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Why Do River Otters Inhabiting Marine Environments Live in Groups?

By Gail Blundell, Institute of Arctic Biology, University of Alaska Fairbanks.

Why animals are social is a question that has intrigued biologists for many years. Explanations for sociality generally fall into two categories: association with a group may offer some benefit in acquiring resources such as food and mates, or in avoiding predation. Nonetheless, for many animals (especially secretive predators) it has been difficult to determine the factors underlying group living. In previous studies (1989-1992) in Prince William Sound (PWS), Alaska, we observed high variability in sociality among river otters inhabiting coastal waters. Our preliminary observations, indicated that males were more social than females, which is a unique phenomenon among mammals. To investigate this unique social organization of coastal river otters, I and several colleagues, live-captured 111 individuals in an area encompassing 4,800-km^2 in PWS from 1996 to 1999. We obtained blood and hair samples from all otters for DNA fingerprinting and stable isotope analysis, and implanted radio-transmitters in 55 of them.

The first idea we explored was that river otters were social to avoid the risk of predation. If this was true, then females with young should be more social than males to protect the pups

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from their main predators (bald eagles, Orcas, and sea lions). Also, otters should be more social in winter when predators have no alternative foods in PWS and would be more likely to attack otters because salmon are unavailable in those months. Our telemetry data revealed the opposite! Group size for otters decreased in winter when predation risk was high and increased in summer when predation risk was low. Also, social otters did not forage further from shore where predation risk is greater. And similar to our previous observations, males were more social then females. So we had to conclude that predation risk was probably not a significant factor promoting sociality in coastal river otters.

Because males were more social than females, we wondered if sociality in river otters was related to the acquisition of mates. In other mammals, such as African lions, groups of sibling males

continued on page 2

Table of Contents

THE RIVER OTTER JOURNAL is a semi-annual publication of the River Otter Alliance. Look for the next edition of THE RIVER OTTER JOURNAL in Autumn 2002!

River Otter Alliance Mission

The River Otter Alliance promotes the survival of the North American River Otter (*Lontra canadensis*) through education, research and habitat protection. We support current research and reintroduction programs, monitor abundance and distribution in the United States, and educate the general public through our newsletter, THE RIVER OTTER JOURNAL, on the need to restore and sustain River Otter populations.

Our goal is to be a center of communications among wildlife biologists, environmental organizations, fishermen, and all interested parties on a national and international basis, in order to ensure the healthy future of the North American River Otter.

Why Do River Otters Inhabiting Marine Environments Live in Groups?

continued from page 1

take over groups of females and assist each other in mating. Using the telemetry data to determine association and group composition, and the DNA fingerprinting to determine relatedness among individuals, we found that relatedness of otters appeared to have little bearing on whom they interacted with or even who their neighbors were, because otters did not preferentially associate with their relatives. Social groups, ranging from two to nine otters in our study, were not composed of kin or family groups. Rather, otter groups included a mixture of individuals that were not related, as well as some that were highly related. Therefore, the relatedness of social groups was not different from a random sample of individuals from the area in which the otters resided. There also was no correlation between how related a pair of individuals was and the incidence of adjoining or overlapping home ranges. In addition, we found no indication that sociality resulted in increased reproductive opportunities — neither males nor females that were social had more offspring than did nonsocial otters, and social otters did not have more relatives in the population than non-social ones.

So we were left with the possibility that sociality in river otters was related to the acquisition of food. In PWS, otters can feed on intertidal fishes (such as gunnels and ronquils) and invertebrates (such as crabs and mussels), or they can feed on pelagic fishes (such as herring, sand lance, capelin, and salmon) that come to the near-shore environment to spawn. Those fishes, which constitute a better-quality diet compared with intertidal fishes, usually migrate to the near shore habitat in summer and are seasonally available, although the timing of their arrival and their location is unpredictable. To determine diets of otters, we conducted analysis of stable isotope ratios of carbon (C) and nitrogen (N) on hair samples. Because the stable isotope signatures (noted as $\partial^{13}C$ and $\partial^{15}N$) of prey items are reflected in the tissues of the predator that consumes them, one can establish the diet of the predator by comparing those signatures of prey with that of the predator. For that reason, we also determined stable isotope signatures of the fishes commonly consumed by river otters in a marine environment.

Photo courtesy of the Exxon Valdez Oil Spill Trustees Council

Our analyses of stable isotopes and degree of sociality (with radio-telemetry) indicated that larger groups of otters coincided with availability of schooling fishes, and that social otters included more pelagic fishes in their diet compared with solitary ones. Studies of other species have shown that schooling fishes are more prone to predation from groups of predators because multiple predators can surround a school of fishes and prevent fishes from escaping. By cooperatively foraging in this manner, social predators can achieve a greater capture success (i.e., each predator in the group can capture more fishes) compared with the success of a solitary predator attempting to capture the same type of fishes. Although we were unable to directly observe cooperative foraging behavior in the wild, a companion study on captive otters at the Alaska Sealife Center in Seward, Alaska, demonstrated greater capture success for otters foraging in groups.

In further support for our conclusion that sociality in river otters was related to the acquisition of food, is the observation that social otters also had smaller home ranges than did less social otters, indicating greater foraging efficiency for social otters. When a solitary predator is unsuccessful in capturing prey, the animal must move on to a different location in hopes of encountering prey that are unaware of its presence, thus increasing the likelihood of a successful hunt by that predator. A solitary predator in a marine environment often expends a great deal of energy and covers a large distance before it is able to capture enough food to meet its energetic requirements. In contrast, a group of predators that are cooperatively foraging can capture

Photo by Eric Peterson©

enough fishes to become satiated by focusing their efforts on one or two large schools of fishes and thus they do not need to cover large areas to meet their energetic requirements.

So why are males more gregarious than females? First we explored the possibility that because male otters were larger than females, they were perhaps stronger swimmers, and thus better at capturing the more rapidly swimming schooling fishes. We had to abandon this idea, however, because our data indicated that body size was less important in capturing pelagic fishes than was sociality, because both males and females that were more social had the better quality diets of pelagic fishes, compared with solitary males and females.

Our latest explanation for the differences in sociality between males and females in coastal river otters revolves around our observation that some females joined male groups for various lengths of time. We suspect that females were constrained in movements by their need to rear and provision young. For up to 6 months of the year and concurrent with the availability of schooling pelagic fishes in the near shore environment, reproductive female otters are limited in movements to the vicinity of the natal and maternal dens where they care for their young. We suspect that the females that join the male groups are those who failed to reproduce that year. For those females, joining male groups to take advantage of the high quality diet of schooling fishes is the best strategy. Although we have no data to support this explanation we hope to continue our studies in PWS and test this idea in the future.

So, why do river otters inhabiting marine environments live in groups? All lines of evidence lead us to conclude that sociality among coastal river otters, at least in Alaska, likely evolved primarily to enhance the capture of schooling pelagic fishes through cooperative foraging.

President's Message

Dear Readers:

Welcome to the Spring 2002 edition of The River Otter Journal.

In this issue, we have an article from Dr. Gail Blundell on her study of why river otters tend to live in groups in marine environments. We also have an update from Dr. Jo Thompson on her work with otter conservation education in Africa, an article on the status of the river otter population restored to Colorado's Rocky Mountain National Park, and an article by Dr. Paul Polechla on places with 'otter names.' Dr. Merav Ben-David has also provided an article which discusses her research using a spatial model to address the question whether river otters could naturally recolonize the Grand Canyon and in what time period.

With spring in the air, it is once again time for otter pups. Congratulations to The Otter Habitat's Tripod and Emmit, proud parents of two river otter pups, born on March 20, 2002. Congratulations also to the Akron Zoo on their three river otter pups born on March 28, 2002.

Akron Zoo otter pups with keepers Wendy Buck & John Samaras.
Photo by Mario Rossetti.

Colorado's Ocean Journey, a Denver-based aquarium housing both river and sea otters, also has a new otter pup; Gracie, a five-year-old southern sea otter, gave birth to her pup on May 11, 2002. This is only the second time a sea otter pup has been conceived, born and survived in captivity. The first was Oz, born January 3, 2001, at the Oregon Zoo. (See Spring 2001 issue of The River Otter Journal for additional information on Oz.)

One of last year's river otter pups, Lyle, from the Rocky Mountain Ark Wildlife Rehabilitation Center, is planning a temporary move to Colorado's Ocean Journey this summer. Lyle will be professionally trained and on display as part of the aquarium's plan to continually offer new displays to attract return visitors. Ocean Journey has recently filed for bankruptcy protection as it attempts to reorganize its debts to stay in business. Ocean Journey has generously supported several river otter-related studies in its short three-year existence. We wish Ocean Journey and their otters the best of luck.

Thank you to everyone who remembered us with donations and membership renewals during these difficult economic times. As a result of your support, we continue to act as a liaison among schools, groups, organizations and government agencies that have an interest in all species of otters. Your donations and membership funds are used to produce, duplicate and distribute materials to interested persons and organizations, as well as produce our bi-annual newsletter. We truly appreciate your continued support.

—Tracy Johnston, ROA President and Newsletter Editor

Can River Otters Naturally Recolonize the Grand Canyon?

By Merav Ben-David, Ph.D.

River otters *(Lontra canadensis)* are piscivorous predators, which forage near the apex of the trophic pyramid and readily accumulate high levels of pollutants. Indeed, river otters in North America were reduced throughout much of their historic range by the early 1900s because of pollution, urbanization, and overharvest. Consequently, numerous projects were initiated to reintroduce river otters to areas from which they were extirpated. Many of the reintroduction programs were highly successful (see article in our Autumn 2001 issue on the river otter in Missouri), but also very costly and sometimes came at the expense of individual animals. Recently, a proposal to reintroduce river otters to the Grand Canyon was put forward. Although this proposal has large appeal, reintroducing river otters to the Grand Canyon has several limitations.

The population status and current distribution of the subspecies that historically inhabited the Grand Canyon, *L. c. sonora*, is unknown. The source populations for reintroduction will likely be of different subspecies trapped in places such as Alaska, Missouri, Louisiana, and Florida, where otter populations are stable and trapping will likely not affect population status. Thus, a successful reintroduction in the Grand Canyon may lead to genetic swamping of the few remaining *L. c. sonora* in adjacent watersheds. Genetic swamping occurs when a large number of individuals with new genetic material breeds with the few original inhabitants of the area producing offspring that carry little of the genetic information of the original population.

In addition, such a reintroduction effort will likely be costly and require numerous permits, health evaluations, veterinary care, and complicated logistics. In every reintroduction program newly trapped animals require health monitoring to ensure their subsequent post-release survival, as well as disease screening to ensure that the newly released animals are not transporting infectious diseases into new areas. Such monitoring may require detention of otters in captivity for long periods of time (rabies testing for example may require several months of observations). Maintaining wild caught otters in captivity for long periods of time may compromise their subsequent post-release survival.

Therefore, before such a project is initiated, the feasibility of natural recolonization of river otters from the upper reaches of the Colorado River and tributaries needs to be assessed. We (Nathan P. Nibbelink, Gail M. Blundell, and myself) are developing a spatially explicit, individual-based model to evaluate the potential for natural recolonization of the Grand Canyon by river otters that may disperse from known populations in the upper Colorado River Basin. This spatially explicit model creates virtual otters that survive year to year, reproduce, and some of the young disperse into new available habitats along the virtual Colorado River and tributaries. At the beginning year (or rather first iteration of the model) the computer plots on the map a number of individuals in Rocky Mountain National Park (RMNP) and the Wyoming Green River (WGR) where surveys identified viable otter populations.

The number of animals on the landscape (density) is based on results of surveys conducted by the University of Wyoming Student Chapter of the Wildlife Society in RMNP this year (see article in this issue). The number of males and females in our model is assumed to be equal (50:50 sex ratio). Each year the computer selects an individual and then based on the survival rate in the population "decides" whether the animal will live or die. If the animal dies its home range becomes empty and is available for dispersing animals. If the animal lives it reproduces. In our model (as in real life) only females produce young. Each of the young is then assigned a gender and survivorship. For surviving young the computer then "decides" whether the animal will disperse or not and how far it will go. If the dispersing animal encounters a vacant home range it will settle there. If not it will move once more. Again, the computer assigns the animal a dispersal distance and if the animal does not find a vacant home range after its second dispersal attempt it will die. The computer cycles with this "decision" process through each and every individual in the population and at the end of the year (iteration) updates the location of each virtual animal on the virtual landscape. The final iteration of the model is when otters reach the Grand Canyon.

How does the computer "decide" whether an animal will survive or die? Or how many young it will have? We create a distribution of survival rate and "ask" the computer to randomly draw from it.

These distributions are derived from data collected in other studies and published in the literature. Similarly we use distributions of litter sizes, number of dispersers per generation, and dispersal distances. We use different survival rates, reproductive rates, dispersal rates, and dispersal distances in each simulation to explore the effects of the level of these variables on population expansion.

One can imagine that as the population increases (more individuals) and expands, the time it takes the computer to run through each iteration increases, because the same calculations are done for each individual animal. Therefore such spatially explicit, individual based models require high computer power and appropriate computing facilities. We thank the Wyoming Geographic Information Science Center for providing us with these capabilities.

In our initial simulations, assuming no barriers to dispersal, survival rates were by far the strongest limitation to river otter population expansion. Those simulations resulted in range expansion of 2,000 to 6,000 square kilometers per year. At that rate it would take between 45 and 134 years for otters to naturally recolonize the Grand Canyon from RMNP and the WGR. These values suggest that natural recolonization under the best circumstances will not occur in our lifetimes. One needs to remember, however, that the model assumes that no otters exist outside RMNP and WGR, which is probably incorrect. If otters are already common further down stream then natural recolonization of the Grand Canyon will be faster. Therefore, our task will be to survey larger areas in Wyoming, Colorado, New Mexico and Arizona to determine the current population status of river otters along tributaries of the Colorado River.

Photo by Eric Peterson©

On the other hand, in our initial simulations we ignored barriers to dispersal all together. We did not account for the potential effects of dams, roads, urban areas, water loss, pollution, and lack of suitable habitat on both population dynamics (survival and reproduction rates) and dispersal. Future modeling work, therefore, will attempt to assess relative effects of movement barriers to river otter dispersal. This exercise, we hope, will assist us in making management recommendations for improving dispersal corridors for river otters in the Colorado River Basin.

By improving habitat quality for river otters along the Colorado River we are likely to not only help river otters naturally recolonize the Grand Canyon but also improve habitats for multitudes of other species including ourselves.

Otter Updates

By Tracy Johnston

Colorado Division of Wildlife officials are planning a study of river otters along the Piedra, San Juan and Pine river complexes. The study will be a follow up to the state's otter reintroduction program that took place between 1976 and 1992. Biologists will attempt to determine a count of the elusive animals using physical signs, such as scat and prey remains. The study will be funded by the Nongame and Endangered Wildlife Fund. Colorado taxpayers may contribute to the fund on their 2001 income tax forms.

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The Ohio Department of Natural Resources, Division of Wildlife, announced the Ohio Wildlife Council removed the river otter from the state's endangered species list this April. Ohio, as well as neighboring states Indiana, Kentucky, Pennsylvania and West Virginia, have all reintroduced river otters back into their states. Otters have now been spotted in 52 Ohio counties.

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Missouri Department of Conservation Fisheries Research Biologist Gary Novinger is seeking information about present or past efforts in other states assessing the impact of river otters on freshwater fish. The information will help him develop a project scope and methodology to study angler reports that river otters are damaging sport fisheries in small streams in the Missouri Ozark. You may reach Gary at novingg@mail.conservation.state.mo.us or at 573-882-9880, ext. 3225.

Rocky Mountain National Park officials conducted their bi-annual river otter population census on March 2, 2002. Twenty-eight volunteers, park officials and Colorado Division of Wildlife employees participated in the survey. Signs of an estimated twelve river otters were found, although officials believe this is a low assessment of the number of otters using the park and believe the population is stable and better reflected in prior years' surveys. Due to extremely cold weather (with temperatures remaining at or below −16 degrees Fahrenheit throughout the day), fresh, wind blown snow, and a lack of open water on many routes, two usual routes were not surveyed and several others were not completed. The survey is conducted every two years as a follow up to the state's reintroduction program. Rocky Mountain National Park river otter census reports are shown below:

Rocky Mountain National Park Otter Census Results

RMNP Survey Date	Number of Otters
2/20/89-2/21/89	14
3/11/90	13
3/28/92	15
3/5/94	17
2/24/96	15
2/28/98	16
3/4/00	22
3/2/02	12

Source: Rocky Mountain National Park.

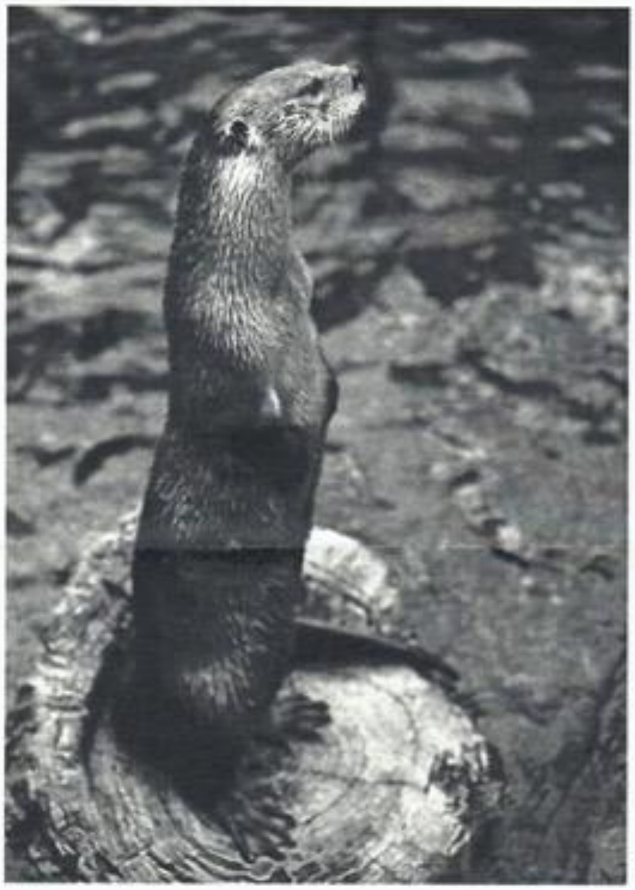
Otter Conservation Education Campaign in Africa

By Dr. Jo Thompson

As a direct result of the August 2001 IUCN/SSC African Otter Specialist Group meeting (The River Otter Journal, Vol. X, No. 2, Autumn 2001), a new project has been launched to create a conservation education brochure about otters in sub-Saharan Africa for Africans. Raising public awareness and providing educational materials is tantamount as a first step for African otter conservation. This first-of-its-kind project will be produced in Kinshasa, Democratic Republic of Congo by the Lukuru Wildlife Research Project in collaboration with the IUCN/SSC African Otter Specialist Group (OSG), Aktion Fischotterschutz, and the Congo Institute for the Conservation of Nature. The narrative was written by Dr. Jo Thompson, under the advise of Mr. Claus Reuther, Chairman of the IUCN/SSC OSG. The artistic interpretations are by Mr. Kizito Ngoma Muanda. The brochure text will be translated into indigenous languages of French and Lingala. The translator is Mr. Masokony Euarist. Lingala is the commercial language for all rural people across the whole of the Congo Basin (countries including DRCongo, Congo-Brazzaville, Cameroon, CAR, Gabon, Equatorial Guinea, and Angola) in Equatorial Africa. The Lingala version will be distributed in the hinterlands of all the Congo Basin countries. The French version will be distributed in the urban areas of those countries and other lingua franca countries. Partial funding for this multi-page brochure (or depliant) will be provided by otter SSP institutions.

River Otter Photos from Colorado's Ocean Journey Aquarium

All photos are courtesy of Eric Peterson and copyrighted 2002.



Otter Place Names: You "Otter" Go There

By Paul J. Polechla Jr.

Often times, geographic localities are named after people, events, and even other localities. The most picturesque place names to me, however, are those that are named after plants and animals living in the area. Here in New Mexico and the "Wild West" names like Pinyon Hills, Bear Wallow, Wild Horse Mesa, Bug Scuffle Canyon, Buffalo Head, Coyote Arroyo, and Beaver Creek conjure up an image in our minds even though we may have never visited the place. Usually our predecessors named these places after animals that they commonly saw. If we have been there, the place names are indelibly etched in our minds. Some of the most exciting names to me are those referring to otters.

What pray tell can you learn from maps and toponymy that is useful to the study of otters or "otter-ology"? When you see place names that have otters in them, it usually means they are or once were common at this place. While I was researching otter ecology in Arkansas it was helpful to me to understand their past distribution and relative abundance. This historical approach requires reading old leather-bound books written by early pioneers and studying fragile parchment maps penned by early explorers. In this manner, I hoped to have a method of comparing the past with the present-day data. I wanted to gain a sense of how we've done as far as managing for otters, now versus then. They say that if we don't learn from history, we are doomed to repeat it. Well, my historical approach worked well; I was able to establish that otters originally occurred nearly statewide. Otters went through a drastic decline and then a big rebound.

While traveling around the country, I began to notice other places that were named after otters. I began to jot them down first as a curiosity and then as an obsession. Lately, the "bug" has been biting me so badly that I began a world-wide web search on the Geographic Names Information Service of the U.S.G.S. and Topozone.com. There were over 175 geographic places that had the word "otter" in them. Another 15 had "sea otter" in them and as expected these were all along the Pacific coast from California to Alaska. At least 33 states contain "otter" place names...from Maine to California and from Florida to Alaska. Otter place names pretty much occur from "sea to shining sea." Overlaying these localities with the known original scientific distribution of river otters (from E. Raymond Hall's 1981 work) in the U.S., it is a fair match.

Most of the otter place names refer to geological places. There are "Otter" Creeks, Ponds (the most numerous otter place name), Lakes, Bays, Coves, Falls, Swamps, Sloughs, Springs, Straits, Rapids, and even Glaciers reminding us of their love for water. Artificial wetlands are not left out either: 'Otters' Water Well (in Spanish), 'The Otters Lateral' (in Spanish; a canal), Otter Pond Ditch, Otter Drain, and Otter Creek Reservoir. There are Otter Cliffs, Capes, Hollows, Islands, Points, Sinks, Bars (no, not that kind of bar!), Summits, Gaps, Mountains, and Forests to remind us of the upland areas that are adjacent to otter wetlands. There are many man-made features named after otters: Otter Trail, Peak of Otter Dam, Upper 'Otter' Limestone Pit (in Spanish), Otter Point Recreation Site (naturally!), Otter Slough State Wildlife Management Area (of course!), Ottrr Valley School, and even Otter Gap Church. There are towns and cities, cemeteries, camps, and schools named after otters. I have two English language favorites: "Otter Slide Creek" in Idaho and an "Otter Slide Rapids" in Wisconsin. You can just imagine a playful otter careening down a slippery bank to splash into the water. The "crème de la crème" has to be "Otter Tail Creek," "Otter Tail River," "Township of Otter Tail Peninsula," and "Otter Tail County," all in Minnesota. I can just see an ol' otter's tail snaking back and forth as it swims across the surface of one of Minnesota's ten thousand pot-hole lakes and numerous streams. Or perhaps a river's typical "S" shaped bend reminded the river's namer of an otter's tail in action.

Otter place names are not restricted to English. My foreign language favorites are in the romance languages. In Arkansas and Louisiana, where many French settlers colonized after the Native Americans, there is a "Bayou de Loutre" (pronounced "By-yew day Lay-oh-tray") meaning "Otter Slough." When I last checked, it was a lazy stream lined with stately bald cypress trees and peppered with otter scats and prints. "Pass a Loutre" is one of the many braided Louisiana "passes" or channels of the Mississippi River Delta, which wanders to the Gulf of Mexico.

In New Mexico, where the Spanish conquistadors roamed, you will find a village along the Rio Grande called "Las Nutrias" (pronounced "Lahs New-tree-ahs"). Looking up any standard Castilian Spanish/English dictionary you will find the translation to be simply "the otters." One might think that this name referred to the exotic, South American, large, semi-aquatic, round- and scaly-tailed rodent with a white-tipped nose; the coypu (*Myocastor coypu*). George H Lowery states that the common name "coypu" is derived from the Araucanian language of Chile. This critter today is commonly but improperly called "nutria" as well. According to old maps, the village of Los Nutrias has been around since 1682. This predates the introduction of the coypu into the United States considerably. Much later, in 1899, the first coypus were brought from South America to California for fur farming. In 1937, the New Mexico Game and Fish brought coypus from South America and stocked them onto Bitter Lake National Wildlife Refuge. Luckily, it appears that they did not really "take" there. The late E. A. McIlhenny, of Tabasco sauce fame, brought them from Argentina to Avery Island, Louisiana, in 1938. There and elsewhere they escaped from captivity, spreading like weeds to different regions of southern and western United States. Now, this exotic rodent is considered a nuisance in many places and may compete with our native muskrat *(Ondatra zibethicus)*. Therefore, these early 1600's references to the Nutria could not have referred to the coypu.

A current dictionary of the Spanish dialect of northern New Mexico and southern Colorado, written by Ruben Cobos, states that "nutria" means beaver, not otter. Castilian Spanish word for beaver is "castor." The Spanish then had a word for the European beaver *(Castor fiber)* and the European otter *(Lutra lutra)*. Initially, when they came to the New World and they saw their American counterparts the American river otter *(Lontra canadensis)* and American beaver *(Castor canadensis)*, they called them by their Old World names "castor" and "nutria" ("Lutra" and "Lontra" are Latin cognates for otter.) When overzealous trappers nearly wiped beaver out in early to late 1800's, they nearly wiped out otters too. Beavers, being herbivorous, are generally more abundant than the carnivorous otter, ecologically speaking. I think that as beaver populations dropped, castor and nutria were used interchangeably until nutria was used for the beaver. Juan Pablo Gallo and L. Rojas's review of colloquial names for Mexican mammals uses "nutria" for the closely related Neotropical otter *(Lontra longicaudis)*. J.C. Winter and his collaborators, in their book on place names in the Four Corners region of the Navajo Nation, translate nutria as otter also. They list both a village called "Nutria" and a "Nutria Creek." Arizona has a town in Apache County named "Nutrioso," an amalgamation of the word nutria and oso (Spanish for bear).

There are a few otter place names in the Swedish word for otter, which is "utter." However, this may refer to the mammary gland of a cow also. I'll leave it to a Swedish speaker to decode this one. There probably were a few places in Alaska that had Russian names with "vidra," until the Americans took over in 1867. When new regimes enter a land they replace many of the geographic names with their own language. Prior to that there were probably Native Alaskan and Native American names involving the word otter as well. An analysis of the languages of the Comanche, Navajo, Zuni Pueblo, and Taos Pueblo people show that each Southwestern tribe had a unique (different from other languages and different from other animals) word for the otter.

So anyhow, folks, if you are pouring over the maps and find an otter place name in your "neck of the woods," let me know. If you get a chance to, you "otter" go there also. See if there are otters still playing around. Happy trails.

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Population Survey for River Otters in Rocky Mountain National Park

By Jason Herreman and Merav Ben-David

A spatially explicit, individual-based model evaluating the potential of natural recolonization of the Grand Canyon by river otters from upper reaches of the Colorado River (see this issue) assumes a viable source population in Rocky Mountain National Park (RMNP). Judy Berg conducted surveys of river otters in the upper Colorado River between 1992-1997 and determined that the region was at carrying capacity (i.e., had the highest possible number of otters given the amount of food and habitat available) and that successful reproduction was occurring. Because this spatial model assumes continuous reproduction and dispersal from the source population, it is important to establish that the trends in population levels of river otters in RMNP observed by Berg have not changed.

Thus, we initiated population surveys of river otters in the RMNP with the assistance of the University of Wyoming Student Chapter of the Wildlife Society (UW-SCTWS). The goals of the surveys were to identify river otter latrine sites along the upper reaches of the Colorado River, monitor scat deposition as an index of population size, and evaluate seasonal changes in latrine use to determine the preferred sampling period. Surveys were conducted during two different sampling periods, spring (April 28-29) and fall (September 22-23) of 2001. We surveyed 7.41 km of stream in spring and 8.49 km in fall. We identified activity sites of otters by trails entering the water, tracks, and feces, and determined their location using handheld GPS units. We then characterized each site with respect to topography, composition of terrestrial vegetation, composition of river substrate, and presence of otter feces.

Photo by Eric Peterson©

During the spring survey we identified 18 different river otter activity sites along 7.41 km of stream (i.e. 2.4 activity sites/km of stream). In contrast, we identified only 12 activity sites during the fall survey along 8.49 km of stream (i.e. 1.4 activity sites/km of stream). Additionally, the average number of feces per activity site was higher during the spring than fall (10.4 and 4.6 respectively). We suspect that the higher level of activity was a result of river otter behavior rather than a change in density. Our spring survey may have occurred during the mating period when both males and females likely advertise their reproductive status. Nonetheless, we do not have a complete knowledge and understanding of the life-history strategies of river otters in the intermountain west and realize that additional studies are necessary if we want to be able to predict the relation between otter behavior and the signs they leave behind. If our observations are indeed consistent among years (something we hope to establish with future surveys), we recommend that river otter surveys should be conducted during late spring rather than fall.

Unfortunately, we are unable to accurately estimate numbers of river otters in RMNP using our study design. At best, such surveys can give us an index of population status. We can say "we have seen a lot more sign this year than last, so there must be more otters this year" but not much more. There are methods to accurately estimate wildlife populations but most of them are not applicable to studying river otters because these critters are hard to catch and are nearly immune to re-captures (which are pre-requisites of sound population estimates). Although we are developing a method that will enable us to estimate otter numbers from DNA fingerprinting of feces (by identifying individuals from the DNA fingerprint of the feces), we haven't applied this method in RMNP yet. So, what can we say about otter numbers in RMNP from our survey? The highest density observed in freshwater systems was one otter per 2.7 km of stream observed by Wayne Melquist in Idaho. By comparing Melquist's report with our observations it appears that we have as much sign of activity as he observed in his study. By applying the Idaho density to the section of the

Colorado River we surveyed we estimate that a minimum of three river otters inhabit this stretch of stream. If we extrapolate this density to the entire length of the Colorado River within the boundaries of RMNP, we get an estimate of 18 river otters. These values were used in the spatially explicit individual-based model.

Some interesting results we obtained from our measurements of habitat variables. Using some complicated statistics (logistic-regression models) we found that brush, cobbles, and stream shading were the variables most significant in discriminating between sites used in spring and fall by river otters in RMNP. Our analysis revealed that during fall otters used sites with higher stream shading, more cobbles, and less brush than in the spring. We interpret these results to mean that in fall, river otters chose areas with higher stream shading, which may produce colder water temperatures that would be favored by fish. During spring when water temperatures are colder due to snowmelt this variable may not be as important. The reason otters prefer areas with cobbles in the fall rather than spring may also relate to fish distribution. Trout, the most abundant fish we saw during our surveys, require areas with gravel beds in spring for spawning while in the fall they seek the protection provided by cobbles. Indeed, our data indicate that river otters selected for gravel in spring and cobbles in fall.

Selection of dense brush during spring, however, may be related to protection from predators. During the fall, brush is covered in leaves, which are absent during the spring. Thus, otters may require denser brush in the spring, a season when females raise young, to compensate for lack of leaves and to obtain higher safety from predators. Why are these findings important? They may give us some insights into the requirements of otters in different seasons and may help us assess habitat quality for otters along lower reaches of the Colorado River. This will be essential when we start exploring the availability of dispersal corridors for river otters into the Grand Canyon.

What are we planning to do next? We hope to continue our surveys in RMNP for several more years, to identify individuals from DNA fingerprints of feces to obtain more reliable population estimates, and extend our surveys to other tributaries of the Colorado River. Our first priority will be the Green River in Wyoming, but we hope that with the help of other student chapters of The Wildlife Society we'll be able to cover larger areas and longer stretches of stream.

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Visit the River Otter Alliance Web Page at www.otternet.com/ROA

The River Otter Alliance is a non-profit, tax-exempt group organized to promote the survival of the North American River Otter (*Lontra canadensis*) though education, research, reintroduction, and habitat protection.

All work and efforts for this organization and newsletter are on a volunteer basis by those who share a common concern for the welfare of the river otter and its habitat. We invite all interested persons to contribute their time at any level of the organization.

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