SEA-BIRD SCIENTIFIC **Newsletter**

August 2017

In This Issue:

Nitrate and its Effect on Sushi

Nori is the ubiquitous dark seaweed paper found in nigiri sushi and sushi rolls, and it is both a vital food and export product for Japan. Japan is the world's largest producer of Nori at about 400,000 tonnes or 10 billion sheets per year.

Above: High quality Nori is jet black (above right) when raised on a fishing ground with DIN > 3 µM. When DIN* drops to < 3 µM, discoloration occurs, where the color changes from dark black to bright green (above left).

In 2009, something dramatic happened - the Nori crop in Japan's Inland Sea crashed. Production was low and moreover, the Nori that was typically reputed as the best in the world, was off-color and

tasted different. Discoloration creates a drop in market value, creating hardship for the fishermen.

Above left: Inspecting SUNA V2 after 3 week deployment. Above right: Checking buoy line with SUNA V2 nitrate analyzer.

Scientists working at a district research station operated by Okayama Prefecture noticed from their monthly sampling that the nitrate levels in the sea were lower that year. Working with Sea-Bird Scientific's Japanese representative CT&C, they installed a network of SUNA V2 nitrate sensors to monitor and study the situation.

SUNAs monitoring nitrate concentration in real time from the fishing grounds, provided information to fishermen by HP and mobile phone. From the subsequent nitrate maps, they were able to determine the optimum Nori production conditions and identified 3 µM nitrate as the critical threshold for harvesting.

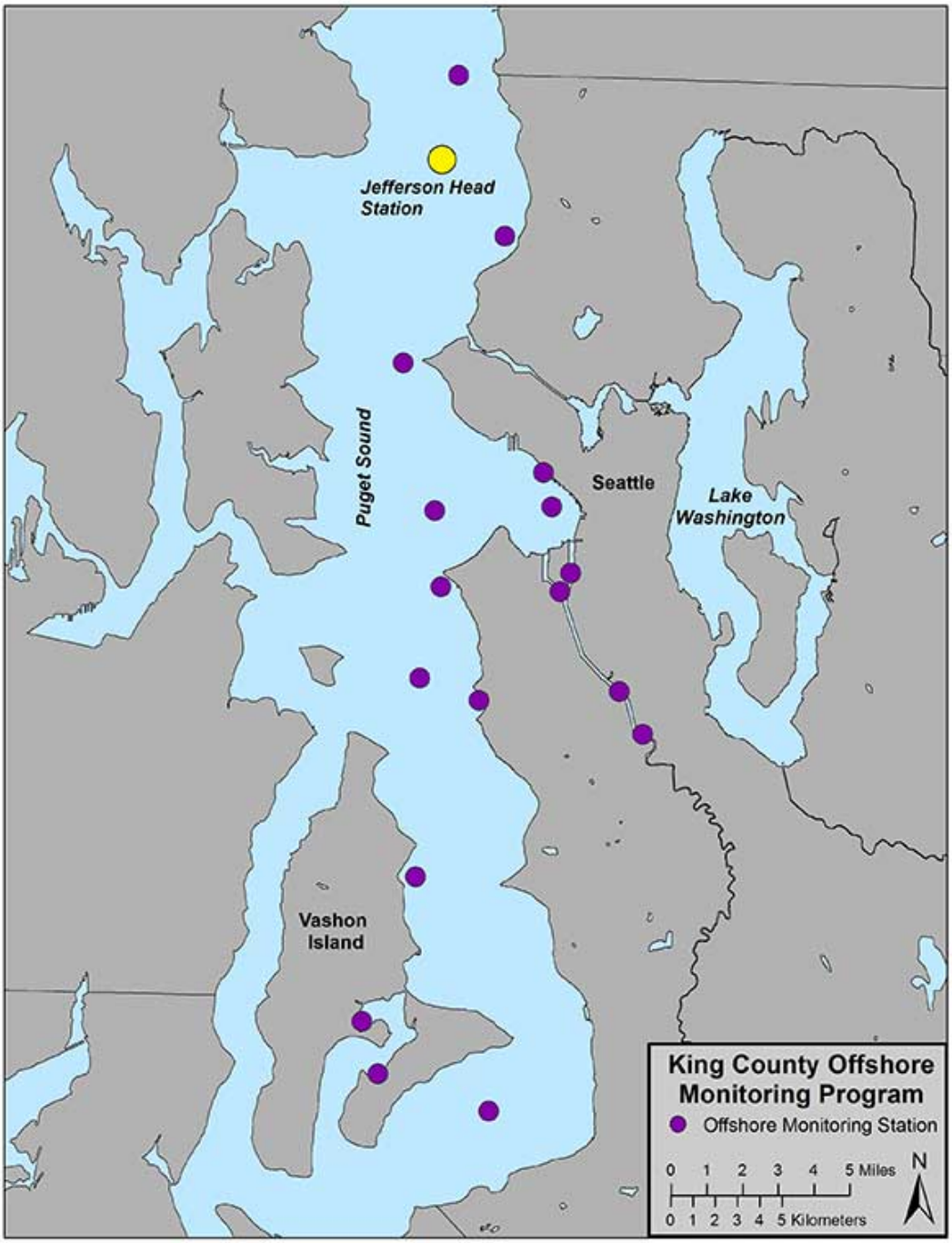
Forecasting conditions now helps fishermen employ various options (e.g. early harvest, moving lines), to mitigate damage when local nitrate levels drop below 3 µM, which is required for an optimal harvest.

Please see our selection of nitrate sensors, and learn more about the SUNA V2 nitrate sensor and potential applications.

*DIN:The Dissolved inorganic nitrogen is the sum of ammonium, nitrite and, nitrate ions (NH4+ + NO2- + NO3-).

King County, WA Offshore Nitrate Monitoring Program

The King County Dept. of Natural Resources and Parks (in Seattle, WA USA) conducts long-term marine monitoring to assess baseline conditions and trends in Central Puget Sound. Routine nutrient data, including nitrate, have been collected since 1994. Twice-monthly observations are collected at several marine stations in Puget Sound (below), using a suite of biogeochemical sensors while concurrently collecting discrete water samples at multiple depths. This enables the direct comparison of *in situ* nitrate measurements made with the SUNA V2 nitrate sensor to those made with traditional wet chemistry methods.

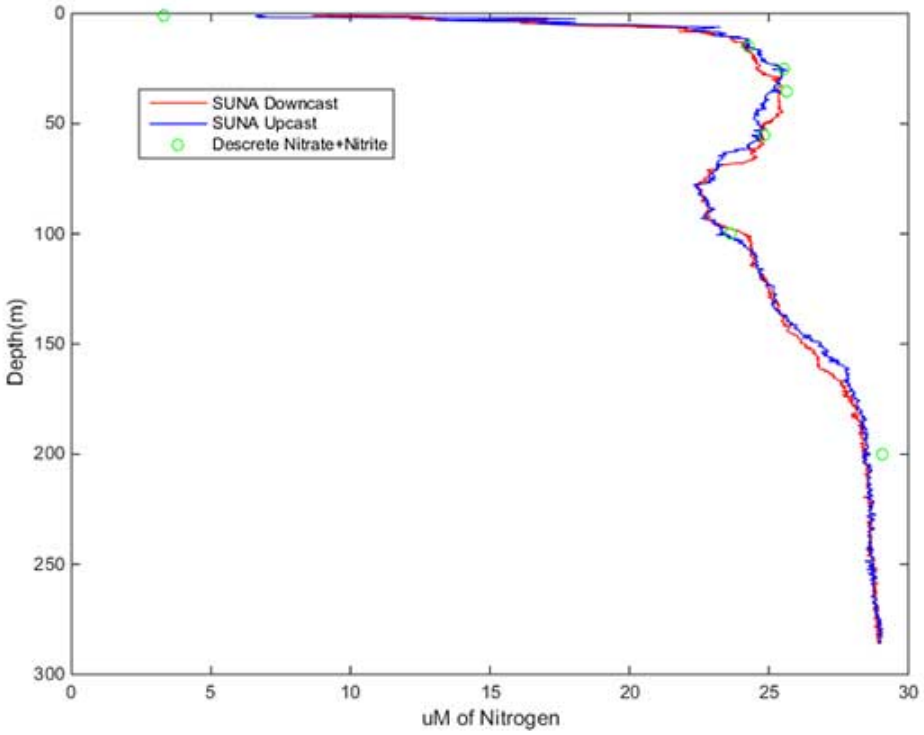


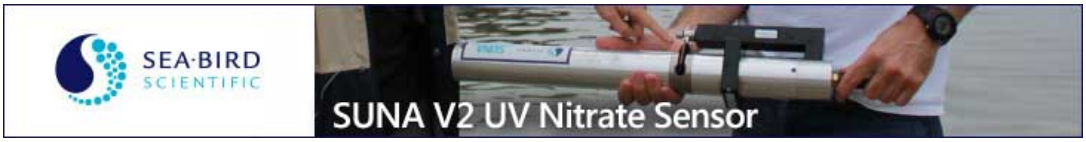
Above: The yellow circle shows the location of Jefferson Head Station and the purple circles show the locations of the other offshore/inshore stations (total of 18 sites) monitored by King County Dept. of Natural Resources & Parks.

In this application, the SUNA V2 is integrated with a Sea-Bird 25plus CTD (Conductivity, Temperature and Depth) on a shipboard profiling carousel. The package collects measurements in real-time during the downcast and upcast and triggers the acquisition of discrete water samples by closing the sampling bottles at specific depths during the upcast. These bottle samples are then used to measure the nitrate concentration in the water using a laboratory, colorimetric analysis method (NEMI METHOD, SM4500-NO3-F). This type of discrete laboratory analysis is a common method employed to reality-check data taken from real-time, *in situ* instruments. In this particular application, the

scientists were able to confirm from the laboratory analysis that the SUNA V2 data delivered in real-time through the profiling package was within +/- 0.18 uM nitrate of the bottle samples. For more *in situ* nutirent sensor application stories, please see our nutrients page.

Below: Vertical profile (upcast in blue and downcast in red) of nitrate in the water column at Jefferson Head Station on April 4th, 2017. Discrete nitrate concentration taken during the upcast are shown as green circle.





Sea-Bird University in October – Limited Spots Available

Hurry! October is almost here and so is our Annual Sea-Bird University! Limited seats are available, so email us to receive your enrollment forms.

Sea-Bird Scientific offers regularly scheduled four-day training classes approximately two times per year at an off-site location near our office/factory in Bellevue, WA (12 miles from downtown Seattle). Through our comprehensive training modules, we teach our customers how to get the most from their instruments. Training consists of operator training on major Sea-Bird products and software, and is hands-on by nature. The curriculum covers profiling instruments, thermosalinographs, and moored instruments, and includes theory and operation, data processing, and maintenance and repair.

We encourage you to take advantage of our expertise and participate in our training classes. **Our next 4-Day training is scheduled for October 16 - 19, 2017.** Visit Sea-Bird University for more details, or contact Payal Parikh (pparikh@seabird.com) to enroll for this class.

Tech Tip: Fresh Water / Salt Water Applications for SUNA V2 Nitrate Sensors

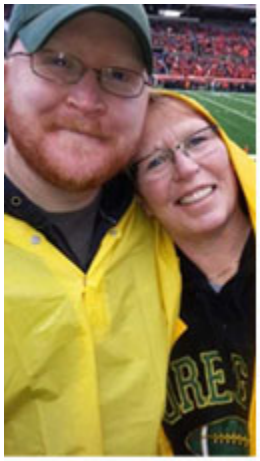
For greater accuracy, SUNA sensors are individually calibrated at Sea-Bird Scientific for use in fresh or seawater. Due to difference in absorptivity characteristics of seawater and fresh water, the calibration data for each of these applications is distinct.

Calibrations for instruments to be used in **fresh water** are determined from aqueous nitrate standards of deionized water with 40 and 4000 micromolar nitrate concentrations and pure deionized water. It is important to note that SUNA units configured for use in fresh water do not give reliable nitrate readings in seawater, as the interference from bromide will not be accounted for without seawater absorption data.

Instruments calibrated for use in **salt water** use nitrate standards of seawater with 40 micromolar nitrate concentrations and nitrate-free seawater to determine the baseline seawater absorbance spectrum. The use of seawater enables the correction for the UV absorption of bromide and other sea salt components. Instruments calibrated for use in seawater can be used in freshwater applications, but the accuracy will be decreased in regions of high nitrate concentration because the instrument is

calibrated for the smaller range of nitrate concentrations typically found in seawater. For details on this and for other FAQs, read the FAQ tab on the SUNA V2 webpage.

Meet Our People: **Andrew Harris,** Customer Service Supervisor



Andrew graduated from Oregon State University in 2014 with a B.S in Public Health Management and Policy, and joined the Service department in Philomath in 2015. Andrew enjoys helping people and believes what we do is important - for our customers, for our environment, and for science. There have been a lot of changes within the Service Department lately and Andrew has been impressed and grateful for the extent to which the staff has stepped up to meet new challenges.

Though he still wants to learn how to fly fish, Andrew enjoys fishing and camping with his wife of 16 years, particularly in the Breitenbush area of central Oregon. And they always take their three dogs!

Facebook Spotlight

Upcoming Events

MTS/IEEE Oceans 2017: Anchorage, AK, USA. September 18 - 21, 2017. Booth 709

Sea-Bird University: Bellevue, WA, USA. October 16 - 9, 2017 REGISTER NOW!

CERF: Providence, RI, USA. November 5 - 9, 2017

Call Us: +1 425 643 9866

Bellevue / Philomath / Halifax

Sea-Bird Scientific, 13431 NE 20th Street, Bellevue, Washington 98005 USA