

## The Bering Sea: Current status and recent events

By Jeffrey M. Napp

### *Current status of the Bering Sea ecosystem*

“It was a dark and stormy night...” I do not know how many of you remember the Peanuts comic strip by Charles Schultz that was syndicated and translated into many different languages for newspapers around the world. Schultz’s character, Snoopy, was a dog, who in this particular instance, wanted to be a famous writer of fiction. He was always trying to start a mystery novel and wanted to do so with great flair. “Dark” and “stormy” were meant to foreshadow something ominous and foreboding. Storminess, however, may have a bad rap – in the eastern Bering Sea (as in other large highly stratified continental shelves) storminess has a beneficial quality – it replenishes nutrients and continues “new” production. The eastern Bering Sea used to be much more stormy than it is today. Wind data from St. Paul Island and from NOAA’s Mooring 2 in the southeastern middle shelf (56.88°N, 164.03°W) have shown that the spring and fall are much less stormy now than in the 1970s and 1980s, resulting in a much longer summer quiescent period. While those of us who venture out on ships in the Bering Sea have welcomed this change, it is most likely not without consequences to the ecosystem and its living marine resources. During this past year, however, the Bering Sea experienced increased storm activity in the spring and fall. An early calm period allowed the water column to stratify, and the spring phytoplankton bloom occurred in early May, several weeks earlier than in recent non-ice years. However, unlike other recent years where the bloom rapidly dissipated after sending excess production to the seafloor, storms and mixing rebooted the system, and high levels of phytoplankton were observed after two storms immediately following the initial bloom. Thus, this year we anticipate that total annual production was higher and the contribution of the spring production to annual production may have been greater. Fall wind mixing also seemed earlier this year, with several NOAA programs experiencing more difficult working conditions and more days lost to weather. The impacts of the storm on the food web and upper trophic level productivity have yet to be assessed, but events in 2005 do provide a good contrast to what has happened in recent years.

Water temperatures continue to be warmer on average than the long-term mean (Fig. 1), and sea ice did not penetrate the southeastern portion of the shelf in the winter of 2004/2005. The summer groundfish survey by NOAA’s Alaska Fisheries Science Center proceeded faster than usual due to exceptionally good weather, and scientists remarked that there seemed to be more young cod this year than in the recent past.

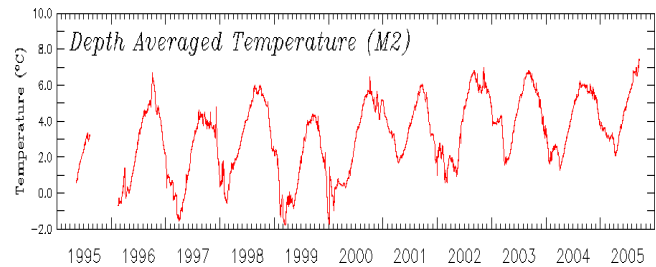


Fig. 1 Average water column temperature in the southeastern Bering Sea from 1995 – 2005 as measured at the Mooring 2 site. Source: P.J. Stabeno, NOAA – PMEL.

### **BASIS**

The Bering Aleutian Salmon International Study (BASIS) is an international research program sponsored by the North Pacific Anadromous Fish Commission (NPAFC). Participants are: Canada, Japan, the Republic of Korea, the Russian Federation, and the United States of America. Japan, the Russian Federation and the United States have conducted BASIS surveys since 2002, and have provided quasi-synoptic sampling of a large portion of the Bering Sea. In addition to surface trawls for salmon, each member country conducts a variety of “other” sampling. This ancillary sampling has become a valuable source of ecosystem information because of the large areas covered and the timing of the surveys. For example, on the eastern side of the Bering Sea, the Auke Bay Laboratory of NOAA’s Alaska Fisheries Science Center carries out its BASIS surveys in late summer/early fall (August, September, early October), a time when very few other programs are making observations. In addition to reporting salmon catch, they also report the abundance of juvenile walleye pollock captured in the salmon trawl, and hydrography and plankton concentrations. Based on a cursory look at the trawl data, in 2005, the young-of-the-year pollock were distributed more uniformly in the northern half of the sampling grid (north of Nunivak Is.) than in 2004 (Fig. 2). In the southern half of the survey, they were most abundant in the middle and outer shelf domains in 2005, as opposed to 2004, when the maximum abundances were in the vicinity of the 50 m isobath (Inner Front). Total CPUE for the two years was similar, and the pollock lengths from the trawl were slightly larger in 2005 than in 2004. Juvenile sockeye salmon catches were higher and more broadly distributed across the shelf (not shown). Anecdotally, the numbers of Pacific cod caught in these trawls may have increased in 2005 over 2004, and the total biomass of jellyfish caught by the trawl was similar to that in 2004, with the notable absence of the very large jellyfish catches that were obtained at a few stations in 2004.

BASIS scientists also commented that the fall storm season seemed to have started earlier in 2005 than in either 2003 or 2004.

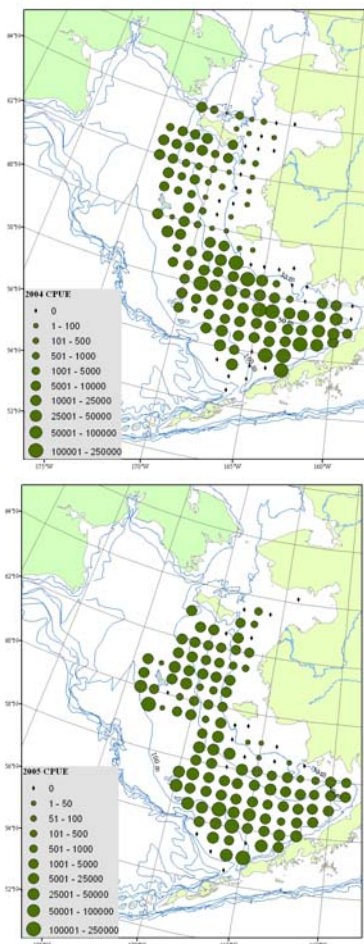


Fig. 2 BASIS catch per unit effort (CPUE) of young-of-the-year walleye pollock. Top panel - 2004; Bottom panel - 2005. Source: J. Murphy (AFSC).

### Future research

Expectations for future research in the eastern Bering Sea are running high with recently

completed calls for proposals from two U.S. funding entities, the North Pacific Research Board (NPRB) and the Arctic Section of the Office of Polar Programs, National Science Foundation (NSF). The NPRB solicitation of proposals was for retrospective work and modeling work, although other areas were included. NPRB will develop its integrated ecosystem research plan for the Bering Sea in the coming year. Next year's call for proposals will target those areas specified by the research (e.g., field-oriented process studies). The NSF call was for a 3-year field program, beginning in spring 2007 and running through 2009. Proposals were to include funds for a write-up and synthesis year in 2010. The NSF announcement of opportunity was in support of the Bering Ecosystem Study (BEST) Program. The successful proposals for both NPRB and BEST will be announced in spring 2006. BEST is a U.S. component of the GLOBEC regional program, Ecosystem Studies of Sub-Arctic Seas (ESSAS) [See the article in this issue of PICES Press on the PICES-GLOBEC workshop on the sub-arctic seas scheduled for June 2006 in St. Petersburg, Russia. More information on BEST can be found at: <http://www.arcus.org/Bering/index.html>. The ESSAS website is: <http://www.pml.ac.uk/globec/structure/regional/essas/essas.htm>.

Researchers working in the eastern Bering Sea have become increasingly concerned at the effects of loss of sea ice in that region. Within the last year several meetings have been held among interested parties to share ecosystem observations and discuss ways of coordinating research in the region. Participating in the discussions were representatives of: Alaska Ocean Observation System (AOOS), Bering Ecosystem Study, NOAA's Alaska Fisheries Science Center (AFSC), NOAA's Pacific Marine Environmental Laboratory (PMEL), North Pacific Research Board, University of Alaska, U.S. Fish & Wildlife Service, U.S. Geological Survey, and U.S. Arctic Research Commission. The group continues to meet and will soon have several products available for the community (an overview paper and website listing cruises, field camps and aerial surveys). Note that NOAA researchers plan to lead an oceanographic cruise to the ice edge in the spring of 2006, to begin collecting data to better understand the role of sea ice in the eastern Bering Sea ecosystem. Proposed sampling on the cruise includes hydrography, ice cores, phyto-, zoo-, and ichthyoplankton, fisheries hydroacoustics, seabird surveys and marine mammal surveys and tagging.

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