# Avian & Bat Impacts and Issues associated with Wind Power Development in the East

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# Biggest Perceived Issues

- Bats

- Bird Migration

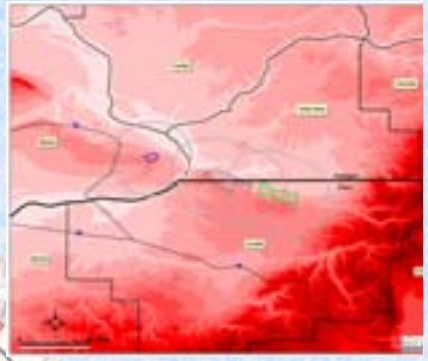
- T&E Issues

# Sources of Impact

- Mortality
- Direct loss of habitat
- Indirect loss of habitat
- Short-term impacts
- Long-term impacts

# ADDRESSING IMPACTS AND RISK

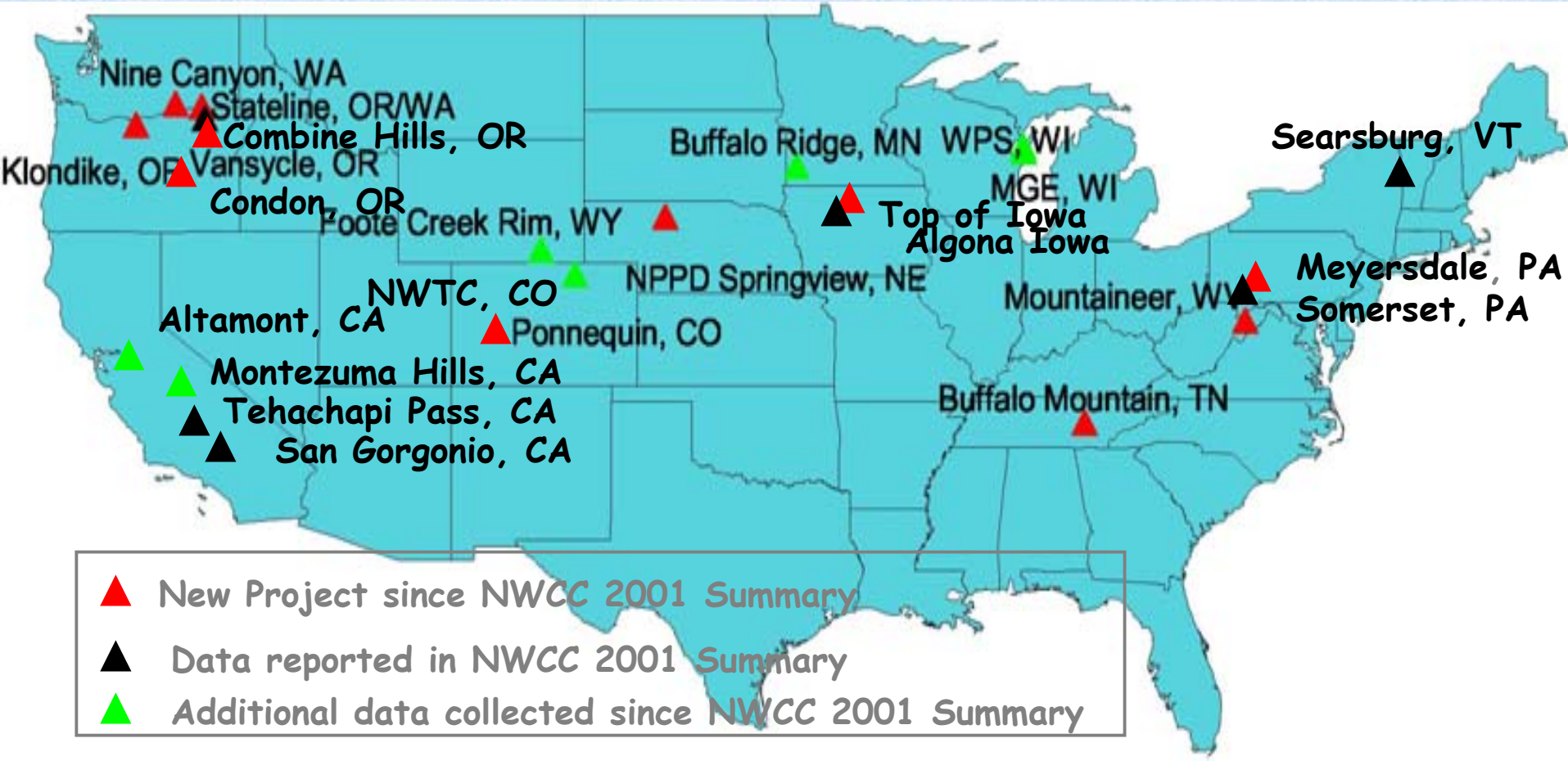
- Site Assessment / Screening
  - Recon level surveys
  - Review existing information
- Baseline Studies
- Theoretic Models
- Monitoring&Research



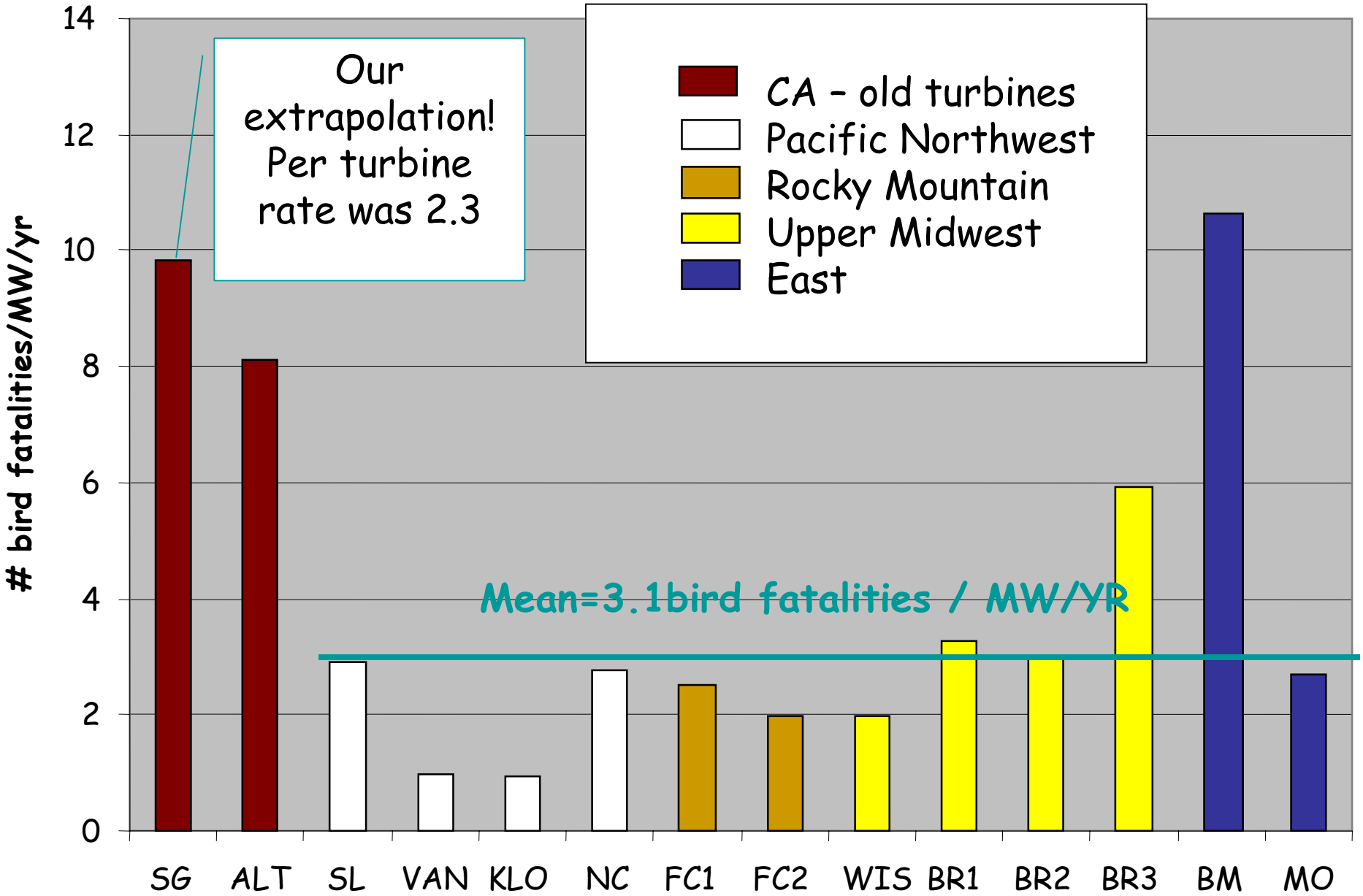
# What are the Questions?

- Siting Wind Projects
- Predicting Impacts of Selected Project
- Microsite Facilities within a  Project Area
- Pre-Project for Monitoring Program

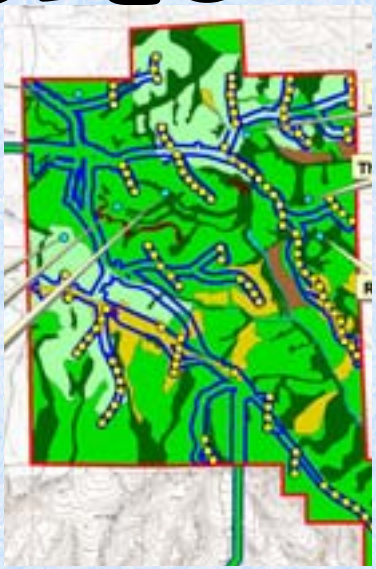
# Fatality Monitoring Studies



# Bird Fatality Estimates



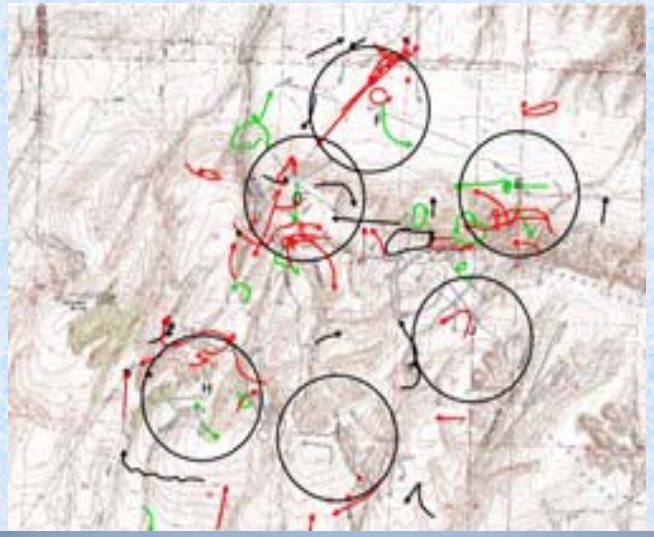
# BASELINE STUDIES

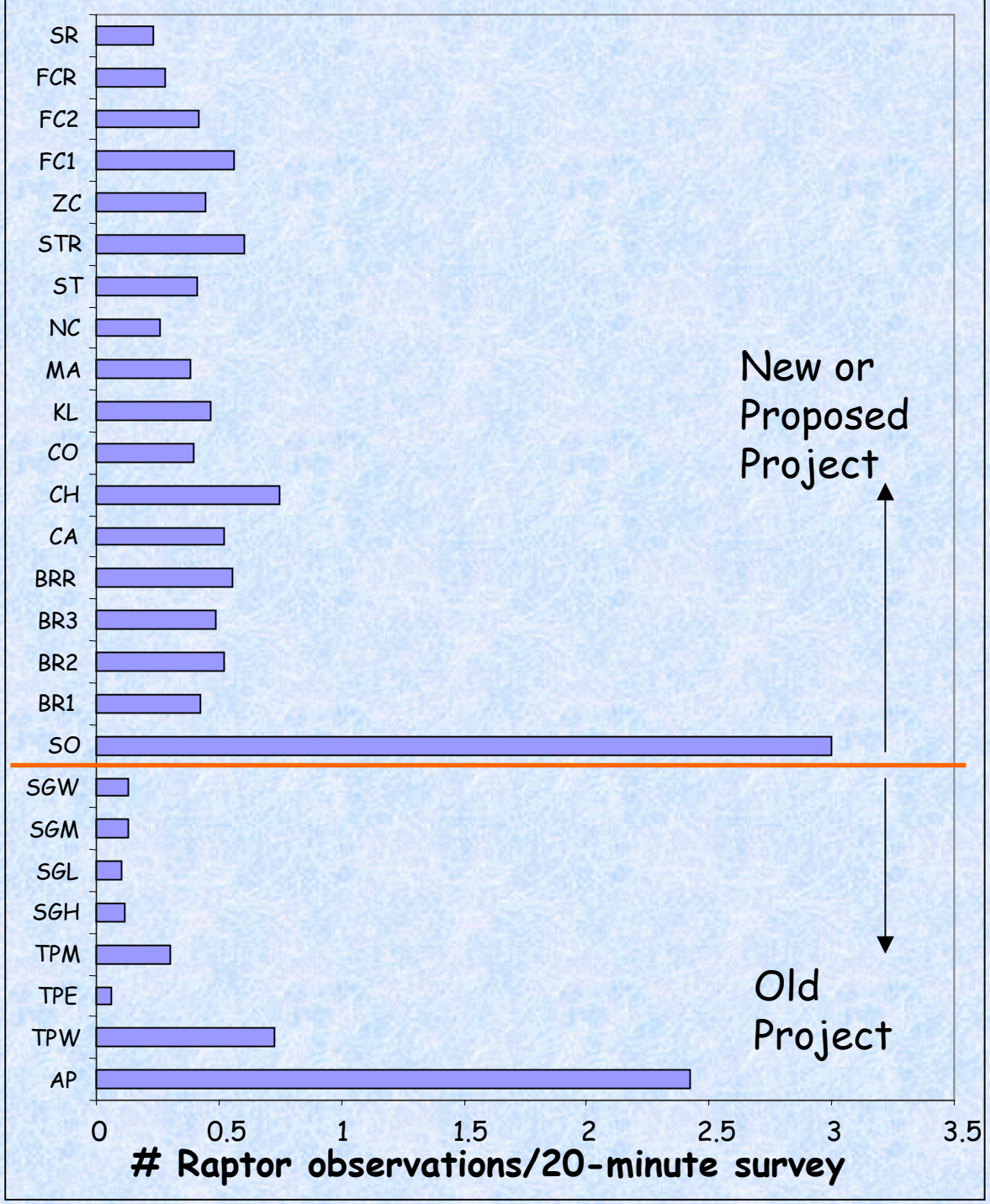


- Habitat Mapping
- Avian Use Surveys
  - Diurnal
  - Nocturnal, if perceived necessary
- Raptor nest surveys
- T&E focused surveys
- Bat Surveys, if perceived necessary

# AVIAN USE

- Point Count Surveys
  - Intensity of Use
  - Flight Paths
  - Flight Heights
  - Behaviors
- Radar
  - Used in select situations in WEST
  - More commonly used in east



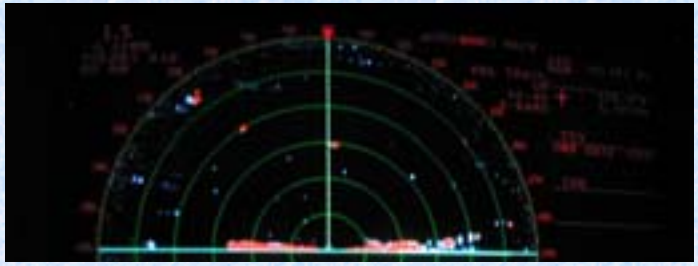



# PREDICTING RAPTOR MORTALITY

- Low-Moderate Raptor Use
  - 0.01 to 0.10 fatalities/MW/YR
- High Raptor Use
  - >0.10 fatalities/MW/YR

# Radar Studies of Nocturnal Migration

- Data
  - Flight directions
  - Migration passage rates
  - Flight altitudes
- Major Assumptions
  - 1 target = 1 migrating bird
  - no detection bias
- Relative Risk
  - # Targets in Exposure Zone

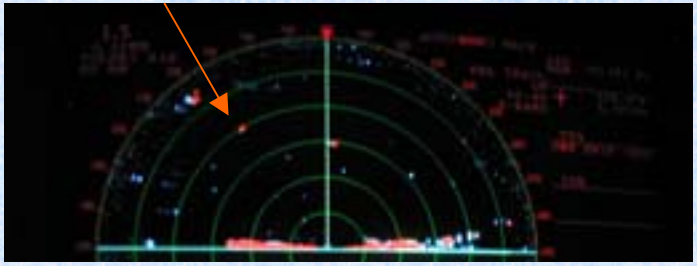


# Limitations

- No correlation documented between target rates and mortality
  - Few sites with both passage rates and mortality and none conducted simultaneously
  - Migration generally broad-front and high altitudes
  - High relative uncertainty in passage rate estimates and songbird fatality estimates

| Site | Passage Rates | % targets <125 m | Fatality Rate |
|---|---|---|---|
| SITE 1 | 178 | 4 | no data |
| SITE 2 | 238 | 5 | no data |
| SITE 3 | 168 | | no data |
| SITE 4 | 192 | | no data |
| SITE 5 | 192 | | no data |
| SITE 6 | 230 | | no data |
| SITE 7 | 122 | | no data |
| SITE 8 | 241 | 16 | no data |
| SITE 9 | 93 | | no data |
| SITE 10 | 23 | 6 | very low |
| SITE 11 | 31 | | very low |

What is that???

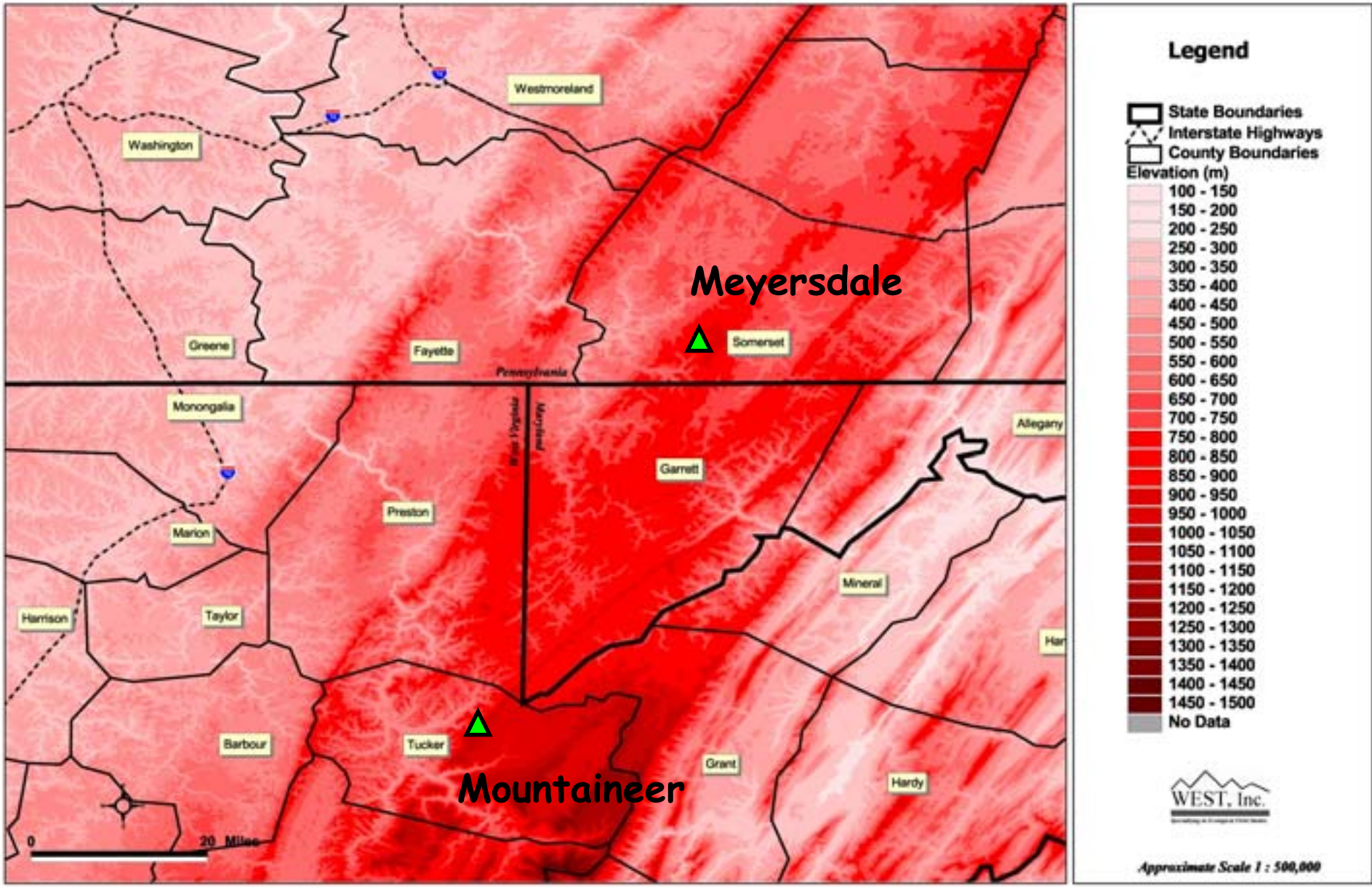


Bat fatalities at wind farms have been documented worldwide
Fatalities have been reported at all wind farms investigated in the U.S. across a wide range of habitats

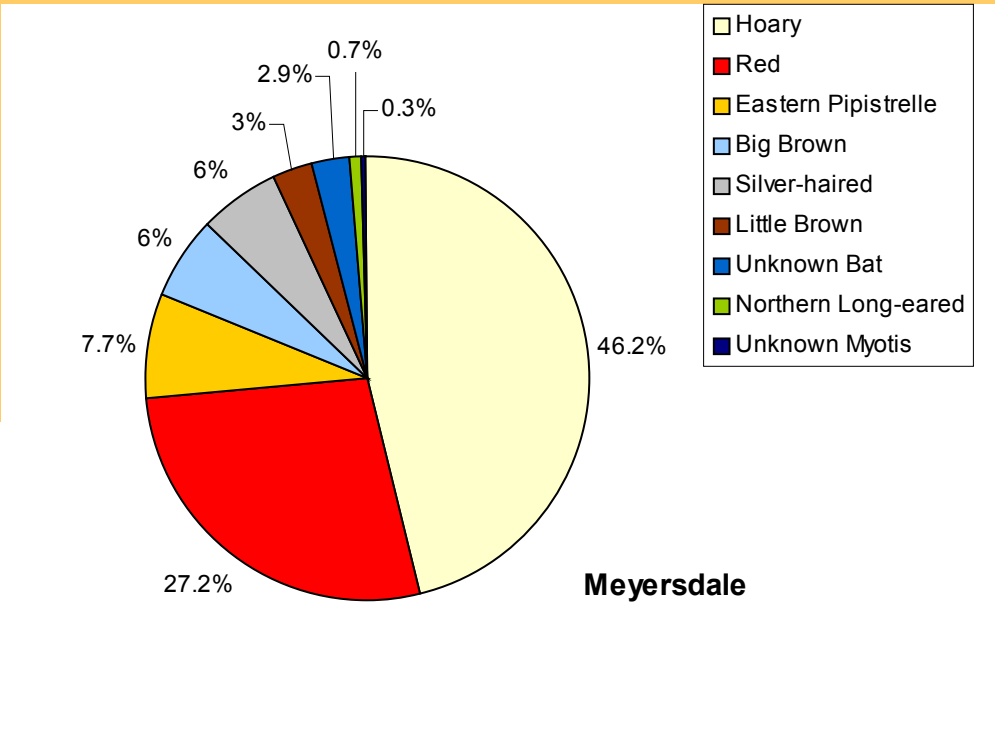
# Bat fatality estimates in the U.S.

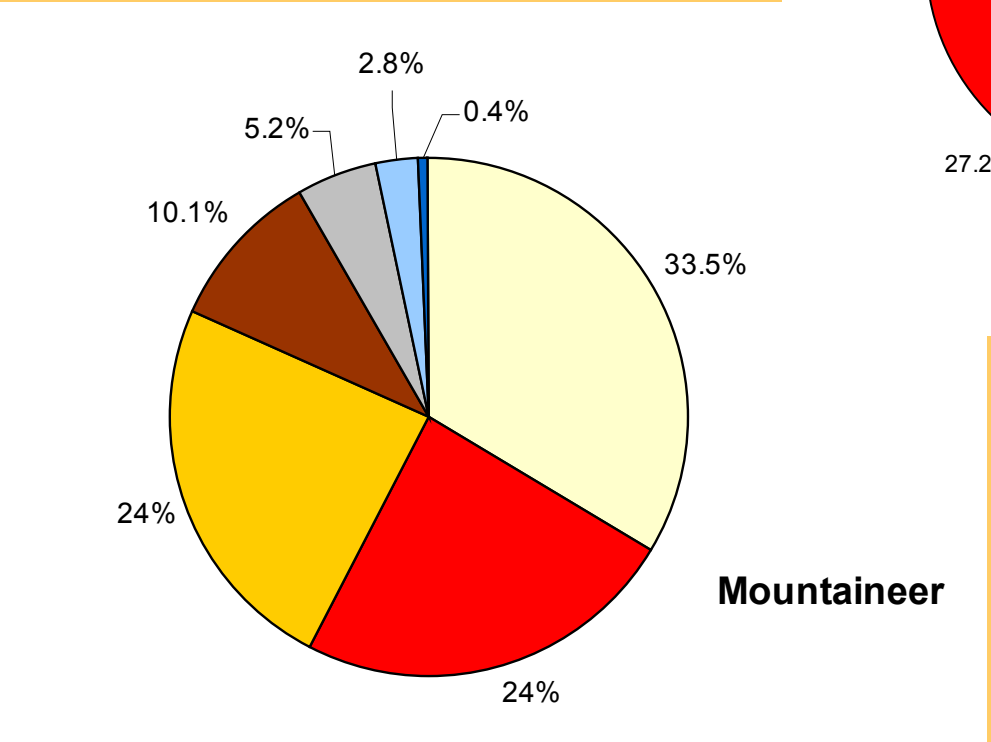
| Region | No. studies | #MW | #/turbine/ #/MW/yr | ~ Total Mortality |
|---|---|---|---|---|
| Northwest | 4 | 397 | 1.2/1.7 | 675 |
| Rocky Mountains | 2 | 68 | 1.2/1.9 | 129 |
| Upper Midwest | 4 | 254 | 1.7/2.7 | 686 |
| East | 2 | 68 | 46.3/32.0 | 2176 |
| Overall | 12 | 787 | 3.4/4.6 | 3620 |

# Location of Study Areas

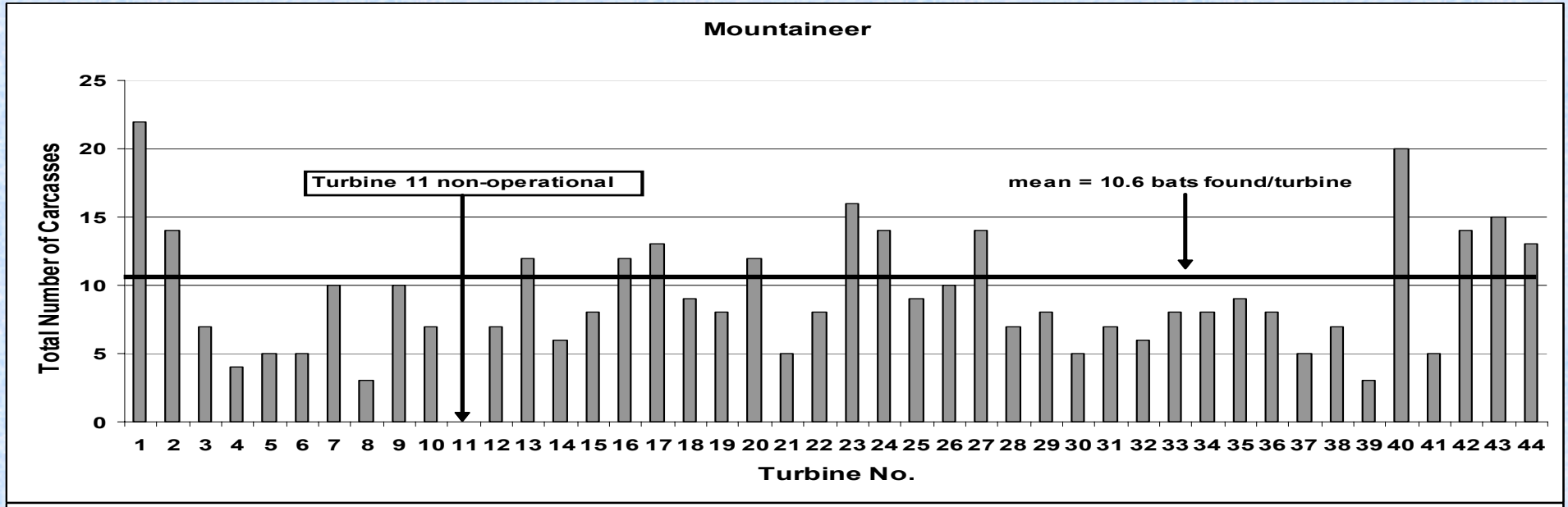


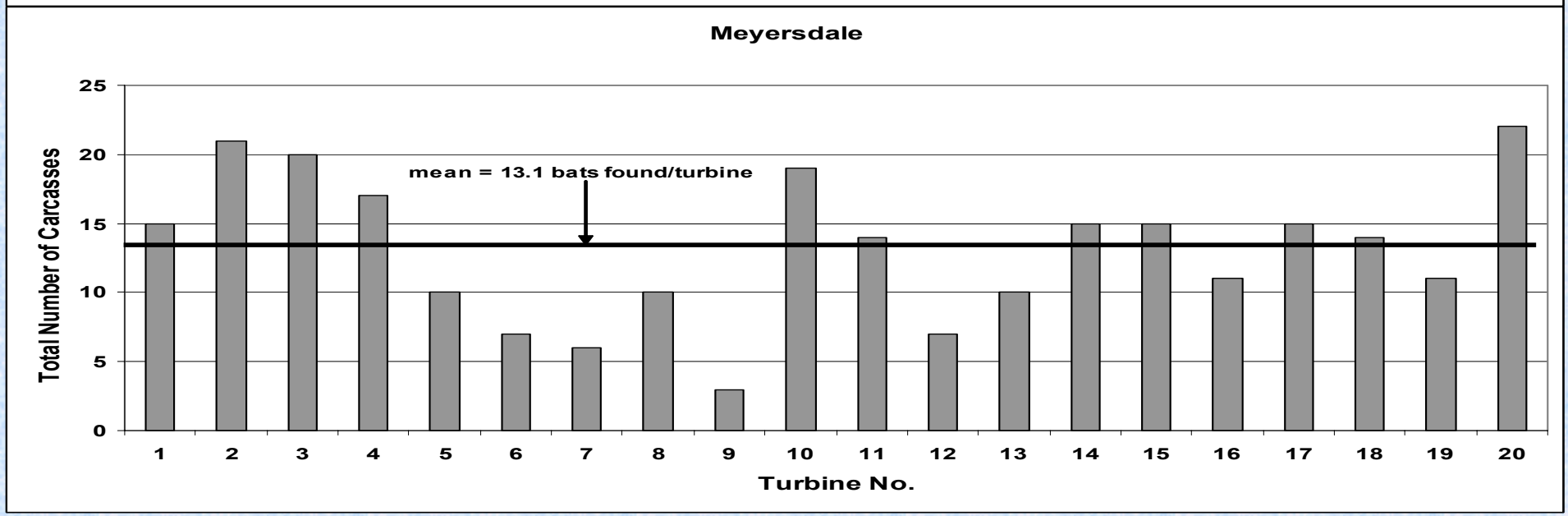
# Species Composition of Bat Fatalities



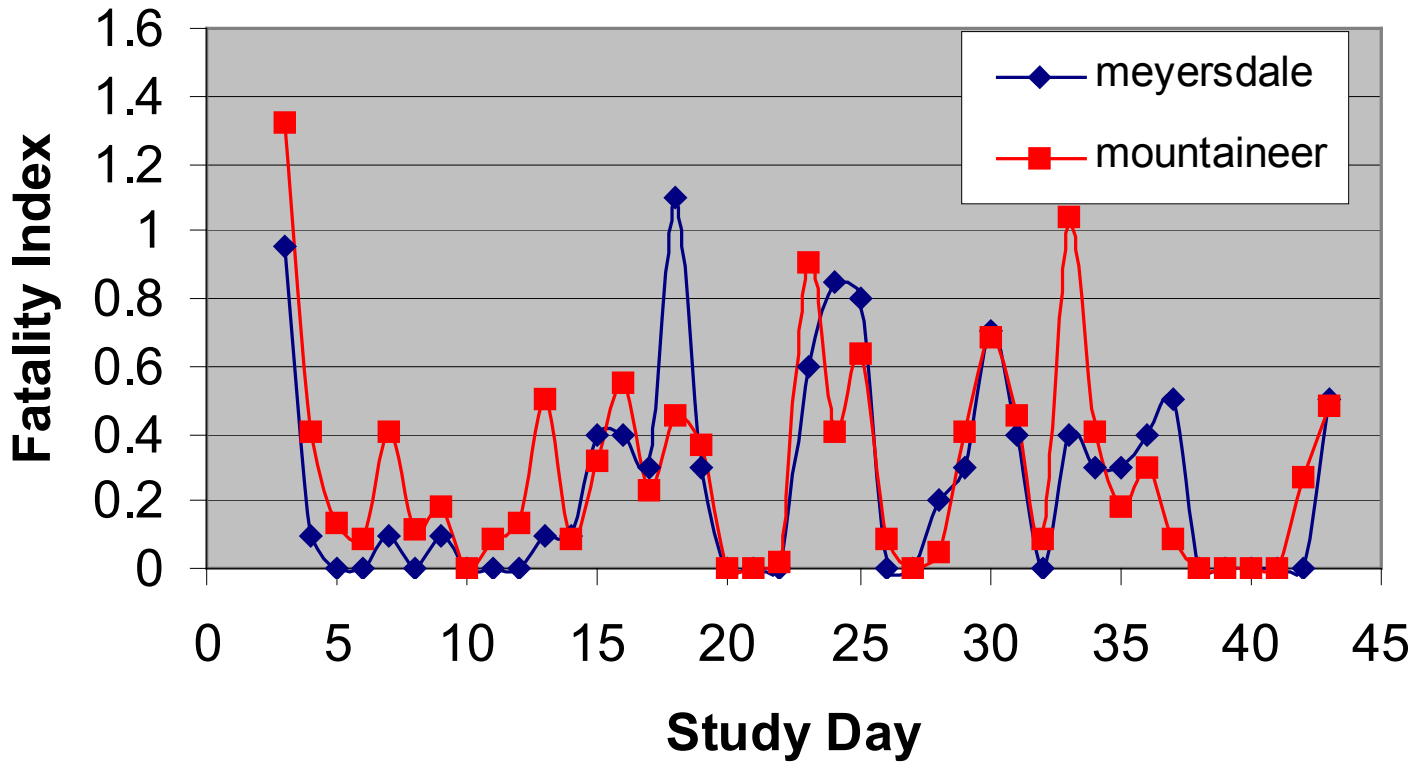
# Fatalities by Turbine



# Timing of Fresh Bat Mortality

High correlation
r=0.7



# Bat Fatalities at Lit and Unlit Turbines

| | Lighted | Unlighted |
|---|---|---|
| # Turbines | 12 | 32 |
| # Dead | 112 | 311 |
| Mean Dead | 9.3 | 9.7 |
| SE | 0.5 | 0.3 |

No difference in fatalities at lit and unlit turbines

# Summary

- Timing and patterns of fatality similar for the 2 sites, suggesting regional patterns
- No bats killed by non-moving turbines (turbine 11 and thermal imaging corroborate)
  - FAA lighting has no apparent influence on bats
  - Fatality appears related to all factors related to low-wind nights and passage of storm fronts and may be highly predictable

# Bird Research Needs

- Radar studies at existing facilities in combination with fatality data to develop stronger risk assessment tools
- Better synthesis of existing information
- Understanding significance of impacts
- Is there really a problem, and if so, under what conditions?

# Bat Research Needs

- Pre-Project tools to assess risk
- Under what conditions are fatality rates expected to be high
- Understanding significance of impacts
- Solutions
  - Magic bat whistle
  - Siting
  - Curtailment
  - Off-site Mitigation