



new jersey  
department of environmental protection

njdep



# Exchanging Ambient Water Quality Data: A New Jersey Perspective on Transitioning from STORET to WQX

Presented by

Paul Morton

NJDEP Water Monitoring and Standards



Presented at the  
National Water Monitoring Conference  
Atlantic City, New Jersey  
May 20, 2008



NJDEP Water Monitoring and Standards

# Presentation Overview



- Review the **need** for ambient water quality monitoring results
- Identify the **challenges** facing NJDEP in migrating from STORET to WQX
- Describe the **solutions** NJDEP will be implementing
- Share **lessons learned**



# Project Goals

- Develop an up to date, searchable **inventory** of ambient water quality monitoring in New Jersey
- **Integrate** ambient water quality monitoring data into NJDEP's enterprise environmental data management system (NJEMS) to enable more integrated environmental decisions
- Make NJ's ambient water quality monitoring data **available** to the public
- **Exchange** ambient water quality monitoring data with USEPA via EPA's Central Data Exchange (CDX)

Funding: **National Environmental Information Exchange Network Grant**

# Project Partners



- NJ Water Monitoring Coordinating Council (Inventory)
- NJDEP
  - Bureau of Water Quality Standards and Analysis
  - Bureau of Freshwater and Biological Monitoring
  - Bureau of Marine Water Monitoring
  - Division of Watershed Management
  - Division of Science, Research, and Technology
- NJ DHSS Laboratory
- Local / County Governments
- Volunteer Monitors
- USEPA
- USGS



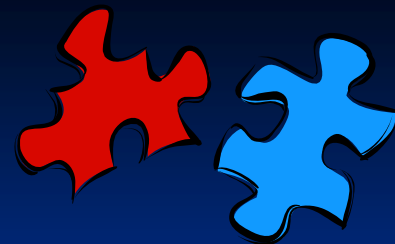
# Need for Ambient Water Quality Monitoring Results

- High quality ambient water quality monitoring results are essential to timely, accurate **statewide water quality assessments** and Total Maximum Daily Load (**TMDL**) calculations.
- States and other organizations are required to use all “**publicly available**” water quality data in making assessments and TMDL calculations
- Relating ambient water quality monitoring results to regulated **facility** data and land use enhances assessments and calculations
- Ambient monitoring results are critical to assessing the **effectiveness of water quality based management practices**





# Challenges



- EPA will **stop accepting Oracle exports** from local copies of STORET, but sending the data to EPA is still a grant requirement
- **XML** and the Exchange Network is **very new** to many of us
- Even with STORET we don't have a good handle on **who** is doing **what** monitoring, **where** they are doing it, **when** they do it and **why**
- Because STORET and NWIS use different formats, it is a **major reformatting** headache to combine data from both sources for assessment purposes



# Findings 1



- Monitoring results exist in **many different locations, formats** and data systems
- Many **partners want metadata** and QA Project Plans (and not just “the number”)
- XML is very new to many partners and they lack the **tools to generate and exchange XML files**
- **Data translation and normalization** is a major time consumer for partners looking to combine results from multiple data sources.



# Findings 2



- There is a **risk from depending solely on desktop solutions** (and individual developers)
- Sole dependence on national solutions is unappealing due to **changing national priorities and business practices** which don't always reflect the local needs
- Successful IT solutions become popular resulting in **heavy use which degrades performance** (which makes them less popular)
- **Audit trails are becoming a higher priority** due to challenges to database integrity (How do I know you didn't mess with the data?)





# Findings 3



- Programs like keeping their personal/desktop databases.
  - Biologists: for metric and index calculations that undergo development/refinement
  - Data Consumers: because assessment protocols get refined and they need to apply best professional judgment
- Critical for data generators (monitoring) staff, data consumers (305(b)/303(d), TMDL Calculations), and IT staff to **communicate and be involved in all phases**
- Ambient monitoring is very different from facility or drinking water monitoring and trying to apply solutions from the later two doesn't work



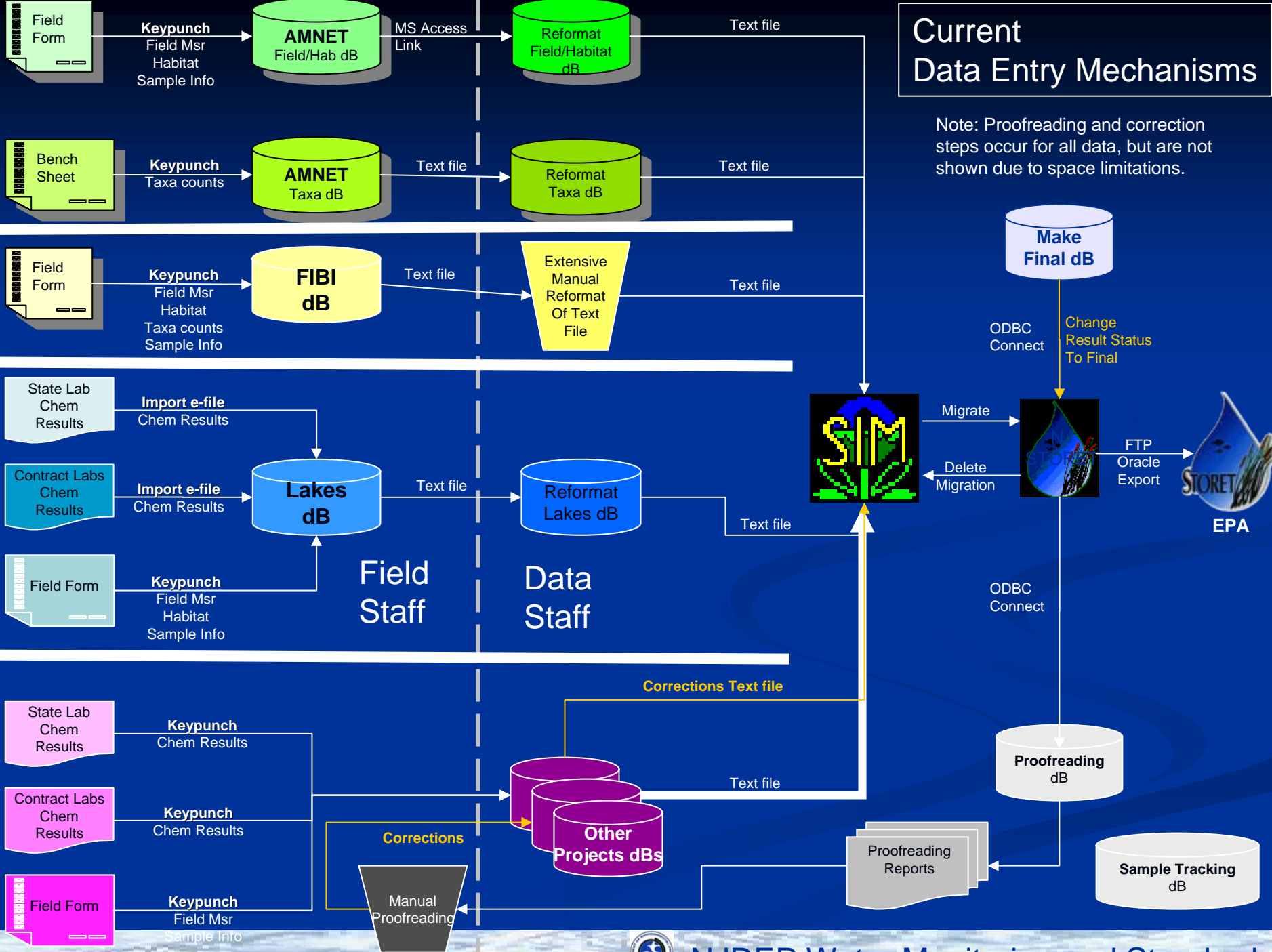


# Solutions

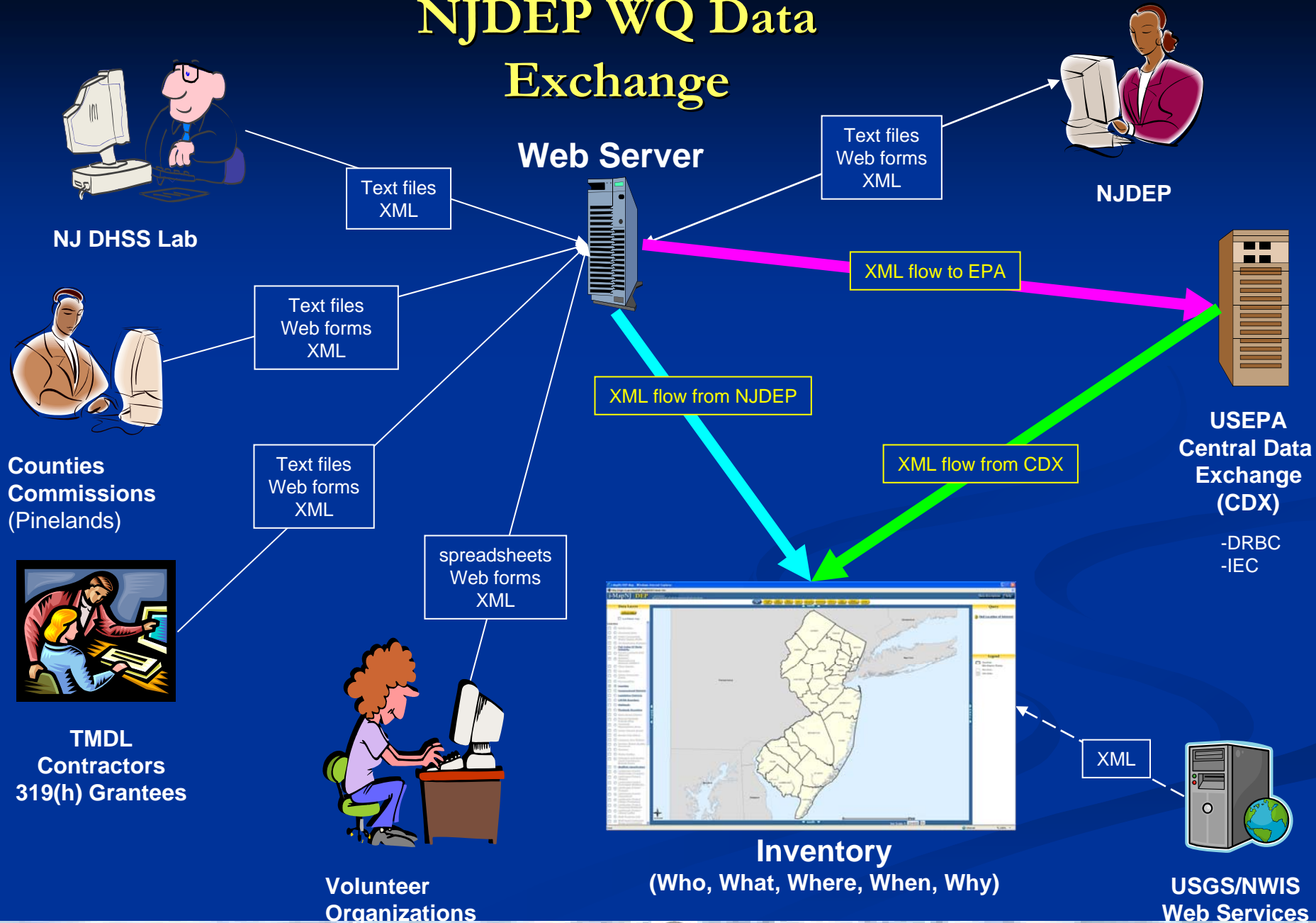


- We are building a **Web based application** to accept data from multiple partners and send it to EPA via our Exchange Network node
- Monitoring programs will **keep their desktop databases** for metric calculation, data assessment and reporting due to the small base of users and frequently changing requirements
- XML is too big a leap for many groups, so we are building our application using **Web forms and text files**
- Our application will include an up to date, **searchable inventory of ambient water monitoring**
- Our proposed “Give Back” to the EN Community will be to enhance the EN Browser and ENDS to **query both the USGS and EPA web services** and return the information in a common format.

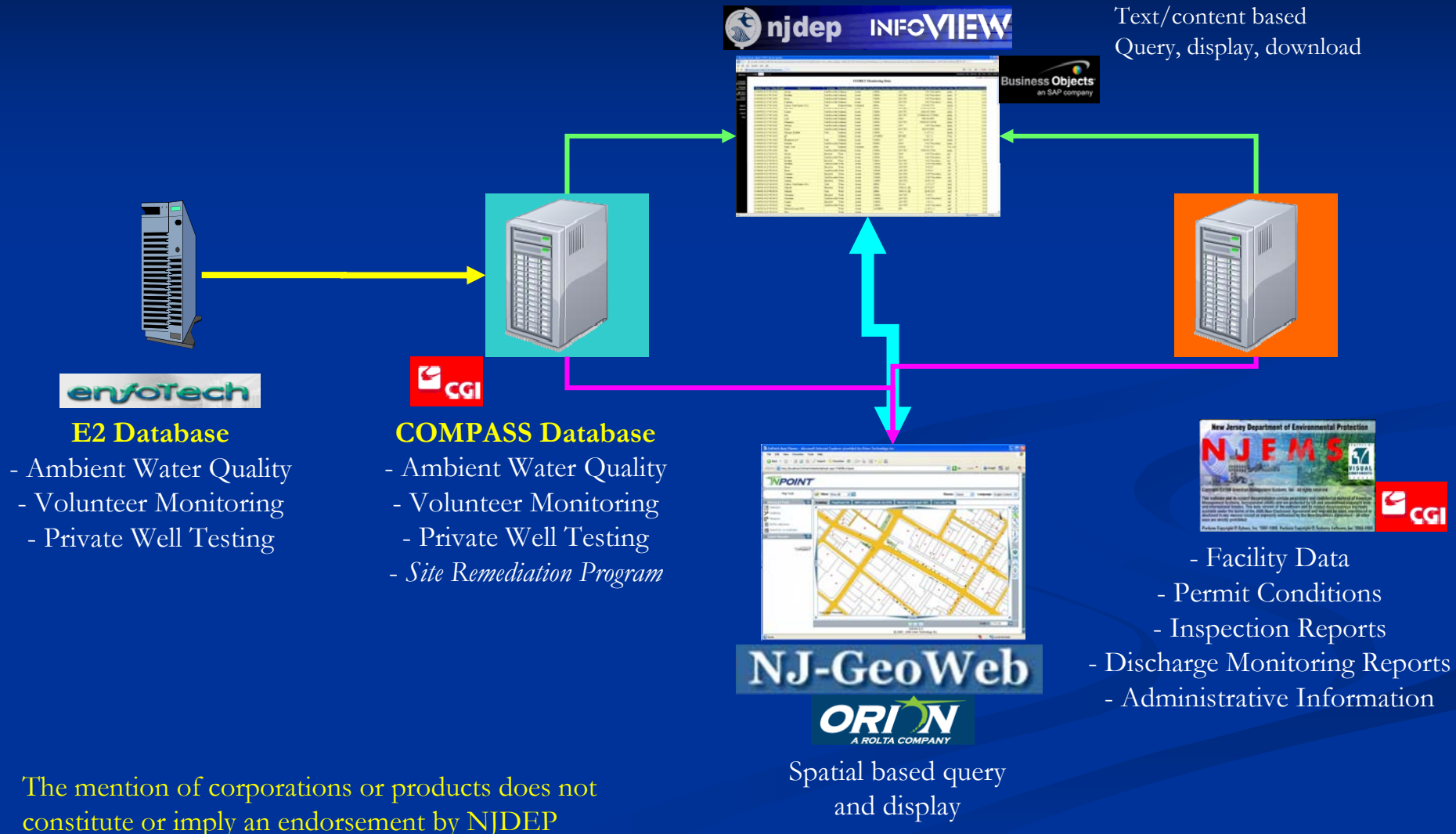




# NJDEP WQ Data Exchange



# NJDEP Enterprise Solution





# Core Components

WQX Module on **E2**

(Web based solution for importing data)

Data **Validation** Procedures

(including historical range checks, characteristic unit pairing and logical checks)

NJ Water Monitoring **Inventory** and Data Portal

(Web based query and mapping of monitoring project & results)

WQX **Schema Extension**

(accommodate additional data elements identified by partners)

**Internal Data Transmission** Services between E2 and NJDEP  
COMPASS database

Outbound Data **Transmission to CDX**





# Web Forms

One alternative for entering Information for:

- Organizations
- Projects
- Stations

Other alternative is batch loading XML or text files

## Organization Information

Organization Name: ☐ New Jersey Department of Environmental Protection

☐ Other:

Division:

Bureau:

Organization EPA Identifier:

Organization Description:

Organization Type:

Organization URL:

## Address

### Location

Address Line 1:

Address Line 2:

City:

State:

Zip Code:

[Copy Address](#)

### Mailing

Address Line 1:

Address Line 2:

City:

State:

Zip Code:

## Contact Information

Contact Name:

Phone:

Phone Type:

Email:

[Submit](#)



# .csv Import Mapping Procedure (CIMP)



Import Configurations

Configuration Header

Configuration File Name:  User/Owner:

Description:

Config File Type:

Text Delimiter:

☒ Skip Header in Import File

Configuration Details

Req.?	Position / Order	Column Name	Auto-Generate Column	Default Value	Insert Value if Empty	Max Length	Data Type	Data Format	Characteristic / Unit Pair (Data Logger)	Characteristic	Unit
<input type="checkbox"/>	<input type="text"/>	Activity Start Date	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Project ID	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Monitoring Location ID	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Activity ID	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Activity Type	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Result	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Characteristic	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Unit	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
<input type="checkbox"/>	<input type="text"/>	Analytical Method	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Add New Row Mapping Translations Group Codes

Exit Save

Tell CIMP which column holds which piece of info. Option to fill in blanks, generate new columns and define formats (ex. date)  
Can even import continuous data (data sonde/hydrolab/data logger information in the one column per Characteristic layout



# Translation



Mapping Translations

Configuration File Name:

Column Name	Value Provided	Map To
<input type="text" value="Characteristic Name"/>	<input type="text" value="DO"/>	<input type="text" value="Dissolved Oxygen"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

CIMP scans the file. If it finds values not in its allowed lists (domain values) it prompts you to provide a translation. Option to map this information ahead of time and to import/export these translations so they can be used by others



# Data Element Groups

## (reduce the load on data submitters)

### ■ Sample Collection Group:

- MethodIdentifier
- MethodIdentifierContext
- MethodName
- MethodQualifierTypeName

### ■ Characteristic Group

- CharacteristicName
- MethodSpeciationName
- ResultSampleFractiontext
- ResultMeasureUnitCode

### ■ Sample Preparation Group:

- MethodIdentifier
- MethodIdentifierContext
- MethodName

### ■ Analysis Method Group:

- MethodIdentifier
- MethodIdentifierContext
- MethodName

Define the group code once then submit the group code rather than all the parts that make up the code



# Input Data Validation

- Compared to historical range for Characteristic
- Checked for appropriate Characteristic unit pairings
- Checked for dissolved < total (within error ranges)





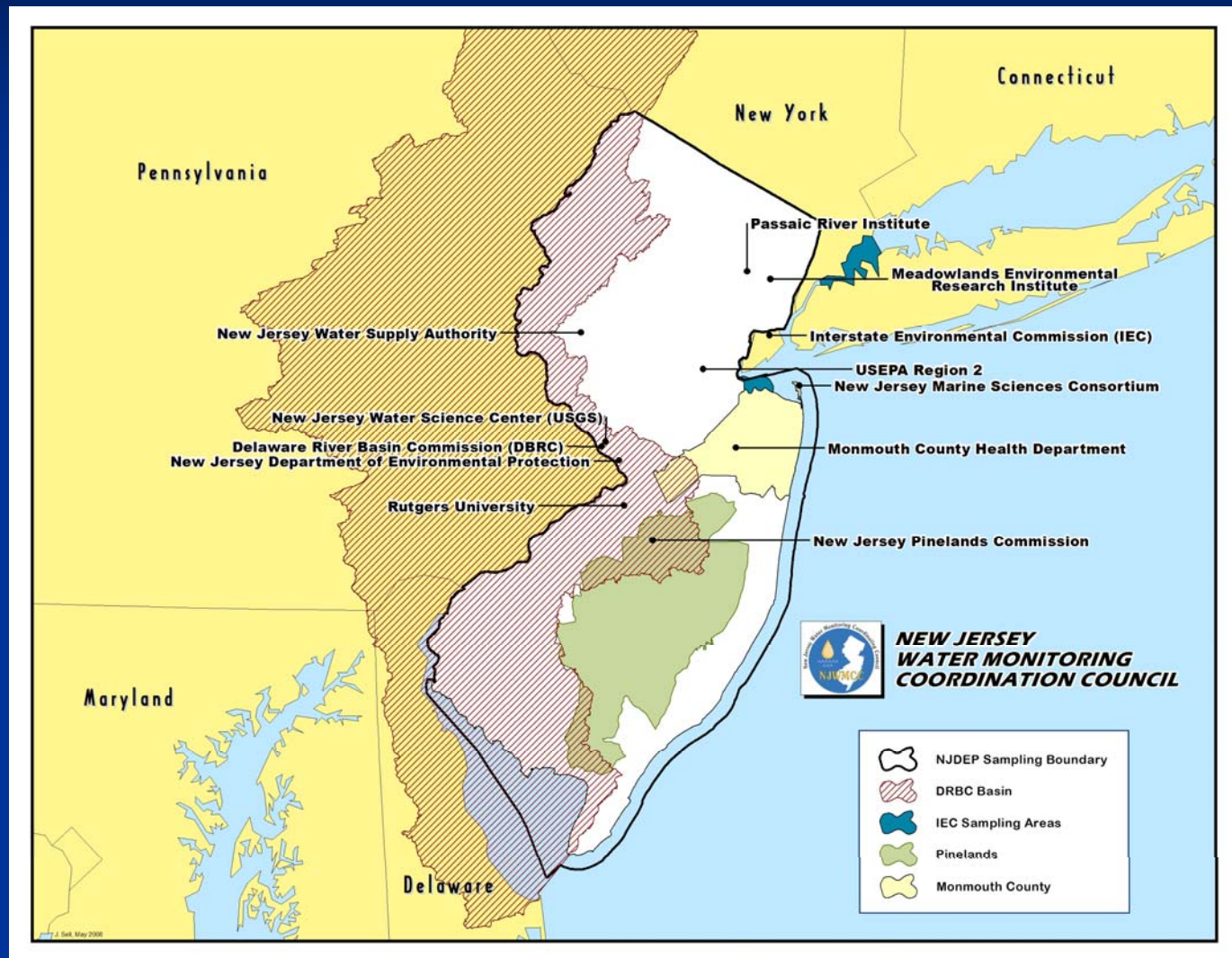
# Possible Inventory Solution

- Improve Exchange Network Browser to:
  - Make it more user-friendly
    - Easier to use User Interface
    - Change focus from EN-audience only to include non-EN-audience
  - Meets business needs for discovering/retrieving/viewing water quality data
  - Improve mapping capabilities for querying/viewing
  - Ensure solution is generic to so it can be applied to:
    - Other data providers of water quality data
    - Other data flows (air, waste, etc...)





# Inventory Users



# Service Discovery



## Exchange Network Browser

Environmental Information



Welcome to the Exchange Network Browser. This tool allows people to discover and retrieve data from environmental data providers who have published their data on the [Exchange Network](#) and registered their data with the Exchange Network Discovery Service.

### What Kind of Data Are You Looking For?

☒ Ambient Water Quality Data

Water Quality eXchange (WQX) data captures ambient water quality monitoring projects, stations, activities, and may include chemical, biological, physical habitat, or population census results.

☒ Ambient Air Quality Data

Provides ambient air quality monitoring data published by states as part of the Air Quality Data Exchange (AQDE) data sharing initiative.

☐ Open Dump Inventory

Provides an inventory of Open Dumps, primarily provided by Tribal organizations.

Continue



# Service Query

Exchange Network Browser

Environmental Information



Ambient Water Quality Data

Ambient Air Quality Data

3 Data Providers Available

Filter Data Providers

GetWQXInventory

GetWQXData

Organization Information

Project Information

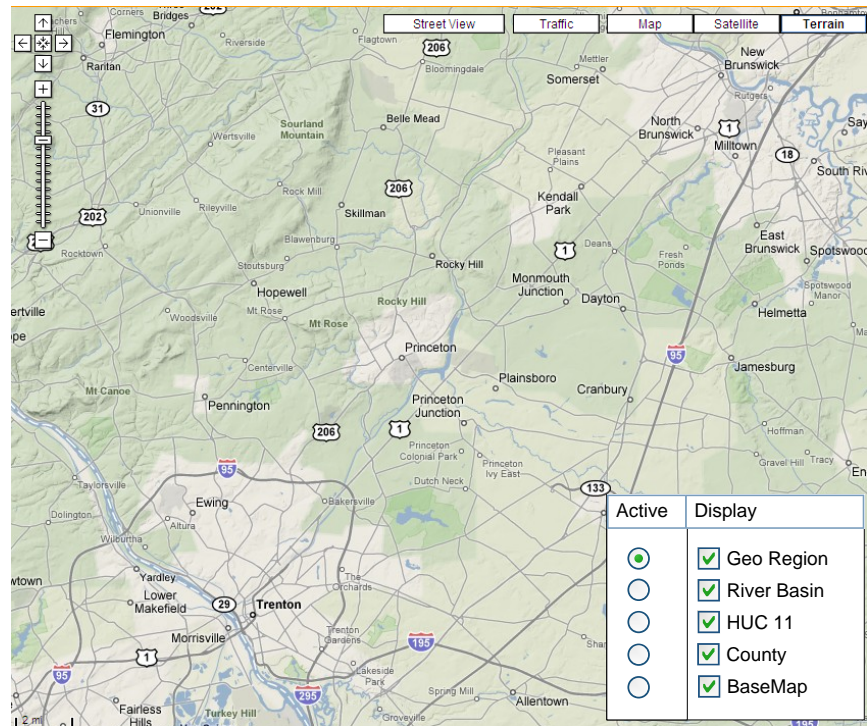
Geographic Information

Activity/Result Information

Temporal Information

Data Quality

Retrieve Data





# Search Activities/Results



Exchange Net

Environmental In

excha

Net

Search Criter

Ambient Water Qualit

GetWQXInventory

Organization Infor

Organization Na

Project Informatio

Project Name:

Geographic Infor

Geographic Reg

Sample & Analysi

Tidal Influence:

Temporal Informa

Project Start-En

Data Quality

QAPP Indicator:

Search Result

HTML

XML

Organization - Windows Internet Explorer

Activity 124 (S-0189394A)

Monitoring Location 12 (SAD-1928)

Project AMENT-2007

Activity Description

Activity Identifier: S-0189394A	Activity Type Code: Sample-Routine
Activity Media Name: Water	Activity Media Sub division Name: Surface Water
Activity Start Time: 2007-08-13, 14:20:00 (EST)	Activity End Time: 2007-08-14, 14:20:00 (EST)
Activity Relative Depth Name: Surface	Activity Depth Height Measure: 3feet
Project Identifier: AMENT-2007	
Monitoring Location Identifier	
Activity Area: Greendale	
Activity Season: Summer	
Data Included In Report Indices	
Runoff Impact: Severe	
Flow Status Indicator: High	
Biological Activity Description	
Assemblage Sampled Name: E	
Sample Collection Method	
Method Identifier: Grab	
Method Identifier Context: NJ	
Method Name: Sample-Grab	
Method Qualifier Type Name:	
Method Description Text: Stan	
Sample Collection Equipment	
Sample Collection Equipment	

File Download

Do you want to open or save this file?

Name: SubmissionXMLFile.xml

Type: XML Document

From: Iogan

Open

Save

Cancel

While files from the Internet can be useful, some files can potentially harm your computer. If you do not trust the source, do not open or save this file.

Activity Metric

Index Identifier: RBP07-A316-14	Metric Comment Text: 1 = min; 10 = max
Metric Score Numeric: 5	Metric Value Measure: 75percent
Activity Metric Type	Metric Type Citation
Metric Type Identifier: PerDom	Resource Title Name: NJ AMNET RBP Metrics
Metric Type Identifier Context: NJDEP-BFBM	Resource Creator Name: Miller
Metric Type Name: % Dominance	Resource Subject Text: RBP
Metric Scale Text:	Resource Publisher Name: BFBM
Formula Description Text: weighted average	Resource Date: 2004-08-13
	Resource Identifier: RBP-0123

Attached Binary Object

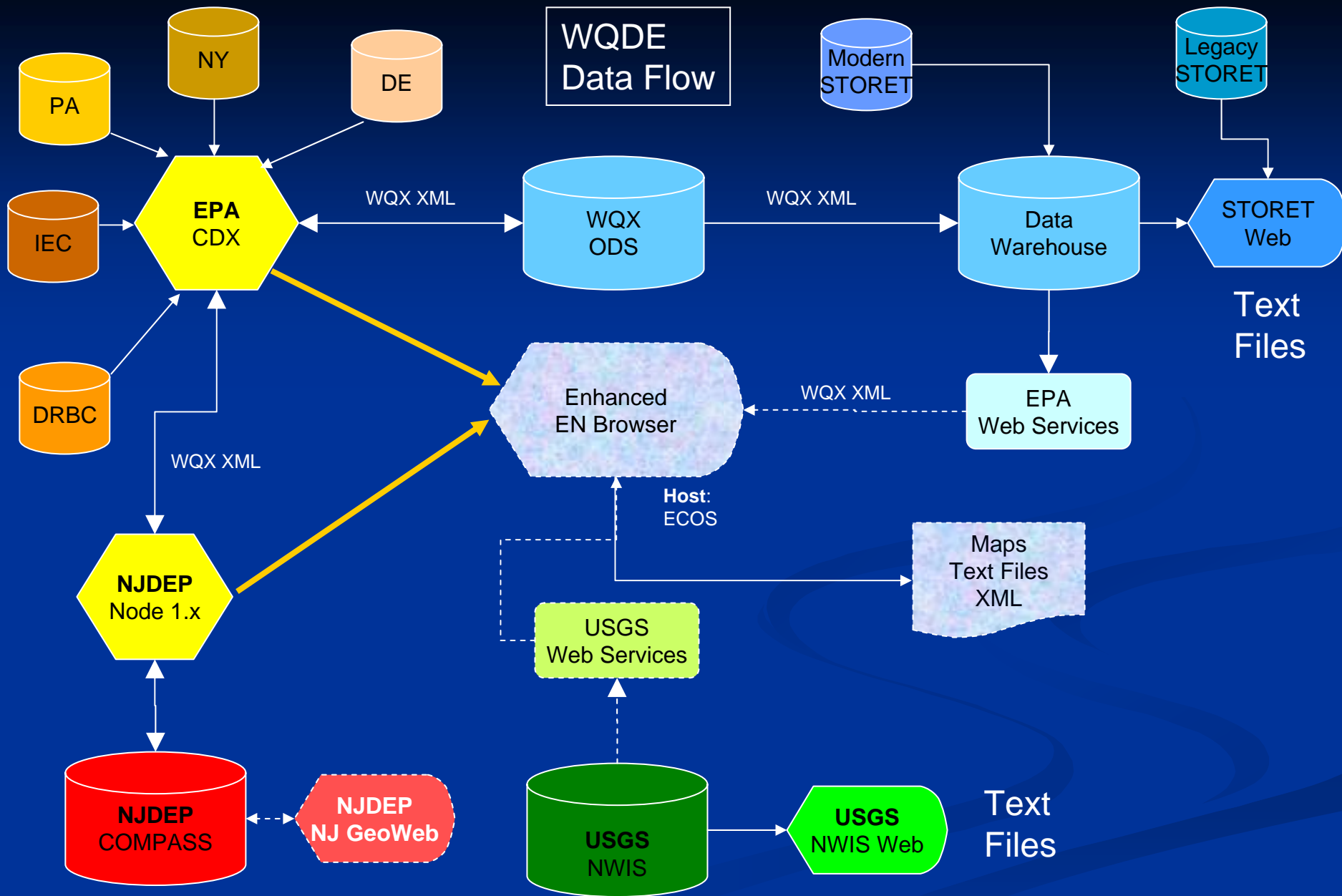
Binary Object File Name:	Binary Object File Type Code:	Binary Object File Location:
Trip - 0123	.jpg	http://njdepfilesserver.wqx.monloc.la-012

Result 214 (215156465489), Activity 124

Result Description

Result Identifier: 215156465489	Data Logger Line Name: 21
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# Status



- Business Process **Analysis** – Done!
- Functional **Requirements** Specifications and System Design – Done!
- System **Development**, Data Preparation and Implementation – “Data in” portion and database changes being deployed to a test server



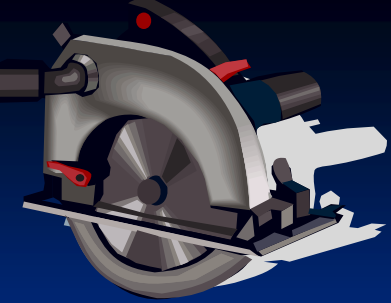


# Next Steps

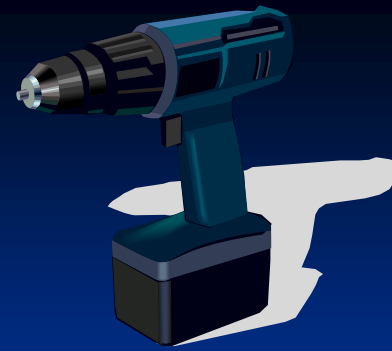


- Build and Test the System (summer/fall 2008)
- Train the Users
- Send data to EPA via CDX
- Get data from EPA and DEP via EN Browser
- Get data from EPA and USGS Web Services
- Target Date: **October 2009**





# Lessons Learned



- Find out what people really need to make their decisions.
- Reports and queries drive database design.
- Make sure you can get the data out correctly
- Test the system thoroughly.
- Strive to satisfy the needs of many (but not all) of the people
- Meet your deadlines and deliver what you promise
- Don't split the work among too many parties
- Communicate in the partner's terms, not database, IT or WQX
- A simple, easy, fast application is better than a comprehensive, slow one



# Additional Information

## ■ Inventory

- Poster session will be held tomorrow (Wednesday May 21<sup>st</sup>)

## ■ After Hours

- An after hours session for State and EPA representatives will be held Thursday afternoon and this subject will be discussed in detail

## ■ This Presentation

- Copies will be available on the NJ Water Monitoring Coordination Council Web page

<http://www.state.nj.us/dep/wms//wmcchome.html>



# Special Thanks To:

- Leslie McGeorge, Alena Baldwin Brown, NJDEP Water Monitoring and Standards
- Alfred Korndoerfer, Leigh Lager, Carol O'Donnell-Kee, NJDEP Bureau of Freshwater & Biological Monitoring
- Angela Witcher, NJDEP/Office of Information Resource Management
- Douglas Timms, EnfoTech & Consulting



# Contact Info

- Paul Morton

- NJDEP Water Monitoring & Standards

[Paul.Morton@dep.state.nj.us](mailto:Paul.Morton@dep.state.nj.us)

- Angela Witcher

- NJDEP Office of Information Resource Management

[Angela.Witcher@dep.state.nj.us](mailto:Angela.Witcher@dep.state.nj.us)

