



NOAA Strategic Priority

Strengthening Arctic Science & Stewardship



The Arctic and sub-Arctic regions are experiencing some of the world's most dramatic environmental and economic impacts from climate change.

These impacts, including loss of sea ice, permafrost thaw, accelerated erosion and global warming, pose a serious threat to our planet and will change living conditions for plants and animals, including people. At the same time, the world will see potential benefits from these impacts such as new access to regional oil and gas development and new ship navigation routes due to loss of sea ice.

Our Vanishing Resources

In the Arctic, climate change is causing air and ocean temperatures to rise, which affects living marine resources and their habitat. As temperatures warm, species may move to cooler habitats, which can affect the Arctic food web. New species also change migration patterns such as the northward expansion of range of both desirable (salmon, Pollock) and undesirable (green crab) species.



The permafrost (permanently frozen subsoil) is thawing. And as it melts, the tundra dries out, dramatically changing the habitat. One third of the world's methane, a greenhouse gas, is trapped under the permafrost. If released, this methane would have more than 20 times the effect on the atmosphere than the same amount of carbon dioxide.

The Arctic's sea ice — a major driver of global climate systems — is shrinking. Arctic sea ice reflects solar energy away from the Earth and acts as a natural refrigerator for the planet. It also has an impact on a wide variety of wildlife, including polar bears, seals, whales, and fish such as Pollock, salmon, and crab.

The Greenland ice sheet and glaciers are melting at the fastest rate in recorded history, exposing the country to higher risks of rising sea levels and increased stream flow. And as more and more water reaches the ocean, it is increasing sea level at a faster rate.

Some coastal areas around Alaska are already showing an increase in storm frequency and intensity, threatening their long-term sustainability. And the interior of Alaska is experiencing heavy precipitation and local flooding, low-water events that affect river transportation and food supplies, sporadic high-winds, and increasing periods of drought.

Impact on Our Economy

Weather and natural resources aren't the only things affected by climate change in the Arctic. It has a direct impact on commerce, transportation, and our economy.

Retreating sea ice in the Bering, Chukchi, and Beaufort Seas is opening up access to regional oil and gas development, commercial fisheries expansion northward, new port destinations, and sea routes for commerce and eco-tourism.

(continued on back)





Preserving the Arctic's Future

To help reduce the effects of these significant changes, NOAA is developing a strategic plan that will leverage NOAA's capabilities in:

- ▶ Climate Science and Services
- ▶ Coastal Community Hazard Resilience
- ▶ Marine Ecosystems and Resource Management
- ▶ Marine Navigation and Safety
- ▶ Weather and Water Services

Some examples of how NOAA works with other agencies include:

- ▶ **Tools and information on climate change** supported by NOAA climate science for climate research.
- ▶ **Geospatial models, tools, and assessments** for scientifically-based decisions on coastal/ecosystem resource management, development, human health, and climate mitigation/adaptation planning.
- ▶ **Accurate weather and water forecasts, warnings, and information** on Arctic/Alaskan conditions for commerce, resource management, and safety of life and property.
- ▶ **Consistent safe marine transportation, spill response, homeland security, and other geospatial data-dependent activities** in Alaska and the Arctic.
- ▶ **Healthy ecosystems services** in Alaska and the Bering, Chukchi, and Beaufort Seas with informed scientific assessments, stewardship, and management.
- ▶ **Support for U.S. foreign policy and interests** in the Arctic with international collaboration, enhanced scientific cooperation, and effective representation.
- ▶ **Interagency mapping** for extended continental shelf in the Arctic and exploring governance gaps related to marine ecosystem-based management.

A Powerful Strategy of Collaboration

Collaborating with international partners, NOAA endorses developing a sustained ocean observing network to study the input of freshwater and its affect on ocean circulation, the status of the ocean carbon system, and the ecological response to physical changes in the Arctic ocean and peripheral seas.

NOAA also is improving global climate models to project climate trends into the future and provide guidance on climate change at scales important for planning and adaptation. NOAA ship *Fairweather* will be surveying the Bering Strait for the next three years.

NOAA's scientific capabilities have been deployed to:

- ▶ Increase our understanding of climate and key environmental trends.
- ▶ Predict the ecosystem response to those trends.
- ▶ Offer technical expertise needed to develop policy option and management strategies.

These capabilities include, but are not limited to, regional observations, mapping, weather and water forecasts, and tools and technical assistance for coastal management. These are needed to support safety and security needs for fishing, marine mammal protection, coastal zone management, marine navigation and transportation, energy resources, infrastructure, and mineral exploration.

Certainly, what happens in the Arctic affects the world. Arctic climate change has complex and powerful affects on global weather patterns, global ocean circulation, and global sea level. NOAA is taking significant steps in addressing these impacts and securing the viability of our planet.

To learn more about NOAA's activities to address climate change in the Arctic, go to <http://www.arctic.noaa.gov>.

To learn more about NOAA, visit <http://www.noaa.gov>. 