

# Climate change could cut First Nations fisheries' catch in half

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# How is climate change likely to affect First Nations' fisheries?



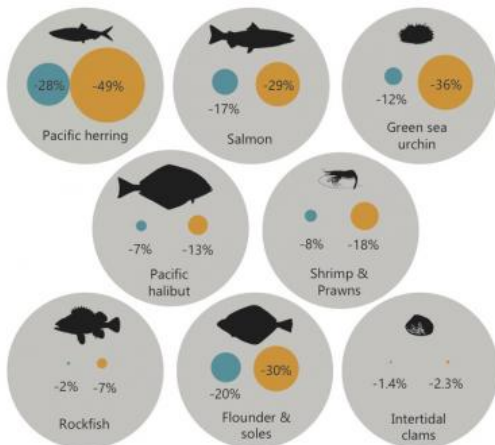
**Weatherdon and colleagues found that climate change is likely to reduce the availability of marine species that are of nutritional, cultural, and economic importance to coastal First Nations in British Columbia (BC), Canada, by up to 49% (for Pacific herring), with conservative estimates of losses between \$6.7 and \$12 million CAD annually.**

The study analysed the habitats and population dynamics of 98 fishes and shellfishes of importance to BC First Nations' fisheries to identify how these species' ranges and abundances are likely to shift under the low- and high-emission scenarios defined by the Intergovernmental Panel on Climate Change (IPCC). The researchers compared the results for 2050 (average of 2041-2060) relative to 2000 (average of 1991-2010).

## Why are these fisheries important?

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| Contribute an estimated <b>\$41-\$52 million</b> to First Nations' annual revenue (2001-2010). | First Nations have relied on these species for <b>millennia</b> as local sources of affordable protein. | These species play important roles in First Nations' ancestral <b>traditional knowledge</b> . |
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## How might declines in catch availability by 2050 differ by commercial fishery and by region?



\*Low emission scenario = 0.5°C rise in sea surface temperature (SST) in the Northeast Pacific Ocean (under Representative Concentration Pathway [RCP] 2.6) | High emission scenario = 1.0°C rise in SST under RCP 8.5.

### Quick statistics

- Marine species in BC are expected to move **10 to 18 km per decade** northwards at an average rate of
- 4.5 to 11%** is the predicted decline in cumulative annual catch for 98 marine species in BC by 2050 relative to 2000.
- The availability of salmon for harvest is predicted to decrease coastwide by **17 to 29%**
- Approx. **90%** of the projected decline in First Nations' revenue coastwide is due to declines in commercial herring and salmon stocks.

## What can be done to reduce impacts?

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| <p><b>Global efforts to reduce carbon emissions</b> can help to mitigate impacts on coastal communities.</p>  | <p><b>Joint management of key resources</b>, such as herring and salmon, referring to traditional knowledge.</p> | <p><b>Proactive planning</b> for resource management under climate change scenarios.</p>  |
| <p><b>Southern species shifting northwards</b>, such as sardines and manila clams**, may offer new opportunities to supplement commercial and subsistence harvests.</p> | <p><b>Reduce cumulative pressures</b> on species vulnerable to climate change.</p>                               | <p><b>Traditional forms of mariculture</b>, such as clam beds, offer opportunities to offset losses by increasing local productivity.</p> |

\*\*Catch potential for sardines is projected to increase by 42% (RCP 2.6) and 44% (RCP 8.5); for manila clams, these estimates are +6% and +15%, respectively.

**Source** Weatherdon LV, Ota Y, Jones MC, Close DA, Cheung WWL. (2016). Projected scenarios for coastal First Nations' fisheries catch potential under climate change: management challenges and opportunities. PLOS ONE. doi: 10.1371/journal.pone.0145285

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**Design** Graphic by Lauren Weatherdon

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First Nations fisheries' catch could decline by nearly 50 per cent by 2050, according to a new study examining the threat of climate change to the food and economic security of indigenous communities along coastal British Columbia, Canada.

"Climate change is likely to lead to declines in herring and salmon, which are among the most important species commercially, culturally, and nutritionally for First Nations," said Lauren Weatherdon, who conducted the study when she was a UBC graduate student. "This could have large implications for communities who have been harvesting these fish and shellfish for millennia."

While many studies examine the impact of climate change on large commercial fisheries, few focus on [indigenous communities](#). The study finds that coastal First Nations communities could suffer economic losses between \$6.7 and \$12 million annually by 2050.

The study, published today in *PLOS ONE*, was conducted by scientists with the Nereus Program, an international research team led by scientists at UBC's Institute for the Oceans and Fisheries, and supported by the Nippon Foundation in Japan.

The researchers modelled how climate change is likely to affect 98

culturally and commercially important fish and shellfish species between 2000 and 2050. The study examined the impact of changes in ocean conditions such as temperature and oxygen levels on habitat suitability for these species under two possible scenarios: a low-emission scenario, where sea surface temperature would increase by 0.5 degrees Celsius, and a high-emission scenario, where [sea surface temperature](#) would increase by one degree Celsius in the northeast Pacific by 2050.

The researchers found that most of the 98 species would be affected by climate change. They projected that fish would move away from their current habitats and toward cooler waters nearer the pole at an average rate of 10.3 to 18 kilometres per decade under the low and high emissions scenarios respectively.

"The shifts in the distributions of these stocks are quite important because First Nations are generally confined to their traditional territories when fishing for food, social, and ceremonial purposes," said Weatherdon, now a researcher at United Nations Environment Programme World Conservation Monitoring Centre.

The research team also found that while southern communities such as those of the Tsawwassen and Maa-nulth First Nations are likely to be most severely affected, all communities are likely to encounter declines in traditional resources including decreases in catch by up to 29 per cent for species of salmon and up to 49 per cent for herring by 2050.

"With unmitigated climate change, current fish habitats are expected to become less suitable for many species that are culturally important for British Columbia's coastal [communities](#)," said William Cheung, associate professor at UBC, Nereus Program Director, Science, and co-author of the study. "Limiting global warming effectively to 1.5 degrees Celsius by the end of the 21st century, as represented by the low emission scenario considered by our study, can substantially reduce such

impacts."

"The Paris Agreement acknowledges that our efforts to tackle climate change must reflect the concerns of indigenous people," said Yoshitaka Ota, co-author and Nereus Director, Policy, who is leading an initiative to study indigenous fisheries around the world. "However, little is known about the impacts of [climate change](#) on coastal indigenous peoples. This study demonstrates the importance of understanding diverse socio-cultural interests."

**More information:** *PLOS ONE*,  
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