

PLANS

Plankton and Nutrient Studies for the Chesapeake Bay

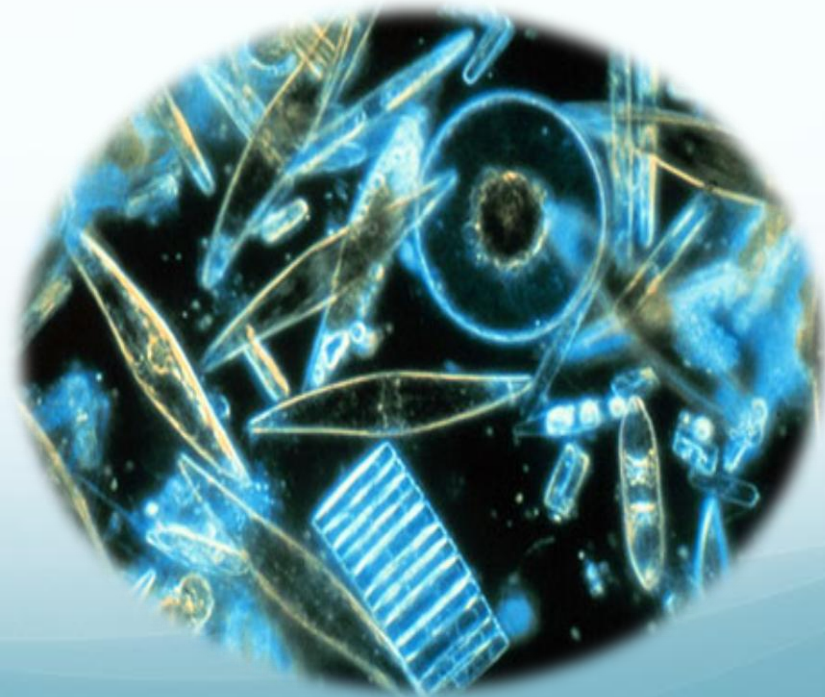


What is PLANS

- A 3-year, NOAA-funded program for the environmental science classes in the Calvert County High Schools
- A collaboration between:
 - Calvert County Public Schools
 - Morgan State University, Estuarine Research Center
 - The Society for Ocean Sciences
- A curriculum enhancement program that employs field activities and inquiry-based learning to build an understanding of the sources, impacts and possible control strategies for nutrient enrichment of the Chesapeake Bay and Patuxent River

What is PLANS

- A set of extra-curricular activities that continue to involve interested students in Plankton Monitoring and the presentation of their findings
 - Year-end capstone symposium
 - Active participation in the Phytoplankton Monitoring Network (PMN)





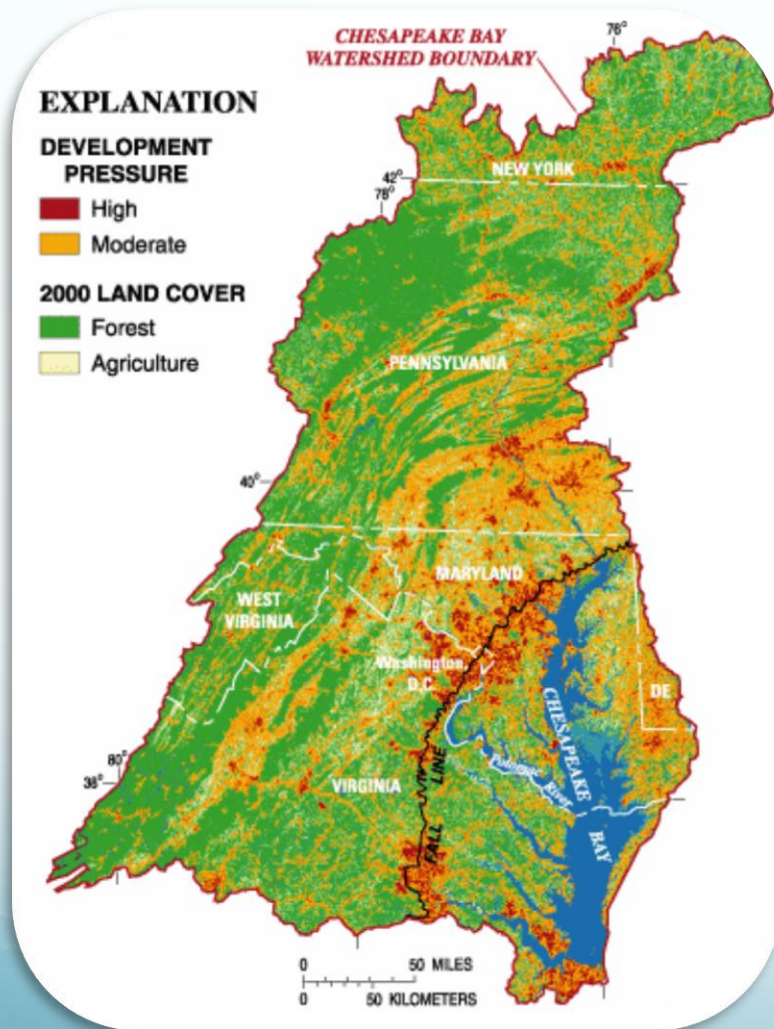
B-WET

BAY WATERSHED EDUCATION & TRAINING PROGRAM

- The NOAA B-WET Program is an environmental education program that promotes locally relevant, experiential learning in the K-12 environment.
- The primary delivery of B-WET is through competitive funding that promotes Meaningful Watershed Educational Experiences (MWEEs)



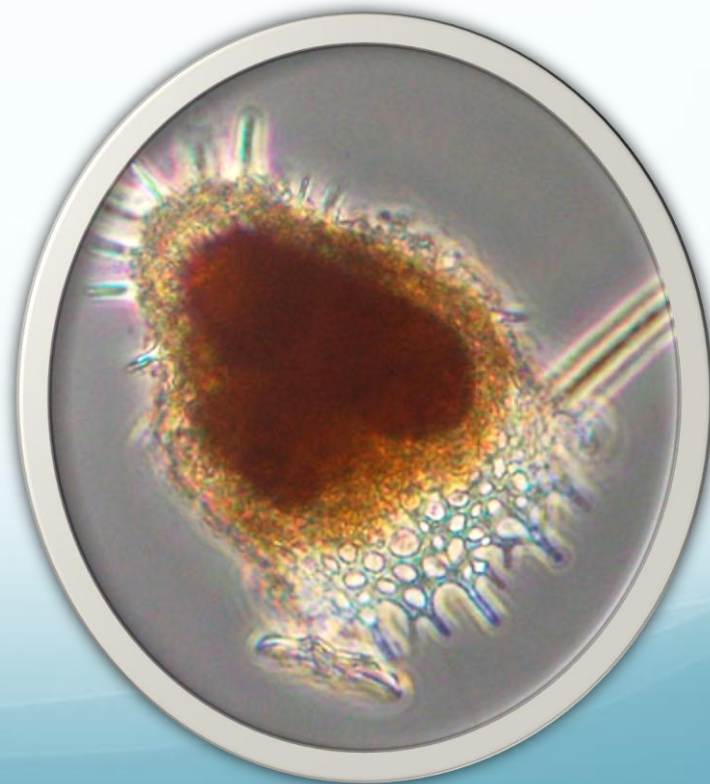
What is a MWEE?



- is investigative or project oriented
- is an integral part of the instructional program
- is part of a sustained activity
- considers the watershed as a system
- is enhanced by NOAA products, services, or personnel, where appropriate

What is a MWEE?

- A MWEE integrates field work in the Chesapeake Bay watershed with multidisciplinary classroom activities and instruction. Students then share their discoveries with local schools and communities, both orally and in writing.
- Each MWEE consists of:
 - Preparation phase
 - Action phase
 - Reflection phase



MWEE's within the PLANS Program

Nutrient Enrichment of the Chesapeake Bay

Designed for 9th grade Environmental Sciences Classes

Nutrient Limitation in the Chesapeake Bay

Designed for AP and Honors Environmental Science Classes

9th Grade MWEE
Nutrient Enrichment
of the Chesapeake
Bay

Nutrient Enrichment of the Chesapeake Bay

- What is the effect of nutrient enrichment on the growth of algae?
- What are the ecosystem consequences of this increased algal growth?
- What are some local sources of nutrients that could enter the Bay?

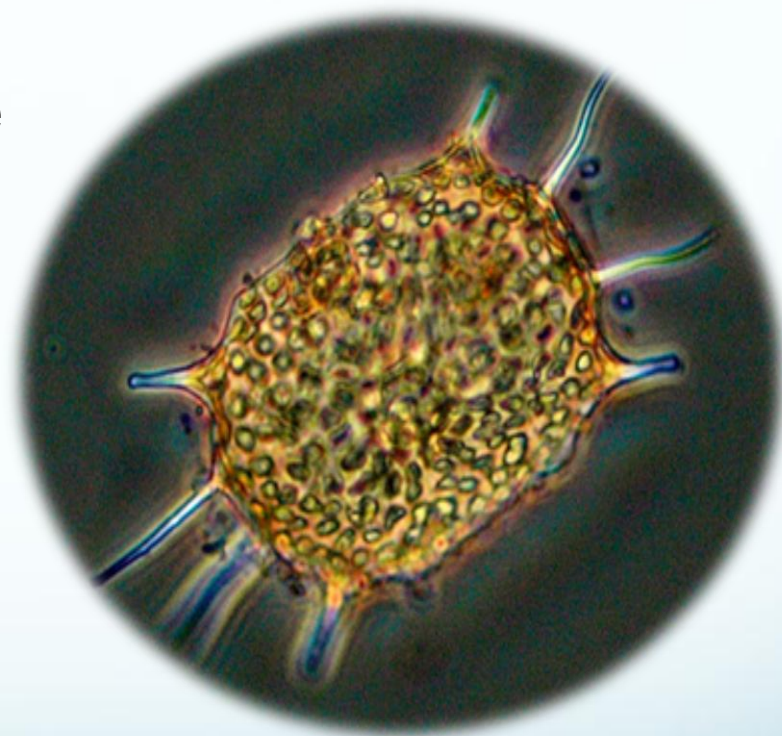
Preparation Phase



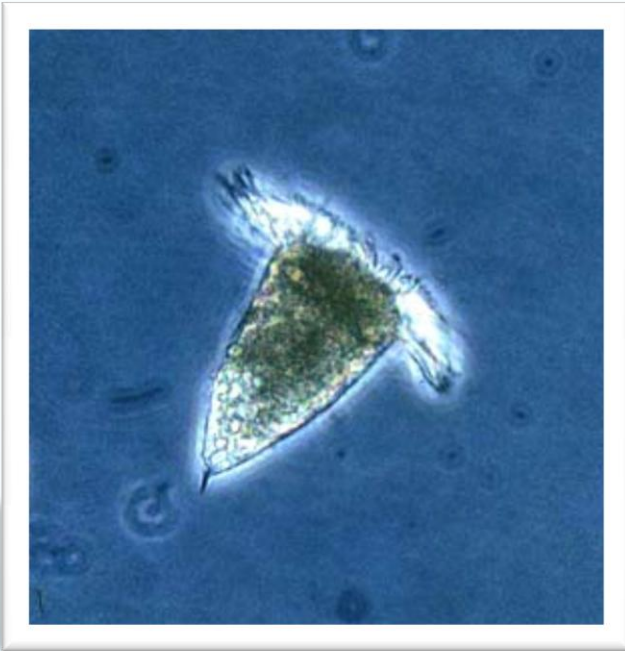
- Classroom introduction to Nutrient Enrichment
- Designing an Enrichment Bioassay (Experiment)
- Setting up initial experiment (monitoring 1-3 weeks)

Action Phase

- Location: Local or schoolyard site
- Collect potential nutrient source samples (soil or water)
- Set up Bioassay with nutrient samples (monitoring 1-3 weeks)



Reflection Phase



- Review / analyze data from Bioassays
- Report results on the PLANS web site
- Employ appropriate web resources to develop a local and regional perspective to nutrient sources
- View computer simulation of enrichment consequences
- Participate in Capstone Activities

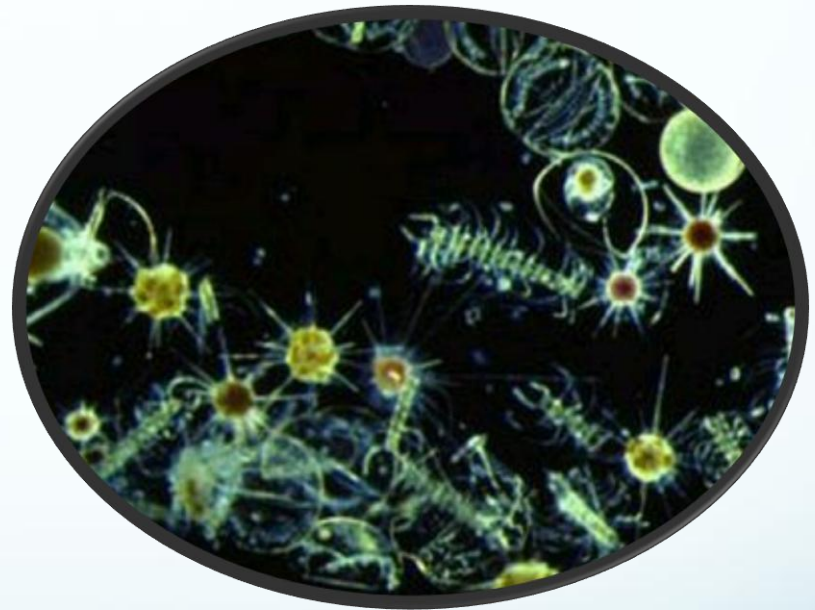
Honors /AP MWEE
**Nutrient Limitation in
the Chesapeake Bay**

Nutrient Limitation in the Chesapeake Bay

1. What nutrient (N or P) controls the growth of algae at any particular point in time and location in the Bay?
2. What are the processes and mechanisms that cause the limiting nutrient to vary seasonally?
3. What nutrient sources are the most critical to control on local / regional scales?

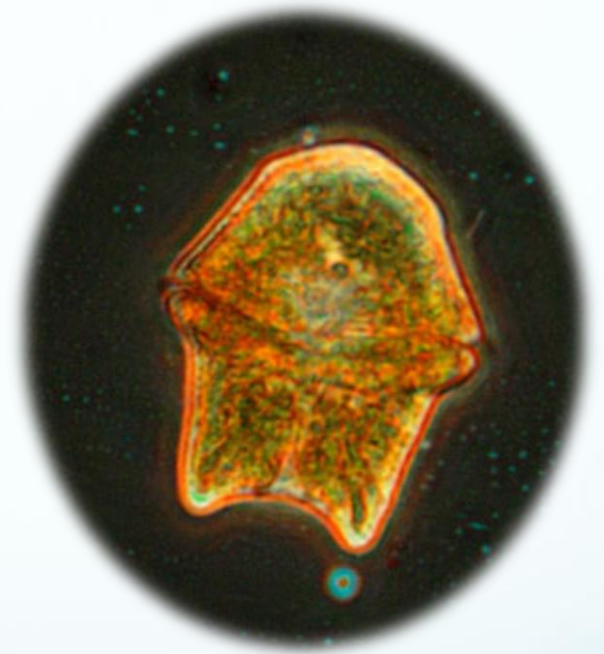
Preparation Phase

- Review the sources and impacts of nutrient enrichment
- Introduce the concept of nutrient limitation
- Design “nutrient limitation” bioassay
- Set up and run assay with a “known” sample of water (monitor 1-3 weeks)

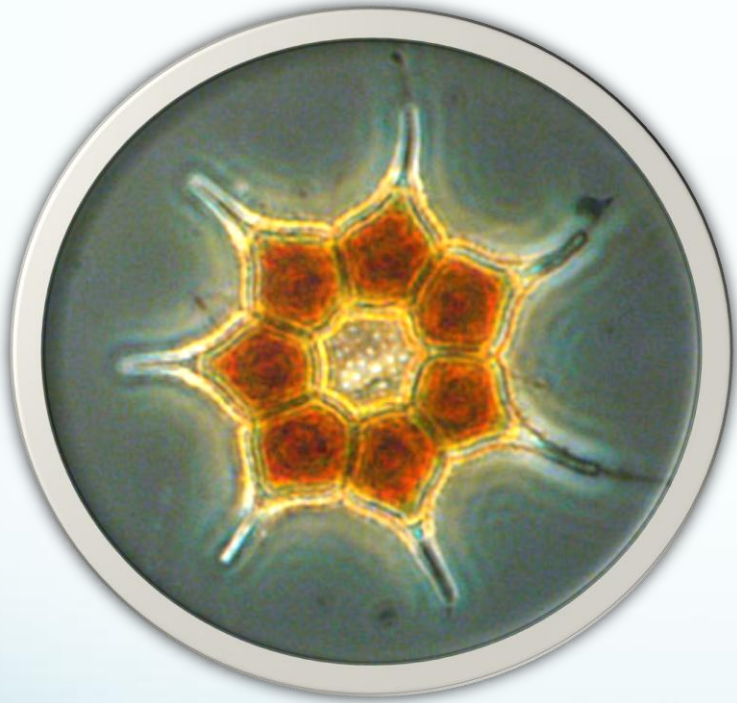


Action Phase

- Location – ERC
 - Research cruise on the Patuxent River
- Collect:
 - Water quality data
 - Water samples
 - Plankton samples
 - Dredge samples
- View plankton samples microscopically
- Return water sample to classroom and set up nutrient bioassay (monitor 1-3 weeks)



Reflection Phase

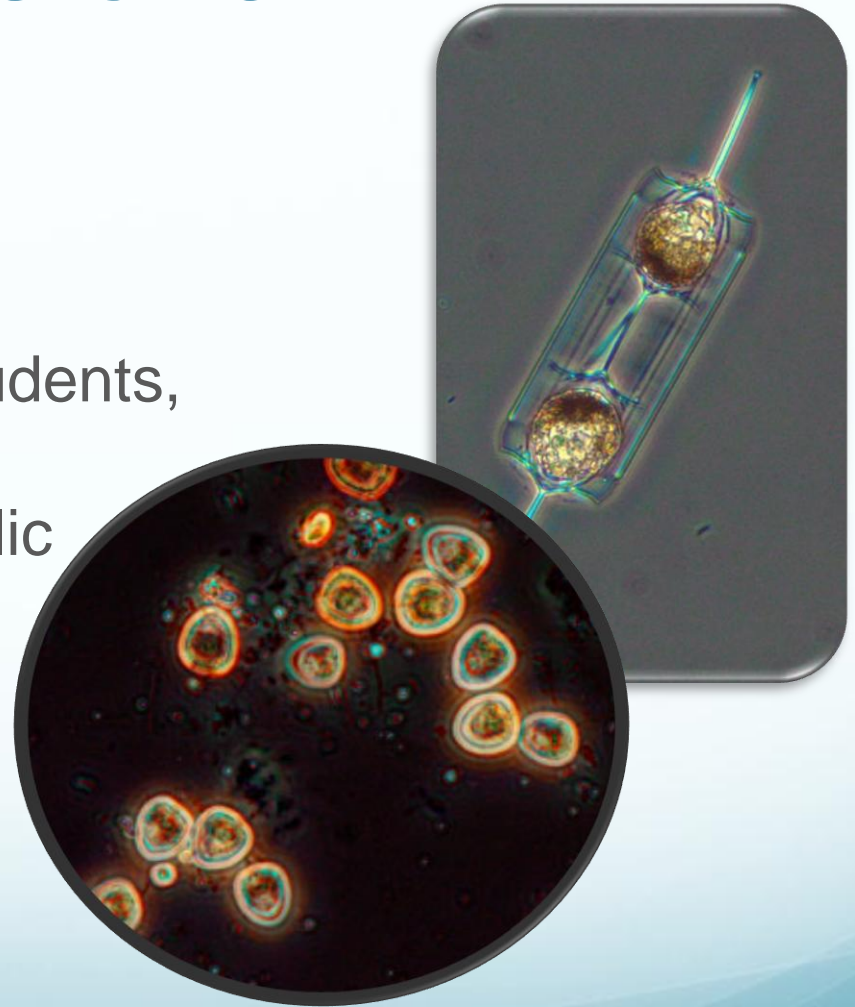


- Review / analyze data from nutrient limitation Bioassays
- Report results on the PLANS Web Site
- Employ appropriate web resources to develop a local and regional perspective on sources of N and P
- Track nutrient input and algal blooms
- Participate in Capstone Activities

Capstone

The PLANS Symposium

- All classes participate
- Attendees will include, students, educators, policy makers, scientists, media, the public
- Keynote science speaker
- Poster presentation
- Photo competition



Phytoplankton Monitoring Network (PMN)

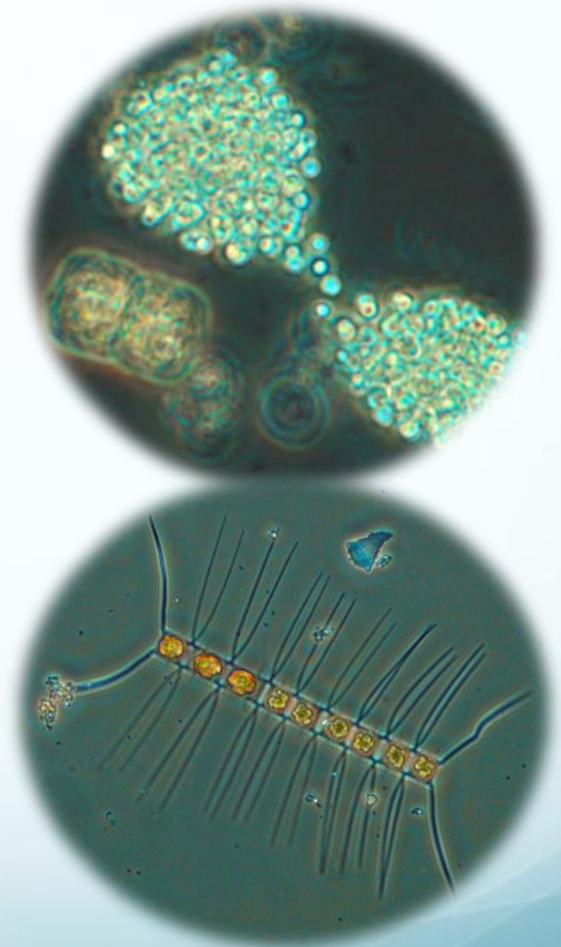


Phytoplankton Monitoring Network

- Links the general public and scientist to monitor coastal phytoplankton
- Monitor and maintain an extended survey area along coastal waters throughout the year
- Create a comprehensive list of harmful algal species inhabiting coastal marine waters
- Promote an increased awareness and education to the public on HABs

Phytoplankton Monitoring Network (PMN)

- ERC is currently a Phytoplankton Monitoring Site
- **Year 1** – participation by one school
 - pilot training of students in PMN protocols and plankton identification using the ERC site samples and an internet link to the school
- **Years 2 and 3**
 - phase in additional schools into the PMN
 - establish additional PMN sampling sites near schools





Nutrient Enrichment of The Chesapeake Bay

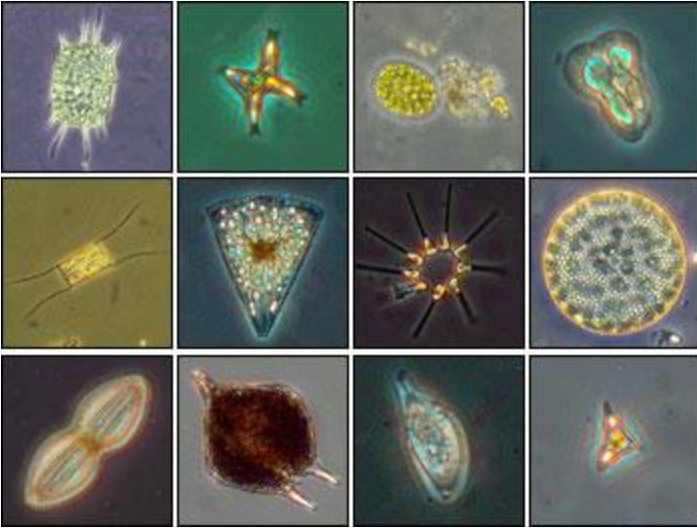


B-WET

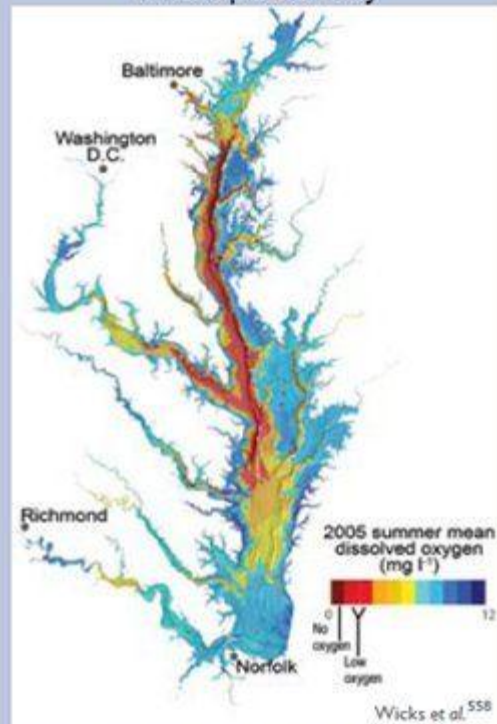
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Phytoplankton Monitoring Network (PMN)

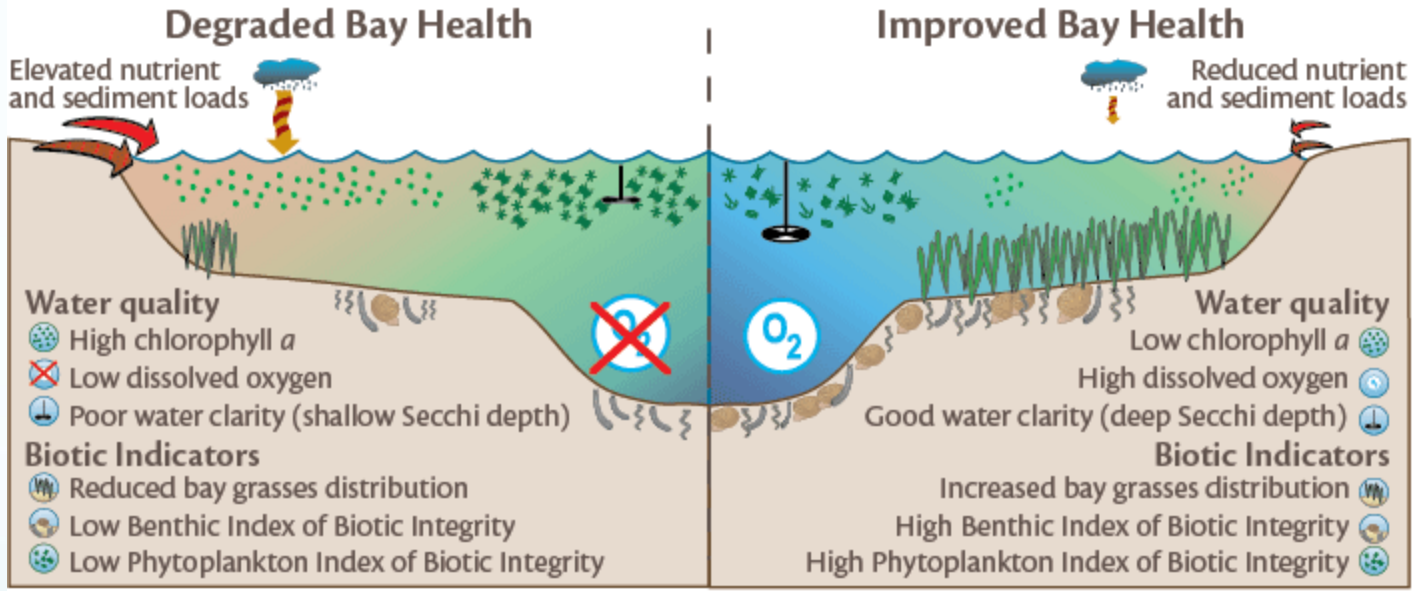
- Identify general trends where HABs are more likely to occur
- Isolate areas prone to harmful algal blooms (HABs) for further study by Marine Biotoxins researchers in effort to assist state managers in mitigating the affects of HABs
- Create a working relationship between volunteers and Marine Biotoxins researchers
- Increase the public's awareness of research conducted by federal workers on HABs

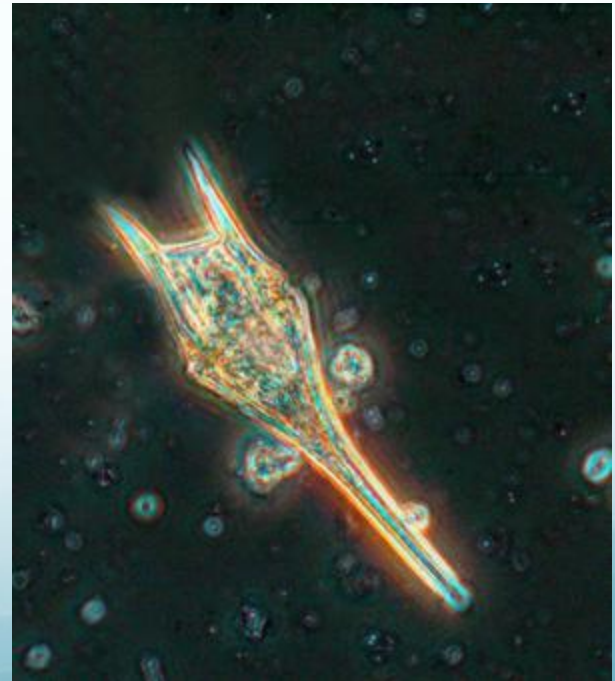


Dead Zones in the Chesapeake Bay

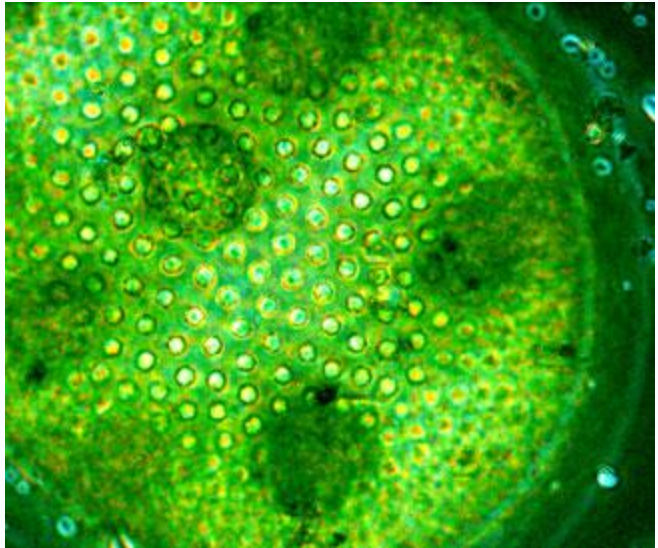


Climate change is likely to expand and intensify "dead zones," areas where bottom water is depleted of dissolved oxygen because of nitrogen pollution, threatening living things.









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