

**Marine Mammal Commission
Annual Report to Congress
1998**

31 January 1999

Chapter II – Species of Special Concern

**Hawaiian Monk Seal
(*Monachus schauinslandi*)**

The Hawaiian monk seal is the most endangered pinniped in U.S. waters and is second only to the northern right whale as the nation's most endangered marine mammal. The Hawaiian monk seal population currently is estimated to number about 1,300 to 1,400 seals, which appears to be less than half its abundance in the late 1950s. The species breeds only in the Hawaiian Archipelago, with most monk seals inhabiting the remote, largely uninhabited atolls and surrounding waters of the Northwestern Hawaiian Islands (Figure 4). More than 90 percent of all pups are born at six major breeding colonies located at French Frigate Shoals, Laysan Island, Pearl and Hermes Reef, Lisianski Island, Kure Atoll, and Midway Atoll. A few births also occur annually at Necker Island, Nihoa, Niihau, and the main Hawaiian Islands. Although monk seals occasionally move between islands, females generally return to their natal colony to pup. Contributing to the species' decline over the past four decades have been human disturbance, entanglement in derelict fishing gear, reduced prey availability, shark predation, natural environmental perturbations, attacks by aggressive adult male monk seals on females and immature seals of both sexes (called "mobbing"), and possibly disease.

Ensuring monk seal recovery continues to be a daunting task. The National Marine Fisheries Service has lead responsibility for Hawaiian monk seals under both the Endangered Species Act and the Marine Mammal Protection Act. To meet its responsibilities, the Service, at the recommendation of the Marine Mammal Commission, established the Hawaiian Monk Seal Recovery Team in 1980. In recent years, the team has met annually to review and provide advice on recovery needs. The Service also has provided recommendations on activities that could affect monk seals pursuant to section 7 of the Endangered Species Act, established regulations to reduce interactions with commercial fisheries, and initiated programs to monitor the status of monk seals throughout their range, remove entangling debris from monk seals and their habitat, reduce male mobbing, and characterize monk seal foraging ecology and diet.

Because all of the Northwestern Hawaiian Islands except Kure Atoll are within either the Hawaiian Islands National Wildlife Refuge or the Midway Atoll National Wildlife Refuge, the Fish and Wildlife Service also has major responsibilities regarding the recovery of monk seals. Among other things, the Fish and Wildlife Service assists with monk seal research and monitoring and factors monk seal protection needs into management decisions related to public use of refuge areas.

Other key agencies and groups whose activities, programs, or responsibilities bear on monk seal recovery include the Army Corps of Engineers, the Coast Guard, the Navy, the State of Hawaii, the Western Pacific Regional Fishery Management Council, the University of Hawaii and the University of Hawaii's Sea Grant Program, the Hawai'i Wildlife Fund, and the Center for Marine Conservation. As discussed in past annual reports, the Marine Mammal Commission was instrumental in initiating the monk seal recovery program late in the 1970s and has since continued to provide advice and assistance to the National Marine Fisheries Service and other agencies on monk seal recovery needs. Important issues in 1998 are discussed below.

Population Trends and Survival

Little is known about Hawaiian monk seals or their population status before the 1950s. It generally is acknowledged that the species was heavily exploited in the 1800s during a short-lived sealing venture. What is thought to be the last Hawaiian monk seal taken by commercial sealers was killed in 1824 by the crew of the brig *Aiona*. Some seals were killed for food by shipwreck victims and other transient visitors to the islands.

The first attempt at estimating Hawaiian monk seal numbers was made in 1958, when a total of 1,206 seals was counted. Between then and the mid-1970s, the overall population size declined by about 50 percent. During this period, colonies at the western end of the archipelago between Kure Atoll and Laysan Island declined by at least 60 percent, and the colony at Midway Island all but disappeared. Most human activity was concentrated at the westernmost atolls of the chain during this period, suggesting that human disturbance contributed to the decline. The Navy undertook a major expansion of its air facility on Midway Atoll during the 1950s, and in 1960 the Coast Guard established a LORAN station at Kure Atoll that was occupied year-round. As described in the previous annual report, ownership of Midway Atoll was transferred from the Navy to the U.S. Fish and Wildlife Service in 1996, and the atoll is now managed as the Midway Atoll National Wildlife Refuge. The Coast Guard closed the LORAN station at Kure Atoll in 1992 and removed most of the manmade structures by 1993.

The decline in monk seal numbers seemed to have slowed by the early 1980s, due primarily to a sevenfold increase in monk seal counts at French Frigate Shoals between the 1960s and mid-1980s. However, the overall population again began to decline in the late 1980s and early 1990s. The downward trend was driven primarily by the colony at French Frigate Shoals, which has been declining significantly since 1989. In the mid-1990s total monk seal numbers appear to have stabilized at about 1,300 to 1,400 individuals. However, the poor juvenile survival experienced in recent years, especially at French Frigate Shoals, is expected to initiate a renewed population decline because fewer females will be entering the breeding population.

The poor juvenile survival rate at French Frigate Shoals does not appear to be due to direct human disturbance. Rather, evidence indicates that limited prey availability may be a factor. The small size of

pups at weaning, the absence of apparent disease-related deaths, the low female reproductive rate, and the delayed age of first reproduction at this location support this hypothesis.

Aggressive behavior or mobbing of females and immature seals by adult males also is a source of mortality. This can be a direct result of injuries inflicted by the aggressive males or as a result of later shark attacks on wounded seals or pups chased into the water by aggressive males. During the 1997 field season at French Frigate Shoals, 14 incidents of adult male aggression toward pups were documented, and eight pups subsequently died. Two adult males were identified as being responsible for most of these injuries. After similar behavior by the same animals was observed again in 1998, the two offending males were translocated to Johnston Atoll, located about 1,125 km (700 miles) south of French Frigate Shoals, on 8 June 1998. At the end of 1998 neither animal had been resighted at French Frigate Shoals, and the incidence of injury or death caused by aggressive behavior had declined dramatically at this site.

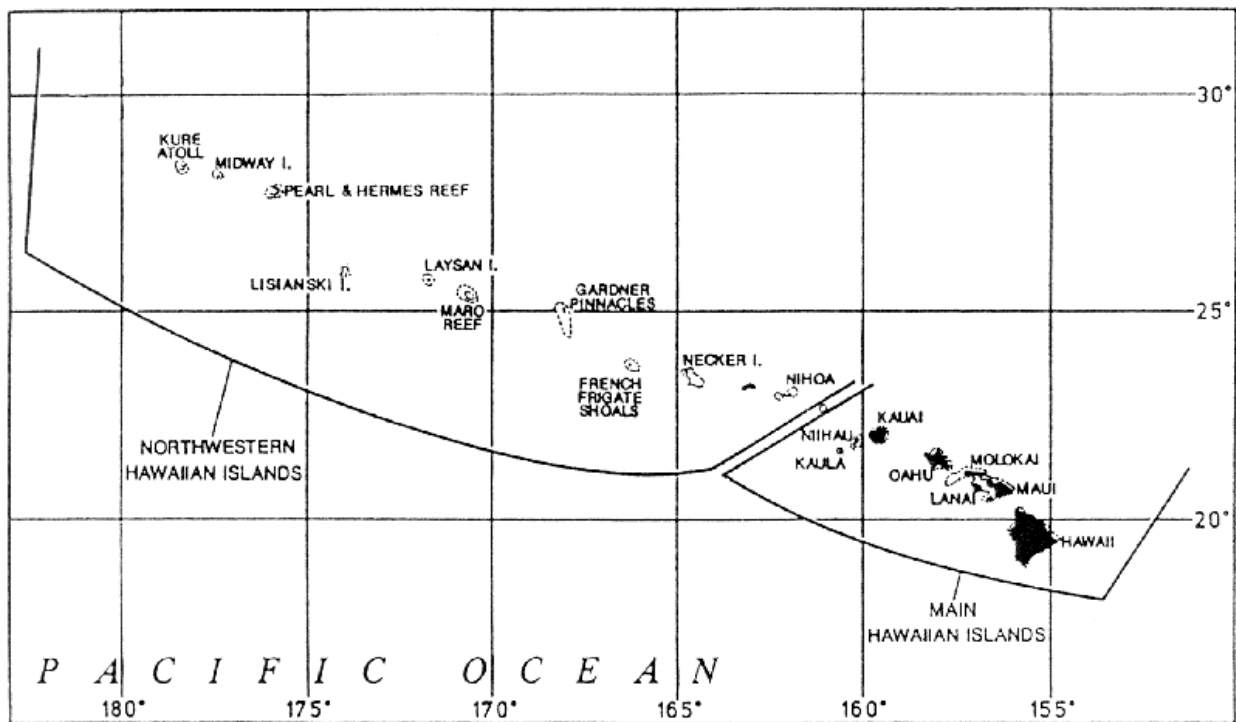


Figure 4. The Hawaiian Archipelago. The Northwestern Hawaiian Island, extending about 1,900 km (1,200 miles) northwest of the main Hawaiian Islands, provides pupping beaches for all major breeding colonies of Hawaiian monk seals.

Overall, during the 1998 field season there were 13 documented cases of male aggression toward females, juveniles, or pups that resulted in injury or death. Of these, three were at French Frigate Shoals, one of which resulted in a death; two were at Laysan Island, one of which resulted in a death; and eight were at Lisianski Island, one of which resulted in a known mortality. In addition to shark attack and mobbing, other natural factors that may affect monk seal populations include disease and biotoxins and environmental changes brought on by climate shifts and perturbations that may affect the abundance of monk seal prey.

Human-related interactions are a known cause of monk seal mortality through interactions with commercial fisheries, entanglement in discarded or lost fishing nets and other debris, pollution from human activities, and entrapment in deteriorating seawalls.

Theater Missile Defense Program

In fiscal year 1995 Congress directed the U.S. Navy to develop a theater missile defense program at the Pacific Missile Range Facility, Kauai, Hawaii. To meet this directive, the Navy plans to design and test the use of interceptor missiles to destroy or knock down target missiles launched from sites at various distances and locations around Kauai. Additional tracking stations and launch sites within the Hawaiian Islands would be required. A draft environmental impact statement on the proposed program indicated that target missiles potentially could be launched from either of two types of free-floating barges, specially configured aircraft, and/or new land-based launch facilities. Potential sites for land-based launch and tracking facilities include Johnston Atoll, Tern Island in French Frigate Shoals, and Niihau.

On 26 May 1998 the Commission commented on the draft environmental impact statement, expressing concern about the possible effects on monk seal behavior and survival from the construction, operation, and human presence at new land-based missile launch facilities, particularly on Tern Island. Given the possibility of severe impacts on monk seal survival at Tern Island, the Commission recommended that it be withdrawn from consideration as a potential target missile launching site, and that the Navy not consider any land-based sites located in the Northwestern Hawaiian Islands. Rather, it urged that emphasis be directed toward mobile sea-based launch sites or, preferably, air-drop target missile launches. On 21 December 1998 the Commission received a letter from the Navy indicating that Tern Island and Johnston Atoll were being withdrawn from consideration.

On 2 September 1998 the Commission received from the Department of Defense, Ballistic Missile Defense Organization, a finding of no significant impact and an associated final programmatic environmental assessment for an air-dropped, short-range target missile to help develop and test ballistic missile defense capabilities. The air-launch target system would involve the release of target missiles from a C130 aircraft and would not require land-based launch pads. In its comment letter of 18 September 1998 the Commission commended the Department of Defense for exploring target missile systems that did not require land-based launch platforms. It noted that it seemed reasonable to conclude that deployment of airdrop target missiles over the open ocean could be undertaken so as to have no significant impact on marine mammals or their habitat. To help ensure this, the Commission recommended that, if it had not already done so, the Department of Defense initiate consultations with the National Marine Fisheries Service pursuant to section 7 of the Endangered Species Act to identify such measures as may be needed to avoid significant adverse impacts on marine mammals and their habitats.

During 1999 the Commission expects to continue following this issue closely.

Tern Island

Tern Island, one of several small islets at French Frigate Shoals, is an important haul-out site for Hawaiian monk seals as well as for endangered sea turtles, and is a rookery for a variety of birds. During World War II, the Navy enlarged the island from its original 4.5 hectares (11 acres) to about 16.2 hectares (40 acres) to accommodate a landing strip. To do so, the Navy constructed a sheet metal bulkhead around most of the island and backfilled behind the structure with dredged spoil and coral rubble from the surrounding lagoon. The Coast Guard took over the island from 1952 to 1979 to operate a LORAN station. Since then, it has been used by the Fish and Wildlife Service as a field station for its Hawaiian Islands National Wildlife Refuge.

The airstrip and small buildings on Tern Island have made it possible to occupy the site year-round since the late 1970s. As the only site with such facilities between the main Hawaiian Islands and Midway Atoll, a distance of about 2,200 km (1,370 miles), it is a strategically important base for providing a regional enforcement presence, a rapid response and evacuation capability in case of maritime emergencies, and a means of facilitating research and management work, including year-round studies of resident monk seals.

The continued existence of the runway and field station – in fact, the integrity of the entire island – is in doubt because the sheet metal bulkhead, now more than 50 years old, is badly deteriorated. If the bulkhead fails, the airstrip would be lost, the field station would have to be abandoned, most of the island would erode away, buried debris would be exposed and create entanglement hazards to wildlife, and erosion pockets behind the rusted-out seawall would become serious entrapment hazards for monk seals and other wildlife. Removal of such hazardous structures and debris would be costly.

As noted in past annual reports, the Commission has recommended that the Fish and Wildlife Service and other agencies take steps to replace the bulkhead as quickly as possible. The Service shared the Commission's concerns, and in 1993 it contracted with the Army Corps of Engineers to develop detailed construction plans for a rock revetment to replace the decaying bulkhead. Although designs were completed in 1995, the Service was unable to obtain funding to construct the new seawall until late in 1998.

The shoreline near the island's buildings continued to erode, and by mid-1997 they were in imminent danger of being undermined by storms. Therefore, late in 1997 the Service contracted with the Army Corps of Engineers for emergency repairs along the short stretch of shoreline fronting Tern Island's buildings. Repairs costing about \$300,000 were completed by the end of 1997. In 1998 the Commission learned that the Fish and Wildlife Service received \$1 million in the beginning of fiscal year 1999 as an initial investment for sea wall construction; additional monies are expected over the next three years. The total cost of the project is estimated to be about \$15 million. The complete restoration of the island's integrity along the lines proposed in 1995 by the Army Corps of Engineers is highest priority.

Midway Atoll National Wildlife Refuge

Midway Atoll, located near the western end of the Hawaiian Archipelago, consists of two principal islands, Sand Island (about 445 hectares or 1,100 acres) and Eastern Island (about 135 hectares or 334 acres). The atoll supports an exceptional assemblage of wildlife including the world's largest colony of Laysan albatrosses, at least 13 other species of migratory seabirds, and four species of migratory shorebirds. It also provides habitat for threatened green sea turtles and Hawaiian monk seals.

Midway is the most intensively developed atoll in the Northwestern Hawaiian Islands. It was used as a trans-Pacific cable relay station beginning in 1903, and in 1935 was developed as a refueling base for commercial trans-Pacific clipper flights. In 1940 the atoll was further developed as a U.S. naval station, and up to 10,000 people were stationed at the atoll during World War II. In 1950 the naval station was reactivated for the Korean War and in 1957 a major expansion and rebuilding program took place. As use of the station decreased, it was redesignated as a Naval Air Facility in 1978 and was closed in 1993.

The Navy transferred ownership of Midway Atoll and the surrounding reefs to the Fish and Wildlife Service in 1996 for management as the Midway Atoll National Wildlife Refuge. Because of the importance of the airfield on Midway for emergency landings, refueling Coast Guard enforcement planes, and other purposes, transfer of the atoll to the Fish and Wildlife Service included an obligation to maintain the runway and associated equipment (e.g., pumps and fuel tanks). The facilities allow easy access for researchers and refuge staff and for public use compatible with wildlife conservation, which is a fundamental purpose of national wildlife refuges. Because the Fish and Wildlife Service has neither the expertise nor the funding to maintain and operate an airfield, it negotiated arrangements with a private contractor in 1996 to maintain and operate the airfield and manage a public visitation program.

As discussed in last year's annual report, the Fish and Wildlife Service developed a Midway Atoll National Wildlife Refuge Public Use Plan. To accommodate and manage public uses compatible with wildlife conservation, the plan proposed a series of compatibility determinations defining allowed activities and related restrictions for public participation in refuge research and management work, recreational fishing, wildlife observation and photography, diving and snorkeling, environmental education, and interpretation of refuge wildlife and historical resources.

Largely as a result of the change in stewardship at Midway Island and the cooperative agreement between the Fish and Wildlife Service and its contractor, monk seals on and around the island have been monitored continuously since February 1997 in a cooperative effort between the National Marine Fisheries Service and the Hawaii Wildlife Fund. The mean beach count of 24 animals in 1998 was far higher than that of any year since 1960. Eleven pups were born at the atoll in 1998, the same number born in 1997. Ten of the 11 survived to weaning in both years. The recent increases in beach counts and births are encouraging signs of the possible reestablishment of the Midway Islands as a major monk seal breeding site.

The National Marine Fisheries Service, the Fish and Wildlife Service, and the Service's contractor continue to work cooperatively to address the array of issues that face monk seals. An overriding

concern is that ecotourism and other activities need to provide enough revenue for the contractor to continue to maintain the facilities at Midway Island. Discussions are ongoing about increasing the visitor cap (currently 100 people at a time), possible tour boat visits, and sportfishing opportunities. Other potentially important issues include regulating access to beaches and reefs to minimize disturbance to monk seals, education and policing of visitors, location for a swim platform, and fishing for lobsters and other species by island residents and visitors.

Prey Availability and Commercial Fisheries

The number of monk seals at French Frigate Shoals, the species' largest colony, declined significantly from 1989 to the mid-1990s. As mentioned earlier, the poor juvenile survival at this site may be a result of limited prey availability. Monk seals feed on reef fish, octopuses, crabs, and lobsters, all of which are taken in the Northwestern Hawaiian Islands' lobster fishery.

The small sizes of banks in the Northwestern Hawaiian Islands and their isolated locations away from other recruitment sources for marine life make them vulnerable to impacts from overfishing. Thus, the Commission has been concerned that, if lobster fishing were to occur around French Frigate Shoals, it could adversely affect stocks of lobsters and other potentially important prey species for monk seals. As noted in its past annual reports, the Commission has repeatedly recommended that the Service close French Frigate Shoals to lobster fishing until better information becomes available on the importance of lobsters in the diet of monk seals and the effects of lobster fishing on important monk seal prey resources. The Commission also has recommended that the Service expedite research to determine the relative importance of lobsters and other species in the diet of monk seals, but funding to do so has not been provided.

By letter of 23 December 1997 to the Service, the Commission repeated its earlier recommendations that the Service increase funding for prey studies and close French Frigate Shoals to lobster fishing. The letter also repeated earlier requests not met by the Service for information on the criteria the Service would use to determine if lobster fishing were either causing or contributing to the monk seal population decline.

On 1 April 1998 the Service wrote to the Commission, advising that it did not plan to close French Frigate Shoals to lobster fishing because, based on previous experience, it was expected that little if any fishing effort would be expended in the area. In addition, the Service stated that it was implementing a vessel-tracking system that would ensure the effective monitoring of fishing vessels anywhere in the Northwestern Hawaiian Islands.

The Service's response failed to address Commission concerns about the impact that lobster fishing at French Frigate Shoals could have on the availability of monk seal prey. Once again, it also failed to provide the requested description of criteria the Service would use to determine the point at which lobster fishing might adversely affect Hawaiian monk seals. Therefore, the Commission wrote to the Service on 17 July 1998 again recommending that French Frigate Shoals be closed to lobster fishing and that, if the Service again declined to do so, it provide the Commission with a detailed description of

the criteria it would use to determine the point at which lobster fishing at French Frigate Shoals might have an adverse effect on Hawaiian monk seal survival. It also asked the Service to provide information on the procedures to be taken to ensure that lobster fishing at French Frigate Shoals did not exceed the level of lobster removal that could adversely affect monk seal survival. The Service subsequently wrote to the Commission on 24 August 1998 noting that it would require additional time to address the points in the Commission's letter. At the end of 1998, the Commission had not received a further reply.

At the Marine Mammal Commission's 1998 annual meeting in Portland, Maine, on 10-12 November and at the 1-3 December 1998 meeting of the Hawaiian Monk Seal Recovery Team, new information was provided indicating that management measures implemented by the Service in 1998 had resulted in a redistribution of lobster fishing effort in the Northwestern Hawaiian Islands. The total quota of 186,000 lobsters was divided into four areas: Necker Island, Gardner Pinnacles, Maro Reef, and the remainder of the Northwestern Hawaiian Islands. As a result of these management measures, lobster fishing effort shifted to the western end of the monk seal's population range, including atolls directly supporting major monk seal breeding colonies.

As noted in the Commission's past letters, lobsters and octopuses are known components of monk seal diets, but their relative importance is uncertain. The Service has discounted the possibility that octopus bycatch in lobster traps may affect monk seal prey availability because they currently constitute a very small component of the lobster fishery bycatch. Although this now may be true, past bycatch may have been higher and may have reduced octopus stock levels. A report entitled "Magnuson-Stevens Act Definitions and Required Provisions," published by the Western Pacific Regional Fishery Management Council in September 1998 noted that mollusks account for just 1 percent of the lobster fishery bycatch in the Northwestern Hawaiian Islands, but that 23 percent of the bycatch is crabs, 25 percent is reef fishes, 11 percent is moray eels, and 4 percent is other lobster species. All of these are components of the monk seal diet. In addition, preliminary results of research to identify the relative importance of monk seal prey species using fatty acid signatures of prey in seal blubber were presented at the recovery team's December meeting. The results suggested that this is a promising means of assessing the composition of monk seal diets, and that lobsters, as well as crabs, eels, reef fishes, and octopuses, are important dietary components. With sampling and analyses done to date, however, it is not possible to reach firm conclusions about the relative importance of different species in the diet of monk seals.

In light of new information on the fishing effort at atolls with major monk seal breeding colonies and available information indicating that lobsters and other species taken as bycatch in the lobster fishery may be significant components in the monk seal diet, the Marine Mammal Commission wrote to the Service on 31 December 1998. It recommended that the Service immediately reinstate consultations pursuant to section 7 of the Endangered Species Act on the possible effect of lobster fishing in the Northwestern Hawaiian Islands on Hawaiian monk seals. In addition, the Commission again recommended that the Service immediately close French Frigate Shoals to lobster fishing pending the availability of better information on (1) the importance of lobsters and other species taken in the lobster fishery in the diet of monk seals, and (2) the status of lobster stocks at French Frigate Shoals.

In this regard, the Commission recommended that the Service provide at least \$50,000 to expedite and support a research program to investigate monk seal prey preferences using fatty acid signatures. The Commission also recommended that the Service immediately act to prohibit lobster fishing at reefs surrounding Kure Atoll, Pearl and Hermes Reef, and Lisianski Island until there is better information on the importance of lobsters and other species taken in the fishery in the diet of Hawaiian monk seals and on the status of monk seal stocks at those atolls. The Commission looks forward to a response from the Service early in 1999.

Enhancing Survival of Pups Born at French Frigate Shoals

In past years the National Marine Fisheries Service has rescued and rehabilitated female yearling monk seals unlikely to survive at French Frigate Shoals and released them at Kure Atoll to help rebuild that depleted colony. The purpose of the effort was to salvage some of the reproductive potential that was being lost at French Frigate Shoals because of low juvenile survival. In 1992 the Service switched release efforts to Midway Atoll to help increase the small but growing colony there. Unlike translocations to Kure Atoll, however, initial releases at Midway Atoll experienced poor survival. Further translocations were suspended pending a thorough review of the program.

After that review, the Commission recommended that translocations to Midway be reinitiated. The Service captured 12 female pups at French Frigate Shoals for this purpose in 1995 and brought them to Oahu for rehabilitation. While in captivity, the animals developed an undiagnosed eye problem never before observed, and they could not be released. A 1997 review of the situation by an independent panel of veterinarians and wildlife managers recommended, in part, that translocation efforts be renewed, but that instead of bringing animals to Oahu, rehabilitation be carried out at the capture or release site and the animals be moved directly to Midway.

During the Commission's 1998 annual meeting, representatives of the Service advised the Commission that funds would be available in fiscal year 1999 for translocating weaned female pups from French Frigate Shoals to Midway Atoll. In anticipation of translocating pups this year, the Service carried out a health and disease assessment involving seals at French Frigate Shoals, Pearl and Hermes Reef, and Midway Island. Preliminary results indicated the presence of antibodies to morbillivirus in three seals from French Frigate Shoals, but not in seals at the other sites. Although antibody levels were low, there is a possibility that seals at French Frigate Shoals have been exposed to a morbillivirus while monk seals at other sites have not. The proposed translocation could therefore inadvertently introduce this virus to seals at Midway and possibly precipitate a die-off. The Service plans to retest samples and collect additional samples from seals at French Frigate Shoals in early 1999 to verify results.

Based on information provided at its annual meeting and at the 1-3 December recovery team meeting, the Commission wrote to the Service on 31 December 1998 recommending that the translocation of weaned pups from French Frigate Shoals not proceed until uncertainties regarding the risk of introducing morbillivirus or other significant disease agents have been thoroughly reviewed by marine mammal veterinarians and epidemiologists. If further consideration indicates that it is not safe to translocate animals from French Frigate Shoals to Midway Island, then the Commission recommended

that funding currently allocated to translocation work be redirected to a headstart program at French Frigate Shoals. This would be similar to previous Hawaiian monk seal headstart programs where female weaned pups were kept in an enclosure and fed during the critical period just after weaning.

As a related matter, the Commission was concerned that an outbreak of morbillivirus could occur with devastating effect on the entire Hawaiian monk seal population. The Commission therefore recommended in its 31 December letter that the Service assess the effectiveness and feasibility of carrying out a program to inoculate Hawaiian monk seals with a vaccine against morbillivirus. If such a program is determined to be potentially beneficial and feasible, the Commission recommended that the Service give serious consideration to developing a plan for implementing a vaccination program.

Marine Debris

Marine debris, particularly derelict fishing nets, poses a serious risk of injury and death to Hawaiian monk seals. The inquisitive nature of seals, particularly pups and juveniles, tends to make them attracted to debris. Subsequent interactions can lead to entanglement and, unless they are able to free themselves quickly, entangled seals risk drowning or death through injuries caused by the entangling gear. During the 1998 field season, 18 seals were found entangled in debris. Of these, 5 were able to disentangle themselves, 12 were disentangled by field crews (Figure 5), and 1 was found dead in a net caught on the reef at Laysan Island.

For several years, the Service has partially addressed the issue by removing debris from seals and beaches during field visits. Submerged debris, however, represents a greater threat because animals caught may drown or be killed by sharks. Therefore, in 1998 the National Marine Fisheries Service organized a multi-agency cleanup effort to remove derelict fishing nets and other debris from the reefs surrounding French Frigate Shoals and Pearl and Hermes Reef. An estimated 94 pieces of netting per square kilometer occurs on the reef surrounding French Frigate Shoals, and an estimated 64 pieces of netting per square kilometer occurs on reefs around Pearl and Hermes Reef. The Service was able to remove only a small proportion of this debris and estimates that 38,000 pieces of netting remain in the waters surrounding each of these locations. Agencies involved in the cleanup included the Coast Guard, the Navy, Hawaii state government, the Fish and Wildlife Service, the Center for Marine Conservation, the Hawai'i Wildlife Fund, the city of Honolulu, the University of Hawaii Sea Grant Program, the University of Alaska Marine Advisory Program, and BFI Industries. Clean-up will require a long-term commitment to remove the substantial amounts of debris now present. The Service is planning to continue this effort in 1999 at a location yet to be determined.

As a related matter, on 16 October 1998 the lobster fishing boat *Paradise Queen II* ran aground on reefs at Kure Atoll. Although more than 15,000 liters (4,000 gallons) of fuel were spilled, it apparently dissipated with no observed impact on monk seals. However, as of December 1998 the vessel and about 3.2 km (2 miles) of line and 500 lobster traps remained on the reef. Recognizing the danger posed by the wreck, the National Marine Fisheries Service explored a variety of options to remove the vessel and its gear before the vessel breaks up and debris is strewn across the reef by storms. The derelict line and other debris could pose a direct entanglement risk for monk seals as well as other

species, such as sea turtles. No funds remain from the vessel's insurance policy to pay for a salvage operation. The Service has asked the Navy for help in removing the vessel from the reef but, to date, the Navy has not been able to comply. The removal of the wreck and its associated debris is an urgent matter. The Marine Mammal Commission therefore recommended in its letter of 31 December 1998 to the National Marine Fisheries Service that it continue its efforts to consult with the Navy and other appropriate state and federal agencies to secure assistance to remove the wreck and associated debris from the reef as soon as possible.



Figure 5. Adult male Hawaiian monk seal found entangled in derelict trawl net on Laysan Island, 23 July 1998. Service personnel removed the netting and the seal was released with no apparent injuries. (Photograph courtesy of Dorothy Dick)

Captive Seals at Kewalo Basin

As noted above and in previous annual reports, 12 underweight female pups were removed from French Frigate Shoals in 1995 and taken to facilities on Oahu for rehabilitation prior to release at Midway or Kure Atoll. However, shortly after arriving at Oahu, most of the seals developed an eye problem never before encountered. Plans for their release were suspended, and the monk seals remained in captivity pending efforts to identify the cause of the eye problem. Two of the original 12 animals died in 1997 of unrelated causes. The cause of the eye problem has not been determined but the clinical result has been corneal opacities limiting vision in one seal and causing total blindness in eight animals. The tenth is unaffected.

The cost of maintaining these animals in captivity has been a significant financial burden on the Service. However, the possibilities that the condition could be contagious, that the monk seals would be unable to adapt to the wild and evade sharks after years in captivity, have made it inadvisable to release them. The Service therefore convened a review panel on 1-4 June 1997 to obtain advice and recommendations on what to do with the seals and whether rehabilitation work should be resumed. The panel included independent experts in veterinary medicine, population biology, and wildlife

management. A report of the panel's findings was circulated in June 1997. Among other things, it recommended that the seals now in captivity not be released and that the Service make every effort to find a facility willing to care for the animals and provide access to them for research.

In light of the panel's recommendations, the Service developed a plan, including a list of potential facilities and transfer criteria, for moving the animals now held in captivity to approved facilities for long-term care. Based on discussions of these plans at the Commission's November 1997 annual meeting, the Commission wrote to the Service on 23 December 1997 urging that, if at all possible, the Service avoid transferring the monk seals to a foreign facility because of their importance for research and because of the less rigorous husbandry and maintenance standards found in some foreign facilities. The Commission recommended that the Service increase efforts to find a suitable U.S. facility to care for the animals.

During the Commission's 10-12 November 1998 annual meeting, it was advised that an agreement has been reached with Sea World of Texas, San Antonio, for the permanent care and maintenance of all of the captive monk seals. The Sea World facility is an appropriate long-term husbandry facility that has the capability to regulate the environment of the holding facility and thereby alleviate potential sources of stress. Also, the monk seals will be kept together as a group and will be available for approved research projects to obtain information that cannot be obtained from wild animals. Pending final approval, the transfer of these animals is expected in February 1999. By letter of 31 December 1998 the Commission commended the Service for its efforts to find a suitable U.S. facility to accept the animals.

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