2021 NOSB Theme

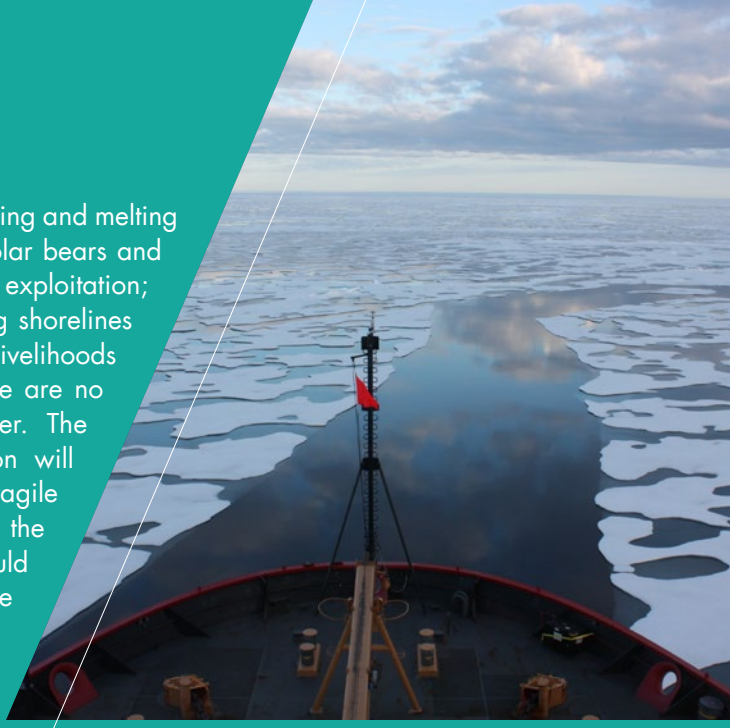
Plunging Into Our Polar Seas

NATIONAL OCEAN SCIENCES BOWL®

The Earth's polar regions are perhaps our planet's most unique ecosystems - the Arctic dominated by floating sea ice and the Antarctic by ice sheets on the continent. The vast, isolated expanses of snow and ice, and the life which inhabits it, have fascinated mankind for ages. Yet much of the Arctic and Antarctic remain unexplored as they are characterized by extremely cold temperatures, heavy glaciation, and extreme variations in daylight hours (24 hours of daylight in the summer and complete darkness in mid-winter). Fascination may have been the impetus for polar research beginning in the late 1800s, but scientists now know that the Arctic and Antarctic are amongst the most vulnerable ecosystems in the world and need to be studied extensively as they hold the keys to understanding the Earth's climate.

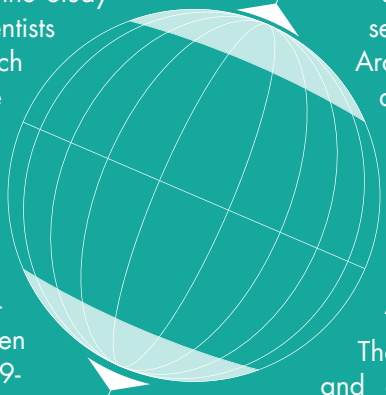
As the North and South Poles are the two coldest climatic regions on Earth, they play a vital role in regulating climate - acting as our planet's cooling system. The global climate is controlled through a process called thermohaline circulation. As sea ice forms at the poles, the remaining salty, dense water sinks and is replaced by warmer, fresher surface water. This water movement creates the deep-ocean currents that move cold and warm water around the globe.

Unfortunately, the polar regions are currently at-risk due to continually increasing levels of anthropogenic carbon dioxide in the atmosphere. Carbon dioxide raises the global temperature by trapping heat that would otherwise escape directly into space - and the poles are warming at much faster rates than anywhere else on the globe. In the Arctic sea ice cover is declining, as is the ratio of thick and thin ice cover. The amount of multi-year ice present in the Arctic has declined each year since the 1980's due to warming temperatures, leaving mostly newer, thinner ice on the surface. The two lowest years on record (2012, 2020) for Arctic sea ice extent occurred in the past decade, and it's likely that the Arctic may have ice-free summers by the end of the 21st century. Warming temperatures in the Arctic may release even more carbon dioxide and other greenhouse gases, such as methane, by melting frozen soil called permafrost that keeps organic carbon in dead plants from decaying and delays its release into the atmosphere. This thawing may result in a positive feedback loop, in which thawing causes faster warming, which in turn causing more thawing. In the Antarctic, coastal glaciers are in retreat, land-based ice is shrinking, and ice melt is increasing as the South Pole has faced extreme warming over the last three decades. The increase in carbon dioxide is doing more than just raising temperatures. More carbon dioxide in the ocean causes it to become more acidic, negatively affecting small shelled creatures, like pteropods, which are an important food sources for fish and larger animals.



Scientists are already documenting the consequences of the warming and melting taking place at the poles. In the Arctic, the loss of habitat for polar bears and walruses; new trade routes leading to greater natural resource exploitation; the loss of unique, Indigenous cultural practices; and the eroding shorelines and loss of permafrost will negatively affect the economy and livelihoods of millions of people that live there. In the Antarctic, while there are no Indigenous peoples, there is a complex ecosystem in danger. The introduction of new species and continued ocean acidification will cause widespread damage to a relatively pristine, unique, and fragile ecosystem. Consequences of polar warming are also felt far from the poles. Some scientists worry that too much fresh melt water could actually 'switch off ' or shift some of these currents, affecting climate across the planet, such as potentially drastic temperature changes in Europe.

Our 2021 theme - **"Plunging Into Our Polar Seas"** - highlights the importance of polar research needed to address the issues facing our polar regions while also bringing attention to one Arctic study in particular - the Multidisciplinary drifting Observatory for the Study of Arctic Climate, or MOSAiC, project. Scientists with the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder (home to our Trout Bowl) along with hundreds of other team members from more than 20 different countries participated in this unprecedented expedition. Following in the footsteps of Fridtjof Nansen's ground-breaking expedition with his wooden sailing ship Fram in 1893-1896, the 2019-2020 MOSAiC expedition aims to better understand the changing Arctic climate system by freezing a ship (Polarstern) in sea ice and drifting with the ice across the Arctic for an entire year - studying ocean, atmosphere, and sea ice processes. MOSAiC scientists recently returned from the Arctic marking the end of the field portion of the expedition and the beginning of the next chapter which involves analyzing this treasure trove of Arctic climate data.



The poles are integral to the entire planet and are rapidly changing, affecting entire ecosystems, forcing plants, animals and humans to adapt. What happens in the polar regions affects the entire world and concerns every citizen. Therefore, the need for ongoing polar research, where scientists from numerous nations work together, has never been greater. Some of the most important questions of our time can only be answered by research in the Arctic and Antarctic.

2021 Virtual Regional Bowls:

February 6, 27, March 6, 27

2021 Virtual National Finals:

May (to be confirmed)

Please visit www.NOSB.org for more information.