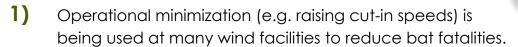
Basic Learning Points:

Research Update: Bats, Songbirds, Prairie Grouse



- a. Several studies show bat fatalities can be significantly reduced by raising turbine cut-in speed by a little as 1.5 m/s above the manufacturer's cut-in speed
- b. Economic costs are variable and relatively unknown
- C. Not applicable in low wind regions
- d. May not meet conservation goals for all species
- e. May refine method using additional weather variables
- 2) Ultrasonic acoustic deterrents use sound to disrupt bat's sonar, causing them to avoid the rotor-swept area.
 - Unproven technology
 - **b.** Attenuation of high frequencies limits area in which deterrents are effective, especially during some weather conditions
 - C. R&D needs: placement, orientation, transmission pattern, frequency
- 3) Small passerines (songbirds) sources of mortality include:
 - a. Habitat loss/climate change
 - b. Collision with manmade structures
 - C. Cats and other predators
 - d. Contaminants and pesticides
 - e. Natural disasters
- 4) Best Management Practices for songbirds include:
 - Minimize lighting on turbines, blinking white or red
 - D. Avoid substation lighting and turn the lights off in the nacelle
 - C. Unguyed permanent met towers

- **5)** Greater Sage Grouse
 - Q. Decreased nest and brood survival may be attributed to increased predation, ecological trap habitats, subsidized predators, and compromised defense mechanisms.
 - b. Strong site fidelity to habitats selected prior to wind development
- **6)** Greater Prairie Chicken
 - a. Nest site selection, nest survival, female survival not impacted by wind development; influenced more by rangeland management
 - **b.** Other energy development experienced opposite impacts.

 Discrepancy likely result of differences in associated infrastructure.
 - **C.** Female greater prairie-chickens avoided wind turbines but there were no negative impacts on demographic performance
- 7) Mitigation and future research for prairie grouse species:
 - **a.** Site specific rangeland management practices
 - **b.** Long-term BACI studies estimating impacts in different ecosystems
 - C. Mechanisms affecting sage-grouse nest and brood survival
- 8) Predation is the main source of nest and brood failure and female mortality for both grouse species.
- 9) Greater sage-grouse nest and brood survival decreased in close proximity to turbines; no effect for greater prairie-chicken nest survival.
- 10) Greater sage-grouse female survival not affected by turbines; greater prairie-chicken survival increased with turbines on the landscape.
- 11) Female greater prairie-chickens avoided turbines whereas greater sage-grouse selected habitats in close proximity to wind turbines.
- 12) Dissemination of research results helps industry and wildlife managers understand impacts and determine best conservation measures.
- 13) Landscape level conservation can be aided by research through better understanding of species needs and appropriate mitigation.

14)	Meta-analyses, such as the small passerine study, detect trends and assemble existing information needed to assess cumulative impacts.