

Supplementary Materials

Table S1. Number of fixed-point locations at solar facilities and reference areas by study site.

Site Name	Blythe		CSV		Seville		Highlander		Mt. Signal		Ref. A	Lake Tamarisk	Total Year
Site Type ¹	Fac.	Ref.	Fac.	Ref.	Fac.	Ref.	Fac.	Ref.	Fac.	Ref.	Ref.	Ref.	
<u>10-min Fixed Point</u>													
2018	18	18	18	18	18	18					22	3	133
2019					18	18	7	18	18	18			97
<u>60-min Long-Sit Point Count</u>													
2019					1	1	1	1	1	1			6
Total Project	18	18	18	18	19	19	8	19	19	19	22	3	200
Habitat Category ²	DS		GR		DS		DS		AG		DS	WA	

¹ Fac. = Solar Facility; Ref. = Reference Area.

² DS = Desert/Scrub; GR = Grassland; AG = Agriculture; WA = Water

CSV = California Valley Solar Ranch, NLCD = National Land Cover Database, Reference A = desert habitat outside of Desert Sunlight

Table S2. Viewshed (meters) used for fatality monitoring with the solar field and in reference areas, and total survey area (ha) at 5 study sites over 2 years.

Facility	Location	Nameplate Capacity (Megawatts)*	Study Year	Area Searched Facility (ha)	Area Searched Reference (ha)	Habitat Category	Technology
California Valley Solar Ranch	San Luis Obispo County, CA	250	2018	99	40	Grassland	Tracker
Blythe	Riverside County, CA	235	2018	87	160	Desert/Scrub	Tracker
Seville	Imperial County, CA	50	2018, 2019	136	120 (year 1) 135 (year 2)	Desert/Scrub	Tracker
Desert Sunlight – Reference A	Riverside County, CA	550	2018	-	161	Desert/Scrub	Fixed
Highlander II	San Bernardino County, CA	21	2019	26	256	Desert/Scrub	Tracker
Mt. Signal 3	Imperial County, CA	328	2019	62	166	Agriculture	Tracker

*The number of watts the generator can provide at full rated power.

Table S3. Number of searcher efficiency trials deployed by study site, strata type, bird size category, and year.

Site	Type	Size	Year	Trials
Blythe	Reference	Large Bird	2018	10
Blythe	Reference	Small Bird	2018	16
California Valley Solar Ranch	Facility	Large Bird	2018	20
California Valley Solar Ranch	Reference	Large Bird	2018	20
California Valley Solar Ranch	Facility	Small Bird	2018	23
California Valley Solar Ranch	Reference	Small Bird	2018	24
Seville	Facility	Large Bird	2018	20
Seville	Reference	Large Bird	2018	20
Seville	Facility	Small Bird	2018	24
Seville	Reference	Small Bird	2018	24
Highlander II	Facility	Large Bird	2019	19
Highlander II	Reference	Large Bird	2019	19
Highlander	Facility	Small Bird	2019	16
Highlander	Reference	Small Bird	2019	20
Seville	Facility	Large Bird	2019	20
Seville	Reference	Large Bird	2019	20
Seville	Facility	Small Bird	2019	15
Seville	Reference	Small Bird	2019	15

Table S4. Candidate searcher efficiency models, AICc, Δ AIC, and selected models for estimating searcher efficiency for small birds and large birds and fatality transects in the facility and reference areas, by year. Separate models were fit by size class and facility/reference areas. Site was included as a potential covariate. A model covariate of '1' indicates an intercept-only model. The best-fit selected model for each strata is indicated in bold.

Model Covariate	Detection Function	AICc	Δ AIC	Size Class	Location	Year
Site	Half-normal	44.25	0.00	Small Bird	Facility	2018
Site	Exponential	47.02	2.76	Small Bird	Facility	2018
Site	Hazard	51.95	7.69	Small Bird	Facility	2018
1	Hazard	63.10	18.85	Small Bird	Facility	2018
Site	Uniform	64.74	20.49	Small Bird	Facility	2018
1	Uniform	66.20	21.94	Small Bird	Facility	2018
1	Exponential	66.67	22.41	Small Bird	Facility	2018
1	Half-normal	88.03	43.77	Small Bird	Facility	2018
Site	Half-normal	20.56	0.00	Large Bird	Facility	2018
Site	Exponential	22.10	1.54	Large Bird	Facility	2018
Site	Uniform	26.82	6.26	Large Bird	Facility	2018
Site	Hazard	31.65	11.09	Large Bird	Facility	2018
1	Uniform	32.25	11.69	Large Bird	Facility	2018
1	Hazard	34.52	13.97	Large Bird	Facility	2018
1	Exponential	35.35	14.79	Large Bird	Facility	2018
1	Half-normal	44.57	24.01	Large Bird	Facility	2018
1	Hazard	82.29	0.00	Small Bird	Reference	2018
1	Exponential	84.34	2.04	Small Bird	Reference	2018
1	Uniform	85.66	3.36	Small Bird	Reference	2018
Site	Exponential	86.28	3.98	Small Bird	Reference	2018
Site	Uniform	86.70	4.41	Small Bird	Reference	2018
Site	Hazard	89.07	6.77	Small Bird	Reference	2018
Site	Half-normal	107.94	25.65	Small Bird	Reference	2018
1	Half-normal	111.07	28.78	Small Bird	Reference	2018
1	Half-normal	31.17	0.00	Large Bird	Reference	2018
Site	Half-normal	34.73	3.56	Large Bird	Reference	2018
1	Exponential	35.91	4.73	Large Bird	Reference	2018
Site	Exponential	38.56	7.38	Large Bird	Reference	2018
1	Uniform	46.05	14.88	Large Bird	Reference	2018
Site	Uniform	46.70	15.52	Large Bird	Reference	2018
1	Hazard	48.45	17.27	Large Bird	Reference	2018
Site	Hazard	55.53	24.36	Large Bird	Reference	2018
Site	Uniform	71.80	0.00	Small Bird	Facility	2019
1	Uniform	75.22	3.42	Small Bird	Facility	2019

Site	Hazard	77.22	5.42	Small Bird	Facility	2019
1	Hazard	77.29	5.49	Small Bird	Facility	2019
Site	Exponential	77.78	5.98	Small Bird	Facility	2019
1	Exponential	82.24	10.44	Small Bird	Facility	2019
Site	Half-normal	95.07	23.27	Small Bird	Facility	2019
1	Half-normal	101.50	29.70	Small Bird	Facility	2019
1	Half-normal	22.15	0.00	Large Bird	Facility	2019
1	Exponential	22.92	0.77	Large Bird	Facility	2019
Site	Half-normal	24.20	2.06	Large Bird	Facility	2019
Site	Exponential	25.05	2.90	Large Bird	Facility	2019
1	Uniform	25.79	3.64	Large Bird	Facility	2019
Site	Uniform	27.93	5.78	Large Bird	Facility	2019
1	Hazard	28.33	6.18	Large Bird	Facility	2019
Site	Hazard	33.97	11.82	Large Bird	Facility	2019
Site	Exponential	63.44	0.00	Small Bird	Reference	2019
1	Exponential	68.56	5.13	Small Bird	Reference	2019
Site	Hazard	69.35	5.92	Small Bird	Reference	2019
1	Hazard	69.77	6.34	Small Bird	Reference	2019
Site	Uniform	74.04	10.60	Small Bird	Reference	2019
Site	Half-normal	74.54	11.10	Small Bird	Reference	2019
1	Uniform	76.17	12.73	Small Bird	Reference	2019
1	Half-normal	86.52	23.09	Small Bird	Reference	2019
Site	Exponential	61.20	0.00	Large Bird	Reference	2019
Site	Half-normal	65.01	3.82	Large Bird	Reference	2019
1	Exponential	68.15	6.95	Large Bird	Reference	2019
1	Hazard	70.25	9.06	Large Bird	Reference	2019
Site	Uniform	70.58	9.39	Large Bird	Reference	2019
Site	Hazard	70.71	9.51	Large Bird	Reference	2019
1	Uniform	74.18	12.98	Large Bird	Reference	2019
1	Half-normal	76.69	15.50	Large Bird	Reference	2019