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Juvenile Northern Elephant Seal (*Mirounga angustirostris*) Onshore with Prey at Point Reyes National Seashore

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In situ observations of northern elephant seal (*Mirounga angustirostris*; NES) foraging behavior are exceedingly rare as they primarily feed at depths of 400 to 600 m (Robinson et al., 2012). Previous studies of the NES diet using stomach content analysis found a large proportion of squid; however, these findings were biased toward prey species with hard parts that are retained in the stomach (i.e., squid beaks; Antonelis et al., 1994). The use of developing technologies such as satellite tags, time-depth recorders, and animal-mounted video recorders in relation to foraging depth and location have determined that the diet of adult female NESs primarily consists of myctophid fishes in addition to opportunistic feeding on mesopelagic squid species (Yoshino et al., 2020; Adachi et al., 2021). However, even with video images of prey items, it is difficult to identify to species from the images alone (Yoshino et al., 2020).

Adult female NESs tend to forage in the water column off the continental shelf, while adult males mostly forage benthically along the continental margin (Le Boeuf et al., 2000). Research on foraging behavior has focused on adults, primarily adult females, but juvenile foraging behavior has not been as widely researched. Many juveniles may not migrate as far or travel as quickly as adults; however, they exhibit the same general migration and diving pattern (Le Boeuf et al., 1996). By their fourth migration, as 2-y-olds, juvenile diving appears to be equal in depth and duration to an adult's (Le Boeuf et al., 1996). Most juvenile NESs are on land for 1 to 3 mo in the fall for the "juvenile haulout" and for several weeks in the spring to molt. During the haul-out periods, the NESs are fasting on land and rely on their blubber stores for energy (Ortiz et al., 1978). At Point Reyes National Seashore (PRNS), yearling (1 y) NESs are observed year-round, although the majority are at sea during breeding season (December through March), which suggests variability in juvenile migratory and foraging behavior.

On 25 January 2022, during a routine population survey, PRNS biologists observed a juvenile, likely 1-y-old, NES on shore with prey. Age was determined by body size, pelage condition, and seasonal timing. Sex was not determined as the ventral area was not visible. The NES was observed in the rocky intertidal, swimming into a cove with a fish dangling from the lower teeth (Figure 1). The NES was observed for about 5 min hauling out of the water and continually moving up the beach, periodically resting while the fish remained in its mouth (Figure 2). The observers moved past the NES to avoid disturbance. Approximately 20 min later, the biologists returned to the site and observed the NES resting on the beach. The area was searched, and the fish was not found, appearing to have been consumed by the NES. A small amount of blood was visible around the NES's mouth. It is unlikely that parasitic common ravens (*Corvus corax*) or gulls (*Larus* spp.) had stolen the prey since parasitic bird activity was not observed.

The prey item was identified as a spotted ratfish (*Hydrolagus colliei*) by California Academy of Sciences Ichthyology Collection Manager Dave Catania. This species is a known prey item of NESs determined through stomach contents (Antonelis et al., 1994), but recent research suggests this may not be a common prey item, at least for adult females (Yoshino et al., 2020). Spotted ratfish are found in coastal benthic habitat from southeast Alaska to the Gulf of California (Hart, 1973), from the intertidal to > 900 m depth (Jopson, 1958). The range of this fish suggests that it would be an available prey item for juvenile NESs.

Since regular monitoring of NESs began at PRNS in 1984, this behavior has not been documented. After consultation with researchers at Año Nuevo State Reserve, we ascertained that an observation with a NES on shore with prey has not been documented in the southern rookeries. The NES arriving on land with an apparently

Figure 1. Juvenile northern elephant seal (*Mirounga angustirostris*) in water with spotted ratfish (*Hydrolagus colliei*) in mouth (*Photo credit:* M. Cox/NPS)

Figure 2. Juvenile northern elephant seal exiting water with spotted ratfish in mouth (*Photo credit:* M. Cox/NPS)

fresh-caught and fully intact fish suggests it was captured in nearshore waters and possibly brought on land to avoid inter- or intraspecific in-water competition. If bringing prey on shore was a common behavior, it would likely have been documented previously as NESs are one of the most consistently studied species of marine mammal. More in-depth research on juvenile, and specifically yearling, behavior is needed to determine if this observation was an anomaly or if some yearling NESs are foraging near their haul-out sites and may opportunistically bring prey ashore. If juvenile NESs are foraging closer to shore, it may contradict the hypothesis that all age classes of NESs are continuously fasting during haul-out periods. Regardless, this is a unique sighting of a NES with a clearly identifiable prey item.

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Literature Cited

Adachi, T., Takahashi, A., Costa, D. P., Robinson, P. W., Hückstädt, L. A., Peterson, S. H., Holser, R. R., Beltran, R. S., Keates, T. R., & Naito, Y. (2021). Forced into an ecological corner: Round the clock deep foraging on small prey by elephant seals. *Science Advances*, *7*(20). https://doi.org/10.1126/sciadv.abg3628

Antonelis, G. A., Lowry, M. S., Fiscus, C. H., Stewart, B. S., & DeLong, R. L. (1994). Diet of the northern elephant seal. In B. J. Le Boeuf & R. M. Laws (Eds.), *Elephant seals: Population ecology, behavior, and physiology* (pp. 211-223). University of California Press. https://doi.org/10.1525/9780520328150-013

Hart, J. L. (1973). *Pacific fishes of Canada*. Fisheries Research Board of Canada. 740 pp.

Jopson, H. G. M. (1958). A concentration of the ratfish *Hydrolagus colliei* Cape Arago, Oregon. *Copeia*, *1958*(3), 232. https://doi.org/10.2307/1440606

Le Boeuf, B. J., Morris, P. A., Blackwell, S. B., Crocker, D. E., & Costa, D. P. (1996). Diving behavior of juvenile northern elephant seals. *Canadian Journal of Zoology*, *74*(9). https://doi.org/10.1139/z96-181

Le Boeuf, B. J., Crocker, D. E., Costa, D. P., Blackwell, S. B., Webb, P. M., & Houser, D. S. (2000). Foraging ecology of northern elephant seals. *Ecological Monographs*, *70*(3), 353-382. https://doi.org/10.2307/2657207

Ortiz, C. L., Costa, D. P., & Le Boeuf, B. J. (1978). Water and energy flux in elephant seal pups fasting under natural conditions. *Physiological Zoology*, *51*, 166-178. https://doi.org/10.1086/physzool.51.2.30157864

Robinson, P. W., Costa, D. P., Crocker, D. E., Gallo-Reynoso, J. P., Champagne, C. D., Fowler, M. A., Goetsch, C., Goetz, K. T., Hassrick, J. L., Hückstädt, L. A., Kuhn, C. E., Maresh, J. L., Maxwell, S. M., McDonald, B. I., Peterson, S. H., Simmons, S. E., Teutschel, N. M., Villegas-Amtmann, S., & Yoda, K. (2012). Foraging behavior and success of a mesopelagic predator in the Northeast Pacific Ocean: Insights from a data-rich species, the northern elephant seal. *PLOS ONE*, *7*(5), e36728. https://doi.org/10.1371/journal.pone.0036728

Yoshino, K., Takahashi, A., Adachi, T., Costa, D. P., Robinson, P. W., Peterson, S. H., Hückstädt, L. A., Holser, R. R., & Naito, Y. (2020). Acceleration-triggered animal-borne videos show a dominance of fish in the diet of female northern elephant seals. *Journal of Experimental Biology*, *223*(5), jeb212936. https://doi.org/10.1242/jeb.212936