

**Wind Farm Effects that will impact NEFSC Survey Operations and Concomitant Stock Assessments
Impacts Draft Breakout Group Summary**

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Major Effects

1. Noise
2. Habitat Alteration
3. Electro-magnetic Fields
4. Radar Effects
5. Changing Availability to survey frame
6. Vessel Traffic
7. Hydrodynamic changes
8. Establishment of new strata that cannot be sampled with current methods, e.g., Wind Turbine Generators (WTGs), unburied cable, buried cable and dredge survey issues
9. Sediment suspension
10. Lighting

Major Impacts

1. Reduce precision on stock assessment indices
2. Reduce accuracy due to availability effects on assessment indices
3. Transitioning to new sampling design will reduce precision on assessment indices in order to build new time series
4. Vessel transit impacts—increasing time to stations and reducing station productivity
5. Reduced safe navigation through WEAs and transit corridor due to Bigelow aircraft height of 85' which will further reduce effective transit corridor between WTGs.
6. Integrated benthic survey operations, e.g., HabCam, will require changes in transect methodology
7. Similar to NEFSC Habcam operations—impacts to Research Set-Aside funded survey operations would be similarly impacted
8. Potential effects of sediment suspension would impact video survey/drop camera operations with consequent impacts on availability and efficiency

9. Assume that exclusion of NOAA Survey Vessels within Wind Energy Areas. NOAA OMOA requires at least 1 mile distance separation for operating mobile gear within oil and gas platforms. No standard operating practice has been developed to address safe operations within wind farm arrays and captain's judgement of safe navigation procedures are always in effect. These decisions will vary by captain, weather, and survey conditions/requirements.
10. Potential changes in hydrodynamics may affect survey gear performance
11. Eliminates the random survey design protocols from being deployed in wind energy areas (~10% of Southern New England/Mid-Atlantic shelf)
12. Increased conflicts with commercial and recreational activities (vessels & gear) will further limit ability to sample within arrays, adjacent areas, or areas that create displacement outside of WEAs
13. Potential effects on marine mammal and fish assemblages (EMF, Noise, etc effects) will impact our ability to accurately assess those populations
14. In NY/NJ NEAMAP survey operations would be impacted and concomitant impacts on assessments that utilize this time series.
15. Light Impacts from WTGs may impact day/night behavior of animals. Changes in behavior may effect survey efficiency and availability with consequent impacts on assessments
16. Impacts of survey operations at night—would increase uncertainty and introduce potential diel effect biases.

Key Questions

1. Can NEFSC execute current range of sampling technologies within wind arrays and cable corridors and possible changing conditions due to construction and operations, e.g., can hydraulic dredges continue to sample over buried cable areas?
2. What survey technologies are European fisheries science bodies utilizing to address survey operation effects and impacts?
3. How would a mixed of fixed and random stations be integrated in statistical models of abundance?
4. How would increasing fixed station component to surveys be accommodated, considering the fraction of fixed stations would increase over time.
5. What alternative sampling methods and alternative vessel operations are feasible to support for current and future assessment needs
6. How many years of baseline surveys using an alternative survey method would be needed to calibrate with our existing survey time series across the range of stocks NEFSC is required to assess through Magnuson?
7. Based on pending foreseeable developments and the likely outcome of development of alternative survey methods within WEAs, should NEFSC increase our current sampling density within WEAs?
8. How much extractive vs non-extractive sampling is required within WEAs to answer research and monitoring needs, e.g., biological samples, sensor-based sampling?
9. What navigation restrictions will be in place due to WEA development?
10. How will changes in vessel traffic and displaced fishing effort impact sampling areas outside of WEAs

11. What mechanisms are in place to train and develop new safety protocols for vessel operations to safely navigate near or within wind arrays?
12. What is the sensitivity of specific stock assessments introduced by changing or evolving survey designs and sampling methods or reduced sampling frames?
13. Can we design regional and site-specific impact monitoring methods and survey operations that are compatible/complementary to replacement alternatives for our regional survey operations?
14. What peer-review process should be employed to assess and institute changes that may be required to NMFS survey operations?
15. What calibration studies will be needed if alternative sampling strategies are recommended?