

Bald Eagle and Golden Eagle mortalities at wind energy facilities in the contiguous United States



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Findings and conclusions are those of the authors and do not necessarily represent the views of the USFWS

Complex life history (for a raptor)



- Floaters VS territorial adults
- Breeding (and success) based on prey density in territory





Migration and seasonal movements



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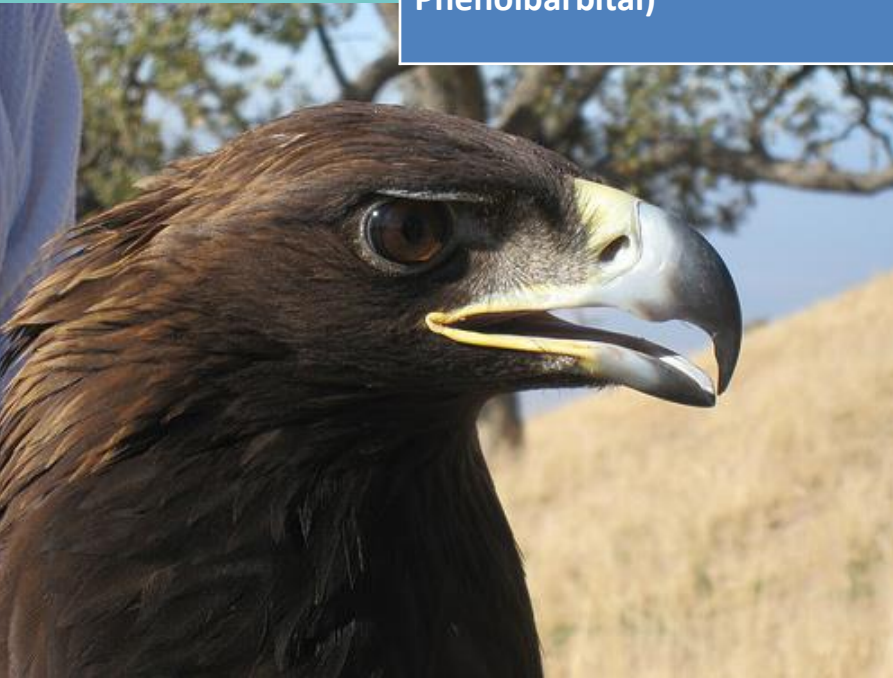




Sources of mortality



Direct Mortality	Indirect Mortality
Electric infrastructure* (collision, electrocution)	Habitat loss*
Lead poisoning*	Recreation*
Wind energy development*	Research impact(s)*
Shooting*	Climate change (drought, wildfire, prey availability, etc.)*
Trapping*	
Water tanks	
Collision with vehicles*	
Poisoning (rodenticide and Phenolbarbital)*	(USFWS 2010:22) * = threats of immediate concern to Golden Eagles in CA, NV, OR.



Turbines are extant or are being planned in GOEA and BAEA foraging habitat, and near nesting habitat







OVERSIZE LOAD

HENDERSON
HEAVY HAUL

HENDERSON
HEAVY HAUL

HENDERSON
HEAVY HAUL

3623THM



Wind Sweep

- 2.83 h wind sweep (6 acre)





Dee Dee Gilwitz
WWW.USWILDLIFEIMAGES.COM

Fatalities: where were the data?




- AWEA (2011 unpublished comments)
- N = 565 Altamont
- N = 12 (all other wind facilities)





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SHORT COMMUNICATIONS

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BALD EAGLE AND GOLDEN EAGLE MORTALITIES AT WIND ENERGY FACILITIES IN THE CONTIGUOUS UNITED STATES

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Data on fatalities at wind turbine facilities for Pagel et al. 2013

High Data Standard

We used only verifiable, known mortalities up to: 30 June 2012

- *Publically available information (Google search)
- *USFWS and State sources
- *Reports from Wind Industry
- ***Anecdotal information not used (17 accounts not included)**



What we reported: Fatalities

Bald Eagle

6 KNOWN incidents*

5 mortalities

1 injury

Maryland = 1

Iowa = 3

Wyoming = 2

***more in US**

since data analysis)



What we reported: Fatalities

**Golden Eagle
U.S. Only**

79 Known incidents*

10 states

28 different facilities

* More since data analysis



What we reported: Fatalities

- Golden Eagle
U.S. Only

California*: 27 mortalities
13 facilities

*Does not include Altamont





Altamont Wind Resource Area:
Approximately 66.7 – 75.0
eagles killed /year in
2005 - 2007

(Drewitt and Langston 2006,
Smallwood and Thelander 2008)

{N= 565 +}



What we reported: Fatalities

Golden Eagle (United States only)

New Mexico = 5

Washington = 5

Colorado = 5

Texas = 1

Utah = 1



What we reported: Fatalities

Golden Eagle
U.S. Only

Oregon = 5
(2 facilities)

Wyoming = 29
(7 facilities)



What we reported: Fatalities

**54% of fatalities were found
incidental to turbine
facility operation**



What we know: Fatalities

25 % unknown source of discovery

Only 18 % of fatalities were discovered via
'surveys;' study design often unknown



What we know: Fatalities

- *Few wind facilities have incorporated systematic searches.
- *e.g. One large wind resource area in CA has had no monitoring since 1997
- *Some facilities may not employ robust surveys. (e.g. Some facilities look under 1/3 towers every month with only a 40 m radius search area.)



What we know: Fatalities

Some carcasses were found cut into multiple parts; and or flung far from turbine



What we reported*: Fatalities

***78 % fatalities since 2008**

**One Bald eagle killed by 3.5 meter
radius blade**

***4 additional states
(Idaho, Nevada, North Dakota,
Montana)**

***Widespread additional fatalities
since 30 June 2012**

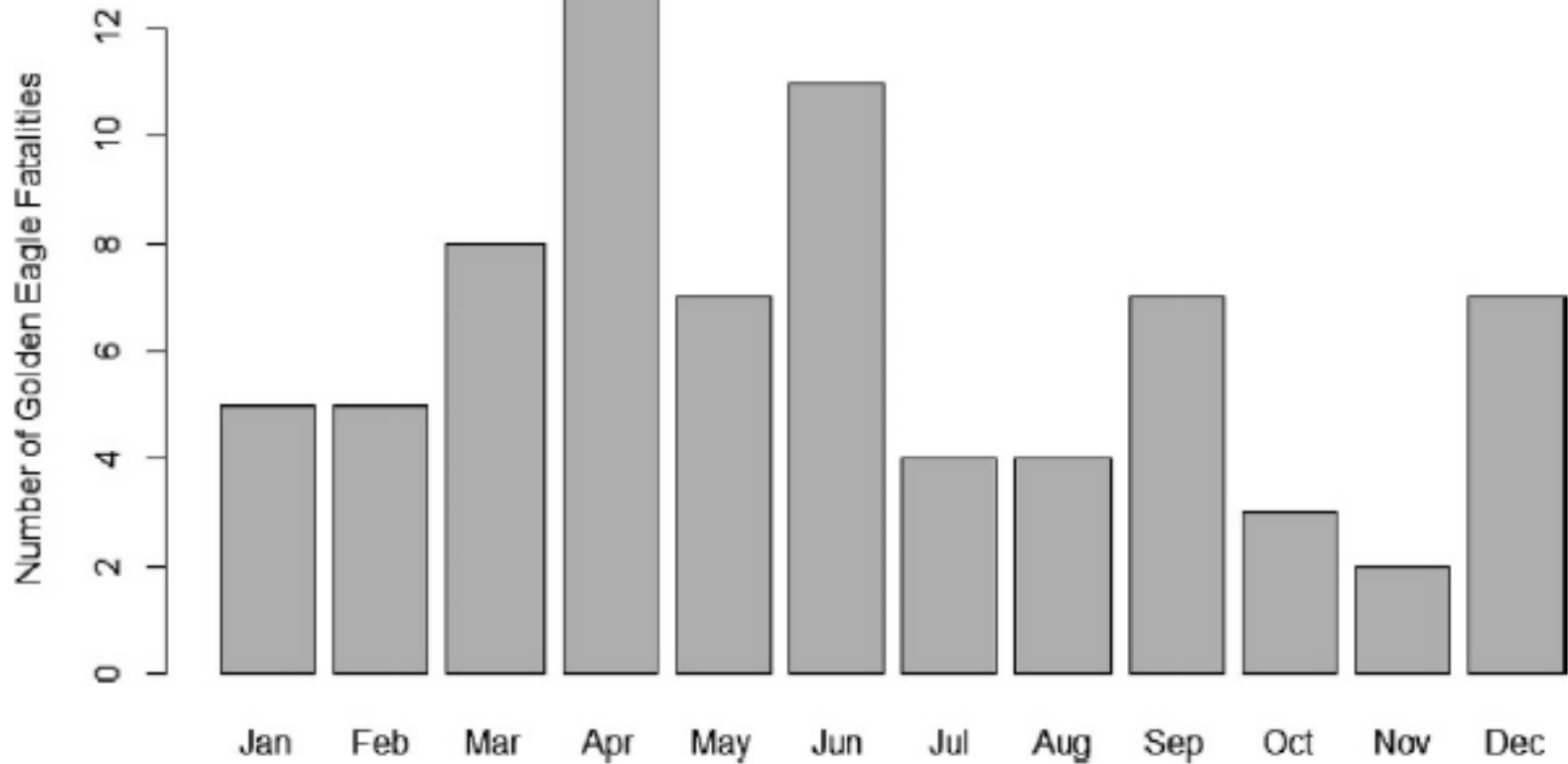


Data lacking on age class of fatalities



Only 36 % of our sample were identified to age class; of those 55 % were adults.

Data lacking on seasonality of mortality events



Data lacking on turbine type and location which cause mortality





“Fatality reporting was voluntary, with little to no effort directed toward finding the total number of eagles killed at a facility”

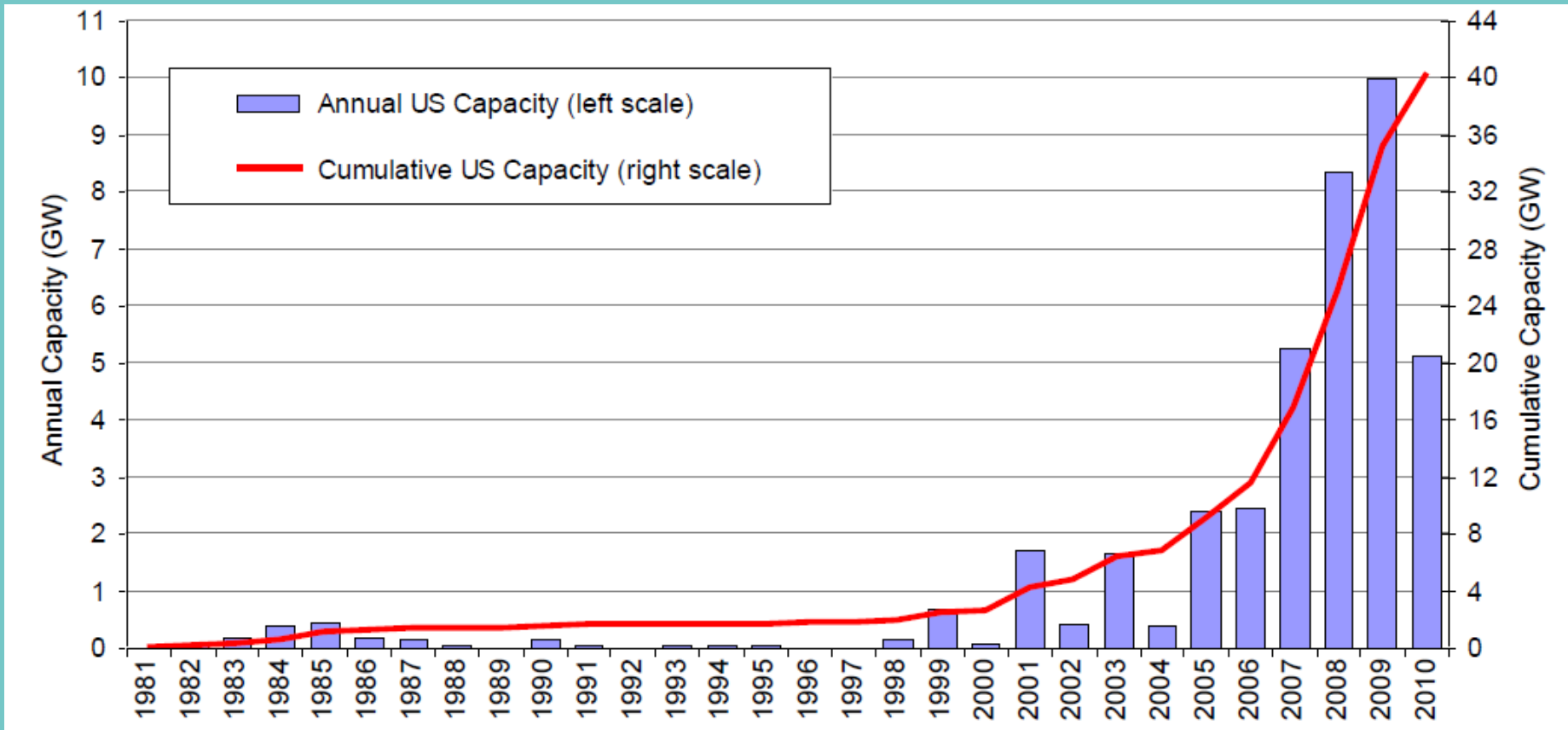
Mortality rates of non-eagles unknown



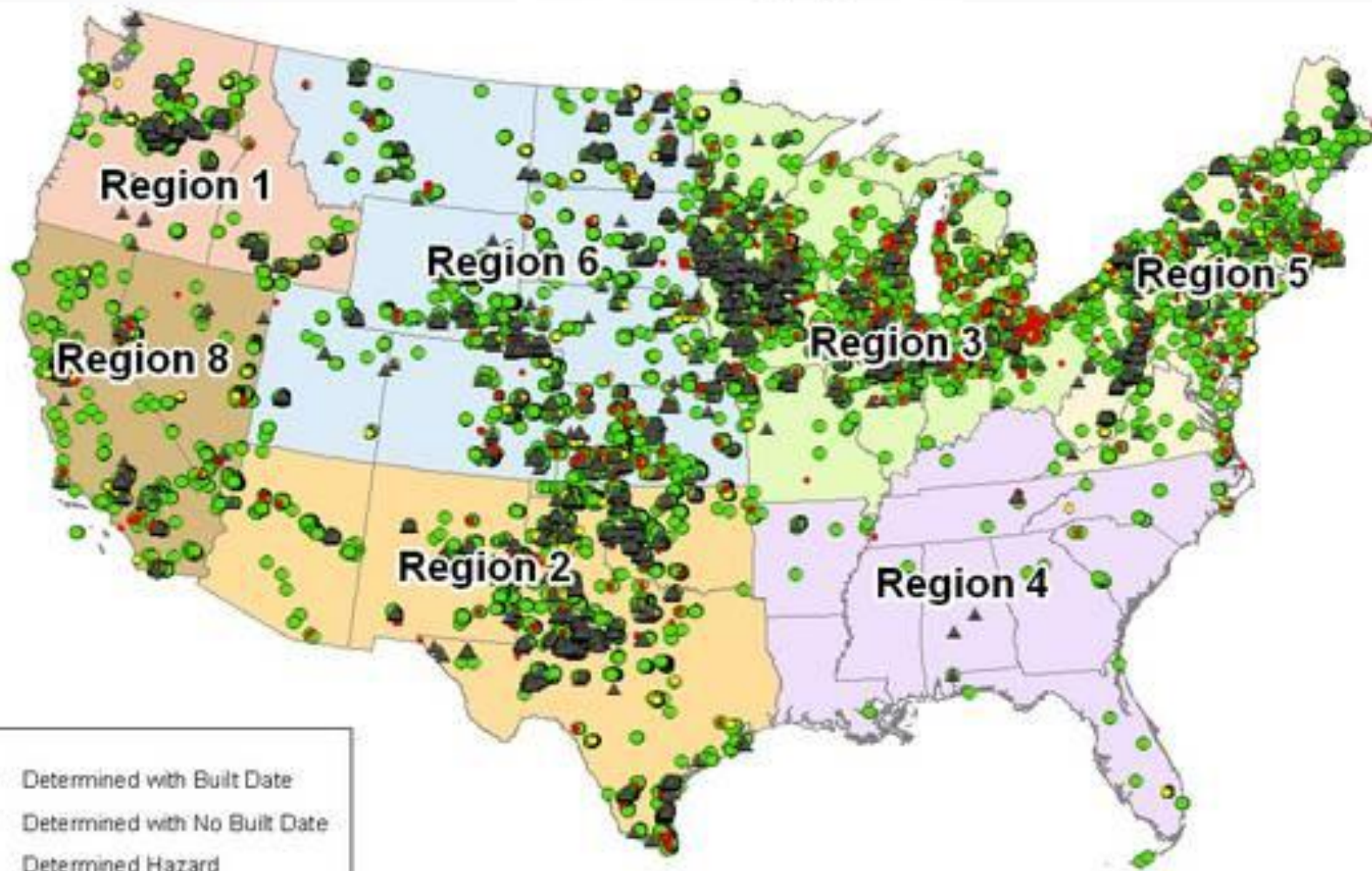


Trends in U.S. Wind Energy Installations (source

= U.S. DOE 2010 Wind Technologies Market Report- June 2011)



**FAA Obstruction Evaluation / Airport Airspace Analysis (OE / AAA)
Wind Turbine Data, August 2011**



- ▲ Determined with Built Date
- Determined with No Built Date
- Determined Hazard
- Not Yet Determined

- Region 1
- Region 2
- Region 3
- Region 4
- Region 5
- Region 6
- Region 7
- Region 8

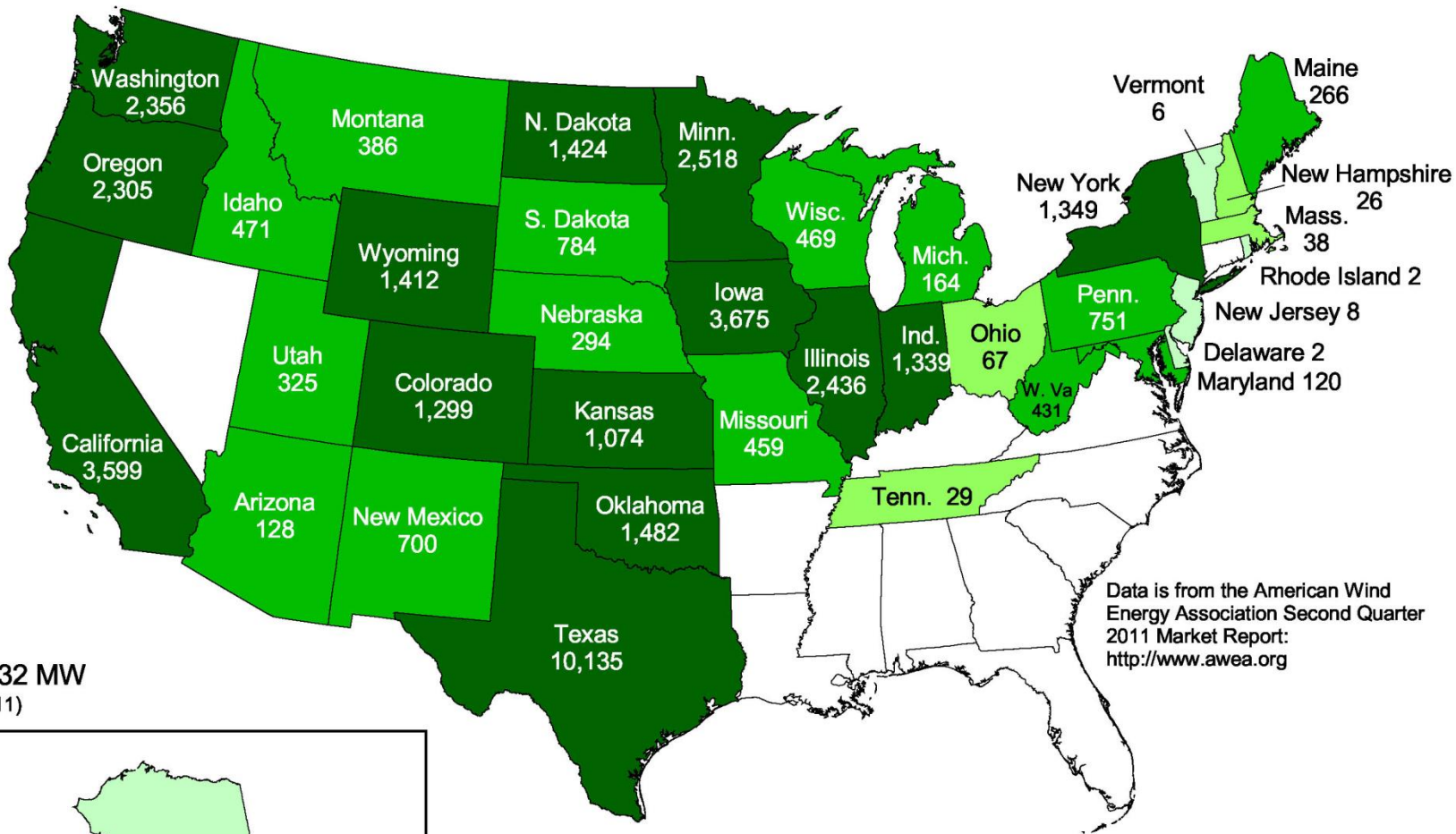
* Determined with Built Date - wind turbines that have been determined by the FAA to pose no hazard to air navigation and have a built date in the FAA database

* Determined with no Built Date - wind turbines that have been determined by the FAA to pose no hazard to air navigation but do not yet have a built date in the FAA database (e.g. are not yet operational)

* Determined Hazard - wind turbines that have been determined by the FAA to pose a hazard to air navigation

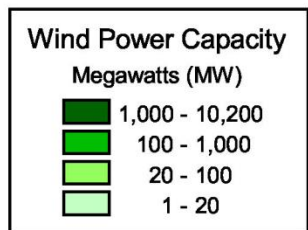
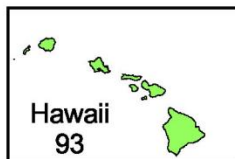
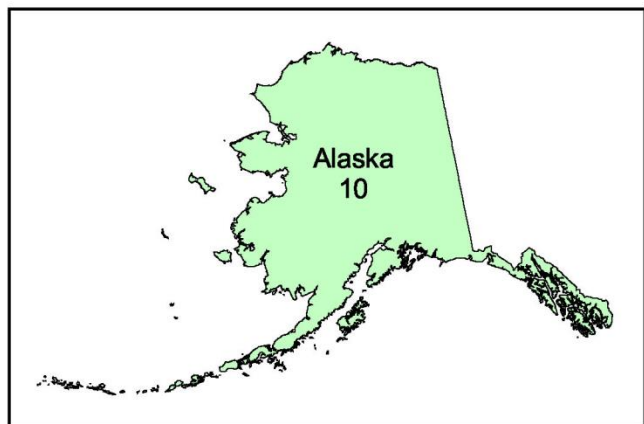
* Not Yet Determined - wind turbine projects that have applied to the FAA for a determination of hazard or no hazard. FAA is in the process of performing an aeronautical study to determine whether or not the turbines poses a hazard to air navigation

Current Installed Wind Power Capacity (MW)

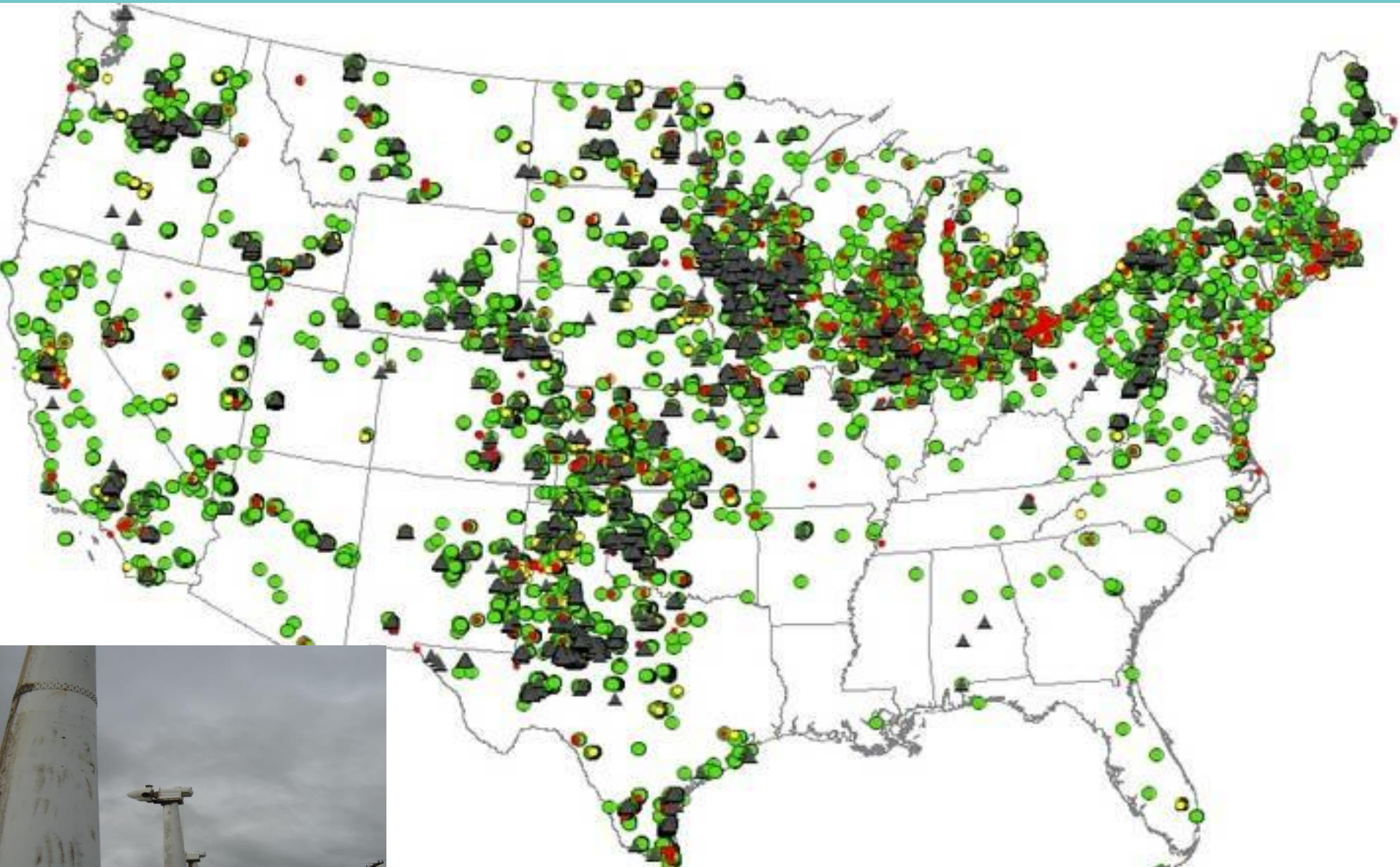


Total: 42,432 MW
(As of 06/30/2011)

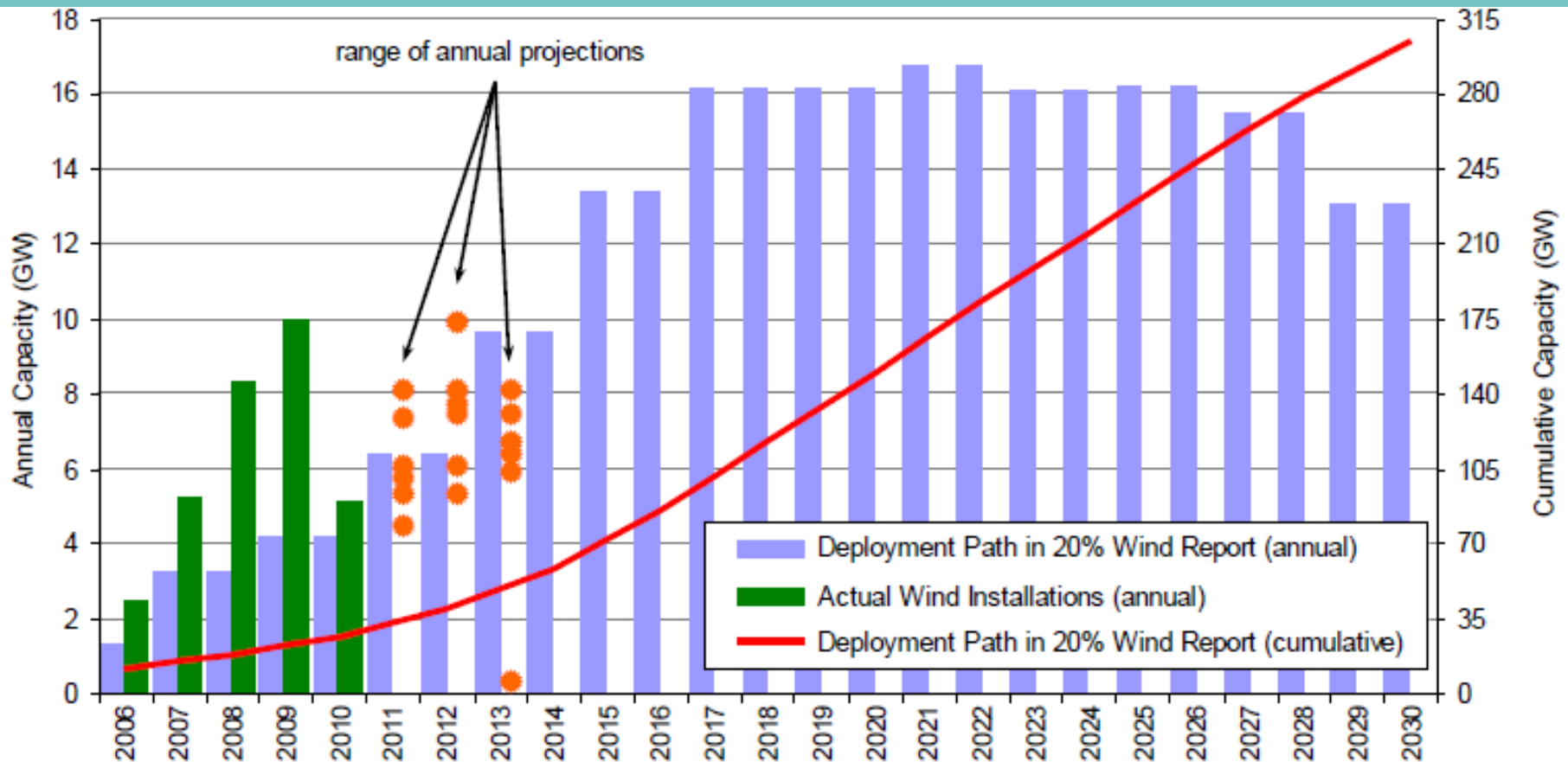
Data is from the American Wind Energy Association Second Quarter 2011 Market Report: <http://www.awea.org>



U.S. Department of Energy



U.S. DOE Forecast for U.S. Wind Energy Growth for 2011-2013, Relative to Actual U.S. Installations (2006-2010), and Target Path for 20% Wind for U.S. by 2030 (source = U.S. DOE 2010 Wind Technologies Market Report- June 2011)



Eagle Fatalities: What we know

- **Limited data!**
- **Most mortalities were detected incidental to facility operation**
- **Projects are likely underestimating fatalities (pre and post)**
- **Many facilities on line since 2000**
- **Many more facilities coming on line in near and far future**
- **Current post construction monitoring lacking; and may not be able to detect all mortalities, or provide an accurate rate of mortality.**





Are Pagel et al. 2013 eagle fatality numbers low?



“This summary likely conveys only a limited portion of eagles killed at non-APWRA wind energy facilities in the contiguous United States, considering the general lack of rigorous monitoring and reporting of eagle mortalities.

Thus, our findings of the reported mortalities likely underestimate, perhaps substantially, the number of eagles killed at wind facilities in the United States. Even with this limitation, we report that blade-strike mortality of eagles is geographically widespread in the United States, and both Bald Eagles and Golden Eagles are killed.”

Page1 et al. 2013. Pp. 313.



Collecting and reporting robust data
does take time and \$\$\$



Little is currently known; agencies are being forced to make decisions based on minimal information



DIED

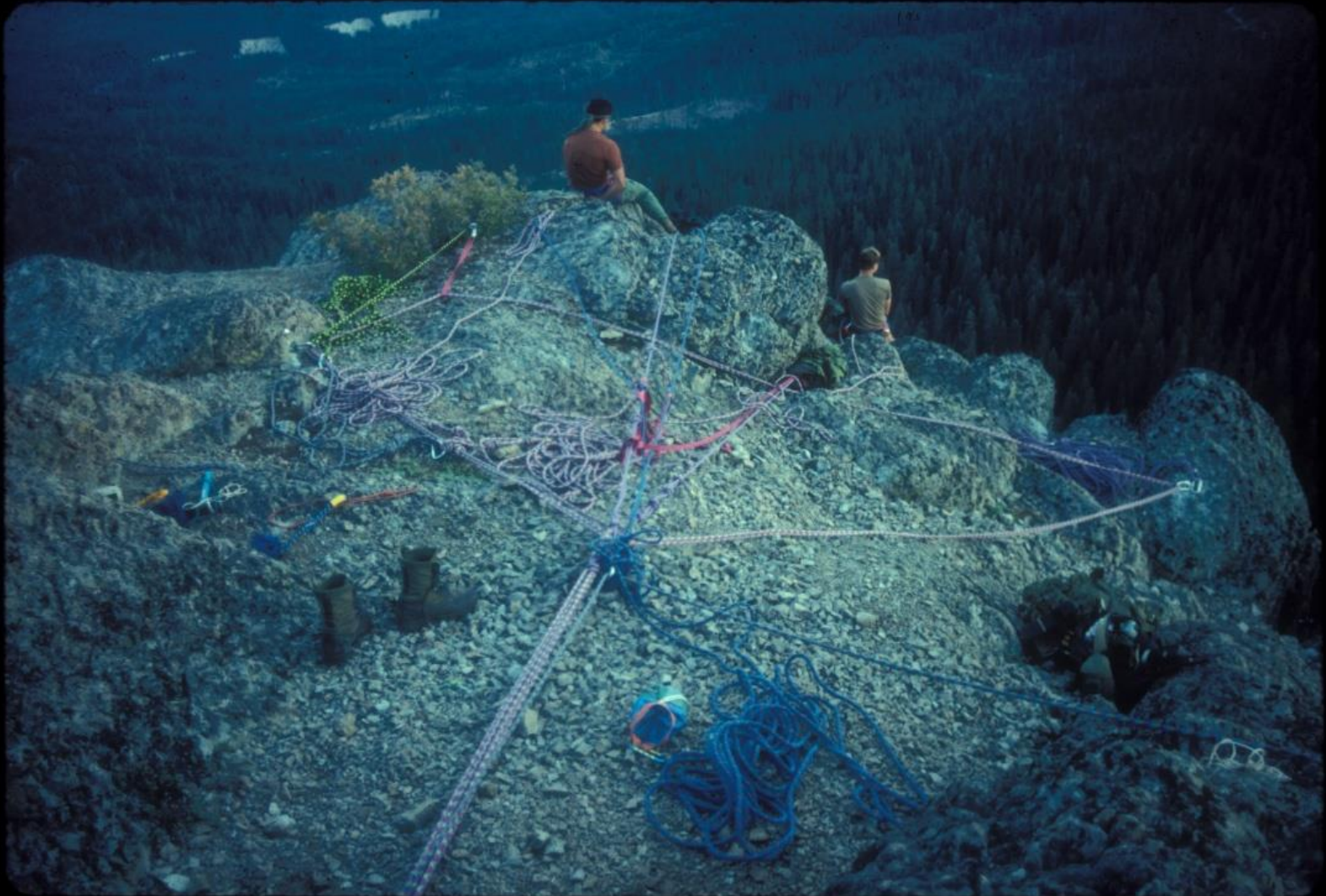
(USFWS Dead Injured Eagle Database)





Errors in assessing risk could mean that a project could take more eagles than predicted; this could induce rescission of the Eagle permit because of unexpected incompatibility with the preservation standard of the Bald and Golden Eagle Protection Act, or third party legal action. (USFWS 2012)

Not to oversimplify; it is complex,
but not a Gordian Knot





Robust, systematic field monitoring of breeding and non-breeding Golden Eagle (by qualified, and where necessary, permitted biologists)

The question still remains: at what rate are eagles being killed at wind facilities?



Questions?



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Eric Kershner, Chris Niemela, Jeep Pagel, Nick
Todd, Scott Thomas, and USFWS.