

## Ecological Niche Modeling Re-examined: A Case Study with the Darwin's Fox

Luis E. Escobar<sup>1</sup>, Huijie Qiao<sup>2\*</sup>, Javier Cabello<sup>3,4</sup>, A. Townsend Peterson<sup>5</sup>

<sup>1</sup>Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia, 24061 USA.

<sup>2</sup>Key Laboratory of Animal Ecology and Conservation Biology, Institute of Zoology, Chinese Academy of Sciences, Beijing, 100101 China.

<sup>3</sup>Centro de Conservación de la Biodiversidad Chiloé-Silvestre, Chiloé Island, Los Lagos, Chile.

<sup>4</sup>Facultad de Medicina Veterinaria, Universidad San Sebastián, Campus Pichi Pelluco, Lago Panguipulli, 1390 Puerto Montt, Chile.

<sup>5</sup>Biodiversity Institute, University of Kansas, Lawrence, Kansas, 66045 USA.

\* Corresponding author: Huijie Qiao, qiaohj@ioz.ac.cn

**Table S1. Darwin's fox (*Pseudalopex fulvipes*) occurrence points.** Occurrences are in geographic coordinates. Data were captured from literature and our ongoing field work in southern Chile in areas including, Río Inio; Caleta Emerenciana, Pirámide, Cerro Mirador, Chaiguaco, and Yaldad in Tantauco Park, Río Chaigua, Chaiguate in Chaiguaco; Rahue; Rancho Grande, Lar, Pescado River Chiloé National Park; Huelde; Cucao; Tulo bridge Ahuenco; Dunas Tongoy; Guaibil-Ahuenco; Sector Palomar-Choroihué; Mechaico-San Antonio; San Antonio.

Longitude	Latitude	Source
-73.75	-43.3333	(Jiménez and McMahon, 2004)
-73.000	-37.750	(Jiménez and McMahon, 2004)
-72.9843	-37.887	(Vasquez-Grandon, 2011)
-72.9995	-37.8309	(Vasquez-Grandon, 2011)
-73.02	-37.826	(Vasquez-Grandon, 2011)
-72.9812	-37.8255	(Vasquez-Grandon, 2011)
-73.012	-37.8248	(Vasquez-Grandon, 2011)
-72.9968	-37.8228	(Vasquez-Grandon, 2011)
-73.0402	-37.8208	(Vasquez-Grandon, 2011)
-72.9633	-37.8167	(Vasquez-Grandon, 2011)
-73.0373	-37.8154	(Vasquez-Grandon, 2011)
-73.1228	-37.8118	(Vasquez-Grandon, 2011)
-73.0198	-37.811	(Vasquez-Grandon, 2011)
-73.0224	-37.8004	(Vasquez-Grandon, 2011)
-73.1514	-37.7765	(Vasquez-Grandon, 2011)
-73.1479	-37.775	(Vasquez-Grandon, 2011)
-72.8573	-37.7704	(Vasquez-Grandon, 2011)

-73.1104	-37.7414	(Vasquez-Grandon, 2011)
-72.9497	-37.7358	(Vasquez-Grandon, 2011)
-72.9141	-37.7254	(Vasquez-Grandon, 2011)
-73.1148	-37.704	(Vasquez-Grandon, 2011)
-73.115	-37.7008	(Vasquez-Grandon, 2011)
-72.9107	-37.6994	(Vasquez-Grandon, 2011)
-73.1732	-37.6978	(Vasquez-Grandon, 2011)
-73.1646	-37.6955	(Vasquez-Grandon, 2011)
-73.1753	-37.6909	(Vasquez-Grandon, 2011)
-73.1762	-37.6872	(Vasquez-Grandon, 2011)
-73.1489	-37.685	(Vasquez-Grandon, 2011)
-73.1742	-37.6828	(Vasquez-Grandon, 2011)
-73.1212	-37.6822	(Vasquez-Grandon, 2011)
-73.1775	-37.6773	(Vasquez-Grandon, 2011)
-73.1254	-37.6693	(Vasquez-Grandon, 2011)
-73.1351	-37.6654	(Vasquez-Grandon, 2011)
-73.1406	-37.662	(Vasquez-Grandon, 2011)
-73.1454	-37.6606	(Vasquez-Grandon, 2011)
-73.151	-37.6604	(Vasquez-Grandon, 2011)
-73.2223	-37.6534	(Vasquez-Grandon, 2011)
-73.2151	-37.6501	(Vasquez-Grandon, 2011)
-73.2081	-37.6496	(Vasquez-Grandon, 2011)
-73.2005	-37.6492	(Vasquez-Grandon, 2011)
-73.1848	-37.6249	(Vasquez-Grandon, 2011)
-73.1953	-37.6231	(Vasquez-Grandon, 2011)
-73.2019	-37.6203	(Vasquez-Grandon, 2011)
-73.203	-37.558	(Vasquez-Grandon, 2011)
-73.4814	-43.1134	(Jiménez et al., 2012)
-73.731	-43.0545	(Jiménez et al., 2012)
-74.1586	-42.8688	(Jiménez et al., 2012)
-74.1474	-42.8324	(Jiménez et al., 2012)
-73.9736	-42.7501	(Jiménez et al., 2012)
-74.1402	-42.7226	(Jiménez et al., 2012)
-74.0092	-42.6458	(Jiménez et al., 2012)
-74.0343	-42.0918	(Jiménez et al., 2012)
-74.0158	-42.0609	(Jiménez et al., 2012)
-73.6017	-41.9973	(Jiménez et al., 2012)
-73.571	-41.8411	(Jiménez et al., 2012)
-73.9577	-42.7477	(González-Acuña et al., 2006)
-74.1222	-42.7094	(González-Acuña et al., 2006)
-73.5036	-42.0117	(González-Acuña et al., 2006)
-73.9578	-42.7478	(Killian and Kristina Killian, 2005)

-74.1222	-42.7094	(Killian and Kristina Killian, 2005)
-73.5036	-42.0118	(Killian and Kristina Killian, 2005)
-73.900	-42.400	(Jimenez et al., 1991)
-72.7333	-37.25	(Jimenez et al., 1991)
-72.8419	-40.8808	(Dieguez, 2014)
-73.5833	-40.0333	(Farias et al., 2014)
-73.4667	-39.9833	(Farias et al., 2014)
-73.3	-39.7	(Farias et al., 2014)
-73.2333	-39.35	(Vilà et al., 2004)
-73.1167	-37.85	(Vilà et al., 2004)
-72.1	-39.1833	(D'Elía et al., 2013)
-74.1167	-43.35	Field Museum ( <a href="http://www.gbif.org">www.gbif.org</a> )
-74.1531	-43.3103	This study
-74.1263	-43.1487	This study
-74.1258	-43.148	This study
-74.285	-43.1479	This study
-74.2811	-43.1478	This study
-74.2917	-43.1473	This study
-74.2769	-43.1473	This study
-74.125	-43.1466	This study
-74.1993	-43.146	This study
-74.1181	-43.145	This study
-74.2659	-43.1448	This study
-74.1177	-43.1447	This study
-74.013	-43.1363	This study
-74.0126	-43.1356	This study
-74.0086	-43.1348	This study
-73.9959	-43.1315	This study
-74.0101	-43.1309	This study
-74.0089	-43.1296	This study
-74.0079	-43.1292	This study
-73.991	-43.1289	This study
-73.9808	-43.1232	This study
-73.9599	-43.1209	This study
-73.9559	-43.1199	This study
-73.9469	-43.1175	This study
-73.9528	-43.1175	This study
-73.9454	-43.1173	This study
-73.9515	-43.1165	This study
-73.9493	-43.1153	This study
-73.795	-43.0183	This study

-73.7851	-43.0177	This study
-73.7895	-43.0176	This study
-73.7891	-43.0171	This study
-73.786	-43.0161	This study
-74.1199	-42.6909	This study
-74.1093	-42.6903	This study
-74.1156	-42.6887	This study
-74.119	-42.6881	This study
-74.0842	-42.5967	This study
-74.0869	-42.5845	This study
-74.0861	-42.5807	This study
-74.085	-42.5797	This study
-74.0794	-42.5797	This study
-74.0798	-42.5778	This study
-74.0732	-42.5697	This study
-74.0774	-42.5624	This study
-74.0732	-42.5555	This study
-74.0688	-42.5491	This study
-74.066	-42.1527	This study
-74.0619	-42.1514	This study
-74.0633	-42.1513	This study
-74.0589	-42.1502	This study
-74.0585	-42.1499	This study
-74.0585	-42.1497	This study
-74.0567	-42.1484	This study
-74.053	-42.1467	This study
-74.0357	-42.1162	This study
-74.0351	-42.1152	This study
-74.0334	-42.1137	This study
-74.0339	-42.1126	This study
-74.0346	-42.112	This study
-74.0397	-42.1114	This study
-74.0355	-42.1108	This study
-74.0453	-42.1079	This study
-74.0462	-42.1075	This study
-74.0465	-42.1071	This study
-74.0469	-42.1067	This study
-74.0508	-42.1066	This study
-74.0474	-42.1065	This study
-74.0477	-42.1063	This study
-74.0509	-42.1063	This study
-74.0544	-42.106	This study
-74.0521	-42.1059	This study

-74.0519	-42.1049	This study
-74.0408	-42.1023	This study
-74.0399	-42.0998	This study
-74.0347	-42.0833	This study
-74.0346	-42.0792	This study
-74.0311	-42.0762	This study
-73.7706	-42.0622	This study
-73.7706	-42.0622	This study
-73.7706	-42.0622	This study
-74.000	-42.000	This study
-73.8283	-41.9583	This study
-73.8283	-41.9583	This study
-73.8283	-41.9583	This study
-73.8283	-41.9583	This study
-73.8283	-41.9583	This study
-73.8283	-41.9583	This study
-73.8283	-41.9583	This study
-72.9695	-37.8262	This study
-73.0342	-37.825	This study

## References

- D'Elía, G., Ortloff, A., Sanchez, P., Guiñez, B., Varas, 2013. A new geographic record of the endangered Darwin's fox *Lycalopex fulvipes* (Carnivora: Canidae): Filling the distributional gap. *Rev. Chil. Hist. Nat.* 86, 485–488. doi:10.4067/S0716-078X2013000400010
- Dieguez, A., 2014. Niños ayudaron a encontrar al esquivo zorro de Darwin. *Las Ultim. Not.* 14.
- Farias, A.A., Sepúlveda, M.A., Silva-rodríguez, E.A., Eguren, A., González, D., Jordán, N.I., Ovando, E., Stowhas, P., Svensson, G.L., 2014. A new population of Darwin's fox (*Lycalopex fulvipes*) in the Valdivian Coastal Range. *Rev. Chil. Hist. Nat.* doi:10.1186/0717-6317-1-3
- González-Acuña, D., Briceño, C., Cicchino, A., Funk, S.M., Jiménez, J., 2006. First records of *Trichodectes canis* (Insecta: Phthiraptera: Trichodectidae) from Darwin's fox, *Pseudalopex fulvipes* (Mammalia: Carnivora: Canidae). *Eur. J. Wildl. Res.* 53, 76–79. doi:10.1007/s10344-006-0066-y
- Jiménez, J., Briceño, C., Alcaíno, H., Funk, S., 2012. Coprologic survey of endoparasites from Darwin's fox (*Pseudalopex fulvipes*) in Chiloé, Chile. *Arch Med Vet* 97, 93–97.
- Jimenez, J.E., Marquet, P.A., Medel, R.G., Jaksic, F.M., 1991. Comparative ecology of Darwin's Fox (*Pseudalopex fulvipes*) in mainland and island settings of southern Chile. *Rev. Chil.* 63, 177–186.
- Jiménez, J.E., McMahon, E., 2004. Darwin's fox *Pseudalopex fulvipes* (Martin, 1837)

Critically Endangered – CR: C2a(ii) (2004), in: Hoffmann, M., Mech, D., Sillero-Zubiri, C. (Eds.), *Canids: Foxes, Wolves, Jackals and Dogs: Status Survey and Conservation Action Plan*. IUCN Canid Specialist Group, Cambridge, pp. 50–55.

Killian, K., Kristina Killian, 2005. Telemetrische Untersuchung zum Einfluss des Menschen auf die Lebensraumnutzung des Darwin-Fuchses (*Pseudalopex fulvipes*, Martin 1837) auf Chiloé, Chile. Universität Hamburg.

Vasquez-Grandon, A., 2011. Conservación del zorro de Darwin en la Cordillera de Nahuelbuta., in: *Preservación y Conservación de la Flora y Fauna de la Cordillera de Nahuelbuta*. Angol, p. 32.

Vilà, C., Leonard, J. A., Iriarte, A., O'Brien, S.J., Johnson, W.E., Wayne, R.K., 2004. Detecting the vanishing populations of the highly endangered Darwin's fox, *Pseudalopex fulvipes*. *Anim. Conserv.* 7, 147–153.  
doi:10.1017/S1367943004001271