

Climate change is luring Kodiak bears away from their iconic salmon streams

August 23 2017

Kodiak brown bears are abandoning salmon-their iconic prey-due to climate change, according to a new study.

The bears are more interested in chowing down on early-arriving red elderberries. The likely result of this "prey switch," the researchers conclude, is a disrupted ecosystem on Alaska's Kodiak Island.

The research was conducted by biologists at Oregon State University, University of Montana's Flathead Lake Biological Station, and Kodiak National Wildlife Refuge.

The findings were published this week in the journal *Proceedings of the National Academy of Sciences*. The bears-the largest in the world-typically gorge on [sockeye salmon](#) in the summer. But in 2014, researchers were surprised to see streams in the Kodiak National Wildlife Refuge full of salmon-with no bears in sight. The scene repeated itself the next year.

"Prior to that summer, we found streams that were littered with thousands of shredded salmon carcasses," Will Deacy, a postdoctoral researcher in OSU's College of Agricultural Sciences and lead author on the study. "In 2014 and again in '15, we were stunned to find such a strikingly different scene. There were piles of rotting, intact carcasses that had died after spawning instead of being killed by bears."

It turns out the bears were on the hillsides, feeding on abundant red

elderberries, which typically ripen after salmon have finished spawning in streams. Wild fruit, chock full of carbohydrates, is typically an important part of a brown bear's diet, especially when the spawning salmon are gone.

Until recently, the bears would eat fish for most of the summer and then move on to the berries, which typically ripen at the end of the salmon season and are available from late August into early September. Bears are generalists that consume dozens of different foods throughout the year, but sockeye salmon and red elderberries are key foods for them.

The researchers found that due to warm spring temperatures on Kodiak, the berries were developing fruit weeks earlier, at the same time as the peak of the salmon migration; 2014 was one of the warmest years on the island since record-keeping began 60 years ago. Although there will continue to be considerable variation in Kodiak's climate, the warming trend is likely to continue.

The research team analyzed the bears' scat to find direct evidence that the bears were consuming the berries and not the salmon.

"An earlier berry crop shut down one of the most iconic predator-prey scenes in nature," said Jonny Armstrong, an ecologist at OSU and member of the research team. "As climate change reschedules ecosystems, species that were once separated in time are now getting a chance to interact—in this case the berries, bears and salmon. This is going to have large impacts that are hard to predict."

For example, birds that depend on bears pulling salmon out of the stream, could be seriously affected, he said. Other far-reaching effects may include changes in bear demographics due to the change in their diet, evolving salmon populations and impacts on plant pollinators.

"It is a strange, indirect effect of climate change," Deacy said. "These bears eat dozens of different foods throughout the year but now two of them are overlapping. This is causing a disruption in the food web that could have profound implications for the ecology of the island."

The abundance of [salmon](#) and berries on Kodiak Island are why there are so many bears there, and why they are so large, said Jack Stanford, director emeritus at the University of Montana's Flathead Lake Biological Station and one of the study's co-authors.

"This overlap in their resources forces the bears to make a choice that could in the long run result in fewer [bears](#) and/or unexpected changes in ecosystem structure," Stanford said.

More information: William W. Deacy et al, Phenological synchronization disrupts trophic interactions between Kodiak brown bears and salmon, *Proceedings of the National Academy of Sciences* (2017). [DOI: 10.1073/pnas.1705248114](https://doi.org/10.1073/pnas.1705248114)

Provided by Oregon State University

Citation: Climate change is luring Kodiak bears away from their iconic salmon streams (2017, August 23) retrieved 19 April 2024 from <https://phys.org/news/2017-08-climate-luring-kodiak-iconic-salmon.html>

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