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Bird Mortality at Wind Energy Facilities in Southwestern U.S.

Several avian fatality studies conducted at wind facilities in the Southwestern U.S. are publically available. These studies used information on the number of recorded carcasses found during searches and bias trials to quantify the expected number of carcasses that might have been missed by searches and/or removed by scavengers prior to the next search. The adjusted bird fatality rates/MW capacity/year are provided in Table 1. The average fatality estimate from these studies is 3.42 birds/MW/yr, and ranged from 0.55 birds/MW/yr (Alite 2010) to 8.3 birds/MW/yr (Pine Tree 2010). Several factors could lead to this estimate being biased high or low. For example, these studies included all carcasses found by searches, and evidence of carcasses often cannot clearly indicate whether a carcass was killed due to collision with a turbine. So these results may include some level of background mortality. Other biases might exist due to the estimator used, and how plot size was factored into the estimate.

Composition by taxonomic group can be found in Table 2. Almost half of species found were Passerines (49.1%). Upland Game Birds made up 14.3% of finds, followed by Unidentified Birds (12.6%), Doves and Pigeons (9.4%), Diurnal Raptors (5.6%). The remaining taxonomic groups made up less than 10% of found birds. Among the 70 species recorded during these studies, only one was listed as a California bird species of special concern—the Loggerhead Shrike (*Lanius ludovicianus*), listed as second priority (California Bird Species of Special Concern 2008). Two Loggerhead Shrikes were recorded, or 0.6% of the birds found.

Using these data, a predicted fatality estimate for an average 500 MW wind project would be approximately 1700 birds per year. Given the composition of the carcasses that have been found and applying that to the 1700 estimate would result in approximately 25 – 75 raptors, 100 waterbirds or waterfowl, 100-200 upland game birds, and most of the rest would be of passerines, some nocturnal and migratory, and some likely resident. These numbers could vary significantly up or down depending on the site, monitoring methods, and other factors.

Table 1. Publically available estimates of bird fatality at Southwestern U.S. wind projects.

Project Name	State/Province	County	Bird fatality/MW/year
Alite 2010	CA	Kern	0.55
Alta Wind I (2011)	CA	Kern	7.07
Alta Wind II-V (2011)	CA	Kern	1.66
Dillon	CA	Riverside	4.71
Dry Lake I	AZ	Navajo	2.02
Dry Lake II	AZ	Navajo	1.57
Edom Hills	CA	Riverside	1.47
Pine Tree	CA	Kern	8.3
Average			3.42

Table 2. Taxa Composition of birds found at publically available studies of Southwestern U.S. wind projects.

Taxa	Count	% Composition
Passerines	168	49.1
Upland Game Birds	49	14.3
Unidentified Birds	43	12.6
Doves/Pigeons	32	9.4
Diurnal Raptors	19	5.6
Large Corvids	8	2.3
Cuckoos	6	1.8
Woodpeckers	4	1.2
Rails/Coots	3	0.9
Owls	3	0.9
Goatsuckers	2	0.6
Swifts/Hummingbirds	1	0.3
Loons/Grebes	1	0.3
Vultures	1	0.3
Waterbirds	1	0.3
Waterfowl	1	0.3
Total	342	100

Table 3. Species Composition of birds found at publically available studies of Southwestern U.S. wind projects.

Common Name	Species	Count	% composition
American coot	<i>Fulica americana</i>	3	0.9
American kestrel	<i>Falco sparverius</i>	4	1.2
ash-throated flycatcher	<i>Myiarchus cinerascens</i>	1	0.3
band-tailed pigeon	<i>Columba fasciata</i>	1	0.3
barn owl	<i>Tyto alba</i>	1	0.3
Bewick's wren	<i>Thryomanes bewickii</i>	2	0.6
black-chinned hummingbird	<i>Archilochus alexandri</i>	1	0.3
black-headed grosbeak	<i>Pheucticus melanocephalus</i>	8	2.3
black-tailed gnatcatcher	<i>Polioptila melanura</i>	1	0.3
black-throated gray warbler	<i>Setophaga nigrescens</i>	4	1.2
black-throated sparrow	<i>Amphispiza bilineata</i>	3	0.9
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	1	0.3
Brewer's sparrow	<i>Spizella breweri</i>	1	0.3
Bullock's oriole	<i>Icterus bullockii</i>	3	0.9
cactus wren	<i>Campylorhynchus brunneicapillus</i>	1	0.3
California quail	<i>Callipepla californica</i>	30	8.8
Cassin's vireo	<i>Vireo cassinii</i>	1	0.3
chipping sparrow	<i>Spizella passerina</i>	1	0.3
chukar	<i>Alectoris chukar</i>	10	2.9
Clark's grebe	<i>Aechmophorus clarkii</i>	1	0.3
common nighthawk	<i>Chordeiles minor</i>	1	0.3
common poorwill	<i>Phalaenoptilus nuttallii</i>	1	0.3
common raven	<i>Corvus corax</i>	8	2.3
common yellowthroat	<i>Geothlypis trichas</i>	1	0.3
Cooper's hawk	<i>Accipiter cooperii</i>	1	0.3
dark-eyed junco	<i>Junco hyemalis</i>	2	0.6
European starling	<i>Sturnus vulgaris</i>	2	0.6
fox sparrow	<i>Passerella iliaca</i>	1	0.3
Gambel's quail	<i>Callipepla gambelii</i>	1	0.3
golden eagle	<i>Aquila chrysaetos</i>	3	0.9
gray vireo	<i>Vireo vicinior</i>	1	0.3
great horned owl	<i>Bubo virginianus</i>	2	0.6
greater roadrunner	<i>Geococcyx californianus</i>	6	1.8
hermit thrush	<i>Catharus guttatus</i>	1	0.3
horned lark	<i>Eremophila alpestris</i>	8	2.3
house finch	<i>Haemorhous mexicanus</i>	3	0.9
house sparrow	<i>Passer domesticus</i>	2	0.6

house wren	Troglodytes aedon	6	1.8
lark sparrow	Chondestes grammacus	3	0.9
lesser goldfinch	Spinus psaltria	2	0.6
Lincoln's sparrow	Melospiza lincolnii	1	0.3
loggerhead shrike	Lanius ludovicianus	2	0.6
MacGillivray's warbler	Geothlypis tolmiei	1	0.3
mallard	Anas platyrhynchos	1	0.3
merlin	Falco columbarius	1	0.3
mountain quail	Oreortyx pictus	8	2.3
mourning dove	Zenaida macroura	26	7.6
Nashville warbler	Oreothlypis ruficapilla	1	0.3
northern flicker	Colaptes auratus	3	0.9
northern mockingbird	Mimus polyglottos	3	0.9
oak titmouse	Baeolophus inornatus	1	0.3
orange-crowned warbler	Oreothlypis celata	3	0.9
red-breasted nuthatch	Sitta canadensis	1	0.3
red-naped sapsucker	Sphyrapicus nuchalis	1	0.3
red-tailed hawk	Buteo jamaicensis	10	2.9
rock pigeon	Columba livia	5	1.5
rock wren	Salpinctes obsoletus	5	1.5
ruby-crowned kinglet	Regulus calendula	6	1.8
Savannah sparrow	Passerculus sandwichensis	5	1.5
spotted towhee	Pipilo maculatus	4	1.2
Steller's jay	Cyanocitta stelleri	3	0.9
turkey vulture	Cathartes aura	1	0.3
unidentified bird (small)		30	8.8
unidentified crowned sparrow		4	1.2
unidentified empidonax	Empidonax spp	1	0.3
unidentified flycatcher		1	0.3
unidentified large bird		13	3.8
unidentified passerine		10	2.9
unidentified sparrow		6	1.8
unidentified thrasher		2	0.6
unidentified thrush		1	0.3
unidentified vireo		1	0.3
unidentified warbler		3	0.9
western bluebird	Sialia mexicana	1	0.3
western meadowlark	Sturnella neglecta	6	1.8
western scrub-jay	Aphelocoma californica	14	4.1
western tanager	Piranga ludoviciana	3	0.9
white-crowned sparrow	Zonotrichia leucophrys	3	0.9
white-faced ibis	Plegadis chihi	1	0.3

Wilson's warbler	Cardellina pusilla	7	2.0
yellow-rumped warbler	Setophaga coronata	10	2.9
Total		342	100
