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Food Habits of the North American River Otter (Lontra canadensis)

By Heidi Hansen

River Otter in Yellowstone National Park
Photo by Nathan Varley

Introduction

The North American river otter (Lontra canadensis) is a predator adapted to hunting in water, feeding on aquatic and semi-aquatic animals. The vulnerability and seasonal availability of prey animals primarily determines the food habits and prey selection of the river otter (Erlinge 1968; Melquist and Hornocker 1983). Studies that document food habits of the river otter cover most of their present range in North America. Those studies include south-central and southeastern Alaska (Bowyer et al. 1994; Larsen 1984); northeastern Alberta, Canada (Reid et al. 1994); Arkansas (Tumlison and Karnes 1987); Colorado (Berg 1999); Idaho (Melquist and Hornocker 1983); Minnesota (Route and Peterson 1988); Oregon (Toweill 1974); and Pennsylvania (Serfass et al. 1990). The diet of the river otter has been determined by analyzing either scat collected in the field (Berg 1999; Larsen 1984; Reid et al. 1994; Serfass et al. 1990; Tumlison and Karnes 1987) or gut contents obtained from trapper-caught otters (Toweill 1974). The contents of guts and scats were identified to general groups (fish, crustacean, etc.) or families and species, if possible, in order to determine the prey selection and the frequency of occurrence in the diet of the river otter.

Fish are the most important prey items for river otters, occurring in the diet throughout the year (Larsen 1984; Reid et al. 1994; Route and Peterson 1988; Serfass et al. 1990, Toweill 1974, Tumlison and Karnes 1987). This has been documented by every study done on river otter food habits. For example, Reid et al. (1994) collected and analyzed 1191 river otter scats in all sea-

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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 Spring 2004!

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.

Food Habits of the North American River Otter

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sons in Alberta and found fish present in 91.9% of the scats. Likewise, in Oregon, Toweill (1974) found that fish occurred in 80% of 103 digestive tracts examined. Crustaceans (crayfish), where regionally available, are the second most important prey for otters and may even be consumed more than fish. For example, Grenfell (1974) found that at certain times of the year in a central California marshland, crayfish constituted nearly 100% of the diet. However, river otters are opportunistic foragers and will take advantage of other prey when available (Melquist and Hornocker 1983; Serfass et al. 1990). Other prey consumed by river otters include reptiles and amphibians, birds, aquatic insects, small mammals and mollusks (Berg 1999, Erlinge 1968; Route and Peterson 1988). River otters avoid consuming carrion (Melquist and Dronkert 1987).

Fishes

River otters consume a wide variety of fish species ranging in size from 0.8 to 19.5 inches (2 to 50 cm), as long as they provide adequate caloric intake relative to the energy expended on capturing them (Melquist and Dronkert 1987). Ryder (1955) stated that river otters feed predominantly on prey in proportion to their abundance but in inverse proportion to their swimming ability. Therefore, slow swimming fishes are preyed upon more often than game fishes when both are equally abundant (Serfass et al. 1990; Toweill and Tabor 1982). Slow-moving fishes include suckers (Catostomidae); sunfishes and bass (Centrarchids); and daces, carp and shiners (Cyprnidae) (Route and Peterson 1988). For example, Berg (1999) found Catostomidae to dominate the diet in the Upper Colorado River Basin in Colorado. Likewise, in other regions of Colorado, Beck (pers. comm.) found common carp (Cyprinus carpio) to be the main prey species eaten by otters.

Some specific examples of fish species that have been found frequently in the diet of otters include: Catostomidae - suckers (Catostomus spp) and redhorses (Moxostoma spp); Cyprinidae - carp (Cyprinus spp), chubs (Semotilus spp), daces (Rhinichthys spp), shiners (Notropis spp and Richardsonius spp) and squawfishes (Ptychocheilus spp); Ictaluridae - bullheads and catfishes (Ictalurus spp). Other fishes that are important in the otters' diet include: fishes that are often abundant and found in large schools such as sunfishes (Lepomis spp), darters (Etheostoma spp) and perches (Perca spp); and bottom dwelling species that are susceptible because of their habit of remaining immobile until a potential predator is close such as mudminnows (Umbra limi) and sculpins (Cottus spp) (Melquist and Hornocker 1983; Toweill 1974; Toweill and Tabor 1982). Similarly, in Prince William Sound Alaska, perciform fishes (sand lances, gunnels, and ronquils) declined in the diet of otters following the Exxon Valdez oil spill while slower moving crustaceans increased (Bowyer et al. 1994; 2003).

Game fishes, such as trout (Salmonidae) and pike (Esocidae), are not an important part of the diet of river otters (Melquist and Dronkert 1987; Toweill and Tabor 1982). Game fishes are fast-swimming and can find good escape cover, making them less available as prey for the otters (Melquist and Dronkert 1987). However, river otters will eat trout (Salmo spp), pike (Esox spp), walleye (Stizostedion vitreum), salmon (Oncorhynchus spp), and other game fishes during spawning (Blundell et al. 2002; Melquist and Hornocker 1983; Reid et al. 1994; Toweill 1974).

Adult river otters can consume 1 – 1.5 kg (2 – 3 lb.) of fish per day (Serfass et al. 1990). Erlinge (1968) studied the feeding behavior of captive Eurasian otters (Lutra lutra) and documented that larger fishes ranging from 6 to 7inches (15-17cm) were preferred more than smaller fishes ranging from 3 to 4 inches (8-10 cm) and that otters had difficulty catching fish less than 4 inches (10 cm) or larger than 7 inches (17cm). Otters bring larger fish onto land to eat whereas smaller fish are eaten in the water (Serfass et al. 1990).

An otter feeding on kelp greenling.
Photo courtesy of Merav Ben-David

Crustaceans

Across North America where crustaceans, especially crayfish (Cambarus spp, Pacifasticus spp, and others), are locally and seasonally abundant, otters may selectively feed on them more than fish (Route and Peterson 1988). In Georgia, crayfish constituted 2/3 of the prey items in the summer diet and were present in 98% of the summer scats. In the winter, crayfish constituted 1/3 of the diet of otters in Georgia (Noordhuis 2002). Tumlison and Karnes (1987) documented a shift in the river otters' diet from fish to crayfish with a shift in water levels in a swamp in Arkansas. During the winter and spring when the water levels were higher, otters fed on crayfish (73% of scats had crayfish remains) more than on fish (Tumlison and Karnes 1987). However, during low water events, crayfish will seek out shelter while fish become more concentrated and highly vulnerable. Therefore, fish are more susceptible to otter predation because the easier-to-catch crayfish are more difficult to obtain (Route and Peterson 1988). In marine habitats, crustaceans and archaegastropod mollusks can compose a sizable portion of the diet of otters in different seasons and years (Bowyer et al. 1994; 2003).

Otter Updates

By Tracy Johnston

The IUCN/SSC Otter Specialist Group's IX International Otter Colloquium will be held in Frostburg, MD June 4-10, 2004. Abstracts for papers and poster sessions will be accepted until February 1, 2004. Planned sessions include: Wetlands Conservation, Veterinary Care/Captive Management, Genetics/ Taxonomy, Food Habits, Habitat Use, Behavior, Reintroductions, Toxicology, Education/Outreach, Status and Management, Human Dimensions, Landscape Ecology/GIS, Morphology/ Physiology, and Field Techniques. The cost to attend is $100 for non-students/$50 for students. Additional information and on-line registration is available at http://otter.frostburg.edu.

An additional two-day workshop focusing on otter captive-husbandry issues will also be held at Frostburg State University on June 3-4, 2004. Topics include health care, diet, exhibitry, reproduction, hand-rearing, rehabilitation, training, enrichment, and public education efforts. The cost to attend is $50. Additional information is available from Jan Reed-Smith at jrsotter@iserv.net. A registration form is available at http://www.knoxville-zoo.org.

Colorado's Rocky Mountain National Park will hold its bi-annual river otter population census on February 28, 2004. The survey is part of an on-going monitoring program of the 45 river otters reintroduced into the Colorado River headwaters within the park between 1978 and 1984. Volunteers interested in participating in this one-day survey should contact Mark Daniel at 970-586-1515 after January 1, 2004. Snow shoes or cross-country skis are required to participate in the survey.

European Otter
Photo by Neil Gerrard

Field surveys of the Smooth-Coated Indian Otter *(Lutra perspicillata)* were conducted on the Karnali River of Nepal's Royal Bardia National Park in April and June 2002. The purpose of the surveys was to evaluate threats, assess habitat quality, and to determine the population status and distribution. Based on field surveys of likely habitat and interviews with local persons, the survey concluded Smooth-Coated Otters are common within the park, but are rare outside the park's border. Although this species of otter is protected under the Aquatic Animal Protection Act, they face pressure from degradation and loss of riparian habitat, poaching for pelts, disturbance by human activities, and conflicts with fishermen who view them as competition.

University of Missouri graduate student Nathan Roberts recently reported three primary reasons why the Missouri river otter population increased beyond a projected population of 12,000 to between 15,000 - 18,000 following the state's reintroduction. Reasons include lower age of reproduction, higher pregnancy rates, and greater numbers of pups born per litter:

River Otter Reproduction	Previous Literature	Missouri Data
Pregnancy Rates		
Adults	60%-80%	80%
2 Year Olds	0-10%	80%
Yearlings	0%	40%
Litter Size	2.0-2.5	3.2-3.5

The Colorado Wildlife Commission voted to down-list the river otter from State Endangered to State Threatened on September 9, 2003. Colorado law defines the status of a Threatened species as ". . . any species or subspecies of wildlife which, as determined by the commission, is not in immediate jeopardy of extinction but is vulnerable because it exists in such small numbers or is so extremely restricted throughout all or a significant portion of its range that it may become endangered."

This was the first down-listing of a Colorado endangered species in ten years. The greater prairie chicken was down-listed to Threatened in 1993 and was removed from the threatened list in 1998.

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Heidi Hansen collecting otter scat near den.
Photo by Tracy Johnston

Other

Reptiles and Amphibians

Amphibians, where available regionally, have been identified in the otters' diet during the spring and summer months in many of the food habit studies (Melquist and Dronkert 1987; Reid et al. 1994; Serfass et al. 1990; Toweill and Tabor 1982). The most common amphibians identified were frogs (Rana spp and Hyla spp) (Toweill 1974). Some specific species eaten by otters include: boreal chorus frogs (Pseudacris triseriata), Canadian toads (Bufo hemiophrys), wood frogs (Rana sylvatica) (Reid et al. 1994), bullfrogs (Rana catesbeiana), green frogs (Rana clamitans) (Serfass et al. 1990), northwestern salamander (Ambyostoma gracile), Pacific giant salamander (Dicamptodon ensatus), rough skinned newt (Tarica granulose) (Toweill 1974), and garter snakes (Thamnophis spp) (Melquist and Hornocker 1983; Toweill 1974). Amphibians and reptiles may be more available for the river otter during the spring and summer due to breeding activity, suitable temperatures, or water availability for the prey (Tumlison and Karnes 1987).

Birds

Waterfowl, some colonial nesting birds, and rails are preyed upon by otters in some areas (Berg 1999, Toweill and Tabor 1982). Frequency of occurrence of these species is greatest during summer (when waterfowl broods are vulnerable) and autumn (Toweill and Tabor 1982). Reid et al. (1994) observed otters catching and consuming molting American widgeon (Mareca americana) and green-winged teal (Anas crecca). Other species of birds identified in the otters' diet include: northern pintail (Anas acuta), mallard (Anas platyrhynchos), canvasback duck (Aythya valisineria), ruddy duck (Oxyura jamaicensis), and American coot (Fulica americana) (Roberts unpub. data; Toweill 1974). Erlinge (1968) found that Eurasian otters did not feed on bird eggs.

Insects

Aquatic invertebrates have been found to comprise a significant portion of the diet of river otters (Berg 1999, Melquist and Hornocker 1983, Reid et al. 1994, Serfass et al. 1990). Reid et al. (1994) found that otters ate more aquatic invertebrates in the summer as the insect populations increased and certain life stages became vulnerable. Most aquatic invertebrates consumed are from the families Odonata (dragonfly nymphs), Plecoptera (stonefly nymphs) and Coleoptera (adult beetles) (Berg 1999, Reid et al. 1994). Toweill (1974) found one leech (Hirudinidae) present in the 103 digestive tracts examined. However, invertebrates found in scats or digestive tracts could most likely be a secondary food item, first being eaten by the fish that are later eaten by otters (Larsen 1984, Toweill 1974).

Mammals

Mammals have been reported infrequently in the otters' diet and are not a major food source (Larsen 1984; Melquist and Dronkert 1987). Mammals that are eaten by the otters include small mammals or riparian species (Berg 1999). The few accounts of mammals identified in the diet of otters include: muskrats (Ondatra zibethicus), meadow voles (Microtus pennsylvanicus), eastern cottontails (Sylvilagus floridanus), and snowshoe hares (Lepus americanus) (Field 1970; Reid 1994; Serfass et al. 1990). There are varying accounts of otters preying upon beavers (Castor canadensis). Green (1932) reported evidence of otter predation on beavers in the southern boreal forest of Manitoba and it is commonly contended by trappers in Alberta that otters are significant predators of beavers (Reid et al. 1994). Reid et al. (1994) found some beaver remains in 27 out of 1191 scats analyzed. However, many other studies have not found any beaver remains in the scats sampled (Gilbert and Nancekivell 1982; Tumlison and Karnes 1987).

Conclusion

Food habits of river otters are mainly determined by prey availability (Ryder 1955). This availability may be determined by the following factors: (1) detectability and mobility of the prey; (2) habitat availability for various prey species; (3) environmental factors such as water depth and temperature; and (4) seasonal changes in prey abundance and distribution in relation to otter foraging habitat (Melquist and Dronkert 1987; Route and Peterson 1988). Otters are not believed to seriously reduce prey populations. When an abundant food source diminishes or other prey become available, otters either move to a new location or shift their diet to the most available prey (Melquist and Hornocker 1983). Although other prey species are important to the river otter temporally, the potential limiting factor to the river otter being established as a permanent resident is the availability of fish year-round (Melquist and Hornocker 1983).

Prey may be either under- or over-estimated in scat analyses due to the composition of the prey. For example, prey with harder remains such as crayfish tend to be overestimated while prey with soft body parts are not identified (Erlinge 1968; Larsen 1984). However, the studies to date on river otter food habits give a reasonable record of seasonal variation in prey selection. The weight of evidence from a wide geographic area and different habitats reveals the importance of fish to otters, the tendency of otters to feed on the most available prey, and their willingness to shift to alternative prey when those become more profitable.

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Otter Updates

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The International Otter Survival Fund (IOSF) conducted an otter population survey of the Scotland's Isle of Tiree August 2-9, 2003. Surveyors searched the Tiree coastline for actual sightings of the European Otter (Lutra lutra), as well for as tracks, scat, latrine sites, freshwater pools, dens and resting areas. Based on a comparison of the data gathered and an assumed correlation between the otter populations and the number of dens found on the islands of Shetland and Skye, the Isle of Tiree's permanent population is estimated to be between six to eight otters. (See the full report on the IOSF web site at http://www.otter.org.)

Photo by Eric Peterson®

The Land Otter Totem Pole

By Dr. Jo Thompson

Native American beliefs are simple but wise; nature is the basis of their beliefs. In most Native American lore, we find references to the Land Otter as a trickster or supernatural being when encountered by people. The Land Otter had a special significance among the Tlingit, in the Pacific Northwest. Although harmless, the Land Otter was dreaded more than any other animal because it was believed to have supernatural powers, particularly over people who were drowned. It was supposed to rescue them into "koosh-da-kah" or into the state of being a Land Otter Person. According to Tlingit mythology, the Land Otter was once a human being. As a supernatural being, the Land Otter stole the spirits of humans who had drowned. The Land Otter lured the victims of overturned boats and canoes to their land. By feeding them fish and kelp, the victims who partook of the feast changed into Land Otter People. In Tlingit culture, Land-Otter-Man (called Kuskdaka) rescued the souls of drowning people and turned them into Land Otters.

Carrying the Land Otter theme further, one special pattern of Tlingit basketry is called "The Track of the Land Otter." Using the Spruce tree roots, the design represents the track of the Land Otter in snow or mud with its heavy tail dragging behind, making a groove. This is an old design and not common.

Several North American Native Indian tribes used special animals in the creation of their authentic totem poles. Land Otters were used to illustrate the totem poles of the Menomonis, Ojibways, and Seminoles of the Mississippi Algonkin or Pueblo tribes, and the Haidas, Eagle clan, and Creek tribes of the Northwest Indians. The most renowned native Indian totem pole depicting a Land Otter is the "Land Otter Pole" located in the Totem Bight State Historical Park, Ketchikan, Alaska. According to the Alaska Department of Natural Resources, the "Land Otter Pole" was designed and carved in 1947 by John Wallace. Harsh weather and time took its toll on the original pole. In 1996 Master Carver Nathan Jackson carved a second replica, which now stands in the Totem Bight State Historical Park. The hero of the story stands on top wearing a dog-skin headdress. The hero holds in one hand the tail of an otter, and in the other hand a carved club. The carved club is symbolic of magical powers allowing him to outwit his enemies. Below is a drowned man holding onto two logs being taken to the home of the Land Otters, represented by the human-like cave being below the logs. At the base is a devilfish.

The Land Otter holds special significance for our Native Americans. Let's hope that it continues to hold special significance for all Americans.

River Otter Study on Mount Desert Island, Maine

By Carol Peterson

Note: The following information is from the senior project study, College of the Atlantic, May 1998 by Peter Diachum. The intent of the study was to update the river otter data to the current distributions in Acadia National Park and create a new model predicting suitable river otter habitat.

The area of study, Mount Desert Island (MDI) is located in the Gulf of Maine and is approximately 281 km2. All surveys were conducted in watersheds within the boundaries of Acadia National Park. The survey included 25 out of a total of 110 watersheds in Acadia National Park. A total of 35 surveys were conducted between Dec. 11, 1997 and March 7, 1998 and were compared to past studies.

During the winters and summers of 1985-1987, Leslie Dubuc conducted a study to determine the abundance of river otters in watersheds on Mount Desert Island. Dubuc found that river otters were using 18 out of 39 watersheds surveyed. In 1992, Carolyn Reeb surveyed watershed use and found that on the eastern side of MDI, 7 out of 12 watersheds were being used by river otters.

Dubuc found that the most important factors influencing river otter distribution included access to food resources, beaver activity, stream length and shoreline diversity. The most important factor that determined river otter habitat was food. During the winter, river otters prey primarily on fish species in streams. As lakes and ponds become more productive in summer, otters shift from foraging in bays and streams to foraging in lakes, ponds and streams for frogs, crayfish, amphibians, reptiles and fish.

In the 1997-1998 study, of the 25 watersheds surveyed, 13 watersheds were used by otters and 12 were unused. Most of the surveys were conducted in watersheds previously surveyed by Dubuc and Reeb. There are some hypotheses for the change in the presence to absence of otters in watersheds from the 1985-87 survey to the 1998 one. Male river otters tend to have large home ranges, which often extend into more than one watershed. Dubuc states the river otter home range may include up to 78 linear kilometers of waterways, and individuals may travel as much as 42 km in a single day. Other factors might include mortality, a change in

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Letter to the Editor

Dear Editor:

Recently the state of Colorado decided to change the status of river otters (Lontra canadensis) from endangered to threatened. The effects of such downlisting are not yet clear because we have no knowledge on the actual numbers of river otters in the state, and we do not know whether this downlisting will result in increased mortality. As things stand, only time will tell.

The decision to change the status of river otters in Colorado came as a surprise to many of us who reviewed a draft of the recovery plan earlier this year. The draft of the recovery plan called for such downlisting to occur by 2005 after extensive surveys determined that 3 populations are established on separate rivers in the state. The criteria for establishment of viable populations (Adopted from the State of Colorado River Otter Recovery Plan, July 2003) require that:

1. River otters occupy a minimum of 50 kilometer (km) (31 miles) of contiguous stream length.
2. River otter sign is present in each 5 km (3.1 mile) section of the 50 km (31 mile) stream length during the survey year, with the exception of up to a total of 10 km (6.2 miles) of unsuitable/unoccupied stream reaches, or reaches where surveys cannot be conducted.
3. Surveys conducted 5, 10, and 15 years after reintroduction indicate population persistence on each recovery stream. (If surveys were not conducted 5 or 10 years post-release, criteria met at 15 years post release would indicate population persistence.)
4. There are documented sightings of river otters on at least 2 connected tributaries or on an additional 15 km (9.3 miles) of the recovery stream outside of the 50 km (31 miles) occupied length.

While these criteria may seem reasonable given the difficulty of obtaining a formal estimate of otter numbers, a decision to downlist otters to a threatened status based on them may be premature. Many of us who study river otters know that a single otter may occupy a 50 km stretch of water-way, especially where prey abundance is low or habitat is less than optimal. For example, Bowyer and colleagues (2003) found that river otter home ranges can be as long as 60 km of shoreline in marine environments, where prey densities are usually higher than those of freshwater systems. Also, river otters are prolific in using feces, urine, and anal gland secretions to mark throughout their home range. Because an otter may defecate on average 8 times every 24 hours (Ben-David, unpublished data) it is likely that each section of stream will harbor river otter sign even if very few individuals occupy the area.

It is true; numerous observers (including volunteers for the Colorado Division of Wildlife, employees of the Division, and members of the Student Chapters of the Wildlife Society from Colorado State University and University of Wyoming) found river otter sign and even had sightings of animals in surveys throughout the state. Nonetheless, such observations--although valuable and informative (especially those of females with young)--cannot be relied upon to conclude that viable otter populations exist in the state. Again, such observations are anecdotal in nature and provide little confidence that populations are viable. For that, formal estimates of animal numbers are needed.

Recently the Colorado Division of Wildlife initiated a project to develop a method for obtaining a formal estimate of river otter numbers in Colorado. This method is based on individual identification of animals from DNA extracted from feces and hair and has been successfully used to determine the number of brown and black bears (Ursus arctos and U. americanus) in Yellowstone and Alaska, martens (Martes americana) in British Columbia, and others. It is expected that development of the method for river otters in Colorado will take 2 years, which would have fit with the planned downlisting of 2005, assuming that a formal estimate of the number of otters is obtained. For that reason, many of us were puzzled by the early decision to downlist.

There is little that can be done now. The decision to downlist to a threatened status was made and is in effect. All we can wish for and ask of the Colorado Wildlife Commissioners is that the next step in the process; complete delisting; will not be rushed. Those making the decisions should allow information on the effects of downlisting to accumulate. That will take several years. Also, serious consideration of results from formal population estimates should precede any future status changes. Because the people of Colorado invested a lot of time, effort, and money to bring the otters back, we have to ensure that the fruits of these efforts are not eliminated as a result of their actions and decisions.

Yours,
Merav Ben-David
Assistant Professor
Department of Zoology and Physiology
University of Wyoming

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water quality, or a shift in food resources.

The analysis performed on the 1998 data generated five variables that could be used to predict otter presence or absence in watersheds. Those model factors included: birch-aspen, shoreline diversity, active or inactive beaver sign, stream length and wetland softwood. Birch-aspen is a key food and building resource for beavers. Since watersheds altered by beavers provide excellent habitat for otters, it is an indicator for otter habitat. Wetland softwood is also a good indicator. River otters are secretive animals that dislike human contact. Tall vegetation, tree roots, and concealed logs offer a secluded place for foraging and lodging. The presence of beaver plays a significant role in river otter ecology. Beaver alter watersheds to create stable water, deep ponds and bring in food

resources. Protecting beaver habitats and food resources are the most important factors in protecting river otters. It is also recommended to establish vegetation corridors along waterways that emerge from the park. Homeowners should be contacted to help develop a vegetative buffer along streams and waterfronts to minimize human disturbance.

Studies were provided by Park Biologist Bruce Connery.

Lessons of the Yup'ik Eskimo Otter Mask

By Paul J. Polechla Jr., Ph.D.

The other night as my friend was carting a pumpkin into the house to show off, I detected a chill in the air, a true clue that impending fall and winter are around the corner. As she looked at the pumpkin, I could tell by the gleam on her face that she imagined a jack-o-lantern face that she would later carve for Halloween in Roswell, New Mexico. Although I am unsure as to where the custom of carving pumpkins for "All Hallow's Eve" originated, I can appreciate the need to carve faces. It seems to be entrenched in many cultures of the world. Everyone fantasizes about being something they are not, even for a moment, to idolize, to revere, and/or to entertain others. For example, during "Mardi Gras" or Fat Tuesday the French Canadian or Cajuns traditionally donned masks of their own design to celebrate before having to observe Lent. Of all the cultures of the world though, I feel that indigenous cultures such as the Yup'ik Eskimo culture of western Alaska has one of the richest tradition of mask making.

While working in Alaska as a sort-of cross-cultural biologist during one long winter, I was starting to get "office-fever." This is a kind of "cabin-fever" that I contracted by staying cooped up in my cubicle crunching numbers like scientists do. I had used enough of my objective "left brain" and wondered how I could exercise my subjective "right brain," as well as my atrophied muscles, which had become victims of sitting too long.

About that time, a perky co-worker popped by my office and encouraged me to take part in a Yup'ik Eskimo dance club our Kuskokwim "Community College" was sponsoring for an upcoming "Camai (Yup'ik for hello) Dance Festival." Yup'ik dance, for the uninitiated, is a dance form in which body and arms are moved but the feet are not. It is like Tai chi above the waist, set to the large pounding of huge walrus stomach covered drums. Even though it can be coed, it is often a 'team sport' as practiced today. Our small town of 4,000 people hosted this international event that was broadcast to Alaska, the lower 48 states, and also to Canada. Although I had some reservations of shyness, I decided to be like Nike and "Just do it!" Upon our dance troupe's first get together, our instructor the famous artist Earl Atchak explained he would like us to bring back two traditions for our dance that depicted walrus hunting that non-Native religious zealots had banned when the missionaries arrived. First, he wanted the men to go bare-chested, and second, he wanted us to wear walrus masks like in the old days. I said, "What the heck; I'll go native."

Because I liked carving, Earl "volunteered" me to help in making five masks. And because I had been fortunate enough to see walruses in the wild off of Round Island, I decided to come up with my own design for the mask I was to wear. I studied Eskimo art books and found a beautiful traditional wooden one that looked rather realistic (see Fineup-Riordan 1996, p. 300). In still other books I examined, I found a photo by Larry J. Beck's 1986 mask that he entitled "Punk Walrus Inua" (Fitzhugh and Crowell 1988, p. 333). Although Larry came from the Yup'ik homeland of western Alaska, he now lived in the "modern world" of the "lower 48" states. His creation was made of what some people might call junk…that is baby moon chrome hubcaps (for the face), dental mirrors (for the eyes), oil spouts (for the tusks), safety pins (for folds of skins), and wire bristles (for the mustache). It looked like a walrus all right--but with the materials donated by rock band "Metallica"--yet it strangely had an "inua" or Yup'ik helping spirit. I couldn't make up my mind which I liked best, the realistic one or the modern one.

I showed Earl the pictures, and he, too was impressed by both, but he reminded me the artist must create his own design. So, I decided to do an amalgamation of both traditional and modern. I would carve a wooden mask patterned after a drawing I had sketched on Round Island, but make the features large enough to be seen across the high school gymnasium where the

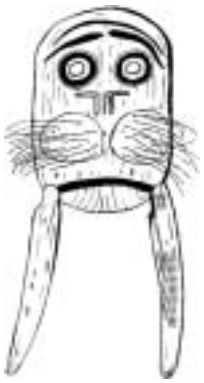

Figure 1

Camai Dance Festival was held. Earl let me do most of the design and carving, but helped me at important crossroads. I carved the walrus mask from a black spruce stump that had drifted down to Bethel from a place far upriver on the Kuskokwim River…a place where the land or river otter was common. I carved with hatchets and draw knives, power drills and electric sanders. Then, I painted it with both natural ochre and artificial bright-yellow acrylic paint. I topped it off with bright yellow nylon bristles from a new-fangled broom for the hairs of the walrus's mustache. And voila, I had this "your walrus on steroids"! (See Figure 1.)

What does this have to do with otters? Maybe nothing, except I was taking a break from number crunching again, looking through the coffee table books of our University of New Mexico Bookstore, and when I noticed an eye-catching book on Yup'ik masks by Ann Fienup-Riordan (1996). On page 223, there is a striking photo by Barry J. McWayne of a traditional Yup'ik mask in the Museum fur Volkerkunde housed in Berlin, Germany. The mask, made by a now anonymous Yup'ik carver and collected by Johan Adrian Jacobsen during the late 1800's, is clearly an effigy of a land or river otter (Figure 2)!

From the artist to the eye of this beholder, it could only be an otter, complete with the valvular-looking ears and nose, the paddle-shaped feet, and the fat, but tapering tail. I had seen the outlines and details of many other mammals before including the red fox (like by Yup'ik carver, Joe Chief Jr.) and the arctic wolf (like by Samuel Fox). I had seen effigies of other, more aquatic mammals, like the mink, muskrat, beaver, and seal. But this was the first time I had seen

Figure 2

an otter in Yup'ik masks. Why wouldn't the Yup'iks carve otter masks too? They still utilize the fur and meat from "keggiarnaq", the otter (Kwaraceius 1994). This Yup'ik name, still used today for the otter, is different than the name of all other animals. There is even an Eskimo otter dance (Himmelheber 1993). The presence of this otter effigy mask reaffirmed what I intuitively felt about the Yup'ik culture. It regarded the river otter as unique with a special life force. I was transfixed by the otter mask, an interesting duality. If you look more closely at the otter's back you will see an interesting human face termed the "yua," translated by Jacobsen as the "shaman's helping spirit." The Eskimo people had several beliefs that engendered respect for animals to prevent reduction of sustainable populations. "Tunghak," the "Keeper of the Game" was the force that insured man did not endanger the animals of the Eskimos by the Bering Sea (Fitzhugh and Crowell 1988). In this modern day and age of water pollution and habitat destruction, the rest of us Americans could adopt similar values. My next mask is going to be an otter with a "helping spirit"! Or, better yet, wouldn't it be wonderful to be an otter?

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President's Message

Dear Readers,

Welcome to the Fall 2003 edition of The River Otter Journal.

In this issue, we have a summary of the Otter Action Plan as it relates to the North American River Otter written by Dr. Tom Serfass. We also have an article by University of Wyoming graduate student Heidi Hansen on food habits of the North American River Otter, as well as a summary of the Mount Desert Island river otter population study written by Carol Peterson. Dr. Merav Ben-David has written a letter to the editor discussing the State of Colorado's downlisting of the river otter from Endangered to Threatened status. We also take you to Alaska in two articles in this edition: You will learn about the Tlingit peoples' belief that the land (or river) otter had supernatural powers in Dr. Jo Thompson's article on The Land Otter Totem Pole, and you will learn about the tradition of mask making within the Yup'ik Eskimo culture in Dr. Paul Polechla's Halloween-themed article.

This spring, Lissa Margetts, Director of the Rocky Mountain Ark Wildlife Rehabilation Center, and I had the pleasure of touring the Clinic for the Rehabilitation of Wildlife (C.R.O.W.). There, Dr. P.J. Deitschel and her staff care for injured and orphaned river otters, as well over 200 other species native to their location on Sanibel Island, Florida. Now in its 35th year, C.R.O.W. (www.crowclinic.org) is one of the oldest wildlife rehabilitation clinics in the nation and is recognized as a model for similar organizations. We also had the pleasure of meeting another dedicated otter care-giver, Paula Blum at Tampa's Florida Aquarium. There we also met orphan-otter, Sophie, and transported her back to her new home at The Ark where she joins another orphaned-otter, Llie, you read about in "A Second Chance for Llie" in the Autumn 2002 edition of The River Otter Journal.

Sophie eating smelt.
Photo by Tracy Johnston

As a volunteer-run, 501(c)3 non-profit organization, The River Otter Alliance uses 100% of your donations to produce this newsletter and provide educational and scientific materials to interested persons or groups. We would appreciate your support if you have requested to be on the mailing list for The River Otter Journal and have not yet sent your membership dues. As always, we appreciate your support and hearing from you on topics related to any and all thirteen otter species.

— Tracy Johnston, ROA President and Newsletter Editor

Otter Action Plan

By Thomas L. Serfass, Ph.D.

NOTE: The International Union for the Conservation of Nature and Natural Resources' (IUCN) Otter Specialist Group is engaged in the development of an "Otter Action Plan." The plan is being directed and organized by the chairman of the Otter Specialist Group, Claus Reuther, and is intended to serve as a guide for the conservation of the world's species of otters. I currently have the privilege of serving as the North American Coordinator for the Otter Specialist Group and am preparing the portion of the Otter Action Plan dealing with the North American River Otter. I wrote the following article for a proceedings from a conference hosted by Claus Reuther in Hankensbuttel, Germany, 2002, which focused on establishing guidelines for preparing the Otter Action Plan. The article is not intended to be a comprehensive treatment of initiatives that need to be undertaken to enhance understanding and conservation of North American river otters. Instead, the article highlights a few important topics to serve as examples for the types of issues that should be addressed in the Otter Action Plan.

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The Otter Action Plan 2000 - Expectations for the North American Region

Abstract: Historical records indicate that the North American river otter (Lontra canadensis) occupied most major drainages in the continental United States and Canada at the time of European settlement. By the early 1900s, unregulated trapping, water pollution, and other disturbances to aquatic and riparian habitats had caused otter populations to decline or become extirpated in many areas. During the 1970s, many wildlife management agencies developed strategies to restore or enhance otter populations, including implementation of otter reintroduction projects in 21 states and 1 Canadian province. These progressive management strategies combined with widespread improvements in water quality have resulted in the recovery of many extirpated otter populations. Although native otter populations have received considerable scientific and management attention in North America, the majority of research and conservation related activities have focused on various aspects of otter reintroduction projects. Consequently, there is a particular need to enhance the understanding of ecological aspects of the continent's native otter populations. The Otter Action Plan (OAP) is being prepared through the International Union for the Conservation of Nature and Natural Resources' Otter Specialist Group and is intended to provide a comprehensive and current review of research and conservation initiatives that have been undertaken for the world's otter species. Hopefully, the document will serve to focus future research and conservation initiatives for the North American river otter.

History, Evolution, and Status of Otter Conservation in North America

The first European settlers in North America encountered a virtually undisturbed landscape that supported large and diverse populations of wildlife. These early settlers most likely viewed the availability of wildlife and other natural resources as limitless. Consequently, there were no limits or regulations imposed to control the consumption of these resources. Unregulated hunting and trapping had severe impacts on wildlife populations, becoming more pronounced as the human population grew and expanded across the landscape (TREFFETHEN 1975). Unfortunately, by the late 1800s many species of wildlife had experienced severe population declines, including extirpations and, in some cases, extinction.

During the 1890s concern expressed by recreational hunters regarding declining

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wildlife populations prompted development of the first state and provincial wildlife management agencies (TREFFETHEN 1975). The initial focus of these developing agencies was to implement strategies to protect and restore depleted populations of "game" animals, such as waterfowl, white-tailed deer (Odocoileus virginianus), beaver (Castor canadensis) and wild turkeys (Melagris gallapavo). Conservation strategies, including closed or regulated hunting and trapping seasons, often coincided with trap and translocation projects. In many cases, these management initiatives were highly successful in restoring wildlife populations. However, none of this conservation attention was directed to predatory species, which were regarded by some as destructive to "important" game animals. In fact, noted early conservationists, including Aldo Leopold, initially supported control of predators as a method to protect or increase game populations. As a result, predators typically did not benefit from early wildlife management activities in North America and, in many cases, intensive, generalized predator control caused further declines in their populations. It was not until the mid-1900s that an appreciation and understanding developed regarding the function of predators in ecosystems (ERRINGTON 1967). Although negative attitudes about predators still persist among some segments of society (KELLERT 1985), most state and provincial wildlife agencies have developed management strategies designed to maintain viable predator populations.

As with many species of wildlife that had commercial value, the North American river otter (Lontra canadensis) was overexploited by early colonists. Initially, colonists traded with Native Americans for otter pelts and then exported the pelts to Europe in exchange for manufactured goods (NILSSON 1980). Unregulated exploitation continued through the 1800s and, by the early 1900s, otter populations had declined throughout large portions of their historic range in the continental United States and southern Canadian provinces, including complete extirpation in 11 states and Prince Edward Island, and severe declines in 9 other states (NILSSON 1980). Although otter population declines were widespread, the most severe declines were associated with interior regions where aquatic habitats were less abundant. In addition to unregulated trapping, otter population declines were attributed to water pollution, and other forms of disturbance to aquatic and riparian habitats (NILSSON 1980, TOWEILL and Tabor 1982, MELQUIST and Dronkert 1987).

During the 1970s, improvements in furbearer management techniques and water quality coincided with increased concern about otter declines in North America (ENDANGERED SPECIES SCIENTIFIC AUTHORITY 1978). Consequently, many wildlife management agencies developed strategies to restore or enhance otter populations, including the use of reintroduction projects (RALLS 1990). The first otter reintroduction project was initiated in Colorado during 1976 (TISCHBEIN 1976). From 1976 to present, 21 states and 1 Canadian province (Alberta) have implemented otter reintroduction projects. Otters were completely extirpated in 9 of the states reintroducing otters. However, 12 states and Alberta, implemented reintroduction projects to restore locally extirpated populations, but also retained remnant otter populations in some areas. In the United States, reintroduction projects coincided with enactment and enforcement of federal clean water legislation, thereby providing potential for expansion of native populations and natural recolonization of formerly occupied habitats. Although otters remain absent from many drainages within their historic range, populations have recovered substantially in many areas and are completely extirpated only in New Mexico, North Dakota, and Prince Edward Island.

North American River Otter Research and Conservation: Future Needs and the OAP

A variety of research projects have been conducted on various biological and ecological aspects of the river otter in North America. Most early studies focused on evaluations of food habits and feeding relationships (WILSON 1954, GREER 1955, RYDER 1955, HAMILTON 1961, SHELDON and Toll 1964, KNUDSEN and Hale 1968, TOWEILL 1974). Considerable research attention also

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has been devoted to the evaluation of otter reproductive biology, primarily by examining carcasses obtained from trappers in areas where otters are legally harvested. Much of this research has been conducted to develop and refine strategies for the sustainable harvest of otters. During the last 20 years most research and conservation initiates related to otters predominately have been associated with reintroduction projects. Radio-telemetry studies to monitor fates of reintroduced otters have yielded information on otter movement and spacing patterns (ERICKSON and McCullough 1987, JOHNSON and Berkley 1999). Reintroduction projects also have resulted in the refinement of techniques for capturing and handling otters (HOOVER et al. 1985, SERFASS et al. 1993). Unfortunately, with a few notable exceptions (MELQUIST and Hornocker 1983, REID et al.,1994, BOWYER et al. 1995, BEN-DAVID et al. 2002), few comprehensive biological or ecological studies have been conducted on native otter populations. Consequently, additional research attention needs to be directed towards native otter populations. The OAP will provide a comprehensive and current review of research and conservation initiatives that have been undertaken for the world's otter species. Hopefully, a review of this type will help to focus and refine future research and conservation initiatives for the North American river otter. The remaining discussion provides a partial examination of several topics related to the biology, ecology, and conservation of North American river otter that have received limited research attention and which would undoubtedly benefit by review and discussion in the OAP.

Feeding Ecology: Although food habits of river otters have been investigated in many regions of North America, the studies have relied almost entirely on determining presence or absence of a particular class of prey occurring in an otter scat or digestive tract (frequency of occurrence analysis). Unfortunately, no effort has been made to systematically evaluate if this type of analysis provides a reliable estimate of otter's diet. Also, there have been no studies to determine the size of fish prey taken by otters and, in most cases, food studies have been conducted without assessing abundance of fish prey in study areas. Consequently, no studies have adequately addressed factors that influence the selection of fish prey by otters. Research is needed to evaluate and thereby enhance methods for studying otter food habits. Studies in these areas should be designed to coincide with studies to quantify factors that influence the selection of fish prey. Also, virtually nothing is known about basic metabolic rates and associated energetic requirements of captive or wild otters. Refinement of methodologies to quantify otter food habits combined with an enhanced understanding of energy requirements would enable researchers and managers to more reliably evaluate the role of otters in structuring aquatic communities. Europeans have done extensive work to quantify various aspects of otter feeding ecology (KRUUK 1995). A summary in the OAP of approaches developed by Europeans would be beneficial in directing and enhancing future studies related to feeding relationships of otters in North America.

Habitat Disturbance: In general, habitats least affected by human activities are presumed most likely to be occupied by otters. Unfortunately, little research has been conducted to assess the types and extent of disturbances to freshwater environments that limit the establishment or maintenance of otter populations. Clearly, water pollution such as severe acidic mine drainage has indirectly caused the elimination of otter populations in many drainages through the destruction of the aquatic food web. The individual effects and interactions of other environmental disturbances, including levels of bioaccumulable pollutants in otter prey, alteration of riparian habitats, acid rain, and construction of dams, tolerable to otter populations are poorly understood. In many cases, the role that these disturbances have played in shaping the current distribution of viable otter populations is based on subjective interpretations. Also, interpretations of factors that limit the current distribution of otters are likely to be confounded by past periods of unregulated otter trapping, which contributed to large-scale extirpations (NILSSON 1980).

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Applied research to understand individual and cumulative effects of various habitat disturbances are needed to identify and direct the implementation of specific conservation measures that will benefit populations of otters and other obligate wetland species. However, in many cases the impact of various habitat disturbances on riparian and aquatic wildlife is obvious and reasonably well understood. Consequently, the need for research to fully understand an environmental perturbation should not preclude implementation of conservation programs to address specific problems. Hopefully, the OAP will encourage the immediate implementation or enhancement of programs that: 1) reduce emissions causing acid rain; 2) implement streambank fencing projects to protect riparian and aquatic habitats in areas where livestock are grazed; 3) enhance existing regulations designed to protect or limit the loss of wetlands; 4) further regulate mining activities that cause acid mine drainage; 5) implement strategies to mitigate the effects of existing acid mine drainage; and 6) enhance policies and enforcement activities to control all forms of point and non-point sources of water pollution.

Harvest: Regulated trapping seasons for otters exist in 29 states and all Canadian provinces, except Prince Edward Island. Most harvests occur in states consisting entirely of remnant otter populations. However, Maryland, Minnesota, New York, North Carolina, Tennessee, and Virginia have trapping seasons in areas occupied by native populations but also have been involved in efforts to reintroduce otters. In 1996, Missouri became the only state to allow legal trapping of otters that originated from reintroduced populations. Harvests are managed in a sustainable manner and, overall, are not a threat to otter populations. However, investigations should be conducted to determine if current harvest levels impede natural re-colonization of suitable, formerly occupied habitats by limiting growth and expansion of native otter populations. Furbearer biologists also should recognize that the otter is appealing and important to many segments of society, other than trappers, and, consequently, has potential to serve as a flagship species (symbol) for the conservation of aquatic resources. The OAP should foster this understanding among furbearer biologists.

Reintroductions: Reintroduction projects have resulted in rapid restoration of otter populations to many portions of their historic range. In many cases, studies associated with reintroduction projects have improved techniques for studying otters in natural environments and enhanced understanding of various aspects of otter biology and ecology. However, a more thorough understanding of otter population genetics and further study of subspecies delineation would have enhanced the reintroduction process. The primary criteria used by reintroduction projects for selecting a source of otters was based on availability and other factors related to ease of acquisition. Often, selection of the source of otters could be defended based on current subspecies delineation. The majority of otters reintroduced in the United States were obtained from large, viable populations that sustain annual harvest by fur trappers. However, otters were often transported over large geographic distances and released into habitats dissimilar to those encountered at source areas. For example, the majority (about 2,800) of approximately 4,121 otters reintroduced were obtained from southern Louisiana. Many otters from Louisiana were

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released in northern states such as Indiana, Ohio, and Pennsylvania. The range of the subspecies of otters inhabiting Louisiana, Lontra canadensis lataxina, occupies large portions of the Mississippi River drainage, extending northward through Iowa, Pennsylvania, and southern New York (HALL 1981). Consequently, otters from Louisiana represent the appropriate subspecies for the majority of states conducting reintroduction projects. Ironically, based on current subspecies delineation, Louisiana otters would be considered more appropriate for release in Pennsylvania or southern New York than otters from northern New York

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(L .c. canadensis). However, after conducting studies to delineate genetic variation among otter populations in North America, SERFASS et al. (1998) questioned the validity of using current subspecies delineation as justification for selecting sources of otters for reintroduction. Clearly, additional research is needed to guide the selection of appropriate sources of otters for use in reintroduction projects. The OAP should review modern genetic techniques that could be applied to address questions related delineation of subspecies and the associated implications for reintroduction projects.

Implementation of the OAP in North American

A well-established environmental infrastructure in North America, comprised of governmental and non-governmental organizations, will enable efficient distribution and promotion of the OAP. Conserving otters has direct implications for protecting other aquatic resources. Consequently, most environmental organizations will have an interest in promoting strategies that conserve otter populations. The United States Fish and Wildlife Service is the federal wildlife management authority in the United States, with primary responsibilities for managing migratory

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species, federally endangered and threatened species, and assisting states with various management initiatives. The U.S. Army Corps of Engineers and U.S. Environmental Protection Agency duties include wetland protection. All state and Canadian provinces have wildlife agencies, which are responsible for the management of other species, including otters, within their respective boundaries. Members of numerous non-governmental organizations (i.e., The Wildlife Society, Wildlife Management Institute, National Wildlife Federation, Audubon Society, Defender's of Wildlife, and many others) actively participate in the formation and direction of conservation policies in North America. Also, zoos, aquariums, and museums provide additional opportunity for distributing the OAP. Meetings and publications associated with these organizations will form the basis for disseminating the OAP to professional and non-professional conservationists.

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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 itshabitat. We invite all interested persons to contribute their time at any level of the organization.

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INSIDE:

Food habits of the North American River Otter, Otter Action Plan, The Land Otter Totem Pole and other interesting stories!