Responses of demersal fish and invertebrates to Block Island Wind Farm

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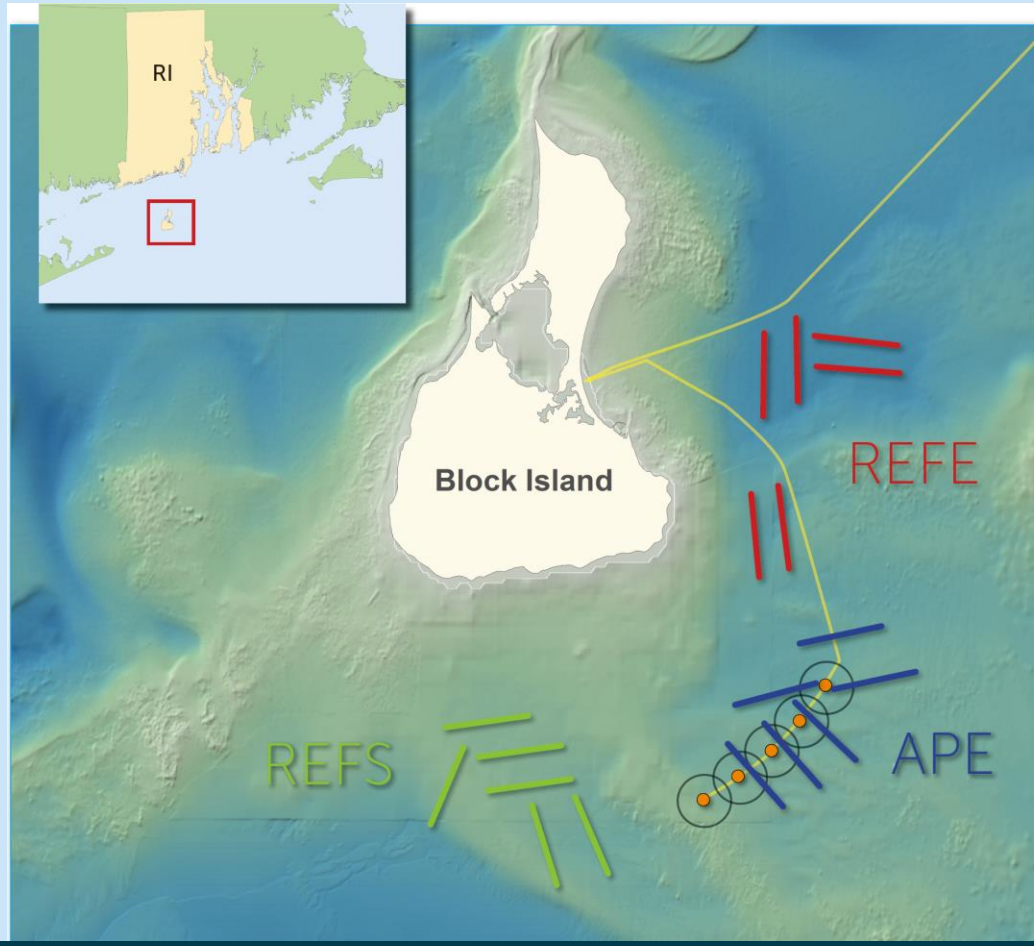
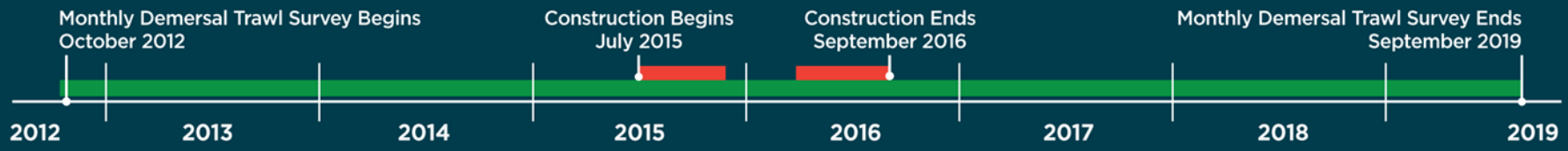
Demersal Trawl Survey

- Conducted on commercial trawler from Pt. Judith
- Otter trawl consistent with other regional studies
- 20 minute tows, once a month
- Three Study Blocks
  - Reference South – 2 tows
  - Reference East – 2 tows
  - Area of Potential Effect – 2 tows
- Seven Years of Surveys
  - 2 years before construction
  - 2 years during construction
  - 3 years after construction





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Block Island Wind Farm Trawl Survey Sampling October 2012 – September 2019

- 497 tows (using regional sampling protocol)
- > 750,000 fish and invertebrates collected
- Nine species account for 90% of all individuals
- Numerical dominants:
  - Butterfish
  - Little skate
  - Scup
  - Winter skate
  - Longfin squid

Block Island Wind Farm Trawl Survey Sampling
October 2012 – September 2019

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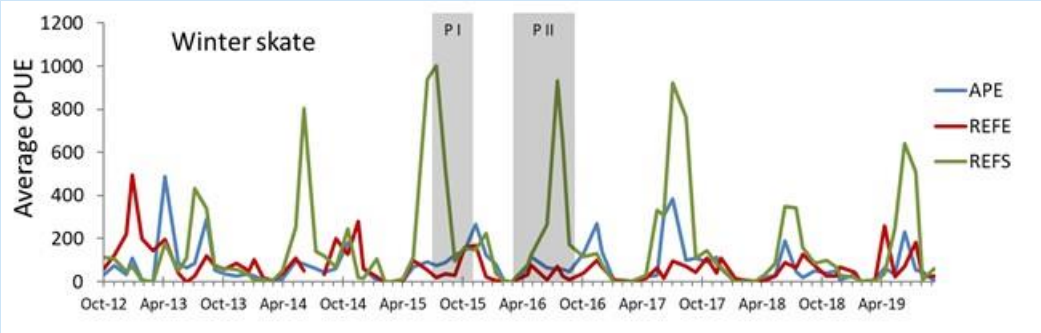
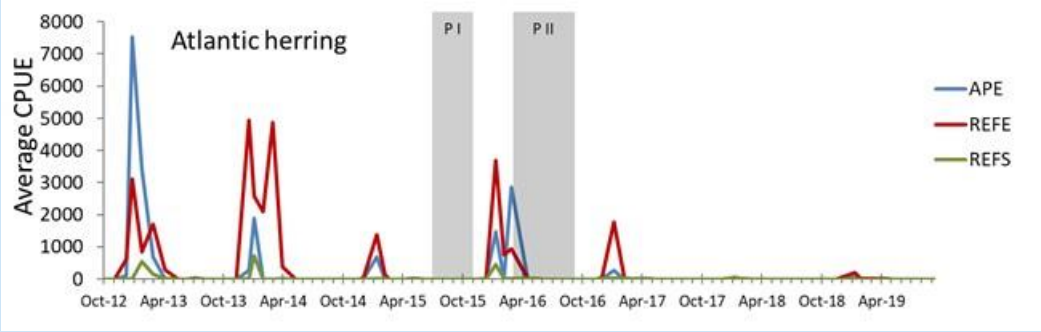
Statistical Power
Minimum effects sizes of approximately
40% to 63% for the fish species evaluated
(black sea bass, little skate, summer flounder, windowpane,
winter flounder and winter skate)

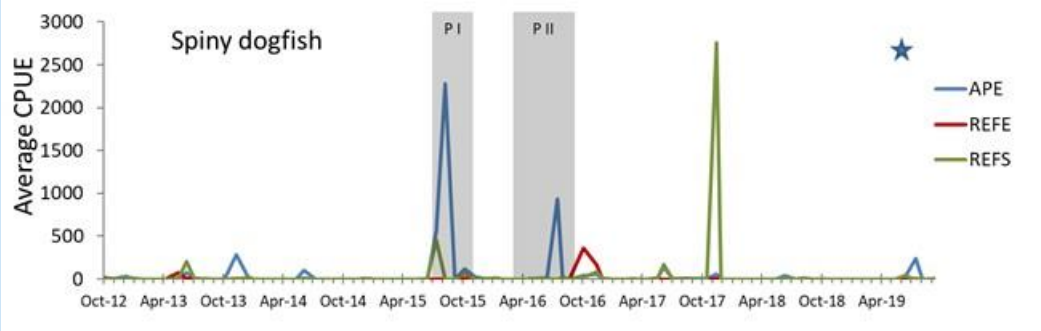
Examined Multiple Metrics

- Fish/invertebrate abundances
- Size distributions
- Fish condition
- Flounder and hake dietary habits
- Prey accumulation curves

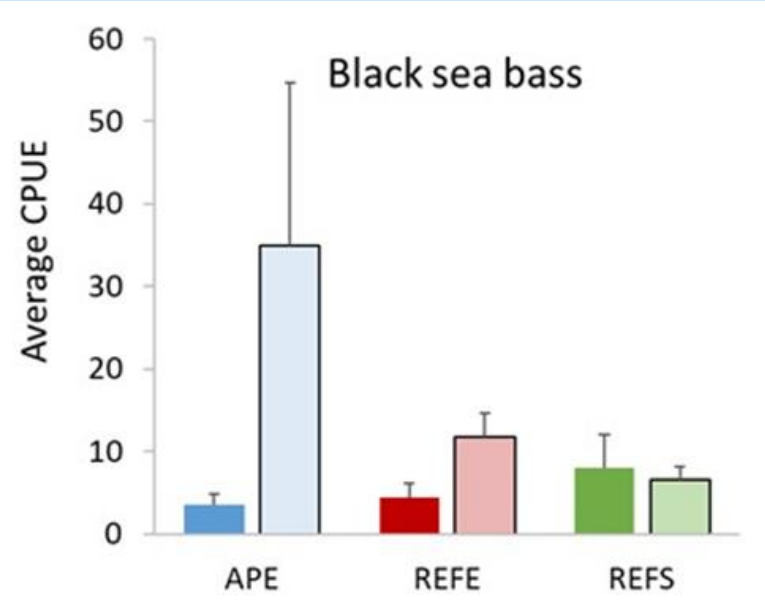
Spatial and Temporal Variation in Abundances







Fish Catch Model – Results
Black sea bass – Baseline vs Operation



Baseline

Operation

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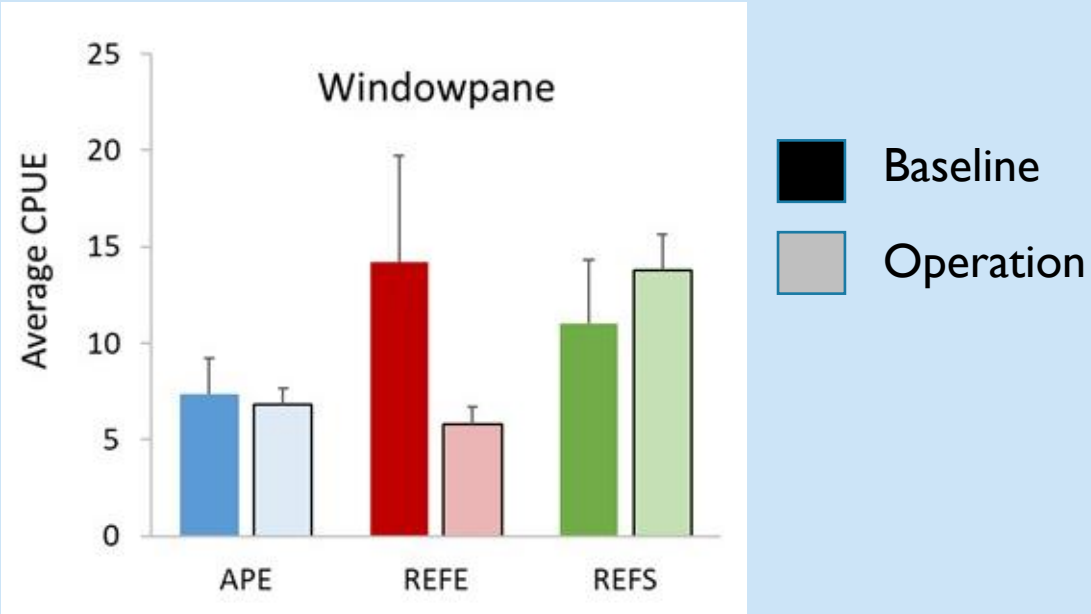
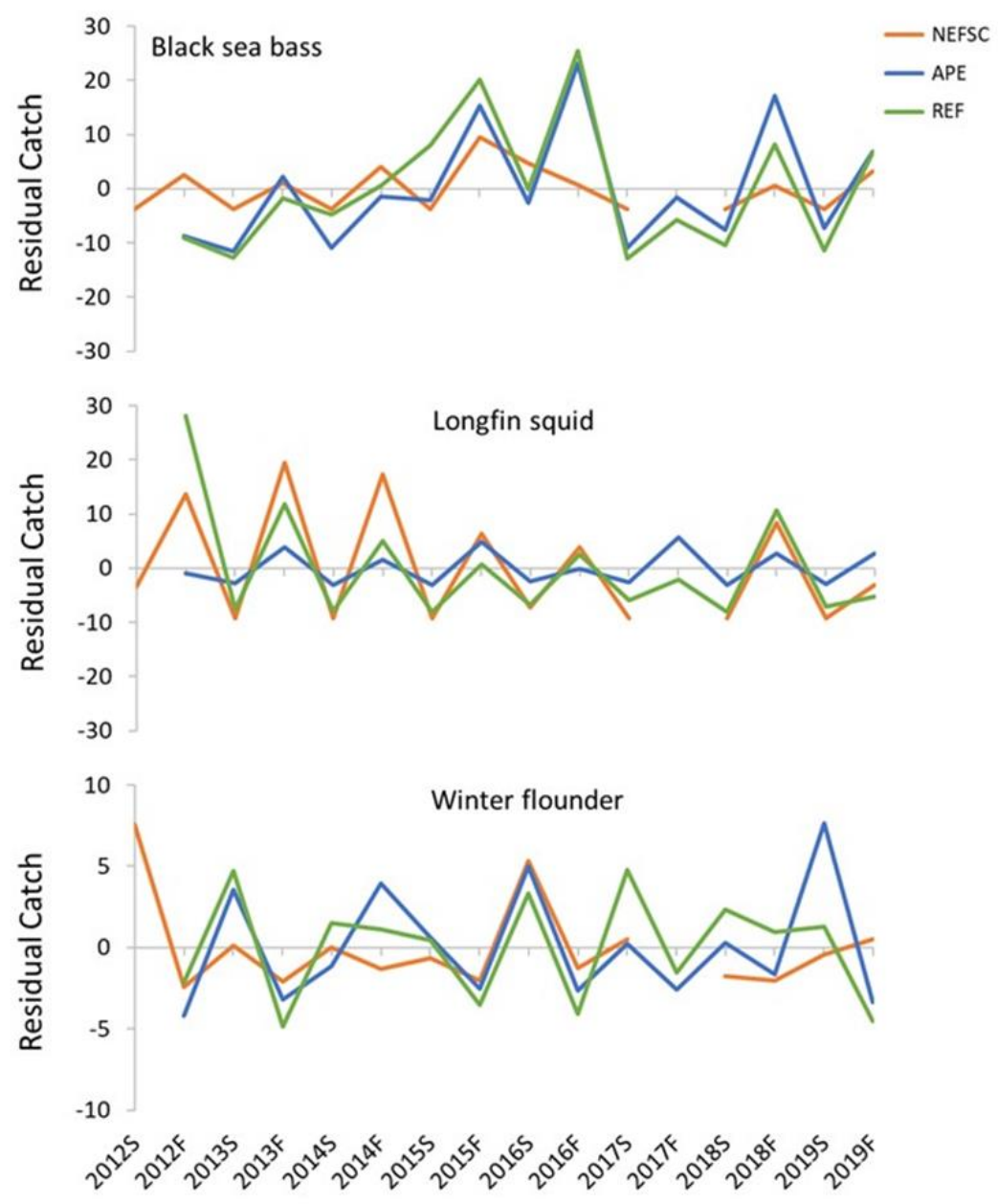
Fish Catch Model – Results
Windowpane – Baseline vs Operation



Regional Context of Study Results



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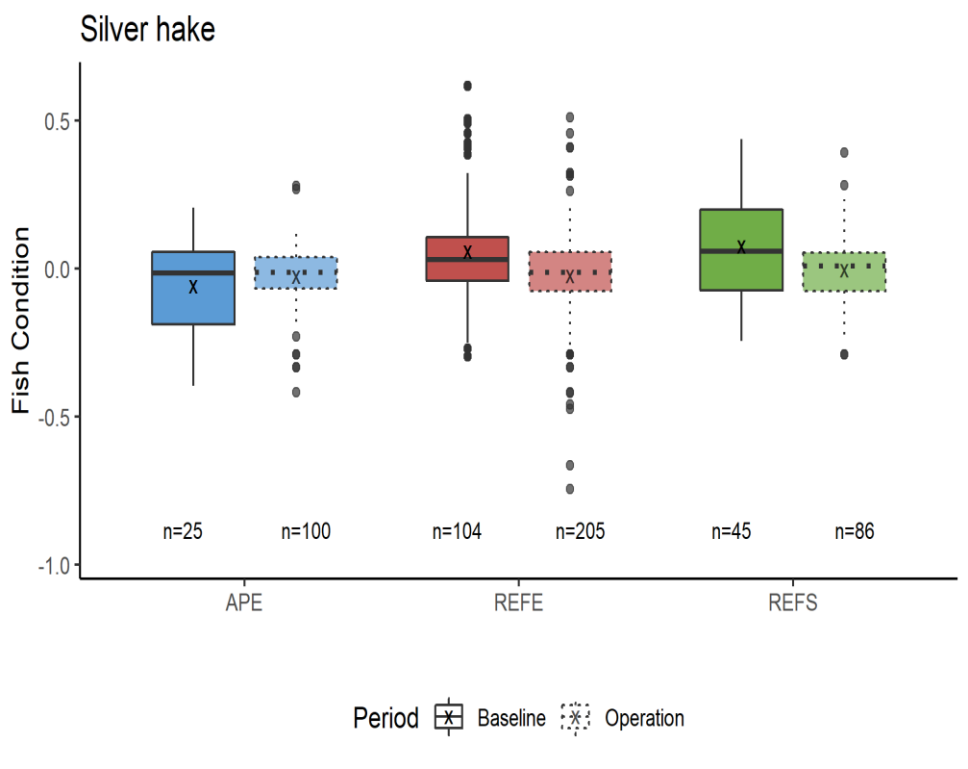
Fish Condition Index – Baseline vs Operation

Condition index values = residuals from a log(Weight)-log(Length) regression

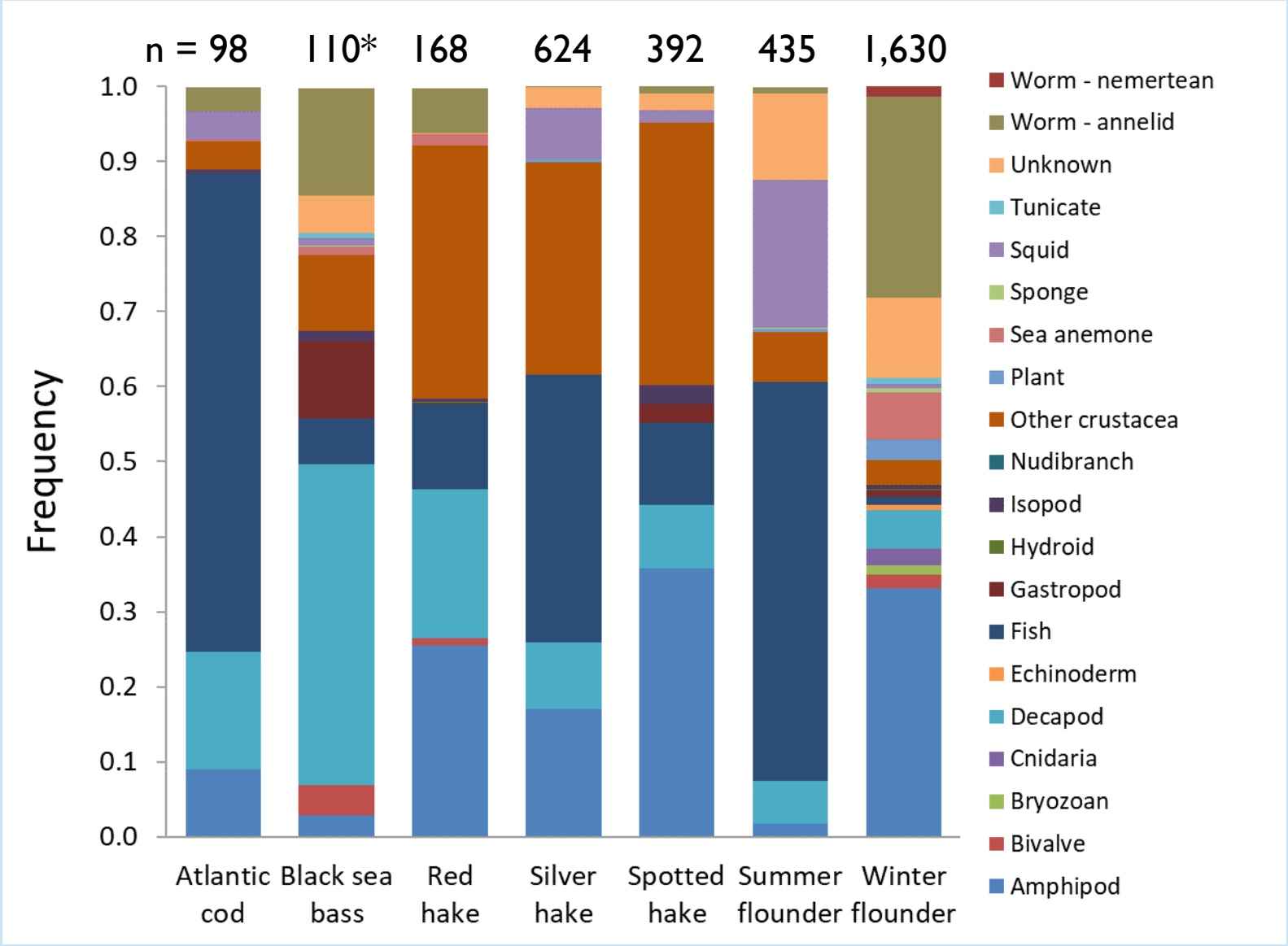


- All species showed highly significant ($p << 0.001$) decreases in condition values from Baseline to Operation (averaged across areas)
- Silver hake condition increased at APE, decreased at reference (interaction $p = 0.016$).

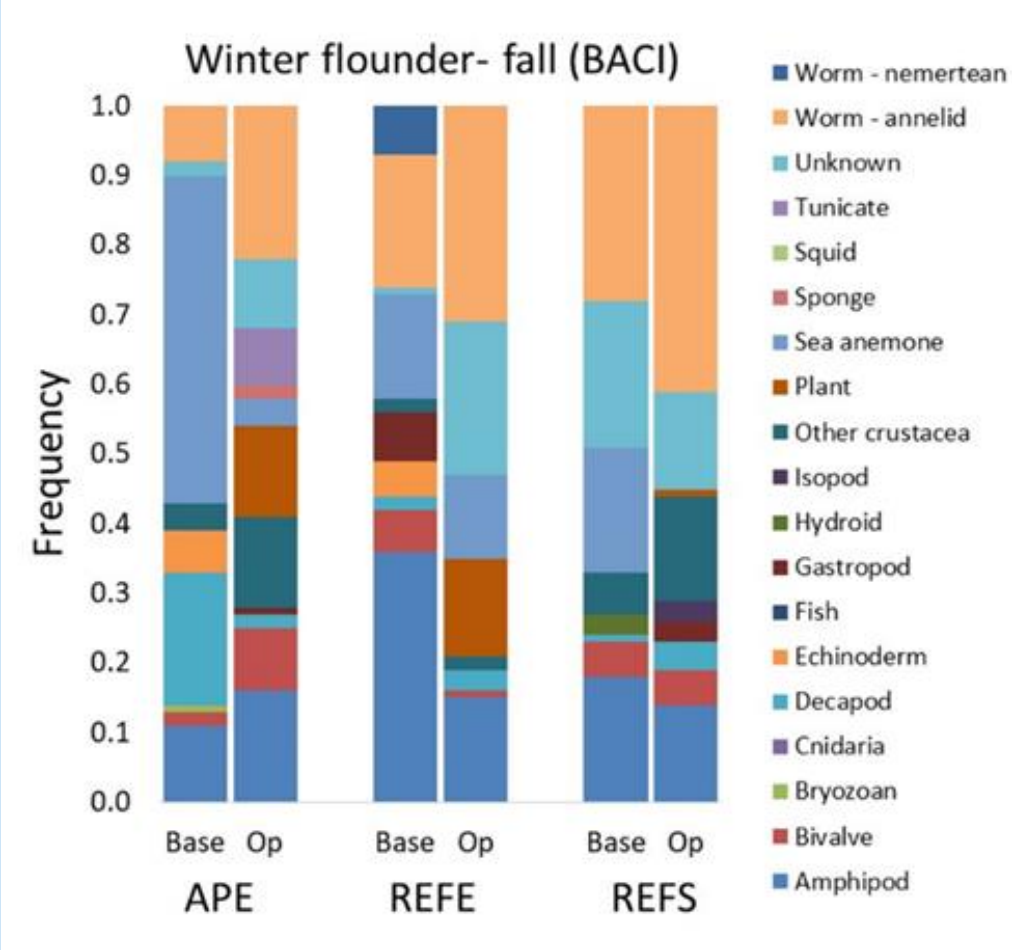
Fish Diet

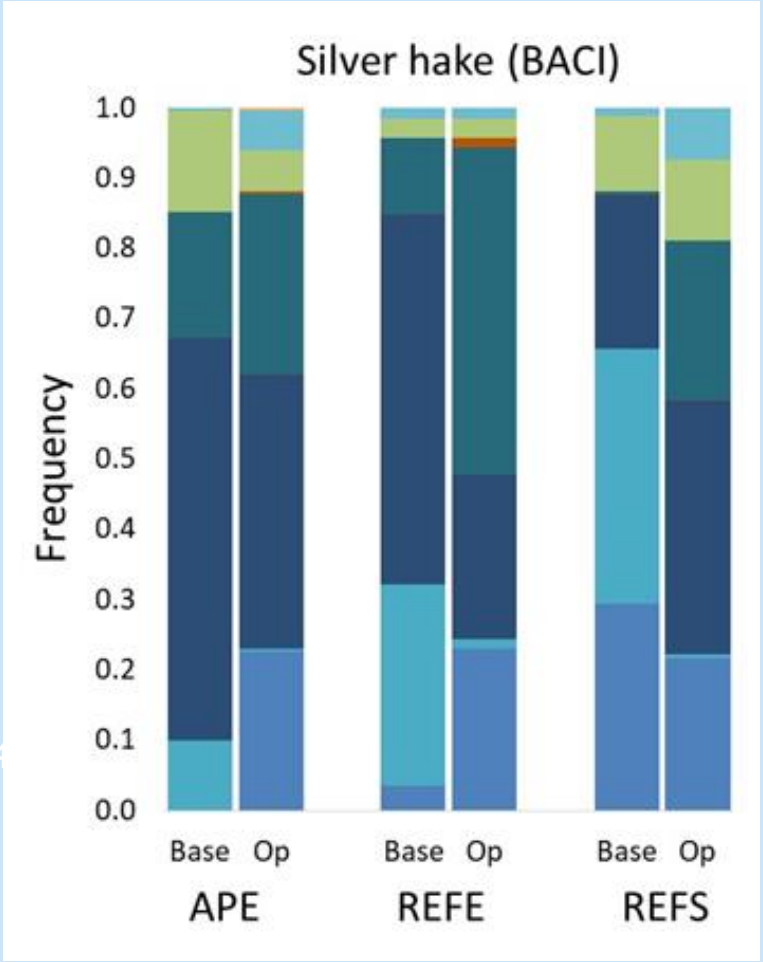
Winter flounder
Summer flounder
Silver hake
Red hake
Spotted hake
Atlantic cod
Black sea bass (Year 7)

Diet Composition

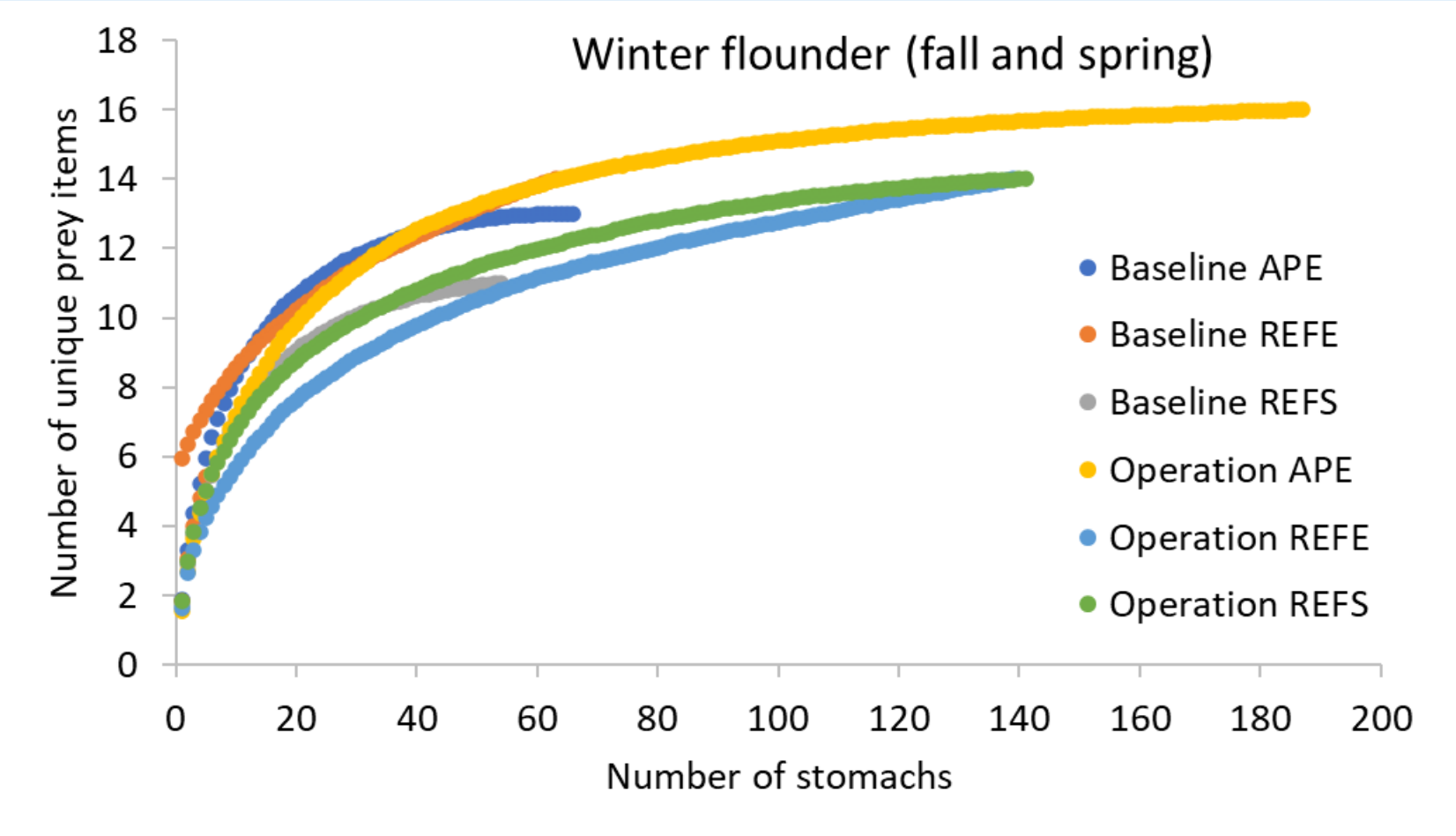


Stomach Content Analysis





Prey Accumulation Curves



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Lessons Learned

- Study design should balance fishing community interests and science interests. Consider adaptive monitoring to address fishing community concerns where possible.

- If possible, conduct power analysis to determine if ecologically meaningful differences can be detected

- Fish abundances (CPUE) are highly variable for some species, and therefore can yield low statistical power. At BIWF, a 40% to 63% difference in catch rates between reference sites was the minimum effect size averaged over the taxa examined.

- Comparing results to regional surveys is useful for interpreting trends.

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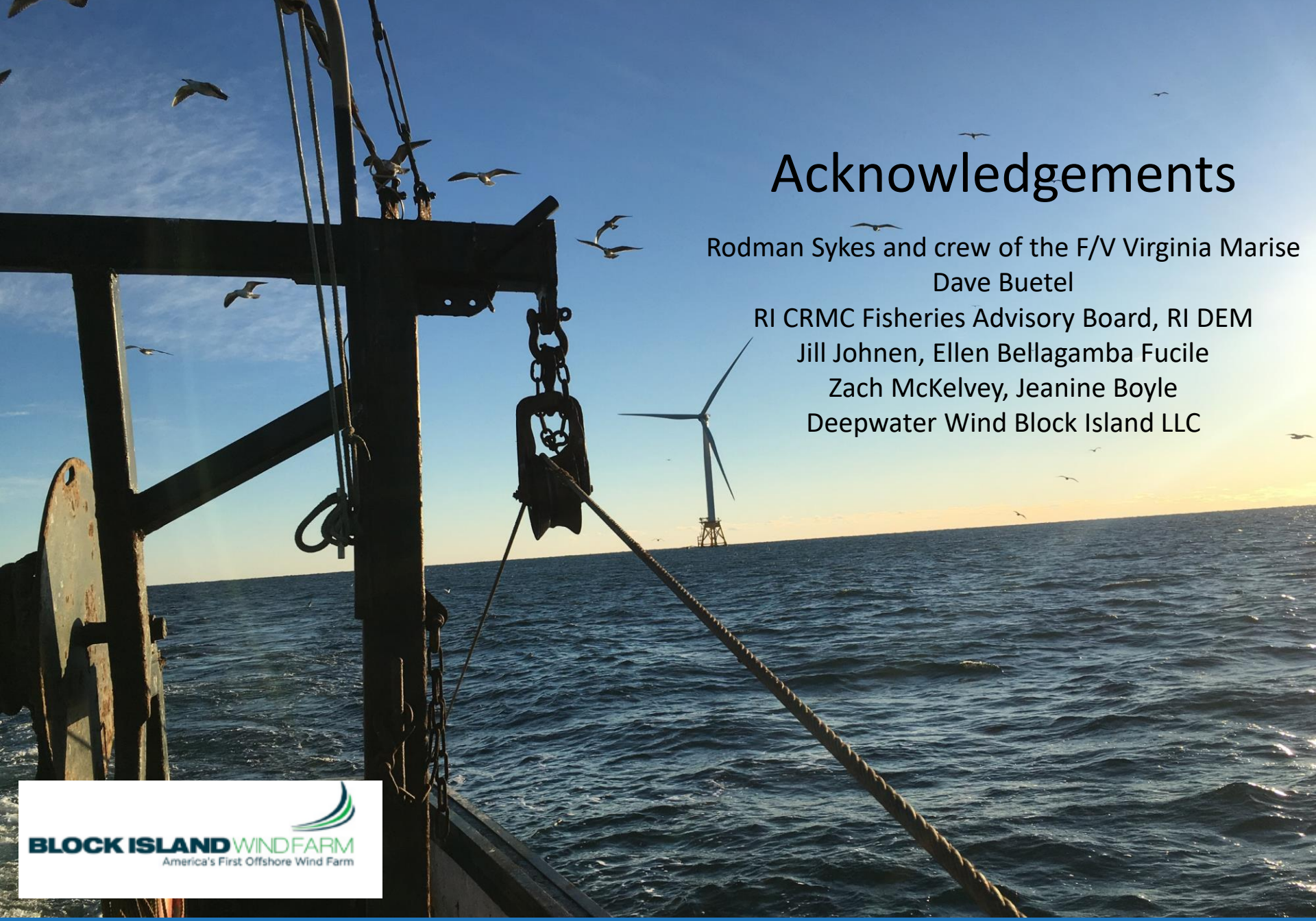

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Deepwater Wind Block Island LLC

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