Lightning Talks – Session 1

Session 1 Moderator
Josh Kohut, Professor, Department of Marine and Coastal Sciences
Ryan Scully
Department of Marine and Coastal Sciences
Fisheries Monitoring of OSW off NJ

Study Campaigns
1. Acoustic Telemetry (Internal Transmitters)
2. Bottom Trawl Survey (Biomass Distribution)
3. Environmental DNA (Bottle Collection)
4. Pelagic Fish (SONAR & Camera)
5. Structured Habitat Survey (Baited Camera)
6. Atlantic Surfclam (Dredge Survey)
7. Oceanographic Data (Sondes & Satellite)

Acoustic Telemetry
High estuarine fidelity & seasonality typify coastal habitat connections

Time Series of Hydrophone Detections

Distribution of Individual Fish Use of Multiple Estuaries

Total Tags Detected by Hydrophone

Number of Hydrophones Detection Passage

Distribution of Fish Use Across Estuaries

- 20%
- 16%
- 15%
- 14%
- 13%
- 12%
- 11%
- 10%
- 9%
- 8%
- 7%
- 6%
- 5%
- 4%
- 3%
- 2%
- 1%
- 0%
Daphne Munroe

Department of Marine & Coastal Science

Surveys and Experiments for Monitoring Surfclams at Offshore Wind Projects
Research Question:
What is the relative biomass, distribution, and demographics of fishery resources within the lease area and at a nearby control site before, during and after wind farm construction?
Environmental parameters are collected with each eDNA sample.

Focused on community analysis of fish, exploiting a strength of eDNA metabarcoding.
Fisheries Monitoring of an Offshore Windfarm: Structured Habitat Survey

- Evaluate the impact of windfarm construction on structure-associated species.
- Six years of surveying (Winter, Spring, Summer, Fall) before, during, and after construction.
- Three gears: Chevron traps, benthic and pelagic videos (BRUVs), and rod-and-reel
Sean Duffy

*Psychology – Rutgers Camden*

*Environmental Psychology*

- History of the problem of climate change – why we need this
- Solutions and wind’s advantage
- History of wind energy and how people think about it
- Environmental Psychology – what is it, how it can help
- How psychologists promote sustainable beliefs and behaviors
- Review of literature on resistance to wind energy
- How psychology can be used as a means to improve support for wind energy projects
- 13 Common arguments against wind energy and proposed rebuttals
Control Co-Design Optimization of Floating Offshore Wind Turbines: 
OpenTurbineCoDe (A DOE ARPA-E ATLANTIS project by Bilgen, Martins, Ning, Burlion, et al.)

OpenTurbineCoDe Graphical User Interface (GUI) and Caller Functions (Modular Python and Matlab Wrappers)

Geometry Module  Structures Module  Aerodynamics Module  Aerostructural Module  Control Co-Design Module

- High (3D)  Medium (3D FEM)  High (3D RANS)  High (3D RANS)  Advanced Robust H∞ Controllers with Reference Governors
- Medium (2D Shell)  Medium (ALM)  Medium (BEM)  Mixed-Fidelity (RANS/BEM +Beam)  ROSCO
- Low (Beam)  Low (Beam)  Low (BEM)  Low (BEM+Beam)  Legacy

PRESENTATIONS on YouTube:
www.obilgen.com (or use QR Code)

CODE REPOS on GitHub:
https://github.com/OpenTurbineCoDe (to be Public in Spring 2023)
• Considering more Degrees of Freedom allows to design advanced controllers for load alleviation

• What’s next? Control Co-Design..
OSW offers many career opportunities, but also poses some challenges. What is the projected mix of job skills? How do they match current labor supply? How can new jobs serve to reduce inequality, particularly for historically marginalized groups and displaced workers?
Richard E. Riman and Hani Nassif

Materials Science and Engineering

Renewable Materials for the next wave of renewable wind energy

• Millions of dollars of materials comprise an OSW generator (OSWG)
• Several serious problems must be overcome
  – Wind energy generator manufacturing generate more CO2 than they avoid
  – Wind energy generator materials are not recyclable
  – Wind energy materials are not inexpensive to manufacture
  – Wind energy magnets are based on scarce material supply chains
• OSWG materials generate CO$_2$ 1 to 10,000 Kg-CO$_2$/kg-material
• The first generation of OSWGs deplete all magnet mineral sources
• No extraction technologies for the next generation of minerals
• Proposed Project
  – Reduce cost of OSWG materials from $2 to 0.50/kg
  – Reduce overall carbon footprint to carbon neutral or negative
  – Create low-cost manufacturing and recycling technologies for magnets
  – Create carbon-negative concrete and advanced composite materials