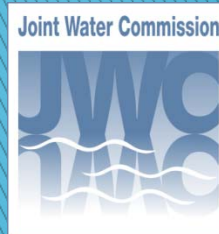


Utilizing water quality data at the Joint Water Commission

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City of Hillsboro

AWWA PNWS Section Conference
Eugene, OR

May 7–9, 2014



Presentation outline

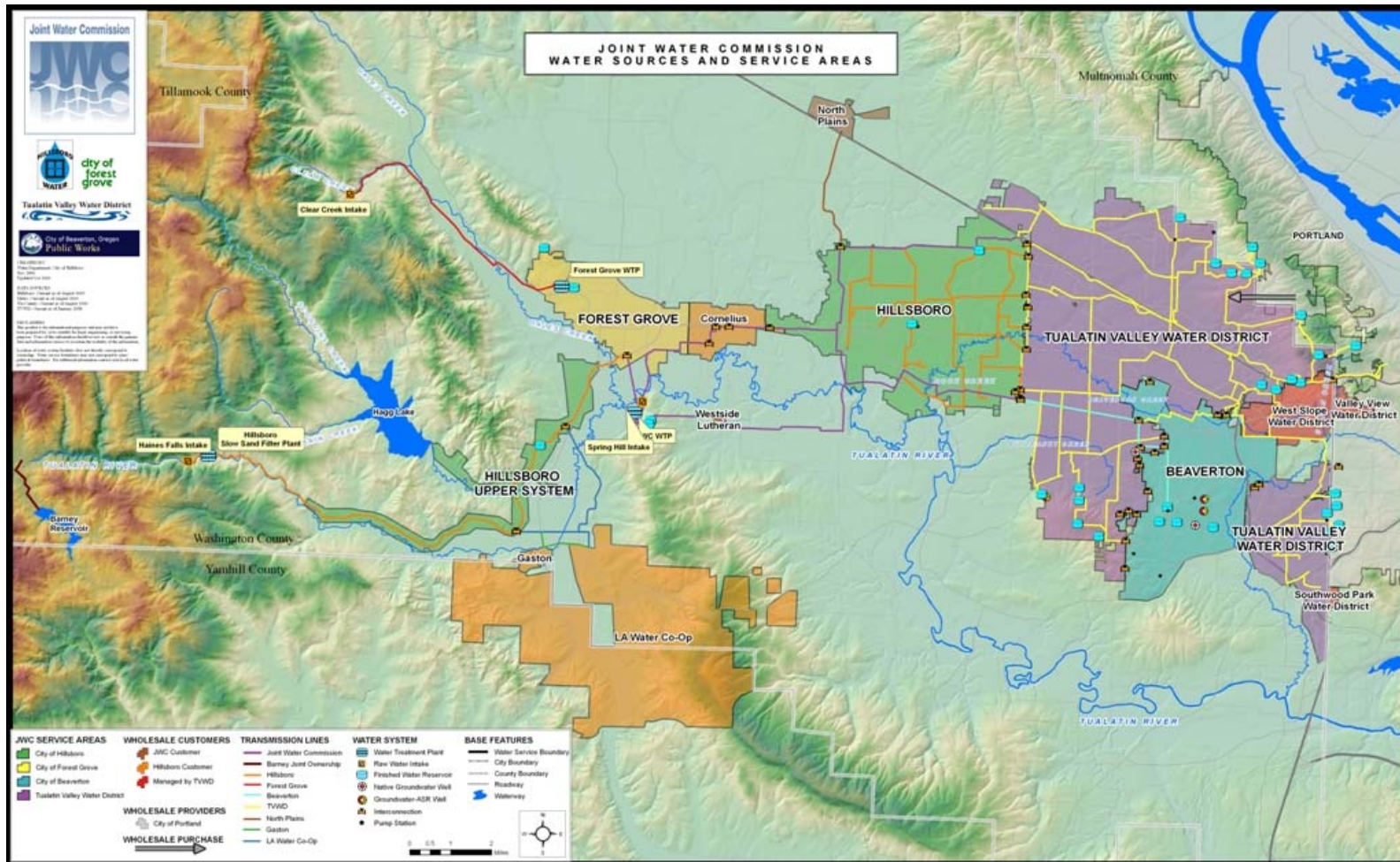
- ▶ Joint Water Commission (JWC)
- ▶ Project need and initiation
- ▶ Database overview and features
- ▶ Project status
- ▶ Relation to water quality program
- ▶ Going forward



The Joint Water Commission



Joint Water Commission

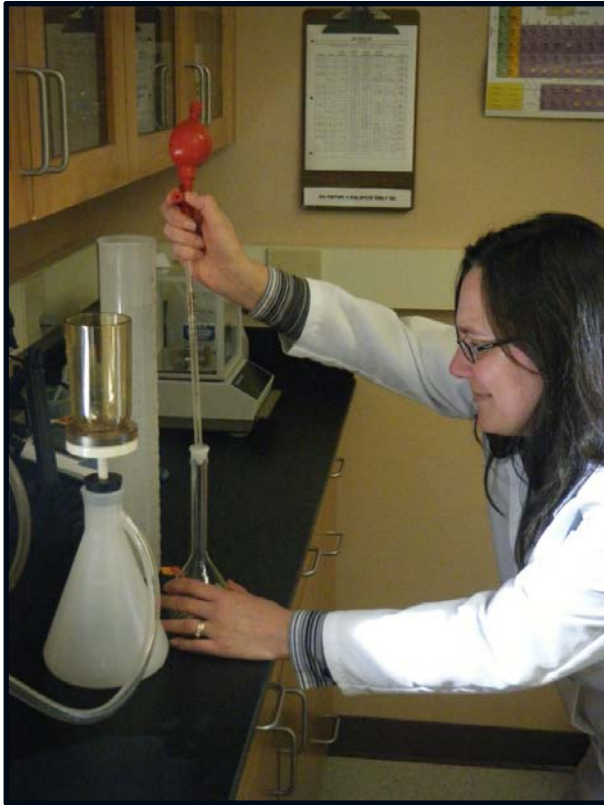


Source Water Protection Project Goals

- ▶ Assess the data available for the basin above the drinking water intake.
- ▶ Assess risk and sensitivity in the watershed.
- ▶ Creation of geodatabase
- ▶ Creation and partial population of a water quality database.
- ▶ Drinking water protection plan

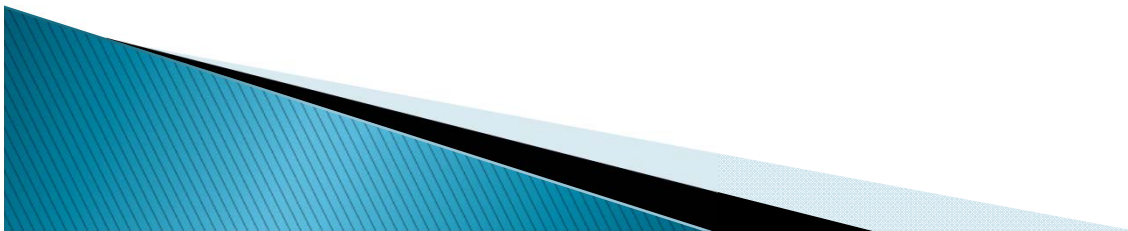


Collecting Water Quality Data is Fun!



But can you use it?

- ▶ Regulatory compliance
- ▶ Treatability
- ▶ Baseline data at watershed locations
- ▶ Investigations
- ▶ Understanding of watershed characteristics, processes, and influences
- ▶ Support management decisions and program development



Why a database?

- ▶ Staff was manually entering lab results and field data into spreadsheets
- ▶ Data stored in over 75 spreadsheets and pdf documents
- ▶ Time and labor intensive data requests
- ▶ No spatial representation of data



How the database works

- Access database using tables and queries.
- Assigns a unique sample control numbers
- Standardizes site names, parameters, and units using lookup tables
- Provides user interface for common tasks such as data entry and lab result upload
- Provides searching and reporting functions
- Interfaces to other applications, such as GIS and statistical packages

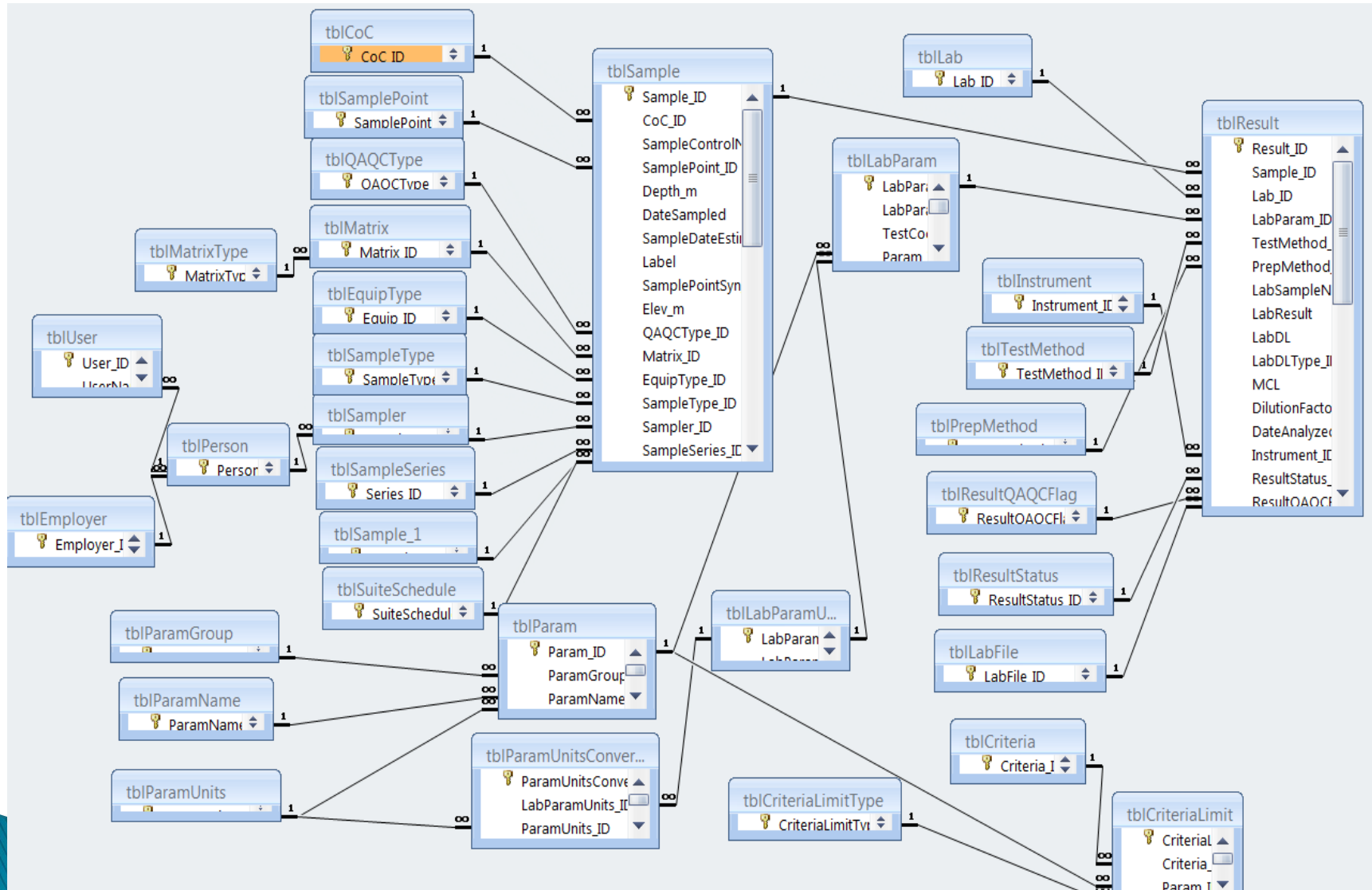


Streamlining data entry

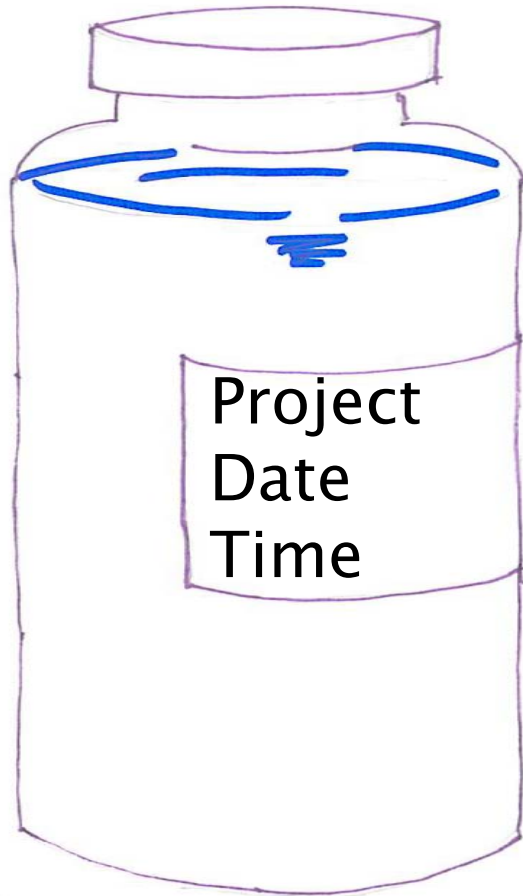
- ▶ Automated uploading of laboratory Electronic Data Deliverables (EDDs)
- ▶ Forms for entering field data
- ▶ Standard Template for uploading historical results from spreadsheet
- ▶ Usernames and passwords



How is the data stored?



SAMPLE

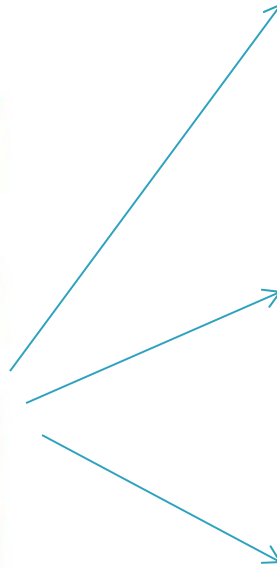


RESULTS

TOTAL NITROGEN

NITRATE

TOTAL
PHOSPHORUS



Data storage–Samples

- Stores about 10 critical pieces of information per sample
 - Location
 - Date and time
 - Depth
 - QA/QC type (sample, duplicate, blank)
 - Sample type (grab or composite)
 - Matrix (surface or finished water)
 - Series
 - Schedule
 - Sample Control Number



Data Storage–Results

- ▶ Stores about 5 critical values per result
 - ▶ Sample ID
 - ▶ Parameter
 - ▶ Units
 - ▶ Lab
 - ▶ Result



Other data that can be stored

- Many other optional data may be stored for each sample and result
 - Laboratory information
 - Sample collector
 - Detection limits
 - Date analyzed
 - Method
 - Instruments used
 - Notes and comments



Data integrity functions

- ▶ Flag quality of data
- ▶ Stores data as received and tracks source files
- ▶ Tracks dates entered and modified and by whom
- ▶ Stores comments from field sampling, lab analysis, and database itself.



GIS Table and Link

- ▶ Data is directly linked to the Source Water geodatabase and can be accessed through GIS.
- ▶ Data is updated in Source Water geodatabase automatically when staff log off.
- ▶ Allows staff to view data within the context of the basin.

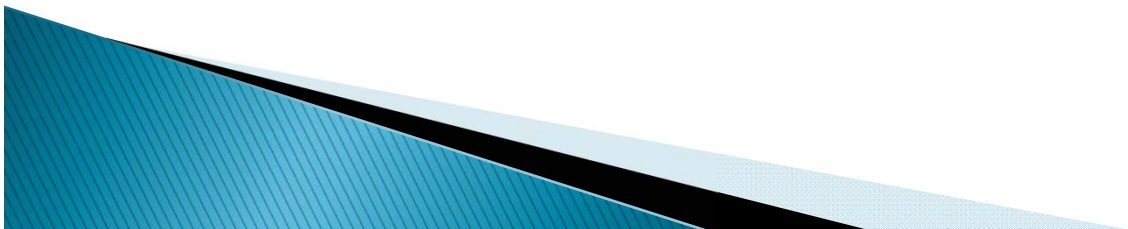
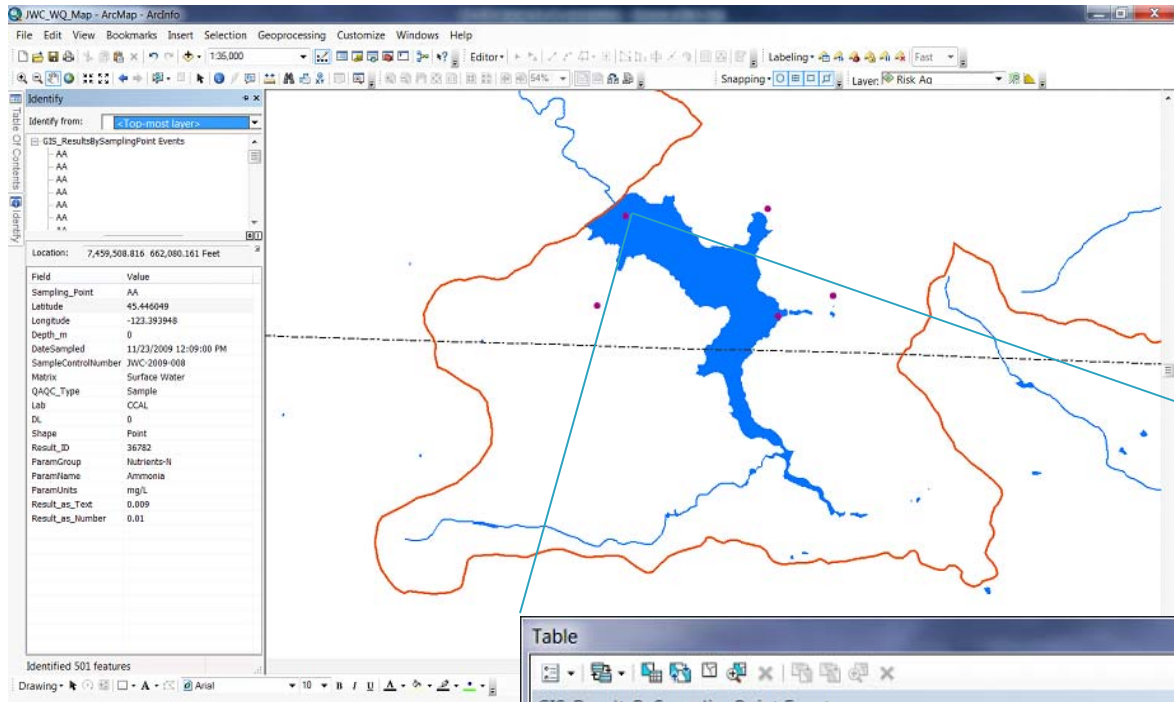


Table for GIS

The screenshot displays the Microsoft Access interface for the 'JWC Water Quality Database'. The 'Tables' pane on the left shows a list of tables, with 'GIS_ResultsBySamplingPoint' circled in red. The main window displays the data for this table, which includes the following columns: QAQC_Type, Lab, ParamGroup, ParamName, ParamUnits, Result_as_Text, Result_as_Number, and DL. The data consists of 20 rows of water quality measurements.

QAQC_Type	Lab	ParamGroup	ParamName	ParamUnits	Result_as_Text	Result_as_Number	DL
Sample	Field	Field Data	Conductivity	uS/cm	45	45	
Sample	Field	Field Data	Dissolved Oxygen	%	91	91	
Sample	Field	Field Data	Dissolved Oxygen	mg/L	11.33	11.33	
Sample	Field	Field Data	Optical Turbidity	NTU	0.6	0.6	
Sample	Field	Field Data	pH	unitless	7.22	7.22	
Sample	Field	Field Data	Phycocyanin	cells/mL	-116	-116	
Sample	Field	Field Data	Chlorophyll a	ug/L	0.4	0.4	
Sample	Field	Field Data	Dissolved Oxygen	%	91.1	91.1	
Sample	Field	Field Data	Phycocyanin	cells/mL	-78	-78	
Sample	Field	Field Data	pH	unitless	7.24	7.24	
Sample	Field	Field Data	Dissolved Oxygen	mg/L	11.34	11.34	
Sample	Field	Field Data	Conductivity	uS/cm	45	45	
Sample	Field	Field Data	Chlorophyll a	ug/L	0.4	0.4	
Sample	Field	Field Data	Temperature	°C	5.99	5.99	
Sample	Field	Field Data	Optical Turbidity	NTU	0.6	0.6	
Sample	Field	Field Data	Phycocyanin	cells/mL	84	84	
Sample	Field	Field Data	Chlorophyll a	ug/L	0.5	0.5	
Sample	Field	Field Data	Conductivity	uS/cm	46	46	
Sample	Field	Field Data	Dissolved Oxygen	%	95.8	95.8	
Sample	Field	Field Data	Dissolved Oxygen	mg/L	11.8	11.8	
Sample	Field	Field Data	pH	unitless	7.29	7.29	
Sample	Field	Field Data	Temperature	°C	6.45	6.45	



Table

GIS_ResultsBySamplingPoint Events

Sampling_Point	Latitude	Longitude	Depth_m	DateSampled	SampleControlNumber	Matrix	QAQC
AA	45.446049	-123.393948	1	5/16/2012 12:10:00 PM	JWC-2012-072	Surface Water	Sam
AA	45.446049	-123.393948	1	2/17/2010 12:17:00 PM	JWC-2010-001	Surface Water	Sam
AA	45.446049	-123.393948	1	2/17/2010 12:17:00 PM	JWC-2010-001	Surface Water	Sam
AA	45.446049	-123.393948	1	2/17/2010 12:17:00 PM	JWC-2010-001	Surface Water	Sam
AA	45.446049	-123.393948	1	2/17/2010 12:17:00 PM	JWC-2010-001	Surface Water	Sam
AA	45.446049	-123.393948	1	2/17/2010 12:17:00 PM	JWC-2010-001	Surface Water	Sam
AA	45.446049	-123.393948	19	10/17/2012 11:04:00 AM	JWC-2013-1966	Surface Water	Sam
AA	45.446049	-123.393948	19	10/17/2012 11:04:00 AM	JWC-2013-1966	Surface Water	Sam
AA	45.446049	-123.393948	19	1/30/2013 11:00:00 AM	JWC-2013-1158	Surface Water	Sam
AA	45.446049	-123.393948	19	1/30/2013 11:00:00 AM	JWC-2013-1158	Surface Water	Sam
AA	45.446049	-123.393948	19	1/30/2013 11:00:00 AM	JWC-2013-1158	Surface Water	Sam
AA	45.446049	-123.393948	19	1/30/2013 11:00:00 AM	JWC-2013-1158	Surface Water	Sam
AA	45.446049	-123.393948	7	3/15/2010 11:42:00 AM	JWC-2010-012	Surface Water	Sam
AA	45.446049	-123.393948	7	3/15/2010 11:42:00 AM	JWC-2010-012	Surface Water	Sam
AA	45.446049	-123.393948	7	4/14/2010 10:31:00 AM	JWC-2010-028	Surface Water	Sam
AA	45.446049	-123.393948	7	4/14/2010 10:31:00 AM	JWC-2010-028	Surface Water	Sam
AA	45.446049	-123.393948	7	4/14/2010 10:31:00 AM	JWC-2010-028	Surface Water	Sam
AA	45.446049	-123.393948	7	4/14/2010 10:31:00 AM	JWC-2010-028	Surface Water	Sam
AA	45.446049	-123.393948	19	1/30/2013 11:00:00 AM	JWC-2013-1158	Surface Water	Sam
AA	45.446049	-123.393948	19	1/30/2013 11:00:00 AM	JWC-2013-1158	Surface Water	Sam

(1422 out of 4096 Selected)

GIS_ResultsBySamplingPoint Events

Database contents

- Contains over 65,000 results from 4,354 water samples
 - Collected from May 1985 to March 2014
 - At 38 sampling sites
 - Analyzed by 17 different labs
 - For over 950 parameters
- Results from routine source water monitoring, regulatory compliance, investigative studies, JWC water treatment plant lab, and special studies from outside agencies.



How does this improve our water quality program?

- ▶ Singular source for data
- ▶ Data analysis and routine reporting
- ▶ Criteria screening



Singular data source

Select Samples

- Barney Reservoir Routine Monitoring
- Cherry Grove Compliance #4100985
- DEQ PPCP Study 2008
- Hexavalent Chromium Study 2011
- Hillsboro Compliance #4101513
- JWC Compliance #4100379
- JWTP Lab Data
- QA/QC

Features

- Barney Reservoir Watershed
- Cherry Grove Distribution
- Cherry Grove WTP
- Hagg Lake Sites
- Hillsboro Distribution
- JWC WTP
- QA/QC
- Retired
- Tualatin River Basin

Sites

- 10-229th & Alexander
- 11-58th Court & Patterson
- 12-64th Ct & Olerich Rd
- 13-220th & Evergreen
- E-JWC Intake**

Selecting the sample information



RESULT SELECTION CRITERIA

Select All

Parameter Groups

- Aesthetic Parameters
- BTEX
- Disinfectants
- Field Data
- General Organics
- Haloacetic Acids
- Herbicides
- Insecticides
- Major Ions

Selecting the result information



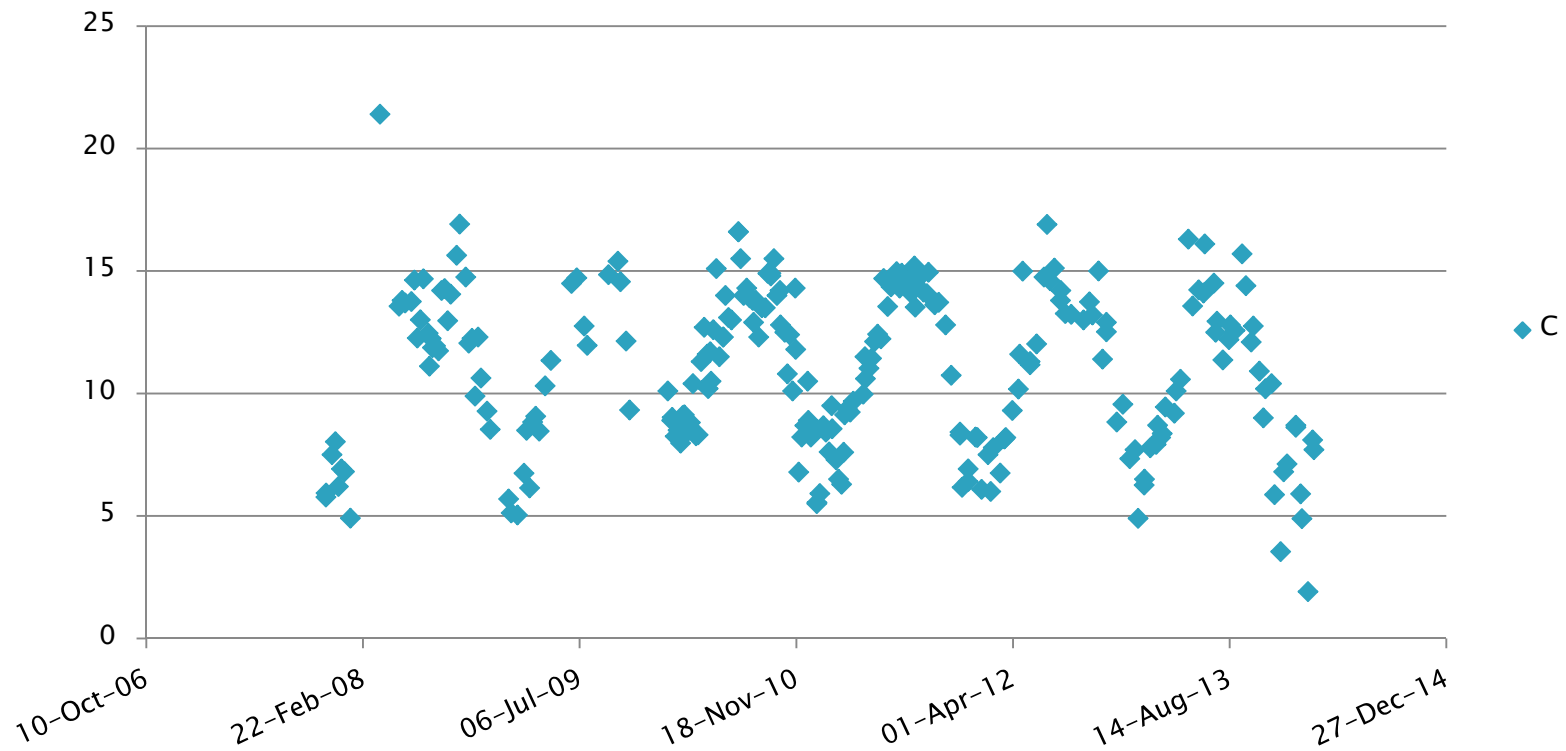
Parameters

Temperature



Single data source (cont.)

Temperature at Intake



Data analysis

- ▶ QA/QC samples
- ▶ Use Summary Statistics report to determine acceptable ranges
 - Parameters
 - Locations
 - Seasonal or comprehensive
 - Trends
- ▶ Easy export to Excel and other stats software
- ▶ Can combine or compare with SCADA reports
- ▶ Missing pieces



Criteria screening

- ▶ Compare data to EPA drinking water MCLs
- ▶ Flag data the exceeds treatability levels
- ▶ Highlight values outside acceptable ranges
- ▶ Many possibilities




Project cost

- ▶ \$17K since 2012 initial project
 - Repurposed database framework with customized features
- ▶ \$20K contracted with Geosyntec to further develop certain features
- ▶ Contract flexibility if budget allows for more assistance



Next steps for database

- ▶ Incorporate remaining historical data
 - ▶ Barney related data management upgrades
 - ▶ Continue data analysis
 - ▶ Using this model to develop a database for Hillsboro Water distribution data
 - ▶ Conversion to SQL as part of city-wide shift
- 

Questions?

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