



# NorEaST Web Portal

## Stream Temperature Mapper and Data Application

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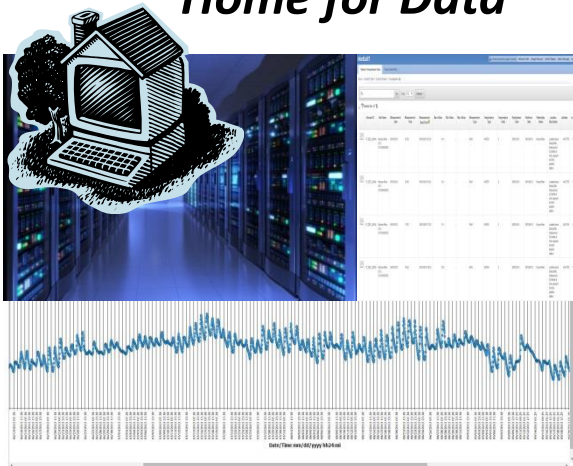
# What is NorEaST Web Portal ?

**Community**

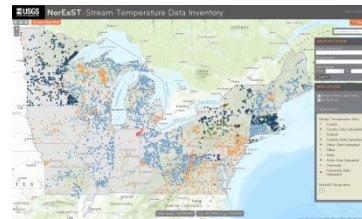
**Stream Temperature**



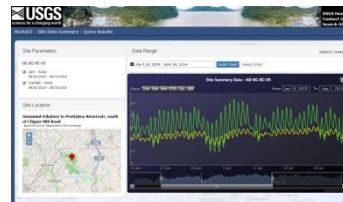
**Home for Data**



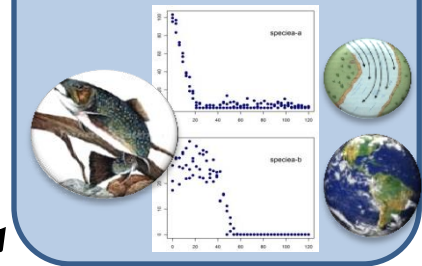
**Mapper**



**Web Services**



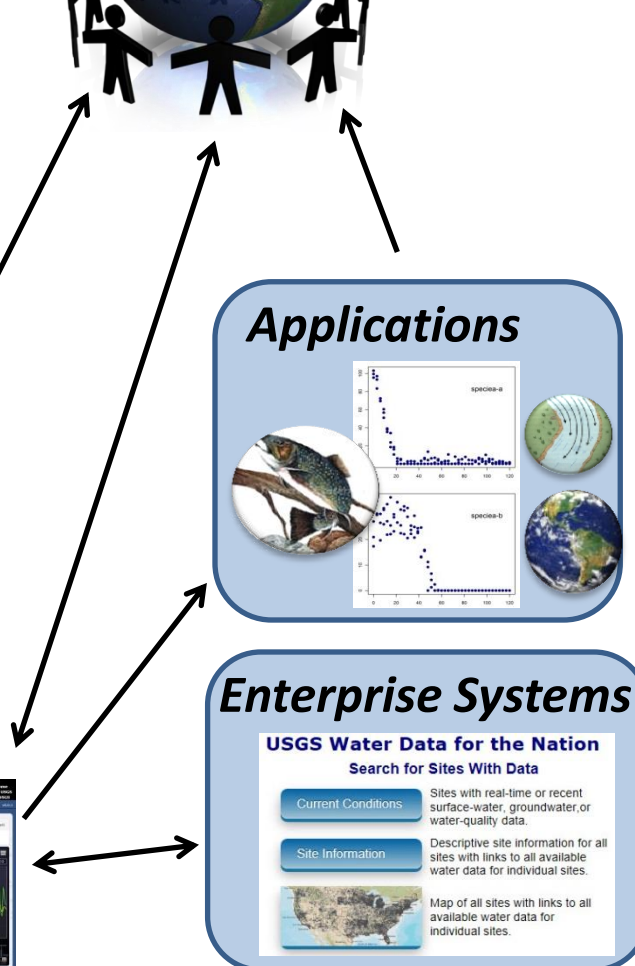
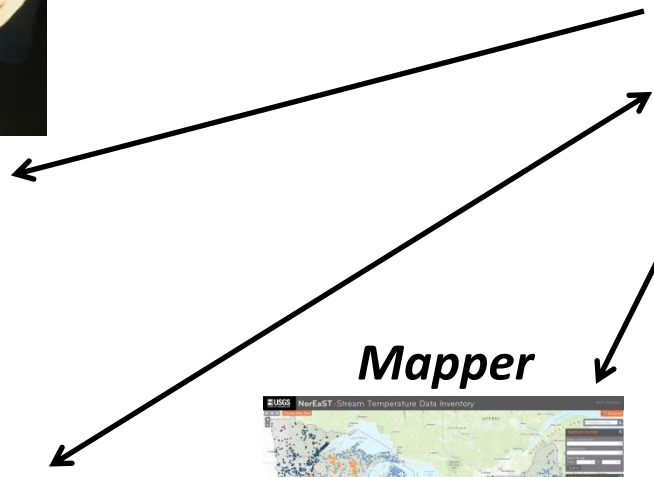
**Applications**

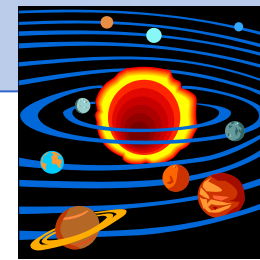


**Enterprise Systems**

**USGS Water Data for the Nation**  
Search for Sites With Data

- Current Conditions** Sites with real-time or recent surface-water, groundwater, or water-quality data.
  - Site Information** Descriptive site information for all sites with links to all available water data for individual sites.
- 





# *Our Approach*

## **Community**

- Identify organizations (contacts) collecting stream temperature data
- Identify/communicate/coordinate with related efforts (Isaak, Deacon, Detenbeck, Jacobs, Letcher)

## **Mapper** (Public)

- locations and inventory (streams)
- active or planned sites
- continuous records (unit or daily values; seasonal, year-round, multi-day)

## **Database** (Internal data stewards)

- data stewards can store/manage sites and data
- common location and data schema
- proof of concept (not enough funds to load everyone's data)

## **Web Services** (Public)

- link to NorEaST data – flagged “public” (view, graph, download)
- connect to other Enterprise systems

## **NorEaST Web Portal v 1.0 Demo and User-testing**

- planned June and September

*So far .....many partners have contributed sites and data to NorEaST*

Organization Type	Organization Count	Site Count
Federal	3	2004
State	25	7460
Local/Regional/NGO	9	131
University	10	149
<b>Total</b>	<b>47</b>	<b>9744</b>

**Federal**

- US Forest Service
- US Geological Survey
- US Fish and Wildlife Service

**State**

- CT Department of Environmental Protection
- IA Department of Natural Resources
- IL Department of Natural Resources
- IL Environmental Protection Agency
- IN Department of Environmental Management
- MA Division of Fisheries and Wildlife
- MA Department of Environmental Protection
- MA Division of Ecological Restoration
- MD Department of Natural Resources
- ME Department of Marine Resources
- ME Department of Environmental Protection
- MI Department of Natural Resources (IFR)
- MN Department of Natural Resources
- MN Pollution Control Agency
- MO Department of Conservation
- NH Department of Environmental Services
- NH Department of Fish and Game
- NJ Department of Environmental Protection
- NY Department of Environmental Conservation
- OH Environmental Protection Agency
- VT Department of Environmental Conservation
- VT Fish and Wildlife Department
- WI Department of Natural Resources
- WV Department of Environmental Protection
- WV Department of Natural Resources

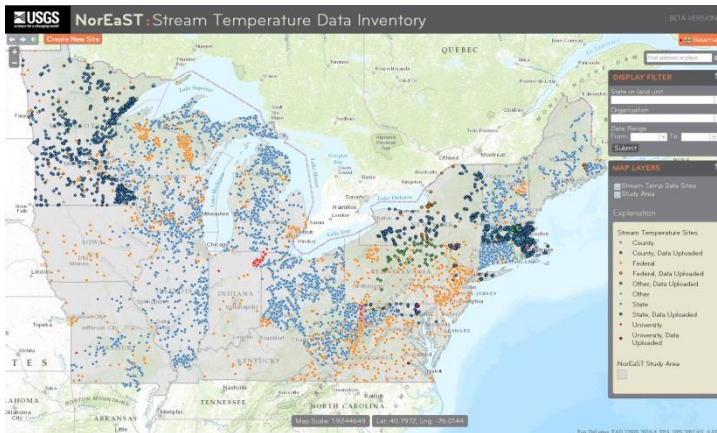
**Local/Regional/NGO**

- Baltimore County Department of Environmental Protection
- Charles River Watershed Association
- French River Connection
- Hoosic River Watershed Association
- Nashua River Watershed Association
- Rushing Rivers Institute
- Susquehanna River Basin Commission
- Wood-Pawcatuck Watershed Association

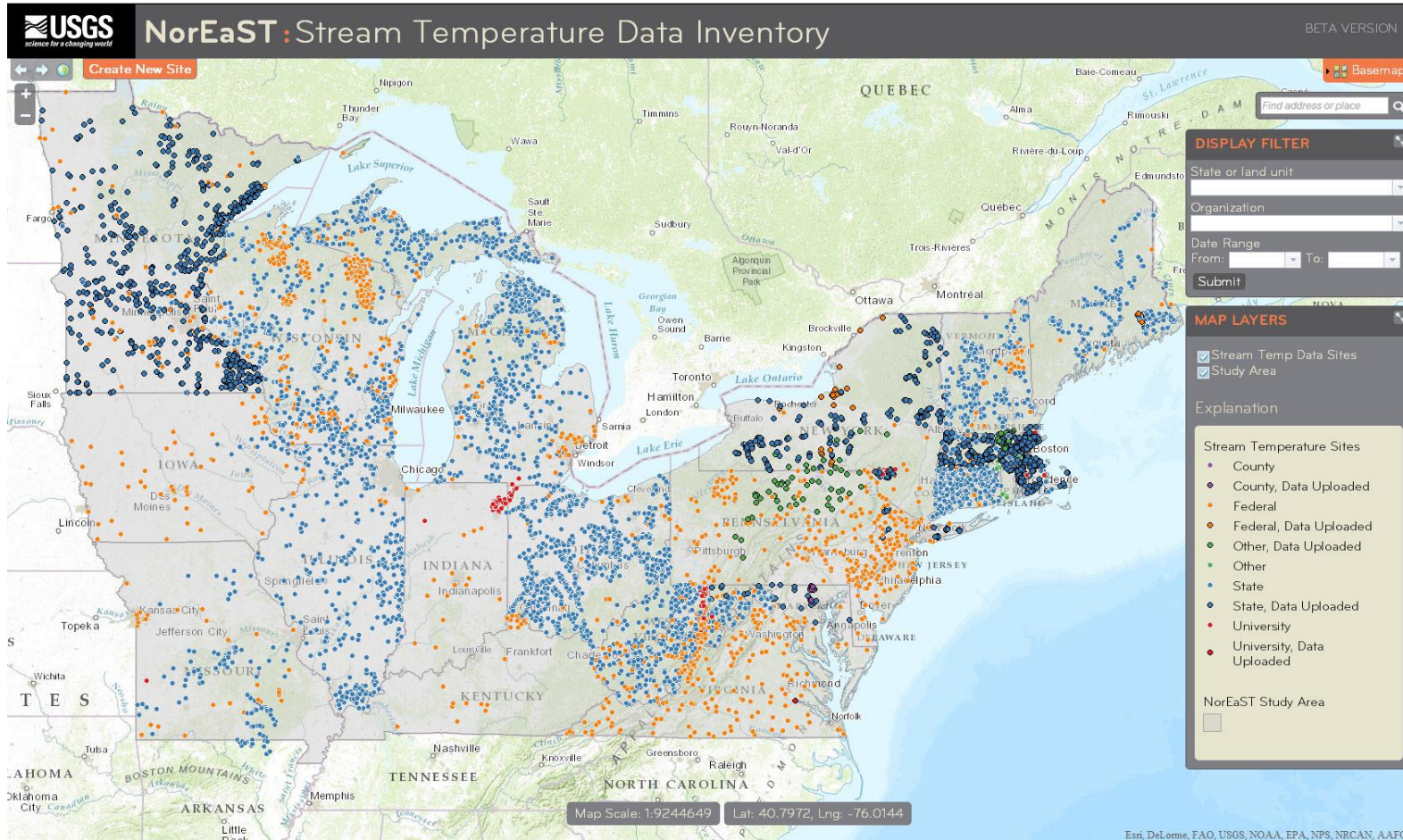
**University**

- Cornell University
- George Mason University
- IN Purdue University Fort Wayne
- Southern IL University
- University of Virginia
- University of Massachusetts – Boston
- University of Missouri
- Virginia Institute of Marine Science
- Virginia Commonwealth University
- West Virginia University

*and the list is growing.....*



*The NorEaST Mapper provides a means for the public to view locations and metadata for current and historic stream temperature monitoring sites across multiple agencies.*



<http://wim.usgs.gov/NorEaST/>

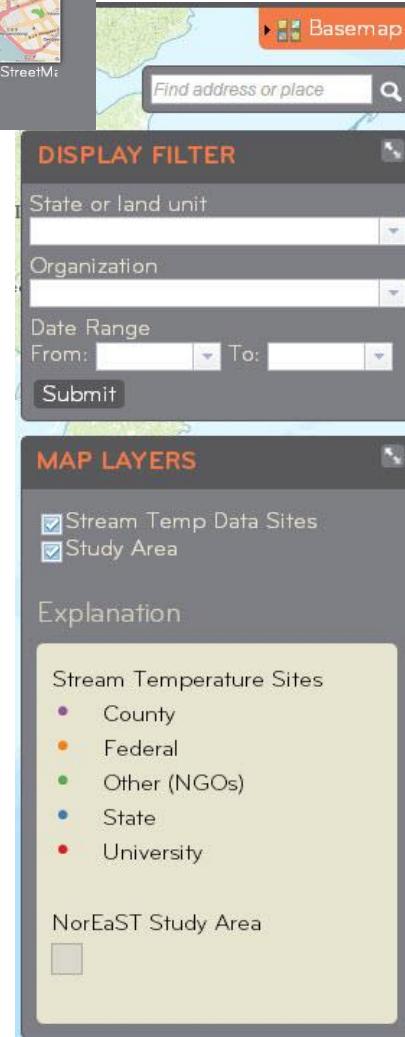
**Developers:**  
**USGS Wisconsin Internet Mapping (WiM) team**

## NorEaST Mapper functionality

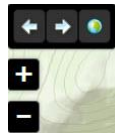
**Basemaps:** Change basemaps (streets, imagery, topo maps)



**Available Layers:** Turn on and off map layers



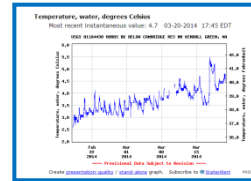
**Navigation:** Zoom – pan



**Pop-Ups:** Click on point - get information about location (s)  
Zoom to location from Pop-up



**Link to USGS NWIS system for USGS sites**



**Search :** type place name; searches basemap

**Filter:** subset of sites filtered by organization, geography, or date range

**Webservice link to NorEaST database to**

Create New Site



## *NorEaST Database is built in Oracle Application Express (APEX)*

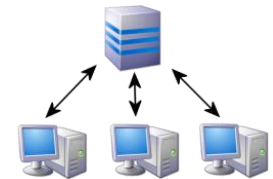
### Phase I – Internal users - completed

- Standard data schema
- Focus on Agencies with file based systems
- Data steward loads, manages, QAs, retrieves data for their agency(s) only
- Proof of concept (not enough funding to load all data)



### Phase 2 – Public users – completed

- Water ML2 standards
- Web services to retrieve data and graph “public” flagged data



### Phase 3 – Applications and User testing – in progress



- Applications of multi-agency continuous stream temperature data
- User testing and documentation

## 1) Become a New User



## 2) Add Sampling LOCATIONS

Add/update sites

Organization \*

Site Status \*  Active  Planned

State/Geographic Region \*

Site Name \*

Legacy ID

NorEaST ID \*

Latitude \*

Longitude \*

Coordinate System \* Geographic

Datum \* NAD83

Location Description

## 3) Add/Edit Sampling EVENTS

NorEaST QA SITE

Home > NorEaST Sites > NorEaST Events

Q- Go Reports 1. Primary Report Actions

Selected Site

Create event for this site	Edit Event	View Data	NorEaST ID	Site Name	Agency
<a href="#">New Event</a>			MD-BC-BC-04	BC-04	Baltimore County Department of Environmental Protection and Sustainability
<a href="#">New Event</a>			MD-BC-BC-04	BC-04	Baltimore County Department of Environmental Protection and Sustainability
<a href="#">New Event</a>			MD-BC-BC-04	BC-04	Baltimore County Department of Environmental Protection and Sustainability

## 4) Upload DATA

### Stream Temperature Data File Upload

**Upload Data**

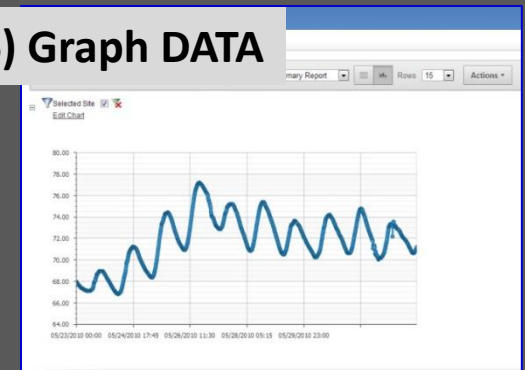
The temperature data file must be a tab-delimited RAW Data: MEASUREMENT\_DATE, MEASUREMENT\_TYPE, TEMPERATURE\_UNITS  
DAILY Data: MEASUREMENT\_DATE, MIN\_VALUE, MAX\_VALUE  
The upload process will skip the first line, assuming it is a header.

Upload Temperature File

## 5) View/edit DATA

Raw Value	Min Value	Max Value	Measurement Type	Temperature Type	Temperature Units
-	11.54	13.882	DAILY	WATER	C
-	7.895	11.2	DAILY	WATER	C

## 6) Graph DATA



## 6) Filter/Query DATA

Filter

Filter Type  Column  Row

Column  Operator  Expression

## 8) Download DATA

Home > NorEaST Sites > NorEaST Events > Temperature Data

Q- Go Reports 1. Primary Report Rows

Download

Choose report download format:

CSV  HTML

Selected Site

NorEaST ID	Site Name	Measurement	Measurement	Measurement	Raw Value
------------	-----------	-------------	-------------	-------------	-----------



To register as a data steward, contact Jana Stewart (USGS-WI WSC) (jsstewar@usgs.gov)  
As a data steward , you can enter, view, graph, QA, filter, download your own data

You can only see and manage data for those organizations to which you are approved



### Welcome to NorEaST

Welcome to the NorEaST data management site. Log in with your email address and NorEaST password below. If you don't have an account to add or update data, please click "Create NorEaST User".

Create NorEaST User

Username

Password

Login

Forgot Password?

#### Add/Update Contributors

<b>First Name *</b>	<input style="width: 90%;" type="text" value="David"/>
<b>Last Name *</b>	<input style="width: 90%;" type="text" value="Armstrong"/>
<b>Phone Number *</b>	<input style="width: 80%;" type="text" value="508-490-5060"/>
<b>Email *</b>	<input style="width: 90%;" type="text" value="darmstro@usgs.gov"/>
<b>Contributor Role *</b>	<input checked="" type="radio"/> Staff <input type="radio"/> Admin
<b>Organizations *</b>	<ul style="list-style-type: none"> <li>• Massachusetts Fish and Wildlife</li> <li>• US Fish and Wildlife Service, Maine Fishery Resources Office</li> <li>• New Hampshire Fish and Game Department</li> <li>• Massachusetts Division of Ecological Restoration</li> <li>• French River Connection</li> <li>• US Forest Service</li> <li>• Connecticut Department of Environmental Protection</li> <li>• Massachusetts Division of Fisheries and Wildlife</li> <li>• US Geological Survey</li> <li>• Vermont Fish and Wildlife Department</li> <li>• University of Massachusetts - Boston</li> <li>• US Fish and Wildlife Service</li> <li>• New Hampshire Department of Environmental Services</li> <li>• Nashua River Watershed Association</li> <li>• Wood-Pawcatuck Watershed Association</li> <li>• Rushing Rivers Institute</li> <li>• Charles River Watershed Association</li> <li>• Maine Department of Marine Resources</li> </ul>
<b>Approved? *</b>	<input checked="" type="checkbox"/>
<b>Contributor added on:</b>	12/03/2013
<b>Last Updated by:</b>	jsstewar@usgs.gov
<b>Last Updated on:</b>	03/20/2014

# Stream temperature data in NorEaST is organized by sampling location...

NorEaST

Users add sampling locations through forms

Home > NorEaST Sites

Create New Site

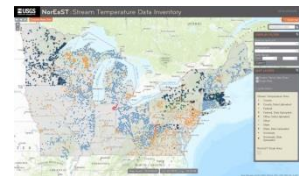
Go
Reports
2. Sites with Events
Rows
15
Actions

Row text contains 'VT\_DEC'

1 - 4 of 4

View Events	NorEaST ID	Agency	Source Comment	Site Name	Waterbody Name	Location Description	Latitude	Longitude	Coordinate System
	VT_DEC_28144	Vermont Department of Environmental Conservation		Lewis Creek 3.7, 530000000037	Lewis Creek	Located approximately 50yds above Route 7 bridge, at the USGS gage.	44.24833	-73.22917	Geographic
	VT_DEC_28145	Vermont Department of Environmental Conservation		Nulhegan River 0.3, 280000000003	Nulhegan River	Located above the first railroad bridge crossing up from mouth. This site replaces the 0.2 location.	44.75499	-71.63564	Geographic
	VT_DEC_28146	Vermont Department of Environmental Conservation		Green River 16.6, 670000000166	Green River	Located about 1 mi below Green River Village covered bridge on river road above a ford crossing to private home.	42.76389	-72.6625	Geographic
	VT_DEC_28148	Vermont Department of Environmental Conservation		Moose River 26.3, 211200000263	Moose River	Located above Gallup Mills, bridge about 0.2 tenths of mile, adjacent to NOAA weather station.	44.57755	-71.7843583	Geographic

1 - 4 of 4



**Agency:** Vermont Department of Environmental Conservation

**Site Name:** Moose River 26.3, 211200000263

**Waterbody Name:** Moose River

**Location Description:** Located above Gallup Mills, bridge about 0.2 tenths of mile, adjacent to NOAA weather station.

**State:** Vermont

**Organization Category:** State

[NorEaST Site Details](#)

[Zoom to](#)

...and by sampling event: there can be multiple sampling events at a given location

Reports **2 Sites with Temperature Data**
 Rows **15**

- Row text contains 'vt\_dec'
- Temperature Data Exists = 'Y'

1 - 5 of 5

Create event for this site	Edit Event	View Data	NorEaST ID	Site Name	Agency	Deployment Date	Retrieval Date	Event Month	Event Year	Measurement Type	Temperature Type	Temperature Units	Temperature Data Exists	Public Allowed Flag	Site Status
<a href="#">New Event</a>			VT_DEC_28148	Moose River 26.3, 211200000263	Vermont Department of Environmental Conservation	09/10/2013	11/06/2013	09	2013	RAW	WATER	C	Y	Y	ACTIVE
<a href="#">New Event</a>			VT_DEC_28148	Moose River 26.3, 211200000263	Vermont Department of Environmental Conservation	05/01/2013	09/10/2013	05	2013	RAW	WATER	C	Y	Y	ACTIVE
<a href="#">New Event</a>			VT_DEC_28144	Lewis Creek 3.7, 530000000037	Vermont Department of Environmental Conservation	05/05/2010	11/15/2010	05	2010	RAW	WATER	C	Y	Y	ACTIVE
<a href="#">New Event</a>			VT_DEC_28144	Lewis Creek 3.7, 530000000037	Vermont Department of Environmental Conservation	05/12/2011	11/08/2011	05	2011	RAW	WATER	C	Y	Y	ACTIVE
<a href="#">New Event</a>			VT_DEC_28144	Lewis Creek 3.7, 530000000037	Vermont Department of Environmental Conservation	04/22/2009	10/21/2009	04	2009	RAW	WATER	C	Y	Y	ACTIVE

Users can create new sampling events ...view other events for this site

..... and Upload unit values or daily summaries

NorEaST

Home > NorEaST Sites > NorEaST Events > Form on Events

Add/Update Sampling Event

Cancel Delete Apply Changes

Event Id 2180

Site \* Lewis Creek 3.7, 530000000037 - Lewis Creek

Measurement Type \*  Raw  Daily

Temperature Type \*  Water  Air

Temperature Units \*  C  F

Public Allowed? \*  Yes  No

Logger Deployment Date

Deployment Time  (HH24MI)

Logger Retrieval Date

Retrieval Time  (HH24MI)

Logger ID

Logger Type and Model

Logger Serial Number

Measurement Interval

Other Data

24 of 2000

Comments

25 of 4000

Data Entry Name jsstewar@usgs.gov

Data Entry Date 29-APR-14

Last Update Name

Last Update Date

Other Events for this Site

Edit Event	Start Date	End Date	Temperature Type	Measurement Type	Temperature Units	Logger Info	Temperature Data Exists?
	04/22/2009	10/21/2009	WATER	RAW	C	ID: Type/Model: Stowaway TidbiT Serial Number: 971634	Yes
	05/12/2011	11/08/2011	WATER	RAW	C	ID: Type/Model: Optic StowAway-TEMP(C)ONSET -28C TO 50C Serial Number: 2261742	Yes

1 - 2

Stream Temperature Data File Upload

Upload Data

The temperature data file must be a tab-delimited .txt or .csv file, with columns ordered as follows:  
RAW Data: MEASUREMENT\_DATE, MEASUREMENT\_TIME, TEMPERATURE\_VALUE

DAILY Data: MEASUREMENT\_DATE, MIN\_VALUE, MAX\_VALUE

The upload process will skip the first line, assuming it's header information. If your data does not contain headers then put a carriage return before the first line to ensure that all your data is loaded.

Upload Temperature File  lewis crk 3.7d2010.txt

Users can view **Tabular** stream temperature data for an event ...

NorEaST

welcome, jana.stewart. logged in as admin | Edit User Profile | Change Password | NorEaST Mapper | Help for this page | Logout

Tabular Temperature Data | Time Series Plot

Home > NorEaST Sites > NorEaST Events > Temperature Data

Q: [ ] Go Rows: 15 Actions

Selected Site [ ] [ ]

NorEast ID	Site Name	Measurement Date	Measurement Time	Measurement Date/Time	Body Name	Location Description	Latitude	Longitude
VT_DEC_28148	Moose River 26.3, 211200000263	05/01/2013	15:38	05/01/2013 15:38		Located above Gallup Mills, bridge about 0.2 tenths of mile, adjacent to NOAA weather station.	44.57755	-71.1
VT_DEC_28148	Moose River 26.3, 211200000263	05/01/2013	16:38	05/01/2013 16:38		Located above Gallup Mills, bridge about 0.2 tenths of mile, adjacent to NOAA weather station.	44.57755	-71.1
VT_DEC_28148	Moose River 26.3, 211200000263	05/01/2013	17:38	05/01/2013 17:38		Located above Gallup Mills, bridge about 0.2 tenths of mile, adjacent to NOAA weather station.	44.57755	-71.1
VT_DEC_28148	Moose River 26.3, 211200000263	05/01/2013	18:38	05/01/2013 18:38	10.8			

**Actions**

- Select Columns
- Filter
- Rows Per Page
- Format
- Save Report
- Reset
- Help
- Download

**Filter**

Filter Type:  Column  Row

Column: Create event for this site Operator: = Expression: [ ]

Cancel Apply

**Download**

Choose report download format:

CSV
  HTML
  Email

Cancel

# Users can graph stream temperature Time Series data ...for an event

**NorEaST** | welcome, jana stewart, logged in as admin | [Edit User Profile](#) | [Change Password](#) | [NorEaST Mapper](#) | [Help for this page](#) | [Logout](#)

[Tabular Temperature Data](#) | **Time Series Plot**

Home > NorEaST Sites > NorEaST Events > Time Series Plot

**Filter Chart**

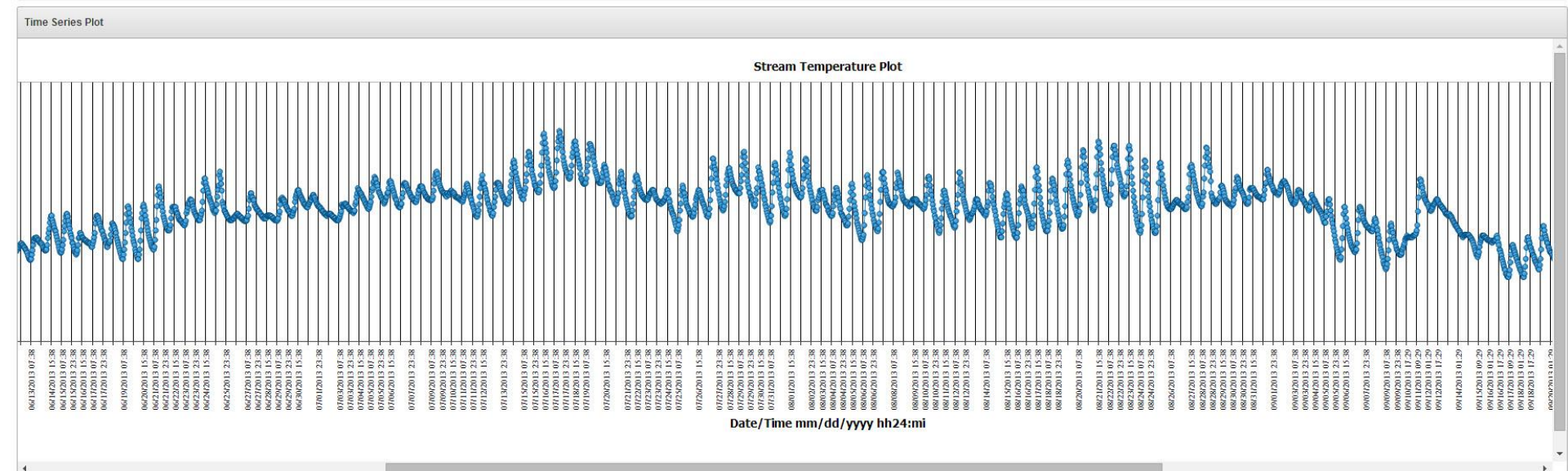
Site:

Select Series to Display:

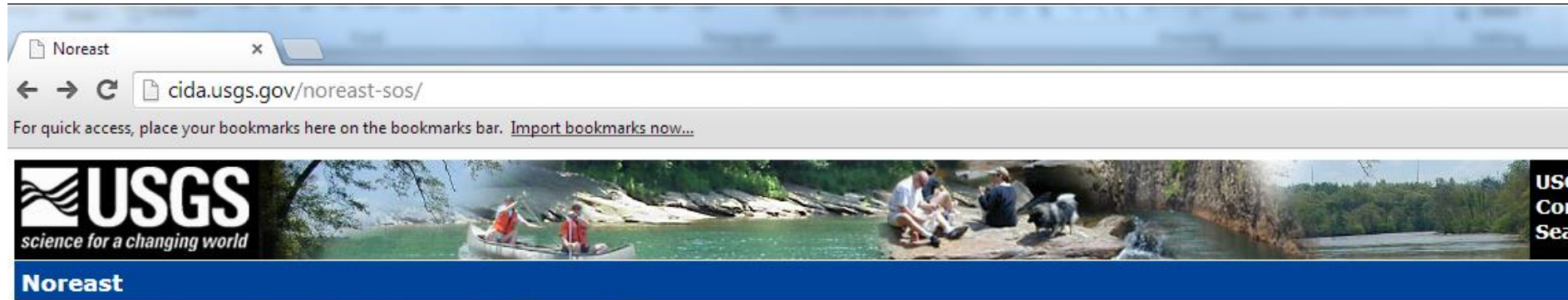
- Raw Data
- Daily Summary Data
- Air Data

Date range between:  and

[Refresh Plot](#)



# Web services for data retrieval (public)



## • Sensor Observation Service - getObservation

**GetObservation** - featureID(required), observedProperty(required), offering (required), beginPosition(optional), endPosition(optional), Interval(optional), Latest(optional)

observedProperty: AIR, WATER  
offering: RAW, MIN, MAX (defaults to RAW)

Simple NOREAST Request:

<http://cida.usgs.gov/noreast-sos/simple?request=GetObservation&featureID=MD-BC-BC-05&offering=RAW&observedProperty=WATER>

Simple NOREAST Request adding begin and end positions:

<http://cida.usgs.gov/noreast-sos/simple?request=GetObservation&featureID=MD-BC-BC-05&offering=RAW&observedProperty=WATER&beginPosition=2010-08-01T00:00:00&endPosition=2010-08-02T00:00:00>

Simple NOREAST Request for daily max water:

<http://cida.usgs.gov/noreast-sos/simple?request=GetObservation&featureID=MD-DNR-NBP0689&offering=MAX&observedProperty=WATER>

Simple NOREAST Request for daily max water with time range:

<http://cida.usgs.gov/noreast-sos/simple?request=GetObservation&featureID=MD-DNR-NBP0689&offering=MAX&observedProperty=WATER&beginPosition=2011-04-12T00:00:00&endPosition=2011-05-12T00:00:00>

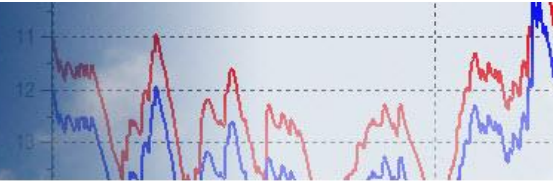
Simple NOREAST Request for raw air:

<http://cida.usgs.gov/noreast-sos/simple?request=GetObservation&featureID=MD-BC-BC-23&offering=RAW&observedProperty=AIR>

*Data retrieval from NorEaST is consistent with WML2 standards:*

# WaterML2

A Global Standard for Hydrological Time Series



WaterML2 is a new data exchange standard in Hydrology which can basically be used to exchange many kinds of hydro-meteorological observations and measurements. WaterML2 has been initiated and designed over a period of several years by a group of major national and international organizations from public and private sector, such as [CSIRO](#), [CUAHSI](#), [USGS](#), [BOM](#), [NOAA](#), [KISTERS](#) and others. WaterML2 has been developed within the OGC Hydrology Domain Working group which has a mandate by the WMO, too.

[Download PDF](#)

Examples:

- [example.wml](#)
- [example.wmz](#)

## Objectives of WaterML2:

- provide a common exchange format for hydrological time-series
- build on existing standards like GML and Observations & Measurements
- provide the option to fully store information including information regarding quality, validity/interpolation, and remarks
- currently it is NOT an objective to provide a comprehensive format with a minimum of characters

Related links:

- [WaterML2 @ OGC](#)
- [HydroDWG](#)
- [SWG](#)
- [GML](#)
- [O&M](#)

## Small code example with explanations:

```

1. <wml2:Collection xsi:schemaLocation="http://www.opengis.net/waterml/2.0
http://www.opengis.net/waterml/2.0/waterml2.xsd" gml:id="Ki.Col.1">
2.   <gml:description>KISTERS KiWIS WaterML2.0</gml:description>
3.   <wml2:metadata>
4.     <wml2:DocumentMetadata gml:id="Ki.DocMD.1">
5.       <wml2:generationDate>2012-06-12T12:10:12.670+00:00</wml2:generationDate>
6.       <wml2:generationSystem>KISTERS KiWIS</wml2:generationSystem>
7.     </wml2:DocumentMetadata>
8.   </wml2:metadata>
9.   <wml2:temporalExtent>
10.    <gml:TimePeriod gml:id="Ki.TempExt.1">
11.      <gml:beginPosition>1990-09-01T00:00:00.000+01:00</gml:beginPosition>
12.      <gml:endPosition>1990-09-30T00:00:00.000+01:00</gml:endPosition>
13.    </gml:TimePeriod>
14.  </wml2:temporalExtent>
15.  <wml2:observationMembers>

```



## *Web Services – NorEaST data can also be accessed using R routines and R Scripts to retrieve data from multiple sites*

- The package to use is: <https://github.com/USGS-R/dataRetrieval>
- Go to the [Package Installation](#) section install.
- The function for retrieving data is called **getWaterML2Data**  
<https://github.com/USGS-R/dataRetrieval/blob/master/R/getWaterML2Data.r>
- This function only pulls the time series out of the xml files.
- Can modify **getWaterML2Data** code to retrieve metadata
- In RStudio, the steps to retrieve data are:  

```
install.packages(c("zoo", "XML", "RCurl", "plyr", "reshape2"))
install.packages("dataRetrieval", repos="http://usgs-r.github.com")
library(dataRetrieval)
getWaterML2Data('http://cida.usgs.gov/noreast-sos/simple?request=GetObservation&featureID=MD-BC-BC-05&offering=RAW&observedProperty=WATER&beginPosition=2010-08-01T00:00:00&endPosition=2010-08-02T00:00:00')
```

- The retrieved data will look like this:

	<b>time</b>	<b>value</b>	<b>qualifier</b>
1	2010-08-01 00:58:00	17.855	NA
2	2010-08-01 03:38:00	17.665	NA
3	2010-08-01 07:18:00	17.475	NA
4	2010-08-01 08:38:00	17.665	NA

## Web Services – Public

If data stewards have approved the data for public release, users can query and graph data, and use web services to retrieve data

**USGS** science for a changing world

NorEaST - Site Data Summary - Query Results

Site Parameters

MD-BC-BC-05

- AIR - RAW  
06/01/2010 - 08/31/2010
- WATER - RAW  
06/01/2010 - 08/31/2010

Date Range (default 1 week)

August 24, 2010 - August 31, 2010 **Build Chart** Reset Chart

Site Location

**Unnamed tributary to Prettyboy Reservoir, south of Clipper Mill Road**  
Baltimore County Department of Environmental

Site Summary Data - MD-BC-BC-05

Zoom 1m 3m 6m YTD 1y All From Aug 25, 2010 To Sep 1, 2010

Friday, Aug 27, 01:30-01:59  
WATER - RAW: 17  
AIR - RAW: 16.5

Highchart

Site data summary: [http://cida.usgs.gov/northeast-sds/results/NorEaST\\_ID](http://cida.usgs.gov/northeast-sds/results/NorEaST_ID)

## Web Services – Public

If data stewards have approved the data for public release, users can query and graph data, and use web services to retrieve data



[USGS Home](#)  
[Contact USGS](#)  
[Search USGS](#)

NorEaST - Site Data Summary - Query Results

v0.0.1

### Site Parameters

MD-BC-BC-05

- AIR - RAW  
06/01/2010 - 08/31/2010
- WATER - RAW  
06/01/2010 - 08/31/2010

### Site Location

**Unnamed tributary to Prettyboy Reservoir, south of Clipper Mill Road**

*Baltimore County Department of Environmental*



### Date Range

(default 1 week)

April 29, 2009 - April 29, 2014

Build Chart

Reset Chart

### Site Summary Data - MD-BC-BC-05

Zoom 1m 3m 6m YTD 1y All

From Jun 13, 2010 To Aug 1, 2010



Highcharts.com

## ***Benefits*** - provides flexibility depending on agency needs

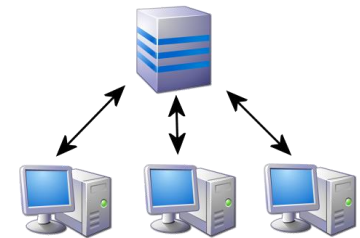
- For agencies that do not have their own database

- The NorEaST Web Portal Database allows agencies to store, update, edit, and quality assure temperature data instead of building their own databases.

- For agencies with their own enterprise database

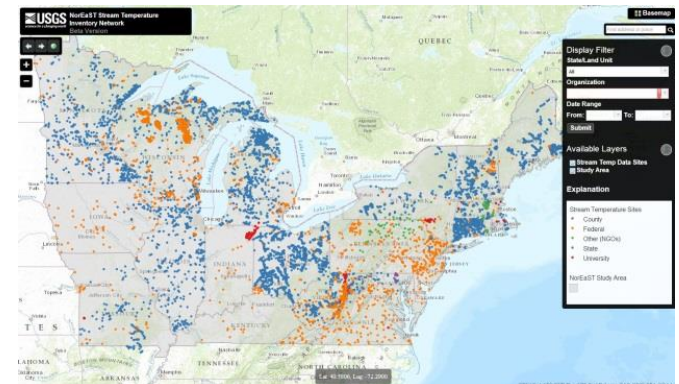
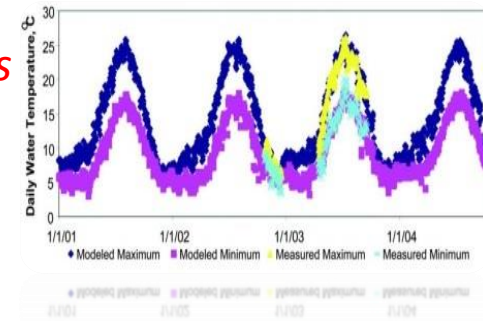
The NorEaST Web Portal Database can connect to existing agency data base using web services

- Does not duplicate data
- Compliant with agencies' data sharing policy
- Provides contact information for data inquiries



# Additional benefits...

- *Community* of contacts
- *leverage* monitoring efforts and data across agencies
- *Database and data standards* to manage data
- Data framework for *comparison, regional analysis, and applications*
- *Temperature models* for some states/regions will be built
- Information to plan for and assess effects of *climate change* on streams



# Future Directions, Needs, and Opportunities

User-testing and on-boarding of users

- Webinar (June 18 – 19)
- User testing meeting (September)

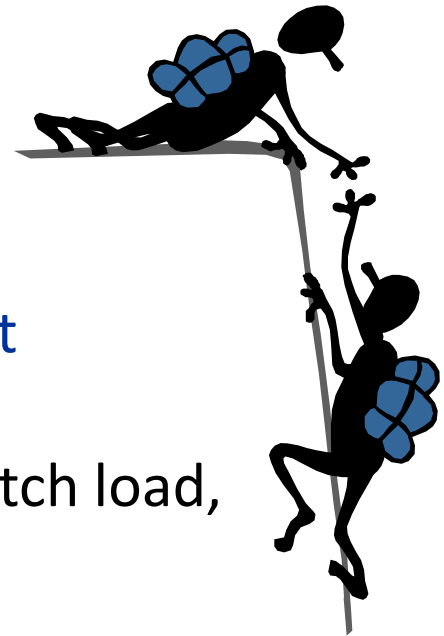
\$\$ Funding for continued development and support

Expand functionality and improve performance (batch load, upload QAPPs, graphing, reports, etc.)

Build additional web services to support other applications

Expand to include:

- Other geographic regions
- Other site types (estuaries, lakes, groundwater)



**Funding** *Northeast Climate Science Center*

**Data** *Data providers (see Next slide)*

**Experiences** *Jeff Deacon, USGS*  
*Callie McConnell, USFS*  
*Dan Isaak, USFS*  
*Gwynne Chandler, USFS*  
*Jennifer Jacobs, UNH*

**NorEaST** *Evan Chambers, UW Platteville*

**Team** *Travis Weaver, UW Platteville*

**Members** *Mike Slattery, USGS Tunnison Lab of Aquatic Sciences*  
*Rob Alexander, USGS Tunnison Lab of Aquatic Sciences*  
*Kyle Herreman, Michigan State University*  
*Lynne Brennan, U Mass, Amherst*  
*Kyle O'Neill, U Mass Amherst*  
*Jon Morrison, CT Water Science Center*  
*Bill Davies, USGS MD/DC Water Science Center*  
*Jen Krstolic, USGS VA Water Science Center*  
*Brian Hasty, USGS VA Water Science Center*  
*Brandon Fleming, USGS MD/DC Water Science Center*



# Thanks!

*Thanks to our contributors!*

Organization Type	Organization Count	Site Count
Federal	3	2004
State	25	7460
Local/Regional/NGO	9	131
University	10	149
<b>Total</b>	<b>47</b>	<b>9744</b>

**Federal**

- US Forest Service
- US Geological Survey
- US Fish and Wildlife Service

**State**

- CT Department of Environmental Protection
- IA Department of Natural Resources
- IL Department of Natural Resources
- IL Environmental Protection Agency
- IN Department of Environmental Management
- MA Division of Fisheries and Wildlife
- MA Department of Environmental Protection
- MA Division of Ecological Restoration
- MD Department of Natural Resources
- ME Department of Marine Resources
- ME Department of Environmental Protection
- MI Department of Natural Resources (IFR)
- MN Department of Natural Resources
- MN Pollution Control Agency
- MO Department of Conservation
- NH Department of Environmental Services
- NH Department of Fish and Game
- NJ Department of Environmental Protection
- NY Department of Environmental Conservation
- OH Environmental Protection Agency
- VT Department of Environmental Conservation
- VT Fish and Wildlife Department
- WI Department of Natural Resources
- WV Department of Environmental Protection
- WV Department of Natural Resources

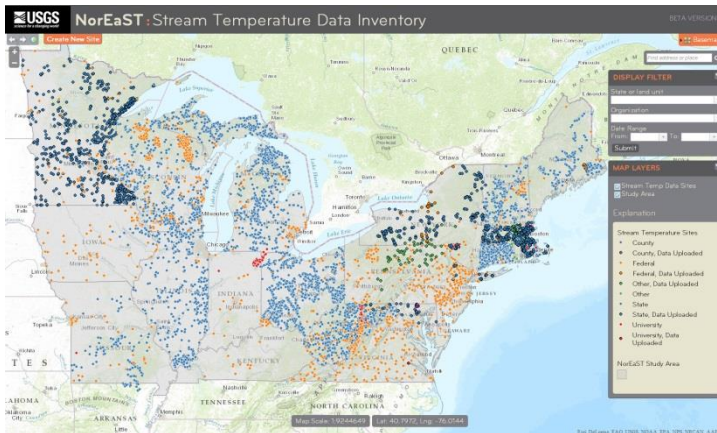
**Local/Regional/NGO**

- Baltimore County Department of Environmental Protection
- Charles River Watershed Association
- French River Connection
- Hoosic River Watershed Association
- Nashua River Watershed Association
- Rushing Rivers Institute
- Susquehanna River Basin Commission
- Wood-Pawcatuck Watershed Association

**University**

- Cornell University
- George Mason University
- IN Purdue University Fort Wayne
- Southern IL University
- University of Virginia
- University of Massachusetts – Boston
- University of Missouri
- Virginia Institute of Marine Science
- Virginia Commonwealth University
- West Virginia University

*and the list is growing.....*





# QUESTIONS ?

