



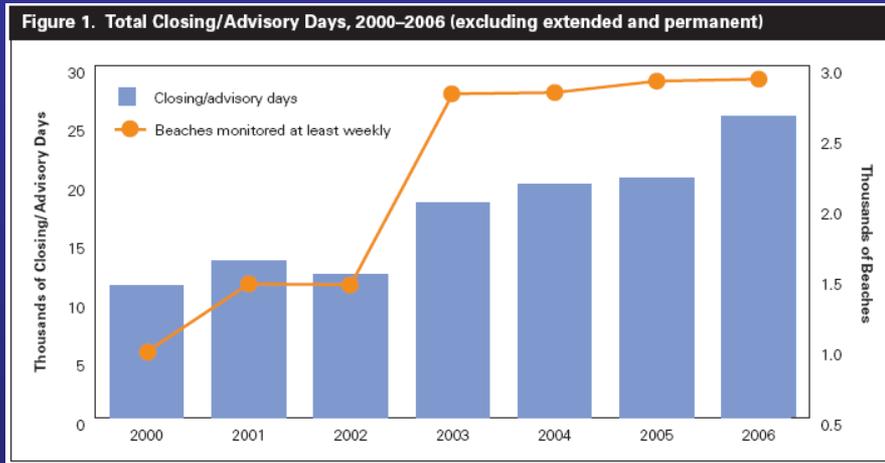
## *Influence of Winds and River Plumes on Beach Water Quality*

**Bill Simmons**  
Monmouth County (NJ) Health Department

**Josh Kohut**  
Rutgers University



# Trends in Beach Closures



*Natural Resources Defense Council (NRDC)*



## Nationally:

Record 25,643 beach closures or warnings in 2006 due to high levels of harmful bacteria.

Up 28 percent, second straight record setting year.

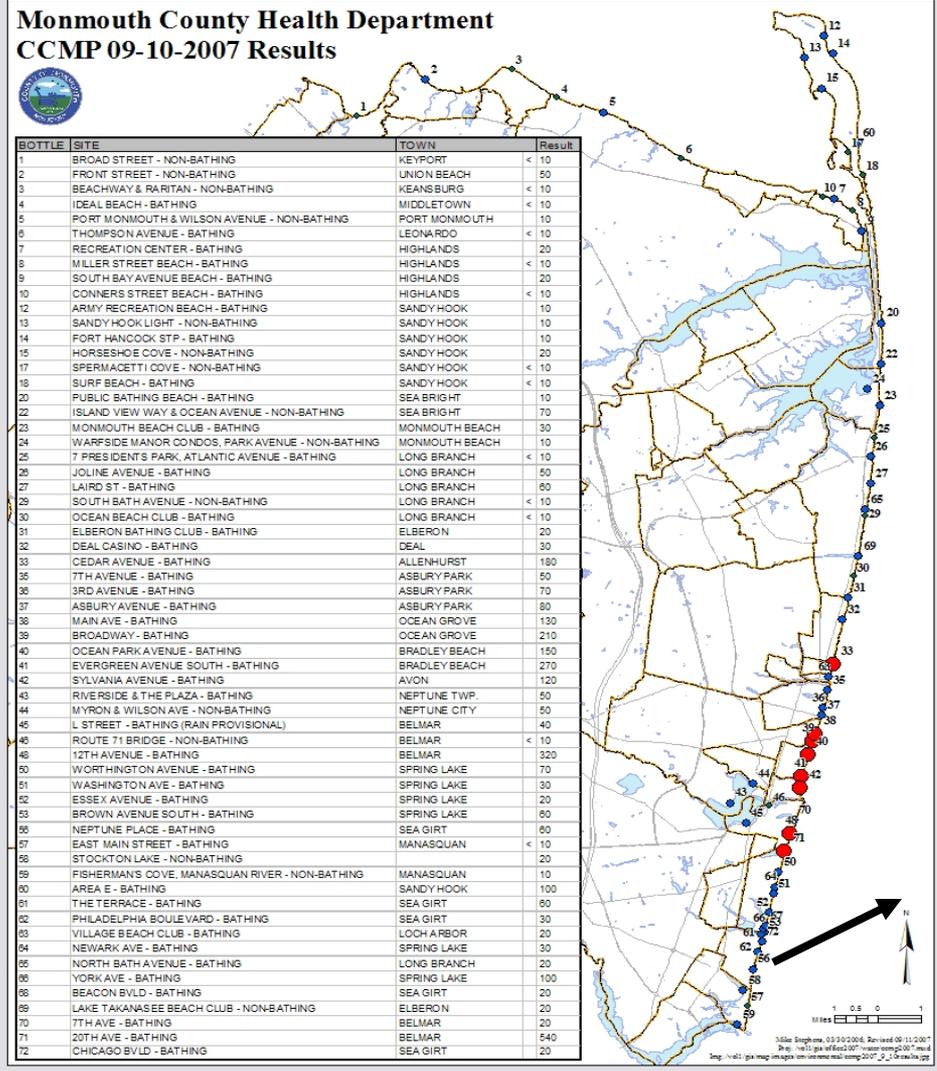
## New Jersey:

134 ocean and bay beach closures and advisories in 2006, most due to preemptive closures in Monmouth County since 2002.

70 percent increase from 79 in 2005.

# New Jersey Cooperative Coastal Monitoring Program

New Jersey Department of Environmental Protection: Bob Connell and Virginia Loftin  
 New Jersey Department of Health and Senior Services  
 County and local health departments in 5 coastal counties  
 Monmouth County Health Department: Michael Meddis, Health Officer



- Weekly in situ water samples are collected at **256** ocean and bay stations throughout NJ to test for enterococcus bacteria, **since 1986**.
- The Monmouth County Health Department samples **62** recreational and environmental monitoring stations.
- **Since 2002**, rainfall in excess of **0.1** inches will preemptively close four ocean beaches located near the ocean outfall of one coastal lake and one bay beach in Monmouth County.

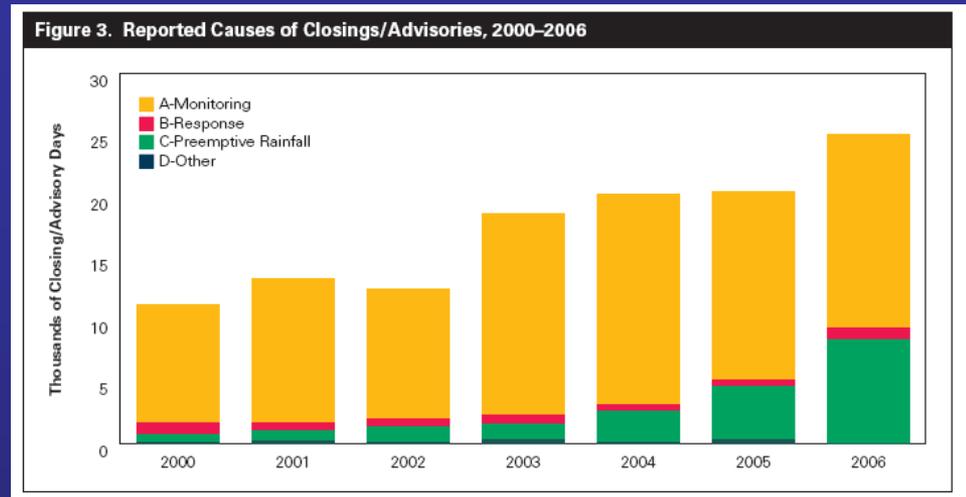


# 21 YEARS OF DATA:

Why doesn't rain intensity and timing reliably predict beach closures?

Why are bacteria levels exceeding water quality standards during dry weather?

What besides rain is changing bacterial water quality along the coast?



*Natural Resources Defense Council (NRDC)*

*\* From the NJDEP CCMP Summary report for 2005 and 2006*

<b>Ocean Closings</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
<b>For Bacteria</b>	7	18	3	8	8	16	0	9	17	7	18
<b>Precautionary</b>	3	0	0	6	3	24	16	58	42	50	79
<b>For Floatables</b>	0	0	0	0	0	0	0	13	0	0	0
<b>Percent Precautionary</b>	30%	0%	0%	43%	27%	60%	100%	73%	72%	88%	81%
<b>Total</b>	10	18	3	14	11	40	16	80	59	57	97

# Website Usage

*Topping 320,000 visits in  
 June 2006*

## Converter

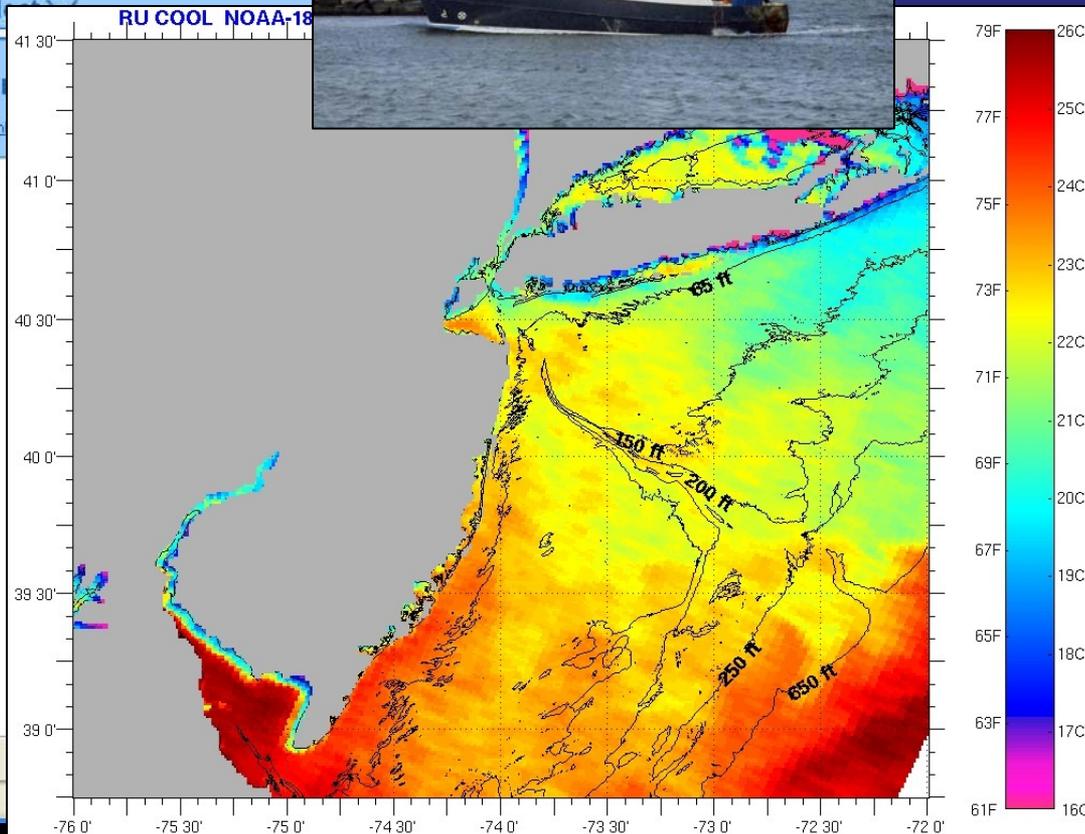
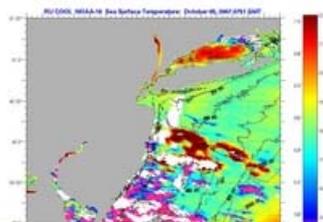
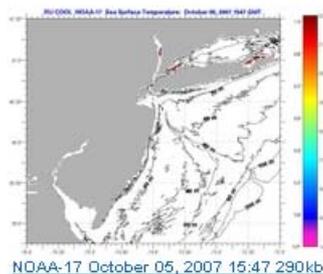
0.000 Feet > 0.000 meters 0.000 fathoms  
 0.000 °C > 32.000 °F

From: Sep 25 2007 Sort by: Date/Time To: Oct 5 2007

### SEA SURFACE TEMPERATURE

- [Alabama](#)
- [Bahamas](#)
- [Northeast](#)
- [Cape Cod](#)
- [Cape Hatteras](#)
- [Chesapeake Bay](#)
- [Eastcoast](#)
- [EDDIES Project](#)
- [Florida Current](#)
- [Florida Coast](#)
- [Georgia Coast](#)
- [Gulf of Mexico](#)
- [Gulf Stream](#)
- [JCNERRS](#)
- [Latte](#)
- [Leo-15](#)
- [Louisiana](#)
- [Maine](#)
- [North Mid-Atlantic Bight](#)
- [New York Bight \(Pt\)](#)
- [New York Bight \(M\)](#)
- >>
- [SHAREM Project](#)
- [Southern New England](#)
- [Mid-Atlantic Bight](#)
- [Hudson Canyon](#)
- [Zoom](#)

## Most Recent



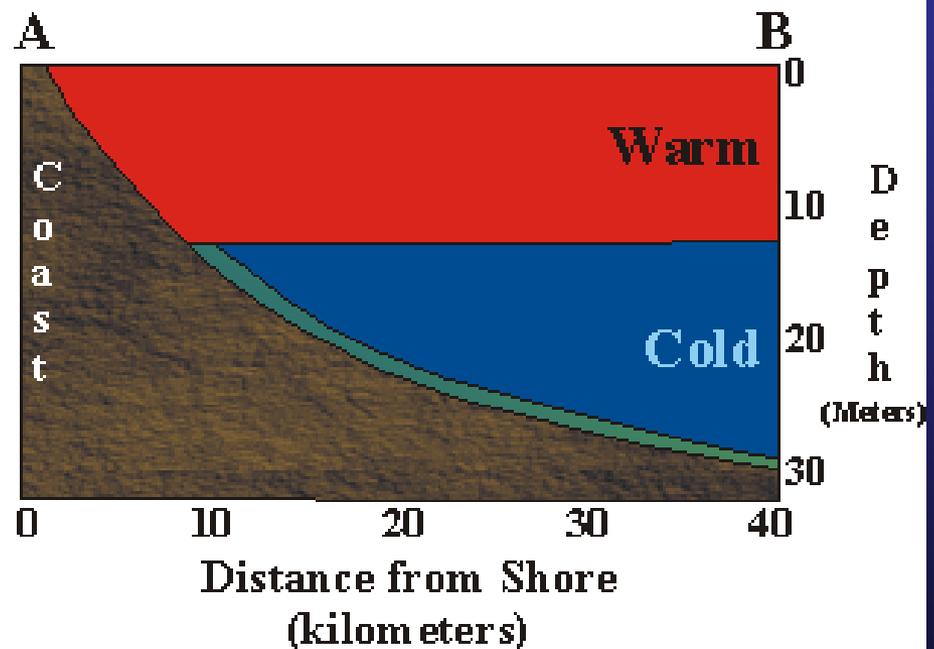
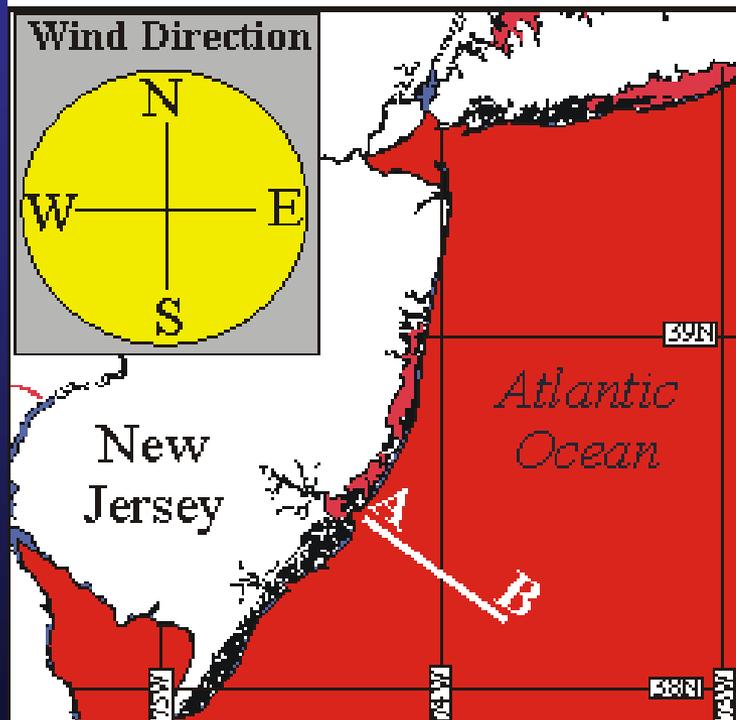
### CHLOROPHYLL CONCENTRATION

- [Northeast](#)
- [Gulf of Mexico](#)
- [JCNERRS](#)
- [Latte](#)
- [New York Bight \(M\)](#)

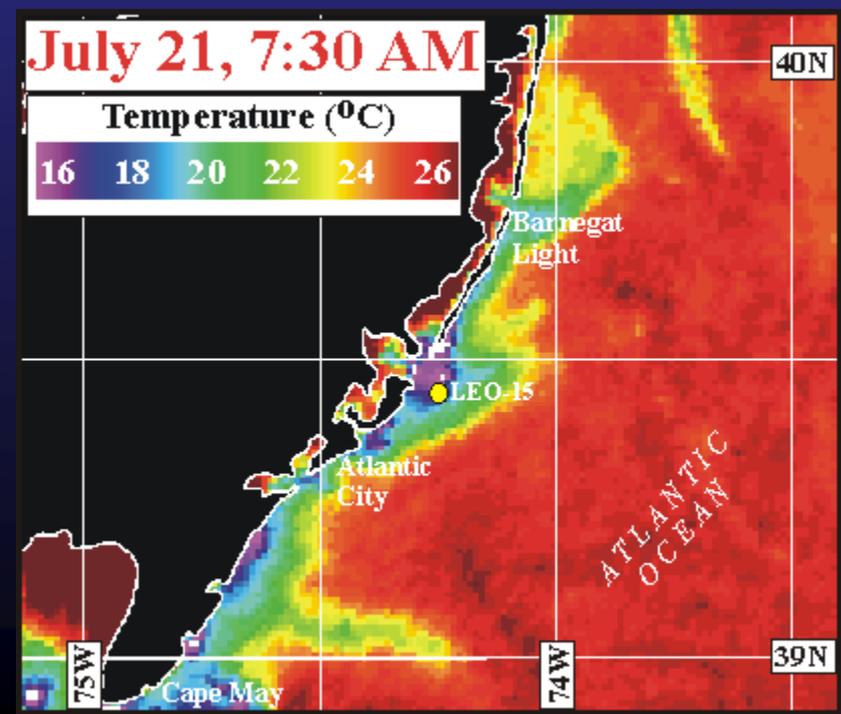
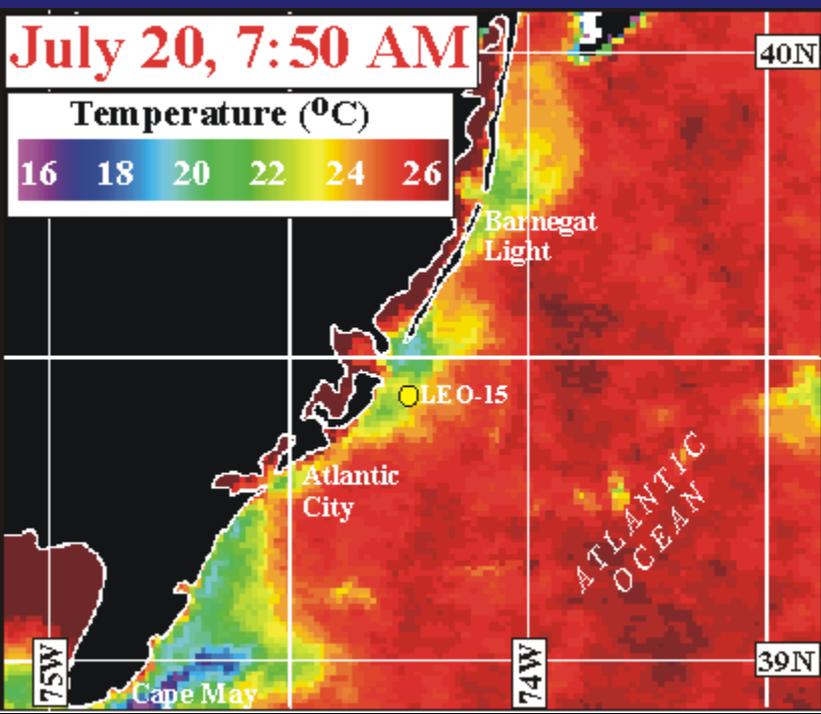
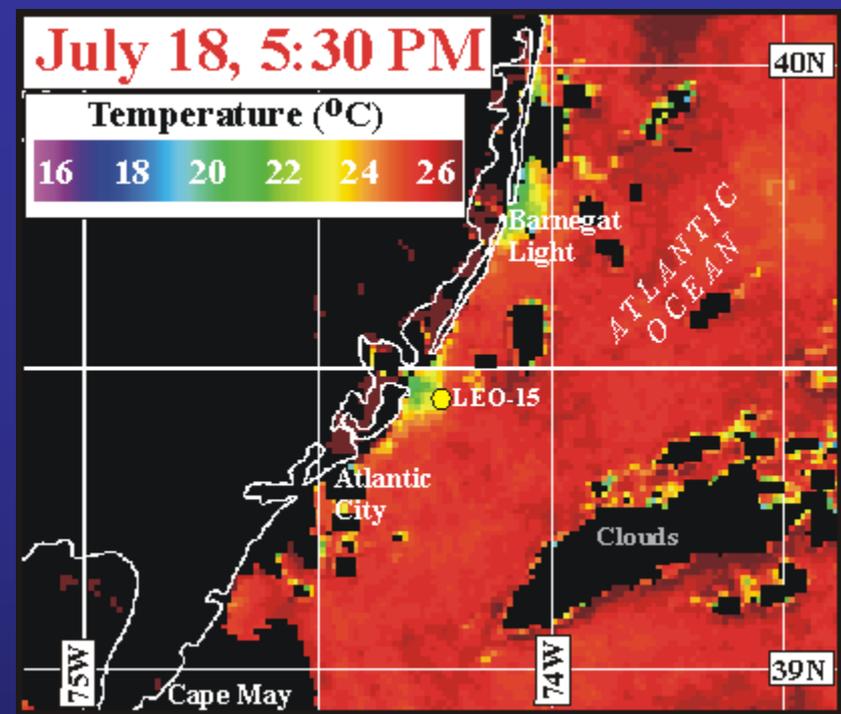
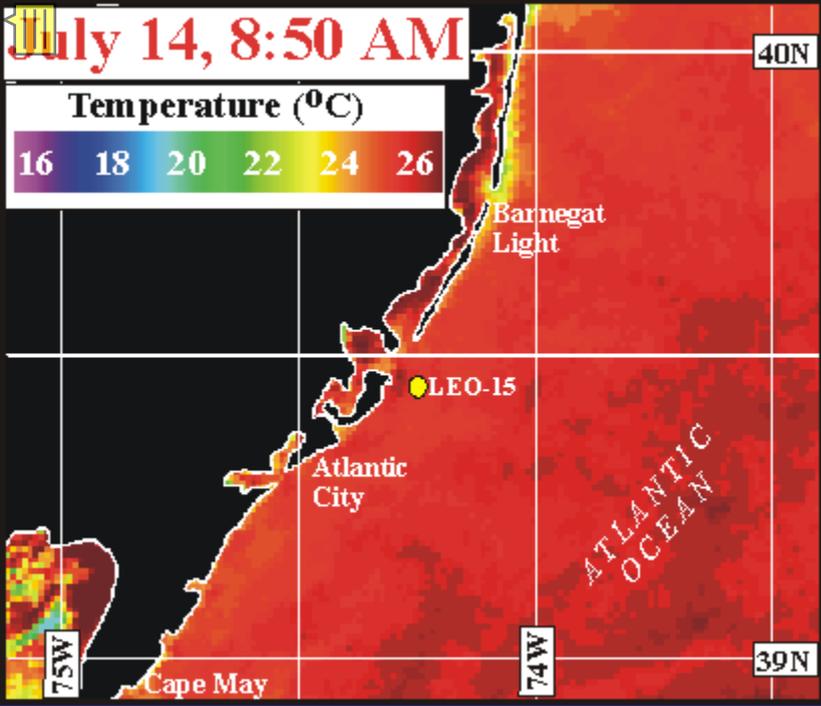
- [SEA SURFACE TEMPERATURE CODAR OVERLAYS](#)
- [Northeast](#)
- [Latte](#)

# The Basics of Coastal Upwelling

## No Wind



- \*Southwesterly winds move surface water away from shore
- \*Northeasterly winds move surface water toward the shore



The  
Real  
Thing

# July 10, 2006.

## Low dry weather bacteria count

TOWN	SITE	BOT#	Date Coll	Ent	TOWN	SITE	BOT#	Date Coll	Ent
MANASQUAN	STOCKTON LAKE - NON-BATHING	58	10-Jul-06	80	SPRING LAKE	BROWN AVENUE SOUTH - BATHING	53	10-Jul-06	10
NEPTUNE CITY	MYRON & WILSON AVE - NON-BATHING	44	10-Jul-06	40	SEA GIRT	THE TERRACE - BATHING	61	10-Jul-06	10
SANDY HOOK	HORSESHOE COVE - NON-BATHING	15	10-Jul-06	40	SEA GIRT	BEACON BVLD - BATHING	68	10-Jul-06	10
SANDY HOOK	FORT HANCOCK STP - BATHING	14	10-Jul-06	30	SPRING LAKE	ESSEX AVENUE - BATHING	52	10-Jul-06	10
SANDY HOOK	SPERMACEITTI COVE - NON-BATHING	17	10-Jul-06	30	SPRING LAKE	WASHINGTON AVE - BATHING	51	10-Jul-06	10
LONG BRANCH	LAIRD AVENUE - BATHING	27	10-Jul-06	20	SPRING LAKE	NEWARK AVE - BATHING	64	10-Jul-06	10
NEPTUNE TWP.	RIVERSIDE & THE PLAZA - BATHING	43	10-Jul-06	10	SPRING LAKE	WORTHINGTON AVENUE - BATHING	50	10-Jul-06	10
AVON	SYLVANIA AVENUE - BATHING	42	10-Jul-06	10	KEYPORT	BROAD STREET - NON-BATHING	1	10-Jul-06	10
BELMAR	20TH AVE - BATHING	71	10-Jul-06	10	UNION BEACH	FRONT STREET - NON-BATHING	2	10-Jul-06	10
BELMAR	12TH AVENUE - BATHING	48	10-Jul-06	10	KEANSBURG	BEACHWAY & RARITAN - NON-BATHING	3	10-Jul-06	10
BELMAR	7TH AVE - BATHING	70	10-Jul-06	10	HIGHLANDS	CONNERS STREET BEACH - BATHING	10	10-Jul-06	10
BELMAR	ROUTE 71 BRIDGE - NON-BATHING	46	10-Jul-06	10	HIGHLANDS	RECREATION CENTER - BATHING	7	10-Jul-06	10
BELMAR	L STREET - BATHING (RAIN PROVISIONAL)	45	10-Jul-06	10	HIGHLANDS	MILLER STREET BEACH - BATHING	8	10-Jul-06	10
BRADLEY BEACH	EVERGREEN AVENUE SOUTH - BATHING	41	10-Jul-06	10	HIGHLANDS	SOUTH BAY AVENUE BEACH - BATHING	9	10-Jul-06	10
BRADLEY BEACH	OCEAN PARK AVENUE - BATHING	40	10-Jul-06	10	MIDDLETOWN	IDEAL BEACH - BATHING	4	10-Jul-06	10
OCEAN GROVE	BROADWAY - BATHING	39	10-Jul-06	10	PORT MONMOUTH	NON-BATHING	5	10-Jul-06	10
OCEAN GROVE	MAIN STREET - BATHING	38	10-Jul-06	10	LEONARDO	THOMPSON AVENUE - BATHING	6	10-Jul-06	10
ASBURY PARK	ASBURY AVENUE - BATHING	37	10-Jul-06	10	SEA BRIGHT	PUBLIC BATHING BEACH - BATHING	20	10-Jul-06	10
ASBURY PARK	3RD AVENUE - BATHING	36	10-Jul-06	10	SEA BRIGHT	NON-BATHING	22	10-Jul-06	10
ASBURY PARK	7TH AVENUE - BATHING	35	10-Jul-06	10	BEACH	AVENUE - NON-BATHING	24	10-Jul-06	10
LOCH ARBOR	VILLAGE BEACH CLUB - BATHING	63	10-Jul-06	10	BEACH	MONMOUTH BEACH CLUB - BATHING	23	10-Jul-06	10
ALLENHURST	CEDAR AVENUE - BATHING	33	10-Jul-06	10	LONG BRANCH	BATHING	25	10-Jul-06	10
DEAL	DEAL CASINO - BATHING	32	10-Jul-06	10	LONG BRANCH	JOLINE AVENUE - BATHING	26	10-Jul-06	10
ELBERON	ELBERON BATHING CLUB - BATHING	31	10-Jul-06	10	LONG BRANCH	SOUTH BATH AVENUE - NON-BATHING	29	10-Jul-06	10
MANASQUAN	NON-BATHING	59	10-Jul-06	10	LONG BRANCH	NORTH BATH AVENUE - BATHING	65	10-Jul-06	10
MANASQUAN	EAST MAIN STREET - BATHING	57	10-Jul-06	10	ELBERON	BATHING	69	10-Jul-06	10
SEA GIRT	NEPTUNE PLACE - BATHING	56	10-Jul-06	10	LONG BRANCH	OCEAN BEACH CLUB - BATHING	30	10-Jul-06	10
SEA GIRT	PHILADELPHIA BOULEVARD - BATHING	62	10-Jul-06	10	SANDY HOOK	SURF BEACH - BATHING	18	10-Jul-06	10
SPRING LAKE	YORK AVE - BATHING	66	10-Jul-06	10	SANDY HOOK	AREA E - BATHING	60	10-Jul-06	10
SPRING LAKE	UNION AVE - BATHING	67	10-Jul-06	10	SANDY HOOK	ARMY RECREATION BEACH - BATHING	12	10-Jul-06	10
					SANDY HOOK	SANDY HOOK LIGHT - NON-BATHING	13	10-Jul-06	10

**\*\*Exceedence level – 104 colonies/100 mls**

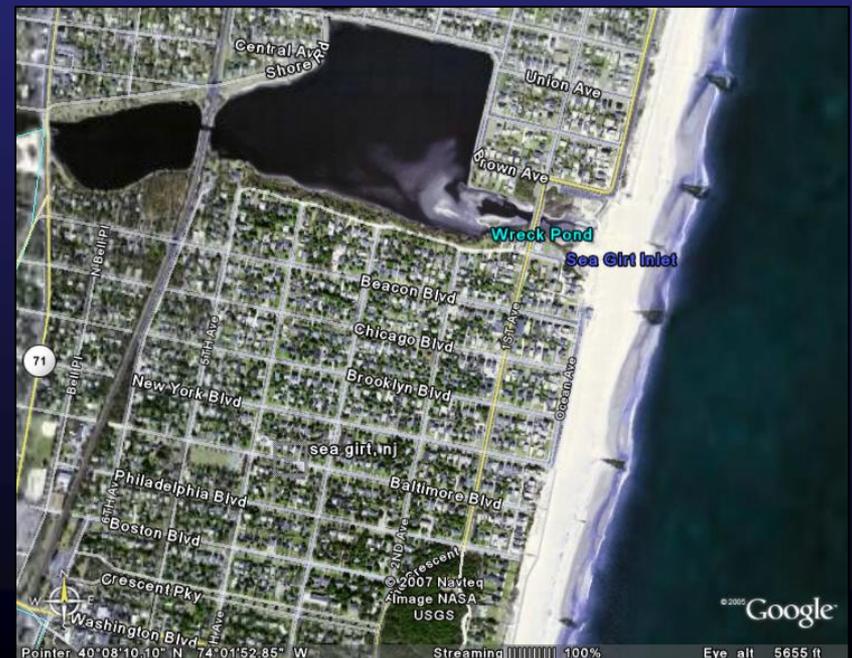
# July 17, 2006.

## High dry weather bacteria count

On 7/17/06, from north to south, (York, Brown, The Terrace, and Beacon Blvd.), enterococcus reached 890, 1150, 6040 and 12,400 colonies.

66C	York Ave.	Spring Lake	7/17/2006	890	flooding/neap
53C	Brown Ave. South	Spring Lake	7/17/2006	1150	flooding/neap
61C	The Terrace	Sea Girt	7/17/2006	6040	flooding/neap
68C	Beacon Blvd.	Sea Girt	7/17/2006	12400	flooding/neap

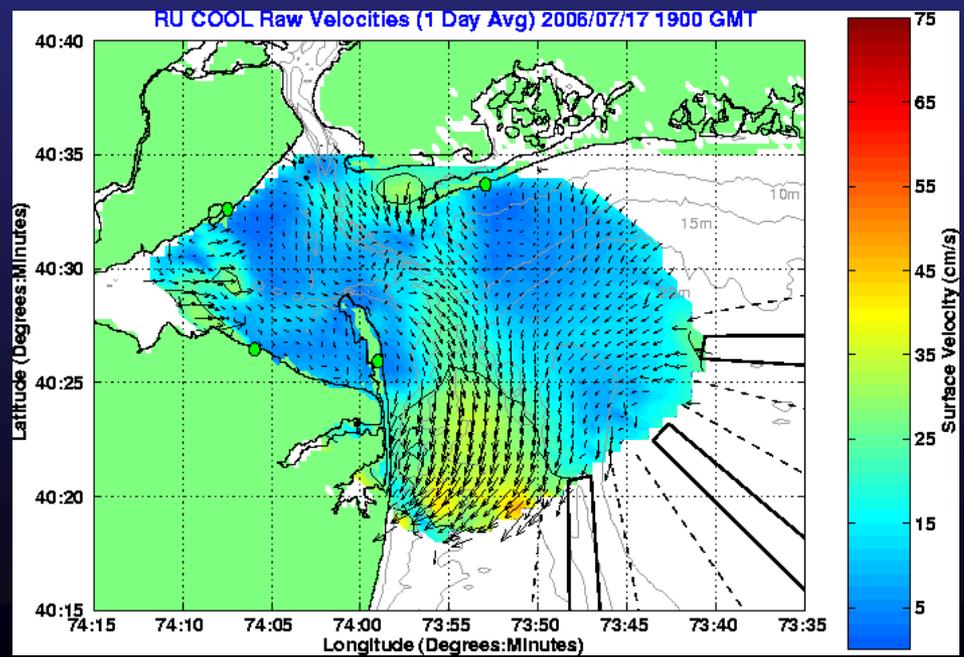
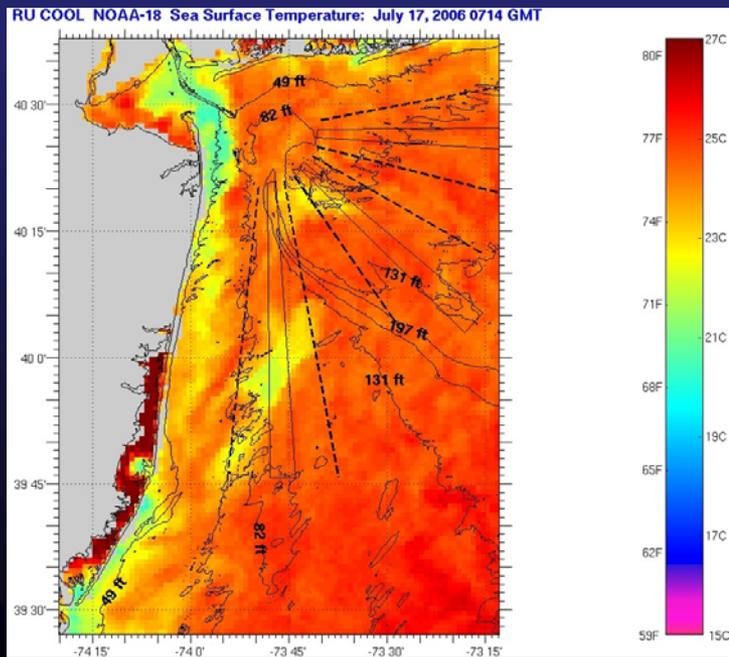
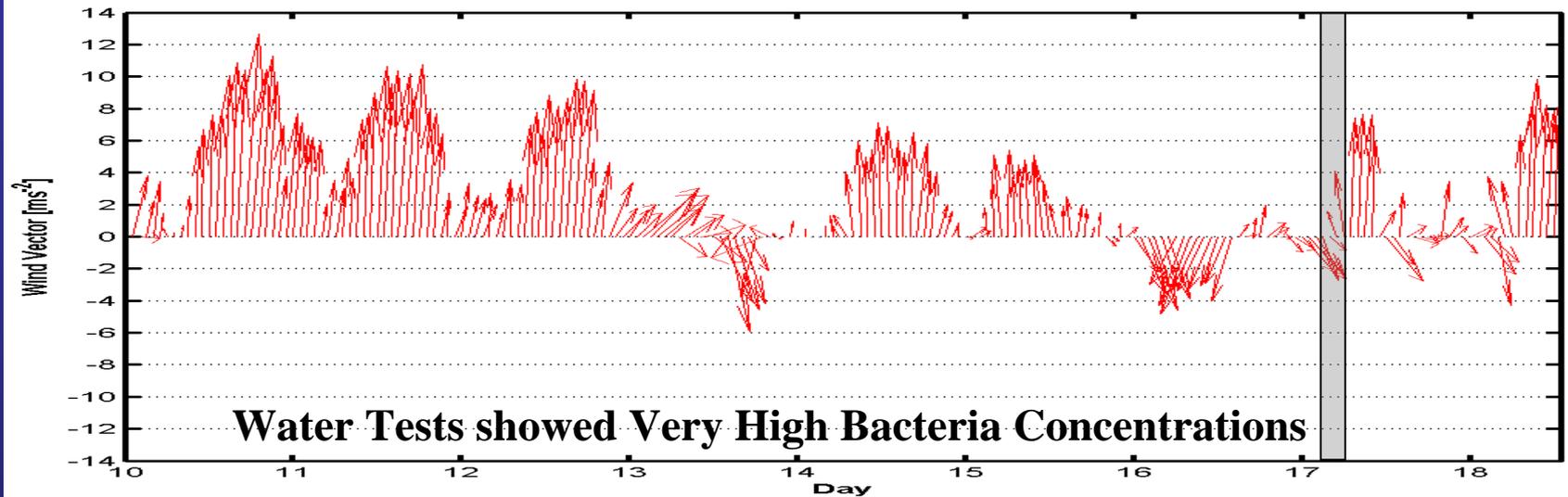
**The next morning on 7/18/06, ALL resamples were at or below detection (10 colonies).**



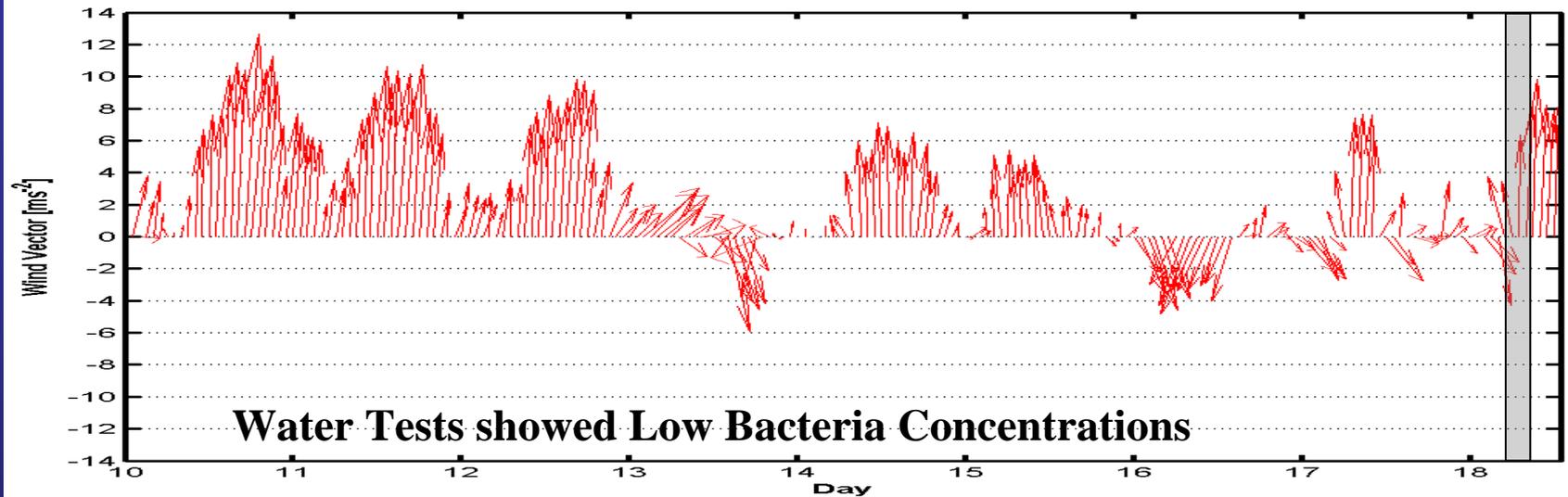
**\*\*Exceedence level – 104 colonies/100 mls**



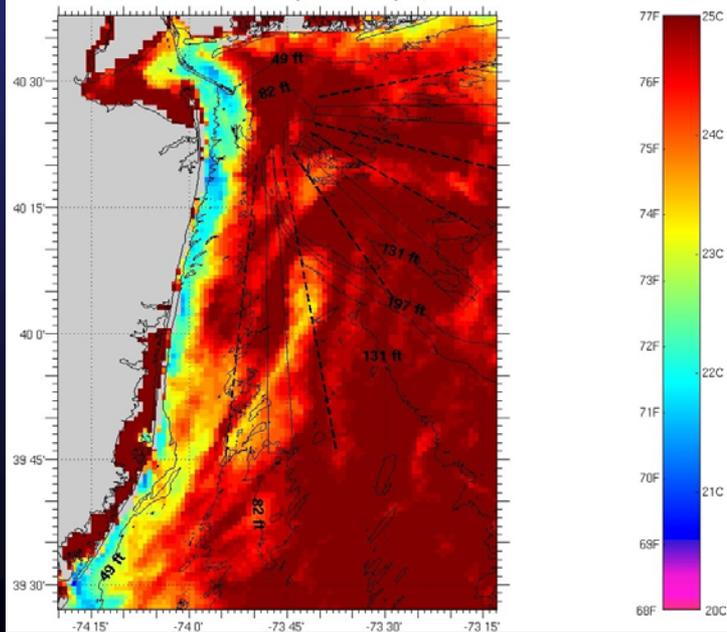
# Water Quality Correlations off the Monmouth County Coast: Summer 2006



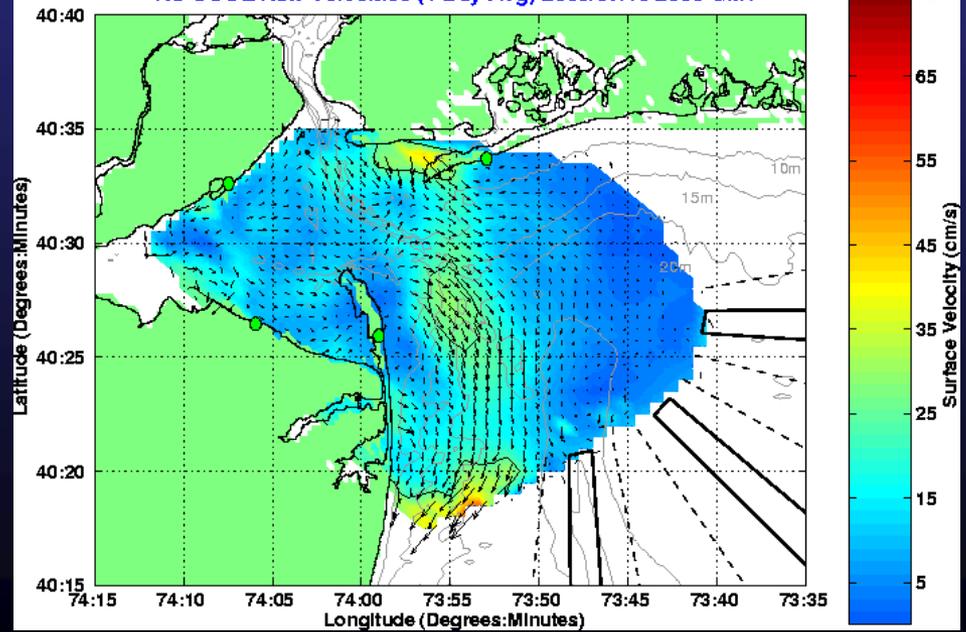
# Water Quality Correlations off the Monmouth County Coast: Summer 2006



RU COOL NOAA-18 Sea Surface Temperature: July 18, 2006 0703 GMT



RU COOL Raw Velocities (1 Day Avg) 2006/07/18 2000 GMT



# Garbage gone from beaches; questions linger

Posted by the Philadelphia Inquirer on 09/12/07

# No excuses for beach debris

Posted by the Asbury Park Press on 09/8/07



## Labor Day 2007 Beach Closure

**Aug 21-22: Over 1" of rainfall through the region**

**Aug. 24: Floatables reported at Union Beach, NJ**

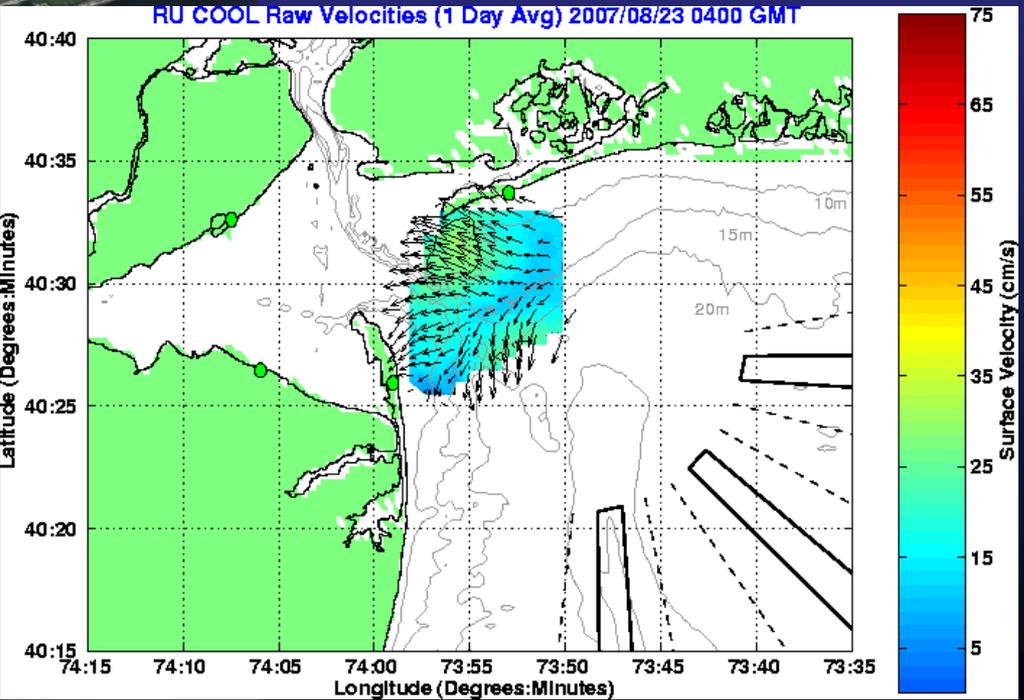
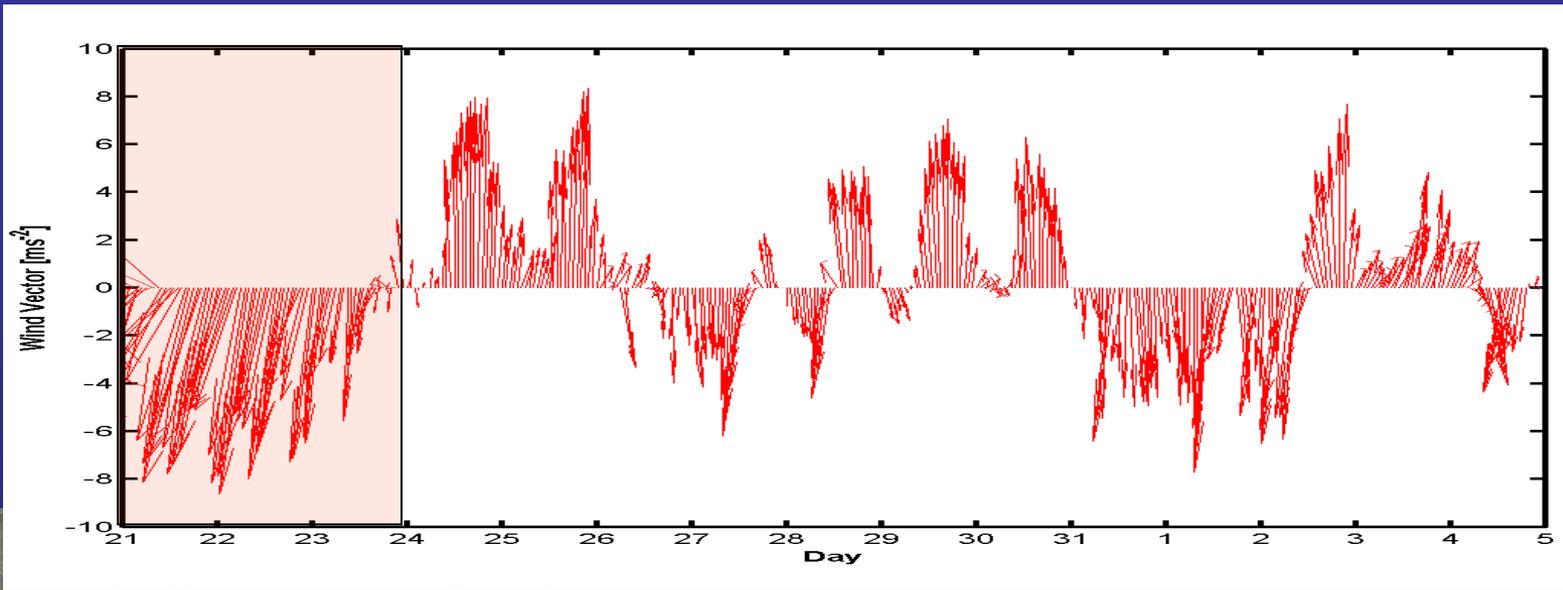
**Aug. 27: Potato Sponges reported at Bradley Beach, NJ**

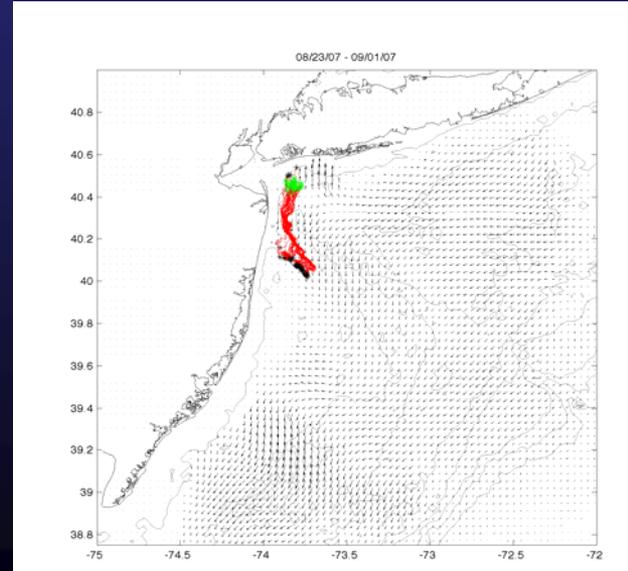
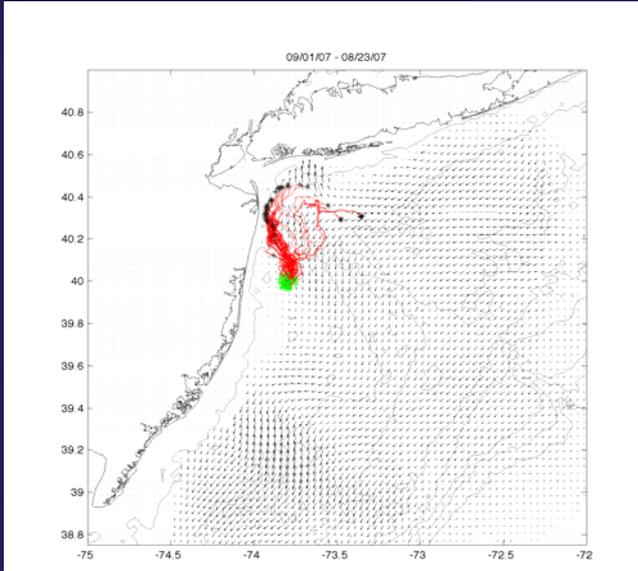
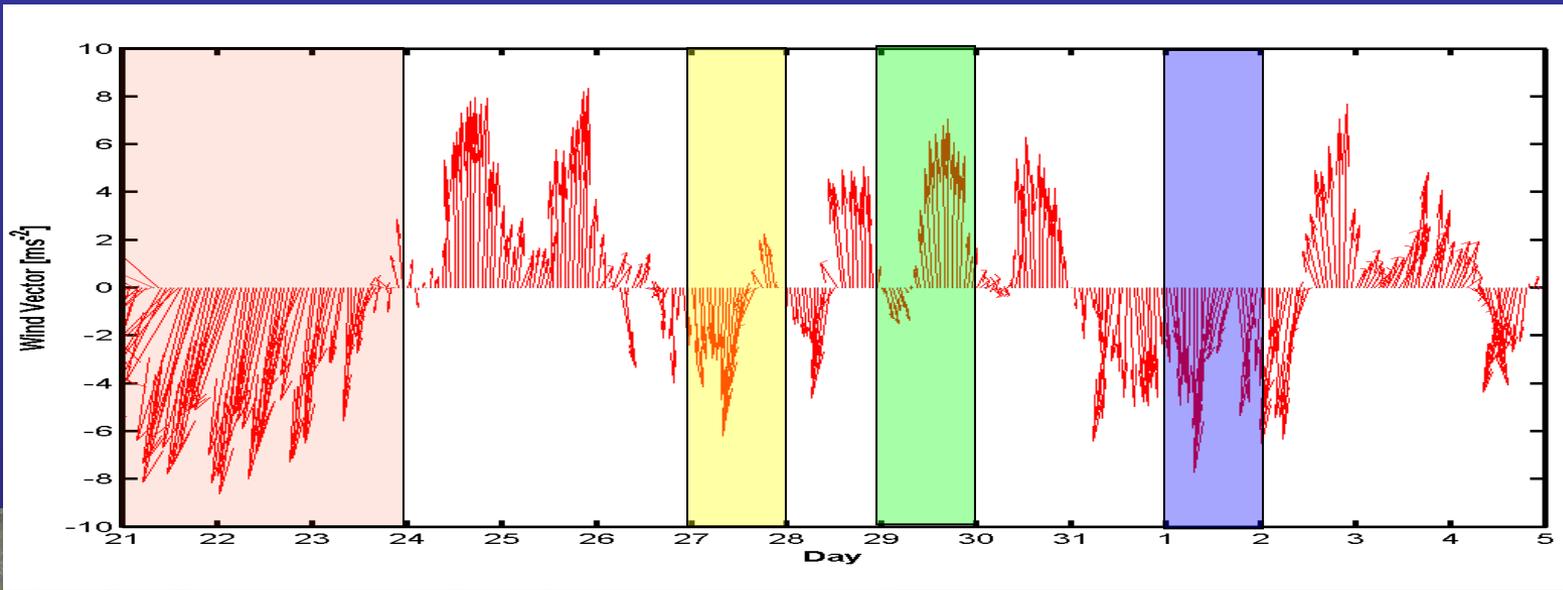
**Aug 29: Grease Balls reported at Deal, NJ**

**Sept. 1: Floatable/Medical Waste at Normandy Beach, NJ**

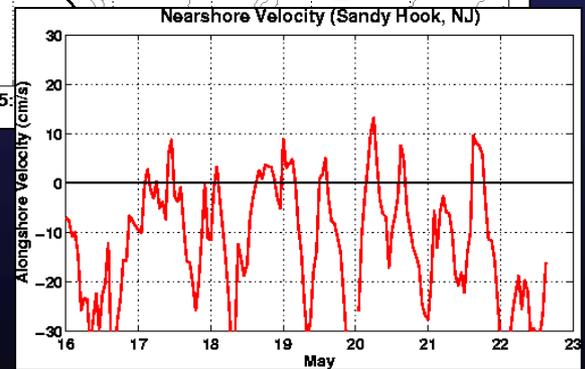
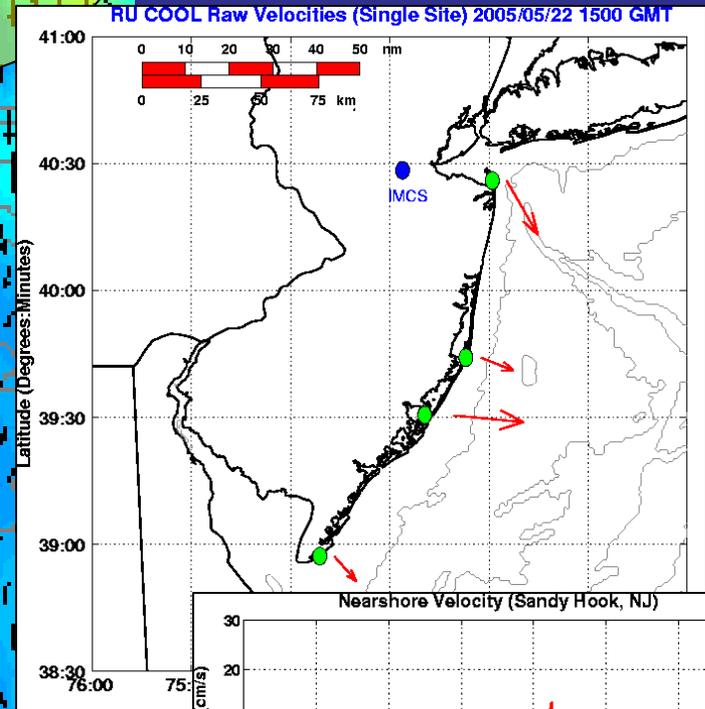
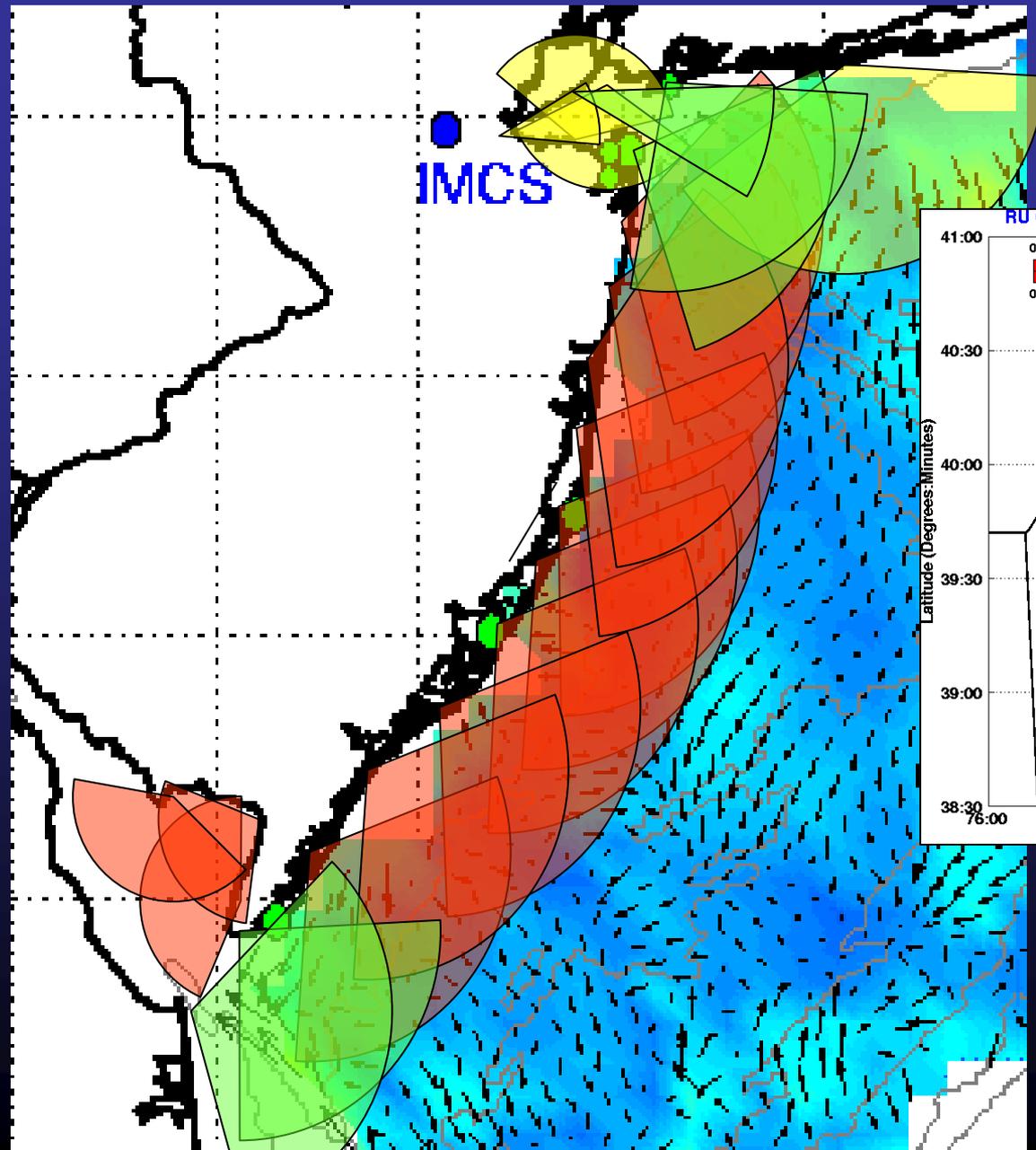


**"Worst beach pollution since the 1980's"**

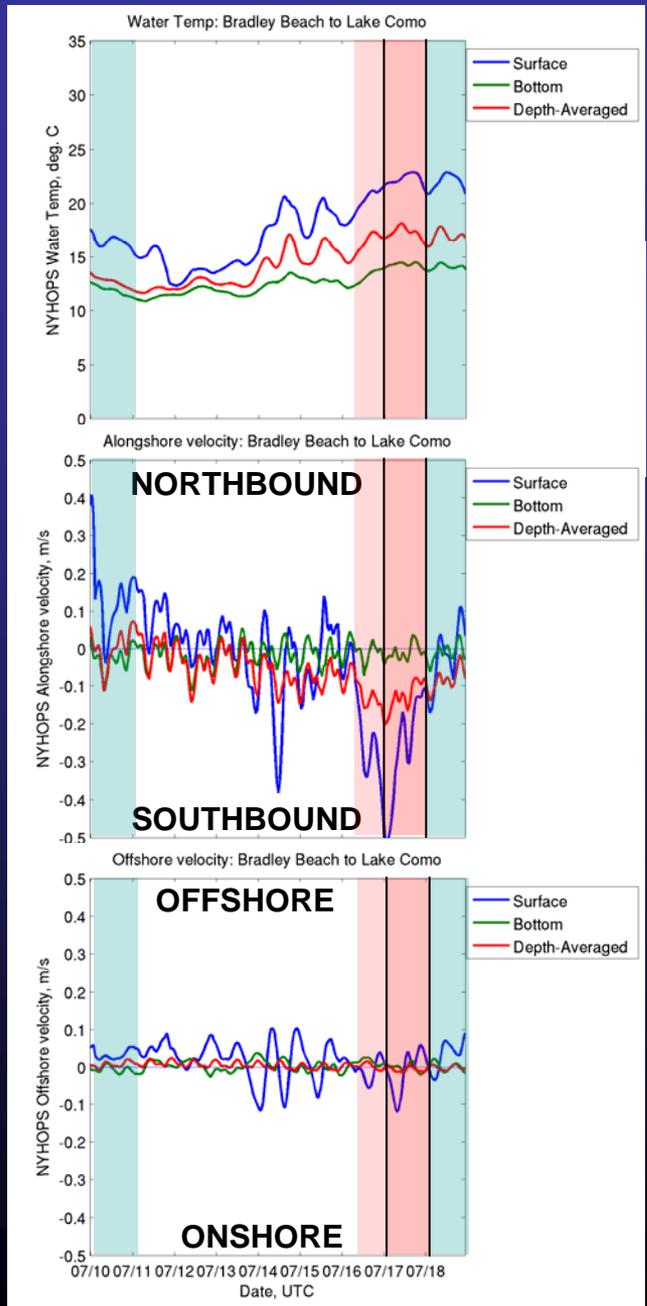




# Gap-Filling the National Coverage



# NYHOPS FORECAST



Water Temperature

Along-shore Currents

Cross-shore Currents

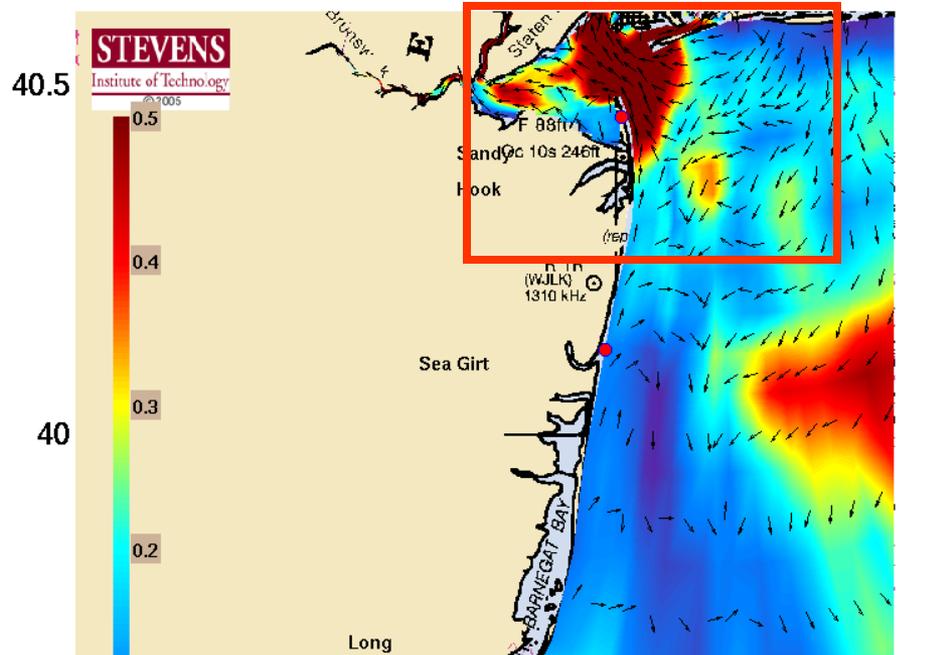




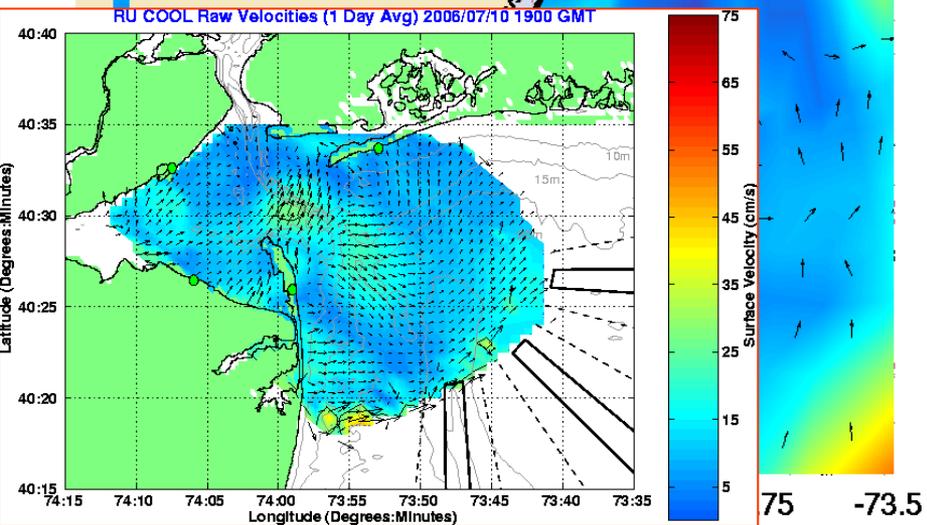
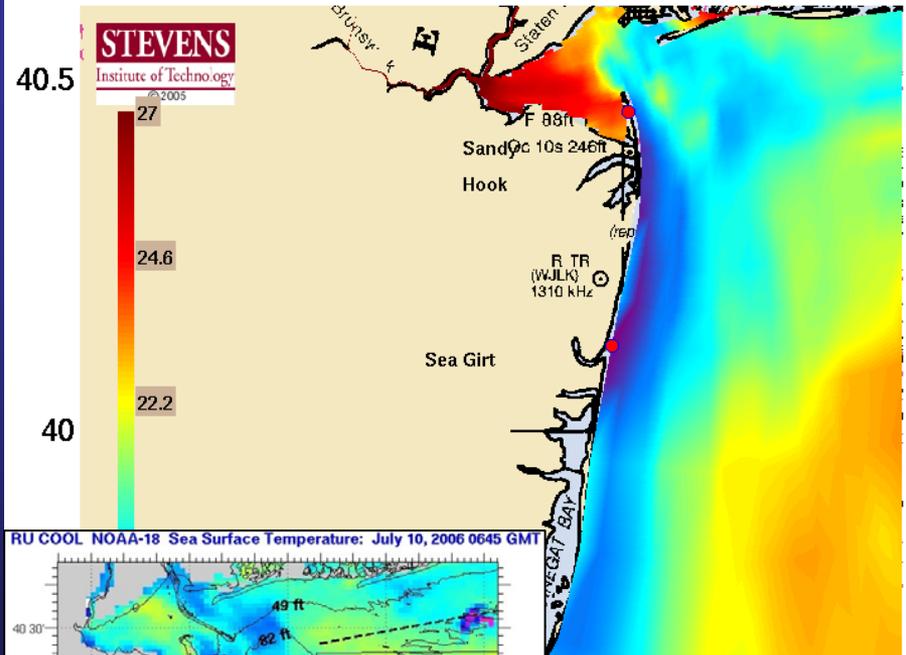
# July 10, 2006. Low bacteria count

Michael Bruno  
Alan Blumberg

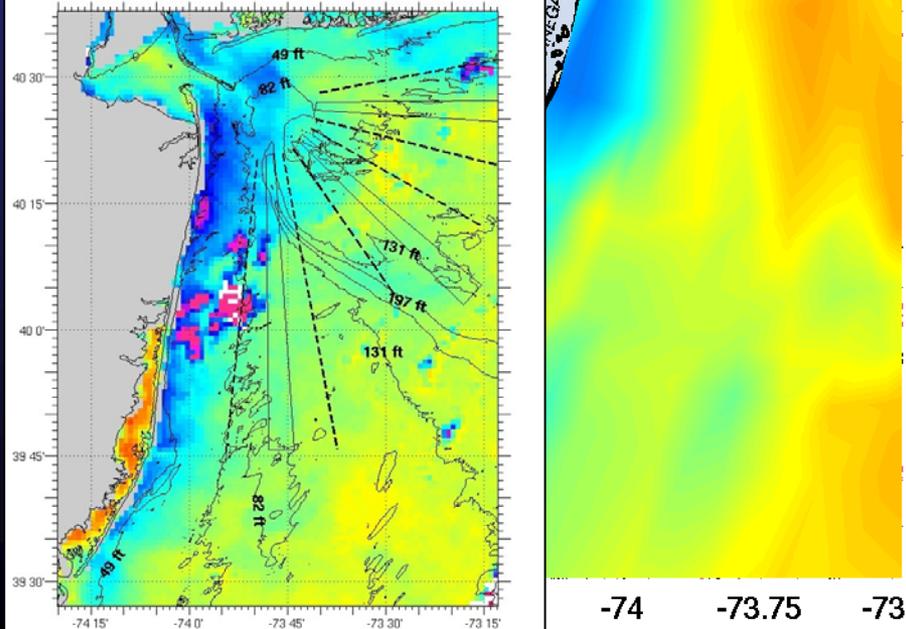
New Jersey Coast Surface Current(m/s) 2006-07-10 07:30 EDT



New Jersey Coast SST(deg. C) 2006-07-10 07:30 EDT



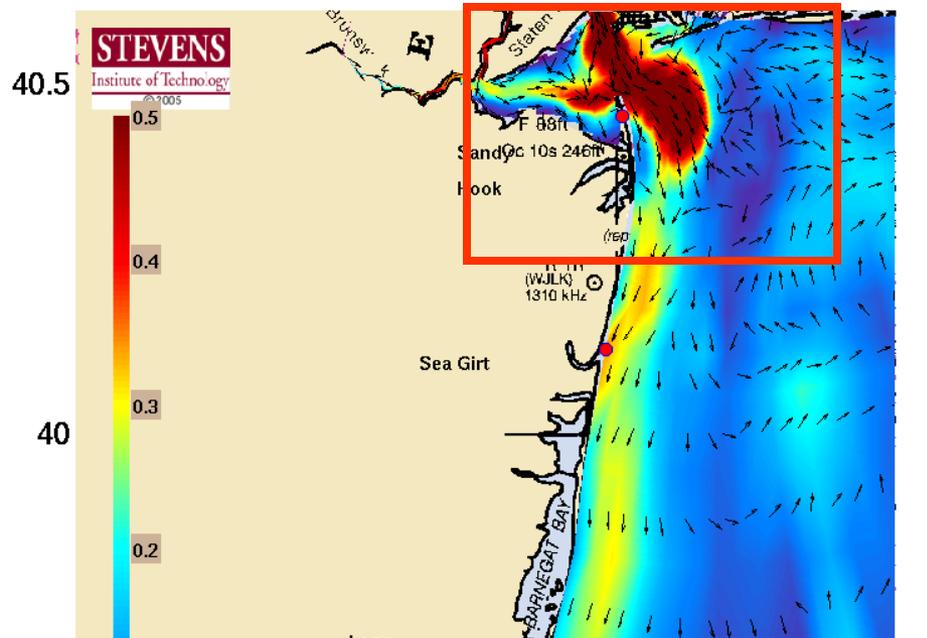
RU COOL NOAA-18 Sea Surface Temperature: July 10, 2006 0645 GMT



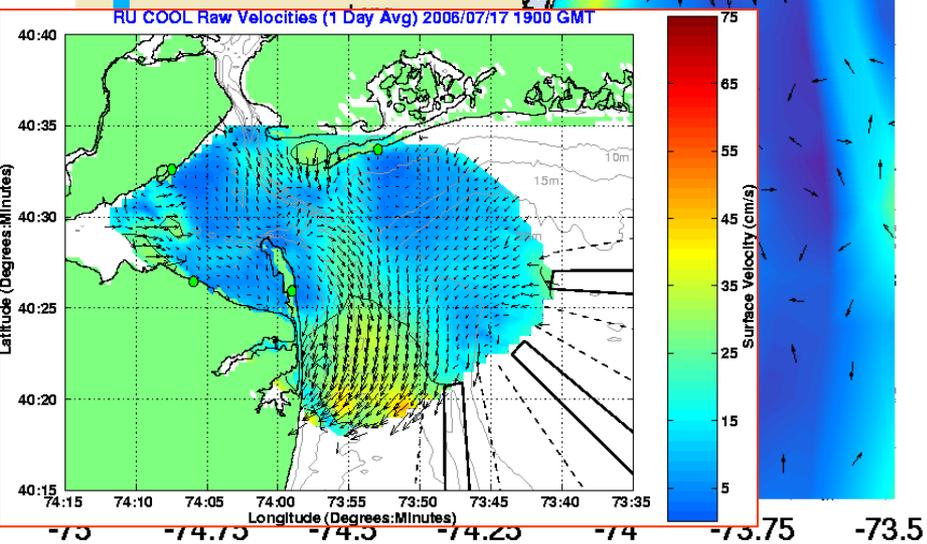
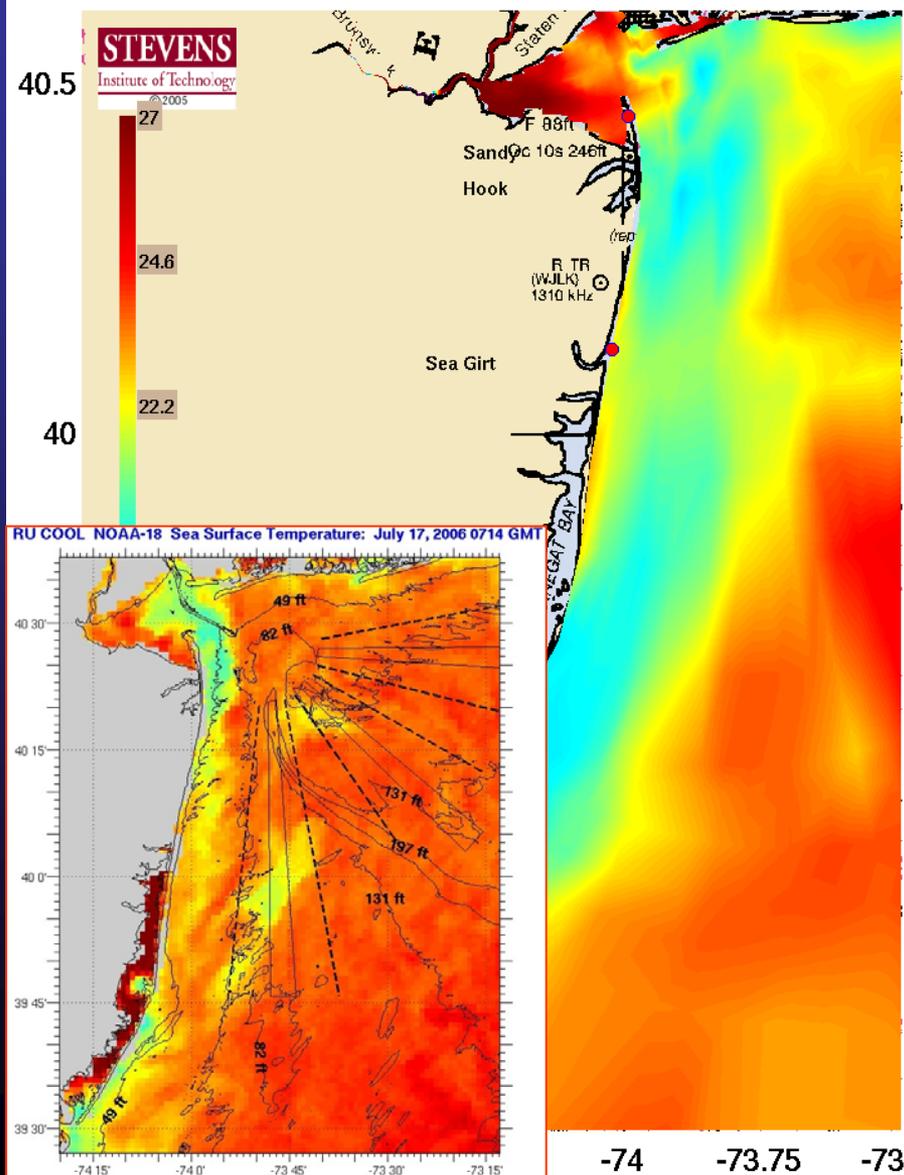
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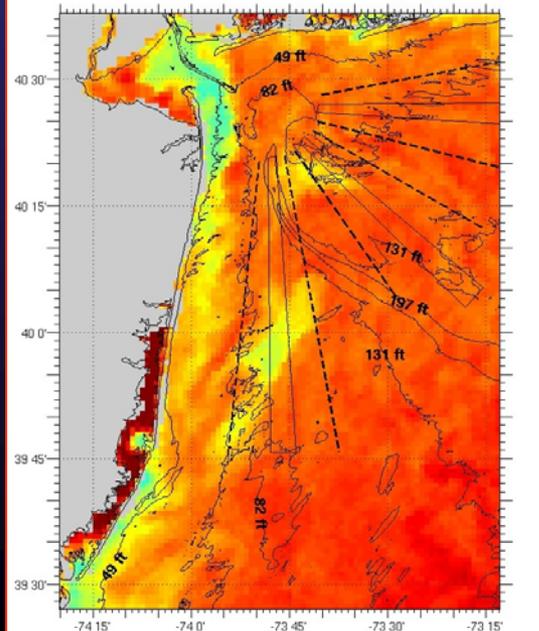
New Jersey Coast Surface Current(m/s) 2006-07-17 07:30 EDT



New Jersey Coast SST(deg. C) 2006-07-17 07:30 EDT



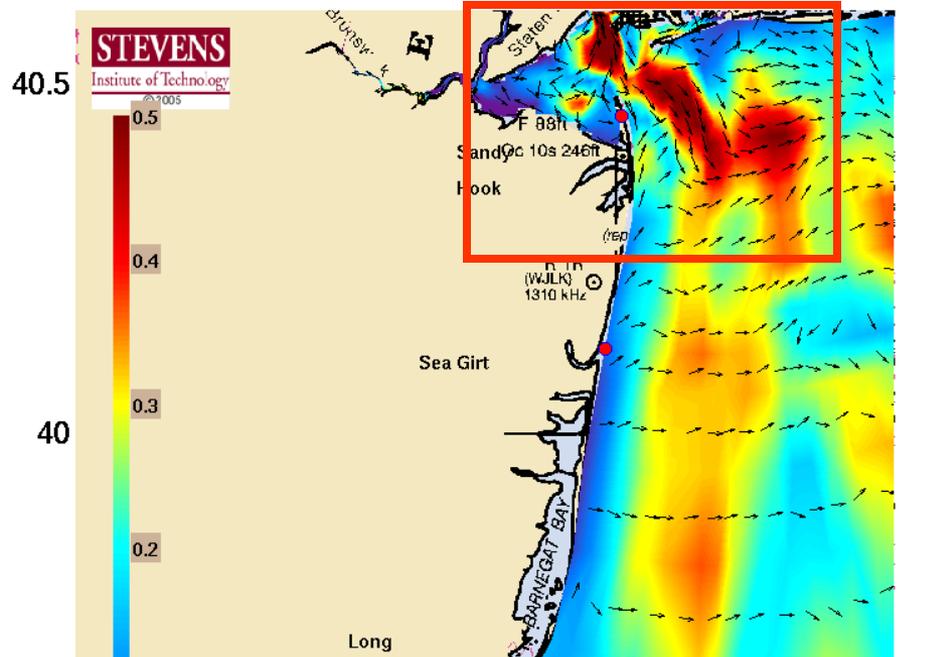
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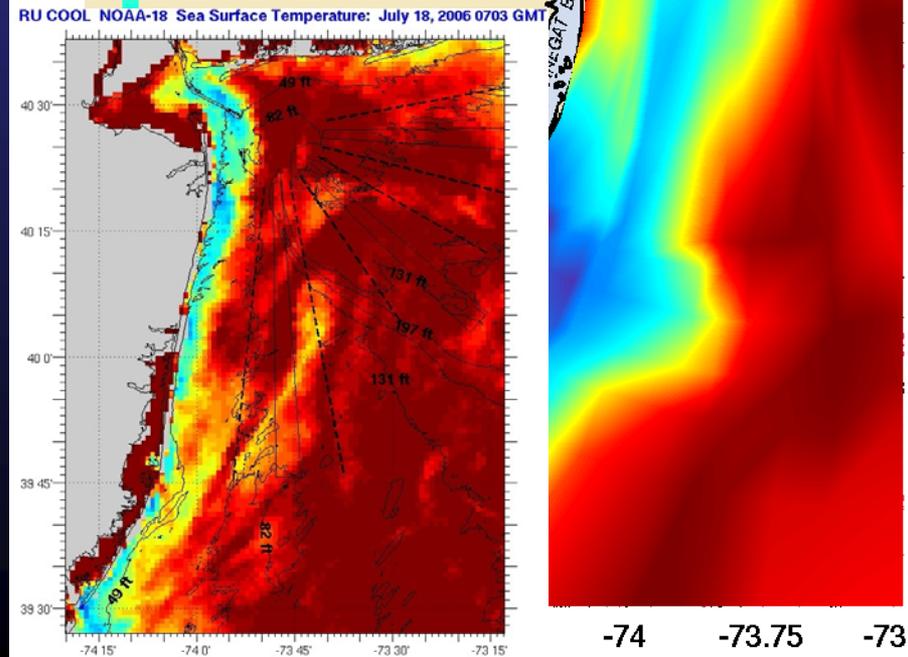
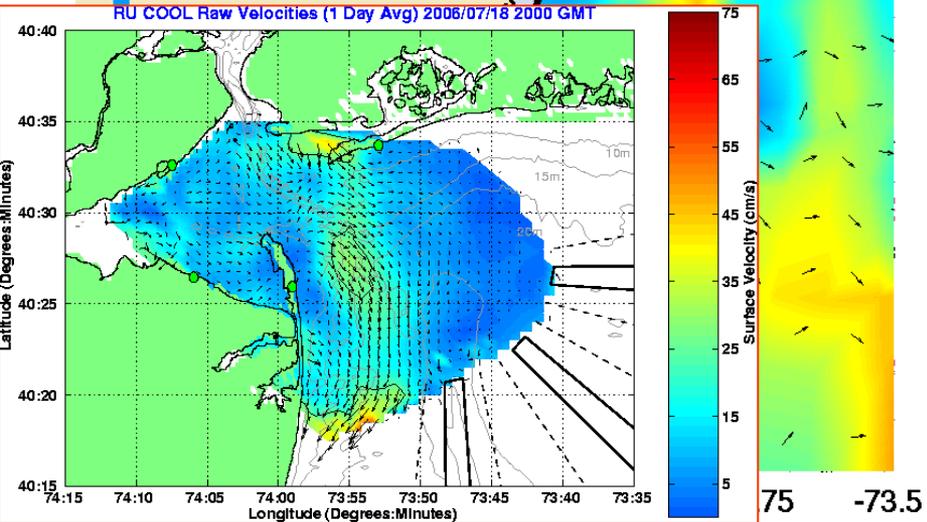
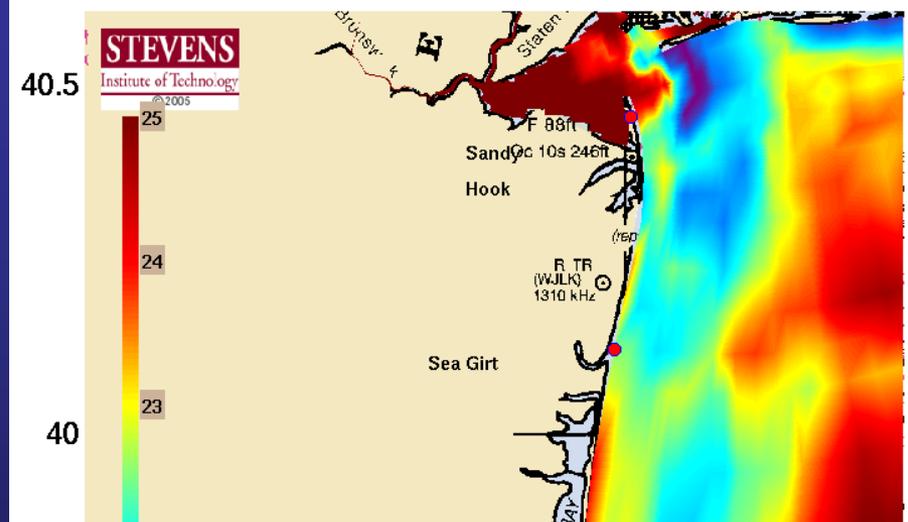
# July 18, 2006. Low bacteria count

Michael Bruno  
Alan Blumberg

New Jersey Coast Surface Current(m/s) 2006-07-18 23:30 EDT

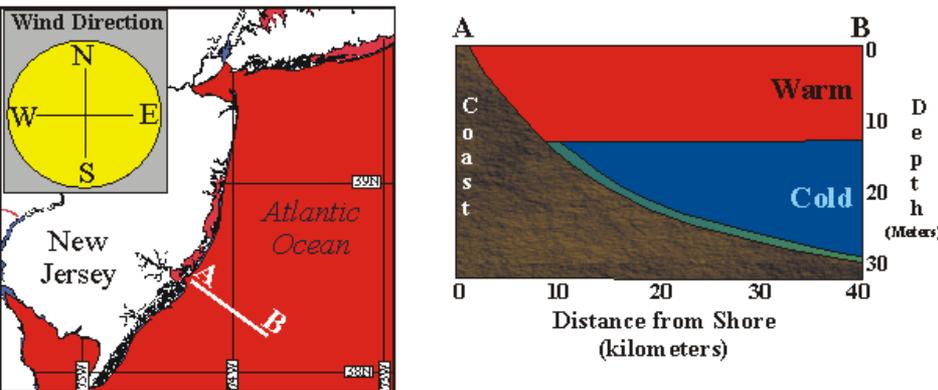


New Jersey Coast SST(deg. C) 2006-07-18 07:30 EDT

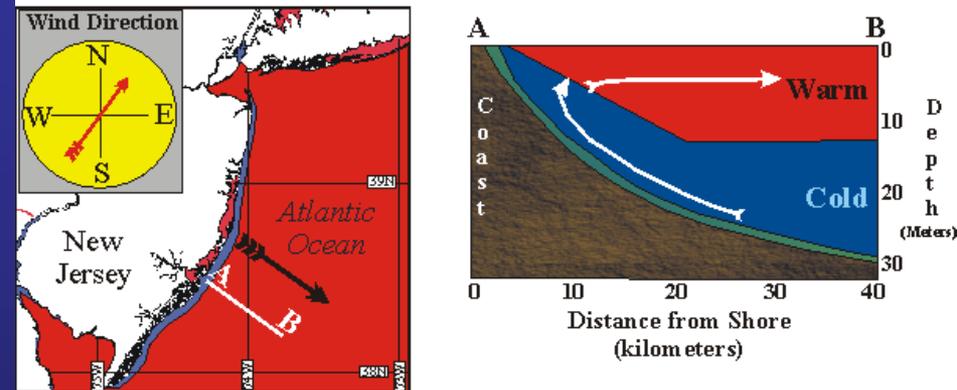


# Movement of an upwelling front

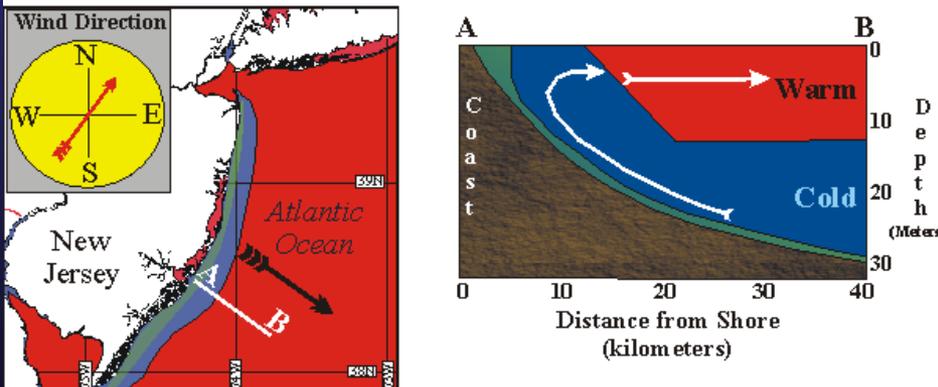
**The Basics of Coastal Upwelling**  
**No Wind**



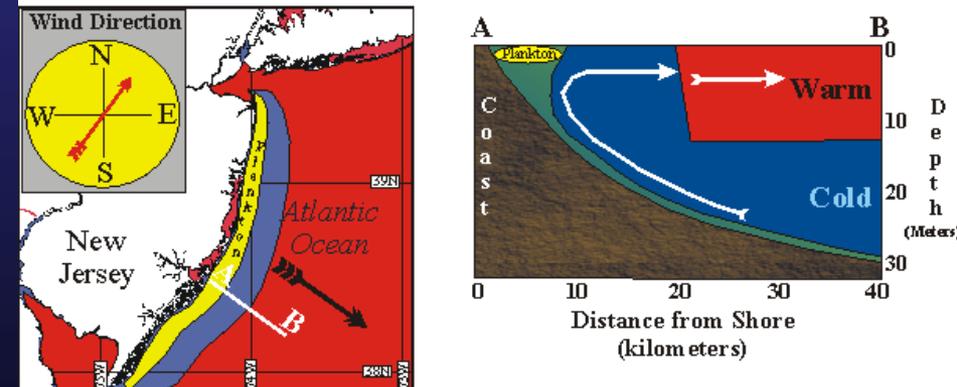
**The Basics of Coastal Upwelling**  
**Southwesterly Wind - Day 4**



**The Basics of Coastal Upwelling**  
**Southwesterly Wind - Day 6**



**The Basics of Coastal Upwelling**  
**Southwesterly Wind - Day 8**



- \*Southwesterly winds move surface water away from shore
- \*Conveyor belt motion
- \*Plankton bloom when nutrients come to surface