**Supplementary Materials**

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**Supplementary Figure 1.** *δ*13C and *δ*15N values measured in a variety of potential modern coyote dietary sources grouped into six isotopically and ecologically relevant dietary categories.

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**Supplementary Figure 2.** *δ*13C and *δ*15N values measured in modern mesopredator scats at Año Nuevo (n = 207) and Younger Lagoon (n = 58).All analyzed samples are shown, including those that were not verified to species (dark gray open symbols). Standard ellipses are depicted separately for Año Nuevo (black solid line) and Younger Lagoon (black dashed line); scats from Año Nuevo occupy a significantly greater isotopic niche than those from Younger Lagoon (SEA.B = 15.8 ‰2, 95% CI: 13.8-18.2 ‰2 and 5.65 ‰2, 95% CI: 4.41-7.5 ‰2, respectively).

**Supplementary Table 1.** Organism and tissue specific discrimination factors applied to modern coyote food source *δ*13C and *δ*15N values. Provided as a tabular file.

**Supplementary Table 2.** C and N isotope data from modern and archaeological coyote food resources. Provided as a tabular file.

**Supplementary Table 3.** C and N isotope data for coyote and coyote competitor (bobcat, gray fox, grizzly bear, mountain lion) samples analyzed. Provided as a tabular data file.

**Supplementary Table 4.** Mixing model results for modern and subfossil coyotes. Provided as a tabular data file.

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| **Supplementary Table 5.** Photographic count statistics for mammalian predators caught by the Año Nuevo and Younger Lagoon camera traps. Values are reported as the relative abundance index: Number of events / [Number of trap nights) x 100]. | | | | | | | |
| **Predator species** | **Nov-12** | **Feb-13** | **May-13** | **Aug-13** | **Sep-13** | **Oct-13** | **Average** |
| **Año Nuevo Inland Camera** |  |  |  |  |  |  |  |
| coyote | 0 | 0 | 0 | 0 | na | na | 0 |
| bobcat | 0.00444 | 0.00438 | 0.01100 | 0.00067 | na | na | 0.00510 |
| gray fox | 0 | 0 | 0 | 0 | na | na | 0 |
| mountain lion | 0 | 0 | 0.00400 | 0 | na | na | 0.00100 |
| **Año Nuevo Coastal Camera** |  |  |  |  |  |  |  |
| coyote | 0.00889 | 0.00714 | 0.06670 | 0.00600 | na | na | 0.00770 |
| bobcat | 0 | 0.00333 | 0.00400 | 0.00200 | na | na | 0.00230 |
| gray fox | 0 | 0 | 0 | 0 | na | na | 0 |
| mountain lion | 0 | 0 | 0 | 0 | na | na | 0 |
| **Younger Lagoon Coastal Camera** |  |  |  |  |  |  |  |
| coyote | na | na | 0 | 0 | 0.00200 | 0.00630 | 0.00210 |
| bobcat | na | na | 0.00250 | 0.00033 | 0.00033 | 0.00037 | 0.00090 |
| gray fox | na | na | 0 | 0 | 0 | 0 | 0 |
| mountain lion | na | na | 0 | 0 | 0 | 0 | 0 |

**Supplementary Table 6.** Scat deposition rates at each site. Provided as a tabular data file.

**Supplementary materials and methods – Site selection**

Modern sites

We selected two sites on the central California coast at which to quantify marine versus terrestrial resource use by modern coyotes, each with access to a slightly different suite of marine resources during different seasons. Año Nuevo State Park and Reserve is located north of Monterey Bay, ~20 miles from Santa Cruz. Año Nuevo is a haul out for California sea lions (*Zalophus californianus*) and home to a breeding colony of northern elephant seals founded in the 1960’s (Le Boeuf and Panken, 1977). The breeding season starts in December when females begin to arrive and give birth. After pups are weaned (~30 days) females mate and return to the sea. Most adults leave by mid-March, though individuals of all ages return later in the year to molt. The scat transect at Año Nuevo follows a gravel road on the coastal side that is restricted to park personnel and researchers needing access to the beach. There is private property directly across Highway 1 from the coastal portion of the park, so the inland portion of the transect requires a short jog up the Highway and then continues up Chalk’s Road, another restricted access gravel road that ultimately connects with Big Basin State Park.

Younger Lagoon Reserve and Moore Creek Preserve are respectively part of the University of California Natural Reserve System and green space belonging to the City of Santa Cruz. Younger Lagoon Reserve is a Y-shaped lagoon on the south side of Highway 1, providing protected habitat for 100 species of resident and migratory birds. Moore Creek Preserve on the north side of Highway 1 has high quality coastal prairie and riparian forest habitat. The scat transect here follows a narrow footpath through Younger Lagoon, breaks for private property, then continues up a restricted access dirt road through Moore Creek Preserve. Parts of Moore Creek are grazed during the winter.

Archaeological and historical sites

CA-SCR-35 is located about 4.8 km south of Davenport, CA in the northernmost reaches of Monterey Bay. Dating to 2970-2870 BP, this is the oldest of our sites. Under the direction of Diane Gifford-Gonzalez, the bulk of the site was analyzed as a practicum in archaeological laboratory techniques by students at UC Santa Cruz. Northern fur seals are present and account for 11% of the number of identifiable specimens (NISP = 19).

CA-MNT-234 is located on a stabilized sand dune very near the junction of Elkhorn Slough and the Monterey Submarine Canyon, at the center of the Monterey Bay shoreline. The primary midden deposit is more than 3 m deep and covers an area of ~16,500 m2 (Gifford-Gonzalez & Sunseri, 2009). Direct Accelerator Mass Spectrometry (AMS) radiocarbon dating of bones from the site combined with the re-analysis of previous radiocarbon dates on single shells suggest that the primary midden deposit represents just a few hundred years between 2700-2300 BP (Newsome et al., 2007). Half of the non-rodent animal bones in the primary midden are northern fur seals (NISP = 2334) (Gifford-Gonzalez, 2011).

CA-MNT-229 is an extensive shell midden (230 cm maximum thickness) on the south bank of Elkhorn Slough near its present outlet to the sea about 1.6 km northeast of MNT-234. It contains faunal and artifactual constituents typical of Central California Coast estuarine shell middens, including an abundance of mussel, clam, and oyster shell fragments as well as vertebrate remains (Jones and Jones, 1992). Radiocarbon dates from shells, charcoal, and collagen suggest primary site occupation dates between 2700-900 BP, as well as an older component that dates from 8200-6000 BP (Jones & Jones, 1992). The Elkhorn Slough site also contains northern fur seal remains, but significantly fewer than CA-MNT-234 (NISP = 114) (Gifford-Gonzalez, 2011).

CA-SLO-239 is a shell midden situated at the site of the Morro Bay Power Plant in central San Luis Obispo County, California. The most abundant identifiable bones come from marine mammals (NISP=39; 78%), with the majority from both California sea lion (NISP=13) and sea otter (*Enhydra lutris*; NISP=13) (Jones et al*.*, 2016). Newly acquired radiocarbon dates from an unmodified gastropod (*Olivella*) shell and three bone collagen samples suggest that there were two periods of occupation; the shell dates from 1885-1685 cal BP during the early Middle Period, while the three bone samples point to a later occupation from ca. 1100-700 cal BP (Jones et al., 2016). With a NISP of five, coyotes are the most prevalent terrestrial mammals in the site.

CA-SMA-18 is located at Point Año Nuevo and dates to 1480-1070 BP (Newsome et al., 2007). The site was on a stabilized sand dune and required a rapid-recovery salvage excavation because elephant seal traffic was causing site erosion. Ten percent of the identifiable bones at SMA-18 are from northern fur seals (NISP = 111), including those of adult males, females, juveniles, and young-of-the-year (Gifford-Gonzalez, 2011). The site represents a relatively short period of occupation, likely less than 200 years (Boone, 2012).

CA-SMA-113 is a more recently occupied site located in Quiroste Valley along the western edge of the Santa Cruz Mountains within Año Nuevo State Park. Northern fur seals make up only ~3% of its identifiable elements (NISP = 11; Gifford-Gonzalez et al., 2013). Their appearance in the SMA-113 fauna at all is of interest, however, because SMA-113 derives from a later period, 940-880 BP, which in part spans the Medieval Climatic Anomaly, a period of transient warm climate, particularly in North America (Gifford-Gonzalez, 2011). Of the two coyote specimens we analyzed from this site, only one had sufficiently well-preserved collagen for isotope analysis.

Finally, CA-SMA-115 is located on the coastal terrace at Montara State Beach on property under the jurisdiction of the California Department of Parks and Recreation. It is both the youngest and northernmost site we considered. Excavation of the site ensued in 1983 after severe El Niño storms washed away some of the terrace and threatened to wash away the site entirely. The site dates to 835-575 BP based on a single calibrated radiocarbon date from a *Mytilus* shell (Hylkema, 1991). At 57.3% of mammalian NISP, sea otters dominate the faunal assemblage (NISP = 55). We were able to sample four coyote specimens.

We obtained historical coyote bone and fur and grizzly bear bone samples from the California Academy of Sciences. We chose specimens from coastal counties that roughly span the period of grizzly bear extirpation in California. The last hunted California grizzly was shot in 1922 in Tulare County, CA and the last recorded California grizzly bear sighting was in 1924 in the southern Sierras (Storer and Tevis, 1996). Of the five grizzly bear specimens we obtained from the California Academy, only one has a known age (CAS 129, collected in 1909); the other specimens have known dates of collection, but were primarily collected opportunistically from building excavations or found on the landscape without additional context after the grizzly extirpation.

**References cited in supplementary text and tables**

Ambrose, SH, Norr, L (1993) Experimental evidence for the relationship of the carbon isotope ratios of whole diet and dietary protein to those of bone collagen and carbonate *in* Prehistoric Human Bone: Archaeology at the Molecular Level. J. B. Lambert and G. Grupe, Eds. Springer-Verlag, Berlin, Germany. Pp. 1-37.

Aurioles, D, Koch, PL, Le Boeuf, BJ (2006) Differences in foraging location of Mexican and California elephant seals: evidence from stable isotopes in pups. Mar. Mamm. Sci. 22(2): 326-338.

Boone, C (2012) Integrating zooarchaelogy and modeling: Trans-Holocene fishing in Monterey Bay, California. University of California, Santa Cruz.

Burton, RK, Koch, PL (1999) Isotopic tracking of foraging and long-distance migration in northeastern Pacific pinnipeds. Oecologia 119(4): 578-585.

Codron, D, Codron, J, Lee-Thorp, JA, Sponheimer, M, De Ruiter, D, Sealy, J *et al.* (2007) Diets of savanna ungulates from stable carbon isotope composition of faeces. Journal of Zoology 273: 21–29.

Dietz, SA, Hildebrandt, WR,Jones, TL (1988) Archaeological investigations at Elkhorn Slough -CA-MNT-229, a Middle Period site on the central California coast. Papers in Northern California Anthropology No. 3. Coyote Press, Salinas, CA.

Gifford-Gonzalez, D (2011) Holocene Monterey Bay Fur Seals: Distribution, Dates, and Ecological Implications. Pp. 221–242 in Human Impacts on Seals, Sea Lions, and Sea Otters: Integrating Archaeology and Ecology in the Northeast Pacific (T. J. Braje & T. C. Rick, eds.). University of California Press.

Gifford-Gonzalez, D, Sunseri, C (2009) An earlier extirpation of fur seals in the Monterey Bay region: Recent findings and social implications. Proceedings of the Society for California Archaeology 21: 89–102.

Gifford-Gonzalez, D, Boone, CM, Reid, REB (2013) The fauna from Quiroste: insights into indigenous foodways, culture, and land modification. California Archaeology 5(2): 291-317.

Hilderbrand, GV, Farley, SD, Robbins, CT, Hanley, TA, Titus, K, Servheen, C (1996) Use of stable isotopes to determine diets of living and extinct bears. Canadian Journal of Zoology 74: 2080–2088.

Hobson, KA, Sease, JL, Merrick, RL, Piatt, JF (1997) Investigating trophic relationships of pinnipeds in Alaska and Washington using stable isotope ratios of nitrogen and carbon. Marine Mammal Science 13(1): 114-132.

Hobson, KA, Schell, DM, Renouf, D, Noseworthy, E (1996) Stable carbon and nitrogen isotopic fractionation between diet and tissues of captive seals: implications for dietary reconstructions involving marine mammals. Canadian Journal of Fisheries and Aquatic Science 53: 528-533.

Hobson, KA, Clark, RG (1992) Assessing avian diets using stable isotopes II: factors influencing diet-tissue fractionation. Condor 94(1): 189-197.

Hylkema, MG (1991) Prehistoric native American adaptations along the central California coast of San Mateo and Santa Cruz counties. San Jose State University, San Jose, CA.

Hylkema, MG, Hildebrandt, WH, Farquhar, J, Gifford-Gonzalez, D, Gobalet. K (editors). (2006) Archaeological investigations at CA-SMA-18: a study of prehistoric adaptations at Año Nuevo State Reserve. Far Western Anthropological Research Group, Davis, Davis, CA.

Jahren, AH, Kraft, RA (2008) Carbon and nitrogen stable isotopes in fast food: signatures of corn and confinement. Proceedings of the National. Academy of Sciences 105(46): 17855-17860.

Jones, TL, Jones, DA (1992) Elkhorn Slough revisited: reassessing the chronology of CA-MNT-229. Journal of California Great Basin Anthropology 14: 159–179.

Jones, TL (2006) Chapter 6. Archaeology and Prehistory *in* Changes in a California estuary: a profile of Elkhorn Slough, edited by J. Caffrey, M. Brown, B. Tyler and M. Silberstein, pp. 55-91. Elkhorn Slough Foundation, Moss Landing, CA.

Jones, TL, Knight, DA, Porcasi, JF.(2016) The Clemmer Collection revisited: re-evaluation of findings from the 1961 excavation of CA-SLO-239, Morro Bay, San Luis Obispo County, California. *J*ournal of California Great Basin Anthropology

Le Boeuf, BJ, Panken, KJ (1977) Elephant seals breeding on the mainland in California. Proceedings of the National Academy of Sciences 41: 267–280.

Miller, JF, Millar, JS, Longstaffe, FJ (2008) Carbon- and nitrogen-isotope tissue-diet discrimination and turnover rates in deer mice, *Peromyscus maniculatus*. *Canadian* Journal of Zoology 86(7): 685-691.

Nardoto, GB, Barboza de Godoy, P, Sansigolo de Barros, E, Ometto, JPHB, Martinelli, LA (2006) Stable carbon and nitrogen isotopic fractionation between diet and swine tissues. Scientia Agricola 63(6), 579-582.

Newsome, S, Phillips, D, Culleton, B, Guilderson, T, Koch, P (2004) Dietary reconstruction of an early to middle Holocene human population from the central California coast: insights from advanced stable isotope mixing models. Journal of Archaeological Science31: 1101–1115.

Newsome, SD et al. (2007) The shifting baseline of northern fur seal ecology in the northeast Pacific Ocean. Proceedings of the National Academy of Sciences104: 9709–9714.

Reid, REB, Koch, PL (2017) Isotopic ecology of coyotes from scat and road kill carcasses: A complementary approach to feeding experiments. PLoS ONE 12, e0174897.

Seminoff, JA, Jones, TT, Eguchi, T, Hastings, M, Jones, DR (2009) Stable carbon and nitrogen isotope discrimination in soft tissues of the leatherback turtle (*Dermochelys coriacea*): insights for trophic studies of marine turtles.Journal of Experimental Marine Biology and Ecology 381(1): 33-41.

Storer, TI, Tevis Jr., LP (1996) California Grizzly. University of California Press, Berkeley, CA.

Tieszen, L, Boutton, TW, Tesdahl, KG, Slade, NA (1983) Fractionation and turnover of stable carbon isotopes in animal tissues: Implications for δ13C analysis of diet. Oecologia57: 32–37.

Warne, RW, Gilman, CA, Wolf, BO (2010) Tissue-carbon incorporation rates in lizards: implications for ecological studies using stable isotopes in terrestrial ectotherms. Physiological and Biochemical Zoology 83(4): 608-617.