

PROJECT ANNOUNCEMENT

**US Army Corps of Engineers (USACE)
Engineer Research and Development Center (ERDC)**

Title: Lake Huron Phosphorous Efflux

Announcement Type: Initial Announcement

Funding Opportunity Number: W81EWF-23-SOI-0002

Assistance Listing Number: 12.630

Date Issued: 08 March 2023

Key Dates: Phase I announcement will be open to receive statements of interest continuously until 12:00pm Central Time (CT), 07 April 2023, at which point all statements of interest must be received.

If invited to Phase II, full proposal applications will be due at 12:00pm Central Time (CT), 08 May 2023.

Estimated Award Ceiling: \$170,000

Estimated Total Program Funding: \$170,000

Agency Contact: Kisha Craig, Kisha.M.Craig@usace.army.mil

I. Program Description

A. Short Description of Funding Opportunity

ERDC seeks applications for: Sampling phosphorous efflux from Lake Huron to learn how concentrations change in the downstream direction and ultimately impact Lake Erie

Recent analyses (Burniston et al. 2018, Scavia in review, Scavia et al. 2019, 2020, 2022) have shown that the phosphorus (P) load from Lake Huron to the St. Clair River has been underestimated by at least a factor of three. Earlier underestimates were based on assuming the load is determined by offshore concentrations, dismissing river measurements because they were presumed to be biased by sediment-bound P that is not available to algae (IJC 1977). However, Scavia et al. (2020) showed that P to be biologically available. The newer load estimates are based on relatively frequent direct measurements in Canadian waters (e.g., Burniston et al. 2018) and estimates based on daily turbidity measurements in US and Canadian waters, and turbidity-P regressions (Scavia et al. 2022). Scavia et al. (2019, 2020) suggested the higher loads are driven by episodic fluxes of wind-driven resuspended sediment from Lake Huron's nearshore.

Burniston et al. (2018) also reported that P concentrations at the bottom of the river near Port Lambton were substantially higher than those measured at the top near Point Edward. Based on Port Huron/ Point Edward and Port Lambton/Algonac average loads, Scavia et al. (2019, 2020, 2022) suggest these higher loads at the bottom could reflect the episodic events that were missed in samples at the top of the river were mixed during transport and captured at the bottom (Figure 1). ***Additional sampling targeting more resuspension events are needed to confirm this.***

Initial efforts also revealed that loads calculated with P concentrations at Port Lambton were higher than those based on concentrations measured across the river at Algonac (Figure 2) even though they are roughly 0.5 km across the river from each other. An important difference between sampling at Algonac and Port Lambton is sampling depth. Algonac samples are taken from 0.5 – 1.0 m below the surface (J. Varricchione, Michigan EGLE, personal communication), whereas Port Lambton samples are from roughly 1 m off the bottom (Burniston et al. 2018).

It is possible that the Port Lambton samples encounter resuspended river sediment or bed load. Dissolved substances (e.g., Chloride) move conservatively from Point Edward to Port Lambton, but the fraction of P in particulate form does not (Figure 3). The particulate fraction is much higher at Port Lambton. These differences are also reflected in suspended solids and organic carbon. ***Additional sampling is required to confirm this.***

B. Program Description/Objective: The US Army Corps of Engineers will collect whole water samples from the St. Clair River and deliver them to a laboratory for nutrient analysis. The sampling plan will be designed with the grant recipient and laboratory. The results of the lab work will be delivered to grant recipient, spatial analyses will be performed to understand the fate and transport of phosphorous. Relationships will be established between samples and an existing sensor network maintained by the federal governments of the United States and Canada. These analyses will be fit into a larger body of nutrient work for the St. Clair-Detroit River system including: (Burniston, et. Al., 2009), (Burniston, et. Al., 2018), (Scavia, et. Al., 2014), (Scavia, et. Al., 2019), (Scavia, et. Al., 2022), (Scavia, 2023), (Totten and Duris, 2019).

D. Public Benefit: In 2014, the city of Toledo, Ohio shut down its water intake due to harmful algal blooms. The city water supply was unsafe to drink even if boiled. A city of 400,000 was forced to drink bottled water until the bloom subsided (Michalak, A.M., et. Al, 2013). Since then, a vigorous monitoring network, including a harmful algal boom forecast system was built. This system has been successful in providing warnings to shut down city intakes if necessary. However, additional work is needed to develop a new nutrient management plan for Lake Erie to reduce the onset of harmful algal blooms.

E. Authorization: 10 USC 4001.

F. Legal Requirements

Each Cooperative Agreement awarded under this announcement will be governed by 2 CFR 200, “Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards”, 2 CFR 1100 Subchapter D—Administrative Requirements Terms and Conditions for Cost-Type Grants and Cooperative Agreements to Nonprofit and Governmental Entities and the DoD research general terms and conditions located at <https://www.nre.navy.mil/work-with-us/manage-your-award/manage-grant-award/grants-terms-conditions>.

G. Program-Specific Requirements

II. Federal Award Information

The following information applies to awards issued under this announcement:

- This is a new program
- The Government anticipates 1 Federal award from this announcement, but reserves the right to award more or less
- The total amount of funding expected to be awarded through this announcement is \$170,000
- The expected amount of funding for each award is \$170,000 for Base award
- Award(s) from this announcement will be Cooperative Agreement(s)

- The anticipated period of performance is 18 months
- Applications for renewal or supplementation of existing projects are eligible to compete with applications for new Federal awards
- The government reserves the right to accept only portions of an application and to negotiate with potential awardees
- Government's substantial involvement includes Collection of water samples including boat time, crew, supply and material. The Government also will be modifying the sensor network to capture nutrient data.

III. Eligibility Information

A. Eligible Applicants

This opportunity is restricted to non-federal partners of the Great Lakes-Northern Forest Cooperative Ecosystems Studies Unit (CESU).

Disclosures of current and pending support made in this application may render an applicant ineligible for funding. Prior to award and throughout the period of performance, ERDC may continue to request updated continuing and pending support information, which will be reviewed and may result in discontinuation of funding.

Religious organizations are entitled to compete on equal footing with secular organizations for Federal financial assistance as described in E.O. 13798, "Promoting Free Speech and Religious Liberty."

B. Cost Sharing or Matching

This action will be 100% funded by USACE.

C. Conflict of Interest

a) General Requirement for Disclosure

You and your organization must disclose any potential or actual scientific or nonscientific conflict of interest(s) to us. You must also disclose any potential or actual conflict(s) of interest for any identified sub recipient you include in your application. We may have to ask you more questions if we need more information.

At our discretion, we may ask you for a conflict-of-interest mitigation plan after you submit your application. Your plan is subject to our approval.

b) Scientific Conflict of Interest

Scientific collaborations on research and development projects are generally the result of close collaboration prior to the submission of applications for support.

Accordingly, these collaborations should be considered when considering potential conflicts of interest. The potential conflict is mitigated by the disclosure of these collaborations, and the list of current and pending support you provide for senior and key researchers. Therefore, you must include in your list of current and pending support all collaborators, even if they did not formally provide support.

D. Other

a) Licensure or Certification

You must include the Acknowledgment of Support and Disclaimer on all materials created or produced under our awards. This language may be found in the Terms and Conditions included in the award documents.

E. Certifications, representations, and assurances

1. To apply for grants and other funding opportunities the applicant entity must have an active registration in the System for Award Management (SAM). Applications will not be accepted through Grants.gov or other methods unless the entity is registered in SAM. Registration in SAM now includes the acceptance of Certifications and Assurances. See <https://www.grants.gov/web/grants/grantors/grantor-standard-language.html> for details on how to register in SAM, and Grants.gov
2. The Federal Assistance Certifications Report is an attestation that the entity will abide by the requirements of the various laws and regulations; therefore, as applicable, you are still required to submit any documentation, including the SF-LLL Disclosure of Lobbying Activities (if award value exceeds \$100,000.00), and, if applicable, informing DoD of unpaid delinquent tax liability or a felony conviction under any Federal law.
3. Certification Regarding Disclosure of Funding Sources. By checking "I Agree" on the SF 424 (R&R) block 17 you agree to abide by the following statement: "By signing this application, I certify the proposing entity is in compliance with Section 223(a) of the William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021 which requires that: (a) the PI and other key personnel certify that the current and pending support provided on the proposal is current, accurate and complete; (B) agree to update such disclosure at the request of the agency prior to the award of support and at any subsequent time the agency determines appropriate during the term of the award; and (c) the PI and other key personnel have been made aware of the requirements under Section 223(a)(1) of this Act. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. code, Title 218, Section 1001)."

IV. Application and Submission Information (2 Phase Process)

A. Phase I: Submission of Statement of Interest (SOI)

1. Materials Requested for Statement of Interest/Qualifications:

a. Please provide the following via e-mail attachment to: Kisha M. Craig, Kisha.M.Craig@usace.army.mil (Maximum length: 2 pages, single-spaced 12 pt. font).

i. Name, Organization and Contact Information

ii. Brief Statement of Qualifications (including):

- Biographical Sketch,
- Relevant past projects and clients with brief descriptions of these projects,
- Staff, faculty or students available to work on this project and their areas of expertise,
- Any brief description of capabilities to successfully complete the project you may wish to add (e.g. equipment, laboratory facilities, greenhouse facilities, field facilities, etc.).

Note: A proposed budget is NOT requested at this time.

The administrative point of contact is Kisha M. Craig, Kisha.M.Craig@usace.army.mil

2. ERDC will only accept SOIs submitted on or before 07 April 2023, 12:00pm Central Time (CT).

Based on a review of the Statements of Interest received, an investigator or investigators will be invited to move to Phase II which is to prepare a full study proposal. Statements will be evaluated based on the investigator's specific experience and capabilities in areas related to the study requirements.

B. Phase II (if invited): Submission of Full Application Package

1. Address to Request Application Package

The complete funding opportunity announcement, application forms, and instructions are available for download at Grants.gov.

The administrative point of contact is Kisha M. Craig, kisha.m.craig@usace.army.mil

2. Content and Form of Application Submission

All mandatory forms and any applicable optional forms must be completed in accordance with the instructions on the forms and the additional instructions below.

a. SF 424 R&R - Application for Federal Assistance

b. Full Technical Proposal – Discussion of the nature and scope of the research

and technical approach. Additional information on prior work in this area, descriptions of available equipment, data and facilities, and resumes of personnel who will be participating in this effort should also be included.

- c. Cost Proposal/Budget – Clear, concise, and accurate cost proposals reflect the offeror’s financial plan for accomplishing the effort contained in the technical proposal. As part of its cost proposal, the offeror shall submit a full budget in sufficient detail so that a reasonableness determination can be made. A recommended template will be included in the invitation to Phase II. The SF 424 Research & Related Budget Form can be used as a guide but is required if the sub-recipient uses it. The cost breakdown should include the following, if applicable:

1. Direct Labor: Direct labor should be detailed by level of effort (i.e. numbers of hours, etc.) of each labor category and the applicable labor rate. The source of labor rates shall be identified and verified. If rates are estimated, please provide the historical based used and clearly identify all escalation applied to derive the proposed rates.
2. Fringe Benefit Rates: The source of fringe benefit rate shall be identified and verified.
3. Travel: Travel costs must include a purpose and breakdown per trip to include destination, number of travelers, and duration.
4. Materials/Equipment: List all material/equipment items by type and kind with associated costs and advise if the costs are based on vendor quotes and/or engineering estimates; provide copies of vendor quotes and/or catalog pricing data.
5. Subrecipient costs: Submit all subrecipient proposals and analyses. Provide the method of selection used to determine the subrecipient.
6. Tuition: Provide details and verification for any tuition amounts proposed.
7. Indirect Costs: Currently the negotiated indirect rate for awards through the CESU is 17.5%.
8. Any other proposed costs: The source should be identified and verified.

- d. R&R Senior/Key Person Profile

1. Biographical Sketch
2. Disclosure of Current and Pending Support:
 - i. A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
 - ii. Title and objectives of the other research projects.
 - iii. The percentage per year to be devoted to the other projects.
 - iv. The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other applications are awarded.
 - v. Name and address of the agencies and/or other parties supporting the other research projects.

vi. Period of performance for the other research projects.

e. SF-LLL Disclosure of Lobbying Activities (if award value exceeds \$100,000.00)

f. Data Management Plan:

A data management plan is a document that describes which data generated through the course of the proposed research will be shared and preserved, how it will be done, or explains why data sharing or preservation is not possible or scientifically appropriate, or why the costs of sharing or preservation are incommensurate with the value of doing so. See also: DoD Instruction 3200.12.

<https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/320012p.pdf?ver=2019-04-30-073122-220>

Data management plans are generally 2 pages in length, and must include the following considerations:

- (1) The types of data, software, and other materials to be produced.
- (2) How the data will be acquired.
- (3) Time and location of data acquisition, if scientifically pertinent.
- (4) How the data will be processed.
- (5) The file formats and the naming conventions that will be used.
- (6) A description of the quality assurance and quality control measures during collection, analysis, and processing.
- (7) A description of dataset origin when existing data resources are used.
- (8) A description of the standards to be used for data and metadata format and content.
- (9) Appropriate timeframe for preservation.
- (10) The plan may consider the balance between the relative value of data preservation and other factors such as the associated cost and administrative burden. The plan will provide a justification for such decisions.

3. ERDC will only accept full application packages submitted on or before 08 May 2023, 12:00pm Central Time (CT).

4. Submission Instructions

Choose **ONE** of the following submission methods:

a. E-mail:

Format all documents to print on Letter (8 ½ x 11”) paper. E-mail proposal to Kisha M. Craig, kisha.m.craig@usace.army.mil.

b. Grants.gov: <https://www.grants.gov/>:

Applicants are not required to submit proposals through Grants.gov. However, if applications are submitted via the internet, applicants are responsible for ensuring that their Grants.gov proposal submission is received in its entirety.

All applicants choosing to use Grants.gov to submit proposals must be registered and have an account with Grants.gov. It may take up to three weeks to complete Grants.gov registration. For more information on registration, go to <https://www.grants.gov/web/grants/applicants.html>.

Organizations must have a Unique Entity Identifier (UEI) and active System for Award Management (SAM) registration to apply for Federal financial assistance.

C. Application Withdrawal:

An applicant may withdraw an application at any time before award by written notice via email. Notice of withdrawal shall be sent to the agency point of contact identified in this announcement and are effective upon receipt.

D. Funding Restrictions

Per 2 CFR § 200.216, funds may not be used to procure telecommunications equipment or video surveillance services or equipment produced by

- Huawei Technologies Company,
- ZTE Corporation Hytera Communications Corporation,
- Hangzhou Hikvision Digital Technology Company,
- Dahua Technology Company
- any subsidiary or affiliate of such entities

Funds from an award may not be used to attain fee or profit.

V. Application Review Information

A. Selection Criteria

Applications will be evaluated using the following criteria, listed in descending order of importance:

- Technical merits of the proposed research and development; and
- Potential relationship of the proposed research and development to Department of Defense missions

B. Review and Selection Process:

Each application will be reviewed based on the selection criteria above rather than against other applications submitted under this Announcement.

Based on the Peer or Scientific Review, proposals will be categorized as Selectable or Not Selectable (see definitions below). The selection of the source for award will be based on the Peer or Scientific Review, as well as importance to agency programs and funding availability.

- i. Selectable: Proposals are recommended for acceptance if sufficient funding is available.

- ii. Not Selectable: Even if sufficient funding existed, the proposal should not be funded.

Note: The Government reserves the right to award some, all, or none of proposals. When the Government elects to award only a part of a proposal, the selected part may be categorized as Selectable, though the proposal as a whole may not merit such a categorization.

In addition to the technical/program review, the DoD performs a budget review and a risk review as directed by 2 CFR 200.206, including a review of the Federal Awardee Performance and Integrity Information System (FAPIIS). Applicants may review information in FAPIIS and comment on any information entered into that system. Comments made by applicants will be taken into account in addition to other information in considering applicants' integrity, business ethics, and record of performance.

VI. Federal Award Administration Information

The notification e-mail regarding a selection is not authorization to commit or expend DoD funds. A DoD grants officer is the only person authorized to obligate and approve the use of federal funds. This authorization is in the form of a signed Notice of Award. Applicants whose applications are recommended will be contacted by a DoD grants officer to discuss any additional information required for award. This may include representations and certifications, revised budgets or budget explanations, or other information as applicable to the proposed award. The award start date will be determined at this time.

VII. Reporting Requirements

The terms and conditions of the award will provide the specifics on how to submit the reports and any required sections for those reports.

In accordance with 2 CFR 200.328 (Financial Reporting) and 2 CFR 200.329 (Program Performance)

Report	Requirements/Form	Frequency	Means of Submission
ERDC Progress Report		Upon submittal of SF270	E-mail
Research Performance Progress Reports (Interim and Final)	OMB Control Number: 0704-0527	Annually	E-mail
Financial Report	SF 425	Quarterly	E-mail
Payment Report	SF 270	Monthly	E-mail
Closeout Report		Once	E-mail

Awardees will need to comply with the reporting requirements in 2 CFR 170: Reporting Subaward and Executive Compensation Information.

The terms and conditions of the award will provide the specifics on how to submit the reports

and any required sections for those reports.

VIII. Federal Contacts

Questions should be directed to:

Kisha M. Craig
Grants Specialist
Kisha.M.Craig@usace.army.mil

Chelsea M. Whitten
Grants Officer
Chelsea.M.Whitten@usace.army.mil

Questions regarding Grants.gov should be directed to the toll-free number 1-800-518-4726 and email at support@grants.gov.

IX. Other Information

References

- Baker, D.B., Confesor, R., Ewing, D.E., Johnson, L.T., Kramer, J.W., Merryfield, B.J., 2014. Phosphorus loading to Lake Erie from the Maumee, Sandusky and Cuyahoga rivers: the importance of bioavailability. *J. Great Lakes Res.* 40 (3), 502–517.
<https://doi.org/10.1016/j.jglr.2014.05.001>
- Bocaniov, S. A.; Scavia, D. Nutrient loss rates in relation to transport time scales in a large shallow lake (Lake St. Clair, USA – Canada): insights from a three-dimensional lake model. *Water Resour. Res.* 2018, 54, 3825–3840
- Bocaniov, S.A., D. Scavia, P. Van Cappellen. Long-term phosphorus mass balance suggests a major role of in-lake mobilization processes in nutrient enrichment of Lake Erie (Canada-USA). *Ecological Informatics*.
- Bocaniov, S.A., Leon, L.F., Rao, Y.R., Schwab, D.J., Scavia, D., 2016. Simulating the effect of nutrient reduction on hypoxia in a large lake (Lake Erie, USA-Canada) with a three dimensional lake model. *J. Great Lakes Res.* 42 (6), 1228–1240
- Burniston, D.; Dove, A.; Backus, S.; Thompson, A. 2018 Nutrient Concentrations and Loadings in the St. Clair River - Detroit River Great Lakes Interconnecting Channel. *J. Great Lakes Res.* 2018, 44: 398-411.
- Burniston, D.A., McCrea, R., Klawunn, P., Ellison, R., Thompson, A., Bruxer, J., 2009. Detroit River Phosphorus Loading Determination. Environment Canada, Water Quality Monitoring and Surveillance Office (Locator No. WQMS09-006, Contribution No. 09-757).
- Confesor, R., Depew, D.C., Höök, T.O., Ludsin, S.A., Matisoff, G., McElmurry, S.P., Murray, M.W., Peter Richards, R., Rao, Y.R., Steffen, M.M., Wilhelm, S.W., 2016. The re-

- eutrophication of Lake Erie: harmful algal blooms and hypoxia. *Harmful Algae* 56, 44–66. <https://doi.org/10.1016/j.hal.2016.04.010>.
- Carpenter, S. R.; Booth, E. G.; Kucharik, C. J.; Lathrup, R. C. Extreme daily loads: role in annual phosphorus input to a north temperate lake. *Aquat. Sci.* 2015, 77, 71–79.
- Dagnew, A.D., Scavia, Y-C Wang, Muenich, R., Long, C., Kalcic, M., 2019. Modeling Flow, Nutrient and Sediment Delivery from a Large International Watershed using a Field-Scale SWAT model. JAWRA. <https://doi.org/10.1111/1752-1688.12779>.
- Howell, E. T.; D.R. Barton, C.L. Fietsch, G. Kaltenecker. 2014. Fine-scale nutrient enrichment and water quality on the rural shores of Southeast Lake Huron. *J. Great Lakes Res.* 2014, 40, 126–140.
- Jennings, E.; Jones, S.; Arvola, L.; Staehr, P. A.; Gaiser, E.; Jones, I. D.; Weathers, K. C.; Weyhenmeyer, G. A.; Chiu, C.-Y.; De Eyto, E. Effects of weather-related episodic events in lakes: an analysis based on high-frequency data. *Freshwater Biol.* 2012, 57, 589–601.
- Kahn, M., E. Hogan, I. Salim. 2023. Phosphorus discharges from Great Lakes Water Authority’s Water Resource Recovery Facility. <https://www.uwindsor.ca/glier/443/phosphorus-discharges-great-lakes-water-authority%E2%80%99s-water-resource-recovery-facility>. Accessed 1/29/2023
- Lang, G.A., Morton, J.A., Fontaine III., T.D., 1988. Total phosphorus budget for Lake St. Clair: 1975–80. *J. Great Lakes Res.* 14, 257–266.
- Manning, N.F., Y.C. Wang, C. M. Long, I. Bertani, M. J. Sayers, K. R. Bosse, R. A. Shuchman, D. Scavia. 2019 Extending the Forecast Model: Predicting Harmful Algal Blooms at Multiple Spatial Scales. *J. Great Lakes Res.* 45:587–595.
- Monteith, T.J., Sonzogni, W.C., 1976. United States Great Lakes Shoreline Erosion Loadings. Prepared for the International Joint Commission's Pollution From Land Use Activities Reference Group. International Joint Commission, Windsor, Ontario.
- Michalak, A.M., Anderson, E.J., Beletsky, D., Boland, S., Bosch, N.S., Bridgeman, T.B. DePinto, J.V., 2013. Record-setting algal bloom in Lake Erie caused by agricultural and meteorological trends consistent with expected future conditions. *Proc. Nat. Acad. Sci.* 110 (16), 6448–6452.
- Robertson, D. M.; Hubbard, L. E.; Lorenze, D. L.; Sullivan, D. J. 2018. A surrogate regression approach for computing continuous loads for the tributary nutrient and sediment monitoring program on the Great Lakes. *J. Great Lakes Res.* 2018, 44, 26–42.
- Robertson, D.M., D.A. Saad, G.A. Benoy, I. Vouk, G. E. Swartz, M.T. Laita. 2019. Phosphorus and Nitrogen Transport in the Binational Great Lakes Basin Estimated Using SPARROW Watershed Models. *JAWRA* 55: 1401-1424.
- Sayers, M., Fahnenstiel, G.L., Shuchman, R.A., Whitley, M., 2016. Cyanobacteria blooms in three eutrophic basins of the Great Lakes: a comparative analysis using satellite remote sensing. *Int. J. Remote Sens.* 37, 4148–4171
- Scavia, D. 2023. Updated Phosphorus loads from Lake Huron and the Detroit River: Implications. *J. Great Lakes Res.*
- Scavia, D., E. J. Anderson, A. Dove, B. Hill, C. M. Long, Y-C Wang. 2020 Lake Huron’s

- Phosphorus Contributions to the St. Clair-Detroit River Great Lakes Connecting Channel. *Environ Sci. Tech.* 54:5550-5559 DOI: 10.1021/acs.est.0c00383
- Scavia, D., J. D. Allan, K. K. Arend, S. Bartell, D. Beletsky, N. S. Bosch, S. B. Brandt, R. D. Briland, I. Daloğlu, J. V. DePinto, D. M. Dolan, M. A. Evans, T. M. Farmer, D. Goto, H. Han, T. O. Höök, R. Knight, S. A. Ludsin, D. Mason, A. M. Michalak, R. P. Richards, J. J. Roberts, D. K. Rucinski, E. Rutherford, D. J. Schwab, T. Sesterhenn, H. Zhang, Y. Zhou. 2014 Assessing and addressing the re-eutrophication of Lake Erie: Central Basin Hypoxia. *J. Great Lakes Res.* 40: 226–246. <http://dx.doi.org/10.1016/j.jglr.2014.02.004>
- Scavia, D., J.V. DePinto, I. Bertani. 2016. A Multi-model approach to evaluating target phosphorus loads for Lake Erie. *J. Great Lakes Res.* 42: 1139-1150
- Scavia, D., S.A. Bocaniov, A. Dagnew, C. Long, Y-C Wang. 2019 . St. Clair-Detroit River system: Phosphorus mass balance and implications for Lake Erie load reduction, monitoring, and climate change. *J. Great Lakes Res.* 45:40-49
- Scavia, D., T. J. Calappi, C. M. Godwin, B. Hill, M. Veliz, Y-C Wang. 2022. Wind-driven sediment resuspension in the world’s fourth-largest lake contributes a substantial phosphorus load to the eleventh largest lake. *ES&T*
<https://doi.org/10.1021/acs.est.2c02820>
- Stow, C.A., Y. Cha, L.T. Johnson, R. Confesor, R.P. Richards 2015. Long-term and seasonal trend decomposition of Maumee River Nutrient Inputs to Western Lake Erie. *Environ. Sci. Technol.*, 49: 3392-3400, 10.1021/es5062648
- Totten, A.R., and Duris, J.W., 2019, Spatial distribution of nutrients, chloride, and suspended sediment concentrations and loads determined by using different sampling methods in a cross section of the Trenton Channel of the Detroit River, Michigan, November 2014–November 2015: U.S. Geological Survey Scientific Investigations Report 2018–5141, 25 p., <https://doi.org/10.3133/sir20185141>.
- Watson, S.B., Miller, C., Arhonditsis, G., Boyer, G.L., Carmichael, W., Charlton, M.N.,