Early Holocene glacial retreat isolated river otter populations along the Pacific coast

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Pleistocene climatic oscillations have resulted in high rates of speciation from landscape fragmentation and genetic drift. Lesser known are speciation events related to early Holocene glacial retreats, which caused increases in sea levels, and resulted in genetic isolation of coastal island populations of terrestrial animals, including Kodiak brown bears (*Ursus arctos*).

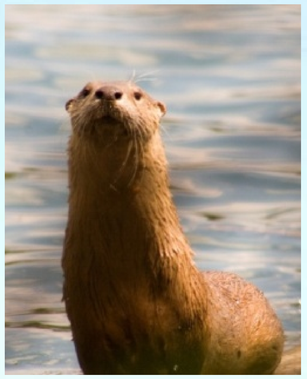


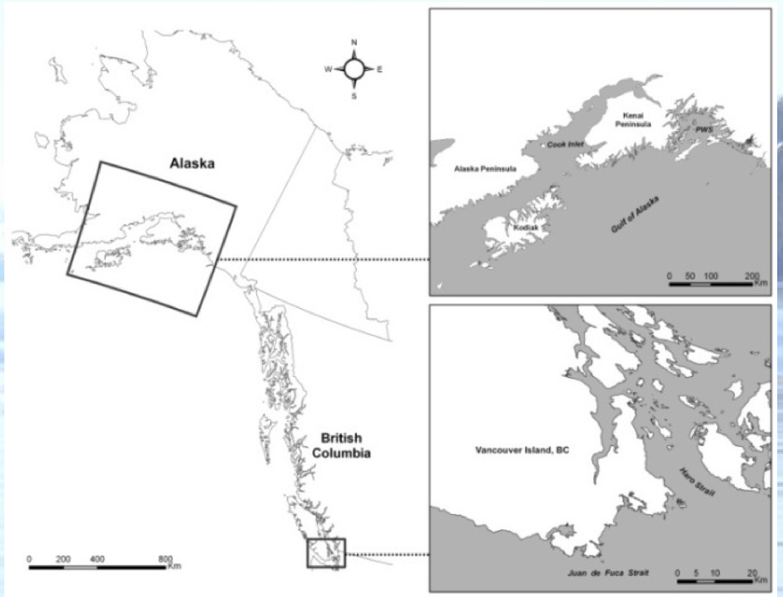
Figure 1 – Location of 5 study areas along the Pacific coast where individual river otters (*n* = 471) were identified via non-invasive genetic sampling of feces. Approximately 2,100 km of shoreline and 727 active latrines in Kenai Fjords National Park, Katmai National Park and Preserve, Lake Clark National Park and Preserve, and Prince William Sound, Alaska, USA, and southern Vancouver Island, British Columbia, Canada, were surveyed between 2004 and 2007.

Receiving population	Source Population				
	KOD	KATM	KEFJ	PWS	BC
KOD		1.155	0.957	1.572	0.725
KATM	1.209		0.761	1.814	0.986
KEFJ	1.306	1.260		1.900	1.378
PWS	1.878	1.656	1.852		1.138
BC	1.201	1.184	0.986	1.726	

Table 1. Migration rates (as calculated by program MIGRATE) suggest low and similar geneflow among all 5 river otter populations.

Because river otters (*Lontra canadensis*) have advanced swimming adaptations, human disturbance along the coasts of the Kodiak Island Archipelago and the Alaska Peninsula is low, and the distance between these two shorelines is shorter than otter dispersal distances, we hypothesized that:

1. Kodiak river otters are genetically connected to their conspecifics on the Alaskan Peninsula.
2. Genetic distances among otter populations along the Pacific coast follow expectations based on an isolation-by-distance model.



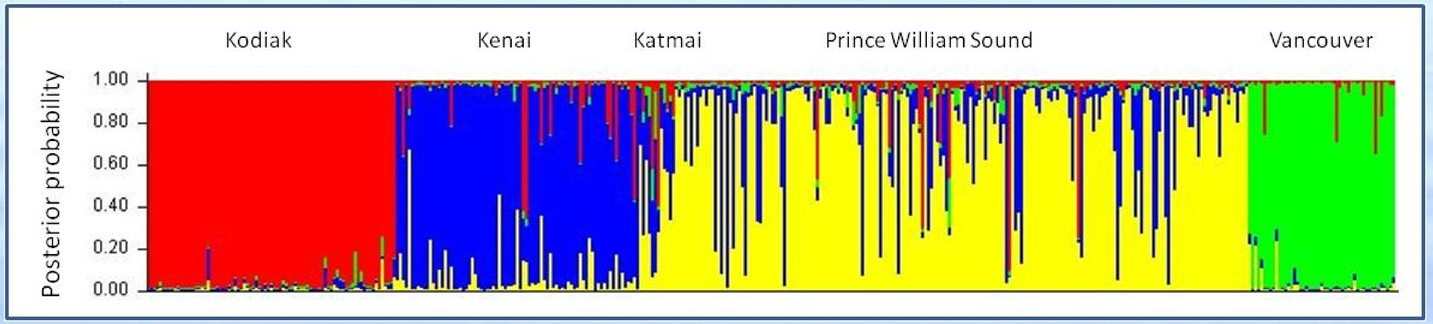


Figure 2 – Posterior probability assignments of river otters to 4 genetic clusters inferred by STRUCTURE for 5 river otter populations sampled along the Pacific coast between 2004 and 2007. No individuals from the Kodiak Island Archipelago or British Columbia were mis-assigned to any other population. Animals from Katmai National Park and Preserve largely clustered with those from Prince William Sound.

Thanks to the multitudes that helped!

Our data suggest that although isolation-by-distance may explain the genetic differentiation between river otters from BC and those from PWS and KEFJ, this model can not explain the isolation of river otters from KOD nor the clustering of animals from KATM with those from PWS. We suggest that despite their advanced swimming adaptations, rising sea levels and resulting strong currents associated with Shelikof straits isolated these otter populations. We hypothesize that river otters from PWS may disperse to the Alaska Peninsula (and vise versa) along the coast of Cook Inlet, making Lake Clark National Park and Preserve an important corridor.

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