



BEAUFORT SHELF BREAK ECOLOGY – PLANKTON, FISH, AND BELUGAS

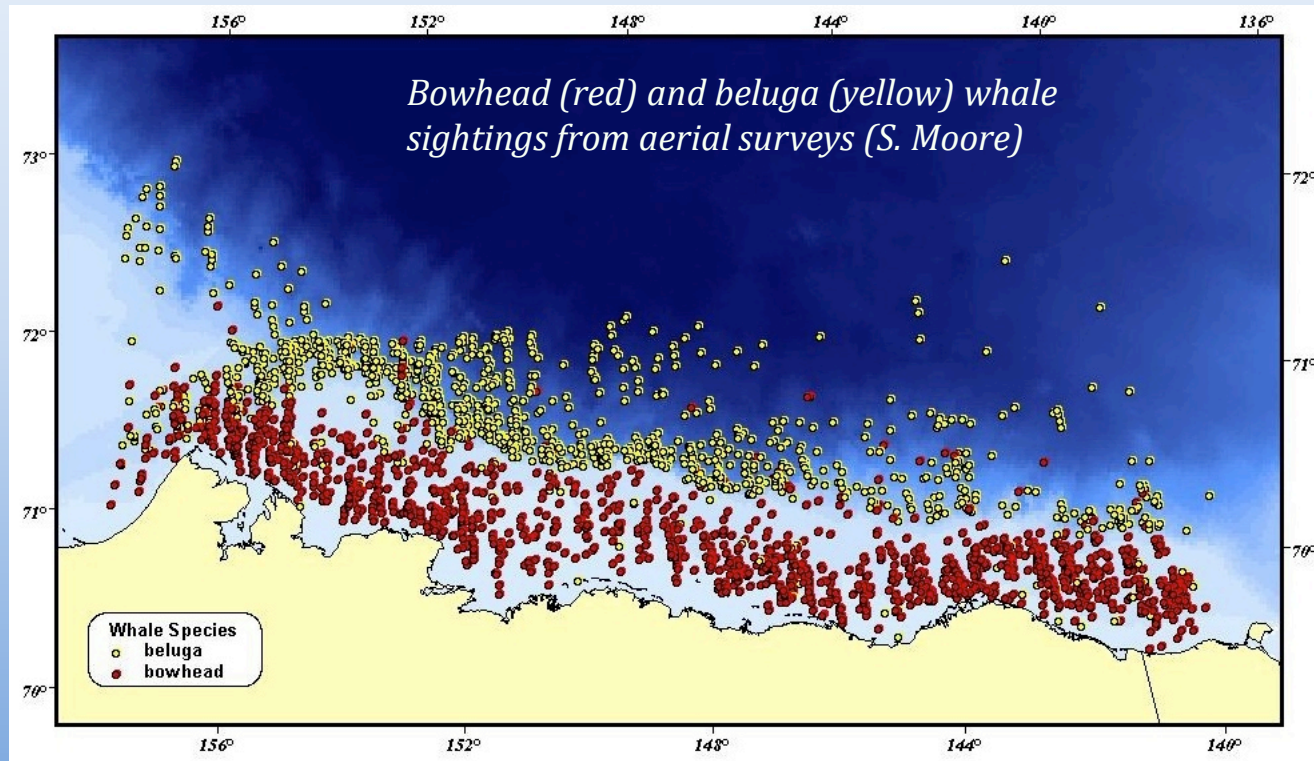
August 25 – September 18, 2017



Carin Ashjian (WHOI)

Bob Campbell (URI), K. Kuletz (USFWS), Mike Jech (NOAA), Joel Llopiz (WHOI), Mike Lowe (LSU), Steve Okkonen (UAF), Kate Stafford (UW) and others at WHOI, URI, UW, UAF, USFWS

Why are beluga whales often found at the transition from shallow to deep water (shelf break) in the Beaufort Sea?



Are beluga whales found along the shelf break because they can find high abundances of their Arctic cod prey there and are these abundances driven by shelf break upwelling of plankton?

Krill, Copepods



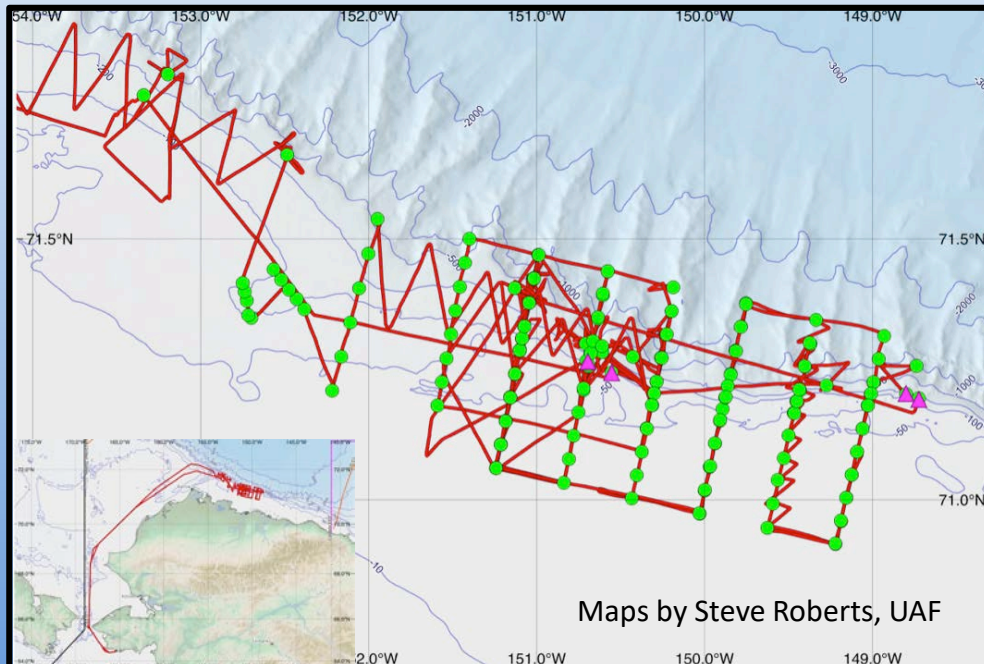
Arctic Cod



Belugas

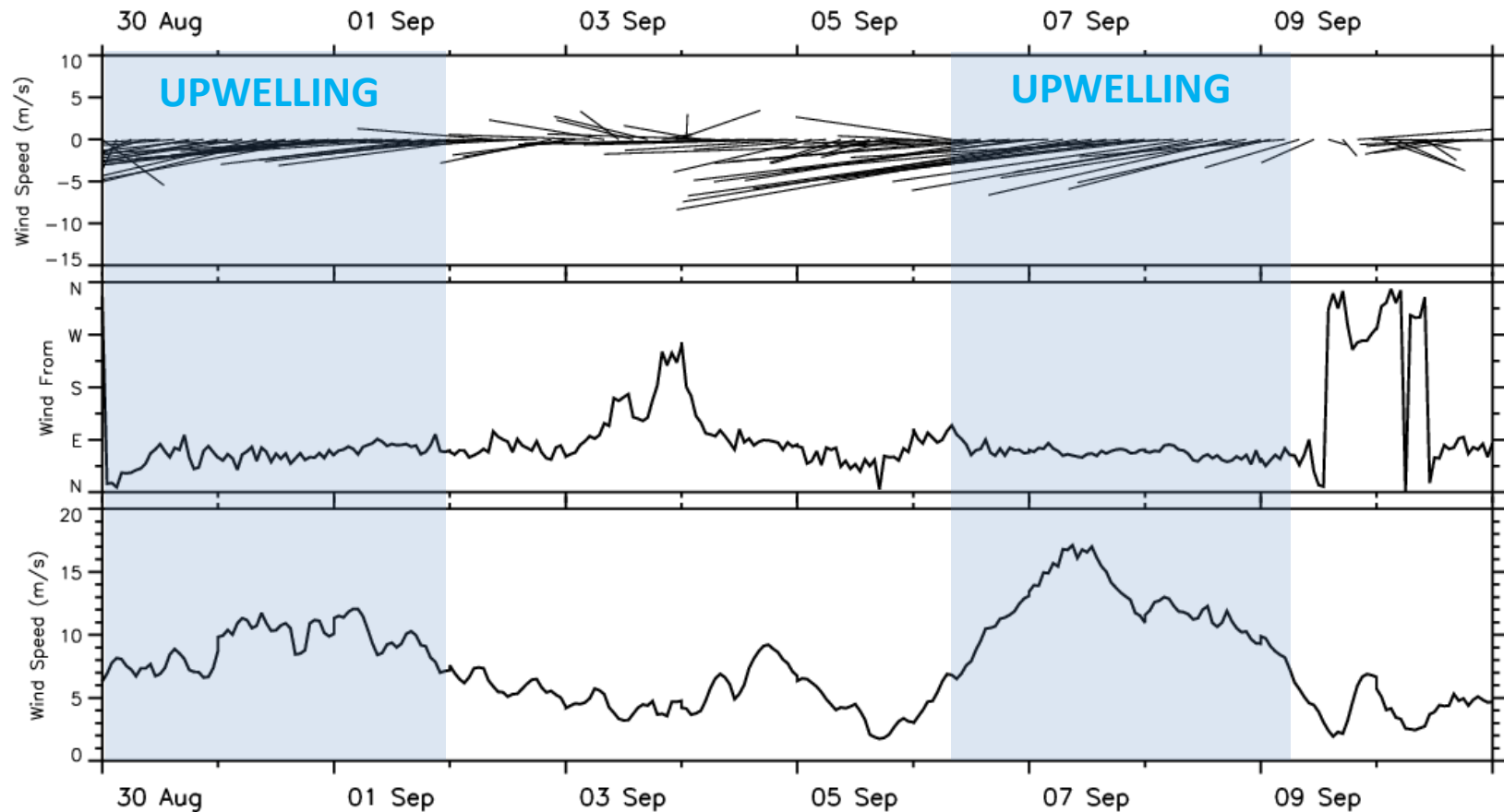


Images not to scale



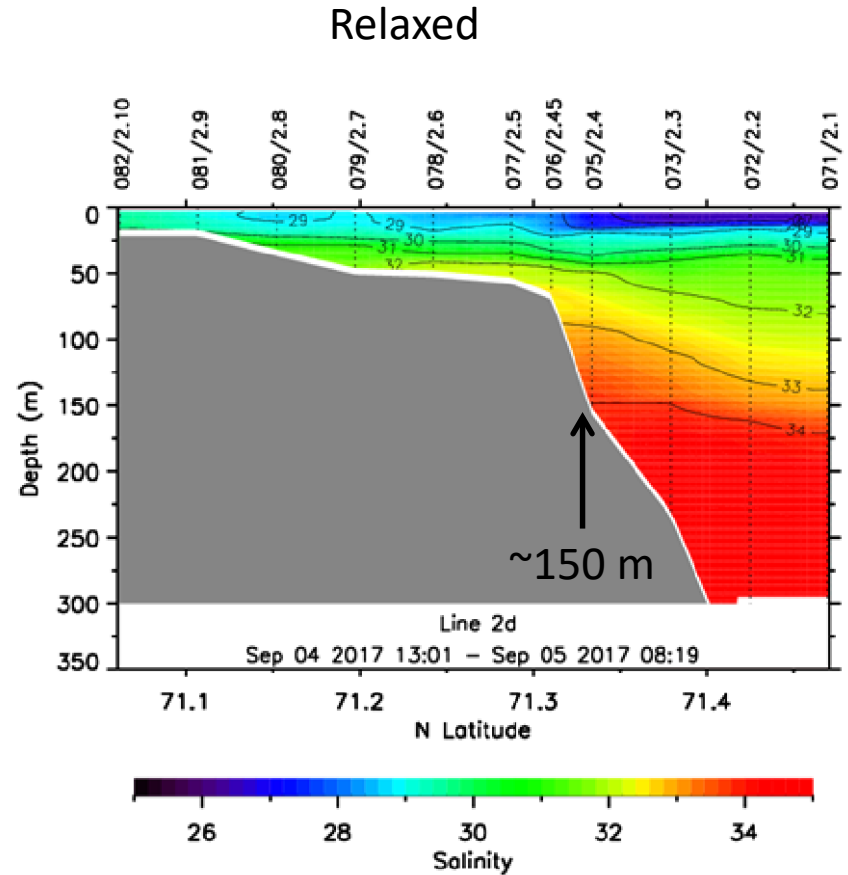
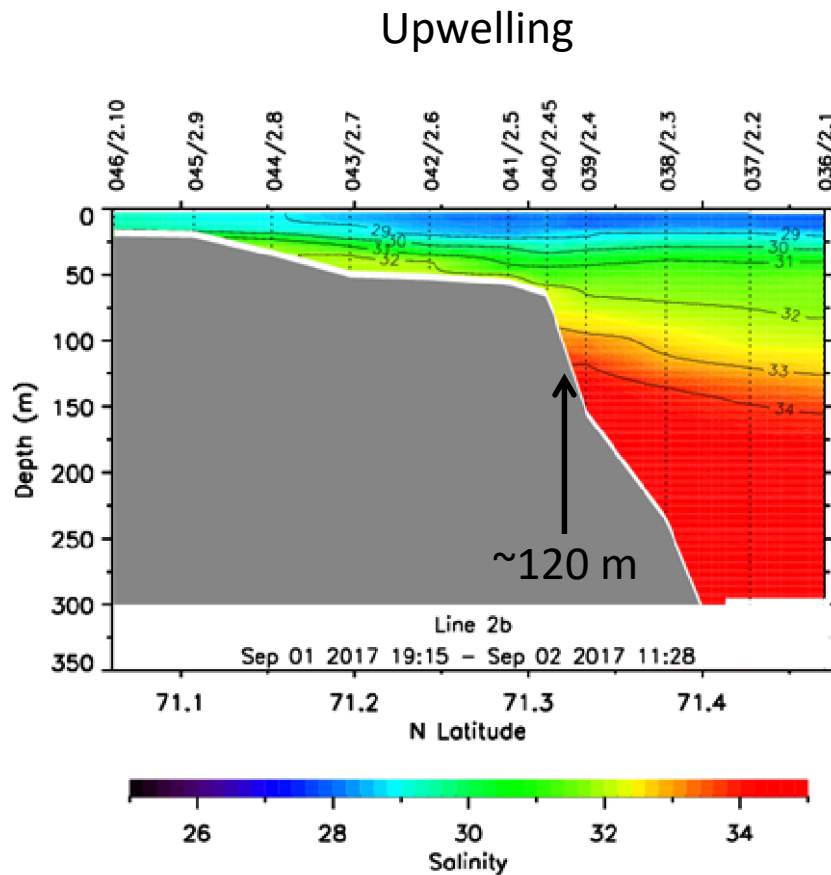
<u>Activity</u>	<u>Number</u>
Stations	184
Bongo Tows	37
CTD Casts	184
Fish Trawls	16
Mooring Deployments	4
Ring Nets	4
Slocum Glider Recovery	1
Tucker Trawls	69

Two Upwelling Events Occurred during the Cruise



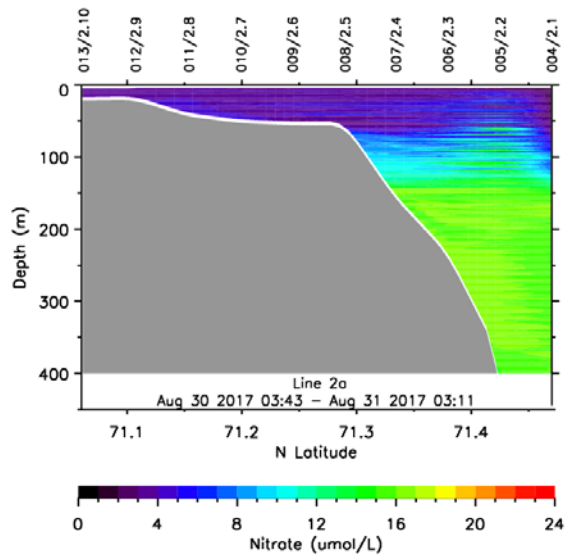
Shading shows periods of upwelling
(Winds from east at 5-6 m/s or greater)

Vertical Distribution of Salinity Shows Upwelling of Water at Shelf Break

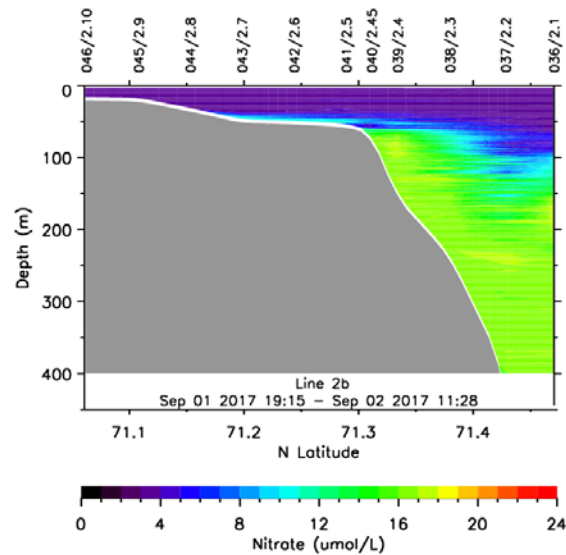


Nitrate was brought onto the shelf during upwelling and remained there for a period afterwards

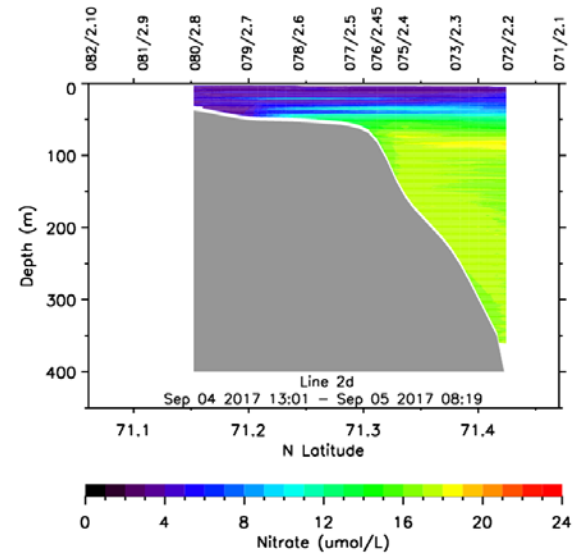
Before Upwelling



During Upwelling



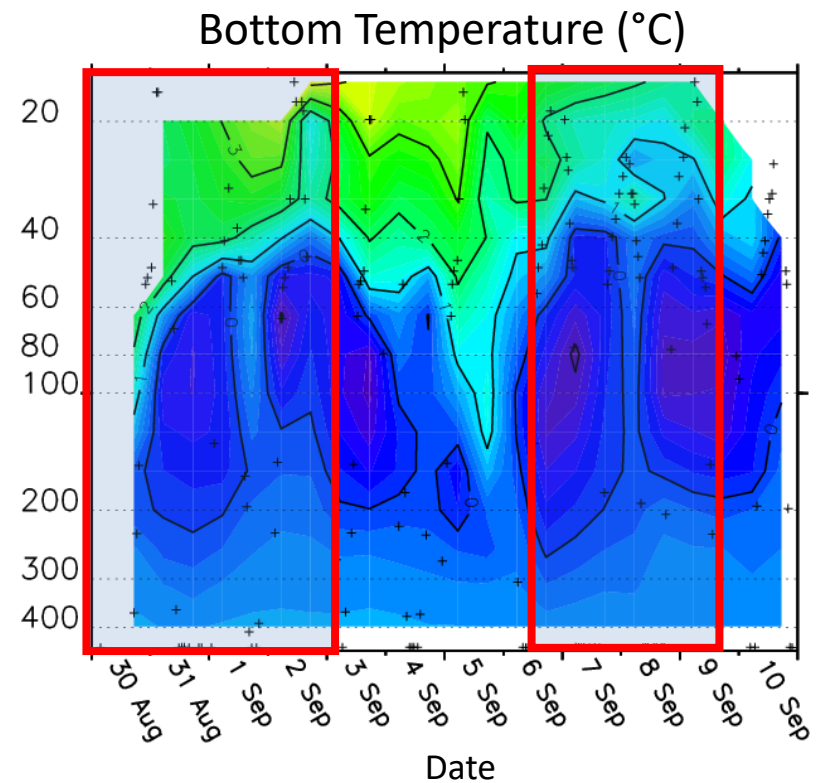
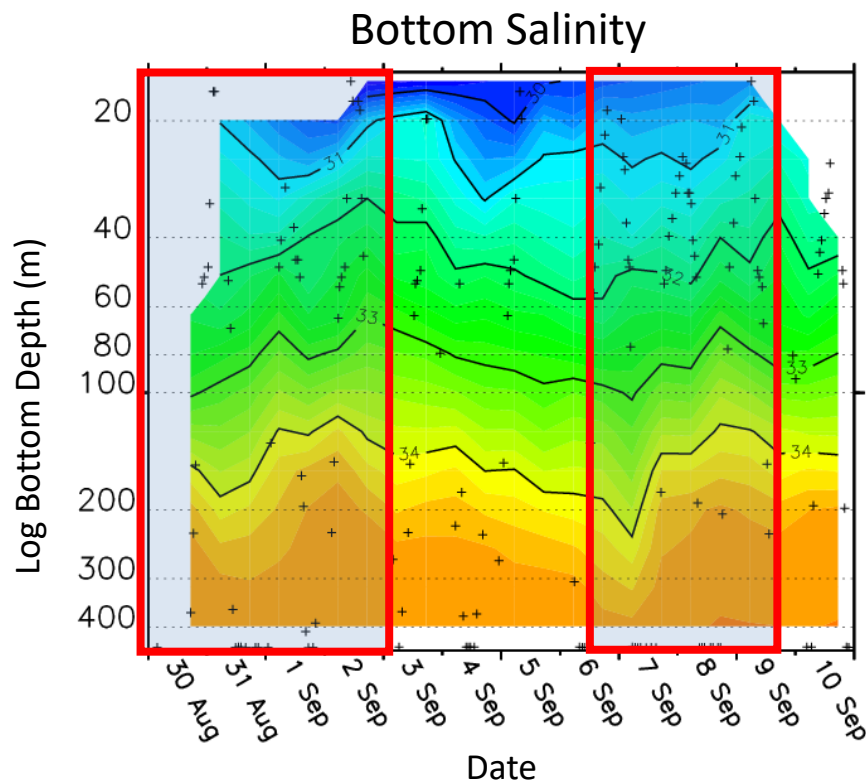
After Upwelling



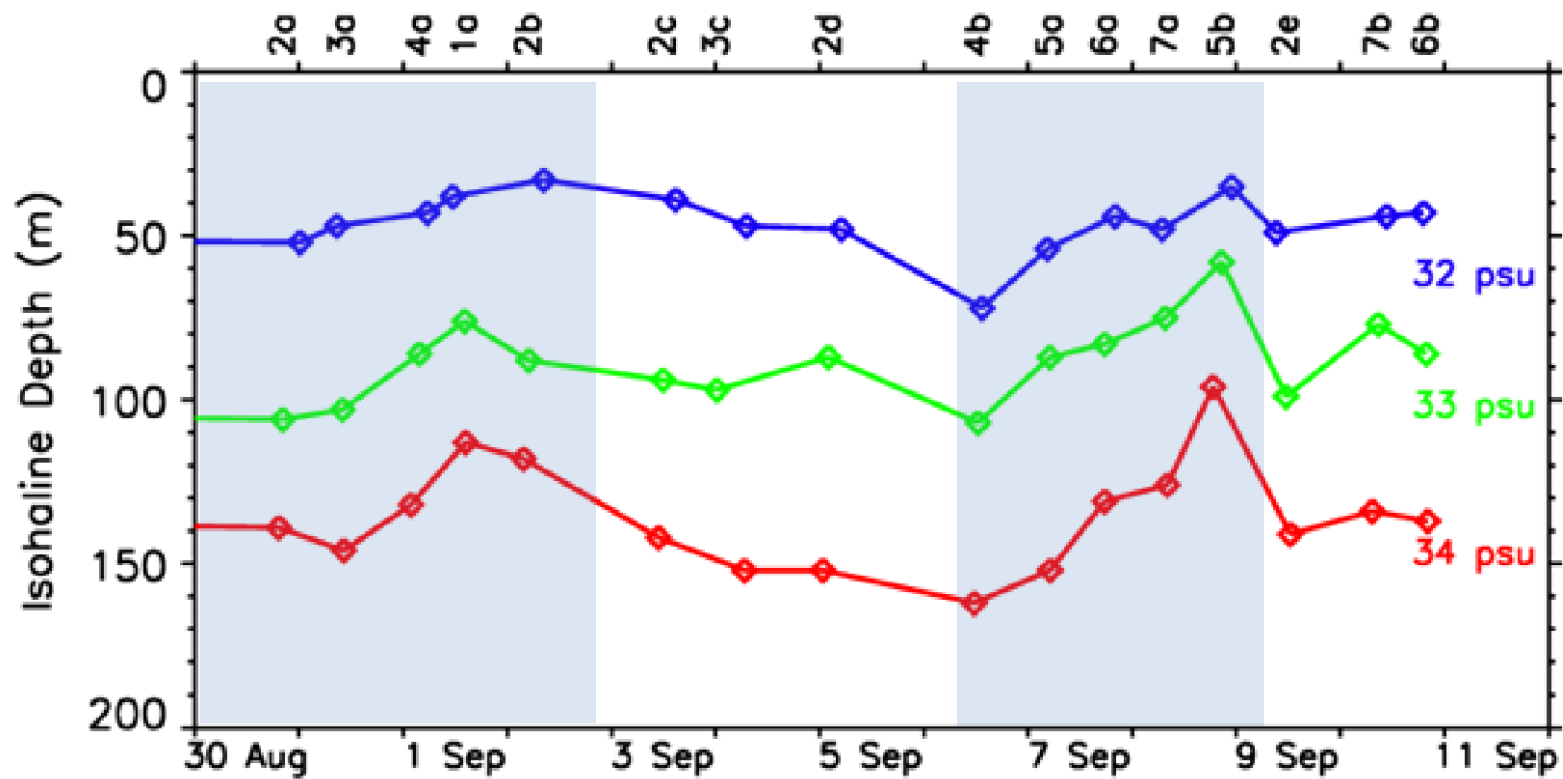
Kate Lowry

Nitrate from a SUNA NO₃ sensor mounted on the CTD Rosette

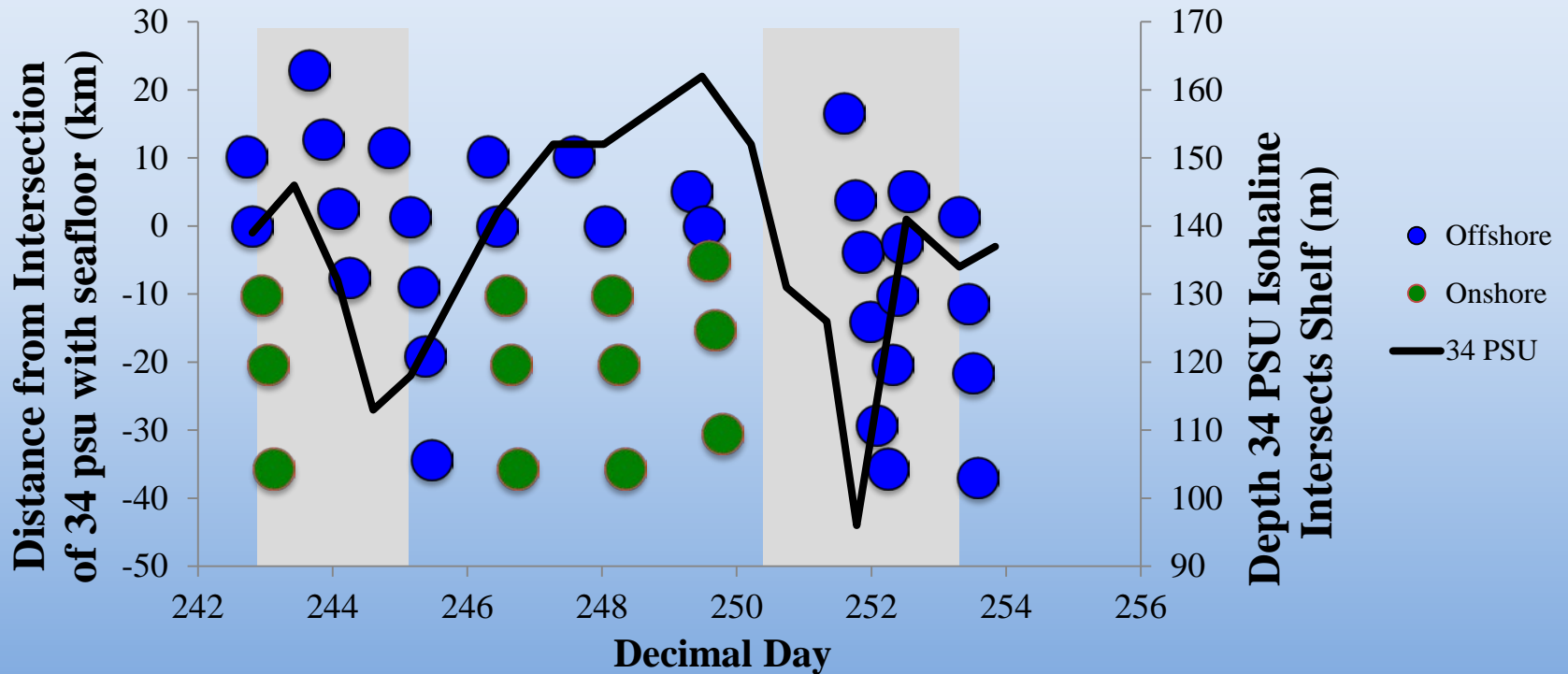
Bottom salinity and temperature show movement of salty, cold water onto the shelf during upwelling



The bottom depths at which different salinities intersect the seafloor rise or fall depending on whether upwelling is ongoing

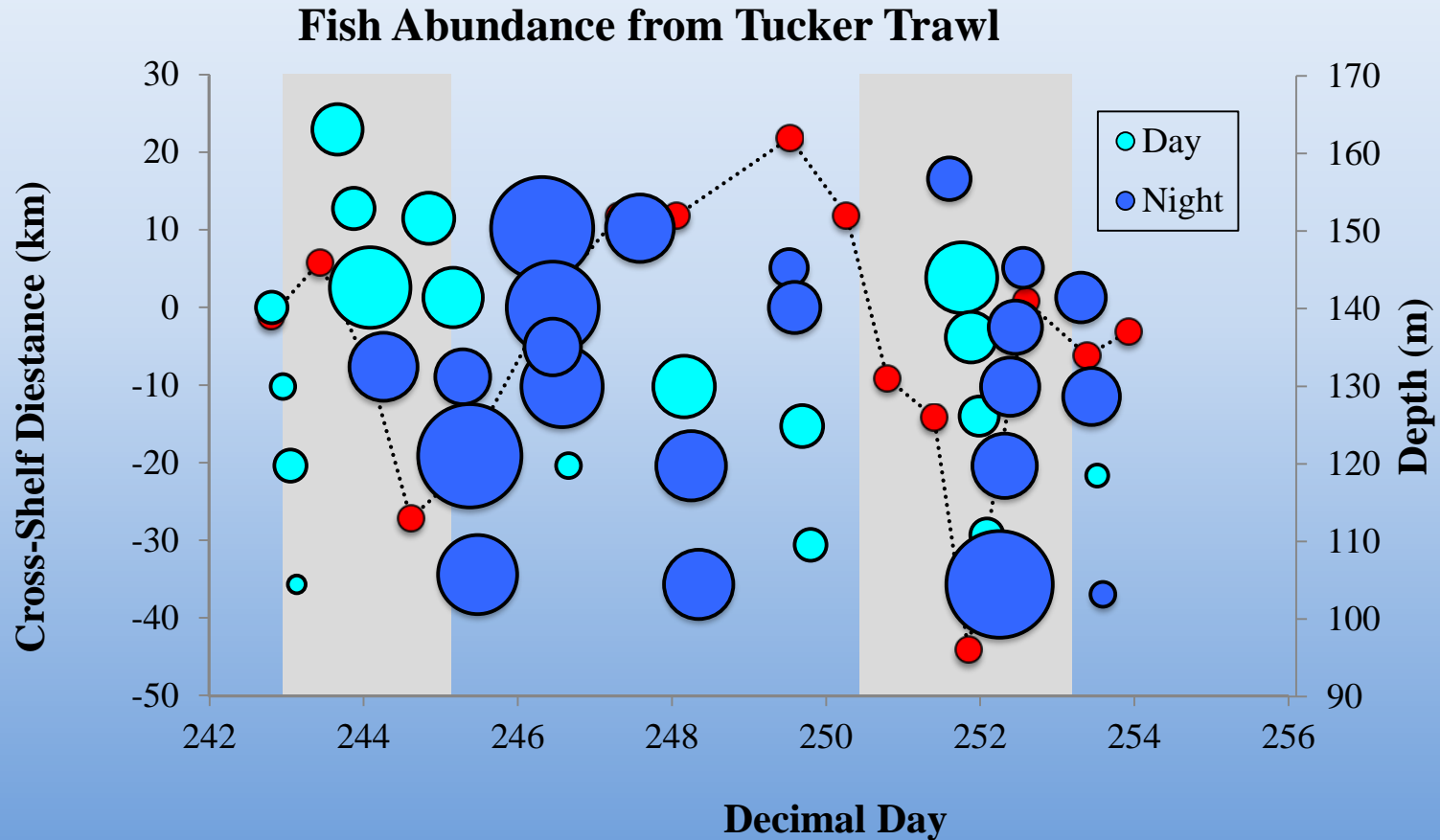


Offshore zooplankton were seen far onto the shelf during and after upwelling

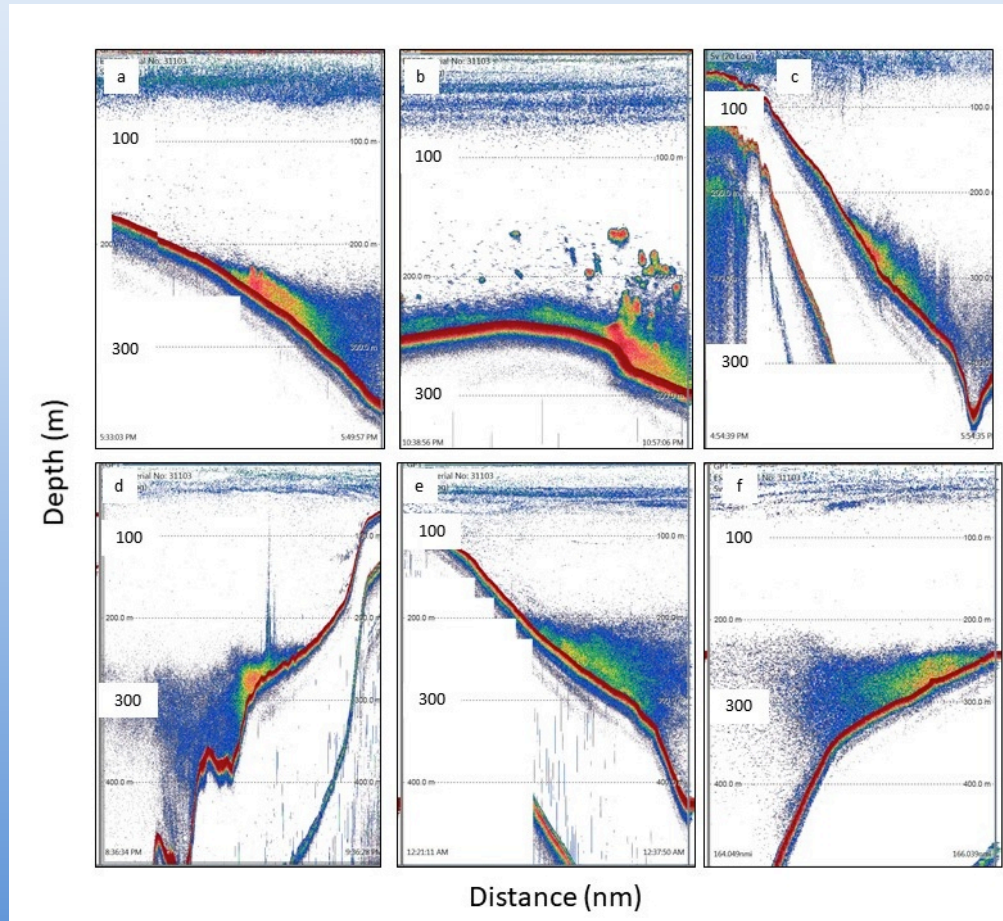


These included large copepods (*Calanus* spp.) and krill that are food for bowhead whales as well as Arctic cod

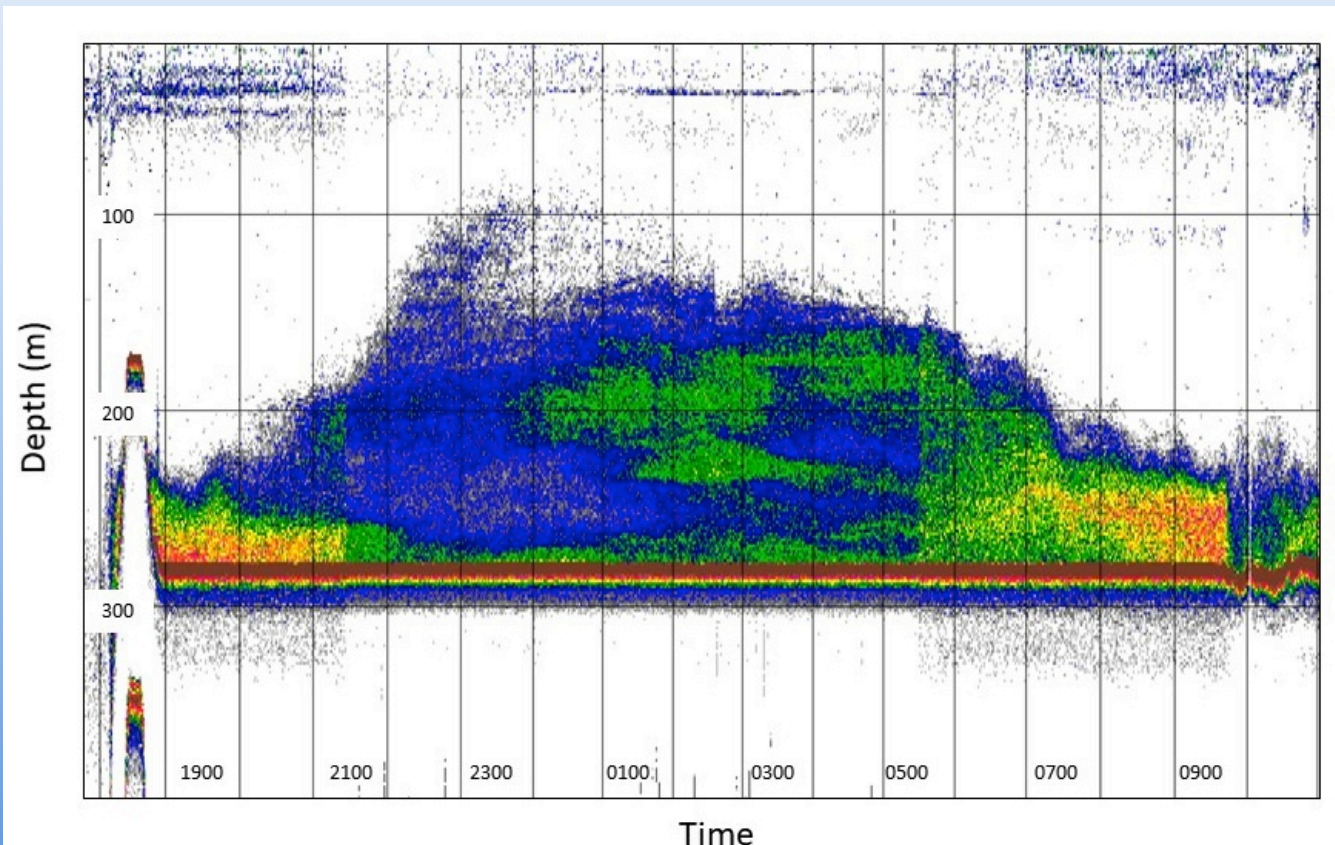
Larger catches of young, small cod during and after upwelling



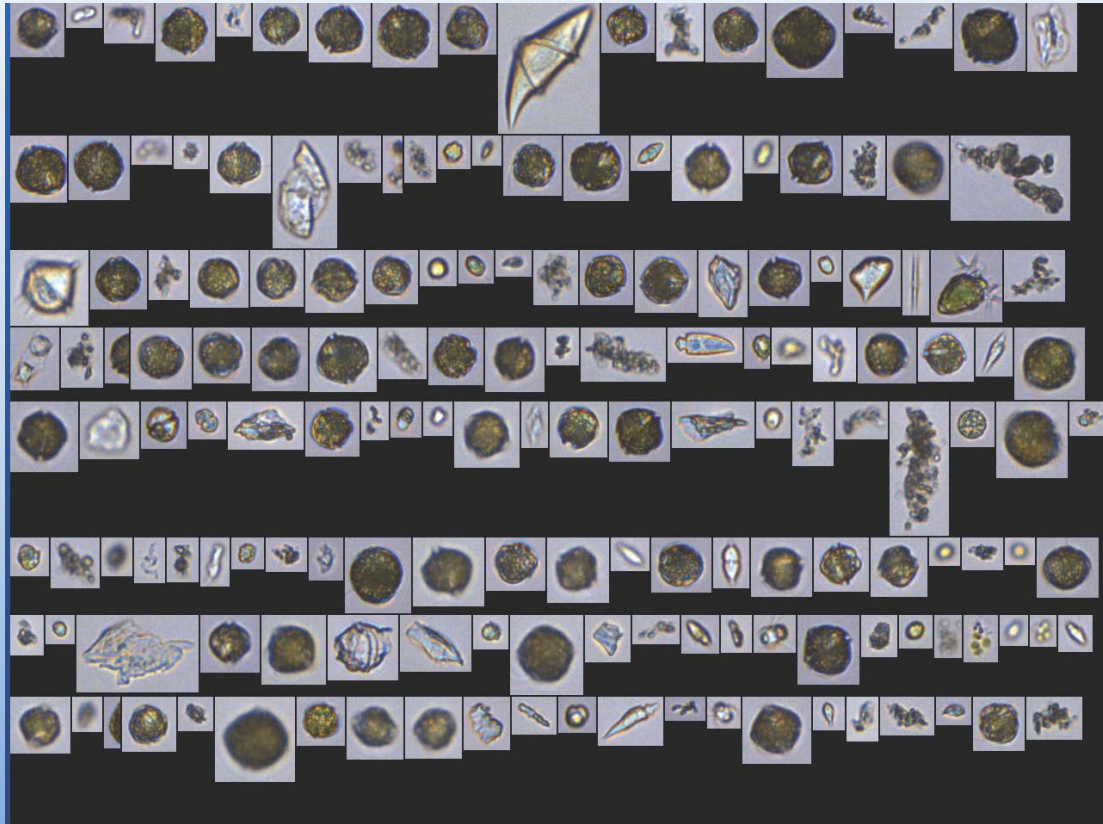
During the cruise, we saw that there usually was a dense patch of fish at about 250 m depth along the shelf break



Fish were very dense near the seafloor in this patch during daylight but migrated upwards at night



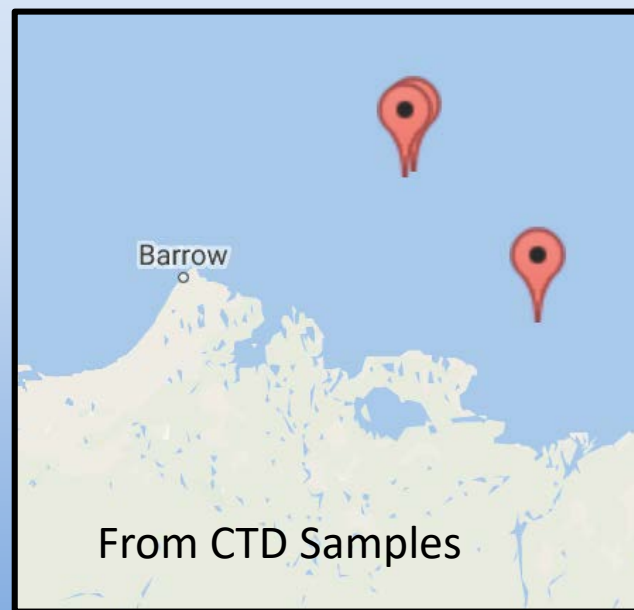
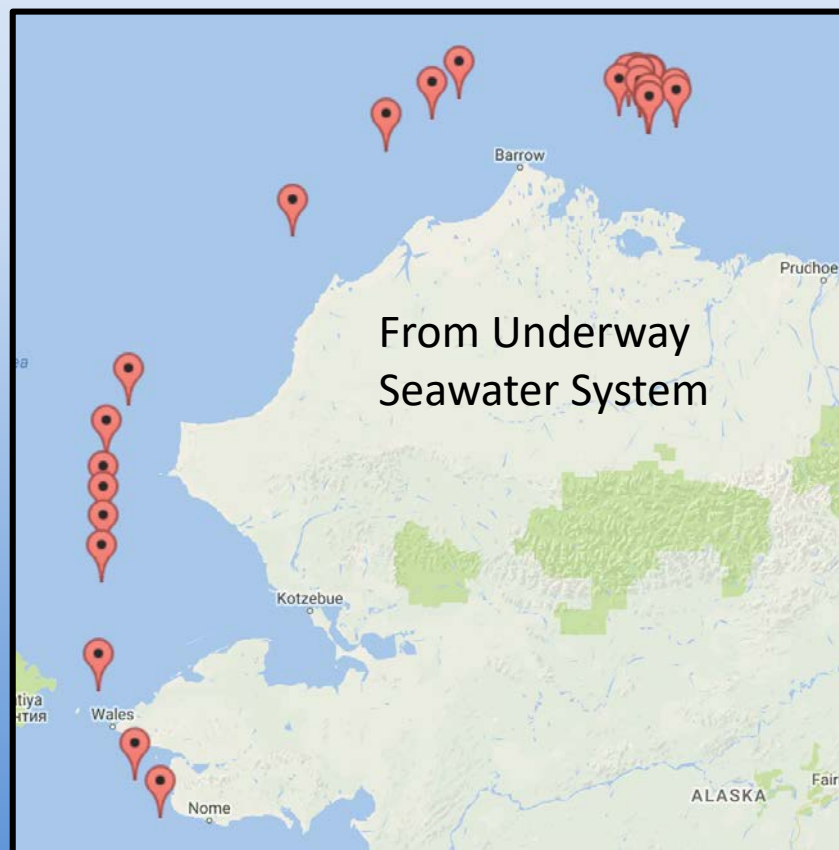
Flow Cam imagery showed presence of the potentially toxic dinoflagellate *Alexandrium* sp.



Kate Lowry

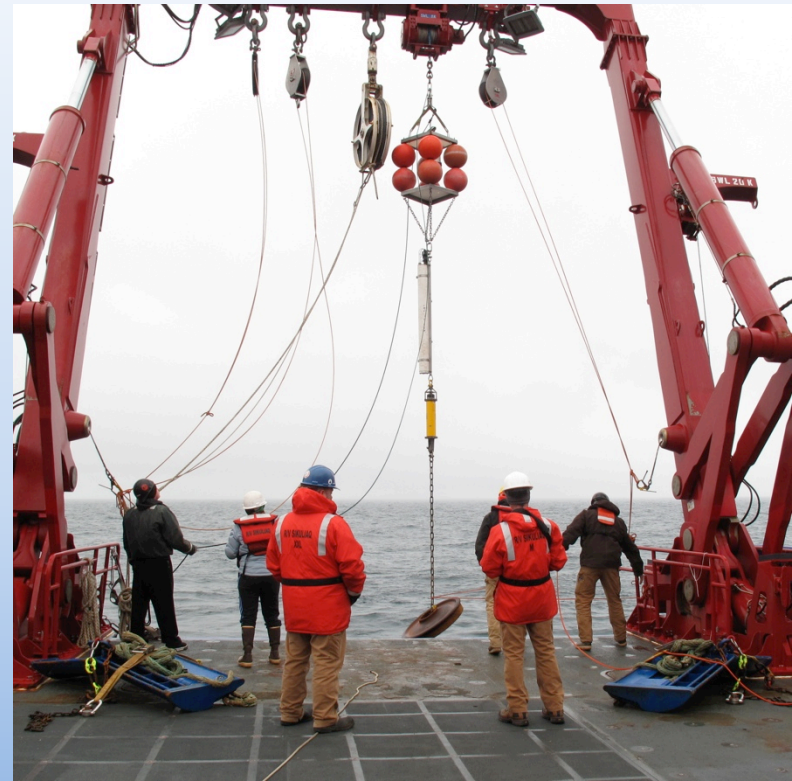
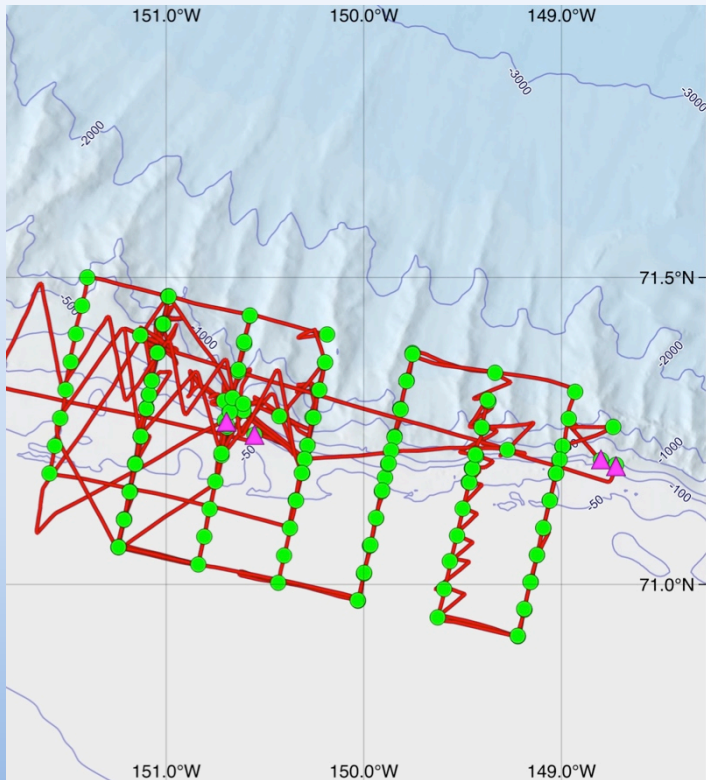
Presently working with samples to determine species and toxicity

Alexandrium was seen throughout the Chukchi in mid-September, in warm water north of Barrow in late August and in mid-September, and in warm water on the shelf in the study area



Kate Lowry

Four year-long moorings deployed along shelf break



All equipped with CTD, three equipped with ADCP, three equipped with Aural acoustic recorder (marine mammal vocalizations), one equipped with acoustic zooplankton fish profiler

Acknowledgements

- Shipboard marine technicians Ethan Roth and Dan Naber
- The Captain and crew of the *R/V Sikuliaq*, including those who were not embarked on our cruise
- Steve Roberts and Steve Hartz at the Seward Marine Center
- Gay Sheffield at the UA Northwest Campus
- Laurie Juranek, the Cowen lab, and the Hatfield Marine Center at OSU for logistic assistance
- The National Science Foundation for support of this research



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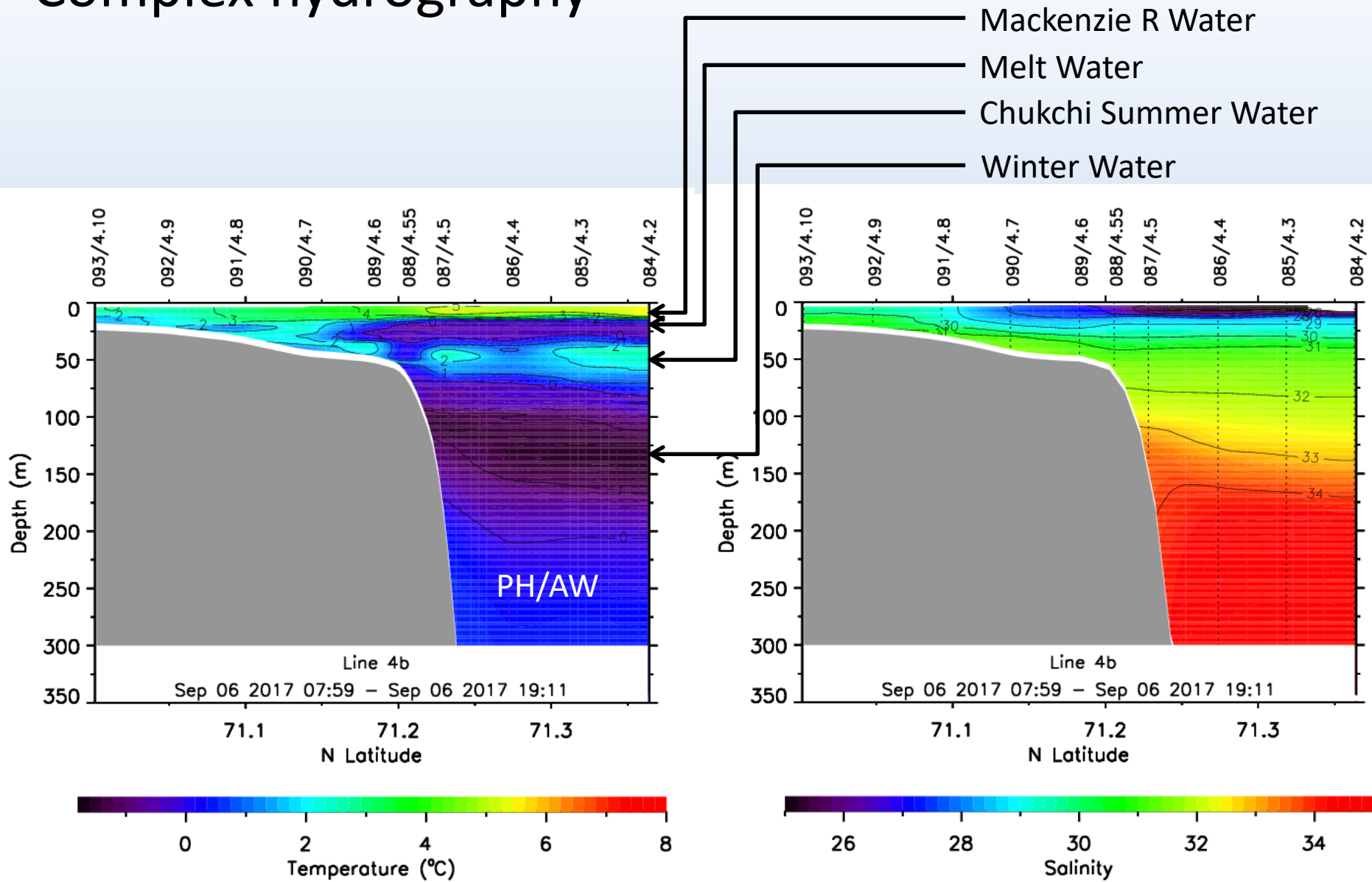
UAF research vessel picks up missing glider

Erin Granger, egranger@newsminer.com Oct 5, 2017 (0)



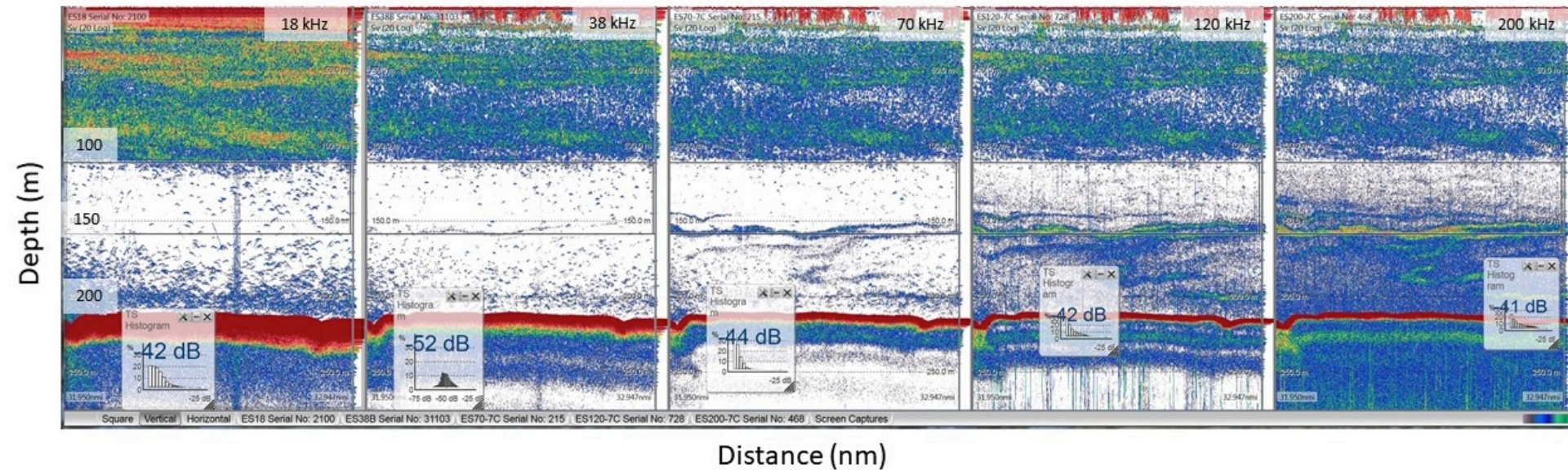
The malfunctioning Slocum Glider lies tied the deck of the research vessel Sikuliaq after the ship crew and researchers captured it at about 1 a.m. Aug. 27. Photo courtesy of Diana Campbell

Complex hydrography



PH/AW = Polar halocline/Atlantic Water

The Sikuliaq Fish Finder (EK60) showed patterns and abundances of fish and of plankton



These data will be used to quantify regional abundances and distributions and the impact of upwelling on those distributions