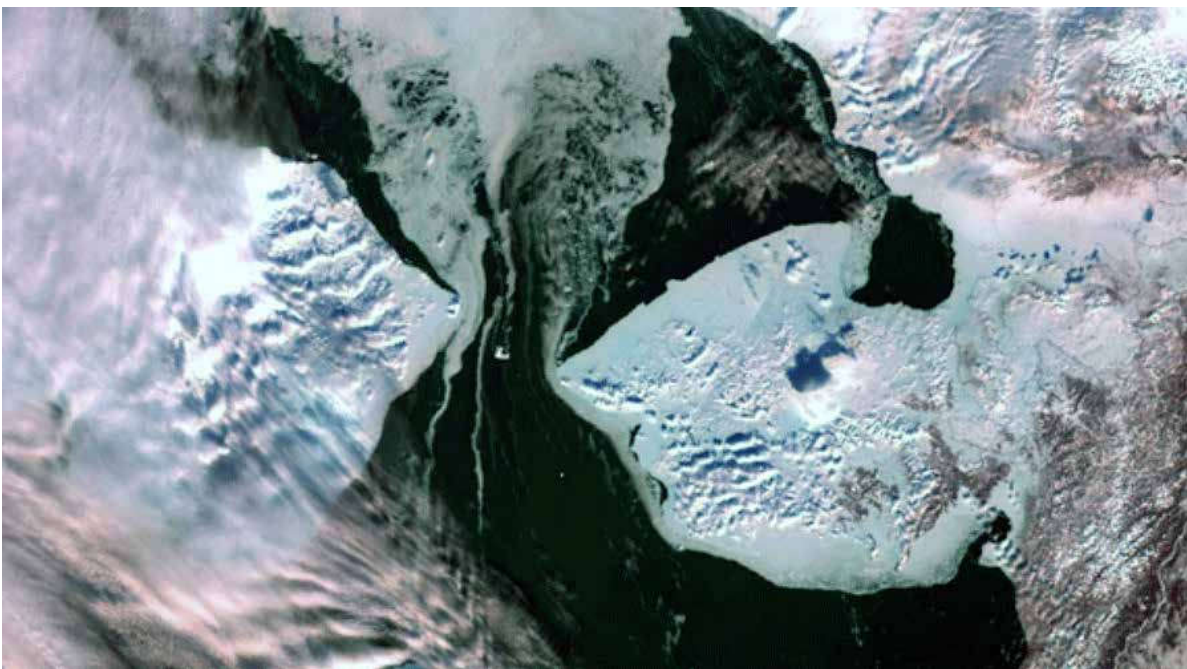


SIWO OBSERVERS DOCUMENT SHRINKING SEA ICE AND UNPREDICTABLE WALRUS IN THE BERING SEA

By Igor Krupnik, Brad Benter, and Lisa Sheffield Guy

Alaska residents, scholars working in the Western Arctic/Bering Sea region, and general readers concerned about the “warming Arctic” have been recently on alert, due to the record low sea ice extent in the Bering Sea in the winter of 2019. As of this writing (late March 2019), the winter sea-ice maximum extent that is commonly recorded in mid-late March across the Arctic regions was by no means a “maximum” in the Bering Sea. It was just the opposite: by March 1, 2019 the Bering Sea

and weather conditions around their communities. They have been systematically recording their observations and sharing critical data and assessment of the ongoing change. In spring 2010, a network of local community monitors in the northern Bering Sea and Chukchi Sea was organized into what was named “Sea Ice for Walrus Outlook” (SIWO), an offshoot of two earlier observational programs, SIKU (Sea Ice Knowledge and Use) and SIZONeT (Seasonal Ice Zone Network) during the International Polar Year 2007–2008. SIWO observations were originally conducted in four Alaskan communities—Wales, Shishmaref, Gambell, and Nome; they continued in the following years, with two more communities, Savoonga and Diomedea, added to the list lately. SIWO



NASA image of sea ice distribution in the northern Bering and southern Chukchi Sea (February 28, 2019)

was literally ice-free. Huge expanses of open water could be seen across the Norton Sound area, off St. Lawrence Island and into the Bering Strait leading to the southern Chukchi Sea; two authors (**Igor Krupnik** and **Brad Benter**) personally observed it when flying to and from Nome during this time. Though the ice has partly returned by mid-March, scholars and media outlets expressed concerns about the impact of the winter ice-free conditions on the Bering Sea marine life and the people who live along its shores.

There is, however, one constituency whose voice has not been heard and whose perspective is critical, namely, local subsistence hunters in rural communities across the northern Bering Sea region. Many of these hunters have been collaborating with scientists and weather/ice services in the effort to monitor sea ice

observations have been commonly conducted from early April until the end of the ice season, formerly in late June. In the past four years, however, the season ended in early June (June 1–9, in 2015–2018), due to the early disappearance of sea ice in the region. Since 2017, the SIWO season has shifted dramatically to both begin and end 2–3 weeks earlier. All personal observations accompanied by photos have been posted onto a special SIWO website <https://www.arcus.org/siwo> that is operated out of the Arctic Research Consortium of the U.S. (ARCUS) office in Fairbanks.

The new, tenth SIWO observational season started on March 15, 2019, with one more community, Brevig Mission on the Seward Peninsula joining the effort. SIWO village monitors report ice and weather conditions, walrus availability and local

hunting effort, take pictures of sea ice from boats and the shore – that are matched with satellite images of ice distribution, synopsis of ice and weather conditions, and ice forecasts provided by specialists at the National Weather Service, Alaska Region and ice specialists. SIWO partners also include the Kawerak, Inc. Eskimo Walrus Commission in Nome, ARCUS, the National Weather Service, and the University of Alaska Fairbanks.

On March 15, 2019, local observers, **Frank (Boogles) Johnson** from Nome, **Robert Tokeinna, Jr.** from Wales, and **Clarence Irrigoo, Jr.** from Gambell reported open water off their communities or a thin sliver of shore-fast ice that is quickly eroding. They and other SIWO monitors will have a critical role in the assessment of what is to happen to the Bering Sea, the Pacific walrus population, and Alaskan subsistence walrus hunting, because of the continuing shrinking and thinning of the ice cover during the winter- and springtime.

Yet in our assessment of what may happen to Bering Sea ice and subsistence walrus hunting in 2019, there is no better comparative body of data than the one from the previous winter-spring season of 2018. According to the summary of ice conditions in the Bering Sea prepared by **Heather McFarland** at the University of Alaska Fairbanks, the freeze-up in winter 2017/2018 was exceptionally late, the new ice was thin, and it was easily broken by the series of strong storms in January and February 2018. Following persistent strong winds from the south—a new phenomenon that is contrary to Native people’s knowledge of the “normal” winter conditions when northern winds prevail—this broken ice was carried out northward, to the Bering Strait and even pushed further north into the Chukchi Sea creating huge expanses of open water, much like in 2019. The overall extent of sea ice in February 2018 was estimated at less than 100,000 sq. mi, about a third of the average extent over 150+

years of available records and 51,390 square miles less ice than in February 2001, the previous record low.

Storms, break-ups, and ongoing cycles of unstable freezing and refreezing continued throughout the month of March 2018, as reported by local monitors: *“After February’s lack of ice, winds shifted abruptly on March 9, bringing sea ice back to Savoonga. Even as ice returned, it is all broken up...no flat pieces and it is real rough. There are patches of open water... biggest open patch in front of town is maybe as big as a football field”* (**Aqef Waghiyi**, Savoonga, March 16).

By April 2018, the ice was mostly gone from the Bering Sea with large stretches of open water extending into the southern Chukchi Sea along the

Alaskan coast—in stark contrast to the “normal” break-up season from 8–10 years ago. Subsistence hunters who observed this unusual condition were as puzzled as ice scientists.

On May 18, 2018, **Clarence Irrigoo Jr.** from Gambell reported *“Very little ice left. Boats are harvesting walrus. Some went very far to the ice—up north 48 nautical miles—and some in the water.”* A similar report from observer Boogles Johnson, from Nome from a week prior (May

12, 2018): *“We went out yesterday to the location on the map and didn’t see any ice as far as the eye can see with binoculars. We did find walrus swimming. They are migrating west and north from the Norton Sound to their summer grounds and having to sleep in the water. This is the first time I’ve ever seen walrus sleep in the open water. ... We thought the walrus were a boat since they were sleeping in a group and can be seen from a great distance.”*

The shore-fast ice was broken off in front of the community of Wales on the first days of May—“super early,” according to local monitor, **Robert Tokeinna, Jr.**, and two weeks earlier than in the 2000s. The main body of Bering Strait cleared of ice in early May, at



Bering Strait: Summary of the winter conditions (flyer by Heather McFarland, 2018)



NASA map: Sea ice extent in the North Pacific-Western Arctic, April 29, 2018



NASA map: Sea ice extent in the North Pacific-Western Arctic, April 29, 2013

least along the Alaskan side. As Diomede monitor **Opik Ahkinga** reported, “On May 2nd, herds of walrus and calves drifted north with the ice floe over the International Dateline. Locals stood on the helipad to watch them pass. ...By early morning the ice had passed and it’s open ocean again. I was told by one of the crewman that five [walruses] were brought back. The boat crew divided their share; this will feed their families well. We are grateful for this hunt and hope to see another ice floe.” (May 4, 2018)

While Native hunters, ice specialists, and marine biologists continue to grapple with the impact of record low winter ice and early break-up in spring 2018 (like is expected in 2019), other questions emerged related to the sea ice-walrus-people interactions. To address them, we may use data on walrus subsistence catch by Alaskan coastal communities that is systematically collected by the Marine Mammals Management (MMM) Division, Alaska Region, of the U.S. Fish and Wildlife Service.

The subsistence catch data have been available for a long stretch of years (see *ASC Newsletter 23*, paper by Krupnik and Benter), including for all years of the SIWO program observations (2010–2018). We may also use hunting records from 2018 as a proxy to assess what may happen in the next few weeks, as herds of walrus start migrating northward past indigenous communities, on their way to summer feeding grounds in the Chukchi Sea.

Two questions loom large: How the record low sea ice and early break-up affected Alaskan subsistence harvest in spring 2018? and What can we learn about the current status of the walrus population from the harvest data and hunters’ observations?

For the former question, the MMM catch records offer a compelling answer. By summer 2018, the cumulative Alaskan subsistence walrus take was 785 animals—higher than in 2017 (700) and above the average of

703 for the past six years (2013–2018). Thus, the unusual sea ice situation did not trigger a catastrophic drop in the Alaskan subsistence walrus catch—as indeed happened in 2013 (*ASC Newsletter 23*).

Yet, the overall fair catch in winter-spring 2018 blurred the sharp differences among individual locations. Two most active walrus hunting communities in Alaska, Gambell and Savoonga on St. Lawrence Island, together harvested 707 walruses, more than in any year since 2013. Brevig Mission, another hunting community on the Seward Peninsula, had its third largest harvest (33) of the past eleven years, 2008–2018. To the contrary, most other communities fared below average (Nome, Toksook Bay, Wales), or even poorly (Diomedes, King Island, Wainwright, Utqiagvik/Barrow). Thirty villages that historically hunted walrus killed no animals at all in 2018, including Hooper Bay, Kivalina, Mekoryuk, Point Hope, Point Lay, Shishmaref, and Togiak. So, to the majority of subsistence hunters, the situation in spring 2018 was by no means “average” or “normal.”

Another obvious outcome of the low ice/early breakup conditions in 2018 was the continuing shift to ever earlier timing of active hunting during the spring season. In Diomedes and Wales, it was the first week of May in 2018. In Gambell and Savoonga on St. Lawrence Island, the prime spring walrus hunting in the years 2000–2013 was generally around mid-May and often extended into early June; in 2018, only 30% of walruses were killed during the month of May (28.7% in Gambell, 30.7% in Savoonga—MMM data. Instead, active hunting now extends into what was traditionally considered the wintertime, that is, into the months of January, February and early March. It already happened in winter 2019, like in the low-ice winters of 2018 and 2017. The time around late March and early April is now a new “peak season” (46 walruses taken in Gambell and 109 in Savoonga, in 2018), and the bulk of the catch in 2018 occurred during the

month of April. Productive hunting in Gambell literally ceased after the third week of May, and in Savoonga, it stopped on the fourth week of May. This dramatic shift in the prime catch time is another indicator of new seasonal patterns, due to the changing ice regime.

We may discern other trends from the MMM catch data for 2018. There has been a significant shift in the past six years from a more even sex-age distribution in Alaskan subsistence catch with a ratio of roughly 55:35:15 of males, females, and calves to a new model, with a much higher share of adult males, around 70:20:10. The respective shares in 2018 were even more skewed—78:16:5. It poses a question first raised by our colleague, marine biologist **Carleton Ray**: Where are the calves and the females? Hunters in all communities report that they are indeed seeing fewer calves and females on their boat trips. So, are females and calves elsewhere? Are they passing beyond hunters' reach, that is, earlier/faster or farther away from shore? Or there is indeed a rapid drop in the share of females and calves in today's Pacific walrus population, another sign of its impending stress?

Hunters believe that all three factors are actually in play. When the Gambell crews did get out in April–May 2018, they never found the herds of females and calves that used to pass by to the west of Gambell on their spring migration (“beyond hunters' reach”). Therefore, they went northward, after the animals) that Savoonga was reporting and that were predominately males (increase in bull walrus catch). Hunters also reported that many of the females they harvested last year had lost their calves, most likely due to drowning—because of storms and no ice floes to travel and to rest on (“fewer calves due to environmental stress”).

Observations of SIWO monitors and other subsistence hunters, therefore, may offer critical insight to the changes in walrus patterns during a rapid restructuring of its habitat that are hard to observe without detailed and expensive biological surveys. The SIWO team (of which the authors are members) planned to have a special workshop with local monitors in February 2019 in Nome. We anticipated to hear their explanations and to share data on the shifting status of sea ice and walrus in the Bering Strait region. Unfortunately, that workshop was cancelled due to government shutdown; we hope to organize it again in winter 2020. In the meantime, the SIWO team will keep monitoring the situation. Interested readers are welcome to visit the SIWO website at www.arcus.org/siwo or SIWO Facebook page [/seaiceforwalrus](https://www.facebook.com/seaiceforwalrus) during the SIWO 2019 season to explore the richness of local observations and knowledge of the changing Bering Sea.

A HOKKAIDO SABBATICAL

By Ben Fitzhugh

During their 2018 sabbaticals from the University of Washington, **Ben Fitzhugh** and **Laada Bilaniuk** spent three months in residence in Sapporo, Japan. They each received Invitational Fellowships from the Japanese Society for the Promotion of Science (JSPS) to conduct collaborative research with colleagues at Hokkaido University. Ben worked closely with **Katsunori Takase** to investigate zooarchaeological collections from around coastal Hokkaido. They visited more than 15 museums and examined collections from more than 22 archaeological sites with components spanning the mid-to-late Holocene. Takase-san went out of his way to plan, guide and translate during these trips. The scientific agenda of our tour of Hokkaido museums was to take stock of these collections for possible future research into changes in climate and marine ecosystems tied to human coastal settlement histories and community resilience to variability in maritime food availability. The immediate goals were to identify collections with good preservation, stratigraphic integrity and secure dates or potential. The project is an extension of Fitzhugh and Takase's archaeological research collaborations in the Kuril Islands and relates to the ASC's Arctic Crashes theme. Shortly after the sabbatical visit, Takase-san submitted a pilot JSPS proposal for a first phase of morphological, isotopic, and a DNA research based on the collections from Southeast Hokkaido.

When touring Hokkaido, Katsunori, Ben and often Laada and Larissa visited many of the archaeological sites associated with the collections. Some sites have been converted into educational parks like that of the famous Moyoro Shell Mound site in Abashiri. Before and after the Second World War, major excavations at this site on the seasonally ice-choked Okhotsk Sea coast revealed evidence of large pentagonal pithouses



Ben Fitzhugh and Katsunori Takase inspect archaeological fauna at the Hokkaido Museum of Northern Peoples in Abashiri on the coast of the Sea of Okhotsk