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Appendix 1

Table A1. Disease risk and diet preferences for common vertebrates at Coal Oil Point Reserve.

Taxon	<i>Baylisascaris procyonis</i> exposure outcome	Diet
Rabbits <i>Sylvilagus</i> spp.	Experimental exposure to 100 eggs generated clinical signs and brain lesions; recorded epizootic baylisascariasis in wild populations (Nettles et al. 1975, Jacobson et al. 1976, Evans 2002, Kazacos 2016).	Primarily grasses, will also incorporate stems, leaves, roots and berries from forbs such as thistle, rose, hemlock, clover (Chapman 1974).
Squirrel <i>Spermophilus beecheyi</i>	Dead and moribund squirrels with neural larva migrans frequently collected around raccoon latrines; in experimental infections, other squirrel species develop fatal neurological symptoms (Evans 2002, Kazacos 2016).	Primarily seeds, incorporates herbaceous vegetation (forbs, grasses) in growing season, trace amounts of arthropods (Schitoskey and Woodmansee 1978, Smith et al. 2016).
Mice <i>P. maniculatus</i> , <i>R. megalotis</i>	In <i>P. maniculatus</i> , exposures to 50 and 500 eggs are 83% and 100% fatal, respectively. <i>Reithrodontomys megalotis</i> develop fatal neurological symptoms from exposure to 250 eggs (Tiner 1953, Sheppard 1996, Evans 2002, Kazacos 2016, Sapp et al. 2016).	Primarily seeds, but omnivorous and diet varies with available resources, also includes arthropods, fruits, green vegetation (Jameson 1952, Whitaker 1966, Webster and Jones 1982).
Birds (common ground foraging passerines including sparrows (white	Birds (including passerines) found dead and moribund with neural larva migrans around	Primarily seeds and insects, occasional plant shoots, berries and small fruits. New World

<p>crowned, golden crowned, song), California towhee, California thrasher)</p>	<p>raccoon latrines (Evans 2002); numerous (fatal) baylisascariasis outbreaks in captive birds (Richardson et al. 1980, Reed et al. 1981, Loretto et al. 2008, Diab et al. 2012) and notably poor ability to encapsulate larvae suggests that most birds are highly susceptible to baylisascariasis (Russell 2006, Kazacos 2016).</p>	<p>sparrows (including towhees) are more granivorous, while the California thrasher consumes relatively more arthropods (Kaufman 2001).</p>
<p><i>Rattus</i> spp.</p>	<p>In <i>R. norvegicus</i>, less than 0.04% of larvae migrate to the brain and most remain in the gut wall; 36% of rats asymptomatic despite experimental acute dosage of 3000 (Wirtz 1982); Wild <i>R. rattus</i> with no signs of infection have been trapped with intensities over 10,000 larval worms (Weinstein 2017).</p>	<p>Preferentially consume fruits, nuts and seeds but highly opportunistic (Feng and Himsworth 2014) and also consume green vegetation, roots, arthropods, small vertebrates (Clark 1981, Grant-Hoffman and Barboza 2010, Ruffino et al. 2011).</p>
<p>Raccoon</p>	<p>Usually no clinical sign of infection, however fatal intestinal obstruction is possible for juvenile animals with exceptionally high loads. Egg susceptibility decreases with age, with resistance past 4 months (Kazacos 1983, Stone 1983, Carlson and Nielsen 1984, Kazacos and Boyce 1989, Kazacos 2001, Kazacos 2016).</p>	<p>Omnivorous, varies with resource availability. Plant foods include berries, nuts, seeds; arthropods, particularly crustaceans when available; vertebrate predation infrequent but includes eggs, injured animals, nestlings. Mammals and birds typically less than 5% of diet, but with seasonal and regional variation (Hamilton 1936, Giles 1939, Giles 1940, Hamilton 1940, Stuewer 1943, Baker et al. 1945, Hamilton 1951, Schoonover and Marshall 1951, Llewellyn and Uhler 1952, Johnson 1970, Harman and Stains 1979, Lotze and Anderson 1979, Greenwood 1981, Tyler et al. 2000, Gehrt 2003, Parsons et al. 2012).</p>
<p>Skunk</p>	<p>Definitive host for related <i>B. columnaris</i>, but can also host adult <i>B. procyonis</i> suggesting that susceptibility and</p>	<p>Primarily insectivorous, but opportunistically omnivorous, eats vertebrates (rodents, eggs, nestling birds, carrion),</p>

	pathogenicity are similar to raccoons (Tiner 1949, Sapp et al. 2017).	vertebrate and invertebrate prey represent 80–90% of diet but will eat fruit, grain and garbage (Wade-Smith and Verts 1982, Rosatte and Lariviere 2003).
Bobcat	No infection in experimentally exposed cats, no documented natural infections despite high exposure through predation on infected rodents; felids presumed resistant to both eggs and larval stages (Miyashita 1993, Kazacos 2016).	Almost exclusively carnivorous, prey varies across season and includes lagomorphs, ungulates, rodents, birds and less frequently herpetofauna, fish, insects and eggs. Grass commonly found in gut likely used as a purgative as with domestic cats (Anderson and Lovallo 2003).
Opossum	No infection in opossums experimentally exposed to eggs, and despite frequent latrine contact, no <i>B. procyonis</i> has ever been documented in wild opossums (Alden 1995, Page 1998, Page et al. 1999, Kazacos 2016).	Omnivorous, but primarily insects, vertebrates and carrion, will also eat garbage and plant material including green vegetation, fruits, nuts and grains (McManus 1974, Gardner and Sunquist 2003).
Reptiles (western fence lizard)	<i>Baylisascaris</i> spp. infections are confirmed only from birds and mammals. Although Davis et al. (2016) report a <i>Baylisascaris</i> larva in a snake, ascarid larvae are difficult to differentiate and this identification is suspect without histological sections or sequencing (L. Camp pers comm).	Insects and spiders (Stebbins 2003).

Appendix 2

Camera set-up

For latrine monitoring, a single camera ($n = 225$) was positioned to monitor animal activity at the latrine. For a subset of latrine deployments, a second camera ($n = 116$) was added to monitor animal activity at a matched adjacent site. Latrines were re-located using field notes, site photographs, GPS coordinates, and site maps. Most latrines remained in use for over a year, with many lasting the entire study duration. On average, each active latrine was visited by 0.46 ± 0.65 (SD) raccoons per day, similar to the visitation rates reported in previous studies (Hirsch et al. 2014).

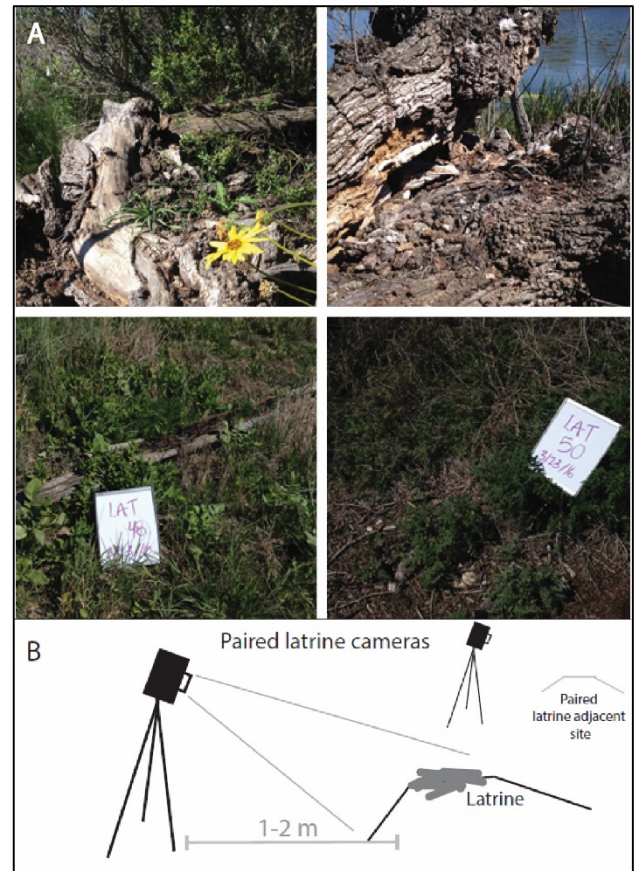


Figure A1. Examples of raccoon latrines at Coal Oil Point Reserve (A) and paired camera set up (B). Photos by S.B. Weinstein.

Image processing

All camera trap images were examined by trained personnel, with each person working together with a more experienced individual until able to identify all species in photographs. All birds were initially coded as 'bird' and then identified to species by C. W. Moura. Any animal captured in the camera frame was considered an observation, however, only animals seen in physical contact with a latrine were classified as 'latrine contacts'. Animals were counted as unique observations if multiple individuals were present, at least 15 min had elapsed since the last observation of that species, or animal features clearly distinguished it from previously observed individuals. Latrine and latrine-adjacent comparisons were based on time spent in each location, using the number of camera triggers as a proxy for time in contact with latrines and matched latrine adjacent sites.

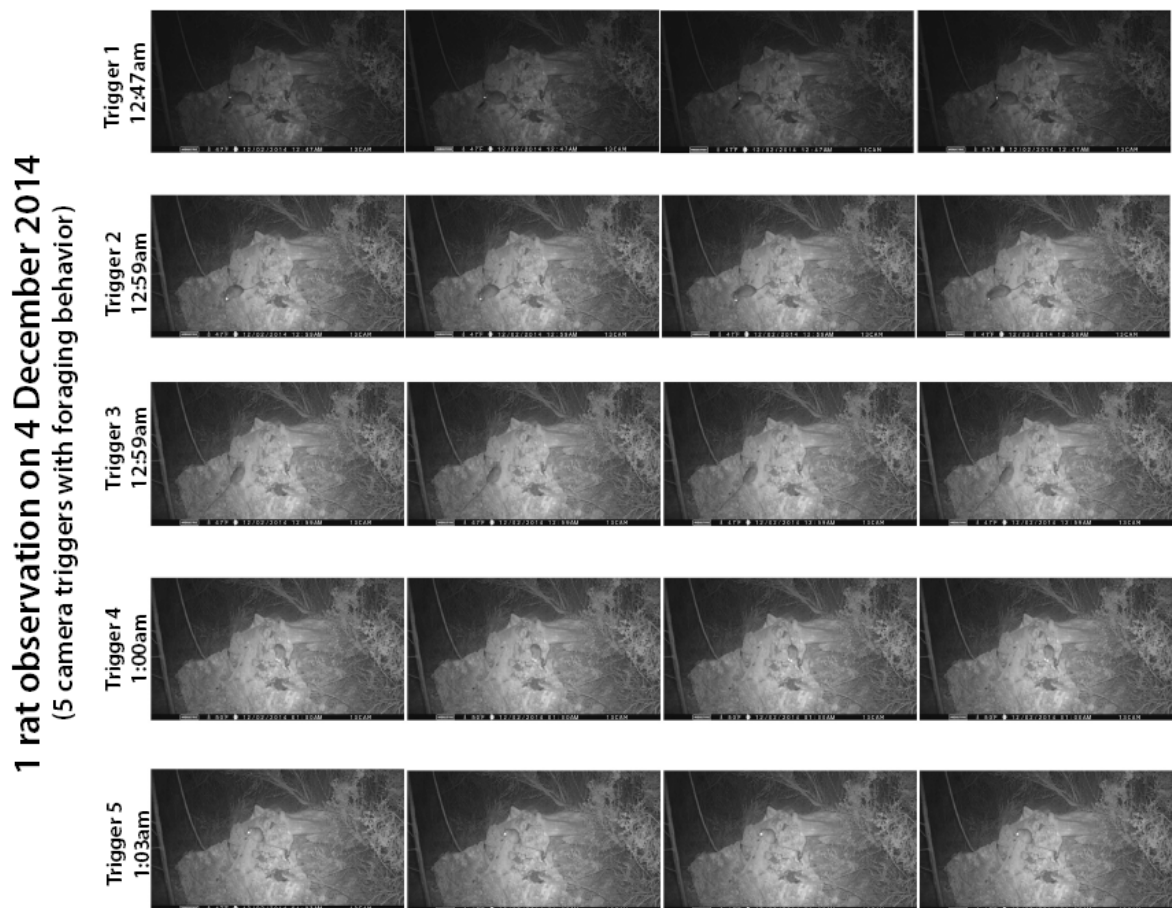


Figure A2. An example of how unique observations and camera triggers were counted, from the latrine pictured in the top right of Figure S1. In this photo sequence from 12:47 to 1:03 am, all images are counted as the same animal observation because time stamps are within 15 min of each other and no features clearly distinguish multiple individuals. Although counted as one observation,

this series contains five camera triggers. Based on the photo sequences, particularly trigger 4 and 5, the animal is also coded as foraging and in contact with the latrine.

Table A2. Counts of observed animal contacts and foraging events at latrines, by species, from 222 latrine camera sets, representing 2058 nights of latrine observations. Animals ‘observed at latrine site’ tabulates unique animal observations where the animal was within 0.5m of visible feces. These unique observations vary in duration, and this relative time at the latrine site is tabulated as ‘camera triggers’. The number of unique observations where the animal was observed in physical contact or foraging in feces are tabulated as ‘Fecal contact’ and ‘Foraging’, respectively.

Animal at latrine	Observations	Camera triggers	Fecal contact	Foraging
Mesopredators				
Raccoon <i>Procyon lotor</i>	960	1596	807	-
Striped skunk <i>Mephitis mephitis</i>	112	131	69	4
Opossum <i>Didelphis virginiana</i>	81	118	63	6
Bobcat <i>Lynx rufus</i>	32	41	19	0
Coyote <i>Canis latrans</i>	1	1	0	-
California sea lion <i>Zalophus californianus</i>	1	3	0	-
Small mammals				
Black rat <i>Rattus rattus</i>	317	492	219	118
Mice <i>P.maniculatus</i> , <i>R.megalotis</i> , <i>M. musculus</i>	91	99	59	16
Brush rabbit <i>Sylvilagus bachmani</i>	82	128	34	8
California ground squirrel <i>Otospermophilus beecheyi</i>	26	32	13	1
Merriam's chipmunk <i>Tamias merriami</i>	5	5	2	0
California vole <i>Microtus californicus</i>	2	2	1	1
Reptiles				
Western fence lizard <i>Scleropus occidentalis</i>	328	1379	153	-
Western skink <i>Plestiodon skiltonianus</i>	13	52	6	-
Snake (either <i>Coluber lateralis</i> or <i>Thamnophis</i> sp.)	2	5	2	-
Southern alligator lizard <i>Elgaria multicarinata</i>	2	2	1	-
Birds				
California towhee <i>Pipilo crissalis</i>	118	132	63	17
Song sparrow <i>Melospiza melodia</i>	54	61	23	4
Golden-crowned sparrow <i>Zonotrichia atricapilla</i>	19	24	12	2
White-crowned sparrow <i>Zonotrichia leucophrys</i>	25	28	9	2
California thrasher <i>Tozostoma redivivum</i>	19	20	8	0
Northern flicker <i>Colaptes auratus</i>	20	34	7	4
Bewick's wren <i>Thryomanes bewickii</i>	12	18	6	2
Hermit thrush <i>Catharus guttatus</i>	11	11	6	2
Mourning dove <i>Zenaida macroura</i>	15	30	5	3
California quail <i>Lophortyx californicus</i>	6	6	4	1
Spotted towhee <i>Pipilo maculatus</i>	8	10	4	2
Nutmeg mannikin <i>Lonchura punctulata</i>	8	10	3	0
American crow <i>Corvus brachyrhynchos</i>	1	1	1	0
Anna's hummingbird <i>Calypte anna</i>	7	8	1	1

House finch <i>Carpodacus mexicanus</i>	7	9	1	1
Killdeer <i>Charadrius vociferus</i>	1	13	1	1
Western bluebird <i>Sialia mexicana</i>	1	1	1	0
Western scrub-jay <i>Aphelocoma californica</i>	2	3	1	0
Yellow-rumped warbler <i>Dendroica coronata</i>	2	2	1	0
Common yellowthroat <i>Geothlypis trichas</i>	2	2	0	-
House wren <i>Troglodytes aedon</i>	2	2	0	-
Acorn woodpecker <i>Melanerpes formicivorus</i>	1	1	0	-
American robin <i>Turdus migratorius</i>	1	1	0	-
Black phoebe <i>Sayornis nigricans</i>	1	1	0	-
Black-headed grosbeak <i>Pheucticus melanocephalus</i>	1	1	0	-
Egret (either <i>Ardea alba</i> or <i>Egretta thula</i>)	1	1	0	-
Hairy woodpecker <i>Leuconotopicus villosus</i>	1	1	0	-
Orange-crowned warbler <i>Oreothlypis celata</i>	1	1	0	-
Western meadowlark <i>Sturnella neglecta</i>	1	1	0	-

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