the River Otter Journal

Volume XII, Number 1, Spring 2003

Photo by Eric Peterson©

Predicting River Otter Locations with Geographic Information Systems

By Merav Ben-David, Department of Zoology and Physiology, University of Wyoming

North Americann River Otters
Photo by Eric Peterson©

Surveys for river otters can be time consuming, especially in areas where populations are low. Knowing where otters will most likely be and concentrating surveys in those areas will optimize our efforts. The advent of the Geographic Information System (GIS) provides us with a powerful tool to generate maps of the highest likelihood of otter occurrence.

GIS is a System of computer software, hardware, and data used to manipulate, analyze and present information that is tied to a spatial location. Data are organized by layers, coverages, or themes. Each layer or theme represents a common feature. For example, one GIS layer can contain information on the spatial location of all 3rd order streams in the state of Wyoming. Another can contain information on elevation. Overlaying the 2 layers will produce a map where elevation and 3rd order streams intersect. Thus, one can determine the elevational range in which 3rd order streams occur.

In order to produce maps of likely distribution of otters in the state of Wyoming, one has to determine which GIS layers are needed to overlay on each other. In other words, what habitat features are important to otters? How do we determine which habitat features are important? One approach is to observe otters directly and determine in what habitats they are most often found. The limitation of this approach is that otters are difficult to observe for extended periods of time; thus obtaining a representative sample is nearly impossible. Another approach is to implant otters with radio transmitters and relocate the marked animals repeatedly. Although this approach may yield invaluable information (see article by G. Blundell in the spring 2002 issue), it is expensive and requires live-capturing otters and conducting invasive surgery on them. A third approach is

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 Fall 2003!

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.

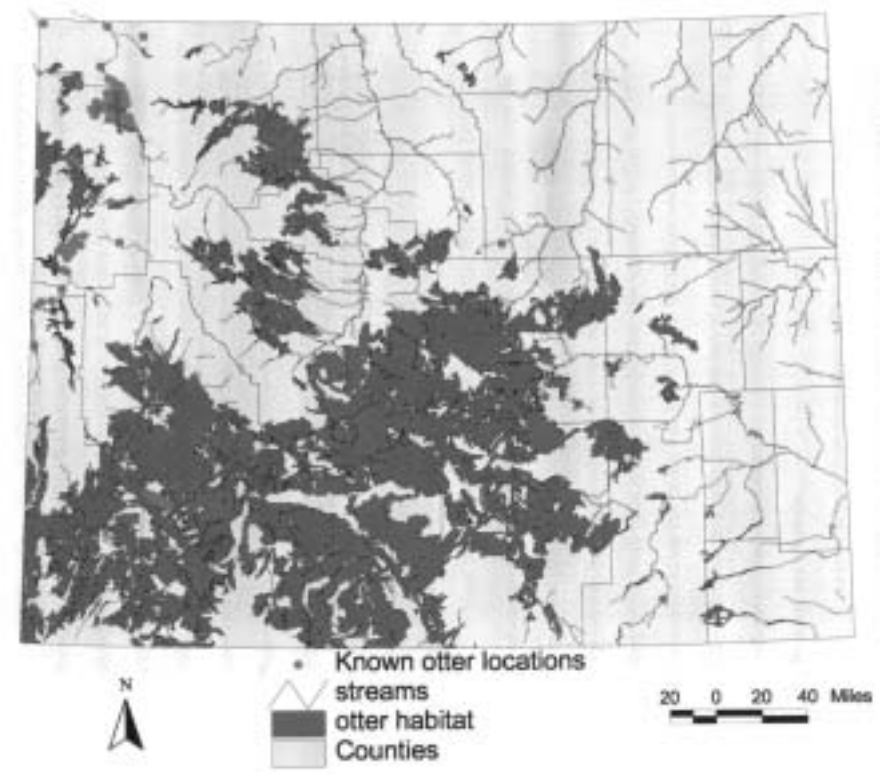
Predicting River Otter Locations with GIS

continued from page 1

to identify otter sign and determine the difference between used sites and other sites randomly selected from the available landscape. This is the approach we took in our studies in Rocky Mountain National Park (RMNP; see spring 2002 issue) and Yellowstone National Park (YNP; see autumn 2002 issue).

What kind of data are collected in the surveys of used (usually latrines) and random sites? We usually measure stream width (as it correlates with discharge), stream gradient (indicates the slope of the terrain), stream substrate and stream shading (both usually indicate the distribution of fish and crayfish), beaver activity (allows for water retention in drought years), and cover of banks by riparian vegetation both overstory and understory (i.e., trees and shrubs; required for protection from predators and for thermoregulatory shelter). After recording these data for latrine and random sites we use statistical procedures to determine which of these variables best separate used from random sites. For example, in both our RMNP and YNP studies we found that otters selected for sites with high spruce cover. This variable was highly correlated with stream shading (which is not surprising). Also, slope entered a few of our models and preferred stream substrates were cobbles and rocks. In RMNP, beaver activity was important when water flow was abnormally low (autumn 2002).

Other studies in other parts of North America (see papers by Bowyer and colleagues in 1995 in the Journal of Mammalogy, Melquist and Hornocker in 1983 in Wildlife Monographs, and Swimley and colleagues in 1998 in the Wildlife Society Bulletin) reported similar reliance of otters on conifer cover and attraction to rocky substrate of stream. Because the pattern of latrine site selection seems consistent in different habitats in North America from Alaska to Pennsylvania, it is likely that using GIS layers of these variables developed for the state of Wyoming will produce maps of expected occurrence of otters. One limitation of GIS, however, is that not all geographic and spatial data are available in digital form. For example, no digital maps of beaver activity exist (which is not surprising, given the dynamic nature of beaver persistence on the landscape). Nonetheless, using available layers of the other variables it is possible to generate a predictive map. Indeed, Jason K. Herreman (see spring 2002 issue) produced such a map for Wyoming (see Figure).



Predictive map of the occurrence of river otters in the state of Wyoming (dark areas) and actual recorded locations of otters (circles). Otter locations were provided by the Wyoming Natural Diversity Database. Map was produced by Jason K. Herreman as part of a final project for his GIS class at the University of Wyoming.

In constructing the map, Jason used a layer of all streams that had a minimum flow of 0.33 m3s-1(the lowest water flow ever recorded in the Colorado River near RMNP), a layer of spruce cover, and a layer of elevation where spruce likely occur. Unfortunately, he did not have a layer representing stream substrate. On the predictive map, Jason plotted all known otter locations (data he received from the Wyoming Natural Diversity Database) to compare the performance of the map to actual otter activity. As one can see, the map Jason produced suggests few areas suitable for otter habitation in eastern Wyoming, which is not surprising and fits well with the lack of observations there. Surprising, however, is the result that the Yellowstone and Grand Teton areas do not seem to provide much in the form of otter habitat. There is, however, a fairly good correspondence between suitable habitats and otter locations even in that part of the state. As can be seen, the south-central part of the state has large tracts of otter habitat with few otters observations. This is the area where future surveys should be conducted, and where I, with the help of the Student Chapter of the Wildlife Society, plan to spend the next few years, hiking and floating streams, camping under the stars, and looking for otter signs.

Otter Updates

By Tracy Johnston

The IX International Otter Colloquium will be hosted in Frostburg, MD on June 4-10, 2004 on the campus of Frostburg State University. Participants are expected from 40 or more countries. Conservation professionals and those with an interest in otter biology, ecology, conservation or captive care and rehabilitation are encouraged to attend. Additional information can be found at http://otter.frostburg.edu. Questions can be e-mailed to otter@frostburg.edu. Questions on sessions related to the care of otters in captivity and rehabilitation can be e-mailed to jrsotter@iserv.net.

Sea otter deaths off the California coast continue to puzzle scientists as to the cause. As reported in the Autumn 2002 River Otter Journal, many of the otter deaths appear to be related to parasitic diseases originating from terrestrial sources, such as toxoplasma. Researchers at the University of California, Davis and the California Department of Fish and Game studied 105 sea otter deaths and found 65% died from diseases, including toxoplasma. Otter deaths are more highly concentrated in areas of freshwater runoff correlating to terrestrial sources of parasitic disease.

In addition, sea otters not killed directly by a disease may die from complications of disease. For example, a correlation was noted between a parasite found in otters' brains and their subsequent deaths due to shark attacks. Analysts suggest the parasite may cause seizures which could attract sharks by shaking or twitching movements. It could also render them disabled and less able to evade sharks, or confused and more likely to swim into unprotected offshore waters.

The study's lead analyst, veterinarian Christine Krueder, also found that a number of sea otters died from heart disease and its complications. The cause of heart disease among otters is not determinate, but may stem from bacterial infections or viruses.

Researchers are continuing their investigations into the causes of California sea otter deaths.

The Colorado Division of Wildlife (DOW) is recommending to the Wildlife Commission that the river otter be down-listed from state endangered to threatened. The Wildlife Commission will make the decision on this staff recommendation at the September 2003 Commission meeting. Down-listing criteria have been met and indicate self-sustaining populations along 50 km contiguous segments of three river systems within the state, indicated by sign within every 5 km section for a survey year. Down-listing from State Endangered to State Threatened will not reduce the protection for river otter; taking is not allowed on a threatened species in Colorado.

The recently completed and adopted state River Otter Recovery Plan includes the following objectives: river otter population monitoring at all release sites 5, 10 and 15 years post release, a state-wide river otter recording system and database, a public education and information program, and possible additional reintroductions.

Four areas were recently surveyed by the DOW to assess the river otter's status relevant to the down-listing criteria. River otter tracks, scat and prey remains were recorded at 9 locations for a 75 km route along the Upper Gunnison, East and Taylor Rivers in an April 2003 study. River otter tracks, scat and latrine sites were recorded at 26 locations, at a frequency of 2.5 otter sign/km, for a 64 km route along the lower Dolores River in a May 2003 study. Within the 64 km surveyed, there was a 40 km stretch that had otter

continued on page 5

Photo by Eric Peterson©

"Any Otters for Me?"

By Tracy Johnston

His otter pens in New York Mills stand empty, but Frank Webb's heart, walls and photo albums are still filled with river otters.

For years I have heard from friends in the 'world of otters' about how generous Frank has always been with advice on river otters based on his many years of experience. Since 1954, Frank has cared for hundreds of otters, raising 17 litters of pups. I have also found this to be so when I spoke to him on the phone a couple of times over the past few years and when I borrowed photos to accompany Lissa Margetts' article on him for the Spring 2001 edition of The River Otter Journal. (See *"Frank Webb, Otter Expert"* article in that issue.) However, this February I was fortunate enough to be able to meet Frank and his daughter, Mrs. Gladys Rogers, in person and spend a few hours chatting with him about our favorite animal, the river otter. We shared photos and stories of otters we've known and cared for, as well as mutual friends who are involved with river otters in various ways.

Although a carpenter by trade, Frank also worked as a warden for the Adirondack League Club during hunting season based out of the "camp" he built for himself in Nobleboro, New York.
Photo courtesy of Frank Webb

Frank Webb and friend
Photo courtesy of Frank Webb

Frank told me he became enchanted with river otters after live-trapping one in the early 1950s. Although he had kept other animals off and on through the years–including a pet fox at one time–no animal captured his fancy like the river otter. Growing up as an outdoorsman in upstate New York, Frank had always trapped. But beginning the day he caught his first live otter, those were the only kinds of otters he wanted to see.

Since so little information was available about the care of river otters in the 1950s and early 1960s, he began to read everything he could on the otter's cousin, the mink. He also obtained advice from various people who had experience with river otters, including John Flader, Dr. Forrest Smith and Lee Roy Sevin. Then, as Frank began to experience his own success in caring for and breeding river otters, he started to keep diligent records on diet, births, deaths, breeding cycles, safe handling and proper holding facilities. As a result, he became a valuable resource for zoo keepers, wildlife rehabilitators and other otter care-givers. He also learned how to modify traps to minimize injury to the animals, and helped teach this to trappers assisting with reintroduction programs. Frank became a trusted source of healthy animals for such programs, including otters for New York's and otters and fishers for Pennsylvania's reintroduction programs, as well many zoos and other facilities. He even supplied the animals for Marty Stouffer Productions' television programs on both animals.

Although its been a few years now since he's kept river otters, Frank still has lots of great advice on them to share and his long affair with them isn't over. Knowing I was on my way to meet his friend, Angie Berchielli, for coffee at the Albany airport (who, herself provided 21 river otters for the New York River Otter Project), Frank called out to me as we waved goodbye saying, "Ask Angie if she has any otters for me!"

Otter Updates

continued from page 3

Entries in Frank's 1981 journal for his favorite otter, Chico, record his birth date as March 25, 1981; he was fed Esbilac formula every 2 hours; Chico's weight at birth was 2 1/2 oz. and his weight was recorded every month until he reached 20 lbs. Also recorded was that Chico's mother mated May 3-5, 1981—Frank's recommended 40 days post-partum—and her next litter was born on March 27, 1982.

Frank Webb and otter pup
Photo courtesy of Frank Webb

sign in every 5 km section, with the exception of one 6 km section that had no sign. Tracks and a latrine site were recorded at 9 locations, at a frequency of 8.6 otter sign/km, for a 78 km route along the San Miguel River in a May 2003 study. Within the 78 km surveyed, there were no sections of continuous otter sign. Tracks, scat, latrine sites and prey remains were recorded at 53 locations, at a frequency of between 5.2 - 6.4 otter sign/km, for a 296 km route along the Yampa River in a June 2003 study. Within the 296 km surveyed, continuous otter sign was found in every 5 km section for three stretches with lengths of 23 km, 16 km, and 14 km. All three studies reported tracks of multiple river otters in some locations.

Otters will be a central theme for The Natural History Museum of the Adirondacks, when it opens in 2006 with Otter Falls, a live river otter exhibit planned for the center building complex, a newsletter named "The Otter," and a river otter in its logo. Located within the Adirondack Park on a 31 acre donated site along the Raquette River near Tupper Lake, New York, the museum is well on its way to becoming a reality with over half of its $20 million fund-raising campaign to finance construction and launch the museum already committed. In addition to river otters, native fish, birds and plants on display, the museum complex will include interactive multi-media exhibits, an amphitheater, an outdoor trail system, a picnic area, snowshoe lodge, wildlife viewing platform and observation tower.

Education Development Director Valerie Trudeau and her staff interviewed otter expert Frank Webb this May to document his experiences with Adirondack river otters as a feature for the museum's education program. (See *"Any Otters for Me?"* article in this newsletter.)

Iowa's river otter recovery program continues with a unique translocation program for in-state animals. Iowa began a reintroduction program in 1985 with three-way trades between Iowa, Kentucky and Louisiana, which released 344 otters to date. The new program seeks to relocate river otters within the state from areas of higher to lower river otter population densities. The otters are live-trapped by selected trappers for a $100 fee and released in new locations by the Iowa Department of Natural Resources (DNR) within a few hours of their capture. "We have currently designated 12 new sites for otter releases and hope to place a total of 10 otters into each stream. Our in-state transplants began in 1999, and so far we've relocated a total of 81 animals, " said Iowa DNR furbearer resource specialist Ron Andrews.

The DNR is working with the scientific authority branch of the U.S. Fish and Wildlife Service to establish a season for regulated otter fur harvest by the fall of 2005.

Over 80% of Iowa's river otter restoration has been paid for by the state's hunters, trappers and anglers.

North American River Otters Captive Breeding Study:

Reproductive Physiology of Captive North American River Otter (Lontra canadensis):

A study of the use of non-invasive sampling of fecal hormone metabolites and behavior to determine estrous, cyclicity, pregnancy, and presumptive embryo implantation in females and reproductive seasonality in males.

Submitted by: Jan Reed-Smith, Columbus Zoo and Aquarium Intern & Helen Bateman, C.R.E.W. Cincinnati Zoo & Botanical Garden

Introduction

The North American (N.A.) river otter is a charismatic native American species, whose wild populations have historically been both adversely, and favorably, impacted by human activities. Up to and including the 1960's and 1970's, river otter numbers were low, or declining, due primarily to unregulated hunting and trapping. However, with subsequent combined efforts including: the resurgence of a strong conservation ethic, regulated trapping/hunting seasons, and restocking or reintroduction programs in twenty-two states, the river otter has flourished over much of its former range. In spite of this success, the species' status is still of concern over many parts of its range; river otters are listed as extirpated in New Mexico and North Dakota; endangered in Colorado, Indiana, Nebraska, and Ohio; threatened in Illinois, Iowa, South Dakota, and Tennessee, and as a species of special concern in Arizona, Pennsylvania, Utah, and parts of California.[1] Furthermore, ongoing threats of habitat loss, habitat fragmentation, water pollution (particularly organoclorides, polychlorinated biphenyls, and mercury which accumulate in the food chain), oil spills, roads, and continued trapping, both legal and illegal, have the potential of dramatically impacting otter numbers in the future.[1, 2, 3, 4, 5]

Because the N.A. river otter is charismatic, has something of a conservation success story to tell, serves well as a wetland ambassador species, is still vulnerable to environmental threats and, in many areas, to man's activities, it is frequently exhibited in North American zoos and aquariums. This species is, in fact, so popular it can be found in facilities ranging from an exhibit in the lobby of an Illinois bank to an eight-acre haven at a Canadian rehabilitation center. The river otters filling all these spaces have primarily been wild-caught. Because of our heavy dependence on obtaining animals from the wild, and the otters' continued vulnerability to environmental threats, the IUCN/SSC Otter Specialist Group (OSG) and American Association of Zoos and Aquariums (AZA) N.A. river otter Population Management Plan (NARO PMP) Steering Committee identified the creation of a self-sustaining N.A. river otter captive population as a high priority for this species.[11, 12]

Photo by Jean Ryskamp, John Ball Zoological Gardens

The goal of the NARO PMP, and recommendation from the N.A. OSG, is reliable breeding of this species in captivity resulting in a zoo and aquarium population supplemented only by non-releasable rehabilitated or orphaned animals. However, captive breeding of this species has been far from reliable and the establishment of a self-sustaining captive population is a goal that currently cannot be met.

To contribute to the accomplishment of this stated goal, our study intends to address some of the questions regarding the failure to reliably breed the North American river otter in captivity and develop some guidelines to enhance our success in the future.

North American river otter (Lontra canadensis) – Captive breeding record.

The N.A. river otter has been kept in captivity in U.S. zoos since at least 1902; during this 99 year period captive breeding has been limited, generally occurring in private collections, particularly those of E. Liers (1930's and 1940's) & A. Hoffman (1960's). Since the 1980's, zoos and aquariums have shown improved success breeding this species. However, the breeding record of the N.A. river otter in captivity is still limited, sporadic or opportunistic in nature, dependent on very few successfully breeding pairs, and frequently still occurring primarily in private collections. Consequently, zoos and aquariums have been forced to rely heavily on wild-caught animals, or animals born in captivity to females bred in the wild.

The current living population of N.A. otters held in some 107 reporting ISIS (International Species Information System) institutions is 134.131.0 (males, females undetermined respectively). (Hamilton, unpublished studbook information). Of these, approximately 145 are wild-caught and 87 are captive-born animals. Of these captive-born animals 25% to 30% (review of ISIS records) were born to females bred in the wild and brought into captivity pregnant. The remaining animals are of uncertain origin but they are believed to be wild-caught animals.[6] There are an uncounted number of river otter held in non-ISIS and non-AZA facilities. These animals are not included in the numbers given here but at least one of these facilities is represented in the breeding study.

As of June 2001, there were roughly 90+ potential pairs held by ISIS member institutions. From these pairings, two litters were produced in 2001, one in 2000, five in 1999, six in 1998, and three in 1997, for a total of 40 animals, or about 45% of the captive-born animals alive at that time. While this is a significant improvement over earlier years, the loss of a number of the breeding females led to a decline in fecundity in 2000 and 2001. This leads us to the crucial questions: "Why is the successful breeding of N.A. river otters in captivity so limited and or sporadic?" And, "What can be done to improve the captive breeding success of the N.A. river otter?"

While we contemplated these questions over 2001 and began the reproductive study in 2002 two things happened; the population continued to age and the otters took things into their own paws, once again. Seven litters were born in the 2002-2003 season and several orphaned pups came into the population. This does not mean the breeding study is no longer needed because we still need to determine and create optimal breeding environments, but it does mean we are adding two additional facilities to the study bringing our total study population to 12.15 (males and females respectively).

North American river otter (Lontra canadensis) – Captive breeding study.

We are investigating the reproductive physiology of N.A. river otters (female N = 11; male N = 10) held under various conditions (large to small exhibits, northern and southern latitudes, indoor and outdoor enclosures) and with various reproductive histories (known breeding pairs, nulliparous pairs, a single sex group (females and males exhibited separately), and sexually maturing animals) via the use of fecal hormone metabolite analysis utilizing species validated ELISA (Enzyme Linked Immunosorbent Assay) protocols while simultaneously collecting behavioral data on the frequency of occurrence of selected breeding related behaviors. Fecal sample collection and behavior observations are being taken throughout the year, over the course of two years, to provide baseline data and the comparison of two breeding seasons.

Photo by Florida Aquarium

This study will allow us to address issues of estrous cyclicity, seasonality in females and males, and determine if it is possible to identify pregnancy or pseudopregnancy by analyzing fecal hormonal metabolites. The questions to be addressed include:

- ***What is the cycle of a reproductive female? Can we define normal vs. abnormal cycles in females?***
- ***Are the females of non-breeding pairs not cycling or cycling abnormally?***
- ***What are the estrous cycle characteristics of sexually mature females housed only with other females?***
- ***Are there any typical estrous behaviors? Are there any behavioral similarities between females in estrous?***
- ***Is it possible to determine if a female is pregnant using non-invasive fecal hormone tests?*** After establishing a normal hormone profile for pregnancy at what stage will we be able to predict pregnancy? Can we identify a pseudopregnancy? Is there a hormonal predictor of imminent parturition? Can we correlate the hormonal profile with presumptive implantation?
- ***What is the reproductive physiology of the male N.A. otter?*** Do males experience reproductive seasonality? What are the normal seminal trait characteristics for N.A. river otter? Do males of non-breeding pairs have abnormal seminal traits? (This is an important part of the study but will be handled opportunistically and conducted in conjunction with scheduled anesthesia for annual physicals. Arrangements will be made separately with facilities willing to participate in this portion of the study.)

Fecal hormone metabolite analysis has proven to be an effective and reliable method to non-invasively monitor hormone levels in

North American River Otters Captive Breeding Study

continued from page 7

several exotic species.[7,8,9,10] Hormone monitoring can provide essential basic reproductive information on seasonality, cyclicity, timing and nature of ovulation (induced or spontaneous), pregnancy, pseudopregnancy, and lactational anoestrus.

Preliminary fecal hormone analyses in the Alaskan sea otter,[7] Asian small-clawed otter,[7] and the North American river otter7 (N = 3) have been reported. These earlier studies suggest that the major route of steroid excretion in otters was through feces and that fecal estradiol and progesterone levels were highly correlated with serum concentrations.[7] Gross' work did not uncover a demonstrable reproductive cycle in N.A. river otters (N = 3); but one female did show a significant peak in estradiol over a two week period.[7] Fecal hormone data from two female sea otters suggests that this species is a seasonal breeder, with low hormone levels during embryonic diapause followed by an increase coinciding with implantation and pregnancy.[13]

Because these earlier studies[7, 13, 14, 15] were limited in scope, conclusive information is lacking about ovulatory mechanisms, reproductive seasonality, length, and profiles of estrous cycles and pregnancy determination. Virtually nothing is known about male reproductive physiology, including seasonality and seminal traits. A more longitudinal, broad-based approach, including both males and females at multiple institutions and with variable reproductive histories, is required to establish a more comprehensive understanding of the reproductive norm for this species.

North American river otter (Lontra canadensis) – Study design.

Fecal samples are tested for estrogen and progestin metabolites in females and for testosterone metabolites in males using validated ELISA protocols. Since ELISA has not been used previously with this species each hormone-specific assay had to first be validated by Helen Bateman at the Center for Research in Endangered Species (CREW) at the Cincinnati Zoo and Botanical Garden.

Institutions participating (Akron Zoo, Brookfield Zoo, Cincinnati Zoo & Botanical Garden, Columbus Zoo & Aquarium, Florida Aquarium, John Ball Zoological Garden, Nashville Zoo @ Grassmere, St. Louis Zoological Garden) in this study are collecting fecal samples four to seven times per week for females and once a week for males. Non-toxic food coloring, oats, or something similar, are used for one animal in the case of pairs, and multiple animals in groups to allow for positive identification of fecal samples.

Behavioral information recording occurs at least four days per week (daily during estrous season). Trained observers (animal staff or volunteers) are collecting the behavioral samples using instantaneous sampling. While it is too early yet to share results of this study it is already providing insight into river otter breeding behavior and physiology and we look forward to sharing more of our results in the future.

Dublin
Photo by Paula Blum, Florida Aquarium

(It should be noted that many zoos and aquariums are working hard to provide optimal environments for the otters in their care and there are others who also are working to answer some of the questions we have regarding the comparatively poor reproductive history of this species in captivity. Shawn Larson of the Seattle Aquarium is using a slightly different technique than the one used in this study and we look forward to combining our results.)*

References

1. Reed-Smith, J. 2001. N.A. river otter Husbandry Manual, 2nd Edition. John Ball Zoo, Grand Rapids, Michigan, 616-336-4301.
2. Foster-Turley, P., S. Macdonald & C. Mason. 1990. Otters: An Action Plan for their Conservation. IUCN/SSC Otter Specialist Group. IUCN, Gland, Switzerland.
3. Harding, L.E., M. L. Harris, C.R. Stephen, & J. E. Elliott. 1999. Reproductive and morphological condition of wild mink (Mustela vison) and river otters (Lutra canadensis) in relation to chlorhydrocarbon contamination. Evron. Health Perspect 107(2):1412-147.
4. Kimber, K.R. & G. Kollias. 2000. Infectious and parasitic diseased and contaminant-related problems of North American river otters (Lontra canadensis): a review. J. Zoo Wildlife Med. 4:452-472.
5. Wren, C.D. 1991. Cause-effect linkages between chemicals and populations of mink (Mustela vison) and otter (Lutra canadensis) in the Great Lakes Basin. J. Toxicol. Environ. Health 33 (4):549-585.
6. Hamilton, D. In press. N.A. River Otter Studbook. Knoxville Zoological Garden.
7. Gross, T. S., 1992. Development and use of faecal steroid analyses in several carnivore species. Proceeding of the First International Symposium on Faecal Steroid Monitoring in Zoo Animals: Royal Rotterdam Zoological and Botanical Garden.
8. Howard, J. G. 1999. Assisted reproductive techniques in nondomestic carnivores. In: Zoo and Wildlife Animal Medicine Current Therapy 4th edition. Fowler, M.E. & R. E. Miller editors. W. B. Saunders Co., Philadelphia, PA. Pg.449 – 457.
9. Wildt, D., B. Pukazhenthi, J. Brown, S. Monfort, J. G. Howard, T. Roth. 1995. Spermatology for understanding, managing, and conserving rare species. Reprod. Fertil. Dev. 7:881 – 824.
10. Wildt, D. E., C. Wemmer. 1999. Sex and wildlife: The role of reproductive science in conservation. Biodiversity and Conservation 8:965 – 976.
11. IUCN/SSC Otter Specialist Group. VIII International Otter Colloquium, 20 – 26 January 2001, Valdivia, Chile. Recommendations for North America, VI.13. In press.
12. AZA N.A. river otter (NARO) PMP Working Group meeting, 26 April 2001, Detroit, Michigan.
13. Long, J. A., S. E. Larson, & S. K. Wasser. 1996. Safeguarding Diversity: Challenges in developing a genome resource bank for the California sea otter. The otter project: Endangered Species Update 1996: 13(12):1 – 7.
14. Binczik, G. A. 1993. Reproductive biology of Asian small-clawed otters. M.S. thesis submitted to Univ. of Minnesota.
15. Sobel, G. 1996. Development and validation of noninvasive, fecal steroid monitoring procedures for the Asian small-clawed river otter: Aonyx cinerea. M.S. thesis submitted to Univ. of Florida.

The Otter and the Mountain Lion

Adapted from Kwapong "Tales for Telling," 1991

nce upon a time, and a very good time it was, there lived in a mountain valley a great many animals and one very mean mountain lion. The mountain lion went wherever he wished and sometimes ate the other animals. One day, the animals heard the mountain lion boasting that he was going to eat the otter. "Today," mountain lion said, "it's otter's turn!"

Otter was swimming and playing in his deep river pool, but became very upset when he heard of mountain lion's intention. Then, he thought of a plan. As mountain lion was on his way to otter's river, he met otter on the path. Otter bravely stood, braced on his tail and said, "I know you plan to eat me today, but I must warn you that you are in danger. There is a bigger mountain lion, not far away and he is eating all the animals. Soon you will have nothing to eat."

"Is that so!" growled the mountain lion. "Show me the way to this other mountain lion and I will teach him who is the boss!" So the otter turned and ran to his deep river pool, turned and told the mountain lion that he should look into the water. Mountain lion stood on a rock, then stretched to look into the water. There was another mountain lion! Quick as a flash, mountain lion jumped into the river to fight the other mountain lion.

Too late, he realized that otter had tricked him. The water was deep and fast and mountain lion could not swim against the current, as could otter. So mountain lion was swept down the river, over the falls and out of the mountain valley.

When the other animals heard what had happened, they hurried to prepare a grand celebration, honoring otter. And as you all know, otter has been celebrating ever since.

— Contributed by John Mulvihill

President's Message

Dear Readers,

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

In this issue, we have an article written by Jan Reed-Smith on a captive-breeding study as it relates to the establishment of a self-sustaining captive population supplying river otters to zoos and aquariums. We also have an article by Dr. Merav Ben-David on how Geographic Information Systems can be used to determine the highest likelihood of locating otter sign along survey routes. Bob Arnebeck provided a summary of the otter activity near Wellesley Island on the St. Lawrence River, including how he observed them living under the ice and collapsing a beaver dam.

Frank Webb and daughter, Mrs. Gladys Rogers
Photo by Tracy Johnston

On a trip to New York this spring, I had the pleasure of meeting Frank Webb. I have included some information I learned in an article named *"Any Otters for Me?"* on how Frank became involved with river otters, how he developed his knowledge of them, and the various programs with which he's been involved. Also on that trip, I was pleased to meet Angie Berchielli, a trapper for the New York River Otter Project, and close friend of Frank's. I also was able to meet Betsy Lowe and Valerie Trudeau of The Natural History Museum of the Adirondacks (www.adknature.org), and hear about their plans for an exciting new facility which will feature river otters as a center attraction and in its logo.

The River Otter Alliance's mission is to be an educational liaison on the subject of the North American River Otter. As you will read in *"Otter Updates"* and other articles in this newsletter, there are always new issues, studies, and changes to the status of otters. We appreciate hearing from you if you find articles about any species of otter, so we may share it with our readers. We also appreciate your donations and annual dues payments. The River Otter Alliance is a 501(c) non-profit group, so your contributions are tax-deductible and all funds are used solely to produce this newsletter and to provide educational and scientific materials to interested persons or groups.

— Tracy Johnston, ROA President and Newsletter Editor

Making it through the Winter

By Bob Arnebeck

On January 19, the middle of one of our colder winters, I picked up an otter trail on a frozen channel between two large islands in the St. Lawrence River. The trail left the river and went up a valley that divided two steep granite ridges that rise 75 feet above the ice level. The valley peaked at a flat where there was a deep, five-acre, beaver tended, man-made pond. The otter trail ran along the shore, circling one hole in the ice above a drainpipe, and then continued out of the pond and up a valley through a series of smaller natural beaver ponds. After crossing over several dams and reaching what I call the East Trail Pond, I saw three otters bobbing up and down from a hole in the snow and ice covering the pond. Since July I had been watching a family of three otters in this pond, a mother and two pups, and I had every reason to believe that in January I was seeing those familiar otters. Since I check these ponds at least every other day and it had snowed early that morning, I knew that these otters had just returned to the East Trail Pond after an absence of over a month.

Photo by Bob Arnebeck

I would not see the otters for the rest of the winter, but I learned a great deal from them. They confirmed what I've learned from watching otters in shallow beaver ponds since 1996. Otters have two strategies for surviving the long north country winter: they breach beaver dams creating galleries under the ice to make foraging for food easier, and they try as best they can to shut the sun out of their life, in an effort, I think, to free themselves from daily activities and thus make a long season seem shorter.

The East Trail Pond, at its fullest is shaped like a comma, and no more than six or seven acres in extent. It is also shallow, perhaps three feet deep in its deepest channel, but, rare for a beaver pond on Wellesley Island, it is well watered, draining three separate valleys with one extending a half-mile. The otters entered it from its upper end, and fashioned the hole I saw them in just at the point where the principal channel through the pond leaves a clump of sedge and cattails. While the ice in other parts of the pond was about eight inches thick, the otters made a hole through about four inches of ice. They had been busy that morning, fashioning small holes in the ice next to a bank beaver lodge on their way in, and in a beaver lodge in the middle of the pond. Fresh scats were outside all the holes. As I watched the otters, they went a few yards in the snow toward the latter lodge, then thought better of that and slipped into the water under the ice.

Thanks to continuing light snows and cold days, I was able to ascertain that the otters didn't leave the pond for several days. However, they were active. Three days after they entered the pond I heard water leaking from the dam. A few days after that there was a magical transformation of the pond. After eight weeks of crossing a level field of ice and then ice covered with deepening snow, I was suddenly in a world of moguls. Ice and snow remained gathered around the many trunks of dead trees but between those high points were the water in this pond drops from two to three feet onto flat ice that would pool with water with each brief thaw. The ice along the dam collapsed at two points, leaving a gapping hole revealing the branches and logs that formed the dam and also a hole under eight inches of ice.

I had no doubt that the otters made a large hole in the dam allowing the water to rush out and the ice to collapse. Generous scats outside the many holes now created throughout the pond proved they were not shy about taking credit. While a February 1988 article in the Journal of Mammalogy, *"River Otters as Agents of Water Loss from Beaver Ponds,"* by Donald G. Reid, Stephen M. Herrero and Thomas E. Code, explored this phenomenon, I find convincing knowledgeable naturalists that otters commonly breach beaver dams, a most difficult task. The stillness of winter, especially under the ice of beaver ponds, is one of the cliches of that season. But seen from the otters' point of view, inviolable dams and constant water levels spell their doom. While otters can swim in water, they need to periodically come up to breathe air. To fish under the pond ice they need a source of air. Most beaver ponds leak naturally but as I could see by looking into the hole they dove into on January 19, the water in pond lapped up above the lower edge of the ice. Having lived in this pond off and on for months, these otters were familiar with its channels and possible den sites. In other years I have heard otters gnawing away inside a beaver dam. Since there was no hole in the snow down into the dam, these otters probably

swam down the central channel to the dam and fashioned a nook in the mud and branches of the dam. Then they began to dig and gnaw down. In other years, I've seen otters progressively lower the breach in the dam over several weeks. Indeed this was the most rapidly fashioned deep hole in the dam that I have ever seen. Once a foot of water drained out of the pond, the otters forsook the holes they had been using in the upper end of the pond. Judging from the scat outside, they began using a complex of burrows and a bank beaver lodge just to one side of the dam. (I should add that the beavers in this pond, and there were at least five, did not seem to mind the otters' activity. The beavers lived in a bank lodge in another end of the pond that the otters seldom visited. While the loss of water, more or less left this lodge high and dry, it also made it easy to break holes in the ice, which the beavers did so that they could forage for bark to eat and replenish their winter stores. Late in the winter they moved back down to the dam, and one-day I heard some rather peeved otters screeching under the ice while a beaver gnawed sticks on top of the dam.)

After the ice collapsed, I began thrusting my digital camera into every hole I could and what some photos revealed was a new world of narrow passages under the collapsed ice. Other photos showed a broad open gallery with a foot to spare between the new water level and the top of the ice. The water under the ice mostly re-froze, but at several points I could see how easy it was to break. Another winter, in a much larger, shallow pond, as the winter progressed I could see how the otters refocused their foraging around a succession of under ice pools of water, cut off from the rest of the pond as water drained out. The fish stranded in such pools were easy picking for the otters.

Almost everyone I show this phenomena to suggests that by coming out early in the morning, I would certainly see the otters coming out to scat. I've tried many times, but have only seen otters do their morning duty once. In this area, where there are frequent light "lake effect" snows, I can tell what the otters are up to on a daily basis. Groups of otters commonly stay under the ice without emerging for as much as three days at time. I suspect single otters of virtually staying under the ice for weeks.

Reconciling myself to otters breaching dams was easy compared to coming to understand the otters' disinclination to enjoy the warmth of the winter sun. Once late in the morning, I came to a pond where I knew the otters were. As I approached the pond, the sun came out and warmed the air above the freezing mark for the first time in days. I sank onto a rock and relished the change. Then I heard otters swimming below the ice, and briefly snorting at me. I waited for an hour perplexed at why at least one otter didn't come out. Then as I began to tire of the bright sun reflected off the snow, I understood the otters' position. Their survival depended on finding food. Not only would being momentarily blinded by the sun not help that quest, but there was no reason to

continued on page 12

Making it through the Winter

continued from page 11

reawaken the habits of the fall when, much to my delight, otters commonly visit a series of ponds each day. Humans might count the days to make winter pass more quickly, animals seem to try to create new patterns of behavior that negate the 24 hour pattern. For otters that means sitting under the ice over either pools of water or slow moving rivulets where fish manage their own fight for winter survival.

To my surprise, the three otters only stayed in the East Trail Pond for a little over a week. Then they moved on to other ponds, though returning to the East Trail Pond periodically. However they came into the pond relatively late, and beginning in late January imperatives other than food prompt otters to start moving. These three otters soon treated me to the wild spate of tracking that I've become used to that sends me to highest points of the island and through some of the thickest brush. I think these adventures result from the need of sexually active adults to separate themselves from the pups who have been dependent on them for the first ten months of their life, but that's another story.

Read more about Bob Arnebeck's otter tracking at http://www.geocities.com/bobarnebeck/tracking.html.

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.

The River Otter Alliance

6733 South Locust Court
Englewood, Colorado 80112

INSIDE:

Predicing Otter Locations with GIS, a North American otter breeding study, and other interesting stories!