

FILE

16-1871-EL-BGN

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Darryl Mueller
3290 Dyer Rd.
Livermore, CA 94551
925-449-3131

Attention Mr. Roak Parker,
DOE Golden Field Office
15013 Denver West Parkway
Golden CO 80401

Email: ProjectIcebreaker@ee.doe.gov 10/20/16

C.c. Mr. Matt Butler, OPSB
Email: ContactOPSB@puc.state.oh.us

C.c. Mr. Joseph Krawczyk
Joseph.w.krawczyk@usace.army.mil

Dear Mr. Parker, and the Officers of the DOE Golden Field Office.

I am writing in the support of Jim Wiegand comment about your wind turbine project. He is spot on with his comment.

I want to give you a word of caution. There is nothing to protect the avian population, after wind farm operation starts.

At a recent meeting on mortality monitoring in Alameda County, I, along with USFWS official's, was there. I asked why couldn't you do a search area that will find 100% of dead eagles and other avian, and then decrease the size to 80% like the standard set by CEC says. In this instance they are using dogs to find the dead avian instead of humans to do mortality searches. This is a great improvement! But instead of searching 250 meter diameter to find all mortality and then going to a reduced search area, "NO costs too much" and "there is no money for that".

My point is these projects have only one goal, doing as little as possible to get by wildlife regulations. I, along with others outside the wind energy field, feel that the influence of money for windmill operators, and money for the government and money for individuals who allow windmill operations on their property, would not exist and no turbines would be built, if this money was not available. Warren Buffet "We get a tax credit if we build a lot of wind farms. That is the only reason to build them." USNWR

Along with production tax credits and accelerated depreciation go directly to operators and investors, for a trickle of expensive electric, all we get is a wholesale slaughter operation. It is in most cases out of control, once operation is started, and over sight is by the wind turbine operators themselves is minimal at best. The fox guarding the hen house.

Your siting in a heavy use avian area will definitely add to the current loss of avian of all types. The recent push by the USFWS to allow over 4,000 eagles to be killed by wind turbines, prove just how political the whole processes is. The complete slaughtering and avian killing by the current administrations wind turbines is cruel and brutal for future generations of bird lovers. We need protection of wildlife, not a way around the law!

In the case of Eagle's, this population takes a long time to recover once it is reduced. One mature pair of Golden Eagles may only reproduce them selves in their 10-year life span. This could be the case of other avian species at the Lake Erie site.

If you build wind turbines where avian habitat is you will be killing off that avian in their habitat. In your case, you will have no way to even count dead bodies, because they will be scavenged by other wildlife. Laws were created to protect wildlife now we have an administration that ignores protecting wildlife, unless it's a photo op with a Polar Bear and they are on the increase.

Please watch these Power Points live Slide Share about the Avian Mortality and Wind Turbines. In the 2nd you will see a raptor ignore the blade and get killed.

<http://www.slideshare.net/MuellerDarryl/golden-eagle-decline-may-10-2016>

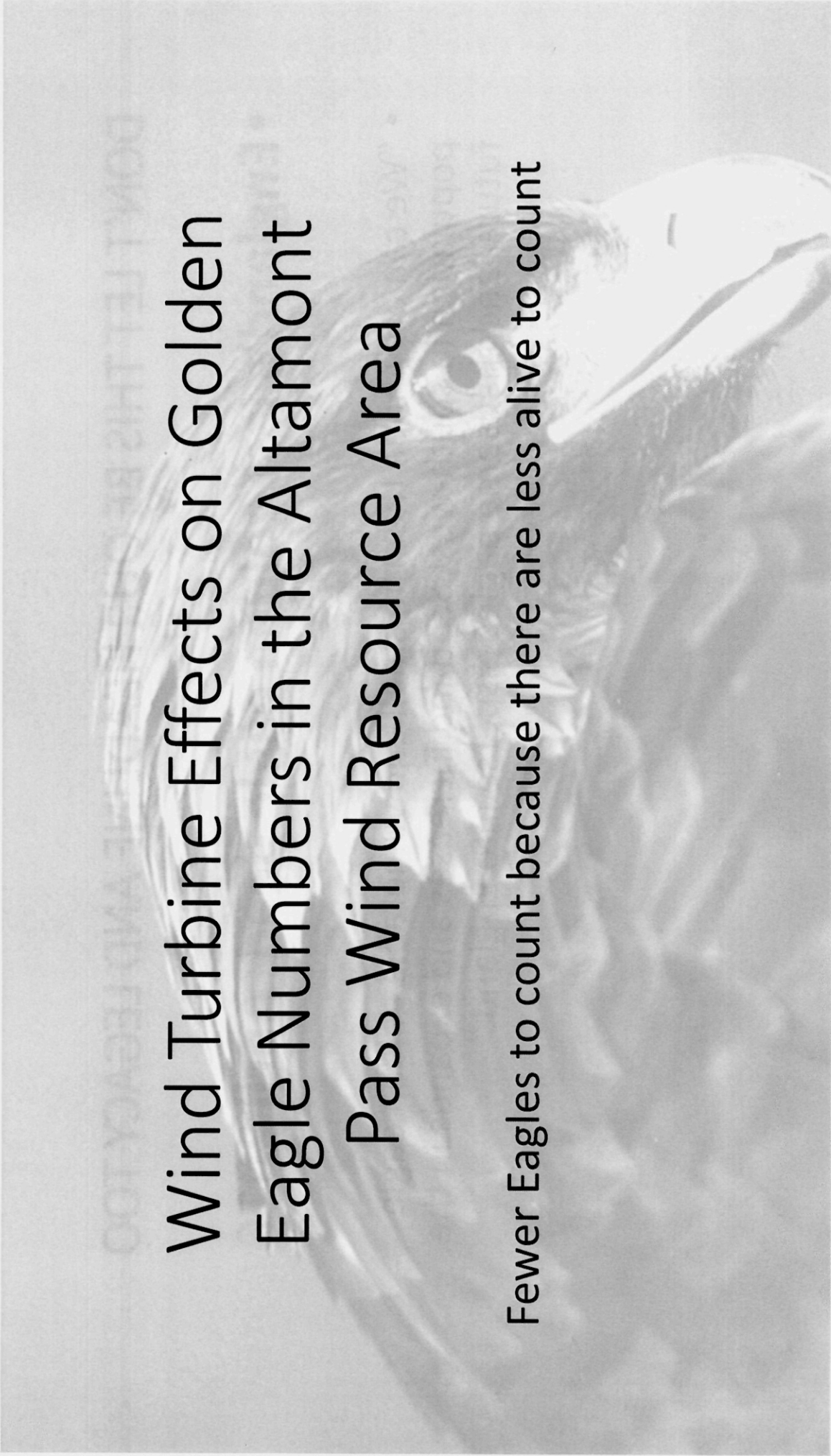
<http://www.slideshare.net/MuellerDarryl/sand-hill-projectmay10-61841973>

<http://www.slideshare.net/MuellerDarryl/windmill-24-march16bats>

Yours Truly,
Darryl Mueller

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Wind Turbine Effects on Golden Eagle Numbers in the Altamont Pass Wind Resource Area

Fewer Eagles to count because there are less alive to count

DON'T LET THIS BE OUR HEADLINE AND LEGACY TOO

•England's last golden eagle dead April 2016

- “We can only hope that the small and vulnerable golden eagle population in south-west Scotland increases and expands in the future, and that some eagles disperse into England.”

Dawn Balmer, head of surveys for the British Trust for Ornithology

Golden Eagle Life Facts

- golden eagles require five years to reach breeding age
- The female lays an average number of eggs of 1.99
 - 332 clutches from 8 studies in 5 of the Western United States

McGahan, J. (1968). "Ecology of the Golden Eagle". Auk 85 (1): 1–12.

Survival Rates

- it is estimated that only 10% of wild-born eagles survive past five years.

<http://curiodyssey.org/animals/our-animals/birds/golden-eagle/>

- In the western Rocky Mountains, 50% of golden eagles banded in the nest died by the time they were 2 and a half years and an estimated 75% died by the time they were 5 years old

McGahan, J. (1968). "Ecology of the Golden Eagle". Auk 85 (1): 1–12

- Think what it is when you add the wind turbine deaths?

Golden Eagles in a Perilous Landscape: Predicting the Effects of Mitigation for Wind Turbine Blade-Strike Mortality, 2002

- Out of 100 golden eagle fatalities, ...42 % from wind turbine strikes

www.energy.ca.gov/2002publications Publication number P500-02-043F

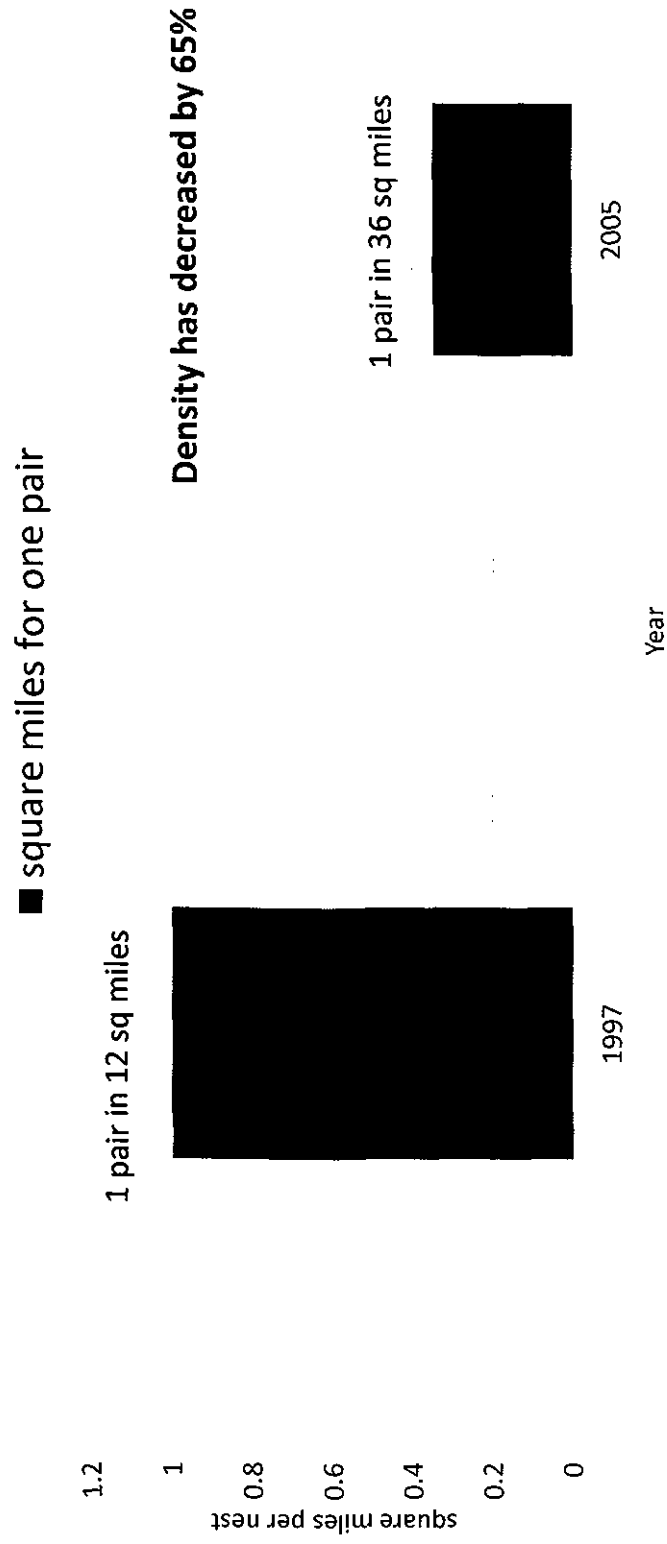
Nesting density 1997 vs 2005

- The nesting density for a breeding population near Livermore, California, and the Altamont Pass Wind Farm is **among the highest in the world for golden eagles**, with at least 44 pairs in 1997, a density of one pair per 19 km (12 mi).

Hunt, W. Grainger; Jackman, Ron E.; Hunt, Teresa L.; Driscoll, Daniel E.; Culp, Lois (June 1999). "A Population Study of Golden Eagles in the Altamont Pass Wind Resource Area: Population Trend Analysis 1994-1997"

- From 23 January to 25 May 2005, the authors surveyed 58 of 61 golden eagle territories that were occupied by pairs in 2000 within 30 km of the WRA boundary
- Hunt, W. Grainger; Hunt, Teresa L. The trend of golden eagle territory occupancy in the vicinity of the altamont pass wind resource area: 2005 survey

Nesting Density 1997 vs 2005



The Trend Of Golden Eagle Territory Occupancy In The Vicinity Of The Altamont Pass Wind Resource Area: 2005 Survey

- The area surrounding the Altamont Pass Wind Resource Area (WRA) contains a higher reported density of nesting golden eagles than anywhere else in the world.
- The Predatory Bird Research Group (PBRG) has been studying aspects of golden eagle ecology in the region since 1994 to determine if wind turbine blade strikes in the WRA are causing the population to decline.
- Estimates of the number of eagles annually killed by turbines in the WRA range from 40 to more than 100.
- Because golden eagles mature and reproduce slowly, and their populations are particularly sensitive to changes in adult and sub-adult survival rates, state and federal wildlife agencies have been concerned for the welfare of the population.

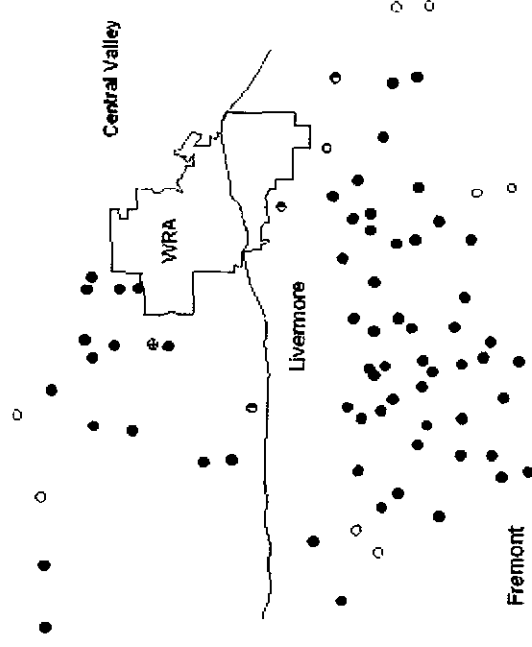
In 2005 Grainger reports no nests in APWRA

There are 58 occupied nests within 30 km of the WRA boundary.

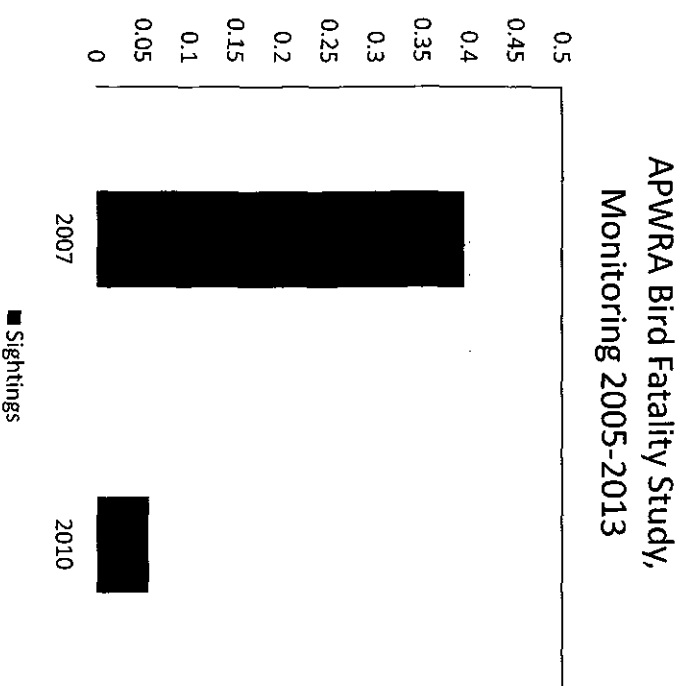
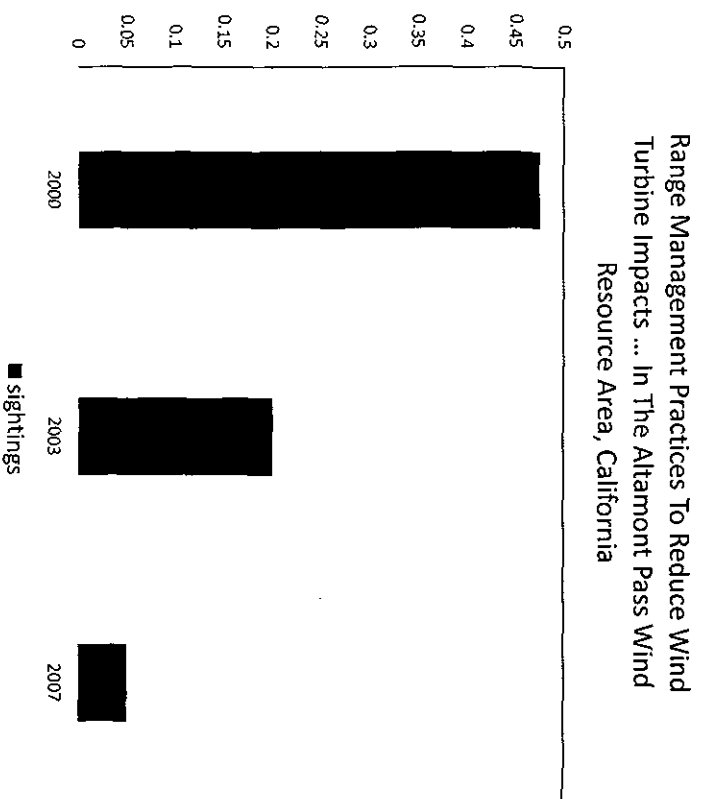
Why is there no data for nests in the WRA?

Are there no nests in the WRA? Have all the breeding pairs died?

Are the breeding pairs being killed before they can complete nests in the WRA?



Two Surveys Same Trend – decreasing population



The Trend Of Golden Eagle Territory Occupancy In The Vicinity Of The Altamont Pass Wind Resource Area: 2005 Survey (cont.)

- This project was a follow-on to the work presented in the 2002 report.
- spring of 2005, the research team surveyed 58 golden eagle breeding territories within 30 km (19 miles) of the WRA boundary, each of which was occupied by a pair of eagles in 2000.
- designed to test the hypothesis that sufficient numbers of floaters exist within the area to fill all breeding vacancies as they occur.

The Trend Of Golden Eagle Territory Occupancy In The Vicinity Of The Altamont Pass Wind Resource Area: 2005 Survey (cont.)

- all 58 that were occupied by pairs in 2000 were occupied by pairs in 2005,
- indicates that the breeding population of golden eagles within the vicinity of Altamont Pass remains intact.
- however, the Altamont WRA kills more eagles than can be produced by the studied sample of 58 pairs
- that sample necessarily being part of a larger population that has provided an influx of recruits to fill nesting territory vacancies.
- Researchers estimate that 167 breeding pairs are required to sustain 50 blade-strike fatalities per year.
- www.energy.ca.gov/2006publications/.../CEC-500-2006-056.PDF

6 year study on radio-tagged golden eagles in the Diablo Range

- suggests that the APWRA has a negative impact on the local eagle population, i.e., eagles nesting within 30 km of the APWRA.
- Of 267 radio-tagged eagles, 100 fatalities were recovered
- Of these, 42 birds were killed by blade strikes
- estimate that about 50 golden eagles are killed per year in the APWRA
- Combined with age-specific mortality data suggests that in order to compensate for 50 turbine-related eagle deaths per year, the reproductive output of 167 pairs is required
- However, because the local population consists of only 58 active territories, immigration into this population is required to maintain its current level

Hunt and Hunt 2006

RANGE MANAGEMENT PRACTICES TO REDUCE WIND TURBINE IMPACTS ON BURROWING OWLS AND OTHER RAPTORS IN THE ALTAMONT PASS WIND RESOURCE AREA, CALIFORNIA, October 2009

- Evidence from the one repowered wind farm in the APWRA (Diablo Winds) suggests that at best a 13% reduction in the golden eagle mortality was achieved.
- The number of raptors observed per hour was similar to past studies in the
- APWRA. Differences in detections over the last decade included an **apparent 56 percent decrease** in golden eagles
- Even at this lower level of mortality, continued immigration would be required to sustain the local golden eagle population.
- Thus, the APWRA will likely continue to serve as a population “sink” for golden eagles for the foreseeable future

What we need to do now

- Place a moratorium on new wind turbine construction until it can be proven that there is no longer a population decline of all raptors and bats
- Send in writing to the Department of Interior Fish and Wildlife Service the Board of Supervisors opposition to the proposed 30 year permit revision for Eagle Incidental Take and Take of Eagle Nests
- Refuse to allow the repowering to expand the killing area by an increase in blade sweep

With out you're help the eagle population will
continue to decline

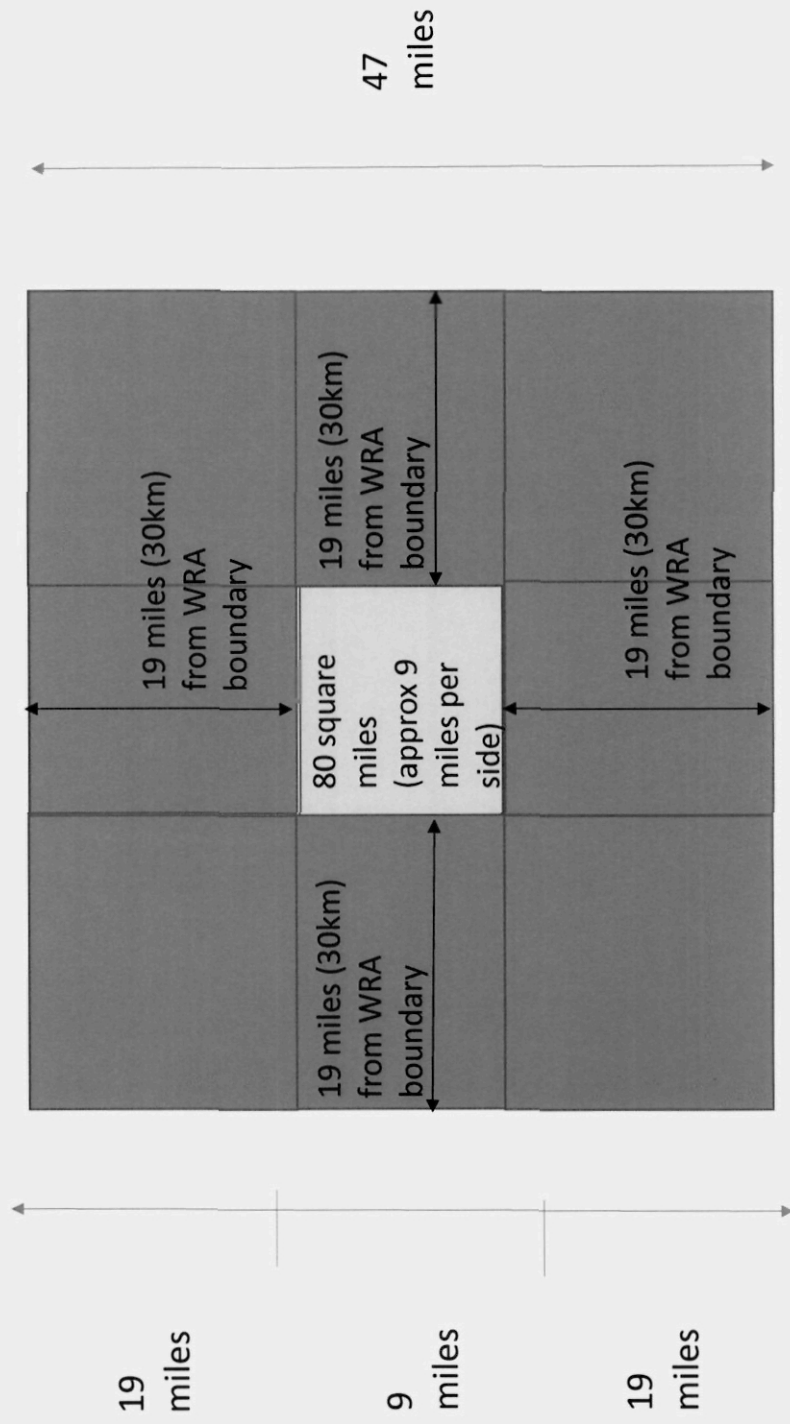


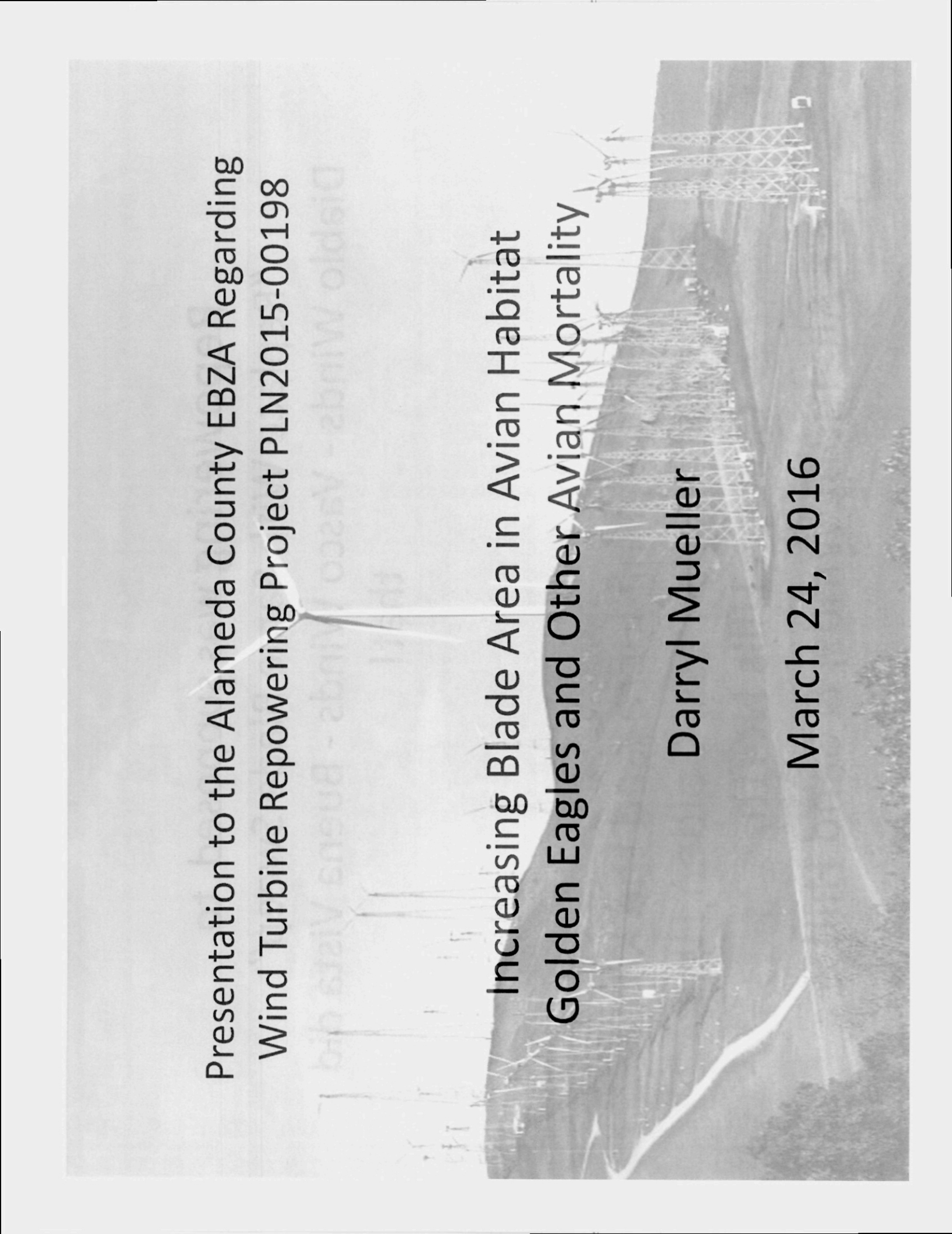
47 miles squared = 2209

9 miles squared = 81

Nesting area is $2209 - 81 = 2128$

2128 square miles divided by 58 nests = 36 square miles per nest





Presentation to the Alameda County EBZA Regarding
Wind Turbine Repowering Project PLN2015-00198

Increasing Blade Area in Avian Habitat Golden Eagles and Other Avian Mortality

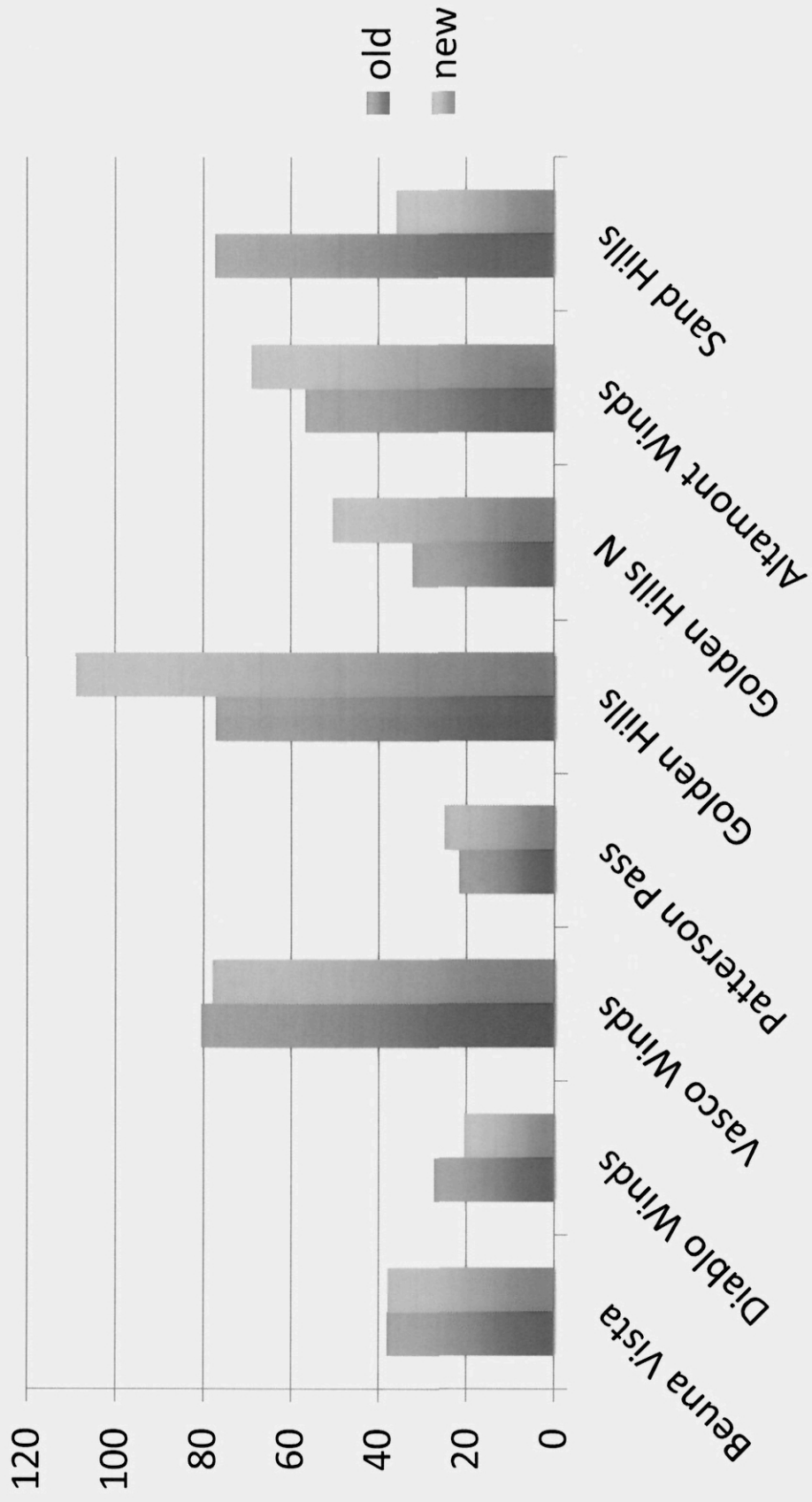
Darryl Mueller

March 24, 2016

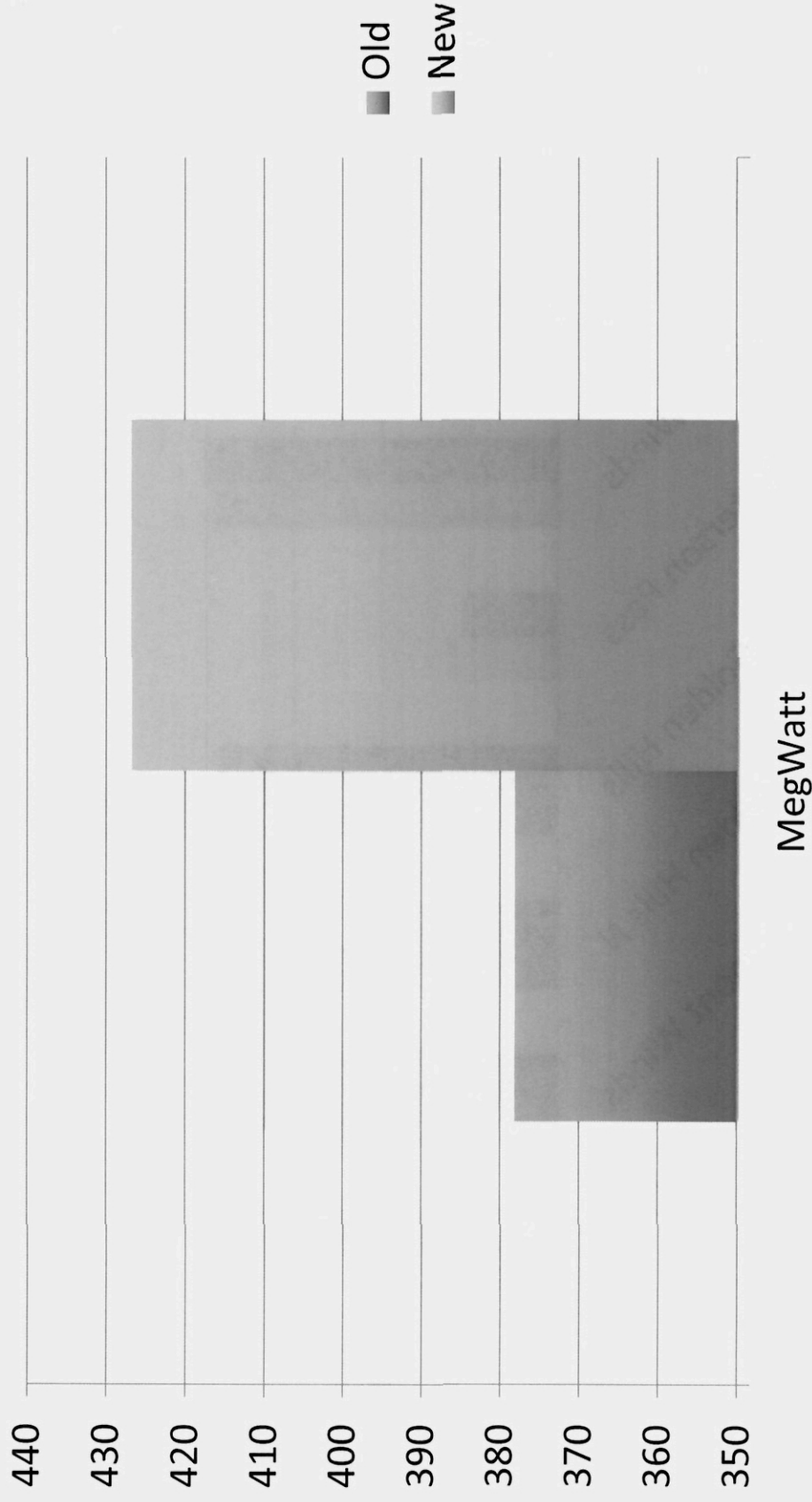
**Repowering was supposed to
“Replace With Same Blade Sweep”
Diablo Winds - Vasco Winds - Buena Vista did
that!**

**New Re-Powering Increased the Killer
Blades Patterson Pass, Golden Hills,
Golden Hills North,
Altamont Winds, & Sand Hill!**

Meg Watts decrease Sand Hill

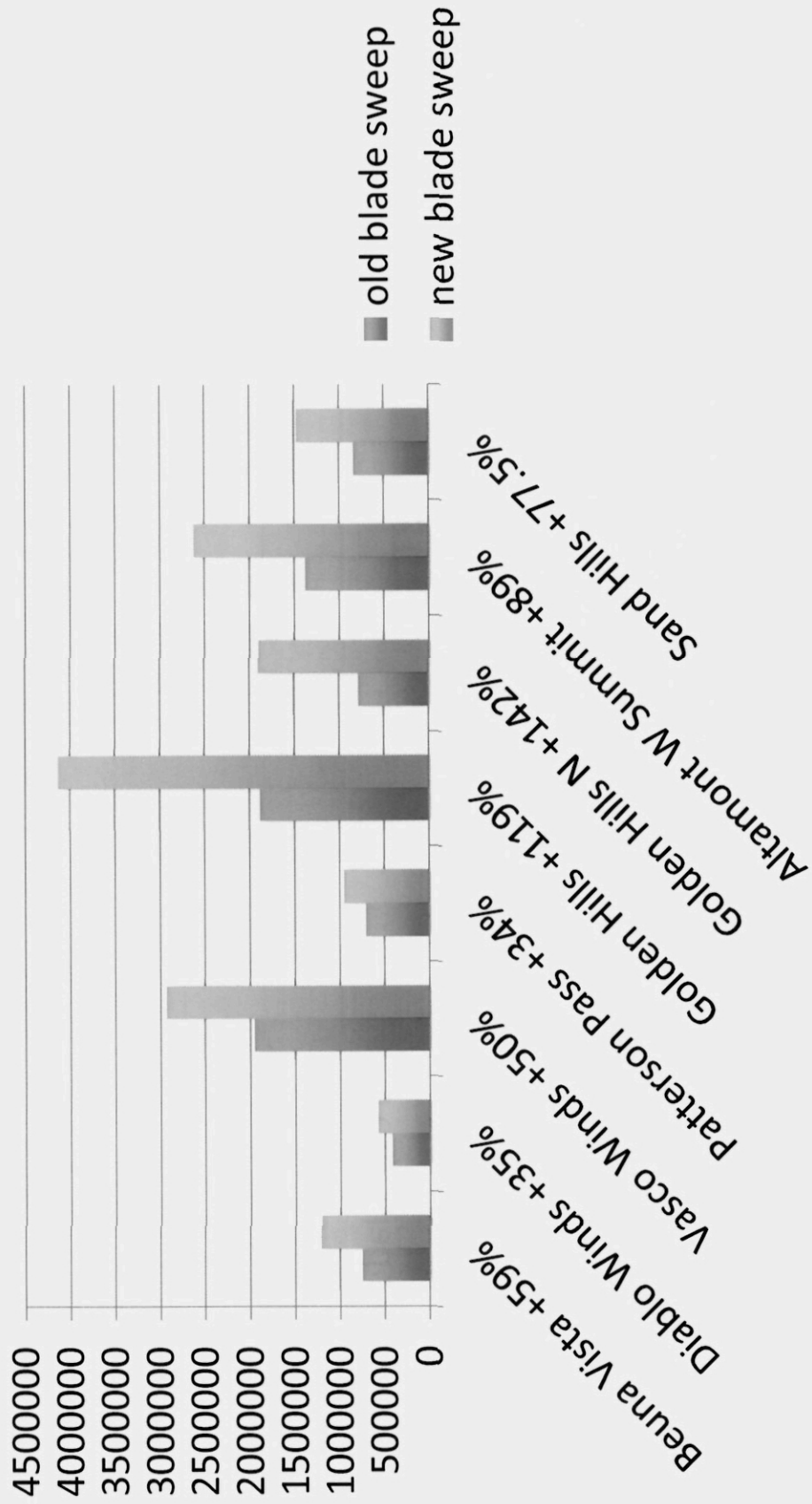


All Repowering Meg Watts 13% increase

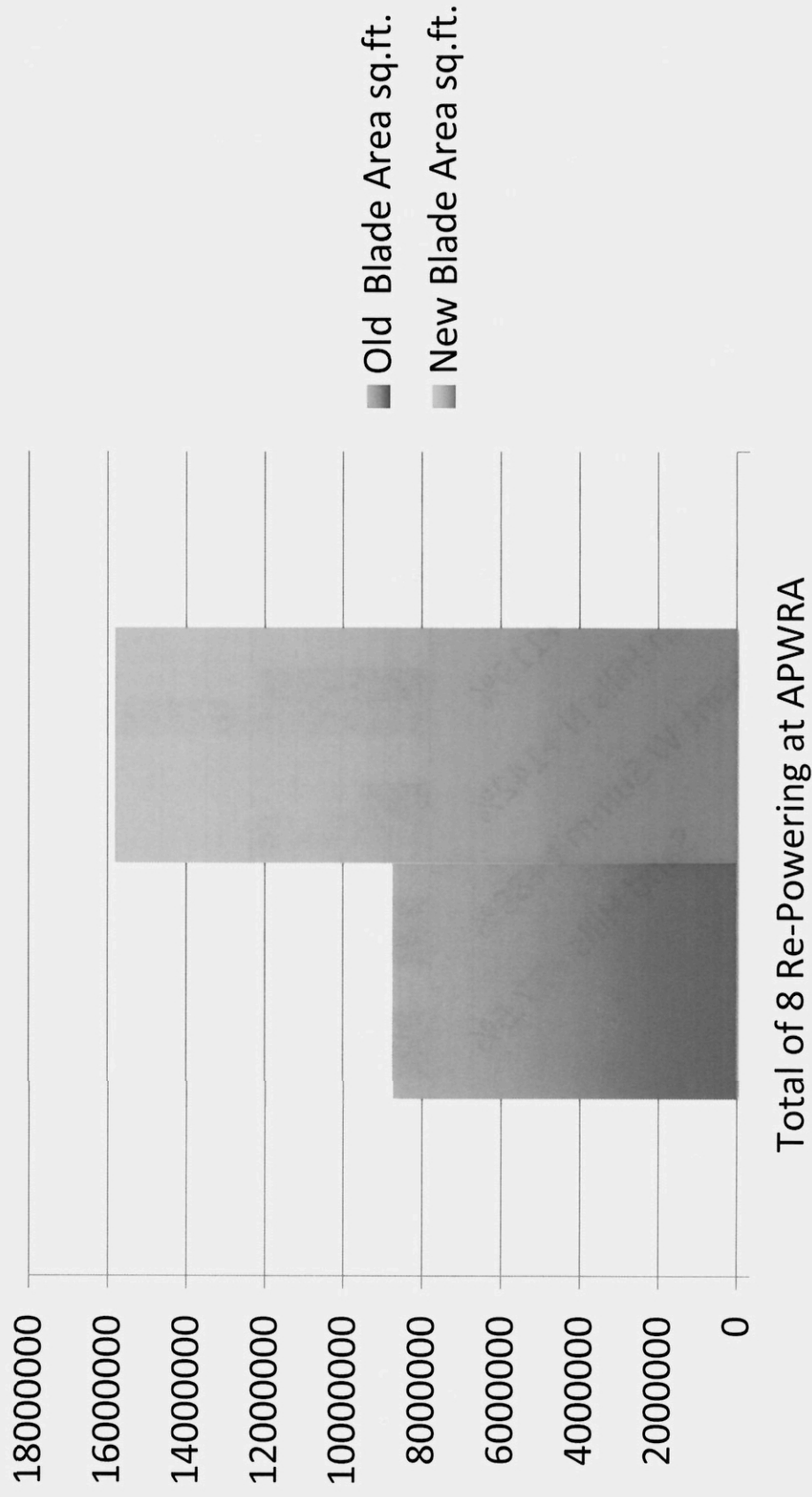


Sand Hill is a 77.5% increased in blade

sweep



Total APWRA Re-Powering adds 97 Extra Industrial Wind Turbines = 76% expansion



Favourable population/species Conservation Status FCS

- 1.The population does not continuously decrease.
- 2. There exist sufficient area of habitats necessary to maintain stable population.
- 3. The range (breeding and non – breeding) does not decrease continuously.
- Mortality caused by collisions and loss of habitats are key in terms of likely adverse effects on birds populations.
- Monitoring (after-construction monitoring) Monitoring shall include a 1 – year cycle replicating the pre – investment monitoring and shall be repeated three times during the 5 - year period after the wind farm is commissioned.
- Implementation of measures mitigating the observed effects (species – oriented mitigating measures, for instance: modifications to turbines'night lighting system, change in structure of land use, temporary shutdown of wind turbines.
- Polish Government Guidelines for assessment of wind farms impact on birds March 2008
- <http://www.darrylmueeller.com/poland.pdf>

3 dimensional aspects or volume in cubic feet of air space occupied up by a turbine blade would contribute to blade strike mortality.

- Old blades were 18 in.+, new blades can be 5+ times thicker this adds collision!
- This fact multiplies strike opportunities for raptor strike of the 3 dimensional blade. Please watch the video, next slide
- during the time it takes a bird to fly through. Rogers et al. (1976)
provide a potentially useful formula for calculating the probability of collision assuming no avoidance.

$$\text{Prob} = \frac{N(R)(D)}{V_a}$$

where:

Prob	= Probability of collision
V _a	= the bird's axial velocity (m/s)
N	= Number of blades
R	= Blade rotational speed (rps)
D	= Average depth of blade (m)

This calculation is only useful in analyzing the probability that a moving blade will strike a bird but cannot be used for the reverse situation which may also occur. It does, however, point out the potential importance of rotor solidity in avian collision rates.

The Slow Blade Illusion kills!



50% Mortality Reduction Goal?

- Sand Hill has increased the blade sweep, (killing potential) by 77.5%. Increased tip speed to 191 mph and cannot reduce mortality 50%
- APWRA Repowering Blade Sweep 76% Expansion
- Look at completed projects Shiloh as what we can expect 12% annual mortality Golden Eagles.
- Less Avian through attrition does not reduce mortality

Attrition of 57.9 percent arising from this singlemortality agent, turbine blades

- Unlike juveniles, radio-tagged subadults and floaters are highly vulnerable to turbine blades.
- We recorded 31 blade-strike fatalities (20.0 percent) within our sample of 155 subadults with working radios and 8 such fatalities (14.8 percent) among 54 floaters. We attribute this susceptibility both to their frequent occurrence in the WRA and their greater tendency, compared with juveniles, to hunt live prey.
- We tagged 25 fledgling eagles in 1994, and a year later, six of these had died or disappeared (emigration plus radio-failure), leaving 19 in the study area as first-year subadults. From January 1995 to November 1999, turbine blades killed 11 of these eagles (including censored ones), an attrition rate of at least 57.9 percent arising from this singlemortality agent.
- Golden Eagles In A Perilous Landscape: Predicting The Effects Of Mitigation For Wind Turbine Blade-Strike Mortality. 2002
- http://www.energy.ca.gov/reports/2002-11-04_500-02-043F.PDF

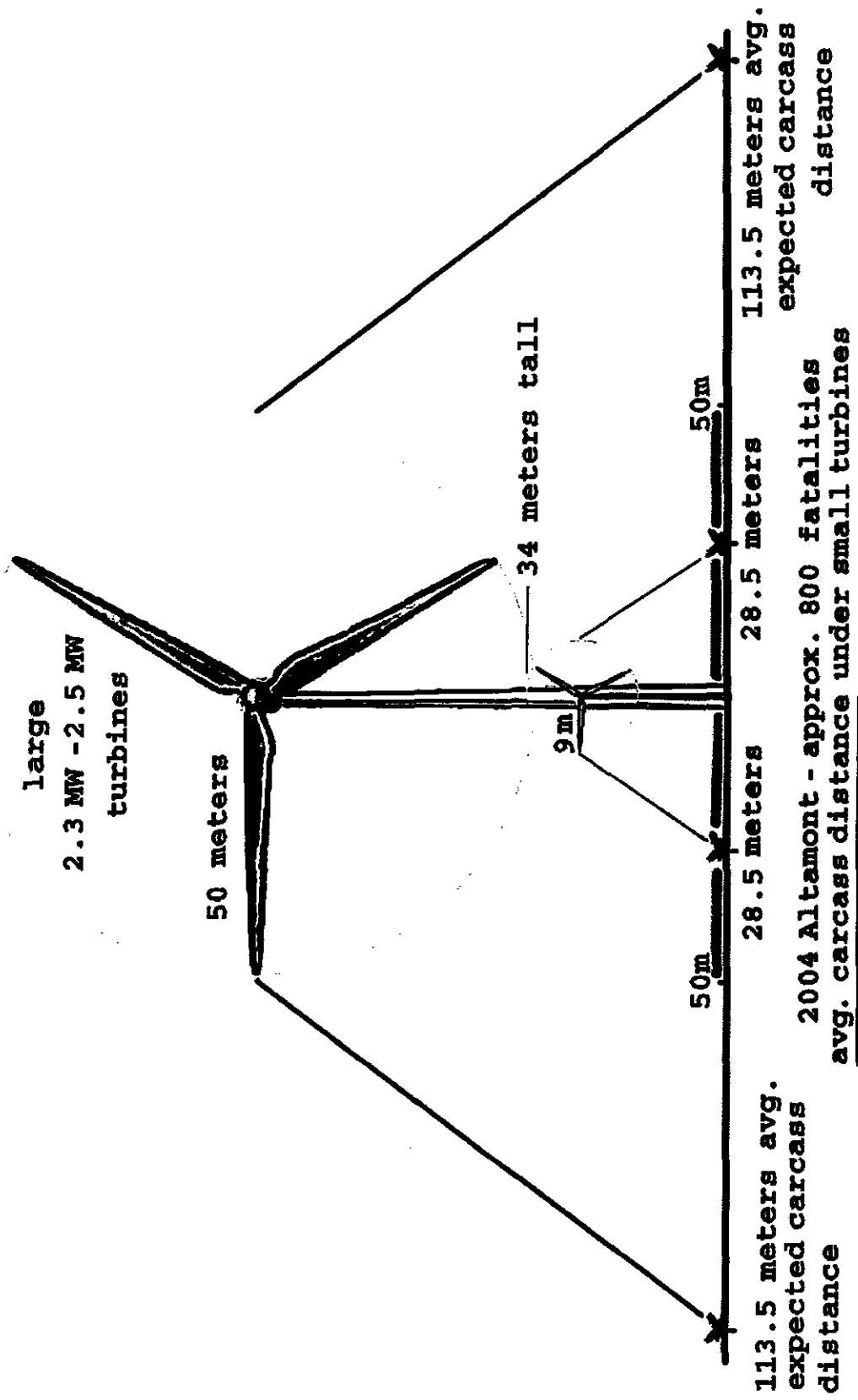
Turbine Eagle Fatalities at 42%

- Another reason to think that locally produced eagles are at greatest risk is that more than 80% of those that PBRG tagged as free-ranging non-breeders showed evidence of residency in the Diablo Mountains a finding consistent with other studies reporting the tendency of golden eagles to gravitate to natal regions (see Kochert et al. 2002 for review).
- At least 68% of 100 fatalities recorded among 257 radio-tagged eagles during 1994–2000 were humanrelated; turbine blade-strikes accounted for 42% and electrocution for 12%. An additional 21% of fatalities of unknown cause likely included some human-related events, e.g., lead and other poisonings.
- The Trend Of Golden Eagle Territory Occupancy In The Vicinity Of The Altamont Pass Wind Resource Area: 2005
- <http://www.energy.ca.gov/2006publications/CEC-500-2006-056/CEC-500-2006-056.PDF>

HIDING WIND TURBINE MORTALITY

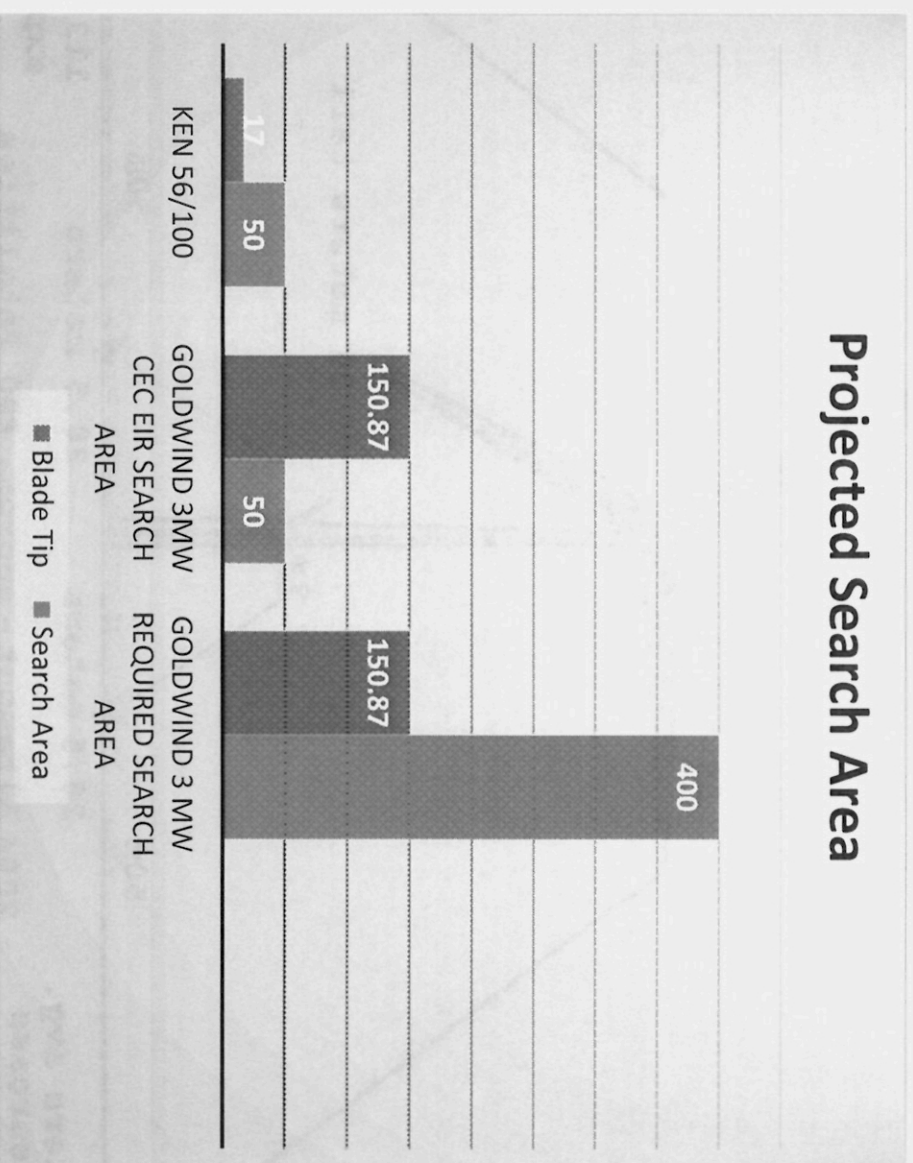
Wind industry studies deliberately use 50-60 meter mortality search areas on their large turbines so their studies will miss most of the fatalities

_____ 130 meters tall



This is why search areas should be 200 meters

Comparison of Search Area in Relation to Early Searches



Alameda County Follow Through

- The East County Board of Zoning Adjustments unanimously approved a conditional use permit for Ogin Inc. to build the first phase of 40 shrouded turbines in the Altamont Wind Resource Area east of Livermore.
- **Groundbreaking’ Altamont wind turbine project moves forward**
 - “From a study point of view, it’s perfect,” said independent researcher Shawn Smallwood, who has been counting fatalities for Ogin since 2012. “That corridor is the worst in the Altamont for killing birds.” 2014
- **Decision delayed on ‘bird friendly’ wind turbine experiment for Altamont Pass**
 - The three-member East County Board of Zoning Adjustments on Thursday delayed voting on permits for the 40-turbine Sand Hill Wind project, citing concerns over “limitations” in the project’s bird mortality study, the scenic impact of the turbines and the precedent the project could set for the technological future of the Altamont Wind Resource Area. 2014
- “I think we need an experiment, but why does the rest of Alameda County have to see it?” said board member Jim Goff. “We’ve got so much rural area, I don’t know why we have to go through a scenic corridor.”
- All that was delivered is the phrase, “Bird Friendly Turbines” that were never delivered and the public thinks the new turbines open blades are “Bird Friendly” that’s called bate & switch.

Repowering with more efficient and bird friendly turbines

- it appears that there is a greater risk of fatal collisions with taller turbines. This is a real problem, as larger wind turbines may provide more efficient energy generation. Consequently, it is expected that new wind farms will contain even bigger turbines, which will result in even more bird deaths..

– (**Reference:** Scott R. Loss, Tom Will, & Peter P. Mara (2013). Estimates of bird collision mortality at wind facilities in the contiguous United States *Biological Conservation*, 168, 201-209 DOI: [10.1016/j.biocon.2013.10.007](https://doi.org/10.1016/j.biocon.2013.10.007))

Searches

- The CEC Guidelines (California Energy Commission and California Department of Fish and Game 2007) recommend that the width of the search area should equal the maximum rotor tip height (i.e., the height of the blade tip when positioned at 12 o'clock), to be specified in the project-specific monitoring plan. Poor not enough.
- ERI completely left out 80% search area, to find this you must find 100%. Only after you establish the 100% can search area diameter be found.
- Then Searches must be every 48 hr., see 48 hr. search study. 80% carcass scavenged after 5 days.

Natural factors resulting in low mortality counts.

- When **we** began this study **we** were completely unaware of the extent to which the yearly sum of **WRA** fatalities contributes to the overall death rate of the golden eagle population residing in the region.
- Because of the difficulty of finding dead eagles visually, the large area involved, and the likelihood that carcasses are often scavenged before they are found, a relatively large proportion of total fatalities (from all causes) are never found.
- Pilot Golden Eagle Population Study in The Altamont Pass Wind Resource Area California May 1995 <http://www.nrel.gov/wind/pdfs/7821.pdf>

USFWS Comment 7/24/14 Large Industrial Wind Turbines Killing Exceeding 5% annual. Current Mortality is 12%

(Service 2009). We also put in place measures to ensure that local eagle populations are not depleted by take that would be otherwise regionally acceptable. As described in our *Eagle Conservation Plan Guidance Module 1: Land-based Wind Energy Version 2* (Service 2013, ECP Guidance), it is the Service's policy that take rates for a local-area population (140 miles for golden eagles) should not exceed 5% annually, whether the impacts of a given project have been offset by compensatory mitigation or not, to ensure sustainable populations of eagles.

In our Environmental Analysis for an eagle take permit at the Shiloh IV Wind Farm located about 30 miles from the APWRA (Service 2014), we determined that the current take rate for the APWRA golden eagle local-area population is approximately 12% annually. We are concerned that this level of ongoing take is having a negative effect on the local-area population of golden eagles and could affect the sustainability of this population.

Please contact Heather Beeler, Eagle Permit Coordinator at (916) 414-6651, if you have any questions.

Sincerely,



Based On The Statement from the Department of Justice the wind industry owes Americans billions in fines and is subject to thousands of years of probation for their unpermitted slaughter to protected bird species. Friday November 22, 2014

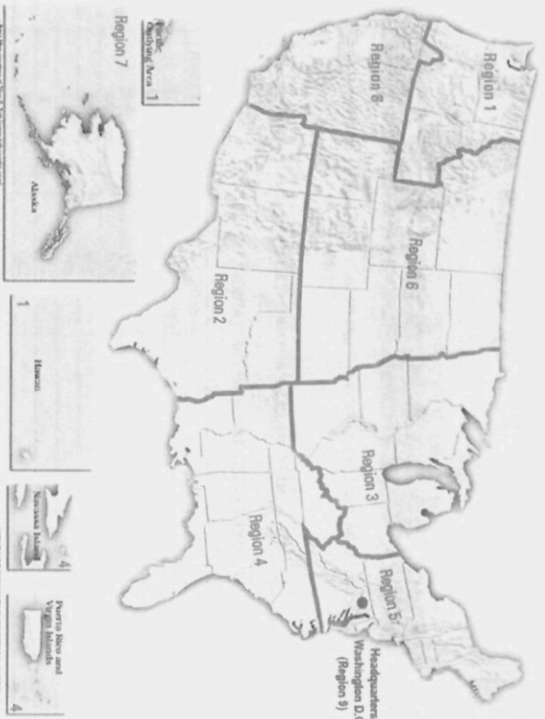
- "More than 1,000 species of birds, including bald and golden eagles, are protected under the Migratory Bird Treaty Act (MBTA). The MBTA, enacted in 1918, implements this country's commitments under avian protection treaties with Great Britain (for Canada), Mexico, Japan and Russia. **The MBTA provides a misdemeanor criminal sanction for the unpermitted taking of a listed species by any means and in any manner, regardless of fault.** The maximum penalty for an unpermitted corporate taking under the MBTA is \$15,000 or twice the gross gain or loss resulting from the offense, and five years' probation."
- **Alameda County & The State of California, & EBRP, LARPD might be considered an accomplice in the fine for knowing that unpermitted killing with the operating permit and having no over sight or complacent in the operation, and receiving revenue from from it.**
- **<http://www.justice.gov/opa/pr/utility-company-sentenced-wyoming-killing-protected-birds-wind-projects>**
- AGREEMENT TO REPOWER TURBINES AT THE ALTAMONT PASS WIND RESOURCES AREA, #6 12/3/10
- **http://www.darrylmueller.com/Audubon_agreement.pdf**

complete as of 10/22/14.

USFWS Regional Map, notice that region 8 Calif.& Nev. 125 and region 2 Texas & Oklahoma 65. This could only reflect under reporting, and attrition.



Click on the map (or the text links, below) for the home page of the eight different US Fish and Wildlife Service regions.



Pacific Region (Region 1)

The Pacific Region includes Idaho, Oregon, Washington, Hawaii and the Pacific Islands.

Southwest Region (Region 2)

The Southwest Region includes Arizona, New Mexico, Oklahoma and Texas.

Great Lakes/Blue Rivers Region (Region 3)

The Great Lakes/Blue Rivers Region includes Illinois, Indiana, Iowa, Michigan, Missouri, Minnesota, Ohio and Wisconsin.

Southeast Region (Region 4)

The Southeast Region includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Puerto Rico, Virgin Islands, South Carolina and Tennessee.

Northeast Region (Region 5)

The Northeast Region includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and West Virginia.

Mountain/Prairie Region (Region 6)

The Mountain/Prairie Region includes Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah and Wyoming.

Alaska Region (Region 7)

The Alaska Region consists of the state of Alaska.

Pacific Southwest (Region 8)

The Pacific Southwest consists of most of these two states, plus the Klamath Basin area of Oregon.

Headquarters, Washington D.C.

Headquarters, Washington D.C.

Questions? Please try our [Search Engine](#) and check out the answers to the [FAQs](#) (Frequently Asked Questions), before you contact us.

Subject: Proof of Increased Allantoin reported eagle kills
From: "Jim elegant" <jm@imglegend.com>
Dear Maon, 14 Dec 2015 11:15:38 -0600
To: "DarnAbuisher" <Frost@umt.edu>

In 1988 with 6,062 of the turbines branded in the media, as being so deadly to raptors, the USFWS reported 29 eagle carcasses killed by Altamont turbines.

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1997 Totals		
1st Quarter	637,400	17,300	86,379,626	71	6	6.9%	162
2nd Quarter	635,900	1,300	294,660,833	78	23	241%	12
3rd Quarter	632,225	15,800	397,087,941	73	25	311%	155
4th Quarter	623,460	17,200	101,149,375	115	10	136%	6,682
1997 Totals	623,600	51,200	91,170,790	75	17	72%	305

2013-2014 eagle carcass numbers given to Don Wiegand by the USFWS in Oct 2015, 33 and 37 an increase of 20 percent. Keep in mind these eagle fatality numbers are with the new "bird friendly" turbines that have been installed and large sections of Altamont set of service during this time due to reconstruction.

As quoted from *USFWS*....."Biden is a monthly break-down for Alamoont dating back to 2013 regarding eagle fatalities. I can not guarantee these numbers are exact, but I am confident that they are certainly close. I killed the highest count (June 2014). If Jim W has a particularly month of interest, or identifies a possible aberrant count, it is possible we have an independent record further accounted for in a specific INV."

February 2013: 4
March 2013: 3
April 2013: 3
May 2013: 1
June 2013: 3
July 2013: 2
August 2013: 5
September 2013: 5
October 2013: 6
November 2013: 1
December 2013: 0
January 2014: 1
February 2014: 0
March 2014: 4
April 2014: 3
May 2014: 5
June 2014: 5
July 2014: 3
August 2014: 2
September 2014: 5
October 2014: 4
November 2014: 2
December 2014: 0
January 2015: 0
February 2015: 2
March 2015: 5
April 2015: 3
May 2015: 0
June 2015: 1
July 2015: 1
August 2015: 3

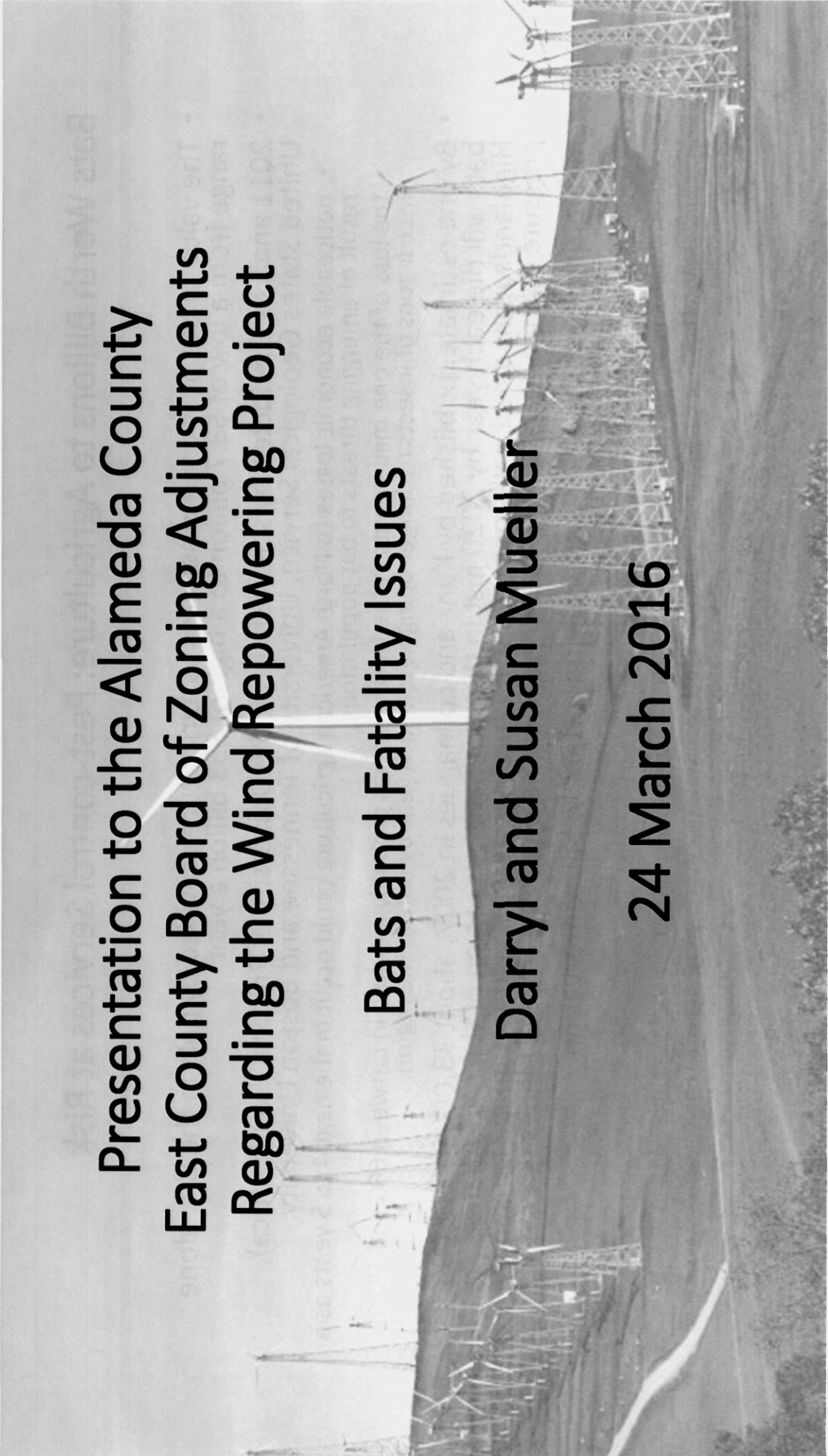
15 Garden! Shut Down
Season of 580 by H. n. p. 1944

29 Eagles were killed in 1988

- And 33 Eagles are Killed in 2013
- And 37 Eagles are Killed in 2014
- Do the Math! On the Low Side
- 26 years X 29 = 754 Dead Eagles
- \$15,000 X 754 = \$11,310,000 and that is only MBTA, BEA has \$200,000 & \$500,000 along with Prison Time.

Blade Sweep 4-30-16

Project Name	CPU #	# to replace	MW	new sweep / old sweep		Blade area meter	56/100	Rounded	Tip MPH	Blade sweep meter / Blade Sweep Ft. /per kw effectiveness	X increase	MW increase																																										
				area of sweep	Area Swap								Area increase	Same as 56/100	per kw	Blade Kill?																																						
USA US Windpower	Kenetec 56/100 kw	17.00	88.00	55.70	2436.70	226.98	1.01	1 to 1	143.10	50.00	164.04																																											
USA	Flowwind 56/150 kw	17.07		56.00	2463.01	228.82	1.01	1 to 1		50.00	164.04																																											
USA	Flowwind 56/250 kw	18.90		62.00	3019.08	280.48	1.24	1 to 1		50.00	164.04																																											
Denmark	Nordtank 65kw	15.84		52.00	2123.72	197.06	0.87	1 to 1		50.00	164.04																																											
Netherlands	Windmaster 75kw	21.95		72.00	4071.51	378.26	1.67	150 to 1		50.00	164.04																																											
Netherlands	Windmaster 200 kw	21.95		72.00	4071.51	378.26	1.67	150 to 1		50.00	164.04																																											
Netherlands	Windmaster 300 kw	23.16		76.00	4536.47	421.45	1.86	1.75 to 1		50.00	164.04																																											
Netherlands	Windmaster 250 kw	24.99		82.00	5281.03	490.63	2.17	2 to 1		50.00	164.04																																											
USA Kenetech	KVS-33	33.20	429.78	108.92	9318.27	865.70	3.82	4 to 1		50.00	164.04																																											
Denmark	Vestas V47 660 kw	47.00	241.14	154.20	18674.76	1734.95	7.66	175 to 1		75.00	246.06																																											
Japan	Mitsubishi 1000A	61.40	278.00	201.44	31870.02	2960.93	13.08	13 to 1		75.00	246.06																																											
India, Magarpatta	Suzlon S97 2.1 MW	97.00	454.00	318.24	79542.72	7389.83	32.64	32 to 1		?	?																																											
China, Beijing	Goldwind GW 121 3MW	121.00	495.00	396.98	123773.64	11499.04	50.80	50 to 1		?	?																																											
German, Hamburg	Siemens 2.3 MW	101.00	427.50	331.36	86236.49	8011.87	35.39	35 to 1		?	?																																											
German, Hamburg	Siemens SWT-2.3MW	120.00	499.00	393.70	121736.76	11309.76	49.83	50 to 1		?	?																																											
Denmark	Vesta V90-3MW	90.00	410.00	295.00	68349.44	6361.74	27.80	28 to 1																																														
Sand Hills 5 different windmills	Golden Hill North 56/100	PIN 2015-00157	24.00	30.40	789489.39	10.00	1119535.85	783.45	2.27	2.44	142%	18.00																																										
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An aerial photograph of a large wind farm. Numerous wind turbines are visible, scattered across a rolling landscape. The turbines are white with three-bladed rotors. The terrain appears to be a mix of grassy fields and some cleared areas. The sky is overcast and grey.

Presentation to the Alameda County East County Board of Zoning Adjustments Regarding the Wind Repowering Project

Bats and Fatality Issues

Darryl and Susan Mueller

24 March 2016

Bats Worth Billions to Agriculture: Pest-control Services at Risk

- The value of the pest-control services to agriculture provided by bats in the U.S. alone range from a low of \$3.7 billion to a high of \$53 billion a year
- 2011 analysis conducted by scientists from the University of Pretoria (South Africa), United States Geological Service, University of Tennessee and Boston University.
 - noticeable economic losses to North American agriculture could occur in the next 4 to 5 years as a result of emerging threats to bat populations.
 - the loss of the one million bats in the Northeast has probably resulted in between 660 and 1320 metric tons of insects no longer being eaten each year by bats in the region.
- By one estimate, published by Kunz and colleagues in 2007, about 33,000 to 111,000 bats will die each year by 2020 just in the mountainous region of the Mid-Atlantic Highlands from direct collisions with wind turbines as well as lung damage caused by pressure changes bats experience when flying near moving turbine blades.
- minimizing these fatalities is critically important to bat conservation

Released: 3/31/2011 U.S. Department of the Interior, U.S. Geological Survey http://www.usgs.gov/newsroom/article.asp?ID=2743#.vNVV3D_8Gbo

"Economic importance of bats in agriculture," appears in the April 1 2011 edition of *Science*. Authors are J.G. Boyles, P. Cryan, G. McCracken and T. Kunz.

Bat Lung damage Caused by Pressure Changes Turbine Blades

- They often fly up to the turbine tower seeking rest.
- But when the creatures fly too close to the football-field-sized windmills they enter an area of reduced air pressure
- The differing wind pressure between the forward and trailing edges of the turbine blades during the down sweep of a blade causes their lungs to explode
- This phenomenon is known as barotrauma and is similar to the bends that afflict divers.

The Washington Times - Monday, March 23, 2009

Wind-turbine operations are associated with bat mortality worldwide

- Cut in speed defined as the lowest wind speed at which turbines generate power to the utility system, thereby reducing turbine operation during periods of low wind speeds
- Study tested the effectiveness of raising wind-turbine cut-in speed to decrease bat mortality
 - Casselman Wind Project in Somerset County, Pennsylvania, over a 2-year period
- Observed bat mortality at fully operational turbines was, on average, 5.4 and 3.6 times greater than mortality associated with curtailed (ie non-operating) turbines in 2008 and 2009, respectively.
- Relatively small changes to wind-turbine operation resulted in nightly reductions in bat mortality, ranging from 44% to 93%, with marginal annual power loss ($\leq 1\%$ of total annual output).
- National average cut in speed is 8-9 mph
 - Suzlon 97 cut in speed is 7.8 mph (3.5 m/s)
- **Increasing Cut-in Speed from 8 mph 11 mph of Wind Turbines Results in Fewer Bat Fatalities**

(Tiffany Kaiser - November 2, 2010 <http://www.dailymed.com/Increasing+Cutin+Speed+of+Wind+Turbines+Results+in+Fewer+Bat+Fatalities/article20043.htm>)

Frontiers in Ecology and the Environment, November 2010, Arnett, Edward B and Huso, Manuela MP and Schirmacher, Michael R and Hayes, John P.

Many bat kills occur during low-wind nights

- Sustained, high fatality rates from collisions with wind turbines could have potentially significant impacts to bat populations because population growth is slow (Racey and Entwistle, 2000).
- Some studies have indicated that tree-roosting bats may be attracted to both moving and non-moving wind turbine blades and that many bat kills occur during low-wind nights (Arnett, 2005). Kunz et al. (2007) describe 11 hypotheses about possible reasons for fatalities at wind energy facilities.
- California Guidelines For Reducing Impacts To Bird And Bats From Wind Energy Development
- <http://www.energy.ca.gov/2007publications/CEC-700-2007-008/CEC-700-2007-008-CMF.PDF>

Outdated Data in Repowering Documentation in EIR

- Failure to review recent scientific data
- Impact Analysis Biological Resources APWRA Repowering Final PEIR page 3.4-48 October 2014
 - *Historically, the number of bat fatalities detected as part of the avian fatality monitoring program at old-generation turbines in the APWRA has been extremely low, due at least in part to the monitoring program's design, which has focused on bird mortality. As previous study methods were not designed to generate defensible bat mortality rates, and as new generation turbines may pose novel threats to bats, assumptions of species vulnerability based on extrapolation from the older turbine technologies present in the APWRA are not necessarily valid* (California Bat Working Group 2006).
- As demonstrated there are at least two studies that have been conducted between 2006 and 2014 regarding bat mortality missing in EIR