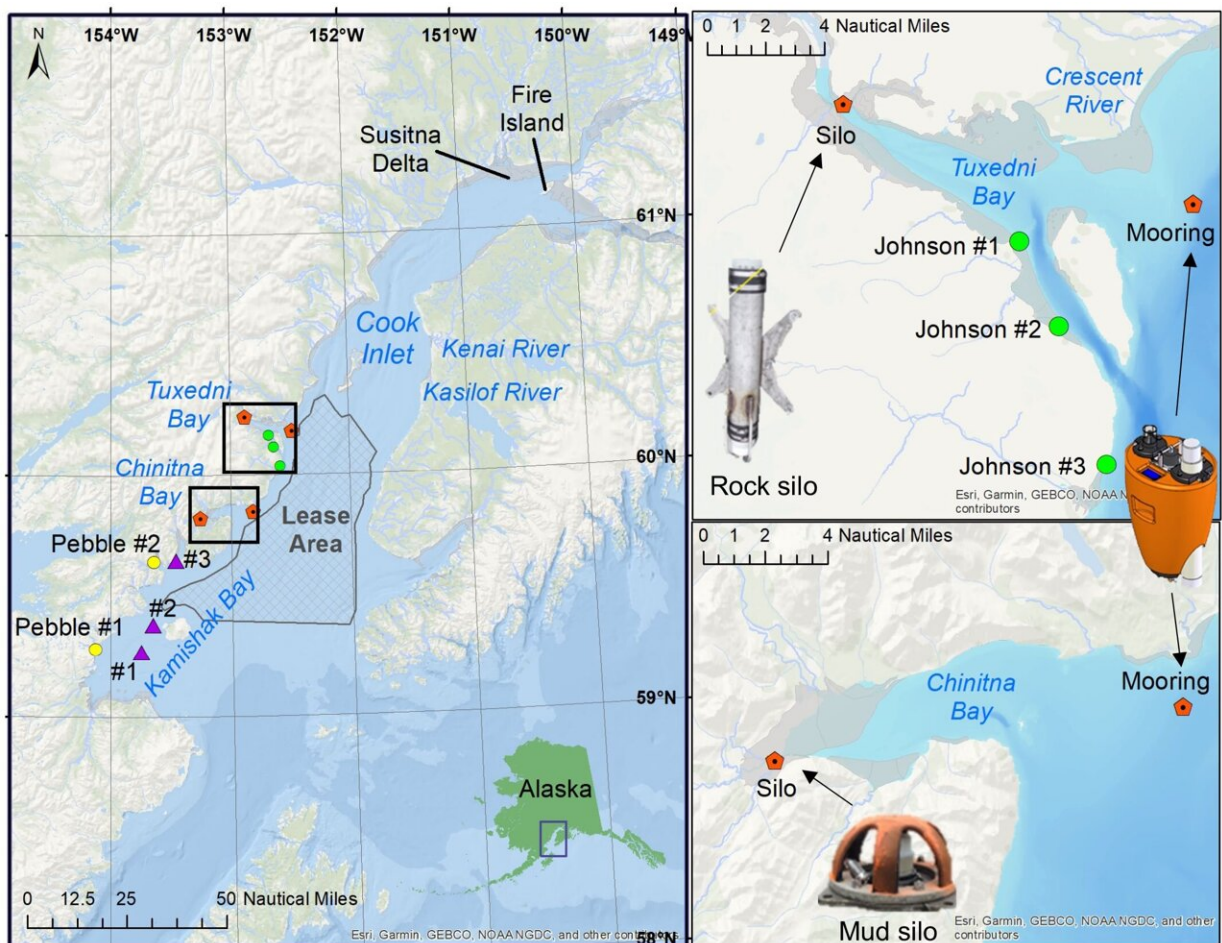


Q&A: 'We lost instruments chewed or crunched by bears and sea otters'—how a researcher listens for elusive belugas

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Left panel—Map of Cook Inlet, AK, depicting the locations of the different industrial activities around Chinitna Bay and Tuxedni Bay: BOEM Cook Inlet Planning Area (gray hatched polygon), Johnson Tract Mine proposed ore terminals (green circles) in Tuxedni Bay, and Pebble Mine proposed port

facilities (yellow circles) and lightering stations (purple triangles) in Kamishak Bay. Right panels—Location of the mooring and silos in Tuxedni Bay (upper panel), and Chinitna Bay (lower panel), in lower Cook Inlet, AK. Credit: *Frontiers in Marine Science* (2024). DOI: 10.3389/fmars.2024.1393380

Dr. Manuel Castellote studies the behavior and conservation of whales and dolphins. After beginning his academic career in Spain, he now works in the United States, applying acoustic techniques to learn more about cetaceans—especially beluga whales—in Alaska and other parts of the northwest of North America.

Acoustic tools allow scientists to remotely monitor the movements of whales and dolphins, improving our understanding of habitat use and [population](#) distributions. He also studies the impact of human noise on cetacean habitats, to understand the effects of noise pollution on the animals' behavior.

Castellote is the corresponding author of a [new article](#) in *Frontiers in Marine Science* which reveals the stealthy movements of the elusive Cook Inlet [beluga](#), and has kindly taken the time to share some thoughts about his career and research as part of the Frontier Scientist series.

What inspired you to become a researcher?

Curiosity about why animals do what they do made me a scientist. Since I was very little, I've been interested in observing animals around me. Later, my curiosity turned towards ocean life, and when it was time to think about a profession, nothing fit better than a career in [biological sciences](#).

Can you tell us about the research you're currently

working on?

I am focused primarily on an endangered population of [beluga whales](#). This population lives in a relatively small area, Cook Inlet, in the south-central region of Alaska. A lot of work has focused on these whales since 2008, when they were listed as endangered, trying to figure out the causes of their lack of recovery.

Almost the entire population is found in northern waters of the inlet from late spring to fall, near the city of Anchorage. For this reason, most of the recent research has been focused in this area of their habitat during summer. In contrast, our recent work has been focused on the winter period and the southern waters of their habitat.

Unfortunately, that comes with a handicap, as the areas are remote, with no infrastructure to rely on, and conditions in fall and winter are not very permissive, with short daylight, unreliable weather, and sea ice. For these reasons, our fieldwork has been quite adventurous lately. Because this population of belugas use coastal, very shallow habitats, we often rely on helicopters or small boats to access study sites.

Both of these working platforms require good weather to operate. In addition, southern Cook Inlet is a wild area—pun intended—and not just the working conditions, but also the amount of bears and sea otters there, took a toll on our research. We lost instruments chewed or crunched by both species, which we never anticipated—a first in my research experience in Alaska.

In your opinion, why is your research important?

Cook Inlet is a sub-arctic habitat—it is one of the southernmost populations for this species. Therefore, their conservation challenges are

an example of what is to come for Arctic populations due to the many impacts of global warming in northern latitudes.

Because of the rapid ecosystem shifts the Arctic is enduring at many levels, overshadowed by human encroachment in the form of increased industrial footprints, Arctic beluga ecosystems are starting to be exposed to challenges we have been observing in Cook Inlet for decades.

Stronger variability in the ice regime, river outflow and runoffs, diminishing [salmon populations](#) forcing shifts in beluga diet, with a stark increase in fishery pressures, commercial shipping, pollution and noise, all mixed with intensifying predation pressure by killer whales, are some examples of the cocktail of threats we are trying to better understand in Cook Inlet. Learning from an ecosystem that has a more advanced level of degradation can tell us how to protect key elements of other similar ecosystems in better health.



Manuel Castellote and Chris Garner working with equipment. Credit: Andrea Gilstad

Are there any common misconceptions about this area of research? How would you address them?

More than misconceptions, I would term them imprecisions. For the Cook Inlet beluga population, a lot of attention has focused on their reliance on salmon as their primary prey. It is clear beluga love salmon, and during the salmon spawning river runs, the entire Cook Inlet beluga population concentrate in river mouths to feast. However, salmon spawning is seasonal, and once this ends, belugas have a long winter ahead of them before the salmon feast parties can happen again.

Belugas are mammals, and they need to keep feeding despite a well-built fat reserve. It seems that not much has been done to better understand winter prey and their foraging grounds, in part due to the glare from their tight relationship with salmon, which seems to be blinding us from looking into the darker winter season.

Our recent work is a humble effort to shine light into the dark of the winter, by means of listening. Our moorings listened for beluga foraging behavior through the winter and found some.

This new information is a corrective to that glare from the salmon feast parties. It is a reminder that there are other prey out there, likely as important as salmon for beluga, of which we know nothing. It is only a small first step that we hope can trigger more research into understanding prey preference and availability in winter habitat.

What are some of the areas of research you'd like to

see tackled in the years ahead?

For Cook Inlet beluga, winter diet is still a large and embarrassing question mark for their conservation. It is shocking to see that the basic ecology of a major and charismatic endangered marine mammal inhabiting the waters around the largest city in Alaska is still so unknown. I would really enjoy seeing more interdisciplinary research being focused on this question.

Fisheries research (i.e., quantifying fish assemblages) combined with behavioral ecology research (i.e., spatial and temporal distribution of beluga foraging grounds) and molecular ecology research (i.e., environmental DNA to identify prey species) could generate a much-needed wealth of knowledge on winter prey preferences, as well as the status of these prey species, for this endangered population.

No recovery is possible unless the most basic, primary fundamentals of the ecology of Cook Inlet beluga are understood. Only then will it be possible to figure out what threats or pressures are impeding the recovery for this population.

How has open science benefited the reach and impact of your research?

One subject of my research is underwater noise. Human activities in the oceans tend to be quite noisy, and this is a concept that has only recently started to become part of the conversations around pollution and human impacts to marine wildlife.

Underwater noise is not visually apparent, is not even aurally apparent for us with ears in the air, and thus it is a hard concept to grasp. However, human generated noise in the oceans is causing great impact to

marine fauna. Publishing research as open science allows a much broader audience to hear the underwater noise and learn about its impacts.

Our recent work in Cook Inlet taps into the importance of quiet environments within critical habitats of endangered cetaceans.

More information: Manuel Castellote et al, Using passive acoustics to identify a quiet winter foraging refuge for an endangered beluga whale population in Alaska, *Frontiers in Marine Science* (2024). [DOI: 10.3389/fmars.2024.1393380](https://doi.org/10.3389/fmars.2024.1393380)

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