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

great lakes observing system

UNIVERSITY OF WISCONSIN SEA GRANT INSTITUTE

science for the sustainable use of Great Lakes resources

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

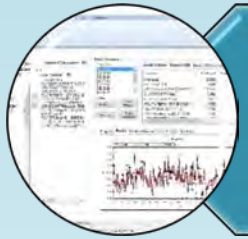
Workshop Objectives

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…

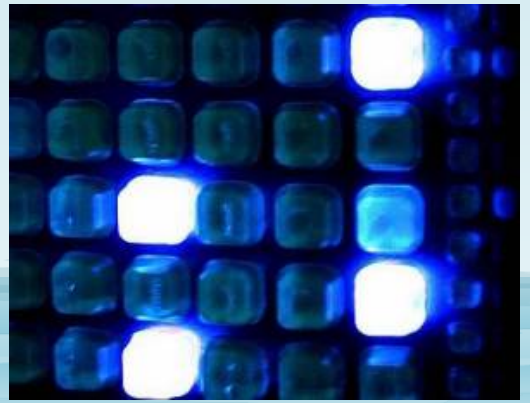
Current Method: Persistence Model

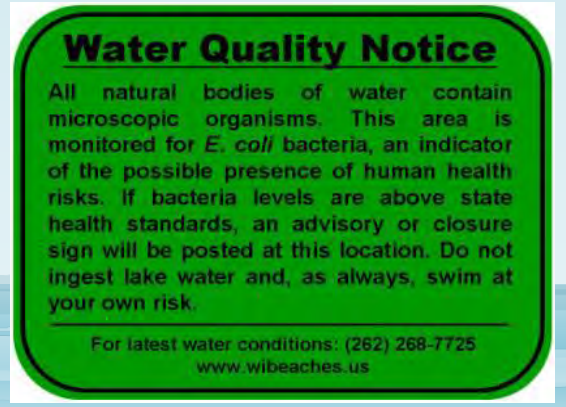
"We issue our advisories on the wrong day."

Current Procedure: Collect and analyze water quality samples

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

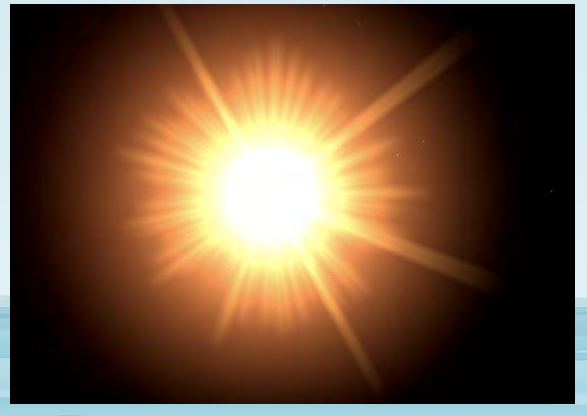
What happens? Swim when bacteria is high, or stay out when bacteria is low.

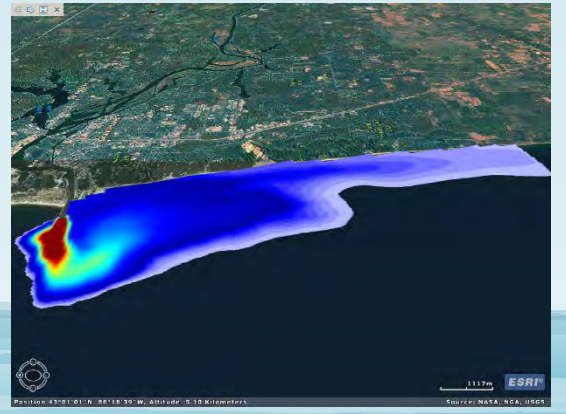




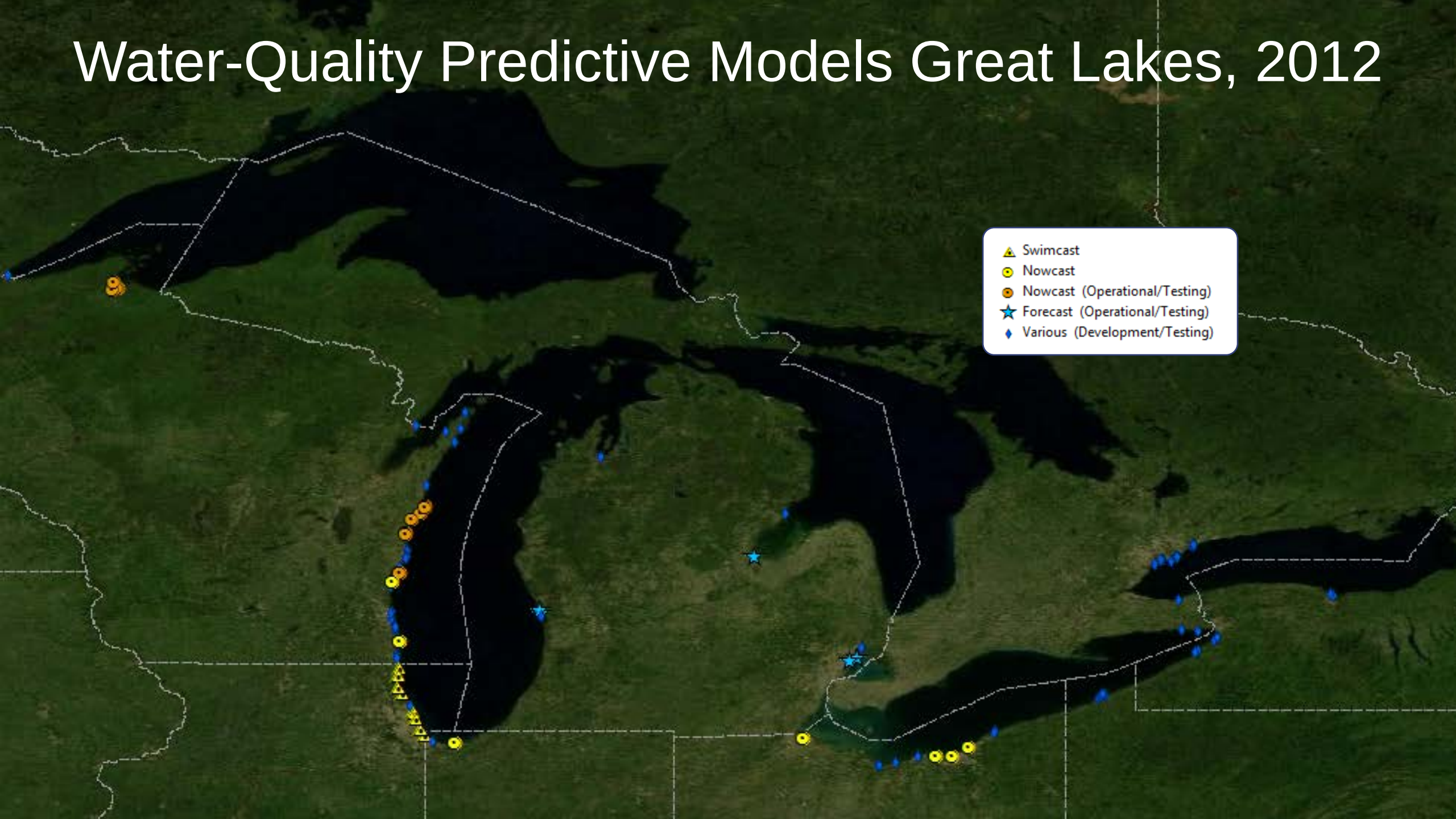
Response: Develop new data and tools

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



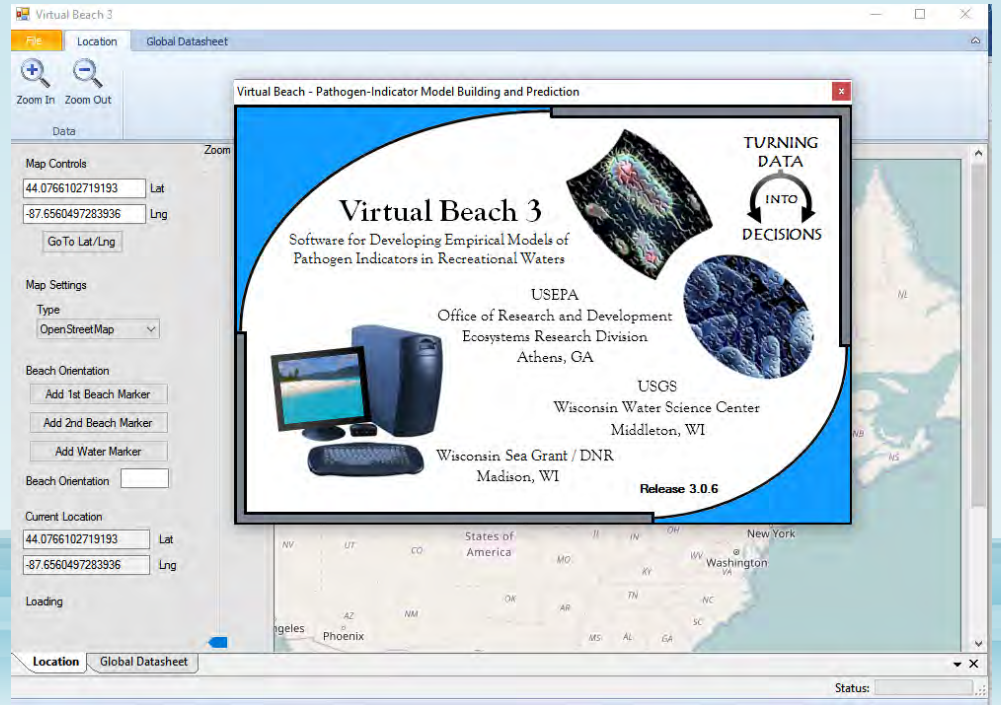


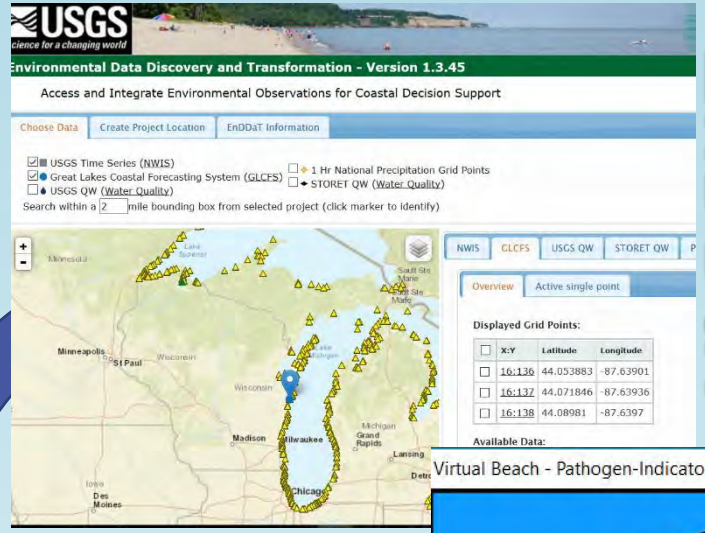
Water-Quality Predictive Models Great Lakes, 2012



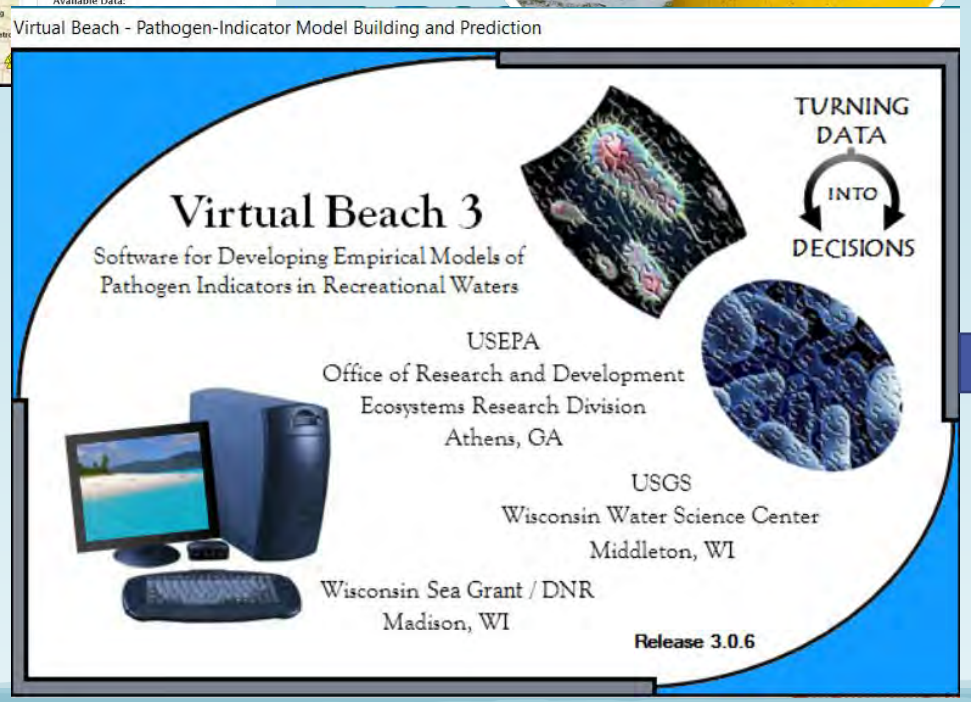
Virtual Beach

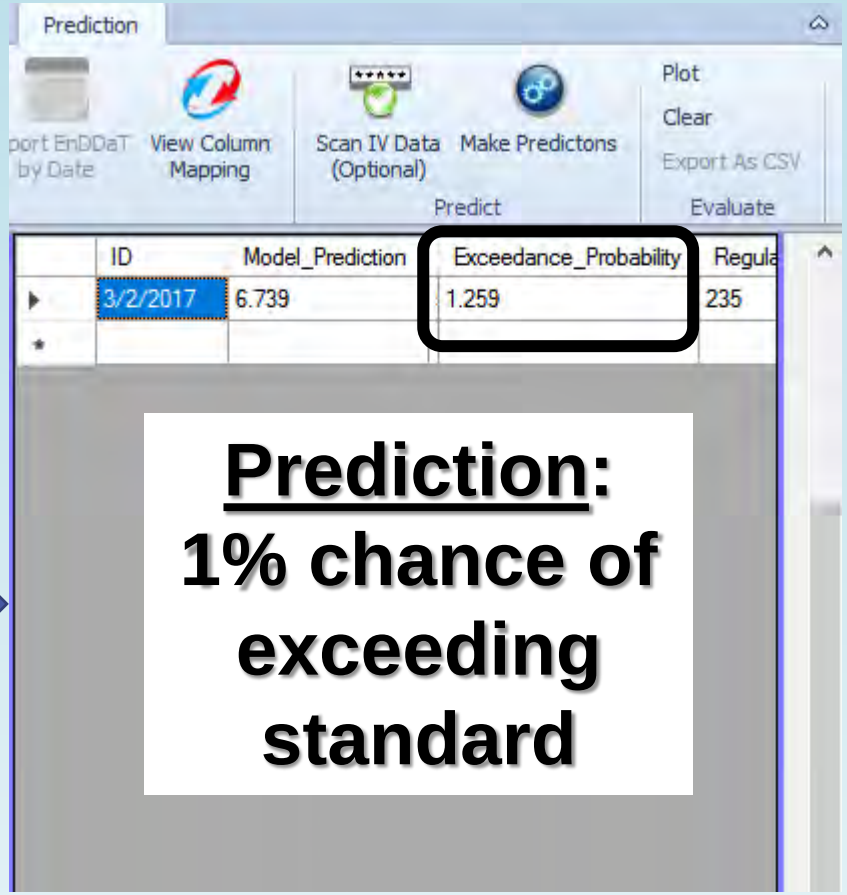
- Created by US EPA
- Used to develop, evaluate, and operate beach-specific nowcast models using field or web-based data
- Used at 16 WI beaches in 2016





EnDDaT

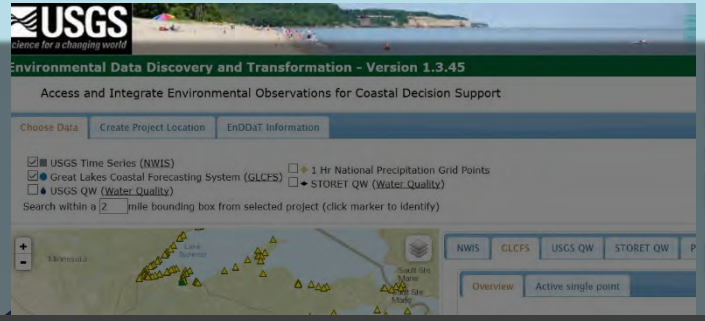




Prediction:
1% chance of exceeding standard

www.virtualbeach.org

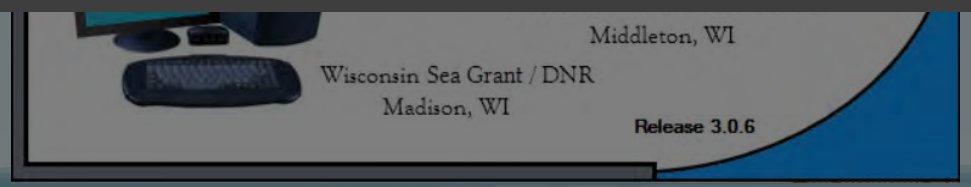
http://coastaldynamics.com/images/services-data-collection.png

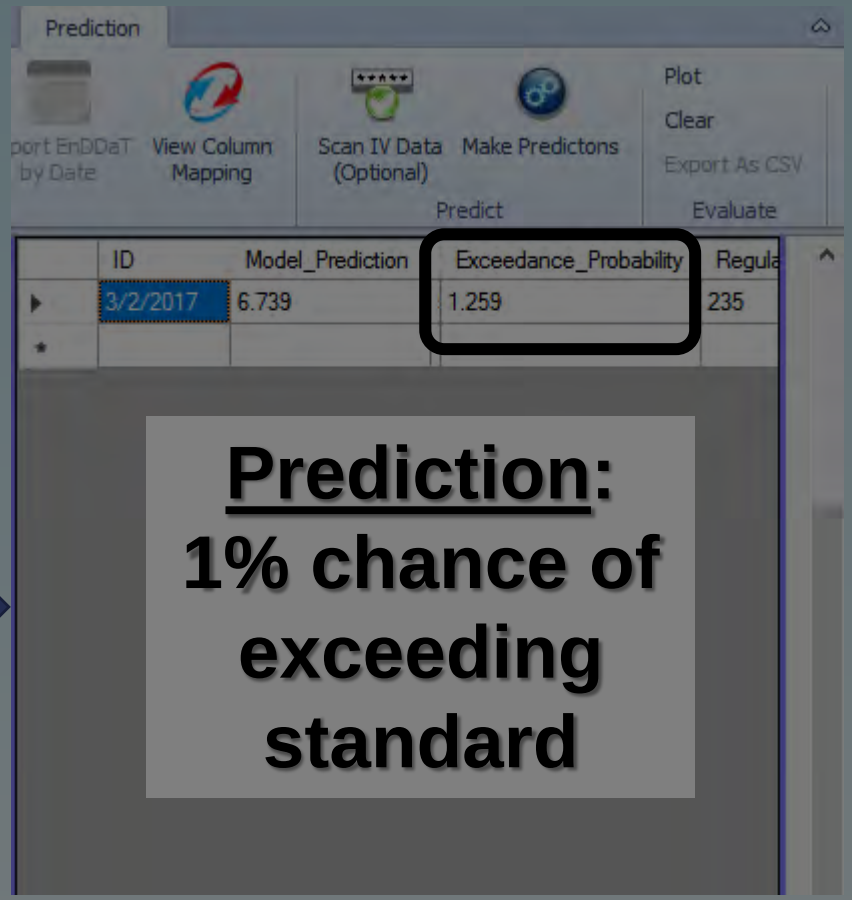


EnDD

Output: Probability of Exceedance

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





Prediction:
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www.virtualbeach.org

http://coastaldynamics.com/images/services-data-collection.png

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?**