



Research in the Grand River

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Michigan Sea Grant

NOAA Center of Excellence for Great
Lakes and Human Health



NOAA Center of Excellence for Great Lakes and Human Health

- Develop forecasting tools to minimize risk to human health in coastal environments
- Identify sources and causes



- Water Quality
- Beach closures
- Harmful Algal Blooms



- GLERL acts as lead of the Center
- Michigan State University,
- EPA Chicago,
- EPA Athens,
- USGS,
- Florida Institute of Oceanography,
- NOAA NOS Beaufort Laboratory,
- University of Michigan,
- NOAA NOS Silver Springs,
- Michigan Sea Grant
- Great Lakes Human Health Network

PARTNERS





Beach Forecasting Research

- Influence of winds and waves on fate and transport of pollutants
- Grand River: largest tributary of Lk Michigan
 - Study Location- Grand Haven area, Michigan
- Agricultural and urban loadings
- Recreational river
- Beaches along shoreline



Grand River

Goal and Objective

Our overall goal is to help build better forecasting tools to warn the public of potential health risks from contact with recreational waters in the coastal regions of the Great Lakes.

- The objective of this experiment was to map the temporal behavior of the Grand River as it interacts with the coastal circulation of Lake Michigan using several different methods.

Methods

- Current meter moorings
- Satellite-reporting surface drifting buoys
- Hydrodynamic numerical modeling
- Aerial imagery
- Mapping T & C fields with towed V-fin
- Tracer studies

Tracer studies

Sulphur Hexafluoride (SF_6)

Benefits:

- Wide range of detection: 10^5
- Cheap

Negatives:

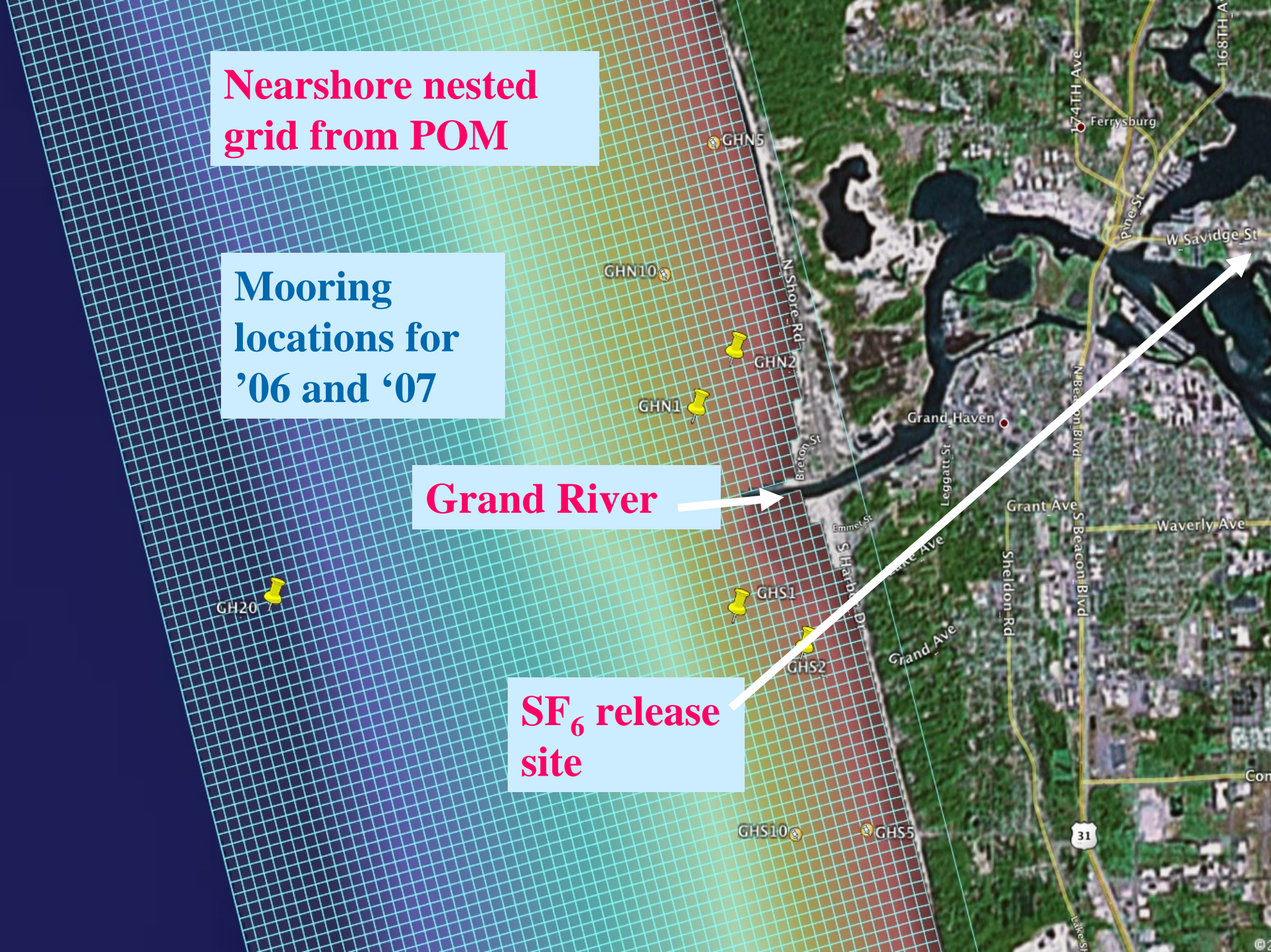
- Complicated measurement procedure, i.e., extracting dissolved gas from H_2O – pumping into gas chromatograph equipped with an electron capture detector.
- Greenhouse gas

**Nearshore nested
grid from POM**

**Mooring
locations for
'06 and '07**

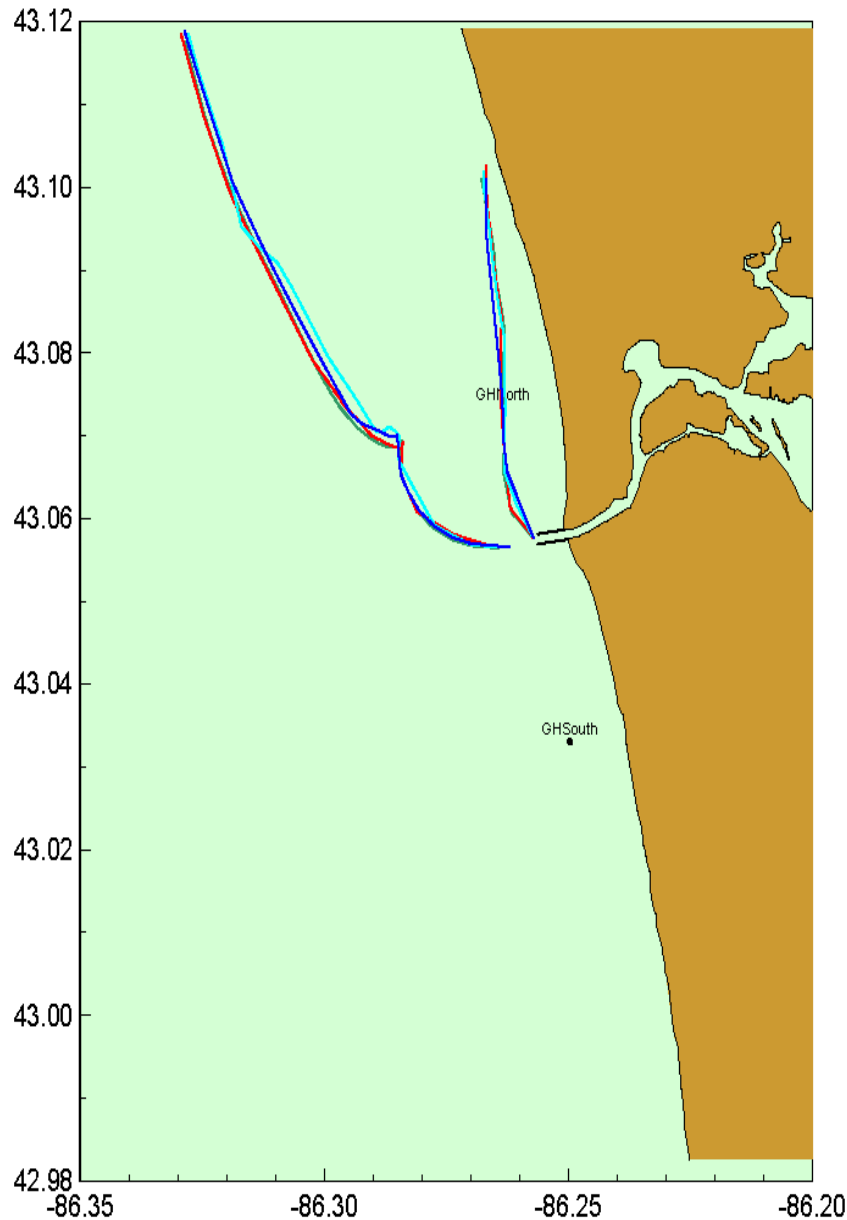
Grand River

**SF₆ release
site**



June drifter tracks

**Mean drifter
speeds were 18
cm/s and were
longshore
directed.**

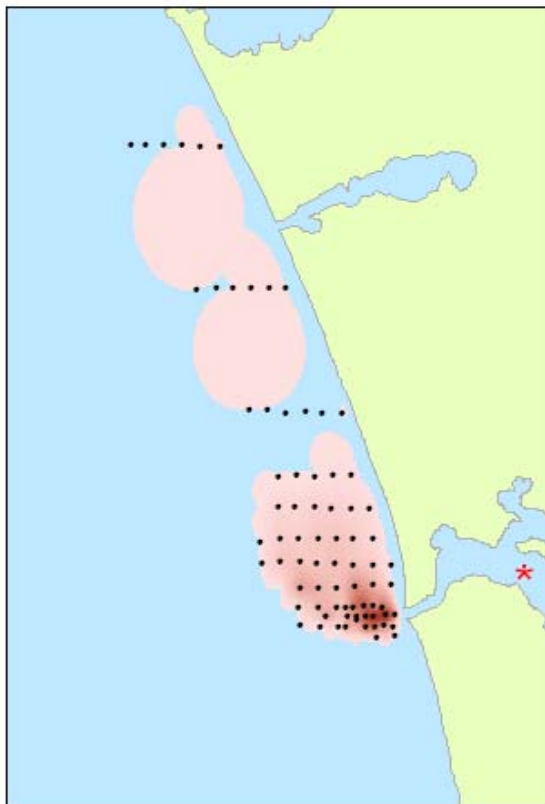


June 2006 Grand Haven Tracer Experiment

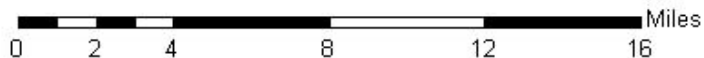
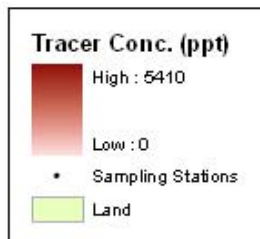
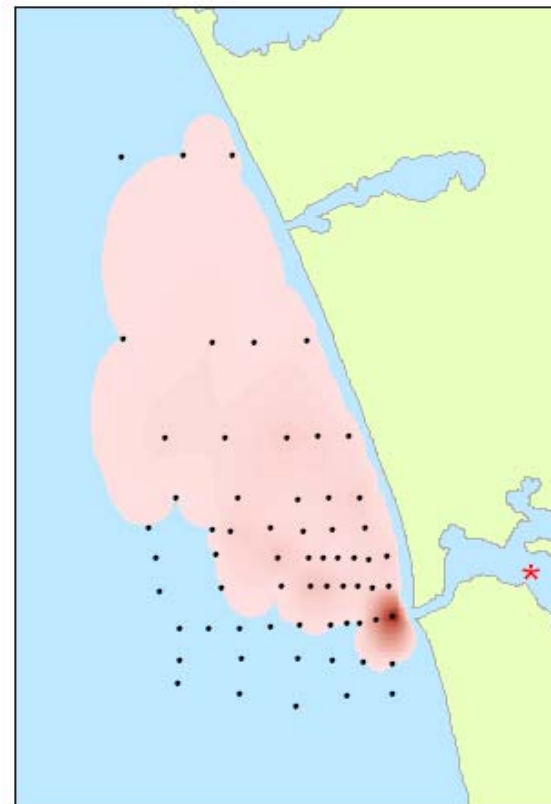
June 21
41 Hours after Release



June 22
66 Hours after Release



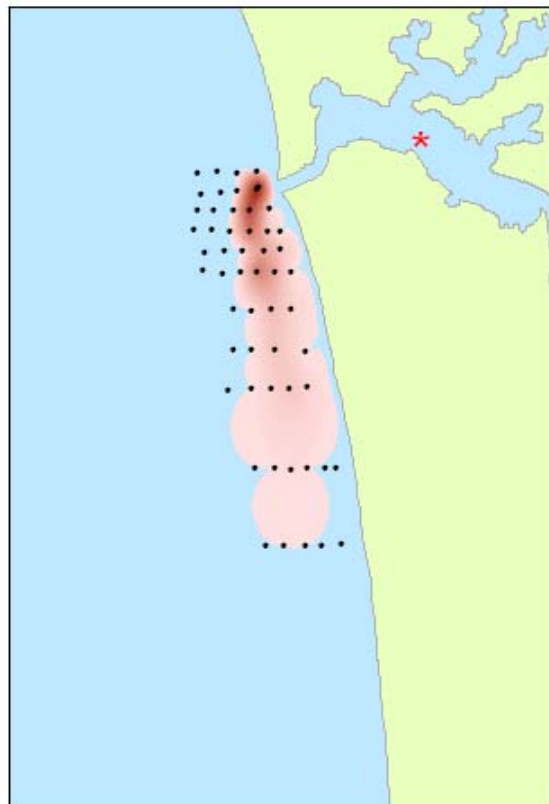
June 23
87 Hours after Release



Tracer Release Started on 6/19/06
Tracer Samples Collected 6/21/06 - 6/23/06
Release Location: Grand River, MI*
NOAA - GLERL

August 2006 Grand Haven Tracer Experiment

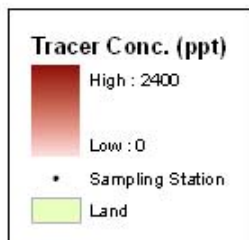
August 8
19 Hours after Release



August 9
45 Hours after Release



August 10
69 Hours after Release



Tracer Release Started on 8/7/06
Tracer Samples Collected 8/8/06 - 8/10/06
Release Location: Grand River, MI*

NOAA - GLERL



Grand Haven Field Study

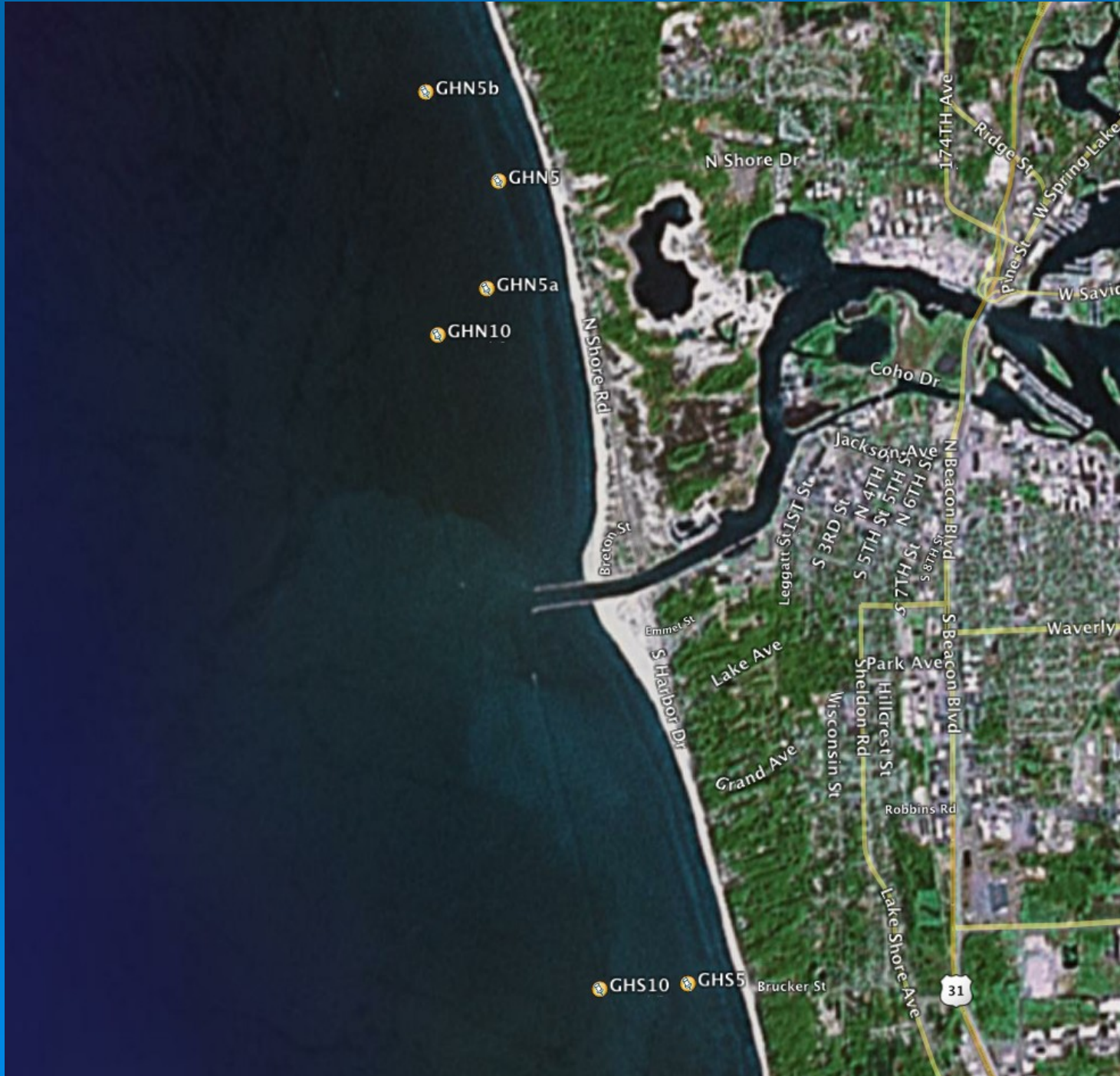
- Rhodamine Dye study
- ADCP to track the dye concentrations at various depths
 - to better understand the movement of the plume.



Aerial view of Grand River Plume.
Photo by M. Beaver



Dyed Grand River. Photo by M. McCormick,
GLERL



GHN5b

GHN5

GHN5a

GHN10

GHS10

GHS5

Brucker St

N Shore Dr

Coho Dr

Jackson Ave

174TH Ave

Ridge St

W Spring Lake

Pine St

W Savic

Coho Dr

N Shore Rd

Bretton St

Leggatt St

S 3RD St

N 4TH St

S 5TH St

N 5TH St

S 6TH St

S 7TH St

S 8TH St

N Beacon Blvd

S Beacon Blvd

Waverly

Emmet St

Lake Ave

Park Ave

Hillcrest St

Sheldon Rd

Wisconsin St

Robbins Rd

Grand Ave

S Harbor Dr

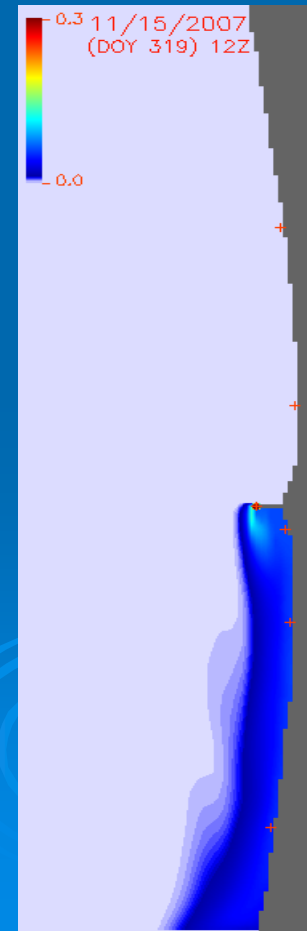
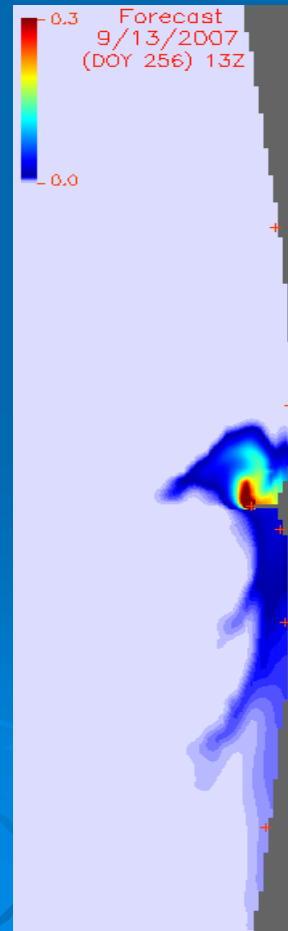
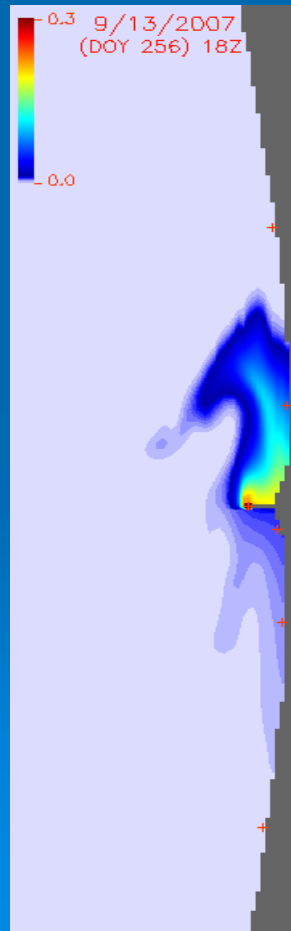
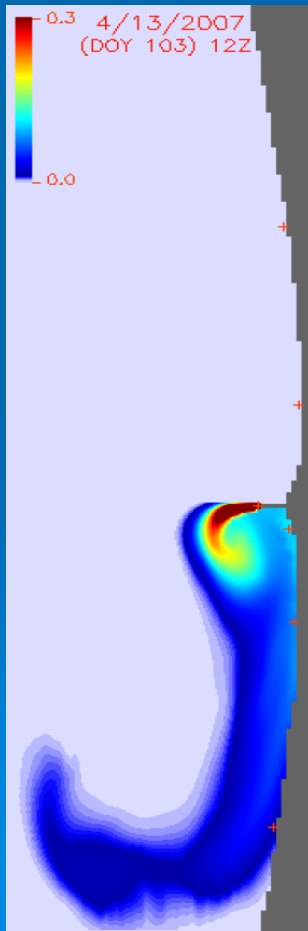
Lake Shore Ave

31

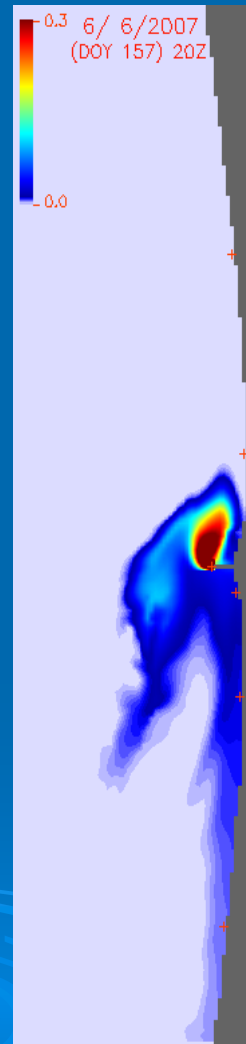
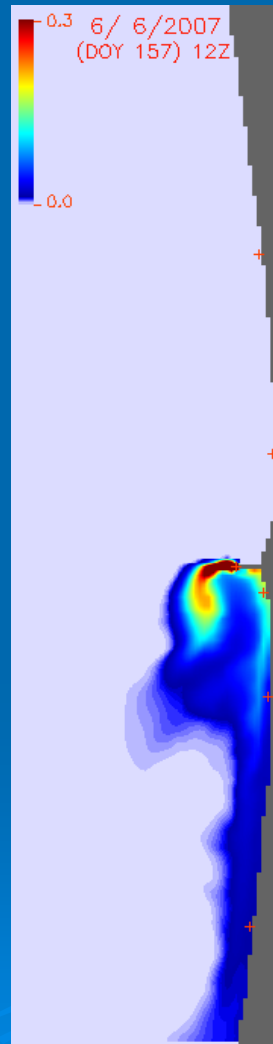
Grand Haven Nowcast and Forecast

<http://www.glerl.noaa.gov/res/glcfs/gh/>

<http://www.glerl.noaa.gov/res/glcfs/ghf/>



Aerial Photos vs. Model Simulation



June 6, 2007 AM

June 6, 2007 PM