



Birds and Offshore Wind: Studying and Assessing Effects

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- Surveys have identified a diversity of species or species groups on the California OCS
- Nearshore and shoreline species
 - § Sea ducks, loons, grebes, shorebirds, gulls, terns
 - § Western Snowy Plover, California Least Tern and Marbled Murrelet – ESA listed
- Pelagic species primarily in deep offshore waters
 - § 50+ species including tubenoses, skuas, alcids
 - § Pelagic shorebirds, terns, gulls
- Changing status
 - § Short-tailed Albatross and Hawaiian Petrel – ESA listed
 - § Rare but increasing
 - § Knowledge of distribution changing... regularly occurring off California



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Collision Hazard

- Rotor and support towers

Avoidance

- Displacement from feeding grounds
- Movement barriers
 - § Migration and feeding

Attraction

- Prey base and habitat alteration/creation
- Light attraction/disorientation
- Perching...including falcons

Effects from one project could be minimal, but cumulative impacts from multiple projects could be significant



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Offshore Wind Farms Operational

- 1,662 turbines grid connected
- 4,995 MW in 55 farms; 10 countries

Assessment and Monitoring Experience

- Insight on survey techniques and duration
 - § 2-3 years of monthly pre-construction surveys
 - § 2 km minimum buffer
 - § Radio tracking, radar, land-based
 - § Post-construction monitoring

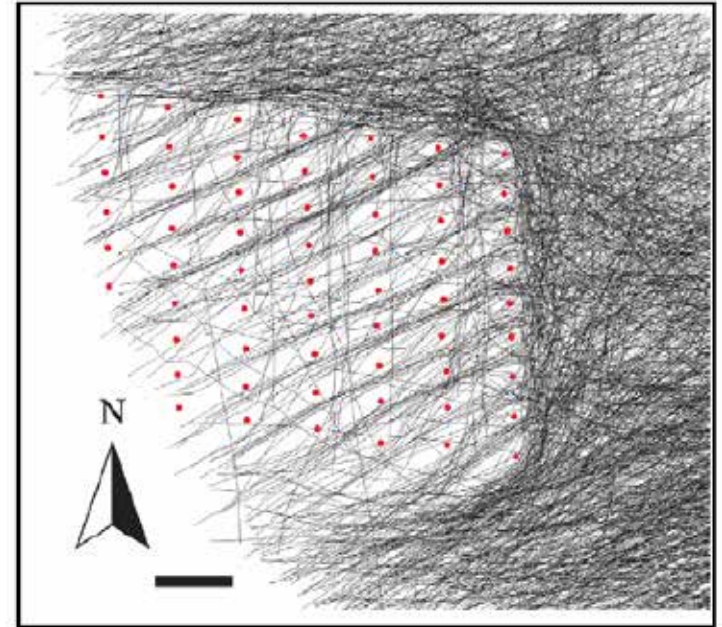
BOEM Workshop – February 2013

- Share experiences and learn from process in Europe
 - § They learned as much from us as we did from them



Effects Monitoring Ongoing

- Collision Risk
 - § Poorly quantified; monitoring difficult
 - § Behavioral changes minimize collision risk
 - § Modeling suggests very low levels of collisions by Common Eiders
- Barrier effects – migration
 - § Most species avoided wind farms
 - § Most showed gradual avoidance; others dramatic
 - § Greater problem for commuting birds
- Displacement
 - § Red-throated Loons avoided completely
 - § Common Scoter showed initial avoidance, but none after 5 years
 - § Long-tailed Ducks had lower densities in wind farm



Cape Wind

- First offshore commercial wind lease in U.S.

WEAs and Task Forces

- Taskforces with 10 states
- Six Wind Energy Areas (WEAs) identified on Atlantic Coast

§ Minimizes conflicts with constraints

§ Expedites leasing

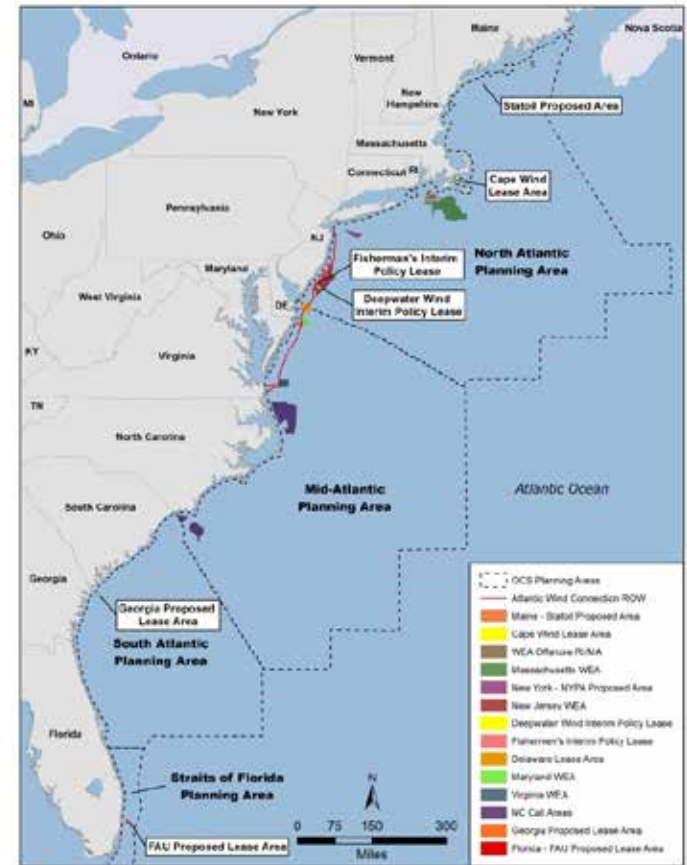
Avian Studies

- Pilot studies – technology

§ Aerial hi-def imaging

§ Acoustic/thermographic monitoring

- Surveys, data synthesis, modeling, statistical analysis to support survey guidelines



Task Forces

- Established for both states; regular meetings

Science Workshops

- BOEM Oregon Marine Renewable Energy Environmental Science Conference and Workshop
Nov 28-29, 2013
- Science Foundations for Ocean Planning in Hawaii: Human Use and Habitat Characterization
Oct 2-3, 2013
 - § Reviewed available knowledge and gaps
 - § Identified needs and next steps

BOEM & NREL Trainings

- Offshore renewable energy technology training
 - § May 21-22 in Portland; Aug 13-14 in Hawaii



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Avian Species

- Abundance and diversity of species in the California Current and Southern California Bight
 - § Some similarity to Europe and Atlantic species; others unique
- Listed species and species of concern
 - § Several globally rare and endemic species
- Determine avian baseline and data gaps
 - § Start needed studies sooner than late
- Lessons from oil and gas?

Diverse Stakeholders

- A number of bird organizations likely involved
- Interested public and variety of stakeholder groups





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Siting is Critical!

- Tough to undo once done so spend time before project understanding bird status, distribution and movements in area

Other Mitigations

- Construction timing
- Turbine design
 - § Fewer larger ones with minimal perching opportunities
- Turbine layout
 - § Wider spacing
- Turbine operation
 - § Slower speeds; temporary shutdown during migratory peaks or low visibility
 - § In conjunction with radar data; MERLIN by DeTect



Federally Endangered and Threatened

- 5 coastal birds and seabirds

Special Status Species

- 10 categories – federal, state and other
- 35 species with some level of special status on the Pacific OCS
 - § Several very rare species endemic to the Pacific OCS
- 35 additional special status species along coast



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Environmental Studies Program

- Collects information for environmental assessment and regulation of operations
- Studies designed to:
 - § Improve understanding of the ecosystem
 - § Provide baseline for foundational knowledge
 - § Provide scientific basis for regulatory measures and mitigation
- An OCS Scientific Advisory Committee annually reviews research proposals and provides input on study plans
- Most ESP studies result in peer-reviewed papers and technical presentations



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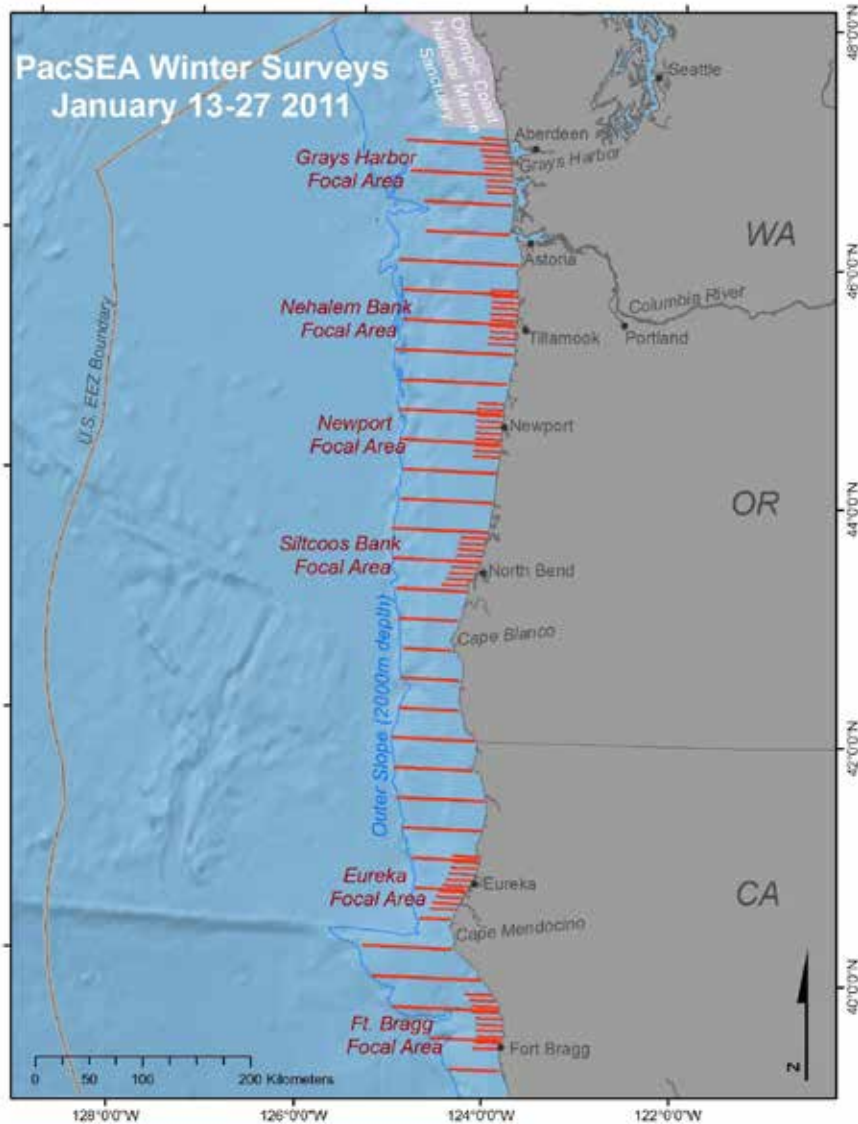


- Site-specific seasonal distribution and abundance – scale
- Seasonal density maps
 - § Feeding, breeding, high use areas, migration routes, colony flight pathways
- Avoidance behavior
- Migration routes and patterns
 - § Distance from shore, timing, passage height, each with weather/climate
- Energetic consequences
- Potential effects on prey
- Nocturnal activity and movement
- Effects of noise, lights and structures; collision risk



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Seabird and Marine Mammal Surveys

- Distribution, abundance and habitats of marine species
 - § Potential renewable energy development
- Validate and enhance aerial survey data for indicator, breeding and migratory species
- 12 surveys completed 2010-2012
 - § 20-year comparison to surveys in 1989-1990 and other products

Vulnerability Index for Scaling Possible Adverse Effects of Renewable Energy Projects on Seabirds – Pacific OCS

- Analyze data on flight height as a function of wind speed and species
- Develop sensitivity index that ranks key vulnerability factors
- Use results to inform siting and operation of facilities



Nocturnal Surveys for Ashy Storm-Petrels and Xantus's Murrelets on Offshore Oil Platforms – Southern California

- Radar and visual surveys
- Evaluate how these species interact with bright lights
 - § Applicability to conventional and renewable energy development



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Acoustic/Thermographic Monitoring

- Combination detection device that can verify recorded vocalizations to species via simultaneous thermal imagery
- Information on bird presence near OCS structures
 - § Circadian, seasonal, annual, weather-related

Aerial High-Definition Imaging

- Minimize error and disturbance to birds
- Evaluate combinations of aircraft type and hi-def camera type, mounting systems, and onboard recording systems
- Determine effective sampling schemes
- Recommend sampling design and cost estimates



Habitat Affinities and At-sea Ranging Behaviors of Main Hawaiian Island Seabirds

- Collect detailed information linking Hawaiian breeding seabirds with coastal and offshore habitat utilization surrounding the MHI
- Link surface wind and wave direction data with proposed *in situ* seabird telemetry data
- Allow BOEM to expand its previously funded “Seabird Vulnerability Index” for the Pacific OCS to the waters surrounding the MHI



Year-round and Diel Pattern in Habitat-use of Seabirds off Oregon

- Conduct multi-species and multi-scale quantification of at-sea habitat utilization and ranging behaviors for breeding and non-breeding seabirds off the Oregon coast
- Compare and integrate results with existing transect survey data
- Compile and provide an analysis of remotely sensed and model-derived habitat data to examine habitat relationships that can predict species' distributions and improve spatial vulnerability maps



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Study on Wind Power Effects on Birds and Bats

- Three-year study on impacts of offshore wind energy development
- Develop instruments to measure how turbines affect birds and bats
 - § Instruments to tune out flying debris; focus on wildlife
- Relevant to onshore and offshore wind turbines



Data Synthesis and Predictive Modeling of Seabird Distribution – Pacific OCS

- Identify, collect and synthesize data from all available marine bird surveys on the U.S. Pacific OCS
- Develop a predictive statistical model of seabird distribution
- Produce high-resolution predictions of seabird abundance patterns



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Many Opportunities for Collaboration

- Several collaborations already established through existing studies
- Variety of partnerships coast to coast
- Taskforces facilitate communication with diverse groups
- Potential for more collaborations in California



- Diversity of birds occur along the coast and offshore California
- Offshore wind energy devices affect birds in several different ways
- Europe has extensive offshore wind development we can learn from
- Offshore wind development in various planning stages in the Atlantic, Oregon and Hawaii
- BOEM facilitates offshore wind projects and conducts studies and analyses prior to lease issuance



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