

Beyond Data Download:

Gathering Information & Knowledge
using Web Based Data Analysis and Visualization Tools
from NOAA's National Status & Trends Program

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NOAA's National Status and Trends Data

- **Mussel Watch Project – since 1986**
 - the longest continuous contaminant monitoring program in U.S. coastal waters
 - chemical and biological contaminant trends in sediment and bivalve tissue
- **Bioeffects Assessment – since 1986**
 - identifies and assesses biological effects associated with contaminant exposure
 - 30 intensive regional studies, using the Sediment Quality Triad approach
 - sediment, tissue, and water chemistry for 80+ organic and inorganic contaminants; toxicity bioassays; biomarker assays; histopathology; and benthic community assessment.
- **Benthic Surveillance Project – 1984 to 1993**
 - chemical and biological contaminant trends in sediment and fish tissue
 - sediment, fish liver and fish bile chemistry for 100+ organic and inorganic contaminants, and associated diseases in the fish livers.

Are your customers looking for *Data, Information, or Knowledge?*

- *Information* comes from data analysis.
 - *Knowledge* comes from the right quantity and quality of information.
-

NS&T Data Portal users can produce Information from Data using web based analysis and visualization tools. For example:

- Visual Analysis: e.g., mapping and graphing
- Numerical Analysis: e.g., statistics



Downloading data can be one way to begin the process of data analysis but

Are you really sure you need to download the data?

- Some databases are large and getting larger.
- Downloading can take time (bandwidth).
- Some databases are updated frequently.
- Large effort to understand the structure of downloaded data before analysis can begin.

If you must download data ...
 limit what you download to your specific needs.

Example 1: Data access, with data query & download

The screenshot shows a 'Where Clause Builder' window with a funnel icon and a lightbulb icon. The funnel icon is connected to a box containing the query: `st_abbr = 'NJ'`. This is followed by an 'AND' connector, a box containing `matrix = 'SED'`, another 'AND' connector, and a final box containing `analyte = 'CU'`. The lightbulb icon has a text box that says 'Drag and drop filters to arrange them.' Below the funnel icon is a 'Java Applet Window'.

Below the 'Where Clause Builder' window is a data table with the following columns: `nst_site`, `year`, `matrix`, `analyte`, `conc1`, and `units`. The table contains 14 rows of data:

	<code>nst_site</code>	<code>year</code>	<code>matrix</code>	<code>analyte</code>	<code>conc1</code>	<code>units</code>
6484	AIAC	1991	SED	CU	8.0333333333	ug/g dry weight
39262	BIBL	1991	SED	CU	18.666666667	ug/g dry weight
36193	BIBL	1996	SED	CU	5.8	ug/g dry weight
82311	DBAP	1986	SED	CU	17.333333333	ug/g dry weight
82444	DBAP	1987	SED	CU	20.5	ug/g dry weight
83112	DBAP	1996	SED	CU	8.1	ug/g dry weight
93898	DBBD	1987	SED	CU	15.333333333	ug/g dry weight
94330	DBBD	1996	SED	CU	11	ug/g dry weight
87998	DBCM	1989	SED	CU	18.266666667	ug/g dry weight
88386	DBCM	1996	SED	CU	16	ug/g dry weight
98898	DBFE	1987	SED	CU	12.866666667	ug/g dry weight
98911	DBFE	1996	SED	CU	11	ug/g dry weight

Below the table is a 'Subset Table' button. Below that is a 'Select Variables' button. Below that is a list of variables: `matrix`, `spec_cd`, `analyte`, `conc1`, and `units`. Below the list is a 'Submit' button, an 'Export to Excel' button, and a '>>Go' button.

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Example 2: Data access, query and download from a map

NS&T Data Access Mapping Tool

NS&T Data

- Sites
 - MW Sites
 - MW Chemistry
 - BS Sites
 - BS Chemistry
- Base Layers
 - States
 - Counties
 - USGS HUCs
 - NOAA Watersheds
 - Estuarine Drainage Area
 - Fluvial Drainage Area
 - Interior Drainage Area
 - Coastal Zone
 - Cities
 - Urban Areas
 - Water Bodies
 - Rivers and Streams

Refresh Map
 Auto Refresh

Help:

- A closed group, click to open.
- An open group, click to close.
- A hidden group/layer, click to make visible.
- A visible group/layer, click to hide.
- A visible layer, but not at this scale.
- An inactive layer, click to make active.
- The active layer.

Select then export

US Department of Commerce > NOAA > NOS > SIOC

Beyond Data Download:

**Examples of Web Tools
for data visualization and analysis**

Suppose a Mussel Watch data user wants to view temporal trends in the mean copper (Cu) levels of the Tampa Bay Watershed relative to the mean level in for the entire state of Florida.

Trends Comparison State vs Watershed for Copper (Cu) (CU) concentration (ug/g dry weight)



Study Area Comparison Tool



State of FL

Tampa Bay Watershed

Selection A		
State Name	Year	Concentration
Florida	1986	100
Florida	1987	91
Florida	1988	136
Florida	1989	140
Florida	1990	150
Florida	1991	158
Florida	1992	184
Florida	1993	147
Florida	1994	459
Florida	1995	241
Florida	1996	137
Florida	1997	292
Florida	1998	241
Florida	1999	292
Florida	2000	292
Florida	2001	292

Selection B		
Sub-Watershed Name	Year	Concentration
Tampa Bay	1986	71
Tampa Bay	1987	62
Tampa Bay	1988	98
Tampa Bay	1989	97
Tampa Bay	1990	102
Tampa Bay	1991	153
Tampa Bay	1992	149
Tampa Bay	1993	91
Tampa Bay	1994	82
Tampa Bay	1995	161
Tampa Bay	1996	107
Tampa Bay	1997	130
Tampa Bay	1998	130
Tampa Bay	1999	130
Tampa Bay	2000	130
Tampa Bay	2001	130

Where do Total PAH concentrations in Mussel Watch Tissue exceed the value of 2,500 ng/g dry wt (user selects value).

Home

Program	Analyte	Year	Help on Range	Operator	Enter Value
Mussel Watch	Total PAH	2002	Help on Range	Greater Than	2500

Query

Avg. conc. of Total PAH (ng/g dry weight) in 2002			
NST_SITE	GEN_LOCA	SPEC_LOC	Conc
HRLB	Hudson/Raritan Estuary	Lower Bay	6722.6
EBFR	Elliott Bay	Four-Mile Rock	5013.9
PSSS	Puget Sound	South Seattle	4581.1
HRRB	Hudson/Raritan Estuary	Raritan Bay	3490.1
SPFP	San Pedro Harbor	Fishing Pier	3404.7
LIHR	Long Island Sound	Housatonic River	3152.1
PSPT	Puget Sound	Port Townsend	2780.2
MSBB	Mississippi Sound	Biloxi Bay	2738
LINH	Long Island Sound	New Haven	2615.5
NBPI	Narragansett Bay	Patience Island	2581.7

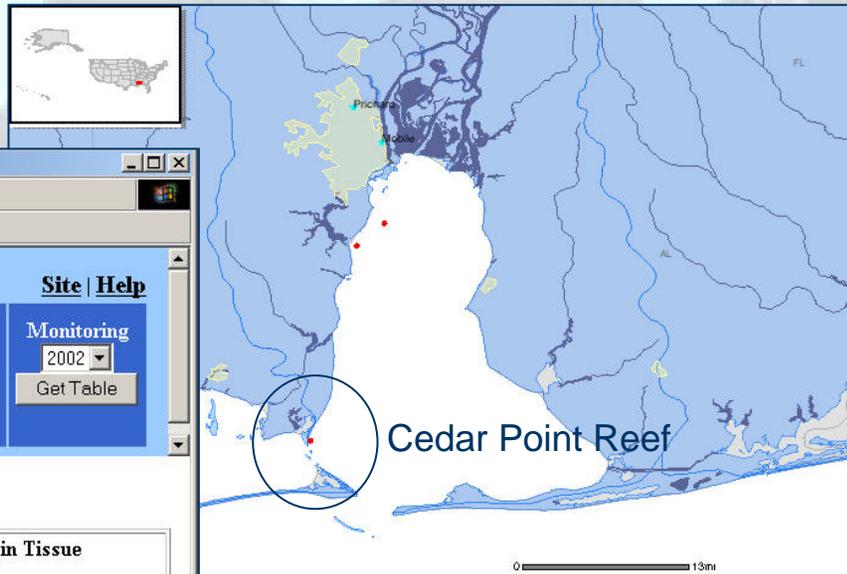
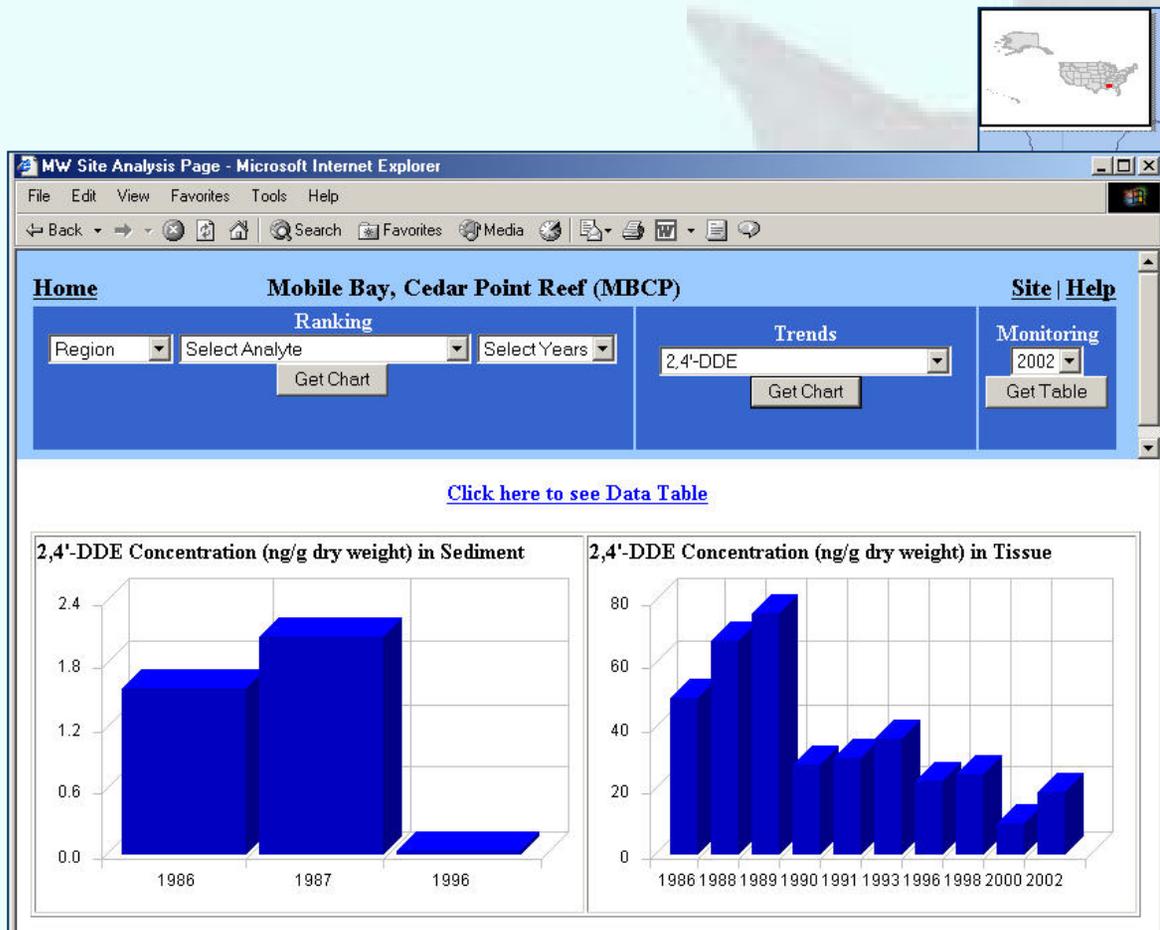
NS&T Mussel Watch

7	NBPI	Narragansett Bay	Patience Island	RI
8	PSPT	Puget Sound	Port Townsend	WA
9	PSSS	Puget Sound	South Seattle	WA
10	SPFP	San Pedro Harbor	Fishing Pier	CA

[Zoom to these records](#)

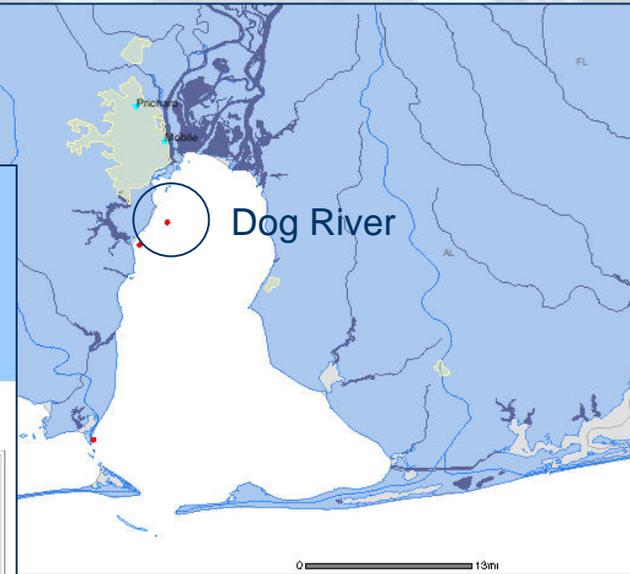
Analyte Conditional Search Tool

I live in the Mobile Bay Watershed of Alabama. What are the temporal trends of DDE in sediment and tissue in my area?



Site Profile Tool
 (Temporal Trends)

I live in the Mobile Bay Watershed of Alabama. How do Total DDT level in sediment and tissue compare?



Home **Mobile Bay, Dog River (MBDR)** [Site](#) [Help](#)

Ranking

Watershed: Total DDT All Years

Trends

%_Lipid

Monitoring

2002

[Click here to see Site Names](#) or [Click here to see Data Table](#)

Total DDT avg. Conc. (ng/g dry weight) in Sediment

The MBDR ranks 1 out of 3 sites monitored for Total DDT in the Mobile Bay Watershed.
 Average Concentration of Total DDT for site MBDR is 11.58 (ng/g dry weight)

Total DDT avg. Conc. (ng/g dry weight) in Tissue

The MBDR ranks 2 out of 3 sites monitored for Total DDT in the Mobile Bay Watershed.
 Average Concentration of Total DDT for site MBDR is 264.55 (ng/g dry weight)

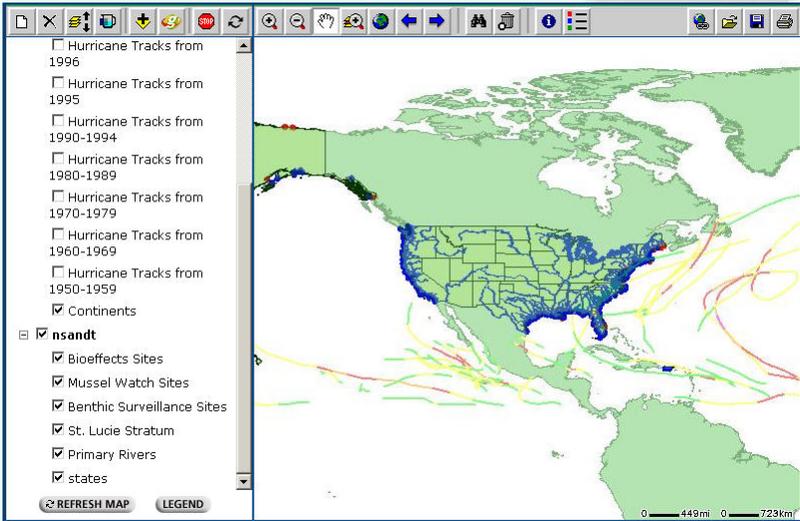
Site Profile Tool (Ranking)

Create maps using geographic data published on the web.

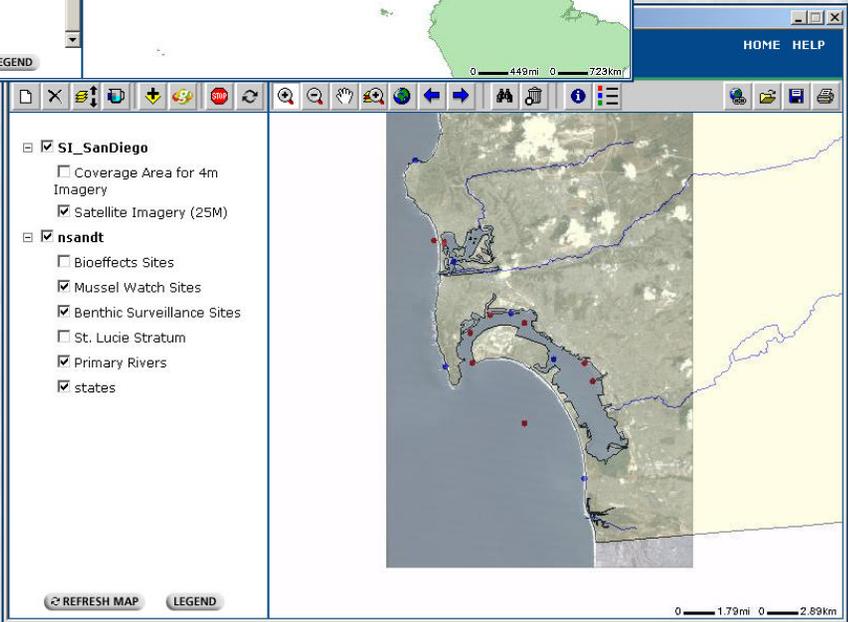
MAP LEGEND

hurricanetracks

	Depression (TD)		Hurricane Category 2
	Tropical Storm (TS)		Hurricane Category 3
	Hurricane Category 1 (continued)		Hurricane Category 4
			Hurricane Category 5
			Continents



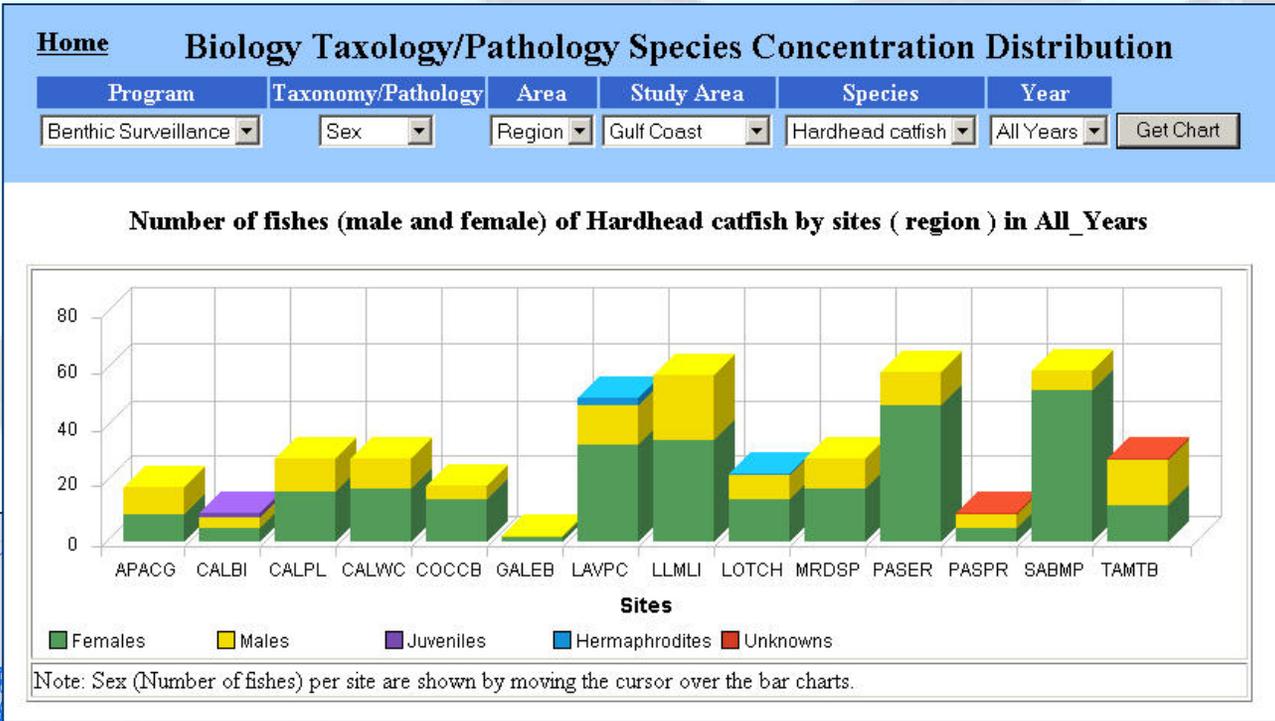
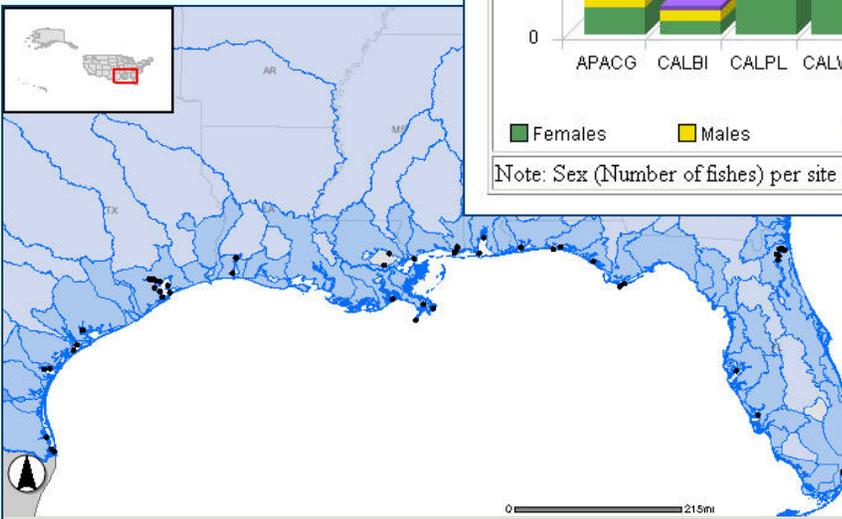
Such maps may provide a useful means to interpret water quality data



[Movie](#)

What was the sex distribution of hardhead catfish collected along the Gulf Coast for NOAA's Benthic Surveillance Project?

Taxonomy & Pathology Tool



Some Data Present Unique Challenges (i.e., opportunities) to Develop New Tools.

- e.g., NOAA's intensive estuary studies (similar to EMAP) based on the Sediment Quality Triad (SQT) approach.
- Data include contaminants; toxicity bioassays; biomarker assays; histopathology; and benthic community assessment.
- Data analysis tools are being design that will:
 - Perform selected statistical analyses
 - Analyze information across data types (SQT) to generate an index value based on all or selected chemical, physical, or biological indicators.

Summary

The NS&T Data Portal is an on going effort to build an enterprise system of automated data management & quality assured data dissemination.

- Management and security of raw data;
- Relational database development and associated metadata;
- Data analysis tools that encourage data use through browsing, analysis and visualization techniques;
- Deliver quality assured data and information products for timely decision making by coastal resource managers.