

**RESOLUTION AUTHORIZING THE AWARD OF A CONTRACT BY THE
NORTH HUDSON SEWERAGE AUTHORITY AS A CONSTITUENT MEMBER
OF THE NEW JERSEY HARBOR DISCHARGERS GROUP**

MOTIONED BY: Velazquez

SECONDED BY: Gardiner

WHEREAS, the North Hudson Sewerage Authority (hereinafter "Authority") is a public body, duly formed under the Sewerage Authorities law, constituting Chapter 138 of the Laws of New Jersey of 1946, as amended (Chapter 14A of Title 40 of the New Jersey Statutes Annotated) and possesses the powers set forth therein; and

WHEREAS, the following sewerage and municipal and county utility authorities in New Jersey have formed a consortium known as the New Jersey Harbor Dischargers Group ("NJHDG") to address issues arising from the various studies performed under the Harbor Program:

Bergen County Utilities Authority
Joint Meeting of Essex and Union Counties
Linden Roselle Sewerage Authority
Middlesex County Utilities Authority
North Bergen Municipal Utilities Authority
North Hudson Sewerage Authority
Passaic Valley Sewerage Commissioners
Rahway Valley Sewerage Authority
Secaucus Municipal Utilities Authority

WHEREAS, the NJHDG has accepted the proposal from Great Lakes Environmental Center (GLEC) to renew the Technical Advisor Contract in the amount of \$113,000.00 and requires each NJHDG member agency pass a resolution authorizing the signing of a contract with GLEC; and

WHEREAS, the share for the North Hudson Sewerage Authority is 7.67% of the total in the amount of \$8,667.10.

NOW, THEREFORE, BE IT RESOLVED that pursuant to the Local Public Contracts Law, specifically N.J.S.A. 40a:11-10, the participation of the Authority is hereby approved as reasonable and necessary for the efficient operation of the North Hudson Sewerage Authority.

BE IT FURTHER RESOLVED that the Executive Director is hereby authorized to execute the contract agreement on behalf of the North Hudson Sewerage Authority, subsequent to the review and approval of the contract language by its General Counsel.

**RESOLUTION AUTHORIZING THE AWARD OF A CONTRACT BY THE
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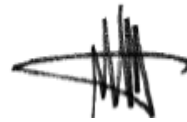
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DATED: DECEMBER 14, 2023

RECORD OF COMMISSIONERS' VOTE

	YES	NO	ABSENT
Commissioner Kappock	x		
Commissioner Marotta			x
Commissioner Gardiner	x		
Commissioner Friedrich	x		
Commissioner Guzman			x
Commissioner Velazquez	x		
Commissioner Barrera	x		
Commissioner Zucconi	x		
Commissioner Assadourian	x		

**THIS IS TO CERTIFY THAT THIS RESOLUTION WAS DULY ADOPTED BY THE
NORTH HUDSON BOARD OF COMMISSIONERS ON DECEMBER 14, 2023.**



SECRETARY

AGREEMENT

This Agreement made this 1st day of June 2023 for the one (1) year period June 1, 2023 to May 31, 2024 by and among the Bergen County Utilities Authority (Little Ferry and Edgewater), Joint Meeting of Essex and Union Counties, Linden Roselle Sewerage Authority, Middlesex County Utilities Authority, North Bergen Municipal Utilities Authority, North Hudson Sewerage Authority, Passaic Valley Sewerage Commission, Rahway Valley Sewerage Authority, and the Secaucus Municipal Utilities Authority, bodies politic and corporate of the State of New Jersey, and Great Lakes Environmental Center with principal offices for the transaction of business located at 739 Hastings Street, Traverse City, Michigan (hereinafter referred to as "GLEC").

WITNESSETH:

WHEREAS, the Clean Water Act, 33 USC 1251 et seq. (the "Act"), empowers the United States Environmental Protection Agency ("USEPA") to develop, in cooperation with other federal and state agencies, comprehensive programs for the prevention, reduction, or elimination of pollution of navigable waters; and

WHEREAS, pursuant to Section 301 of the Act, the USEPA is authorized to establish effluent limitations for publicly-owned treatment works; and

WHEREAS, the USEPA, New Jersey Department of Environmental Protection ("NJDEP"), and the New York Department of Environmental Conservation have initiated and coordinated the New York/New Jersey Harbor Estuary Program (Harbor Program) to study the quality of water in the New York/New Jersey Harbor; and

WHEREAS, the following sewerage and municipal and county utilities authorities in New Jersey have formed a consortium known as the New Jersey Harbor Dischargers Group ("NJHDG") to address issues arising from the various studies performed under the Harbor Program:

Bergen County Utilities Authority (Little Ferry and Edgewater)
Joint Meeting of Essex and Union Counties
Linden Roselle Sewerage Authority
Middlesex County Utilities Authority
North Bergen Municipal Utilities Authority
North Hudson Sewerage Authority
Passaic Valley Sewerage Commission
Rahway Valley Sewerage Authority
Secaucus Municipal Utilities Authority

WHEREAS, the NJHDG has determined that it is necessary to engage a professional environmental consultant to serve as Technical Advisor to the NJHDG to coordinate the monitoring of the New York/New Jersey Harbor and its tributaries and for the performance of toxics and nutrient studies that will be required by the NJHDG; and

WHEREAS, the NJHDG has designated the Passaic Valley Sewerage Commission ("PVSC") to serve as lead agency for the purpose of procuring the necessary professional environmental services required by the NJHDG; and

WHEREAS, on or about July 18, 1994, the Bergen County Utilities Authority (BCUA), on behalf of the NJHDG, issued a Request for Proposals ("RFP"), to solicit proposals from professional environmental consultants to serve as Technical Advisor to the NJHDG; and

WHEREAS, the NJHDG had previously awarded a contract to GLEC to act as Technical Advisor to the NJHDG which has now expired, and.

WHEREAS, the NJHDG desires to continue to engage GLEC to serve as Technical Advisor to the NJHDG; and

WHEREAS, the services to be rendered by GLEC are exempt from competitive bidding requirements under N.J.S.A. 40A: 11-5(1)(a)(I), as such services constitute professional services, i.e., services required or performed by a person authorized by law to practice a recognized profession, whose practice is regulated by law; and

WHEREAS, the scope of work and compensation to be paid therefore shall be memorialized in an Agreement to be executed by and between the members comprising the NJHDG and GLEC; and

WHEREAS, the members of the NJHDG are desirous of executing an Agreement with GLEC for the continued performance of professional environmental services as Technical Advisor to the NJHDG; and

WHEREAS, pursuant to the terms of Cooperative Pricing Agreement (52NJHDGCPSPS), renewed and approved by the New Jersey Department of Community Affairs on October 23, 2023, each member of the NJHDG is required to pay its proportionate share of the cost of the professional environmental services contemplated hereby (a schedule of such proportionate costs is attached hereto and made a part hereof as "Attachment A") and to authorize the execution of the Agreement, similar in form and substance to the Agreement attached hereto, in order to initiate the procurement of professional environmental services as Technical Advisor to NJHDG to perform the studies and analyses required by the NJHDG; and

WHEREAS, the award of this Agreement is necessary for the efficient operations of the members of the NJHDG;

NOW, THEREFORE, it is mutually agreed by and between the parties as follows:

1. The NJHDG appoints and retains GLEC to serve as Technical Advisor to the NJHDG in accordance with their most recent proposal submitted on April 26, 2022 which proposal is incorporated herein by reference and made a part hereof.
2. GLEC shall perform the professional environmental services as enumerated and set forth in their proposals for the compensation set forth therein.
3. GLEC represents and warrants that it possesses all requisite degrees, accreditation, and licenses required by law to perform the services enumerated in this Agreement.

4. GLEC shall prepare and submit to the NJHDG such reports on the status of services being provided by GLEC as may be requested by the NJHDG.
5. GLEC shall not enlarge or reduce the scope of services with respect to any matter assigned to it without the express written consent of the NJHDG.
6. GLEC agrees that it will make adequate staff available to the NJHDG to provide the services required hereunder.
7. GLEC agrees to comply with all federal, state, and local laws and regulations applicable to the rendering of the services by GLEC hereunder, and particularly to comply with non-discrimination laws and regulations promulgated pursuant to *P.L. 1975, c. 127*, where and if applicable, and the terms of Exhibit A, Mandatory Equal Employment Opportunity Language, appended hereto.
8. Nothing herein contained shall be deemed or construed from preventing GLEC from utilizing professional sub-consultants for the performance of the professional services, if the same are required to complete the work contemplated hereby, on notice to and approved by the **NJHDG**.
9. GLEC agrees to indemnify the NJHDG from all claims, liabilities, losses, damages, and/or expenses resulting in property damage and/or personal injuries arising out of or resulting from the negligent acts and/or omissions of GLEC and its agents, servants, employees, or independent contractors or sub-contractors in performing the professional environmental services as set forth in this Agreement.
10. GLEC represents and agrees that it shall perform all professional environmental services under this Agreement in a manner consistent with that duty and level of due care and skill, respectively, ordinarily exercised by environmental professionals under similar circumstances.
11. The parties agree that the NJHDG shall have the right to terminate this Agreement at any time by giving GLEC written notice in accordance with the terms of this Agreement. Should termination occur, GLEC shall be paid for all services provided up to the date of final termination. In determining the value of the work performed by GLEC prior to such

termination, no consideration will be given to anticipated profit which GLEC may have contemplated on the uncompleted portion of the work. If such termination is effected, GLEC shall, however, issue an interim report upon such termination, indicating the work performed to date.

12. Any notice by either party to the other shall be in writing and shall be deemed to have been duly given only if delivered personally or sent by registered or certified mail in a postage prepaid envelope addressed, if to GLEC:

Mick DeGraeve, President
Great Lakes Environmental Center
739 Hastings Street
Traverse City, Michigan 49686

If to the NJHDG:

Thomas Laustsen,
Chief Operating Officer
Passaic Valley Sewerage
Commission
600 Wilson Ave.
Newark, New Jersey 07105

or at such other address as GLEC or NJHDG, respectively, may designate in writing. Notice shall be deemed to have been duly given, if delivered personally, on delivery thereof, and if mailed, upon the delivery of same.

13. No representations or promises shall be binding on the parties hereto except those representations and promises contained herein or in some future writing signed by the party making such representations or promises.
14. This Agreement is for the sole benefit of the NJHDG, its successors and assigns, and GLEC, its successors and assigns, and no third part beneficiary to this Agreement is contemplated or implied.
15. In the event the corporation known as GLEC shall be reorganized, dissolved and reconstituted for any reason, this Agreement shall continue in full force and effect with the successor organization, provided that the NJHDG shall have the right to cancel this Agreement upon notification to the NJHDG of any termination or reorganization of GLEC

involving an outside firm or organization becoming involved in the control of the corporation known as GLEC.

16. This Agreement is specifically subject to the availability and appropriation annually of sufficient funds as may be required to meet this extended obligation by the members of the NJHDG. In the event it becomes apparent to the NJHDG that adequate funds will not be available to meet any extended obligation herein, the NJHDG shall immediately notify GLEC.
17. Each member of the NJHDG shall be liable for the share of the total amount of the contract as indicated in Attachment "A", and as Attachment "A" may be modified in accordance with Article 5 of the Agreement. Failure of any of the NJHDG members to pay GLEC any amount due shall not become the responsibility of the NJHDG or any other member thereof. GLEC shall be responsible for billing each NJHDG member individually for its share.
18. This agreement constitutes the entire Agreement between the parties pertaining to the subject matter hereof and supersedes all prior or contemporaneous agreements, understandings, negotiations, and discussions, whether oral or written, pertaining to the subject matter hereof, and there are no warranties, representations, or agreements between the parties in connection with the subject matter hereof except as set forth or referred to herein. No supplement, modification, waiver, or termination of this Agreement or any Provisions herein shall be binding unless executed in writing by the parties. No waiver of any of the provisions of this Agreement shall constitute a continuing waiver unless otherwise expressly provided. All of the terms and provisions of this Agreement shall be binding upon and shall inure to the benefit of the parties hereto.
19. GLEC shall present separate evidence that it maintains in effect the following policies of insurance during the term of this Agreement: (a) Workers' Compensation Insurance in accordance with the provisions of the Workers' Compensation Law of the State of New Jersey, for each employee engaged to work under this Agreement; (b) Comprehensive General Liability Insurance, with a combined single limit of at least \$2,000,000.00; and (c) Professional Liability Insurance with a combined single limit of at least \$2,000,000.00. The above noted policies of insurance shall be maintained with carriers that are acceptable to the

PVSC, and the PVSC's acceptance shall not be unreasonably withheld. GLEC shall provide the PVSC with its certificate(s) for the above insurances naming the PVSC and the other members comprising the NJHDG as additional insured's. The certificate(s) shall include a statement that prior to cancellation of the policy, notice of same shall be given to the PVSC for all policies so affected. All notices shall name and identify this Agreement. Failure to give such notice for any reason shall be a breach of this Agreement which may, at the option of the PVSC and upon reasonable notice to GLEC, cause this Agreement to be terminated.

20. This agreement has been awarded to GLEC based on the merits and abilities Of GLEC to provide the services as described herein. This Agreement was not awarded through a "fair and open process" pursuant to N.J.S.A. 19:44A-20A et seq. As such, the undersigned does hereby attest that GLEC, its subsidiaries, assigns or principals controlling in excess of 10% of the GLEC has neither made a contribution, reportable pursuant to the Election Law Enforcement Commission pursuant to N.J.S.A. 19:44A-8 or 19:44A-16, in the one (1) year period preceding the award of the contract that would, pursuant to *P.L. 2004, c. 19*, affect its eligibility to perform this Agreement, nor will it make a reportable contribution during the term of the Agreement to any political party committee in Essex, Monmouth, Passaic, Bergen, Union, Hudson, Middlesex, Somerset, and Morris Counties (collectively "the Counties") and any municipality, fire district, board of education in such Counties, (together with Counties, collectively "Entities" and individually "Entity") if a member of that political party is serving in an elective public office of any Entity when the contract is awarded, or to any candidate committee of any person serving in an elective public office of any Entity when the Agreement was awarded. GLEC shall have a continuing duty to report to the Election Law Enforcement Commission any contributions that constitute a violation of *P.L. 2004 c. 19*, that are made during the duration of this Agreement.

21. As a courtesy, GLEC is advised that a for-profit business entity that has received \$50,000 or more through government contracts in a calendar year, must file an annual disclosure statement on political contributions with the New Jersey Election Law Commission pursuant to *P.L. 2005 c. 271* by March 30. It is the Broker's responsibility to determine if filing is necessary. Additional information on this requirement is available from the ELEC at (888) 313-3532 or at www.elec.state.nj.us.

22. If any paragraph or provision of this Agreement is judged to be invalid or unenforceable, it shall then be severed from this agreement, and the balance of this Agreement shall survive as if such paragraph or section was not contained within this Agreement.

23. Business Registration Certificate. GLEC shall provide written notice to its subcontractors of the responsibility to submit proof of business registration to GLEC prior to entry into a contract with GLEC.

"Subcontractor" means any business organization that is not a contractor that knowingly provides goods or performs services for GLEC or another subcontractor in the fulfillment of this Agreement where the aggregate cost of the subcontractors work exceeds 15% of the Authority's bid threshold (where the costs of the subcontractor's work in the aggregate exceeds \$6,000.00).

Before final payment on the Agreement is made by the Authority, GLEC shall submit an accurate list and the proof of business registration of each subcontractor or supplier used in the fulfillment of this Agreement, or shall attest that no subcontractors were used.

A business organization that fails to provide a copy of a business registration as required pursuant to section 1 of *P.L.2001, c./34* (C.52:32-44 et al.) or subsection e. or f. of section 92 of *P.L.1977, c.110* (C.5:12-92), or that provides false business registration information under the requirements of either of those sections, shall be liable for a penalty of \$25 for each day of violation, not to exceed \$50,000 for each business registration copy not properly provided under a contract with a contracting agency.

24. For the term of the contract, GLEC and each of its affiliates and a subcontractor and each of its affiliates (N.J.S.A. 52:32-44(g)(3)) shall collect and remit to the Director, New Jersey Division of Taxation, the use tax due pursuant to the Sales and Use Tax Act on all sales of tangible personal property delivered into this State, regardless of whether the tangible personal property is intended for a contract with a contracting agency.

25. Travel Costs. If applicable, travel will be reimbursed at a rate not to exceed the applicable IRS rate in effect at the time the travel occurs, and any out of pocket costs for tolls and parking shall be reimbursed at actual cost.

26. This Agreement shall be construed in accordance with the laws of the State of New Jersey.

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ATTACHMENT "A"

New Jersey Harbor Dischargers Group Total Cost Per Facility

with

Great Lakes Environmental Center

TOTAL AMOUNT OF CONTRACT \$113,000

Bergen County Utilities Authority (Little Ferry & Edgewater)	11.11%	\$12,554.30
Joint Meeting of Essex & Union Counties	10.70 %	\$12,091.00
Linden Roselle Sewerage Authority	6.72%	\$7,593.60
Middlesex County Utilities Authority	15.64%	\$17,673.20
North Bergen Municipal Utilities Authority	5.76%	\$6,508.80
North Hudson Sewerage Authority	7.67%	\$8,667.10
Passaic Valley Sewerage Commissioners	28.19%	\$31,854.70
Rahway Valley Sewerage Authority	8.30%	\$9,379.00
Secaucus Municipal Utilities Authority	5.91%	\$6,678.30
		<u>\$113,000.00</u>

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$12,554.30

Witness

**Bergen County Utilities Authority
(Little Ferry and Edgewater)**

By:_____
Authorized Signature

Witness

Great Lakes Environmental Center

By:_____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$12,091.00

Witness

Joint Meeting of Essex and Union Counties

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$7,593.60

Witness

Linden Roselle Sewage Authority

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$17,673.20

Witness

Middlesex County Utilities Authority

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$6,508.80

Witness

North Bergen Municipal Utilities Authority

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$8,667.10

Witness

North Hudson Sewerage Authority

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE = \$31,854.70

Witness

Passaic Valley Sewerage Commission

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE =\$9,379.00

Witness

Rahway Valley Sewerage Authority

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

IN WITNESS WHEREOF, the members comprising the NJHDG and GLEC have caused this agreement to be executed the day and year first above written.

MEMBER SHARE = \$6,678.30

Witness

Secaucus Municipal Utilities Authority

By: _____
Authorized Signature

Witness

Great Lakes Environmental Center

By: _____
Authorized Signature

Exhibit A

EXHIBIT A
MANDATORY EQUAL EMPLOYMENT OPPORTUNITY LANGUAGE
N.J.S.A. 10:5-31 et seq. (P.L.1975, C. 127) N.J.A.C. 17:27
GOODS, PROFESSIONAL SERVICE AND GENERAL SERVICE CONTRACTS

During the performance of this contract, the contractor agrees as follows:

The contractor or subcontractor, where applicable, will not discriminate against any employee or applicant for employment because of age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Except with respect to affectional or sexual orientation and gender identity or expression, the contractor will take affirmative action to ensure that such applicants are recruited and employed, and that employees are treated during employment, without regard to their age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Public Agency Compliance Officer setting forth provisions of this nondiscrimination clause.

The contractor or subcontractor, where applicable will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to age, race, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex.

The contractor or subcontractor, where applicable, will send to each labor union or representative or workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer advising the labor union or workers' representative of the contractor's commitments under this act and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The contractor or subcontractor, where applicable, agrees to comply with any regulations promulgated by the Treasurer pursuant to N.J.S.A. 10:5-31 et seq., as amended and supplemented from time to time and the Americans with Disabilities Act.

The contractor or subcontractor agrees to make good faith efforts to employ minority and women workers consistent with the applicable county employment goals established in accordance with N.J.A.C. 17:27-5.2, or a binding determination of the applicable county employment goals determined by the Division, pursuant to N.J.A.C. 17:27-5.2.

The contractor or subcontractor agrees to inform in writing its appropriate recruitment agencies including, but not limited to, employment agencies, placement bureaus, colleges, universities, labor unions, that it does not discriminate on the basis of age, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, and that it will discontinue the use of any recruitment agency which engages in direct or indirect discriminatory practices.

The contractor or subcontractor agrees to revise any of its testing procedures, if necessary, to assure that all personnel testing conforms with the principles of job-related testing, as established by the statutes and court decisions of the State of New Jersey and as established by applicable Federal law and applicable Federal court decisions.

In conforming with the applicable employment goals, the contractor or subcontractor agrees to review all procedures relating to transfer, upgrading, downgrading and layoff to ensure that all such actions are taken without regard to age, creed, color, national origin, ancestry, marital status, affectional or sexual orientation, gender identity or expression, disability, nationality or sex, consistent with the statutes and court decisions of the State of New Jersey, and applicable Federal law and applicable Federal court decisions.

The contractor shall submit to the public agency, after notification of award but prior to execution of a goods and services contract, one of the following three documents: Letter of Federal Affirmative Action Plan Approval; Certificate of Employee Information Report or Employee Information Report Form AA302.

The contractor and its subcontractors shall furnish such reports or other documents to the Div. of Contract Compliance & EEO as may be requested by the office from time to time in order to carry out the purposes of these regulations, and public agencies shall furnish such information as may be requested by the Div. of Contract Compliance & EEO for conducting a compliance investigation pursuant to **Subchapter 10 of the Administrative Code at N.J.A.C. 17:27**

Exhibit B



June 14, 2023

**Great
Lakes
Environmental
Center, Inc.**

Applied
Environmental
Sciences
www.glec.com

**Traverse City
Operations**
739 Hastings St.
Traverse City
MI 49686

231 941-2230
231 941-2240 fax

**Columbus
Operations**
1295 King Ave.
Columbus
OH 43212

614 487-1040
614 487-1920 fax

Mr. John Dinice
Bergen County Utilities Authority
P.O. Box 122
Foot of Merhof Road
Little Ferry, New Jersey 07643

RE: NJHDG TECHNICAL SERVICES PROPOSAL for 2023/2024

Dear John:

Great Lakes Environmental Center, Inc. (GLEC) is pleased to offer this Technical Services Proposal to the New Jersey Harbor Dischargers Group (NJHDG) to cover the Technical Services Contract period from June 1, 2023 to May 31, 2024.

As you know, GLEC and NJHDG have maintained a mutually beneficial contractual/working relationship since 1993. During this 30-year period GLEC has acted as NJHDG's Technical Adviser for all matters related to water quality in the New York/New Jersey Harbor. GLEC's historic and on-going services have included interactions with Region II EPA, the State of New Jersey, and the New York/New Jersey Harbor Estuary Program on behalf of NJHDG. Under previous agreements and contracts with NJHDG we have assisted with NPDES permitting issues/questions, established a long-term ambient water quality monitoring program for the New Jersey portion of the Harbor, and played a key role in the Contaminant Assessment and Reduction Program for the Harbor in collaboration with New York City, the States of New Jersey and New York, EPA Region II and the Port Authority of New York and New Jersey.

In addition to maintaining a strong collaborative interaction with the NY/NJ HEP Program including attending meetings of the Water Quality Work Group (WQWG) and preparing meeting summaries for NJHDG members, under the most recent Technical Services Contract (TSC) GLEC also provided:

- Technical advisory services related to the further refinement and implementation of water quality goal requirements for the waters of the New York/New Jersey Harbor, with emphasis on dissolved oxygen (DO), toxics and pathogens;



- Technical assistance related to NJHDG's Water Quality Monitoring Program for the Harbor and New Jersey tributaries, including assisting NJHDG in refining the QAPP and the quality assurance/quality control procedures for the monitoring program to reflect modifications to the QAPP;
- Work related to compliance with DO criteria and standards in anticipation of TMDLs or other regulatory initiatives, including pursuing possibilities of developing site-specific criteria for DO;
- Advocacy and representation of NJHDG's best interests during the development of an up-to-date "Regional-Scale, System-wide DO/Nutrients Modeling Framework."

We look forward to the opportunity to provide NJHDG GLEC's continued technical support, expertise and insight under a new TSC based on the similar and additional tasks described below.

Note that after multiple discussions with several NJHDG and GLEC staff members, we have agreed to modify the approach and leadership that GLEC has applied to fulfill NJHDG member needs under the annual TSC. Beginning with the June 1, 2023 to May 31, 2024 contract period, Dr. Tyler Linton will be transitioning into the Program Manager (PM) position for the contract. Tyler is a Senior Research Scientist at GLEC and formally trained aquatic toxicologist with substantial experience in aquatic life criteria and permit negotiations. He will be assisted by longtime PM on GLEC's previous annual TSCs for NJHDG, Dr. Mick DeGraeve.

In addition to Tyler acting as PM with continued support and assistance provided by Mick, GLEC is pleased to offer NJHDG other specialized scientific and environmental engineering support from the following highly qualified staff as contract needs arise. As demonstrated in the attached resumes, these seasoned individuals bring a combination of previous NJHDG contract experience along with core technical expertise needed to service 2023-2024 and ongoing contract requirements.

- **Dr. Dennis McIntyre** - Senior Research Scientist. Extensive research experience, specializing in field studies in fresh- and marine waters, as well as laboratory toxicological testing with fresh- and marine-organisms.
- **Doug Endicott** - Principal Research Scientist and Senior Environmental Engineer. Water quality modeler with substantial experience in contaminant modeling.
- **Bill Arnold** - Principal Research Scientist and Manager of GIS. Senior GIS mapping researcher and expert in graphic communications.
- **Jennifer Hansen** - Senior Researcher and Quality Assurance Officer. Highly experienced water quality scientist and quality assurance systems expert.
- **Jamie Saxton** - Principal Research Scientist and GLEC Vice President. National expert in field assessment science and program management.

Proposed Technical Services: As briefly described above, GLEC has provided a range of recurring professional/technical services for the NJHDG under the annual TSC over the past 30 years. GLEC proposes the following services along with progress notes for the 2023-2024 contract requirements:

Task 1: Collaborative Interactions with the NY/NJ HEP, Including Attending Meetings of the Water Quality Work Group (WOWG), and Preparing Meeting Summaries for NJHDG Members

There are quarterly HEP WQWG meetings planned for the 2023-2024 contract period. There may also be two additional HEP general water quality-related meetings in 2023-2024 as a result of the additional funding from the "Infrastructure" legislation. These meetings are a key source of important information about initiatives and opportunities in the NY/NJ Harbor Estuary. This task includes the time to attend up to six meetings and prepare a summary of pertinent information to share with the Group. If there is an available option, the meetings will be attended virtually.

Total Cost: \$15,000

Task 2: Technical Assistance-Related to NJHDG's Water Quality Monitoring Program for the Harbor and New Jersey Tributaries

Since the initiation of NJHDG's monitoring program, GLEC has performed a quality assurance check on the data generated under this program, which GLEC will plan to continue for the June 1, 2023– to May 31, 2024 period. GLEC will also continue to play an oversight role for the monitoring program and assist NJHDG in refining the QAPP and the quality assurance/quality control procedures for the monitoring program to reflect modifications to the QAPP, to include:

- Assistance with updating the QAPP as needed to reflect changes made to the program after the original QAPP in 2015;
- Perform quality assurance check on the data generated under the program; and
- Evaluate data and recommend changes to the sampling program as needed to determine if there are any cost-saving opportunities that would not compromise the quality of the results and the integrity of the program.

Total Cost: \$15,000

Task 3: Emerging Pollutants and Environmental Issues of Concern

This task will include researching and keeping the NJHDG up to date (via white papers, memoranda, presentations) on emerging pollutants and other environmental issues of concern, including PFAS, metals (aluminum, copper, nickel), nutrients, dissolved oxygen, pathogens, climate change, etc.

Total Cost: \$30,000

Task 4: Optional Technical Assistance Contingency

This task will include as needed services and will be used to provide technical assistance to the Group for water quality/regulatory matters that may arise over the course of the contract period. Prior to using this task, GLEC will submit a brief description of the proposed task

and estimated cost for approval by NJHDG. Once approved, GLEC can work on the assigned task. Examples of items that may be completed under this task include:

- Representing NJHDG in discussions about the new Regional-Scale, System-Wide Nutrients Modeling Framework being developed by NYCDEP, EPA Region 2, and the EPA Long Island South Estuary Program;
- Identifying potential funding sources for scientific/ regulatory initiatives;
- Reviewing proposed legislation as it pertains to NJHDG; and,
- Representing NJHDG in discussions on regulatory matters related to Water Quality Standards development/implementation, especially in regard to negotiations between EPA Region 2, NYDEC and NJDEP for standards to be applied to the Shared Waters.

Total Cost: \$53,000

Total Cost: \$113,000

Note: The estimated costs for Task 1 - 3 above provide a task-by-task breakdown for work activity, while the estimated cost for Task 4 represents a lump sum to be used on an as-needed basis. For the latter (Task 4), GLEC cannot provide specific costs for the range of technical activities that may, or may not, be activated over the course of the next year. Additionally, for attendance at the quarterly Water Quality Work Group (WQWG) meetings that are held at the Hudson River Foundation (HRF) in conjunction with the Harbor Estuary Program, we were recently informed that the WQWG meetings that have been held virtually during the Covid years may be held on site at the HRF, which affect the cost estimate for Task 1. Currently, total cost is based on the average of the budgets that GLEC has been allocated over the past 6 years, which have ranged between \$96,000 in 2002-2003 to \$130,000 in 2017-2018; with an overall average of \$113,000.

As part of our cost proposal, we do offer contract hourly labor rates for the aforementioned designated technical experts, as well as for Tyler, Mick and administrative support staff in Table 1. GLEC has 60 employees, and any number of our staff (and potentially others) could be called upon in addition to the designated staff to fulfill potential contract needs.

Table 1.- GLEC Staff Hourly Rates

GLEC Staff	Hourly Rate
DeGraeve, Mick (PM Assistance)	\$207.71
Linton, Tyler (PM)	\$158.95
McIntyre, Dennis	\$190.58
Endicott, Doug	\$184.53
Arnold, Bill.	\$149.29
Hansen, Jennifer	\$104.58
Saxton, Jamie	\$146.61
Anderson, Gina (Clerical)	\$70.66
Howard, Amelia (Accounting)	\$116.46

If there are any questions or comments about this proposal, please do not hesitate to contact me at 231-499-0813 or mick@glec.com. On behalf of the entire GLEC organization, thank you for the opportunity to continue to serve the New Jersey Harbor Dischargers Group.

Sincerely,



G.M. (Mick) DeGraeve
Director

Attachment: Resumes

ATTACHMENT

Great Lakes Environmental Center, Inc - Resumés

G. MICHAEL DeGRAEVE

Director Strategic Planning and Program Development
Senior Research Scientist

**Education**

B.S., Biology, Eastern Michigan University, Ypsilanti, Michigan, 1968
M.S., Biology, Eastern Michigan University, Ypsilanti, Michigan, 1970
Ph.D., Aquatic Biology, University of Wyoming, Laramie, Wyoming, 1979

Qualifications

Dr. DeGraeve (Mick) is the founder of Great Lakes Environmental Center (GLEC) in Traverse City, Michigan and Columbus, Ohio. He is a senior aquatic biologist/toxicologist responsible for program development and strategic planning for GLEC. His day-to-day responsibilities include acting as Program Manager for EPA Office of Water contracts; supervising aquatic research and problem solving for programs involving environmental compliance assistance, monitoring/assessment, environmental toxicology and water quality; for both government and commercial clients.

Relevant Experience

Mick has established aquatic toxicology laboratories at five different locations in the United States and Canada. For the past 45 years, he has supervised government and private sector research programs focused on solving existing problems in water pollution/environmental health/aquatic biology and toxicology. Over the course of Dr. DeGraeve's career, he has interacted regularly with professionals in other disciplines, and with representatives of industry, government, and academia. He has been especially successful in helping to bring groups with diverse environmental needs and interests (such as regulators and the regulated community) together to reach a consensus perspective that meets the needs of all affected parties.

Since the early 1990's, Mick has served as the Program Manager and technical leader for ongoing GLEC technical service support contracts representing the 12 member New Jersey Harbor Discharger's Group (NJHDG) in activities related to the NY/NJ Harbor Estuary Program. In this role, he is responsible for technical direction, coordination of subcontractors, client interaction and interactions with EPA Region 2, the NY/NJ Harbor Estuary Program, the New Jersey Department of Environmental Protection, the New York City Department of Environmental Protection and the Interstate Water Pollution Control Commission. He regularly meets with NJHDG members, the States of New Jersey and New York, and EPA Region 2 to coordinate NJHDG's sampling, analysis and interpretation efforts in the Harbor Estuary Program. This work has allowed GLEC and Mick to maintain a high awareness of regional environmental issues and evolving plans for future water quality-related programs.

Mick has worked for the Passaic Valley Sewerage Commission since the early '90s on a wide range of environmental projects. Over the course of overseeing the work that GLEC has conducted for PVSC over the years, Mick has had the good fortune to have the opportunity to form mutually respectful and trusting professional relationships with many PVSC staff members. And these relationships have facilitated GLEC's ability to meet the objectives that have been assigned to us by PVSC. In addition, Mick has worked collaboratively with PVSC and the regulatory authorities (NJDEP and EPA Region II) to address environmental requirements and needs in ways that take into account the interests and perspectives of both PVSC and the

G. MICHAEL DeGRAEVE

Director Strategic Planning and Program Development
Senior Research Scientist



environmental protection agencies. Other PVSC contract work includes overseeing activity related to the ongoing CERCLA action in the Passaic River, with Mick playing an important facilitation role, and a second contract involved with CSO planning in regard to the effects of pathogen discharges to the Passaic River and Newark Bay.

Mick's projects over the course of his career have included managing a program to review EPA's Aquatic Life Criteria Guidelines and to identify priority research needs to update the Guidelines; developing a guidance manual for developing site-specific water quality criteria for the State of California; managing reviews of water quality literature, conducting field assessments and biological/chemical monitoring in the Great Lakes, researching the effects of pesticides on fish in the Great Lakes; studying the effects of several sewage effluent disinfectants on freshwater fish and invertebrates; determining the toxic components in process waters produced from coal gasification, oil shale extraction, and tar sands extraction; monitoring and assessing the effects of contamination from mining operations in New Brunswick, Canada; on-site monitoring to determine bioaccumulation and biomagnification characteristics of insecticides used to control forest pests in New Brunswick, Canada; determining long-term bioaccumulation, survival and growth effects of dioxins and dibenzofurans; evaluating short-term chronic tests used by the U.S. EPA to test complex effluent toxicity; performing toxicity source identification and toxicity reduction evaluations for complex industrial and municipal effluents; working with the EPA Region 2 Harbor Estuary Program to evaluate the need for and develop TMDLs for toxics, pathogens and oxygen-demanding substances in the New York/New Jersey Harbor and tributaries; assessing the chemical, toxicological, and ecological effects in the field and in the laboratory of contaminated lake sediments; development of field and laboratory procedures to evaluate toxicity persistence in complex effluent/receiving water mixtures; developing watershed management plans to address non-point source pollution; refinement and field validation of EPA-developed methods to detect, identify, and quantify bioconcentratable compounds in effluents, tissues and sediments; managing field programs to collect ecological data for hydropower relicensing; and development of Criteria Documents for the EPA's Criteria and Standards Division. Dr. DeGraeve has also served as the project manager in a number of applied field programs, including biological monitoring to determine effects of base metal and potash mining operations; installing and operating counting fences to monitor fish populations for a comprehensive study of the effects of acidic precipitation on a river in Nova Scotia, Canada; evaluating the decay of chlorine in a five mile long municipal effluent discharge tunnel; and sampling and analysis of surface water, municipal effluent and combined sewer overflows for the New York/New Jersey Harbor Estuary Program to develop.



EXPERIENCE SUMMARY

Dr. Linton is a Senior Research Scientist at GLEC where he plans, conducts, and supervises projects of major significance, uniqueness, and complexity, necessitating his advanced knowledge and ability to originate and apply new and unique methods and procedures. Tyler specializes in managing, developing, and conducting applied water quality studies and related projects, emphasizing aquatic toxicology and ecological effects assessment and evaluation. He routinely develops National ambient water quality criteria for the protection of aquatic life; prepares technical guidance and conducts analyses to support of water quality standards development and implementation; derives site-specific water quality criteria; and conducts ecological effects assessments and evaluations of toxics on aquatic and aquatic-dependent wildlife. His research has contributed to the development of methods for bioassessment-based benchmarks for iron, new estimation tools and approaches for assessing effects of chemicals on sensitive aquatic and aquatic-dependent species, and design of novel field studies to characterize fate and effects of pollutants and nutrients in receiving streams. He has published on his research in the areas of chemical toxicity on both freshwater and saltwater organisms with an emphasis on water quality factors affecting toxicity; the physiological costs and consequences to coldwater fish living in a warmer and more polluted environment; site-specific water quality criteria development for ammonia, copper and selenium; influence of water hardness and sulfate on the acute toxicity of chloride to sensitive freshwater invertebrates; and bioaccumulation of arsenic and selenium in freshwater aquatic systems. Dr. Linton routinely conducts review and analyses of data produced from exposure research available in published sources (secondary data) and makes available relative indices in support of evaluations and publications.

RELEVANT EXPERIENCE

AQUATIC LIFE CRITERIA DEVELOPMENT AND CWA SUPPORT

Technical Support for Developing Perfluorinated Chemicals Aquatic Life and Aquatic-Dependent Wildlife Screening Values, Benchmarks, or Criteria, 2019-present. Tyler and staff actively provide USEPA general technical support for the analysis of perfluorinated chemical freshwater and estuarine/marine effects and occurrence data for aquatic life and aquatic-dependent wildlife. The data and analyses are used in developing aquatic life and/or aquatic-dependent wildlife screening-level values, benchmarks, and criteria and open literature publication(s) authored by EPA staff for perfluorinated chemicals, including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

Technical Support for Developing Revised Mercury Aquatic Life and New Aquatic-Dependent Wildlife Criteria, 2016-present. Tyler and staff support USEPA in the critical review, compilation, and analysis of mercury effects and bioaccumulation data for aquatic and aquatic-dependent wildlife. Most recently (2021-present), aquatic dietary mercury toxicity and bioaccumulation data were reviewed and compiled to support a draft mercury aquatic life criterion for the State of Idaho, with eventual application to a pending national mercury aquatic life criteria update. In 2017, aquatic-dependent wildlife toxicity were also reviewed and compiled to support EPA's *Draft Considerations for Site-Specific Mercury Ambient Water Quality Criteria for the Protection of Aquatic-Dependent Wildlife in the State of California*. Great Lakes Initiative methodology was applied to calculate dietary values. The Spreadsheet-based Ecological Risk Assessment for the

EDUCATION

B.S., Zoology and Physiology, University of Wyoming, 1989
M.S., Biology, University of West Florida, 1992
Ph.D., Biology, McMaster University, 1997

AREAS OF EXPERTISE

Aquatic Life Criteria Development
Aquatic Toxicity Testing
Ecological Effects and Risk Assessment
Site-specific Criteria Development
Endangered Species Assessment
Bioaccumulation
Clean Water Act (CWA) support
National Pollution Discharge Elimination System (NPDES) Permit Compliance Assistance
Project Management
Data management and Analysis

LICENSES/REGISTRATIONS

None

PROFESSIONAL AFFILIATIONS

Society of Environmental Toxicology and Chemistry
Wisconsin Wastewater Operators Association

OFFICE LOCATION

River Falls, WI

YEARS OF RESEARCH

32

YEARS WITH GLEC

25

Fate of Mercury (SERAFM) model was applied to assess mercury methylation in aquatic ecosystems, and to quantify trophic transfer and bioaccumulation of methylmercury. Measured dietary and tissue concentrations for both aquatic and aquatic-dependent wildlife support derivation of criteria values.

Freshwater Ammonia Ambient Aquatic Life Criteria Document Development and Technical Support, 2008-2013. Tyler co-authored and developed USEPA's 2013 Freshwater Ambient Water Quality Aquatic Life Criteria for Ammonia (EPA 822-R-13-001). He and staff were also responsible for compiling, organizing, reviewing, and preparing written recommendations for USEPA's four separate Response to Comment documents published with the updated aquatic life criteria update document.

Support of EPA White Paper on Recommendations and Challenges with Developing Ambient Aquatic Life Criteria for Contaminants of Emerging Concern. Tyler, with technical oversight and direction from a joint USEPA OST-ORD Workgroup, produced a final draft white paper entitled, Aquatic Life Criteria for Contaminants of Emerging Concern: General Recommendations and Challenges (Parts I and II). The white paper focused on pharmaceuticals and personal care products (PPCPs) with an endocrine disrupting chemical (EDC) mode of action (MOA). He also compiled and prepared data and developed slides for the USEPA Science Advisory Board (SAB) convened to review the white paper. Following the review, under a different EPA HECD work assignment, Tyler and staff developed USEPA's draft *Technical Support Document for the Development of Aquatic Life Criteria for Contaminants of Emerging Concern*, which included case studies with ethynylestradiol (EE2), trenbolone, and triclosan to illustrate application of the recommendations made in the white paper. The triclosan case study included recommendations and guidance on deriving a final plant value from toxicity tests with aquatic algae, diatoms and macrophytes.

Technical Support of the 2007 Revision of the Aquatic Life Ambient Freshwater Quality Criteria for Copper. Tyler compiled and analyzed the necessary water chemistry data to calculate the Biotic Ligand Model (BLM)-normalized acute toxicity values used to derive USEPA's 2007 freshwater quality criteria for copper (EPA-822-R-07-001). Tyler also prepared Appendix C (Estimation of Water Chemistry Parameters for Acute Copper Toxicity Tests) and co-authored Appendix D (Saltwater Conversion Factors for Dissolved Values) of the document.

Development of Saltwater Aquatic Life Criteria for Nickel and Cyanide. Under contract with the Bergen County [New Jersey] Utility Authority (BCUA), Tyler prepared an addendum to USEPA's saltwater nickel criteria for the State of New Jersey. The New Jersey Department of Environmental Protection Agency (NJDEP) adopted, and USEPA Region 2 approved, the revisions. Tyler and staff subsequently prepared a biological evaluation (BE) for Section 7 Endangered Species Act (ESA) consultation on the approval action. Tyler led a similar criteria revision effort for BCUA that resulted in updated saltwater cyanide standards for New Jersey coastal waters.

Development of a Bioassessment-based Benchmarks for Iron. For the Electric Power Research Institute (EPRI), Tyler and staff used field bioassessment data for macroinvertebrates from West Virginia along with quantile regression analysis to derive updated freshwater quality criteria benchmarks for total iron. He and staff prepared an EPRI technical report (Water Quality Criteria Development for Iron, EPRI, Palo Alto, CA: 2004. Publication # 1008466) and peer-reviewed publication based on the novel approach to aquatic life criteria development.

Technical Support for Clean Water Act Review and Evaluation of Oregon Water Quality Standards for Toxics. Tyler led an effort to develop and prepare technical support documents to facilitate EPA Region 10's Clean Water Act (CWA) review and evaluation of Oregon's Water Quality Standards for Toxics (OR Toxics WQS). Tyler and staff reviewed all available acute and chronic toxicity data that were used to support any one of the 31 chemical criteria (fresh and salt water) included in the OR Toxics WQS to determine whether the water quality standards for the state are adequately protective of the aquatic communities residing in state waters. Chemical-specific weight-of-evidence documents were prepared, each: a) identifying all valid and acceptable ecotoxicological data currently available for the chemical, and b) providing a written summary and determination as to whether these data support approval of OR Toxics WQS. A CWA Evaluation document was prepared and submitted according to a rigorous timeline required by the Agency and included a Quality Assurance Documentation Report (QADR) and corresponding Information Quality Guidelines checklist (IQGC).

Data Quality and Acceptability Review and Update of Draft Criteria Documents for Protection of Aquatic Life. Since 1998, Tyler has assisted with, co-authored parts of, developed tables and figures for, and provided technical and quality control and assurance reviews of draft and advanced draft (final) aquatic life water quality



criteria documents for aluminum, atrazine, cadmium, carbaryl, copper, diazinon, lead, nonylphenol, and selenium. Data quality acceptance criteria and procedures followed those described in EPA's 1985 Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses.

BIOACCUMULATION

Development of National Default and Baseline Bioaccumulation Factors. For USEPA, Tyler assisted with the development of national baseline bioaccumulation factors (BAFs) for 28 organic chemicals. He also led the effort to develop national default bioaccumulation factors for mercury and methylmercury (USEPA 2000), and national baseline bioaccumulation factors for arsenic, atrazine and alachlor. He was co-investigator and co-author of Electric Power Research Institute (EPRI) technical publication documents concerning: 1) the fate, accumulation, and trophic transfer of selenium in fresh water lotic and lentic environments (EPRI, Palo Alto, CA: 2006. Publication 1005315), and 2) speciation and bioaccumulation issues with USEPA's arsenic ambient water quality criteria environments (EPRI, Palo Alto, CA: 2008. Publication 1015570).

Technical Support of Equilibrium-partitioning Sediment Benchmarks. Tyler coordinated USEPA's Sediment Workgroup revisions to, and finalization of, USEPA's draft Procedures for the Derivation of Equilibrium Partitioning Sediment Benchmarks (ESBs) for the Protection of Benthic Organisms for Endrin (EPA/600/R-03/009), Dieldrin (EPA/600/R-02/010), and PAH Mixtures (EPA/600/R-02/013). He also co-authored the section: Teratogenicity and Carcinogenicity in EPA/600/R-02/013.

SITE-SPECIFIC CRITERIA DEVELOPMENT AND NPDES COMPLIANCE ASSISTANCE

Development of Regional Site-specific Water Quality Criteria for Copper in Michigan. Tyler led a site-specific study for the Michigan Department of Environmental Quality (MDEQ) to develop a modified water quality criterion for copper applicable to the streams in the Upper Peninsula (U.P.) of Michigan, based on region-specific water quality conditions. Water was collected seasonally from 18 sites in 17 different waterbodies (15 rivers and streams; two lakes) for chemical analysis and water-effect ratio (WER) determination using paired 48 h acute static exposures of *Ceriodaphnia dubia* in laboratory and copper-spiked site water. Tyler applied the copper biotic ligand model (BLM) to determine the appropriateness of the model for Michigan U.P. waters. Modification of Michigan's copper standard at any given U.P. site is best achieved by linear graphic interpolation of the WER from measured DOC concentrations.

Determining Copper Water Effect Ratios for Site-specific Water Quality Criteria Development in Ambient Surface Waters. Tyler served as principal investigator or assisted on several studies for municipal and state (Michigan Department of Environmental Quality, State of New Jersey) clients designed to develop site-specific water quality criteria for copper in ambient surface waters receiving permitted wastewater discharge, using EPA's water effect ratio (WER) Interim Procedure, Streamlined WER Procedure for copper, as well as the Biotic Ligand Model (BLM).

Los Angeles River and Tributaries Metals TMDL- Technical Advisory Committee. Tyler served as a member of the technical advisory committee (TAC) to provide technical review and insight on the copper water-effect ratio (WER) study and lead recalculation report to support implementation of the Los Angeles River and tributaries metals total maximum daily load (TMDL). He provided technical review and expert comment on study design, results, and interim draft and final data summary reports, and performed a weight-of-evidence evaluation and assessment of lead toxicity to amphibians as supplemental information for the lead recalculation report.

Case Studies of the Application of EPA's 2013 Revised Deletion Process in the Recalculation Procedure to Derive Site-specific Criteria for Ammonia. Tyler applied and summarized the results of USEPA's Revised Deletion Process for the Site-Specific Recalculation Procedure for Aquatic Life Criteria (EPA-823-R-13-001) on 20 sites representing broad geographic distribution within the conterminous U.S. and with diverse or unique species composition. He acquired site faunal lists to apply the new deletion process of the recalculation procedure (RP) in order to fully assess its utility and application in U.S. waters and identify any possible changes in the direction (up or down) and magnitude of the recalculated site-specific ammonia criteria (chronic emphasis). The results of the analysis were provided in a streamlined report for internal USEPA use and training. In a separate project, Tyler served as principal investigator and primary author of the Electric Power Research Institute (EPRI)-sponsored study



and published report: Investigation of the utility of USEPA's recalculation procedure for deriving site-specific criteria for ammonia (EPRI, Palo Alto, CA: 2014. Report # 1026827).

2013 Freshwater Ammonia Ambient Aquatic Life Criteria Implementation Assistance and Mussel Occurrence Survey Technical Support Document. Tyler and staff developed and conducted a survey of contacts and officials from state natural heritage programs, state fish and game agencies, and other experts (malacologists) to determine the types of biological survey methods that states routinely use to: i) conduct freshwater mussel population surveys, and, ii) determine presence or absence of these taxa in ambient surface waters. He prepared a report summarizing the information, as well as recommendations regarding sampling approaches and mussel survey designs. Survey data were downloaded from NatureServe© Explorer for 312 freshwater unionid mussel species in the contiguous United States, and several mussel distribution maps were generated using GIS software. Under a follow-up work assignment with USEPA, Tyler and staff used the information previously gathered and generated to write the Technical Support Document for Conducting and Reviewing Freshwater Mussel Occurrence Surveys for the Development of Site-specific Water Quality Criteria for Ammonia (EPA 800-R-13-003).

Ammonia Criteria Implementation Stakeholder's Meeting. In 2014, Tyler and colleagues at GLEC proposed to bring together USEPA, the states, superintendents of publicly-owned treatment works (POTWs) and researchers to lay out a framework and path forward for dealing with the implementation difficulties that stakeholders were expecting with regard to EPA's 2013 freshwater ammonia ambient aquatic life criteria. National Association of Clean Water Agencies (NACWA) contracted with GLEC to develop a meeting outline, organize the meeting, invite speakers and subject experts, moderate the meeting, and prepare a Proceedings of the meeting. The Ammonia Criteria Implementation Stakeholders Meeting was convened October 29-30, 2014 in Arlington, Virginia, and represented a collaboration between NACWA, the Association of Clean Water Administrators (ACWA), the Water Environment Research Foundation (WERF), the Water Environment Federation (WEF), and other select stakeholders.

Study Report to Congress of Discharges Incidental to Normal Operation of Commercial Fishing Vessels and Other Non-Recreational Vessels Less than 79 Feet (EPA 833-R-10-005). Tyler co-led a study to evaluate discharges incidental to the normal operation of vessels from all sizes of commercial fishing vessels and from other non-recreational vessels less than 79 feet in length for USEPA's Water Permits Division (WPD) of the Office of Water (OW), as obligated under the purview of Senate Bill 3298 – Pub. L. No. 110-299. The major task consisted of a primary data collection effort that involved sampling 61 vessels in nine vessel classes in 15 separate cities and towns in states across multiple geographic regions, including New England, the Mid-Atlantic, the Gulf Coast, the Mississippi River, and Alaska. Vessel types included fishing vessels (gillnetter, lobster tank, longliner, purse seiner, shrimp trawler, tender, trawler, troller), tugboats, water taxis, tour boats, tow/salvage boats, research vessels, fire boats, supply boats, and recreational boats. The sampling and analysis program for the study included 301 target analytes, including: microbiologicals (pathogen indicators); volatile and semivolatile organic compounds; total and dissolved metals; oil and grease; long and short chain nonylphenol and octylphenol ethoxylates and total nonylphenol; nutrients; and other physico-chemical parameters and classical pollutants (pH, temperature, conductivity, salinity, turbidity, TOC, TSS and BOD, COD, oil and grease, sulfide, total residual chlorine). Tyler and his staff had responsibility of study plan and quality assurance project plan development; scheduling and tracking analytical samples; reviewing analytical data quality; creating a comprehensive analytical database (in Microsoft Access) for the information collected from the study; data evaluation, presentation, and summary; reporting quality assurance and control of analytical data; and document development and preparation.

NPDES Permitting Framework for Vessel Discharges. Tyler led a task order under contract with USEPA's water permits division to provide technical and factual materials in support of EPA's national general NPDES permit for non-recreational vessels. This support included researching and compiling information to develop and prepare Technical Memoranda for the Administrative Record and other aspects of the litigation on numerous topics related to the incidental discharges covered under the vessel general permit (VGP). It also included the development, preparation and co-authorship by Tyler and staff of the first comprehensive summary of vessel information garnered from the Notice of Intent (NOI) filed by the over 3,430 different respondents representing the 43,431 uniquely identified vessels for which coverage was sought under the vessel general permit.

New York-New Jersey Harbor & Estuary Program - Impact Evaluation of Projected DO Deficits in the NY-NJ Harbor Estuary. Tyler recently provided technical and written support of a report to the Hudson River



Foundation for the New York-New Jersey Harbor & Estuary Program to address the question of whether EPA's or New York State's dissolved oxygen criteria are appropriately protective of the estuarine and marine aquatic life throughout the Harbor. By reviewing measured and predicted critical and non-critical DO levels in the Harbor Tyler found concrete evidence of the presence of DO-sensitive species in Harbor areas projected to have the greatest number of non-attainment days (using the System Wide Eutrophication Model or SWEM model), and no clear and consistent pattern of dominance of tolerant species/taxa at those sites. As part of the project, Tyler prepared a responsiveness document on comments received from EPA Region 2, New Jersey Department, and expert peer-reviewers.

Baseline Environmental Monitoring Study of the Milwaukee River. Tyler was project manager for a monitoring project for the Milwaukee Metropolitan Sewerage District (MMSD) designed to provide the data necessary to assess whether surface waterbodies within the upper portion of the Milwaukee River Watershed (MLR) meet the applicable water quality criteria related to the water quality impairments identified in a forthcoming Total Maximum Daily Load (TMDL) for total suspended solids, total phosphorus, and fecal indicator bacteria. In situ measurements and surface water samples (for analysis of total phosphorus, total suspended solids, *Es. coli*, and Fecal Coliform by MMSD) were collected monthly on regularly scheduled dates at 25 pre-selected sites. Stage/discharge measurements were taken coincident with water quality sampling at each site. Solinst® levellogger 3001 series data loggers are deployed at each site and the data calibrated with stage/discharge measurements for estimating real-time stream flow. Instantaneous (measured) pollutant loadings from all sites were calculated and reported, as well as mean daily pollutant mass loadings estimated on an annual basis for the 2017-2019 project period using the flow-stratified Beale's Ratio Estimator (BRE). Methods summary and results were in a final report to MMSD (*Consultant Agreement P-2721, Baseline Water Quality Monitoring, Milwaukee River Watershed, Phase One*) for distribution among stakeholders, Wisconsin Department of Natural Resources, and other interested parties.

Ammonia Fate and Characterization Study of Activated Sludge Plants in Central Ohio. Tyler led an Ohio Water Development Authority research and development project for City of Johnstown, OH in partnership with Ohio EPA and four partnering wastewater treatment (activated sludge) plants. Activated sludge plants in Ohio were sampled in winter and summer (2016). Two types of data collection took place at each site from January 25 through February 27, 2016 (winter seasonal sampling) and again from July 6 through August 29, 2016 (summer seasonal sampling): i) acquisition of real-time (continuous) data of in-plant effluent and in-stream ammonium and nitrate concentrations via deployment of data sonde instruments (VARiON) equipped with parameter-specific electrodes and connected to central controlling units; and ii) acquisition of supporting in-stream water quality conditions and stream flow/discharge via either fixed instrumentation (data sondes) or field devices for additional in-stream ammonia and nitrate characterization immediately upstream of effluent discharge and at different downstream distances. The novel study design is widely applicable to wadeable waters of the state, and the numerous wastewater treatment facilities that discharge to these waters. Included in the project was an Ammonia Survey, developed in collaboration with staff at Ohio EPA (Headquarters, and Northeast and Northwest regional offices), for assessing the knowledge and ability of small discharges to comply with more restrictive ammonia criteria in Ohio.

Use of Diatoms as a Bioassessment Tool for Monitoring Nutrient Enrichment and Effects in Streams. Tyler was principal investigator on a Ohio Water Development Authority research and development project for City of Johnstown, OH. The project involved a case study conducted in 2018 and 2019 to characterize nutrient condition status and link of excess nutrients (enrichment) to ecological effect in a wadeable stream with known point and non-point source nutrient contribution in Central Ohio. Characterization entailed measurement of total and dissolved reactive phosphorus (TP and DRP) and dissolved inorganic nitrogen (DIN – Nitrate, Nitrite, Ammonia) concentration in combination with benthic diatom community composition, dissolved oxygen and pH diurnal swing, and benthic algal biomass (chlorophyll a) at discrete locations along Raccoon Creek.

Development of a Citizen-based Benthic Algae Biomonitoring Program. In 2018, Tyler supported the Friends of the Kinni (FOTK; non-profit) with a Wisconsin DNR Surface Water Grant project to develop and train local citizens in the use of a DNR-approved procedure for viewing bucket assessments of benthic algal abundance and coarse-level taxonomic composition. The goal of the grant project Tyler wrote and is conducting for FOTK is to establish an on-going, sustainable citizen-based biomonitoring program on the Kinnickinnic River (a Class 1 trout stream in Western Wisconsin) that involves annual benthic algal biomonitoring and reporting of findings to member organizations of the Kinnickinnic Watershed Partnership (KWP) and Wisconsin DNR. Benthic algal abundance



monitoring via the viewing bucket method was conducted by Tyler in partnership with students at University of Wisconsin-River Falls to identify areas that show phosphorus response that may need more focus and attention. A user-friendly procedure for citizen scientists and volunteers was developed and a workshop/public meeting is planned to broadly disseminate the method and information within the State of Wisconsin.

Water Temperature Study of the San Gabriel River Watershed in Southern California. Tyler is currently GLEC project leader on a subcontract with Larry Walker Associates to support a water temperature study for five water reclamation plants (WRPs) operated by the Los Angeles County Sanitation Districts (Districts). The WRPs are discharging tertiary-treated disinfected wastewater effluent to the San Gabriel River Watershed and Rio Hondo Reach 3 located in the Los Angeles River Watershed where the California Regional Board has proposed lowering the upper limit for temperature in surface water discharge permits issued to the Districts' WRPs from 86 to 80°F. The Districts are developing and implementing the temperature study to better understand the temperature range protective of the WARM beneficial use in the receiving waterbodies. The project involves evaluating aquatic life uses in each waterbody to characterize the relationship between water temperature and the ability to support warm water aquatic life. The work effort is focused on collecting the species, water temperature and critical related data (water flow and depth) to facilitate the assessment.

ENDANGERED SPECIES ASSESSMENT

Preparation of Biological Evaluation Documents for Section 7 Endangered Species Act Consultations on EPA 304(a) Ambient Aquatic Life Criteria. Tyler supports EPA HECD by preparing the agency's effects assessments and associated analysis documents for Endangered Species Act (ESA) national consultations on EPA's 304(a) aquatic life criteria recommendations. Tyler and staff prepared analysis documents for ammonia, aluminum, cadmium, cyanide, chromium III and chromium VI for USEPA at the national level, as well as draft and final BEs for formal and informal ESA consultations at the EPA regional level for metals (arsenic, aluminum, cadmium, copper, lead, nickel, silver, tributyltin, zinc), organics (endrin, endosulfan, dieldrin, heptachlor, heptachlor epoxide, lindane, pentachlorophenol), ammonia and dissolved oxygen (EPA Regions I, II, III, IV, V, VI, VII, VIII and X: New Hampshire, Vermont, New Jersey, Virginia, West Virginia, North Carolina, Illinois, New Mexico, Texas, Kansas, South Dakota, and Oregon).

Development of Biological Evaluation Methodology for Section 7 Endangered Species Act (ESA) consultations on EPA 304(a) aquatic life water quality criteria. Tyler is GLEC technical lead for USEPA HECD to evaluate and analyze methods and develop guidance for EPA regions and states to use to complete Biological Evaluations (BEs) for Section 7 Endangered Species Act (ESA) consultations on EPA 304(a) [National] aquatic life water quality criteria, including robust assessment of uncertainties, statistical methods and other factors related to the evaluations. Tyler assisted with developing the multiple lines of evidence approach that serves as the foundation of USEPA's effects data tiering and prioritization system emphasizing taxonomic relation and use of high quality empirical over predicted values. Predictive tools used include EPA's Interspecies Correlation Estimation (web version), Acute-to-Chronic Estimation or ACE, as well as other scientifically-accepted conventions for predicting chronic toxicity (e.g., Acute-Chronic Ratios). He and staff develop acute and chronic adjustment factors based on concentration-response data and curve fitting using EPA's Toxicity Relationship Analysis Program (TRAP) and Benchmark Dose Software (BMDS), and perform on-going in-depth assessment of the uncertainties associated with the use of adjustment factors and other predictive tools in the overall risk assessment/BE development process.

Review of and Expert Comment on US Fish and Wildlife Service and National Marine Fisheries Service Biological Opinions. Tyler reviewed and commented on the U.S. Fish and Wildlife Service's Programmatic Biological Opinion on EPA's Proposed Continuing Approval or Promulgation of New Cyanide Criteria in State and Tribal Water Quality Standards (January 2009 Administrative Draft). Tyler also reviewed and provided written comments on the U.S. Fish and Wildlife Service's Method for Analysis of the U.S. Fish and Wildlife Service's Biological Opinion for Oregon's Water Quality Criteria for Toxic Chemicals (August 2009 Draft).

Preparation of EPA's Biological Evaluation for the 2013 Vessel General Permit (VGP) and Small Vessel General Permit (sVGP). Tyler was project and technical lead for USEPA's Office of Wastewater Management (OWM), under subcontract to the Eastern Research Group, to develop and prepare the unprecedented BE in support of EPA's 2013 Vessel General Permit (VGP) and Small Vessel General Permit (sVGP), general permits, which



control the discharges of chemical and biological pollutants incidental to the normal operation of vessels in territorial seas. The vessel discharges analyzed were anti-fouling leachate from hull coatings, ballast water, graywater, bilgewater, deck washdown, exhaust gas scrubber wash water, fish hold effluent, graywater, stern tube discharges, and engine effluent. The categories of pollutants and constituents of concern evaluated included aquatic nuisance species (ANS), nutrients, pathogens, oil and grease, metals, toxic organics, and most conventional pollutants. A total of 621 aquatic and aquatic-dependent animal and plant species that have more than just limited exposure to waters of the United States were evaluated. The effects of ANS (because ANS can spread) were evaluated on the full list of 621 species, but the scope of the toxic effects (i.e., quantitative) analysis was limited to that subset of 386 listed aquatic and aquatic-dependent species found in navigable waterways. Tyler and staff wrote the effects summary and final effects determination section of the BE, and prepared all supporting tables, text and appendices supporting the analysis.

AQUATIC TOXICITY TESTING

Acute Chloride and Sulfate Toxicity Testing with Chloride-Sensitive Freshwater Macroinvertebrates. Tyler was principal investigator and project lead on a 2008 USEPA HECD study to determine the acute toxicity of chloride to four freshwater invertebrate species: water flea (*Ceriodaphnia dubia*), fingernail clam (*Sphaerium simile*), planorbis snail (*Gyraulus parvus*), and tubificid worm (*Tubifex tubifex*), under different levels of water hardness and sulfate concentrations. The tests were conducted in support of the derivation of chloride acute water quality criteria for the State of Iowa. Experiments included two sets of chloride toxicity tests (48-h static) with *C. dubia*: i) for studying the effect of water hardness on the acute toxicity of chloride to *C. dubia* at nominal hardness levels of 25, 50, 100, 200, 400, 600 and 800 mg/L (as CaCO₃), at a constant sulfate concentration of approximately 65 mg/L; and ii) for studying the effect of sulfate on the acute toxicity of chloride to *C. dubia* at nominal sulfate levels of 25, 50, 100, 200, 400, and 600 mg/L, at a constant total hardness concentration of approximately 300 mg/L as CaCO₃. Ninety-six hour static acute toxicity tests at two different nominal total hardness levels (50 and 200 mg/L as CaCO₃; approximately 65 mg/L sulfate) were also conducted for the freshwater clam, planorbis snail, and tubificid worm. Results were published in a report and peer-reviewed journal.

Chronic Ammonia Toxicity Testing with Juvenile Gill-bearing Snails. Tyler was principal investigator and project lead on a 2010 USEPA HECD study to conduct 28-day chronic toxicity tests for three species of field-caught gill-bearing (non-pulmonate) snails to augment the 2013 chronic ammonia toxicity aquatic life criteria dataset. Locations of wild populations of each species (mixed ages) were identified and snails were collected and transported to GLEC's facility in Traverse City, Michigan for holding prior to toxicity testing. Of the three species collected, GLEC was able to hold and maintain *Pleurocerca canaliculata* in sufficient health for subsequent toxicity testing. Tyler and staff conducted the 28-day chronic toxicity test with *P. canaliculata* generally following the applicable guidance outlined in ASTM E 1241, Standard Guide for Conducting Early Life-Stage Toxicity Tests with Fishes (ASTM 1998) and supplemented with any applicable methods and protocol established in ASTM E2455-06, Standard Guide for Conducting Laboratory Toxicity Tests with Freshwater Mussels (ASTM 2006). The chronic toxicity test data from the 28-day test with *P. canaliculata* was used as weight-of-evidence supporting the final chronic value for ammonia in freshwater (see GLEC 2011 in EPA 822-R-13-001).

Academic-based Aquatic Toxicity Testing. Tyler conducted research on the basic bioenergetic, physiological, and toxicological responses of juvenile rainbow trout to simulated global warming and sublethal ammonia (PhD Dissertation). He also investigated the effects of temperature and salinity on the chronic toxicity of nitrophenols to the saltwater fish species, sheepshead minnow (Master's Thesis). His PhD and Master's research resulted in 10 publications in high-quality peer-reviewed journals.

Endocrine Disruption. Tyler was recipient (August 1998) of a Small Business Innovation Research (SBIR) grant to develop a rapid amphibian *in vivo* assay to predict potential interference of environmental agents with normal thyroid function.

PUBLICATIONS, TECHNICAL REPORTS AND SELECT PRESENTATIONS

Peer-Reviewed Journal Articles



- Soucek, D.J., T.K. Linton, C.D. Tarr, A. Dickinson, N. Rickramanayake, C.G. Delos, and L.A. Cruz. 2011. Influence of water hardness and sulfate on the acute toxicity of chloride to sensitive freshwater invertebrates. *Environmental Toxicology and Chemistry*. 30(4):930-938.
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- Pacheco, M.A.W., D.O. McIntyre, and T.K. Linton. 2005. Integrating chemical and biological criteria. *Environmental Toxicology and Chemistry*. 24:2983-2991.
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- Morgan, I.J., L.M. D'Cruz, J.J. Dockray, T.K. Linton, D.G. McDonald, and C.M. Wood. 1998. The effects of elevated winter temperature and sub-lethal pollutants (low pH, elevated ammonia) on protein turnover in the gill and liver of rainbow trout (*Oncorhynchus mykiss*). *Fish Physiology and Biochemistry*. 19:377-389.
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- Reid, S.D., T.K. Linton, J.J. Dockray, D.G. McDonald, and C.M. Wood. 1998. Effects of chronic sublethal ammonia and a simulated global warming scenario: protein synthesis in juvenile rainbow trout (*Oncorhynchus mykiss*). *Canadian Journal of Fisheries and Aquatic Sciences*. 55:1534-1544.
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- Linton, T.K., F.L. Mayer, T.L. Simon, J.A. Malone, and L.L. Marking. 1994. Salinity and temperature effects on the chronic toxicity of 2,4-dinitrophenol and 4-nitrophenol to sheepshead minnows (*Cyprinodon variegatus*). *Environmental Toxicology and Chemistry*. 13:85-92.

Technical Reports and Proceedings

- Linton, T.K. and J. Heinlein. 2021. Use of diatoms as a bioassessment tool for monitoring nutrient enrichment and effects in streams. Prepared on behalf of the City of Johnstown, Ohio for Ohio Water Development Authority (OWDA) Research and Development Grant # 7879.



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Linton, T.K. 2017. Acquisition and development of information leading to adoption of new ammonia criteria and implementation support tool. Prepared on behalf of the City of Johnstown, Ohio for the Ohio Water Development Authority, Research and Development Grant # 7179.

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D.O. McIntyre, M. Grossell, and Linton, T.K. 2008. Evaluation of U.S. Environmental Protection Agency's arsenic ambient water quality criteria: Speciation and bioaccumulation issues. EPRI, Palo Alto, CA, Duke Energy Corporation, Charlotte, NC, Progress Energy, Inc., Raleigh, NC, SCANA Corporation, Columbia, SC, Southern Company, Birmingham, AL, and Tennessee Valley Authority, Chattanooga, TN: 2008. 1015570.

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Book Chapters

McIntyre, D.O. and T.K. Linton. 2012. Chapter 6. Arsenic, pp. 297-349. In: C.M. Wood, A.P. Farrell, and C.J. Brauner (Eds.), Homeostasis and Toxicology of Non-Essential Metals: Volume 31B. Elsevier.

Select Presentations

Linton, T.K., C. Delos, K. Taulbee, C. Voros, and G. Smith. 2016. Variability and Uncertainty in Use of Mean Effect Concentrations for Aquatic Life Criteria Derivation. Society of Environmental Toxicology and Chemistry 7th SETAC World Congress and 37th North America Annual Meeting, Orlando, Florida, November 6-10, 2016.

Linton, T.K., C. Voros, C., J. Van Dommelen, and J. Liggett. 2016. Can Small Plants Meet Revised Ammonia and Nitrogen Criteria? Ohio Water Environment Association Annual Meeting, Aurora, Ohio. June 29, 2016.

Linton, T.K. 2014. Overview of U.S. EPA's 2013 Ammonia Criteria: Options and Considerations for Achieving NPDES Compliance and Site-specific Criteria Development. EPRI Environment Advisory Meeting, Indianapolis, IN, September 15, 2014.

Linton, T.K., C. Voros, C.G. Delos, L.F. Huff and K. Gallagher. 2013. Use of EPA's Revised Deletion Process to Modify National Recommended Criteria to Protect Site-Specific Assemblages of Freshwater Species from Ammonia. Society of Environmental Toxicology and Chemistry (SETAC) North American 34th Annual Meeting, Nashville, TN, 17-21 November, 2013. (Poster – MP243).

Linton, T.K. 2009. Emerging contaminants biological basis for regulatory concern. SW/SE Ohio Water Environment Association Joint Section Meeting, City of Marysville WWTP, September 17, 2009.



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Linton, T.K., W.H. Clement, D.O. McIntyre, M.A. Pacheco, and J.W. Goodrich-Mahoney. 2003. Development of tiered freshwater iron aquatic life criteria. Proceedings of the Society of Environmental Toxicology and Chemistry. Austin, TX. Nov 2003. #182.

Linton, T.K., D.O. McIntyre, B. Premo, and M. Alexander. 2002. Use of the BLM to determine a WER for copper. Proceedings of the Society of Environmental Toxicology and Chemistry. Salt Lake City, UT. Nov 2002. p.192.

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Linton, T.K., I.J. Morgan and C.M. Wood. 1996. Long-term effects of global warming and sublethal ammonia on juvenile rainbow trout. Proceedings of the Society of Environmental Toxicology and Chemistry. Washington, D.C. Nov. 1996. p. 136.

Linton, T.K., J.J. Dockray, I.J. Morgan and S.D. Reid. 1996. Sodium regulation in freshwater rainbow trout chronically exposed to elevated ammonia or low pH: does acclimation occur? Proceedings of the Society for Experimental Biology. University of Lancaster, England. Mar. 1996. p. 39.

Linton, T.K., T. Banka, I.J. Morgan, S.D. Reid, D.G. McDonald and C.M. Wood. 1995. The physiological implications of elevated water temperature, sublethal ammonia, and food limitation on juvenile rainbow trout. Proceedings of the Society for Experimental Biology. St. Andrews University, Scotland. Mar. 1995. p. 4.

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Education

B.S., Zoology, Ohio State University
M.S., Entomology, Ohio State University
Ph.D., Entomology, Ohio State University

Qualifications

Dr. McIntyre's strength is in the area of aquatic toxicology. He has thirty-eight years of experience in water quality-related work. He has conducted a variety of research projects mostly related to aquatic toxicology. Projects have included the development of a tissue-based water quality criterion for selenium and its translation to a water value, site-specific studies for the determination of water quality criteria, development of national baseline bioaccumulation factors, bioaccumulation of arsenic, development of biological criteria in lakes, round-robin toxicity testing, enzymatic degradation of insecticides, and toxicokinetics of xenobiotic compounds in aquatic organisms. This varied background, ranging from the molecular to community level of biological organization, has given him familiarity with many areas of environmental toxicology. Areas of research expertise include: fate and effects of selenium in aquatic systems; biological monitoring and water quality assessment of streams, fish, and macroinvertebrates; field sampling techniques; laboratory bioconcentration and field bioaccumulation studies; toxicity testing with fish and invertebrates; toxicity identification/reduction evaluation; and EPA's protocol for the assessment of bioconcentratable contaminants in effluents and fish tissue.

Relevant Experience

EPA Contracts - Programmatic Experience. Dr. McIntyre has been a key scientist supporting the water quality criteria and biocriteria programs of U.S. EPA's Health and Ecological Division (HECD). Through GLEC's contracts with HECD, Dennis has led the development of several criteria most notably, selenium, U.S. EPA's first tissue-based criterion for the protection of aquatic life. He worked with U.S. EPA workgroups and management to identify and resolve data gaps in both the development of the selenium tissue-based criterion and its translation to a water value.

Biological Evaluation. Dr. McIntyre served as project leader and lead analyst of a biological evaluation of lead and total dissolved solids (TDS) criteria proposed for New Jersey's water quality standards. The biological evaluation included an analysis of the toxicity data, risk summary, and an effects determination for lead and total dissolved solids.

Biocriteria Development. Dr. McIntyre served as project leader for the development of biological criteria for New Jersey Lakes using macroinvertebrates data collected from the sublittoral zone of 72 New Jersey lakes. The project included the classification of lakes, selection of metrics and development of a multi-metrics index.

Pine Bluff Arsenal (PBA). Dr. McIntyre served as Program Manager for GLEC's environmental engineering services contracts from 1993 to 2010. Support work included (1) compliance with environmental regulations related to the Clean Water Act and the Resource

Conservation and Recovery Act, (2) investigation of sources of contamination to surface waters due to previous activities on the arsenal, and (3) optimizing the efficiency of the PBA's central waste treatment system and waste minimization activities. Dr. McIntyre has led a number of special research studies to support PBA's Environmental Management:

- An ecological risk assessment of eight closure sites on PBA;
- A study to locate a source of DDT contamination outside the area remediated to contain the contamination.
- Toxicity identification/reduction evaluations at two NPDES permitted outfalls.
- Pilot-scale evaluation of the effectiveness of a constructed wetland on the removal of organic dyes packaged at the arsenal;
- Quantifying the wastewater flow and loadings to the Arsenal's Central Waste Treatment system;
- Evaluation of the current treatment system and several modifications to optimize operations;
- Assessment of DDT compounds and mercury in ecological receptors in the Arkansas River adjacent to the Arsenal;
- Development of a site-specific mercury criterion using a site-specific bioaccumulation factor.

Site-Specific Criteria Development. Dr. McIntyre was primary author for a guidance document for the State of California on the development of site-specific objectives (criteria). He has served as Project Manager on over thirty studies (municipal and industrial clients) for the development of site-specific water quality criteria for various chemicals (cadmium, copper, zinc, lead, hexavalent chromium, aluminum, manganese, iron, chlorine, selenium, mercury and ammonia). Dennis was also the technical lead on a project designed to achieve compliance with an NPDES permit limit for mercury.

Stressor Identification. Dr. McIntyre was the lead analyst for a stressor identification investigation of three biodiversity-impaired reaches of the Blackstone River in Rhode Island. The investigation identified potential factors such as habitat disturbances; chemical stressors from industrial, municipal and non-point sources; changes in hydrology caused by impoundments; historical land use characteristics; and impacts to aquatic life caused by toxicity. A strength of evidence (SOE) approach relating the candidate cause to the biological effect that is supported by the analysis was used to identify the potential cause(s). Based on a number of lines of evidence including stressor-response models, the candidate stressors identified to be the likely cause of biological impairment were specific conductance, copper and increased autochthony (nutrients - total phosphorus and total nitrogen).

Effluent Toxicity Studies. Program Manager for various municipal and industrial biomonitoring and TI/RE programs in compliance with NPDES. He was Task Leader for a bioaccumulation identification evaluation conducted in accordance with a TI/RE for a wastewater treatment facility. Participated in an invited workshop on TI/RE's that resulted in the publication, Toxicity Identification Evaluation /Toxicity Reduction Evaluation: What works and What Doesn't. Pensacola, Florida, June 23-27, 2001. Proceedings published by SETAC.

Site-specific Whole Effluent Toxicity (WET). Dennis was Project leader for the preparation of a guidance document for the electric utility industry on applying site-specific considerations to WET limits.

Field Assessments. Dr. McIntyre has led several bioassessment studies which include: Central Ohio where biological community, fish and macroinvertebrates, and habitat indices determined at each site were compared to Ohio's biocriteria; an assessment of the fish and macroinvertebrates in the Cuyahoga River in to determine if a wastewater effluent impacted the aquatic community in the Cuyahoga River; and a comprehensive field and laboratory evaluation of the water quality of an industrial discharger's receiving streams which water, sediment, fish and macroinvertebrate sampling and analysis.

Bioconcentration/Bioaccumulation. Dr. McIntyre has supported the development of national baseline bioaccumulation factors (BAFs) for 28 organic chemicals and for methylmercury. He has served as Principal Investigator for numerous laboratory studies assessing the bioconcentration of individual compounds in fish; Principal Investigator and researcher on temperature accumulation dynamics of organochlorines in invertebrates; and Principal Investigator for laboratory and field studies assessing the bioaccumulation of contaminants from a wastewater and selected contaminants from surface run off using the Asiatic clam *Corbicula fluminea*.

Conductivity Criteria. Dennis supported U.S. EPA's development of a criteria document to support states, tribes, and territories interested in using a field methodology to quantify narrative conductivity criteria or develop numeric conductivity criteria. Technical support included identifying and filling in potential gaps, providing information related to implementation of the criteria such as magnitude and duration and how they relate to the field-based value. Dennis led a project supporting U.S. EPA Region 6 and the State of Arkansas with investigating scientifically defensible option(s) to protect waters from ionic stress (e.g., chloride, sulfate, and other ions). GLEC performed a literature review, evaluation, and analysis of available ions data. The results of this analysis informed the interested parties of the viability of potential approaches (e.g., hardness-based, field-based similar to the EPA Benchmark Report approach, and any new approaches) to protect the aquatic community from the effects of elevated ions.

Method Development for Data Limited Substances. Dennis served as work assignment leader for U.S. EPA work on methods and mechanisms for generating acceptable data and values where data are too limited to generate Ambient Water Quality Criteria. A summary report was prepared of the existing methods used in the US and other countries to derive a criterion or benchmark value. Several methods for relevance, acceptability, and feasibility were evaluated. Several tools such as species sensitivity distributions, QSARs, read-across and ICE were evaluated using selected data sets of chemicals that have similar modes of action.

Integrating Chemical and Biological Criteria. Work assignment leader supporting U.S. EPA in an evaluation of the relationship between chemical and biological criteria. GLEC developed an approach to compare the species identified as being sensitive to selected chemicals in laboratory toxicity tests, and the species identified in field biometric indices as being intolerant of human influences. Bioassessment data from Ohio and West Virginia were

analyzed to determine effect levels for selected contaminants for individual species. Effect levels for the field were compared to the effect levels determined in laboratory tests to evaluate the relationship between species sensitivity in lab testing versus field biometrics.

Mercury Residue in Fish Tissue. Project leader for a study to determine if mercury was accumulating in fish below an industrial outfall to help determine wildlife and human risk and exposure. Exposure to humans was assessed using filet samples from larger fish species. Smaller fish species were analyzed for whole body mercury concentration to assess risk and exposure to wildlife.

NPDES Permit Development. Project leader providing technical support for EPA Region I in the preparation of the documents required to complete draft NPDES permits packages for a general permit and 16 selected facilities seeking renewal of NPDES permits. This work included the preparation of the draft permit, fact sheet, statement of basis, response to public comments, and supplementary information necessary for completion of the administrative record.

Tribal Outreach. Work assignment leader supporting the preparation and publication of successful case studies of Indian water standards contained in a folder describing the water quality standards and how to adopt them. This publication describes different aspects of the water quality standards program including what the program is and how it can be of benefit in Indian country. Case studies of tribes that have success with the water quality standards program is included in this publication. GLEC staff visited five different reservations (Seminole Tribe, Sioux and Assiniboine Tribes, the Salish and Kootenai Tribes, Hoopa Valley Tribe, Mole Lake Band of Lake Superior Chippewa Indians, and the Hualapai Tribe) to interview tribal members and obtain information on their water quality standards program.

Professional Recognition and Affiliations

Member, Society of Environmental Toxicology and Chemistry

Douglas Endicott

Environmental Engineer



EXPERIENCE SUMMARY

Doug is responsible for developing and conducting applied environmental engineering studies and projects, emphasizing water quality (nutrient/eutrophication and contaminant transport and fate), bioaccumulation, and aquatic ecosystem modeling. Mr. Endicott also conducts engineering studies for a wide range of environmental applications, including total maximum daily load (TMDL) and mixing zone studies, regulatory and cost-benefit analysis, technical guidance for water quality standards development and implementation, and design and conduct of water quality studies guided by mass balance and water quality modeling principles and statistical designs. His research has contributed to the development of both simple and complex models used to address water quality problems in the Great Lakes, their embayments and tributaries. He has published on his research in the areas of in-place pollutant transport and fate, food web bioaccumulation of PCBs and dioxins, and model uncertainty analysis.

RELEVANT EXPERIENCE

- *Saginaw River Dissolved Oxygen Study*; Michigan EGLE, Water Resources Division
- *Baseline Water Quality Monitoring, Milwaukee River Watershed, Phase One*; Milwaukee Metropolitan Sewerage District; 2017-2020.
- *Development of Predictive Nutrient-Based Water Quality Models for the Three Lakes System: Torch Lake, Clam Lake, and Lake Bellaire*; Three Lakes Association.
- *Lake Erie Tributary Loading Analysis*; Michigan EGLE, Water Resources Division
- *Loading of Dioxin/Furans and Polychlorinated Biphenyls to the Lower Passaic River from Combined Sewer Overflows*; Passaic Valley Sewerage Commissioners.
- *Sediment/Contaminant Transport Modeling Expert for the City of Seattle, Lower Duwamish Waterway Allocation Convening, Sediment Transport Group*; City of Seattle.
- *Mercury Bioaccumulation Study in Phillips Creek, Pine Bluff Arsenal*; Dept. of Army.
- *St. Louis River Estuary Watershed Toxics Total Maximum Daily Load*; RTI and US EPA Region V. 2013-15.
- *EPA Science Advisory Board, Lake Erie Phosphorus Objectives Review*. 2015-16.
- *CREP VFS Effectiveness*; Michigan Department of Environmental Quality Water Division
- *Assessment of Water Quality Impairments Related to Forest Roads*; US EPA Standards and Health Protection Division.
- *Lake Michigan Mass Balance Technical Support*; US EPA Health and Ecological Criteria Division for MED-Duluth.
- *Validation of National Bioaccumulation Factor Methodology and Site-specific Bioaccumulation Factors Technical Support Document*; USEPA Health and Ecological Criteria Division.
- *Housatonic River PCB Modeling Peer Review*; Marasco Newton and SRA International.
- *NPDES Permit Support: Mixing Zone Modeling of PVSCs' Secondary Outfall to Newark Bay: Evaluating Compliance with Surface Water Quality Standards During Wet Weather*; Passaic Valley Sewerage Commissioners.
- *Biotic Ligand Model (BLM) Software and Supporting Documents Preparation, Development of Fixed Site Criteria Methodology and Sensitivity Analysis, and Development of Tools to Estimate Water Quality Parameters for the Copper BLM*; US EPA Health and Ecological Criteria Division.
- *Vessel General Permit Technical Support*; RTI International. 2016-19.
- *Five Year Monitoring Study of Water Quality in the James River near Hopewell, VA*; Hopewell Regional Wastewater Treatment Facility and Honeywell Hopewell Industries.

EDUCATION

BSE, Environmental Science Engineering, University of Michigan, 1983

MSE, Environmental Engineering, University of Michigan, 1984

AREAS OF EXPERTISE

Water Quality Modeling

Bioaccumulation

Design, Conduct and Management of Water Quality Field Studies

Sediment Transport

Polychlorinated Biphenyls (PCBs)

Clean Water Act (CWA) support

National Pollution Discharge Elimination System (NPDES) Permit Compliance Assistance

Data Management and Analysis

LICENSES/REGISTRATIONS

Licensed Professional Engineer, State of Michigan (inactive)

PROFESSIONAL AFFILIATIONS

American Chemical Society

American Society of Civil Engineers

International Association for Great Lakes Research

Society of Environmental Toxicology and Chemistry

OFFICE LOCATION

Traverse City, MI

YEARS OF EXPERIENCE

38

YEARS WITH GLEC

21



Education

Master of International Management, Thunderbird School of Global Management, 1979
B.A., Geography and Anthropology, Minor in English, Michigan State University, 1977

Qualifications

Mr. Arnold has a diverse background in geographic information systems (GIS), environmental and engineering project management, data processing, graphic communications, technical writing, and business development. He has 25 years of applied GIS work experience and has worked for large, medium, and small corporations serving government and commercial clients in both domestic and international markets. Since 2001, he has managed GLEC's GIS operations and specializes in ESRI® ArcGIS and Adobe® applications. He works closely with GLEC's environmental engineers, biologists, and chemists on multiple projects for U.S. EPA, state regulatory agencies, conservation groups, and industrial clients to apply GIS and visual communications towards understanding complex environmental realities.

Relevant Experience

Mr. Arnold has led international, national, state, and regional level GIS projects involving water quality surveys; watershed management; ecological risk assessments; sediment and groundwater assessments; habitat and species surveys; georeferencing environmental and infrastructure data; integrating relational databases; land use and demographic analyses; geochemistry trends analyses; bathymetric and watershed mapping; storm water/runoff studies; radio frequency engineering; and site analyses for the telecommunications industry. He has designed and supervised complex digitizing and geodatabase development projects for the U.S. Army, large wastewater utilities, and telecommunications companies.

Mr. Arnold has conducted GIS and graphics work for the New Jersey Harbor Dischargers Group (NJHDG), the EPA New York- New Jersey Estuary Program and Hudson River Foundation, including mapping and graphics support for annual NJHDG water quality monitoring reports. Mr. Arnold has supported the Passaic Valley Sewerage Commission (PVSC) projects since 2003 as a contracting resource for GIS, mapping, spatial analysis, permitting support, and report materials. He was the project lead for the 2013 to 2015 PVSC GIS modernization and community digitizing. Other PVSC GIS projects include acquiring, maintaining, and analyzing environmental discharger spatial data for PVSC projects such as defense preparation for the Passaic River CERCLA dioxin case; analyzing historical bathymetry data and creating depth profiles for water quality modeling investigations; and providing general GIS, cartography and permitting/report support.

Mr. Arnold maintains the facility GIS and water quality data for the U.S. Army Pine Bluff Arsenal. For the USEPA's UCMR program, he led GIS projects to map contaminant detections at public water systems. He has played a key role in processing spatial data, survey operations, and publications for USEPA's National Aquatic Resource Surveys, including creation of unique U.S. Ecoregions, site evaluation processes, and web-based mapping applications for survey logistics. He has seven publication citations and has presented his work with USEPA on nutrient database mapping at the ESRI International Users Conference.

Education

M.S., Biology/Conservation Biology, Central Michigan University, Mt. Pleasant, MI., 2002
B.S., Biotechnology, Ferris State University, Big Rapids, MI., 1990

Qualifications

Jennifer Hansen has a diverse background in the biological and biochemical sciences. She has extensive professional experience as a Quality Assurance Specialist, including development and implementation of Quality Assurance Systems, data review and approval, laboratory auditing and approval, and noncompliance investigations. She has extensive professional experience in laboratory and field operations including water quality sampling, testing and reporting.

Professional Experience

Quality Assurance Officer (QAO) – Great Lakes Environmental Center, Traverse City, MI.
Ms. Hansen has been the GLEC QAO since 2009. As the QAO, Ms. Hansen is responsible for implementing and maintaining all of GLEC's quality control (QC) and quality assurance (QA) systems, procedures and quality documentation. She authors and maintains the corporate Quality Management Plan (QMP) and contract specific QMPs. She reviews and approves GLEC's Quality Assurance Project Plans (QAPPs), Laboratory QA Manuals, and Standard Operating Procedures (SOPs). She oversees training and training documentation. She conducts annual internal laboratory and data audits, and provides ongoing QA/QC technical support. Ms. Hansen is the primary contact for external audits of GLEC's laboratories by clients as well as by the New Hampshire NELAP accrediting body, oversees corporate and contract-wide QA systems, and serves as QA contact for all contracts

Researcher - Great Lakes Environmental Center, Traverse City, MI. Professional and technical duties include a wide variety of projects utilizing Ms. Hansen's graduate training and expertise in field botany and taxonomy. Jennifer has experience working in GLEC's taxonomy laboratories, for both plants and benthic invertebrates. She has experience working in the toxicology, microbiological and chemistry laboratories, in the field, and as a procedural writer and reviewer.

Contract Quality Assurance Experience

As GLEC's QAO, Ms. Hansen oversees the QA systems for all of GLEC's U.S EPA Office of Water contracts, Michigan Department of Environment, Great Lakes and Energy contracts, U.S. Army contracts, numerous industrial client contracts and subcontracts to other science and engineering firms. Following are examples of key contract QAO experience.

New Jersey Harbor Dischargers Group (NJHDG): Technical Services

The New Jersey Harbor Dischargers Group (NJHDG) was formed by the 12 New Jersey municipal dischargers to the New York/New Jersey Harbor to consolidate their efforts related to EPA's New York/New Jersey Harbor Estuary Program (HEP). The Group was formed in

1993, and since that time GLEC has acted as the Group's Technical Advisor in all matters related to the HEP. This responsibility has included not only active representation at the Nutrient Work Group, Pathogens Work Group, Toxics Work Group and TMDL Work Group meetings, but also development and implementation of a number of technical studies related to water/sediment quality in the Harbor. GLEC has been responsible for coordinating the collection of hundreds of samples from area municipalities and surface waters, sample shipment to analytical laboratories, and for QA/QC of sample analyses for toxics, pathogens, and nutrients. GLEC has also summarized and interpreted the data for NJHDG, and has provided technical guidance to NJHDG regarding the significance of the results and impacts regarding NJHDG member's ability to achieve permit limits and meet standards.

Ms. Hansen has supported these contracts as GLEC's QAO since 2009, and has been very involved in developing program QAPPs and reviewing water quality monitoring data. She supported the development of NJHDG annual reports, and provided extensive analysis of the data for the Harbor Estuary Program reports.

Passaic Valley Sewerage Commission (PVSC) – Ongoing Support

GLEC scientists have been helping the Passaic Valley Sewerage Commissioners (PVSC) plan for and meet their NPDES permit limitations and other regulatory requirements for their 350 MGD outfall to the New York Harbor. PVSC is the largest wastewater treatment facility in New Jersey, and serves hundreds of industrial dischargers spanning the range of discharger categories. GLEC has provided contract services to PVSC since 1998.

Ms. Hansen has supported the contract work as GLEC's QAO for the past 9 years. Examples of QA support include QAPP input and review, including review and support for Data Quality Objectives, QA sampling design, and review of quality control sample results.

U.S. EPA Office of Water, Health and Ecological Criteria Division (HECD): Scientific, Technical and Regulatory Support for Development and Implementation of Ecological, Human Health and Other Environmental Criteria and Standards

Ms. Hansen has served as QAO for four consecutive multi-year HECD contracts involving water quality criteria development, water quality testing, training/workshop support, and water quality modeling. HECD work assignments have focused on extensive analysis of secondary data, as well as literature reviews, database searches, peer reviews and document searches to develop new or update existing water quality criteria standards for stressors on human and ecological health. Ms. Hansen authors and maintains the HECD contract specific QMPs; approves project specific QAPPs, and GLEC's Quality Review Forms and Quality Assurance Reports for deliverables.

U.S. EPA Office of Water, Office of Ground Water and Drinking Water: Technical Support for Implementation of the Unregulated Contaminant Monitoring Rule and Drinking Water Standards Development (UCMR)

Ms. Hansen has served as QAO for three consecutive UCMR contracts, which provide technical support and implementation of UCMR programs. Work assignments have included

design and execution of monitoring plans, screening surveys and prescreen testing, laboratory approvals, sampling kit design and construction and ongoing supplies and shipping, field crew training, and ongoing logistics and support.

Michigan Department of Environment, Great Lakes, and Energy (EGLE): Water Quality Monitoring Services

As GLEC's QAO, Ms. Hansen has supported three EGLE contracts. This program is designed to identify waters that are not meeting Michigan water quality standards; measurement of temporal and spatial trends; evaluation of the effectiveness of existing programs; and detection of emerging problems. GLEC's work assignments for EGLE have included: water quality trend monitoring; water quality assessment of randomly selected streams; *Escherichia coli* monitoring in numerous Michigan watersheds in support of Total Maximum Daily Load (TMDL) development; assessment of the ecological integrity of Michigan lakes, rivers, coastal areas, and wetlands in support of EPA's National Aquatic Resource Surveys;

U.S. Army Pine Bluff Arsenal: Environmental Engineering Services

Ms. Hansen has served as QAO for four Pine Bluff Arsenal (PBA) Contracts. Ongoing work at Pine Bluff Arsenal is designed to determine the potential for significant adverse environmental effects, both acute and chronic, from PBA's operations. PBA activities have involved Ecological Risk Assessments, aquatic toxicity assays, and ecological assessments of receiving streams. GLEC researchers have integrated relevant GIS data for the closure sites and surrounding areas to supplement the Arsenal's Long-Term Environmental Management Plan for land management and risk minimization. Ms. Hansen provides overall QA System support. She has performed quality and traceability reviews of PBA data, spanning multiple years.

Professional Training

Internal Audits - Auditing the Management System in Environmental Analytical Labs. Sponsored by ANSI-ASQ National Accreditation Board (ANAB). November 2018.

Ethical Vigilance – Lessons for Environmental Laboratories and Beyond. Sponsored by Association of Public Health Laboratories (APHL). October 2018.

Environmental Laboratory Ethics – Then and Now. Sponsored by Association of Public Health Laboratories (APHL). September 2017.

Best Practices for Internal Audits. Sponsored by ERA. December 2016.

Laboratory Fraud – Part Deux. Sponsored by Association of Public Health Laboratories (APHL). September 2016.

Laboratory Fraud. Sponsored by Association of Public Health Laboratories (APHL). September 2015.



Education

B.S., Water Resources and Environmental Biology, Heidelberg University, 1999
M.S., Limnology, Michigan State University, 2001

Qualifications

Mr. Saxton has experience in water quality monitoring research, including data collection, analysis and interpretation. Additionally, he has experience investigating the effects of municipal and industrial discharges on aquatic communities, and collecting and identifying biotic components of aquatic ecosystems, including macroinvertebrates, plankton, fish and macrophytes. At Great Lakes Environmental Center, Inc. (GLEC) he manages and provides assistance to research programs for industrial, municipal and government clients including the Michigan Department of Environment, Great Lakes and Energy (EGLE) and the U.S. Environmental Protection Agency (EPA). His principal area of expertise is the development and implementation of surface water quality and aquatic community monitoring programs, and data interpretation.

Relevant Experience

EPA National Aquatic Resource Surveys. Mr. Saxton is currently serving as Deputy Program Manager for GLEC's contract with EPA's Assessment and Watershed Protection Division entitled *Technical Support for National Aquatic Resource Surveys*. Under this contract he served as Task Order Leader for the following Task Orders: 1) *2017 National Lakes Assessment: Logistics Support and Training*, 2) *2018-2019 National Rivers and Streams Assessment: Logistics Support and Training*, 3) *2020 National Coastal Condition Assessment: Logistics Support and Training* and 4) *2021 National Wetland Condition Assessment: Logistics Support and Training*. Mr. Saxton has also served as a field methods trainer, field methods training facilitator, auditor and field crew member for all of EPA's NARS since 2007, including the National Lakes Assessment (NLA) 2007, 2012 and 2017; National Rivers and Streams Assessment (NRSA) 2008/09, 2013/14 and 2018/19; National Coastal Condition Assessment (NCCA) 2010, 2015 and 2020; and National Wetland Condition Assessment (NWCA) 2011, 2016 and 2021. Jamie served as the Contractor Field Crew Manager for the NCCA 2015, the NLA 2017, the NRSA 2018/19 and the NCCA 2020. Under this role he was responsible for managing 19 GLEC crews completing approximately 1,600 site visits in four Great Lakes and nearly 20 states around the U.S.

EGLE Work Assignments. Mr. Saxton is currently the Program Manager for GLEC's contract with the EGLE's Water Resources Division entitled *Water Quality Monitoring Services for Michigan Department of Environment, Great Lakes and Energy*, and previously served as Deputy Program Manager for a similar contract entitled *Technical Support for Water Quality Monitoring Program for the Department of Environmental Quality*. Additionally, he has been the Work Assignment Leader for a large number of Work Assignments under these contracts, including Work Assignments that addressed: 1) water quality trend monitoring on Saginaw Bay (Lake Huron) and Grand Traverse Bay (Lake



Michigan), 2) water quality trend monitoring in Michigan's Great Lakes connecting channels, 3) water quality monitoring in a stream supporting a state fish hatchery, 4) water quality assessment of 250 randomly selected streams in Michigan in support of MDEQ's Water Chemistry Monitoring Project, 5) *Escherichia coli* monitoring in numerous Michigan watersheds in support of Total Maximum Daily Load (TMDL) development, 6) Conservation Reserve Enhancement Program (CREP) implementation in Michigan, 7) assessment of the ecological integrity of randomly selected Michigan lakes in support of EPA's NLA, 8) assessment of the ecological integrity of non-wadeable rivers in Michigan, 9) monitoring of impacted urban streams in support of TMDL development, 10) assessment of the ecological integrity of randomly selected Great Lakes nearshore sites in Michigan in support of EPA's NCCA and 11) implementation of EPA's NWCA in Michigan.

EPA Work Assignments. Mr. Saxton has been the Work Assignment Leader under contracts with EPA's Health and Ecological Criteria Division and EPA's Standards and Health Protection Division. Specifically, he was the Work Assignment Leader for Work Assignments that addressed: 1) EPA Region 10 biological evaluations for Endangered Species Act consultations, 2) chemical criteria: technical support, 3) "lessons learned" regarding implementation of state nutrient standards, 4) the development of annotated bibliographies on nitrogen and diurnal dissolved oxygen fluctuations in relation to aquatic community structure, 5) monitoring of marine beaches impacted by storm runoff, 6) acute and chronic toxicity of seven chemicals on freshwater invertebrates, 7) fish assemblage assessment methods and biological criteria development for a non-wadeable river in North Dakota and 8) implementation support for EPA's National Aquatic Resource Surveys (NARS). Mr. Saxton also serves as Program Manager for the United States Virgin Islands Basic Ambient Water Quality Monitoring Program (BAWQMP), a five-year monitoring program in St. Thomas, St. Croix and St. John administered through EPA Region 2.

Mr. Saxton has also assisted EPA in conducting workshops that addressed numerous topics, including: 1) designating attainable uses for the Nation's waters, 2) water quality standard designation (i.e., EPA's Water Quality Standards Academy), 3) mussel toxicity testing procedures, 4) copper biotic ligand model training, 5) suspended and bedded sediments and 6) nutrient criteria promulgation in Wisconsin.

Environmental Assessments for the Power Industry. Mr. Saxton has acted as Field Supervisor and Project Manager for numerous environmental assessment projects completed for Consumers Energy Company, DTE Energy and AEP Indiana Michigan Power Company. Specific projects include: 1) river and impoundment water quality studies on the Manistee, Au Sable and Muskegon Rivers, 2) water quality monitoring at the Webber Dam Hydroelectric Project, 3) fish contaminant monitoring on the Manistee, Au Sable and Muskegon Rivers' Hydroelectric Projects, 4) impingement and entrainment studies at the J. H. Campbell and D.E. Karn/J. C. Weadock Generating Complexes, 5) environmental surveys of the DTE Fermi 3 Nuclear Generating Station, 6) invasive species survey at the Buchanan, Constantine and Mottville Hydroelectric Projects, 7) bird nesting structure monitoring at the Mottville Hydroelectric Project and 8) qualitative habitat and shoreline erosion survey at the Mottville Hydroelectric Project.



Aquatic Field Studies. Mr. Saxton has collected fish, macroinvertebrate and water samples to determine the impact of industrial and municipal effluent on aquatic life. He has evaluated ecological community data using community metrics analyses such the Index of Biotic Integrity and the Invertebrate Community Index. He has assessed lentic and lotic habitat quality using rapid bioassessment techniques and quantitative physical habitat assessment protocols, including those utilized in EPA's NLA, NRSA, NCCA and NWCA, and in the EGLE's Surface Water Assessment Section's (SWAS) Procedure 51.

Data Interpretation and Report Generation. Mr. Saxton routinely develops reports summarizing and interpreting water quality and aquatic community data, including graphical and basic statistical analyses. He also routinely develops Quality Assurance Project Plans (QAPP) for government and industrial clients.

Prior Professional Experience

Graduate Research Assistant - Michigan State University; As a Graduate Research Assistant, Mr. Saxton's duties included: developing and implementing research protocols, collecting and analyzing benthic invertebrate and plankton samples and organizing and analyzing data for scientific reports. He interpreted technical scientific data for the public and trained and managed undergraduate students.

Biological Student Assistant – National Center for Water Quality Research; While working as a biological student assistant for the National Center for Water Quality Research, Mr. Saxton collected and analyzed benthic invertebrates, fish and plankton from Lake Erie. He analyzed the gut contents of benthivorous and planktivorous fish collected from Lake Erie. He also maintained an analytical laboratory, prepared regents for water pollution analysis and collected water samples for the analysis of numerous chemical and biological parameters.

Student Assistant - Industrial Fluid Management, Inc.; As a student assistant, his duties included: researching and lecturing on water quality issues, facilitating the bioaugmentation of wastewater and assisting with bioremediation of petroleum spills. He performed chemical and biological analyses of wastewater and assisted with the maintenance of small wastewater treatment plants.

Teaching Assistant - Heidelberg University; Mr. Saxton taught students in field laboratory sessions and developed and evaluated laboratory examinations in botany and general biology laboratory sessions. He collected organisms from the field for laboratory testing. He has also organized and analyzed large collections of aquatic organism population data.