

Encounters of Hawaiian Monk Seals With Fishing Gear at Lisianski Island, 1982

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Introduction

Interactions of marine mammals with various fisheries are documented for many species (Mate, 1980; Beverton, 1982; Contos, 1982), though studies have generally emphasized direct interactions which economically impact a fishery, take considerable numbers of marine mammals, and have high public visibility. Less apparent interactions, such as entanglement in lost or abandoned fishing gear, are more difficult to assess, yet may significantly impact some marine mammal species.

Northern fur seals, *Callorhinus ursinus*, have been observed entangled in net debris on shore and at sea (Fiscus and Kozloff¹; Jones²; Scordino and Fisher³), and such entanglements may be a source of significant mortality for the species (Fowler, 1982). Collars of rope and plastic strapping have been reported on Cape fur seals, *Arctocephalus pusillus* (Shaughnessy, 1980), and Antarctic fur seals, *A. gazella* (Bon-

ner and McCann, 1982). Hawaiian monk seals, *Monachus schauinslandi*, are also known to become entangled in fishing gear and other synthetic debris. Monk seals with distinctive, garrote scars have been observed, as have animals bearing net fragments and debris (Balazs, 1979; Kenyon, 1980; Gilmartin⁴). A weaned monk seal pup at French Frigate Shoals was found entangled in, and immobilized by, a piece of fishing net to the extent that drowning would likely have resulted had the animal not been freed (Andre and Ittner, 1980).

Fragments of lost or discarded fishing gear regularly wash ashore at all of the Northwestern Hawaiian Islands (NWHI). At Lisianski Island this occurs predominantly on the east (windward) side of the island and the debris includes net fragments, tangles of rope and line (some of which may be mooring line), and assorted glass and plastic floats. In 1978, Fiscus et al.⁵ counted 18 pieces of netting at Lisianski which they considered could entangle a seal. Net fragments and tangles of line also foul on the reefs which extend approximately 100 m offshore on the north and east sides of the island, and remain partially submerged in the shallow (< 5 m) water. The size of these fragments ranges from small (< 1 m²) pieces to

virtually entire nets weighing over 100 kg. Many of these pieces have been identified as originated from Japanese trawls and gill nets (footnote 5).

From March to September 1982, a study was conducted at Lisianski Island to assess the effect of tagging on the behavior of weaned pups. Methods included individually marking all pups. During the course of this study, seals were observed to encounter fishing gear. These observations are reported here.

Observations

Presence and Accumulation of Net Debris

Those net fragments on the island which were deemed hazardous to monk seals were sampled and inventoried early in the season, and such debris which accumulated throughout the field season was similarly monitored. Assessment of the hazard to seals was subjective; criteria included size of the fragment and presence of loops or holes large enough to encircle the head of the seal. Fifty-two net fragments which had been present an unknown time were counted and 21 fragments washed ashore during the 6 months in which field personnel were on the island.

Inventory of debris included recording the size, location, color, and type of material. Samples were taken

¹Fiscus, C. H., and P. Kozloff. 1972. Fur seals and fish netting. Appendix E in fur seal investigations, p. 124-132. Natl. Mar. Mammal Lab., Northwest Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98112.

²Jones, L. L. 1982. Incidental take of northern fur seals in Japanese gillnets in the North Pacific Ocean in 1981. Background paper submitted to the 25th Annual Meeting of the Standing Scientific Committee, North Pacific Fur Seal Commission, Ottawa, 16 p.

³Scordino, J., and R. Fisher. 1983. Investigations on fur seal entanglement in net fragments, plastic bands and other debris in 1981 and 1982, St. Paul Island, Alaska. Background paper submitted to the 26th Annual Meeting of the Standing Scientific Committee, North Pacific Fur Seal Commission, held on March 28-April 8, 1983 in Washington, D.C., 33 p. + appendix tables and figures.

⁴W. G. Gilmartin, pers. commun., Honolulu Laboratory, Southwest Fish Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, October 1981.

⁵Fiscus, C. H., A. M. Johnson, and K. W. Kenyon. 1978. Hawaiian monk seal (*Monachus schauinslandi*) survey of the Northwestern (Leeward) Hawaiian Islands. Northwest Alaska Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Seattle, WA 98112. Proc. Rep., 27 p.

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for subsequent determination of twine and mesh sizes.

Seals Lying on Nets

Seals of all ages often hauled out atop or adjacent to piles of net and line which were high on the beach. No records of this behaviour were maintained, though the behavior was particularly evident among molting individuals who apparently seek objects against which they can roll or rub to facilitate sloughing off old pelage.

Pups Investigating Net Fragments and Flotsam

Five weaned pups, none of which was involved in the entanglement incidents described below, were observed investigating floating net fragments. The pups swam into and around the fragments, often surfacing with mesh covering their head and neck. A sixth weaned pup was observed investigating a large net fragment which was fouled on a rock ledge. Although no entanglement occurred during any of these incidents, encounters such as these could easily result in entanglement if holes large enough to accommodate a head or flipper were present in the fragment.

Weaned pups were also frequently observed nuzzling and investigating plastic and glass floats and other flotsam, often mouthing various objects, including shards of broken glass floats. No injuries from these incidents were noticed. One pup inserted its muzzle into a 7 cm diameter plastic ring which remained tightly encircling the seal's snout for 24 hours before it was removed by field personnel.

Entanglements

Incident One

Soon after arrival at Lisianski on 17 March, field personnel observed a large mass of net approximately 25 m offshore on the east side of the island. Subsequent inspection of the net on 8 April showed that it was fouled on coral rubble in water 3-4 m deep, and the bulk of the net mass was floating. A 43 cm green sea turtle *Chelonia*

mydas, and a small ulua, *Caranx* sp. entangled in the net were released.

At 1430 hours on 22 April a weaned male pup was found entangled in the same net. The pup's head and left fore-flipper were inserted through a hole in the mesh, and five to six strands encircled the neck and flipper. The pup was lying atop the net mass and not in immediate danger of drowning, but it was so firmly entangled that escape was unlikely and it probably would have starved had it not been released. The net was dragged ashore. It formed a pile 1.5 m high, 2 m in diameter, and probably weighed over 100 kg. The twine was gray polypropylene 2 mm in diameter; the stretched mesh size was 9 cm.

Incident Two

At 0830 hours on 6 May, a weaned pup was observed ashore on the north end of the island with a piece of net around its chest. The net fragment did not impede the seal's movements, but was tightly constricted about the chest, forming a 1-2 cm deep depression around the animal. The net would likely have eventually slipped off due to postweaning weight loss and the attendant reduction in girth. Nonetheless, infection and necrosis of the constricted tissue surrounding the constriction might also have occurred, or the net might have fouled on a piece of coral as the seal swam. The net fragment was removed by field personnel. The gray polypropylene fragment measured 30 × 60 cm, had a stretched mesh size of 10.5 cm, and a 2 mm twine diameter. The pup had been entangled through a hole in the web, not in a single mesh.

Incident Three

At 0830 hours on 8 May, a weaned pup was heard vocalizing repeatedly from the reef edge, approximately 100 m offshore from the east side of the island. Closer inspection revealed the male pup to be entangled in an 80 × 30 cm mass of monofilament net and 25 mm diameter polypropylene line. The net apparently had been fouled on the shallow reef for some time, and the pup had become entangled by four

strands of the line, two strands each anterior and posterior to the front flippers, girdling the chest. The entire tangle was in water approximately 0.25 m deep, the tide was low, and the seal was held so tightly that had biologists not released the animal, it would almost certainly have drowned during the incipient high tide.

Incident four

At 0830 hours on 9 May, an adult female seal attended by her 26-day-old nursing pup was seen apparently entangled in a mass of net and line at the reef edge, about 75 m off the northeast side of the island. The female appeared to have several coils of line draped over her neck and back. The pup was swimming and vocalizing near the female.

Research personnel prepared equipment for restraining and releasing the female, but upon returning to the site at about 0930 hours, they found the female had freed herself and was ashore nursing her pup. The net which had entangled the female washed ashore later the same day, 200 m west of the entanglement site. The net mass comprised assorted polypropylene lines and monofilament net.

Incident five

At approximately 0900 hours on 23 June, a weaned male pup was found entangled in a net mass on the east side of the island. The net was the same one that entangled a pup on 22 April (incident one). Though the net mass had been previously dragged ashore, high tides and wave surge had moved it about 400 m north, where it was in the wash zone of the beach. The pup was lying atop the pile entangled by a twisted noose of mesh about its neck (Fig. 1). As in incident one, the pup was not in immediate danger of drowning, but was so firmly bound that escape would have been unlikely. Field personnel released the pup and retained the mesh noose. (The net was later moved high up on the beach.)

Discussion

Although the number of hazardous

nets counted on Lisianski was markedly higher in this study than counted by Fiscus et al. (footnote 5) in 1978 (52 versus 18), this amount does not necessarily represent accumulation over 4 years. Some of the nets cataloged in 1982 were found in vegetation well up the beach, and may not have been seen during the 4-day visit in 1978. Criteria by which a net was deemed hazardous may also have been less stringent in 1982 than in 1978. Nonetheless, the large number of fragments accumulating throughout the 6-month field season in 1982 indicates that floating debris is ubiquitous in the waters of the NWHI.

Twenty-six pups survived to weaning at Lisianski in 1982. When field personnel departed the island on 15 September, 25 pups were still alive. The one pup that died was once entangled (incident one), but the death was unrelated to that incident. During a 1-month field camp from 26 October to 22 November, 24 of these pups were seen.

Since all pups were bleach marked, the identity was known of all individuals observed entangled in or investigating nets. The 10 incidents reported here (4 pup entanglements, 6 observations of pups investigating debris) involved 10 different animals, 38.5 percent of the pups of the year. Three of these entanglements could have resulted in death of the monk seal had researchers not intervened. Moreover, the large percentage of pups known to have interacted with nets suggested a general propensity in pups to explore fishing debris. Entanglement of northern fur seals, *Callorhinus ursinus*, is believed to similarly result from investigative behavior by the seals rather than from accidental blundering⁶. This investigative behavior, coupled with the presence of large amounts of such



Figure 1. — Hawaiian monk seal pup (59 days postweaning) entangled in a fragment of fishing net.

debris, could lead to considerable mortality among recently weaned monk seals. The escape of an apparently entangled adult female suggests that nets and other debris may present less hazard to adults than to pups.

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⁶Scordino, J., G. Beekman, H. Kajimura, K. Yoshida, Y. Fujimaki, and M. Tomita. 1984. Investigations on fur seal entanglement in 1983 and comparisons with 1981 and 1982 entanglement data, St. Paul Island, Alaska. Background paper submitted to the 27th Annual Meeting of the Standing Scientific Committee, North Pacific Fur Seal Commission, March 29-April 6, 1984, Moscow, 26 p. + appendices and figures.