Global Reintroduction Perspectives: 2018

Case studies from around the globe

Edited by Pritpal S. Soorae

IUCN/SSC Reintroduction Specialist Group (RSG)

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Published by: IUCN/SSC Reintroduction Specialist Group & Environment Agency-Abu Dhabi

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Citation: Soorae, P. S. (ed.) (2018). *Global Reintroduction Perspectives: 2018. Case studies from around the globe*. IUCN/SSC Reintroduction Specialist Group, Gland, Switzerland and Environment Agency, Abu Dhabi, UAE. xiv + 286pp.

6th Edition

ISBN: 978-2-8317-1901-6 (PDF)
978-2-8317-1902-3 (print edition)

DOI: https://doi.org/10.2305/IUCN.CH.2018.08.en

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Printed by: Arafah Printing Press LLC, Abu Dhabi, UAE

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Sea otter reintroductions into previously occupied habitat, Northeast Pacific, USA and Canada

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Introduction

Once numbering about 300,000, sea otters (*Enhydra lutris*) historically occupied all nearshore habitats around the north Pacific Rim from central Baja California, Mexico to the northern Islands of Japan. Beginning in 1741 they were exploited in a 170-year commercial fur harvest resulting in catastrophic population declines to approximately 1,000 animals until international protections were put in place in 1911. Between 1937 and 1989, nine sea otter reintroductions into previously occupied habitat, resulted in six successful and self-sustaining populations. Today, those reintroduced populations comprise approximately 30% of the nearly 125,000 extant sea otters and occupy more than 50% of the sea otters historic range. Three sub-species are presently recognized based on skull morphology: *E.l. lutris* (Russia), *E.l. kenyoni* (Alaska to Washington) and *E.l. nereis* (California). Two stocks of sea otters are listed as threatened under the Endangered Species Act (ESA): California and the Southwest Alaska (from Kodiak Island in the east to the end of the Aleutian chain in the west). The sea otter is listed as Endangered by the IUCN due to past population declines, the California subspecies is listed as an Appendix I species, and all other populations are listed as Appendix II species by CITES.

Goals

- Goal 1: Augment the natural recolonization of sea otter habitat vacated as a consequence of the maritime fur harvest that ended in 1911.
- Goal 2: Establish self-sustaining populations of sea otters to pre-exploitation abundance in previously occupied habitat.
- Goal 3: Reduce the threat of a catastrophic event that may eradicate a geographically isolated population and result in sub-species or population extinction(s).
- Goal 4: Restore the historical ecological structure and function of nearshore marine habitats and communities that were dramatically changed with the widespread removal of sea otters.
- Goal 5: Re-establish historical connectivity and gene flow of sea otter populations throughout the north Pacific rim.

Success Indicators

- Indicator 1: Establishment and persistence of self-sustaining and growing sea otter populations in previously occupied habitat.
- Indicator 2: An increased rate of sea otter range expansion into previously occupied habitat resulting from reintroductions.

- Indicator 3: Reduction of threats to remnant populations by increasing connectivity between populations.
- Indicator 4: The transition from a less complex and herbivore (sea urchin) dominated coastal ecosystem to one dominated by benthic primary producers (the alga such as kelps) with more ecological complexity and diversity due to the presence of an apex predator (sea otter).

Female sea otter and pup

- Indicator 5: The increase of genetic diversity across sea otter populations due to enhanced geneflow between adjacent populations that had previously been genetically isolated for over 100 years.

Project Summary

Feasibility: The commercial maritime fur harvest from 1741 - 1911, while driving sea otters to near extinction, resulted in little impairment of sea otter habitat, which consists of marine waters and benthos between the supratidal zone and the 100 m bathymetric contour. Until recently, with the effects of global climate change on the nearshore ecosystem unknown, industrialization and human developments have not widely altered sea otter habitats and most sea otter habitat remains suitable for complete recolonization and restoration. The removal of sea otters via the maritime fur trade harvest provides a seminal example of the effect of removing an apex predator from a food web. The removal of the sea otter from nearshore marine habitats resulted in many sea otter prey populations, including various species of clam, crab, mussel and urchin, to dramatically increase in abundance. These benthic invertebrate increases eventually formed the basis for commercial and recreational fisheries on species such as Pismo and razor clams, several species of abalones, sea urchins and Dungeness crab. As sea otters naturally recolonize and are reintroduced into vacant habitat, competition and conflict often arises between humans and sea otters over these valuable invertebrate resources. Alternatively, the abundant prey populations available to reintroduced sea otters have contributed to sea otter population growth rates that are found to be significantly greater within the reintroduced populations (often near maximum for the species) than rates demonstrated within recovering populations.

As sea otters reclaim previously occupied habitat, they initiate a cascade of ecological effects that include reduction in the abundance and grazing effects of the herbivorous (primarily kelp eating) sea urchins, resulting in the re-establishment of understory and canopy forming kelp forests, and an increase in nearshore biodiversity largely through kelp dependent species of invertebrates,

Sea otters in their natural habitat

fishes and seabirds. Where sea otter populations persist, there tends to be a more complex nearshore marine ecosystem illustrating the value of a critical keystone species.

Implementation: Numerous sea otter reintroductions have occurred. The first experimental translocation of sea otters was conducted by the Russians in 1937, when nine sea otters were captured in the Commander Islands, for transport to the Murman coast in the southern Barents Sea, well outside the species historic range. Two males survived for five years demonstrating the potential for reintroducing this species into previously occupied habitat. The first efforts to reintroduce sea otter populations within their historic range began between 1951 and 1959 when sea otters were moved from Amchitka Island in the central Aleutians to the Pribilof Islands in the Bering Sea and Attu Island in the western Aleutians. These two reintroductions failed, most likely due to poor husbandry and inadequate numbers transferred. In 1965, multiple successful reintroductions followed from Amchitka and Prince William Sound to the Pribilof Islands, southeast Alaska (two efforts), British Columbia, and Washington and included one unsuccessful reintroduction to Oregon. The latest effort was in 1987, when 139 animals were taken from the central California coast to San Nicolas Island, off the coast of Southern California. Despite several successful reintroductions, currently there remains a large portion of unoccupied sea otter habitat between San Francisco, California and southern Washington that is not likely to be re-colonized by natural sea otter range expansion in the near future. Thus, further reintroduction is recommended to recover the sea otter and its habitat in this area.

Post-release monitoring: Little systematic effort was allocated toward monitoring early reintroductions and the status of those sea otter populations was determined primarily through anecdotal observations and infrequent surveys and reports. Following the sea otter reintroductions in the 1960s to 1970s, state and federal agencies conducted infrequent surveys of distribution and abundance to evaluate success and the status of those populations. Recently, over the past two decades, more frequent surveys have improved documentation of change and trend in both remnant and reintroduced sea otter populations. Across all reintroductions, initial declines of the number of individuals moved generally were high, about 90% in most cases, presumably resulting from emigration and mortality. However, following initial declines, population growth rates, in most cases, approached the maximum possible for the species of about 20% annually. The notable exception was San Nicolas Island off the coast of southern California;

of the 139 animals moved after the initial decline there remained a population of less than 20 animals which remained unchanged for nearly two decades despite normal reproduction. Only recently has the population increased its growth rate, reaching 100 animals in 2016. Incidental mortality associated with fisheries around San Nicolas Island in California likely contributed to the initial slow growth of this population. In addition legal harvest for otter pelts by First Nations in Alaska have reduced growth rates of some reintroduced sea otter populations.

Major difficulties faced

- Rates of loss of individuals following translocation approach 90% due to mortality and emigration.
- Limited understanding of the basic physiology related to thermoregulation and adverse effects of long distance transportation to reintroduction sites resulted in high post reintroduction mortality.
- Limited understanding of species specific social structure and affinity to relatively small home ranges resulted in a large loss of individuals from the reintroduction site due to emigration.
- The abundance of commercial and recreational fisheries species in the nearshore coastal areas was inflated due to the removal of sea otters from the system during the fur trade thus the adverse impact of sea otters on these fisheries caused conflict and controversy.
- Conveying to management and the public the ecological consequences (e.g. trophic cascades) of reintroducing a key-stone predator back into its historic range.

Major lessons learned

- Successful reintroductions contributed significantly to the conservation and recovery of sea otters with 30% of current sea otter abundance resulting from reintroduced stocks and the return of this keystone species restored ecological structure and function of nearshore marine communities.
- Biology of the species is important. The selection of healthy animals that sustain minimal injuries or stress from reintroductions should be released in healthy habitats.
- Behavior of the species is important and should be taken into account. The sea otters fidelity to small home ranges and affiliations with conspecifics likely contributed to initial losses where reintroduced individuals tended to try to return to where they were originally taken.
- Mixing of individuals from geographically/genetically distinct populations contributed to increased genetic diversity in reintroduced populations.
- Unanticipated fisheries conflicts and related mortality along with legal human harvests likely led to delayed success in at least two reintroductions.

Success of project

Highly Successful	Successful	Partially Successful	Failure
√**1, 2, 3, 4, 5, 6**			√**7, 8, 9**

1. Pribilof Islands
2. Southeast Alaska-northern section
3. Southeast Alaska-southern section
4. Vancouver Island
5. Washington State
6. San Nicolas Island California
7. Pribilof Islands (early 20th century)
8. Attu island (early 20th century)
9. Oregon state (late 20th century)

Reason(s) for success/failure:

- Initial failures resulted from high mortality related to poor husbandry practices including but not limited to the soiling of pelage during transport and the resulting negative effect on thermoregulatory processes.
- Insufficient numbers of individuals translocated likely contributed to failures.
- Larger numbers of individuals translocated likely contributed to successful reintroductions.
- The lack of human caused degradation of previously occupied habitat and abundance of prey likely contributed to success.
- The mixing of individuals from different locations has resulted in increased genetic diversity in the reintroduced population and has resulted in the recovery of genetic diversity lost due to the extensive fur trade extirpations.

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