

Avian Interactions with Wind Power Structures

December 17-18, 2002

University of California, Davis

California Wind Energy Consortium Forum

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California Energy Commission

Wind Energy/Bird Interactions

History

- Altamont Pass WRA
- National Effect
- National Wind Coordinating Committee's Avian Subcommittee Formed
- Industry and Public Sponsored Research
- Site-specific Problems


AVIAN SUBCOMMITTEE

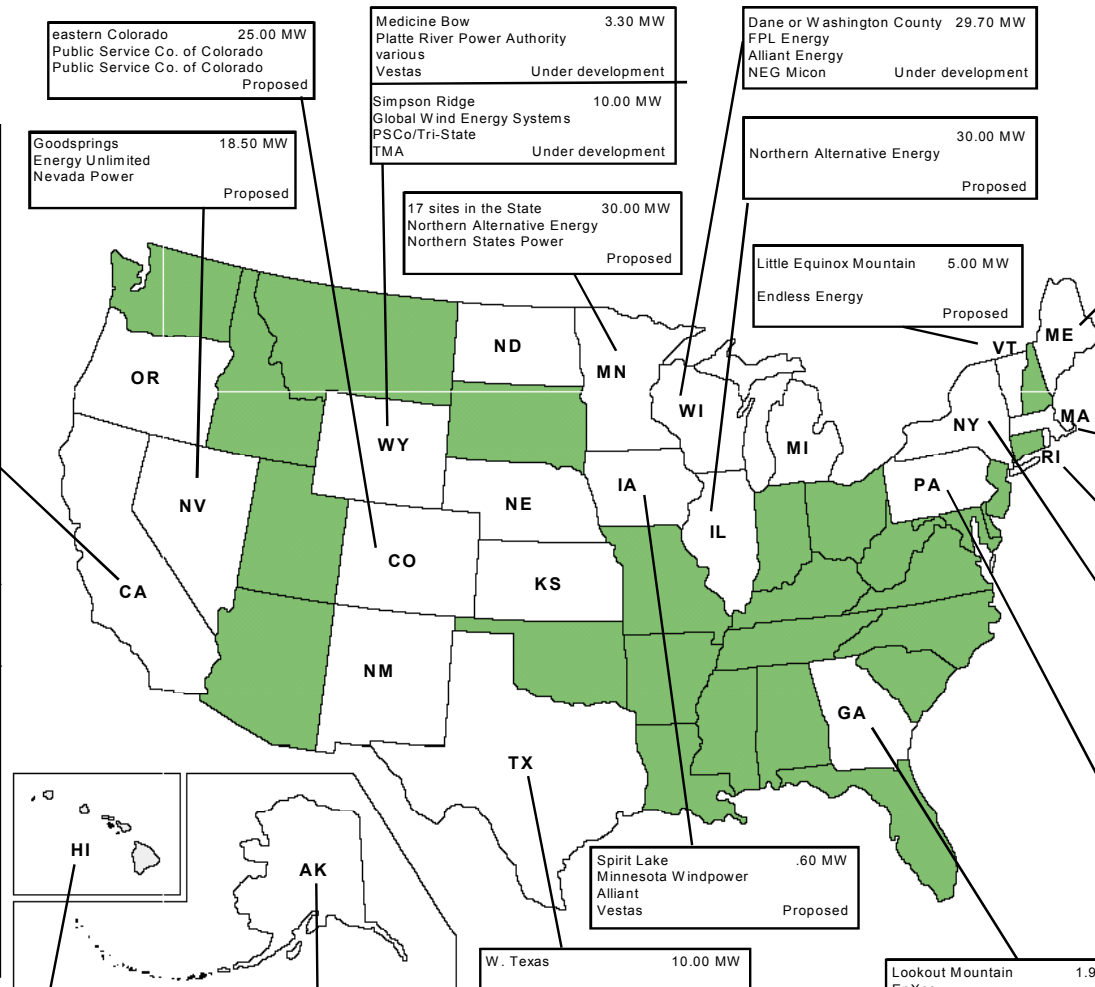
ACTIVITIES

- Four technical planning meetings
- Proceedings of those meetings
- Technical advice and recommendations
- Coordination and communication
- Standard metrics and methods
- WWW.NationalWind.org plus CEC and NREL websites for additional information

U.S. Wind Power Projects-Under Development or Proposed

Update 12/31/99

Legend			
Name/Location	MW Capacity	Developer	Utility
		Manufacturer	Status
 No installed or proposed wind power			



San Gorgonio	33.0 MW	Mark Technologies	Southern California Edison	Proposed
San Gorgonio	60.70 MW	Whitewater Energy	Southern California Edison	Proposed
San Gorgonio	64.40 MW	Venture Pacific/SeaWest	Southern California Edison	Proposed
Tehachapi	8.40 MW	CaWind Resources	Southern California Edison	Proposed
Tehachapi	unknown MW	Windland	Southern California Edison	Proposed
Venture Pacific/Altamont Pass	25.6 MW	SeaWest	Pacific Gas & Electric	Proposed-repower
San Clemente Island	0.45 MW	Pacific Industrial Electric	U.S. Navy	Under development
Kenetech sites/Altamont Pass	64.40 MW	FPL/Green Ridge Power	Pacific Gas & Electric	Under development-repower
FloWind sites/Altamont Pass	31.50 MW	FPL/Altamont Power	Pacific Gas & Electric	Under development-repower
Mojave/Tehachapi	33.60 MW	Tomen	Southern California Edison	Under development-repower
Gorman (new location)	39.75 MW	Enron	Southern California Edison	Proposed

eastern Colorado	25.00 MW	Public Service Co. of Colorado	Public Service Co. of Colorado	Proposed
Goodsprings	18.50 MW	Energy Unlimited	Nevada Power	Proposed

Medicine Bow	3.30 MW	Platte River Power Authority	various	Under development
Simpson Ridge	10.00 MW	Global Wind Energy Systems	PSCO/Tri-State	Under development

17 sites in the State	30.00 MW	Northern Alternative Energy	Northern States Power	Proposed
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Dane or Washington County	29.70 MW	FPL Energy	Alliant Energy	Under development
Northern Alternative Energy	30.00 MW			Proposed

Little Equinox Mountain	5.00 MW	Endless Energy		Proposed
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Reddington Mountain	20.00 MW	Endless Energy		Proposed
Boundary Mountains	6.00 MW	Enron		Proposed

Hancock (Brodle Mountain)	7.50 MW	DisGen	AllEnergy	Proposed
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R.I. Energy Collaborative	2.00 MW	Endless Energy		Proposed
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Madison County	11.55 MW	PG&E Generating		Proposed
Western NY Wind Partners	9.24 MW	Niagra Mohawk	Vestas	Proposed

Green Mountain/Garrett	10.40 MW	DisGen		Under development
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South Point/Big Island	9.75 MW	Kamaoa Partners	Hawaiian Electric Light Co.	Under development-repower
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Kotzebue	0.1 MW	Kotzebue Electric Association	Kotzebue Electric Association	Proposed
Wales	0.1 MW	Kotzebue Electric Association	Alaska Village Electric Cooperative	Under develop.

W. Texas	10.00 MW	El Paso Electric		Proposed
King Mnt. near Odessa	21.6 MW	Texas Windpower	City of Austin	Proposed
Fort Stockton	3.50 MW	Cielo Wind Power, LLC	Texas-New Mexico Power Co.	Under development

Lookout Mountain	1.98 MW	EnXco	Tennessee Valley Authority	Proposed
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Kahua Ranch/Big Island	10.00 MW	Enron Wind Corp.	Hawaiian Electric Light Co.	Proposed
near Maalaea/Maui	20.00 MW	Enron Wind Corp.	Maui Electric Co.	Proposed

Under development	196.70 MW
Proposed	460.92 MW
Total	657.62 MW

Note: Labeled states have wind projects completed, under development or proposed.

Partial Listing of Studies

- Altamont CA
- Buffalo Ridge MN/IA
- Foote Creek Rim WY
- Ponnequin CO
- Searsburg VT
- San Geronio CA
- Tehachapi CA
- Big Springs TX
- Ft. Davis TX
- Glenmore WI
- Kotzebue Alaska
- Springview NE
- Algona IA
- Oregon/Washington

Planning Meeting 4

Carmel, CA May 2000

Presentations Discussed

- **Species Impacts**
- **Tower Type and Size, Number of Towers, and Tower Placement**
- **Avian Vision and Turbine Blade Conspicuity**
- **Avian Acoustical Data Monitoring**
- **The Role of Avian Prey in Avian-Turbine Interactions**

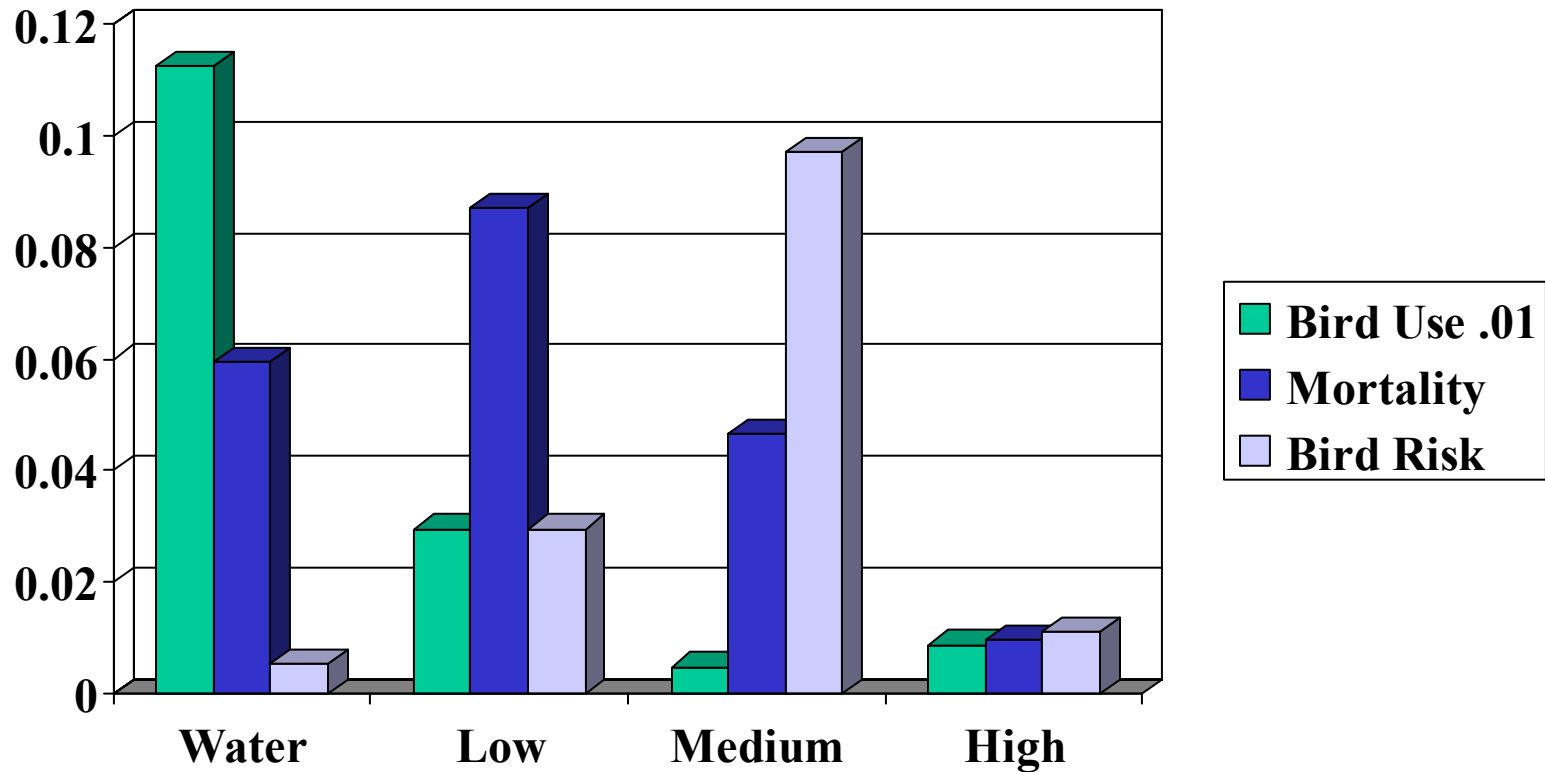
Planning Meeting 4

Carmel CA May 2000

Presentations Discussed (cont)

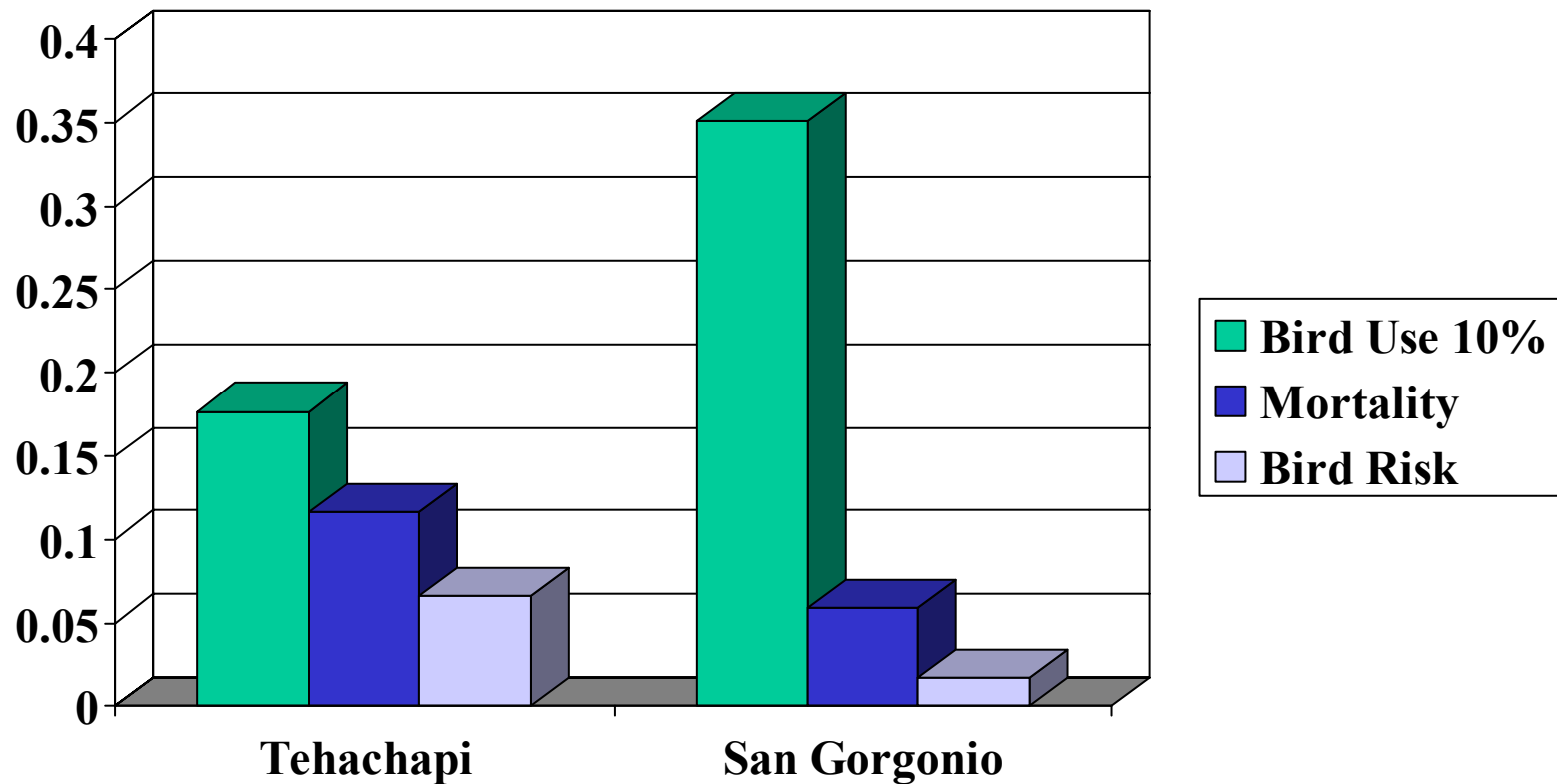
- **Potential Deterrents**
- **Bat Ecology and Wind Turbine Considerations**
- **Site Specificity and Siting of Wind Facilities**
- **Effectiveness of Standard Methods and Metrics**
- **Understanding the Significance of the problem**

Bird Use, Mortality, and Risk Variation Within a WRA SAN GORGONIO, CA

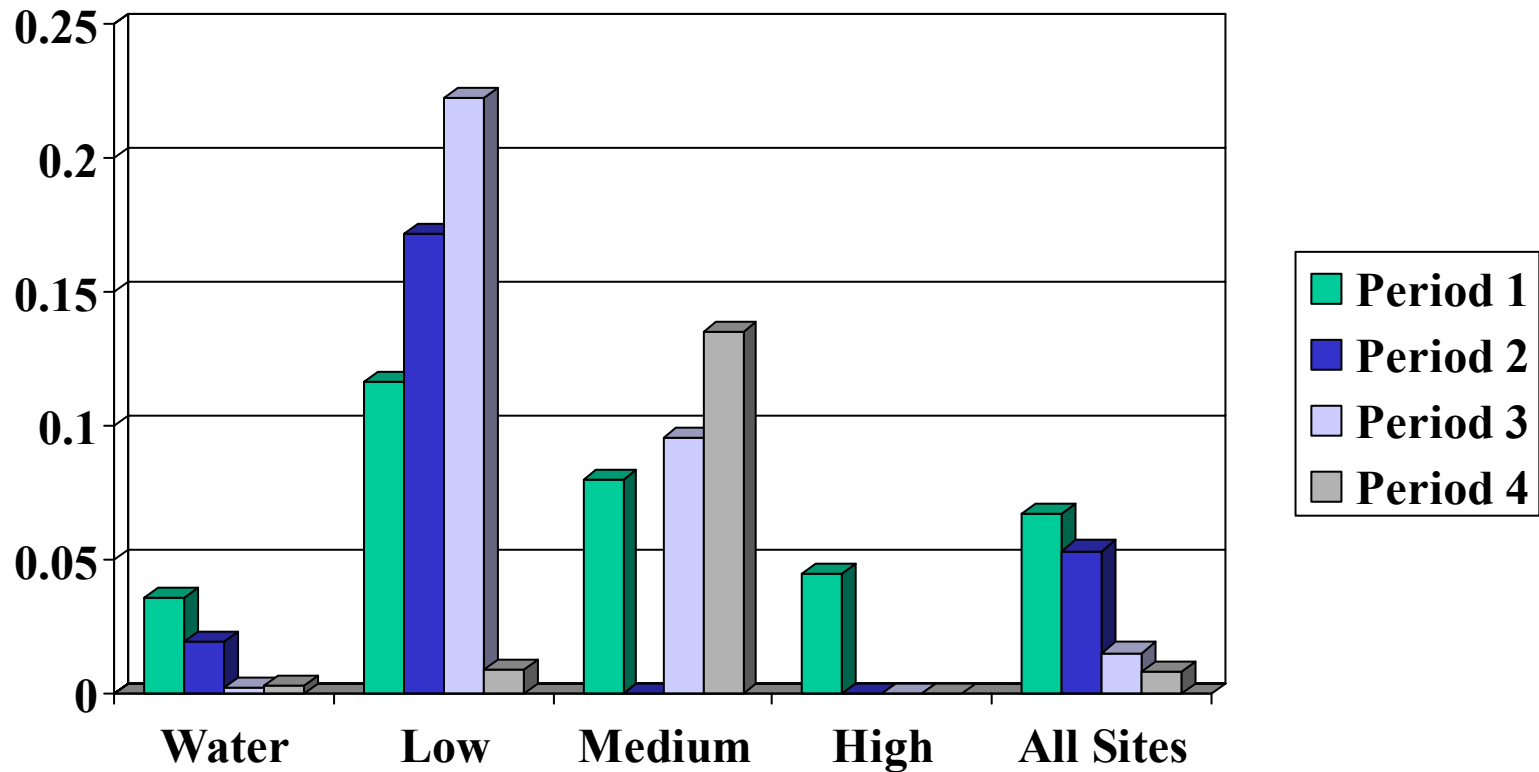


Bird Use, Mortality, and Risk Variation Between WRAs

TEHACHAPI AND SAN GORGONIO WRAs, CA

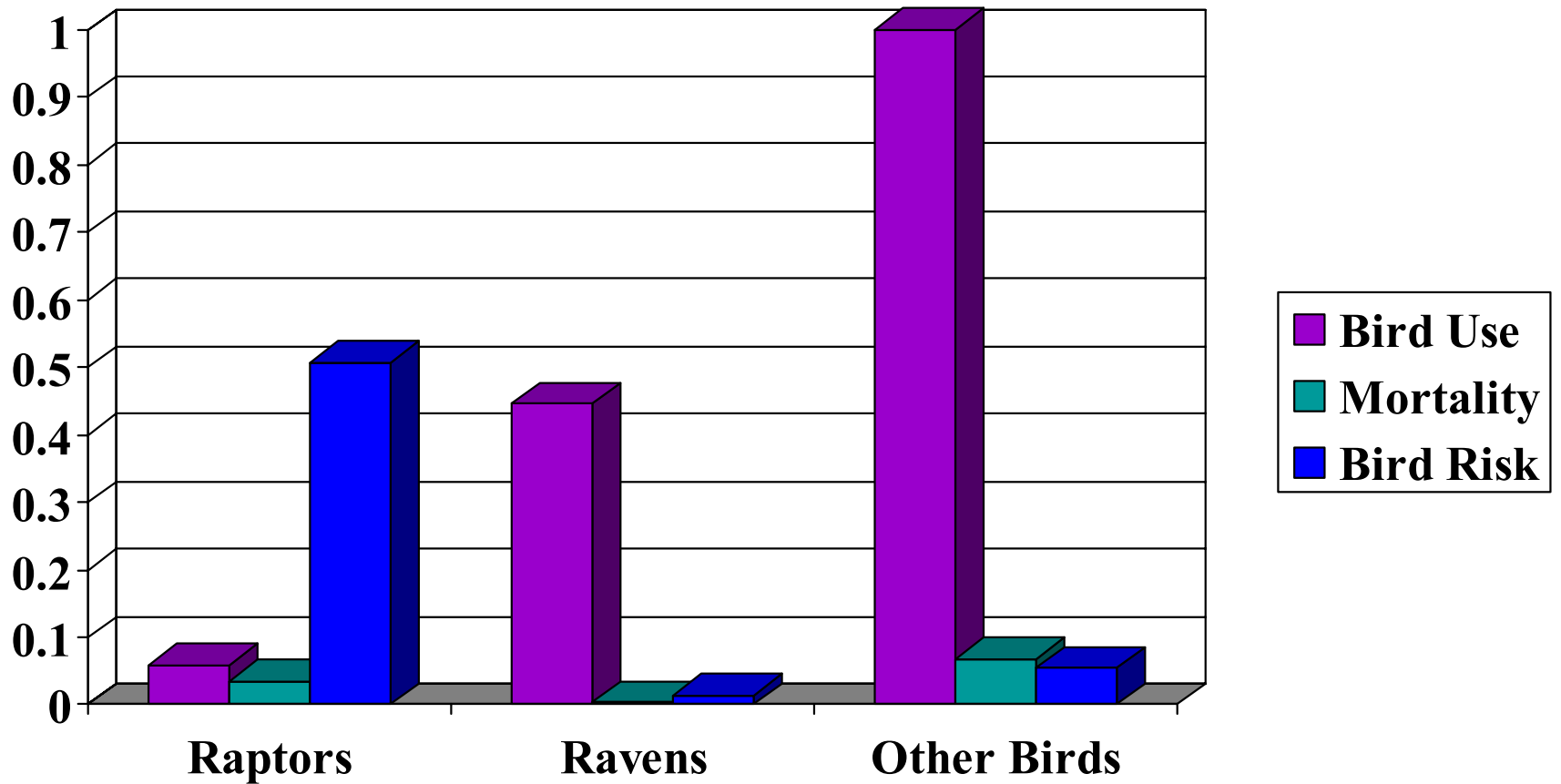


Seasonal Bird Risk Variations within a WRA SAN GORGONIO CA

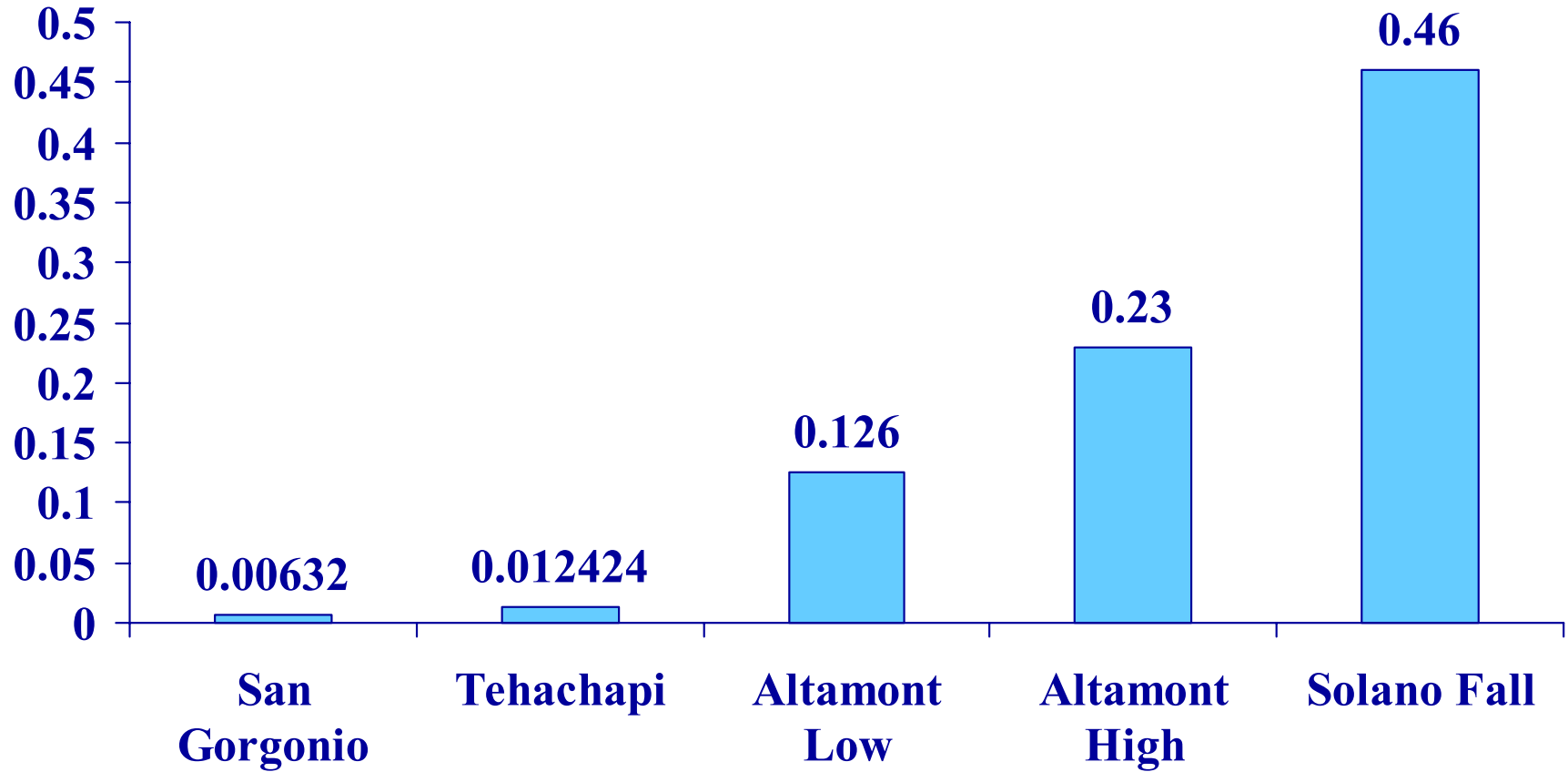


Variation Between Bird Groups

TEHACHAPI CA



Raptor Use Comparison Between California WRAs



Altamont Pass WRA Research Update

- Bird fatalities are being found by all turbine types (tubular and lattice), with no clear differences/preferences at this time (Thelander pers. Comm. Oct. 2002).
- Bird fatality numbers are higher than previous Altamont studies.

Altamont Pass WRA Research Update (cont.)

- Golden Eagle breeding pair numbers appear relatively constant, but the non-breeding floater numbers that replace the breeders are dwindling. This may result in population problems in the future.
- Ground squirrel densities may influence golden eagle fatalities

What Have We Learned

- **Wind turbines kill birds**
- **Wind turbines kill bats**
- **Bird impacts can be significant or insignificant**
- **Raptors are a high risk bird group**
- **Bird use, mortality, and risk vary between and within wind resource areas**
- **Site specific issue**

What We Have Learned (cont.)

- **Birds are killed during day and night**
- **There is no conclusive data as to whether: a) large or small turbines reduce risk, or b) tube or lattice towers reduce risk**
- **There is nothing known for sure that significantly reduces avian fatalities**
- **Avoidance of areas with high bird use is only proven way to avoid high levels of avian fatalities**
- **With the exception of the Altamont Pass WRA, developed WRAs studied are of less concern**