

ENERGY

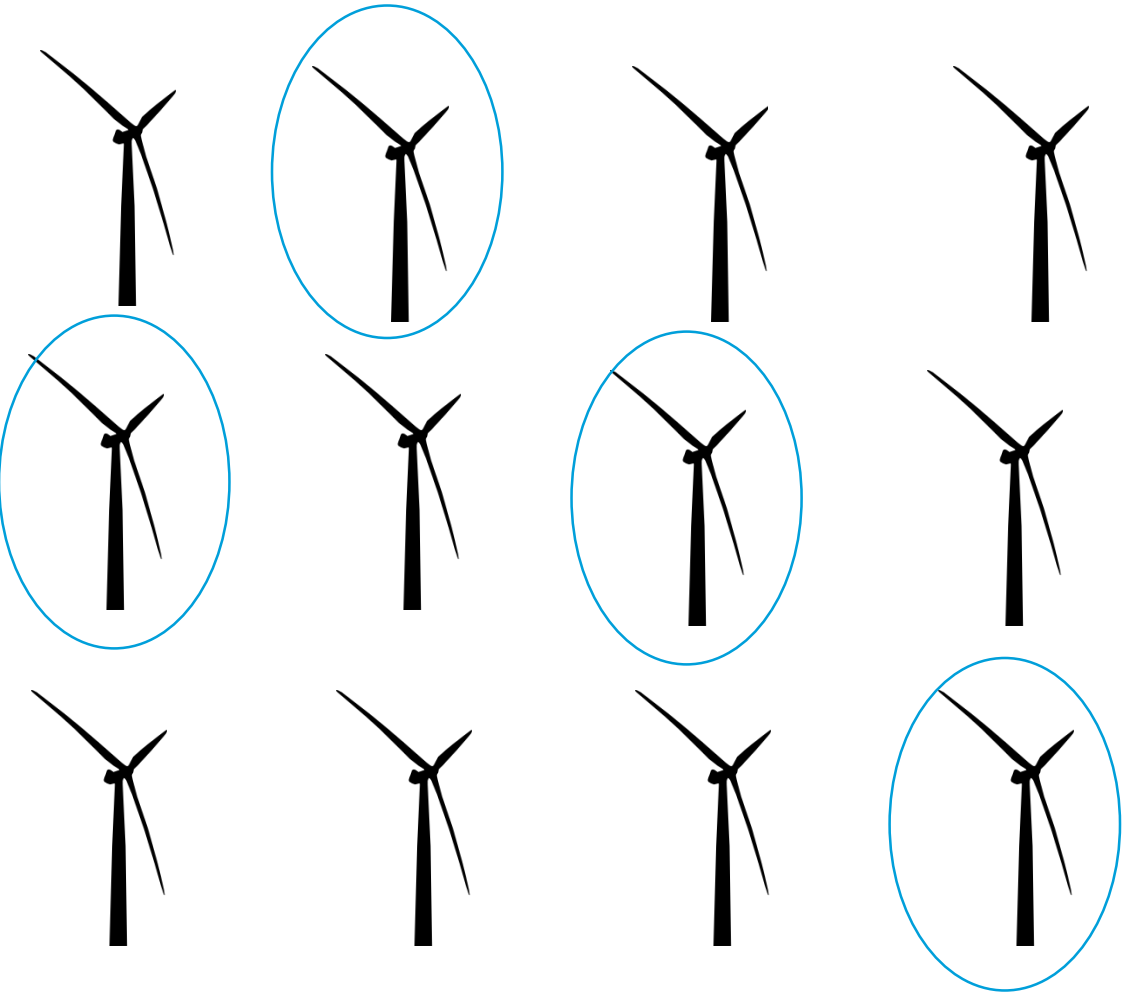
# Estimating Mortality

## Wind Energy and Bat Conservation Symposium

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**DNV GL Energy USA, Inc.**

## Estimating Mortality – The Problem



- Want to know how many total bats are killed
- Want process of measurement to be practicable
- Can't be at all turbines all the time
- Must sample
  - Turbines
  - Space
  - Time

## The Solution – Statistical Estimation

- Rate Estimate – **what is the fatality rate of species or group X at my facility?**
  - Extrapolation from subset of time and space to entire wind farm
  - Many statistical estimators are available
  - “Typical” number of fatalities
  - 30% of turbines typically sampled
  - Sample interval depends on species monitored
- Total Estimate – **how many individuals were killed by my facility?**
  - Extrapolation from rate estimate
  - Magnifies error in rate estimate

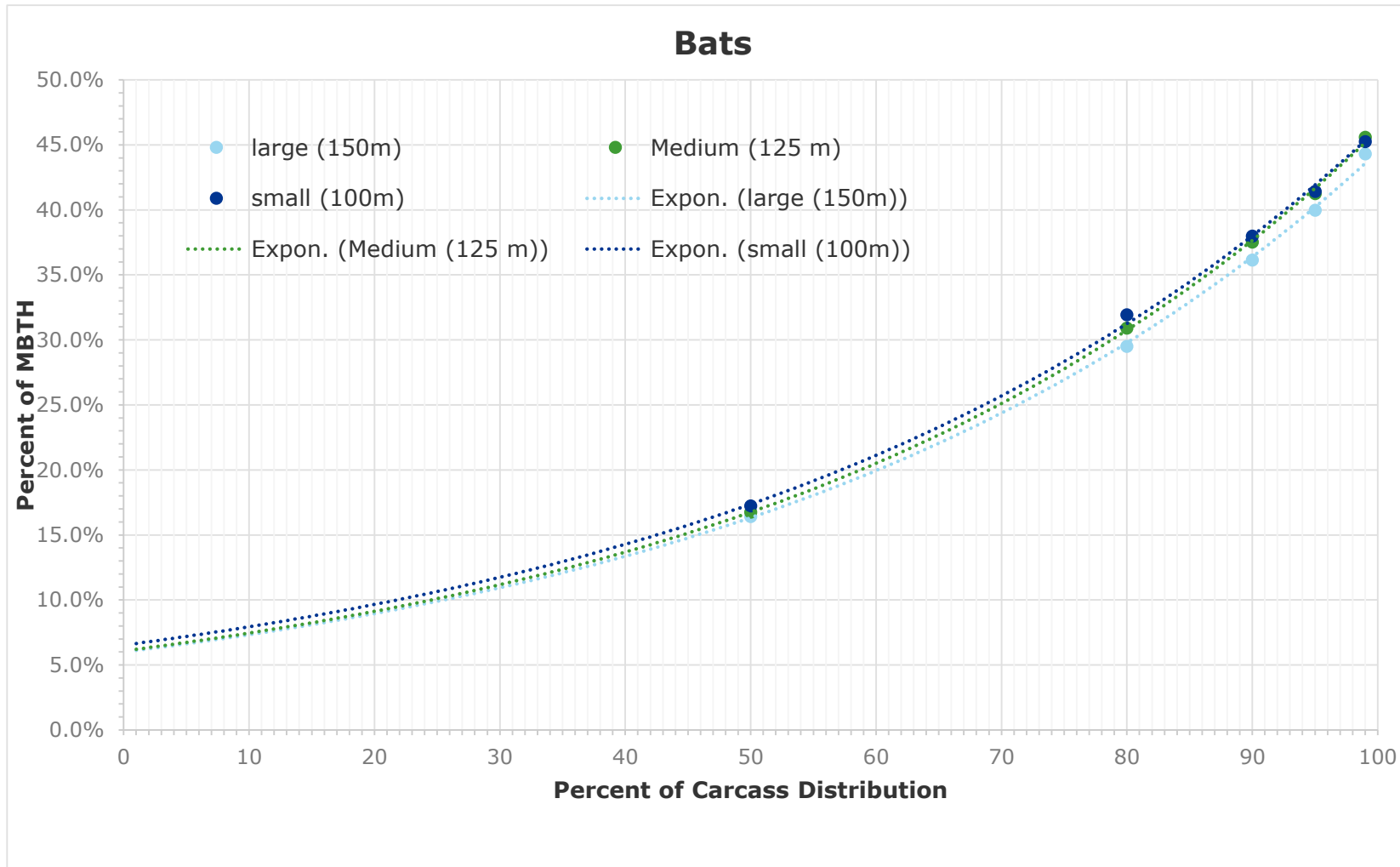


## Rate Estimation - Considerations

- Estimate of the rate of fatalities at a project (annual, seasonal, etc)
- Total fatalities or subgroup fatalities (small birds, etc.)
- Estimate because of detection bias
- Fatality rate incorporates correction for bias due to
  - Searcher ability
  - Ground cover
  - Carcass persistence
  - Proportion of carcass distribution sampled
    - Turbine proportion
    - Area per turbine



# Effects of Search Plot Size



## Issues in Reporting and Comparison

Parameter	Project 1	Project 2	Project 3	Project 4
<b>Project Conditions</b>				
# turbines	50	100	10	33
MW per turbine	2	1	3.3	1
Total MW	100	100	33	33
<b>Scenario 1 – Bat fatality rate (reported as per turbine per year)</b>				
Bat fatality rate (#/turbine/year)	5	5	5	5
Annual site-total fatality estimate	250	500	50	165
<b>Scenario 2 – Bat fatality rate (reported as per MW per year)</b>				
Bat fatality rate (#/MW/year)	5	5	5	5
Annual site-total fatality estimate	500	500	165	165

**Accuracy, Cost, and Feasibility:  
Practical Considerations of Estimating Mortality**

Andrew Ryckman, NRSI

**GenEst – A Comprehensive Overview**

Paul Rabie, WEST, Inc.

# Estimating Mortality

## Wind Energy and Bat Conservation Symposium

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