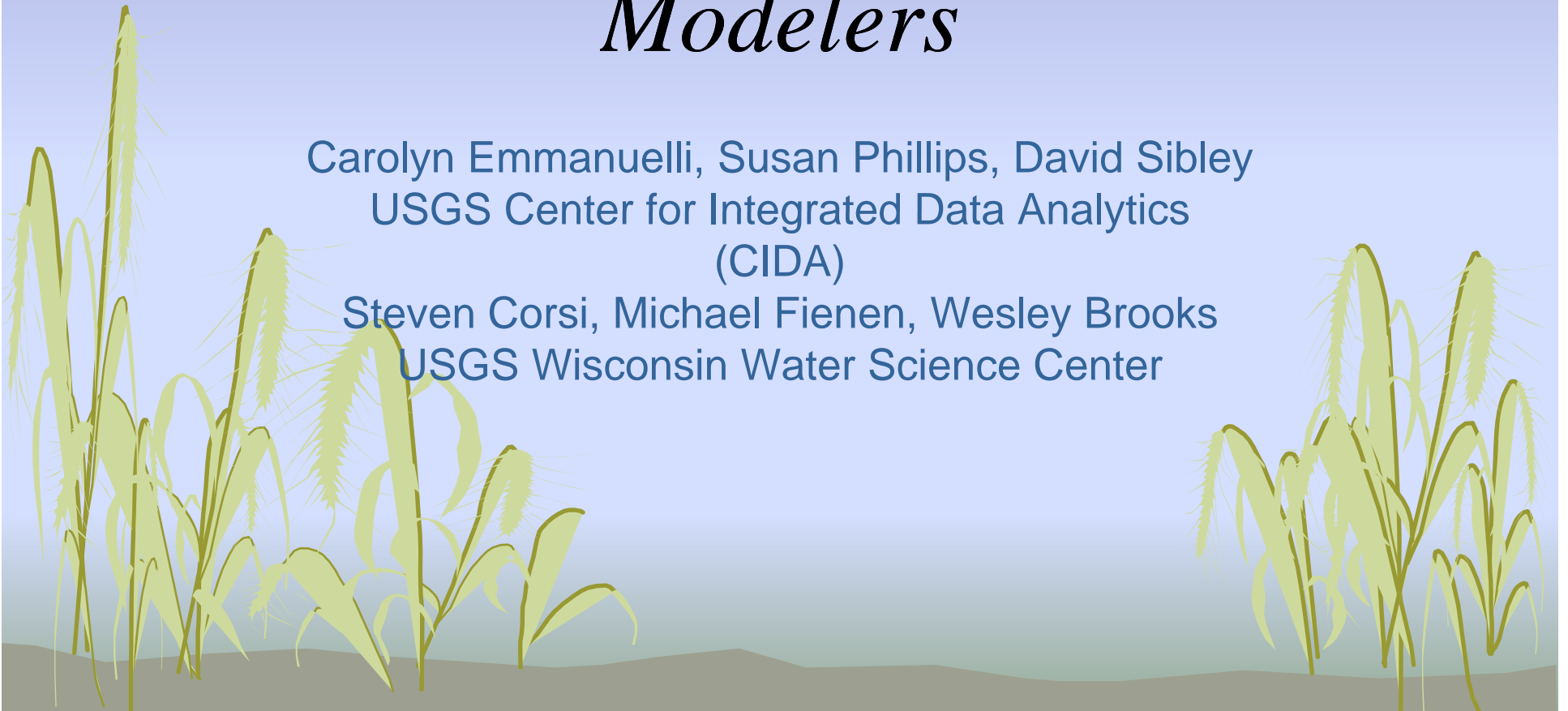


Data Support for Beach Managers, Researchers, and Modelers

Carolyn Emmanuelli, Susan Phillips, David Sibley
USGS Center for Integrated Data Analytics
(CIDA)

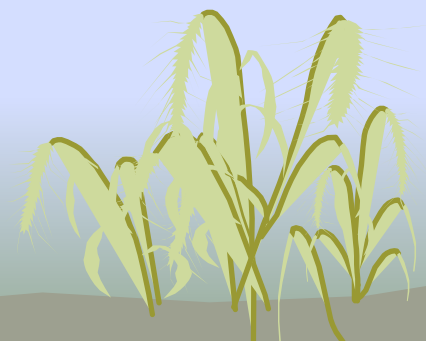
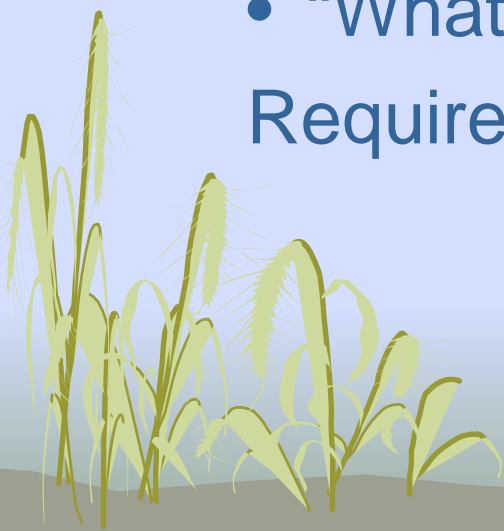
Steven Corsi, Michael Fienen, Wesley Brooks
USGS Wisconsin Water Science Center



Beach Data Usage

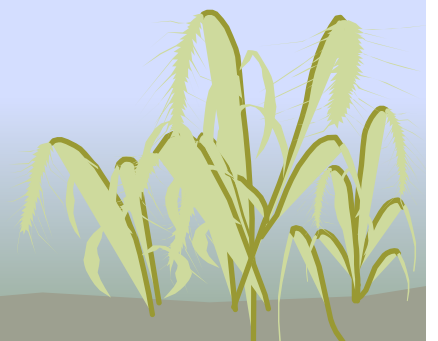
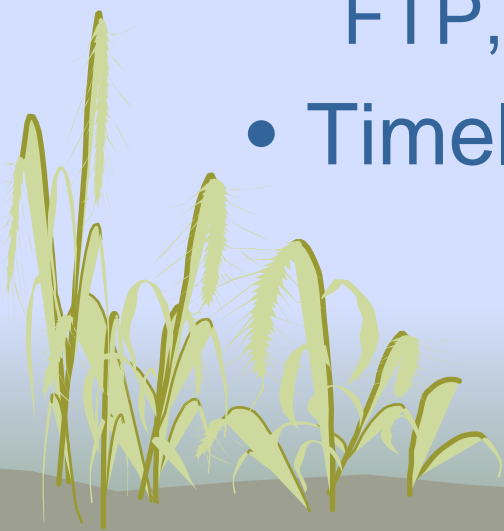
- Decision Support Systems
- Predictive Modeling
- Forecasting
- Nowcasting
- Research
- “What if” Scenarios

Requires relevant, timely and integrated data



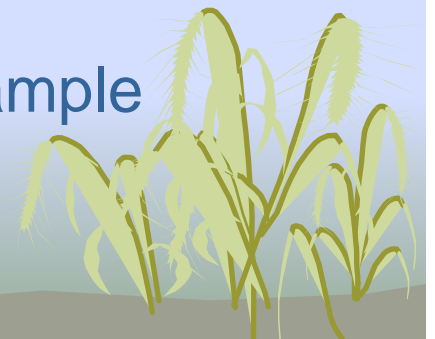
Data Collection Challenges

- Distributed and fragmented data sets
- Accessibility of data sets
 - Security and firewalls
- Transfer mechanisms
 - FTP, data loggers, large datasets
- Timeliness of data



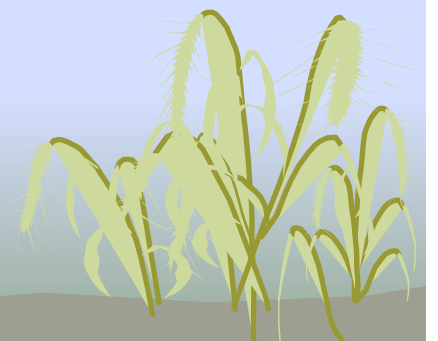
Additional Data Challenges

- Ability to synthesize data for various purposes
 - Modeling, Analysis, Research, Risk Assessment
- Data compatibility
 - Varying protocols and methods for collection
 - Inconsistent formats
 - Units of measure
 - Date fields (formats, time zones)
 - What is the data really? Composite sample



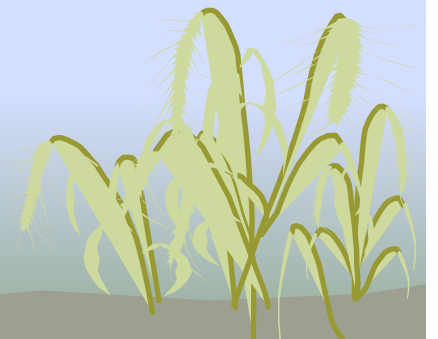
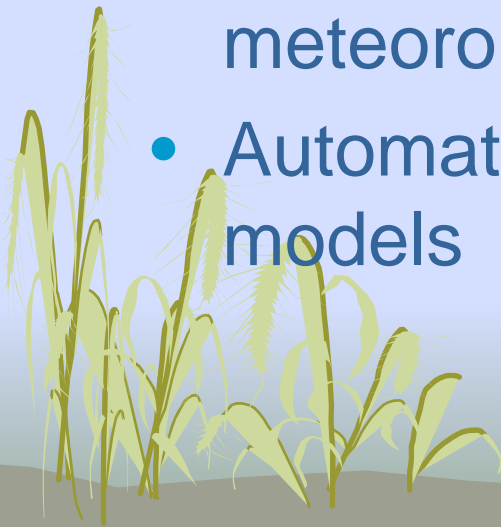
GLRI Beach Project Partners

- USGS: Wisconsin, Ohio, Michigan, Lake Michigan Ecological Research Station, Pennsylvania, New York
- Beach data collected in 7 states by various groups – states, municipalities, volunteers (Adopt-a-Beach)



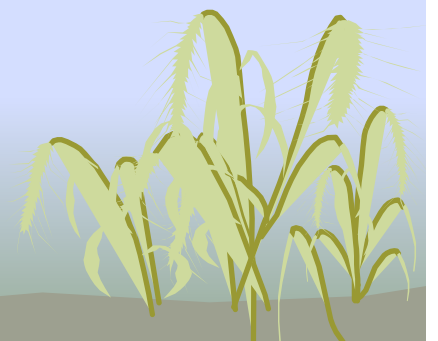
Great Lakes Restoration Initiative Beach Project Goals

- Build database to store beach specific data
- Standardized data template
- Online forms and reports allowing instant access to data
- Utilize web services to access water quality, meteorological and hydrological data
- Automated, real-time connectivity feed into models



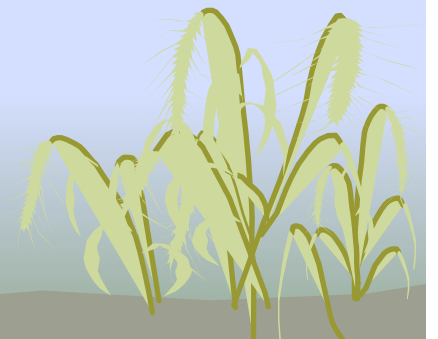
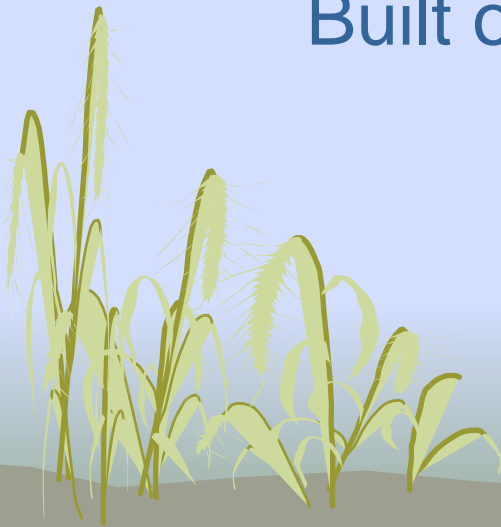
Beach Project Activities

- Started with US EPA routine sanitary survey form data elements
- Additional data elements identified by partners and modelers
- Created a flexible database for storage of 250+ data elements



Beach Project Activities

- Standardized data template
 - Identified required elements
 - Acceptable formats
- Data collection
 - Built online forms
 - Short minimal data entry form
 - Long form



Online Form (Short)

USGS - GL Beaches Sanitary Survey - TEST SITE 2

Basic Information (Required)

Surveyor:	<input type="text" value="sfphilli"/>
Date:	<input type="text" value="13-07-2010"/>
Time (HH:MM 24-Hour Time):	<input type="text" value="07:55"/>
Time Zone:	<input type="text" value="Central Standard Time"/>
Water Temperature:	<input type="text" value="24.6"/>
Water Temperature Units:	<input type="text" value="Celsius Degrees"/>
Turbidity (NTU):	<input type="text" value="7.89"/>
Wave Height (ft):	<input type="text" value="0.917"/>
Birds:	<input type="text" value="28"/>
People In Water:	<input type="text" value="0"/>
People On Beach:	<input type="text" value="15"/>
Algae:	<input type="text" value="4"/>
Fecal Material:	<input type="text" value="1"/>
Debris:	<input type="text" value="3"/>

Additional Information (Optional)

E. Coli Measurement:	<input type="text" value="10.9"/>
E. Coli Method / Units:	<input type="text" value="QuantiTray (MPN/100mL)"/>
E. Coli Lab Note:	<input type="text" value="None"/>
Enterococci, mEI (CFU/100mL):	<input type="text"/>
Enterococci Lab Note:	<input type="text"/>
Lake Current Direction (° From N):	<input type="text"/>
Lake Current Speed:	<input type="text"/>

Online Form (Long)

USGS - Wisconsin Coastal Program Sanitary Survey - TESTING SITE

[Link to the US Geological Survey main web page](#)

Basic Information

Date*: 02-08-2010

Time (HH:MM 24-Hour Time)*: 07:30

Time Zone*: Central Standard Time

Surveyor*: sfphilli

Part I - General Beach Conditions

Specific Conductance ($\mu\text{S}/\text{cm}$): 304

Air Temperature: 68

Air Temperature Units: Fahrenheit Degrees

Wind Speed (mph): 7.4

Wind Direction ($^{\circ}$ From N): 90

Hours Since Last Rain Event:

Rainfall Measurement:

Rainfall Units:

Rainfall Intensity:

Description of Current Rain Event:

Weather Conditions: Partly Sunny (3/8 To 1/2 Cloud Coverage)

Sample Collection Depth:

Sample Collection Depth Units:

Wave Intensity:

Wave Direction:

Wave Height (ft)*: 0.4

Longshore Current Speed: 12.5

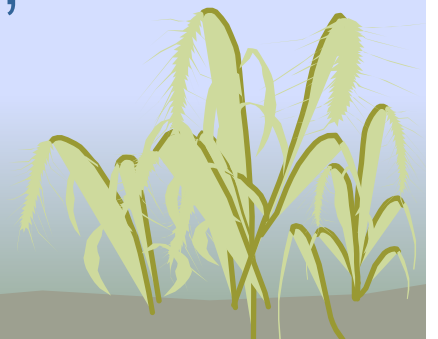
Longshore Current Speed Units: ft/s

Longshore Current Direction ($^{\circ}$ From N): 180

Comments / Observations - Part I:

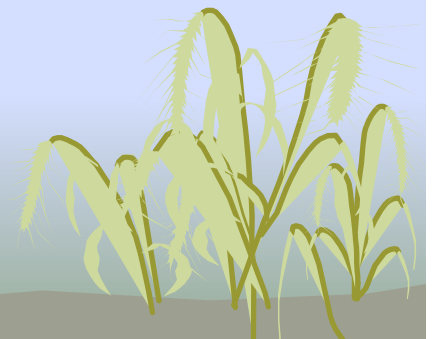
Long Form Data Elements

- Weather conditions
- Water conditions
- Algae
- Debris
- Bird numbers
- Fecal categories
- Tributaries – plume, total daily volume, turbidity, water level, velocity, sc



Additional Data Collection

- Bulk loading capacity for legacy datasets
- Automated feeds from in-lake equipment
- Web Services
- Web site scraping



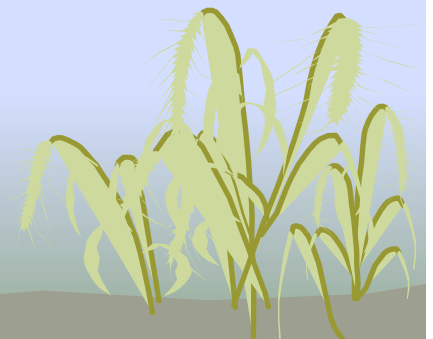
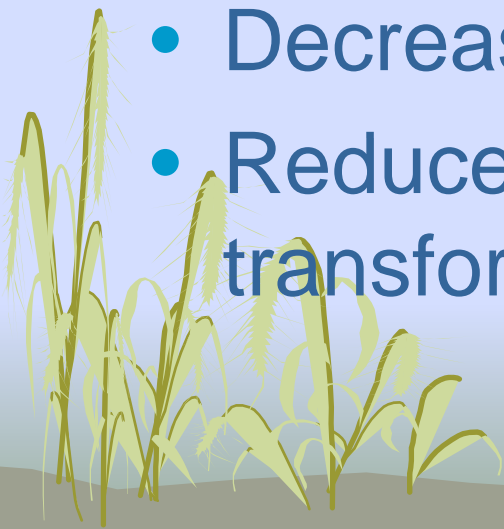
Web services

- Standardized computer-to-computer protocol using XML
- Share data and functionality via the internet
- Data is independent of operating system, hardware, programming language, database
- Configurable to allow specific requests for data (point, polygon, subsets)



Benefits to using web services

- Data is managed by data creators
- Data in standardized format
- Easy to pull together and combine
- Real-time capabilities
- Decreases time spent manipulating data
- Reduces errors introduced during data transformation



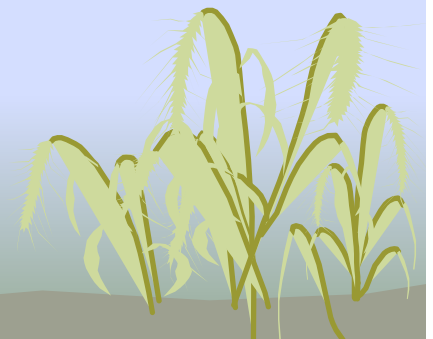
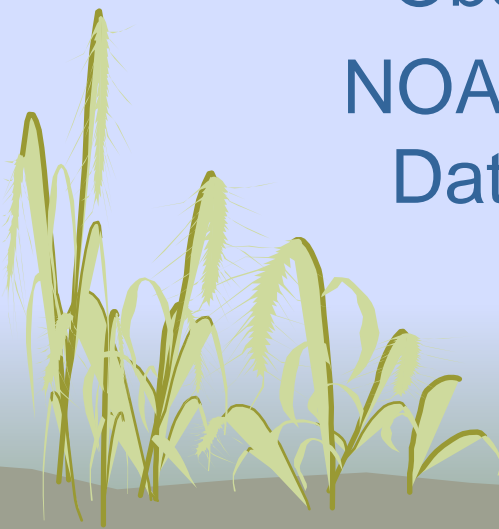
Standardized XML schemas

- Groups developing standardized XML schemas

EPA Office of Water – Water Quality Exchange (WQX) XML Schema

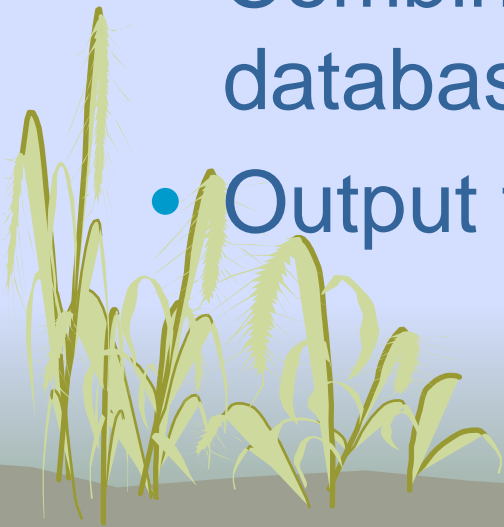
Open Geospatial Consortium (OGC) – Observations and Measurements (O&M)

NOAA – National Digital Forecast Database (NDFD)



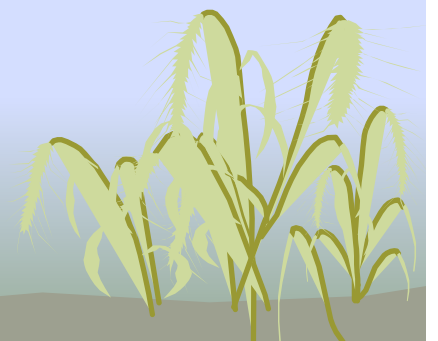
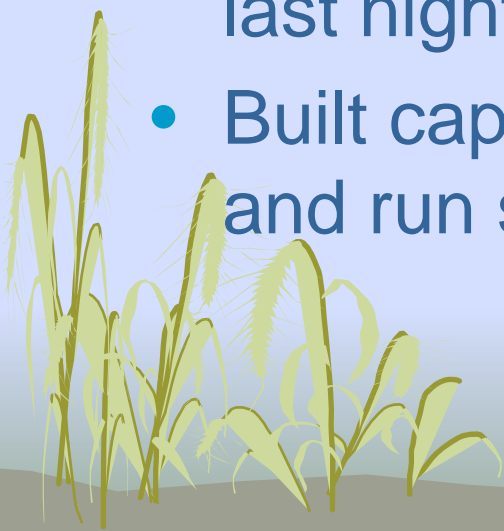
GLRI Beach Project

- Used published web service meteorological, stream flow, hydrodynamic modeling data (NOAA, USGS, USEPA)
- Combined web service data and data in database
- Output fed into models



GLRI Beach Data for Modeling

- Three pilot sites had existing beach models with prior years data – Virtual Beach and Ohio's Linear Regression Model
- USGS WI Water Science Center's PLS Partial Least Squares Model (poster session last night)
- Built capability to feed data into both models and run side by side comparison





GLRI Beaches - Windows Internet Explorer

https://greatlakesb... greatlakesbeaches

File Edit View Favorites Tools Help

GLRI Beaches



USGS Home
Contact USGS
Search USGS

Required Information

Beach name:

Turbidity (NTU):

Wave height (ft):

Radar Rainfall Data

Automatically look up radar rainfall:

Rainfall (radar, yesterday, in.):

Rainfall (radar, 2 days ago, in.):

Cleveland/Hopkins International Airport Rainfall Data

Automatically look up KCLE rainfall:

Rainfall (KCLE, yesterday, in.):

Rainfall (KCLE, 2 days ago, in.):

Reset Submit

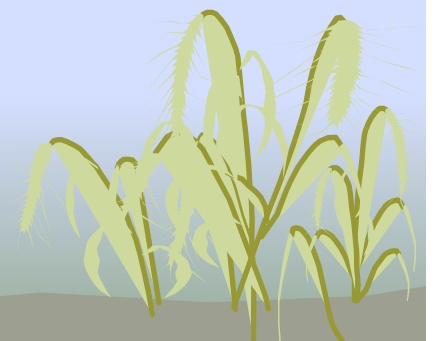
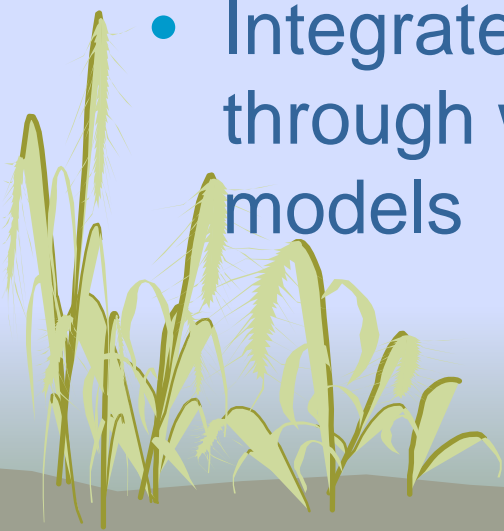
Accessibility FOIA Privacy Policies and Notices

U.S. Department of the Interior | U.S. Geological Survey
Page Contact Information: [Site Administrator Contact Form](#)
Page Last modified: 10/14/2010 14:09:30

Done Local intranet 100%

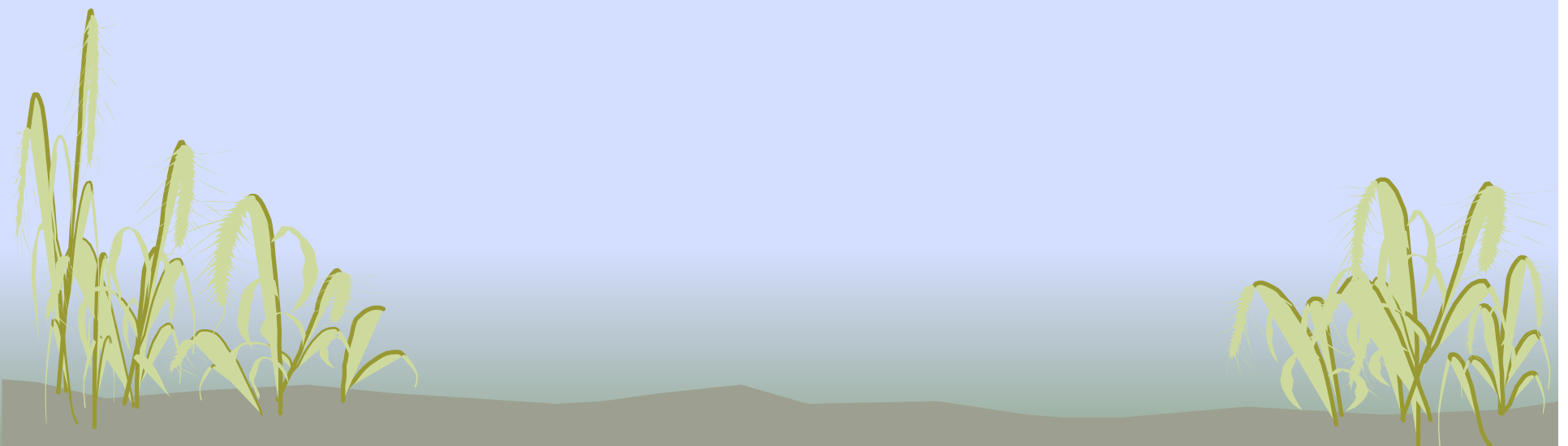
GLRI Beach Project 2010 Summary

- 72 sampling sites across the Great Lakes participated this year
- Created a centralized data repository for beach data elements that is flexible enough to allow for a variety of data collection needs
- Integrated data collected with data available through web services to feed real-time models



GLRI Beach Project Summary

- Experimented with using the different types of web service feeds available
- Gained a better understanding of the data availability options for users



GLRI Beach Project 2011

- Explore new datasets that become available through web services
- Improve flexibility of data requests
 - Point, polygon, or watershed
 - Ability to run models on multiple sampling points (average of sites, weighted average etc.)
- Expand modeling efforts to additional beaches
- Make integrated beach data available for multiple purposes via web services



Questions?

<http://greatlakesbeaches.usgs.gov/>

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(608) 821-3811

USGS Wisconsin Science Center
<http://wi.water.usgs.gov/mdc/>
Center for Data Analytics
<http://cida.usgs.gov/>

