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Evaluating Attempts to Reintroduce Sea Otters Along the California Coastline

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The U.S. Fish and Wildlife Service (FWS) listed the southern sea otter, *Enhydra lutris nereis*, as threatened in 1977 under the Endangered Species Act of 1973 (ESA) after consideration of its small population size, greatly reduced range, and the increasing risk from oil spills. The ESA requires the FWS to develop and implement recovery plans for listed species. The recovery plan for the southern sea otter was initiated in 1979 and approved in February 1982. During development of this plan, the Marine Mammal Commission recommended the FWS consider the ultimate need for zonal management of sea otters and fisheries in California (see Wendell, this issue). Contemporary issues addressed in the plan were the (1) taxonomic status of the California population, (2) effects of sea otters on shellfish fisheries, and (3) effects of outer continental shelf oil development, production, and transportation.

At the time the plan was being developed, available information suggested that the sea otter population was not growing, and some biologists believed that the population was declining. This information greatly influenced the recommendation that translocating southern sea otters to a new site within their historical range was necessary to enhance population growth and distribution. At the time the otter was listed, and when the recovery plan was approved, the magnitude of the threat to sea otters from incidental entanglement and drowning in commercial halibut gill and trammel nets was not recognized. It was not until later that an analysis of data obtained between 1982 and 1984 indicated that an average of 80 sea otters per year, or about 6 percent of the population per year, had been accidentally drowned in commercial fishing nets. State and federal biologists concluded that these losses were large enough to have prevented the population from growing from the early 1970s to the mid-1980s (Wendell et al. 1985).

The goals cited in the 1982 recovery plan were to: (1) minimize the risk of oil spills from tanker accidents and other sources; (2) establish at least one additional breeding colony outside the present range; (3) minimize vandalism, harassment and incidental take; (4) monitor recovery progress; and (5) integrate the recovery plan into plans of local coastal community governments. This paper reviews the events leading up to the translocation, the process guiding it and the results. The success of these efforts is also evaluated.

Translocation as a recovery goal

In 1982, the FWS considered oil spills as the primary threat to the continued existence of the sea otter. Although some management efforts were underway to improve capture techniques and rehabilitation of oiled sea otters, the FWS believed that these tools alone would be ineffective in protecting the sea otter population in the event of a large oil spill. The recovery plan also recognized that the sea otter population had not significantly changed in size since 1973. The California Department of Fish and Game (CDFG) proposed that the population was at carrying capacity, which accounted for the reduced growth rate (Miller 1980); the FWS suggested that the problem was due to high mortality. Because the ability to protect sea otters from oil once a spill occurs is inadequate and the sea otter population was not increasing in size, the FWS determined that translocating sea otters was the most effective and reasonable recovery action. The purpose of translocation was to enhance range expansion by establishing a new colony within the historic range which would ultimately result in a larger continuous distribution and population size. Translocation was viewed as paramount to achieving recovery and establishing a data base for identifying the optimal sustainable population level for the southern sea otter as required under the Marine Mammal Protection Act (MMPA) of 1972 (see Baur et al.; DeMaster et al., this issue).

Translocations of listed species are authorized under the terms of section 10(j) of the ESA, which addresses the establishment of experimental populations. However, prior to the amendments of 1988,

there were no provisions under the MMPA to translocate sea otters for conservation purposes. To resolve this dilemma, in 1986 Congress passed legislation (Pub. Law. 99-625) that specifically authorized and set the ground rules for translocation of California sea otters. The key points were that by regulation the FWS must develop a translocation plan that includes the following: (1) the number, age and sex of sea otters to be translocated; (2) the methods for capture, translocation, release, monitoring, and protection; (3) the specification of a "translocation zone" where otters will be relocated, plus a buffer area, with formal section 7 consultations (see Clark, this issue) required in the zone for all Federal activities except those that are defense-related; (4) the specification of a "management zone," which would surround the translocation zone but would not include the existing sea otter range or adjacent areas where expansion is needed for the species recovery; (5) measures to isolate and contain the experimental population, backed up by an adequate funding mechanism; (6) a detailed description of the relationship of translocation to the status of the species and to future section 7 determinations relative to either the parent population or the experimental population; and (7) a provision that the plan should be administered in cooperation with the state. The management zone is to be kept free of sea otters using non-lethal means, no formal section 7 consultations will be required (only conferences), and incidental take of sea otters resulting from otherwise legal activities will not be a violation of the ESA or MMPA.

In June 1984, the FWS published a Notice of Intent to prepare an Environmental Impact Statement (EIS) and proposed rule for establishing an experimental population of southern sea otters. All major interest groups, including environmental organizations, the oil industry, and sport and commercial fisheries interests, were represented at the public scoping meetings. As suggested by the Council of Environmental Quality, the FWS established an interagency project review team made up of representatives from the CDFG, Marine Mammal Commission, and Minerals Management Service. Their assistance was solicited to participate in the scoping process and consult with the FWS in the preparation of the EIS. All meetings of the interagency project review team provided for the participation and involvement of interested members of the public. The FWS also established an Expert Review Team consisting of recognized experts in the fields of benthic ecology, marine mammal biology, marine resource economics, physical oceanography, and the physics and chemistry of pollutant transport, to provide impartial comments to the FWS on major sections of the EIS.

The draft EIS considered all data and information available up to the time of its publication and evaluated potential effects of the action on the marine environment, the southern sea otter, and the socioeconomics in the area. The draft EIS was made available for public review, and public hearings were held in Brookings, Oregon, and Monterey and Ventura, California. After release of the draft EIS, the President signed into effect on November 7, 1986 Pub. Law 99-625, which broadened the FWS's authorization for long-term management of an experimental population. Therefore, the final EIS was prepared to meet the requirements of Pub. Law 99-625, which was the sole authority under which translocation was proposed. The final EIS also incorporated comments received during the public review period and the final rule (50 C.F.R. Part 17) that governed the translocation under the new legislative authority (Pub. Law 99-625).

Implementing the translocation

Authority for implementing the translocation was given to the FWS pursuant to Pub. Law 99-625. The FWS requested and received assistance and cooperation from the CDFG for implementation of the translocation plan. Under an existing Cooperative Agreement, the FWS and the CDFG signed a Memorandum of Understanding addressing respective responsibilities, funding, contingency plans to handle funding, containment and logistical problems, and other items.

The FWS had lead responsibility for all management and research activities. The sea otter containment program, law enforcement, sea otter protection, review of Federal activities that may have affected the colony, and issuance of all permits related to the translocation was handled by the FWS's Fish and Wildlife Enhancement Program. Assistance in translocation activities and subsequent research was provided by the FWS's Research Group.

The Research Group designed and conducted the translocation of sea otters, including all aspects of capture, holding, veterinarian care, transport, release and baseline ecological studies. These studies were continued after the translocation and included an assessment of the effect(s) of translocation on the parent population.

The successful implementation of the translocation plan depended on an adequate commitment of funding and personnel. The FWS requested funding through its normal congressional appropriations process. Federal funding was administered through the FWS's Fish and Wildlife Enhancement Program. Monies were distributed to management and research. The CDFG received operational funds through the ESA section 6 (grant-in-aid to states) program.

On August 11, 1987, the FWS published a final rule (50 C.F.R. 17.84) to establish an experimental population of the southern sea otter at San Nicolas Island, located about 70 miles west of Los Angeles (see Figure 1).

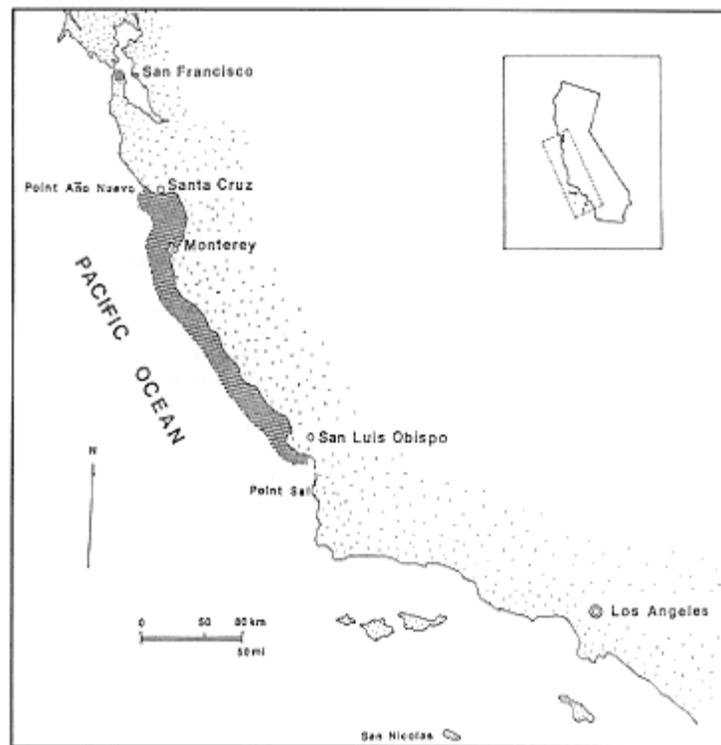


Figure 1. The Channel Islands, roughly 70 miles (110 km) west of Los Angeles and significantly south of the current sea otter habitat, were chosen as the translocation site.

The final rule established the boundaries of a translocation zone to which otters would be translocated and given protection similar to that of the source population, and a management zone to be maintained otter-free by removing sea otters by non-lethal means. The intent of designating a management zone was to limit sea otter impacts on existing fisheries and other marine resources (see Wendell, this issue). The management zone encompasses the entire southern California bight south of Point Conception, except the translocation zone surrounding San Nicolas Island (see Figure 2).

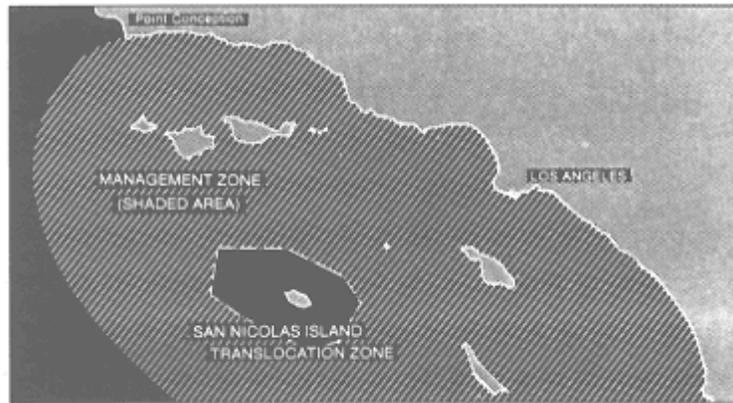


Figure 2. San Nicolas Island translocation and management zone.

Between 1987 and 1990, 139 sea otters (31 males, 108 females; 63 adults, 76 juveniles) were translocated to San Nicolas Island from the mainland population. No sea otters have been translocated to San Nicolas Island since 1990 (see Table 1).

Table 1. Summary of total number of sea otters captured for translocation to San Nicolas Island, August 1987-August 1996

Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Captured	124	104	23	1	0	252
Released at Capture	50	43	8	0	0	101
Died During Translocation	4	2	1	1	0	8
Released During Translocation	1	3	0	0	0	4
Translocated to SNI	69	56	14	0	0	139

Results of translocation efforts

The purposes of the translocation program were to: (1) implement a primary recovery action for a Federally listed threatened species; (2) obtain data for assessing capture, transport, reintroduction, and containment techniques; (3) gather data on population dynamics, ecological relationships of sea otters and their near-shore community; and (4) determine the effects on the donor population of removing sea otters for translocation.

Reproduction at San Nicolas Island was first observed during the initial translocation year, when two pups were observed. As of September 1996, 40 pups are known to have been born at San Nicolas Island, of which 6 died as pups, 11 were weaned, and the fate of 23 remains undetermined. Pre-weaning mortality within the mainland population in California is about 40 percent. In past years, a higher mortality rate (66%) has been documented at San Nicolas Island. This rate may be misleadingly high because the number of identifiable otters at the island has declined due to tag loss, thus tracking individual otters is almost impossible.



Sea otter being captured for translocation to San Nicolas Island. Photograph provided by Carl Benz, U.S. Fish and Wildlife Service.

Of the 139 sea otters translocated to San Nicolas Island, the fate of 61 is known. Thirty-seven sea otters are known to have returned at least once to the range of the parent population. Eleven have been captured in the designated management zone and released in the range of the mainland population. Three were found dead at San Nicolas Island shortly after they were released. Three have been found dead in the management zone. At least seven are believed to have taken up residency at the island. The status of the remaining sea otters is unknown. The cause of the continuing attrition of tagged animals over the past several years remains unknown. The question of the final fate of the original animals becomes less relevant as

many of the translocated animals are reaching the expected natural lifespan of a sea otter in the wild.

The lack of growth of the colony has been attributed primarily to poor recruitment and, to a lesser extent, emigration and adult mortality. Although reproduction has been observed every year, the fate of most pups is not known and few have been observed to be over 135 days of age. Food resources are abundant and should be readily accessible to young sea otters. Predation is not known as a factor, although great white sharks do occur in the area. Incidental take in the lobster fishery may contribute to the lack of population growth. Hundreds of pots are set around San Nicolas Island each season, and the opening into the pots may be large enough for a small to medium sized sea otter to enter. Entrapment of sea otters in lobster pots has not been documented at San Nicolas Island. However, a dead sea otter was found near Santa Cruz, Santa Cruz County, in an abandoned crab pot with similar dimensions to those of lobster pots. A few records exist of Alaskan sea otters entrapped in crab pots. With only five to six pups born each year and high pre-weaning mortality, incidental take and natural mortality factors could threaten the long-term persistence of the population.

Zonal management

The containment program is intended to prevent sea otters from colonizing the management zone through a cooperative effort between the FWS and the CDFG. The containment operation, as outlined in the translocation plan and the FWS's Containment Plan, consists of three interrelated and interdependent activities: surveillance of the management zone, the capture of sea otters in the management zone, and the relocation of captured sea otters to the range of the mainland population.

Captured sea otters are released in the northern portion of the mainland population range to reduce the likelihood of returning to the management zone. Early in the containment program, sea otters captured in the management zone were released at their original capture location along the mainland. Travel time to the more remote locations was lengthy; therefore, the FWS and CDFG decided to reduce stress to captured sea otters by releasing them in accessible locations. To avoid releasing a disoriented female sea otter into an area that may contain aggressive male sea otters, the decision was made to release female sea otters into female dominated areas. Male sea otters were released into male dominated areas.

Since 1987, 20 independent sea otters (10 males, 10 females) and 4 dependent pups have been captured in the management zone. Eleven of the otters had been translocated to San Nicolas Island, four had apparently swam down from the mainland range, and nine either swam down from the mainland range or were born in the management zone or at San Nicolas Island. Two of the sea otters mentioned above were captured and removed from the management zone twice.

In February 1993, all sea otter containment activities were halted following the deaths of 2 independent otters shortly after their release at a predetermined site at the northern end of the range. Concern was raised whether sea otter containment activities were being conducted by non-lethal means. An evaluation of containment techniques proved to be inconclusive, and recommendations were made to continue sea otter containment activities with minor modifications that included improved post-release monitoring activities. However, subsequent sea otter containment activities were limited due to the unavailability of funds within both the FWS and the CDFG. No sea otters have been removed from the management zone since early 1993.

Evaluation of the success of the translocation effort

From 1980 until the initial translocation period, the southern sea otter recovery program was considered a high priority FWS program based upon the combination of species vulnerability and political controversy associated with recovery needs. The southern sea otter population size was small and growth was minimal, at best. Small populations are vulnerable to a variety of perturbations. For the sea otter, the impact associated with oil spills was the greatest threat, and there were increasing risks of oil spills from expected increases in offshore oil and gas development and from increases in coastal tanker traffic. Recovery of the sea otter also would most likely conflict with both shellfish fisheries and oil related activities. Consequently, implementation of the translocation effort involved diverse political attention and a highly regulated process.

By the end of the first year of translocation, the rate of dispersal of sea otters from the island was higher than expected and appeared problematic to establishing a colony. However, a review of another reintroduction effort, that to Washington State, provided insight that translocation to San Nicolas Island may ultimately be successful. For the Washington effort, 59 Alaskan sea otters were released during 1969 and 1970. At least 16 of 29 sea otters released in 1969 died within 2 weeks. No data are available on deaths after the second release of 30 sea otters in 1970. Very few data on this reintroduction were recorded until 1977, when FWS biologists conducted the first intensive survey. At that time only 19 sea otters, including 4 pups, were observed. However, population surveys during the 1980s suggested that the Washington population was slowly increasing. Total counts in 1981, 1983, 1985, and 1987 were 36, 52, 65, and 94, respectively. The high count for the 1996 survey was 430 sea otters indicating that the population is established and should continue to grow. These observations suggest that post-translocation dispersal of sea otters occurs and can reduce the population to a very small founder population. However, if left undisturbed and protected, the founder population can become established. The major differences between the Washington population and the San Nicolas Island population are the active lobster trap fishery at the island and the presence of the management zone. Although sea otters found within the management zone were to be removed, as many were, there are no data suggesting that sea otter containment activities create a sink effect on the island population. The dynamics of the management zone surrounding San Nicolas Island is not believed to negate a comparison to the Washington State example.

At the end of the third year of the post translocation phase of the program (August 1993), the FWS evaluated the status of the translocated San Nicolas colony, containment efforts and failure criteria. Population surveys confirmed that the numbers of sea otters were continually declining, and therefore, the program as a whole should be evaluated. The FWS could not identify any deterministic causes as to why the San Nicolas Island colony was not increasing as expected, and therefore took a "wait and see" position while continuing monitoring efforts.

Over subsequent years, bi-monthly sea otter counts at San Nicolas Island ranged between 12-16 independent otters. The population has not changed significantly in size. A small colony (12-16 individuals) of southern sea otters still persists at San Nicolas Island. Based on the results of the translocation effort in Washington State, additional years of monitoring are necessary to determine if the San Nicolas Island colony will become established.

From a management perspective, the translocation as implemented failed to achieve the anticipated results for expediting recovery. As discussed in the EIS, the FWS expected that most of the sea otters would remain at the island and the colony would become established in about 5 years. Carrying capacity was expected to be reached after a minimum of about 10 to 15 years.

Actual implementation of the translocation plan was significantly hampered because any change to translocation procedures required a change in the enacting federal regulation and concurrence by the California Fish and Game Commission. At times this process exceeded 6 months. The requirement of Pub. Law 99-625 that the fine procedural details be defined in federal regulation prohibited the FWS from efficiently, and therefore possibly more effectively, implementing the translocation.

Lessons from the translocation

The political and public scrutiny of daily events, often resulted in a "small picture" mentality focusing attention on issues that in the "big picture" were insignificant. The deaths of three animals translocated to the island, the ability to track animals that disperse from the island, and the fate of missing animals are examples that required extensive attention by the FWS (briefing commissions, drafting reports, etc.). This attention tended to discredit the program, compromising the public's understanding and support. In turn, this influenced decisions on how the translocation efforts would proceed. In the big picture, and over time, these issues were not significant, but the impacts on the program were.

As the translocation program advanced, the political-environmental conditions changed. The FWS faced ever increasing budget demands to list and recover endangered species, the number of listed species more than doubled between 1980 and 1990. The amount of recovery dollars available did not keep pace with recovery need. New high-profile controversies of a much broader scale surfaced demanding attention by the FWS (e.g., spotted owl, delta smelt, California gnatcatcher). The CDFG was experiencing similar problems.

At the same time, our knowledge base regarding the southern sea otter and recovery needs grew. The restrictions on entangle net fishing virtually eliminated the accidental drowning of sea otters, and growth of the mainland population resumed. The ability to establish a colony was proving to be difficult and the translocation effort was expensive. Furthermore, the Exxon Valdez oil spill in 1989 demonstrated that oil spills can affect a large area, the effects of which can persist over a prolonged period, and the ability to protect sea otters once a spill occurs is insignificant.

In combination, these changing conditions affected the FWS's focus and priority on the translocation effort. The purpose of the translocation initially was to establish a sea otter colony and to obtain information valued for the long-term management of sea otters. As evidence grew indicating that the colony would not easily become established, most consideration seemed to shift away from the success of the entire project. In light of our present understanding of the recovery needs for the southern sea otter, including an analysis of oil spill risk to coastal California and the mainland population growth rate, it appears that recovery will likely be achieved by the natural growth of the mainland population and the San Nicolas Island colony will not contribute significantly. Attention and efforts therefore have shifted to other higher priority needs, with only minimal attention remaining at San Nicolas Island.

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