

Appendix X
Fisheries and Aquatic Resources and
Avian and Bat Memoranda of
Understanding

Fisheries and Aquatic Resources Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING
Between the Ohio Department of Natural Resources and Icebreaker Windpower Inc.
In the matter of the Application of Fred Olsen Renewables USA LLC/Icebreaker
Windpower Inc. for a Certificate to
Construct a Wind-Powered Electric Generation Facility

Case No. 16-1871-EL-BGN
Monitoring Protocols for Fisheries and Aquatic Resources
June 8, 2017

Since April 2016, Icebreaker Windpower, Inc. ("Applicant") and the Ohio Department of Natural Resources ("ODNR") (jointly referred to as the "Parties") have been working collaboratively to ensure compliance with the requirements in Ohio Revised Code ("R.C.") Chapter 4906 and Ohio Administrative Code Chapter 4906-4 and develop pre-, during-, and post-construction monitoring protocols for fisheries and aquatic resources located in the vicinity of the Icebreaker Wind six turbine offshore wind demonstration Project located 8 to 10 miles off the shore of Cleveland, Ohio (the "Project"). On February 1, 2017, as supplemented on March 13, 2017, the Applicant filed its application ("Application") with the Ohio Power Siting Board ("OPSB") for a certificate to construct the Project in Case No. 16-1871-EL-BGN.

The Parties are entering into this Memorandum of Understanding ("MOU") to set forth the agreements that have been reached on the monitoring protocols for fisheries and aquatic resources. The purpose of these monitoring protocols will be to help assess, in a scientifically rigorous manner, any impacts that Project construction and operation may have on these aquatic species and resources. The goal of assessing these impacts is: 1) to document existing conditions and patterns of use by the species of concern at the Project site; 2) to document changing conditions and patterns of use by species of concern and their associated habitats as a result of Project construction and operations at the Project site; 3) to develop and implement effective mitigation and adaptive management strategies to minimize fisheries and aquatic resource impacts; 4) to evaluate the feasibility of various monitoring protocols in an offshore setting; and 5) to better understand how future offshore wind projects in Lake Erie or the Great Lakes may affect fisheries and aquatic resources.

The Parties recognize that the location and size of any future offshore wind projects will be significant factors in future risk assessments. There are issues related to the statistical detectability of certain types of impacts due to natural variability, the limited footprint, and size of this demonstration Project. A determination of impact, or lack thereof, whether positive or negative in this small project, should not be construed to represent an impact

condition for larger projects with different turbine configurations and offshore locations. Recognizing these limitations, these monitoring studies and protocols have been designed to provide information that will help to guide future monitoring efforts and provide a sound scientific basis for future decision-making.

By and through this MOU, the Parties hereby agree to the following:

- A. The Lake Erie Monitoring Plan (“LEMP”) dated January 25, 2017, which was prepared by LimnoTech for the Applicant (Exhibit A attached), will serve as the basis for the aquatic resources and fisheries pre-, during-, and post-construction monitoring effort by the Applicant, any of its consultants or sub-consultants acting on its behalf, and any successor(s) to the Applicant, consultants, or sub-consultants. The offshore aquatic sampling protocols are based on the offshore grid block risk potential maps developed by ODNR and illustrated in Figures 3 and 5 in Exhibit A.
- B. The LEMP is a living document and will serve as a template for all future aquatic monitoring work related to the Project. The length and type of sampling conducted will be reviewed annually by ODNR as outlined in the LEMP to determine whether the sampling intensity, frequency, and duration are appropriate. Any such adjustments to the existing protocol will be based on actual sampling results from prior years.
- C. In order to effectuate any adjustments, the Parties will review sampling results annually (at the end of the field season) and will meet annually to discuss and reach mutual agreement on any adjustments to the sampling program necessary to meet monitoring and assessment goals. The annual meeting will be held at least one month prior to the next field season. The Parties agree to meet prior to March 1 of each year. This will provide adequate lead time to make adjustments to the sampling program prior to the start of the field season.
- D. Annual monitoring reports, including preliminary analyses and summaries of all data collected to date, must be submitted to ODNR at least two weeks prior to the scheduled date of the annual meeting provided for at Paragraph (C) above. Annual pre-construction monitoring reports will provide a summary of pre-construction baseline data collected from the prior sampling season and an analysis of natural variability. Annual post-construction monitoring reports will provide a summary of data collected for the prior sampling season and a comparative analysis to identify potential changes and/or impacts due to the construction and/or operation of the offshore wind facility to be developed by

the Applicant. Annual monitoring reports will be shared with the United States Fish and Wildlife Service (“USFWS”), the Ohio Environmental Protection Agency (“Ohio EPA”), and the OPSB for external review and analysis. These reports will be provided to those officials specified at those agencies to receive notices under Paragraph (L)(10) of this MOU.

- E. The Applicant shall submit quarterly Project reports to ODNR summarizing monitoring activities performed during the prior three-month period. The start date for the quarterly Project reports will be determined subsequent to execution of this MOU. Quarterly reports will include an outline of all sampling attempted, completed, and a summary of data collected as described in the LEMP document. Quarterly reports shall be submitted pursuant to the Notice provision set forth at Paragraph (L)(10) of this MOU. Quarterly reports will also be shared with USFWS, the OPSB, and the Ohio EPA for review and analysis.
- F. Post-construction annual monitoring reports will be required for all post-construction sampling years. An interim summary post-construction report is required to be submitted by March 1 of the year following the third post-construction year, unless the parties have adjusted the number of sampling years pursuant to Paragraph B. The interim report will include a detailed analysis of the first three years of data, discussion, conclusions, and any recommendations for mitigation if needed, unless the parties have adjusted the number of sampling years pursuant to Paragraph B. A final Project report shall be submitted to ODNR one year after all sampling and monitoring work has been completed. The final report will include complete analysis of all data, discussion, conclusions, and any recommendations for mitigation if needed, and it will be transmitted pursuant to the Notice provision located at Paragraph (L)(10) of this MOU. A summary of reporting requirements is presented in Exhibit B attached.
- G. All raw data collected will be submitted by the Applicant annually to ODNR on or before February 1st of the year immediately following sample collection. These data will be distributed to the USFWS and Ohio EPA for external review and analyses. Such data will become a public record and will be made available upon proper request unless the Applicant specifically identifies any data or information under this section which it believes to be proprietary in nature at the time of submission to the ODNR. If data or information is identified as proprietary in nature, then the ODNR will immediately notify the Applicant, through the contact person specified to receive notices under Paragraph (L)(10) of this MOU, of the fact of a records request under R.C. Section 149.43, et. seq.,

so that the Applicant will, within fourteen (14) business days, be able to consider and act as it may consider necessary and appropriate to protect its proprietary interest, including without limitation filing an action for injunctive relief to prevent the disclosure of its intellectual property.

- H. ODNR and designated technical experts will review all quarterly, annual, interim, and final reports to ensure they meet the assessment goals as outlined in paragraph two of page one of this document. If a finding of significant adverse impact is determined, ODNR shall immediately notify the Applicant and follow-up with appropriate agencies and the Applicant to address and/or remediate the impact.
- I. This MOU may be made a condition of Submerged Lands Lease SUB-2356-CU between the State of Ohio and the Applicant.
- J. This MOU may be made a condition of any Certificate of Environmental Compatibility and Public Need issued to the Applicant in Case No. 16-1871-EL-BGN by the OPSB.
- K. This MOU shall terminate on the date that is five years beyond the date on which commercial operations began for the Project, unless terminated earlier by mutual consent of the Parties. The term of the MOU may be extended beyond five years if ODNR determines that post-construction assessment results demonstrate a significant adverse impact and that the continued collection of aquatic sampling data for an additional period of time is scientifically warranted. The specific type of aquatic sampling required to address the adverse impact will be mutually agreed to by the Parties.
- L. General Terms and Conditions

1. Liability

The Parties agree that Applicant shall be solely responsible for any and all claims, demands, or causes of action arising from Applicant's obligations under this MOU. Each Party to this MOU must seek its own legal representative and bear its own costs, attorney fees and expenses, in any mediation or litigation that may arise from the performance of this MOU. It is specifically understood and agreed that ODNR does not indemnify Applicant. Nothing in this MOU shall be construed to be a waiver of the sovereign immunity of the State of Ohio or the immunity of any of its employees

or agents for any purpose. In no event shall ODNR be liable for indirect, consequential, incidental, special, liquidated, or punitive damages, or lost profits.

2. Ethics

By signing this MOU the Applicant certifies that it: (i) has reviewed and understands the Ohio ethics and conflict of interest laws as found in R.C. Chapter 102 and in R.C. Sections 2921.42 and 2921.43, and (ii) will take no action inconsistent with those laws. The Applicant understands that failure to comply with Ohio's ethics and conflict of interest laws is, in itself, grounds for termination of this MOU with the State of Ohio.

3. Ohio Elections Law

Applicant affirms that, as applicable to it, no party listed in Division (I) or (J) of Section 3517.13 of the R.C. has made, as an individual, within the two previous calendar years, one or more contributions to the Governor or to his campaign committees that exceed the limits established by that code.

4. Assignment/Delegation or Amendment

Neither Party to this MOU will assign any of its rights, amend this Agreement, nor delegate any of its duties and responsibilities under this MOU without the prior written consent of the other Party. Any assignment or delegation not consented to may be deemed void by the non-consenting Party.

5. Severability

In case any one or more of the provisions previously contained in this MOU shall for any reason be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision thereof and this MOU shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.

6. Counterparts

This MOU may be executed in two or more counterparts, each of which shall be

deemed to be an original and taken together shall be deemed to be one and the same instrument.

7. Controlling Law

The laws of the State of Ohio shall govern this MOU and any claims arising in any way out of this MOU. Any provision of this MOU prohibited by the law of Ohio shall be deemed void and of no effect. Any litigation arising out of or relating in any way to this MOU or the performance hereunder shall be brought only in Franklin County, Ohio or before the OPSB.

8. Mediation

If a dispute arises between the Parties regarding the performance, interpretation, or implementation of any provision in this MOU and the Parties reach an impasse, prior to pursuing litigation, the Parties will engage a mutually agreed to third-party mediator and will, in good faith, attempt to reach agreement on the issue within a reasonable period of time.

9. Waiver

A waiver by any Party of any breach or default by the other Party under this MOU shall not constitute a continuing waiver by such Party of any subsequent act in breach of or in default hereunder.

10. Notices

Each Party will designate an individual by name, title, and both street and e-mail addresses for the receipt of any notifications required by this MOU and for the purpose of communicating on any issues that relate to the MOU and its objectives. Except to the extent expressly provided otherwise herein, all reports, notices, consents and communications required hereunder (each, a "Notice") shall be in writing and shall be deemed to have been properly given when: 1) hand delivered with delivery acknowledged in writing; 2) sent by U.S. certified mail, return receipt requested, postage prepaid; 3) sent by overnight delivery service (Fed Ex, UPS, etc.) with receipt; or 4) sent by fax or email to the officers listed below. Notices shall be deemed given upon receipt thereof, and shall be sent to the addresses first set forth below. Notwithstanding the foregoing, notices sent by fax or email shall be

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effectively given only upon acknowledgement of receipt by the receiving Party. Any Party may change its address for receipt of Notices upon notice to the other Party. If delivery cannot be made at any address designated for Notices, a Notice shall be deemed given on the date on which delivery at such address is attempted.

Contact and delivery information for the Parties:

Lake Erie Fisheries Program Administrator
Ohio Division of Wildlife
305 East Shoreline Drive
Sandusky, Ohio 44870
(419) 625-8062
Travis.Hartman@dnr.state.oh.us

President
Icebreaker Windpower, Inc.
1938 Euclid Avenue, Suite 200
Cleveland, Ohio 44115
(216) 965-0627
lwagner@leedco.org

Delivery locations for the other agencies:

Executive Director
Ohio Power Siting Board
180 East Broad Street, 6th Floor
Columbus, Ohio 43215
(866) 207-6772

Environmental Manager
Northeast Ohio District Office
Ohio Environmental Protection Agency
2110 East Aurora Road
Twinsburg, Ohio 44087-1924
(330) 963-1200
Richard.Blasick@epa.ohio.gov

Field Supervisor
Ecological Services Field Office
U.S. Fish and Wildlife Service
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993
dan.iverson@fws.gov

11. Conflicts

In the event of any conflict between the terms and provisions of the body of this MOU and any exhibit hereto, the terms and provisions of the body of this MOU shall control.

12. Headings

The headings in this MOU have been inserted for convenient reference only and shall not be considered in any questions of interpretation or construction of this MOU.

13. Entire Agreement

This MOU represents the full agreement of ODNR and the Applicant to the pre-, during-, and post-construction monitoring protocols for fish and aquatic resources. It may not be modified, amended or supplemented, or any rights herein waived, unless specifically agreed upon in writing by the Parties hereto. This MOU supersedes any and all previous agreements, whether written or oral, between the Parties.

14. Execution and Electronic Signatures

This MOU is not binding upon the Parties unless executed in full, and is effective as of the last date of signature by the Parties.

Any Party hereto may deliver a copy of its counterpart signature page to this MOU electronically pursuant to R.C. Chapter 1306. Each Party hereto shall be entitled to rely upon an electronic signature of any other Party delivered in such a manner as if such signature were an original.

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IN WITNESS THEREOF, ODNR and Icebreaker Windpower, Inc. have caused this Memorandum of Understanding to be duly executed and have caused their seals to be hereto affixed by their duly authorized officers on the date associated with each authorized signature.

This MOU shall be effective as of the date on which the last of the Parties executes it.

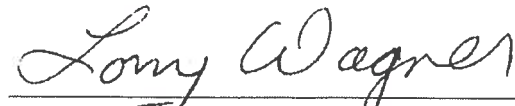
STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES

ATTEST:

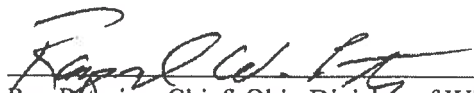

James Zehringer, Director *for* 6/15/17
Date

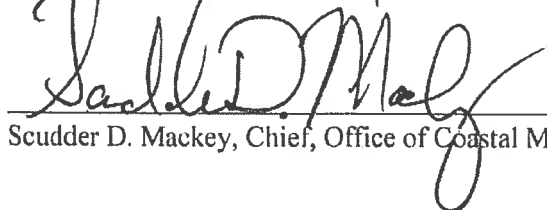
ICEBREAKER WINDPOWER, INC.

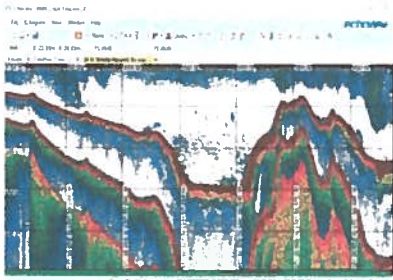
ATTEST:


Lorry Wagner, President 6/8/2017
Date

APPROVED:


Ray Petering, Chief, Ohio Division of Wildlife 6/9/17
Date


Scudder D. Mackey, Chief, Office of Coastal Management 6/9/2017
Date



Lake Erie Monitoring Plan

for the Offshore Wind Project: Icebreaker Wind

Prepared for:
Icebreaker Windpower Inc.

Prepared by:
LimnoTech

January 25, 2017



Water | Scientists
Environment | Engineers

**Lake Erie Monitoring Plan
Icebreaker Wind**

**Prepared for:
Icebreaker Windpower Inc.**

January 25, 2017



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Introduction

1.1 Background

Offshore wind (OSW) and other renewable energy sources within the Great Lakes have the potential to reduce carbon dioxide and other air emissions, water usage by power plants and associated fish mortality within the Great Lakes. However, decision makers require knowledge of the potential impacts, both physical and biological, to evaluate the extent to which OSW development might impact the fishery and ecosystem of the Great Lakes to recommend appropriate measures to protect critical habitat and preserve self-sustaining fish populations. The subject of this sampling plan is Icebreaker Wind, the offshore wind project sponsored by Icebreaker Windpower¹, which includes six 3.45 megawatt turbines and a transmission cable, proposed to be built in an area 8 to 10 miles off-shore of Cleveland, Ohio.

A workshop organized by the Great Lakes Commission through the Great Lakes Wind Collaborative was held on November 22-23, 2012 at NOAA Great Lakes Environmental Research Laboratory (GLERL) in Ann Arbor, Michigan. The purpose of the workshop was to discuss Great Lakes related research on the potential impacts, both physical and biological, of offshore wind development in the Great Lakes. The outcomes of this workshop supported the development of the Ohio Department of Natural Resources (ODNR), Division of Wildlife, Lake Erie Open Water Aquatic Sampling Protocol for Securing Submerged Land Leases Offshore Wind Power Siting, herein after referred to as the “ODNR Protocol” (ODNR, 2013).

The sampling plan presented here was developed using the ODNR Protocol and was reviewed by ODNR and US Fish and Wildlife Service (USFWS) biologists. This plan addresses the issues raised by the ODNR and USFWS related to Icebreaker Wind’s potential impact on aquatic resources, and represents the parties’ agreement on pre and post construction protocols required to monitor environmental impacts on the aquatic resources in the Project area. In anticipation of filing a permit application with the Ohio Power Siting Board (OPSB), ICE WP initiated pre-construction monitoring activities in 2016. This sampling plan presents a detailed description of the data that are currently being collected to meet ODNR requirements.

This Sampling Plan represents Icebreaker Windpower’s best judgment and approach to capture system dynamics and fish behavior. The Plan will be continually assessed through quarterly status reports and annual summaries and reviewed with ODNR and USFWS annually. The exact parameters of the Plan are flexible and will be subject to modification over time based on results of sampling. Revisions and adjustments to the Plan, which could include changes to the location of sampling, sampling frequency and

¹ Lake Erie Energy Development Corporation (LEEDCo) created and has been advancing Icebreaker Wind (formerly known as Project Icebreaker) since the project’s inception. In 2016, LEEDCo entered into an agreement with Icebreaker Windpower Inc. (Icebreaker Windpower) whereby: a) all of the assets related to the project transfer from LEEDCo to Icebreaker Windpower; b) Icebreaker Windpower assumes ownership of Icebreaker Wind; and c) ICEWP takes on responsibility for the development and construction of Icebreaker Wind. Consequently Icebreaker Windpower is the applicant for all state and federal permits required to construct and operate Icebreaker Wind. For the purpose of simplicity throughout this document, prior work and studies related to Icebreaker Wind are attributed to Icebreaker Windpower even though LEEDCo may have been the entity responsible at the time. Icebreaker Windpower will be responsible for all activities related to Icebreaker Wind going forward.



duration, and sampling parameters, will be made as appropriate, in consultation with the ODNR and USFWS.

Draft versions of the sampling plan were submitted to ODNR on May 10, 2016 and October 18, 2016. The version presented here is the final version. Only a few minor changes to stations and sampling effort were made between the May 2016 version and the January 2017 version presented here. The sampling plan was also updated during the course of the 2016 field sampling to reflect the agreed upon sampling method and frequency discussed with ODNR and USFWS.

1.2 Plan Objectives

This Monitoring Plan describes the sampling that began in 2016 to meet the requirements of the ODNR Protocol. The plan is designed to collect physical, nutrient, and biological data at both the project and reference sites prior, during, and after construction activities. For the 2016 field season, this sampling covers the first year of pre-construction monitoring. This Plan is meant to serve as a template, which will be reviewed annually by ODNR, USFWS and LimnoTech to ensure that only necessary and relevant data are collected. The sampling protocol is organized into three major categories including:

- Fish Community/Lower Trophic Level Impacts
- Physical Habitat Impacts
- Fish Behavioral Impacts

The sections below provide a brief overview of the monitoring activities for each category as well as description of the project team and field effort.

1.3 Site Description

The proposed demonstration project, Icebreaker Wind, will include installation of six wind turbines, 8 to 10 miles offshore of Cleveland, Ohio in the central basin of Lake Erie. A 2.8 mile buried electric cable will connect the 6 turbines, and approximately 9 miles of buried electric cable will connect the turbines to the Cleveland Public Power, Lake Road substation. Figure 1 shows the project location within central Lake Erie offshore of Cleveland and the bathymetry contours. Lake Erie is generally classified as a mesotrophic system with some portions of the eastern basin considered oligotrophic and a few embayments in the western basin that are hyper-eutrophic (GLFC, 2009). The Lake provides a valuable commercial and sport fishery, including walleye and yellow perch. Invasive species -- including dreissenid mussels, round gobies, smelt, and alewives -- play substantial roles in restructuring Great Lakes ecosystems, including Lake Erie. Figure 1 depicts the proposed seven wind turbine locations (ICE1 through ICE7). There will only be six turbines, so this includes one alternate location that will be utilized if a location is determined to be unfavorable for construction and installation of a turbine. All seven proposed turbine locations have been studied by Icebreaker Windpower to determine the feasibility of each location in the event an alternative location is needed.





Figure 1. Project location map

1.4 Project Team and qualifications

The project team will be led by LimnoTech and supported by other scientific experts to assist with sample collection, analysis, and interpretation. Table 1 details the project team organizational chart. Dr. Lorry Wagner, Dave Karpinski and Beth Nagusky are the points of contact for Icebreaker Windpower. Ed Verhamme of LimnoTech will serve as the project manager and be the main point of contact with Icebreaker Windpower. He will coordinate all activities involving LimnoTech and other supporting team



members. A description of each team member's involvement in various components of the study is included in Table 2.

LimnoTech

LimnoTech is an environmental engineering and science firm that has provided multiple environmental services concerning water-related issues to clients throughout the United States and internationally since 1975. LimnoTech is headquartered in Ann Arbor, Michigan, with regional offices in Washington, DC, the Minneapolis-St. Paul area, and El Segundo, CA. Clients include municipalities, regional governmental units, the federal government, industry, engineering firms, legal firms, commercial clients, and private individuals. We offer our clients the latest water science and engineering in numerous specific disciplines within the broader areas of watershed and waterway management, contaminated site and sediment evaluation and restoration, permitting and regulatory assistance, water sustainability and stewardship, ecosystem studies, and applied research. Additional information on LimnoTech can be found at: <http://www.limno.com/>.

The LimnoTech team is led by Ed Verhamme with support from Greg Peterson, Jen Daley, Cathy Whiting, John Bratton, and Greg Cutrell. Additional staff from the Ann Arbor office will support fieldwork as needed. LimnoTech will be responsible for all project deliverables, communication with ICEWP, and management of additional team members.

The Ohio State University – Stone Lab

Established in 1895, Stone Laboratory is the oldest freshwater biological field station in the United States and the center of Ohio State University's teaching and research on Lake Erie. The lab serves as a base for more than 65 researchers from 12 agencies and academic institutions, all working year-round to solve the most pressing problems facing the Great Lakes. You can find more information on their website <http://stonelab.osu.edu/about/>.

Justin Chaffin and Chris Winslow at Ohio State University's Stone Lab will support collection of juvenile fish and will also process the nutrient and water samples.

Cornell Bioacoustics

The Bioacoustics Research Program develops and uses digital technology, including equipment and software, to record and analyze the sounds of wildlife around the globe. By listening to wildlife, their research advances the understanding of animal communication and monitors the health of wildlife populations. Policy makers, industries, and governments use this information to minimize the impact of human activities on wildlife and natural environments. You can find more information on their website at <http://www.birds.cornell.edu/page.aspx?pid=2713>

Aaron Rice with Cornell Bioacoustics will assist with the development of the underwater soundscape/noise survey as well as assist with data processing and interpretation.

BSA Environmental Services

BSA Environmental Services, Inc. is an environmental consulting firm committed to providing high quality, cost-effective environmental services. Located in Beachwood, OH, BSA has served government agencies, non-profit organizations, and private clients for over 20 years. BSA has a reputation for superior performance, customer service, and cost containment. You can find more information on their website <http://www.bsaenv.com/>

John Beaver of BSA will assist LimnoTech with processing and identifying organisms from the phytoplankton, zooplankton, and larval fish surveys.





Aerodata

Aerodata provides aerial photography, surveys and airborne data collection for a variety of clients. John Sullivan, president of Aerodata will coordinate collection of recreational boater surveys in and around the project site. You can find more information on their website <http://aerodataphoto.com/>

Equipment Vendors

LimnoTech will consult with equipment vendors including VEMCO, Biosonics, and Fondriest Environmental to acquire the equipment necessary to collect the required continuous monitoring data.



Table 1. Project Roles and Responsibilities

Name/Contact Information	Role	Responsibility
Lorry Wagner LEEDCo lwagner@leedco.org	President	Project Manager
Dave Karpinski LEEDCo dkarpinski@leedco.org	Vice-President	Project Manager
Beth Nagusky LEEDCo bnagusky@leedco.org	Director	Sustainable Development
Ed Verhamme LimnoTech everhamme@limno.com	LimnoTech Project Manager Technical Lead	Project management, coordination, communication, planning, review, report preparation
Greg Peterson LimnoTech gpeterson@limno.com	LimnoTech Project Officer	Project oversight, planning, report review
Jennifer Daley LimnoTech jdaley@limno.com	LimnoTech Biological Lead	Field management and coordination, data collection, analysis and review, report preparation
John Bratton LimnoTech jbratton@limno.com	LimnoTech Project Advisor	Project oversight, technical support, planning, report review
Cathy Whiting LimnoTech cwhiting@limno.com	LimnoTech Field Manager LimnoTech Project Advisor	Provide and oversee field staff, technical support, coordination, planning, QA/QC, report review
Gregory Cutrell LimnoTech gcutrell@limno.com	Technical Support	Field collection, technical support, data review and analysis, report support
John Beaver BSA Environmental j.beaver@bsaenv.com	Taxonomy Manager	Taxonomy Management, Sample sorting, identification, QA/QC, documentation
Justin Chaffer Ohio State University Chaffin.46@osu.edu	Juvenile Fish Collection Water Quality Analysis	Support collection of juvenile fish and will also process the nutrient and water samples.
Chris Winslow Ohio State University	Juvenile Fish Collection Water Quality Analysis	Support collection of juvenile fish and will also process the nutrient and water samples.
Aaron Rice Cornell Bioacoustics arice@cornell.edu	Underwater Noise	Support the development of the underwater soundscape/noise survey. Assist with data processing and interpretation.
John Sullivan Aerodata	Aerial surveys of boat	Coordinate the collection of recreational boater surveys.



Table 2. Overview of major sampling tasks and project team responsibilities.

	Task Description	Collection	Support/Equipment	Sample Processing
Fish Community	Hydroacoustic	LimnoTech	Biosonics	LimnoTech
	Larval Fish	LimnoTech	LimnoTech	BSA Env. Serv.
	Juvenile	LimnoTech	Ohio State-Stone Lab	Ohio State-Stone Lab
	Zooplankton	LimnoTech	LimnoTech	BSA Env. Serv.
	Phytoplankton	LimnoTech	LimnoTech	BSA Env. Serv.
	Benthos	LimnoTech	LimnoTech	BSA Env. Serv.
Physical	Chemistry (discrete)	LimnoTech	LimnoTech	Stone Lab
	Chemistry (continuous)	LimnoTech	Fondriest	LimnoTech
	Substrate Mapping	LimnoTech	VanZandt*	LimnoTech
	Hydrodynamic	LimnoTech	Nortek	LimnoTech
Fish Behavior	Acoustic telemetry	LimnoTech	VEMCO	LimnoTech-OSU
	Fixed Acoustic	LimnoTech	Biosonics	LimnoTech
	Noise	LimnoTech	Cornell Bioacoustics	Cornell Bioacoustics
	Aerial Surveys	Aerodata	LimnoTech	LimnoTech

*VanZandt study completed in 2015, with follow-up in 2016



2 Scope of Work

This section describes the major tasks that will be accomplished to meet the project objectives. Work will involve the following primary tasks:

- Health and safety plan
- Sampling and analysis
- State agency coordination
- Documentation and data analysis
- Interim and final reporting

2.1 Health and Safety Plan

A Health and Safety Plan (HASP) was developed for the planned field activities in coordination with Icebreaker Windpower and all project partners. The HASP defines general applicability and general responsibilities with respect to compliance with health and safety programs. The intent is that field workers are entitled to a safe and healthful workplace; and all employees are expected to follow safe and healthful work practices, implement both required and appropriate safety and health protocols, and work in a manner which maintains high safety and health standards. Work will be founded on four Safety Guiding Principles:

- All injuries and events are preventable.
- Responsible leadership and accountable employees prevent injuries and events.
- Plan safety into our work.
- Look out for yourself and each other.

2.1.1 Training and Communication

LimnoTech and all field personnel working on the project (including sub-contractors) will be informed of and agree to the standard operating and site emergency response procedures and known fire, explosion, health, or safety hazards associated with the field work. The HASP will summarize these hazards and define protective measures planned for relevant project activities, including the Lake Erie field work. Site personnel are required to be trained in accordance with applicable work tasks to be conducted, instrumentation/equipment to be used, and applicable OSHA regulations. At a minimum, field personnel are required to be trained in the provisions of this HASP, to recognize the hazards at the site, and the responsible personnel. Additionally, daily pre-work safety meetings will be conducted to review daily tasks and required safety procedures. Documentation of these briefings will be maintained.

2.1.2 Safety and Health-Risk Analysis

The HASP defines the hazards and methods to protect personnel from those hazards as identified in previous site work or background information. The evaluation of hazards is based upon known or suspected conditions associated with the work activities to be conducted and the conditions of the site. Details of the work to be conducted are presented in this Sampling Plan.



2.2 Sampling and Analysis

This section details the specific sampling plan for each major category as defined in the ODNR Protocol. The major sections include: Fish Community/Lower Trophic Level Impacts, Physical Habitat Impacts, and Fish Behavioral Impacts. Table 3 shows a summary breakdown of the location, frequency, and project phase when sampling will take place for each category of sampling. Unless specifically noted, sampling will be conducted pre-, during-, and post- construction of the project. Sampling results will be reviewed at least annually by ODNR, USFWS, Icebreaker Windpower, and LimnoTech. Based on these results, the parties will determine whether the sampling intensity, frequency, and duration can be modified to ensure that only necessary and relevant data are collected.

Monitoring the health of the fish community and lower food web is accomplished through routine sampling of the benthos and water column. Benthic macroinvertebrates' abundance is quantified twice per year, plankton in the water column are sampled monthly using a net and later counted for abundance, small larval fish are sampled and quantified in the spring, juvenile fish are sampled using a bottom trawl throughout the summer and early fall, and estimates of total fish abundance are collected monthly using hydro acoustic equipment.

Physical and chemical characteristics of the lake are sampled using a variety of methods. On a monthly basis during the growing season (May to October), depth integrated water samples are collected and analyzed for phosphorus and nitrogen. Vertical profiles of temperature, oxygen, pH, conductivity, and turbidity are collected monthly to monitor the progression of lake stratification throughout the project site. At select locations, continuous measurements of temperature, oxygen, and light (PAR) are recorded to help interpret lake trends between monthly sampling visits. Continuous measurements of water currents, wind, and waves are also recorded at the project site. Bottom substrate is also mapped to identify key habitat areas using a side scan sonar.

The final category of sampling is related to behavior of fish and recreational boaters. A network/array of acoustic receivers is installed throughout the project site to monitor the movement of tagged fish, which will give insight into how fish interact with the various elements of the project. Hydro acoustic data collected monthly at fixed locations enables researchers to monitor the behavior of fish over a several hour period at key locations. Underwater microphones are also continuously recording noise levels to monitor for any sound/acoustic impacts the project site might have on migration patterns. An aerial survey of boaters in the region over the season will help track how recreational boaters interact with the project site.



Table 3. Review of sampling, sampling locations and frequency.

	Task Description	Stations	Frequency	Phases of project
Fish Community	Hydro acoustic	3 transects	Monthly (May-Oct)	All
	Larval Fish	ICE2, ICE6, REF1	May, June, July	All
	Juvenile	ICE2, ICE6, REF1	May, August, October	All
	Zooplankton	REF 1 to 6, ICE2, ICE4, ICE6	Monthly (May-Oct)	All
	Phytoplankton	REF 1 to 6, ICE2, ICE4, ICE6	Monthly (May-Oct)	All
	Benthos	REF 1, ICE2, ICE6	Spring and Fall	All
Physical	Chemistry (discrete)	REF 1 to 6, ICE2, ICE4, ICE6	Monthly (May-Oct)	All
	Chemistry (continuous)	DO & PAR: REF 1, ICE4 DO: ICE1, ICE2, ICE7	May-Oct	All
	Substrate Mapping	Throughout	Once	Pre and Post
	Hydrodynamic	REF 1 and ICE4	May-Oct, Nov-Apr	All
Fish Behavior	Acoustic telemetry	26 receivers	Annually	All
	Fixed Acoustic	REF 1 and ICE3	Monthly (May-Oct)	All
	Noise	REF 1 and ICE4	May-Oct	All
	Aerial Surveys	Throughout	2days every 3wks May-Oct	All

All = Pre construction, during construction, and post construction phases of the project

2.2.1 Sampling Locations

Sampling stations are shown below in Table 4. The table lays out, by category, which stations or transects will be sampled for each type of sampling. A graphical depiction of the stations is shown in Figure 2. Each GPS position is shown in Table 5. The transects are located down the center (C) of the project grid, and to the east (E), and west (W) in adjacent Reference areas. The transects have a southeast to northwest orientation, and are aligned down the axis and parallel to the proposed turbines. Transect C extends from Turbine Station ICE1 to ICE7, transect W extends from Reference Station 3 to 2, and Transect E extends from Reference Station 4 to 6.



Table 4. Sampling stations by sample type.

Task Description		Reference Stations						Turbine Stations							Transects		
		1	2	3	4	5	6	ICE1	ICE2	ICE3	ICE4	ICE5	ICE6	ICE7	C	E	W
Fish Community	Mobile Acoustic														x	x	x
	Larval Fish	x							x				x				
	Juvenile	x							x				x				
	Zooplankton	x	x	x	x	x	x		x		x		x				
	Phytoplankton	x	x	x	x	x	x		x		x		x				
	Benthos	x							x				x				
Physical	Chemistry (discrete)	x	x	x	x	x	x		x		x		x				
	Chemistry (discrete sonde profiles)	x	x	x	x	x	x	x	x	x	x	x	x	x			
	Chemistry (continuous)	x						x (DO)	x (DO)		x			x (DO)			
	Substrate Mapping	See substrate mapping section															
	Hydrodynamic	x									x						
Fish Behavior	Acoustic telemetry	See acoustic telemetry section for map															
	Fixed Acoustic	x								x							
	Noise	x									x						
	Aerial Surveys	See aerial survey section for description of locations															

Table 5. Table of stations and latitude and longitude

Turbine Station	Latitude	Longitude	Reference Station	Latitude	Longitude
ICE1	41.60072	-81.80055	1	41.60867	-81.82550
ICE2	41.60616	-81.80602	2	41.62539	-81.84210
ICE3	41.61159	-81.81150	3	41.59184	-81.80890
ICE4	41.61702	-81.81697	4	41.60899	-81.79150
ICE5	41.62246	-81.82245	5	41.62493	-81.80810
ICE6	41.62789	-81.82793	6	41.63990	-81.82370
ICE7	41.63333	-81.83340			



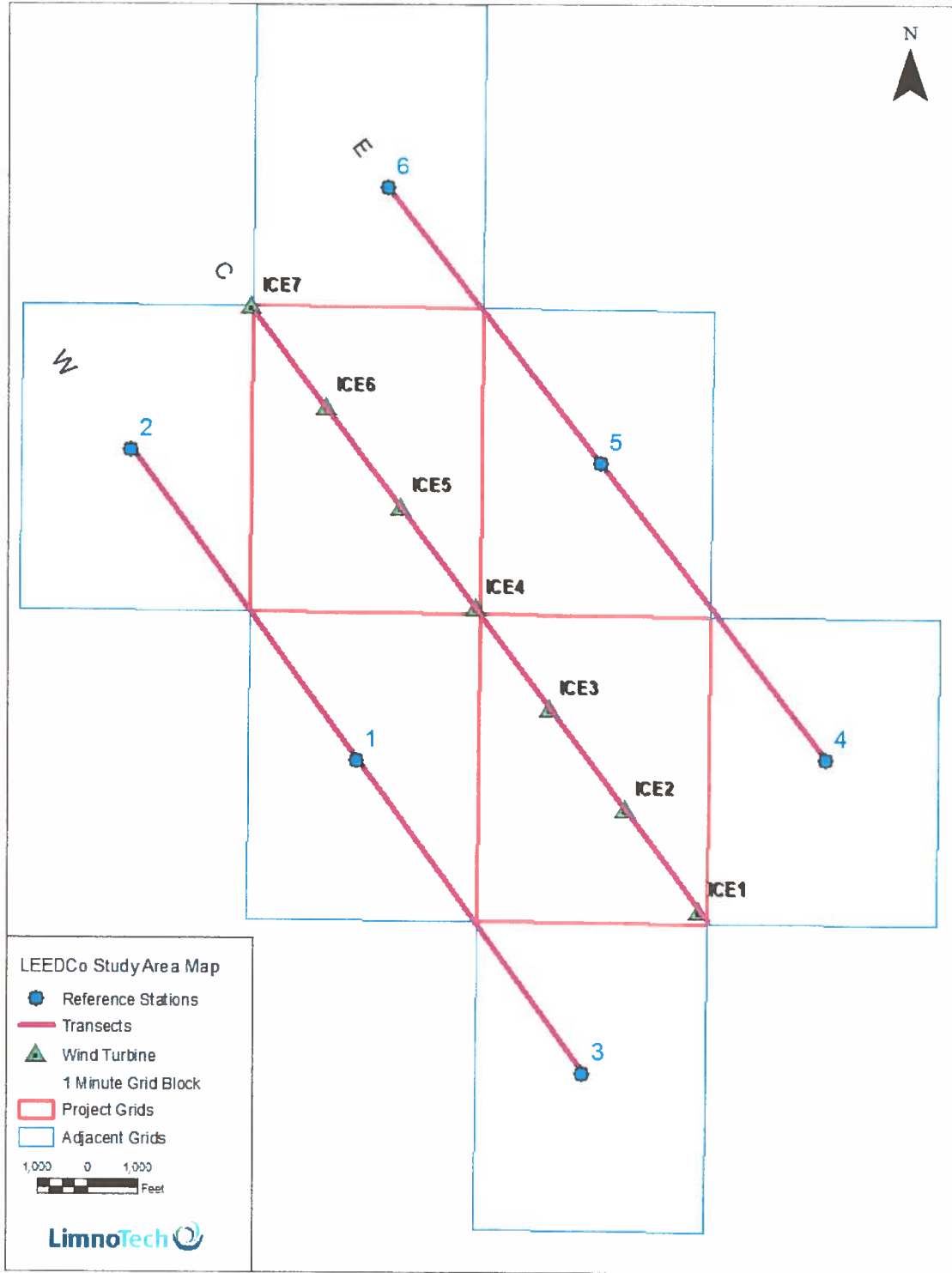


Figure 2. Map of project area, proposed turbine locations, sampling stations, and transects.



2.2.2 Fish Community/Lower Trophic Levels

The purpose of this task is to monitor the fish, zooplankton, phytoplankton and benthos abundance and composition before, during and after construction to provide a better understanding of the food web within and near the project location, as well as any impacts on it as a result of Icebreaker Wind. The sampling will support the overarching goal of the ODNR to monitor and report on the status and composition of the aquatic food web of the central basin in Lake Erie, and any project impacts.

2.2.2.a Fish Hydro Acoustic Monitoring

Hydro acoustics utilizes sonar technology for the detection, assessment and monitoring of underwater objects. Active hydro acoustics sensing involves listening for the echo from sound via an echo sounder. This method can determine the range and size of an object and is used for the assessment of fish size, distribution and abundance in an area. Acoustic monitors will be used to assess whether the turbines and cable have any impact on fish distribution, abundance, and movement in the Project area. Hydro acoustic monitoring will be conducted from May to October. Sampling will be done on three transects, one down the center of the project grid and turbine locations, and two transects in adjacent grid cells to serve as reference areas. The map in Figure 2 shows the location of the acoustic transects. Collection methods and sampling design will follow the Standard Operating Procedure for Fisheries Acoustic Surveys in the Great Lakes (FASGL; Parker-Stetter et al. 2009). Briefly, a BioSonics DT-X portable echo sounder surface unit with an emitting frequency of 120kHz with a 6° split beam transducer will be pole-mounted and towed along sampling transects at appropriate speeds. Equipment will be calibrated prior to each survey following manufacturer protocols. Whenever possible the event will be completed in calm conditions, a half hour after sunset and within five days of the new moon. Unforeseen circumstances (i.e. inclement weather) may preclude this timing during certain months. Data analysis and fish density calculations will be determined using the Echoview software according to the FASGL guidelines. The main output from this task will be an estimate of the total fish densities within the project area and adjacent reference transects before, during and after construction. Sampling was conducted during 6 months in 2016. Future sampling efforts will be based upon the results of the 2016 and subsequent year’s data, in consultation with the state and federal wildlife agencies.

Stations	Sampling Frequency	Equipment Summary	Data Outputs	Project Phase
Project Area (1 transects) Reference Area Transect (2 transects)	Monthly (May, June, July, August, September, October)	BioSonics DT-X Portable Echo sounder Surface Unit (120KHz, 6° Split Beam)	Fish densities per transect	All

2.2.2.b Larval Fish Sampling

Larval fish contribute both to recruitment and to the food base of adult fish. The composition of Lake Erie’s larval fish community has shifted in the last several decades, due in part to the introduction of exotic species and a shift in the food web structure. Larval fish sampling was conducted once monthly during 2016, in May, June and July. Three replicate 5-minute tows will be completed at two Turbine Stations (ICE2 and ICE6) and one Reference Station (Reference 1). The stations where sampling will occur are shown in Table 3 and Figure 2. A 1X2m frame, 500micron neuston net will be used to collect the fish according to the ODNR ichthyoplankton sampling protocols. Following collection, samples will be concentrated and preserved in 95% ethanol. Samples will be brought to the BSA Environmental lab, where they will be separated for taxonomic identification. All samples will be enumerated and identified to species and a subsample of 30 individuals from each species will be measured for total length (nearest



mm). The main output from this task will be an assessment of the species composition of larval fishes within the project area and an adjacent areas.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE2, ICE6) Reference Area (REF1)	3 events (May, June & July) 3 replicates per station	1X2m frame, 3m length, 500micron neuston net, ethanol	Species composition	All

2.2.2.c Juvenile Fish Sampling

Fish are mostly poikilothermic ectotherms which represent the top of the aquatic food chain and are important due to their recreational and/or commercial value. Additionally, the overall health of the fish community should signify the health of “lower” trophic levels. Juvenile fish sampling will be conducted once monthly in May, August and October. Three replicate 10 minutes tows will be conducted at two Turbine Stations (ICE 2, ICE 6) and one Reference Station (REF1), as shown in Table 3 and Figure 2. A flat-bottom otter trawl with a 10.7 meter head rope and 12-mm bar mesh in the cod end will be used to complete the bottom trawls according to ODNR bottom trawl techniques. Given the limited availability of a net with these specifications, a 9.4 m footrope; 7.8 m head rope; 12 mm bar mesh size in the cod end net will be used for the 2016 season and a larger net, with the required 10.7m head rope will be used for subsequent years. A net mensuration study will help to determine the appropriate scale factor to account for the smaller net used in 2016.

Trawl catches will be sorted by species and where appropriate age-category (AC 0-3, based on the ODNR Age Break protocol) and enumerated. A subsample of 30 individuals per species and age category will be measured for total length (nearest mm) and weight (nearest 0.1g). During days with larger waves, weights may need to be estimated in the field and a subset of species preserved (in formalin, or held on ice for 24 hours) and brought back to the lab for more precise measurements. The main output from this task will be an assessment of the species composition of juvenile fishes within the project area and in adjacent areas.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE2, ICE6) Reference Area (REF1)	3 events (May, August & October) @ 3 Locations * 3 replicates =27 total samples	Flat-bottom otter trawl 10.7m meter head rope (7m head rope in 2016) and 12-mm bar mesh in the cod end	Species composition, age cohorts	All

2.2.2.d Zooplankton Sampling

Zooplankton are heterotrophs which are a vital component of freshwater food webs. Zooplankton sampling will be conducted once monthly from May through October. Samples will be collected at six reference stations and three turbine stations as shown in Table 3 and Figure 2. Sampling protocols will follow the Lake Erie Coordinated Lower Trophic Level Assessment. Briefly, a weighted zooplankton net (0.5m in diameter, 64 micron mesh), with a flow meter will be used to complete the sampling. The net will be lowered to the lake bottom and then pulled up so the plankton are collected along the way down and up. The net will be washed with filtered water so all plankton are within the collection jar. Samples will be concentrated through a 64 micron screen and preserved with 5% Lugols’s Iodine solution, which is the preservative recommended by BSA Environmental. Samples will be stored in 200mL jars and three 2 to 5mL sub-samples will be removed for plankton identification to taxonomic genus and enumerated. Any exotic species found will also be identified to species level. Laboratory protocols for identification, enumeration and biomass estimates will follow the methods that BSA Environmental Services has been



using for several years. A Quality Assurance Project Plan (QAPP) was used to ensure high quality data. Methods and quality assurance plans for zooplankton enumeration are available upon request. Samples will be stored following analysis, and retained following identification. Any exotic species found will be identified to species level. The main output from this task will be an assessment of the taxonomic composition of the zooplankton community to provide a better understand productivity and food availability within the project area and adjacent areas.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE2, ICE4, ICE6) Reference Area (REF 1 to REF 6)	Once monthly from May-October @ 9 Locations =54 total samples	A weighted plankton net. 0.5m diameter and 64 micron mesh, formalin	Taxonomic identification, measure of productivity	All

2.2.2.e Phytoplankton Sampling

Phytoplankton are primary producers that form the base of many food webs. Phytoplankton sampling will be conducted once monthly from May through October. Samples will be collected at six reference stations and three turbine stations as shown in Table 3 and Figure 2. Sampling and laboratory protocols will follow the Lake Erie Coordinated Lower Trophic Level Assessment. Briefly, an integrated tube sampler at 2 times the Secchi depth will be used to complete the sampling. Samples will be concentrated and preserved with 4% Lugols solution. Samples will be processed according to the BSA Environmental Services Laboratory method, which follows The Ohio State University’s (OSU) Aquatic Ecological Lab processing protocols. The main output from this task will be an assessment of the taxonomic composition of the phytoplankton community to better understand productivity and food availability within the project area and adjacent areas.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE2, ICE4, ICE6) Reference Area (REF 1 to REF 6)	Once monthly from May-October @ 9 Locations =54 total samples	Integrated PVC tube sampler	Taxonomic identification, measure of productivity	All

2.2.2.f Benthos Sampling

Benthic macroinvertebrates are organisms without backbones that live on the bottom substrates (rocks, sediments, debris, logs, plants, etc.) of lakes. Unlike fish, they are relatively immobile and are continuously exposed to their environments, making them very sensitive to the water quality. Many reside in the study area long enough (months to years) to reflect changing environmental conditions and serve as an important food source for fish species.

Benthos sampling will be conducted once in May or June and once in September or October. Samples will be collected in conjunction with the phytoplankton, zooplankton and water chemistry cruises. Sampling will be collected at one Reference Station and two Turbine Stations, as described in Table 3 and Figure 2. Sampling and laboratory protocols will follow the Lake Erie Coordinated Lower Trophic Level Assessment. Three replicate grabs of bottom sediment will be collected using a PONAR grab sampler. Benthos will be removed, preserved, sorted to the nearest taxonomic order or aquatic functional group and enumerated. The main output from this task will be an assessment of the taxonomic composition of the benthic community to better understand productivity and food availability within the project area and an adjacent area.



Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE2, ICE6) Reference Area (REF1)	Twice – May or June and September or October 3 Locations * 3 replicates =18 total samples	PONAR grab	Taxonomic identification	All

2.2.3 Physical Habitat Impacts

This section summarizes data collected to understand potential project impacts on water chemistry, bottom substrate, and lake currents.

2.2.3.a Water Chemistry (Discrete)

Discrete water chemistry sampling will be conducted from May through October. Samples will be collected in conjunction with the zooplankton, phytoplankton and benthos cruises. Samples will be collected at six reference stations and three turbines stations (ICE2, ICE4, ICE6) as specified in Table 3 and Figure 2. Sampling and laboratory protocols will follow the Lake Erie Coordinated Lower Trophic Level Assessment. Additionally, vertical profiles with the YSI water quality sonde will be collected at all ICE 1 through ICE 7 stations. In 2016 these were initiated in June, but will occur during every discrete sampling event in subsequent years.

Temperature and dissolved oxygen profiles will be collected from surface to bottom at 1 meter increments. A Secchi disk will be lowered into the water column until it is no longer visible to measure water clarity. A Li-COR submersible light meter will be used at the surface and at 0.5 -1.0 meters increments to determine light extinction. An integrated tube will be lowered to the lake bottom for a total water column collection that will be emptied into a stainless steel bucket and then sub-sampled into separate bottles for analysis of nitrogen, phosphorus, and chlorophyll-*a* samples.

All field probes will be calibrated prior to the first measurement. All sampling containers and field probes will be thoroughly rinsed prior to each collection. Field preservation of all samples will be limited to keeping the samples cold in coolers with ice and adding the proper preservatives. At the end of each round of sampling, the samples will be delivered to the laboratory at the end of the business day. Chain of custody forms will be completed and will accompany all samples to the laboratory. Upon receipt of samples by the laboratory, further preservation will be conducted in accordance with the laboratories' standard operating procedures.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE2, ICE4, ICE6) Reference Area (REF 1 to REF 6)	Once monthly from May-October 9 Locations * 6 months =54 total samples Additional sonde profiles at ICE 1, 3, 5,7 (June to Oct)	YSI-multi parameter data sonde, Secchi Disk, Li-COR Submersible light meter, Integrated Tube Sampler, Brown plastic and glass bottles, H2SO4 for preserving	Temperature, dissolved oxygen, total phosphorus, total nitrogen, chlorophyll- <i>a</i> , light extinction and water clarity	All



2.2.3.b Water Chemistry (Continuous)

Continuous water chemistry sampling monitors will be deployed throughout the field season, May-October. Underwater data loggers will be deployed at the Turbine Station (ICE4) and the Reference Station (REF1) to measure temperature (surface and bottom). Dissolved oxygen (DO) loggers will be deployed near the bottom of the lake and submersible Odyssey loggers will be deployed about 1-meter below the surface to analyze Photosynthetically Active Radiation (PAR). Additional temperature and DO sensors (miniDO₂T) will also be deployed at ICE 1, ICE 2, ICE 7. All field probes will be calibrated prior to the first measurement and maintained throughout the field season. The main output from this task will be to collect a continuous water quality dataset which helps provide an indication of the productivity, light transmission, and key water quality parameters within the project area and an adjacent location. In 2016, not all continuous sampling equipment was in place the entire season due to ongoing negotiations with ODNR regarding the total number of sensors and locations.

Sampling Location	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE 4, & DO & temperature only at ICE1, ICE2, and ICE7) Reference Area (REF1)	Continuous from May-October 2 Locations * 6 months Additional DO, temp sensors at ICE 1,2 and 7	Odyssey PAR Logger, HOBO Temperature Logger, YSI Optical DO Logger, PME miniDOT (DO)	Water temperature, dissolved oxygen, photosynthetic active radiation	All

2.2.3.c Substrate Mapping

Physical habitat features like substrate are an important ecosystem constituent that can impact the surrounding communities. Using technologies such as side-scan sonar in conjunction with a single or multi-beam sonar system, one can provide continuous data of a larger area which increases the accuracy and precision of substrate mapping.

A side-scan sonar survey of the lakebed within and adjacent to the Icebreaker Wind site was completed on June 24th 2015 by VanZandt Engineering. A total area of about 6700 feet (2050 m) by 100ft (305 m) was surveyed in the project area. The line spacing for the survey was 30 meters with a 50 meter range for each side, which gave over 100 percent overlap of sonar coverage line to line. An Imagenex 872 YellowFin side-scan sonar system with digital data acquisition software was used to collect the side-scan data. An additional side scan sonar survey of the proposed transmission line path was completed in August of 2016. The side scan sonar showed a generally uniform and smooth lake bottom. No features or artifacts of historical significance were identified by the survey that would pose a hazard to the construction activities at the project site. The analyzed data also showed no areas of benthic significance. A few targets possibly representing small schools of fish were observed near the bottom but these targets may have been geologic in nature.

Results from both surveys in 2015 and 2016 will be summarized and used to complete this task in the ODNR Protocol. The main output and justification for this survey is to provide substrate classification and bathymetry maps which will help define and quantify the available habitat for fish, plankton, invertebrates within the project area and an adjacent location.



Sampling Location	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area including cable route	1 survey using data collected from 2015 and 2016.	Imagenex 872 YellowFin bathymetry survey within the project site	Substrate classification (from 2015 and 2016)	Pre and Post

2.2.3.d Hydrodynamic Surveys

The primary objective is to determine how the project might affect local and regional lake circulation patterns in Lake Erie. The secondary objective is to determine how any documented change in currents could affect water quality, the lower food web (plankton), or the upper food web (fish).

To meet the sampling objectives we propose to do a combination of monitoring and modeling of lake currents within the project study area. The monitoring will consist of measuring ambient lake currents with an Acoustic Doppler Current Profiler (ADCP) in pre-, during-, and post- construction periods of the project and will be supplemented with localized current monitoring around the turbines after installation. Two modeling exercises are planned to examine the full range of expected current impacts at near and far field scales. The near field modeling will investigate the predicted current speeds near the turbine tower under a full range of expected environmental conditions. The far field model will utilize output from the near field scale model to inform a lake wide model of Lake Erie to look at any potential impacts to regional or lake-wide circulation patterns. The monitoring and modeling approaches are described in more detail below.

Regional Current Monitoring

Two ADCPs will be deployed throughout the field season, May-October 2016, as well as through the winter of 2016 to monitor lake currents at the project and reference sites. One ADCP (Nortek AWAC AST 1MHz Aquadopp Z-cell) will be deployed at the center turbine location (ICE 4) and the second ADCP (RDI Workhorse Sentinel 1200kHz) will be deployed at the designated reference location about one mile west of the center turbine location. Both ADCPs will measure lake currents on an hourly basis in one meter increments from the surface to the bottom of the lake. The ADCP’s will remain in place for the pre-, during-, and post- construction periods.

Localized Current Monitoring

After the installation of one or more turbine foundations a detailed examination of currents in the vicinity of the turbine will be conducted to identify near field current impacts. The investigation will utilize Horizontal ADCPs (HADCP) to record current velocities immediately adjacent to the turbines. The HADCP will be lowered next to the turbines and point outwards to obtain velocity measurements in one meter increments away from the turbine to a total distance of 30 meters. Figure 3 shows how the current meters will be placed around each side of the turbine. The currents meters will be placed at each location for approximately 15 minutes or until a stable current meter reading is obtained and then moved to a new location. The measurements will be taken at two turbine locations, which corresponds to the shallowest and deepest turbine sites. Two dimensional views of the current profile will be generated from the measurements to show the current around the turbines. This monitoring approach may be modified in the field to account for local environmental conditions.



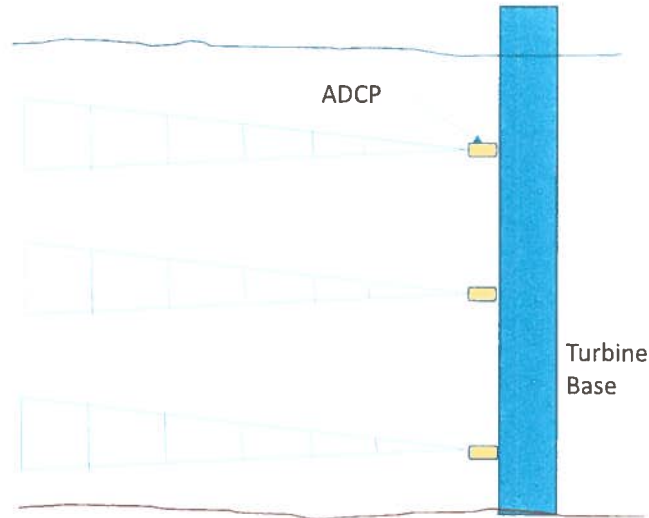


Figure 3. Current monitoring locations near turbine base.

Near Field Model

A near field model will focus on describing current conditions adjacent to the turbine base. Each turbine base is expected to cause some local changes to the ambient current field. This modeling exercise will draw on existing modeling of current movement around fixed structures in lakes and rivers. The goal of the near field model is to develop an understanding of expected current impacts under a range of ambient current conditions. Given the limited scope of the field monitoring near the turbines, a near field model can provide a more robust understanding of year round impacts of turbines as well as understand current impacts during unusual or extreme conditions that might not occur in a typical year. The model will draw on literature and simple numerical equations describing fluid flow around fixed structures.

Far field Model

The far field model will build on the near scale model by extrapolating how local changes in current conditions around the turbines could affect larger circulation patterns in central Lake Erie. LimnoTech has expertise working with local, regional, and full scale circulation patterns models of Lake Erie. LimnoTech will coordinate with the NOAA Great Lakes Environmental Research Laboratory (NOAA GLERL) to accurately simulate expected lake currents during pre-, during-, and post- construction monitoring. NOAA-GLERL develops and maintains high resolution circulation models of Lake Erie and has coordinated with industry in the past including investigating the potential impacts of oil spills in the Straits of Mackinaw and potential impacts of aquaculture on the Great Lakes. Additional information on the NOAA circulation model can be found here http://tidesandcurrents.noaa.gov/ofs/leofs/leofs_info.html. This model is of sufficient resolution to be able to address how potential changes to characteristics of one or two model cells might affect regional or lake-wide circulation patterns.

Timeline

An approximate timeline is laid out below to show when each of the activities mentioned above will occur. The far field monitoring will occur beginning in 2016 and continue through 2017, 2018, and potentially longer into post construction monitoring. Near field monitoring will begin in 2018 or after the first turbines are placed in the lake. Near field modeling will begin with an initial literature review in 2016 and early 2017 to examine existing models on fixed structures in lakes and rivers. More detailed near field modeling will occur in 2018, after the near field monitoring is complete. The far field modeling will begin in late 2016 and early 2017. This early component will work to develop a more detailed modeling approach and preliminary modeling in collaboration with NOAA GLERL. It is anticipated that



preliminary results of the near or far field modeling will be shared immediately with ODNR in technical memorandums. Modifications to the modeling and monitoring plan could be made after review of the preliminary modeling analysis.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE4) Reference Area (REF1)	Continuous from May-October and October to April (begin 2016) 2 Locations (REF 1 and ICE4)	RDI Workhorse Sentinel -1200kHz Nortek AWAC AST 1MhZ Aquadopp Z-cell	Current velocity and direction	All
Project Area (various)	Near field monitoring Near and far field modeling	Horizontal Acoustic Doppler Current Profilers at each location Use near field model to estimate near field current impacts during other seasons Use far field model to extrapolate near field impacts	Current velocity and direction Model of turbulence around turbine foundation	Construction Only

2.2.4 Fish Behavioral Impacts

Fish behavior and movements are driven by several factors. Fish often make daily movements between feeding and resting habitats, seasonal movements to summer and winter habitat and annual movements to spawning areas. Fish also respond to direction and rate of water movement by their lateral line which contains nerve endings and acts as radar, allowing the fish to detect the size, shape, direction and speed of objects. Fishes may trade-off food acquisition to decrease the risk of predation, so that a habitat with lower food availability may be used to reduce risk. Understanding normal fish behavior and movement is critical to being able to predict how a population may respond to variable environmental conditions.

2.2.4.a Acoustic Telemetry

Acoustic telemetry will be used to determine if offshore wind turbines and associated buried electrical transmission cables alter fish behavior in Lake Erie. LimnoTech will use data to study fish behavior patterns in pre-, during-, and post- construction phases of the Icebreaker Wind project near the turbine sites and along the electrical transmission line running to shore using acoustic telemetry equipment.

Acoustic telemetry is used to collect information about fish movements and behaviors. An acoustic telemetry system involves two main components: the moving transmitter tags attached to fish that broadcast a unique numeric ID and the fixed hydrophone receivers that log the unique ID as fish pass by. Icebreaker Windpower will support the installation and maintenance of a local array of hydrophone receivers near the project site and transmission line. Icebreaker Windpower will not tag any additional fish as part of this project, but will rely on cooperation with active fish telemetry projects being conducted by ODNR and the Great Lakes Acoustic Telemetry Observing System (GLATOS). There are already hundreds, if not thousands of actively tagged fish in Lake Erie including walleye, whitefish, lake trout, and other species that Icebreaker Windpower will track as they travel past the project site. Icebreaker



Windpower will download data from the local hydrophone array on an annual basis and work with ODNR to interpret the tagged fish observations. LimnoTech is also working closely with Dr. Stu Ludsin and The Ohio State University (OSU) to assist with array configuration and data interpretation.

The array configuration will be developed in coordination with VEMCO, OSU, and ODNR. VEMCO is the ODNR preferred equipment vendor, which supports other telemetry projects on Lake Erie and can ensure adequate receiver coverage and transmitter tag frequency. The receiver array will be designed to have two rows of hydrophones (26 total), one on each side of the turbine/transmission line as depicted in Figure 4. This configuration is designed to monitor the behavior of tagged fish in and around the turbine site and transmission line with sufficient density to capture fish moving through the project and transmission sites. This array configuration minimizes monitoring gaps within the study area and the double line of receivers array provides a better understanding of individual fish track as it moves from one side of the project site to the other. The distance between receivers along each transect is approximately 1,500 m. The distance between the two parallel receiver lines is approximately 1,000 m. This distance is well within the limits of the receiving equipment and transmitter range data provided by ODNR but will not provide a VEMCO Positioning System. Distances between receivers might be modified slightly after range tests are conducted in the field prior to receiver installation.

Prior to deployment, a small subset of receivers will be deployed for a short period (<24 hours) and secured to a surface spar buoy. A set of transmitter tags will be towed at various distances away from the receivers to do an in-situ range test. These receivers will be retrieved and data downloaded to help estimate an appropriate detection range between receivers. Following the range testing, the full array will be installed. Each receiver will be suspended above the bottom using an anchor, underwater floats, and a drag line will be placed on the lake bottom. The drag line will be used for annual instrument retrieval and data downloading. To ensure ongoing testing and verification of the system, three acoustic (sentinel) tags will be permanently within the receiver array. These tags will allow continual range testing to occur and verify any VPS ability of the array.

Twenty six receivers will remain in place over the 2016/2017 winter period. In spring of 2017 the receivers will be remotely evaluated using the surface acoustic communication box to check on battery life and other vital statistics. The receivers will remain in the water through fall 2017. In fall 2017, receivers will be retrieved, data offloaded, batteries changed, and redeployed. This annual maintenance cycle (check status in spring and retrieve, download, and redeploy in fall) will be repeated annually during all phases of the project. Acoustic telemetry will be used to assess the degree to which the turbines and the transmission line act as impediments to fish movement, by determining the probability that resident and highly migratory fish species travel across the project area unabated. It will also help determine if the turbine area or the transmission line act as attractants or deterrents to fish by comparing the occupancy times at the project receivers to receivers in similar habitat types from the existing lake-wide GLATOS receiver grid.



Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (Turbine and Transmission Line Areas) - see map below	26 receivers deployed for 12 months along transmission and turbine line First deployed in Oct. 2016 and maintained annually/year-round	22 VEMCO VR2Tx receivers and 4 VEMCO VR2AR receivers	Fish tag data from receivers and range test results	All

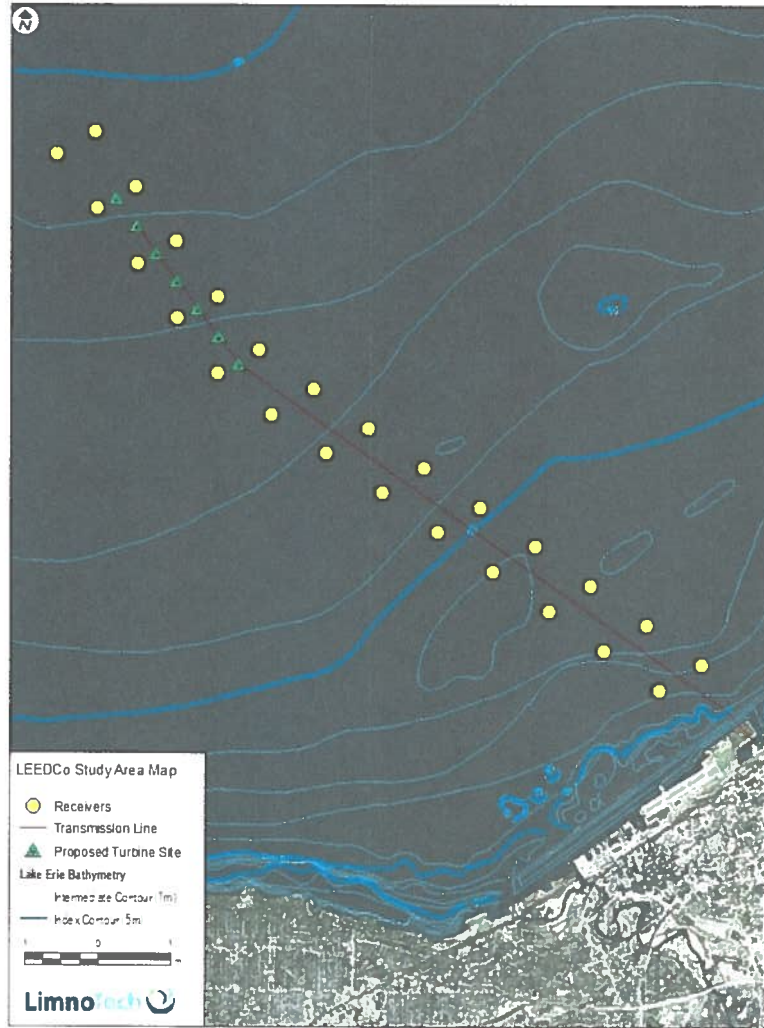


Figure 4. Map of the projected array configuration.

2.2.4.b Fixed Acoustics

Hydroacoustics utilizes sonar technology for the detection, assessment and monitoring of underwater objects including fish. Fixed hydroacoustic sampling will take place on the same nights at the mobile acoustic surveys. Fixed surveys will be completed by anchoring the boat for one hour at Turbine Station ICE3 and for one hour at Reference Station REF1. The equipment and data settings will remain the same as the mobile survey (section 2.2.2a), with the exception that the collection ping rate will be increased



from 5 pings per second to 10 pings per second. Fixed acoustic data will be collected monthly from May through October. As a result of discussions with ODNR in 2016, sampling wasn't initiated until August 2016.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE3) Reference Area (REF1)	Monthly from May - October, however in 2016 only 3 months were sampled (August, September, October)	BioSonics DT-X Portable Echo sounder Surface Unit (120KHz, 6° Split Beam)	Fish densities	All

2.2.4.c Noise Production

Sources of anthropogenic sound are extensive and include any kind of boating or shipping, seismic exploration devices, construction activities, and active sonar (used by the shipping industry, commercial and recreational fisheries, the military, and the oceanographic research community). Longer lasting sounds, such as those associated with shipping, cause a general increase in background noise in some locations. Potential effects on fish from anthropogenic sounds could include behavioral changes, such as moving towards or away from a sound source or leaving a feeding or breeding site; and increased stress. Noise production monitoring will be conducted continuously throughout the field season from May-October. Two underwater sound recorders will be deployed using Ocean Instruments Smart Hydrophone Soundtraps at Reference Station 1 and Turbine Station ICE4. The instruments will allow for the determination of a range of frequencies of ambient sound. Sound traps will be deployed within the project area and will be maintained on a regular basis. Data processing and interpretation will be supported by the Cornell Bioacoustics team. The main output from this task will be an assessment of the background noise in the project location and potential impacts on fish and other biotic organisms.

Sampling Locations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Project Area (ICE4) Reference Area (REF1)	Continuous (May-October) 2 Locations * 6 months	OceanSonics Smart Hydrophone Soundtraps	Sound recording files	All

2.2.4.d Aerial Surveys of Boating Usage/Fishing Pressure

Aerial surveys will be conducted within the project area and reference areas. Overflights will be scheduled for two times a week (one weekday and one weekend day), every three weeks from May 1st to November 1st. We are working with planes and pilots that will be stationed out of Ann Arbor and Cleveland. Aerial surveys will provide a boat count and Airborne Digital cameras will capture photos for QA/QC purposes on several trips. The surveys will be limited to good weather days when aerial visibility is adequate, and will be at the discretion of the pilot. The main output from this task will be an assessment of the boater usage at the project area and an adjacent location. A map of the counting grids is shown in Figure 5 below.

Stations	Sampling Frequency	Materials Summary	Data Outputs	Project Phase
Two 10 minute grid cells depicted in map below	2 days a week, every six weeks, from May 1- November 1	Cessna Aircraft with a Leica Airborne Digital Camera	Boat counts and digital images for QA/QC	All





Figure 5. Map of aerial recreational boat counts in Cleveland area. The project area is in zone 911-NW.

2.3 State Agency coordination

As required by the ODNR Protocol the project team coordinated with ODNR on specific sampling requirements as well as review and acceptance of the sampling plan and monitoring approach. The LimnoTech led team and Icebreaker Windpower discussed the sampling plan development with ODNR and USFWS at the following times:

- April 11, 2016 – Initial in person meeting in Columbus, OH with OPSB, ODNR, and USFWS
- May 3, 2016 – Meeting in Columbus, OH at ODNR headquarters with OPSB (phone), and USFWS
- August 11, 2016 – Meeting in Sandusky, OH at ODNR field station with OPSB (phone), and USFWS (phone)
- September 14, 2016 – Phone call with ODNR to coordinate transition of key staff at ODNR.
- January 19, 2017 – received final and minor comments from ODNR on sampling plan.
- January 20, 2017 – Phone call with ODNR to review comments and prepare final sampling plan draft.

ODNR provided follow-up communication via email to Icebreaker Windpower and LimnoTech regarding feedback on the sampling plan development in emails dated July 28, August 25, and September 13. This sampling plan incorporates the feedback from ODNR from the emails and in person meetings and phone call mentioned above.

ODNR and USFWS will work with Icebreaker Windpower and LimnoTech at the conclusion of each field season to review monitoring data from the previous year and determine if any changes can and should be

made to the sampling intensity, frequency and duration to ensure that only necessary and relevant data continues to be collected. Any changes to the sampling plan will be documented and included as an appendix to this sampling plan.

2.4 Documentation & Data Analysis

Data gathering and data analyses will follow the guidelines for data handling presented in this section. In general, these guidelines ensure that samples collected are properly labeled and the sample analyses and results can be tracked throughout the process.

Samples will be marked with the sampling location, date, time, type of sample, name of collector, and labeling exposed to formalin or ethanol will be conducted in pencil to eliminate fading of documentation.

Field data sheets and field notebooks will be used to record field sampling events and findings at the time of occurrence. Field data sheets will be filled out in the field that includes field team information, fish capture data, sample management data, water quality information, and sub-sample information. Other pertinent information that may not be directly applicable to field data sheets (e.g., photographic records of threatened or endangered specimens) will be recorded in a field notebook.

Preprocessing laboratory data sheets will also be prepared to record sample and organism condition, species identified, length and enumeration of fish larvae or eggs by species identified (to the extent possible).

A daily sampling record sheet will be prepared at the end of each day of sampling that will list for each sample, sub-sample, or laboratory sample, the sample date/time, type, collection location, identification, and storage location. The sampling record sheets will be maintained by the field crew leader or project lead to track sample collections and can form the basis for transport chain-of-custody records. A field notebook will include other observations, a record of deviations from the sampling plan, record of accidents, equipment problems, etc., or duplicate records of field data sheet information.

2.5 Interim and Final Reporting

2.5.1 Interim and quarterly reporting

The LimnoTech led team will provide quarterly reports to ODNR that detail all relevant activities from the previous three months. The reports will be formatted as technical memoranda and will include dates of fieldwork, summary of metadata from the field events (e.g. number of samples collected), and any preliminary observations or conclusions available at the time of the report. LimnoTech will work closely with other team members to ensure their relevant activities are included in the quarterly reports. When feasible, batches of samples will be processed and reported throughout the season via the quarterly reports to provide preliminary results to ODNR and the USFWS, which may facilitate further discussion between ODNR, USFWS, Icebreaker Windpower and LimnoTech and inform any potential changes in sample collection, sample frequency and duration.

If any issues arise during the field season, LimnoTech will work with Icebreaker Windpower to notify ODNR of any concerns about field data quality or modifications to methods. Summaries of any issues will be reported in the quarterly report covering that period and the annual summary report for that year.

2.5.2 Annual data report

After field data has been collected and analyzed for the season a data summary report will be prepared to summarize field activities, metadata, observations, data analysis, discussion, conclusions, and any recommendations for future year monitoring. It is anticipated that other involved/interested agencies including USFWS and OPSB will also be engaged in the review process. The field report will be



transmitted to ODNR four months after the field season. The field season ends at the end of October, so the annual report will be delivered to ODNR by March 1st following each field season. This will ensure ODNR and Icebreaker Windpower have two months to work through any concerns before the next field season begins in May.

This Plan is meant to serve as a template, which will be reviewed by ODNR, USFWS and LimnoTech through the quarterly and annual reports and annual summaries to ensure that only necessary and relevant data are being collected during every phase of the project. Revisions and adjustments to the Plan, which could include changes to the location of sampling, sampling duration and frequency, and sampling parameters, will be made as appropriate, in consultation with the state and federal agencies. Any changes to the sampling plan will be attached as an appendix to this sampling plan.

References

- ODNR, 2013. Aquatic Sampling Protocols for Offshore Wind Development for the Purpose of Securing Submerged Land Leases. Ohio Department of Natural Resources. Revision 1.
- Parker-Stetter, S. L., L. G. Rudstam, P. J. Sullivan and D. M. Warner. 2009. Standard operating procedures for fisheries acoustic surveys in the Great Lakes. Great Lakes Fish. Comm. Spec. Pub. 09-01.



Exhibit B - Timeline of reporting requirements. All reports will be due on the first of the month listed.

Report	Project Phase			Annual Due Dates
	Pre-Construction	During Construction	Post-Construction	
Quarterly	X	X	X	June, September, and December
Annual	X	X	X	March ¹
Interim			X	March ¹
Final			X	March ²

¹The interim report will be given in lieu of the annual report in the third year of post-construction.

²Final report will be due one year after final sampling year.

Avian and Bat Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

**Between the Ohio Department of Natural Resources and Icebreaker Windpower Inc.
in the matter of the Application of Fred Olsen Renewables USA LLC/Icebreaker
Windpower Inc. for a Certificate to Construct a
Wind-Powered Electric Generation Facility**

**Case No. 16-1871-EL-BGN
Monitoring Protocols for Avian and Bat Resources
July 12, 2017**

Since August 2016, Icebreaker Windpower, Inc. ("Applicant") and the Ohio Department of Natural Resources ("ODNR") (jointly referred to as the "Parties") have been working collaboratively to ensure compliance with the requirements in Ohio Revised Code ("R.C.") Chapter 4906 and Ohio Administrative Code ("O.A.C.") Chapter 4906-4 and develop pre-, during-, and post-construction monitoring protocols for avian and bat resources located in the vicinity of the Icebreaker Wind six turbine offshore wind demonstration Project located 8 to 10 miles off the shore of Cleveland, Ohio (the "Project"). On February 1, 2017, as supplemented on March 13, 2017, the Applicant filed its application ("Application") with the Ohio Power Siting Board ("OPSB") for a certificate to construct the Project in Case No. 16-1871-EL-BGN.

The Parties are entering into this Memorandum of Understanding ("MOU") to set forth the agreements that have been reached on the monitoring protocols for avian and bat resources. The purpose of these monitoring protocols will be to help assess, in a scientifically rigorous manner, any impacts that Project construction and operation may have on avian and bat species and resources in the Project vicinity or likely to encounter the Project area. The goal of assessing these impacts is: 1) to document existing conditions and patterns of use by the species of concern at the Project site; 2) to document changing conditions and patterns of use by species of concern and their associated habitats as a result of Project construction and operations at the Project site; 3) to develop and implement effective mitigation and adaptive management strategies to minimize avian and bat resource impacts; 4) to evaluate the feasibility of various monitoring protocols in an offshore setting; and 5) to better understand how future offshore wind projects in Lake Erie or the Great Lakes may affect birds and bats.

The Parties recognize that the location and size of any future offshore wind projects will be significant factors in future risk assessments. There are issues related to the statistical detectability of certain types of impacts due to natural variability, the limited footprint, and size of this demonstration Project. A determination of impact, or lack thereof, whether

positive or negative in this small Project, should not be construed to represent an impact condition for larger projects with different turbine configurations and offshore locations. Recognizing these limitations, these monitoring studies and protocols have been designed to provide information that will help to guide future monitoring efforts and provide a sound scientific basis for future decision-making.

By and through this MOU, the Parties hereby agree to the following:

- A. The Icebreaker Wind Avian and Bat Monitoring Plan ("MP"), attached as Exhibit A, which was prepared by Western EcoSystems Technology Inc. ("WEST") for the Applicant, and modified pursuant to discussions with the ODNR, will serve as the basis for the avian and bat resources pre-, during-, and post-construction monitoring effort by the Applicant, any of its consultants or sub-consultants acting on its behalf, and any successor(s) to the Applicant, consultants, or sub-consultants. The sampling protocols set forth in the MP are based on the best available scientific methodologies to meet the study objectives defined in the requirements of the ODNR On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio, project specific recommendations provided to the OPSB by the ODNR and United States Fish and Wildlife Service ("USFWS") in comments dated February 28, 2017, and additional consultation between the Applicant and wildlife agencies.
- B. The MP is a living document and will serve as a template for all future avian and bat monitoring work related to the Project. The length and type of sampling conducted will be reviewed annually by ODNR as outlined in the MP to determine whether the sampling intensity, frequency, and duration are necessary and appropriate to meet the study objectives. Any such adjustments to the existing protocol will be based on actual sampling results from prior years.
- C. Prior to the date of construction as identified by the Applicant pursuant to OAC Section 4906-3-13(B), post-construction protocols in the Plan will be finalized and approved through written communication with the ODNR. In order to effectuate any adjustments, the Parties will review sampling results annually (at the end of the field season) and will meet annually to discuss and reach mutual agreement on any adjustments to the sampling program necessary to meet monitoring and assessment goals. The annual meeting will be held at least one month prior to the next field season. The Parties agree to meet prior to January 31 of each year. This will provide adequate lead time to make adjustments to the sampling program prior to the start of the field season.

- D. Annual monitoring reports, including preliminary analyses and summaries of all data collected to date, must be submitted to ODNR at least two weeks prior to the scheduled date of the annual meeting provided for at Paragraph (C) above. Annual pre-construction monitoring reports will provide a summary of pre-construction baseline data collected from the prior sampling season. Annual post-construction monitoring reports will provide a summary of data collected for the prior sampling season and a comparative analysis to identify potential changes and/or impacts due to the construction and/or operation of the offshore wind facility to be developed by the Applicant. Annual monitoring reports will be shared with the USFWS and the OPSB for external review and analysis. These reports will be provided to those officials specified at those agencies to receive notices under Paragraph (L)(10) of this MOU.
- E. The applicant shall submit quarterly and interim Project reports to ODNR summarizing monitoring activities performed according to the timeline provided in Exhibit B attached. Quarterly and interim reports will include an outline of all sampling attempted, completed, and a summary of data collected as described in the MP document. Quarterly and interim reports shall be submitted pursuant to the Notice provision set forth at Paragraph (L)(10) of this MOU. Quarterly reports will also be shared with USFWS and the OPSB for review and analysis.
- F. Post-construction annual monitoring reports will be required for all post-construction sampling years as identified in Exhibit A attached, with interim, quarterly, and annual reports following the schedule established in Exhibit B, attached. A final Project report shall be submitted to ODNR one year after all sampling and monitoring work has been completed. The final report will include complete analysis of all data, discussion, conclusions, and any recommendations for mitigation if needed, and it will be transmitted pursuant to the Notice provision located at Paragraph (L)(10) of this MOU. A summary of reporting requirements is presented in Exhibit B attached.
- G. All raw data collected will be submitted by the Applicant to ODNR within three months of the conclusion of each monitoring component set forth in the MP with each annual report. These data will be distributed to the USFWS for external review and analyses. Such data will become a public record and will be made available upon proper request unless the Applicant specifically identifies any data or information under this section which it believes to be proprietary in nature at the time of submission to the ODNR. If data or information is identified as proprietary in nature, then the ODNR will

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immediately notify the Applicant, through the contact person specified to receive notices under Paragraph (L)(10) of this MOU, of the fact of a records request under R.C. Section 149.43, et. seq., so that the Applicant will, within fourteen (14) business days, be able to consider and act as it may consider necessary and appropriate to protect its proprietary interest, including without limitation filing an action for injunctive relief to prevent the disclosure of its intellectual property.

- H. ODNR, working cooperatively with the USFWS and with designated technical experts, will review all quarterly, annual, interim, and final reports to ensure they meet the assessment goals as outlined in paragraph two of page one of this document. If a finding of significant impact is determined, ODNR shall immediately notify the Applicant and follow-up with appropriate agencies and the Applicant to address and/or remediate the impact.
- I. This MOU may be made a condition of Submerged Lands Lease SUB-2356-CU between the State of Ohio and the Applicant.
- J. This MOU may be made a condition of any Certificate of Environmental Compatibility and Public Need issued to the Applicant in Case No. 16-1871-EL-BGN by the OPSB.
- K. This MOU shall terminate on the date that is five years beyond the date on which commercial operations began for the Project, unless terminated earlier by mutual consent of the Parties. The term of the MOU may be extended beyond five years if the ODNR determines that post-construction assessment results demonstrate a significant adverse impact and that the continued collection of avian and bat sampling data for an additional period of time is scientifically warranted. The specific type of avian and bat sampling required to address the significant adverse impact will be mutually agreed to by the Parties.
- L. General Terms and Conditions
 - I. Liability. The Parties agree that Applicant shall be solely responsible for any and all claims, demands, or causes of action arising from Applicant's obligations under this MOU. Each Party to this MOU must seek its own legal representation and bear its own costs, attorney fees and expenses in any litigation that may arise from the performance of this MOU. It is specifically understood and agreed that ODNR does not indemnify Applicant. Nothing in this MOU shall be construed to be a waiver of

the sovereign immunity of the State of Ohio or the immunity of any of its employees or agents for any purpose. In no event shall ODNR be liable for indirect, consequential, incidental, special, liquidated, or punitive damages, or lost profits.

2. Ethics. By signing this MOU the Applicant certifies that it: (i) has reviewed and understands the Ohio ethics and conflict of interest laws as found in R.C. Chapter 102 and in R.C. Sections 2921.42 and 2921.43, and (ii) will take no action inconsistent with those laws. The Applicant understands that failure to comply with Ohio's ethics and conflict of interest laws is, in itself, grounds for termination of this MOU with the State of Ohio.
3. Ohio Elections Law. Applicant affirms that, as applicable to it, no party listed in Division (I) or (J) of Section 3517.13 of the R.C. has made, as an individual, within the two previous calendar years, one or more contributions to the Governor or to his campaign committees that exceed the limits established by that code.
4. Assignment/Delegation or Amendment. Neither Party to this MOU will assign any of its rights, amend this Agreement, nor delegate any of its duties and responsibilities under this MOU without the prior written consent of the other Party. Any assignment or delegation not consented to may be deemed void by the non-consenting Party.
5. Severability. In case any one or more of the provisions contained in this MOU shall for any reason be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision thereof and this MOU shall be construed as if such invalid, illegal, or unenforceable provision had never been contained herein.
6. Counterparts. This MOU may be executed in two or more counterparts, each of which shall be deemed to be an original and taken together shall be deemed to be one and the same instrument.
7. Controlling Law. The laws of the state of Ohio shall govern this MOU and any claims arising in any way out of this MOU. Any provision of this MOU prohibited by the law of Ohio shall be deemed void and of no effect. Any litigation arising out of or relating in any way to this MOU or the performance hereunder shall be brought only in Franklin County, Ohio or before the OPSB.
8. Mediation. If a dispute arises between the Parties regarding the performance,

interpretation, or implementation of any provision in this MOU and the Parties reach an impasse, prior to pursuing litigation the Parties will engage a mutually agreed to third-party mediator and will, in good faith, attempt to reach agreement on the issue within a reasonable period of time.

9. Waiver. A waiver by any Party of any breach or default by the other Party under this MOU shall not constitute a continuing waiver by such Party of any subsequent act in breach of or in default hereunder.
10. Notices. Each Party will designate an individual by name, title, and both street and e-mail addresses for the receipt of any notifications required by this MOU and for the purpose of communicating on any issues that relate to the MOU and its objectives. Except to the extent expressly provided otherwise herein, all reports, notices, consents and communications required hereunder (each, a "Notice") shall be in writing and shall be deemed to have been properly given when: 1) hand delivered with delivery acknowledged in writing; 2) sent by U.S. Certified mail, return receipt requested, postage prepaid; 3) sent by overnight delivery service (Fed Ex, UPS, etc.) with receipt; or 4) sent by fax or email to the officers listed below. Notices shall be deemed given upon receipt thereof, and shall be sent to the addresses first set forth below. Notwithstanding the foregoing, notices sent by fax or email shall be effectively given only upon acknowledgement of receipt by the receiving Party. Any Party may change its address for receipt of Notices upon notice to the other Party. If delivery cannot be made at any address designated for Notices, a Notice shall be deemed given on the date on which delivery at such address is attempted.

Contact and delivery information for the Parties:

Wildlife Wind Biologist
Ohio Division of Wildlife
2045 Morse Road, Building G
Columbus, Ohio 43229-6693
(614) 265-6349
Erin.I.hazelton@dnr.state.oh.us

President
Icebreaker Windpower, Inc.
1938 Euclid Avenue, Suite 200
Cleveland, Ohio 44115

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ODNR and Icebreaker Windpower
Case No. 16-1871-EL-BGN
Avian and Bat Resources
July 12, 2017

(216) 965-0627
lwagner@leedco.org

Delivery locations for the other agencies:

Executive Director
Ohio Power Siting Board
180 East Broad Street, 6th Floor
Columbus, Ohio 43215
(866) 207-6772

Field Supervisor
Ecological Services Field Office
U.S. Fish and Wildlife Service
4625 Morse Rd., Suite 104
Columbus, Ohio 43230
(614) 416-8993
dan.everson@fws.gov

Director, Region Three
U.S. Fish and Wildlife Service
5600 American Blvd. West, Suite 990
Bloomington, Minnesota 55437-1458
(612) 713-5360

9. Conflicts. In the event of any conflict between the terms and provisions of the body of this MOU and any exhibit hereto, the terms and provisions of the body of this MOU shall control.
10. Headings. The headings in this MOU have been inserted for convenient reference only and shall not be considered in any questions of interpretation or construction of this MOU.
11. Entire Agreement. This MOU represents the full agreement of ODNR and the Applicant to the pre-, during-, and post-construction monitoring protocols for fish and aquatic resources. It may not be modified, amended or supplemented, or any rights herein waived, unless specifically agreed upon in writing by the Parties hereto. This

Memorandum of Understanding
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Avian and Bat Resources
July 12, 2017

MOU supersedes any and all previous agreements, whether written or oral, between the Parties.

12. Execution and Electronic Signatures. This MOU is not binding upon the Parties unless executed in full, and is effective as of the last date of signature by the Parties.

Any Party hereto may deliver a copy of its counterpart signature page to this MOU electronically pursuant to R.C. Chapter 1306. Each Party hereto shall be entitled to rely upon an electronic signature of any other Party delivered in such a manner as if such signature were an original.

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Signature Page Follows


Memorandum of Understanding
ODNR and Icebreaker Windpower
Case No. 16-1871-EL-BGN
Avian and Bat Resources
July 12, 2017

IN WITNESS THEREOF, ODNR and Icebreaker Windpower, Inc. have caused this Memorandum of Understanding to be duly executed and have caused their seals to be hereto affixed by their duly authorized officers on the date associated with each authorized signature.

This MOU shall be effective as of the date on which the last of the Parties executes it.

**STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES**

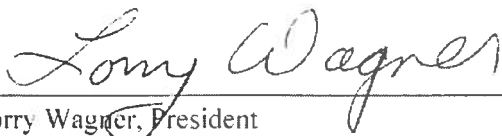
ATTEST:



James Zehringer, Director *for* 7/20/17
Date

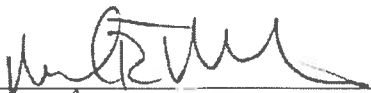
ICEBREAKER WINDPOWER, INC.

ATTEST:

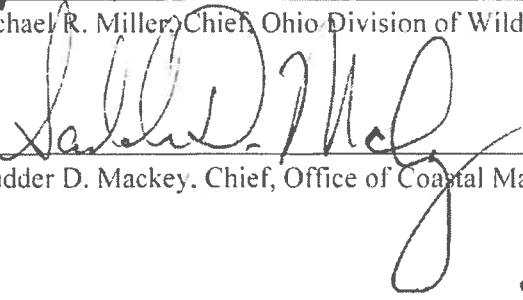


Lorry Wagner, President 07/12/2017
Date

APPROVED:



Michael R. Miller, Chief, Ohio Division of Wildlife 7/18/17
Date



Scudder D. Mackey, Chief, Office of Coastal Management 7/13/2017
Date

ICEBREAKER WIND AVIAN AND BAT MONITORING PLAN LAKE ERIE, OHIO



Prepared for:
Icebreaker Windpower, Inc.

Prepared by:
Western EcoSystems Technology, Inc.
415 West 17th Street, Suite 200
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July 17, 2017



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INTRODUCTION

The Icebreaker Wind Avian and Bat Monitoring Plan (“Monitoring Plan” or “Plan”) describes the studies and analyses that will be performed to document the avian and bat resources at the Icebreaker Wind Project (“Icebreaker” or “Project”) site and assess potential impacts to those resources during the final pre-construction and post-construction phases of the Project. This Project is a six turbine freshwater offshore wind facility proposed 8 to 10 miles off the shore of Cleveland, Ohio by Icebreaker Windpower Inc. (“Applicant” or “IWI”). This Monitoring Plan is based on currently available scientific methodologies (e.g., radar, acoustics, collision monitoring, etc.) to assess avian and bat displacement, avoidance, attraction/deterrence, and potential for mortality. The Plan considers the Project size, offshore location, and other factors specific to the unique design of this Project and is based on the requirements of the Ohio Department of Natural Resources (“ODNR”) On-Shore Bird and Bat Pre- and Post- Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio. Project specific recommendations were provided to the Ohio Power Siting Board (“OPSB”) by the ODNR and the US Fish and Wildlife Service (“USFWS”) in comments dated February 28, 2017, and additional consultation between the IWI project team and the wildlife agencies. Per OPSB’s order dated April 3, 2017, a Memorandum of Understanding and monitoring protocols are to be submitted for its consideration.

Due to the unprecedented nature of this demonstration project, protocols for determining potential impacts to birds and bats in an offshore environment have not been previously established for the Great Lakes. Thus, this Plan makes a good-faith effort to document and address the potential impacts of the Project on avian and bat behavior and mortality. The Plan proposes an adaptive management framework to further minimize and mitigate any unforeseen Project impacts. Pre-construction monitoring shall be completed prior to the date on which construction will begin as identified by the Applicant pursuant to Ohio Administrative Code 4906-3-13(B). Post-construction monitoring shall commence coincident with the date the Project begins commercial operation as identified by the Applicant pursuant to Ohio Administrative Code 4906-3-13(B).

The contents of the current Plan have been shaped by studies and risk assessments previously performed by the IWI project team, as well as by the numerous discussions between the IWI project team and wildlife agencies. Some elements described within the current Plan consist of monitoring studies that will supplement data collected by preceding studies. Potential behavioral impacts will be assessed by characterizing pre-construction baseline conditions using methodologies that will be duplicated during the Project’s operational (post-construction) phase in order to provide robust pre- vs. post-construction comparisons for impact assessment. Other elements described within the Plan are unique to the operational phase of the Project. As this plan is a living document, certain elements (i.e., radar surveys, post-construction collision monitoring protocols) currently exist in draft form and will be finalized in consultation with the ODNR, OPSB, other agencies and stakeholders. Changes in the Plan, upon timely approval by ODNR in writing, will be incorporated into this document as an amendment.

The specific monitoring elements contained within the current Plan have been shaped by extensive discussions between the IWI project team, the resource agencies, and the Project's lead bird and bat consultant, Western EcoSystems Technology, Inc. ("WEST"). WEST proposed a Post-Construction Monitoring Plan on October 12, 2016. The Plan included a preliminary outline of potential options to assess project impacts. On October 20th, the ODNR and USFWS provided IWI (then the Lake Erie Energy Development Corporation [LEEDCo]) a document setting forth criteria and recommendations related to pre- and post-construction monitoring goals and objectives. In November, the USFWS and ODNR provided a response to WEST's proposed post-construction monitoring plan. Numerous conversations with representatives from the agencies occurred over the next two months. On December 13th and 14th, IWI and WEST met with the ODNR, USFWS, OPSB, and US Department of Energy ("DOE") in Columbus, Ohio to discuss post-construction monitoring, and any additional associated pre-construction baseline monitoring determined necessary. Subsequent to this meeting, WEST prepared a matrix of monitoring options that was presented to the agencies and discussed at a meeting in Columbus, Ohio on January 6, 2017. On February 28th, the ODNR and USFWS submitted recommendations for bird and bat monitoring at the Project to the OPSB in association with IWI's February 1, 2017 application for a Certificate of Environmental Compatibility for Icebreaker, and on March 6th IWI submitted a response.

The current Plan provides comprehensive detail on the monitoring elements of the pre- and post-construction studies for which methodologies can be defined and elaborated at the present time (i.e., bat acoustic monitoring and aerial water bird surveys). With regard to post-construction monitoring for bird and bat collision impacts during the Project's operational phase, no proven technologies or methodologies are currently available for the offshore environment. The Plan articulates the IWI project team's commitment to continue to evaluate emerging collision monitoring technologies in consultation with ODNR, OPSB, and other agencies and stakeholders to design and implement protocols that employ the most promising and viable collision monitoring technology available at the time such monitoring is set to commence. Such monitoring will be specific to the Project size, offshore location, and other factors specific to the unique design of this Project. With regard to radar monitoring, the Plan articulates the IWI project team's commitment to work with ODNR, OPSB, and other agencies and stakeholders to retain an objective third party radar expert to determine the feasibility and precise design of any pre- and post-construction radar monitoring surveys.

As a follow up to the discussions regarding the radar monitoring element, the wildlife agencies and the IWI project team prepared a Request for Information (RFI) to assess the viability of deploying radar on a large vessel with a four point anchor prior to construction at the project site. The RFI was sent to three potential providers and responses were received in late March. Follow-up questions were sent to the providers by the Applicant and the USFWS, and responses were received. The agencies and Project team held a conference call on April 13th to discuss the viability of vessel-based radar. Subsequent discussions have led to a commitment between the ODNR and Applicant to work with the DOE, USFWS, and one or more objective third-party radar experts to design the exact parameters of any pre- and post-

construction radar surveys deemed feasible.

This Plan responds to issues and concerns raised by ODNR and the USFWS related to potential impacts on birds and bats resulting from implementation of the proposed Project. These protocols (and the executed Avian and Bat Monitoring MOU) demonstrate IWI's commitment to ODNR that IWI will implement the required pre- and post-construction protocols described herein to monitor and assess environmental impacts on the avian and bat resources in the Project area.

It is critical that sufficient and accurate data are collected pre-and post-construction in order to evaluate risk of the Project to avian and bat species. This Project is the first offshore freshwater wind installation in North America. Established land-based protocols may need to be modified or adapted in order to assess risk in an offshore environment. As a pilot project, it may be necessary to explore the use of experimental technologies or methods to collect the data necessary to assess behavioral impacts and mortality. The protocols described herein in no way establish a state-approved standard for future offshore wind energy development.

The Plan will be continually assessed through interim and quarterly status reports and annual summaries, and reviewed with ODNR and OPSB annually. The exact parameters of the Plan are flexible and will be subject to modification over time based on results of surveys. Any revisions and adjustments to the Plan, which could include changes to the location of sampling, sampling frequency and duration, and sampling protocols and parameters, will be made as appropriate, and only in consultation with the ODNR and OPSB, taking into consideration input from other agencies and stakeholders. ODNR and IWI will review sampling results annually (at the end of the field season) and will meet annually to discuss and reach mutual agreement on any adjustments to the Plan necessary to meet monitoring and assessment goals. Prior to the date of construction as identified by the Applicant pursuant to Ohio Administrative Code 4906-3-13(B), post-construction protocols in this Plan must be finalized and, upon timely approval by ODNR in writing, will be incorporated into this document as an amendment.

STUDY AREA

The proposed Project will consist of six turbines in a single row, located 8 to 10 miles from the Cleveland shore (Figure 1).

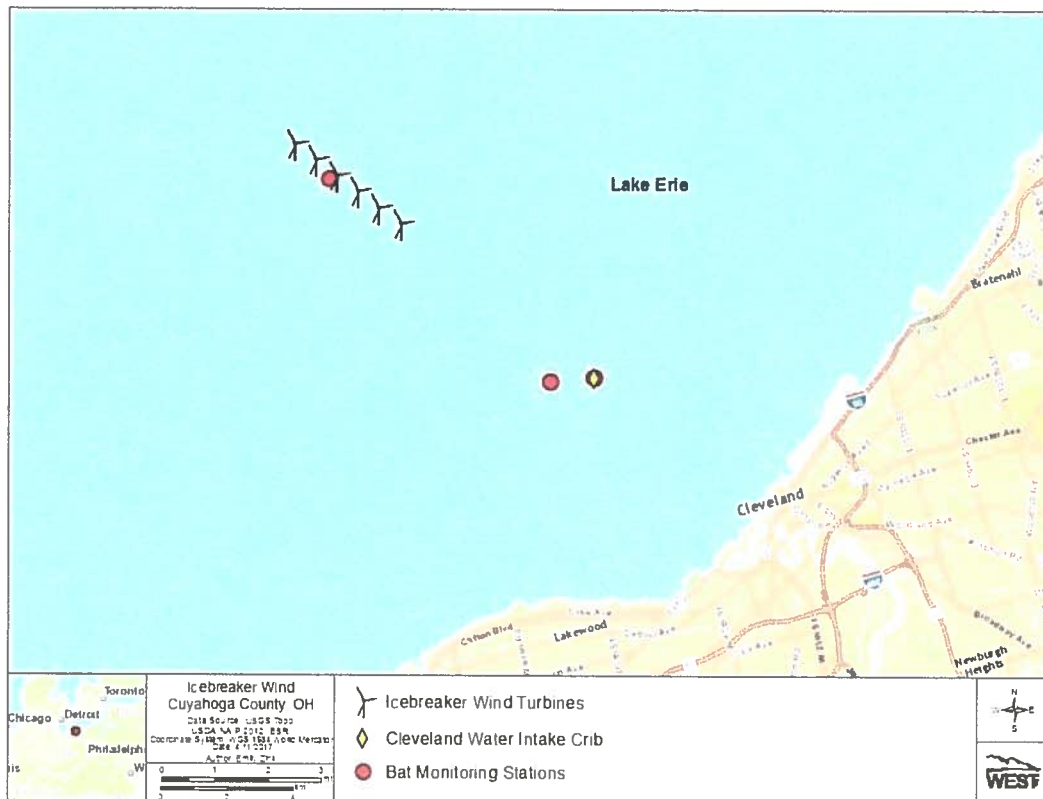


Figure 1. Turbine locations for the Proposed Icebreaker Wind Project, showing locations of pre-construction bat acoustic monitoring (see text). Two buoys have been deployed for bat acoustic monitoring at the location furthest offshore (Mile 7 buoy).

BAT ACOUSTICAL MONITORING

Objectives

The primary objectives of the bat acoustic monitoring element are as follows:

- Characterize the exposure of bats to potential impacts from the Project, pre- and post-construction.
- Characterize the potential behavioral responses of bats to the presence of the Project.
- Characterize bat species composition, activity, and seasonal patterns between the Project site and off site.

Overview of Pre-Construction Bat Monitoring Protocol

Beginning in 2017, the following methods will be deployed to monitor bat activity at and in the vicinity of the Project site:

- At least one full season (15 March – 15 November) of acoustic monitoring. Should inclement weather threaten to delay the monitoring season, IWI will immediately notify ODNR so that survey dates may be amended to maintain 80% functionality.
- Deploy acoustic monitors at the following locations: on the Cleveland Water Intake Crib (one at approximately 50 meter height above water level and one at 3 meter height above water level); on the mile 3 buoy near the water level; on a mile 7 buoy¹ near the water level; and, on a second mile 7 buoy at the 10 meter height to monitor the base of the rotor-swept zone (Figure 1).
- If a vessel is deployed at the project site pre-construction (see radar section, below), deploy an acoustic monitor on the vessel as close to a 50 meter height as mechanically feasible.
- Use Wildlife Acoustics SM4™ detectors, or the equivalent
- Detector sensitivity adjusted to detect a calibration tone at 20 meters
- Run all acoustic detectors 30 minutes before sunset to 30 minutes after sunrise continuously and concurrently during the monitoring season
- Monitor, repair, and replace detectors as needed to maintain 80% functionality at each detection location during monitoring season, with emphasis on the spring and fall migration season data
- Review results of acoustic monitoring with ODNR, Division of Wildlife within three months of deployment of all monitoring equipment to evaluate effectiveness of protocol

¹ The mile 7 buoy is in fact located approximately 9 miles off of the Cleveland shore, or almost in the middle of the Icebreaker Wind project's turbine string.

Overview of Post-Construction Bat Monitoring Protocol

After construction in years 1 and 3 and following the same protocol as pre-construction, bat acoustic monitors will be deployed as follows:

- On three turbines (at least one on an end) with high (nacelle) and low (turbine platform) detectors
- On the mile 7 buoys near the water level and at 10m height
- On the Crib at the same locations as pre-construction monitoring
- Review results of acoustic monitoring with ODNR, Division of Wildlife within three months of deployment to evaluate effectiveness of protocol
- Submit annual report and copy of raw data three months after the completion of the first monitoring season (post-construction) and determine applicability of year three acoustic monitoring

Protocol Discussion

Bat acoustic data gathering will be conducted as described above to complete one full monitoring season prior to Project construction. Bat monitoring will be conducted using full-spectrum acoustic SM4™ detectors (Model: SM4, Wildlife Acoustics™, Maynard, MA; Figure 2) or the equivalent.

Preliminary data was collected using two SM4 units deployed on March 21, 2017 on a buoy located approximately 9 miles offshore of Cleveland, Ohio, within the Project area (Figure 1). This deployment was managed by a WEST bat acoustics specialist working in conjunction with the Project's fisheries consultant, LimnoTech, who deployed and maintains the buoy, and whom WEST trained to monitor and maintain the bat acoustic detectors throughout the recording season. Microphone extension cables were used to raise the microphones to approximately two meters above the water level (Figure 3).



Figure 2. SM4 Bat Acoustic Detector



Figure 3. SM4 Bat Detector Deployed on a buoy for the Icebreaker Wind Project, showing microphones deployed at approximately 2m above the surface of the water

Two additional units were deployed at the Cleveland Water Intake Crib on March 23, 2017. One of these was deployed with its microphone located approximately 3 meters above the water level, and the other was deployed with its microphone located approximately 50 meters above water level on the Crib's meteorological tower (Figure 4). One additional detector was also deployed on March 23, 2017 on the mile 3 LimnoTech buoy located in close proximity to the Cleveland Crib (Figure 1). Similar to the deployment on the mile 7 buoy, the microphone on this detector was also deployed at an altitude approximately 2 meters above water level. Additional detectors have been deployed subsequently at all of these locations for redundancy in June so that there are now two detectors at each of the four recording locations, in order to minimize the potential for data gaps due to equipment malfunctions. An additional buoy with a 10m tall pole was deployed next to the mile 7 buoy on July 11, 2017. When the dual microphones are fitted to the top of this pole and begin recording in order to monitor the base of the rotor-swept zone, the start of the one-year pre-construction monitoring effort will begin. Recordings will be maintained at least 80% functionality for each location, with emphasis on spring and fall migration.

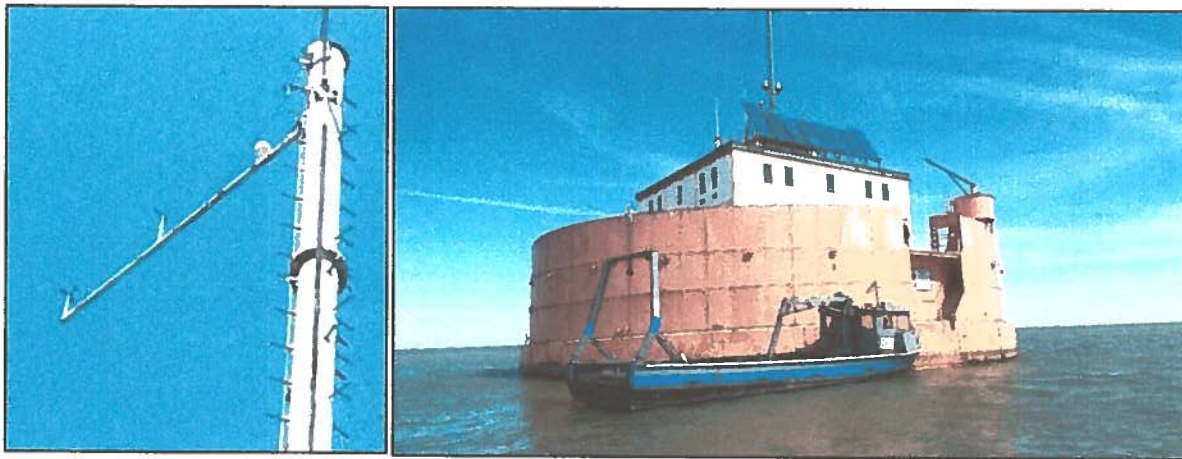


Figure 4. The Cleveland water intake Crib (right), and close-up shot of the Crib's meteorological tower (left) on which a bat acoustical detector was deployed at roughly 50 m above the water level during the March 23, 2017 deployment

If vessel based radar is deployed prior to construction at the project site, a bat acoustic detector will be deployed on the vessel as high as possible, but at a minimum of 20 meters.

All detectors have been, or will be, fitted with LimnoTech-fabricated brackets for attachment to buoys and Cleveland Crib components. LimnoTech will be responsible for bracket fabrication. External batteries (12 volt, 36 ah) and two Sandisk128 GB cards for each unit will be utilized to allow for monthly equipment checks and data card change-outs. Sensitivity has been, or will be adjusted to detect a calibration tone at 20 meters. Detectors have been or will be programmed

to begin recording at least 30 minutes before sunset and continue recording until 30 minutes after sunrise. A copy of raw data, acoustic analysis, and methodology will be included in the annual reports to ODNR.

AERIAL WATERFOWL SURVEYS

Objectives

The primary objectives of the aerial waterfowl monitoring element are as follows:

- Characterize whether or not any water bird species are displaced from the Project area due to the presence of the Project
- Characterize the use of the project area by diurnal birds, including species composition, abundance, and distribution patterns

Overview of Pre- and Post-Construction Monitoring Protocol

IWI will adhere to all of the recommendations contained in the February 28, 2017 comments from the USFWS and ODNR regarding aerial waterfowl surveys. IWI will use human observers for these aerial surveys, and will work with the agencies to design the system that offers the most effective means to collect the waterfowl information sought. The Applicant will work with the ODNR, in consultation with the USFWS, to define the survey area and flight patterns to assure study objectives are achieved. The aerial survey project area and flight patterns will be approved by the ODNR in writing at least two months prior to the initiation of the initial survey. The surveys will be designed to include the following²:

Pre-construction

- Performed for one complete season (fall through spring) prior to Project construction
- Focus on waterfowl, bald eagles, and ice relative to location of birds
- Survey transects should run parallel to the turbine string
- Survey dates: mid-October through end of May
- Survey frequency: every 2 weeks
- Transect spacing: close enough to the turbines to observe birds between the turbines, but a safe distance from the blades
- Flight heights: 76-100 m in order to detect small water birds
- Flight speeds: 150-200 km/h unless constrained by local flying restrictions
- Suitable weather conditions for surveys defined as follows:

² Including recommendations contained within the document entitled "Preliminary recommendations to facilitate data collection during the autumn 2013 migration season Great Lakes aerial surveys" (Gilbert et al. 2013), which was included as an appendix to the ODNR/USFWS Feb 28 comments. Note, where specific recommendations differ between the ODNR/USFWS letter and the Gilbert et al. 2013 (e.g. transect orientation), the former is taken, as it was developed based on site- and application-specific considerations for the Project.

- Beaufort scale wave conditions of 4 or below
 - winds of 37 km/h or below
 - minimum of 3.2 km visibility (or pilot's discretion)
- Conduct surveys at a variety of different times of day
- Standardize survey parameters
- Standardize environmental parameters
- Standardize observation methods, including the following:
 - Apply distance sampling using distance band method
 - Use a data logger or voice recorder to record data in flight
 - Record all bird species encountered
 - Record time and GPS position of each bird observation
 - Standardize collection of environmental data
 - Minimize the number of different observers used
- Conduct observer training
- Record survey transect times and GPS tracks
- Standardize data collection and QA/QC process, including the following data fields on the data sheets:
 - Survey area
 - Date
 - Time (GMT/UTC or other standardized system)
 - Observer location within the plane
 - Species code and/or common name (use standardized codes/names, as well as various degenerate categories, e.g. "unidentified gull", "unidentified diving duck")
 - Count (# of birds per observation)
 - Distance band
 - Sea state
 - Glare
 - Visibility
 - Geoposition
- Conduct statistical power analysis
- Standardize transect spacing. Transects should be spaced to maximize the number of transects within the project boundary while minimizing likelihood of observing the same flock/individual multiple times.

- Conduct double-observer studies

Post-construction

- Similar transect protocol as pre-construction
- Performed in years 1 and 4 subsequent to Project construction

RADAR

Objectives

The primary objectives of a radar monitoring element would be as follows:

- Characterize the altitudinal distribution and density of flying birds and bats at the Project site, pre- and post-construction
- Characterize behavioral avoidance/attraction effects in flying birds and bats in response to the presence of the Project

Overview of Pre- and Post-Construction Radar Monitoring Protocol

The ODNR, USFWS and IWI have retained an objective third party radar expert (Dr. Robb Diehl, USGS) to determine whether collection of pre-construction radar data at the project site on a vessel is feasible and will achieve the study objectives. A recommendation on the viability and precise design of any pre-construction radar is expected by the Fall of 2017. A decision on the final design of any post-construction radar will be made following the determination regarding pre-construction vessel based radar.

If either or both pre- or post-construction radar studies are determined unlikely to achieve the radar study objectives, the Applicant and agencies will work to re-direct resources to alternative monitoring efforts better designed to produce meaningful information concerning Project impacts.



Figure 5. Example of a barge of the general size and type proposed as the on-site deployment platform for pre-construction radar monitoring to be conducted for the Icebreaker Wind Project.

COLLISION MONITORING

Objectives

The primary objective of the collision monitoring element is as follows:

- Detect collisions of birds and bats with wind turbines and identify to guild (if determined possible), post-construction

IWI recognizes that the potential for birds and/or bats to collide with Project infrastructure during the Project's operational phase is of primary importance for the Project and for the Monitoring Plan. IWI also recognizes that the well-established methods for monitoring such impacts at land-based wind energy facilities cannot be performed at an offshore facility such as the Project. Although several promising technologies are under active development, no proven effective technologies to perform bird/bat collision monitoring at offshore wind energy facilities are currently available; however, several emerging technologies appear promising.

The Applicant will consult with the ODNR, OPSB, and other agencies and stakeholders to design a post-construction mortality monitoring plan using innovative technologies that are economically and logistically feasible for this demonstration project. The commitment made by IWI at the present time is to continue to evaluate developing technologies and available options with the expectation of implementing a robust collision-monitoring program during the Project's operational phase, with the specific technology, protocol, and sampling parameters to be determined through continued consultation with wildlife agencies, experts, and other stakeholders. Depending on the limitations of the technology, additional methods may be warranted to supplement the data collected to provide post-construction collision information, specific to the project size, offshore location, and other factors specific to the unique needs of the project. The specific collision technology, protocol, and sampling parameters will be identified in the post-construction protocol and, upon timely approval by ODNR in writing, will be incorporated into this document as an amendment.

ADAPTIVE MANAGEMENT AND MITIGATION

Icebreaker Wind is a first of its kind U.S. demonstration project, and as such the Applicant recognizes the importance of rigorous post-construction monitoring to continuously evaluate the actual impacts of the Project on fish and wildlife. The Applicant is committed to taking adaptive management steps to further minimize and mitigate any unforeseen adverse impacts on fish and wildlife species. A comprehensive adaptive management plan specifying all of the impacts avoidance, minimization and mitigation measures to be implemented, including quantitative impact thresholds that trigger additional mitigation contingencies, will be developed in consultation with the agencies and included in the Project's Bird and Bat Conservation Strategy ("BBCS"). IWI will submit the results of the pre- and post-construction surveys within three

months of the conclusion of the relevant survey and will discuss annually with the wildlife agencies and stakeholders practical and reasonable technologies and methods that can be employed to further avoid, minimize and mitigate any unforeseen adverse impacts that the project is having on bird and bat species.

The Applicant is developing a Bird and Bat Conservation Strategy (BBCS) to conduct thorough post-construction monitoring of Proposed Project impacts, and to undertake adaptive management measures, if necessary. Mitigation and adaptive management measures would be implemented if actual impacts exceed expectations. The BBCS will be submitted during the permitting process and will be finalized, in consultation with the wildlife agencies and stakeholders, well before construction.

The Applicant has agreed that the Proposed Project's turbines would be curtailed until winds reach 6.7 mph at night during the fall bat migratory period.

The Applicant will follow lighting recommendations per the USFWS 2012 land-based wind energy guidance documents. Gehring et al. (2009) found that the use of red or white flashing obstruction lights strongly correlated with a decrease in avian fatalities compared to non-flashing, steady burning lights at tower systems. Gehring et al. (2009) further stated that "Removing non-flashing lights from towers is one of the most effective and economically feasible means of achieving a significant reduction in avian fatalities at existing communication towers." The Proposed Project would use flashing red lights on turbines, as stipulated by FAA for bird safety.

Icebreaker will continue to work with state and federal agencies to: address any bird and bat issues that could arise during planning, construction, operation, or decommissioning of the Proposed Project to ensure that they remain in compliance with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Exhibit B

Timeline of Reporting Requirements, Pre-and Post-Construction

Quarterly status reports are due on the first day of March, June, September, and December for the term of this MOU.

Interim reports for the pre- and post-construction protocols described in Exhibit A (Icebreaker Wind Avian and Bat Monitoring Plan) are due three months after the start of data collection for each monitoring component.

Annual reports are due three months after completion of each monitoring season.

A final report is due one year after all sampling and monitoring work has been completed.