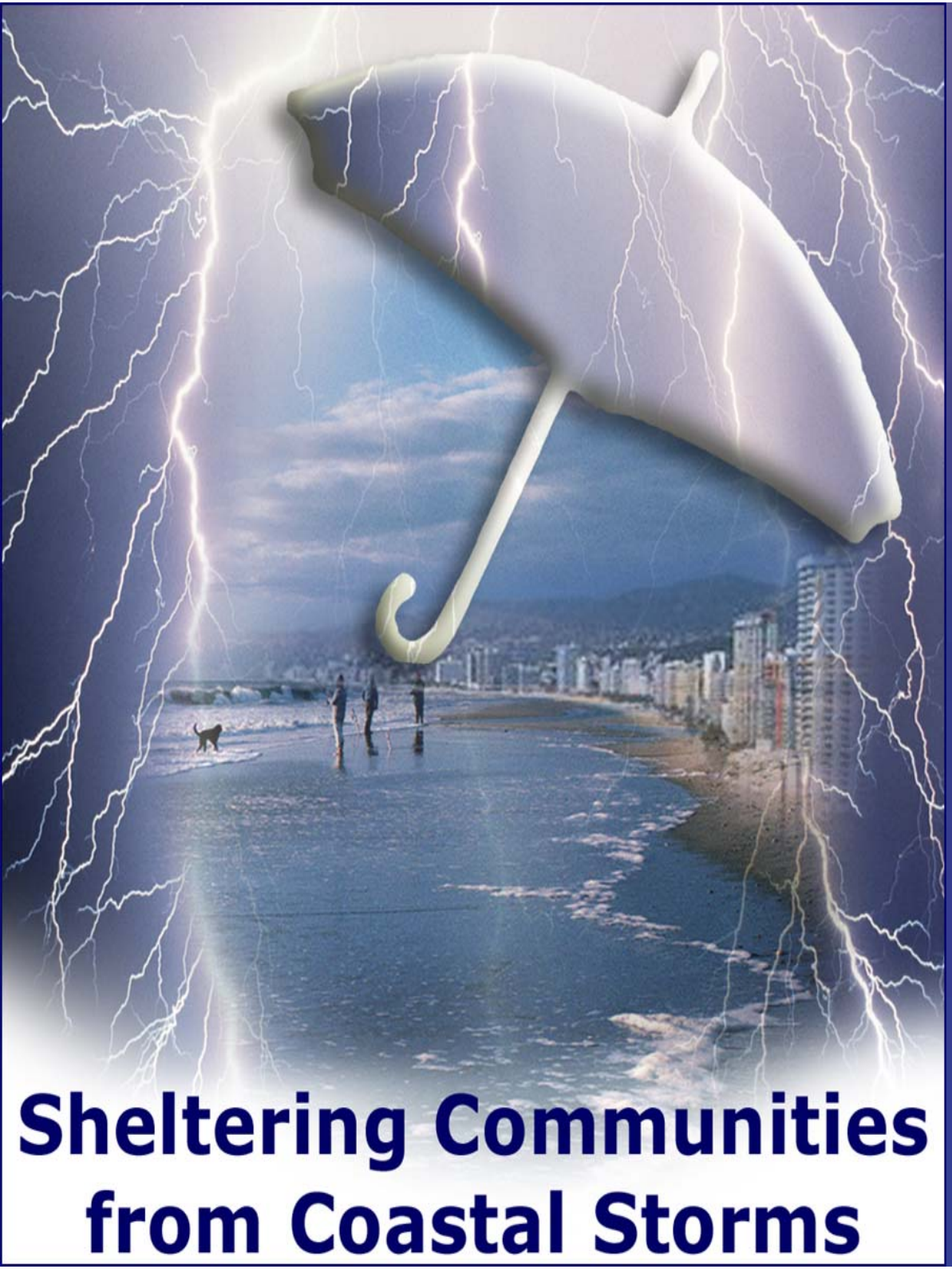


NOAA Coastal Storms Initiative

Frank Aikman

Erica Boyce

Russell Jackson

Keelin Kuipers

Ed Myers

Tom Siewicki

NOAA National Ocean Service
Coastal Services Center

Coastal Storms Initiative

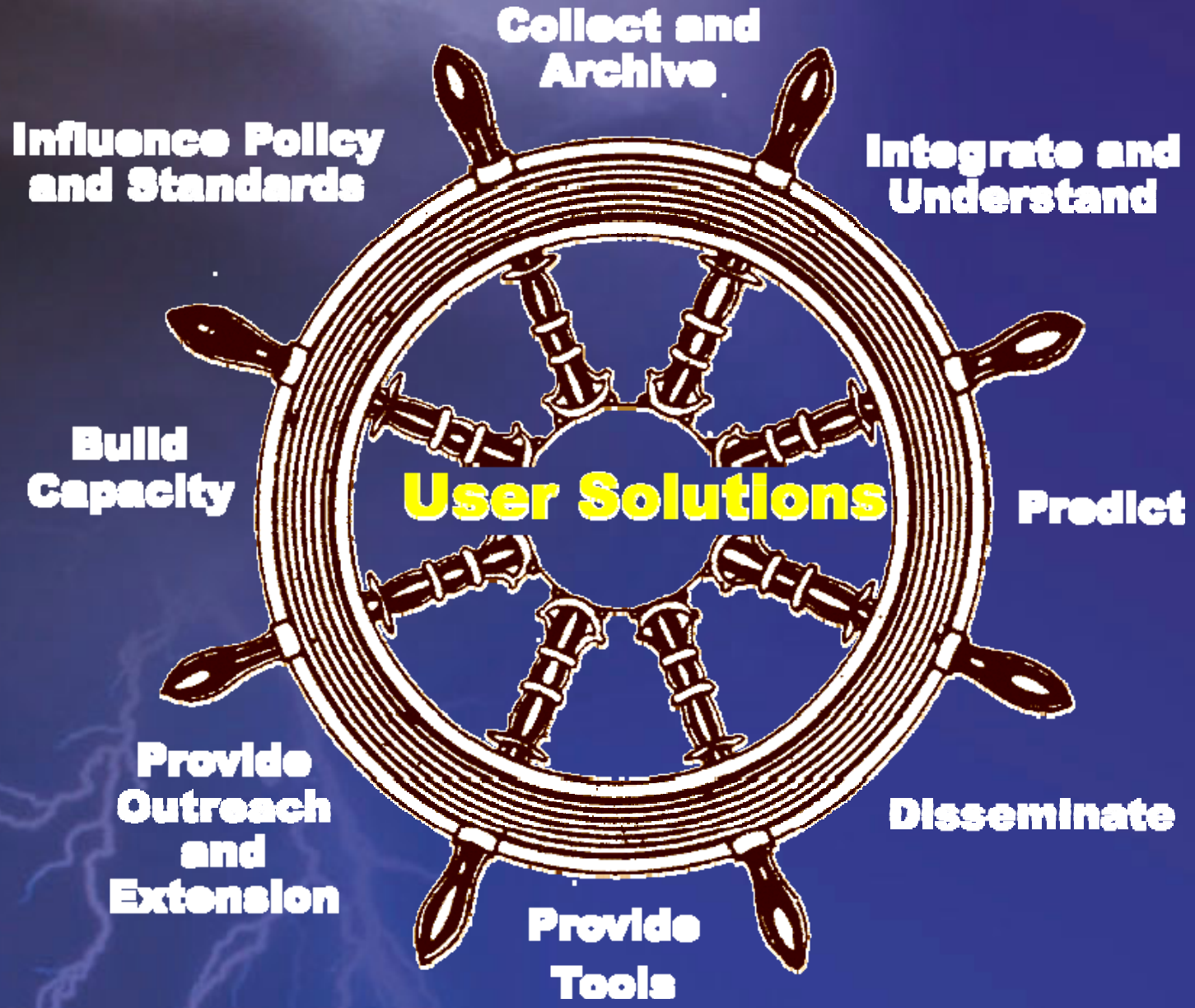
Key Components

- National partnership effort
- Will address specific local needs
- Local leadership working with NOAA resources
- First pilot project is in Florida

Primary Goals

- Prevent loss of life and property
- Lessen economic impacts on communities and business
- Sustain the natural environment

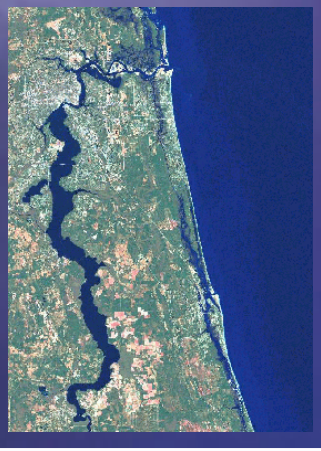
The Sum is Greater than the Parts.



Coastal Storms Initiative

3 Pilot Regions

1) St. Johns River, FL (Jacksonville)



Why?

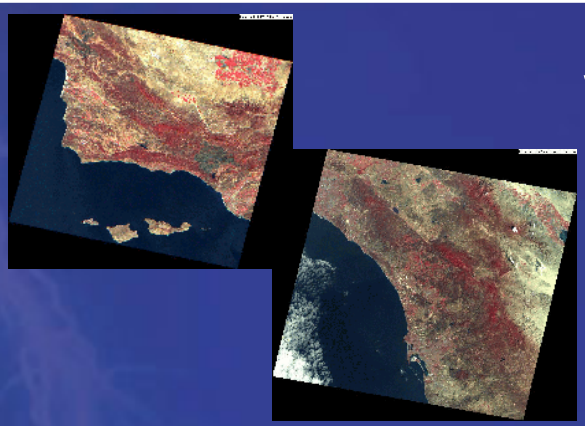
- Hurricanes
- Flooding/winds
- Ecological impacts

2) Pacific Northwest (Columbia River)

Why?

- Pacific Storms
- Flooding and erosion
- Fish habitat impacts

3) Southern California (Bight Region)



Why?

- Pacific Storms
- Flooding and runoff
- Pollution

Florida Pilot Focus

- Easier data access
- New models and tools
- Improved forecasting
- Increased coordination
- Enhanced local decision making

Florida Pilot Projects

Shallow Water Bathymetry
St. Johns River

Ensures navigation safety by

- updating critical chart areas
- providing emergency response information

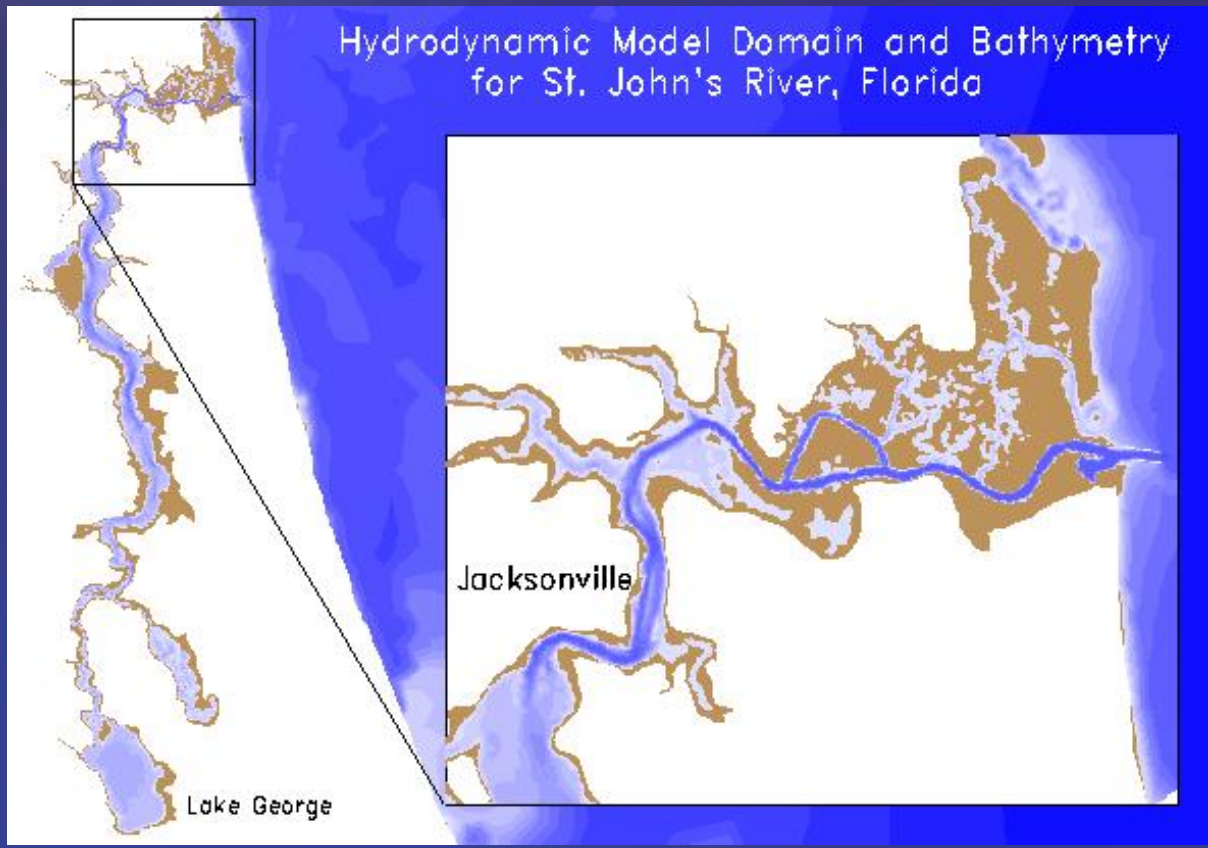
Coastal Storms Initiative

Florida Pilot Projects

St. Johns River Circulation Model

Promoting public safety by

- providing real-time river conditions and forecasts
- supporting hazardous spill tracking
- planning for coastal flooding response and evacuation

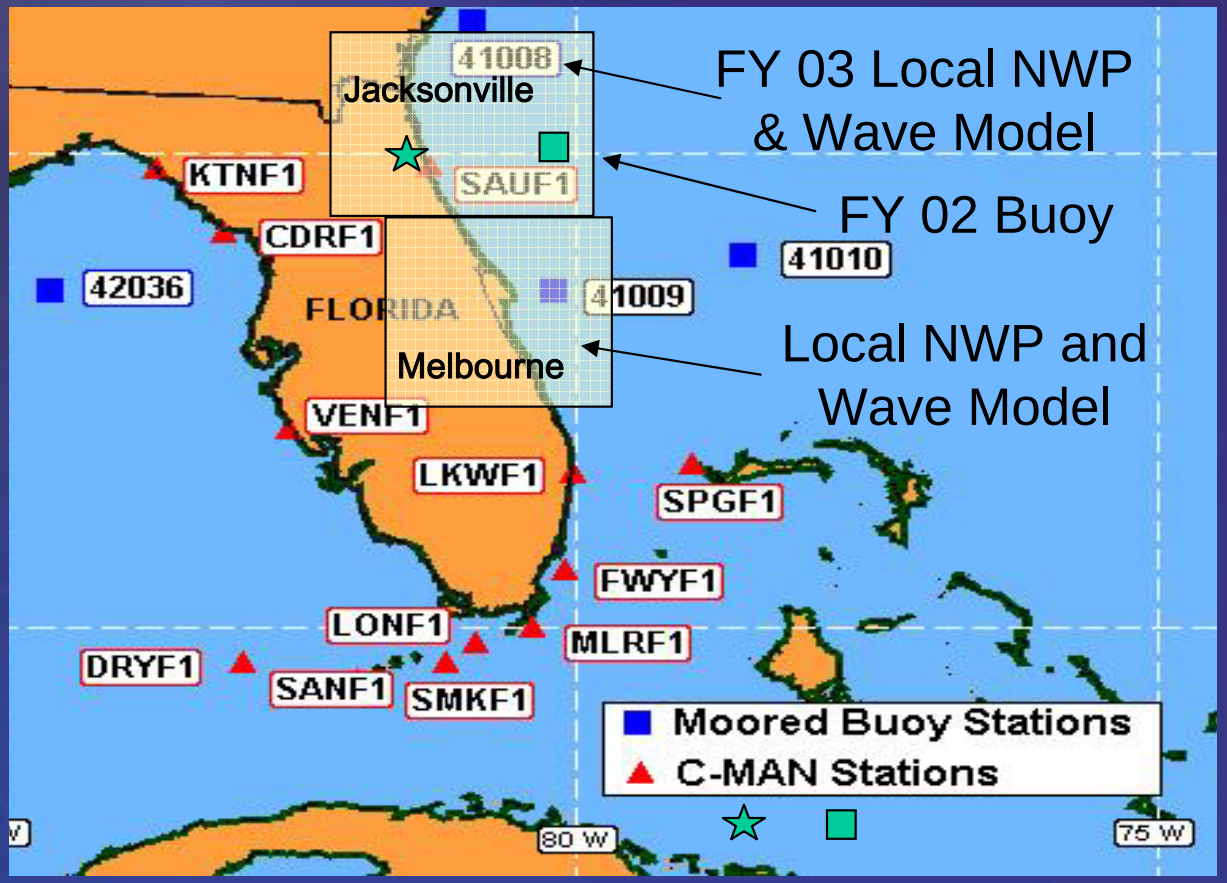


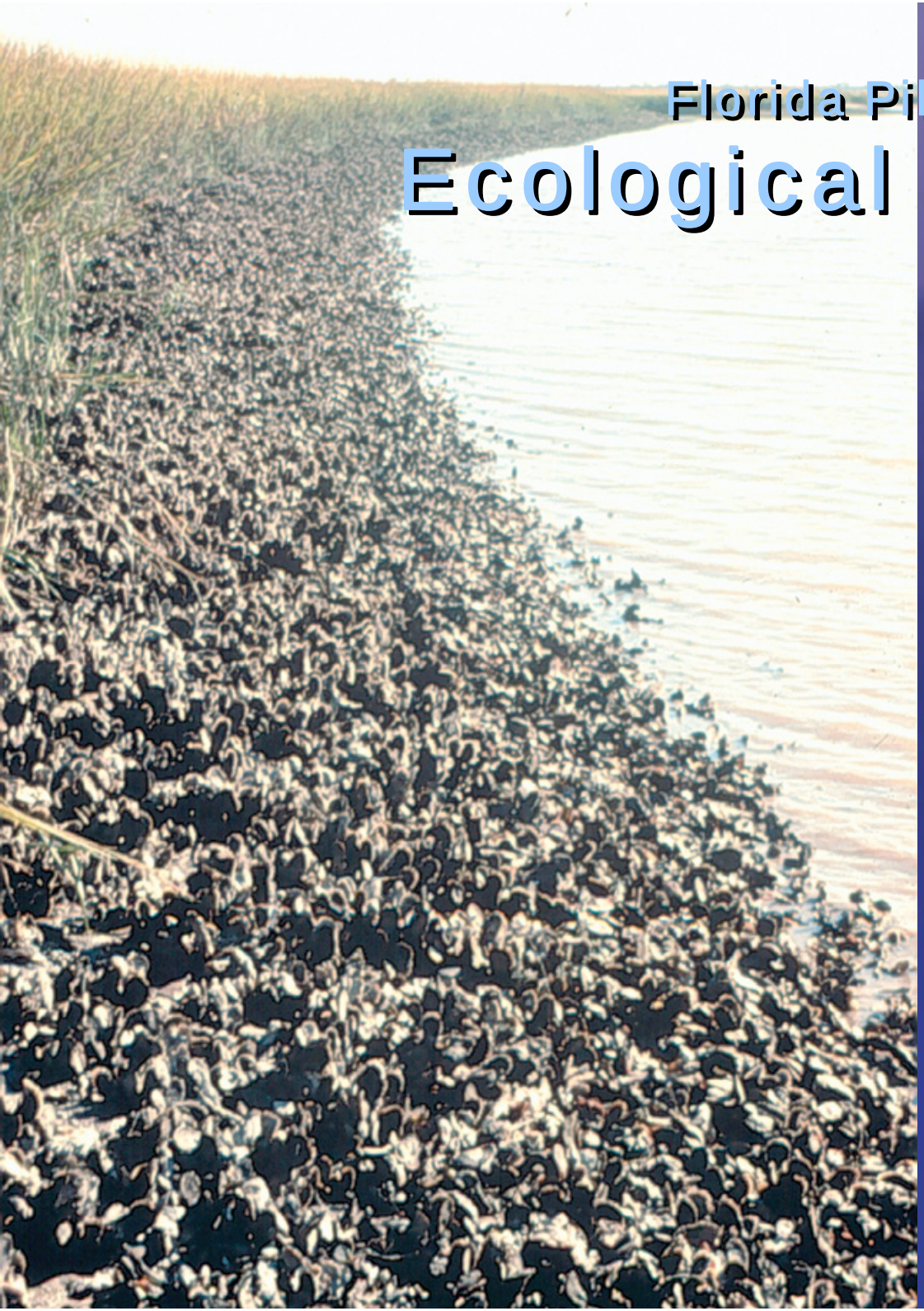
Florida Pilot Projects

Improved Ocean and Observations

Provides user-friendly observations by

- updating existing networks
- standardizing sensors and systems





Florida Pilot Projects

Ecological Forecasting

Protects public health by

- identifying causes of beach and shellfish bed closures
- developing a model to track and predict contaminant flow
- determining appropriate mitigation strategies

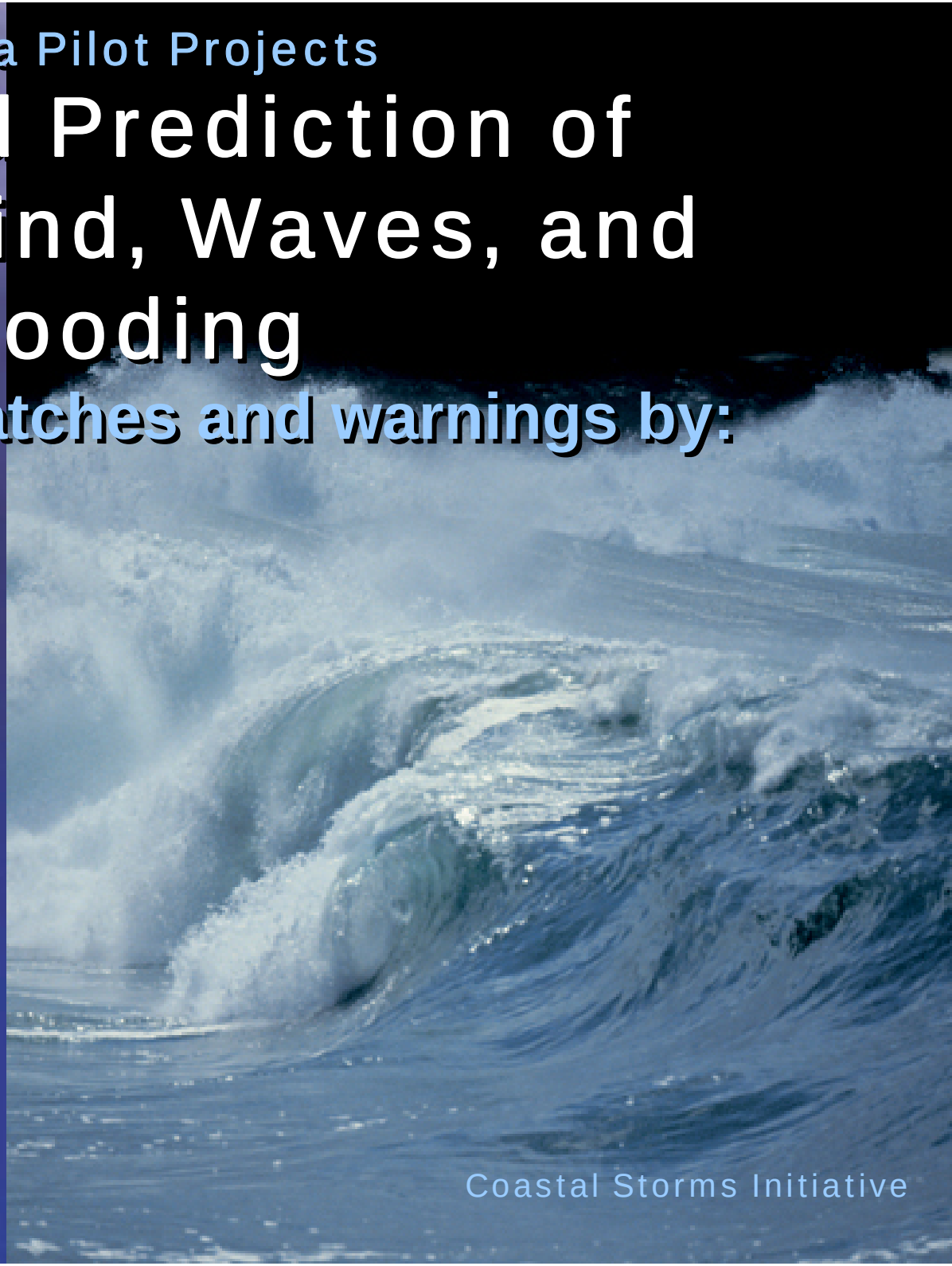
Coastal Storms Initiative

Florida Pilot Projects

Improved Prediction of Coastal Wind, Waves, and Flooding

Enhancing storm watches and warnings by:

- improving forecasts of winds, precipitation, thunderstorms, and marine visibility
- providing new wave forecasts for shoreline and offshore areas
- improved forecasts of ocean water levels and potential flooding



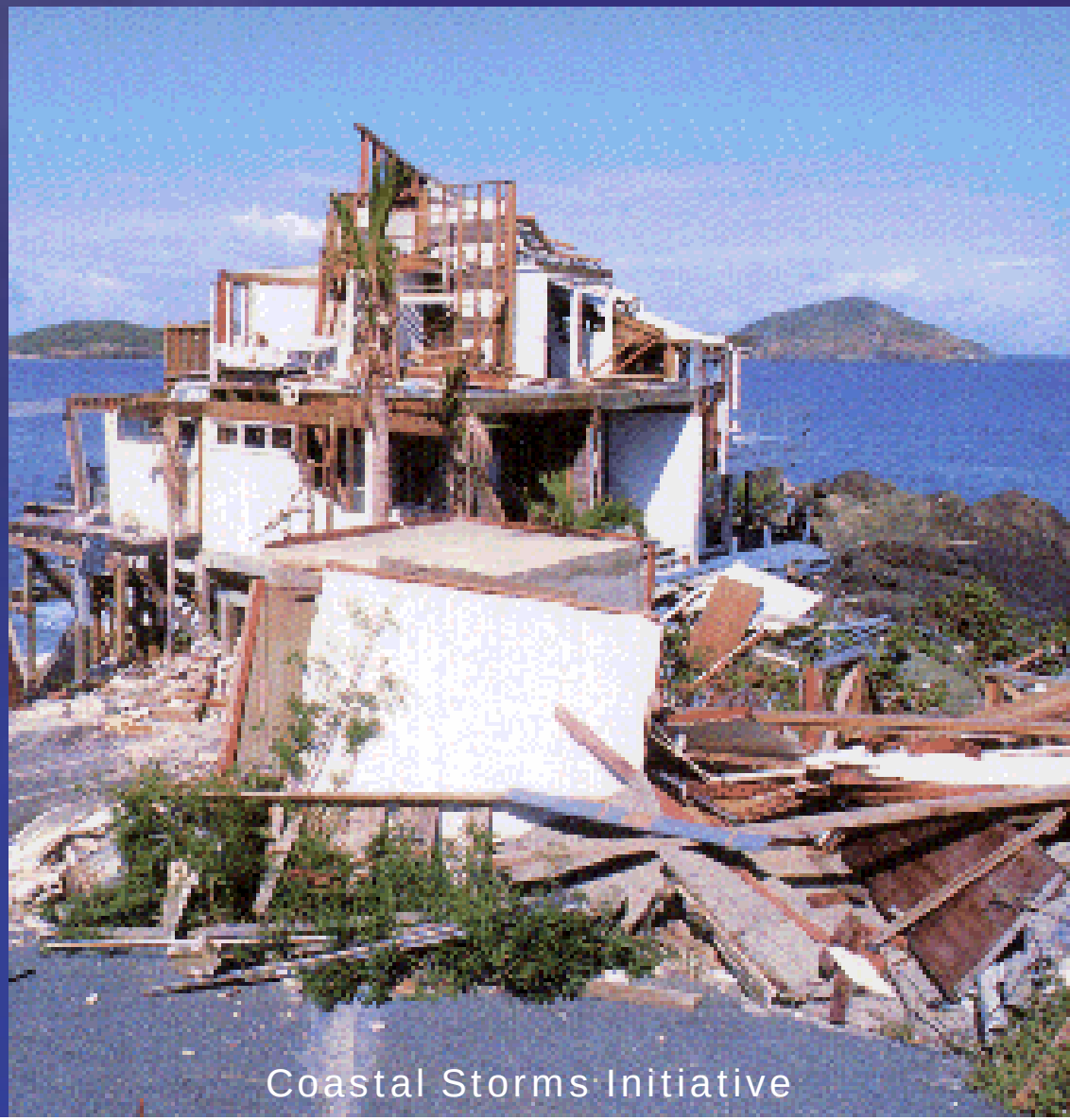
Coastal Storms Initiative

Florida Pilot Projects

Risk and Vulnerability Assessment Tool

Advancing hazard planning by

- developing a tool to visually illustrate risks
- empowering communities with knowledge



Coastal Storms Initiative

Florida Pilot Projects

Outreach and Extension

Promoting community efforts by:

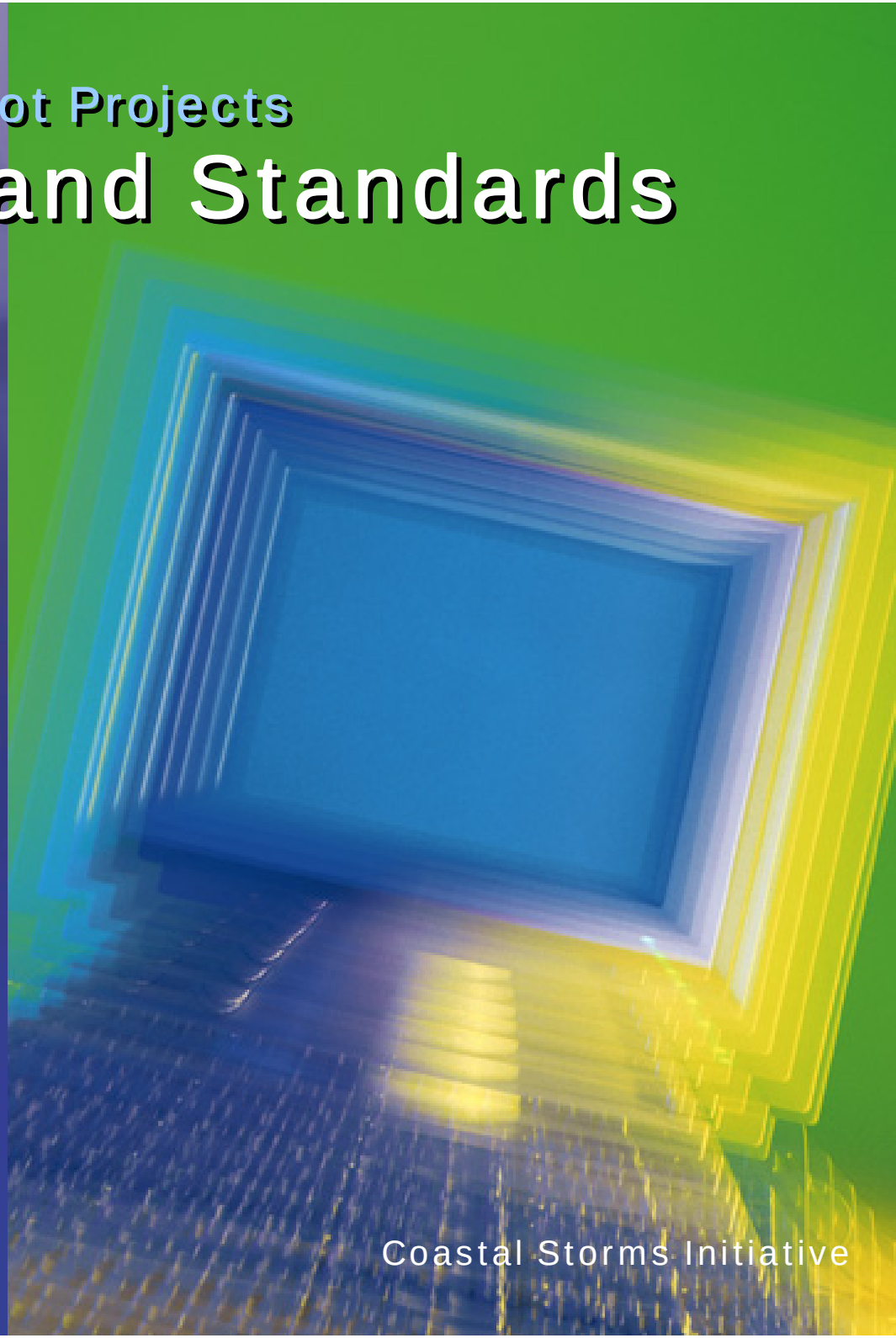
- **facilitating public meetings**
- **helping to build capabilities through training, workshops, and outreach**

Florida Pilot Projects

Data Access and Standards

Ensuring data reliability by

- collecting coastal data
- converting data into user-friendly formats

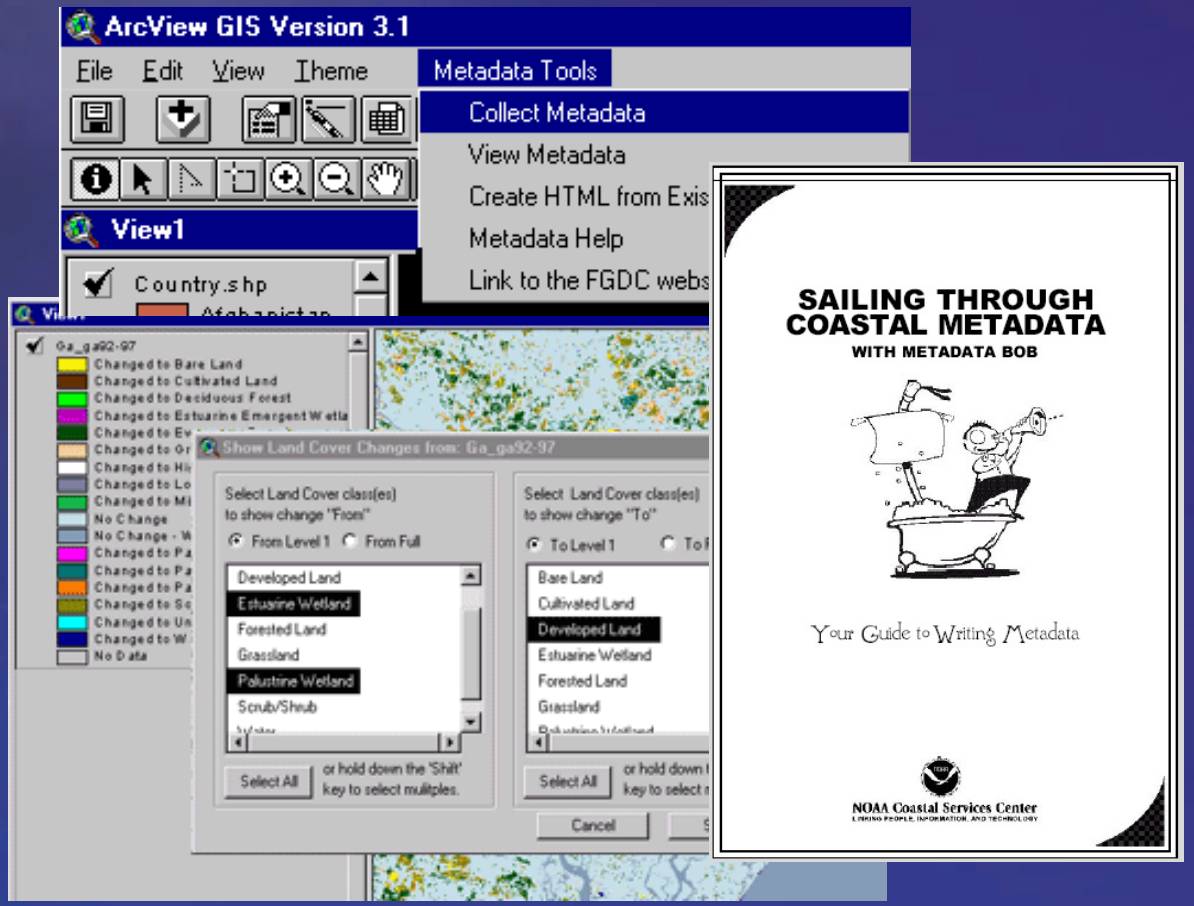


Florida Pilot Projects

Data Access and Standards

Ensures data availability by

- making data more widely available on-line
- providing free, one-stop shopping
- providing a Metadata catalog



Expected Benefits

- More accurate storm warnings
- Greater evacuation time for populations
- Better planning and mitigation strategies
- Prevention of property loss or damage
- Lives saved

Florida Pilot Projects 2 and 6

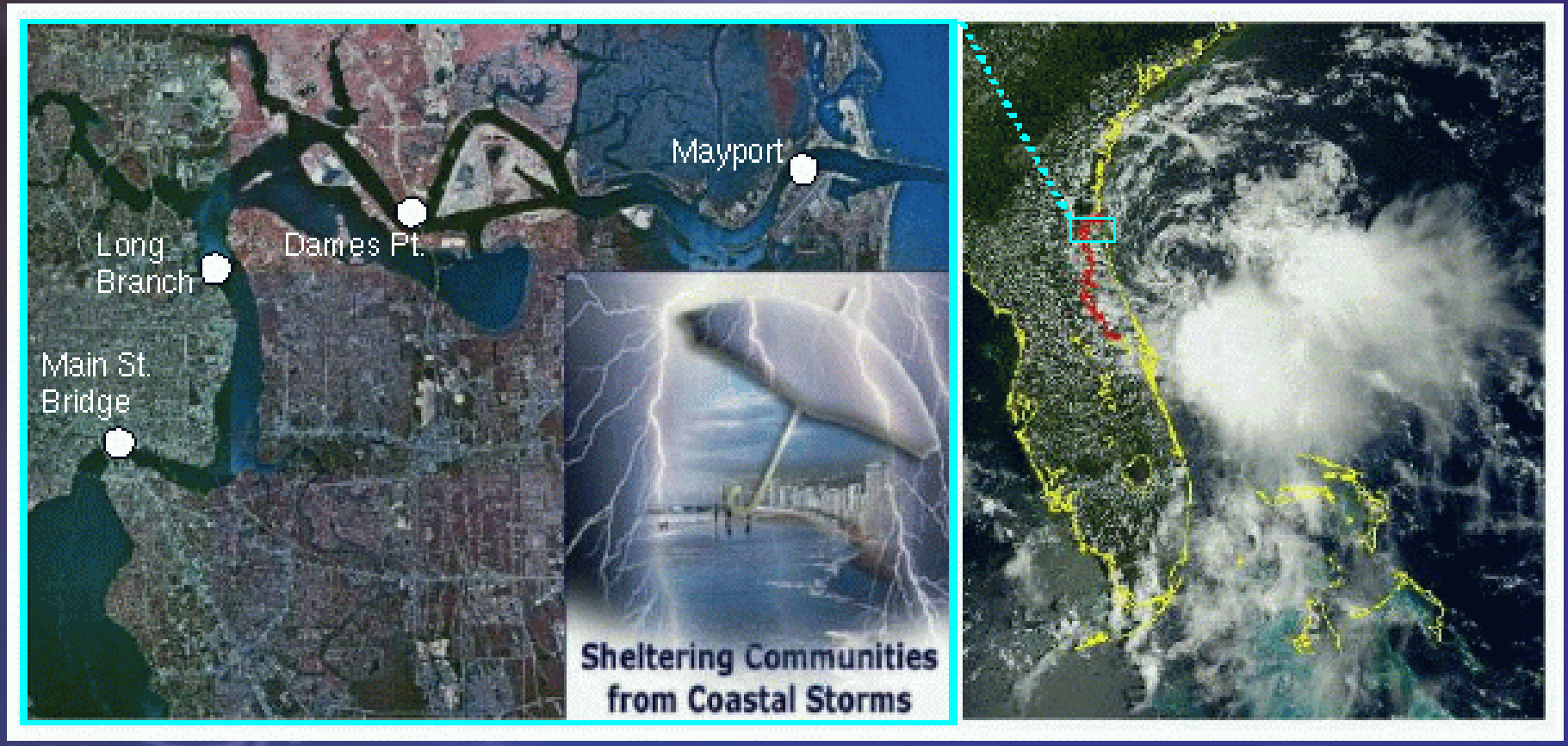
Prediction of River and Marine Conditions in the St. Johns River Watershed

Ed Myers and Frank Aikman
NOAA Office of Coast Survey

Coastal Storms Initiative

Real-Time Prediction of River and Marine Conditions in the St. Johns River Watershed

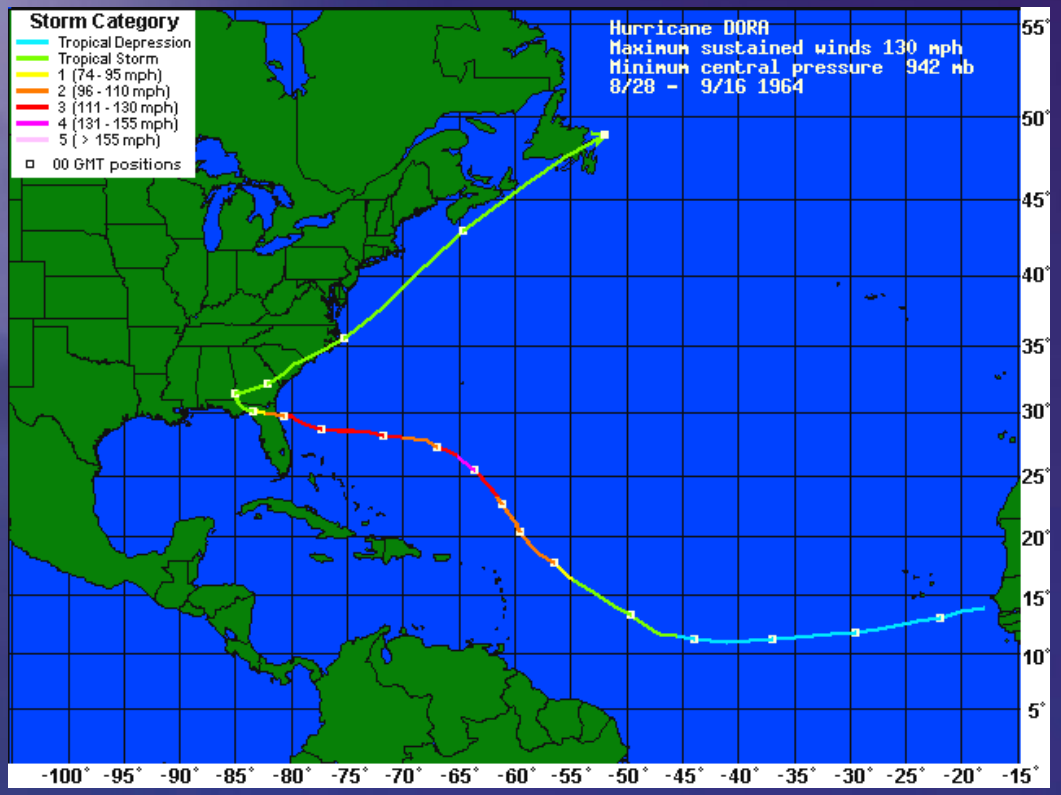
Coastal Storms Initiative



- ✓ New Experimental River Forecast System
- ✓ Improved Flood Warnings
- ✓ Improved Weather Prediction
- ✓ New Wave Forecasts for the Coasts

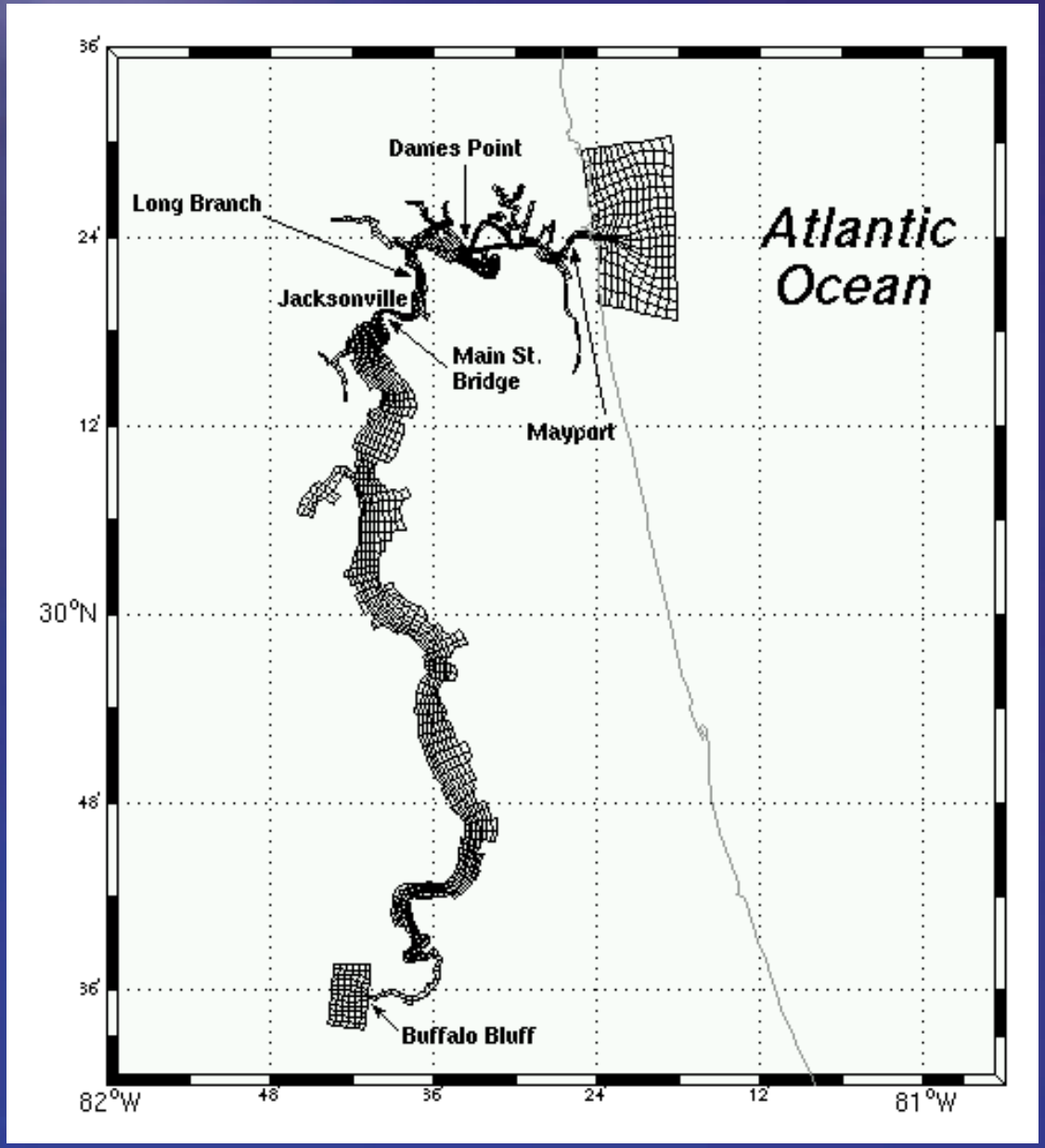
Why Mitigate Impacts of Coastal Storms

- Flooding due to Storm Surge
- Wave Action on the Coast
- Adverse Weather
  - ° Wind
  - ° Precipitation
  - ° Thunderstorms
  - ° Marine Visibility
- Navigation Hazards
  - ° Water Levels and Under Keel Clearance
  - ° Currents for HAZMAT, Search and Rescue, Homeland Security
- Resource Management



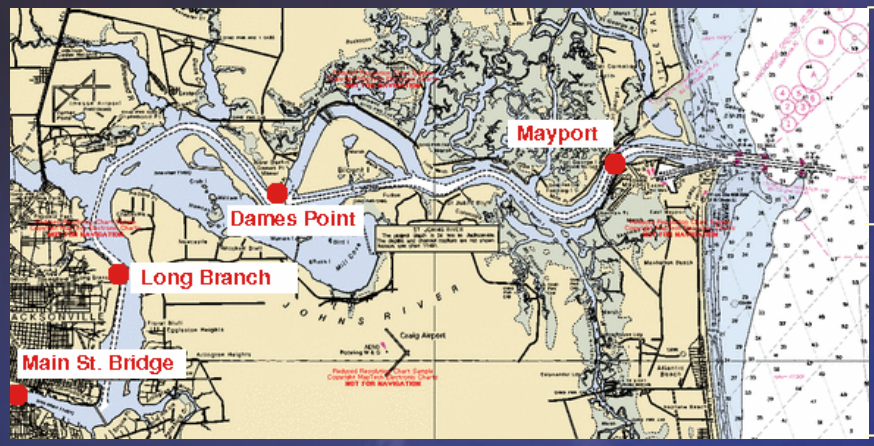
St. Johns River Circulation Model: Nowcast/Forecast System

- EFDC (Environmental Fluid Dynamics Code) application developed by the St. Johns River Water Management District.
- NOS implemented a real-time experimental version:
  - ° hourly nowcasts
  - ° 36-hour forecasts four times a day
- Webpage with water levels, currents, salinity and temperature from both model and data.

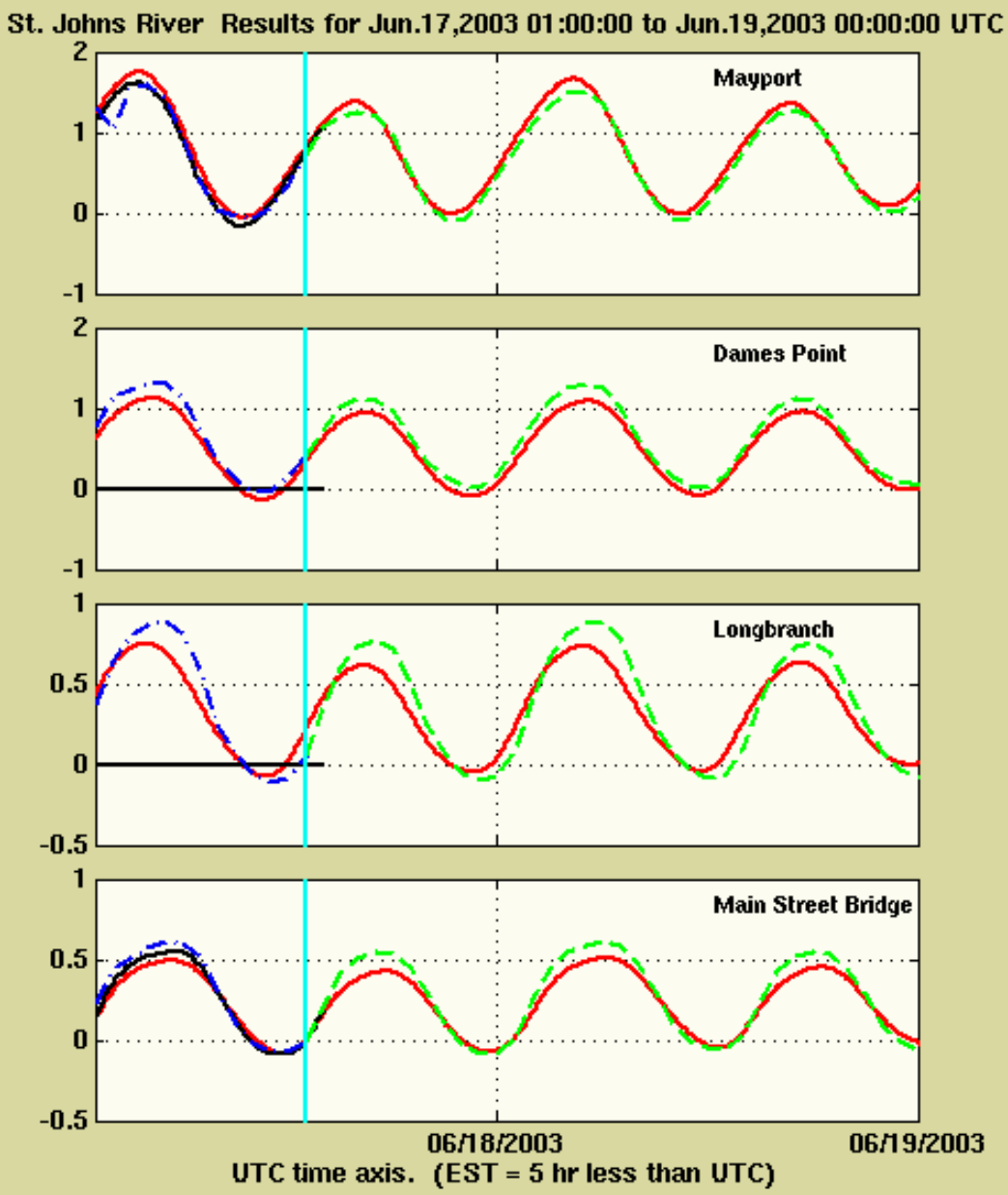


Real-Time Water Levels

- For the nowcasts, the model uses water levels from Mayport as an open ocean boundary condition.



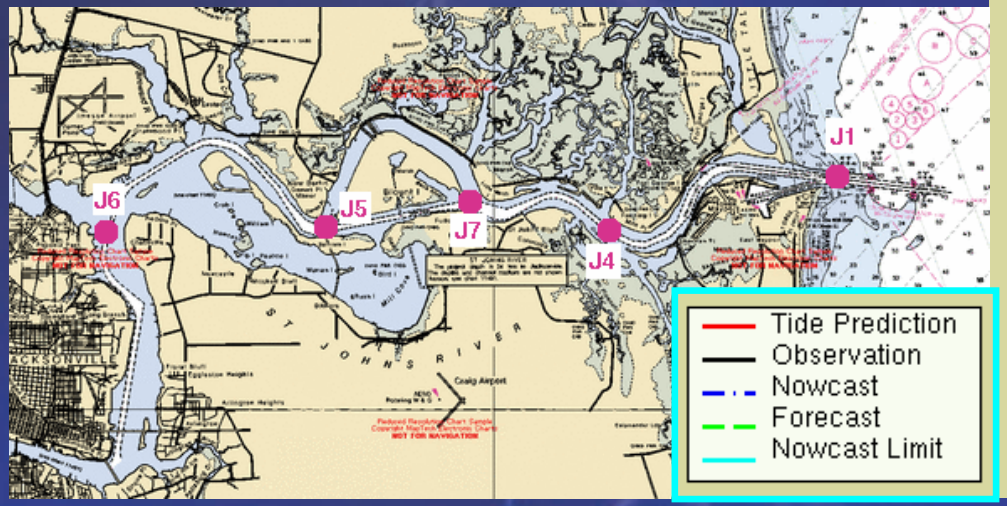
- For the forecasts, tide predictions from Mayport are added to forecasts of nontidal water levels made by NWS' Extratropical Storm Surge model.

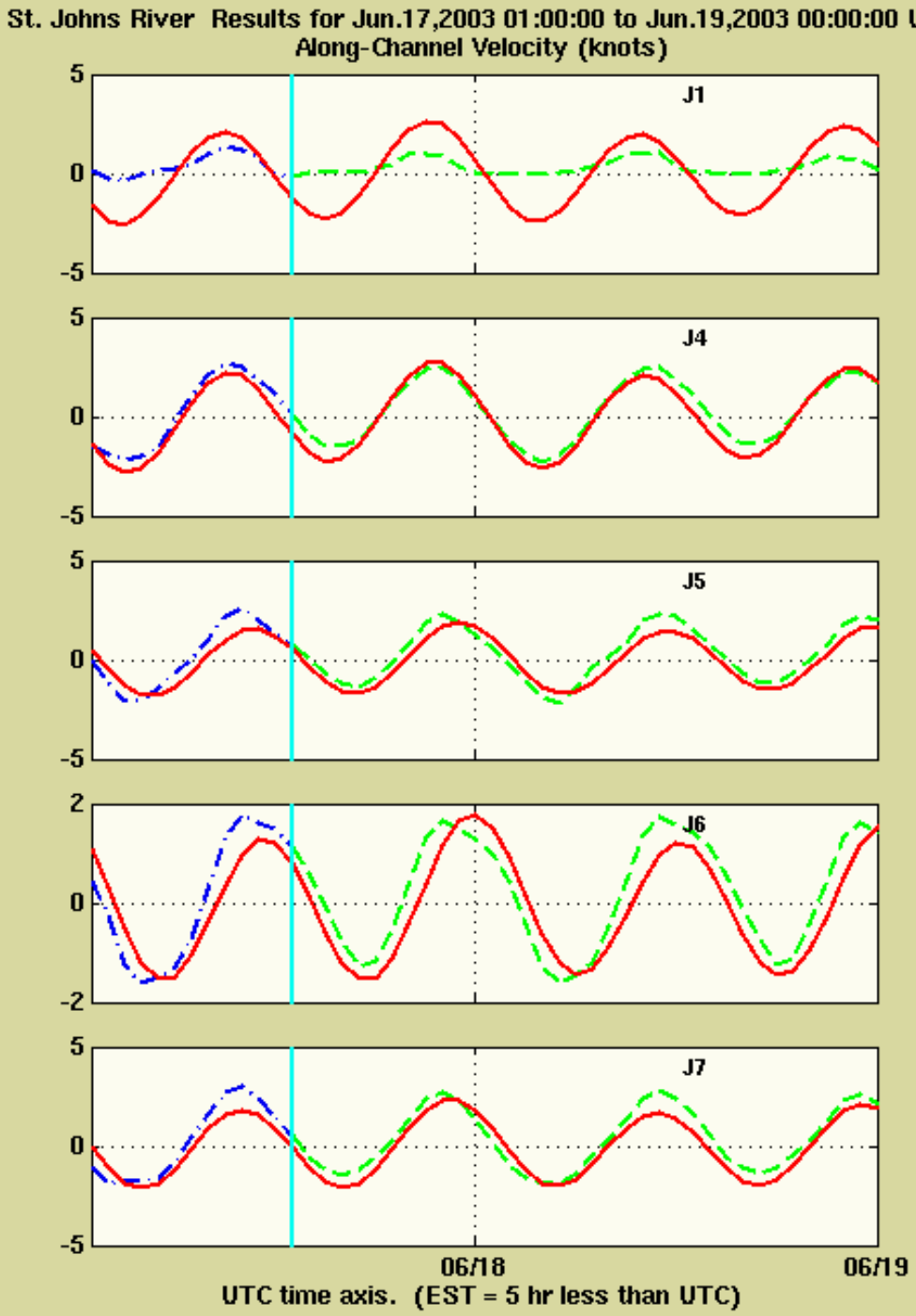


Real-Time Currents

Along-Channel currents are compared with tidal predictions computed from historical current meter measurements.

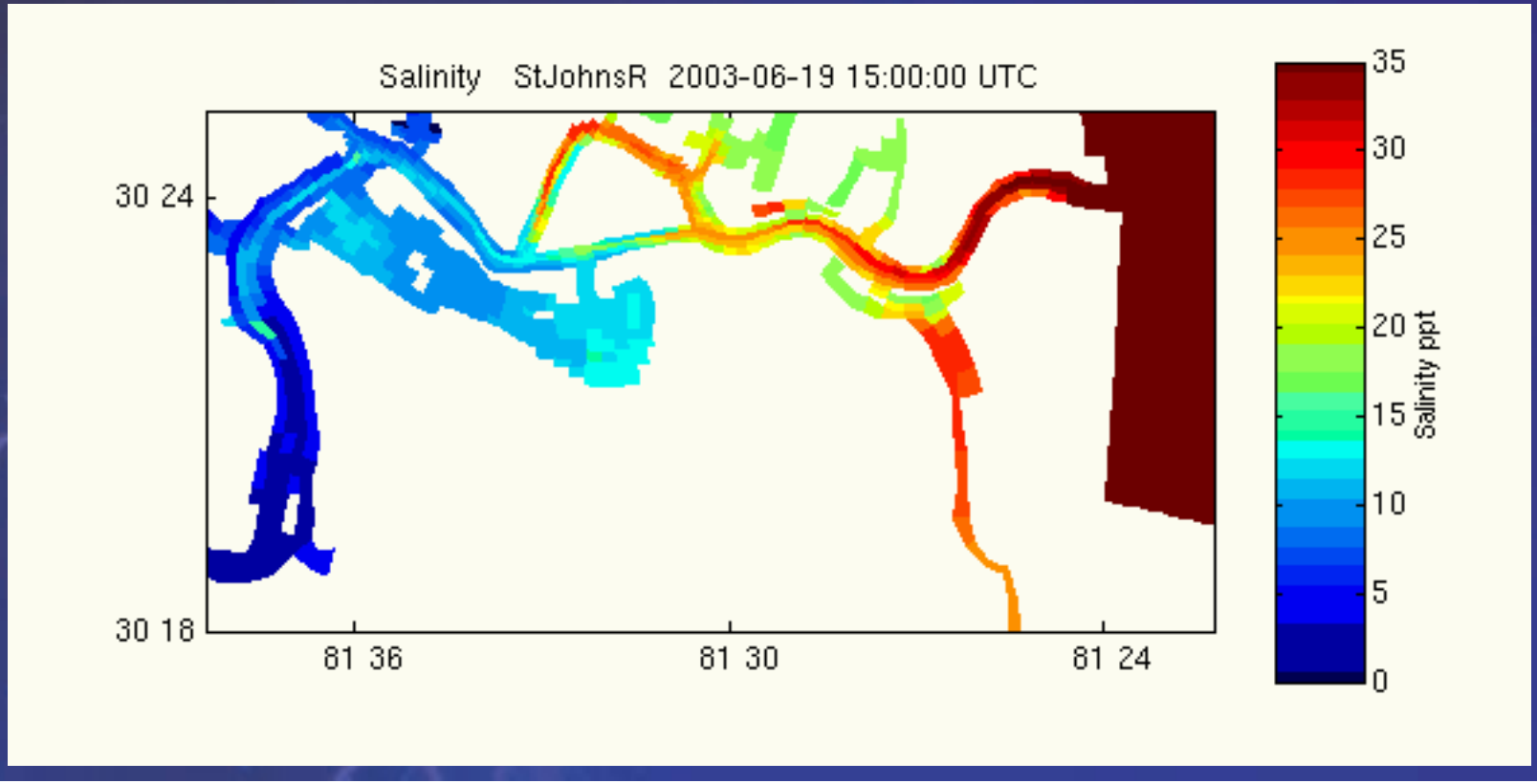
New current measurements will enable updated model evaluations and comparisons.





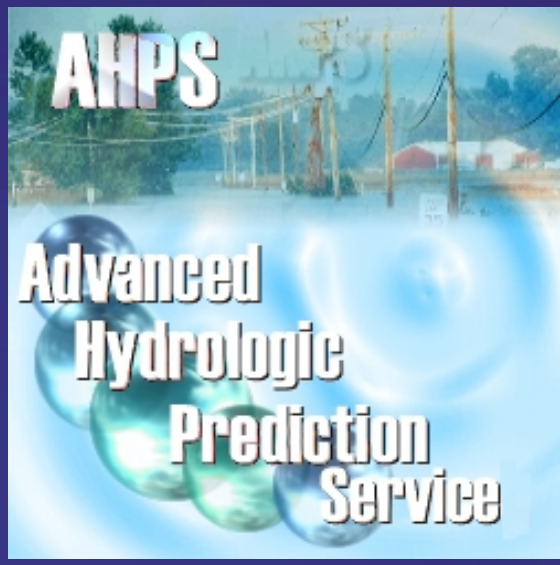
Real-Time Salinity

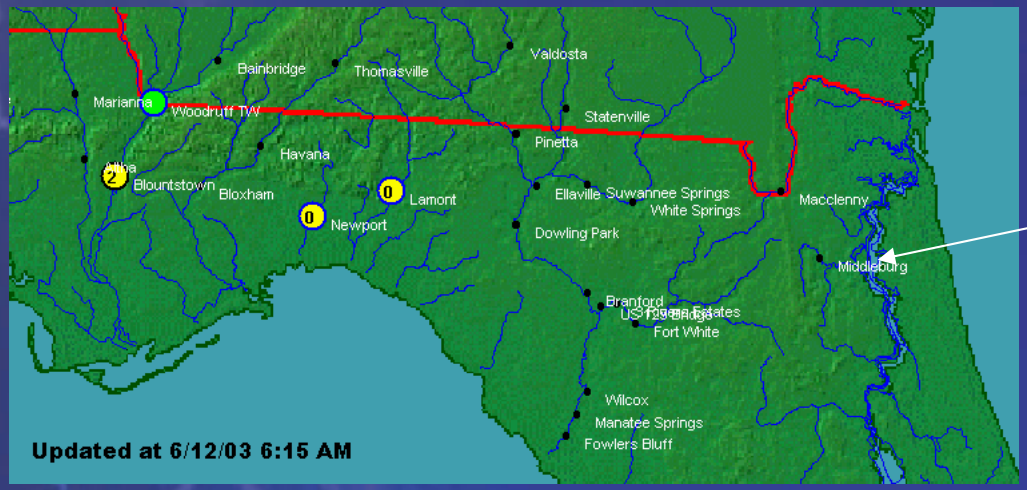
- Salinity is imposed along the ocean boundary as a 35-36 PSU profile.
- At the upstream boundary, salinity (< 1PSU) is imposed with data from a real-time USGS gauge. Tributary freshwater input from an additional five USGS gauges are also input to the model.
- NOS and FDEP are upgrading instruments to make real-time salinity data available for comparison with the model.



Flood Forecasting

- National Weather Service (NWS) working with National Ocean Service (NOS) to:
  - Create 6 new forecast points on the St. Johns
    - Part of NWS Advanced Hydrologic Prediction Service (AHPS)
    - Will provide inputs to NOS estuary model
  - Develop real-time flood mapping capability
  - Integrate output from NOS estuary model with NWS models (inland river, storm surge) into a single product.

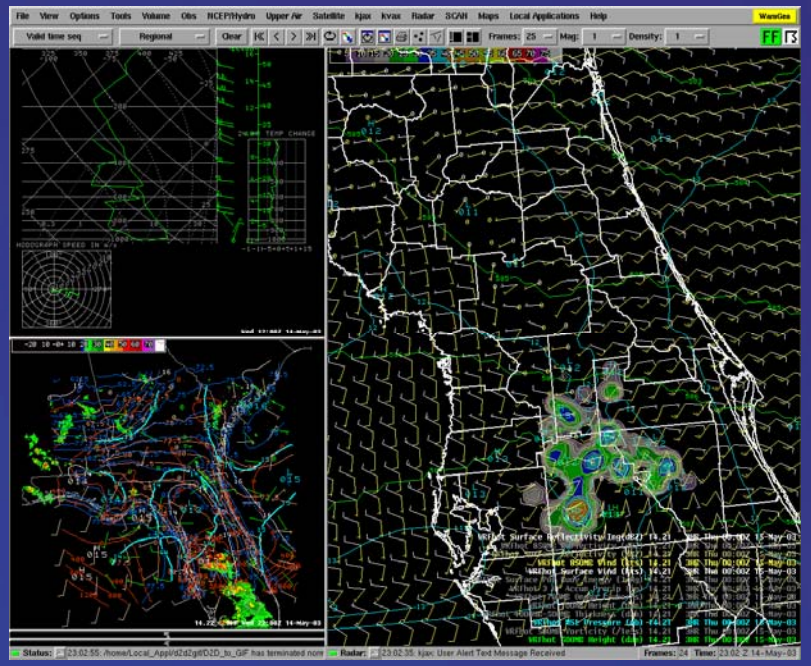




Currently no river forecast points

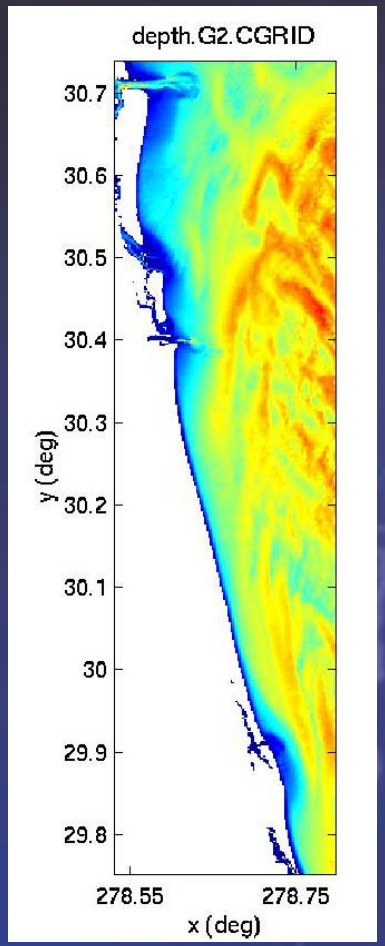
Weather Forecasting

- NWS implemented Weather Research and Forecast (WRF) model at office in Jacksonville
- Provides highly detailed forecasts (5 km res) for 24 hours, 4 times a day
  - Wind forecasts as input to NOS estuary model
  - Improved forecasts of coastal winds, such as sea breezes
  - Improved forecasts of temperature, visibility, thunderstorm activity
- Formal evaluation began June 2



Wave Forecasting

NWS collaborating with Naval Research Lab to develop:



- **High resolution nearshore wave model**
  - **Model guidance currently lacking for NWS forecasters**
- **Focus on northern Florida and Pacific Northwest regions initially**
- **Better planning and safer navigation near bars along west coast**
- **Improved forecasts of other hazards (High surf, rip currents)**

Real-Time Prediction of River and Marine Conditions

Integrated Products to Improve Predictions and Real-Time Information on:

- **River conditions: water levels, currents, temperature and salinity**
- **Improving forecasts of water levels and potential flooding**
- **Improving forecasts of winds, precipitation, thunderstorms, and marine visibility**
- **Providing new wave forecasts for shoreline and offshore areas**

Florida Pilot Project 7

Risk and Vulnerability Assessment Tool

Russell Jackson
NOAA National Ocean Service
Coastal Services Center

Coastal Storms Initiative

Need for …

•The counties had developed a hazard mitigation plan in paper format (just sat around) – they needed a more interactive way to visualize risk and vulnerabilities.

•Assisting the counties with their Disaster Mitigation Act of 2000 requirements.

•Internet access to the tools, especially mapping applications, increase the use of the data.

•Smaller towns without GIS capability or risk and vulnerability assessment expertise now have the resources to conduct them.

•Provide more access and utility for some of the data and information provided by other CSI projects.

Community based process

- Working directly with Brevard and Volusia Counties, FL
  - -Local Emergency Management Office – lead
  - -Hazard Mitigation Committee

- Partner interaction and feedback led to other products/tools
  - -Identified a need for tools specifically for public outreach and awareness
    - -Hazards Locator Tool
    - -3D storm surge visualizations
  - -Floodplain Management Tool – lower rates
  - -Parcel Analysis Tool

Technology

Internet - to maximize usage (especially smaller communities without GIS and risk and vulnerability assessment capabilities)

- Web based tutorials
- 3D visualizations and images
- Internet Mapping Applications
  - -Hyperlinks to other data, products, services

Web site – Homepage

Assessing the Risk and Vulnerability of Brevard and Volusia Counties, Florida to Coastal Storms - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address I:\ID\4tashya\hazards\csi\website\index.html Go

NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

Site Search: Go

Risk and Vulnerability Assessment Tool (RVAT)

Using geographic information system (GIS) to analyze coastal hazard vulnerability to develop loss reduction strategies

Center Home
On-line Mapping

RVAT Home

Risk & Vulnerability Assessment
Overview
Identifying Hazards
Critical Facilities
Societal
Economic
Environmental

Interactive Mapping
Risk & Vulnerability
Parcel Analyzer
Community Ratings
Hazards Locator Tool

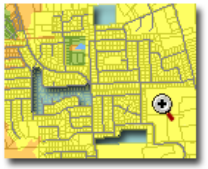
Mitigation
Mitigation Opportunities
Community Rating Overview

Storm Surge Visualization

Resources
Glossary
Links
Data Dictionary
Disclaimer

Mapping Hazards and Identifying Vulnerability

Use the Interactive Mapping to:



- Perform analyses on data to determine the locations of vulnerable people, property and natural resources
- Use analysis results to prioritize hazard mitigation measures
- View the status of the Community Rating System by municipality and county
- Analyze parcel data and information

Need to Conduct a Risk and Vulnerability Assessment?

The risk and vulnerability analysis outlines the steps, provides examples, gives data locations, and contact information for performing a risk and vulnerability assessment.

The Coastal Storms Initiative project was piloted in Brevard and Volusia Counties, Florida, but is adaptable to other areas.

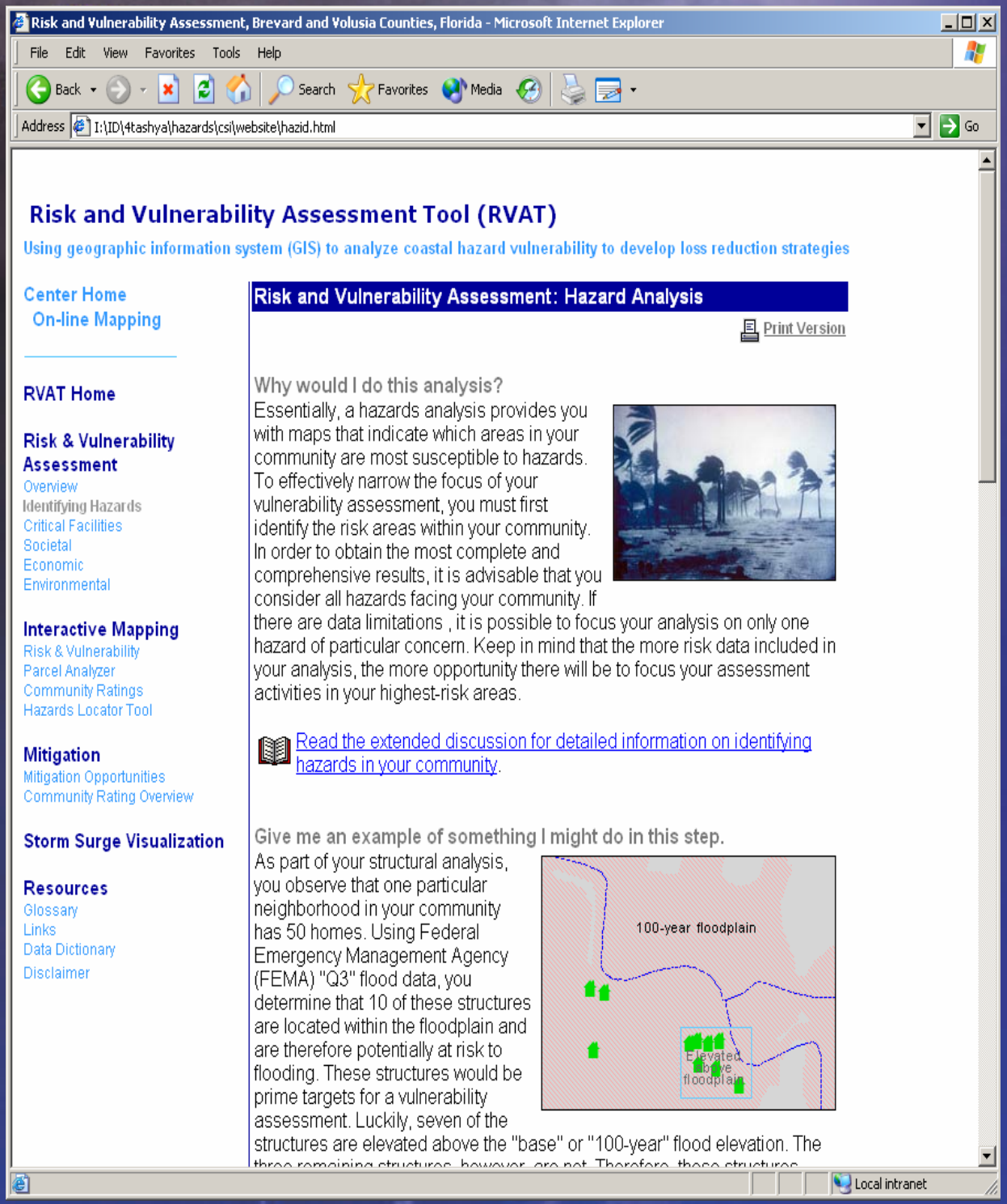
Not Sure What Hazards May Impact You?

Use the Hazards Locator to see if floods, hurricanes or erosion could impact your family

Interested in Reducing Flood Risk and Insurance Premiums?

Find out how Community Rating System activities can reduce flood risk and increase flood protection.

Local intranet

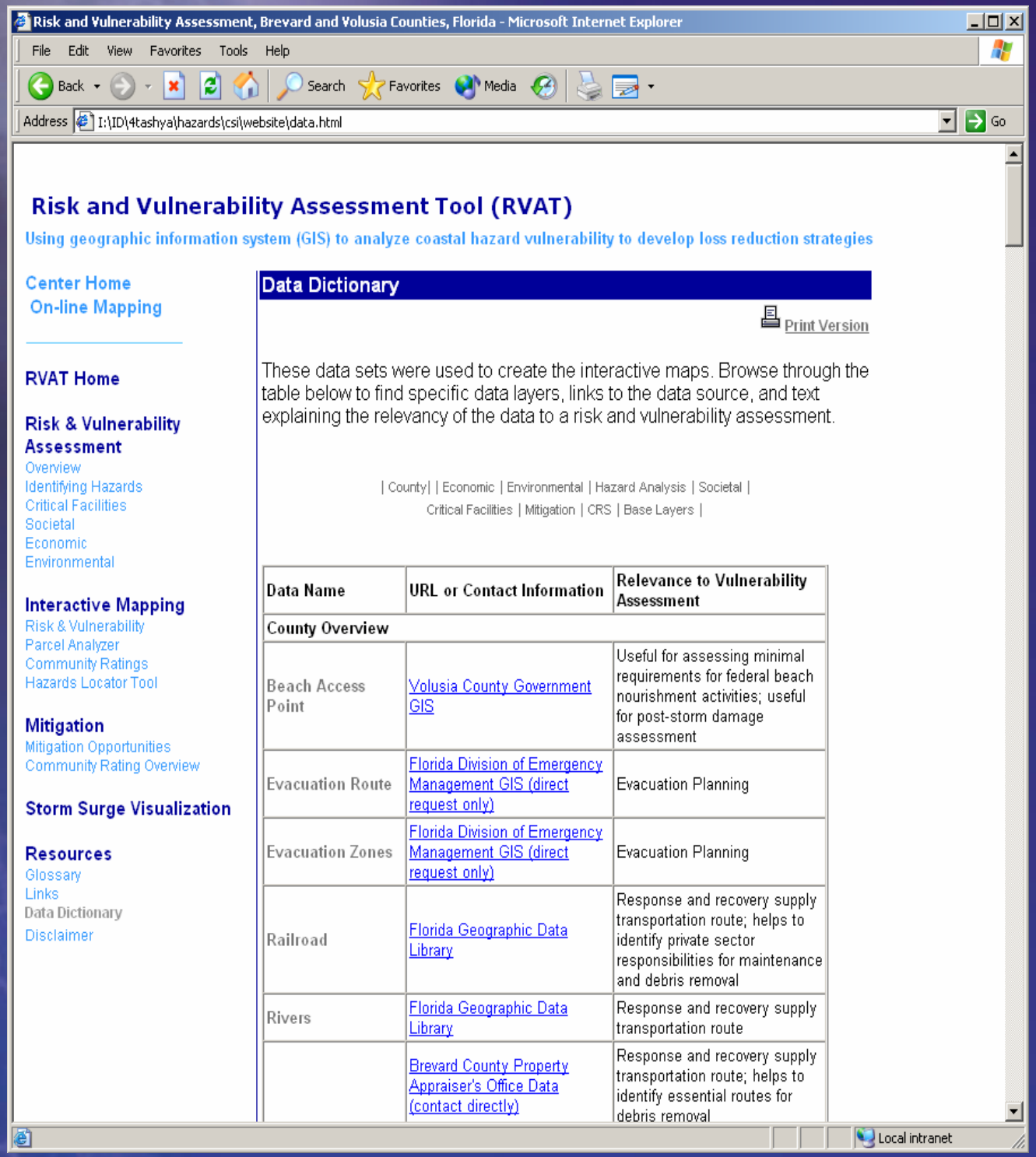


Web site – Assessment Discussions

- **Brief overview**
- **Expanded discussion, including methodology**

Web site – Data Dictionary

- Link to source
- Relevance to assessment



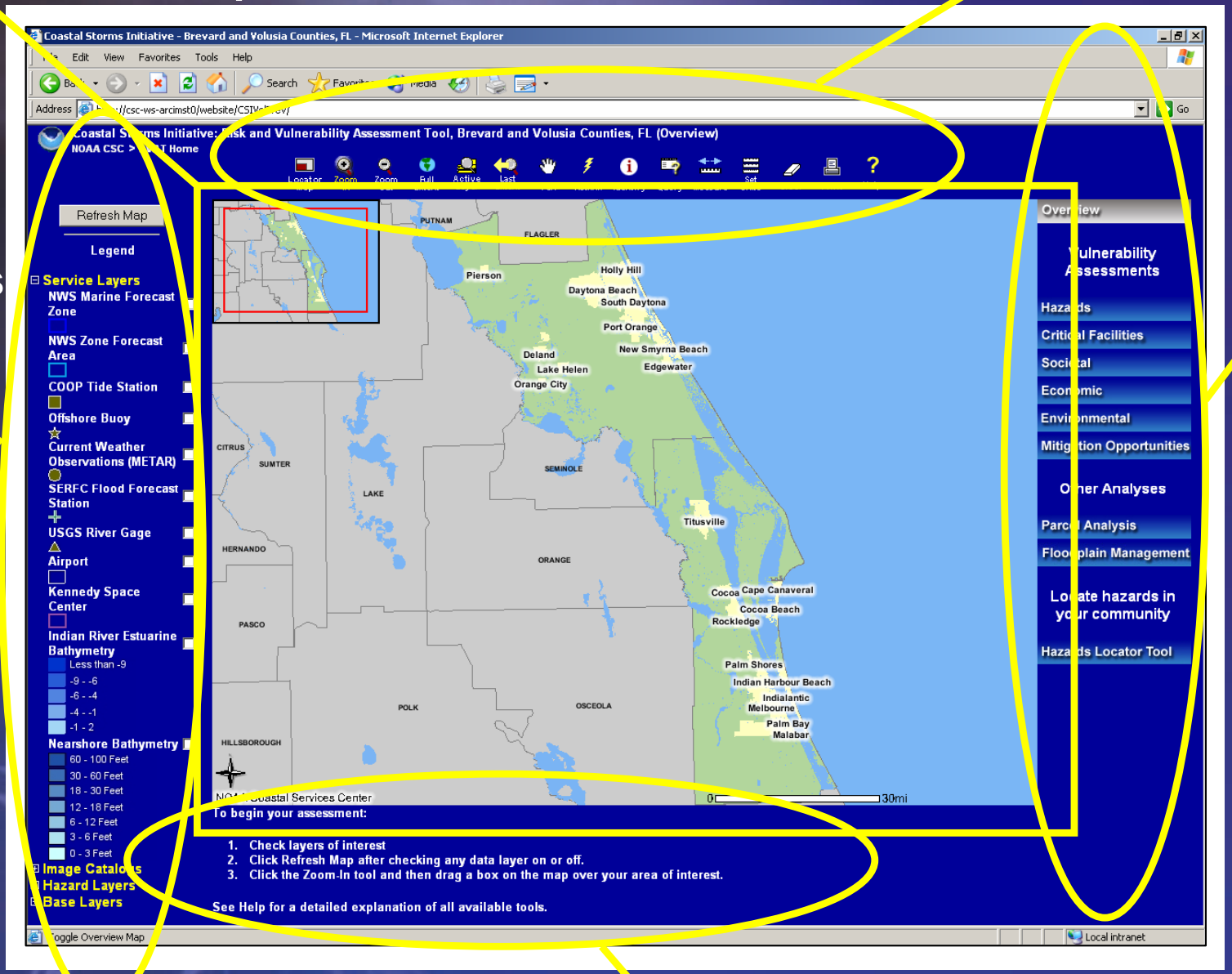
ArcIMS - Overview

Interactive Map

Interactive Tools

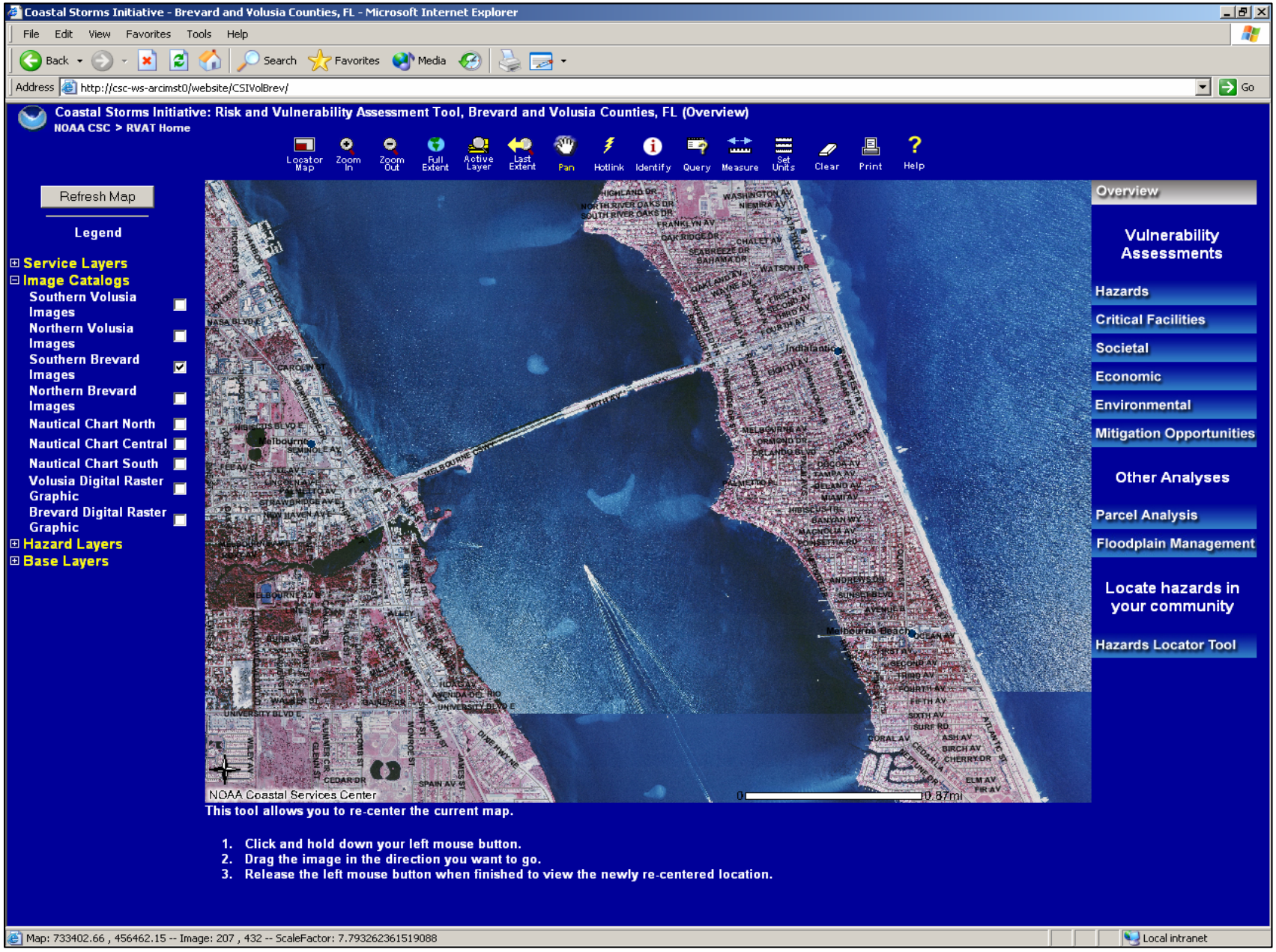
Data Layers

Mapping Services

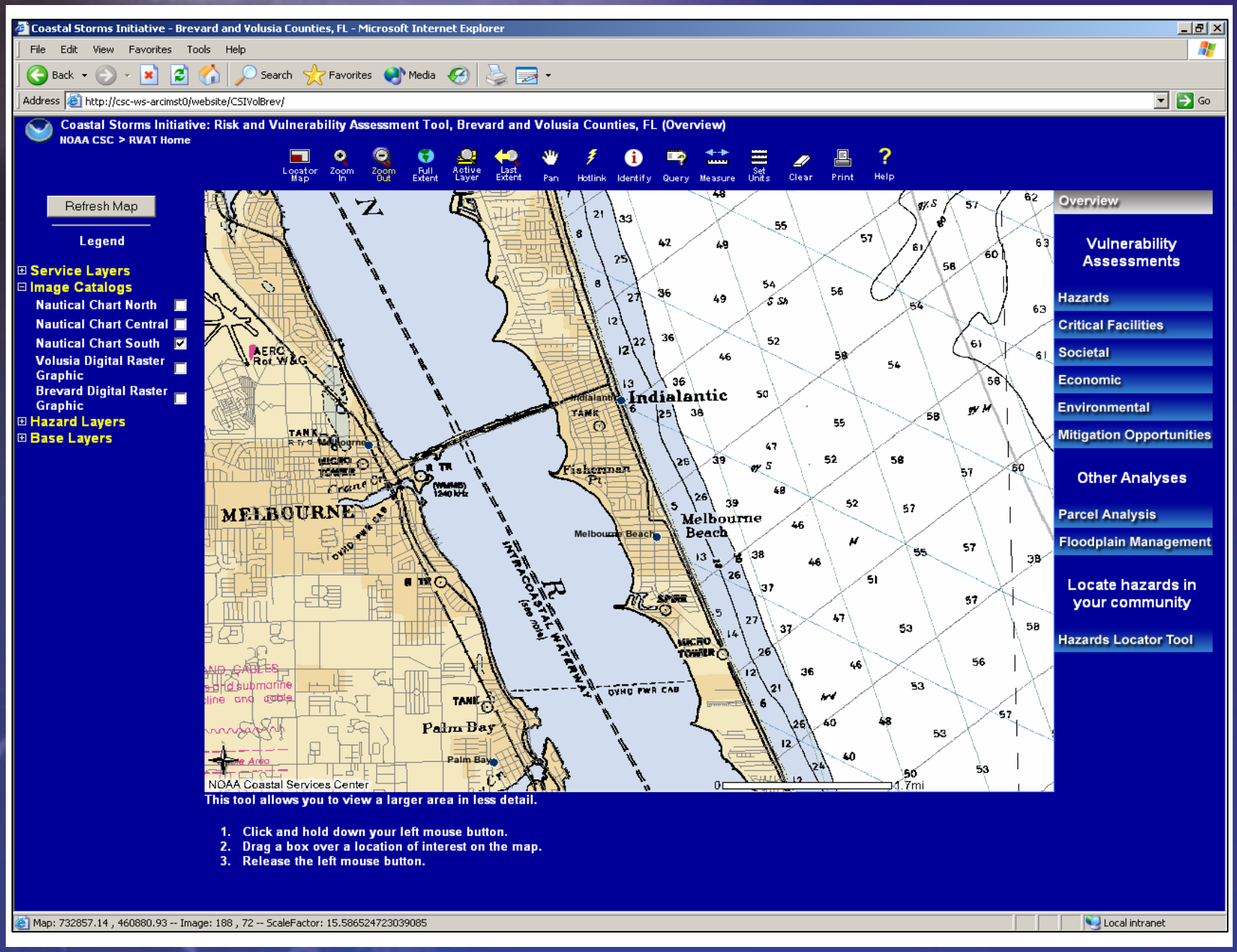


Instructions

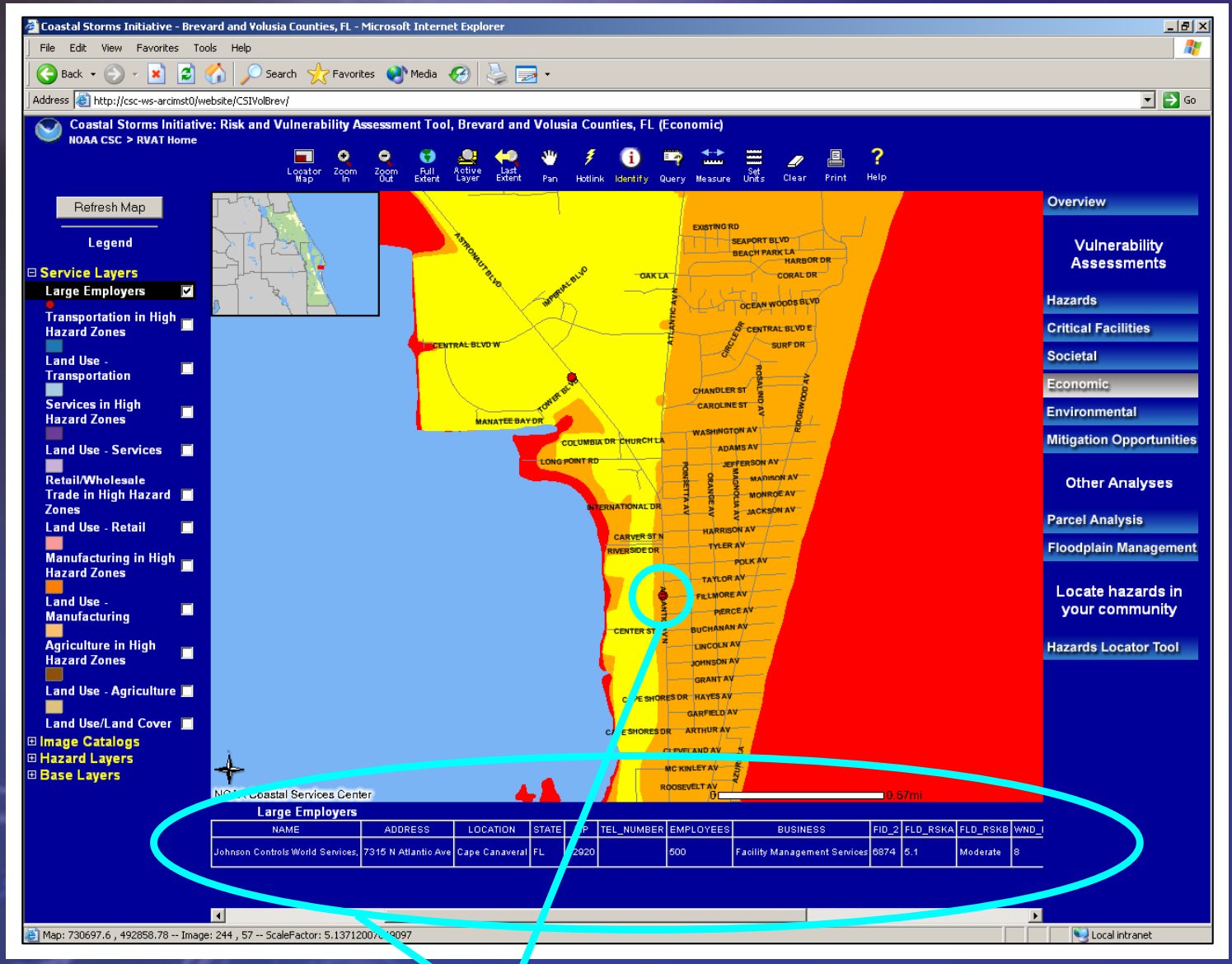
ArcIMS – Imagery Sample, 1m 1999-2000 DOQQs



ArcIMS – Imagery Sample, NOAA Nautical Chart

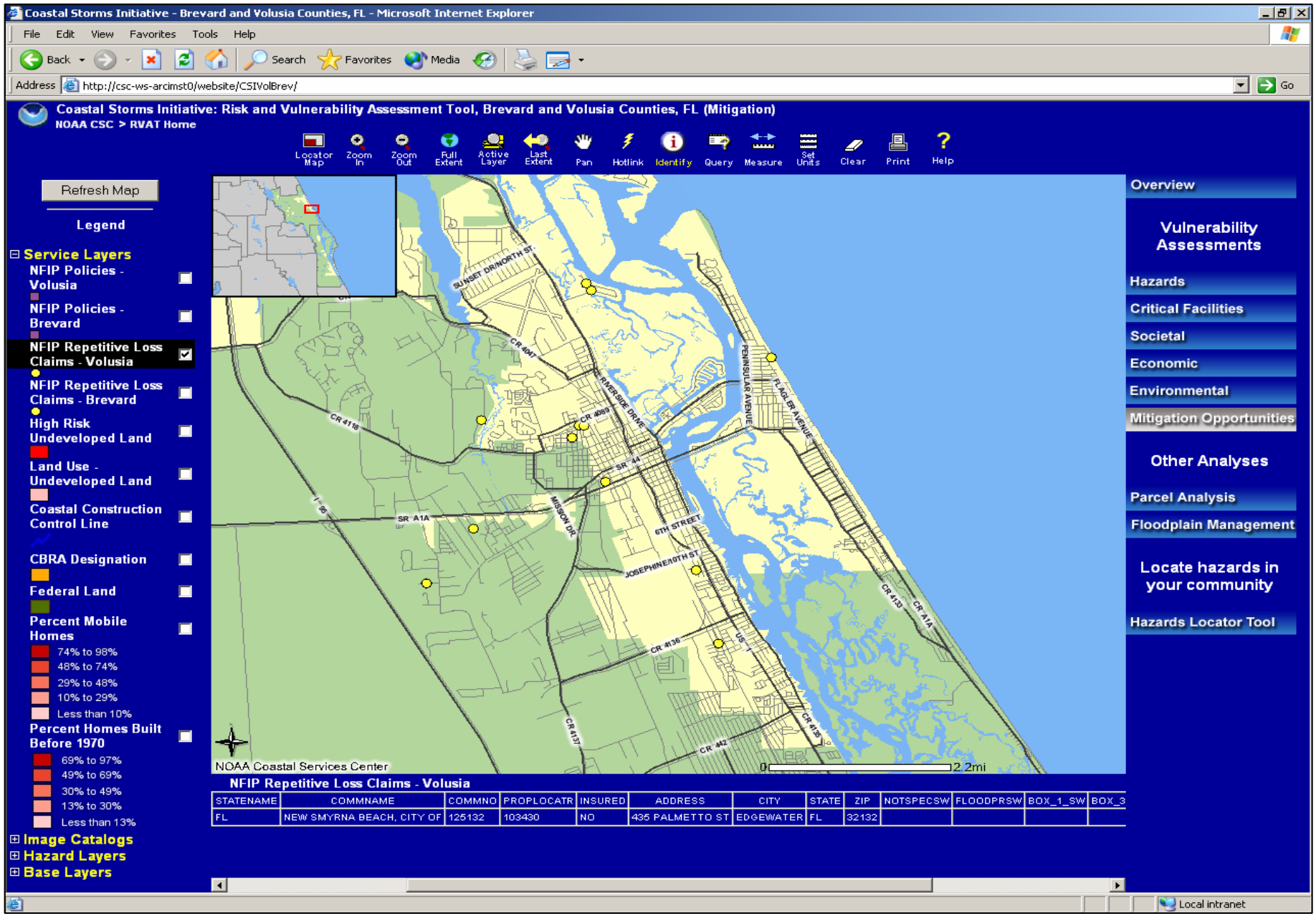


ArcIMS – Economic Vulnerability Assessment

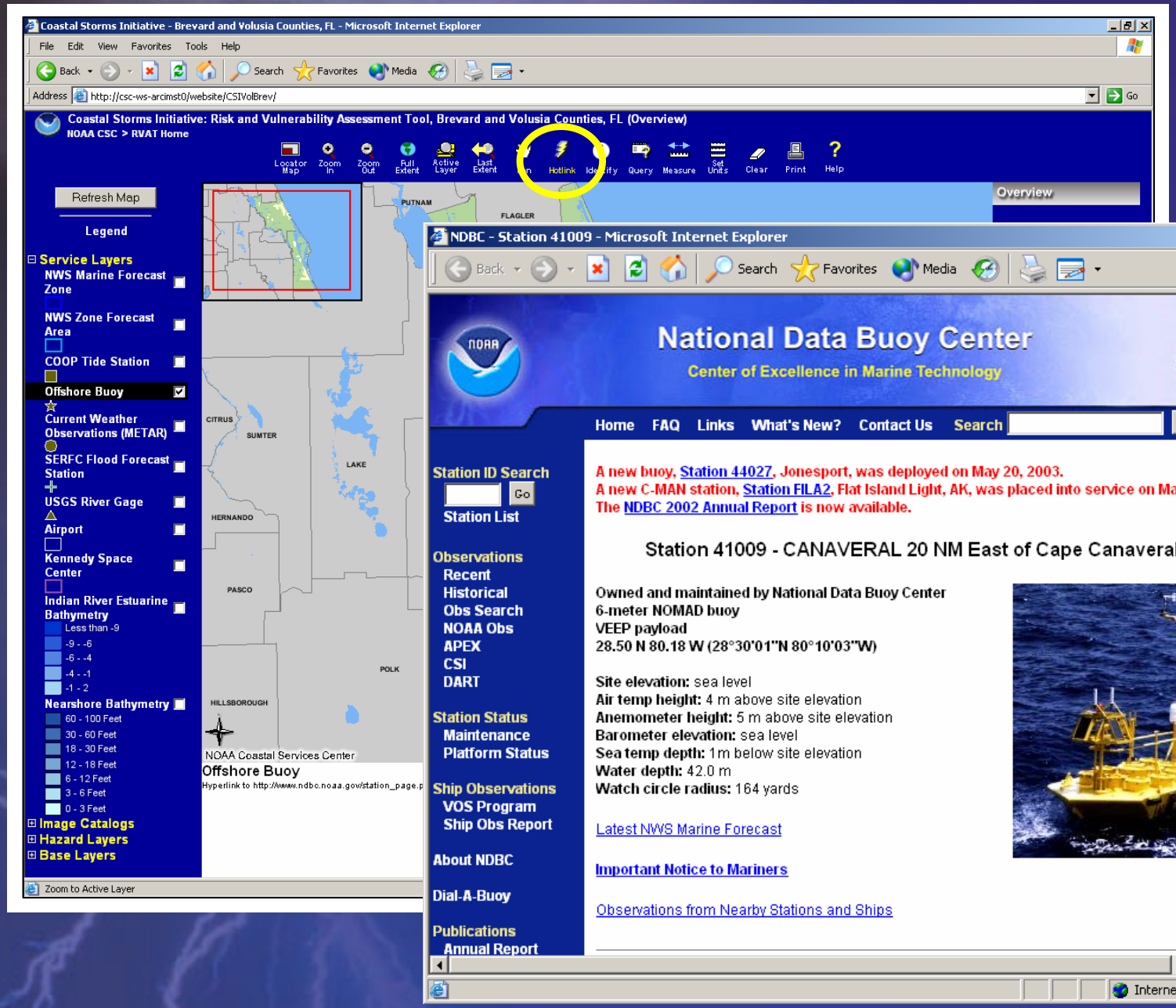


Information about hazardous location

ArcIMS – Repetitive Loss Structures

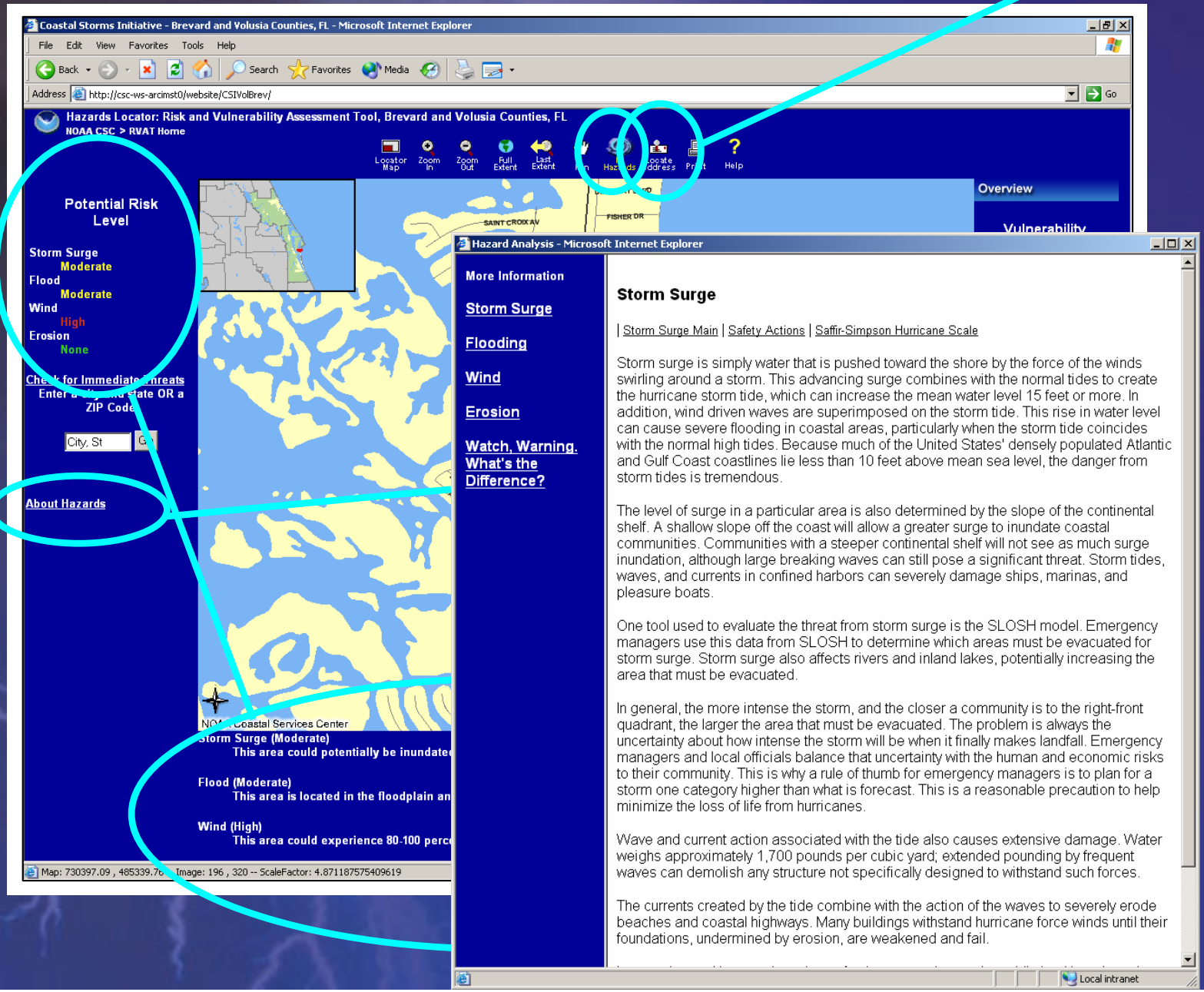


ArcIMS - Hotlinks



ArcIMS – “Hazard Locator”

Address locator tool



Benefits

Local officials, emergency managers, coastal zone managers, and the general public can use the tools to identify potential risks and vulnerabilities to coastal storm impacts

- The information can be used to make informed decisions to lessen disaster impacts – hazard mitigation

- Develop effective response & recovery plans – debris management plans, temporary housing plans, etc.

- Use information in real-time to enhance response and recovery activities – target search and rescue efforts, enhanced evacuations, etc.

Florida Pilot Project 4

Ecological Forecasting of Coastal Storm Impacts on Marine Resources

Erica Boyce and Tom Siewicki
NOAA National Ocean Service

Center for Coastal Environmental Health and Biomolecular Research

Coastal Storms Initiative

Project Purposes

- Identify species at risk
- Identify geographic locations at risk
- Focus post-storm ecological assessments
- Assist mitigation planning
- Provide access to available pesticide information
- Promote responsible pesticide use

Project Components

Risk Assessment
- Landuses
- Toxicology
- Database

Modeling
- Transport and Fate
- Volusia and Brevard Counties

Toxicology
- Indigenous Species
- Developmental Model

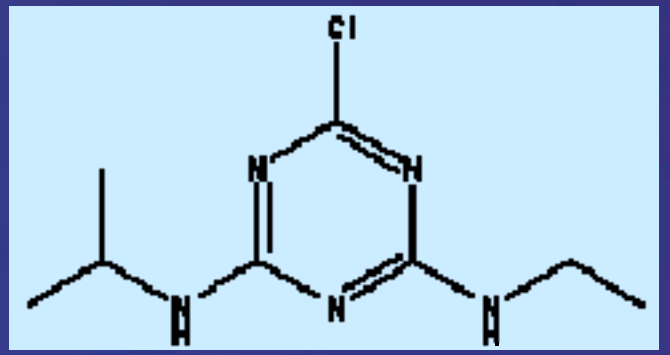
Fact Sheets

Source: www.sjrwmd.org

Pesticide Database

Crop Information

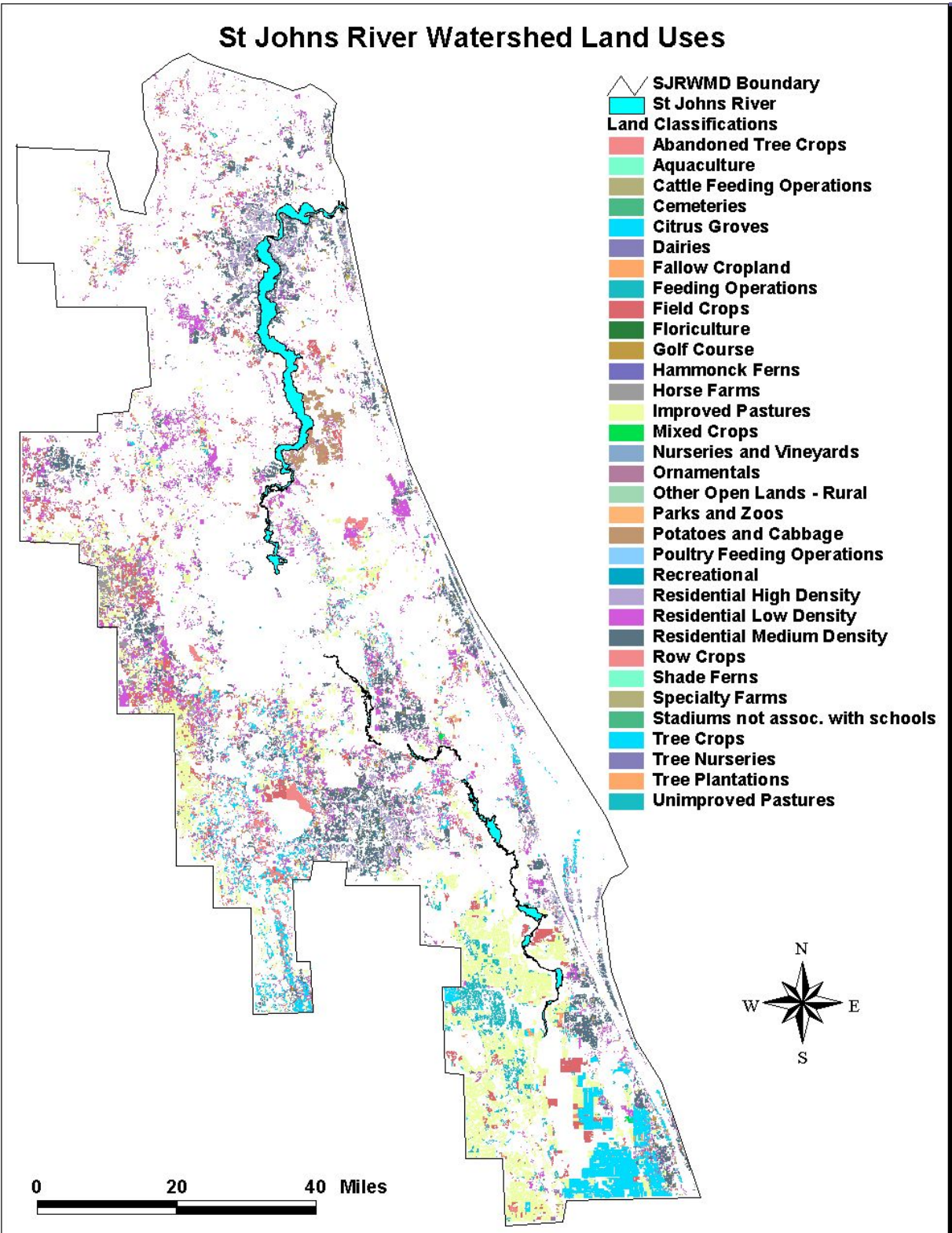
- Acreage of Each Crop per County
- Pounds of Active Ingredient per Crop Year Applied to Each Crop



Pesticide Information

- Chemistry
- Toxicity
- Allowable Land Cover for Application

Web Accessibility

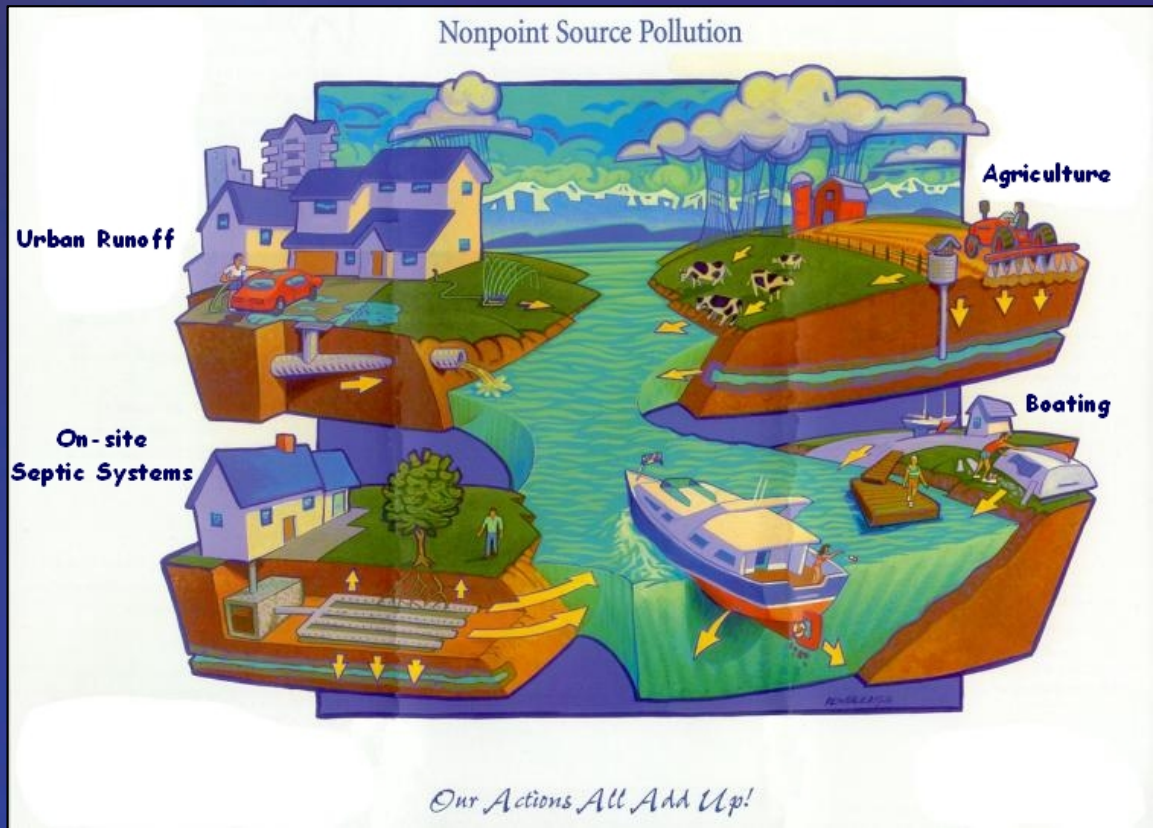


Land Cover Data

Coastal Storms Initiative

Transport and Fate Modeling

- Atrazine, Fipronil and Imidacloprid
- PRZM-3 (Pesticide Root Zone Model)
  - EPA Tier 2
  - Groundwater
  - Effects of Rain, Application, Transpiration, etc.
  - Hydrology and Chemical Transport



Transport and Fate Modeling

EXAMS-II (Exposure Analysis Modeling System)

- EPA Tier 2
- Surface Water
- Effects of Sorption, Biodegradation, Photolysis, etc.
- Uses Output of PRZM
- Predicted Concentrations Compared to Aquatic Animal and Human Health Levels of Concern

Technical Fact Sheet

General information about the pesticide

Chemistry

Map of potential application sites

Toxicology

PESTICIDE FACT SHEET
ST. JOHNS RIVER

THE COASTAL STORMS INITIATIVE — ATRAZINE

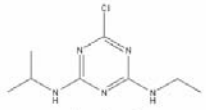
ATRAZINE

General Atrazine Information

Atrazine is an herbicide commonly used in the control of broadleaf and grassy weeds in corn, sorghum, rangeland, sugarcane, macadamia orchards, pineapple, and turf grass sod. Atrazine can be used as a non-selective herbicide for vegetation control on non-crop land[4]. Other facts about atrazine are listed below.

- It is the most heavily used pesticide in the United States.
- Atrazine frequently contaminates both surface and ground water.
- It is highly mobile during storms.
- Atrazine resists degradation.
- It disrupts primary productivity and aquatic insects.
- Atrazine has secondary effects on fish and shellfish.

Chemistry of Atrazine



Atrazine[1]

- CAS Number[1]: 1912-24-9
- Chemical Formula[1]: $C^8H^{14}ClN^5$
- Molecular Weight[1]: 215.6851
- Melting Point[4]: 171-174 °C
- Density[4]: 1.187g/cm^3 at 20 °C
- Log Kow:
- Koc:
- Solubility[2]: In water, 33 ppm at 25 °C

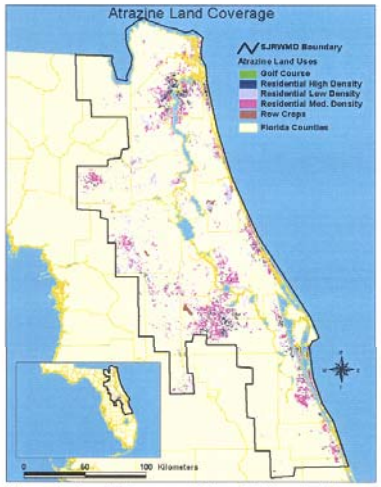


Figure 1 - Land Coverage of Potential Atrazine Use

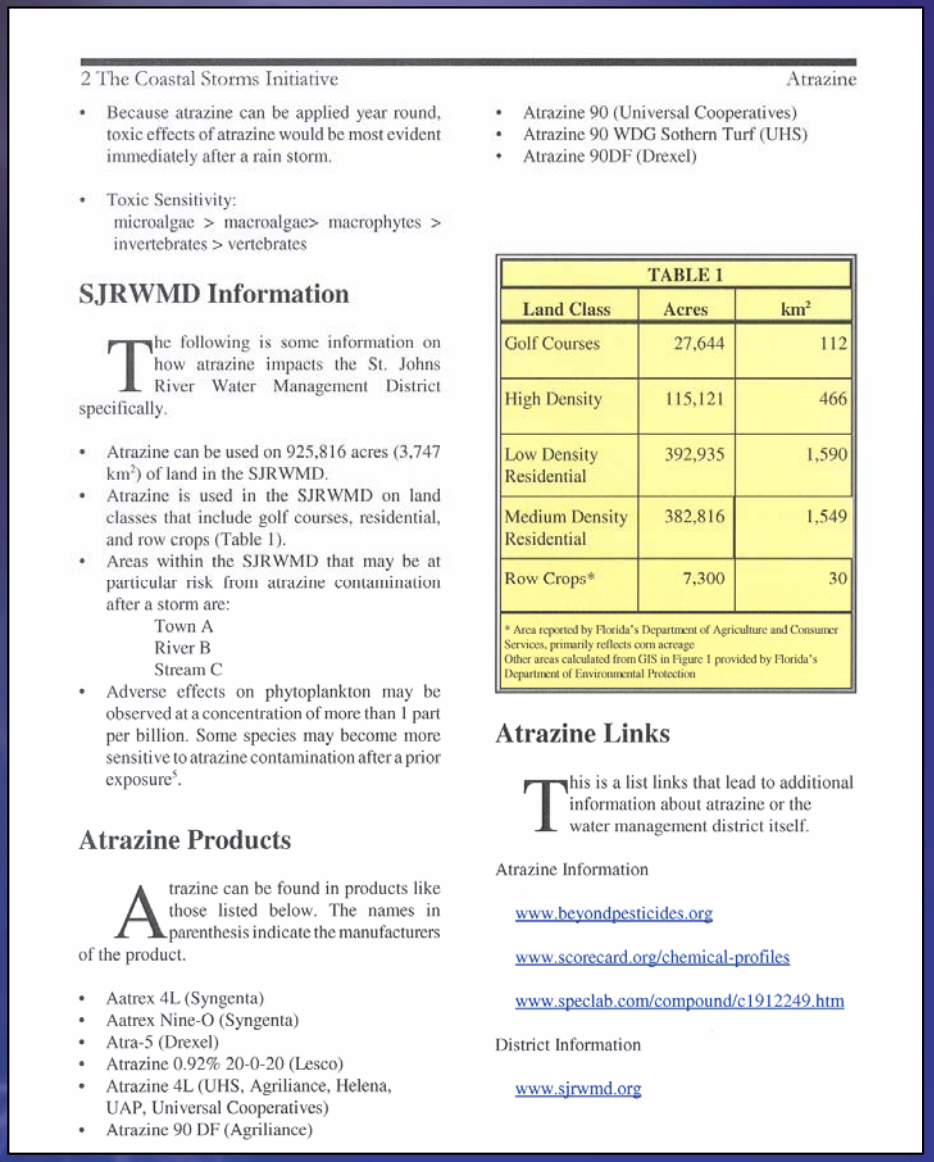
- Half Life:
- Atrazine is moderately to highly mobile in soils, especially where soils have low clay or organic matter content. Because it does not absorb strongly to soil particles and it has a lengthy soil half-life, it is expected to have a high potential for groundwater contamination, even though it is only moderately soluble in water[3].

Toxicology of Atrazine

- Data has suggested atrazine is an endocrine disruptor for some amphibians an crustaceans at environmentally possible levels[5].

Technical Fact Sheet

- District Information
- Common products with that pesticide



- Because atrazine can be applied year round, toxic effects of atrazine would be most evident immediately after a rain storm.
- Toxic Sensitivity: microalgae > macroalgae> macrophytes > invertebrates > vertebrates

SJRWMD Information

The following is some information on how atrazine impacts the St. Johns River Water Management District specifically.

- Atrazine can be used on 925,816 acres (3,747 km^2) of land in the SJRWMD.
- Atrazine is used in the SJRWMD on land classes that include golf courses, residential, and row crops (Table 1).
- Areas within the SJRWMD that may be at particular risk from atrazine contamination after a storm are:
  - Town A
  - River B
  - Stream C
- Adverse effects on phytoplankton may be observed at a concentration of more than 1 part per billion. Some species may become more sensitive to atrazine contamination after a prior exposure[5].

Atrazine Products

Atrazine can be found in products like those listed below. The names in parenthesis indicate the manufacturers of the product.

- Aatrex 4L (Syngenta)
- Aatrex Nine-O (Syngenta)
- Atra-5 (Drexel)
- Atrazine 0.92% 20-0-20 (Lesco)
- Atrazine 4L (UHS, Agriliance, Helena, UAP, Universal Cooperatives)
- Atrazine 90 DF (Agriliance)
- Atrazine 90 (Universal Cooperatives)
- Atrazine 90 WDG Sothern Turf (UHS)
- Atrazine 90DF (Drexel)

TABLE 1

Land Class	Acres	km^2
Golf Courses	27,644	112
High Density	115,121	466
Low Density Residential	392,935	1,590
Medium Density Residential	382,816	1,549
Row Crops*	7,300	30

* Area reported by Florida's Department of Agriculture and Consumer Services, primarily reflects corn acreage
Other areas calculated from GIS in Figure 1 provided by Florida's Department of Environmental Protection

Atrazine Links

This is a list links that lead to additional information about atrazine or the water management district itself.

Atrazine Information

www.beyondpesticides.org

www.scorecard.org/chemical-profiles

www.speclab.com/compound/c1912249.htm

District Information

www.sjrwmd.org

- Acreage Calculations
- Links for more information

Layperson Fact Sheet

- General information about pesticides
- Information about the specific pesticide

PESTICIDE FACT SHEET
ST. JOHNS RIVER

THE COASTAL STORMS INITIATIVE — ATRAZINE

ATRAZINE

What is a Pesticide?

The Environmental Protection Agency defines a pesticide as any substance or mixture of substances intended for preventing, destroying, repelling, or migrating any pest. This does not refer just to insect pests but to plants, fungi, microorganisms such as bacteria and viruses as well as mice and other animals. Many household products that people commonly use from flea and tick sprays to kitchen disinfectants to swimming pool chemicals are considered pesticides.

What Kind of Pesticide is Atrazine?

Atrazine is an herbicide commonly used in the control of broadleaf and grassy weeds. Other facts about atrazine are listed below.

- It is the most heavily used pesticide in the United States.
- Atrazine frequently contaminates both surface and ground water.
- It is highly mobile during storms.
- Atrazine takes a long time to break down.
- It disrupts primary productivity and aquatic insects.
- Atrazine has secondary effects on fish and shellfish.

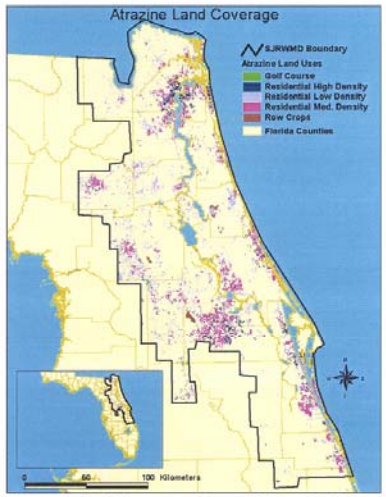


Figure 1 - Land Coverage of Potential Atrazine Use

Where is Atrazine Used in the SJRWMD?

- Atrazine can be used on 952,268 acres (3,854 km^2) of land in the SJRWMD.
- Atrazine is used in the SJRWMD on land that include golf courses, residential lawns, other turf areas, and corn crops (Figure 1).
- Areas within the SJRWMD that may be at particular risk from atrazine contamination after a storm are:
  - Town A
  - River B
  - Stream C

- Map of potential application sites
- District Information

Layperson Fact Sheet

Why should I care?

What can I do to help?

Why Should I Care?

The presence of high levels of atrazine in ground and surface water can lead to the following effects in the surrounding ecosystem.

- The algae and aquatic insects that are harmed by the atrazine serve as the food for larger organisms such as shellfish and fish. If their food is gone, they too may die.
- Because I said so?

What Can I Do to Help?

Anytime you use pesticides, there are things you can do to minimize the harmful effects the pesticide may have on your household and the environment around you.

- Only use a product for its intended purpose. Just because it eliminated one pest does not mean it remove another.
- Always use the amount recommended on the label. More does not mean better.
- Manufacturer labels advise users not to apply atrazine to sand and loamy sand soils where the water table (ground water) is close to the surface and where these soils are well-drained. Your local agriculture agencies can provide further information on the type of soil in your area and the location of ground water.
- Atrazine should not be mixed, loaded, or used within 50 feet of wells, including abandoned wells, drainage wells, and sink holes.
- Atrazine may not be applied aerially within 200 feet of natural or impounded lakes and reseviors.
- Do not use outdoor pesticides near sources of water. Allow for a XX feet between your application and the water.

- Unless instructed to by the label, do not apply the pesticide before a predicted rain storm. The rain washes the chemicals into nearby creeks and rivers.

Atrazine Products

Atrazine can be found in products like those listed below. The names in parenthesis indicate the manufacturers of the product.

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Pesticide Information

www.epa.gov/pesticides/about/

Atrazine Information

www.beyondpesticides.org

www.scorecard.org/chemical-profiles

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District Information

www.sjrwmd.org

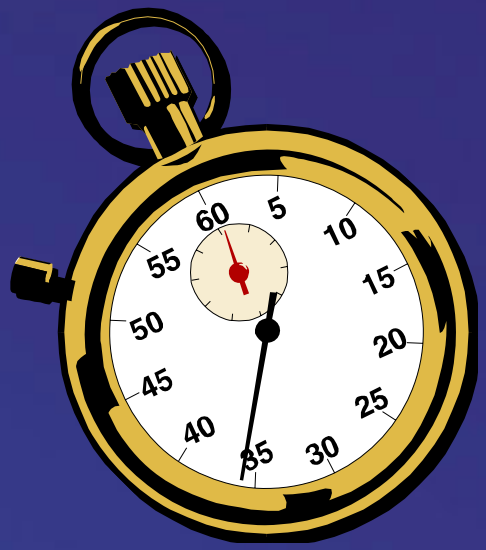
Common products with that pesticide

Links for more information

Project Progress

Risk Assessment and Toxicology

- Bulk of data collection completed Fall 2002
- Online database construction began Spring 2003
- Acute toxicity tests are ongoing



Modeling

- Preliminary results achieved Spring 2003
- Further development is currently ongoing

Fact Sheets

- Preliminary template created Winter 2003
- Feedback evaluation is currently ongoing

Total Project

- Proposed date of completion is Summer 2004

Second Pilot Region
Pacific Northwest and Beyond

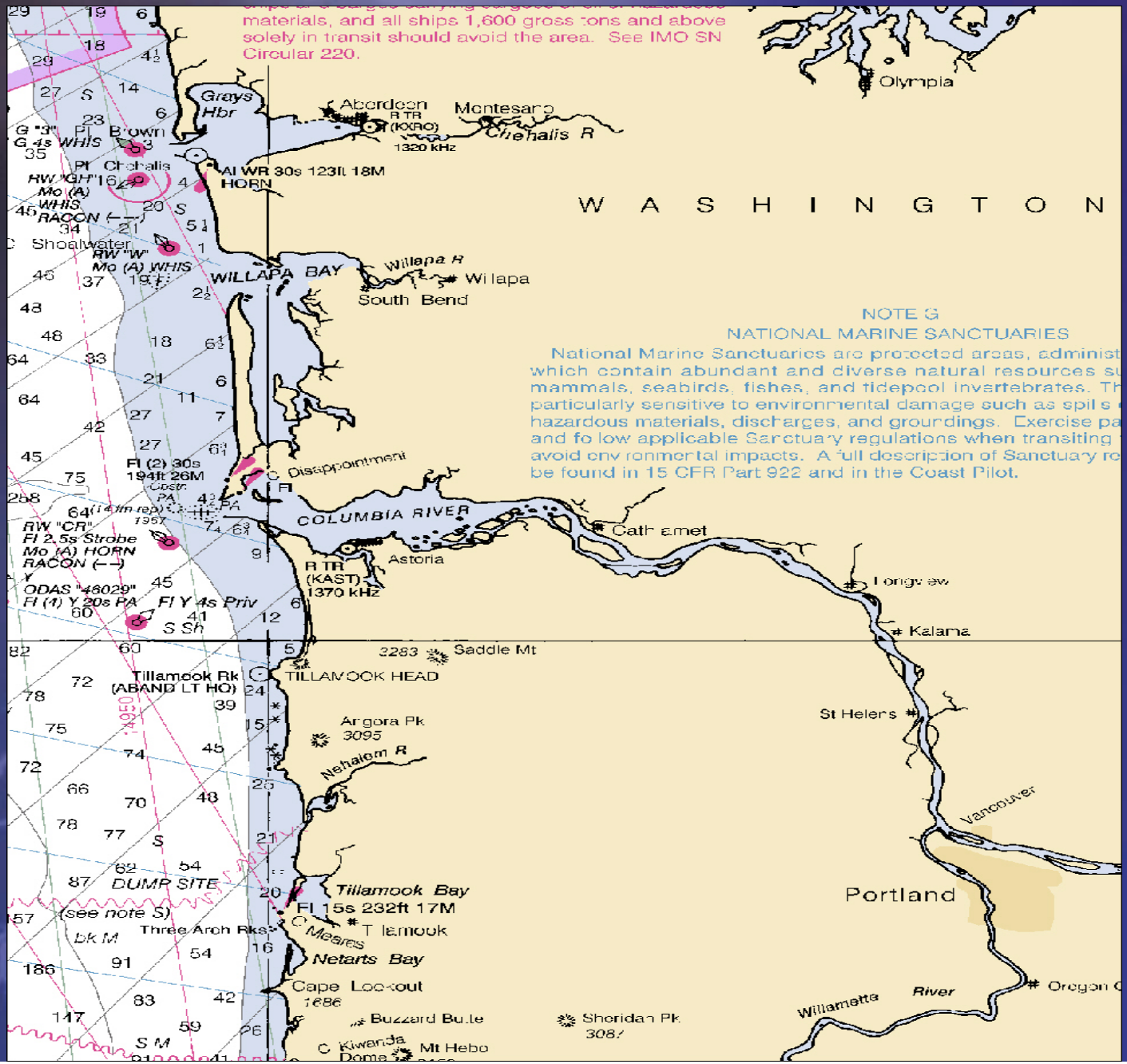
Keelin Kuipers
NOAA Office of Ocean & Coastal Resource Management / Coastal Services Center

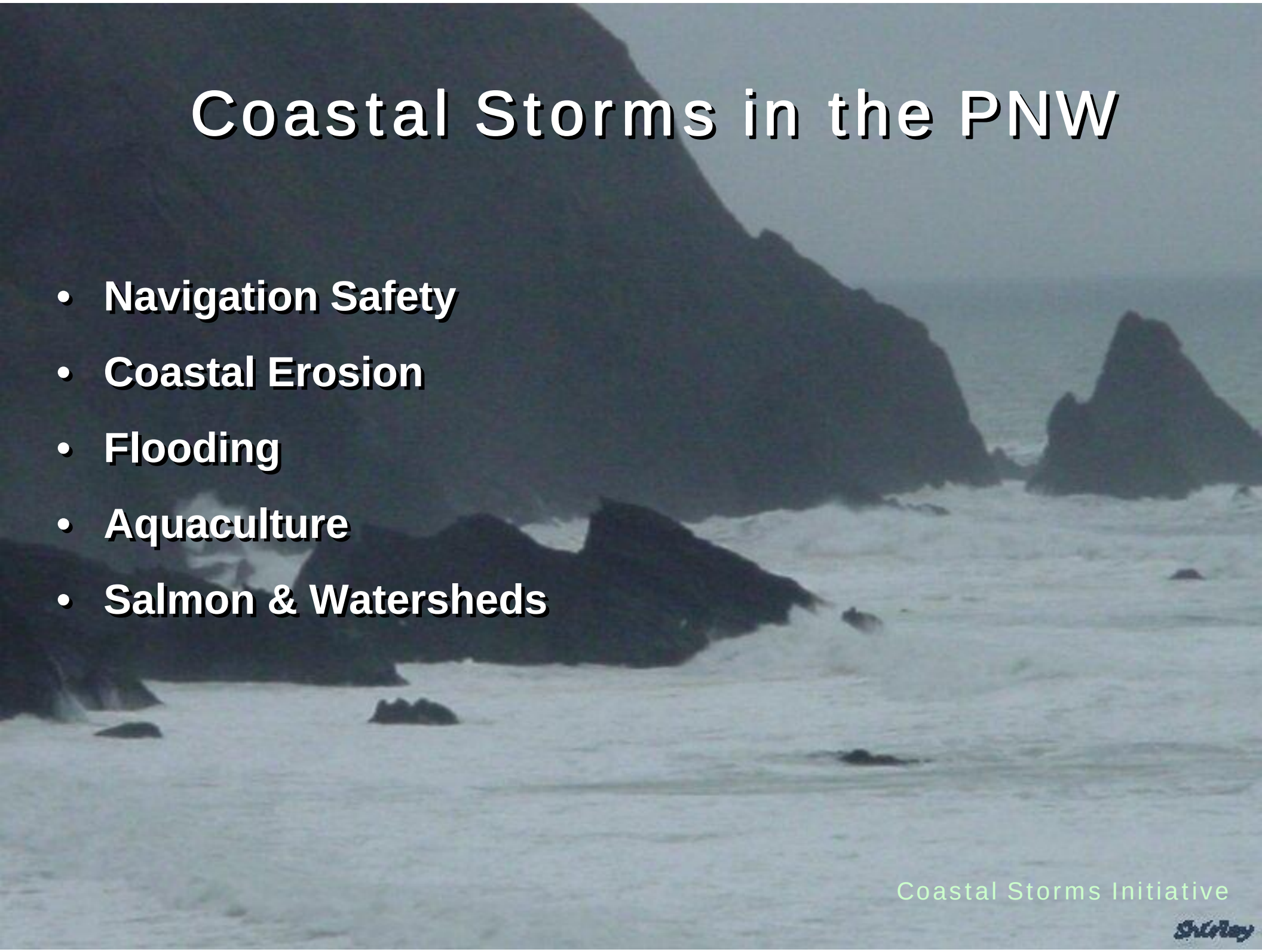
Coastal Storms Initiative

Next Steps

- Pacific Northwest pilot underway
- Southern California pilot anticipated in FY05
- Expansion within pilot regions planned

Pacific Northwest Pilot





Coastal Storms in the PNW

- **Navigation Safety**
- **Coastal Erosion**
- **Flooding**
- **Aquaculture**
- **Salmon & Watersheds**

Pacific Northwest Pilot Issues

Navigation Safety

- Port of Portland and 14 small ports in the pilot area
- Fishing and commercial shipping important
- Accurate storm forecasting needed
- Treacherous bar conditions a hazard

Pacific Northwest Pilot Issues

Coastal Erosion

- Coastal storms a major factor
- Erosion hotspots
- El Nino impact
- Storm wave height is increasing

Pacific Northwest Pilot Issues

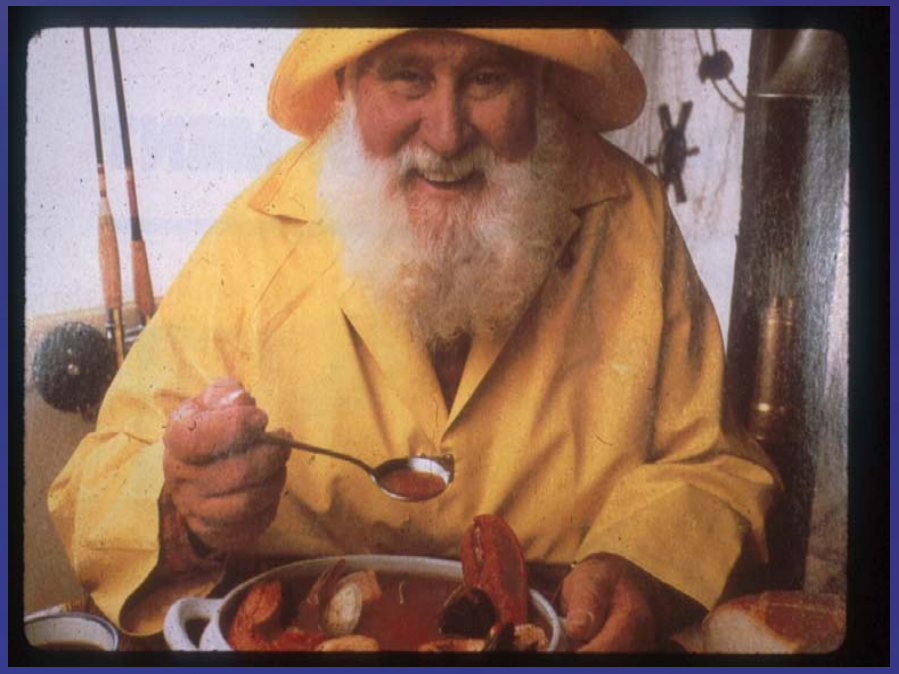
Flooding

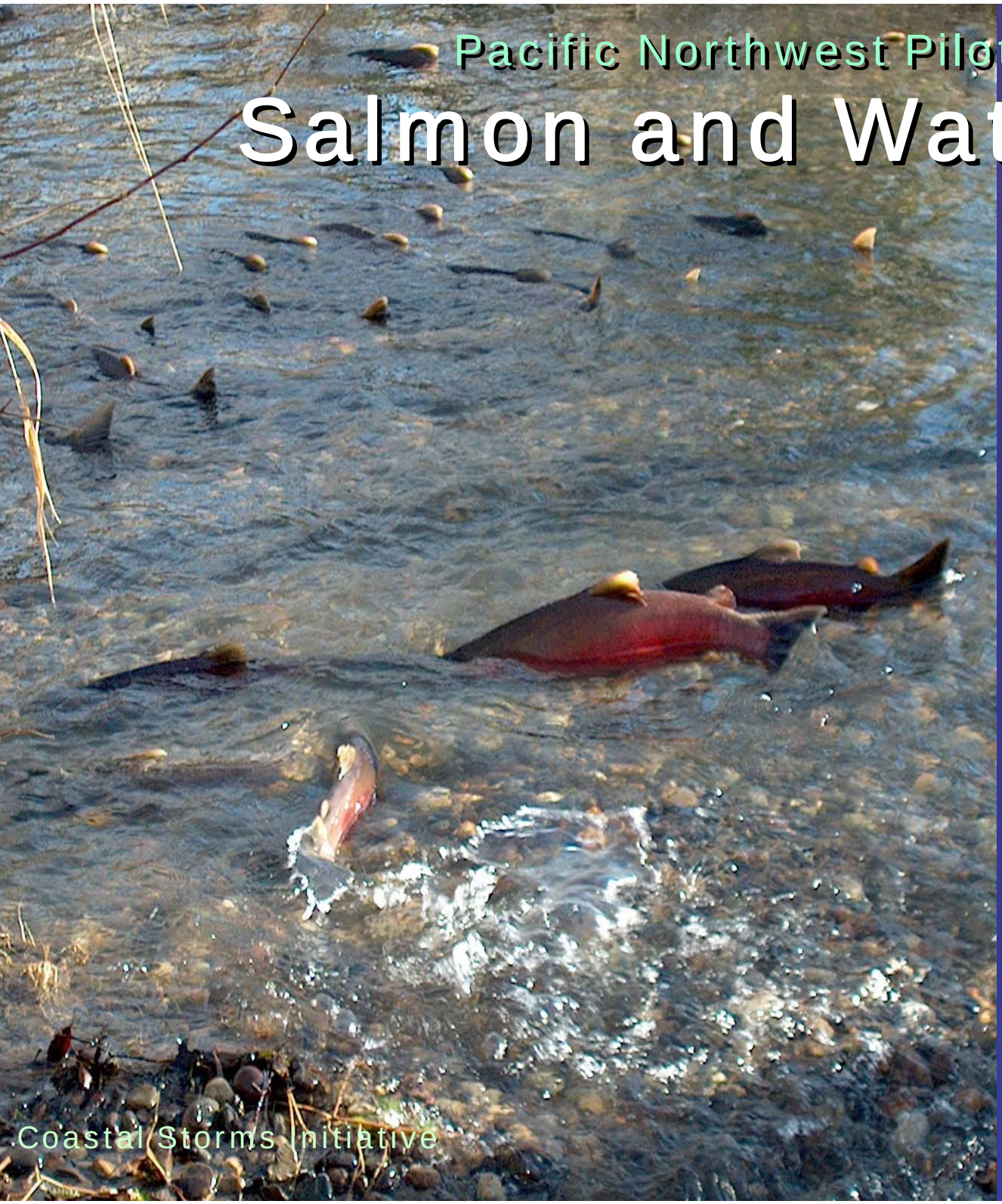
- Can be a major storm issue
- Impacts to lives, property, & businesses
- Tillamook County, Oregon particularly vulnerable

Pacific Northwest Pilot Issues

Aquaculture

- **Major industry in Washington and Oregon**
- **Stormwater runoff impacts**
- **Wind, wave & sediment impacts**





Pacific Northwest Pilot Issues

Salmon and Watersheds

- Storms a double edged sword
- Storms critical for recharging coastal rivers, but…
- runoff, sediment and contaminant impacts can harm salmon

Status of Pacific Northwest Pilot

- Currently working closely with federal, state and local partners
- Fall Roundtable Meeting- October 2003
- Pilot will be fully implemented in FY 2004

Pacific Northwest Partners

- National Oceanic and Atmospheric Administration
- Oregon Sea Grant
- Washington Sea Grant
- Oregon Coastal Management Program
- Washington Coastal Management Program
- Currently identifying other partners

Next Steps...

Southern California Pilot

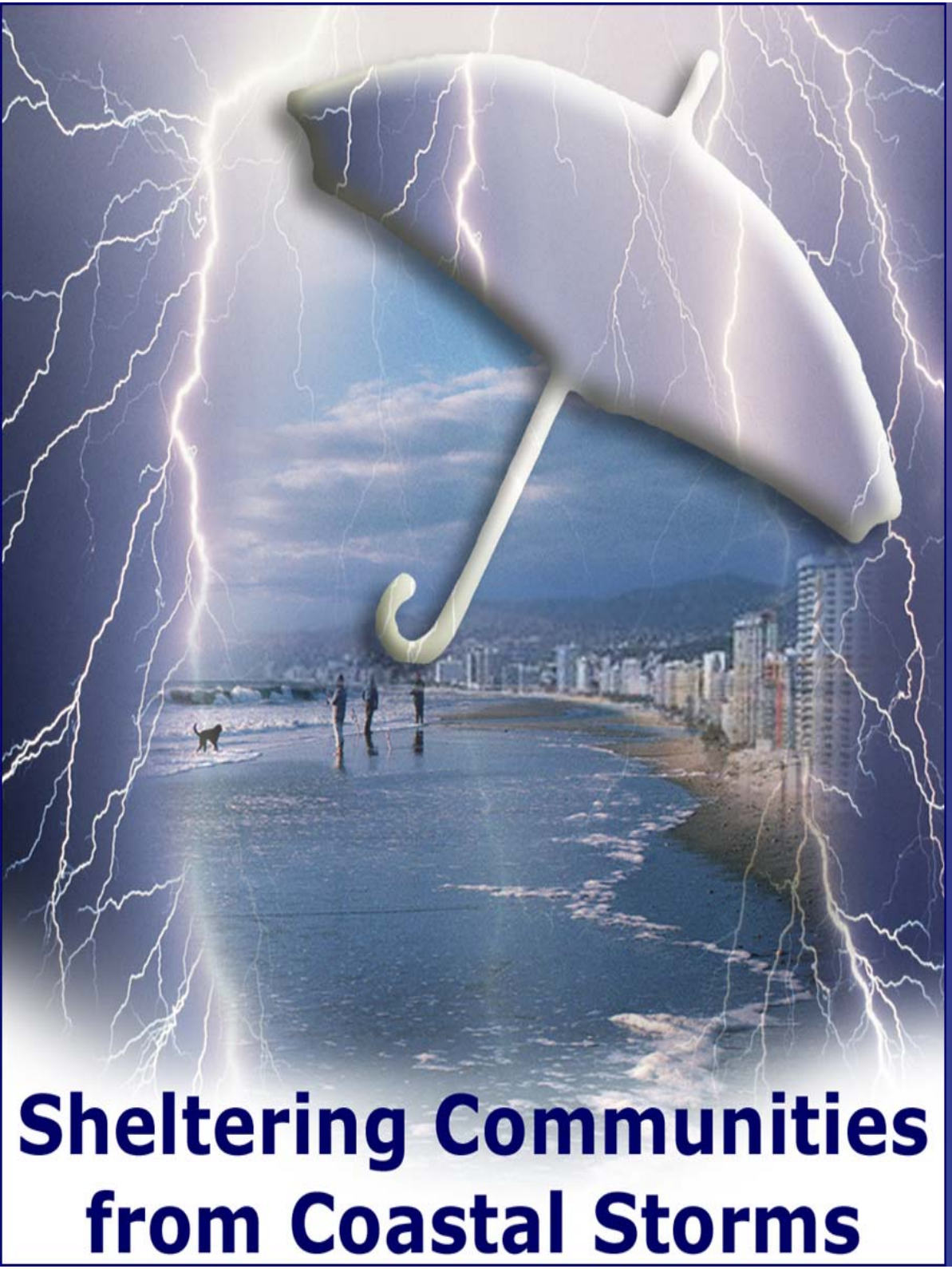
- Early planning in FY 2004
- Implementation anticipated in FY 2005

Regional Expansion

- Exploring opportunities to expand within pilot regions

For more information
on the Coastal Storms Initiative
and for contact information
check your packet.

You may also visit our web site at
www.csc.noaa.gov/csi



The NOAA Coastal Storms Initiative