WIND ENERGY DEVELOPMENT, WILDLIFE, AND ENVIRONMENTAL REVIEW

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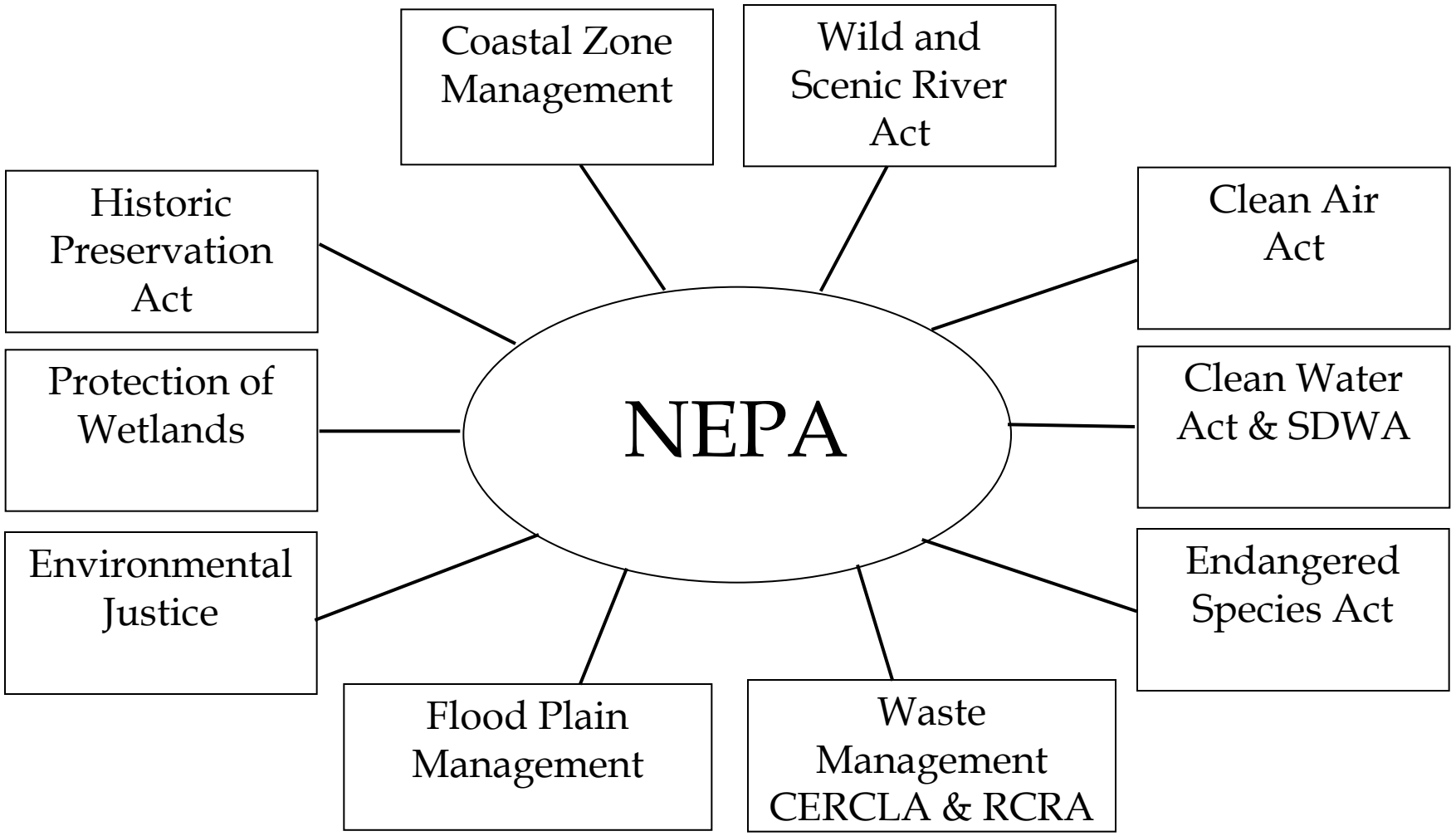
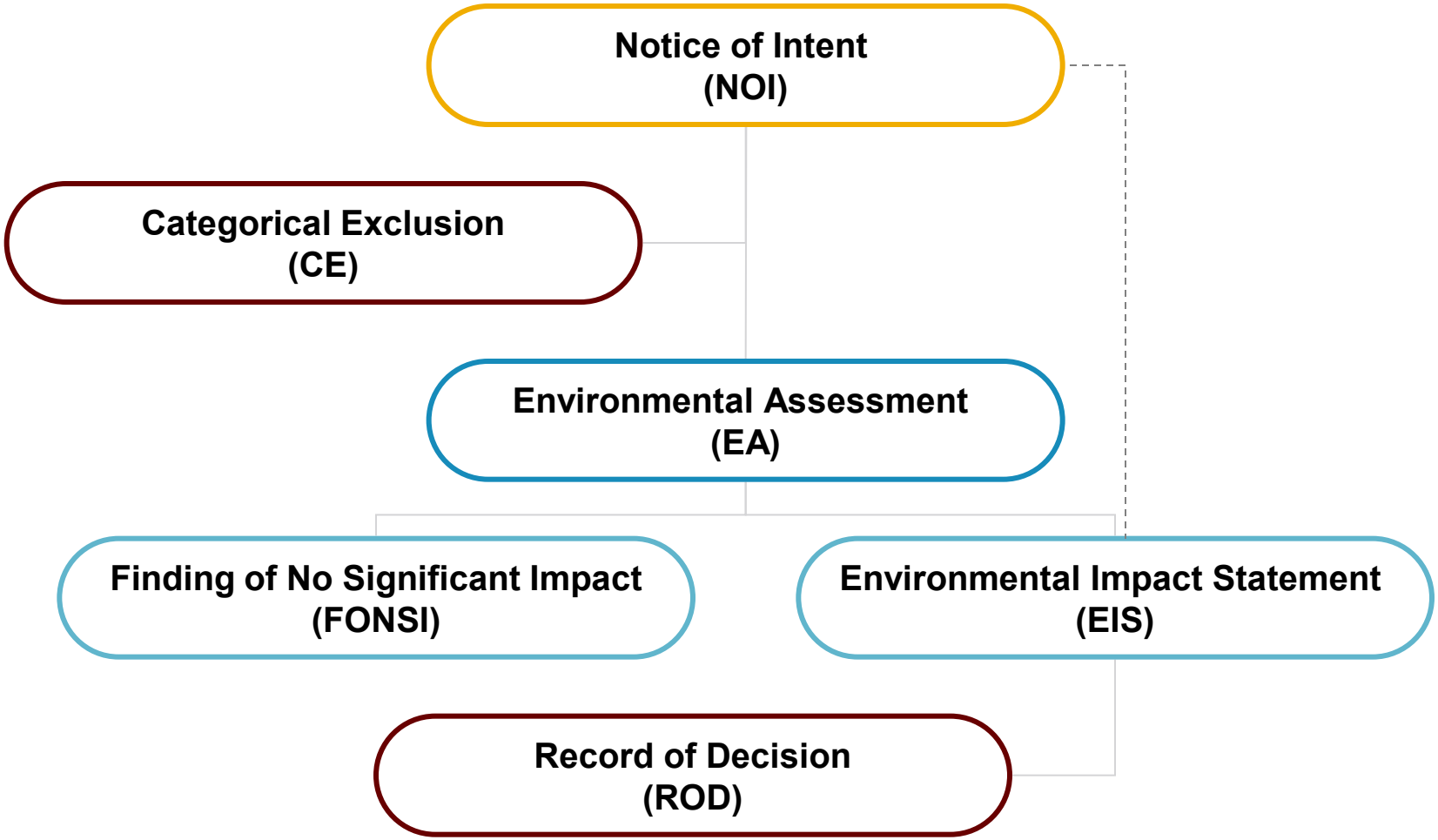
General Relationship of Many Federal Laws/Regulations



NEPA Drivers (a.k.a "Triggers")

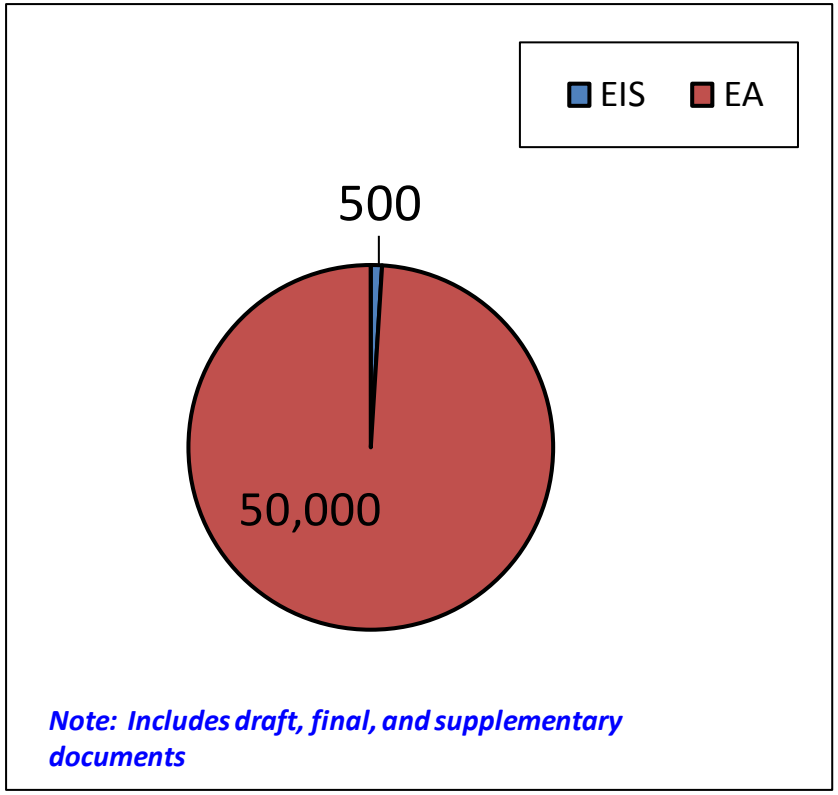
- Federal actions include projects and programs that are:
  - **Regulated**
    - Army Corps of Engineers
      - **Section 10, River & Harbors Act (navigable waterways)**
      - **Section 404, Clean Water Act (wetlands)**
    - Endangered Species Act
  - **Approved**
    - **Bureau of Land Management ROW Grant**
    - **US Forest Service Special Use Permit**
    - **Western Area Power Administration (interconnect)**
  - **Financed**
    - Federal Highway Administration
    - **RUS and DOE Funding**
  - **Assisted**
    - Federal Emergency Management Agency
  - **Conducted**
    - Department of Homeland Security
    - National Park Service
    - National Refuge System

The Formal Process



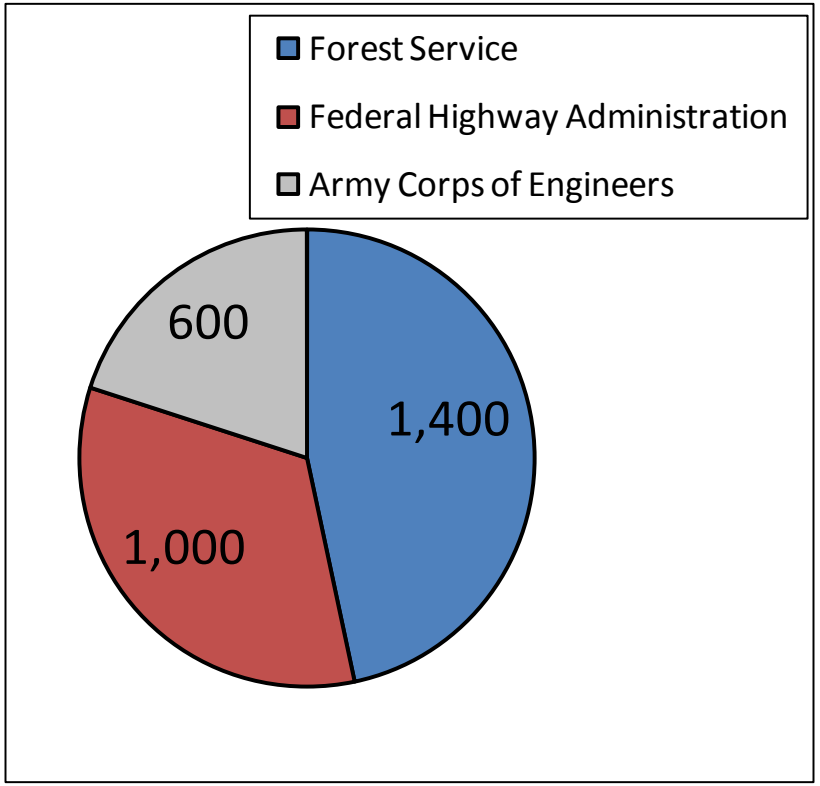
NEPA Statistics

AVERAGE ANNUAL SUBMITTALS



Note: Includes draft, final, and supplementary documents

NUMBER OF EIS REPORTS FILED BETWEEN 1994 - 2004



Endangered Species Act (ESA)

- Purpose – "to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of these species". The Act defines three fundamental terms:
  - "Endangered" means that a species of fish, animal, or plant is "in danger of extinction throughout all or a significant portion of its range"
  - "Threatened" means a species "is likely to become endangered within the foreseeable future." Regulations for a threatened species may be less restrictive than if it were endangered.
  - "Critical habitat" means "specific geographical areas that are …essential for the conservation and management of a listed species, whether occupied by the species are not."
- Section 9 of the ESA prohibits any person from "taking" endangered wildlife
- Section 7 addressed during the NEPA process

Consultation with U.S. Fish & Wildlife Service (USFWS)

- ESA Section 7 requires consultation for any federal permit review – Biological Assessment Prepared in Conjunction with NEPA Document
- Informal Consultation Process
  - Discussions with USFWS
  - No Effect
  - May Effect, Not Likely to Adversely Effect
- Formal Consultation
  - BA Determination of “May Effect, Likely to Adversely Effect”
  - USFWS prepare Biological Opinion

Consultation with U.S. Fish & Wildlife Service (USFWS)

- ESA Section 7 requires consultation for any federal permit review
- ESA Section 10 is for incidental take for non-federal projects
  - Habitat Conservation Plan (see 1996 HCP Handbook, *Handbook for Habitat Conservation Planning and Incidental Take Permitting Process*)
  - Incidental Take Permit
- ESA Section 11 establishes penalties and enforcement provisions
  - Civil – up to $25,000 per violation
  - Criminal – up to $50,000 per violation and one year in jail

Migratory Bird Treaty Act (MBTA)

- Forbids the taking, killing, or possession of migratory birds (more than 800 species)
- No statutory or regulatory mechanism to limit liability
- Wind developers need to take proactive measures to minimize the risk of mortality
- Individuals or organizations may be fined, and may face imprisonment for misdemeanor violations
- Often work with USFWS and state agencies during informal consultation

Bald and Golden Eagle Protection Act

- Makes it unlawful to import, export, take, sell, purchase, or barter any bald or golden eagle, their parts, products, nests, or eggs.
- Misdemeanor violations – fines up to $100,000 for individuals and $200,000 for organizations
- Felony violations – fines of up to $250,000 and $500,000 for individuals and organizations
- Informants may be eligible for cash rewards
- Bald and Golden Eagle Protection Act – Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy (IM No. 2010-156; expires 09/30/2011

BLM Managed Lands

- Wind Energy Development Program – Programmatic EIS October 2003
- BLM Wind Policy (Instruction Memorandum (IM) No. 2009-043) – *Expires 09/30/2010*
- Gunnison and Greater Sage-grouse Management Considerations for Energy Development (Supplement to National Sage-Grouse Conservation Strategy)

BLM Managed Lands (continued)

- Wildlife Habitat Management Plans and Areas
- BLM 6840 Sensitive Species Policy (2008)
- BLM/State Sensitive Species Agreements
- Other ESA Plans, Programs and Agreements (e.g. PRRIP, Colorado River T&E)
- State laws, regulations, and executive orders (e.g., Sage Grouse in Wyoming)

USFWS Interim Guidelines / Federal Advisory Committee

- May 13, 2003 – Department of Interior (DOI) issued Interim Guidance on Avoiding and Minimizing Wildlife Impacts from Wind Turbines
- April 26, 2004 – USFWS issued a memorandum regarding implementation, stated that the "Interim Guidelines are not to be construed as rigid requirements, which are applicable to every situation, nor should they be read literally"
- 2007: Wind Turbine Guidelines Federal Advisory Committee (WTGAC) to finalize revised Guidelines
- 2010 - WTGAC report transmitted to the Secretary of the Interior
- USFWS currently preparing new guidelines based in part on the WTGAC recommendations

WTGAC Recommendations

- Tiered process
- Pre-construction
  - Tier 1 - Screening
  - Tier 2 - Site assessment
  - Tier 3 - Baseline studies
- Post-construction
  - Tier 4 - Fatality monitoring
  - Tier 5 – Habitat impact assessment and studies of mitigation and risk reduction effectiveness

TIMELINES

- Wildlife Studies – 1-3 years pre-construction (Tier 2 and 3). Does not consider other aspects of environmental review – e.g., cultural resources.
- NEPA Process
  - NOI
  - DEIS and Biological Assessment
  - FEIS
- Wildlife Studies – 1-3 years post-construction (Tier 4 and 5)
- Many steps have mandatory review/comment periods

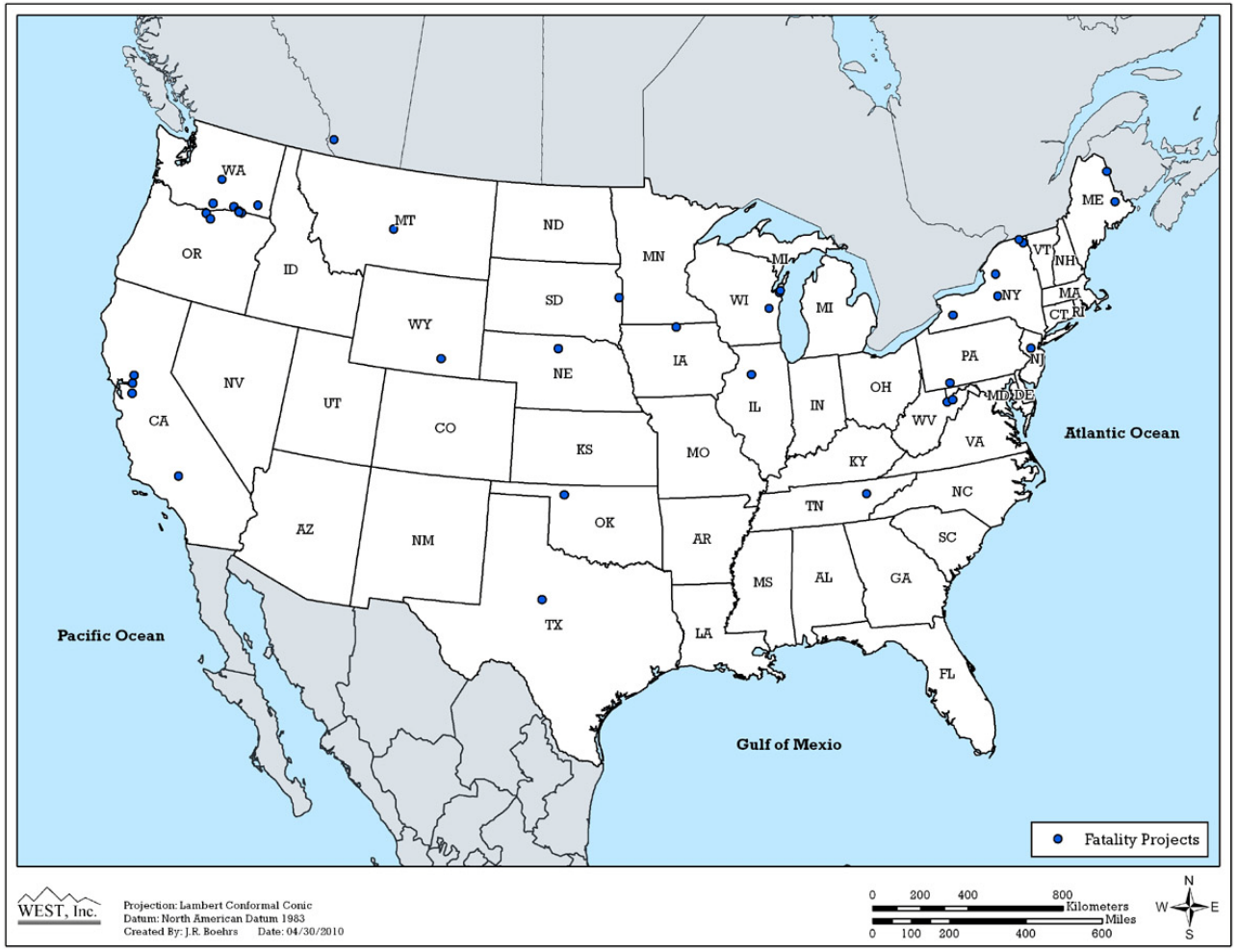
What are the Wind-Wildlife Impacts?

- **Avian Mortality**
- Loss of Habitat
  - Direct loss to facility
  - Indirect loss to disturbance
- Bat Mortality
- T&E Species Issue

Where did the avian concern start?

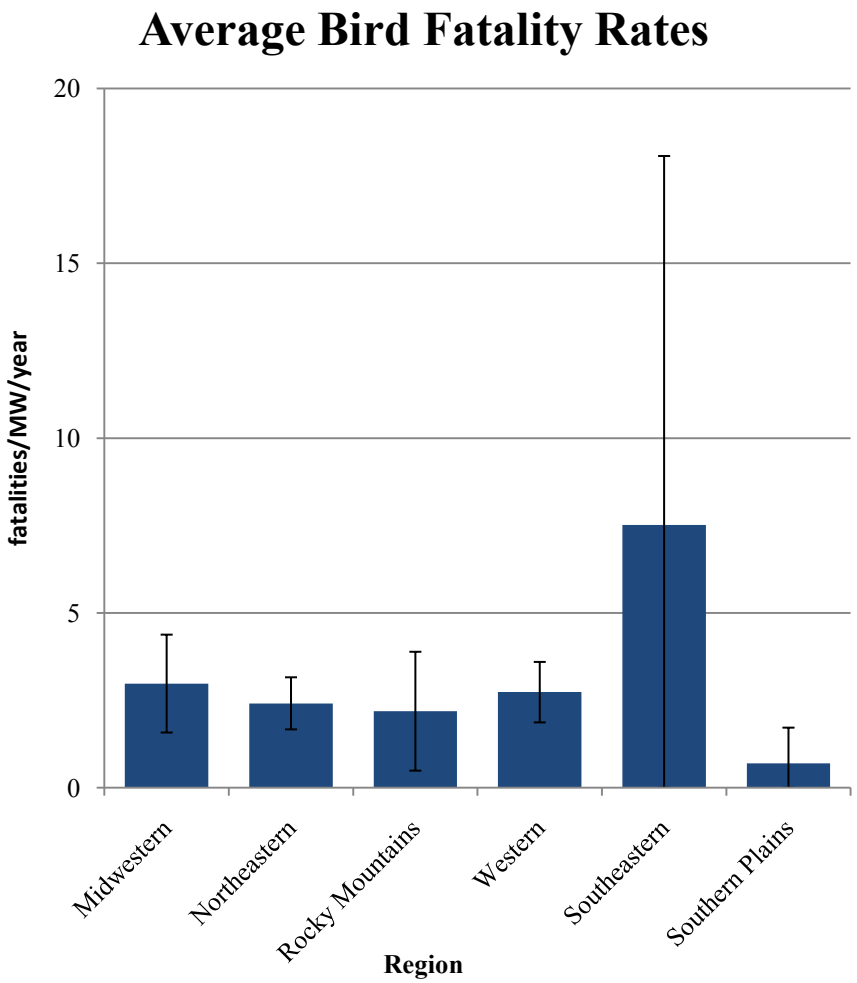
- Altamont Pass 1980s: 7000+ turbines (now ~5000) of various designs in 60 sq. mile area.
- Arid rolling hills environment with high prey base (ground squirrels) and high raptor use.
- High raptor mortality
  - golden eagles (30-70 fatalities/year)
  - red-tailed hawks (300-500 fatalities/year)
  - American kestrel (several hundred)
  - burrowing owls (several hundred)
- Also other birds but historic study focus has been on raptors.
- Few bats

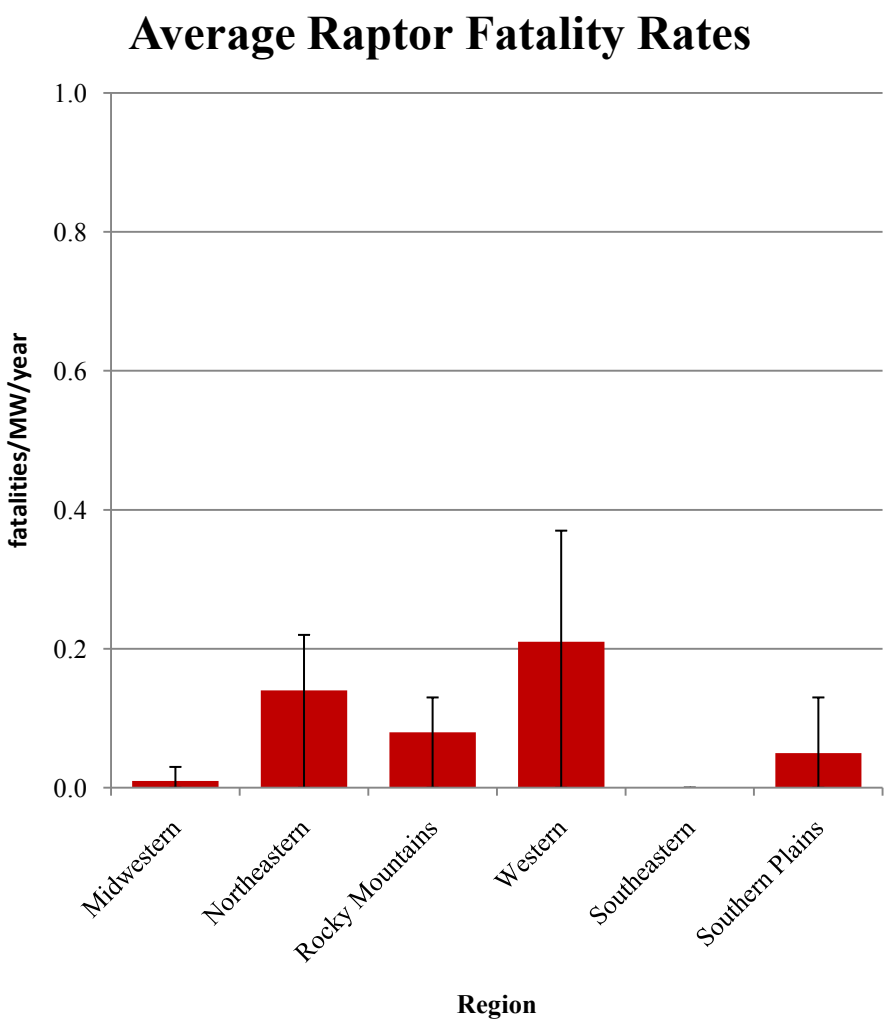
Mortality Studies in North America



- Western:
  - Washington, Oregon, California
- Rocky Mountain:
  - Montana, Wyoming,. Alberta (Canada)
- Midwest:
  - Iowa, Illinois, Minnesota, Nebraska, Wisconsin
- Southern Plains:
  - Texas, Oklahoma
- Eastern:
  - Maine, New York, Pennsylvania, Tennessee, West Virginia
- Southeastern
  - Tennessee

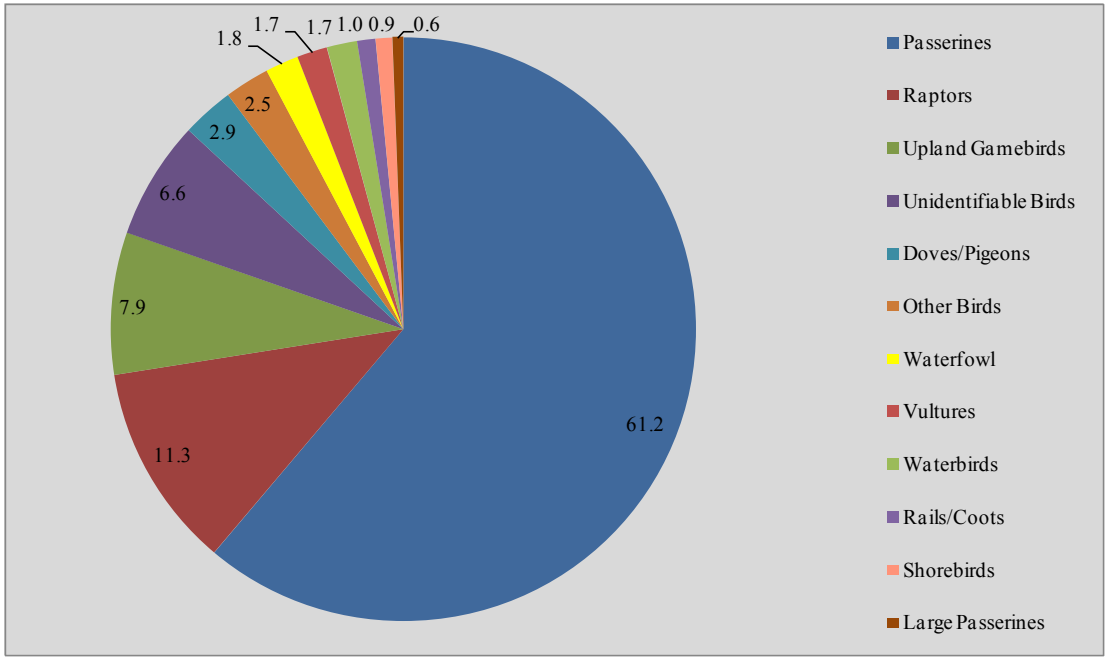
Avian Fatality Rates



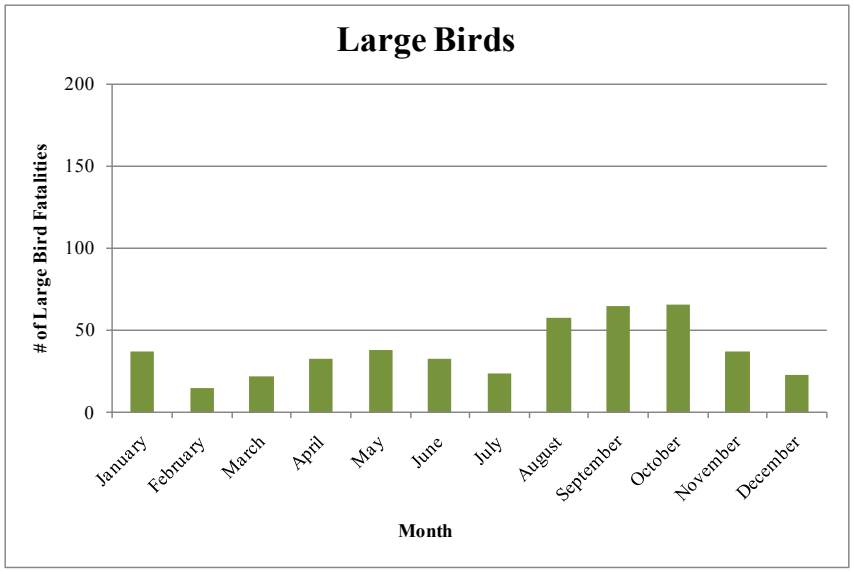


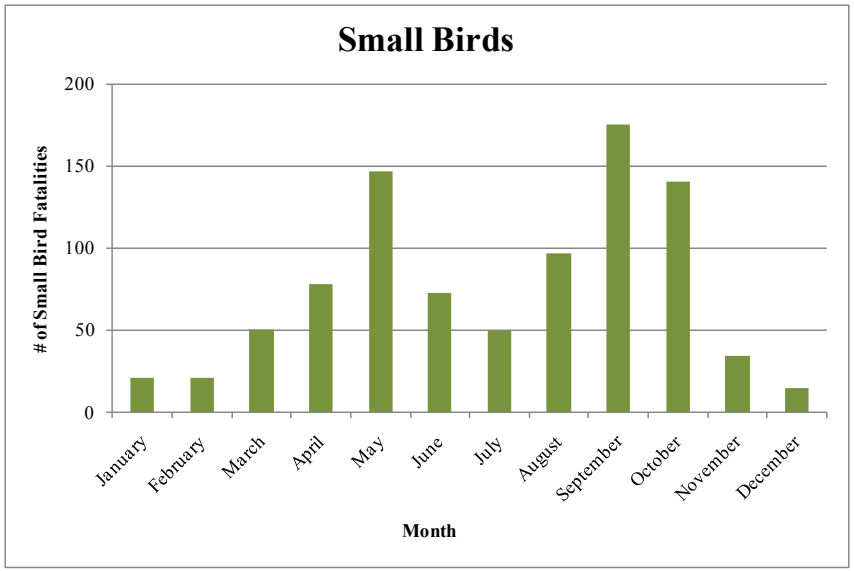
Mortality by Avian Type

Bird Types	Fatalities	% Composition
Passerines	1,130	61.2
Raptors	209	11.3
Upland Gamebirds	145	7.9
Unidentifiable Birds	121	6.6
Doves/Pigeons	53	2.9
Other Birds	46	2.5
Waterfowl	34	1.8
Vultures	31	1.7
Waterbirds	31	1.7
Rails/Coots	19	1.0
Shorebirds	17	0.9
Large Passerines	11	0.6
Overall	**1,847**	**100**



Bird Mortality Timing

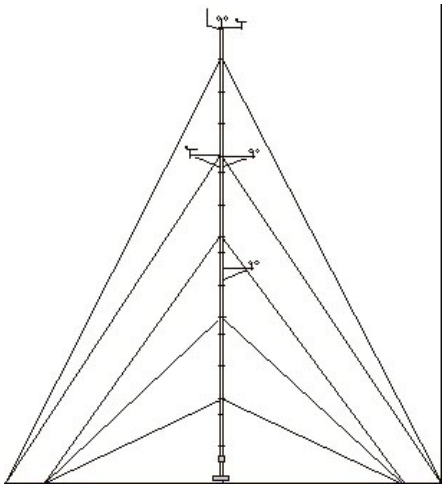




- Results may be limited by search effort; many studies focus primarily on spring and fall seasons.
- Date of mortality not presented in all studies, so fewer casualties included in timing figures than overall results.

Met Towers

- Four times higher mortality at guyed met towers compared to turbines at Foote Creek Rim
  - 5 guyed towers; 69 turbines



Gehring 2008 – guyed comm. Tower 10 times higher mortality than unguyed towers

Avian Mortality Summary

- Projects appear to not impact populations
- Siting very Important
- Impacts to Nocturnal Migrating Songbirds has generally been low
- Raptors at relatively high risk
- Cumulative Impacts concern as Industry continues to expand

What are the Wind-Wildlife Impacts?

- Avian Mortality
- Loss of Habitat
  - Direct loss to facility
  - Indirect loss to disturbance
- Bat Mortality
- T&E Species Issues

Sources of Habitat Impact

- Direct loss of habitat
  - Turbine pads, roads, substations, transmission lines
- Indirect loss of habitat
  - From behavioral response to wind project facilities
  - Turbines, transmission lines, roads, human activity

Fragmentation/Displacement Impacts – Indirect Habitat Loss

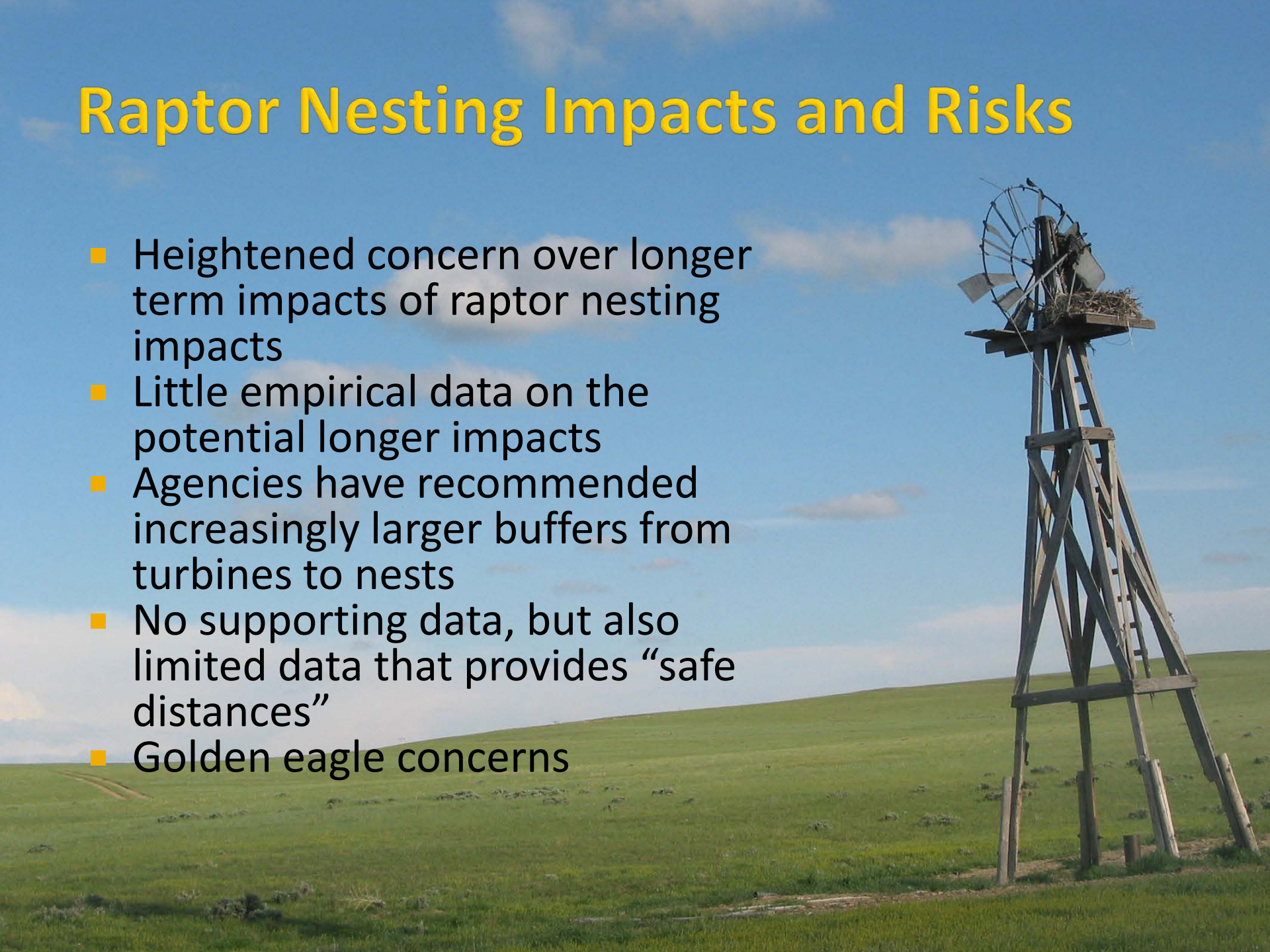
- Grassland songbird species
  - Several wind turbine studies showing small scale effects (0 –200m)
- Prairie grouse
  - Few wind turbine studies to date
  - Some on-going – Kansas and Wyoming
  - Anecdotal information and surrogate studies
- Raptors
  - A few wind turbine studies
- Big game
  - Few studies, no effects detected, surrogate and anecdotal information
- Whooping Crane
  - Information lacking – HCP effort ongoing

Monitoring Studies – Disturbance

- Grassland Songbird Displacement Studies conducted at Buffalo Ridge, MN
  - Small scale displacement (~180-250 m)
- Studies of bird displacement at Stateline, Combine Hills (WA/OR), minimal displacement measured
- South Dakota: 1 of 3 species (grasshopper sparrow) showed reduced density within 150m of turbines (Schaffer and Johnson 2007)
- Long-term Mountain Plover study Foote Creek Rim, WY – suggests habituation; decline in numbers during construction; increase post construction; although, decline was regional

Raptor Nesting Impacts and Risks

- Heightened concern over longer term impacts of raptor nesting impacts
- Little empirical data on the potential longer impacts
- Agencies have recommended increasingly larger buffers from turbines to nests
- No supporting data, but also limited data that provides “safe distances”
- Golden eagle concerns



Big Game

- Study at Foote Creek Rim of pronghorn; however, use was low pre-project limiting ability to detect effects.
- Blue Canyon OK – no apparent effect on elk
- Wildhorse – no indication elk avoid the wind project
- Oil and Gas studies (WEST 2008) suggest impacts to mule deer

Summary - Habitat

- Direct habitat impacts are relatively small
- Displacement of grassland nesting birds is likely but the magnitude is uncertain and may range from near 0 to few hundred meters for song birds and even greater for other species (e.g., effects may be much larger for prairie grouse leks)
- Wind project (macro) and wind turbine (micro) siting believed to be best way to minimize impacts
- Cumulative impacts poorly understood
- Virtually nothing known about habitat-related impacts on many species

What are the Wind-Wildlife Issues?

- Avian Mortality
- Loss of Habitat
  - Direct loss to facility
  - Indirect loss to disturbance
- **Bat Mortality**
- T&E Species Issue

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

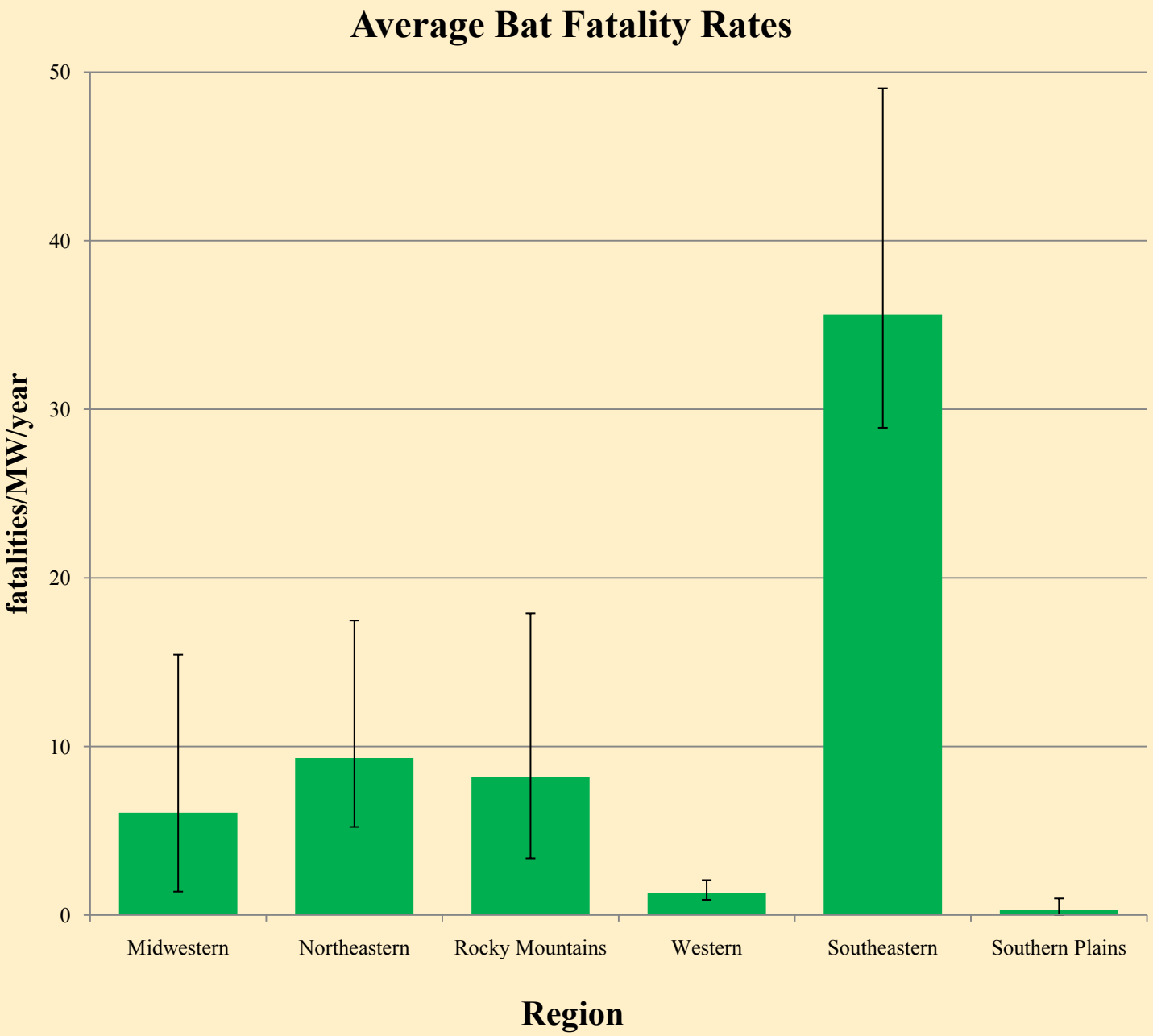
Bat fatalities have been documented at wind facilities worldwide across a wide range of habitats…

appear to be highest at sites on forested ridges in eastern U.S (~28 bats/MW)…possibly tens of thousands

Recent studies have found higher than expected bat fatalities in open prairie in Alberta (~11/MW)

Mixed agriculture/forest habitats in New York (~15/MW)

WEST, Inc.


Average Bat Fatality Rates
fatalities/MW/year
50
40
30
20
10
0
Midwestern
Northeastern
Rocky Mountains
Western
Southeastern
Southern Plains
Region

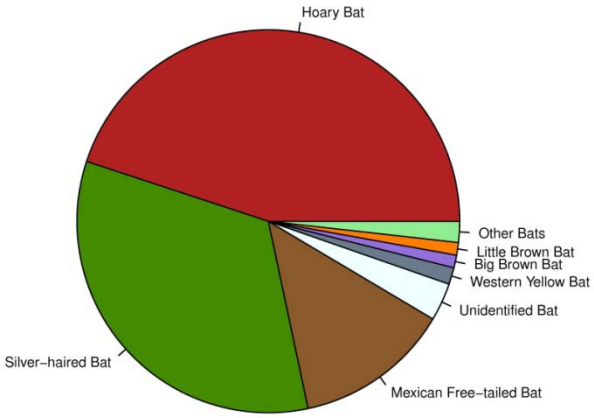
Patterns of Bat Fatality

Thirteen of the 45 species north of Mexico have been found killed by turbines

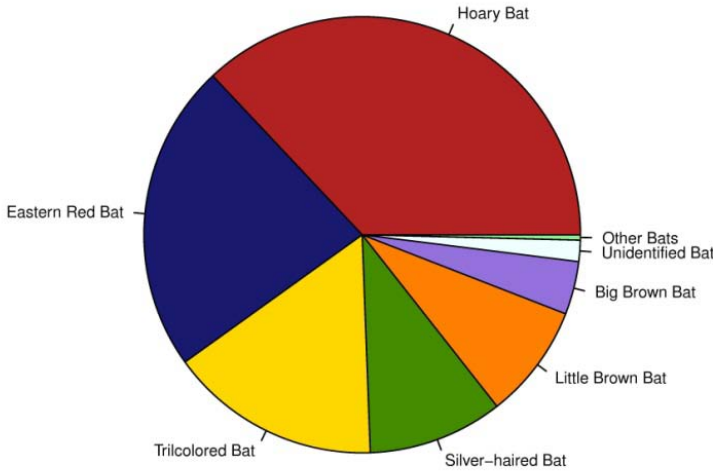
Fatalities are skewed to migratory, tree roosting bats at sites currently studied…BUT…

High proportions of Mexican free-tailed bats found at what few sites studied in the range of this species…

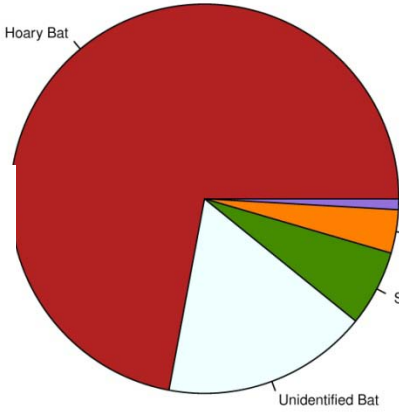
Western Fatalities Composition



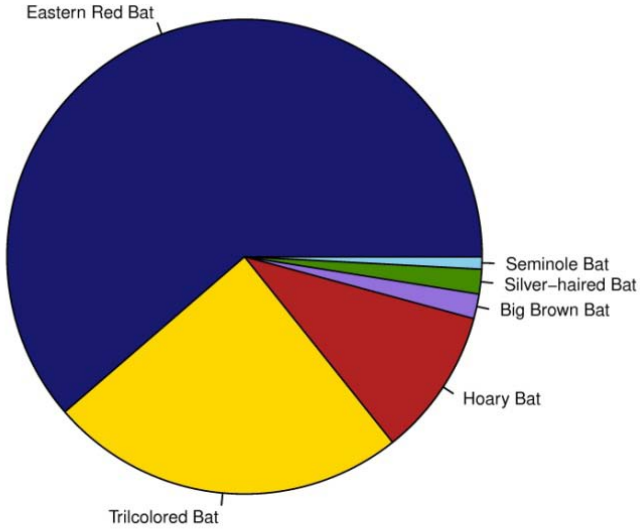
Northeastern Fatalities Composition



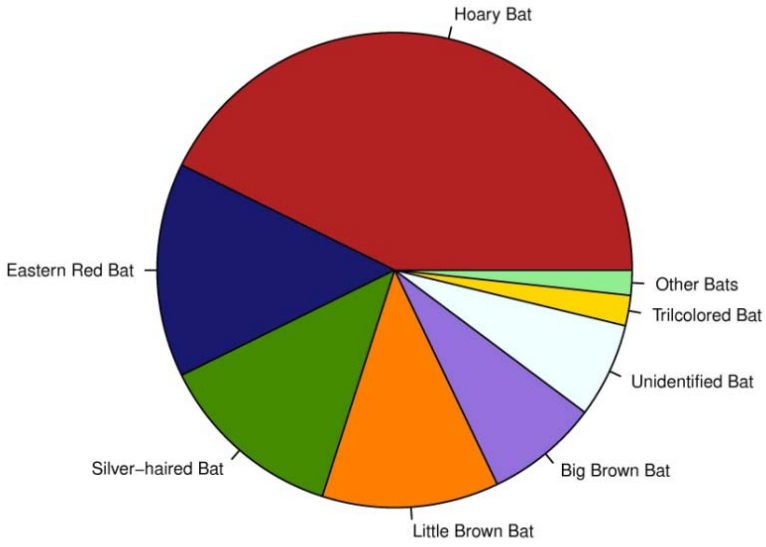
Rocky Mountains Fatalities Composition



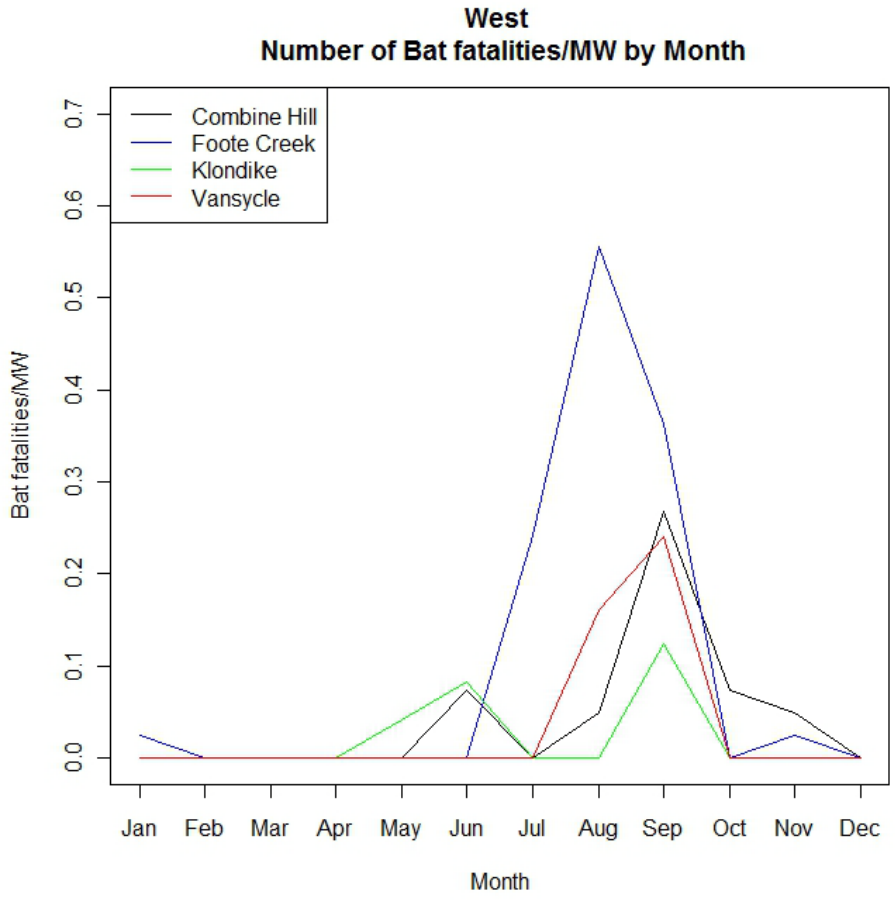
Southeastern Fatalities Composition

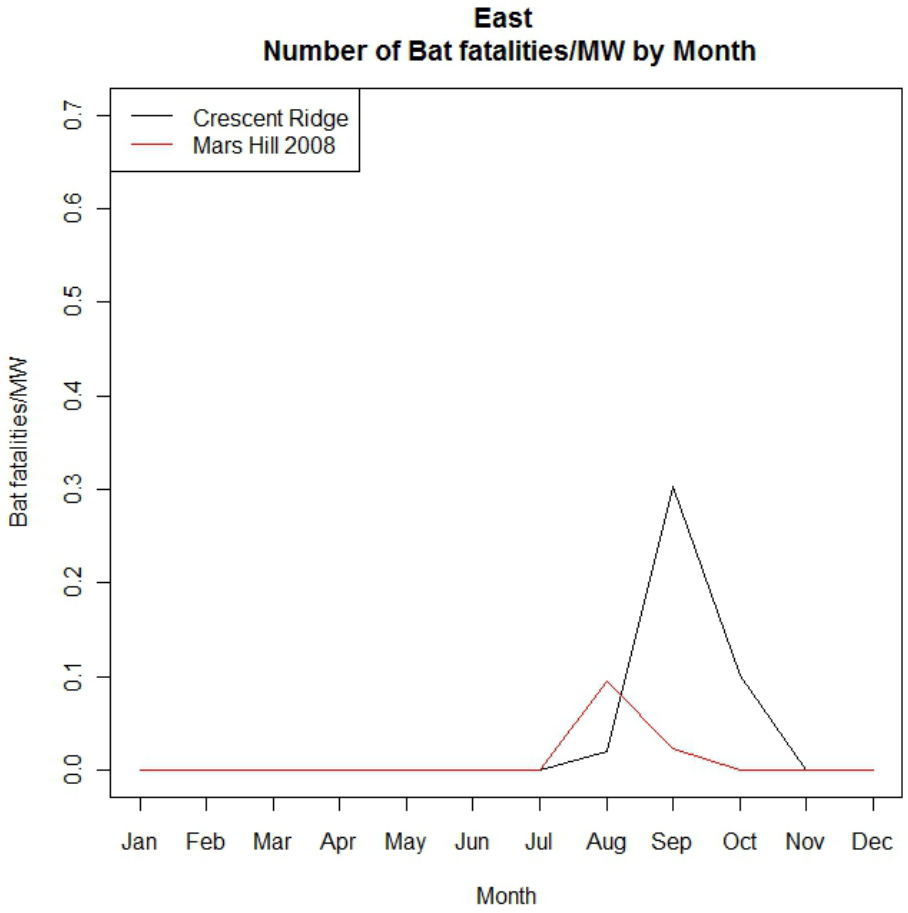


Midwest Fatalities Composition



Timing of Bat Fatalties





Five key unifying patterns of bat fatalities at wind facilities documented from studies in North America:

(from Arnett et al. 2008)

Fatalities are heavily skewed toward tree roosting migratory bats, to date;

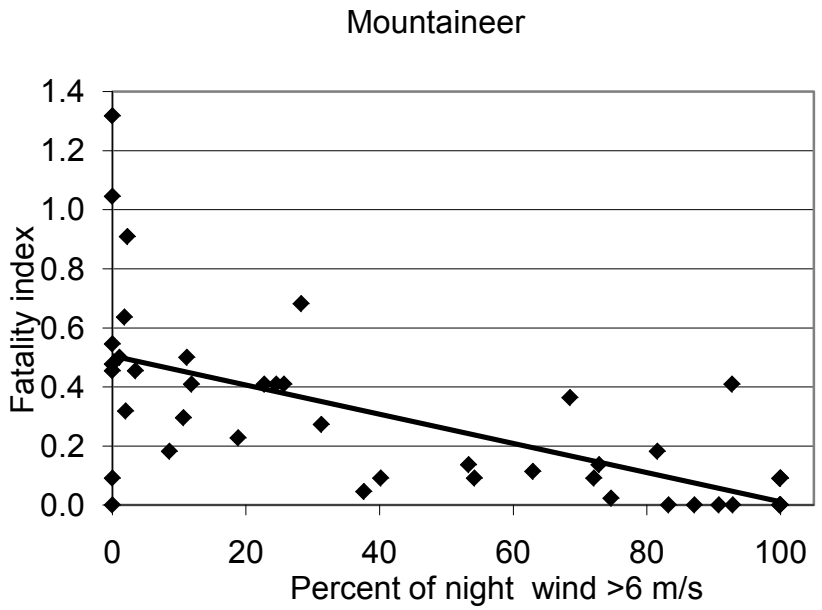
Studies consistently report peak turbine collision fatalities in mid-summer through fall from studies in North America;

Fatalities are not concentrated at individual turbines (i.e., fatalities are distributed among turbines at facilities) and current studies have not yet identified consistent relationships with habitat variables (e.g., distance to water);

Red-strobe lights recommended by the FAA do not influence bat fatality; and

Bat fatalities are highest during periods of low wind speed and appear related to climate variables associated with the passage of weather fronts.

Lower Wind = Higher Bat Fatality



Majority of bats killed in PA, TN, WV were on low wind nights; kills negatively related to wind speed

Bat kills also associated with passage of weather fronts

Patterns may be predictable!

What are the Wind-Wildlife Issues?

- Avian Mortality

- Loss of Habitat
  - Direct loss to facility
  - Indirect loss to disturbance

- Bat Mortality

- **T&E Species Issues**

Impacts to T&E Species

- Peregrine falcon and brown pelican in fatality pool
- No reported bald eagles to date but recently de-listed.
- No grey bats, Virginia long-eared bats found to date.
- Rising concerns as numbers and locations of wind projects increase.
  - e.g. Indiana bats in east, whooping crane migration corridor through Midwest, black-capped vireo in Texas
- First Indiana bats fatality found in Indiana in 2010 in agricultural landscape
- Varied potential for impacts to listed terrestrial species; often a site specific concern