

CanWEA Wind Energy and Bat Conservation Review



Overview

Over the last decade wind energy has become the largest source of new electricity generation in Canada. Wind energy represents a zero-emission energy source that will help combat the negative impacts of climate change.

The Canadian Wind Energy Association (CanWEA) has proactively developed a Wind Energy and Bat Conservation Review (Review) to provide the wind industry, policy makers, and other stakeholders with a scientific and ecological approach to supporting renewable energy production while minimizing the potential for impact to bats. The Review objectively summarizes the body of scientific and practical knowledge gained over the last several decades regarding wind energy and bats. By consulting the Review, it is anticipated that the wind industry and other stakeholders will

be better positioned to make decisions using sustainable, science-based approaches to wind turbine siting and bat impact mitigation measures.

Bats and Wind Energy

Bat fatalities are caused by a variety of human and natural factors including lost habitat, environmental contaminants, diseases, forestry practices, and collisions with structures such as wind turbines. The wind industry has taken measures to avoid and minimize turbine-caused bat fatalities during project planning and operations. The industry will also continue to coordinate with federal and provincial agencies to identify practical and effective measures for avoiding, minimizing, and mitigating potential impacts to bats.

Review Components

Siting and Development Considerations

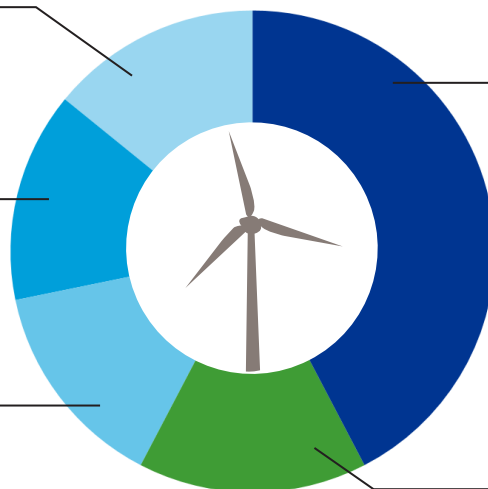
- Species, habitats and landscape features
- Avoidance and minimization strategies

Compensation and Offsets

- Habitat protection or enhancement
- Reducing effects of white-nose syndrome
- Conservation banking

Adaptive Management Framework

- Influence diagram
- Objectives and mitigation hierarchies
- Decision tree



Operational Avoidance and Minimization

- Species considerations
- General avoidance strategies
- Curtailment strategies
- Emerging technologies (deterrents, monitoring, integrated systems)

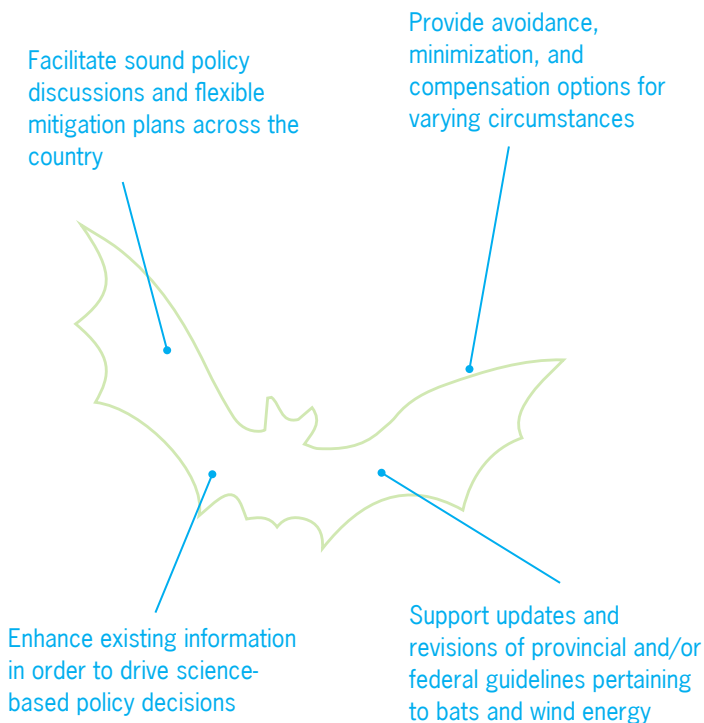
Post-construction Monitoring and Estimating Impacts to Bats

- Fatality monitoring design
- Sources of bias
- Estimators

Review Objectives

Regulators in several Canadian jurisdictions have taken steps to establish guidelines and protocols to minimize impacts to bats. Although it is appealing to have standardized approaches to avoidance and minimization, these guidelines are often based on the findings of a limited number of early bat studies in the United States or regions with different ecological conditions.

Alternatively, this Review provides current information and an adaptive management approach that will incorporate new research and technology into the development of effective strategies. The Review has the following objectives:



Key Conclusions

- **Avoidance measures employed during siting and construction may reduce risk to bats and should be evaluated in balance with other siting considerations.** Recommendations and best practices for avoidance during development are informed by species natural history information and survey results, and are most effective when they allow flexibility. Additional research is needed to better establish effectiveness.

- **Emerging bat deterrent technologies show promise for avoiding and minimizing impacts to bats during operations.** Acoustic deterrents have undergone the most advanced testing for effectiveness, followed by texturized coatings and low-level ultraviolet lighting.
- **Emerging monitoring and integrated system technologies are available for industry and other stakeholders to cooperatively evaluate their potential for avoiding and minimizing impacts to bats during siting and operations.** Collision, infrared and species identification systems technologies, are in the early stages of testing and can be integrated in detection-deterrent and detection-avoidance systems.
- **While operational curtailment (stopping energy production at pre-defined wind speeds) has been shown to be effective at reducing bat fatalities, it is still unclear at which wind speeds and under what conditions it is most effective.** The optimal curtailment wind speeds for minimizing impacts to bats are unknown, particularly the benefits of increasing cut-in speeds above 4.5 m/s or incorporating additional environmental parameters into curtailment triggers.
- **Fatality-rate monitoring protocols and estimators continue to develop, and flexibility is important for identifying the most appropriate methods for each fatality monitoring program.** The industry and regulators can continue to coordinate to ensure that estimators and search protocols are compatible, and to consider new and more reliable estimation methods as they emerge.
- **In some cases, compensation and offsets might be appropriate, and flexibility is crucial to identifying and developing effective programs aimed at bat conservation.** Habitat protection or enhancement, reducing the impacts of white-nose syndrome, and/or conservation banks can be effective tools, pursuant to further research, for reaching broad-scale, regional conservation goals.
- **Adaptive Management allows for an iterative learning process that will improve the effectiveness of bat conservation measures and reduce scientific uncertainty over time.** As more is learned, mitigation and monitoring strategies will become more targeted, cost effective, and beneficial to bats.