

Virtual Beach 3.0 Training

Chicago Park District Office

Thursday, March 2, 2017

ELISABETH SCHLAUDT, VIRTUAL BEACH OUTREACH COORDINATOR

SONYA CARLSON, VIRTUAL BEACH OUTREACH EDUCATOR

WISCONSIN SEA GRANT



Workshop Time Frame

8:30 – Breakfast

Let Elisabeth or Sonya know if you can't get Virtual Beach to run on your computer

9:00 - Introductions to Virtual Beach & each other

9:45 - Module I – Model Set-up

11:30 - Lunch on your own

12:30 - Module II-Build and Evaluate a “GBM” model

1:45 - Break

2:00 - Module III Using EnDDaT and making predictions

3:15-4:00 - Additional Assistance/ Feedback

Workshop Objectives

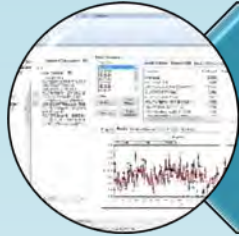
MODULE 1: Learn
the foundation and
benefits of
**predictive
modeling**

MODULE 2: Build
and validate a
GBM model

MODULE 3: Learn
to navigate and
utilize **EnDDaT**



Predictive Modeling and Nowcasting



Virtual Beach – what is it?



Preparing to Use Virtual Beach



VB Community and Resources

What is a Model?

Model: Using knowledge to estimate or predict observed behavior

In our day-to-day lives, we continuously develop, use, and refine predictive models:

- Experience to predict weather
- Intuition to estimate who to avoid at parties



What is a Model?

Empirical predictive models (from the very simplest to the most complex...) are all based on:

1. **Observations** - Gathered over some period of time
2. **Fundamental Assumption** - The way things worked/interacted in the past will continue through the present, into the future...

Empirical Predictive Models

Predict the value of a response variable

- e.g. *E. coli* concentration

According to the values of explanatory variables

-e.g. nearshore turbidity, antecedent rainfall, waves...

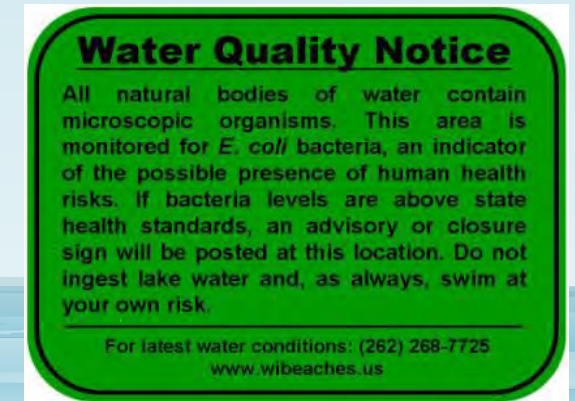
Current Method: Persistence Model

“We issue our advisories on the wrong day.”

Current Procedure: Collect and analyze water quality samples

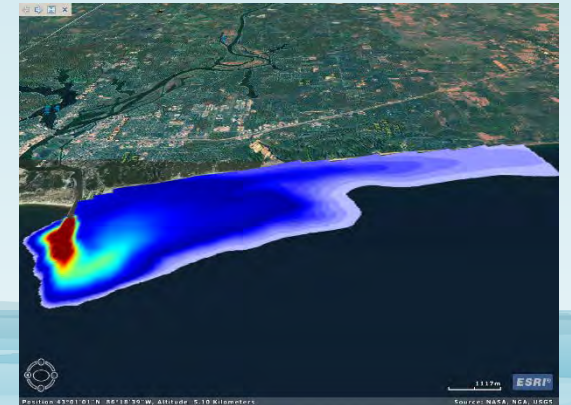
Lab analysis at least 18 hours, so results not reflective of present conditions

What happens? Swim when bacteria is high, or stay out when bacteria is low.

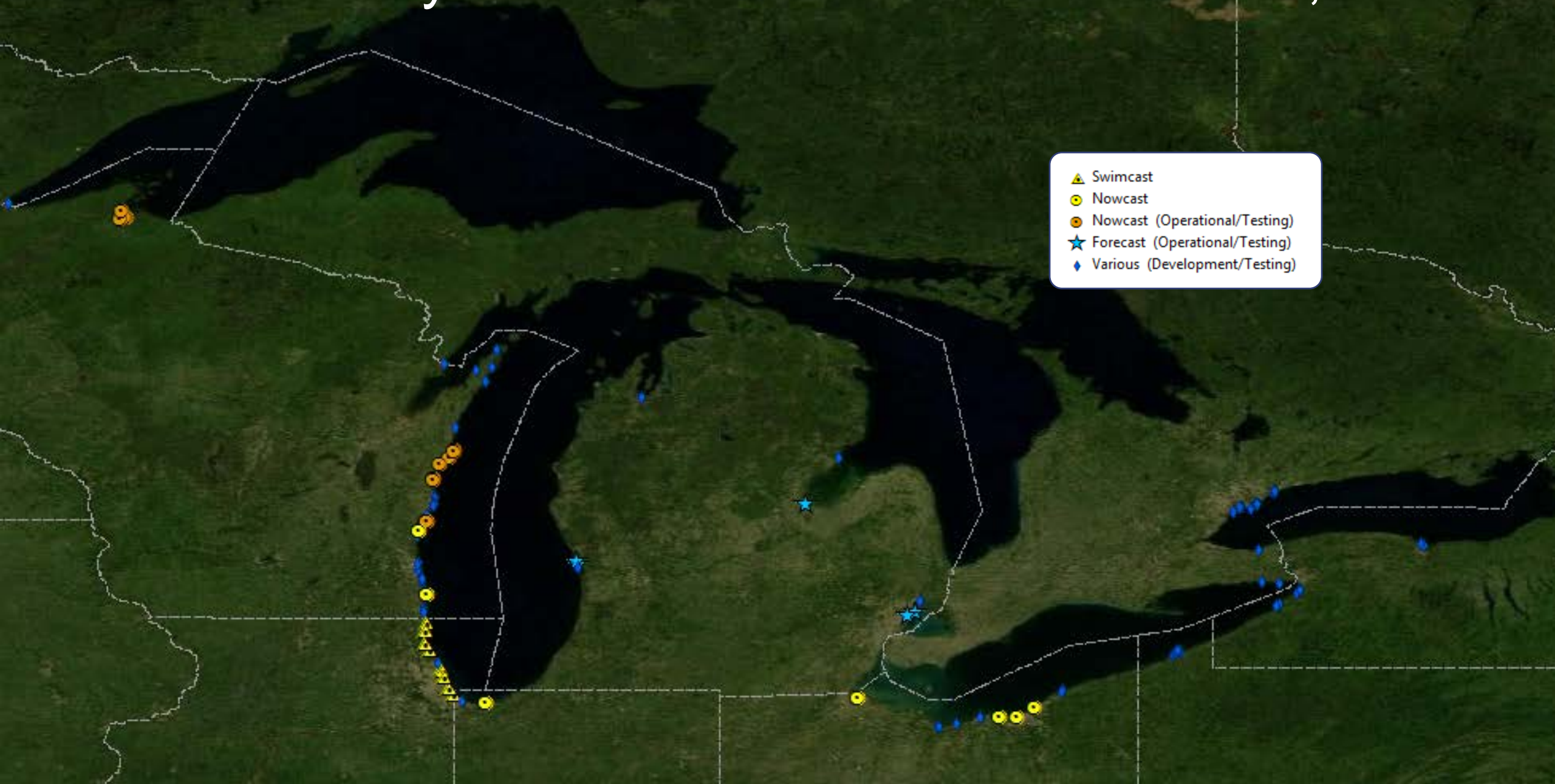


Response: Develop new data and tools

Nowcasting: predict real-time or future water quality indicators and exceedance probabilities based on *observed or web-available data*

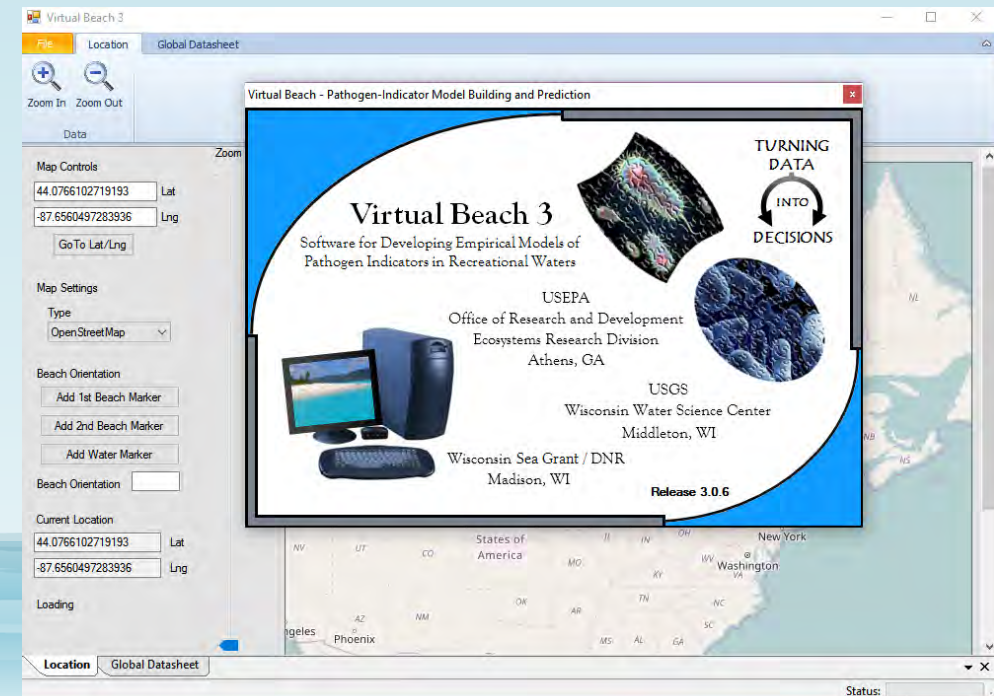


Water-Quality Predictive Models Great Lakes, 2012



Virtual Beach

- Created by US EPA
- Used to develop, evaluate, and operate beach-specific nowcast models using field or web-based data
- Used at 16 WI beaches in 2016



USGS
science for a changing world

Environmental Data Discovery and Transformation - Version 1.3.45

Access and Integrate Environmental Observations for Coastal Decision Support

Choose Data | Create Project Location | EnDDaT Information

USGS Time Series (NWIS) 1 Hr National Precipitation Grid Points
 Great Lakes Coastal Forecasting System (GLCFS) STORET QW (Water Quality)
 USGS QW (Water Quality)

Search within a 2 mile bounding box from selected project (click marker to Identify)

Map showing grid points in the Great Lakes region.

Displayed Grid Points:

X:Y	Latitude	Longitude
16:136	44.053883	-87.63901
16:132	44.071846	-87.63936
16:138	44.08981	-87.6397

Available Data:

EnDDaT



Prediction

port EnDDaT | View Column Mapping | Scan IV Data (Optional) | Make Predictions | Plot | Clear | Export As CSV

Predict | Evaluate

ID	Model_Prediction	Exceedance_Probability	Regularization
3/2/2017	6.739	1.259	235

**Prediction:
1% chance of
exceeding
standard**

Virtual Beach - Pathogen-Indicator Model Building and Prediction

Virtual Beach 3
Software for Developing Empirical Models of Pathogen Indicators in Recreational Waters

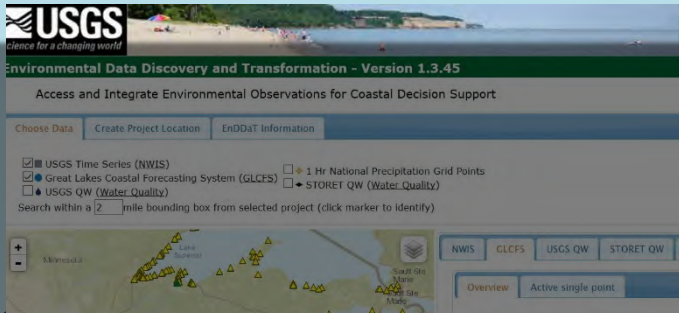
TURNING DATA INTO DECISIONS

USEPA
Office of Research and Development
Ecosystems Research Division
Athens, GA

USGS
Wisconsin Water Science Center
Middleton, WI

Wisconsin Sea Grant / DNR
Madison, WI

Release 3.0.6



ENDDaT

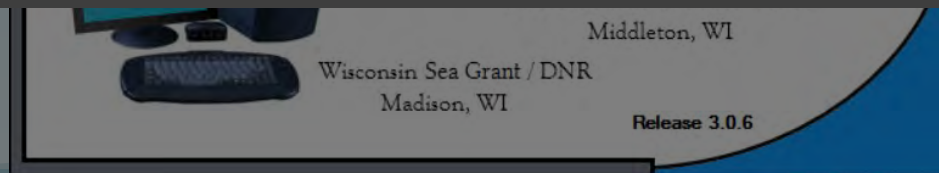


Output: Probability of Exceedance

VB calculates “confidence intervals” around model predictions -- infers the probability that predicted *E. coli* levels will exceed a given threshold...

ID	Model_Prediction	Exceedance_Probability	Regularization
3/2/2017	6.739	1.259	235

Prediction:
1% chance of exceeding standard



Use Consistent Measurements!

Quality Assurance & Quality Control in Data & Data-Collection Procedures

- Same instruments
- Same locations
- Same approximate time of day
 - **Morning** is preferable

How many samples to make model?

As many as possible!

Try to collect samples in all different conditions that occur – sunny, rainy, windy...

*Best Case: 100 sample days over 2 seasons**



**USEPA 2010*

Still need to sample *while* using model

As often as practical to verify that model is predicting reasonable results



Timely help and troubleshooting at virtualbeach.org

Virtual Beach Users

Users Group

The Virtual Beach Users Group (VBUG) provides a forum for sharing best practices, trouble-shooting problems, and identifying priority needs. Users communicate via the 'VBU' listserv (below) and meet online or in person, as needed.

Listserv

The [Virtual Beach Users \(VBU\) listserv](#) is intended to foster communication and mutual assistance among VB users. The list is moderated by Wisconsin Sea Grant and hosted by the Great Lakes Information Network. [Subscribe to the VBU listserv.](#)

Spend 5 minutes talking to neighbor

- 1. What makes sense to you so far?**
- 2. What is a mystery to you?**