Title: Simulating Spill Scenarios for Public Health Protection in the Huron to Erie Corridor

Focus Area: Public Health and Water Security

Contact Information:

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Submitting Agency
Southeast Michigan Council of Governments
1001 Woodward, Suite 1400
Detroit, MI 48226
Contact: William Parkus, Environmental Planner
(O) 313-324-3351
parkus@semcog.org

Length of Project: Two years

Project Request: $69,516

Abstract: The Huron to Erie Drinking Water Real-Time Monitoring Alliance of Water Treatment Plant (WTP) operators and county health department officials are interested in developing a menu of protections for source water security, water treatment plan intakes, and public health. Some of these protections can be realized through the integration of monitoring and modeling. Modeling spill scenarios in the Detroit River and Lake St. Clair that could impact water treatment plant intakes and recreational beaches is important for developing standard operating procedures (in advance), both for protecting the plants and public health as well as for communicating conditions and decisions among WTP operators in the path of a spill. This has already been done by Dr. Schwab along the St. Clair River. The group is also interested in improving the public use of the GLOS website and its tools. This will be done by updating, re-imagining and integrating the HECWFS-generated model data with existing observing data from GLOS platforms such as Observations Explorer (http://data.glos.us/obs/) and Boaters' Forecast (http://glos.us/data-access/boaters-forecast), with significantly more meteorological observing information from along the corridor area. This will increase acute awareness of the impact of climatological factors on human activities and natural processes and assist in water quality and spill impact decision making.

Simulating Spill Scenarios for Public Health Protection in the Huron to Erie Corridor

Project Description

Introduction

According to a 2006 GAO report, 991 reports of spills along the St. Clair/Detroit River System were received by the NRC (National Response Center) between 1994 and 2004. In response to this high number of spills, a system of real-time monitoring equipment was installed in the water treatment plants from Port Huron down to Monroe funded through federal, state, and local means.

This project is consistent with the Public Health and Water Safety Focus Areas of the GLOS Operational Blueprint. SEMCOG, the Water Treatment Plant operators and county health departments—now collaborating as the Huron to Erie Drinking Water Real-time Monitoring Alliance—are interested in developing a menu of protections for source water security, water treatment plant intakes, and public health. Approximately 3 million people get their water from the St. Clair/Detroit River corridor. Modeling spill scenarios that could impact water treatment plant intakes is important for developing standard operating procedures (in advance), both for protecting the plants and public health as well as for communicating conditions and decisions among WTP operators in the path of a spill. This has already been done along the St. Clair River.

In 2009-2010, contaminant spill scenarios were simulated along the St. Clair River in a joint GLOS and NOAA GLERL initiative (Anderson and Schwab 2012). There were three spill transects used along the St. Clair River – at Sarnia, Marysville and St. Clair. Each transect had five release locations equally spaced across the river. Two dye releases were made at each release location – one surface floating and the other bottom sinking – for a total of 30 spill scenarios. The simulations calculated spill characteristics data such as time of arrival at each of the eight downstream transects (for recording spill parameter data), or at water treatment plants through interpolation, location of plume relative to shoreline, and location of peak plume concentration over time. A graphic-based spill tracking tool for the St. Clair River was developed by NOAA-GLERL and SEMCOG for the Water Treatment Plant operators based on data generated in each spill simulation. This project will continue the development of spill scenario simulations through the end of the 90 mile Huron to Erie corridor to improve spill tracking protections at water treatment plants for public health purposes.

This project will also update and re-imagine the webpage of the Huron to Erie Connecting Waterways Forecasting System (HECWFS) and make it more pertinent to the various users that utilize the GLOS website for information and decision-making. These updates will include the addition of weather and climatological data, i.e., wind speed and direction, precipitation, barometric pressure, solar intensity, air and water temperature, etc. Such data will make the web site more useful to a wider variety of users, e.g., boaters, hunters, marine law enforcement, and beach managers, in addition to its ongoing use by drinking water treatment plant operators and public health authorities. These updates will allow for quicker comparisons between climatological data and results obtained from running of the HECWFS model to evaluate impacts of such factors on spills and contaminant transport. This aspect of the proposal is consistent with the Data Management and the Public Health and Water Safety Focus Areas of the GLOS Operational Blueprint.

Scope of Work

Serving as the international boundary between Canada and the United States, the Huron to Erie Corridor consisting of the St. Clair River, Lake St. Clair and the Detroit River provides potable water to some 3 million people on the U.S. side. The corridor is also a hub for chemical refineries, factories and commercial shipping. This dichotomy creates a potential threat to public health from drinking water

contamination in the event of a toxic spill from a passing freighter or chemical plants in the waterway. Given the fast flow rates in the corridor (average discharge rate of 5,200 m^3/s), once released, contaminants can travel to downstream water intakes within minutes, depending on where the spill occurs. As a result, water treatment plant operators may have to react immediately in order to prevent contaminant uptake.

The goals of the project are as follows: 1) Spill scenario simulation will be undertaken in the Detroit River and Lake St. Clair predominantly to protect public health by estimating the location, travel time and impact of upstream spills on water treatment plant intakes and shoreline bathing/recreational beaches; and 2) The GLOS website data display platforms that utilize HECWFS-generated data in conjunction with other observing data will be improved to increase their utility to various user groups.

This project will continue the effort started on the St. Clair River to perform scenario-based spill simulations at locations critical to public health, such as bathing beaches and public drinking water intakes. Dr. Schwab, PI, who developed these efforts while at NOAA, is now a researcher at the Michigan Tech Research Institute, which includes computer science, ecologist, GIS, web mapping, and other supporting researchers with relevant experience to extend this previous effort to new areas. Regular updates and input on tasks and product development will be sought from the Huron to Erie Drinking Water Real-Time Monitoring Alliance, especially during periods of scaling up such as project planning. Input will also be sought from other data user groups as well as from the staff of the Great Lakes Observing System.

The tasks that will be performed under this project are as follows:

Task #1: Scenario-based spill simulations in the Detroit River: Spill simulations on the Detroit River will utilize the same modeling process as was used on the St. Clair River (Anderson/Schwab) with the HECWFS three-dimensional hydrodynamic model. Spill characteristics for each simulation will be calculated for up to eight downstream transects and will be presented in Spill Reference Tables for each scenario. There are three water intakes on the U.S. side of the Detroit River. Two belong to the Detroit Water and Sewerage Department and one to the Wyandotte Water Treatment Plant. Spills within a river system such as the Detroit or St. Clair rivers are influenced almost totally by downstream moving currents. Wind forcing is not a significant factor and is not accounted for in this spill simulation process. Approximately 30 spill scenarios (15 surface release and 15 bottom release) will be simulated that address the following questions:

- How long will it take for upstream spills of known originating time and location to impact downstream intakes?
- How long will it take for upstream spills of known originating time and location to impact downstream shoreline bathing beaches?

Task #2 Scenario-based Spill Simulations in Lake St. Clair

Simulating spills in Lake St. Clair is a more complicated activity. Wind plays a major role in creating currents in the lake. Thus, currents change more rapidly and do not follow a consistent linear path as they do in rivers. There are four Water Treatment Plants with intakes along the U.S. side of Lake St. Clair located in Ira Township, New Baltimore, Harrison Township, and Grosse Point Farms. Recreational beaches and the public that use them, could also be impacted by spills. Spill probability simulations on Lake St. Clair will require pre-selected locations with simulations run for numerous wind directions and speeds. This proposal is to do spill probability simulations at 6-8 locations along the shipping channel. Nine simulations would be run at each location consisting of eight different wind directions and the no wind option in order to answer the following questions:

- Will a spill at location X, at originating time T, at wind direction D and at wind speed S impact any water treatment plants along the U.S. side of Lake St. Clair? If so how long will this take?

- Will a spill at location X, at originating time T, at wind direction D, and wind speed S impact bathing beaches at Burke Park (New Baltimore), Lake St. Clair Metropark (Harrison Township) and Veterans Park (St. Clair Shores). If so, how long will this take?

Spill simulations on Lake St. Clair will calculate the same spill characteristics as those used in the St. Clair River and Detroit River simulations. Refer to Spill Reference Tables of the St. Clair River (Anderson and Schwab 2012) for more information on the spill characteristics used.

Task #3 Updating and Reimagining HECWFS webpage on GLOS Website
This task will combine and or link existing observing data from such GLOS platforms as Observations Explorer (http://data.glos.us/obs/) and the Boaters' Forecast (http://glos.us/data-access/boaters-forecast) with the HECWFS generated model data and significantly more climatological information such as wind speed and direction, barometric pressure, precipitation, solar intensity, air temperature from along the corridor area. The purpose is to increase the number of regular visits by both technical and non-technical visitors. This update should be able to answer questions from various user groups:

- *Public health officials*: In light of current precipitation and weather conditions, should I schedule additional sampling or issue a public health advisory at area bathing beaches?
- *Beach manager*: Should I be prepared to close or restrict swimming at my beach in anticipation of unfavorable results from the health Department?
- *Recreationalist*: Is this a good day to take my family to the beach or boating or should I wait for a day in which conditions are more favorable?
- *Water treatment plant operator*: A spill has occurred out in Lake St. Clair. Will the current wind direction and speed move the plume to impact my water intakes?
- *Commercial ship captain*: How will current weather and water current conditions affect my traverse of the Huron to Erie Corridor?

In order to achieve the most benefit, project partners will work directly with GLOS staff and user groups to determine the extent of consolidation and data linkage that will be needed. Input from user groups on potential updating options will be sought. Methods to collect this input will include direct meetings as well as surveys.

Outcomes and Deliverables

There will be three major deliverables directly related to the goals of the project. All work will be carried out by the project team with input from the Huron to Erie Drinking Water Real-Time Monitoring Alliance and other user groups and collaborators.

Product # 1: **Spill Tracking Tool for the Detroit River**
The data from each scenario reference table will be used to generate a two-dimensional graphic representation that illustrates potential impacts of the plume on water treatment plant intakes and bathing beaches. These graphic representations of each spill scenario, along with the spill data tables, will be collected into a spill tracking tool with instructions for use by water treatment plant operators, health department personnel, and municipal officials. During an actual spill event, this tracking tool will be useful to downstream WTPs especially if the time and location of the spill's origination are known. By finding the location of the current spill location on a graphic and referring to the appropriate spill table, a rough estimate of the time of arrival of the leading edge of the plume could be deduced and checked for and confirmed with a plant's real-time monitoring equipment.

Product #2 Spill Tracking Tool for Lake St. Clair
The data from each scenario reference table will be used to generate a two-dimensional graphic representation that illustrates the movement of the plume through the lake with eventual impacts at water treatment plant intakes and bathing beaches. These graphic representations of each spill scenario, along with the spill data tables, will be collected into a spill tracking tool with instructions for use by water treatment plant operators, health department personnel, and municipal officials. During an actual spill event, this tracking tool will be useful to downwind WTPs, especially if the time and location of the spills origination is known. By finding the location of the current spill location on a graphic and referring to the appropriate spill table, a rough estimate of the time of arrival of the leading edge of the plume could be deduced and checked for and confirmed with a plant's real-time monitoring equipment.

Product #3 – Updating and Reimagining HECWFS webpage on GLOS Website
The resulting data display will integrate HECWFS generated model data with existing observing data from such GLOS platforms as Observations Explorer (http://data.glos.us/obs/) and the Boaters' Forecast (http://glos.us/data-access/boaters-forecast) with significantly more meteorological information from along the corridor area. This will increase acute awareness of the impact of climatological factors on human activities and natural processes, and assist in water quality and spill impact decision making.

Data and Data Sets
The following sources of information and data may be consulted as needed during the course of this project:

1. NOAA/GLERL Spill Tracking Tool for the St. Clair River
    a. Past simulation results at transect locations and water treatment intakes
2. Regional Water Quality Information Management System (RWQIMS) – Wayne State University
    a. Archived data from St. Clair River/Lake St. Clair real-time drinking water monitoring system – publicly available through RWQIMS
3. Monitoring data for New Baltimore, Lake St. Clair Metropark, and St. Clair Shores Memorial Park Beaches – available from Macomb County Health Department and RWQIMS
4. Observations Explorer meteorological data – GLOS
5. GPS locations for public water system intakes – communities with raw water intakes
6. Raw water pumpage data - communities with raw water intakes
7. Source Water Assessment data and reports – Michigan Department of Environmental Quality and United States Environmental Protection Agency

Timeline and Milestones
This project will be implemented over a two year period in three phases, with each phase dedicated to a different task and product. Two teams will be dedicated to project implementation – a modeling simulation team and the website update team.

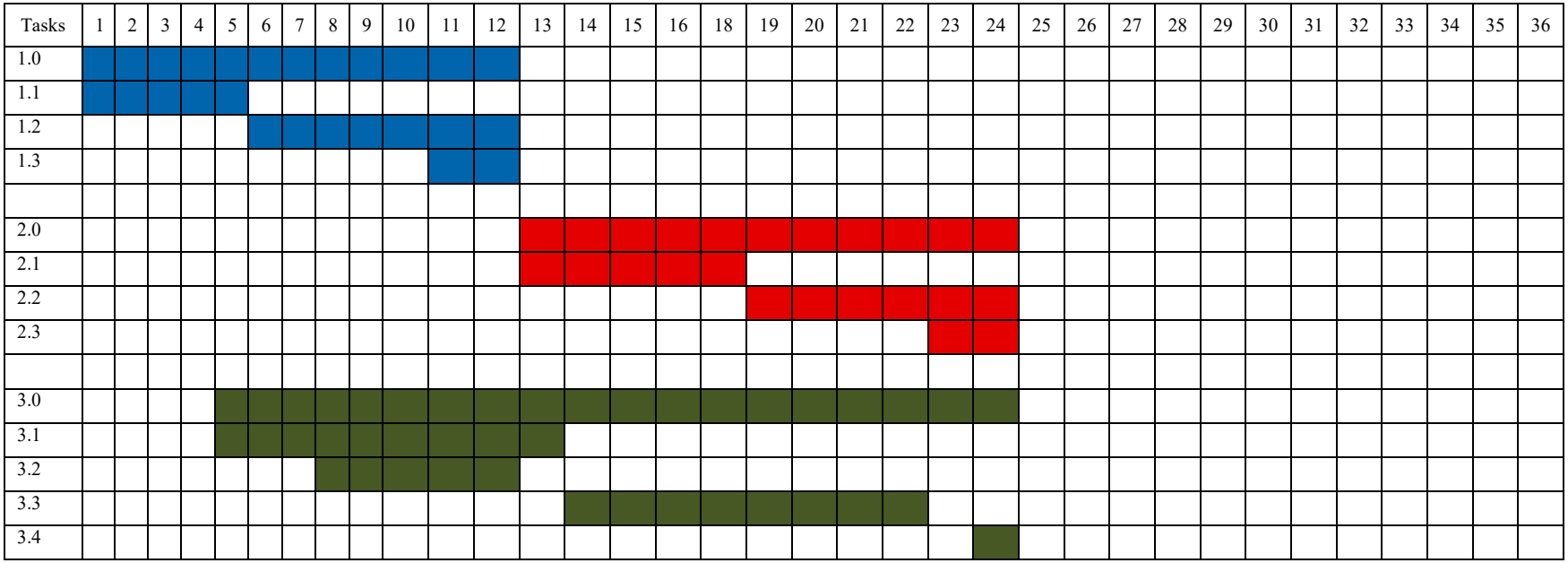
Modeling Simulation Team: This team will develop and implement all spill simulations within the Detroit River and Lake St. Clair. These task will be carried over two one-year phases, each phase ending with the development of a Spill Tracking Tool for each respective water body.

Website Update Team: This team will work with other user groups and GLOS staff to re-imagine and update the GLOS website that integrates HECWFS model data with other observing data with as well as other climatological data to create a data platform that better meets the needs of both the technical and non-technical public.

The timeline and milestone matrix, which follows identifies specifics of each phase as well as scale-up and scale down periods of activity.

Schedule and Milestones

Months after project inception



1. Detroit River spill simulations

1.1 **Project planning:** Scale-up of activity, it includes seeking input from users and development of project specifics and simulations

1.2 Simulation runs: Project team runs spill scenario simulations and develops spill characteristic tables and spill graphics

1.3 **Product design and development:** Scale down – includes design and development of the Detroit River Spill Tracker Tool

2. Lake St. Clair spill simulations

2.2 Project planning: Scale-up of activity – includes seeking input from users and development of project specifics and simulations

2.3 Simulation runs: Project team runs spill scenario simulations and develops spill characteristic tables and spill graphics

2.4 Product design and development: Scale down – includes design and development of the Detroit River Spill Tracker Tool

3. Update of GLOS website

3.1 Project planning: Scale-up of activity – includes development of surveys, I.D. of user groups, plan for changing website

3.2 User group outreach: Outreach to users groups/GLOS by either surveys or meetings to seek input on user group data needs

3.3 Implementation of upgrades: Project team implements new observing data/HECWFS data platform design – Scale down

3.4 On-line: New Platform goes on-line.

Budget

Salaries for all personnel will follow Michigan Technological University (MTU) guidelines for faculty and staff appointment. PI Dr. David Schwab will oversee and coordinate all project activities supported by CO-I Brooks, Grimm and Sawtell. An intern will support the technical efforts of this project. A 5% salary increase is factored in costs for full time staff as the project period extends into the next fiscal year of the University**. Fringe Benefits** on staff salaries are calculated at 36.5%, hourly interns at 10% and MTU students at 0%. See www.mtu.edu/research/references/forms. **Travel** is budgeted for 4 day trips each year to Detroit, Michigan for quarterly meetings with SEMCOG. Per Diem and incidental expenses are calculated per U.S. Government Per diem rates. No costs are requested for **Equipment**, **Supplies**, **Contractual**, **Construction** or **Other Direct Costs**. The **Indirect Cost** rate, also referred to as the Facilities and Administrative rate, is 50.75%. See www.mtu.edu/research/references/forms.

Budget Estimate	Request Amt. Yr 1	Request Amt. Yr 2	Total Request Amount
PI Name: David Schwab			
Proposal #			
Sponsor Name: Southeast Michigan Council of Governments (SEMCOG)			
Title: Stimulating Spill Scenarios fro Public Health Protection in the Huron to Erie Corridor			
Start Date: 07/01/2016			
End Date: 06/30/2018			
Personnel			
Other (36.5%) Schwab mos effort per year: 3.0/2.0	4,414	3,090	7,504
Other (36.5%) Brooks 0.2 mos effort each year	2,322	2,438	4,760
Other (36.5%) Grimm 1.2 mos effort each year	5,418	5,689	11,107
Other (36.5%) Sawtell 0.5 mos effort each year	2,646	2,779	5,425
Temporary (10%) TBD 1.0 mos effort each year	2,253	2,253	4,506
Subtotal-Personnel	**17,053**	**16,249**	**33,302**
Fringe Benefits			
Temporary (10%)	225	225	450
Faculty Academic and Other (36.5%)	5,402	5,109	10,511
Subtotal Fringe Benefits	**5,627**	**5,334**	**10,961**
Total Personnel & Fringe Benefits	**22,680**	**21,583**	**44,263**
Domestic Travel	925	925	1,850
Total All Direct Cost	**23,605**	**22,508**	**46,113**
Facilities & Admin Costs (total direct less equip. & tuition and fees)			
Applicable F & A Rate Enter 55, 50, 75, 84.5, 71, 26, 41, 52.25, 36, 59.5	50.75	50.75	
Collectable Rate from Sponsor: **Enter Rate Requested**	50.75	50.75	
50.75% on campus Organized Research MTRI only	**11,980**	**11,423**	**23,403**
Total Facilities & Administrative Costs	**11,980**	**11,423**	**23,403**
TOTAL	**35,585**	**33,931**	**69,516**
Attach budget justification for each category			
Grand Total	**35,585**	**33,931**	**69,516**

Updated 3/27/15

Project Team and Collaborators

Michigan Tech Research Institute: David Schwab will serve as the technical PI for the project, under the direction of the proposal lead at SEMCOG, William Parkus. Dr. Schwab is an expert on hydrodynamic modeling of the Great Lakes and other coastal regions with over 40 years of experience. His work covers a wide range of topics in geophysical fluid dynamics including theoretical, numerical, and observational investigations of circulation, thermal structure, seiches, storm surges, wind waves, and air-sea interaction. Dr. Schwab's current interests are applications of hydrodynamic modeling to water quality problems, including transport of bacteria from tributary sources to swimming beaches and predictive tracking of algal blooms. Assistant Research Scientist Amanda Grimm will assist with the data analysis and modeling work. Ms. Grimm holds a MS in Natural Resources & Environment and a graduate certificate in Spatial Analysis from the University of Michigan. Her research focus is nearshore aquatic remote sensing. Colin Brooks will oversee the website update component of the project, building from his experience in increasing access to data through the GLOS Data Portal. Mr. Brooks has over 20 years of experience in the application of remote sensing and GIS technologies to the modeling and understanding of environmental processes with extensive background in the application of decision support systems and geospatial data for solving diverse problems in Great Lakes ecology, contaminated areas, agricultural systems, transportation applications, and ecosystems undergoing land cover change. Reid Sawtell will provide technical support for both project components. Mr. Sawtell is a computer scientist working primarily with remote sensing/GIS programming, web development, and database management.

SEMCOG: Represented by William Parkus, SEMCOG will provide regional coordination and support for the project. SEMCOG will provide the communication link between the Huron to Erie Alliance of Water Treatment Plant operators, county health Department officials and other data users as needed and the project team. SEMCOG will provide updates at Alliance meetings and seek input as needed to ensure effectiveness of products that are developed. Please refer to William Parkus' Professional Biography for more information about SEMCOG's role in natural resource and public health protection along the corridor.

Huron to Erie Drinking Water Real Time Monitoring Alliance: The Alliance will be represented on the Project Team by Gary White. Gary is a former Deputy Health Officer of the Macomb County Health Department and current member of the Alliance. Mr. White will provide technical input and guidance into the project. He will also contribute to project updates at Alliance meetings as well as outreach to other user groups.

Reference:

Anderson, E. J., & Schwab, D. J. (2012). Contaminant Transport and Spill Reference Tables for the St. Clair River. *Marine Technology Society Journal*,*46*(5), 34-47.

Simulating Spill Scenarios for Public Health Protection in the Huron to Erie Corridor

Appendix

The Appendix consists of the following documents:

- **Project Team Resumes/Professional Biography**
  - Dr. David Schwab, MTRI
  - Colin Brooks, MTRI
  - Amanda G. Grimm, MTRI
  - Reid W. Sawtell, MTRI
  - William Parkus, SEMCOG
  - Gary White, Representing HEC Drinking Water Real-Time Monitoring Alliance
- **Letters of Support**
  - City of Grosse Pointe Farms
  - City of Mount Clemens
  - Macomb County Health Department
  - Wayne County Health Department
- **Map**
  - Water Treatment Plants and Beaches along Lake St. Clair and Detroit River

Note: Due to limited space, only four of the seven letters of support received are included in the Pre-proposal. If selected and a full proposal is requested, all letters of support will be included.

Curriculum Vitae

David J. Schwab
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Research Scientist, Michigan Tech Research Institute, Michigan Technological University, 3600 Green Ct., Ste. 100, Ann Arbor, MI, 48105.
Great Lakes Research Scientist, Water Center, University of Michigan, 625 East Liberty St., Suite 300, Ann Arbor, MI 48104

Education

Ph.D., Oceanic Science, University of Michigan, 1981
M.S., Physics, University of Wisconsin-Milwaukee, 1974
B.S. (summa cum laude), Applied Mathematics and Physics, University of Wisconsin-Milwaukee, 1972

Professional Experience

Great Lakes Research Scientist, Water Center, University of Michigan, Ann Arbor, MI, 2013-present
Research Scientist, Michigan Tech Research Institute, Ann Arbor, MI, 2013-present
Integrated Physical and Ecological Modeling and Forecasting Division Branch Chief, NOAA Great Lakes Environmental Research Laboratory, 2010-2012
Acting Director, NOAA Center of Excellence for Great Lakes and Human Health, 2008-2012
Co-Director, NOAA Center of Excellence for Great Lakes and Human Health, 2004-2008
Physical Sciences Division Branch Chief, NOAA Great Lakes Environmental Research Laboratory, 1992-1995
Oceanographer, NOAA Great Lakes Environmental Research Laboratory, 1980-2012
Physical Scientist, Great Lakes Environmental Research Laboratory, NOAA, 1975-1980
Adjunct Assistant Professor in Department of Geography, Atmospheric Sciences Program at the Ohio State University, 1992-1994
Adjunct Assistant Professor in Atmospheric and Oceanic Science Department of the Univ. of Michigan, 1981-1982

Professional Honors and Awards

NOAA/ERL Distinguished Authorship Award - 1984
U.S. Department of Commerce Silver Medal for Scientific/Engineering Achievement- 1999
American Meteorological Society Special Award for developing Great Lakes Coastal Forecasting System – 2001
NOAA Office of Oceanic and Atmospheric Research Outstanding Scientific Paper Award – 2006
Great Lakes Observing System (GLOS) Special Achievement Award - 2009
International Association of Great Lakes Research, Lifetime Achievement Award – 2012
U.S. Department of Commerce, NOAA Distinguished Career Award – 2012

Professional Affiliations: American Geophysical Union, American Meteorological Society, International Association for Great Lakes Research (Treasurer, 1986-1989), Associate Editor for Journal of Great Lakes Research (1991-2012)

Recent Committee Memberships

NOAA IOOS Modeling Task Team
Organizing Committee for Estuarine and Coastal Modeling Meeting

Publications (Research Articles, Book Chapters, and Reports)

Niu, Q., Xia, M., Rutherford, E., Mason, D., Anderson, E.J., and D.J. Schwab. Investigation of interbasin exchange and interannual variability in Lake Erie using an unstructured-grid hydrodynamic model. Journal of Geophysical Research: Oceans. (2015, in press)

Bai, X., Wang, J., Austin, J., Schwab, D.J., Assel, R., Clites, A., Bratton, J.F., Colton, M., Lenters, J., Lofgren, B., Wohlleben, T., Helfrich, S., Vanderploeg, H., Luo, L., and G. Leshkevich. A record-breaking low ice cover over the Great Lakes during winter 2011/2012: Combined effects of a strong positive NAO and La Niña. Climate Dynamics (2014, in press)

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Wang, J., H. Hu, D.J. Schwab, G.A. Leshkevich, D. Beletsky, N. Hawley, and A.H. Clites. Development of the Great Lakes ice circulation model (GLIM): Application to Lake Erie in 2003-2004. *Journal of Great Lakes Research* 36:425-436 (2010).

146 more publications, 1976-2014.

Colin N. Brooks
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Education:

Michigan Technological University, Ph.D., Biology – in progress. Advisor: Dr. Amy Marcarelli.
Master of Environmental Management, Duke University School of the Environment, Durham, NC. 1993.
Bachelor of Science**,** *Pre-Forestry*, Magna Cum Laude, Lenoir-Rhyne College, Hickory, NC. 1992.

Professional Experience:

Research Scientist and Environmental Science Lab Manager – May 2005 to present; **Adjunct Lecturer - Biological Sciences Department**, January 2008 to present
Michigan Tech Research Institute (MTRI), Ann Arbor, MI (Michigan Technological University)
(As part of the Altarum Institute, 2005-2006)

- GLRI Co-Investigator for Cladophora mapping and Harmful Algal Bloom mapping applied projects; NASA Co-Investigator for feasibility of mapping Cladophora algae via remote sensing, and on tuning color-producing agent algorithms for Great Lakes multi-scale assessment with satellite imagery and estimating Great Lakes productivity.
- Mapping changing patterns in land use and land cover types in diverse landscapes using advanced object-based and multi-temporal methods of analyzing remote sensing data for the Nature Resource Conservation Service (NRCS), the University of Michigan Water Center, the Michigan DOT, and for historical mining sites.
- Currently working with the Great Lakes Observing System on making remote sensing science products more easily available to end users.
- Developing new applications of Unmanned Aerial Vehicles for applications in transportation, aquatic ecology, and wetlands assessment.

GIS Analyst - May 1996 to May 2005
University of California - Berkeley, Integrated Hardwood Range Management Program (IHRMP), Hopland Research and Extension Center, Hopland, CA

- Provided GIS analysis to UC-Berkeley researchers on multiple research projects. Projects included: modeling the impacts of local government land-use policies with GIS, analyzing the effects of expanding vineyards and rural parcelization on biodiversity, salmonid restoration planning with GIS, the impacts of urbanization on native carnivores, the building of Lyme disease risk models, improved methods of integrating GIS in watershed restoration planning, open space planning, and establishing patterns of natural oak woodland regeneration.

GIS Specialist - May 1993 to May 1996
Savannah River Forest Station, USDA Forest Service, New Ellenton, SC

- Utilized ARC/INFO GIS, including querying of Oracle databases, for forest management and research support on a 200,000 acre site.

Example Publications:

Brooks, C., A. Grimm, A., R. Shuchman, M. Sayers, N. Jessee, N. 2015. A satellite-based multi-temporal assessment of the extent of nuisance Cladophora and related submerged aquatic vegetation for the Laurentian Great Lakes. Remote Sensing of Environment, 157: 58-71.

Bourgeau-Chavez, L.L., K.P. Kowalski, M.L. Carlson Mazur, K.A. Scarbrough, R.B. Powell, C.N. Brooks, B. Huberty, L.K. Jenkins, E.C. Banda, D.M. Galbraith, Z.M. Laubach, K. Riordan. 2013. Mapping invasive *Phragmites Australis* in the coastal Great Lakes with ALOS PALSAR satellite imagery for Decision Support. Journal of Great Lakes Research, 39(1): 65-77.

Amanda G. Grimm

Assistant Research Scientist ▪ Michigan Tech Research Institute ▪ Michigan Tech University
Ann Arbor, MI 48105 ▪ Phone: (734) 994-7233 ▪ Email: aggrimm@mtu.edu

EDUCATION

Master of Science, Conservation Biology **University of Michigan,** **December 2011**

- Thesis topic: "Lidar-based modeling of understory vegetation structure and insectivorous bird habitat in a lowland rainforest"; Thesis advisor: Dr. Kathleen Bergen; Committee: Dr. Kathleen Bergen, Dr. Leland Pierce

Bachelor of Science, Environmental Biology/Zoology **Michigan State University, April 2006**

- Researched the ecological effects of management of invasive *Phragmites* as part of the Cary Institute for Ecosystem Studies' Research Experiences for Undergraduates (REU) program

PROFESSIONAL EXPERIENCE

Assistant Research Scientist August 2012 - Present
Michigan Tech Research Institute Ann Arbor, MI

- Current research projects focus on the use of satellite imagery and GIS for environmental applications including algae mapping, detection of fish spawning habitat, evaluation of wetland habitat quality, fish production modeling, rip current hazard mapping, and other areas of interest, primarily in the Great Lakes
- Collect field data including vegetation surveys, bird counts, harmful algal bloom sampling, chl-a and phycocyanin concentrations, benthic substrates, Secchi depths, nearshore bathymetry, and LAI
- Utilize ArcGIS, ERDAS IMAGINE, and ENVI software programs to process and analyze spatial data as well as Python and R to perform statistical analyses in support of research projects

Research Intern January 2012 – August 2012
Michigan Tech Research Institute Ann Arbor, MI

- Contributed to grant-funded research focused on the use of satellite imagery for mapping *Cladophora* extent and other water quality parameters in the Great Lakes
- Utilized ArcGIS, ERDAS IMAGINE, and ENVI software programs to process and analyze spatial data in support of research projects

Research Assistant August 2009 – December 2011
Environmental Spatial Analysis Laboratory Ann Arbor, MI

- Assisted with a NASA-funded project focused on combining SAR, InSAR and lidar data to measure vegetation biomass and 3D structure in the context of the proposed DESDynI mission (PI Dr. Paul Siqueira, University of Massachusetts)
- Used GIS, image processing, and statistical software (ArcGIS, ERDAS Imagine, Matlab, Stata) to conduct spatial and non-spatial statistical analyses

Graduate Instructor – Introduction to Remote Sensing January 2011 – May 2011
UM School of Natural Resources and Environment Ann Arbor, MI

- Assisted with teaching a graduate-level course on remote sensing covering topics including interpretation of air photos and satellite imagery, photogrammetry, geometric and atmospheric correction, classification, change detection, radar/lidar, and integration of remotely sensed data with GIS

Project Manager/Crew Leader August 2008 - April 2009
Purdue University West Lafayette, IN

- Directed and participated in the collection of field data for an NSF-funded study of oak dispersal by Blue Jays including trapping, mist-netting, and radio tagging of Jays

Reid W. Sawtell
Michigan Tech Research Institute, Michigan Technological University,

3600 Green Ct., Ste. 100, Ann Arbor, MI
rwsawtel@mtu.edu ● 734-994-7226
www.mtri.org

Professional Preparation:

Michigan Technological University	Computer Science	B.S., 2010
University of Wisconsin Madison	Computer Science	M.S., 2012

Appointments:

2012-Present
Assistant Research Scientist, Michigan Tech Research Institute, Michigan Technological University

2010-2012
Computer Science Teaching Assistant, University of Wisconsin, Madison

2009-2010
Computer Science Learning Center Coach, Michigan Technological University, Houghton

2008-2010
Summer Intern, Michigan Tech Research Institute, Michigan Technological University

Experience:

Reid Sawtell is a computer scientist with a focus on computer graphics and machine learning. He has experience working with a variety of programming and scripting languages including C/C++, Java, Javascript, Bash, and Python. He has worked to create Graphical User Interfaces, Rendering Software, Photo-Editing Software, and Computer Visualizations for a variety of platforms including the Cave Automatic Virtual Environment at the Living Environments Laboratory, University of Wisconsin Madison. He also has experience working with and automating scientific algorithms for remote sensing applications, including non-linear optimization to solve color producing agent concentrations in water, Fourier analysis to remove sensor induced periodic measurement error, and threshold detection for automatic parameter determination. He has recently been working on a procedure for the generation of primary production estimates in the Great Lakes. He is also the lead developed for a tablet-based application to record and organize bridge element inspection data in a 3D graphical environment.

GARY R. WHITE, M.S., R.S.

14484 Boner Rd.
Allenton, Michigan 48002
candgwhite.14484@gmail.com
810-395-1660 home
810-627-0564 cell

OBJECTIVE

Utilize my knowledge and skills gained over a 35 year Environmental career to assist communities and others in resolving environmental issues, while promoting stewardship of air and water resources.

SKILLS AND EXPERTISE

- Knowledge and awareness of environmental factors that affect public health
- Experience with community and non-community public water supplies, including large scale service interruptions, capacity problems, MCL violations, monitoring and source water issues
- Extensive experience with conducting water quality monitoring and sanitary surveys at bathing beaches for public health protection
- Extensive experience with designing and conducting watershed and source water monitoring projects
- Good knowledge of water quality parameters and

WORK EXPERIENCE

2010-Present — ***Deputy Health Officer*** — ***Macomb County Health Department Administration***

- Participate in and assist with direction of a broad range of public health programs and services, including immunizations, health education, environmental health, medical examiner, animal shelter/control, emergency preparedness, disease control and field nursing services.
- Management of fiscal, staffing, planning and quality assurance functions, made especially challenging in light of reduced resources and the resultant need to increase efficiency
- Health Department representative on the Macomb County Water Resources Advisory Council and the Clinton River Area of Concern Public Advisory Council
- Instrumental in efforts to redefine and revitalize the Huron-Erie Corridor Drinking Water Monitoring Network in collaboration with community partners

EDUCATION

1979-1981 — Wayne State University, Detroit, Michigan
Master of Science in Industrial Hygiene

1974-1977 — Michigan Technological University, Houghton, Michigan
Bachelor of Science in Biological Science

Professional Biography
For
William Parkus

William Parkus is an Environmental Planner with the Southeast Michigan Council of Governments. His current focus is on protecting and restoring the water quality and natural resources of the Huron to Erie Corridor – particularly Lake St. Clair and the St. Clair River. SEMCOG facilitates the Lake St. Clair/St. Clair River Protection and Restoration Partnership – a collaboration of 37 representatives from local, regional, state and federal agencies, associations, nongovernmental organizations, academic institutions, and consulting technical experts. The partnership is responsible for implementing the *St. Clair River and Lake St. Clair Comprehensive Management Plan*.

The Partnership has developed the *St. Clair River and Lake St. Clair Strategic Implementation Plan (SIP)*. The SIP is a five year list of priority projects identified by the Partnership to implement the Management Plan. There are 107 projects identified in the SIP totaling approximately $200 million.

Protecting public health along the Great Lakes coastline is a priority of the Management Plan. This priority led to the placement of real-time monitoring equipment in the water treatment plants along the corridor and the establishment of the Huron to Erie Drinking Water Real-Time Monitoring Alliance of Water Treatment Plant operators and public Health Department representatives. The group has long advocated the integration of monitoring and modeling and has worked with GLOS toward this goal for the last several years.

Bill holds a Bachelors of Science in Geology and a Masters of Science in Land Use Planning from Eastern Michigan University.

City of Grosse Pointe Farms
90 Kerby Road, Grosse Pointe Farms, Michigan 48236-3161
phone 313 885.8600 fax 313 885.0917

March 12, 2015

Ms. Kelli Paige, Executive Director
Great Lakes Observing System
328 S. State Street
Ann Arbor, MI 48104

Dear Ms Paige:

I am writing in support of the SEMCOG proposal entitled *Simulating Spill Scenario's for Public Health Protection in the Huron to Erie Corridor* being put forward on behalf of the Water Treatment Plants (WTPs) and Health Departments that comprise the Huron to Erie Drinking Water Real Time Monitoring Alliance.

This proposal, if funded will implement spill scenario simulations in the Detroit River and Lake St. Clair by estimating the location, travel time and impact of upstream spills on public health targets such as WTP intakes and bathing beaches. This activity will provide another tool available to WTP operators to protect their source water, water treatment plan intakes, and the public health.

This project will also upgrade and re-imagine the GLOS website and data display platforms that uses HECWFS (Huron–Erie Connecting Waterways Forecasting System) generated data in conjunction with other observing data. The GLOS website will then be more pertinent to the various users (i.e., WTP operators) for information and decision-making.

Scott Homminga recommends a positive review and selection of this proposal for funding by the GLOS/IOOS association.

Sincerely,

Scott Homminga

Scott Homminga
Water Superintendent
City of Grosse Pointe Farms

MACOMB COUNTY HEALTH DEPARTMENT
Mount Clemens Health Center
43525 Elizabeth Road • Mount Clemens, Michigan 48043
PHONE: 586-469-5235 FAX: 586-469-5685
www.macombgov.org/publichealth

Mark A. Hackel
County Executive

William J. Ridella, M.P.H., M.B.A.
Director/Health Officer

Kevin P. Lokar, M.D.
Medical Director

March 23, 2015

Ms. Kelli Paige, Executive Director
Great Lakes Observing System
328 S. State Street
Ann Arbor, MI 48104

Dear Ms. Paige:

SUBJECT: LETTER OF SUPPORT FOR *SIMULATING SPILL SCENARIO'S FOR PUBLIC HEALTH PROTECTION IN THE HURON TO ERIE CORRIDOR*

On behalf of the Macomb County Health Department, I am pleased to provide this letter of support of the SEMCOG proposal entitled *Simulating Spill Scenario's for Public Health Protection in the Huron to Erie Corridor*.

This proposal will fund spill scenario simulations in the Detroit River and Lake St. Clair by estimating the location, travel time and impact of upstream spills on public health targets, such as Water Treatment Plant (WTP) intakes and bathing beaches. This activity will provide another tool available to WTP operators to protect their source water, water treatment plant intakes and the public health.

This project will also upgrade and re-imagine the GLOS website and data display platforms that use HECWFS (Huron–Erie Connecting Waterways Forecasting System) generated data in conjunction with other observing data. The GLOS website will then be more valuable to the various users (i.e., WTP operators) for information and decision-making.

The Macomb County Health Department recommends a positive review and selection of this proposal for funding by the GLOS/IOOS association.

Sincerely,

Krista Willette
Deputy Health Officer
Macomb County Health Department

City of Mount Clemens
One Crocker Boulevard
Mount Clemens, Michigan 48043

March 24, 2015

Ms. Kelli Paige, Executive Director
Great Lakes Observing System
328 S. State Street
Ann Arbor, MI 48104

Dear Ms Paige:

I am writing in support of the SEMCOG proposal entitled *Simulating Spill Scenario's for Public Health Protection in the Huron to Erie Corridor* being put forward on behalf of the Water Treatment Plants (WTPs) and Health Departments that comprise the Huron to Erie Drinking Water Real Time Monitoring Alliance.

This proposal, if funded, will result in spill scenario simulations in the Detroit River and Lake St. Clair. These simulations could provide important data on where spills might occur and the associated travel time and possible impacts on downstream locations such as WTP intakes and bathing beaches. This activity will provide another tool to WTP operators as we seek to protect our source water and the public health.

This project will also upgrade the GLOS website and data display platforms that use HECWFS (Huron–Erie Connecting Waterways Forecasting System) generated data in conjunction with other observing data. The GLOS website would then be an even better tool for our WTP staff and improve the information we have available for decision-making.

Therefore, the City of Mount Clemens recommends a positive review and selection of this proposal for funding by the GLOS/IOOS association.

Sincerely,

Steven M. Brown
City Manager

WARREN C. EVANS
WAYNE COUNTY EXECUTIVE

March 24, 2015

Ms. Kelli Paige, Executive Director
Great Lakes Observing System
328 S. State Street
Ann Arbor, MI 48104

Dear Ms Paige:

I am writing in support of the SEMCOG proposal entitled *Simulating Spill Scenario's for Public Health Protection in the Huron to Erie Corridor* being put forward on behalf of the Water Treatment Plants (WTPs) and Health Departments that comprise the Huron to Erie Drinking Water Real Time Monitoring Alliance.

This proposal, if funded will implement spill scenario simulations in the Detroit River and Lake St. Clair by estimating the location, travel time and impact of upstream spills on public health targets such as WTP intakes and bathing beaches. This activity will provide another tool available to WTP operators to protect their source water, water treatment plan intakes, and the public health.

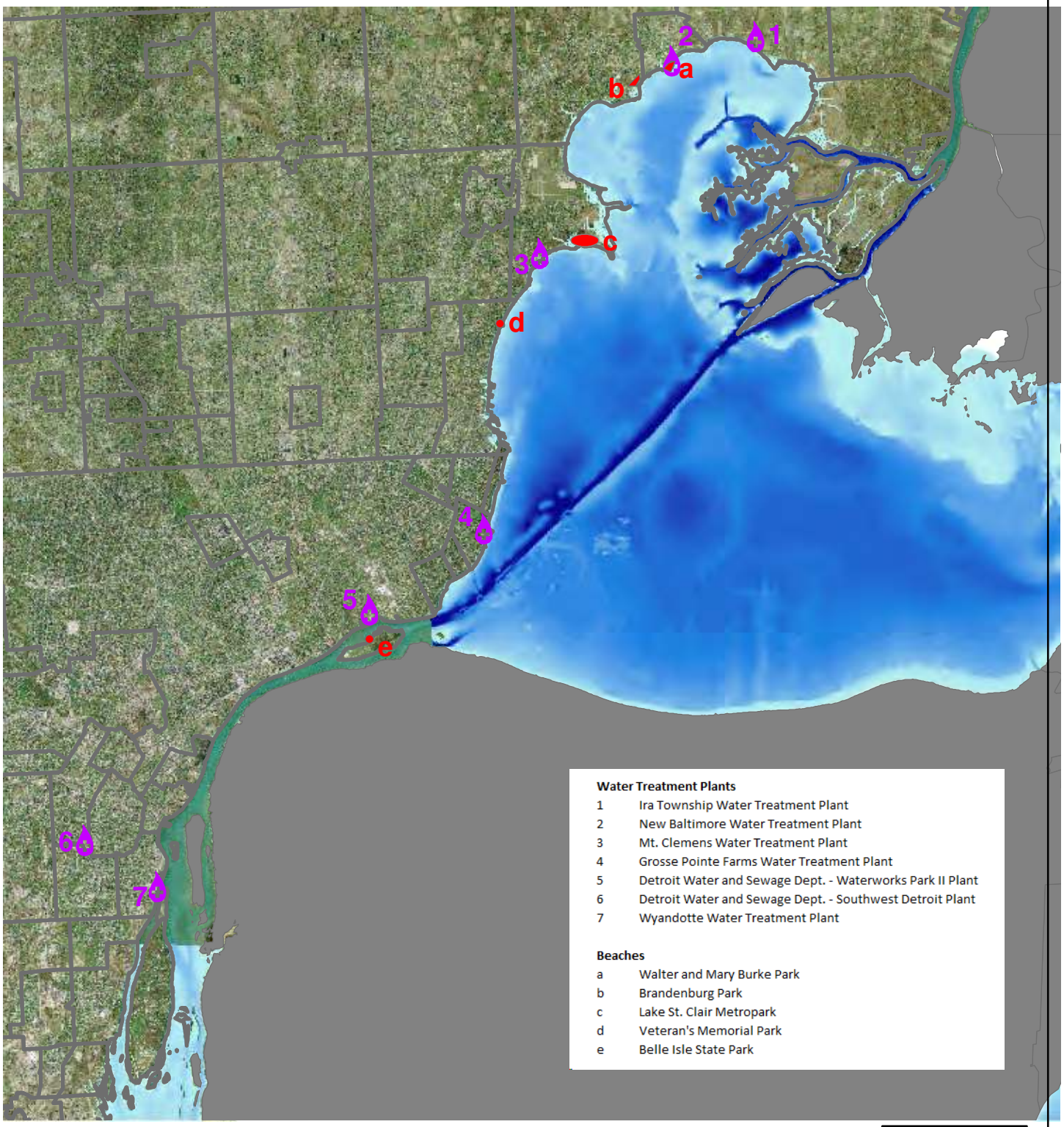
This project will also upgrade and re-imagine the GLOS website and data display platforms that uses HECWFS (Huron–Erie Connecting Waterways Forecasting System) generated data in conjunction with other observing data. The GLOS website will then be more pertinent to the various users (i.e., WTP operators) for information and decision-making.

Wayne County Public Health Department (WCPHD) currently has a representative on the advisory committee for the DWSD Surface Water Intake Protection Program. The proposal, if funded, will provide additional resources and data valuable to have an efficient and targeted response to protect the public water supply. WCPDH recommends a positive review and selection of this proposal for funding by the GLOS/IOOS association.

Sincerely,

Carol Austerberry, MPA, MS, RS
Acting Deputy Health Officer
Wayne County Public Health Department
33030 Van Born Road
Wayne, MI 48184

Public Health Targets Along Lake St. Clair & Detroit River



SEMCOG
Southeast Michigan Council of Governments
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Phone (313) 961-4266, Fax (313) 961-4869
www.semcog.org

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State Plane NAD83 HARN
March 2015

Water Treatment Plants
Beaches

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