



**START**

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Preserving Our  
Coastal Waters

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**START1.ORG**

# Red Tide and You



# What is Florida red tide?

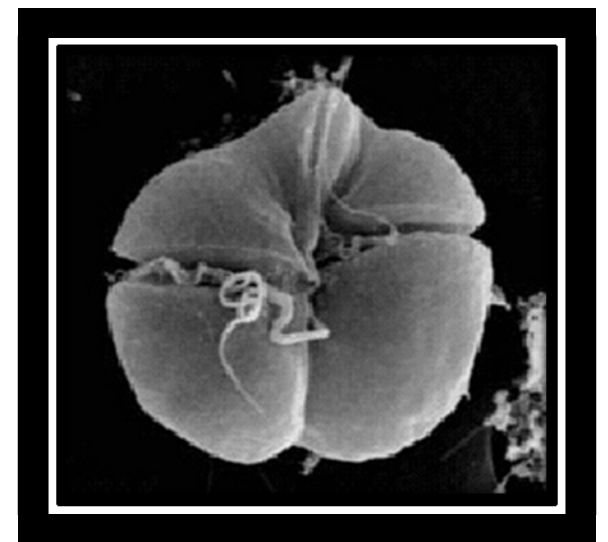
A specific type of Harmful Algal Bloom (HAB), called *Karenia brevis* or *K. brevis*. HABs occur around the globe, in both fresh and salt water.

Major HAB-related Events in the Coastal U.S.



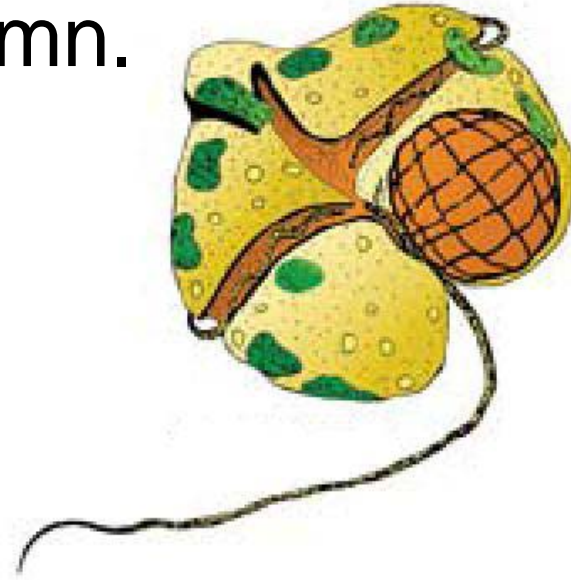
# *Karenia brevis*

- Microscopic plant-like organism
- Releases harmful chemicals (brevetoxins)
- First documented in Florida in 1840's



# *K. brevis* is mobile...

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

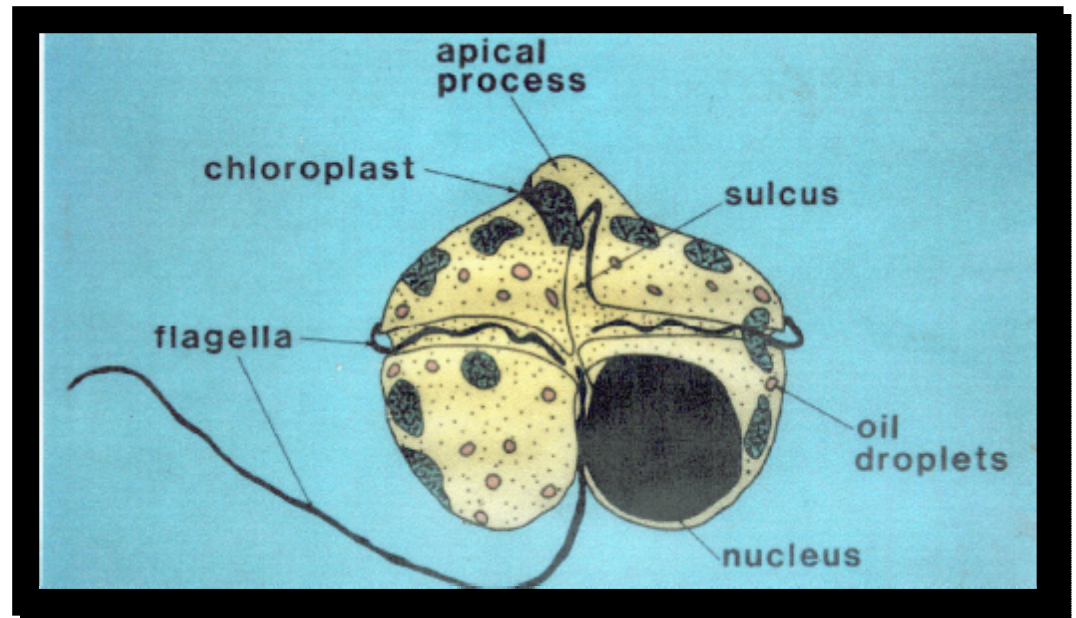


**DAY:** Cells move towards the sun. The organism creates energy by using its chloroplasts for photosynthesis.

**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

# Biology

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

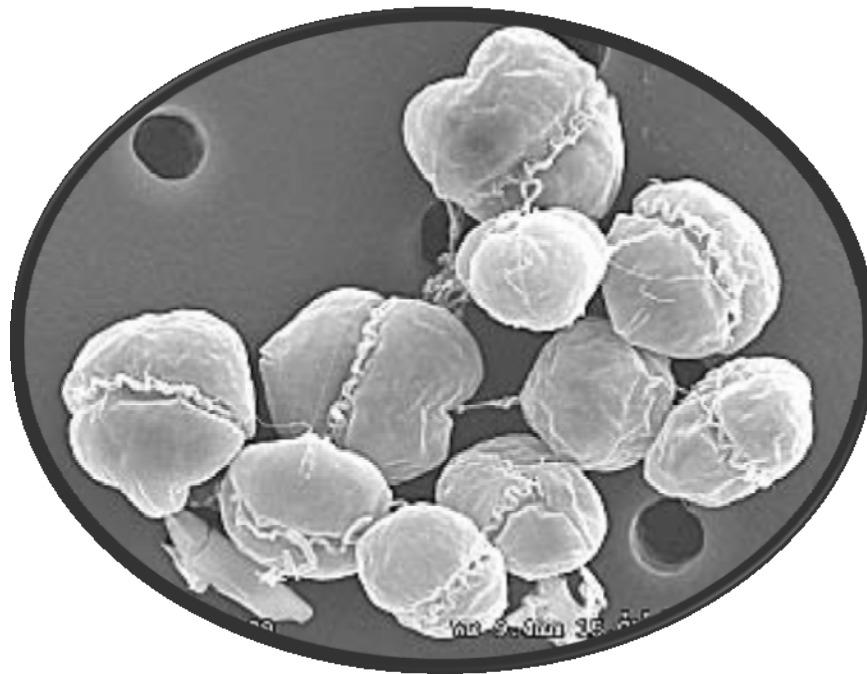
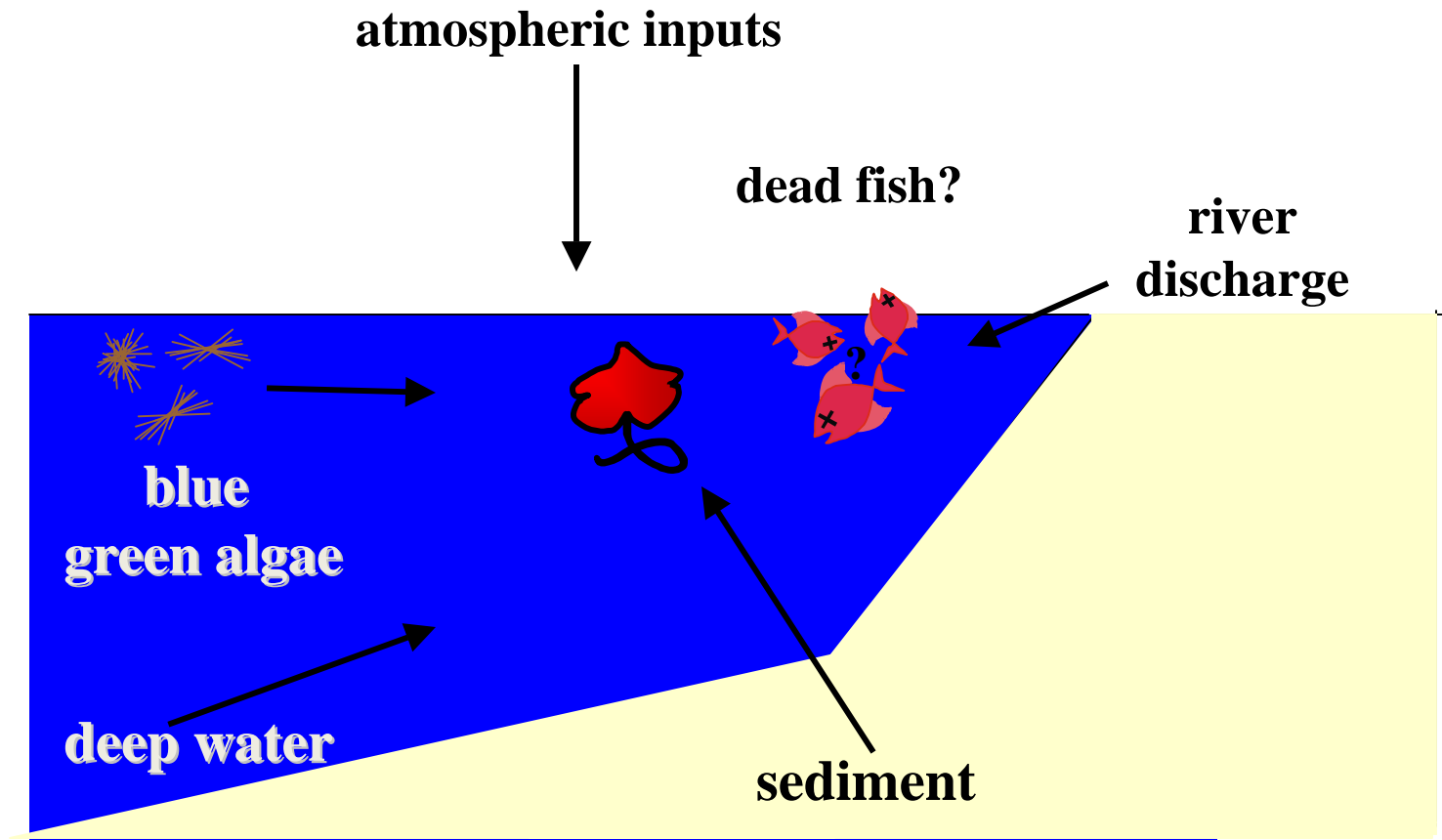


Photo: Anthony Greco (USF)



# Chemistry

## Nutrient sources

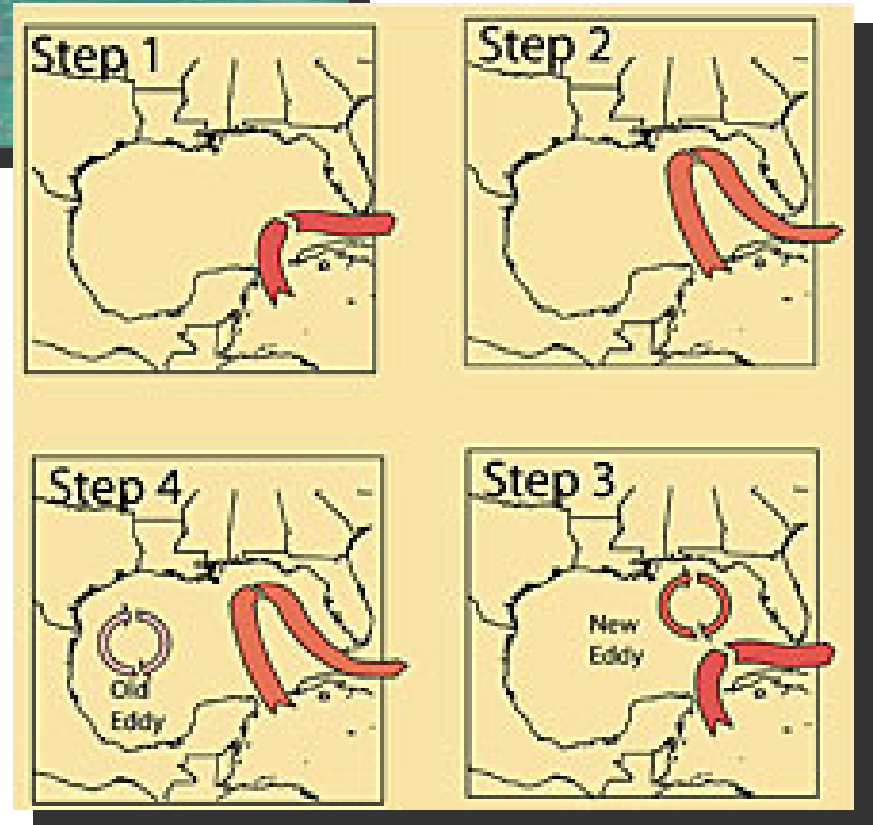


(altered from Vargo et al., in prep.)

# 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/](http://www.coolgate.mote.org/beachconditions/)

941- BEACHES (232-2437)

Sarasota County Beach Reports - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://coolgate.mote.org/beachconditions/

Customize Links

Sarasota County Beach Reports Airway Responses to Aerosolized Brev...

**New! Get the Beach Conditions Report via telephone at (941) 388-5223**

**Welcome to the Sarasota County Beach Conditions Report site.**

*This service is in collaboration with Mote Marine Laboratory, Sarasota County, and the Florida Department of Health to provide beach condition reports from the 6 public beaches of Sarasota County.*

*To view the latest beach report at a select site, simply click on the balloon at that site.*

*The reports are subjective (no measurements taken, just an estimate) and designed to indicate to the beachgoer which beach may be more preferable to visit at a particular time.*

*Beach condition reports will be posted at 10 am and 3 pm.*

*If a posting is late, please understand that the beach reporters may be involved in more pressing matters.*

**Beach flags provide information on swimming conditions:**

- green flag - good swimming conditions
- yellow flag - use caution
- red flag - dangerous swimming conditions
- double red flag - beach is closed to swimming
- purple flag - hazardous marine life

*Thank you for your support. Please take a moment and [tell us what you think](#) about this site.*

Map Satellite Hybrid

Lido Key  
Last Report: 01/09/2007 9:00am


Dead Fish: None  
Water Color: Clear  
Respiratory Irritation: None  
Wind From: N  
Surf: Moderate  
Beach Flag: Green

St. Pete Beach Tampa Bay  
Egmont Key State Park Anna Maria Nat Bradenton Sarasota Bay Longboat Key Sarasota Phillip Estab Park

Done

# What is being done about red tide?

## Forecasts



Gulf of Mexico Harmful Algal Bloom Bulletin  
4 June 2007  
NOAA Ocean Service  
NOAA Satellites and Information Service  
Last bulletin: May 29, 2007

### Conditions Report

There is no indication of harmful algal bloom presence alongshore Southwest Florida, including the Keys region, at the present time. No impacts are expected in any of the Florida counties today through Sunday.

### Analysis

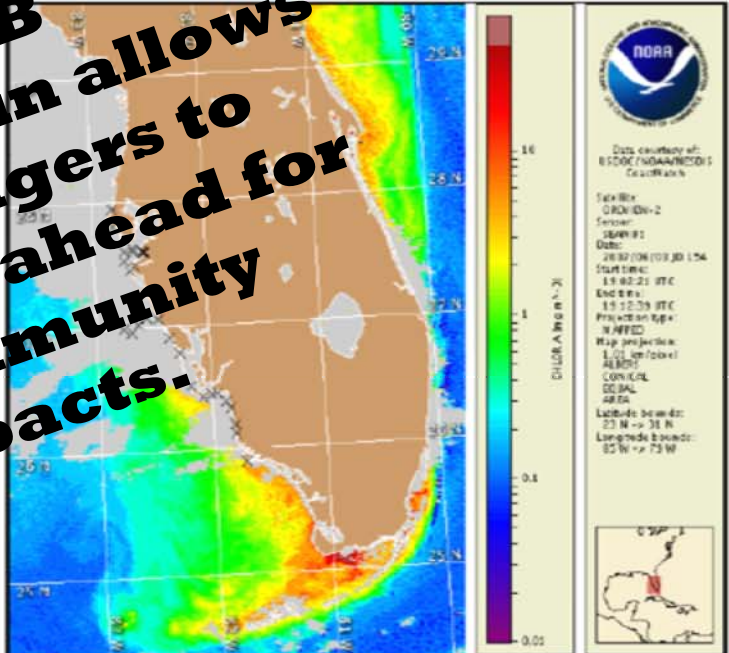
In Pinellas, Manatee, Sarasota, Lee, and northern Collier Counties sample results indicate no presence of *Karenia brevis* (FWRI; 5/30). In the Ten Thousand Islands region, central Collier County only one of nine samples taken contained background levels of *K. brevis*; the other eight samples contained no *K. brevis* (FWRI; 5/29).

Satellite imagery indicates the presence of slightly elevated chlorophyll levels southwest of Sanibel Island in Lee County; however this patch is attributed to varying concentrations of non-harmful algal species as confirmed by field samples over the past few weeks (FWRI).

Onshore winds today through Wednesday and variable winds on Thursday and Friday will continue to make *K. brevis* bloom formation unlikely.

Urizar, Bronder

**The HAB Bulletin allows managers to plan ahead for community impacts.**



The figure is a satellite chlorophyll image of the Gulf of Mexico coast. It features a color scale on the right ranging from 0.01 (dark blue) to 1.0 (red). The map shows a large area of elevated chlorophyll (yellow and red) along the coast, particularly near Sanibel Island. A red polygon highlights a specific area of high concentration. Metadata on the right includes: Data courtesy of: ESDOC/NOAA/NESDIS; Sat: SeaWiFS; Sensor: OCM-2; Date: 2007/06/03 15:54; Start time: 15:02:21 UTC; End time: 15:12:29 UTC; Projection: EPSG:4326; Map projection: UTM; Units: meters; Longitude bounds: 85 W -> 73 W.

Satellite chlorophyll image with possible HAB areas shown by red polygon(s). Cell concentration sampling data from May 25-30 shown as red squares (high), red triangles (medium), red diamonds (low b), red circles (low a), orange circles (very low b), yellow circles (very low a), green circles (present), and black "X" (not present). For a list of cell count data providers and a key to the cell concentration categories, please see the the HABFS bulletin guide: [http://www.csc.noaa.gov/crs/habf/habfs\\_bulletin\\_guide.pdf](http://www.csc.noaa.gov/crs/habf/habfs_bulletin_guide.pdf)

# 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 control or mitigation
- Peer-reviewed, competitive process
- Twelve research projects recommended for funding for FY 07-08



Smithsonian



# 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

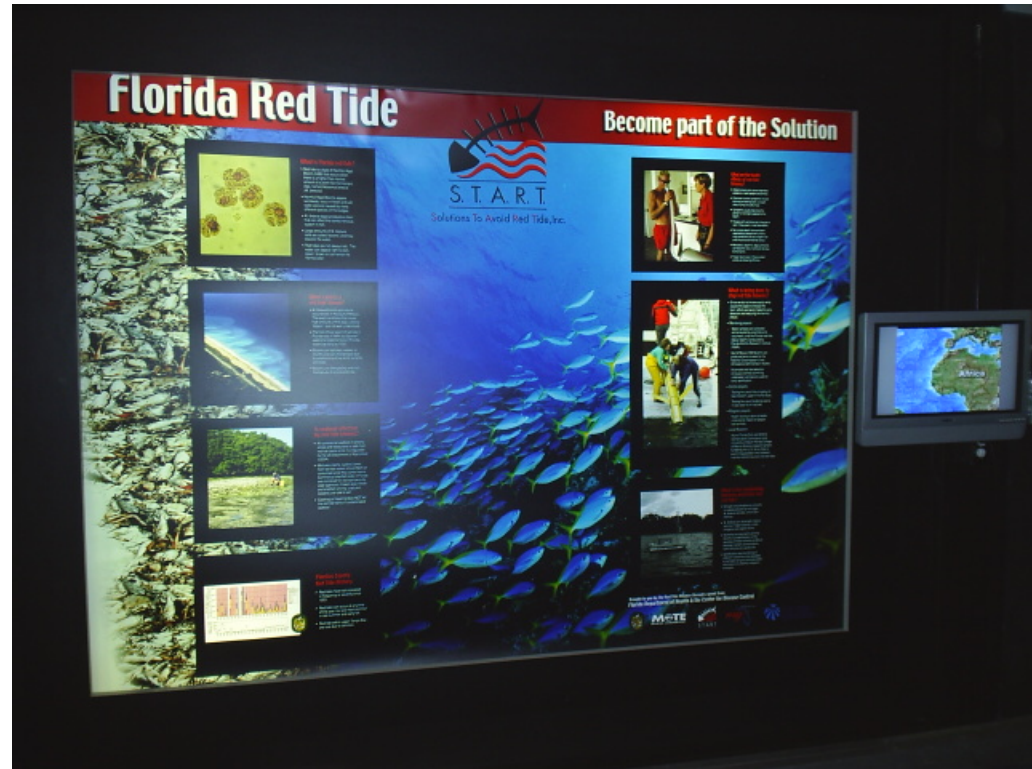


Brevenal may serve as a therapeutic treatment for marine mammals exposed to red tide toxins.

# 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](http://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.





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