policy. "In addition to benefiting humans as food, they are highly sought after for [sport fishing](#), scuba diving and ecotourism, which creates thousands of jobs."

The study also describes how aquatic predators can moderate [climate change](#) effects and have become inspiration for new products, such as shark skin-mimicking surfaces, being used to design more aerodynamic drones and planes, as well as the development of new medicines.

"To aid in future investigations, we identified 16 priority research questions," said Steven Cooke, study co-author and professor at Carleton University, Canada. "One of the most critical is understanding how climate change is affecting the ecological roles of aquatic predators and the services they provide to humans in a changing world."

The study concludes with a framework to aid policy makers and wildlife managers in supporting adaptive decision making involving aquatic predators within a context that maximizes their ecosystem function as well as the benefits they provide to humans under current and future [environmental change](#).



Predators from marine and freshwater habitats, such as sharks, seals, tarpon and crocodiles, can impact ecosystems and also benefit human society in various ways. However, a new study reveals how resulting important ecological processes and associated benefits to society can break down or recover from population losses and recoveries of aquatic predators. Credit: Shark, tarpon and cape fur seal: Neil Hammerschlag, Ph.D. American Crocodile: Massimo Giorgetta

The study, titled "Ecosystem Function and Services of Aquatic Predators in the Anthropocene", DOI doi.org/10.1016/j.tree.2019.01.005 was published online in the journal *Trends in Ecology & Evolution* on March 8, 2019.

More information: Neil Hammerschlag et al, Ecosystem Function and Services of Aquatic Predators in the Anthropocene, *Trends in Ecology & Evolution* (2019). DOI: [10.1016/j.tree.2019.01.005](https://doi.org/10.1016/j.tree.2019.01.005)

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