What does a good fisheries resource monitoring plan contain?

September 8, 2021
Mid Atlantic Fisheries Management Council
Scientific and Statistical Committee

NOAA FISHERIES
Northeast Fisheries Science Center

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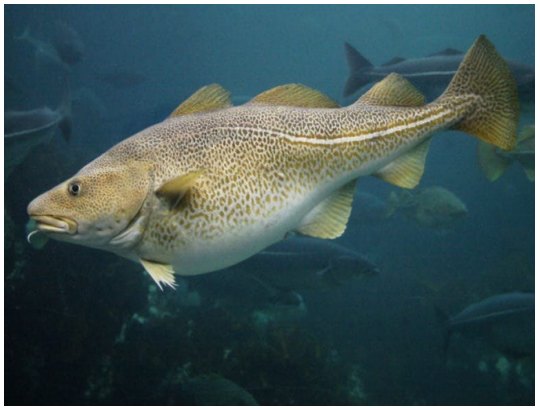
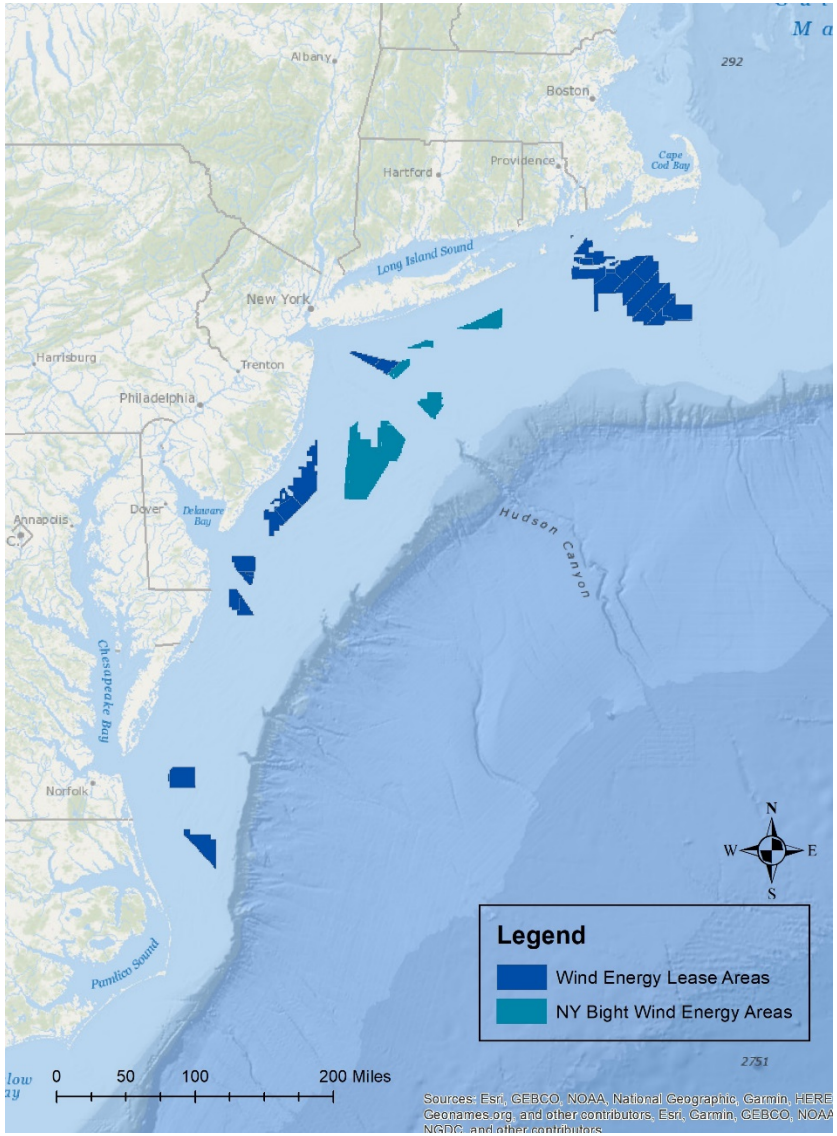
IBSS in support of NOAA NMFS NEFSC



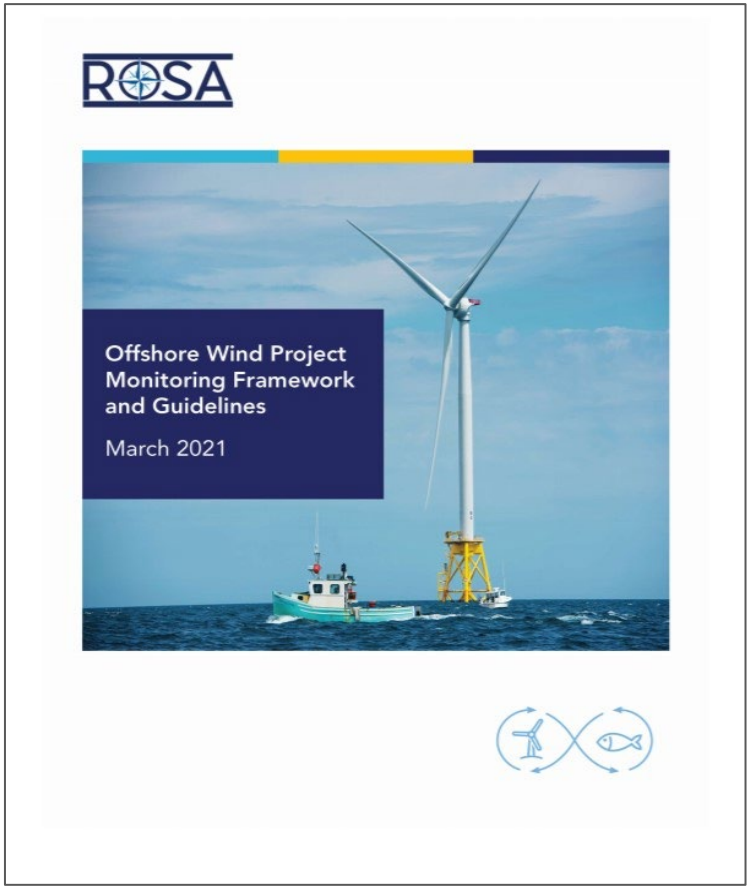
Offshore Wind Development on the NE U.S. Shelf is Imminent

- Interactions with fisheries resource species are expected
- What are the best practices for monitoring and research?



Guidelines for fisheries resource research and monitoring

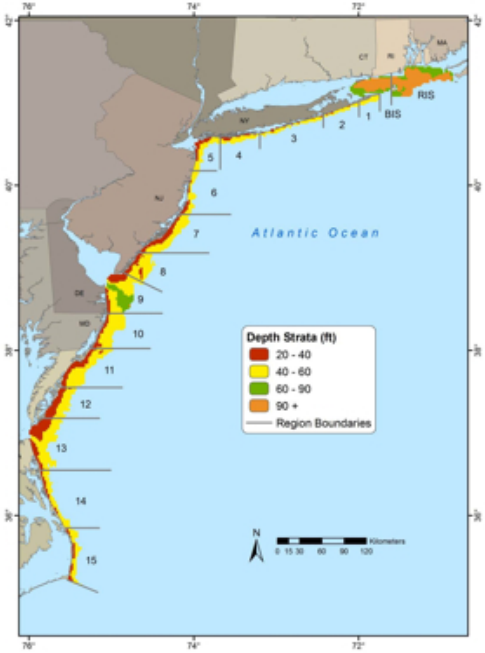
1. Evaluate existing data
2. Consult with regional science entities
3. Define clear and relevant objectives and hypotheses
4. Identify focus species or groups to monitor
5. Define measureable thresholds
6. Develop a statistical study design to achieve objectives and address hypotheses
7. Identify sampling methods
8. Apply for state/federal permit authorizations
9. Collect data using standardized protocols
10. Analyze data collected
11. Evaluate the performance of the study plan
12. Adjust sampling design/methods as needed to continue to address monitoring objectives
13. Store and share data and results



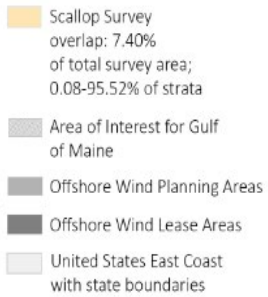
www.rosascience.org

1. Evaluate Existing Data

- Existing data are available data to describe fishery, habitat, and socioeconomic resources within the project area
- Data on existing, future, and/or cumulative stressors within the project area
- e.g.,
  - NMFS bottom trawl survey, shellfish surveys
  - NEAMAP
  - State surveys



www.vims.edu/newsandevents/topstories/archives/2011/neamap.php

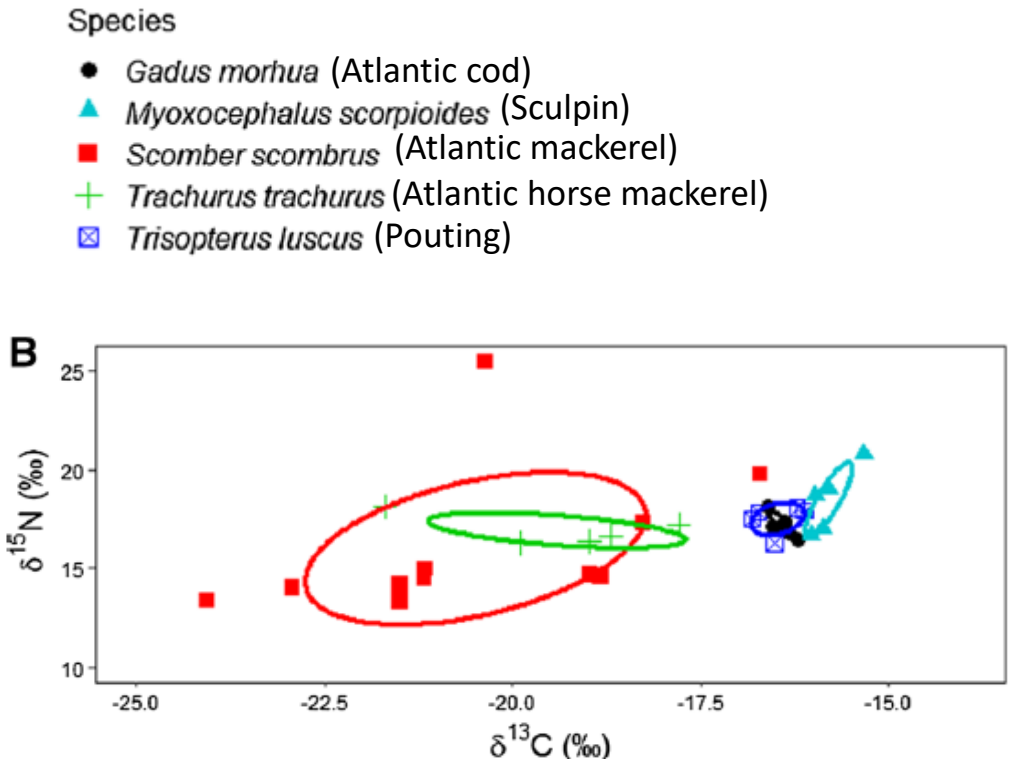


2. Consult with Regional Scientific Entities

- Consultation with state/federal agencies, researchers, and fishing industry participants
- Discuss
  - relevant species
  - existing, future, or cumulative stressors
  - indicators
  - priority objectives, hypotheses, and questions

3. Define relevant objectives and hypotheses

- Objectives / hypotheses should be concise, appropriate, and testable
- Example
  - What are fish in the wind farm area feeding on?



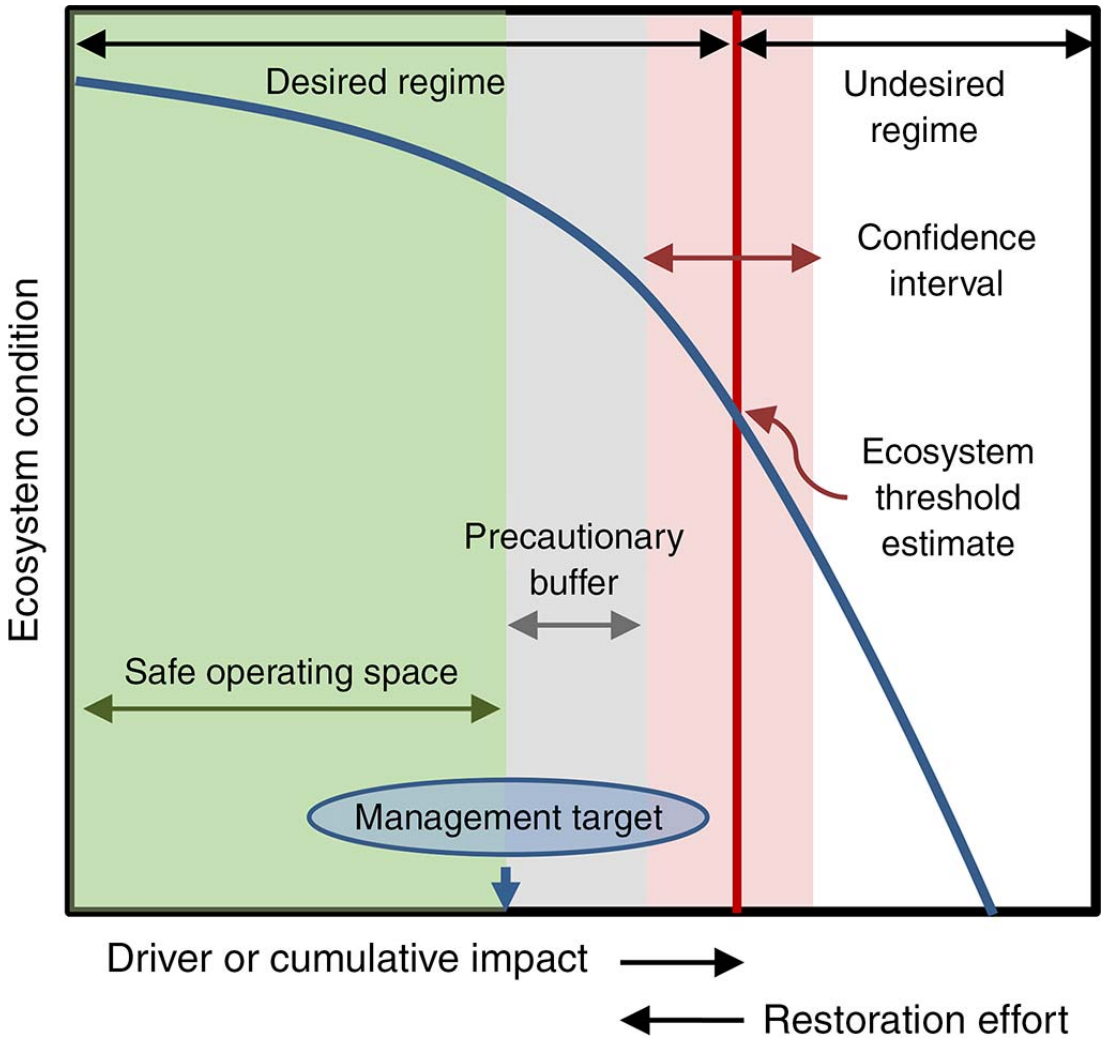
Mavraki et al., 2021

4. Identify focus species/ groups/ indicators/ receptors

- Identify research focus (species, habitats, etc.) and appropriate indicators/receptors to monitor
- Some useful characteristics of a good indicators (Methratta and Link, 2007)
  - Occur in the project area
  - Representative of key processes, community, etc.
  - Sensitive to offshore wind development
  - Measurable

5. Define thresholds of change

- Thresholds should be appropriate and measurable
- What is the biological significance of crossing the threshold?
- What are the implications from fisheries, fisheries management, and regulatory perspectives

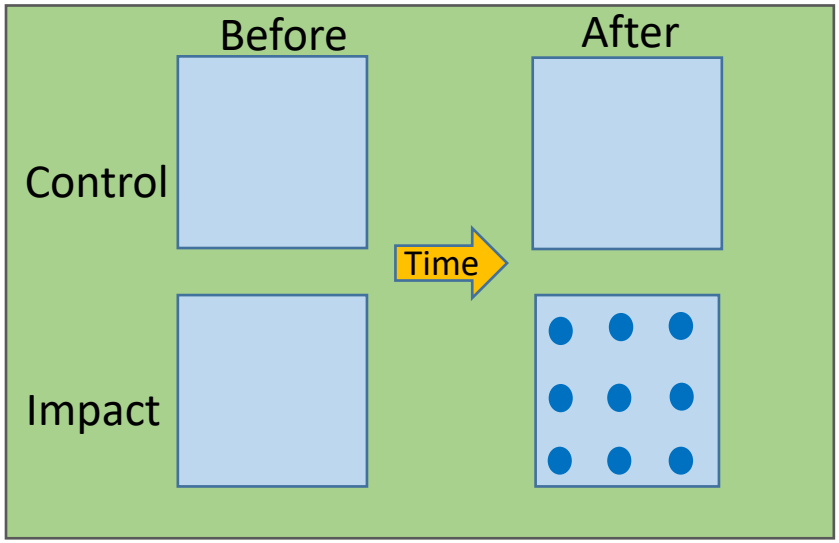


http://oceantippingpoints.org/our-work/glossary

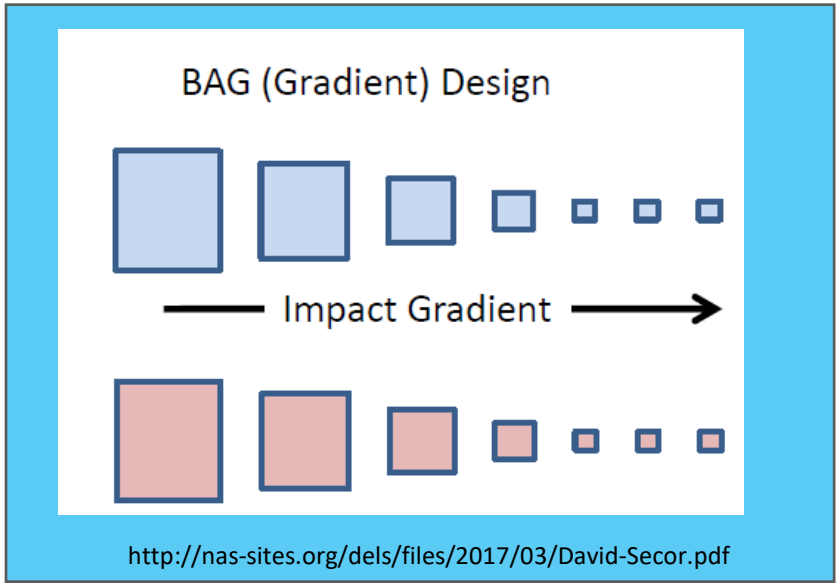
6. Develop a statistical study design to achieve objectives and address hypotheses

- Design should be based upon the
  - question being asked
  - indicators measured
  - change thresholds

Before-After-Control-Impact (BACI)
-Underwood 1992, 1994

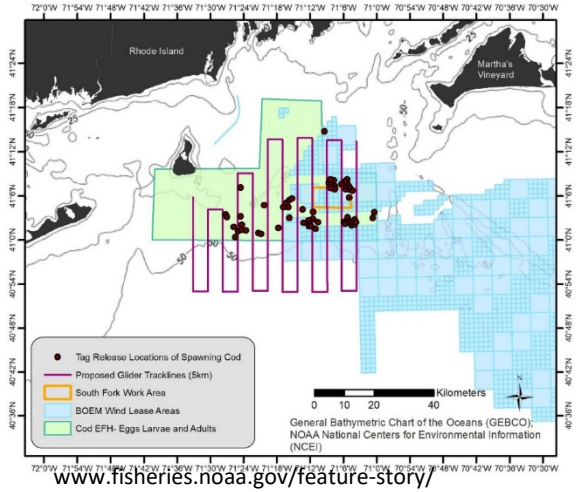


Before-After-Gradient (BAG)
-Secor et al., 2018
-Methratta, 2020



7. Identify sampling methods

- Method should collect appropriate data to address monitoring objectives



www.fisheries.noaa.gov/feature-story/

8. State/federal permit authorizations

- Characterize appropriate federal and state permits/authorizations for selected monitoring activities

https://endlessocean.fandom.com

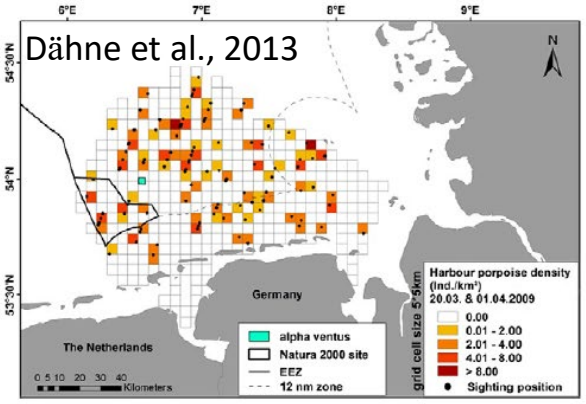
https://www.njspotlight.com/2021

9. Collect data using standardized protocols

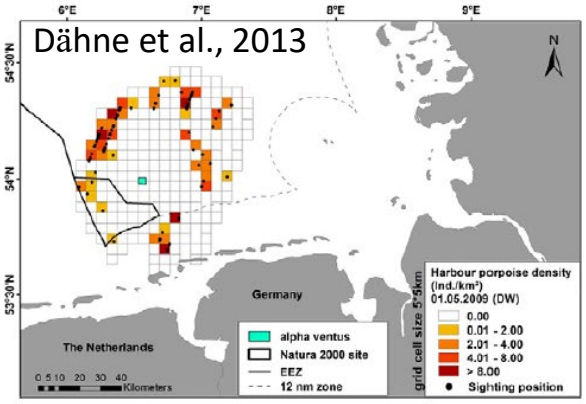
- Data collection methods should use standardized protocols to collect and analyze biological and environmental data that can be integrated with existing survey data

10. Data Analysis Plan

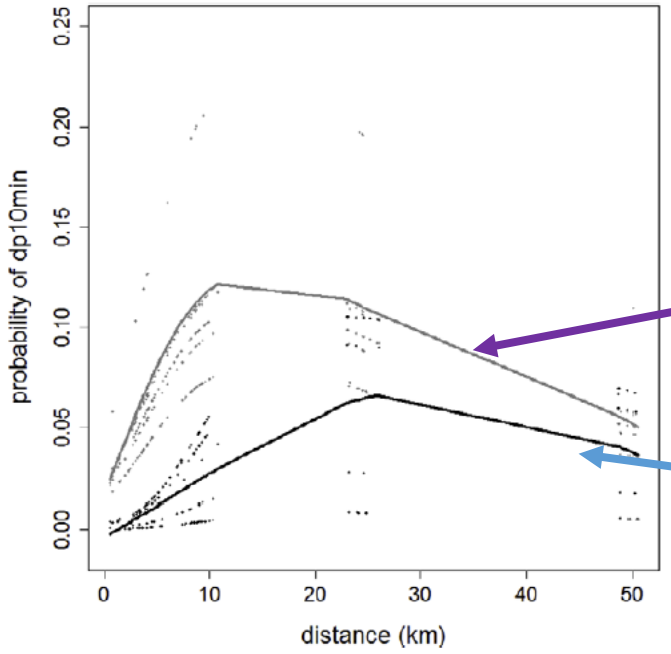
- Use statistical methods and models capable of:
  - achieving monitoring objectives,
  - testing stated hypotheses, and
  - assessing whether meaningful thresholds have been crossed



a) Porpoise Density Before Pile Driving



b) Porpoise Density During Pile Driving



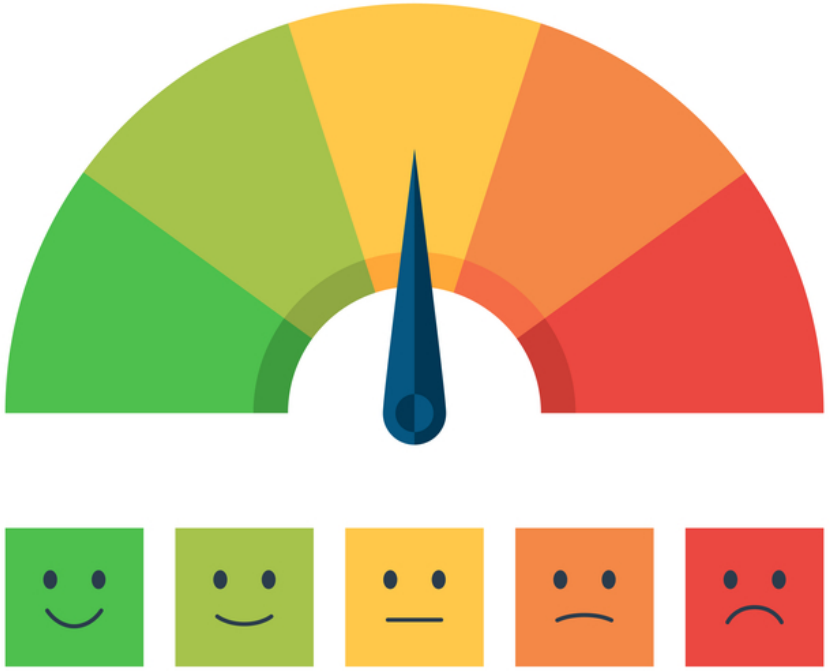
Results of GAMMs from Dähne et al., 2013

No pile driving occurring

Pile driving occurring

11. Evaluate the performance of the study plan

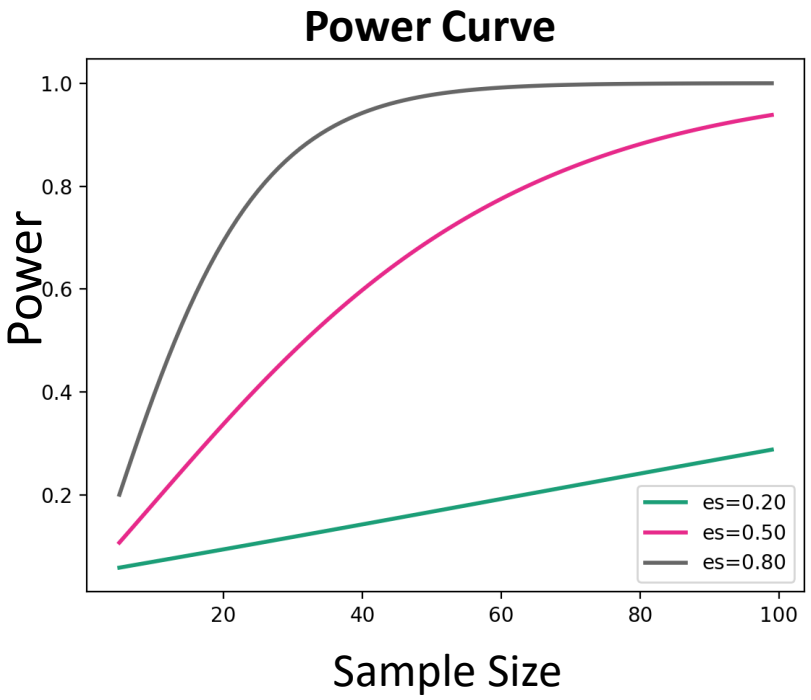
- Is plan achieving its objectives?
- What performance indicators will be used? E.g.:
  - Are indicators representative?
  - Are the sampling technologies consistently able to collect the desired data?
  - Is the sampling design able to detect real effects?

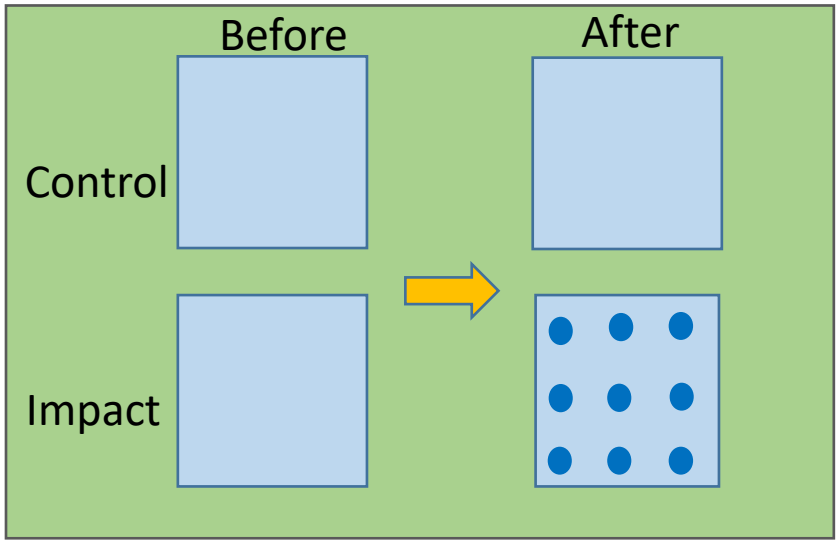


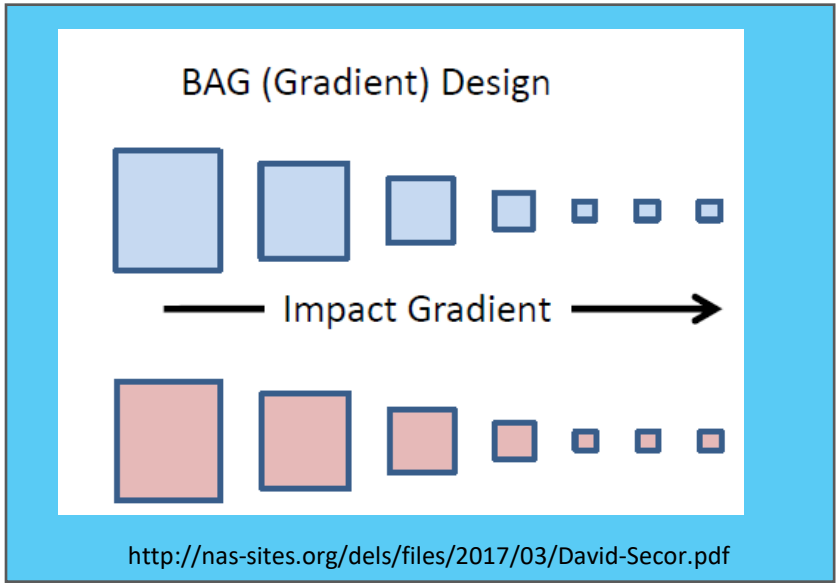
www.fels.upenn.edu/recap/posts/1521

12. Adjust sampling design/methods as needed to continue to address monitoring objectives

- Is statistical design and sample size sufficient to detect effects?

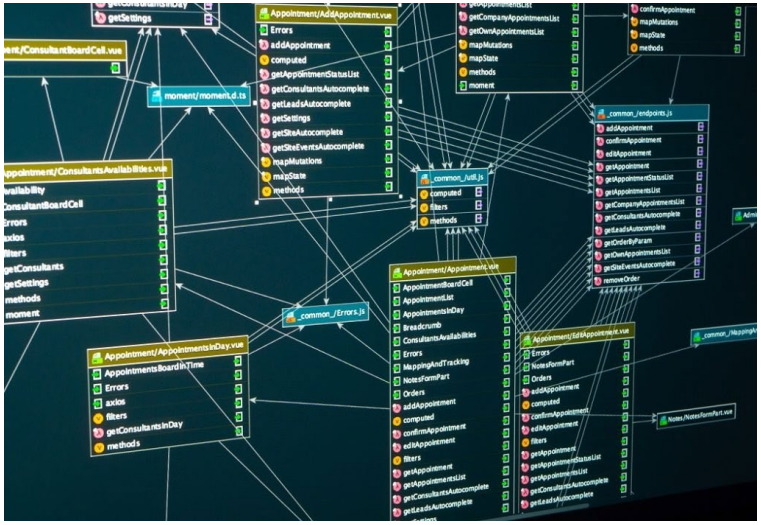


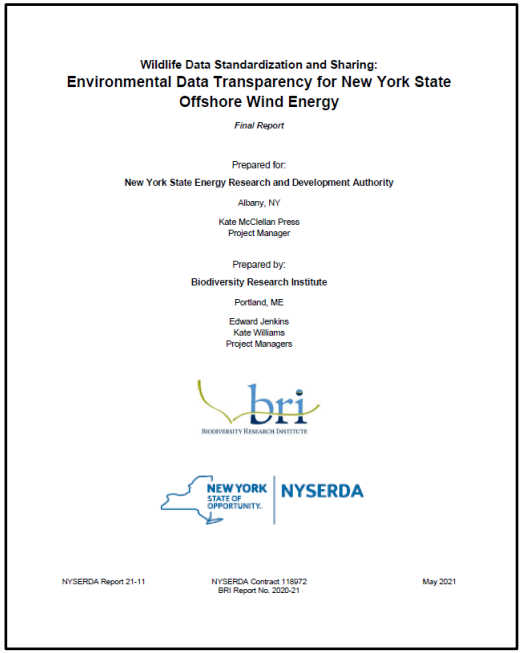




13. Store and share data and results

- Indicate how and where data will be stored and shared
- Standardized databases should be used





Wildlife Data Standardization and Sharing:
Environmental Data Transparency for New York State Offshore Wind Energy

Final Report

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Albany, NY
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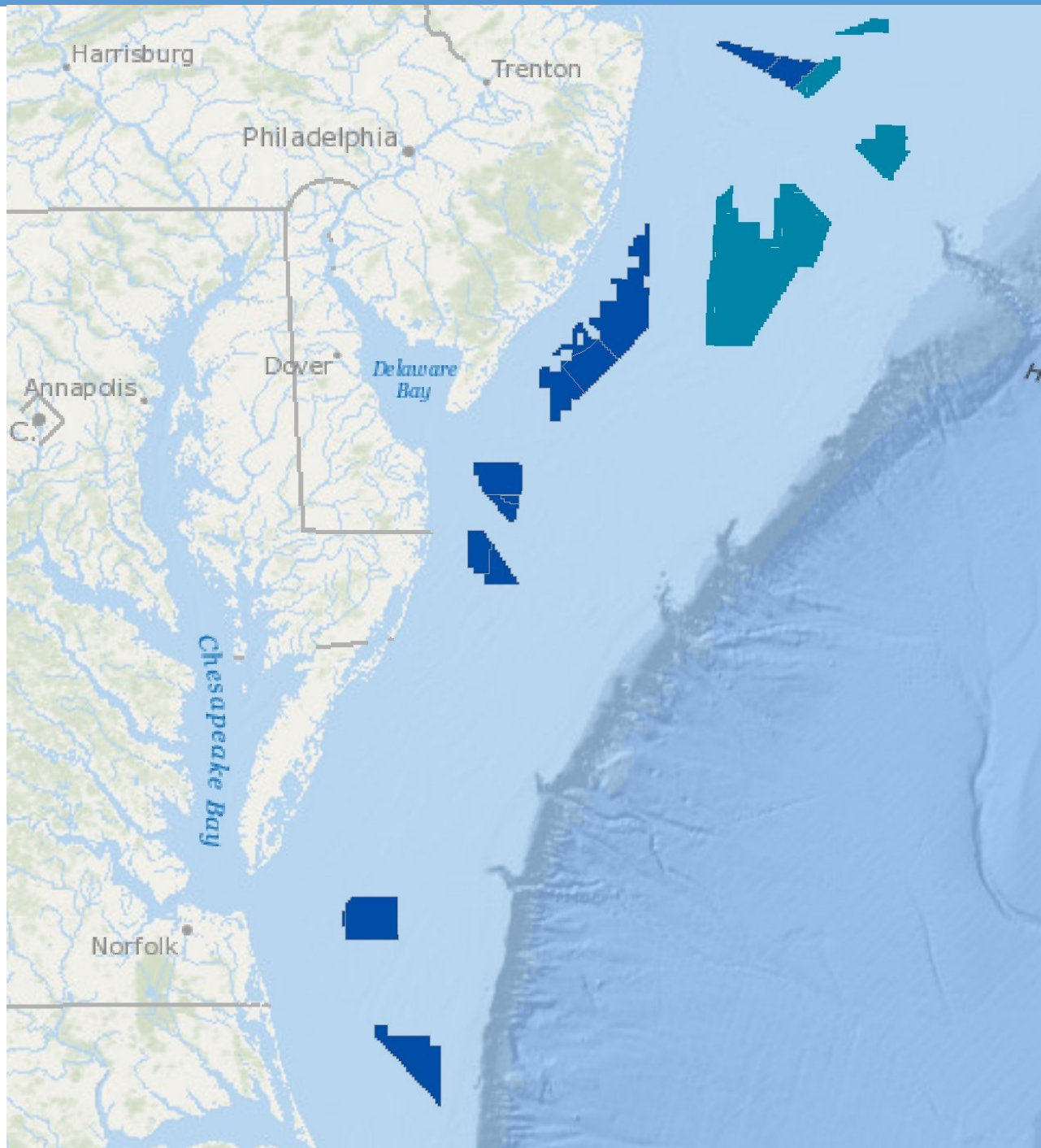
Biodiversity Research Institute
Portland, ME
Edward Jenkins
Kate Williams
Project Managers

NYSERDA Report 21-11 | NYSERDA Contract 118972, BRI Report No. 2020-21 | May 2021

www.nyserda.ny.gov/-/media/Files/Programs/offshore-wind/21-11-Wildlife-Data-Standardization-and-Sharing-Environmental-Data-Transparency-for-NYS-OSW-Energy.pdf

*Regional Coordination



*Define temporal scales

- Multiple years are needed to assess natural patterns of variation and to disentangle post construction effects from natural variation

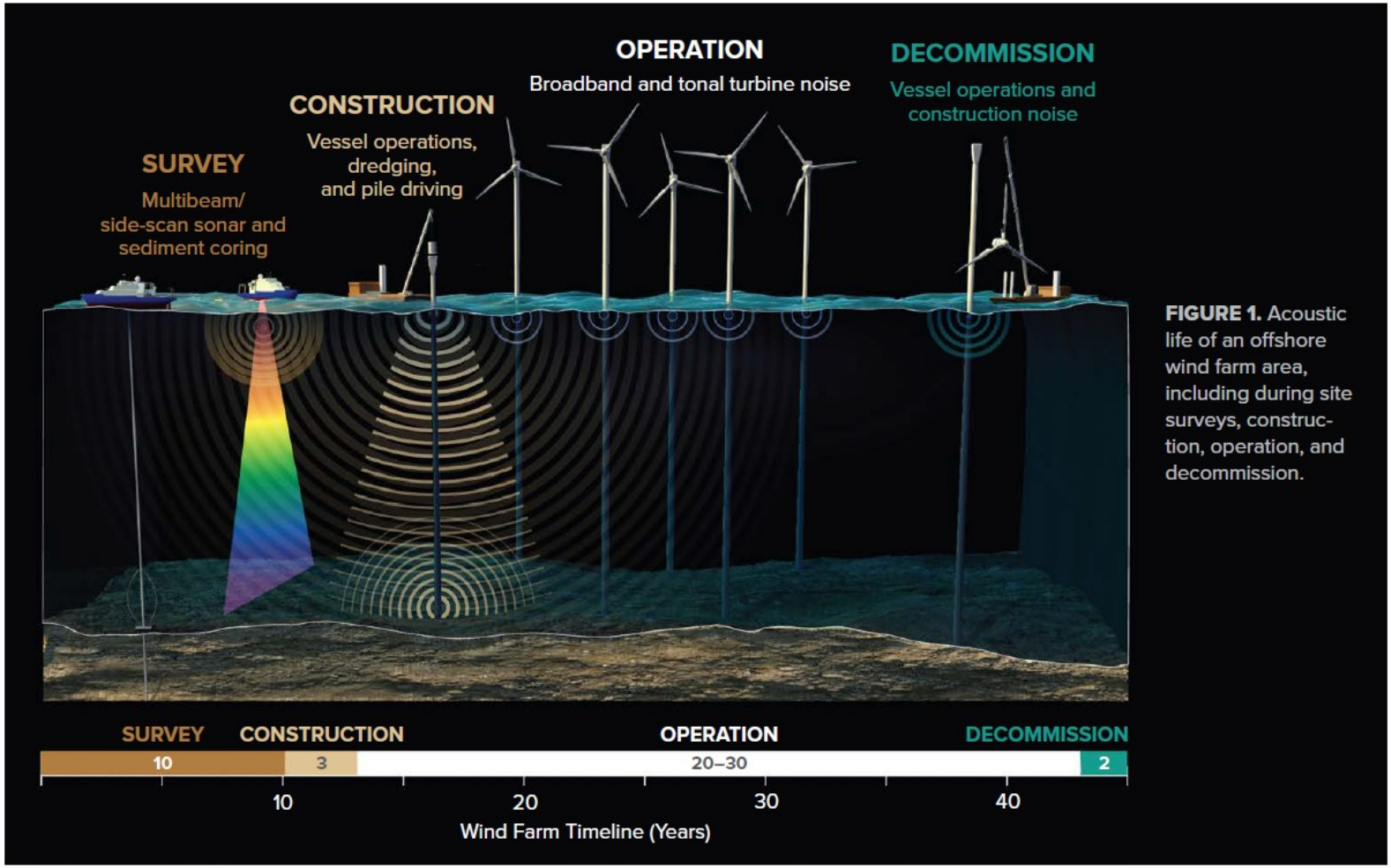
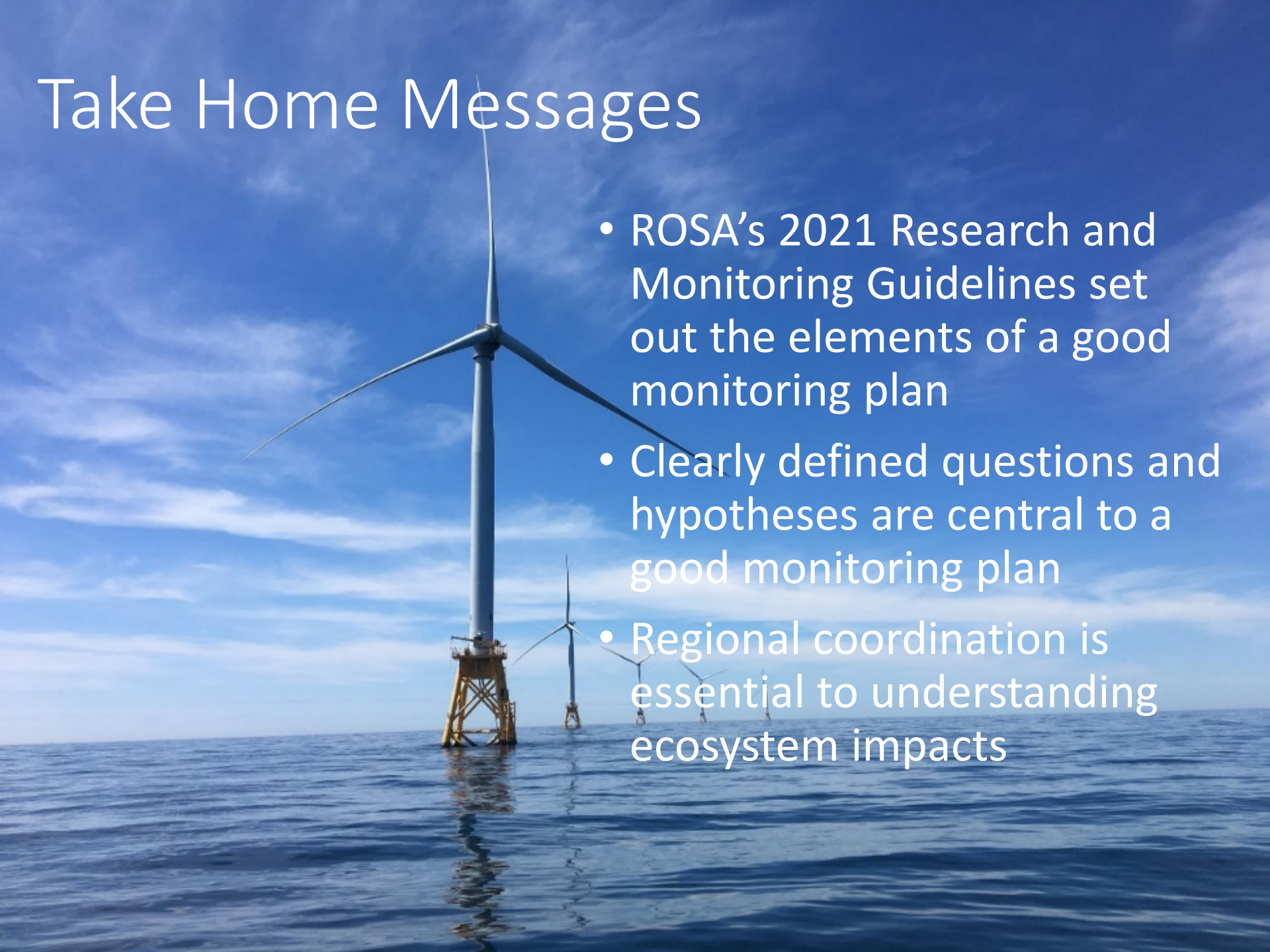


FIGURE 1. Acoustic life of an offshore wind farm area, including during site surveys, construction, operation, and decommission.

Mooney et al, 2020

Take Home Messages



- ROSA's 2021 Research and Monitoring Guidelines set out the elements of a good monitoring plan
- Clearly defined questions and hypotheses are central to a good monitoring plan
- Regional coordination is essential to understanding ecosystem impacts

Thank you!

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