What have we learned from pre-construction radar studies?

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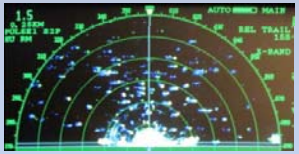
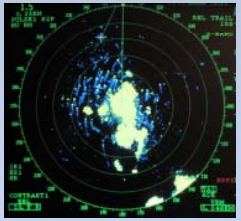
Introduction

Since 1999 over 100 seasonal nocturnal migration marine radar studies have been completed as part of pre-construction risk assessments for proposed wind energy projects in the eastern US.

Regulators, developers, stakeholders and biologists assume that study results inform risk:

high passage rate & low target altitude = high risk?





Methods

- Tested whether standardized pre-construction passage rate & other metrics correlated with post-construction fatality estimates using non-parametric correlation coefficients.
- Assessed variation in metrics across studies.
- Analyzed geography and landcover as covariates - ANOVA.

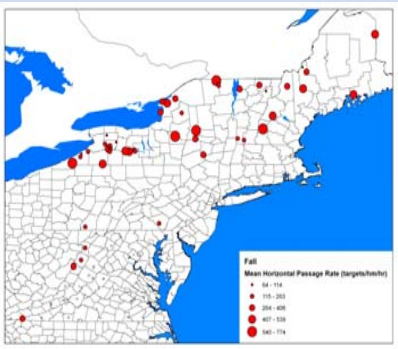
Radar Metrics

Mean Passage Rate (targets/km/hr)

Mean Flight Height

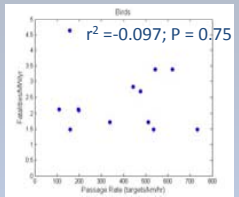
Percent < 125 m ARL

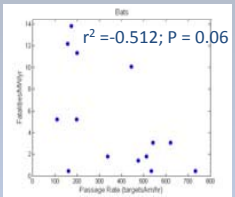
Target Flight Direction



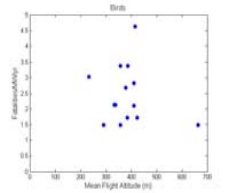
Results

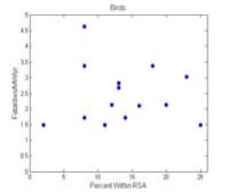
1. Pre-construction passage rates do not correlate with post-construction fatality estimates



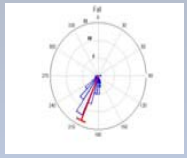


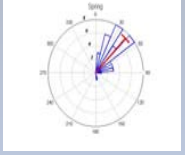
2. No correlation between mean flight height or % targets flying within Rotor Swept Area (RSA) & fatality estimates





3. Little variation in seasonal flight direction (T = 95 % CI bootstrapped)



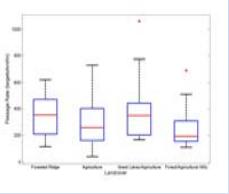


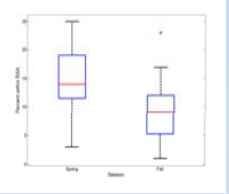
4. Landcover and geography do not significantly effect passage rate, altitude or % targets within RSA

Results of one-way analysis of variance for separate tests of effects of landcover, geography, & season on passage rate, altitude, and % targets within RSA. Tests significant at α = 0.05.

Response	Effect	Effect df	Error df	F	p-value
Passage Rate	Landcover	3	88	2.46	0.068
Altitude	Landcover	3	87	0.39	0.758
Percent within RSA	Landcover	3	86	0.06	0.980
Passage Rate	Geography	4	51	1.53	0.207
Altitude	Geography	4	50	0.90	0.471
Percent within RSA	Geography	4	50	0.13	0.972
Passage Rate	Season	1	91	0.02	0.888
Altitude	Season	1	90	5.29	**0.024**
Percent within RSA	Season	1	89	24.21	**<0.001**

5. Mean altitude and % targets within RSA differed significantly between seasons





Discussion

- The assumption that higher passage rate = higher risk is not supported by existing data.
- Variation between sites does not appear to significantly effect target direction, passage rate, altitude, or % targets within RSA. However, further evaluation of landcover warranted.
- Additional pre-construction radar studies in heavily studied region (NY, VT and NH) may yield little benefit for project risk assessment. Post-construction radar studies would yield better value and benefits to the **wind industry** (streamline approach), **agencies** (concurrent risk & impact data) and **wildlife** (focused evidence-based mitigation).