Supplemental Information

Terrestrial Scavenging of Marine Mammals: Cross-ecosystem Contaminant Transfer and Potential Risks to Endangered California Condors (*Gymnogyps californianus*)

Methods

Tissue sample collection and processing

California condor (*Gymnogyps californianus*) samples (Table S1) were collected opportunistically by biologists associated with the California Condor Recovery Program during routine health monitoring from 2009 – 2012. Blood was collected into Vacutainers with heparin or EDTA and maintained at ~4°C. Whole blood from Vacutainers with heparin was centrifuged within 24 hours of collection and plasma (~2 mLs) was collected with kilned glass pipettes and placed in kilned amber glass vials for analysis of organochlorines and PBDEs. Plasma samples were stored frozen at -20°C until processed for contaminant analysis. Subsamples of whole blood from Vacutainers with EDTA were transferred into cryovials and frozen at -20°C until processed for stable isotope (~0.1 - 0.2 mL) and mercury (~0.5 - 1.0 mL) analysis. Blubber (n = 17, Table S2) and muscle (n = 5, Table S3) samples from dead-stranded marine mammals were collected along the central coast in Monterey County, California through the Moss Landing Marine Laboratories Stranding Network from 2008 through 2012 (Figure S1). Twelve muscle samples from dead-stranded marine mammals collected along the northern California coast through the California Marine Mammal Stranding Network from 2009 through 2012 were received from C. West of the Yurok Tribe Wildlife Program (Table S3). Blubber and muscle samples from marine and terrestrial mammals (potential condor diet items) that were collected for contaminant and stable isotope analyses (Table S3), respectively, were wrapped in aluminum foil, placed in plastic Ziploc bags, and stored at -20°C until processed for analysis.

Contaminant analysis

Marine mammal blubber (n = 17 organochlorines, n = 7 PBDEs) and condor plasma samples (n = 33 organochlorines, n = 13 PBDEs) were shipped frozen to the California Department of Fish and Wildlife Water Pollution Control Laboratory (WPCL) for analysis. Twenty-six chlorinated pesticides, including the seven metabolites of DDT, as well as 54 PCB and 27 PBDE congeners were evaluated (Table S4). Analytical quality controls (method blank, laboratory control sample, and/or certified reference material) were included with every batch processed. Each batch was comprised of no more than 20 field samples of similar matrix processed together using the same method, processes, reagents and instruments. WPCL added surrogate compounds prior to processing to provide evidence that the compounds of interest were recovered in accordance with method expectations. Values were not corrected for surrogate recoveries. The WPCL is certified/registered as a State environmental testing laboratory pursuant to the provisions of the California Environmental Laboratory Improvement Act of 1988 (Health and Safety Code, Div 1, Part 2, Chapter 7.5, Section 1010). See also https://www.wildlife.ca.gov/OSPR/Science/Laboratories/Chemistry/Quality-Assurance.

Whole blood from condors was analyzed for total mercury concentrations by Eurofins Frontier Global Sciences, Inc., Bothell, Washington. Samples were prepared and analyzed by the EPA Method 1631 on a Tekran 2600 Flow Injection Mercury System (FIMS). Standard Reference Material (DORM-4, fish protein) and laboratory biological control total mercury spike recoveries were between 98 and 107% (n = 4). Matrix (condor blood) total mercury spike recoveries were between 89 and 122% (n = 10). A subset of samples (n = 5) were analyzed for methylmercury in addition to total mercury via the EPA Method 1630 following methanolic potassium hydroxide extraction. Matrix (condor blood) methylmercury spike recoveries were between 93 and 99% (n = 2).

Stable carbon and nitrogen isotope analysis

Approximately 0.7 mg of each tissue was sealed into 5 x 9 mm tin capsules. Samples were analyzed for their $\delta^{13}C$ and $\delta^{15}N$ values using a Carlo Erba CE1108 elemental analyzer interfaced via a CONFLO III device to a Thermo-Electron Delta Plus XP mass spectrometer at the Stable Isotope Laboratory at the University of California Santa Cruz Department of Earth and Marine Sciences. We calculated the average precision for these data as the SD of the $\delta^{13}C$ and $\delta^{15}N$ values from a set of standards (acetanilide from A. Schimmelmann, Indiana University[1]) and precision was 0.05‰ for nitrogen and 0.06‰ for carbon.

Data analysis and simulations

Only quantifiable compounds were used for determining sum chlorinated pesticides, sum PCBs, or sum PBDEs. In statistical analyses, for *p,p'*-DDE, half the detection limit was used for samples that were below the detection limit (ND) and half the limit of quantification was used for samples that were detectable but not quantifiable (DNQ) (Table S9). If all compounds within a group were below the limit of quantification, half the detection limit or limit of quantification from one compound was used as follows: *p,p'*-DDE was used for sum chlorinated pesticides, PCB 153 was used for sum PCBs, and PBDE-47 was used for sum PBDEs (Table S9). Half the detection limit was not used to replace individual compounds within a group if at least one analyte was above the limit of quantification; for example, if a condor had one PCB congener value above the limit of quantification, that detectable PCB value was used as sum PCBs, but if a condor had no PCB values above the limit of quantification, half the detection limit for PCB 153 was used for sum PCBs. In summary results reported graphically or in tabular format compounds below the limit of quantification were considered zero.

We predicted the proportion of the central California (coastal) flock of condors to have exceeded two thresholds for DDE exposure through 2013 (see Figure 5). Thresholds used were

plasma DDE concentrations of 600 ng/g, and 1900 ng/g. When applying a conversion factor developed for other raptors[2], these thresholds are approximately equal to wet weight egg concentrations of 5000 ng/g and 15000 ng/g, respectively. Bald eagles reportedly exhibited 10% eggshell thinning at egg DDE concentrations of 5000 ng/g wet weight, whereas bald eagles with DDE concentrations above 15000 ng/g wet weight approached 100% reproductive failure[3]. Our lower threshold of 5000 ng/g also corresponds to a level associated with 20% eggshell thinning (using a linear extrapolation) in California condors[4] and thus we feel these thresholds are reasonable to assess the potential for DDE-associated eggshell thinning in coastal condors. We simulated DDE for all individuals in the central California flock, including for chicks and potential breeders (≥5 years old) based on their lifetime observed marine mammal feeding (Eqn. 1, Fig. 5, Table S10), incorporating unexplained variance due to residual standard error. We ran replicate trajectories (n = 1000) of DDE accumulation through time and show median ± 90 percentiles. These simulations are important for predicting flock-wide exposures because sampled individuals were not selected randomly with respect to traits that influence DDE.

Supplemental Information: Tables and Figures

Table S1. List of condor samples collected for stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope analysis, total mercury, organochlorines (chlorinated pesticides and PCBs), and PBDEs.

Condor ID	Flock	date	$\delta^{13}C/\delta^{15}N$	mercury	organochlorines	PBDEs
112	coastal	4/12/2009	X	X	X	
168	coastal	5/27/2011	X	X		
168	coastal	5/16/2013	X	X		
171	coastal	6/21/2010	X	X		
190	coastal	7/10/2009	X	X		
194	coastal	7/5/2010	X	X		
199	coastal	1/28/2009	X	X		
199	coastal	5/17/2012	X	X	X	
204	coastal	6/1/2011	X	X		
204	coastal	5/17/2012	X	X	X	
208	coastal	5/27/2011	X	X		
209	coastal	1/30/2009	X	X		
209	coastal	5/27/2011	X	X		
219	coastal	5/28/2010	X	X		
219	coastal	5/12/2011	X	X		
219	coastal	5/17/2012	X	X	X	
219	coastal	6/6/2013	X	X		
222	coastal	5/27/2011	X	X		
231	coastal	9/13/2009	X			
231	coastal	9/25/2012	X	X		
236	coastal	6/5/2013	X	X		
294	coastal	5/24/2011	X	X	X	X
298	coastal	5/24/2011	X	X	X	X
303	coastal	5/19/2008	X	X		
303	coastal	9/8/2009	X	X		
306	coastal	7/2/2007	X	X		
306	coastal	10/8/2010	X	X		
306	coastal	9/25/2012	X			

Condor ID	flock	date	carbon and nitrogen	mercury	organochlorines	PBDEs
307	coastal	12/14/2006	X	X		
310	coastal	5/27/2009	X	X		
310	coastal	6/6/2013	X	X		
311	coastal	6/1/2011	X	X		
312	coastal	7/3/2006	X	X		
312	coastal	3/25/2010	X	X		
312	coastal	6/10/2011	X			
313	coastal	10/21/2011	X	X		
317	coastal	5/12/2011	X	X	X	
317	coastal	5/9/2013	X			
318	coastal	4/12/2009	X	X	X	X
330	coastal	4/12/2009	X	X	X	X
332	coastal	10/26/2011	X	X		
335	coastal	8/2/2007	X	X		
335	coastal	5/24/2011	X	X	X	X
340	coastal	4/12/2009	X	X	X	X
340	coastal	5/8/2013	X			
345	coastal	5/24/2011	X	X	X	X
351	coastal	7/6/2008	X	X		
351	coastal	9/14/2010	X			
351	coastal	5/24/2011	X	X	X	
351	coastal	11/14/2012	X	X		
375	coastal	12/5/2012	X	X		
400	coastal	5/27/2011	X	X		
401	coastal	5/11/2010	X	X	X	X
411	coastal	5/11/2010	X	X	X	
421	coastal	4/12/2009	X	X	X	
431	coastal	5/11/2010	X	X	X	
438	coastal	4/29/2011	X	X		
451	coastal	5/24/2011	X	X	X	
470	coastal	5/11/2010	X	X	X	X
525	coastal	9/18/2012	X		X	

Condor ID	flock	date	carbon and nitrogen	mercury	organochlorines	PBDEs
538	coastal	5/4/2011	X	X	X	X
566	coastal	9/18/2012	X		X	
98	noncoastal	6/22/2011	X	X	X	
161	noncoastal	6/22/2011	X		X	
192	noncoastal	6/26/2010	X	X		
214	noncoastal	6/21/2010	X	X		
216	noncoastal	6/3/2010	X	X		
237	noncoastal	6/21/2010	X	X		
262	noncoastal	6/9/2010	X	X		
289	noncoastal	6/17/2010	X	X		
289	noncoastal	6/22/2011	X		X	
326	noncoastal	6/9/2010	X	X		
365	noncoastal	6/9/2010	X	X		
365	noncoastal	6/22/2011	X		X	X
374	noncoastal	6/22/2011	X		X	X
449	noncoastal	7/3/2010	X	X		
457	noncoastal	6/9/2010	X	X		
507	noncoastal	6/15/2011	X		X	X
513	noncoastal	6/22/2011	X		X	
536	noncoastal	6/22/2011	X		X	
525	prerelease	9/14/2010	X	X	X	
534	prerelease	9/14/2010	X	X	X	
543	prerelease	9/14/2010	X	X	X	

Table S2. Blubber samples from dead-stranded marine mammals were collected in Monterey County, CA through the Moss Landing Marine Laboratories Stranding Network for contaminant analysis from 2008 through 2012.

Common name	Genus, species	n
California sea lion	*Zalophus californianus*	12
Gray whale	*Eschrichtius robustus*	1
Harbor seal	*Phoca vitulina*	1
Humpback whale	*Megaptera novaeangliae*	1
Risso's dolphin	*Grampus griseus*	1
Unidentified cetacean	NA	1

Table S3. Muscle samples from dead marine mammals, wild, nonproffered terrestrial prey, and proffered terrestrial prey were collected for stable isotope analysis from 2008 through 2012.

Common name	Genus, species	n	Location
Marine mammals			
California sea lion	*Zalophus californianus*	11	Central/Northern CA
Harbor seal	*Phoca vitulina*	3	Central/Northern CA
Northern elephant seal	*Mirounga augustirostris*	1	Northern CA
Risso's dolphin	*Grampus griseus*	1	Central CA
Steller sea lion	*Eumatopias jubatus*	1	Northern CA
Wild, nonproffered terrestrial prey			
California ground squirrel	*Otospermophilus beecheyi*	2	Central CA
California mule deer	*Odocoileus hemionus californicus*	5	Central CA
Coyote	*Canis latrans*	1	Central CA
Wild pig	*Sus scrofa*	5	Central CA
Wild rabbit	Sp. unknown	2	Central CA
Wild pig	*Sus scrofa*	1	Southern CA
Wild rabbit	Sp. unknown	2	Southern CA
Proffered terrestrial prey			
Dairy calves		18	Central CA
Holstein cows		8	Central CA
Dairy calves		2	Southern CA

Table S4. List of organochlorine pesticides (OCHs), polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) measured in marine mammal and California condor samples by the California Department of Fish and Wildlife Water Pollution Control Laboratory. Due to instrument changes, PCB 183 was not analyzed on all samples but accounted for <3% of total PCBs reported.

OCHs	PCBs	PCBs, cont.	PBDEs
aldrin	8	128	17
chlordane, cis	18	137	25
chlordane, trans	27	138	28
dacthal	28	141	30
DDD, o,p'	29	146	33
DDD, p,p'	31	149	47
DDE, o,p'	33	128	49
DDE, p,p'	44	151	66
DDMU, p,p'	49	153	85
DDT, o,p'	52	156	99
DDT, p,p'	56	157	100
dieldrin	60	158	138
endosulfan I	64	169	153
endrin	66	170	154
HCH, alpha	70	174	179
HCH, beta	74	177	183
HCH, gamma	77	180	187
heptachlor epoxide	95	187	190
hexachlorobenzene	97	189	200
methoxychlor	99	194	201
mirex	101	195	202
nonachlor, cis	105	198_199	203
nonachlor, trans	110	200	206
oxadiazon	114	201	207
oxychlordane	118	203	208
	126	206	209
		209	

Table S5. The mean stable carbon ($\delta^{13}C$) and nitrogen ($\delta^{15}N$) isotope values (±SD) from whole blood from coastal (central CA) and noncoastal (southern CA) California condors and from muscle tissue from condor diet items.

Source	$\delta^{13}C$ (‰)	$\delta^{15}N$ (‰)	n
Coastal condors	-22.1±1.2	9.9±1.2	65
Noncoastal condors	-23.2±1.2	8.0±0.8	18
Marine mammals	-17.3±0.8	17.1±1.0	17
Wild, terrestrial animals (central CA)	-25.3±1.0	5.3±1.8	15
Wild, terrestrial animals (southern CA)	-23.9±0.9	5.4±1.3	3
Proffered, terrestrial animals (central CA)	-22.8±2.3	7.1±0.9	26
Proffered, terrestrial animals (southern CA)	-22.1±5.3	5.8±0.2	2

Table S6. Diet contribution means (% diet ± SD) calculated by package MixSIAR, a Bayesian stable isotope mixing model (R version 3.0.2, R Core Team, 2013), for individual condors in the coastal, central California flock. Marine mammals refers to dead-stranded marine mammal carcasses, wild terrestrial refers to terrestrial carcasses encountered and eaten in the wild, and proffered terrestrial refers to terrestrial carcasses fed to condors at feeding stations.

Bird	Date blood collected	Marine mammal	Wild terrestrial	Proffered terrestrial
112	4/12/2009	20±13	33±20	48±25
168	5/31/2011	28±12	30±17	42±22
168	5/16/2013	18±10	43±21	39±24
171	6/21/2010	40±13	23±15	36±20
190	7/10/2009	16±8	41±20	43±25
194	7/5/2010	41±8	24±14	35±18
199	1/28/2009	36±7	29±15	35±19
199	5/17/2012	16±8	46±20	38±24
204	5/31/2011	52±7	16±10	32±14
204	5/17/2012	45±7	29±15	26±17
208	5/31/2011	19±8	37±18	44±23
209	1/30/2009	14±9	34±19	52±25
209	5/31/2011	14±9	35±19	51±25
219	5/28/2010	13±8	35±19	52±25
219	5/12/2011	13±8	38±19	49±24
219	5/17/2012	10±6	56±25	34±27
219	6/6/2013	9±6	57±19	34±22
222	5/31/2011	35±7	27±15	38±20
231	9/13/2009	37±7	29±16	34±19
231	9/25/2012	9±6	56±21	35±24
236	6/5/2013	12±9	51±22	37±25
294	5/24/2011	13±8	42±19	45±24
298	5/24/2011	12±8	47±20	41±25
303	5/19/2008	18±10	42±21	40±24
303	9/8/2009	12±9	50±20	38±23
306	7/2/2007	19±11	39±20	42±24
306	10/8/2010	16±10	42±25	42±25
306	9/25/2012	13±10	49±22	38±25
307	12/14/2006	13±11	49±22	38±25
310	5/27/2009	19±13	31±19	50±25
310	6/6/2013	12±10	51±22	37±24
311	5/31/2011	18±12	37±20	45±25
312	7/3/2006	14±11	46±21	40±25
312	3/25/2010	16±11	36±20	48±25
312	6/10/2011	13±10	48±21	39±24
313	10/21/2011	8±6	63±22	29±18
317	5/12/2011	16±13	37±20	47±25

317	5/9/2013	14±9	46±22	40±25
318	4/12/2009	20±15	31±20	49±26
330	4/12/2009	14±10	46±21	39±24
332	10/26/2011	8±8	62±22	30±23
335	8/2/2007	11±10	53±22	36±24
335	5/24/2011	16±11	41±21	43±25
340	4/12/2009	18±13	34±20	48±26
340	5/8/2013	16±11	42±25	42±21
345	5/24/2011	17±14	39±21	44±25
351	7/6/2008	19±8	42±19	39±20
351	9/14/2010	13±10	36±24	51±21
351	5/24/2011	14±11	40±20	46±26
351	11/14/2012	12±10	51±21	37±24
375	12/5/2012	9±8	60±22	31±23
400	5/27/2011	13±11	48±21	38±24
401	5/11/2010	11±8	51±23	38±25
411	5/11/2010	16±12	36±20	48±25
421	4/12/2009	18±16	29±20	53±26
431	5/11/2010	24±18	30±19	46±25
438	4/29/2011	17±12	39±21	44±26
451	5/24/2011	15±11	42±21	43±25
470	5/11/2010	18±11	38±21	44±25
525	9/14/2010	18±13	38±20	45±25
525	9/18/2012	9±9	57±21	34±22
534	9/14/2010	17±12	38±20	45±26
538	5/4/2011	10±9	54±25	35±26
543	9/14/2010	15±13	36±20	49±25
566	9/18/2012	32±12	30±17	38±22

Table S7. DDE (*p,p'*-DDE), sum chlorinated pesticides (OCHs), sum PCBs, sum PBDEs, and total mercury (ng/g wet weight) concentrations for coastal, noncoastal, and prerelease condors. Values reported as average ± SD, range, (*number of samples*). Total mercury was measured in whole blood, while OCHs, PCBs, and PBDEs were measured in plasma. ND = all samples below the limit of quantification, NA = not measured. See also Tables S8, S9.

	DDE	**Sum OCHs**	**Sum PCBs**	**Sum PBDES**	**Total mercury**
Coastal	498 ± 672 ND – 2680 (*22*)	522 ± 702 ND – 2810 (*22*)	122 ± 152 ND – 546 (*22*)	106 ± 104 2.9 - 297 (*10*)	132 ± 200 0.5 - 922 (*54*)
Noncoastal	24 ± 24 ND – 70 (*8*)	24 ± 24 ND – 70 (*8*)	3.1 ± 6.1 ND – 17 (*8*)	ND (*3*)	2.2 ± 0.9 1.2 – 4.1 (*11*)
Prerelease	ND (*3*)	ND (*3*)	ND (*3*)	NA	1.1 ± 0.3 0.9 – 1.5 (*3*)

Table S8. Total mercury concentrations (ng/g wet weight) measured in whole blood samples from coastal, noncoastal and prerelease condors.

Coastal			Coastal		
Condor ID	**Date**	**Total mercury**	**Condor ID**	**Date**	**Total mercury**
112	4/12/2009	0.5	310	5/27/2009	240
168	5/16/2013	53	310	6/6/2013	49
168	5/27/2011	39	311	6/1/2011	41
171	6/21/2010	920	312	7/3/2006	2.0
190	7/10/2009	180	312	3/25/2010	86
194	7/5/2010	670	313	10/21/2011	2.6
199	1/28/2009	510	317	5/12/2011	9.9
199	5/17/2012	140	318	4/12/2009	170
204	5/17/2012	660	330	4/12/2009	360
204	6/1/2011	320	332	10/26/2011	24
208	5/27/2011	54	335	8/2/2007	6.8
209	1/30/09	290	335	5/24/2011	50
209	5/27/2011	3.8	340	4/12/2009	310
219	5/17/2012	14	345	5/24/2011	11
219	6/6/2013	23	351	7/6/2008	200
219	5/28/2010	110	351	5/24/2011	6.8
219	5/12/2011	9.2	351	11/14/2012	3.7
222	5/27/2011	270	375	12/5/2012	2.2
231	9/25/2012	42	400	5/27/2011	3.3
236	6/5/2013	1.3	401	5/11/2010	87
294	5/24/2011	30	411	5/11/2010	1.5
298	5/24/2011	27	421	4/12/2009	1.2
303	5/19/2008	390	431	5/11/2010	11
303	9/8/2009	9.0	438	4/29/2011	30
306	7/2/2007	36	451	5/24/2011	2.5
306	10/8/2010	140	470	5/11/2010	440
307	12/14/2006	13	538	5/4/2011	20
Noncoastal			**Prerelease**		
Condor ID	**Date**	**Total mercury**	**Condor ID**	**Date**	**Total mercury**
98	6/22/2011	1.0	525	9/14/2010	1.5
192	6/26/2010	4.1	534	9/14/2010	0.9
214	6/21/2010	2.2	543	9/14/2010	1.0
216	6/3/2010	1.2			
237	6/21/2010	1.5			
262	6/9/2010	2.8			
289	6/17/2010	2.1			
326	6/9/2010	2.5			
365	6/9/2010	1.9			
449	7/3/2010	2.0			
457	6/9/2010	2.5			

Table S9A. Chlorinated pesticide compounds in California condor plasma samples for central (coastal) and southern (noncoastal) California as well as prerelease birds. Values in parentheses are the method reporting limit for compounds that were nondetectable (ND) or the reporting limit for compounds that were detectable but not quantifiable (DNQ). Values are reported in ng/g plasma wet weight. Compounds measured (Table S4) but below the limit of detection in all samples are not shown.

Central

condor ID	collection date	chlordane, cis	DDD, p,p'	DDE, p,p'	DDMU, p,p'	dieldrin	endosulfan I	HCH, beta	heptachlor epoxide	nonachlor, cis	nonachlor, trans	oxychlordane
112	4/12/2009	ND (3.49)	ND (1.08)	19.2	ND (0.942)	ND (3.77)	ND (4.88)	ND (1.83)	ND (2.15)	ND (2.69)	ND (1.69)	ND (4.13)
199	5/17/2012	DNQ (4.39)	DNQ (4.39)	1010	DNQ (13.2)	8.03	ND (2.46)	11.2	DNQ (4.39)	DNQ (4.39)	29	DNQ (4.39)
204	5/17/2012	DNQ (3.34)	DNQ (3.34)	867	DNQ (10.0)	13.5	ND (1.87)	4.68	DNQ (3.34)	DNQ (3.34)	13.3	DNQ (3.34)
219	5/17/2012	4.45	3.93	2680	22	7.17	ND (2.14)	27.3	7.46	4.95	45.3	7.83
294	5/24/2011	DNQ (1.18)	1.26	1324	11.7	4.46	ND (0.658)	8.68	3.56	DNQ (1.18)	11.1	3.20
298	5/24/2011	DNQ (1.02)	1.98	918	9.02	2.68	ND (0.573)	5.08	2.06	DNQ (0.315)	11.6	1.72
317	5/12/2011	ND (2.96)	DNQ (7.40)	287	DNQ (22.2)	DNQ (3.70)	ND (4.14)	DNQ (7.40)	ND (1.82)	ND (2.28)	7.99	ND (3.51)
318	4/12/2009	DNQ (2.24)	6.14	1518	15.1	6.72	ND (1.25)	13.2	4.04	3.04	27.0	2.98
330	4/12/2009	DNQ (2.75)	3.10	179	DNQ (8.24)	2.48	ND (1.54)	4.90	DNQ (2.75)	ND (0.846)	8.62	ND (1.30)
335	5/24/2011	DNQ (1.18)	3.64	700	8.64	2.68	ND (0.658)	5	1.762	1.346	14.98	1.614
340	4/12/2009	DNQ (2.44)	DNQ (2.44)	169	DNQ (7.31)	2.26	7.58	2.66	DNQ (2.44)	ND (0.750)	6.14	ND (1.15)
345	5/24/2011	DNQ (0.887)	1.04	330	3.90	1.53	2.52	2.38	0.912	DNQ (0.887)	5.60	DNQ (0.887)
351	5/24/2011	ND (1.38)	DNQ (3.45)	436	DNQ (10.3)	3.58	ND (1.93)	6	DNQ (3.45)	ND (1.06)	9.63	ND (1.63)
401	5/11/2010	DNQ (2.67)	DNQ (2.67)	96.0	DNQ (8.00)	2.04	ND (1.49)	DNQ (2.67)	ND (0.656)	ND (0.822)	4.20	ND (1.26)
411	5/11/2010	ND (3.84)	ND (1.19)	DNQ (19.2)	ND (1.04)	ND (4.14)	ND (5.37)	ND (2.01)	ND (2.36)	ND (2.95)	ND (1.86)	ND (4.55)
421	4/12/2009	ND (4.46)	ND (1.38)	ND (5.35)	ND (1.20)	ND (4.82)	ND (6.24)	ND (2.34)	ND (2.74)	ND (3.43)	ND (2.16)	ND (5.29)
431	5/11/2010	ND (3.94)	ND (1.22)	24.2	ND (1.06)	ND (4.25)	ND (5.51)	DNQ (9.85)	ND (2.42)	ND (3.03)	ND (1.91)	ND (4.67)

451	5/24/2011	ND (2.20)	ND (0.681)	ND (2.64)	ND (0.593)	ND (2.37)	ND (3.07)	ND (1.15)	ND (1.35)	ND (1.69)	ND (1.07)	ND (2.60)
470	5/11/2010	DNQ (2.43)	5.60	370	DNQ (7.28)	3.20	ND (1.36)	ND (0.510)	DNQ (2.43)	DNQ (2.43)	14.1	DNQ (2.43)
525	9/18/2012	ND (1.73)	ND (0.535)	DNQ (8.63)	ND (0.466)	ND (1.86)	ND (2.42)	ND (0.906)	ND (1.06)	ND (1.33)	ND (0.837)	ND (2.05)
538	5/4/2011	ND (0.675)	DNQ (1.69)	18.9	DNQ (5.06)	0.980	ND (0.945)	DNQ (1.69)	ND (0.415)	ND (0.520)	DNQ (1.69)	ND (0.800)
566	9/18/2012	ND (1.41)	ND (0.438)	17.2 (1.69)	DNQ (10.6)	ND (1.52)	ND (1.98)	ND (0.741)	ND (0.868)	ND (1.09)	DNQ (3.53)	ND (1.67)

Southern

condor ID	collection date	chlordane, cis	DDD, p,p'	DDE, p,p'	DDMU, p,p'	dieldrin	endosulfan I	HCH, beta	heptachlor epoxide	nonachlor, cis	nonachlor, trans	oxychlordane
98	6/22/2011	ND (3.89)	ND (1.21)	38.3	ND (1.05)	ND (4.21)	ND (5.45)	ND (2.04)	ND (2.39)	ND (3.00)	ND (1.89)	ND (4.61)
161	6/22/2011	ND (3.11)	ND (0.964)	69.7	DNQ (23.3)	ND (3.36)	ND (4.35)	ND (1.63)	ND (1.91)	ND (2.39)	ND (1.51)	ND (3.69)
289	6/22/2011	ND(4.17)	ND (1.29)	31.7	ND (1.12)	ND (4.5)	ND (5.83)	ND (2.19)	ND (2.56)	ND (3.21)	ND (2.02)	ND (4.94)
365	6/22/2011	DNQ (2.36)	DNQ (2.36)	25.8	ND (0.255)	2.08	ND (1.32)	ND (0.495)	ND (0.580)	ND (0.726)	DNQ (2.36)	ND (1.12)
374	6/22/2011	DNQ (2.18)	ND (0.270)	23.6	ND (0.235)	1.52	ND (1.22)	ND (0.457)	ND (0.535)	ND (0.670)	DNQ (2.18)	ND (1.03)
507	6/22/2011	DNQ (2.00)	ND (0.248)	DNQ (3.99)	ND (0.216)	1.18	ND (1.12)	ND (0.419)	ND (0.491)	ND (0.615)	DNQ (2.00)	ND (0.947)
513	6/22/2011	ND (4.11)	ND (1.27)	ND (4.93)	ND (1.11)	ND (4.44)	ND (5.75)	ND (2.16)	ND (2.53)	ND (3.16)	DNQ (10.3)	ND (4.87)
536	6/22/2011	ND (5.4)	ND (1.67)	ND (6.48)	ND (1.46)	ND (5.83)	ND (7.56)	ND (2.83)	ND (3.32)	ND (4.16)	ND (2.62)	ND (6.4)

Prerelease

condor ID	collection date	chlordane, cis	DDD, p,p'	DDE, p,p'	DDMU, p,p'	dieldrin	endosulfan I	HCH, beta	heptachlor epoxide	nonachlor, cis	nonachlor, trans	oxychlordane
525	9/14/2010	ND (2.62)	ND (0.813)	ND (3.15)	ND (0.708)	ND (2.83)	ND (3.67)	ND (1.38)	ND (1.61)	ND (2.02)	ND (1.27)	ND (3.11)
534	9/14/2010	ND (2.10)	ND (0.652)	ND (2.52)	ND (0.568)	ND (2.27)	ND (2.95)	ND (1.10)	ND (1.29)	ND (1.62)	ND (1.02)	ND (2.49)
543	9/14/2010	ND (2.00)	ND (0.621)	ND (2.40)	ND (0.541)	ND (2.16)	ND (2.80)	ND (1.05)	ND (1.23)	ND (1.54)	ND (0.971)	ND (2.37)

Table S9B. PCB congeners in California condor plasma samples for central (coastal) and southern (noncoastal) flocks as well as prerelease birds. Values in parentheses are the method reporting limit for compounds that were nondetectable (ND) or the reporting limit for compounds that were detectable but not quantifiable (DNQ). Values are reported in ng/g plasma wet weight. Compounds measured (Table S4) but below the limit of detection in all samples are not shown. NA = congener was not measured in sample.

Central

condor ID	collection date	49	52	66	74	87	95	99	101	105	110	114	118	128	137	138	141
112	4/12/2009	DNQ (5.23)	DNQ (5.23)	ND (1.74)	ND (1.74)	ND (2.62)	ND (2.62)	DNQ (5.23)	ND (2.62)	DNQ (5.23)	ND (2.62)	ND (1.74)	ND (2.62)	9.07	ND (1.74)	DNQ (5.23)	NA
199	5/17/2012	DNQ (2.64)	3.81	DNQ (2.64)	DNQ (2.64)	5.37	DNQ (3.95)	18.3	16.2	6.16	4.7	ND (0.878)	22.6	7.71	ND (0.878)	16.7	NA
204	5/17/2012	4.26	7.38	4.97	4.6	8.68	5.64	38.9	35	12.2	8.85	ND (0.667)	52.4	13.8	ND (0.667)	33.5	NA
219	5/17/2012	DNQ (2.29)	2.35	DNQ (2.29)	DNQ (2.29)	DNQ (3.43)	DNQ (3.43)	13.2	10.3	4.46	DNQ (3.43)	ND (0.763)	18.9	6.39	13.4	48.2	NA
294	5/24/2011	1.23	2.17	1.93	2.00	2.94	1.26	14.1	11.8	6.46	3.82	NA	23.6	7.41	2.44	40.1	1.12
298	5/24/2011	0.809	1.42	1.41	1.30	2.16	1.23	8.65	7.58	3.98	2.50	NA	15.5	4.53	1.39	24.8	0.712
317	5/12/2011	DNQ (4.44)	DNQ (4.44)	DNQ (4.44)	DNQ (4.44)	DNQ (6.66)	DNQ (6.66)	5.85	DNQ (6.66)	DNQ (4.44)	DNQ (6.66)	ND (1.48)	7.54	DNQ (4.44)	5.73	14.7	NA
318	4/12/2009	1.75	3.09	2.73	2.55	4.09	3.13	15.2	13.6	7.51	5.33	NA	26.2	7.64	2.19	43.0	DNQ (1.34)
330	4/12/2009	DNQ (1.65)	1.84	1.66	DNQ (1.65)	DNQ (2.47)	DNQ (2.47)	4.04	5.01	2.73	3.61	NA	7.95	DNQ (1.65)	ND (0.550)	8.96	ND (0.550)
335	5/24/2011	1.10	1.96	1.76	1.49	2.58	2.41	8.13	9.02	4.24	3.23	NA	14.6	3.84	1.15	22.5	0.870
340	4/12/2009	DNQ (1.46)	1.49	DNQ (1.46)	DNQ (1.46)	DNQ (2.19)	DNQ (2.19)	4.24	4.81	2.52	3.20	NA	7.66	1.80	ND (0.487)	9.37	ND (0.487)
345	5/24/2011	DNQ (0.532)	0.799	0.769	0.636	1.16	0.849	3.59	3.61	1.81	1.50	NA	6.59	1.67	0.533	9.84	DNQ (0.532)
351	5/24/2011	DNQ (2.07)	2.28	DNQ (2.07)	DNQ (2.07)	DNQ (3.10)	DNQ (3.10)	7.97	8.05	3.29	DNQ (3.10)	ND (0.689)	11.3	3.5	ND (0.689)	21	NA
401	5/11/2010	DNQ (1.60)	DNQ (1.60)	DNQ (1.60)	DNQ (1.60)	DNQ (2.40)	DNQ (2.40)	2.40	3.36	DNQ (1.60)	DNQ (2.40)	NA	4.93	DNQ (1.60)	ND (0.534)	4.97	ND (0.534)

411	5/11/2010	DNQ (5.75)	DNQ (5.75)	ND (1.92)	ND (1.92)	ND (2.88)	ND (2.88)	DNQ (5.75)	ND (2.88)	DNQ (5.75)	ND (2.88)	ND (1.92)	ND (2.88)	DNQ (5.75)	ND (1.92)	DNQ (5.75)	NA
421	4/12/2009	DNQ (6.69)	DNQ (6.69)	ND (2.23)	ND (2.23)	ND (3.34)	ND (3.34)	DNQ (6.69)	ND (3.34)	DNQ (6.69)	ND (3.34)	DNQ (6.69)	ND (3.34)	DNQ (6.69)	ND (2.23)	DNQ (6.69)	NA
431	5/11/2010	DNQ (5.91)	DNQ (5.91)	ND (1.97)	ND (1.97)	ND (2.95)	DNQ (8.86)	DNQ (5.91)	ND (2.95)	DNQ (5.91)	ND (2.95)	ND (1.97)	DNQ (8.86)	DNQ (5.91)	ND (1.97)	DNQ (5.91)	NA
451	5/24/2011	DNQ (3.29)	DNQ (3.29)	ND (1.10)	ND (1.10)	ND (1.65)	ND (1.65)	DNQ (3.29)	ND (1.65)	DNQ (3.29)	ND (1.65)	ND (1.10)	ND (1.65)	DNQ (3.29)	ND (1.10)	DNQ (3.29)	NA
470	5/11/2010	DNQ (1.46)	2.28	2.01	1.46	2.70	2.76	7.67	8.19	3.94	3.84	NA	12.7	3.13	DNQ (1.46)	17.5	DNQ (1.46)
525	9/18/2012	DNQ (2.59)	DNQ (2.59)	DNQ (2.59)	ND (0.863)	DNQ (3.88)	DNQ (3.88)	DNQ (2.59)	DNQ (3.88)	DNQ (2.59)	DNQ (3.88)	2.76	DNQ (3.88)	DNQ (2.59)	DNQ (2.59)	2.88	NA
538	5/4/2011	ND (0.338)	DNQ (1.01)	DNQ (1.01)	ND (0.338)	ND (0.506)	DNQ (1.52)	DNQ (1.01)	DNQ (1.52)	DNQ (1.01)	DNQ (1.52)	NA	DNQ (1.52)	ND (0.338)	ND (0.338)	1.08	ND (0.338)
566	9/18/2012	DNQ (2.12)	DNQ (2.12)	ND (0.706)	ND (0.706)	ND (1.06)	DNQ (3.18)	DNQ (2.12)	DNQ (3.18)	DNQ (2.12)	DNQ (3.18)	ND (0.706)	DNQ (3.18)	DNQ (2.12)	ND (0.706)	DNQ (2.12)	NA

Southern

condor ID	collection date	49	52	66	74	87	95	99	101	105	110	114	118	128	137	138	141
98	6/22/2011	DNQ (5.84)	DNQ (5.84)	ND (1.95)	ND (1.95)	ND (2.92)	ND (2.92)	DNQ (5.84)	ND (2.92)	DNQ (5.84)	ND (2.92)	DNQ (5.84)	ND (2.92)	DNQ (5.84)	ND (1.95)	DNQ (5.84)	NA
161	6/22/2011	DNQ (4.67)	DNQ (4.67)	ND (1.56)	ND (1.56)	ND (2.33)	DNQ (7.00)	DNQ (4.67)	DNQ (7.00)	DNQ (4.67)	DNQ (7.00)	ND (1.56)	DNQ (7.00)	DNQ (4.67)	ND (1.56)	5.09	NA
289	6/22/2011	DNQ (6.25)	DNQ (6.25)	ND (2.08)	ND (2.08)	ND (3.13)	ND (3.13)	DNQ (6.25)	ND (3.13)	DNQ (6.25)	DNQ (9.38)	DNQ (6.25)	DNQ (9.38)	DNQ (6.25)	ND (2.08)	DNQ (6.25)	NA
365	6/22/2011	ND (0.472)	DNQ (1.42)	DNQ (1.42)	DNQ (1.42)	DNQ (2.12)	DNQ (2.12)	DNQ (1.42)	DNQ (2.12)	DNQ (1.42)	2.34	NA	2.64	ND (0.472)	ND (0.472)	DNQ (1.42)	ND (0.472)
374	6/22/2011	ND (0.435)	DNQ (1.31)	DNQ (1.31)	ND (0.435)	ND (0.653)	DNQ (1.96)	DNQ (1.31)	DNQ (1.96)	DNQ (1.31)	DNQ (1.96)	NA	DNQ (1.96)	ND (0.435)	ND (0.435)	DNQ (1.31)	ND (0.435)
507	6/22/2011	DNQ (1.20)	1.20	DNQ (1.20)	DNQ (1.20)	DNQ (1.80)	DNQ (1.80)	DNQ (1.20)	DNQ (1.80)	DNQ (1.20)	DNQ (1.80)	NA	DNQ (1.80)	ND (0.399)	ND (0.399)	DNQ (1.20)	ND (0.399)

513	6/22/2011	DNQ (6.17)	DNQ (6.17)	ND (2.06)	ND (2.06)	ND (3.08)	DNQ (9.25)	DNQ (6.17)	ND (3.08)	DNQ (6.17)	DNQ (9.25)	DNQ (6.17)	ND (3.08)	DNQ (6.17)	ND (2.06)	DNQ (6.17)	NA
536	6/22/2011	DNQ (8.10)	DNQ (8.10)	ND (2.70)	ND (2.70)	ND (4.05)	ND (4.05)	DNQ (8.10)	ND (4.05)	DNQ (8.10)	ND (4.05)	ND (2.70)	ND (4.05)	DNQ (8.10)	ND (2.70)	DNQ (8.10)	NA

Prerelease

condor ID	collection date	49	52	66	74	87	95	99	101	105	110	114	118	128	137	138	141
525	9/14/2010	DNQ (3.93)	DNQ (3.93)	ND (1.31)	ND (1.31)	ND (1.97)	ND (1.97)	DNQ (3.93)	ND (1.97)	DNQ (3.93)	DNQ (5.90)	ND (1.31)	ND (1.97)	DNQ (3.93)	ND (1.31)	DNQ (3.93)	NA
534	9/14/2010	DNQ (3.16)	DNQ (3.16)	ND (1.05)	ND (1.05)	ND (1.58)	ND (1.58)	DNQ (3.16)	ND (1.58)	DNQ (3.16)	ND (1.58)	ND (1.05)	ND (1.58)	DNQ (3.16)	ND (1.05)	DNQ (3.16)	NA
543	9/14/2010	DNQ (3.00)	DNQ (3.00)	ND (1.00)	ND (1.00)	ND (1.50)	ND (1.50)	DNQ (3.00)	ND (1.50)	DNQ (3.00)	ND (1.50)	ND (1.00)	ND (1.50)	DNQ (3.00)	ND (1.00)	DNQ (3.00)	NA

Table S9B. PCB congeners continued.

Central

condor ID	146	149	151	153	156	158	170	174	177	180	183	187	194	195	199	201	203	206
112	ND (1.7)	DNQ (5.2)	ND (1.7)	DNQ (5.2)	ND (1.7)	DNQ (5.2)	ND (1.7)	ND (1.7)	ND (1.7)	DNQ (5.2)	NA	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)	NA	ND (1.7)	ND (1.7)
199	6.36	11.1	4.37	91.6	DNQ (2.6)	35.1	8.38	3.23	5.94	29.4	NA	15.8	3.22	DNQ (2.6)	5.16	NA	4.82	DNQ (2.6)
204	11.2	21.1	5.67	70.5	2.3	32.2	17.3	5.23	11.1	68.2	NA	31.7	9.04	2.37	12.9	NA	12.2	2.96
219	5.29	6.23	2.52	190	DNQ (2.3)	ND (0.76)	8.48	DNQ (2.3)	5.24	33.5	NA	13.7	4.64	DNQ (2.3)	5.64	NA	6.87	DNQ (2.3)
294	5.34	6.13	0.969	64.0	NA	2.47	5.47	0.927	2.97	16.2	7.41	13.7	2.72	NA	NA	2.98	2.00	0.874
298	3.29	3.89	1.12	37.4	NA	1.48	3.09	DNQ (0.61)	1.84	9.61	4.37	8.49	1.65	NA	NA	1.87	1.15	DNQ (0.61)
317	DNQ (4.4)	DNQ (4.4)	DNQ (4.4)	20.9	DNQ (4.4)	ND (1.5)	DNQ (4.4)	DNQ (4.4)	DNQ (4.4)	8.03	NA	5.36	ND (1.5)	ND (1.5)	DNQ (4.44)	NA	ND (1.5)	ND (1.5)
318	5.22	7.70	2.65	74.4	NA	2.54	5.70	DNQ (1.3)	3.48	17.7	7.89	14.7	3.05	NA	NA	3.56	2.20	DNQ (1.3)
330	DNQ (1.7)	2.38	DNQ (1.7)	15.7	NA	ND (0.55)	DNQ (1.7)	ND (0.55)	DNQ (1.7)	3.04	DNQ (1.7)	2.63	ND (0.55)	NA	NA	DNQ (1.7)	DNQ (1.7)	ND (0.55)

335	2.87	6.37	1.86	37.3	NA	1.10	2.57	0.848	1.58	7.71	3.56	8.21	1.15	NA	NA	1.43	0.844	DNQ (0.71)
340	DNQ (1.5)	2.21	DNQ (1.5)	17.4	NA	DNQ (1.5)	DNQ (1.5)	ND (0.49)	DNQ (1.5)	3.17	DNQ (1.5)	2.65	ND (0.49)	NA	NA	DNQ (1.5)	DNQ (1.5)	ND (0.49)
345	1.20	1.99	0.537	17.3	NA	0.552	1.19	DNQ (0.53)	0.754	3.95	1.73	3.54	0.733	NA	NA	0.838	DNQ (0.53)	DNQ (0.53)
351	3.16	4.96	DNQ (2.1)	35.7	DNQ (2.1)	ND (0.69)	3.98	DNQ (2.1)	3.18	13	NA	7.36	DNQ (2.1)	ND (0.69)	2.57	NA	2.12	ND (0.69)
401	DNQ (1.6)	DNQ (1.6)	DNQ (1.6)	8.50	NA	ND (0.53)	ND (0.53)	ND (0.53)	ND (0.53)	DNQ (1.6)	DNQ (1.60)	DNQ (1.6)	ND (0.53)	NA	NA	ND (0.53)	ND (0.53)	ND (0.53)
411	DNQ (5.8)	DNQ (5.8)	DNQ (5.8	DNQ (5.8)	DNQ (5.8)	ND (1.9)	DNQ (5.8)	DNQ (5.8)	DNQ (5.8)	ND (1.9)	NA	DNQ (5.8)	ND (1.9)	ND (1.9)	ND (1.9)	NA	ND (1.9)	ND (1.9)
421	DNQ (6.7)	DNQ (6.7)	ND (2.2)	DNQ (6.7)	DNQ (6.7)	DNQ (6.7)	ND (2.2)	ND (2.2)	DNQ (6.7)	ND (2.2)	NA	DNQ (6.7)	ND (2.2)	ND (2.2)	ND (2.2)	NA	ND (2.2)	ND (2.2)
431	DNQ (5.9)	DNQ (5.9)	DNQ (5.9)	DNQ (5.9)	DNQ (5.9)	ND (2.0)	DNQ (5.9)	DNQ (5.9)	DNQ (5.9)	DNQ (5.9)	NA	DNQ (5.91)	ND (2.0)	ND (2.0)	ND (2.0)	NA	ND (2.0)	ND (2.0)
451	DNQ (3.3)	DNQ (3.3)	DNQ (3.3)	DNQ (3.3)	DNQ (3.3)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	NA	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	NA	ND (1.1)	ND (1.1)
470	1.97	4.80	1.77	31.1	NA	DNQ (1.5)	1.88	DNQ (1.5)	DNQ (1.5)	5.76	2.45	5.79	DNQ (1.5)	NA	NA	DNQ (1.5)	DNQ (1.5)	ND (0.49)
525	DNQ (2.6)	DNQ (2.6)	DNQ (2.6)	DNQ (2.6)	DNQ (2.6)	2.64	DNQ (2.6)	DNQ (2.6)	DNQ (2.6)	DNQ (2.6)	NA	DNQ (2.6)	ND (0.86)	ND (0.86)	ND (0.86)	NA	ND (0.86)	ND (0.86)
538	ND (0.34)	DNQ (1.0)	ND (0.34)	1.77	NA	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	DNQ (1.0)	ND (0.34)	ND (0.34)	ND (0.34)	NA	NA	ND (0.34)	ND (0.34)	ND (0.34)
566	DNQ (2.1)	DNQ (2.1)	DNQ (2.1)	DNQ (2.1)	DNQ (2.1)	ND (0.71)	DNQ (2.1)	DNQ (2.1)	DNQ (2.1)	DNQ (2.1)	NA	DNQ (2.1)	ND (0.71)	ND (0.71)	ND (0.71)	NA	ND (0.71)	ND (0.71)

Southern

condor ID	146	149	151	153	156	158	170	174	177	180	183	187	194	195	199	201	203	206
98	DNQ (5.8)	DNQ (5.8)	DNQ (5.8)	DNQ (5.8)	DNQ (5.8)	DNQ (5.8)	DNQ (5.8)	ND (1.9)	ND (1.9)	ND (1.9)	NA	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)	NA	ND (1.9)	ND (1.9)
161	DNQ (4.7)	DNQ (4.7)	DNQ (4.7)	6.81	DNQ (4.7)	ND (1.6)	DNQ (4.7)	DNQ (4.7)	DNQ (4.7)	5.11	NA	DNQ (4.7)	ND (1.6)	ND (1.6)	ND (1.6)	NA	ND (1.6)	ND (1.6)
289	DNQ (6.3)	DNQ (6.3)	ND (2.1)	DNQ (6.3)	DNQ (6.3)	ND (2.1)	DNQ (6.3)	DNQ (6.3)	DNQ (6.3)	DNQ (6.3)	NA	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	NA	ND (2.1)	ND (2.1)
365	ND (0.47)	DNQ (1.4)	ND (0.47)	1.90	NA	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)	NA	NA	ND (0.47)	ND (0.47)	ND (0.47)
374	ND (0.43)	ND (0.43)	ND (0.43)	DNQ (1.3)	NA	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	NA	NA	ND (0.43)	ND (0.43)	ND (0.43)
507	ND (0.4)	ND (0.4)	ND (0.4)	DNQ (1.2)	NA	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	NA	NA	ND (0.4)	ND (0.4)	ND (0.4)
513	DNQ (6.2)	DNQ (6.2)	ND (2.1)	DNQ (6.2)	DNQ (6.2)	DNQ (6.2)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)	NA	DNQ (6.2)	ND (2.1)	ND (2.1)	ND (2.1)	NA	ND (2.1)	ND (2.1)
536	DNQ (8.1)	DNQ (8.1)	DNQ (8.1)	DNQ (8.1)	DNQ (8.1)	DNQ (8.1)	ND (2.7)	ND (2.7)	DNQ (8.1)	ND (2.7)	NA	ND (2.7)	ND (2.7)	ND (2.7)	ND (2.7)	NA	ND (2.7)	ND (2.7)

prerelease

condor ID	146	149	151	153	156	158	170	174	177	180	183	187	194	195	199	201	203	206
525	ND (1.3)	DNQ (3.9)	DNQ (3.9)	DNQ (3.9)	DNQ (3.9)	DNQ (3.9)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	NA	DNQ (3.9)	ND (1.3)	ND (1.3)	ND (1.3)	NA	ND (1.3)	ND (1.3)
534	DNQ (3.2)	DNQ (3.2)	DNQ (3.2)	DNQ (3.2)	DNQ (3.2)	DNQ (3.2)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NA	DNQ (3.2)	ND (1.0)	ND (1.0)	ND (1.0)	NA	ND (1.0)	ND (1.0)
543	DNQ (3.0)	DNQ (3.0)	DNQ (3.0)	DNQ (3.0)	DNQ (3.0)	ND (1.0)	ND (1.0)	ND (1.0)	DNQ (3.0)	ND (1.0)	NA	DNQ (3.0)	ND (1.0)	ND (1.0)	ND (1.0)	NA	ND (1.0)	ND (1.0)

Table S9C. PBDE congeners in California condor plasma samples for central (coastal) and southern (noncoastal) flocks. Values in parentheses are the method reporting limit for compounds that were nondetectable (ND) or the reporting limit for compounds that were detectable but not quantifiable (DNQ). Values are reported in ng/g plasma wet weight. Congeners measured (Table S4) but below the limit of detection in all samples are not shown.

Central

condor ID	collection date	028/33	47	99	100	138	153	154	183
294	5/24/2011	2.05	112	25.0	38.9	4.41	33.8	11.6	58.9
298	5/24/2011	1.46	73.3	23.9	21.2	ND	3.97	4.10	DNQ (4.10)
318	4/12/2009	3.52	138	22.6	38.4	DNQ (3.58)	23.4	10.3	60.8
330	4/12/2009	ND (0.549)	33.2	8.62	7.83	ND (1.10)	ND (1.10)	DNQ (4.40)	ND (2.20)
335	5/24/2011	1.31	46.8	8.51	16.1	ND (0.470)	4.94	3.23	6.86
340	4/12/2009	ND (0.487)	30.7	10.5	6.76	ND (0.975)	DNQ (3.90)	DNQ (3.90)	DNQ (9.75)
345	5/24/2011	0.786	29.3	8.14	9.56	DNQ (1.42)	6.89	ND (0.355)	12.5
401	5/11/2010	ND (0.534)	15.0	DNQ (4.27)	DNQ (4.27)	ND (1.07)	DNQ (4.27)	ND (1.07)	DNQ (10.7)
470	5/11/2010	DNQ (1.94)	56.2	11.2	12.5	ND (0.971)	DNQ (3.88)	DNQ (3.88)	DNQ (9.71)
538	5/4/2011	ND (0.338)	2.95	ND (0.675)	ND (0.675)	ND (0.675)	ND (0.675)	ND (0.675)	ND (1.35)

Southern

condor ID	collection date	028/33	47	99	100	138	153	154	183
365	6/22/2011	ND (0.472)	DNQ (1.89)	DNQ (3.77)	ND (0.943)	ND (0.943)	ND (0.943)	ND (0.943)	ND (1.89)
374	6/22/2011	ND (0.435)	DNQ (1.74)	DNQ (3.48)	ND (0.870)	ND (0.870)	DNQ (3.48)	ND (0.870)	DNQ (8.70)
507	6/22/2011	ND (0.399)	DNQ (1.60)	ND (0.799)	ND (0.799)	ND (0.799)	ND (0.799)	ND (0.799)	ND (1.60)

Table S10: Model selection table showing top 20 models for multiple linear regression predicting plasma DDE levels (lnDDE) in California condors. Predictor and response variables were transformed as needed to maximize linearity and homoscedasticity, and all predictor variables were standardized. Variables considered were the cumulative number of years in which an individual was observed feeding on marine mammals excluding gray whales (lnYrsFedMM), years since the start of the release program (lnYrs), age of bird in years (Age), the number of free flying days (days in which the bird was free to fly and thus not held in flight pens or captivity for health monitoring or treatment) in the 18 months preceding the sample (lnFreeFlyDays), the proportion of free flying days observed feeding at proffered feeding stations in the 18 months preceding the sample (FedProffered), the number of unique carcasses an individual was observed feeding on prior to the sample (lnNumCarcasses), the proportion of free flying days an individual was sighted in the Big Sur coastal area in the 18 months preceding the sample (Coastalness). We also screened additional variables but final model selection only included the best variable within each subgroup evaluated. The additional variables included shorter time scales for all behavioral and marine mammal feeding observations, as well as feeding on all marine mammals including gray whales.

Intercept	lnYrs FedMM	lnYrs	Age	lnFree FlyDays	Fed Proffered	lnNum Carcasses	Coastalness	R^2	*F*	*df*	log likelihood	AICc	Delta AICc	AICc weight
4.765	2.080							0.847	110.3	3	-28.04	63.4	0	0.200
4.765	2.156	-0.248						0.857	57.13	4	-27.23	64.8	1.4	0.099
4.765	1.957		0.217					0.853	55.02	4	-27.58	65.5	2.1	0.070
4.765	2.006			0.165				0.851	54.16	4	-27.73	65.8	2.4	0.060
4.765	2.049				-0.087			0.848	52.91	4	-27.95	66.2	2.83	0.048
4.765	1.947					0.150		0.847	52.76	4	-27.97	66.3	2.89	0.047
4.765	2.084						-0.007	0.847	52.39	4	-28.04	66.4	3.02	0.044
4.765	2.065	-0.303		0.242				0.866	38.8	5	-26.54	66.8	3.41	0.036

4.765	2.030	-0.253	0.225					0.864	38.16	5	-26.70	67.1	3.73	0.031
4.765	2.106	-0.319			-0.202			0.864	37.96	5	-26.75	67.2	3.83	0.029
4.765	1.813	-0.324				0.412		0.863	37.87	5	-26.77	67.3	3.88	0.029
4.765	2.059	-0.338					0.206	0.861	37.23	5	-26.93	67.6	4.2	0.024
4.765	1.844		0.255	0.205				0.859	36.59	5	-27.09	67.9	4.53	0.021
4.765	1.586		0.298			0.365		0.857	36.04	5	-27.24	68.2	4.81	0.018
4.765	1.303	-0.396	0.396			0.756		0.880	31.13	6	-25.34	68.3	4.87	0.018
4.765	1.900		0.240				0.073	0.853	34.92	5	-27.53	68.8	5.41	0.013
4.765	1.945		0.206		-0.053			0.853	34.88	5	-27.55	68.8	5.43	0.013
4.765	1.890	-0.320	0.280	0.290				0.876	30.06	6	-25.68	69	5.55	0.012
4.765	2.052			0.205			-0.105	0.852	34.51	5	-27.64	69	5.63	0.012
4.765	2.080							0.847	110.3	3	-28.04	63.4	0	0.200
4.765	2.156	-0.248						0.857	57.13	4	-27.23	64.8	1.4	0.099
4.765	1.957		0.217					0.853	55.02	4	-27.58	65.5	2.1	0.070
4.765	2.006			0.165				0.851	54.16	4	-27.73	65.8	2.4	0.060

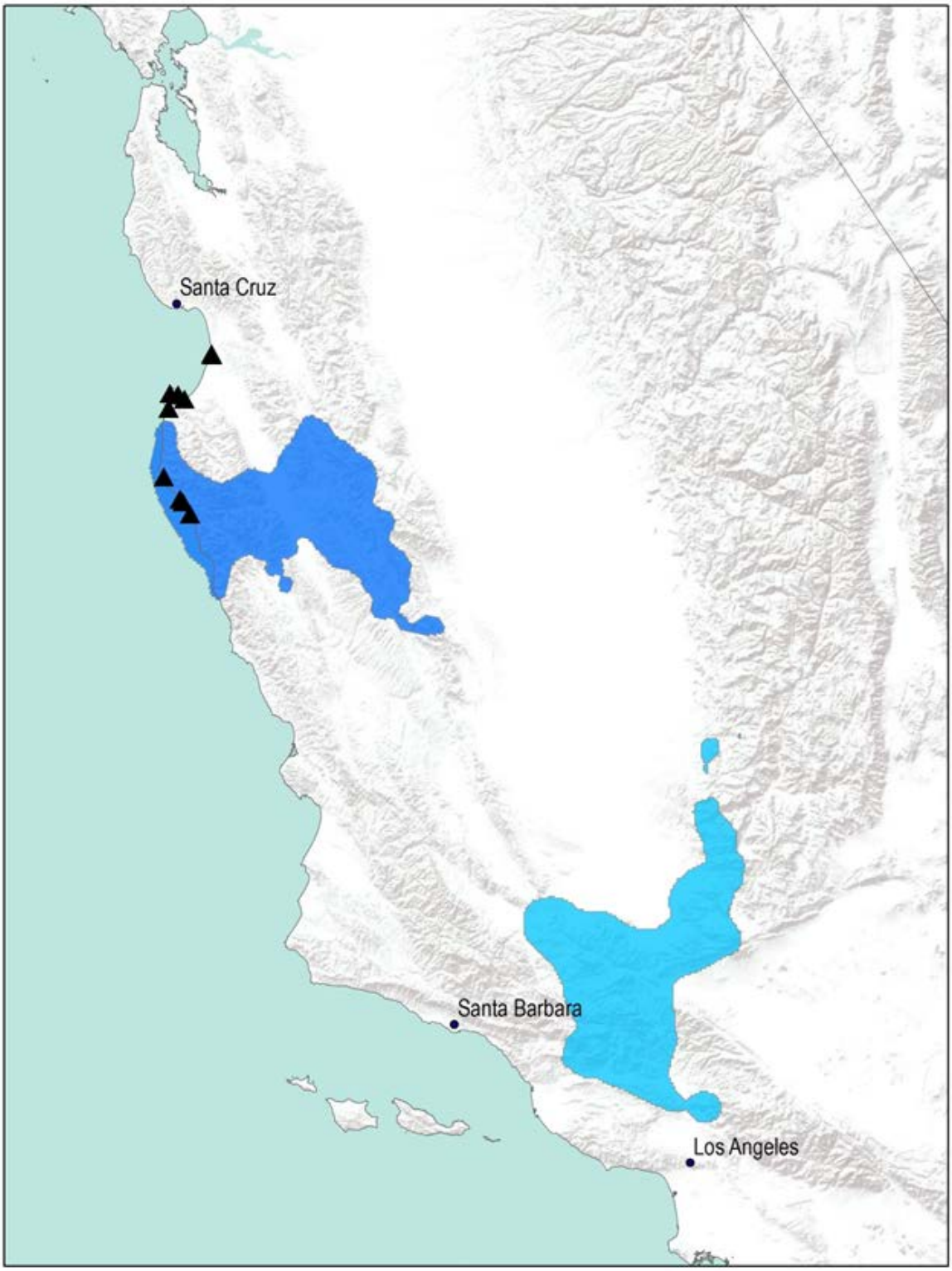

Figure S1. 99% kernel density estimate (KDE) home ranges of central (coastal; dark blue) and southern (noncoastal; light blue) California condor flocks from GPS data from 2009 through 2013. Black triangles represent stranded marine mammal sample collection locations within Monterey County from 2008 through 2012.

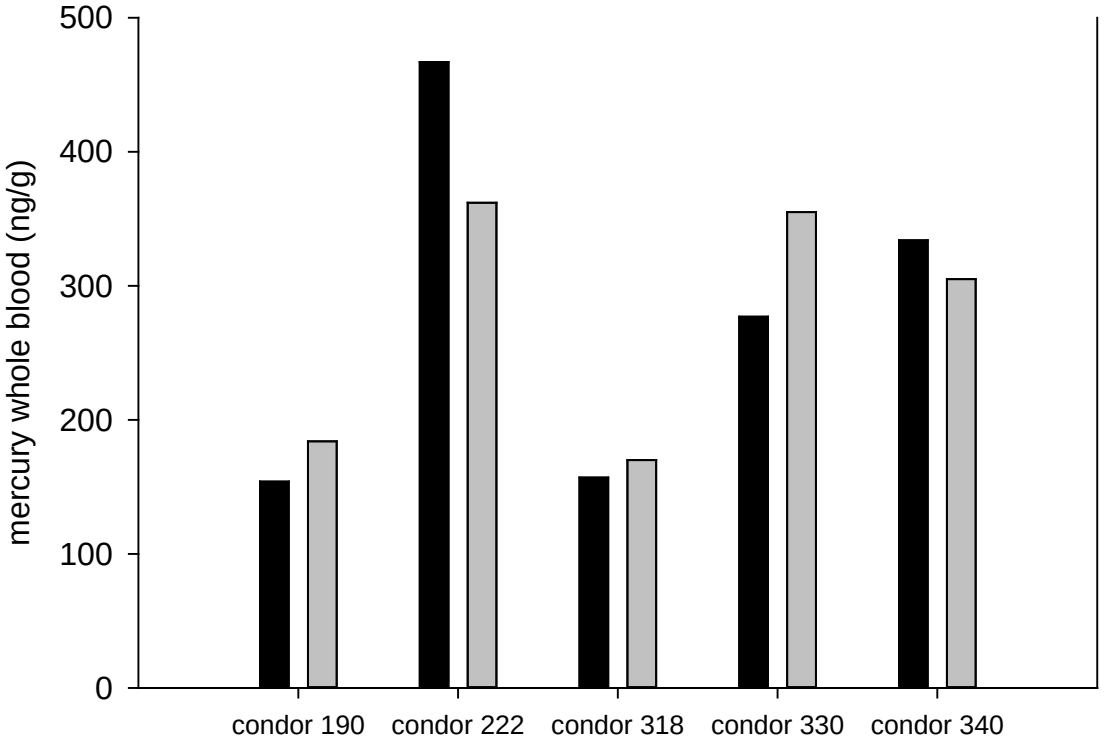

Figure S2. Comparison between methylmercury (black bars) and total mercury (gray bars) measured in five condor whole blood samples illustrating that methylmercury comprised the vast majority of total mercury measured in condor blood (average % = 99% ± 21SD), which is expected if condors accumulate mercury from feeding on dead-stranded marine mammals.

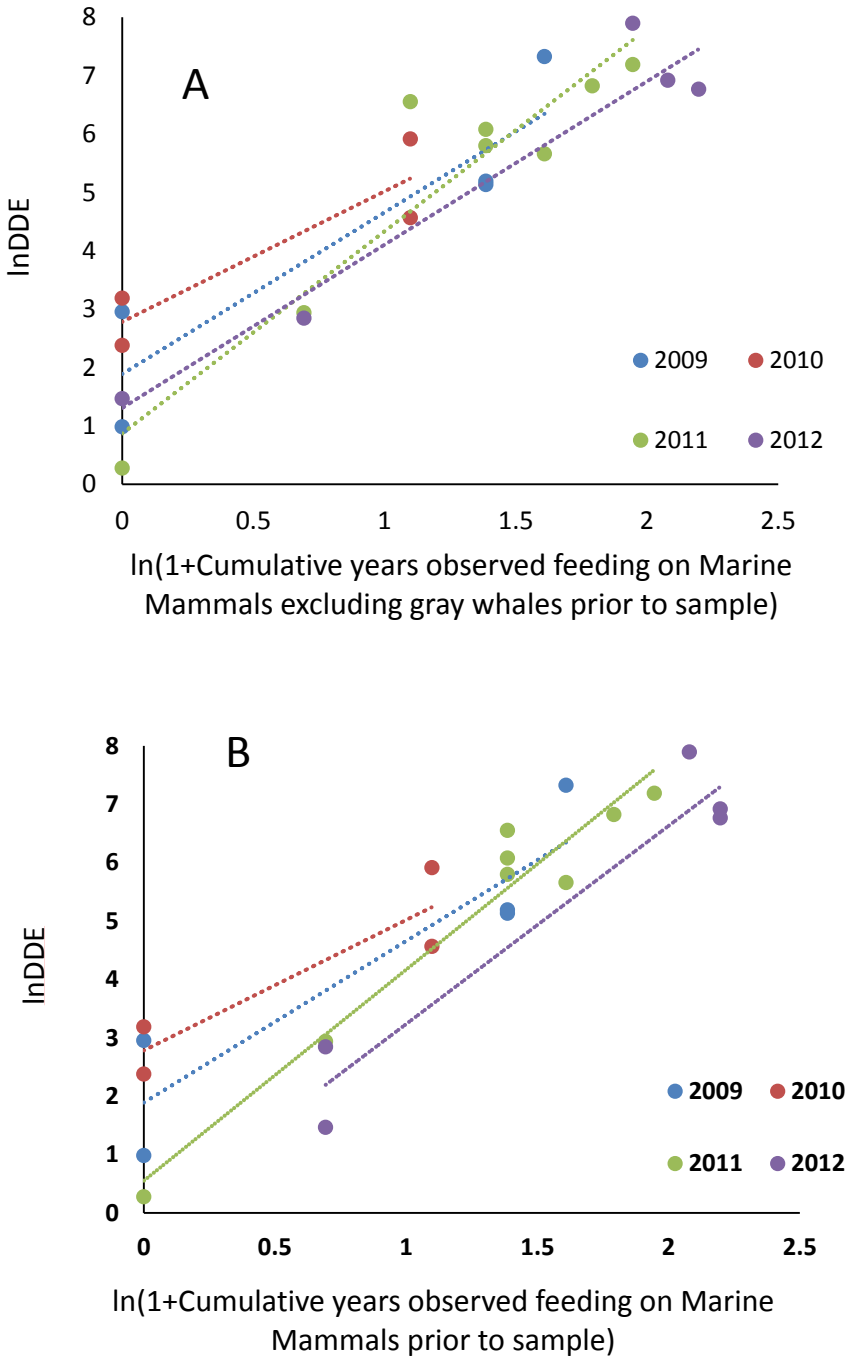

Figure S3. The linear relationship between lnDDE and either A) cumulative years observed feeding on marine mammals or B) cumulative years observed feeding on marine mammals excluding gray whales was similar with R^2 values of 0.813 versus 0.893 respectively. Likewise, similar patterns held across all years of the study.

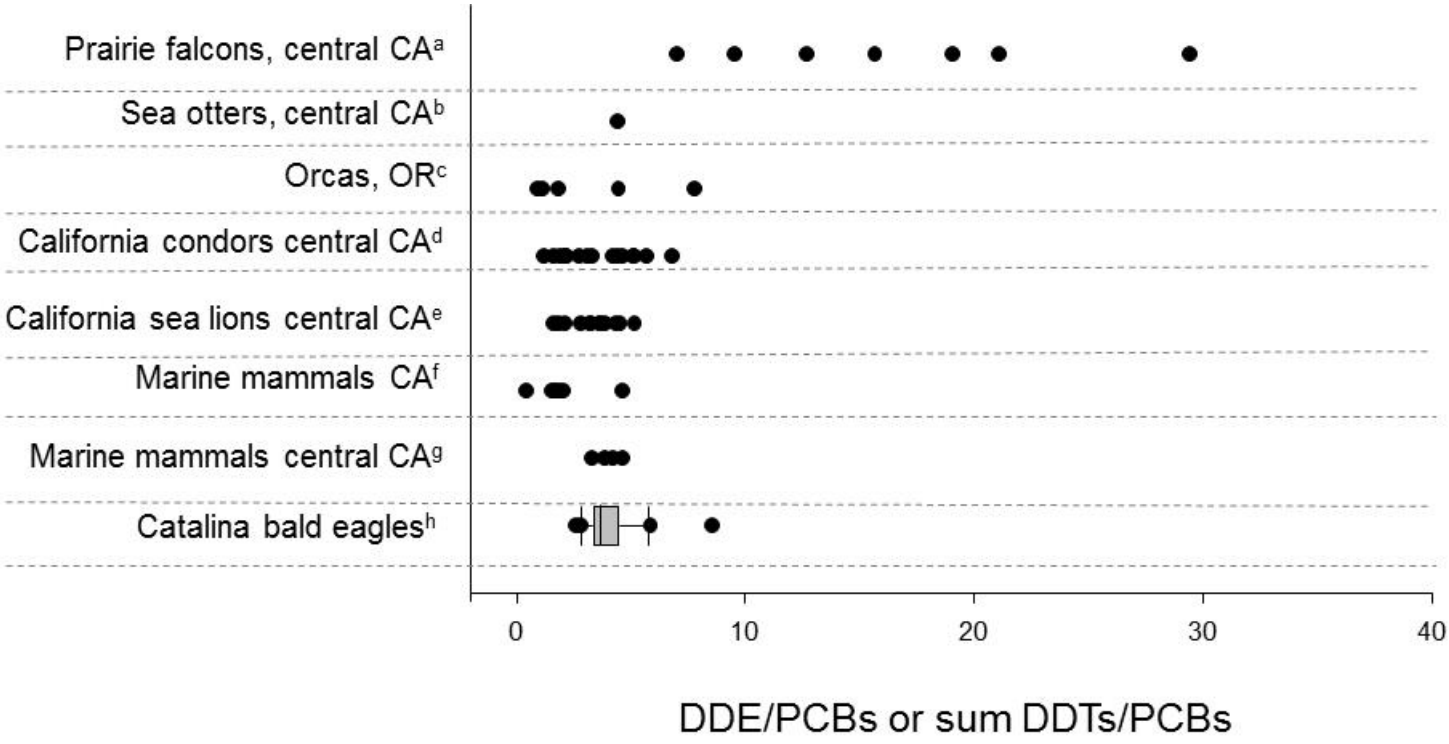

Figure S4. Comparison of DDE or sum DDTs to PCBs from multiple studies do not support the use of the DDE to PCBs ratio as diagnostic of environmental contamination as a result of discharge from the Montrose Chemical Corporation in the Southern California Bight but rather suggests that an enriched signature of DDTs to PCBs indicates exposure to elevated sources of DDTs. Figure adapted from[5].

[a]DDE/total PCBs for prairie falcon eggs collected from 1989 through 1991[6]. Note that each data point graphed represents seven locations that reflect between one to six eggs per location. If a location represents >1 egg, average DDE/average PCBs is shown.
[b]Average DDE/average total PCBs for California sea otter liver samples collected in central California (e.g., Elkhorn Slough) from 1988 through 1991[7].
[c]DDE/total PCBs in killer whales stranded along the Oregon coast from 1988 through 1997[8].
[d]Total DDTs/total PCBs in California condor plasma samples from central California collected from 2009 through 2012 for this study. Condor samples with detectable levels of DDTs and PCBs included for comparison of ratio data (n = 16 out of 22 central California condor plasma samples analyzed).
[e]Total DDTs/total PCBs in California sea lion blubber samples collected from sea lions stranded along the central California coast from 2008 through 2012 for this study.
[f]Total DDTs/total PCBs in blubber samples from marine mammals (two northern elephant seals, one sea otter, one humpback whale, one gray whale, and one harbor seal) stranded along the California coast (from Rio Del Mar to Año Nuevo)[9].
[g]Total DDTs/total PCBs in blubber samples from four marine mammals (one harbor seal, one unidentified cetacean, one humpback whale, one Risso's dolphin) collected from animals stranded in central California from 2009 through 2011 for this study.
[h]DDE/total PCBs from bald eagles on Catalina Island from 1989 through 1998, D. K. Garcelon, unpublished data, data shown as box plot.

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