

# *Lessons Learned: Land-Based Avian Studies*

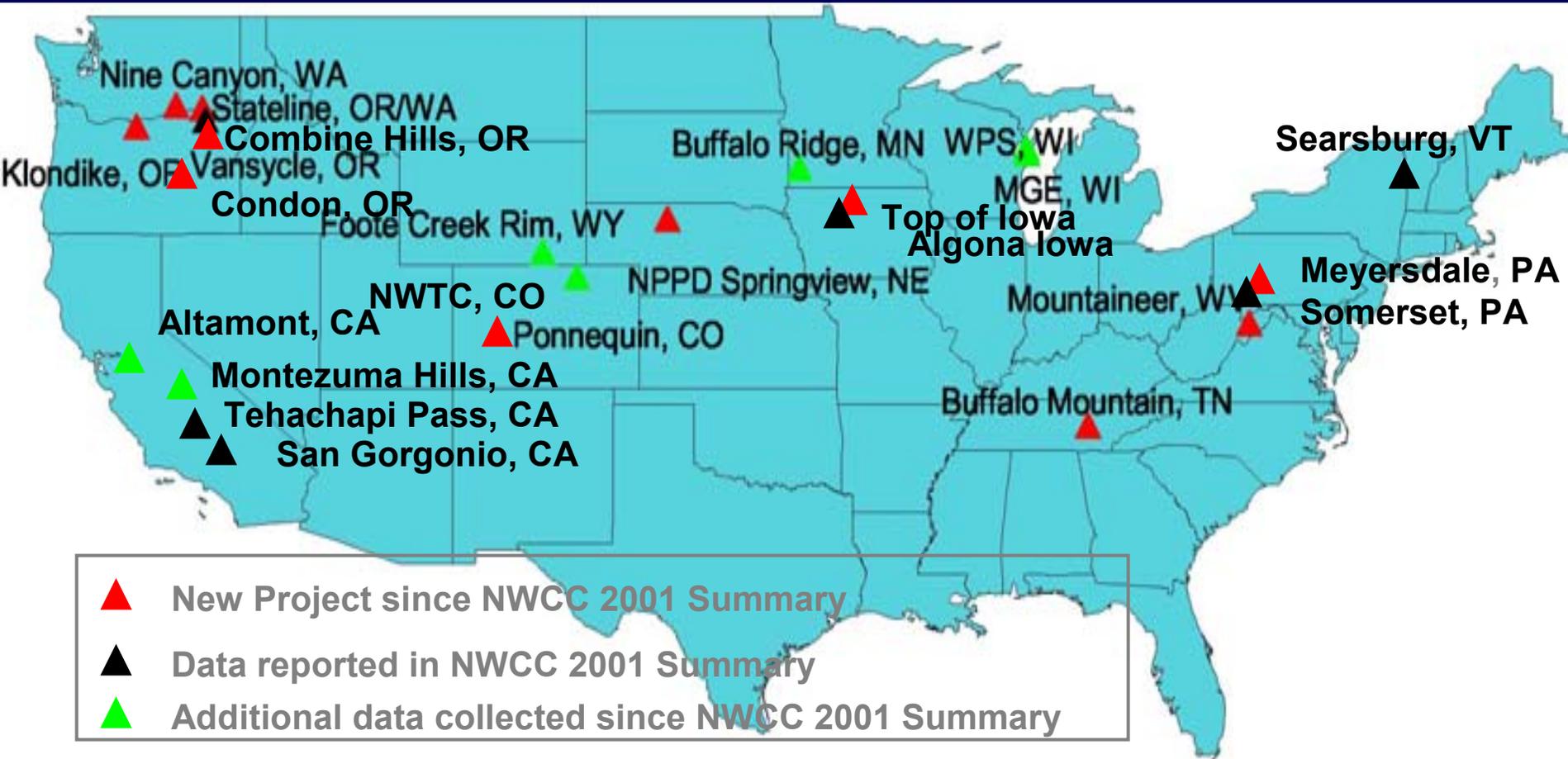
April 4, 2006  
Toledo, Ohio

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# Onshore Studies

- Issues – Fatalities and Habitat loss
- Studies of potential impact (Pre-project)
  - Site characterization for impact prediction, wind plant design, and pre-project data for impact and risk estimation
- Studies of impact (Post-project)
  - Fatalities
  - Use
  - Habitat impacts
  - Impacts on reproduction

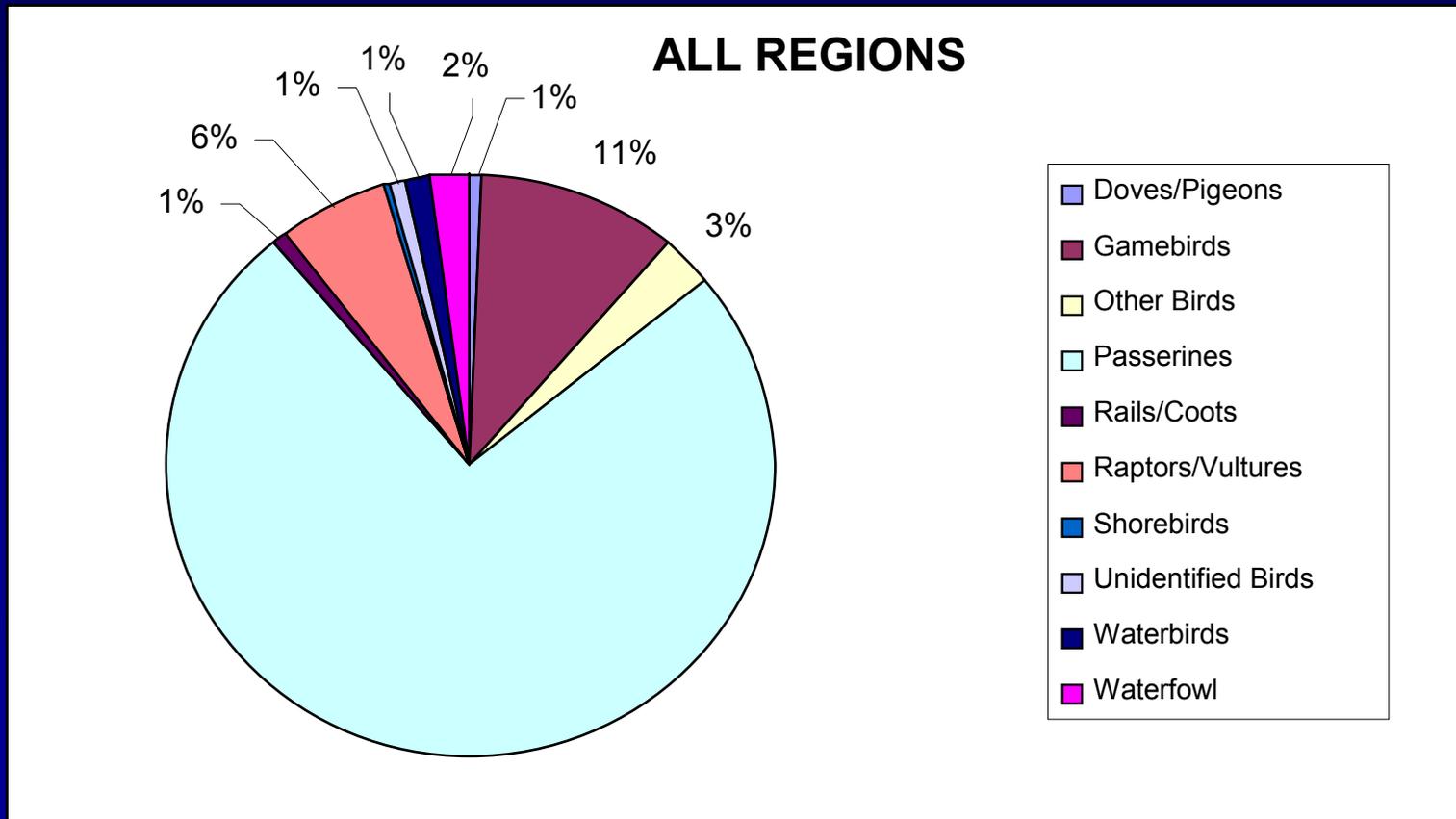
# Fatality Monitoring Studies



# Avian fatality rates from systematic study for minimum of one year with bias adjustments

Region/	#	#	#/turbine/	#/MW/
Veg Community	Studies	MW	Year	Year
NW-Ag/CRP/Gr	5	397	2.0 (0.6-3.6)	2.7 (0.9-2.9)
RM – SGr	2	68	1.5 (1.5-1.5)	2.3 (2.0-2.5)
UMW – Ag	5	254	2.2 (1.0-4.5)	3.5 (2.0-5.9)
E – Forest	2	68	4.3 (4.0-7.7)	3.0 (2.7-11.7)
US	14	787	2.1 (0.6-7.7)	3.0 (0.9-11.7)

# Species Composition of Avian Fatalities



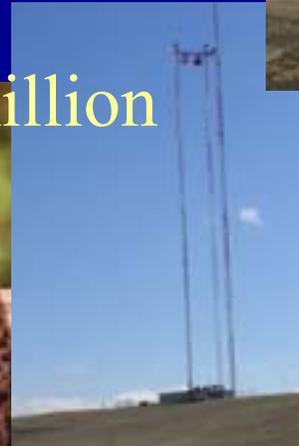
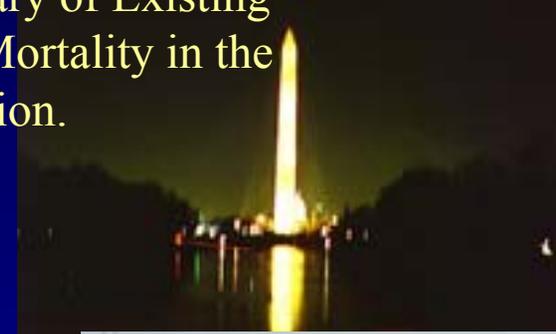


# Avian Collision Mortality Perspectives Paper

Erickson, W.P., G. D. Johnson, M. D. Strickland, D. P. Young, Jr., K.J. Sernka and R.E. Good. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States. National Wind Coordinating Committee Publication.

<http://www.nationalwind.org/pubs/default.htm>

- Vehicles: 60 - 80 million
- Buildings and Windows: 98 - 980 million
- Powerlines: tens of thousands - 174 million
- Communication Towers: 4 - 50 million
- House cats: 100 million
- Wind: 10,000 – 40,000





# Sources of Habitat Impact

- Direct loss of habitat
  - Turbine pads, roads, substations
- Indirect loss of habitat from behavioral response to wind plant facilities
  - Turbines, power lines, roads
- Long-term impacts
  - Permanent structures and/or avoidance with no habituation
- Short-term impacts
  - Construction, restoration and/or habituation



# Summary for Birds

Based on existing studies at the current level of development

- With the possible exception of Altamont, fatalities are risk to individuals and not populations
- Direct habitat impacts relatively small
- Preliminary information on new technology suggests reduced risk for some bird groups and species
- Disturbance factor for avian species uncertain
- Effectiveness of mitigation measures uncertain

# Summary (continued)

- Data better for wind than other sources of impact
- Wind turbine lights not currently documented as a significant attractant for birds, but studies very limited
- Wind project (macro) and wind turbine (micro) siting believed to be best way to minimize impacts
- Impacts on bird fatalities of wind turbine design (e.g., tower type, tower height, RSA, blade rpm) less understood

# Monitoring & Research Needs

- Estimate impacts in unstudied and newly developed habitats (e.g., SW, Coastal, offshore)
- Determine mitigation effectiveness
- Consider the relationship of small scale versus large scale impacts of development
- Quantification/prediction of indirect impacts (e.g., displacement)
- Consider linkage of non fatality impacts to population dynamics and biological significance

# Offshore Issues/Data needs

Exo, et al. 2003. Birds and offshore wind farms: a hot topic in marine ecology.  
Wader Study Group Bull. 100:50-53.

- Risk of collision
- Short-term habitat loss during construction
- Long-term habitat loss due to disturbance by O&M
- Formation of barriers to migration and daily movements
- Habitat fragmentation

# Offshore methods and metrics

## LIPA as a Case Example

<http://www.lipower.org/cei/offshore.html>

[www.fplenergy.com](http://www.fplenergy.com)

[www.nan.usace.army.mil/business/buslinks/regulat/lipa](http://www.nan.usace.army.mil/business/buslinks/regulat/lipa)

# *Bird Impact and Risk Assessment*

- Regional scale - avian use in relation to proposed wind plant site
  - Aerial observational survey
  - NEXRAD data
- Site specific - Estimation of risk and impact will involve analyzing and integrating different kinds of data from multiple sources
  - Marine radar
  - NEXRAD
  - Boat observational Surveys
- Review European offshore studies

# Land-Based Radar Coverage

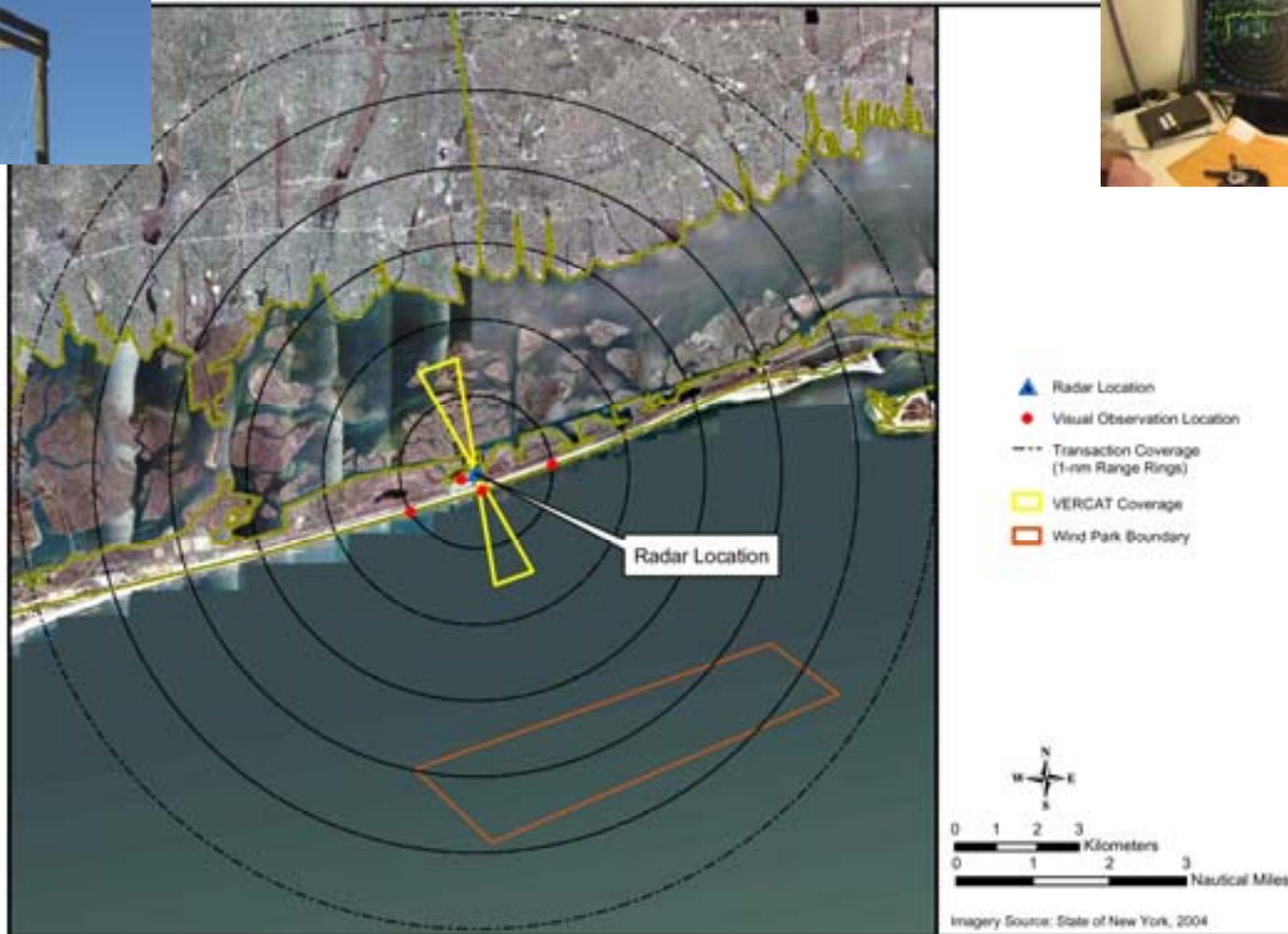
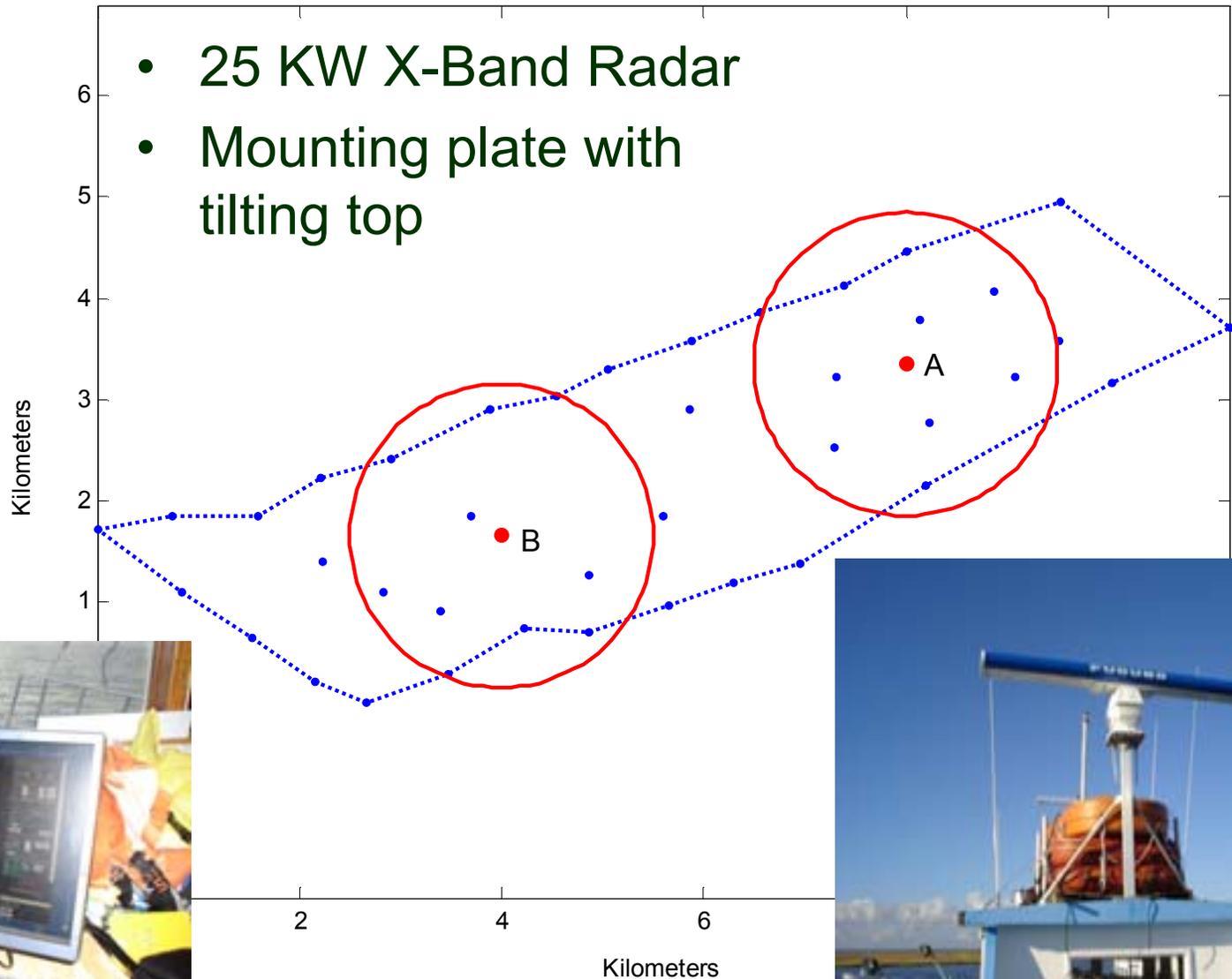


Figure 4-1. Radar Coverages in the Study Area.

# Vessel-based Radar Coverage



# Proposed NEXRAD Analysis



Compare Wind Park to site closer to radar station

Wind Park at 30 nm

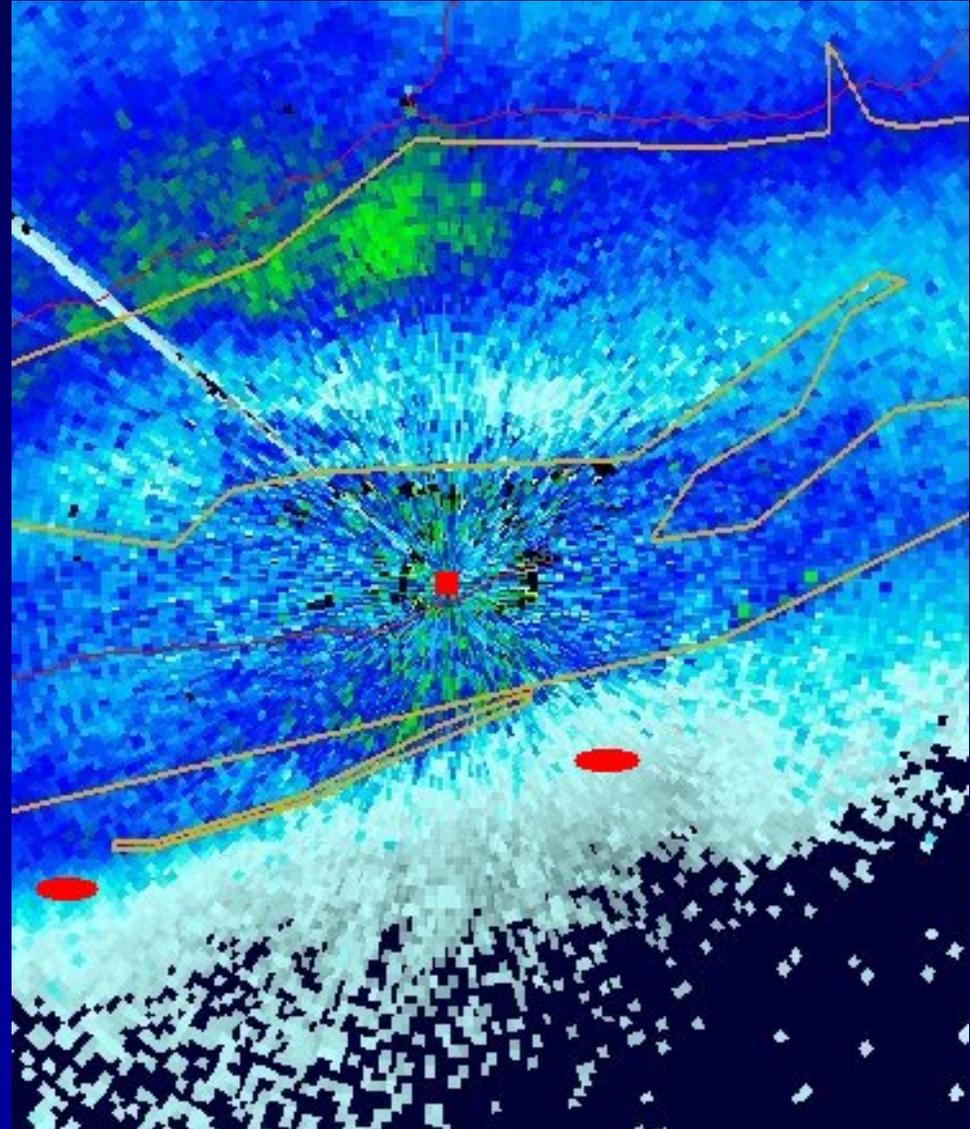
Center of beam - 2300' ASL

Lower "edge" of beam - 690' ASL

Reference area at 11 nm

Center of beam - 735 ft ASL

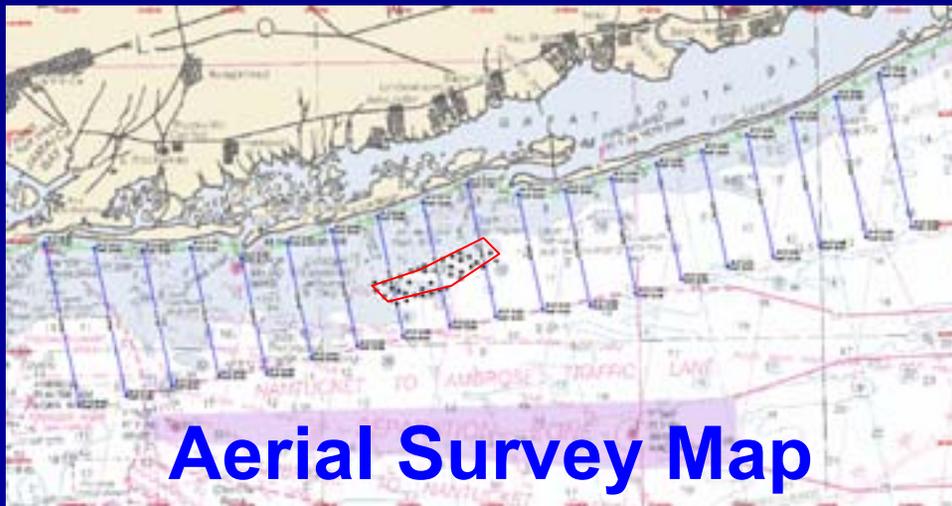
Lower "edge" - 162 ft ASL



# Avian Boat and Aerial Surveys



**11 Boat Survey Transects**  
**Length 72 miles**



**Aerial Survey Map**

# Bird Impact and Risk Estimation

- Assessment will be based on data from multiple sources
- Shore-based marine radar and boat surveys will represent primary data sources, though other data sources are important
- Quantitative assessment requires estimation of both exposure and effects
- Assessment will acknowledge data limitations and estimation errors



Questions?

Nysted Offshore Wind Farm

[http://uk.nystedhavmoellepark.dk/frames.asp?Page\\_ID=66&Page\\_Ref=49&Templates\\_ID=12](http://uk.nystedhavmoellepark.dk/frames.asp?Page_ID=66&Page_Ref=49&Templates_ID=12)