



**NATURAL RESOURCE SOLUTIONS INC.**

Aquatic, Terrestrial and Wetland Biologists

# **Environmental Considerations of Offshore Wind Energy**

**Andrew Ryckman, B.Sc.**

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# Overview

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# **NRSI Background**

- **Natural Resource Solutions Inc. (NRSI) is an environmental consulting firm based in Waterloo, ON**
- **NRSI has consulted on more than 4000MW of proposed wind energy generating facilities**
- **NRSI has worked on proposed facilities across Canada including Ontario, Manitoba, Alberta, Saskatchewan, and New Brunswick**
- **Projects have ranged in size from single 500kW turbines to 300MW facilities**



# Introduction

- **Offshore wind energy production is a relatively new industry**
- **New set of environmental considerations for offshore wind development**
- **This talk will relate existing projects and proposals to the site specific conditions of North America, specifically the Great Lakes**
- **Make sense of the variety of environmental studies required at proposed offshore sites**





# Current Studies

- Several proposed North American facilities undergoing baseline studies, including proposals in the Great Lake
- Cape Wind
- Nai Kun Wind Farm



*Nai Kun Wind Farm*



*Cape Wind*



# Fisheries

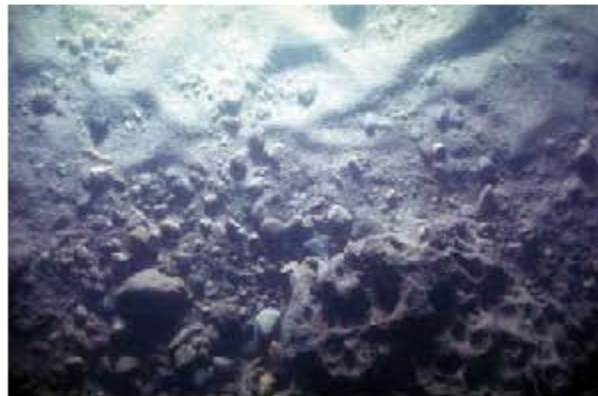
- **Impacts to fisheries are largely expected to occur during the construction phase of development**
- **Additional noise, sedimentation, and loss of lakebed all have the potential to impact local fish populations**
- **Some turbine foundations have been shown to create a reef-effect, increasing local fish populations**





# Fisheries

- **Fish sampling may be required to confirm and build upon background information**
- **Huge amounts of baseline fisheries data, particularly for the Great Lakes**
- **Substrate and habitat assessment of the lakebed**





# Birds

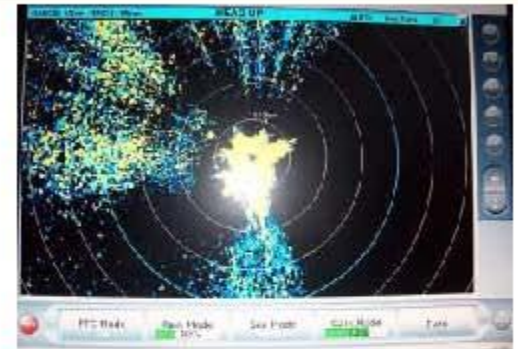
- **Impacts on birds revolve primarily around collision and displacements impacts**
- **Larger, offshore turbines will require additional study**
- **Migratory birds and staging or wintering waterfowl may be displaced from feeding areas**





# Birds

- **RADAR based surveys**
- **Plane-based surveys should be used to identify large rafts of waterfowl in offshore habitats**
- **Boat surveys can be used to confirm species and identify diurnal migrants**
- **Agency consultation**





# Bats

- Impacts of wind turbines on bats include direct collisions and other close contact impacts (i.e. barotrauma)
- Bats are expected to use areas above open water, but full extent is not know
- Migratory paths of bats, particularly over Great Lakes is under-studies





# Bats

- **RADAR monitoring may provide some information of bat movement over open water**
- **Acoustic monitoring will be an important tool in determining the presence of bats offshore**
- **Passive monitoring installed on test towers and/or boat-based active monitoring can be conducted**



*Cape Wind Tower*



# Vegetation

- **Offshore wind developments will have little impact on terrestrial vegetation**
- **Impacts will be localized at shoreline connection points, laydown areas, and any necessary equipment maintenance yards or new port facilities**
- **Due to the localized impact on shoreline habitats, coastal wetlands, dunes, and beach habitats may be impacted**





# Vegetation

- **If any natural vegetation is to be disturbed, site specific mapping and vegetation inventories should be conducted**
- **Vegetation mapping**
- **Rare species surveys**
- **Wetland evaluations**





# Post-Construction

- **Post-construction surveys may be dependent on pre-construction surveys, and could include:**
  - **Avian and Bat Mortality**
  - **Waterfowl Usage**
  - **Fish Habitat and Substrate**
- **Post-construction surveys are logistically difficult in open water**





# Available Guidance

- **The novelty of offshore wind energy in Canada is reflected in the limited available guidance documents**
- **Environment Canada has no current offshore wind energy guidelines to avian studies**
- **Provincial-level guidance is limited, and is dependent on each specific province**



# Recommendations

- **Studies, studies, studies**
- **Agency collaboration to develop and refine guidelines**
- **Industry collaboration to develop mortality monitoring solutions**
- **New process, there will be speed bumps along the way**



# Thank you

## Questions?

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