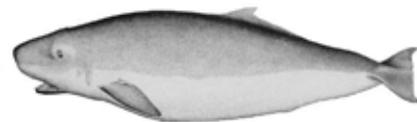


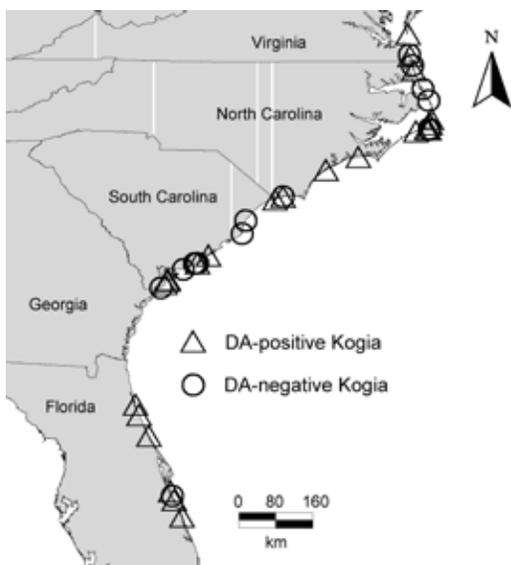
## Domoic Acid Exposure in Strandings Along Atlantic Coast

During early September 2006, several small whales belonging to the genus *Kogia* (which includes pygmy and dwarf sperm whales) were involved in a mass stranding near Cape Hatteras, North Carolina. As part of the investigation to determine the cause of death in these animals, samples were collected by the [U.S. Marine Mammal Stranding Network](#) and sent to the [NOAA Marine Biotoxins Program](#) for algal toxin analysis. Since this particular region is not particularly active in terms of HABs, and since a HAB was not associated with this mass stranding, several algal toxins were included in the analyses. Results were surprising in that samples from all 4 *Kogia* sampled were positive for the algal toxin domoic acid (DA), making this the first detection of DA in marine mammals in coastal waters of the southeastern U.S.



http://www.phytoplankton.noaa.gov/mon/figs/2006.htm

*Kogia*



Kogia stranding/sampling locations in the SEUS, between 1997-2008.  
Triangle markers = DA-positive animals, circles = DA-negative animals

Following detection of the first toxic *Pseudo-nitzschia* bloom in North Carolina in November 2006, and detection of DA by NOAA researchers in 3 additional *Kogia* stranding in North and South Carolina in March-April 2007, an investigation was initiated by the NOAA Marine Biotoxins Program in order to assess the extent of DA exposure in *Kogia* from the southeastern U.S. states. In collaboration with members of the Stranding Network, samples collected from 41 *Kogia* stranding from Florida to Virginia between 1997-2008 were analyzed for DA by liquid chromatography/tandem mass spectrometry (LCMS) methods. Surprisingly, feces samples from 87% of the *Kogia* analyzed were positive for DA, at concentrations ranging between 12-13,566 nanograms DA per gram of sample. More surprisingly, all the *Kogia* analyzed in this study had stranded in the absence of any detected HABs.

In order to determine if this widespread DA exposure was restricted to *Kogia* or if other marine mammal species were also affected, samples from 11 additional cetacean (i.e., dolphins, whales) species were collected for analysis. Samples (feces, urine, stomach contents) from 40 non-*Kogia* individuals stranding from Virginia to Florida between 2006-2008 were analyzed for DA, and all samples were negative for the toxin. Results from this study suggest that, in the absence of detectable DA-producing blooms, *Kogia* from the southeastern U.S. can accumulate this toxin when other cetacean species apparently do not.

The DA concentrations in these *Kogia* are generally much lower than those reported for DA-related marine mammal die-offs where toxic *Pseudo-nitzschia* blooms are common, and were not likely a factor in mortality. However, since *Kogia* are pelagic, deep-diving whales, this DA accumulation may be an indication of undetected offshore HAB activity, potentially causing chronic HAB exposure to marine mammals inhabiting this region. These findings are an excellent example of how phytoplankton monitoring networks, marine mammal strandings networks and algal toxin researchers successfully collaborate to fully understand the impacts of HABs in marine ecosystems.

Article written by [Dr. Spencer Fire](#), Marine Biotoxins Program Biologist

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## From The Desk Of Dr. Morton

It has been a busy summer for the Volunteer Phytoplankton Monitoring Network. Firstly, I would like to thank Dr. Spencer Fire, Coordinator of the Analytical Response Team (ART) for writing the front story on domoic acid and *Kogia*. Spencer and I were recently informed that the resulting manuscript on these events was accepted for publication in the international journal "Harmful Algae". This research would not be possible without volunteer observations along the East Coast.

During the summer, Allison, Jeff and I attended the [National Marine Educators Association](#) (NMEA) annual meeting held in Savannah, GA. A short story on NMEA is in this issue. One of the participants of the workshop on phytoplankton and zooplankton identification was Dr. Maia McGuire of the Northeast Florida SeaGrant office. Maia and I were both



Dr. Morton and Dr. Freudenthal

undergraduates at Florida Institute of Technology in the early 80s and have not seen each other in 20 years. It is great to have Maia as a volunteer! Also in attendance was Dr. Hugo Freudenthal. Hugo is a retired professor from Long Island University. Hugo is the phytoplankton taxonomist who described *Symnodinium microadriticum*, the "zooxanthellae" of corals and other tropical invertebrates. Hugo attended phytoplankton taxonomy classes at Woods Hole Oceanographic Institute with my Ph.D. major professor, Dr. Don Tindall.

Also during the summer months we updated our species descriptions and updated our taxonomy. The first changes you will notice is the change of *Asterionella* morphotype to *Asterionellopsis* morphotype and *Fragilaria* morphotype with *Fragilariopsis* morphotype: The reason for this change was both are the accepted marine genus of this morphotype while *Asterionella* and *Fragilaria* are considered the accepted freshwater genus of these diatoms. We also updated *Rhizosolenia* morphotype which would encompass the genera *Rhizosolenia*, *Proboscia*, and *Pseudosolenia*. If you have any questions regarding these changes, feel free to contact me.

Another major change occurring this summer was changing the responsibilities of Allison and Jeff. To streamline the program, Allison will be the point of contact for states north of Georgia while Jeff will be the point of contact for states along the Gulf of Mexico. This was done to reduce travel cost associated with training and sites visits. So, Allison will be the point of contact for GA, SC, NC, VA, MA and Jeff will be the point of contact for TX, LA, AL, MS and FL. Again, if you have any questions, contact us.

I am extremely excited about the start of the PMN's 8th year of operation. Thank you all so much for volunteering your time and effort to this project.

Steve

Be sure to visit our web site at [chbr.noaa.gov/pmn](http://chbr.noaa.gov/pmn)

## 2008 NMEA Conference

The Phytoplankton Monitoring Network had quite a presence at the 2008 [National Marine Educators Association Conference](#) in Savannah, GA. Over 450 teachers



costume demonstration

and educators from around the country attended the meeting. The PMN presented with Amanda Taylor from Myrtle Beach State Park "Phytoplankton Fun-Activities and More!" Amanda presented the use of costumes to present plankton form and function while Allison presented the new "HAB card game". Over 65 people attended this standing-room only presentation.

Also during NMEA, the PMN in collaboration Dennis and Wendy Allen from the [University of South Carolina's Baruch Marine Field Laboratory](#) and the [North Inlet - Winyah Bay National Estuarine Research Reserve](#) provided an all day workshop on plankton identification. This included both zooplankton and phytoplankton. Over 12 participants attended this workshop. Thanks goes to Olympus for the loan of several microscopes for use at the workshop.



This newsletter is published by the Volunteer Phytoplankton Monitoring Network

For more information or to submit an article, contact Allison Sill at 843-762-8656 or [allison.sill@noaa.gov](mailto:allison.sill@noaa.gov)

Phytoplankton Monitoring Network ~ 219 Fort Johnson Road ~ Charleston, South Carolina ~ 29412

## The *Noctiluca* Are Blooming!

In Alaska there doesn't seem to be many fish in Ketchikan waters this season, but there sure is a lot of *Noctiluca scintillans*. This bioluminescent dinoflagellate appears a soupy orange by day and a glowing blue-green by night. *Noctiluca* is non-toxic to shellfish but has been known to cause fish kills by accumulating and emitting an overabundance of ammonia. *Noctiluca scintillans* blooms have no known human health effect.



Alaska *Noctiluca* bloom 8/3/08

Although *Noctiluca* was present in samples taken before the bloom was identified, it was in Ketchikan on June 26 that it reached bloom levels. A friend of PMN Volunteer Kurt Morin called to tell him about the tomato soup substance floating near the surface of the water behind boats in Bar Harbor Marina. It was so



Alaska *Noctiluca* bloom 6/27/08

thick that the small bottle of sea water Kurt collected was completely opaque with *Noctiluca* cells. Kurt identified the phytoplankton as *Noctiluca scintillans* and brought the sample to Barbara Morgan, Coordinator for the University of Alaska Southeast Fisheries Technology Program. Allison Sill was in Ketchikan during the bloom and worked with Barbara to confirm the identification of the causative species. The sample was preserved and sent to Dr. Steve Morton at NOAA's Marine Biotoxins Lab in Charleston, South Carolina for further study.

In the days that followed, reports of the bloom extended from Ketchikan harbor to as far south as Carol Inlet and as far North as the Point Higgins area. The bloom has continued through the summer, with the latest reports on July 11, 2008.



Alaska *Noctiluca* bloom 8/6/08

Article written by Barbara Morgan, University of Alaska, Southeast

To see other volunteer reported blooms and where other phytoplankton are being reported, visit the PMN Arc IMS maps at

<http://www.ncddc.noaa.gov/website/SEPMN/viewer.htm>

## Species Spotlight: *Noctiluca*

*Noctiluca*, is one of the largest dinoflagellates known with a size range of 200 to 2000  $\mu\text{m}$  in diameter. This genus has only one species, *N. scintillans*. This dinoflagellate is unarmored and flattened with a spherical body shape and no division of the epitheca or hypotheca regions. It has two flagella and a ventral groove that houses an oral pouch, a tooth, and a tentacle. *Noctiluca* is a strict heterotrophic dinoflagellate, feeding on phytoplankton and zooplankton by phagocytosis. Although sexual reproduction can be observed, *N. scintillans* mostly reproduces asexually through fission, producing daughter cells. Surprisingly motionless in the water column, the prominent flagellum is unable to move the cell. Any motion observed is credited to the control of large buoyancy vacuoles present in the cell that enables vertical movement.

*Noctiluca* is also known as "sea sparkle" because of its bioluminescence. Any water movement over the cell can cause it to produce a flash or sparkle of light that when found in large numbers can create a glowing of the sea. This can be observed when *N. scintillans* is found in large, compact blooms that can create pink, red or orange colored red tides.

*Noctiluca* is a non-toxic dinoflagellate but has been linked to fish mortality events world-wide due to release of high concentrations of ammonia stored in the cell's vacuole. To date, PMN volunteers have observed *Noctiluca* blooms in Texas and Alaska.

Visit the [Resources](#) page on the PMN website to see an archive of past phytoplankton in the spotlight.

Feel free to suggest a phytoplankton for spotlight.

## 2008 Microscopy and Microanalysis Conference

The Phytoplankton Monitoring Network attended the 2008 [Microscopy and Microanalysis Conference](#) in Albuquerque, New Mexico. A poster was presented on a new method we developed in preparing phytoplankton samples entitled "A Rapid New Method for Preparing Samples for Phytoplankton Taxonomy and Distribution using SEM." In addition, in-workshop classes titled "Basic Biological Confocal Microscopy" and "Imaging and Analysis with a Variable Pressure (VPSEM) or Environmental SEM (ESEM)" were attended along with other various biological and technological sessions, including demonstrations with the latest technology in microscopy advancements.

## Ask A Scientist....

### How does *Pseudo-nitzschia* produce chains?

What happens is that when a single cell divides, the daughter cells do not separate, but stay attached to one another by the valve face. But because they have a raphe and can move, the daughter cells gradually slide against each other until they remain attached only near the ends of the cells. The length of the attachment in relation to the total cell length is sometimes used as a species specific character. You often see chains with cells that have recently divided with the daughter.

*Dr. Rita Horner; School of Oceanography, University of Washington and author of "A Taxonomic Guide to Some Common Marine Phytoplankton"*

## Volunteer Spotlight:Alabama

It was in July of 2007 that this enthusiastic group of volunteers first congregated at the [Dauphin Island Sea Lab](#) (DISL) to learn about monitoring phytoplankton. Over a year later this group has hardly missed a week of sampling which has provided all of the Alabama volunteer groups with Olympus Mic-D Digital Microscopes. It was difficult to select just one volunteer for the spotlight since each group works tirelessly to monitor phytoplankton activity in their waters, so we selected all of them! The Alabama PMN volunteers represent the following organizations: [Little Lagoon Preservation Society](#) (LLPS), [Wolf Bay Watershed Watch](#) (WBWW) and Dauphin Island Sea Lab.

Many of the Little Lagoon Preservation Society volunteers have grown up in this area and want to protect what has provided them with many memories. Val Dickenson recalls residents sharing "stories about gigging for flounder, learning to sail, shrimping and even proposing to spouses by the lagoon." This is a very special place to the LLPS and they work hard to keep it that way. Some volunteers are transplants, but they too share the same deep concern for maintaining the balance between people and nature.

The LLPS has 13 volunteers that monitor four sites around the lagoon. When it comes to organization, Val and Bill Dickenson have assumed the role as group leaders, but they rely on others like Suely Munsell to help enter the data collected online. The group has not found any crimson tide yet, but they are finding quite a few *Navicula* spp., *Rhizosolenia* spp., *Nitzschia* spp. and *Chaetoceros* spp. The LLPS also samples for *eColi* and sends water samples to DISL for chemical analysis.

Homer Singleton, with the Wolf Bay Watershed Watch, is a volunteer that has shown tremendous dedication to the Phytoplankton Monitoring Network. Arnica Bay, Cook's Dock and Fish Trap are the three sites that Homer monitors on a bi-monthly basis. When seeing just a few species and low numbers in his samples, he reminds himself "that I really don't want to see harmful algal blooms in my Bay and [I'm] relieved that the few species I see are few in number." The WBWW volunteers includes Homer Singleton, Bob and Barb Suberi. Common phytoplankton that they find in Wolf Bay include *Ceratium furca*, *Coscinodiscus* spp., *Rhizosolenia* spp. and *Akashiwo sanguinea*.

Dauphin Island NE is the eastern-most site and is monitored by John Dismukes. John is a volunteer that pays tremendous attention to detail and has emailed us numerous pictures to confirm identification of mystery species. He is the only Alabama volunteer that submits data on a weekly basis. A resident of Dauphin Island, John is a hard working independent volunteer who uses the DISL resources for support.

This group of PMN volunteers is dedicated and composed of motivated citizens realizing the importance of phytoplankton and monitoring for harmful algal blooms along the Gulf Coast. At thirty two miles, Alabama's coastline may not be long, but it is well covered by the eight sites monitored by hard working volunteers. Our hats go off to the high interest and enthusiasm demonstrated by the PMN volunteers in Alabama, thank you for the continued effort!



Liam Nevils: Youngest PMN Volunteer

## Biotoxins Scientist Q & A: Dr. Gregory Doucette, Research Oceanographer

### Schools/Degree(s):

- 1989 Ph.D., University of British Columbia, Vancouver, B.C. Botany
- 1982 M.Sc., Texas A&M University, College Station, TX. Oceanography
- 1979 B.Sc., cum laude. Bowling Green St. Univ., Bowling Green, OH. Biology

**Favorite Subject(s):** I have always enjoyed biology and chemistry (specifically biochemistry)...biology because I like working with living 'bugs' (especially algae and bacteria) and chemistry because this provides much of the foundation for understanding how the 'bugs' do what they do.



**Best Part of Job:** I feel very fortunate to have a job in which research and discovery are among the main goals...my work allows me to be creative in finding ways to answer questions or address issues that are important to our Agency and thus to the public. I also value very much the interactions that I have with colleagues and partners, especially in other countries...it is exciting not only to collaborate on research projects, but also to gain an understanding and appreciation of their social and cultural values. The science is important and interesting, but the people we interact with make it fun!

### Q: How did you become involved in the sciences?

A: The most important influences in my choice of a career were two professors at the undergraduate level...one got me very excited about marine sciences (she organized incredible field trips to the Gulf of Mexico during our spring breaks as a follow-on to her Marine Biology course – an amazing opportunity for students at a land-locked university in NW Ohio!) and the other developed my fascination with algae (invited me to 'jump in' and work on research projects with grad students in his lab).

### Q. What are your current research areas?

A: Determining the routes, efficiency, and effects of algal toxin trophic transfer in marine food webs; the development and application of detection methods for harmful algal species and their toxins, including deployment on automated, in-situ platforms in support of ocean observation systems; employing classical and molecular-based approaches to investigate the toxic effects of marine biotoxins; assessing the role of bacteria in regulating algal bloom population dynamics, with an emphasis on algicidal bacteria.

### Q: What would you like to accomplish next in your career?

A: Some of the work we are doing now on autonomous, in-water sensors for harmful algae and their toxins is incredibly exciting and has potential applications for many other areas under the 'umbrella' of ocean observing...to ultimately make this very powerful technology widely available so that people can actually use their office or home computer (or blackberry) to "see" what's happening at that moment in places like Monterey Bay, the Gulf of Mexico, and even globally, will be very cool!

**Memorable Event:** One of the great work-related experiences I've had was spending six weeks on a research vessel in the Antarctic. Not many people have had the opportunity to visit and or work in this remote area of our planet - it is a truly amazing and peaceful place. Spending time in this unique and fragile ecosystem also helps one to better appreciate its susceptibility to "pressures" from climate change, over fishing, and even tourism.

**Outside work:** I have a Masters in Coaching from USA Hockey, coach a youth travel hockey team, and play in an adult hockey league (OK, I'm originally from Canada, eh!)

### Schedule a PMN Training

Please check the on-line [PMN training calendar](#) for available dates and email your state's contact person to reserve the day and time which works best for you.

Allison: US Atlantic Coast from Georgia north and Alaska

Jeff: Florida, Gulf of Mexico, US Pacific Coast and Hawaii

## PMN Expansion

This has been a great year for PMN expansion as we have not slowed down since the Alaska training in April. In early July we travelled to Gautier, Mississippi to work with 24 educators, scientists and retirees interested in joining our network. Groups represented included the [Mississippi Master Naturalists](#), [University of Southern Mississippi Gulf Coast Research Lab](#), [Our Lady Academy](#), [Mississippi State University](#), [Mississippi-Alabama Sea Grant Consortium](#) and [NOAA's Northern Gulf Institute](#). Within three weeks of the training, five monitoring sites were set up along the Mississippi coast. Thank you to all of the new volunteers who are enthusiastic about monitoring!

The PMN recently worked with Dr. Barb Kirkpatrick and Kate Nierenberg of [Mote Marine Laboratory](#) to expand the networks monitoring beyond the Jacksonville, FL region. During two separate trips to Florida, over 90 new volunteers attended training sessions held at the [Whitney Laboratory](#) in St. Augustine, at [Florida Institute of Technology](#) (FIT) in Melbourne, at [Florida Gulf Coast University \(FGCU\) Vester Field Station](#) in Naples, at Mote Marine Laboratory in Sarasota, and at the Academy of Environmental Science in Crystal River.

New volunteers represent a diverse group of individuals, including the [Florida Paddling Trails Association](#) (FPTA), [Florida Surfrider Association](#), [Florida Master Naturalists](#), FGCU and FIT, various Florida high schools, [St. Augustine EcoTours](#), Olga Outdoor Center, the Whitney Laboratory, and interested citizens. Approximately 50 new sampling sites will be established from these initial trainings along the coast of Florida. Yet this represents only the first wave of trainings. There are many additional groups that want to get involved and new volunteers in the Panhandle are patiently waiting for our next visit to the state.

While tropical storms Fay and Hanna provided some excitement for the scheduled trainings, it was the volunteers that attended the training sessions that really brought the enthusiasm for phytoplankton exploration! But the show stopper at each training was definitely the Red Tide tattoos. Thank you Mote!

The PMN looks forward to working with all the new FL volunteers as you monitor your local waters. Have fun sampling!



Florida Gulf Coast University Vester Field Station, Bonita Beach, Florida

### Submitting Images to PMN

If you have identified or unknown phytoplankton images, PMN would love to see them! Please include a proper cite for the image(s) in your email to Allison Sill ([allison.sill@noaa.gov](mailto:allison.sill@noaa.gov)) or Jeff Paternoster ([jeff.paternoster@noaa.gov](mailto:jeff.paternoster@noaa.gov)).

### PMN Image Use

If there are any PMN images you would like to use, please contact Dr. Steve Morton at 843-762-8857 or [steve.morton@noaa.gov](mailto:steve.morton@noaa.gov) for the proper procedures for image use.