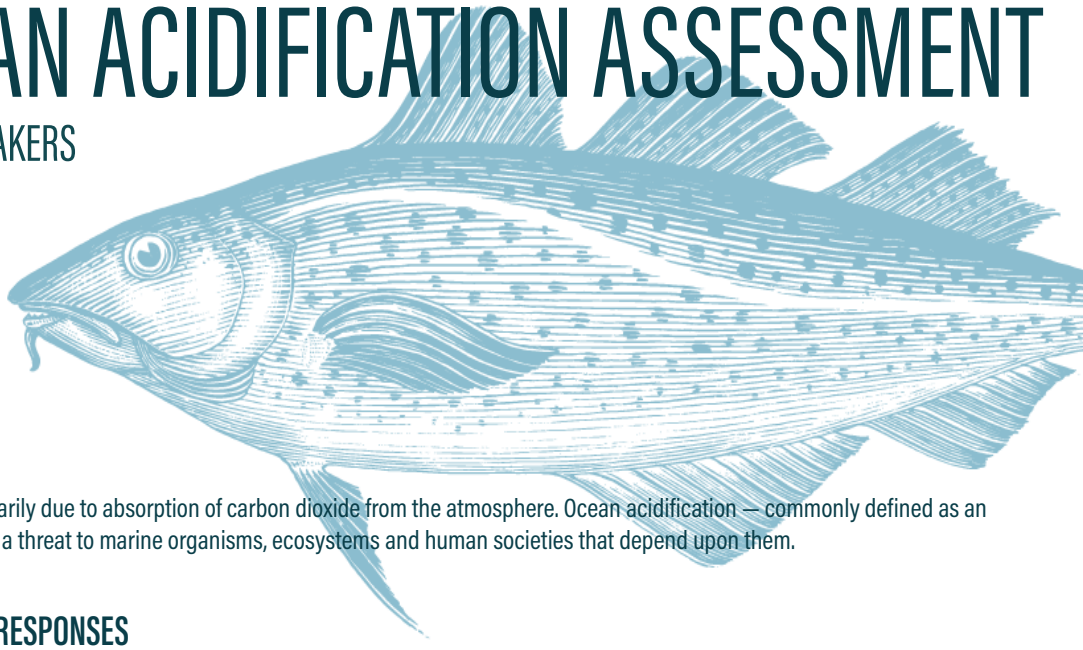
KEY FINDINGS

ARCTIC OCEAN ACIDIFICATION ASSESSMENT

2018 SUMMARY FOR POLICYMAKERS



WHY THIS IS IMPORTANT

Oceans around the world are acidifying, primarily due to absorption of carbon dioxide from the atmosphere. Ocean acidification — commonly defined as an ongoing decrease in pH of seawater — poses a threat to marine organisms, ecosystems and human societies that depend upon them.

BIOLOGICAL AND SOCIO-ECONOMIC RESPONSES

The Arctic and subarctic regions are home to important and valuable fisheries. They yield a tenth of the global commercial catch, and subsistence fisheries provide vital nutritional and cultural services to Arctic residents.

The biological effects of ocean acidification are difficult to assess, especially because this process is taking place at the same time as other major changes, such as ocean warming, oxygen depletion and, at high latitudes, sea ice loss. Human activities are causing a range of impacts in addition to ocean acidification, which complicate biological responses to the latter. A wide range of direct and indirect effects of acidification have been observed, some negative and some positive. Some species will have an advantage while others will be disadvantaged, possibly to the point of local extinction. Ocean acidification may threaten fisheries, both directly, by altering the growth, development or behavior of marine life, and indirectly, by altering foodwebs and predator-prey relationships. The future effects of ocean acidification will not be uniform, nor can they be reliably predicted. Nonetheless, ocean acidification, alongside other ecosystem stressors, is likely to affect the abundance and distribution of fish stocks and marine animals of commercial and cultural importance to communities in the Arctic and beyond.

NORWEGIAN KELP AND SEA URCHINS

Models project that harvest yields of sea urchins may decline sevenfold over the next 30 years. While warmer sea temperatures are the main driver, acidification is also a factor. Both drivers affect sea urchins, a major predator of kelp, mainly during their larval and juvenile stages. Kelp is heavily impacted by sea urchins along the coast of northern Norway. Although acidification may have weakly positive impacts on kelp growth, it is unlikely to allow full recovery of the kelp forest off northern Norway over the next 30 years unless combined with a rigorous urchin cull.

BARENTS SEA COD

Ocean acidification could result in increased mortality and reduced catch, greatly increasing the risk of fishery collapse, compared to the risk from ocean warming alone. The stock may be able to support only a much smaller fishing industry. Even with the best adaption efforts, the fishery may be at risk of collapse by the end of the century. Good fisheries management can help reduce this risk and aid fish stock adaptation to a changing environment.

GREENLAND SHRIMP FISHERY

Northern shrimp appear to be relatively resilient to the direct effects of ocean acidification, although indirect effects could be more significant. For example, changes to shrimp predators could affect shrimp numbers, while acidification could affect market demand for the product owing to degraded flavor. Nevertheless, there are high levels of uncertainty at all stages of analysis, from the rate of acidification, to its biological, ecological and economic impacts.

ALASKA'S FISHERY SECTOR

Mollusks are likely to be the organisms most affected by ocean acidification. This will result in cascading effects through the food chain, affecting predators such as walrus, seals and humans. A review of the red king crab fishery in Bristol Bay found that acidification is expected to cause a long-term decline in the harvest, with southern Alaska facing the greater risk due to many factors including its dependence on susceptible species for nutrition and income. These changes will affect both highly productive commercial fisheries and traditional subsistence ways of life.

ARCTIC COD IN THE WESTERN CANADIAN ARCTIC

Arctic cod (or polar cod) is a key forage species in the food web that supports the region's Indigenous communities. Potential changes in the availability of Arctic cod are of great relevance to local communities, and there is already evidence of its distribution shifting northward as the Arctic Ocean warms. The abundance of Arctic cod could decline, while other forage species, such as capelin and sandlance, are likely to migrate northward into the region. A decrease in Arctic cod abundance could affect its predators, including culturally important species hunted by Inuit, such as ringed seals and beluga.

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