

Effects of wind energy on wildlife

An introduction and overview

John Lloyd, Associate Director of Research

www.awwi.org

Overview on impacts & mitigation: an outline of our approach

Two kinds of adverse impact

Fatalities from collisions

Habitat-based impacts

We'll summarize what is known about:

1. Risk
2. Mitigation
3. Information gaps



American Wind Wildlife Information Center

Montana Wind Wildlife Workshop

May 4th 2021

American Wind Wildlife Information Center

Anonymized pooled data resource for turbine collision risk assessment

AWWIC strategy:

1. Use data-sharing agreements to build a database of otherwise unavailable collision monitoring data
2. Publish data summaries to support generation of collision risk hypotheses
3. Conduct and support peer-reviewed research using database

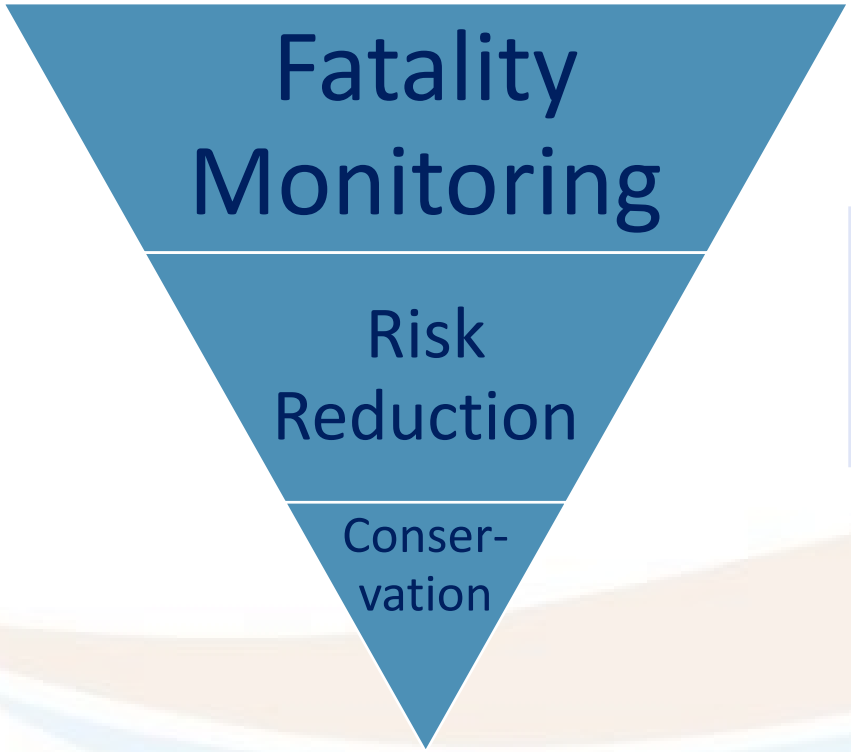
Data Source:

- Post-Construction Fatality Monitoring Studies (Tier 4 of the Wind energy guidelines)
  - **Methods**
  - **Details of each carcass discovery**
  - **Bias trial raw data**
  - **Fatality estimate results**

AWWIC Overview

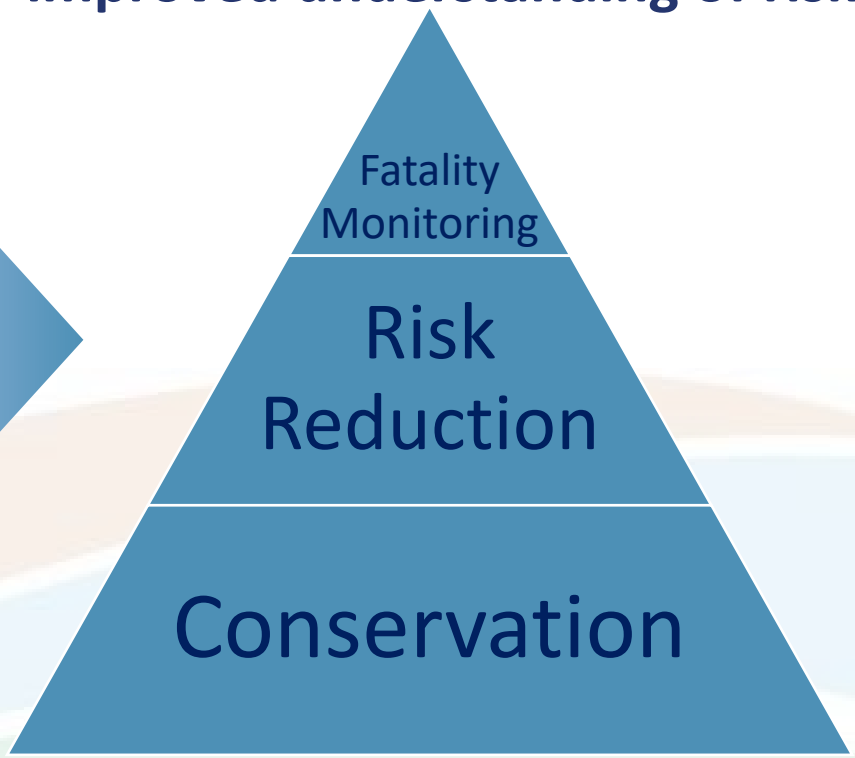
Using data to improve wind energy's ability to conserve wildlife

Current Projects' Wildlife Expense



AWWI's Data Tools

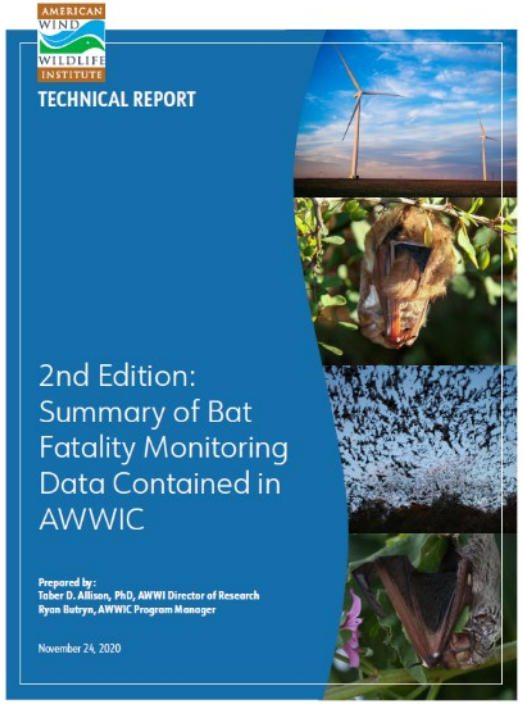
Greater conservation focus with improved understanding of risk

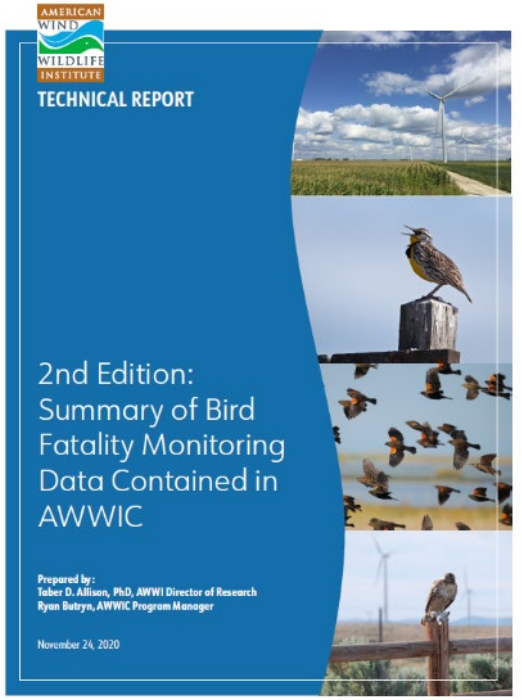


AWWIC Results

- **Second Bird and Bat Technical Reports published November 2020**
- WWRF research projects
  - **Do landscape characteristics explain collision risk?**
  - **Is there species-specific variation in curtailment effectiveness?**
  - **Can regional weather predict bat fatalities?**
- AWWI-led research
  - **How does timing of fatalities vary by region and species?**

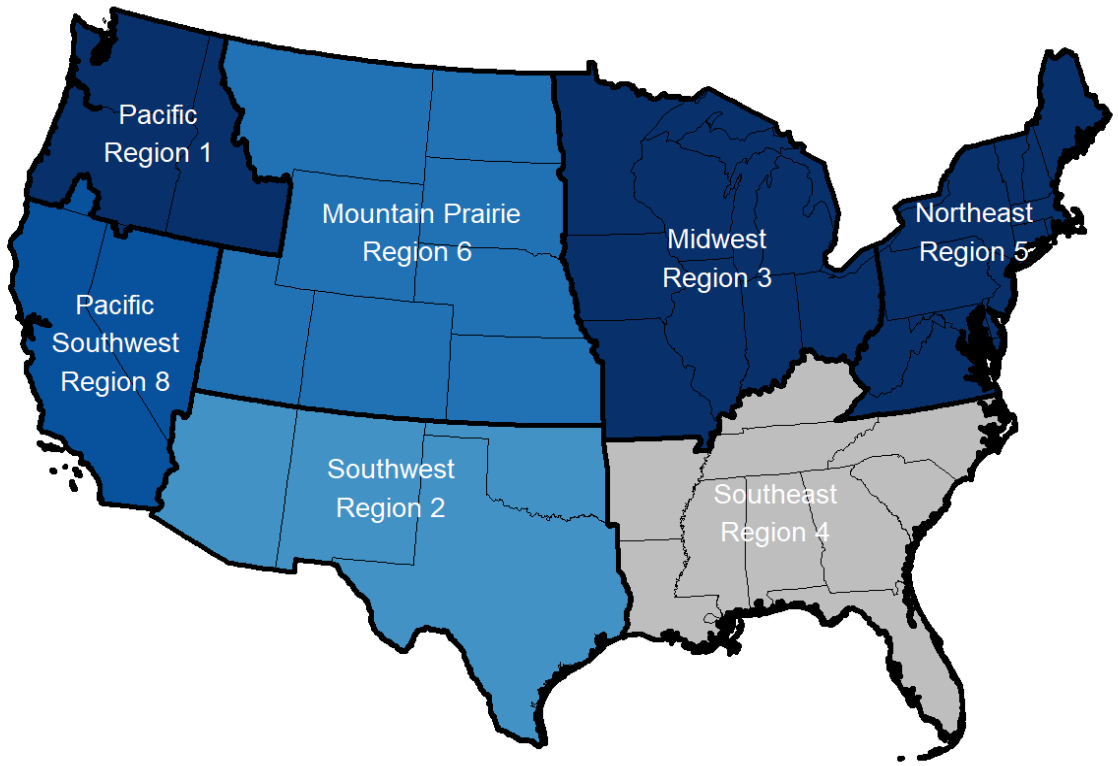
Reports on Second Analyses for Birds and Bats





www.awwi.org/results-catalog

Current Data Status



AWWIC By the Numbers

- Estimated percentage of operating MWs (as of Q2 2019): **33%**
- Number of U.S. projects: **235**
- Number of post-construction studies: **355**
- Total number of turbines searched: 8,757
- Total number of carcass searches: 558,000

U.S. Bat Species Reported

Species	Percentage of incidents	Frequency
hoary bat	30.8	259
eastern red bat	27.3	151
silver-haired bat	14.1	192
Mexican free-tailed bat	7.3	64
big brown bat	6.9	126
little brown myotis	4.2	79
evening bat	2.1	49
tri-colored bat	2.1	45
northern yellow bat	1.1	6
southern yellow bat	0.3	7
western red bat	0.1	10
big free-tailed bat	0.1	8
Seminole bat	<0.1	7
cave myotis	<0.1	5
canyon bat	<0.1	3
greater bonneted bat	<0.1	4
northern long-eared myotis	<0.1	4
western yellow bat	<0.1	3
Indiana myotis	<0.1	4
pocketed free-tailed bat	<0.1	3
California myotis	<0.1	1
long-legged myotis	<0.1	1
Unknown	3.4	111
Total	100	273

Mountain Prairie Bat Species Reported

Species	Mountain Prairie (44)	Total (273)
hoary bat	42.8	30.8
eastern red bat	13.8	27.3
silver-haired bat	17.4	14.1
Mexican free-tailed bat	8	7.3
big brown bat	3.3	6.9
little brown myotis	1.3	4.2
unidentified bat	7.7	3.3
evening bat	4.9	2.1
tri-colored bat	–	2.1
northern yellow bat	–	1.1
Region totals	1074	18070

U.S. Bird Species Reported

Species	Percentage of incidents	Frequency
Horned lark	13.2	128
Mourning dove	5.5	114
Red-eyed vireo	3.9	81
Golden-crowned kinglet	3.8	95
Western meadowlark	3.4	58
Red-tailed hawk	2.5	95
American kestrel	2.4	56
Turkey vulture	2.3	70
Killdeer	1.8	54
Red-winged blackbird	1.7	35
European starling	1.6	77
Ruby-crowned kinglet	1.6	74
Ring-necked pheasant	1.4	51
Rock pigeon	1.2	58
Savannah sparrow	1.1	39
Other species (292)	36.6	265
Unknown	14.4	211
Total	100	274

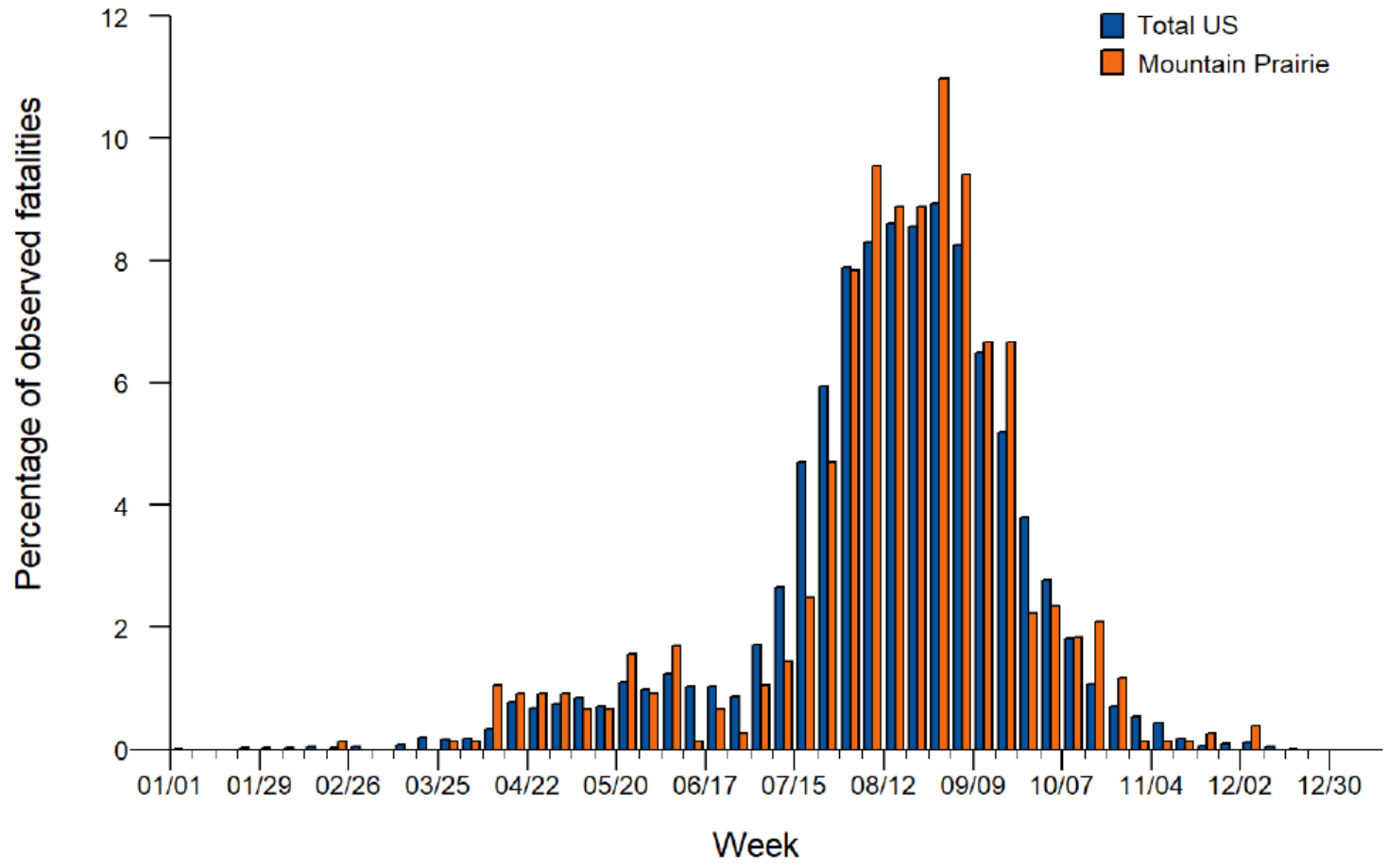
Mountain Prairie Bird Species Reported

Species	Number of incidents	Percentage of incidents	Frequency
Horned Lark	329	33.6	33
Ring-necked Pheasant	36	3.7	13
Western Meadowlark	35	3.6	15
Mourning Dove	26	2.7	14
Lark Bunting	19	1.9	12
Vesper Sparrow	19	1.9	12
American Coot	17	1.7	10
European Starling	17	1.7	8
Common Nighthawk	14	1.4	4
Red-tailed Hawk	14	1.4	11
Chipping Sparrow	11	1.1	10
Turkey Vulture	11	1.1	6
Wilson's Warbler	11	1.1	6
Swainson's Hawk	10	1	8
Other species (109)	290	29	42
Unknown	121	12.3	32
Total	980	100	45

Mountain Prairie Bird Groups

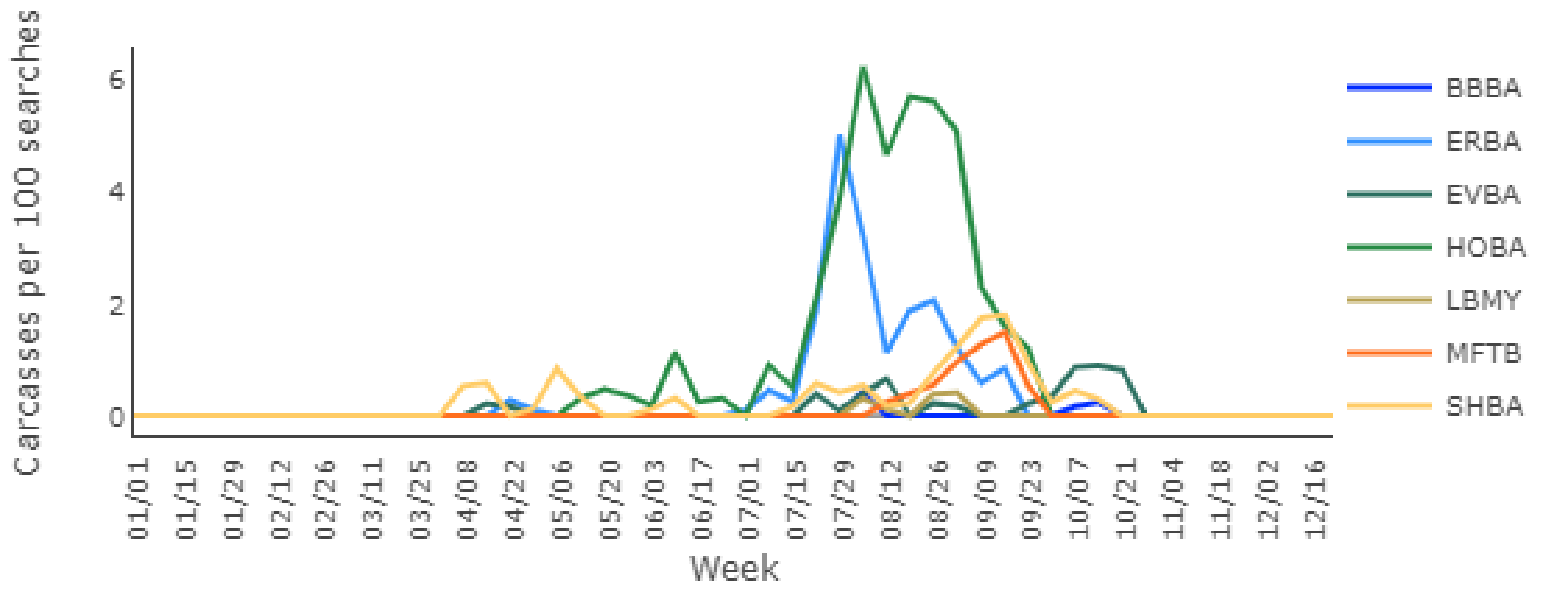
Bird Group	Mountain Prairie (45)	Total US (273)
Small Passerines	65.7	58.3
Unidentified Small Bird	6	8.2
Doves/Pigeons	3.5	7.1
Diurnal Raptors	4.7	7.1
Upland Game Birds	5.2	4.2
Vultures	1.1	2.4
Shorebirds	1	2.3
Waterfowl	2.7	2
Rails/Coots	2.2	1.4
Unidentified Large Bird	1.7	1.2
Cuckoos	0.4	1.1
Owls	0.7	1
Woodpeckers	0.5	0.9
Swifts/Hummingbirds	0.5	0.6
Gulls/Terns	–	0.5
Goatsuckers	1.5	0.5
Large Corvids	0.4	0.4
Loons/Grebes	1.9	0.3
Waterbirds	0.1	0.3
Domestic	–	<0.1
Kingfishers	–	<0.1
Region totals	980	9316

U.S. Bat Fatality Timing



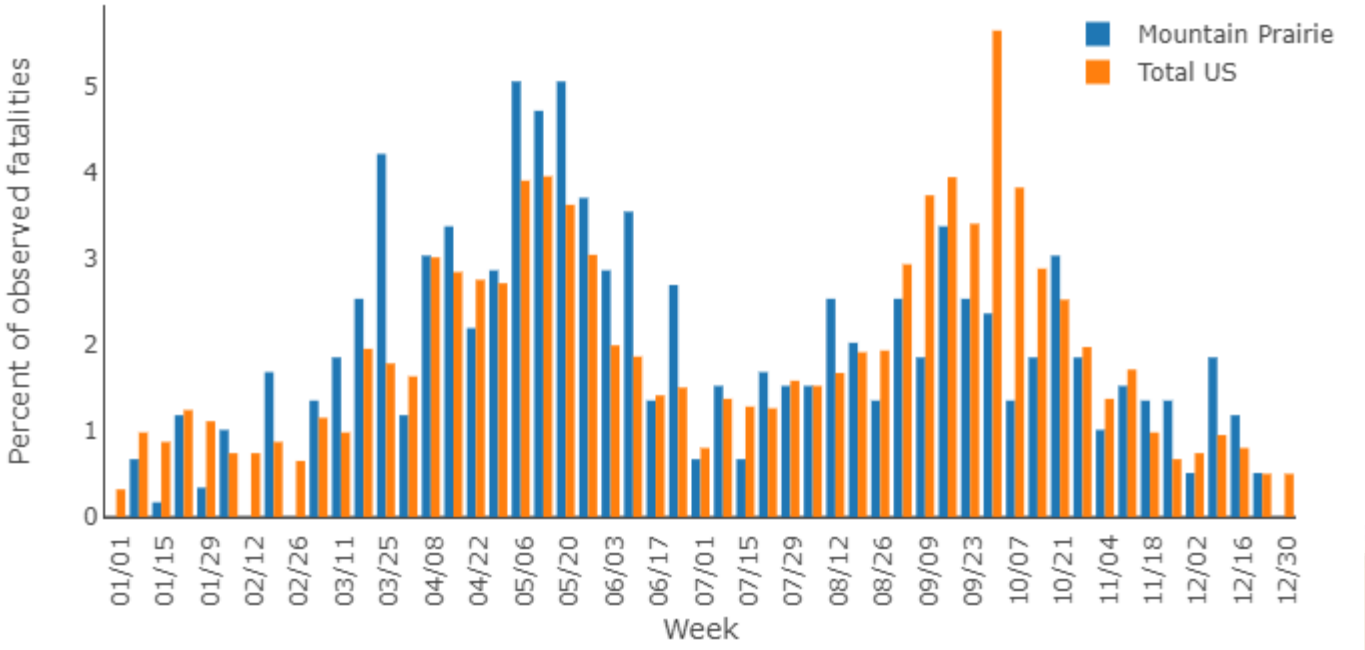
Mountain Prairie Bat Fatality Timing by Species

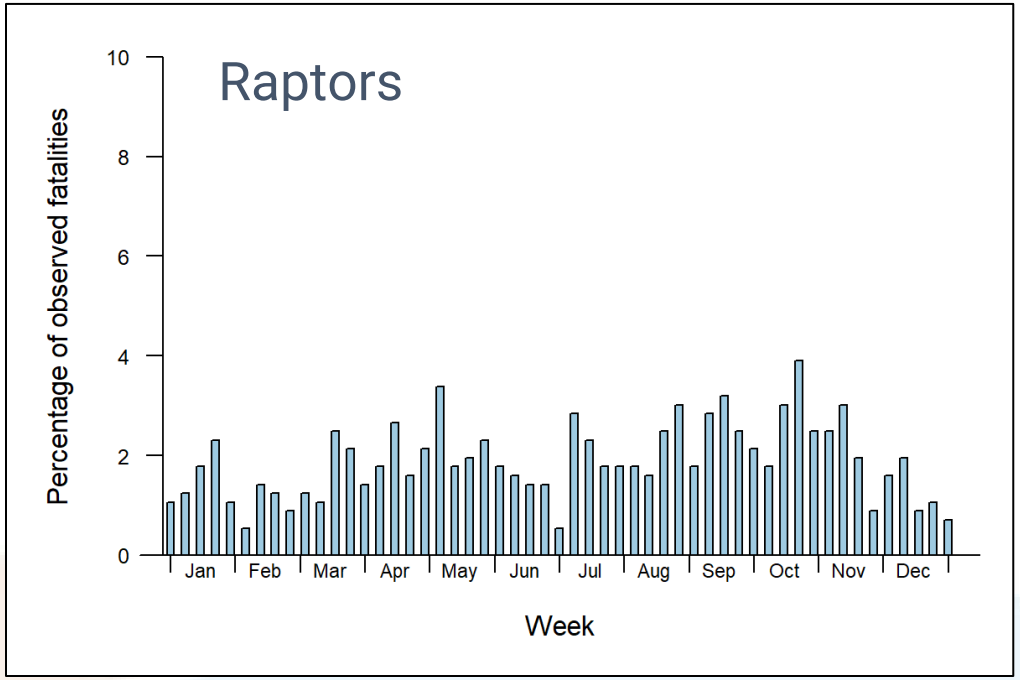
- Carcass finds standardized by number of turbine searches per week



Bird Fatality Timing

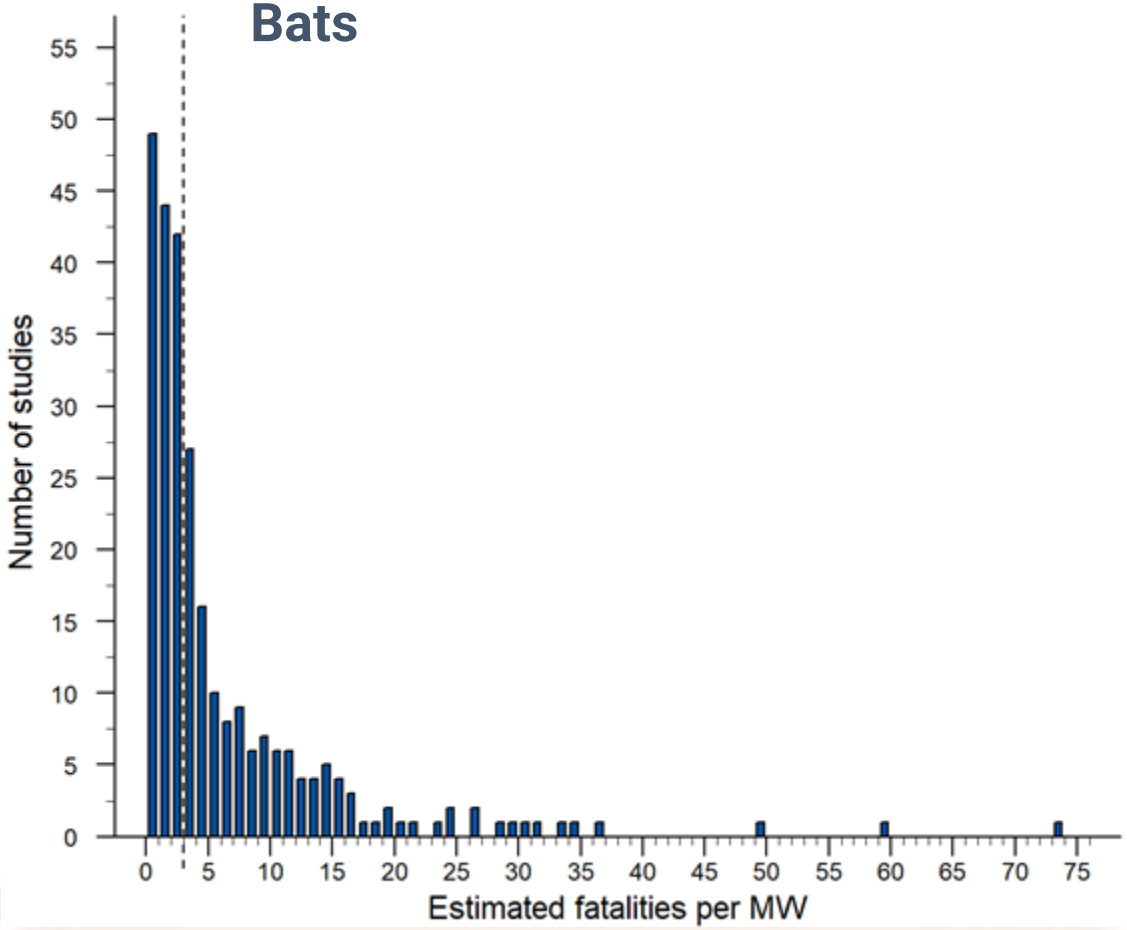
All birds



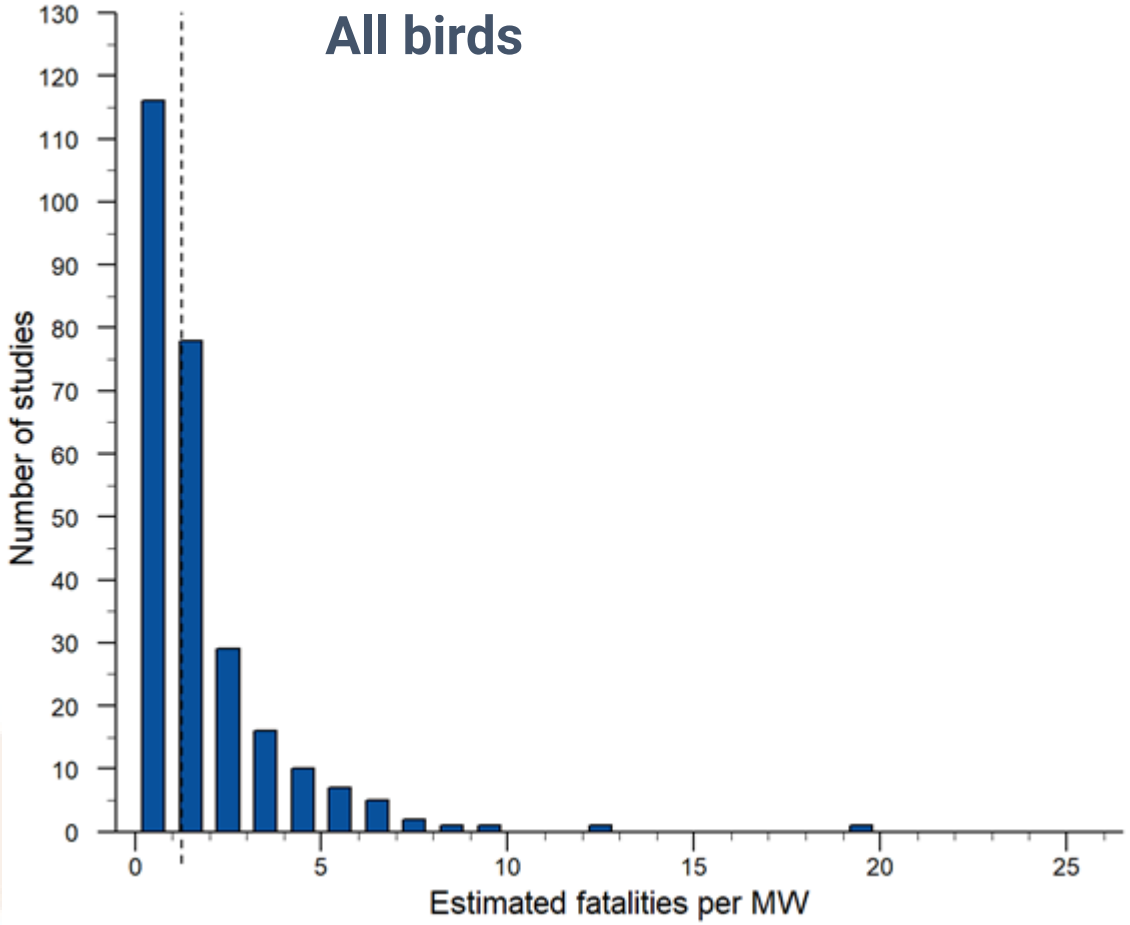


Distribution of Reported Fatality Estimates for studies in the U.S.

Bats

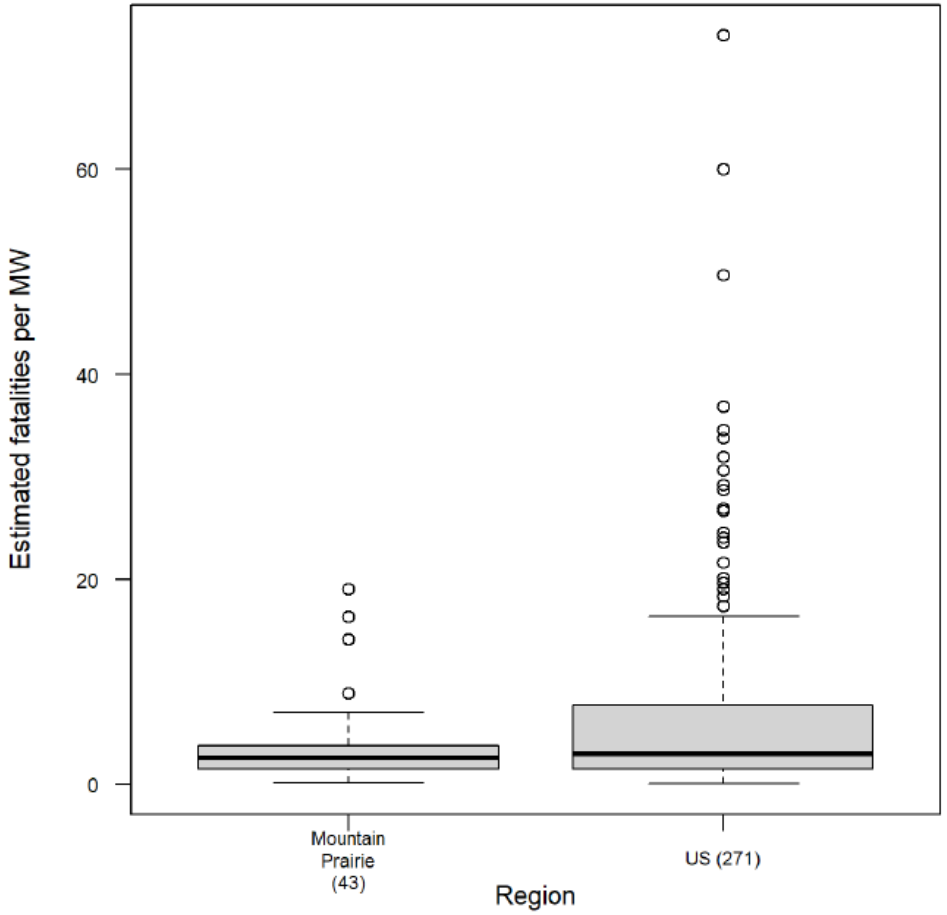


All birds

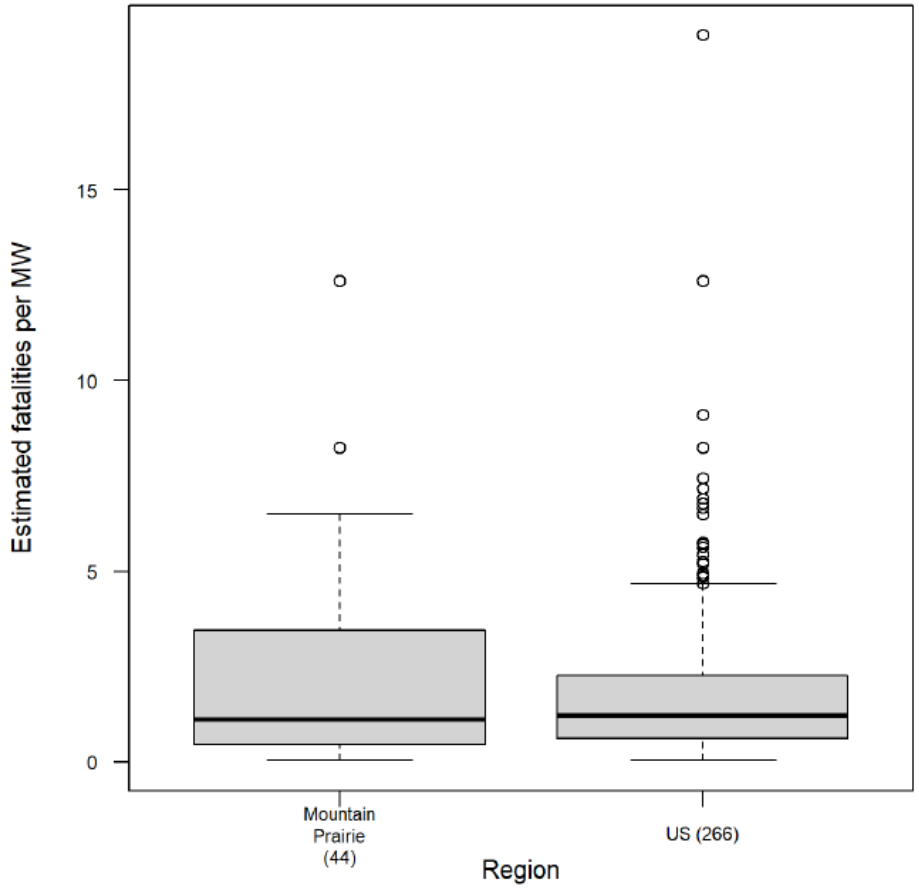


Mountain Prairie Fatality Estimates

Bats



All birds



Research Status of Population-level Impacts

- The estimated total bird fatalities is much lower than other leading anthropogenic sources of mortality.
- Fatality rates at currently estimated values do not appear likely to lead to population declines in most bird species.
  - **The most frequently reported species are common and widespread species**
  - **Collisions may be relatively more important for diurnal raptor species, including golden eagles**
- Little is known about many bat species' population status.
  - **White-nosed syndrome has caused ~90% decline in some cave-hibernating species that have also been reported as fatalities at wind facilities**
  - **Size of migratory tree-bats populations is poorly understood**

Overview on impacts & mitigation: an outline of our approach

Two kinds of adverse impact

Fatalities from collisions

Habitat-based impacts

We'll summarize what is known about:

1. Risk
2. **Mitigation**
3. Information gaps

Mitigating risk from collision fatalities

Avoid

Use risk analysis and other research findings to inform siting

Minimize

Develop and evaluate techniques and technologies to reduce impacts

Compensate

Develop quantifiable and verifiable options for offsetting impacts