

Developing Procedures for Water Quality Reporting for National Parks

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RTI
INTERNATIONAL



Overview

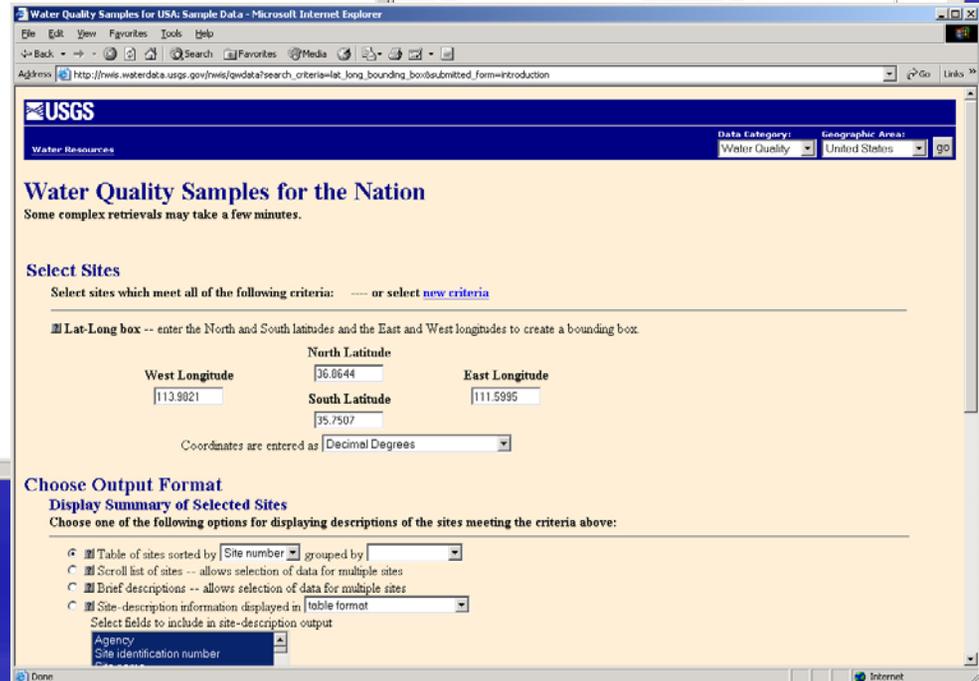
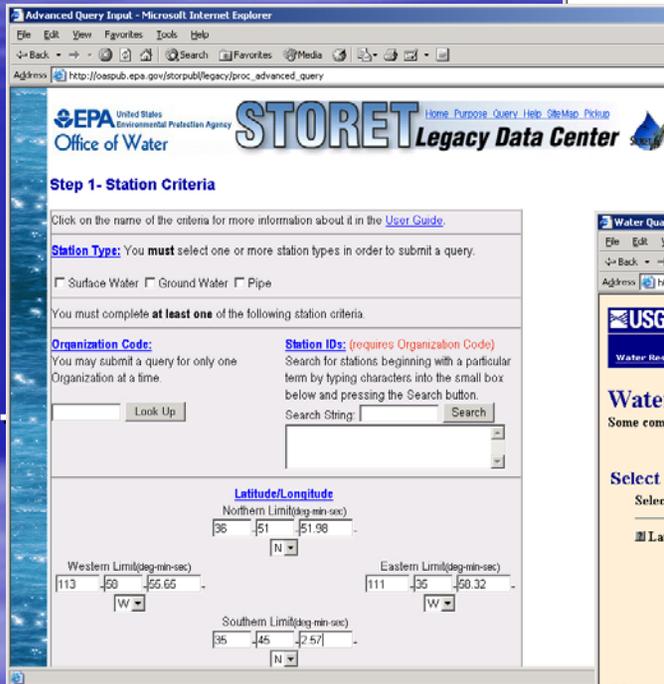
- NPS creates reports for each park in the NPS system.
- Each report contains a summary of monitoring data collected within the park or a specific 'Study Area' as defined by the NPS.
- The sources for this monitoring data are: Modernized STORET, Legacy STORET, and NWIS.

Some Issues

- Where and how to get the data?
- How to pull data for a geographical area?
- How to integrate data from the 3 data systems?
- How to report on data in ways that help assess water quality.

Where do you get the data?

3 Data Sources:



All

Getting the Data, an Example from Grand Canyon National Park



How can you pull all of the data for a geographical area?

Pull Data from Storet Data Warehouse

EPA > STORET > Result Search Summary - Microsoft Internet Explorer

Address: http://oaspub.epa.gov/storpub/DW_RESULT_COUNT

U.S. Environmental Protection Agency

STORET

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[EPA Home](#) > [Water](#) > [Wetlands, Oceans, & Watersheds](#) > [Monitoring and Assessing Water Quality](#) > [STORET](#) > Data Warehouse

Result Search Summary

Number of Results Returned: 678

Search Criteria

North Limit: 36.8644 NORTH

South Limit: 35.7507 NORTH

East Limit: 111.5995 WEST

West Limit: 113.9821 WEST

Activity Start Dates: ALL

Medium: ALL

Characteristic(s): ALL

Select 'Back' to modify search criteria and refine your query.
Select 'Continue' to generate a report based on your current selections.
You may customize the content of your report by selecting Data Elements below.

<<Back Continue>>

Select Data Elements for Report

Org ID Well Number Result Free Text

Org Name Pipe Number Weight Basis

Done Internet

Getting Data: The Alternate Route

- Not all data will come from the WWW:
 - Modernized STORET data are from a mirror copy of STORET running on NPS servers.
 - NPS has also loaded a copy of the STORET Legacy Data system on their server.
 - NWIS Data are from the web.
 - Why?

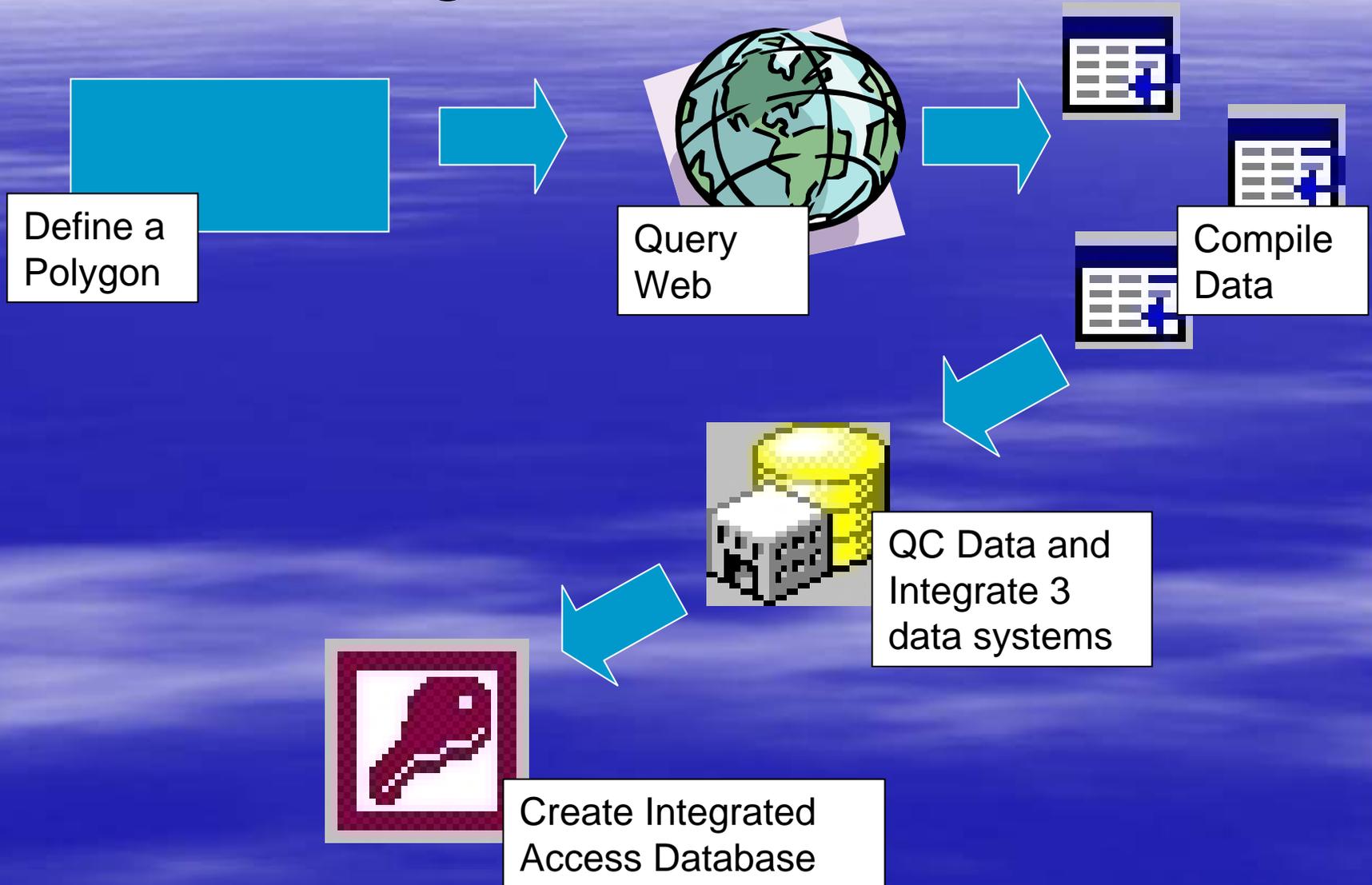
What are the primary considerations in integrating data from these three systems?

- Creating Unique Station IDs
- Removing duplicates
- Working with both Parameter Codes (PCODES) and Characteristics
- Common Units
- General QC of Data

Procedures developed address:

- Assigning new station IDs based on location
- Examining results for duplicates
- Reconciling STORET pcodes/characteristics
- Including procedures to check and correct dubious results

Getting the Data: Overview



Reports

- 20+ Complex reports in Microsoft Word
- Hyperlinks, Time History and Box and Whisker Plots, Tables, Footers, etc.
- Compiled together into one report.
- Invented new technology to make it work
- Broke down report into its individual components, with each component having properties

Reports

Page Element

Font Property

Header Row Element

Cell Elements

STATION/CHARACTERISTIC PERIOD OF RECORD TABULATION FROM 07/15/1983 TO 04/20/1993						
Station	In Pak	Characteristic/Parameter Name	Start-End	Years	Obs.	Plots
GRC A0029	Yes	AGENCY ANALYZING SAMPLE (CODE NUMBER)	01/01/1989-04/20/1993	4	1161	T, A
GRC A0029	Yes	AGENCY COLLECTING SAMPLE (CODE NUMBER)	01/01/1989-04/20/1993	4	1066	T, A
GRC A0029	Yes	ALKALINITY, TITRATION TO PH4.5, LABORATORY (MG/L AS CaCO3)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	ALKALINITY, WATER, DISSOLVED, FIXED ENDPOINT, FIELD, AS CaC	10/07/1989-10/23/1992	3	16	T
GRC A0029	Yes	ALKALINITY, WATER, DISSOLVED, TOTAL, INCREMENTAL TITRATION,	10/07/1989-10/23/1992	3	16	T
GRC A0029	Yes	ALKALINITY, WATER, WHOLE, TOTAL, FIXED ENDPOINT TITRATION, FI	02/09/1991-02/09/1991	0	1	
GRC A0029	Yes	ALKALINITY, WATER, WHOLE, TOTAL, INCREMENTAL TITRATION, FIEL	02/09/1991-02/09/1991	0	1	
GRC A0029	Yes	BAG MESH SIZE, BEDLOAD SAMPLER, MM	12/20/1990-05/28/1991	1	529	
GRC A0029	Yes	BAROMETRIC PRESSURE (MM OF HG)	10/07/1989-04/20/1993	4	20	T
GRC A0029	Yes	BICARBONATE, WATER, DISSOLVED, INCREMENTAL TITRATION, FIELD,	10/07/1989-10/23/1992	3	16	T
GRC A0029	Yes	BICARBONATE, WATER, WHOLE, INCREMENTAL TITRATION, FIELD, MG/L	02/09/1991-02/09/1991	0	1	
GRC A0029	Yes	CALCIUM, DISSOLVED (MG/L AS Ca)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	CARBON, ORGANIC, TOTAL (MG/L AS C)	10/08/1989-10/11/1989	0	4	
GRC A0029	Yes	CARBONATE, WATER, DISSOLVED, INCREMENTAL TITRATION, FIELD, MG	10/07/1989-10/23/1992	3	16	T
GRC A0029	Yes	CARBONATE, WATER, WHOLE, INCREMENTAL TITRATION, FIELD, MG/L A	02/09/1991-02/09/1991	0	1	
GRC A0029	Yes	CHLORIDE, DISSOLVED (MG/L AS CL)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	CROSS-SECTION LOCATION FEET FROM LEFT BANK LOOKING DOWNSTREA	10/07/1989-05/28/1991	2	942	T
GRC A0029	Yes	DEPTH, BELOW LAND SURFACE (WATER LEVEL) (FEET)	10/09/1989-10/09/1989	0	1	
GRC A0029	Yes	DEPTH, HOLE, TOTAL (FEET)	10/09/1989-10/12/1989	0	4	
GRC A0029	Yes	DEPTH, WELL, TOTAL (FEET)	10/09/1989-10/12/1989	0	4	
GRC A0029	Yes	DISCHARGE, INSTANTANEOUS, CUBIC FEET PER SECOND	10/07/1989-04/20/1993	4	1151	T, A
GRC A0029	Yes	DISTRICT	10/07/1989-05/28/1991	2	918	T
GRC A0029	Yes	DISTRICT	10/07/1989-05/28/1991	2	911	T
GRC A0029	Yes	DISTRICT	10/07/1989-05/28/1991	2	908	T
GRC A0029	Yes	DISTRICT	10/08/1989-10/12/1989	0	189	
GRC A0029	Yes	DISTRICT SPECIAL 99905	10/07/1989-05/28/1991	2	941	T
GRC A0029	Yes	DISTRICT SPECIAL 99906	10/07/1989-05/28/1991	2	918	T
GRC A0029	Yes	DISTRICT SPECIAL 99907	10/07/1989-05/28/1991	2	923	T
GRC A0029	Yes	DISTRICT SPECIAL 99908	10/08/1989-10/11/1989	0	5	
GRC A0029	Yes	FLOW RATE, GALLONS PER MINUTE	10/09/1989-10/12/1989	0	55	
GRC A0029	Yes	FLOW RATE, YIELD OF WELL, (GALLONS/DAY)	10/09/1989-10/12/1989	0	11	
GRC A0029	Yes	FLOW RATE, YIELD OF WELL, (GALLONS/MINUTE)	10/09/1989-10/12/1989	0	20	
GRC A0029	Yes	FLUORIDE, DISSOLVED (MG/L AS F)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	GAGE HEIGHT, FEET	10/07/1989-04/20/1993	4	167	T, A
GRC A0029	Yes	MAGNESIUM, DISSOLVED (MG/L AS MG)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NITROGEN AMMONIA, DISSOLVED (MG/L AS N)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NITROGEN, AMMONIA PLUS ORGANIC, TOTAL (MG/L AS N)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NITROGEN, NITRITE PLUS NITRATE, DISSOLVED (MG/L AS N)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NITROGEN, NITRITE PLUS NITRATE, TOTAL (MG/L AS N)	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NITROGEN, NITRITE, TOTAL, MG/L AS N	10/07/1989-10/11/1989	0	5	
GRC A0029	Yes	NUMBER OF SAMPLING POINTS (COUNT)	10/07/1989-04/20/1993	4	21	T

Table Element

Water Quality Criteria Assessment

- NPS has compiled water quality benchmarks/criteria; the report procedures compare monitoring data against criteria
- Statistical summaries, box and whisker plots and time series data also provide helpful analytical tools
- These tools make Water Quality Managers jobs easier

What's Next

- Expect to be done in several months
- The concept of spatially retrieving, integrating data from these three sources, and reporting and performing analysis has wide-ranging potential for water quality assessment

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