

Study finds black bears in Yosemite forage primarily on plants and nuts

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Black bear in the Canadian Rockies. Image: Wikipedia.

Black bears in Yosemite National Park that don't seek out human foods subsist primarily on plants and nuts, according to a study conducted by biologists at UC San Diego who also found that ants and other sources of animal protein, such as mule deer, make up only a small fraction of the bears' annual diet.

Their study, published in this week's early online edition of the journal *Methods in Ecology and Evolution*, might surprise bear ecologists and conservationists who had long assumed that [black bears](#) in the Sierra Nevada rely on lots of protein from ants and other insects because their remains are frequently found in bear feces. Instead, the researchers believe that bears likely eat ants for nutrient balance.

Rather than relying on indigestible foods found in bear feces for

information about the importance of digestible bear foods, the UC San Diego ecologists looked at the digestible foods that were used to produce bear tissue. They accomplished this by measuring the abundances of carbon and nitrogen isotopes found in different species of plants and animals, and used a statistical approach to relate them to the carbon and nitrogen isotopes measured in bear hair. This allowed the scientists to quantify what the bears ate, then assimilated into their hair.

The scientists also applied the same technique to Norway rats in Alaska's Aleutian Islands and determined that this invasive species subsisted largely on terrestrial plants and seasonal pulses of marine amphipods, rather than marine birds as had been long assumed.

"Rats tend to dominate the habitats they invade on islands, killing much of the native fauna, especially birds, which is a serious conservation issue," said Carolyn Kurle, an assistant professor of biology at UC San Diego who conducted the study with Jack Hopkins, a postdoctoral fellow. "Using [stable isotopes](#), we confirmed that [marine birds](#) have been extirpated to such levels on the islands where we worked that rats don't eat them anymore."

"Both rats and black bears are omnivores with complex diets consisting of both plants and animals," said Hopkins. "To our knowledge, no study before this has accurately estimated the relative importance of plants and animals to the diets of these omnivore populations."

Hopkins said he and Kurle found in their study that plants and acorns are black bears' primary food sources in Yosemite. "We also learned that female bears foraged for high-fat acorns and pine nuts more heavily than males, suggesting that females likely need these seeds for reproduction. This could be a real problem for Sierra black bears in the future if blister rust continues to kill sugar pines and sudden oak death moves in from the coast."

Besides resolving the issue of what black bears and Norway rats actually use for growth and function, the scientists said a major goal of their study was to demonstrate how the use of stable isotopes derived from animal tissues and their prey could be used to quantify the resource use of other omnivores with complex diets.

"Ecologists currently focus too much attention on measuring the variation of isotope data for consumers and their prey and not enough attention on quantifying the interactions of consumers and their prey using isotope data," Hopkins explained. "Measuring such interactions and their relative strengths can help us understand the impacts animals have on their environment."

Over the past two decades, black bears in Yosemite were involved in more than 12,000 reported incidents within the national park, injuring nearly 50 people and causing \$3.7 million worth of property damage. In response to these problems, Congress has appropriated over \$8 million since 1999 to mitigate human-bear conflicts in Yosemite.

Those efforts appear to be working. In a study published last year in the journal *Frontiers in Ecology and the Environment*, Hopkins and other scientists measured the stable isotopes of carbon and nitrogen in the hair and bone of Yosemite bears over the past century and found that since 1999, the proportion of human-derived food in bear diets has dramatically declined.

"Yosemite bears currently consume human foods in a similar proportion as they did in the early 1900s," said Hopkins. "This suggests a notable management achievement in the park, considering that thousands of people visited Yosemite annually in the early 1900s, while about four million people visit each year today."

Provided by University of California - San Diego

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