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2015 Database Team

IMPLEMENTATION OF AN INTERACTIVE DATABASE INTERFACE UTILIZING HTML, PHP, JAVASCRIPT, AND MYSQL IN SUPPORT OF WATER QUALITY ASSESSMENTS IN THE NORTHEASTERN NORTH CAROLINA PASQUOTANK WATERSHED

ABSTRACT

The Center of Excellence in Remote Sensing Education and Research (CERSER) has implemented three research projects during the summer Research Experience for Undergraduates (REU) program gathering water quality data for local waterways. The data has been compiled manually utilizing pen and paper and then entered into a spreadsheet. With the spread of electronic devices capable of interacting with databases, the development of an electronic method of entering and manipulating the water quality data was pursued during this project.

This project focused on the development of an interactive database to gather, display, and analyze data collected from local waterways. The database and entry form were built in MySQL on a PHP server allowing participants to enter data from anywhere Internet access is available. This project then researched applying this data to the Google Maps site to provide labeling and information to users. The NIA server at http://nia.ecsu.edu is used to host the application for download and for storage of the databases.

This project was built on water quality data gathered by the Summer Research Experience for Undergraduate teams during the summers of 2014, 2013, and 2011.

INTRODUCTION

- Summer Undergraduate Research Experience
- Pasquotank Watershed
- Testing
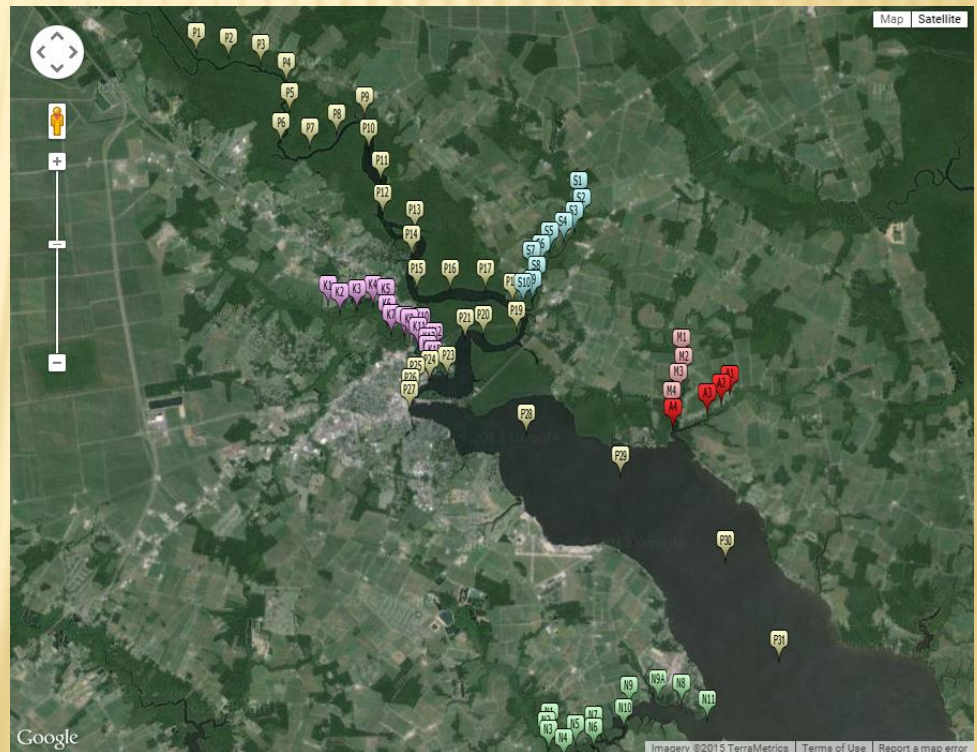
GOALS

* Combine Spreadsheets

* Create Database

* Create Data Show, Modification, Entry, Delete pages

* Create data visualization page

SOFTWARE/LANGUAGES

- HTML
- Google Maps
- phpMyAdmin
- Dreamweaver

SOFTWARE/LANGUAGES

- PHP
- MySQL
- XML
- JavaScript

METHODOLOGY

- Combine Spreadsheets
- Create Database
- Create Data Pages
- Create Visualization of Data

COMBINE SPREADSHEETS

* Standardize Spreadsheets
  + Turbidity
  + Units of Measurement
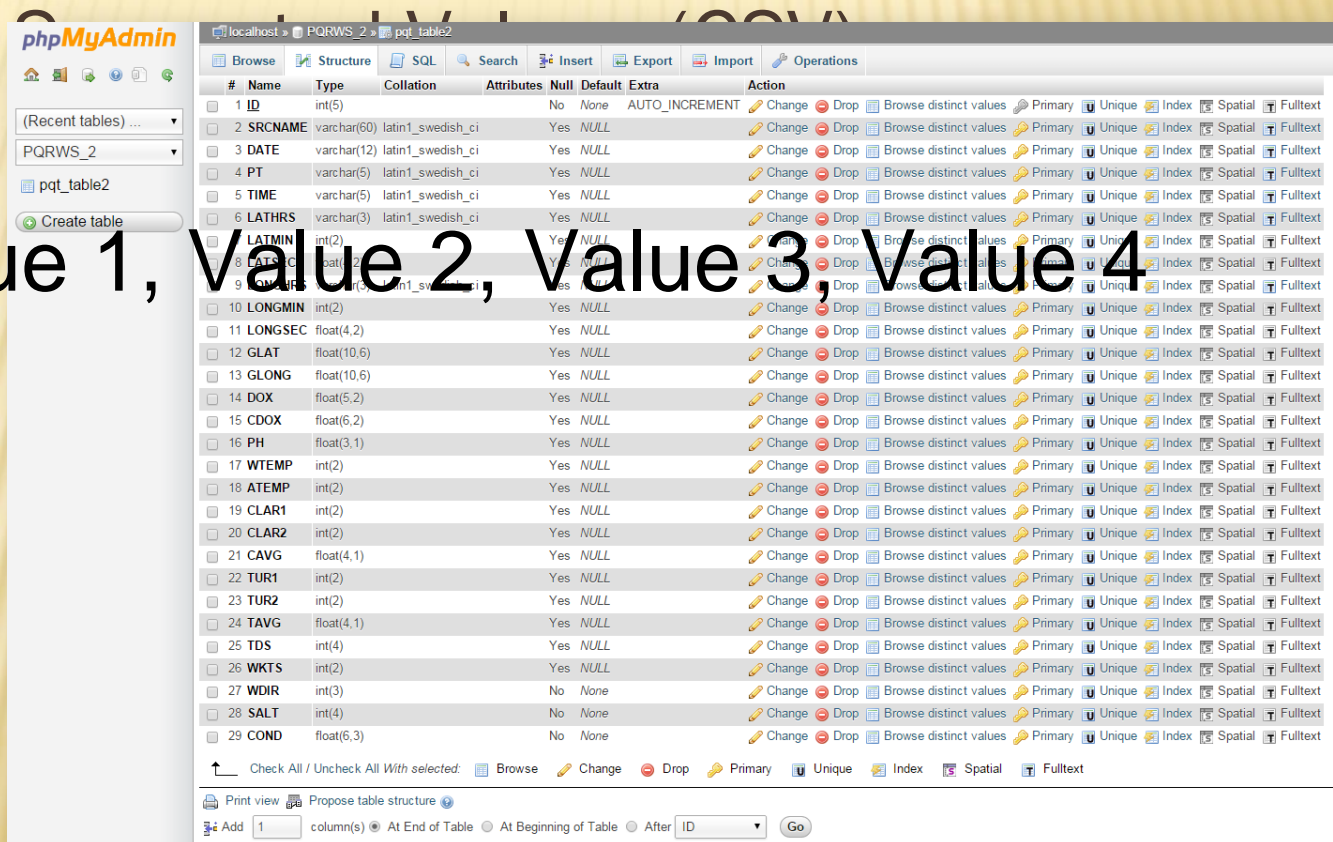 + Wind Direction
* Latitude/Longitude Symbols
* File Combination

DATABASE CONSTRUCTION

- phpMyAdmin
- Comma Separated Values (CSV)

Value 1, Value 2, Value 3, Value 4

DATA PAGES

- Data Display

		ID	SRCNAME	DATE	PT	TIME	LAT	LONG	GLAT	DOX	CDOX	PH	WTEMP	ATEMP	CLAR1	CLAR2
Modify	Delete	1	Newbegun Creek	6/4/14	N1	11:20	36°12′47.31″	76°10′22.32″	36.213139	76.172859	1.10	7.4	24	35	21	18
Modify	Delete	2	Newbegun Creek	6/4/14	N2	11:08	36°12′39.47″	76°10′26.87″	36.210945	76.174141	1.20	7.5	24	35	23	19
Modify	Delete	3	Newbegun Creek	6/4/14	N3	10:55	36°12′31.85″	76°10′23.76″	36.208866	76.173279	1.60	7.6	24	35	27	18
Modify	Delete	4	Newbegun Creek	6/4/14	N4	10:35	36°12′24.23″	76°10′6.39″	36.206730	76.168442	2.80	7.8	24	35	24	25
Modify	Delete	5	Newbegun Creek	6/4/14	N5	10:28	36°12′36.37″	76°9′52.63″	36.210102	76.164619	4.00	7.7	25	35	25	24
Modify	Delete	6	Newbegun Creek	6/4/14	N6	10:21	36°12′33.41″	76°0′32.34″	36.209278	76.158974	5.30	8.0	25	31	23	23
Modify	Delete	7	Newbegun Creek	6/4/14	N7	10:14	36°12′44.30″	76°9′32.40″	36.212307	76.158997	4.80	8.0	25	30	26	21
Modify	Delete	8	Newbegun Creek	6/4/14	N8	9:46	36°13′14.50″	76°7′51.40″	36.220695	76.130943	7.20	8.3	26	29	20	20
Modify	Delete	9	Newbegun Creek	6/4/14	N9	10:00	36°13′12.61″	76°8′51.61″	36.220169	76.147667	3.90	8.2	25	31	21	22
Modify	Delete	10	Newbegun Creek	6/4/14	N9a	9:52	36°13′18.40″	76°8′18.60″	36.221779	76.138496	4.20	8.3	25	28	30	21
Modify	Delete	11	Newbegun Creek	6/4/14	N10	10:05	36°12′52.00″	76°8′58.10″	36.214443	76.149475	7.40	8.1	26	30	23	22
Modify	Delete	12	Newbegun Creek	6/4/14	N11	9:37	36°13′0.00″	76°7′21.00″	36.216667	76.122498	6.40	8.4	25	29	26	18
Modify	Delete	13	Mill Dam Creek	6/2/14	M1	8:50	36°18′35.10″	76°7′51.10″	36.309750	76.130859	0.20	6.8	21	21	14	15
Modify	Delete	14	Mill Dam Creek	6/2/14	M2	9:20	36°18′18.90″	76°7′48.60″	36.305248	76.130165	0.40	6.8	21	22	25	25
Modify	Delete	15	Mill Dam Creek	6/2/14	M3	9:41	36°18′3.40″	76°7′54.90″	36.300945	76.131897	0.70	6.7	23	24	22	22
Modify	Delete	16	Mill Dam Creek	6/2/14	M4	9:58	36°17′47.00″	76°8′2.40″	36.296391	76.134003	1.60	6.9	23	27	17	19
Modify	Delete	17	Areneuse Creek	6/4/14	A1	16:58	36°18′1.80″	76°6′55.70″	36.300499	76.115471	4.30	7.5	26	25	29	29
Modify	Delete	18	Areneuse Creek	6/4/14	A2	12:45	36°17′53.60″	76°7′4.70″	36.298222	76.117973	2.00	7.2	27	43	20	22

DATA PAGES

- × Data Modify
- × Data Delete
- × Data Entry

ID:	**1**
SRCNAME:	Newbegun Creek
DATE: DD/MM/YY	6/4/14
PT:	N1
TIME:	11:20
LAT:	36 ° 12 ′ 47.31 ″
LONG:	76 ° 10 ′ 22.32 ″
GLAT:	36.213139
GLONG:	76.172859
DOX:	1.10
CDOX:	13.06
PH:	7.4
WTEMP:	24
ATEMP:	35
CLAR1:	21
CLAR2:	18
CAVG:	19.5
TUR1:	13
TUR2:	8
TAVG:	10.5
TDS:	290
WKTS:	290
WDIR:	0
SALT:	210
COND:	0.424

Update record

VISUALIZATION OVERVIEW

- Pass Parameters
- XML Format
- JavaScript Variables
- Google Maps
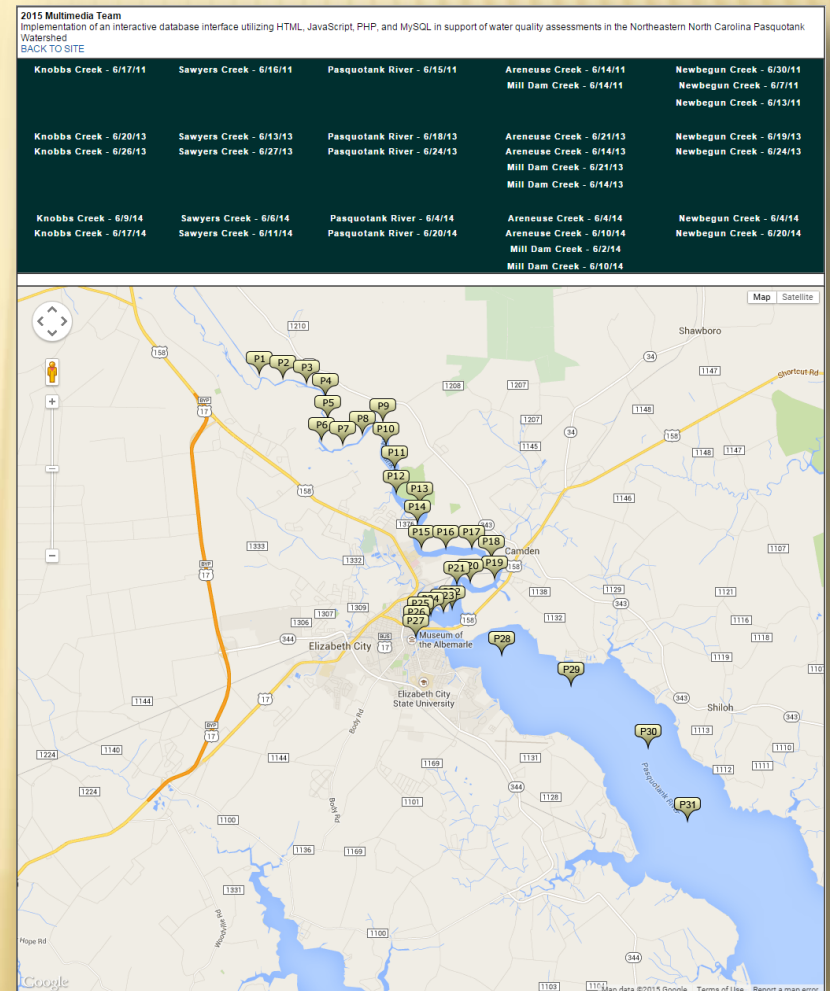
XML BUILDER FILE

DOM_example.php?DATE=6/27/13&SRCNAME=SAWYERS%20CREEK

```xml
<markers>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S1" TIME="9:48" LATHRS="36" LATMIN="21" LATSEC="1.73" LONGHRS="76"
LONGMIN="9" LONGSEC="6.20" GLAT="36.350481" GLONG="-76.162857" DOX="0.70" CDOX="0.70" PH="6.9" WTEMP="26" ATEMP="28"
CLAR1="14" CLAR2="14" CAVG="14.5" TUR1="5" TUR2="4" TAVG="4.5" TDS="640" WKTS="0" WDIR="0" SALT="460" COND="0.924"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S2" TIME="10:05" LATHRS="36" LATMIN="20" LATSEC="46.40" LONGHRS="76"
LONGMIN="9" LONGSEC="45.70" GLAT="36.346222" GLONG="-76.162697" DOX="0.60" CDOX="0.60" PH="6.8" WTEMP="27" ATEMP="29"
CLAR1="20" CLAR2="20" CAVG="20.5" TUR1="5" TUR2="4" TAVG="4.5" TDS="710" WKTS="0" WDIR="0" SALT="510" COND="1.027"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S3" TIME="10:20" LATHRS="36" LATMIN="20" LATSEC="33.60" LONGHRS="76"
LONGMIN="9" LONGSEC="54.30" GLAT="36.342667" GLONG="-76.165085" DOX="1.10" CDOX="1.10" PH="6.5" WTEMP="26" ATEMP="30"
CLAR1="18" CLAR2="18" CAVG="18.5" TUR1="6" TUR2="5" TAVG="5.5" TDS="740" WKTS="0" WDIR="0" SALT="530" COND="1.061"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S4" TIME="10:31" LATHRS="36" LATMIN="20" LATSEC="23.90" LONGHRS="76"
LONGMIN="10" LONGSEC="7.30" GLAT="36.339973" GLONG="-76.168694" DOX="1.60" CDOX="1.60" PH="6.6" WTEMP="27" ATEMP="28"
CLAR1="16" CLAR2="16" CAVG="16.5" TUR1="5" TUR2="4" TAVG="4.5" TDS="750" WKTS="3" WDIR="210" SALT="530" COND="1.075"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S5" TIME="10:44" LATHRS="36" LATMIN="20" LATSEC="15.50" LONGHRS="76"
LONGMIN="10" LONGSEC="22.90" GLAT="36.337639" GLONG="-76.173027" DOX="2.20" CDOX="2.20" PH="6.4" WTEMP="27" ATEMP="30"
CLAR1="22" CLAR2="22" CAVG="22.5" TUR1="6" TUR2="5" TAVG="5.5" TDS="740" WKTS="8" WDIR="230" SALT="520" COND="1.059"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S6" TIME="10:56" LATHRS="36" LATMIN="20" LATSEC="3.00" LONGHRS="76"
LONGMIN="10" LONGSEC="32.70" GLAT="36.334167" GLONG="-76.175751" DOX="2.90" CDOX="2.90" PH="6.8" WTEMP="28" ATEMP="32"
CLAR1="16" CLAR2="16" CAVG="16.5" TUR1="4" TUR2="0" TAVG="2.0" TDS="740" WKTS="7" WDIR="230" SALT="530" COND="1.069"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S7" TIME="11:17" LATHRS="36" LATMIN="19" LATSEC="56.80" LONGHRS="76"
LONGMIN="10" LONGSEC="43.40" GLAT="36.332443" GLONG="-76.178719" DOX="3.00" CDOX="3.00" PH="6.6" WTEMP="29" ATEMP="32"
CLAR1="11" CLAR2="11" CAVG="11.5" TUR1="5" TUR2="4" TAVG="4.5" TDS="730" WKTS="5" WDIR="240" SALT="520" COND="1.033"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S8" TIME="11:28" LATHRS="36" LATMIN="19" LATSEC="43.30" LONGHRS="76"
LONGMIN="10" LONGSEC="37.90" GLAT="36.328693" GLONG="-76.177193" DOX="4.60" CDOX="4.60" PH="6.7" WTEMP="30" ATEMP="29"
CLAR1="15" CLAR2="15" CAVG="15.5" TUR1="5" TUR2="4" TAVG="4.5" TDS="750" WKTS="11" WDIR="240" SALT="540" COND="1.081"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S9" TIME="11:40" LATHRS="36" LATMIN="19" LATSEC="30.20" LONGHRS="76"
LONGMIN="10" LONGSEC="43.00" GLAT="36.325054" GLONG="-76.178612" DOX="4.80" CDOX="4.80" PH="6.3" WTEMP="29" ATEMP="31"
CLAR1="14" CLAR2="14" CAVG="14.5" TUR1="6" TUR2="5" TAVG="5.5" TDS="850" WKTS="4" WDIR="220" SALT="600" COND="1.207"/>
    <marker SRCNAME="Sawyers Creek" DATE="6/27/13" PT="S10" TIME="11:46" LATHRS="36" LATMIN="19" LATSEC="27.40" LONGHRS="76"
LONGMIN="10" LONGSEC="54.20" GLAT="36.324280" GLONG="-76.181725" DOX="6.30" CDOX="6.30" PH="6.6" WTEMP="28" ATEMP="30"
CLAR1="18" CLAR2="18" CAVG="18.5" TUR1="9" TUR2="8" TAVG="8.5" TDS="980" WKTS="8" WDIR="240" SALT="700" COND="1.404"/>
</markers>
```
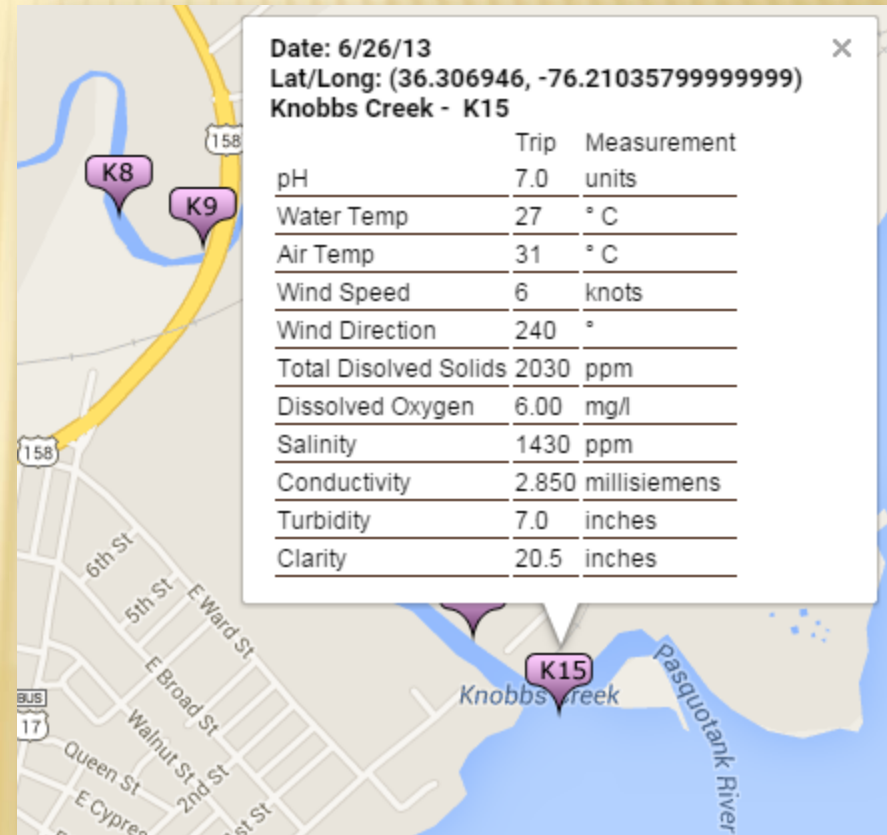
GOOGLE MAPS DISPLAY

- Load Function

```
//This is the main function for creating the map from the XML data
function load() {
  var map = new google.maps.Map(document.getElementById("map"), {
    center: new google.maps.LatLng(36.2965, -76.2161),
    zoom: 12,
    mapTypeId: 'roadmap'
  });
```

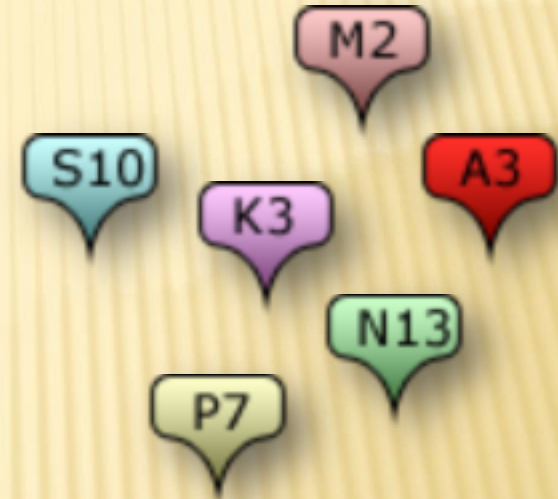- http://nia.ecsu.edu/googleDOM_example.html?DATE=6/4/14&SRCNAME=Pasquotank%20River

GOOGLE MAPS DISPLAY

- Loop through records
- Place in variable HTML

GOOGLE MAPS DISPLAY

* Icon
* Combine LAT/LONG
* Place in variable HTML

2015 Multimedia Team
Implementation of an interactive database interface utilizing HTML, JavaScript, PHP, and MySQL in support of water quality assessments in the Northeastern North Carolina Pasquotank Watershed
BACK TO SITE

Knobbs Creek - 6/17/11	Sawyers Creek - 6/16/11	Pasquotank River - 6/15/11	Areneuse Creek - 6/14/11	Newbegun Creek - 6/30/11
			Mill Dam Creek - 6/14/11	Newbegun Creek - 6/7/11
				Newbegun Creek - 6/13/11
Knobbs Creek - 6/20/13	Sawyers Creek - 6/13/13	Pasquotank River - 6/18/13	Areneuse Creek - 6/21/13	Newbegun Creek - 6/19/13
Knobbs Creek - 6/26/13	Sawyers Creek - 6/27/13	Pasquotank River - 6/24/13	Areneuse Creek - 6/14/13	Newbegun Creek - 6/24/13
			Mill Dam Creek - 6/21/13	
			Mill Dam Creek - 6/14/13	
Knobbs Creek - 6/9/14	Sawyers Creek - 6/6/14	Pasquotank River - 6/4/14	Areneuse Creek - 6/4/14	Newbegun Creek - 6/4/14
Knobbs Creek - 6/17/14	Sawyers Creek - 6/11/14	Pasquotank River - 6/20/14	Areneuse Creek - 6/10/14	Newbegun Creek - 6/20/14
			Mill Dam Creek - 6/2/14	
			Mill Dam Creek - 6/10/14	

RESULTS

- Spreadsheets
- Data Show, Modify, Entry, and Delete
- Google Files

CONCLUSION

- Accuracy
- Analyzation
- Increased Enhancements

FUTURE WORK

- Date Format MM/DD/YY to YYYY-MM-DD
- Search Capability
- Mobile Application
- Visual Design
- Delete Pause

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QUESTIONS