Red Tide and You
What is Florida red tide?

A specific type of Harmful Algal Bloom (HAB), called *Karenia brevis* or *K. brevis*. HABs occur around the globe, in both fresh and salt water.
Karenia brevis

- Microscopic plant-like organism
- Releases harmful chemicals (brevetoxins)
- First documented in Florida in 1840’s
**K. brevis** is mobile...

*K. brevis* uses it’s flagella, or tail, to move up and down the water column.

**DAY:** Cells move towards the sun. The organism creates energy by using it’s chloroplasts for photosynthesis.

**NIGHT:** Cells disperse downward without actively swimming.
*K. brevis* is a complex organism…

*K. brevis* has 20 times the number of unique gene clusters as found in the human genome.
What causes a red tide bloom?

Three conditions are needed for a high concentration of *K. brevis* cells:
1) biology
2) chemistry
3) physics

Photo: P. Schmidt (Charlotte Sun)
Biology

*Karenia brevis* cells must be present in the water column.

Photo: Anthony Greco (USF)
Chemistry

Nutrient sources

atmospheric inputs

dead fish?

river discharge

blue green algae

deep water

sediment

(altered from Vargo et al., in prep.)
Physics

currents or winds
Environmental Effects

The story of red tide is more than just a fish story…
Environmental Effects

Scallops, fish, sea turtles, dolphins, manatees, sea birds…the whole marine ecosystem is affected.
Public Health Effects

Two main routes of exposure exist that produce very different symptoms in humans.

- **Ingestion**
- **Inhalation**
Public Health Effects
Ingestion

Symptoms of Neurotoxic Shellfish Poisoning:
• Gastro-intestinal distress
• Reversal of hot and cold
• Headache
• Chills
• Muscle weakness
Public Health Effects
Inhalation

Upper airway symptoms:
• Scratchy throat
• Watery eyes
• Coughing

Lower airway symptoms (Asthmatics):
• Chest tightness
• Wheezing
• Shortness of breath
Economic Effects

A recent study of two communities, Ft. Walton and Destin, showed a 29-35% decline in monthly revenues for the restaurant and lodging industries during red tide incidents. (Larkin & Adams, in press)
What is being done about red tide?
Protecting Public Health

Commercially harvested shellfish is safe to eat, due to a diligent monitoring program run by the FL Department of Agriculture and Consumer Services (FDACS).
What is being done about red tide?

Protecting Public Health

Beach Conditions Report

The report is available via the web or by phone and allows beachgoers to decide where to go. START is helping to expand the report to include other coastal counties.

www.coolgate.mote.org/beachconditions/

941- BEACHES (232-2437)
What is being done about red tide?

Forecasts

The HAB Bulletin allows managers to plan ahead for community impacts.
What is being done about red tide?

Nutrients

NOAA ECOHAB: *Karenia* Project (2006-2011)

- What nutrient forms are used by *K. brevis* in different environments?
- How much do bacteria and other microscopic organisms contribute to red tides?
- How much do near-shore, man-made nutrients contribute to red tide blooms?
What is being done about red tide?

Florida Red Tide Control & Mitigation Grant Program

• $850 K annually for research focused on control or mitigation
• Peer-reviewed, competitive process
• Twelve research projects recommended for funding for FY 07-08
What is being done about red tide?

Human Effects

NIEHS: Red Tide Toxins, Health Effects, and Exposure Study (2001-2011)

What effect do brevetoxins have on:

- people with asthma (decreased lung function)?
- people who are occupationally exposed, like lifeguards?
What is being done about red tide?

Possible Remedies

Brevenal may serve as a therapeutic treatment for marine mammals exposed to red tide toxins.
Education Outreach

START has developed many print materials to inform the public about red tide.

- Fact cards
- Beach report
- Beach signs
- Displays

www.start1.com
Education Outreach
HD Documentary Film

‘Guardians of the Gulf’ produced by the Essential Image Source Foundation

• For use in aquaria and museum theaters
• Special movie premier, Sarasota FL
• Middle school science curriculum
What can you do?
Be a part of the solution

• Educate yourself and those around you

Learn more at these websites

• http://www.start1.com
• http://www.noaa.gov
• http://www.mote.org
• http://research.myfwc.com
What can you do?
Be a part of the solution

• Support local efforts to reduce coastal pollution and improve water quality

• Ask your elected officials to help

• Become a member of S.T.A.R.T.