# Update of Avian and Bat Impacts from Windpower Studies

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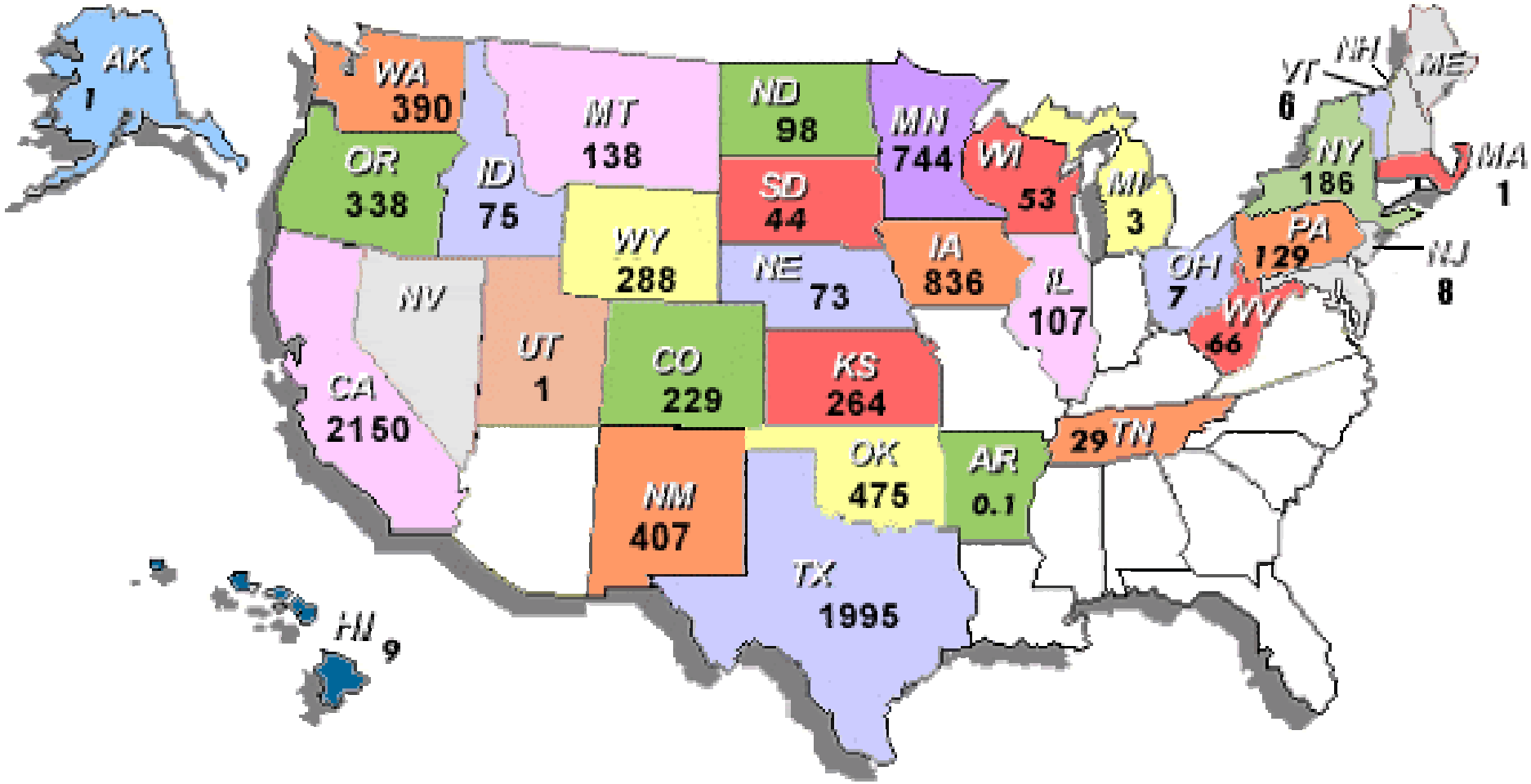
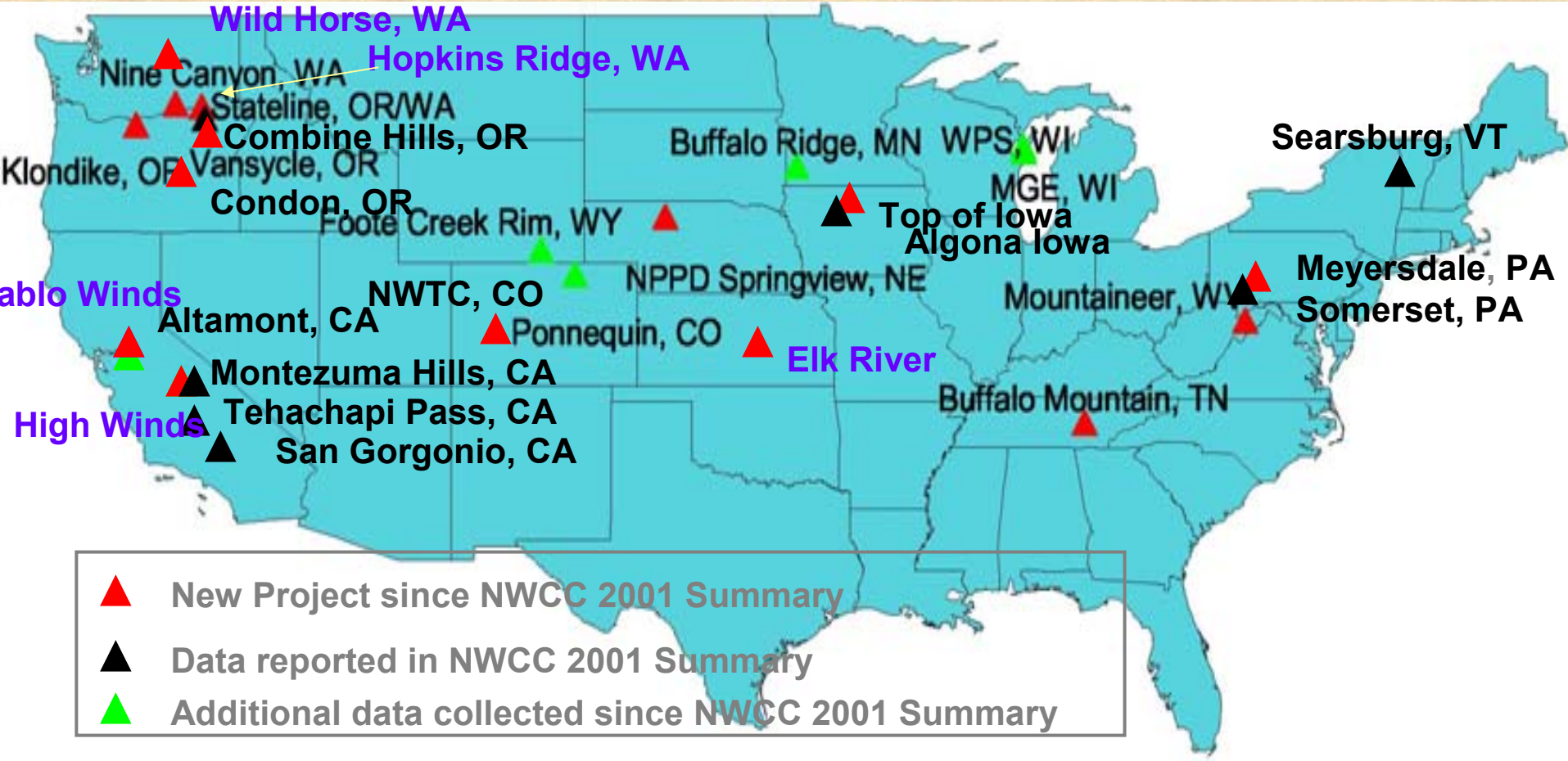
# Growth of Wind in the U.S.

**TOTAL INSTALLED U.S. WIND ENERGY CAPACITY: 9,149 MW**
**(1/25/06, www.awea.org)**



# Fatality Monitoring Studies



# Avian Fatality Rates

Data from systematic studies for 1-yr minimum with bias adjustments
New generation turbines only

| Region | # Studies | #/MW | #/turb/yr | #/MW/yr |
|---|---|---|---|---|
| Northwest | 5 | 397 | **2.0** (0.6-3.6) | **2.7** (0.9-2.9) |
| Rocky Mt | 2 | 68 | **1.5** (1.5-1.5) | **2.3** (2.0-2.5) |
| Upper Midwest | 5 | 254 | **2.2** (1.0-4.5) | **3.5** (2.0-5.9) |
| East | 2 | 68 | **4.3** (4.0-7.7) | **3.0** (2.7-11.7) |
| CA | 2 | 187 | **1.9** (1.4–2.3) | **1.7** (1.3 – 2.1) |

# New Study Results

- **High Winds – 162 MW project, CA**
  - **91 1.8 MW Turbines**
  - **High raptor use – higher than Altamont Pass**
    - **Especially RTHA, AMKE**
  - **2 years of monitoring (Curry and Kerlinger 2006)**
  - **0.40 raptors/MW/year**
    - **55% AMKE, 35% RTHA**
  - **1.62 birds/MW/year**

# Altamont Pass WRA

- Majority of turbines shutdown for 2 months during winter 2005/2006
  - Nov. and Dec. – northern half
  - Jan. and Feb. – southern half
  - Monitoring on-going to detect effectiveness
- Diablo Winds – first repowering project, ongoing monitoring

# FAA Lighting

- Review of data recently submitted for publication (Kerlinger, Gehring and Erickson 2006)
- Conclusions:

--Evidence does not suggest that red flashing (L-810 or L-864) attract or disorient night migrants

--No large fatality events at wind facility on single night

--No trends toward higher songbird mortality at lit vs unlit turbines

--Results corroborated by MI communication tower work

--Turbine height and lack of guy wires might be important factors

# Prairie Grouse Research

- 4-year collaborative research project conducted by KSU
- Study the Effects of Wind Power on the Demography and Population Genetics of the Greater Prairie-Chicken
- Organized through NWCC; members include:

  FPL Energy

  Horizon Wind Energy

  PPM Energy

  KS and OK offices of TNC

  state agencies

  Kansas Department of Wildlife and Parks

  DOE's National Renewable Energy Lab (NREL)

  U.S. Fish and Wildlife Service.

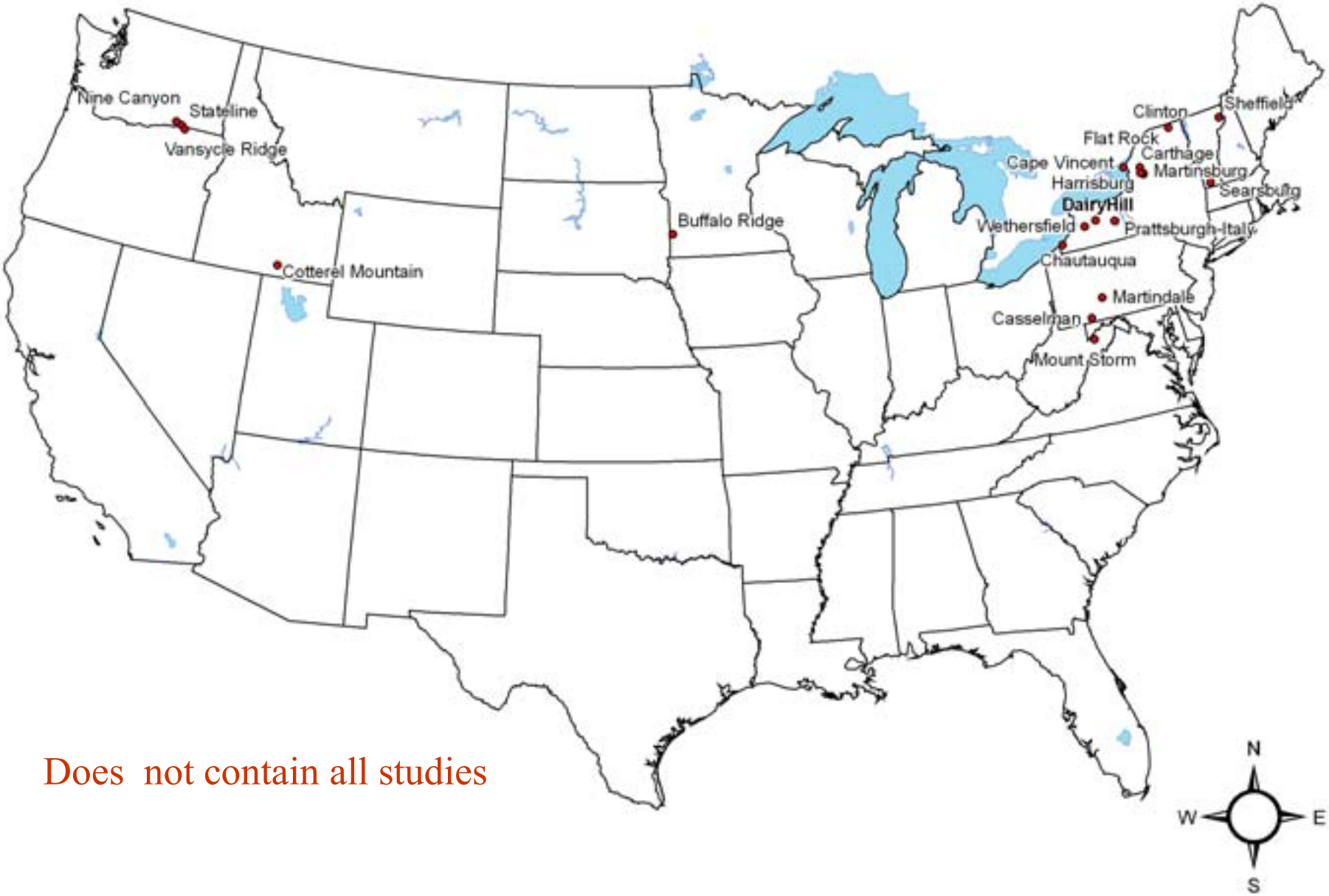
- DISGEN, Greenlight Energy, and Horizon Wind Energy have granted access to three proposed wind sites.

# BATS

- Causal mechanisms still not understood
- Site characteristics believed to be important in determining fatality levels; very few studies in very few habitat types
- Higher mortality than anticipated at a site in Canada; agricultural land near east side of Rocky Mountains
- Mortality at relatively low levels at two new projects in CA, but higher than older projects
- BCI Collaborative research on deterrents and pre-project assessment
- Combining mortality studies with radar studies may provide important information

# Marine Radar

# Marine Radar Studies for Wind Projects in the U.S.




Does not contain all studies

BASELINE AVIAN STUDIES
MOUNT STORM WIND POWER PROJECT,
GRANT COUNTY, WEST VIRGINIA
FINAL REPORT
A Visual and Radar Study of 2003
Spring Bird Migration at the
Proposed Chautauqua Wind
Energy Facility, New York
A Fall 2004 Radar, Visual, and Acoustic Survey of Bird and
Bat Migration at the Proposed Hardscrabble Mountain
Wind Project in Sheffield, Vermont
NOCTURNAL BIRD MIGRATI
NINE CANYON WIND ENERGY PROJEC
A RADAR STUDY OF NOCTURNAL BIRD MIGRATION AT THE
PROPOSED MOUNT STORM WIND-POWER DEVELOPMENT,
WEST VIRGINIA, FALL 2003

## Results of Radar Studies at Proposed and Existing Wind Project Sites in the U.S.

| Site | Passage Rates (targets/km/hr) | | Mean Flight Height (m) | | % Targets below 125 m | | Mean Flight Direction | | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | Spring | Fall | Spring | Fall | Spring | Fall | Spring | Fall | |
| Clinton County, NY | 110 | 197 | 338 | 333 | 20 | 12 | 30 | 162 | (Mabee *et al.* 2006) |
| Dairy Hills, NY | 117 | 94 | 397 | 466 | 15 | 10 | 14 | 180 | (Young *et al.* 2006) |
| Prattsburgh, NY | 170 | 200 | 319 | 365 | 18 | 9 | 18 | 177 | (Mabee *et al.* 2004, 2005) |
| Chautauqua, NY | 395 | 238 | 528 | 532 | 4 | 5 | 29 | 199 | (Cooper *et al.* 2004a,b) |
| Flat Rock, NY | | 158 | | 415 | | 8 | | 184 | (Mabee *et al.* 2005) |
| Wetherfield, NY | | 168 | | | | | | 179 | (Cooper and Mabee 2000) |
| Harrisburg, NY | | 122 | | | | | | 181 | (Cooper and Mabee 2000) |
| Copenhagen, NY | 192 | 225 | | | | | 12 | 184 | (Cooper *et al.* 1995) |
| Cape Vincent, NY | 192 | | | | | | 18 | | (Cooper *et al.* 1995) |
| Martinsburg, NY | | 230 | | | | | | 191 | (Cooper *et al.* 1995) |
| Deerfield, VT | 404 | 178 | 523 | 556 | 6 | 4 | 47 | 203 | (Roy and Pelletier 2005, 2005) |
| Sheffield, VT | 199 | 109 | 522 | 566 | 6 | 1 | 40 | 200 | (Roy *et al.* 2005, 2006) |
| Martindale, PA | | 187 | | 436 | | 8 | | 188 | (Plissner *et al.* 2005) |
| Casselman, PA | | 174 | | 448 | | 7 | | 219 | (Plissner *et al.* 2005) |
| Mount Storm, WV | | 199 | | 410 | | 16 | | 184 | (Mabee *et al.* 2004) |
| *Mean - East Studies* | 222 | 180 | 437 | 452 | 11.5 | 8 | 26 | 188 | |
| | | | | | | | | | |
| Cotterel Mountain, ID | | 32 | | 565 | | 3 | | 155 | (Cooper et al. 2004) |
| Stateline, OR/WA | 50 | 23 | 625 | 470 | 16 | 6 | 9 | 165 | (Mabee and Cooper 2002) |
| Nine Canyon, WA | 98 | 31 | 472 | | 15 | 8 | 23 | 181 | (Mabee and Cooper 2000, 2001) |
| Buffalo Ridge, MN | 93 | | | | | | | | (Hawrot and Hanowski 1997) |
| *Mean – West Studies* | 80 | 29 | 548 | 517 | 5.5 | 5 | 16 | 167 | |

# Summary

Based on existing studies at the current level of development

- **Birds**
  - With the possible exception of Altamont, fatalities are risk to individuals and not populations
  - Preliminary information on new technology suggests possible reduced risk for some bird groups and species – however not the Holy Grail
  - Disturbance factor for avian species uncertain
  - Data better for wind than other sources of impact

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# Summary

Based on existing studies at the current level of development

- **Bats**
  - Unknown whether impact at population level
  - Certain site characteristics seem important but studies at new sites increase knowledge
  - Fatality linked to weather variables; regionally similar, may be predictable
  - "Binford 5000 Bat-Be-Gone"???
  - Mitigation may be alternative if no experimental attempts to reduce mortality

# Summary

Based on existing studies at the current level of development

- **General**
  - Lighting not currently documented as a significant attractant for birds, but studies very limited
  - Wind project (macro) and wind turbine (micro) siting believed to be best way to minimize impacts
  - Impacts on bird and bat fatalities of wind turbine design (e.g., tower type, tower height, blade rpm) less understood

# Further Monitoring & Research Needs

- Consistent long-term research in wide range of habitats (e.g., eastern agriculture, SW, Coastal, offshore)
- Hope for the best but prepare for the worst!!!
- Pre-construction risk vs post-construction mortality
- Radar and mortality combination
- Determine mitigation effectiveness
- Indirect impacts (e.g., displacement)
- Impacts (direct and indirect) to population dynamics and biological significance