

Who's Elakha?

The Sea Otter has played a Leading role in Northwest History and Coastal Ecology But Important Research Is Needed Before It Can Be Reintroduced to Oregon's Coast

By David R. Hatch and Kim Valentine

Dr. Virginia Butler, Dr. Debby Duffield, Dr. Roberta Hall [posted.02.08.01]

By the time Lewis and Clark reached the Pacific Ocean shores, the fate of "e-lak'-ha" -- the Chinook trade-jargon word for the Sea Otter -- was already sealed.

Russian, Spanish, English and American traders -- drawn by the luxuriously soft fur of the sea otter -- were quickly driving the Oregon sea otter to extinction. With the killing of the last known Oregon sea otter in 1906, the last page of this creature's history appeared written. But as told in the first installment of this series, Elakha's story is far from over. Research is currently being launched that could help restore sea otters to Oregon's coastal shores.

Today, populations of sea otter are distributed across the rim of the North Pacific--from the Kuril Islands north of Japan, north and east across the Aleutian chain, through coastal Alaska, down the coast of British Columbia and Washington's Puget Sound; and in southern California. Early naturalists in the region saw that the sea otters across this vast area varied in certain ways such as fur color. For the past 70 years or so, workers have puzzled over this variation, and tried to classify the various populations and piece together the evolutionary reasons for the patterns. There has been an ongoing debate over the existence of sea otter subspecies. As a result, the boundaries of the 'map' for sea otter subspecies has been moving throughout the years.

Scientific reports will almost always conclude with a reference to "further study" needed. This is a good thing. It's a lesson we must be reminded of. The more we know, the more we know we don't know. It's also a good thing because these references provide us a starting point for future explorations.

For many years scientists have puzzled over the existence of sea otter subspecies and the boundaries between the subspecies. The 'map' which shows where Oregon's Elakha fits in has never been defined.

In 1936, the U.S.D.A. publication North American Fauna described the four known sea otter skulls collected in Oregon in the years 1856, 1859, 1874 and 1930. In the publication, senior biologist Vernon Bailey observed that "sufficient specimens have not been brought together to show the area of intergradation with the subspecies *neréis*, but all available specimens from the coast of California, Oregon and Washington can be safely referred to this form, rather than to *lutris* of Kamchatka."

In 1950, researchers Scheffer and Wilke simply erased the subspecies boundary when they concluded that "neither on the basis of demonstrable variation or on the grounds of geographical isolation is there support for a southern subspecies of the



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sea otter."

Today's true elder of sea otter science, Karl Kenyon, questioned erasing the boundary in 1969 when he wrote: "Because of the variation among animals I have seen, the meager specimen material used to date in defining races, and the similarity of habitats occupied by the sea otter throughout its geographic range, it is not possible, without further study, to distinguish racially distinct populations which might exist."

Recent advances in genetic analysis have finally confirmed that the Pacific's sea otter populations are genetically distinct. In 1997, researcher Kim Scribner summarized the genetic analysis: "Each genetic marker employed revealed that on a macrogeographic level (across subspecies and large geographic distances) sea otter populations are highly divergent."

So, now that we know the existing sea otter populations are distinct subspecies, who was Oregon's Elakha and why is this knowledge important? In the early 1970s, attempts were made to reintroduce sea otter to coastal Oregon, using the Aleutian population as the source. Unfortunately, the re-colonizing effort did not succeed.

In 1996, zooarchaeologist R. Lee Lyman speculated as to why this effort may have failed: "Several years ago I examined prehistoric sea otter remains recovered from archaeological sites on the coast of the state of Oregon — the middle latitudes of the historically documented range of sea otters. The size of otter teeth recovered from those sites are more or less intermediate to those from Alaska (large) and those from southern California (small), but they also vary somewhat from this simple pattern. Prehistoric Oregon sea otters match modern Alaskan sea otters in some characteristics; in others they match modern California sea otters. Precise details are unnecessary to the point I wish to make here, which is: Were the sea otters captured in Alaska and translocated to the Oregon coast in the 1970s of the proper phenotype (or genotype)? Zooarchaeological evidence suggests they were not. If this is a correct interpretation, then perhaps those transplanted sea otters were doomed from the moment they were captured."

Is Lyman's speculation correct -- that the 1970's re-introduction effort failed because we introduced animals from an inappropriate source population? We don't know, but at least we know that we don't know. We also know that it is appropriate to find an answer before another re-introduction attempt is made.

The World Conservation Union has adopted guidelines for re-colonizing extirpated species. The guidelines state: "An assessment should be made of the taxonomic status of individuals to be re-introduced. They should preferably be of the same subspecies or race as those which were extirpated, unless adequate numbers are not available. An investigation of historical information about the loss and fate of individuals from the re-introduction area, as well as molecular genetic studies, should be undertaken in case of doubt as to individuals' taxonomic status...."

Dr. Debbie Duffield, Dr. Virginia Butler and Ms. Kim Valentine from Portland State University along with Dr. Roberta Hall from Oregon State University, in cooperation with an advisory council known as the Elakha Alliance, have begun a project to determine which of today's sea otter subspecies is most closely related to Oregon's Elakha.

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Ecotrust has established the Elakha Alliance Fund. All donations to the fund are dedicated specifically to the DNA analysis described in this article.

The Oregon

DNA from modern subspecies is going to be compared to skeletal remains from the very few known historic samples and samples from our coastal middens. To do this we are going to develop DNA markers using samples from modern subspecies. These will be the markers which distinguish the northern (Alaskan) and southern (Californian) sea otters. We are going to extract DNA from ancient bones and teeth of Oregon sea otters and then compare ancient Oregon sea otter DNA to the modern subspecies DNA.

The DNA technique of choice for this analysis is mitochondrial DNA (mtDNA) analysis, as it represents a way to examine the geographic distributions of lineage within and among closely related species.

The method has been successfully used to distinguish sea otter populations before. DNA primers specific to sea otter mtDNA have been reported and used to examine the mtDNA variation among the extant subspecies and populations of sea otters in the eastern and western North Pacific. These primers provide an excellent starting place for the construction of new primers that would be able to pick up the smaller 150-300 base pair fragments expected from ancient DNA extractions. The more specific primers could then be used to screen the historical samples to establish their similarity to northern vs. southern subspecies.

To extract DNA from the bone and teeth, techniques previously used will be modified where necessary and used for these extractions. A small section of bone or tooth will be drilled, taking care not to compromise the specimens. The bone/tooth dust will be extracted in a 6M GuSCN solution, mixed with a silica suspension, and eluted with Triton X-100. These extraction procedures are now available in kit form which has helped to standardize this procedure considerably.

To develop new specific primers for the ancient DNA, available primers and PCR (Polymerase Chain Reaction) will be used to sequence the mtDNA regions reported for sea otter. From these sequences, a comparison of differences between northern and southern sea otter haplotypes will be made to identify the specific regions of distinction. Primers will be designed to target these regions. Modern samples will be used to test the accuracy of these primers and then they will be used to screen the ancient bone samples.

We hope the result of the project will be an answer to "Who's Elakha?" We also anticipate that we will identify needs for "further study", but this is good.

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The Elakha Alliance is an evolving group which at this time includes representation from the Confederated Tribes of the Siletz Indians of Oregon, the Coquille Tribe, the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians, the U.S. Geological Survey, the Oregon Zoo, the Oregon Coast Aquarium, Ecotrust of Oregon, Portland State University, Oregon State University and Oregon teachers. Our near term goal is to complete this molecular genetic study. Our long term goal is to see an appropriate re-introduction plan developed in compliance with the guidelines of the World Conservation Union. We know that such a plan must wait until the appropriate sea otter population is strong enough, but when the time is right we want to have all the thinking in place to truly welcome Elakha back to Oregon.

Ecotrust has established the Elakha Alliance Fund. All donations to the fund are dedicated specifically to the DNA analysis described in this article.

LITERATURE CITED

The Oregon Coast Aquarium

Oregon Zoo

Facts About Sea Otters From the Vancouver Aquarium

Focus On Sea Otters From the Monterey Bay E-Quarium

Upwelling on the Web: Sea Otters

The Otter Project

Friends of the Sea Otters

Avice, J.C. 2000. Phylogeography: The History and Formation of Species. Harvard University Press, London. 447 pp.

Bailey, V. 1936. The mammals and life zones of Oregon, North American Fauna, 55:302-305

Butler, V.L. and N.J. Bowers. 1998. Ancient DNA from salmon bone: a preliminary study. Ancient Biomolecules, 2:17-26.

IUCN, The World Conservation Union, Guidelines for Re-Introductions, Approved by the 41st Meeting of the IUCN Council, Gland Switzerland, May 1995

Kenyon, K.W. 1969. The sea otter of the eastern Pacific Ocean, North American Fauna, 68

Lyman, R.L. 1996. Applied zooarchaeology: the relevance of faunal analysis to wildlife management. World Archaeology, 28(1):110-125

Lyman, R.L. 1988. Zoogeography of Oregon coast marine mammals: the last 3,000 years. Marine Mammal Science, 4(3):247-264.

Roslund, W.L., S.R. Fain, L. Finn Yarborough, P.E. Rosel and D.A. Duffield. 1995. DNA analysis used to distinguish harbor and Dall's porpoise bone fragments from an Alaskan archeological site. 11th Biennial Conf. Biology of Mar. Mammals, Orlando, FL, Dec 14-18.

Scheffer, V.B. and F. Wilke, 1950, Validity of the subspecies *Enhydra lutris nereis*, the southern sea otter. Journal of the Washington Academy of Sciences, vol. 40, no. 8, p.293-342

Scribner K.T., J. Bodkin, B. Ballachey, S.R. Fain, M.A. Cronin, and M. Sanchez, 1997, Population genetic studies of the sea otter (*enhydra lutris*): a review and interpretation of available data. Molecular Genetics of Marine Mammals, Special Publication 3:197-208

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