



## AFRICAN OTTERS: CONSERVATION IN THE CONGO

BY JO THOMPSON, PH.D.

THIS IS AN EXCERPT FROM THE FULL ARTICLE WHICH CAN BE FOUND AT:  
<http://wildlife-conservation.suite101.com/article.cfm/reality-of-conservation-in-the-congo>

Early in February 2010...[after killing the adult mother of a Congo Clawless otter pup, a hunter, named Mundweni, brought the newborn pup to two missionaries serving in the Democratic Republic of Congo (DRC), Africa.]

Glen and Rita Chapman are missionaries who have lived most of their lives serving in the Congo. Their mission station is a small pastoral training center called Kikongo. About 170 kilometers east of Kinshasa, the capital city, their idyllic home village lies on the bank of the Wamba River (a tributary to the Kwango River) in Bandundu Province, DRC. Rita has a special gift for successfully raising wild orphans. So, Mundweni presented Rita with the newest addition to her menagerie.



Photo © Glen Chapman

The Congo Clawless otter (*Aonyx congicus*) range corresponds to the Congo river basin. It is one of the least

known otter species in the world. It has a patchy distribution across its range of occurrence and a very low density of occupation where it is found. Within their previous range, their population numbers have been reduced and they have been extirpated from areas where they may have previously been assumed to occur. There is a desperate need for conservation action and research.

Threats to the Congo Clawless otters' survival include:

- the escalating demand for bush meat and skins
- habitat loss and degradation

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Photo courtesy of The Wild Center  
<http://wildcenter.org>

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Photo © Jeff Gerow

## PRESIDENT'S MESSAGE

Welcome to the Spring-Summer 2010 issue of *The River Otter Journal*.

I say "spring" advisedly because here in Oregon's Willamette Valley winter and spring seemed to come in reverse sequence this year. March came in like a lamb and went out like a lion. By the time April arrived, it seemed like the robins that arrived in February had turned around and gone back to their winter homes. The good news is that lakes and reservoirs that in early March were feared to settle well below sustainable levels for summer irrigation, recreation and survival of species that require adequate flows of cool rivers filled to their brims by the end of the month. This is particularly good news for the otters that inhabit the substantial Willamette River watershed.

As I write this towards the end of April, spring has returned, the cherry and apple blossoms, violets and camas, are in full bloom ... and the robins have returned for another try, along with the usual influx of other spring migrants.

We talked before about how otters' adaptability to a wide diversity of habitats, climates and food sources places it in good stead to survive the episode of climate change Earth is now experiencing. Being a semi-aquatic mammal and depending on aquatic food sources, otters may need to become even more creative to subsist through drier periods when competition for water sources with human demand grows intense.

Not as fortunate is the otter's close mustelid relative, the wolverine. Not much larger than otters, wolverines are built to be fiercer carnivores and will challenge the largest of potential prey. Because they occupy much larger home ranges than otters and are restricted to snowy habitats, they are not able to adapt to climate change nearly as well as otters. In a recent article [see *Defenders of Wildlife*, Spring 2010] by wildlife biologist Douglas Chadwick, wolverines are reported to be seriously threatened by receding glaciers in both Yellowstone and Glacier Park ecosystems. Even Glacier National Park, which has the densest population of wolverines in the lower 48 states, supports only 40 to 50 individuals. Petitions to list wolverines as endangered are pending with USFWS.

This will likely be my last message to you as President of The River Otter Alliance, except to introduce you to my successor. I have decided to retire from this position to devote adequate time to my work with The Nature Conservancy, as well as engage in some personal recreation. I have enjoyed my three years as President, as well as the several previous years I served on the Board. I will continue to support the Board and manage the ROA website as long as they will have me.

Diane has once again produced a fine edition of *The River Otter Journal*. Articles you will read include continued reporting on the progress of research grants awarded by ROA, Kenneth Nelson's report on the effects of environmental enrichment on river otter swimming patterns and an endearing children's story, *Ollie the Otter*. Please enjoy your reading and have a great summer.

David

*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-Winter 2010!

### 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. The River Otter Alliance is a tax-exempt, non-profit organization. All efforts to our organization are on a voluntary basis by those who share a common concern for the river otter and its habitat. We welcome any interested persons to volunteer their time at any level of the organization.

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*The River Otter Journal* has been printed on recycled paper.

## AFRICAN OTTERS: CONSERVATION IN THE CONGO CONT'D

BY JO THOMPSON, PH.D.

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### Threats cont'd:

- steep decline in fish populations due to overfishing by humans with improved technology and nylon fishing nets
- pressure from development of hydro-electric power projects
- under-representation of otter habitat in protected areas
- pollution and deterioration of water quality resulting from large scale deforestation throughout their range
- growing proliferation of weapons and munitions such that now otters can be shot from pirogues and river banks
- dramatic depletion of other species (such as the hippo) who play an integral role in the food chain on which otters depend and contribute to the aquatic-ecosystem functioning that supports otter food supplies.

The Congo Clawless otter is the most terrestrial otter species in the world and is therefore much more vulnerable to snares set on land. They are not protected by traditional taboos across their range. Some of these threats can be considered major, but, more importantly, is the dramatic combined effect of threats on otter populations.

### Today

The little pup is now known around the world as "Mazu" in deference to his persistent vocalizations recognized in the world of otter husbandry as the "nursing hum." Mazu means "noise" in the tribal Kikongo language. Mazu has united the interests of people around the world and in his home village. Locally and abroad Mazu has become a symbol of Congolese natural heritage and a global treasure. Through the efforts of the International Otter Survival Fund ([www.otter.org](http://www.otter.org)), Mazu has been introduced to the world and on this global stage has become an unparalleled ambassador for African otter conservation.

### The Future

For Mazu, it will be inappropriate to release him back into the wild. Congolese do not have experience distinguishing between wild animals and tamed wild animals when they are hunting. So, with the support of a group of caring individuals and organizations, Glen will be providing a safe and stimulating enclosure to meet Mazu's growing needs, Rita will continue to provide the nurturing and sensitive care under which Mazu thrives, the local community will reap the benefits of global attention and Mazu will continue to teach us all.



*Mazu, along the Wamba River, being reintroduced to his natural environment*

Photo © Glen Chapman

### The latest on Mazu from Jo Thompson

He continues to thrive. His morphometric development and behavioral changes are being tracked. "A group of otter experts from around the world are intimately participating in his growth." Additionally, DNA analysis is being conducted on Mazu.

### A SPECIAL POINT OF INTEREST

A large care package was sent by several organizations and individuals to support Mazu. The following details some of the items that were sent\*:

#### By the IOSF:

- Bars of soap
- Pins of "I love otters"
- World of Otters' posters

#### By the Columbus Zoo:

- Noromectin
- Nutri-cal
- Syringes and needles
- Footprint casts
- Enrichment toys

#### By Jo Thompson:

- Nursing kits
- Two Gavin Maxwell books
- Dark Chocolate M&Ms [to bolster the caretaker's energy supply during late night feedings!]
- Aonyx skull illustrations

#### By Glenn Chambers:

- An otter coloring book
- DVD of *Otter Chaos*

\*For a complete list of items donated, please refer to our website, [www.otternet.com/ROA](http://www.otternet.com/ROA).

# Otter Updates



The River Otter Alliance has awarded a \$500 grant to Emmelianna Bujak of the Institute of Zoology in London. The grant will assist her on-going fecal studies of captive female Eurasian otters to better understand the species' reproductive physiology. The purpose of the study is to aid in developing self-sustaining captive Eurasian otter (*Lutra lutra*) populations by increasing breeding success and decreasing neonatal mortalities with the goal of species conservation.



Congratulations to Judy Berg and *The Otter Spirit* for receiving an Honorable Mention for Legacy Non-fiction in the Eric Hoffer Awards. Read more about this at [www.hofferaward.com/HABookwinners.html](http://www.hofferaward.com/HABookwinners.html).



The Denver Post publishes a Mini-Page section for young children every Wednesday. One recent edition called "Awesome Otters" was published on February 24, 2010 and featured sea otters, North American River otters and Asian Small-clawed otters. Read more about this Mini-Page at [www.denverposteducation.com/eedition-lessons/mini-page-lessons/mini-page-lessons-archive-2009-2010/feb-24-2010-awesome-otters](http://www.denverposteducation.com/eedition-lessons/mini-page-lessons/mini-page-lessons-archive-2009-2010/feb-24-2010-awesome-otters). A subscription to the Mini-Pages is free to Colorado-based teachers.



A rescued 11-week old sea otter pup named Kit joined the Monterey Bay Aquarium's sea otter exhibit in February 2010. Kit is paired with sea otter, Mae, who is helping Kit learn valuable skills. In early April, they both went behind the scenes for Kit to interact with other otters and gain even more skills. Never fear, though, Kit will be back on exhibit soon. Visit [www.montereybvaquarium.org](http://www.montereybvaquarium.org) for updates.



For those members interested in receiving *The River Otter Journal* online, please provide your e-mail address on our membership form on page 12 or e-mail your request to [riverotteralliance@earthlink.net](mailto:riverotteralliance@earthlink.net) to receive a web link to future editions.

## Update on the New Mexico Reintroduction

Report to The River Otter Alliance:  
 Volunteer Monitor Training and Monitoring the Reintroduced Otters  
 Submitted by,  
 Rachel Conn/New Mexico Friends of River Otters

On October 21<sup>st</sup>, 2008 a volunteer monitoring training was conducted. Two biologists were present instructing on the biology of river otters and how to look for and identify river otter sign. The biologists also spoke about the recent reintroduction efforts. The training was well attended by 25 individuals. A handbook of materials about otter biology was given to the volunteers. The materials also included pictures and tools to assist volunteer monitors in identifying otter sign. A map of the release site was presented and volunteers were asked to conduct surveys on public lands along the Rio Grande both upstream and downstream from the release site. A survey form, including contact information for the BLM, New Mexico Friends of River Otters and New Mexico Game and Fish

was given to volunteers. The monitors were asked to return their completed forms to BLM and New Mexico Friends of River Otters. These two agencies keep records of otter sightings and reports of otter sign. E-mail addresses for volunteers were gathered and periodic updates were sent out to the volunteers offering reports and guidance.

In May 2009, a follow-up training and presentation was conducted to local river rafting guides. The training handbook including survey forms was distributed to approximately 40 river rafting guides. There have been many reports submitted by volunteers documenting river otter sign along the Rio Grande. The reports have come from as far downstream as Cochiti Reservoir and as far upstream as the Colorado state line.

The training materials discussed in this article were made possible through grant funding by The River Otter Alliance.

## THE EFFECTS OF ENVIRONMENTAL ENRICHMENT ON A STEREOTYPED SWIMMING PATTERN FOR A NORTH AMERICAN RIVER OTTER (*LONTRA CANADENSIS*)

By,

Kenneth O. Nelson

Graduate Student at the Rochester Institute of Technology, Department of Environmental Science  
 Editor's note: This article is part of a larger article available on our website, [www.otternet.com/ROA](http://www.otternet.com/ROA)

### INTRODUCTION

This article investigates the behavioral influences of environmental enrichment on a captive North American River otter (*Lontra canadensis*). The study focuses on the development and mitigation of stereotyped behaviors using environmental enrichment. From subjective observations of a single river otter at the Seneca Park Zoo in Rochester, NY, it was noticed that the individual otter performed a circular swimming pattern, and based on literature review of scientific publications of captive animal behavior, this behavior can be classified as a stereotyped behavior. "A stereotyped behavior can be defined as a behavior pattern that is repetitive, invariant and has no obvious goal or function" (Fox, 1965; Hutt and Hutt, 1970; Odberg, 1978; Wiepkema et al., 1983; Mason, 1990). Stereotyped behaviors include pacing, weaving, repetitive body movements, and/or self-mutilation (Markowitz et al., 1978; Mellen et al., 1981; Markowitz and LaForse, 1987; Fischbacher and Schmid, 1999; Hawke et al., 2000). These behaviors are thought to be a sign of sub-optimal welfare, usually developing in situations where there is physical restraint, a low amount of stimuli, or inescapable fear or frustration and therefore, a sign of stress (Mason, 1991).

Environmental enrichment is a process for improving and/or enhancing zoo environments and care based on the inhabitant's behavioral biology and natural history (Shepherdson, 2003). The enrichment process involves the identification and corresponding modification to the zoo environment of a specific environmental variable (Shepherdson, 2003). Environmental enrichment has been used as a research tool, exploring the behavioral effects of environmental modifications by adding objects to an enclosure, changing feeding routines/methods and modifying enclosure design (Paquette and Prescott, 1998; Maki and Bloomsmith, 1989; Caine and Boyle, 1992; Saudargas, and Drummer, 1996; Shepherdson et al., 1993). The overall goal of the enrichment program is to gain a better understanding of the physiological and psychological well being of a captive animal, and to gain more insight of appropriate application of environmental enrichment methods to improve captive animal welfare (Mellen and Sevenich-MacPhee, 2001).

Based on a literature review, it is hypothesized that the stereotyped swimming behavior occurs from frustration due to the inability to perform appetitive behaviors, such as hunting (Hughes and Duncan, 1998; Swaisgood and Shepherdson, 2007), where there is no prey, but there still exists a corresponding end point via consumption of food through traditional feeding methods and



Photo © Kenneth O. Nelson

frequencies. It is predicted that presenting four enrichment items randomly to the river otter enclosure will reduce the occurrence of the stereotyped behavior. The enrichment will occupy the otter's time with focal mimic stimuli in lieu of naturally occurring stimuli.

### METHODS

The otter exhibit studied at the Seneca Park Zoo is separated into three main sections: a holding section, an upper level with an indoor viewing area and a lower level with an outdoor viewing area. Both upper and lower levels have aquatic and terrestrial areas. The exhibit is fairly large, well-shaded and contains an array of naturalistic items. One individual otter was observed in the study; Admiral, a male, approximately 19 years old. He came to the Seneca Park Zoo from the Bayou Otter Farm in Theriot, LA on May 12, 1993.

The study took place from May through September 2008. Observations occurred twice on Tuesdays and Thursdays, during mornings and afternoons (i.e. AM and PM). Each session was divided into three half periods with a 15 minute break between each period. Five days of initial baseline observation took place before enrichment items were introduced and five days of post-baseline observation after the enrichment treatments were complete. Enrichment was presented in random order, and items were placed randomly between the upper or lower level of the exhibit. The randomness of the enrichment was configured using Minitab 15®.

Four enrichment items were presented to the otter in this study; two food enrichment items - live fish ( $n = 11$ : 5 upper level section, 6 lower level section) and fish frozen in an ice block ( $n = 11$ : 5 upper level section, 6 lower level section); as well as two non-food items - PVC tubes with differing scents ( $n = 5$ : 3 upper

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Editor's note:  
 Minitab 15® (referenced here →)  
 is a statistical analysis program.

# OLLIE THE

## Story inspired by Squeaker, one of the otters at *The Wild Center* in Tupper Lake, NY

by Thomas M. Schneeberger



*Squeaker on the Rocks in Otter Falls  
at The Wild Center  
Photo courtesy of The Wild Center*

Editor's Note: The story author, Thomas Schneeberger, contacted The River Otter Alliance after reading the summary story by Carol Peterson on *The Wild Center* in the Fall-Winter edition of *The River Otter Journal*. He has graciously allowed us to publish his endearing story here. Enjoy!

explore the winding river. Paddling and diving he remembered his mother's voice:

*"Ollie the Otter come swim with me...  
so graceful and playful, come swim with me."*

It was a lazy summer day, which made for great napping, but as evening approached it was time to have some fun. Ollie playfully searched the riverbank and slid on his belly down the rocks for what seemed like hours when, with his keen nose and sensitive whiskers, he detected a scent that was very unfamiliar and made him want to investigate further. As Ollie got closer to this alluring smell he knew he was in trouble...he had become trapped. A heavy steel trap used for beaver had now caught Ollie. His left leg was beginning to hurt. As long as he lay still the pain was bearable. The memory of his mother's voice and the refrain she whistled kept Ollie believing he was going to be ok:

*"Ollie the Otter come swim with me...  
so graceful and playful, come swim with me."*

With that fond refrain Ollie fell asleep. His sleep was filled with wonderful dreams of somersaults and belly slides. Diving and fishing...he was joined

The water was crystal clear as the late winter snow melted into the season of spring. Ollie, a young river otter, was just discovering that swimming, diving, turning somersaults and fishing were his purpose for living!

Ollie's mother had taken great care of her new pup during these early weeks of life. Every evening before leaving the den, she would whistle to her newborn this refrain:

*"Ollie the Otter come swim with me...  
so graceful and playful, come swim with me."*

Ollie the Otter would later learn that his mother was coaxing him into the water with that refrain...a memory he carried with him, a memory that also gave him a sense of courage, as he grew older.

So, the time had come, for the year old otter, to leave the safety and security of the den and

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# Ollie the Otter

*(Continued from page 6)*

by his sisters and brothers whom he had not seen since they left the den. It was so much fun to be swimming again with his family. In dreamland, so graceful and playful, Ollie swam until...ouch!

Ollie awoke suddenly with that pain in his leg and in the arms of a complete stranger. A woman, who had discovered him while she hiked her favorite trail, had released Ollie from the trap. Ollie felt confused. The soft-spoken woman carried him very securely. He could feel the woman's heart beating which reminded him of his own mother's heartbeat.

Immediately the memory of his mother's whistle returned:

*"Ollie the Otter come swim with me...  
so graceful and playful, come swim with me."*

Ollie knew the woman was not going to harm him as she began to wrap and care for his injured leg. She fed him his favorite fish. The woman appeared to know a lot about otters and other webbed footed animals. Her home was filled with feathered friends and furry critters. She was especially trained and licensed to care for injured wildlife.

Ollie's leg continued to heal as his days were now filled with ample time to nap and exercise by swimming in what appeared to be his own private "pool." The soft-spoken woman spent hours each day helping Ollie regain his strength and use of his injured leg. The woman had become like his own mother as Ollie recalled those days when his mother would coax him into the water from the den as a young pup:

*"Ollie the Otter come swim with me...  
so graceful and playful, come swim with me."*

Ollie was meeting a lot of new people and was learning to trust their voices and the care they gave him. He especially enjoyed the children that would stop and talk with him and watch him "perform" in the water. In fact, Ollie began to dream about just how great it would be to swim with children and even teach them how to belly slide or do a somersault under water. As Ollie was having those thoughts so too was the soft-spoken woman. Her thought was out of concern for Ollie's injury and his ability to live a healthy and active life without assistance.

It was then that a new wildlife "living museum" was being designed in a near by village. The exhibit would authentically match Ollie's environment on a river or beaver pond. It would have rocks to slide on, water to swim and fish, places to explore and to hide in and, best of all, a lot of glass to be nose to nose with the children who would come to visit.

Ollie thought, I could teach all who came about the life of a river otter and how important it is to protect and take care of our rivers, streams, and the entire natural world.

Ollie's dream came true! His days are now full of playful and graceful time in a safe and protected place where children young and old come to visit every day. Ollie has also now discovered that this is his real purpose for living, just as his mother had taught him:

*"COME, SWIM WITH ME...  
SO GRACEFUL AND PLAYFUL, COME SWIM  
WITH ME!"*

## THE EFFECTS OF ENVIRONMENTAL ENRICHMENT (CONT'D)

By KENNETH O. NELSON

(Continued from page 5)

level section, 2 lower level section) and a Ply-Drum serving as a tube to swim through ( $n = 9$ : 5 upper level section, 4 lower level section). For live fish enrichment, four to five live fish were released at the same time in the exhibit. For fish frozen in ice block, four to five fish were frozen in a block. PVC tubes were presented in groups of three. Overall there were 36 presentations of enrichment over 20 days.

\* $n$  is the number of trials or times each item was presented.

The instantaneous sampling method with a 15 second interval was used to sample otter behavior (Martin and Bateson, 2007:38, 40). Every 30 minutes included 120 behavioral records with one session totaling 360 behavioral records. Paper data sheets were used to record the behaviors. A calibrated stopwatch, with an audio earpiece, was used to cue the 15 second interval. Observations took place throughout the exhibit depending on otter movement. Observers followed the otter between levels, stopping the watch on transition from one level to the other and re-starting the watch once the otter was located again. The stereotyped swimming behavior only occurred in the upper level section of the exhibit. Results presented here are only those which pertain to the stereotyped swimming which is defined as:

*An aberrant behavior in the aquatic environment. Two repetitive patterns, where the otter passes a point twice, will constitute this stereotyped swimming behavior. Slight deviations may occur, but will not break the stereotyped pattern unless the otter moves between all three sections of the aquatic environment or moves between the aquatic and terrestrial environment. Aquatic locomotion will be recorded as the behavior until the pattern begins.*

Percents presented in results are averages based on the summation of behavioral occurrences out of 120 observations for each half hour period for all trials ( $n$ ) under each treatment. Data was separated into two sets, an AM and a PM, analyzed separately, and based on percent time spent in the behavior for each 30 minute period. Comparisons were done using either ANOVA General Linear Models or non-parametric Kruskal-Wallis tests (Zar, 1984). Critical values for all tests were set at  $P < 0.05$ . All statistical testing was done using Minitab 15®.

### RESULTS AND DISCUSSION FOR THE PM SESSION

Average percent time spent in stereotyped swimming increased successively for each half hour for the PM session for all enrichment items combined ( $1^{\text{st}} = 6.06\%$ ,  $2^{\text{nd}} = 13.38\%$ ,  $3^{\text{rd}} = 37.45\%$ ), and there was significant difference between the half

hours. This seems to suggest that enrichment application increases the occurrence of the stereotyped behavior. Examining Figure 1 [see page 11], the initial baseline data for the PM session showed that stereotyped swimming increased sequentially with each half hour ( $1^{\text{st}} = 16.00\%$ ,  $2^{\text{nd}} = 25.83\%$ ,  $3^{\text{rd}} = 44.16\%$ ). In fact, each enrichment item, except live fish, showed an increase from the  $1^{\text{st}}$  half hour to the  $2^{\text{nd}}$ . This suggests a daily rhythmic pattern and a potential seasonal rhythmic pattern. The seasonal rhythmic pattern shows the otter activity time beginning later in the day throughout the study, which has been correlated to how much time the otter



Photo © Jeff Garow

was inactive (See Figure 2). It is apparent that the time spent inactive for all enrichment treatments and both baselines increased over the course of the study for all half hours. Examining time spent in stereotyped swimming, the otter was completely inactive during the  $1^{\text{st}}$  and  $2^{\text{nd}}$  half hours, but showed a stereotyped swimming average of 25.50% for the  $3^{\text{rd}}$  half hour. For all enrichment items, in the  $1^{\text{st}}$  half hour, the otter was inactive (83.94%), spending time sleeping in the lower level during the PM session (28.70%), presumed sleeping or behind the drop wall (64.35%). Hence, the  $1^{\text{st}}$  half hour was left out of further comparisons for the PM session.

The fact that enrichment was lower in the  $2^{\text{nd}}$  half hour compared to the  $3^{\text{rd}}$  suggests that it influenced the occurrence of the behavior by keeping it lower. In fact, comparisons of live fish to the initial baseline for the  $2^{\text{nd}}$  half hour showed a significant difference. Additionally, frozen fish (10.83%) showed a lower occurrence of the stereotyped swimming behavior in the  $2^{\text{nd}}$  half hour compared to the initial baseline (25.83%). This suggests that both the food items were effective at deterring stereotyped swimming.

Figure 3 shows percent time spent in stereotyped swimming for the  $2^{\text{nd}}$  and  $3^{\text{rd}}$  30 minute sessions for food and non-food items, as well as the initial baseline data for both the AM and PM session. There was significant difference between the food items and the initial baseline for the  $2^{\text{nd}}$  half hour showing a 19.92% reduction in the stereotyped behavior. For the  $2^{\text{nd}}$  half hour, food items show 5.92% of time in the stereotyped behavior whereas non-food enrichment items show 24.05% of time in stereotyped behavior. This suggests food enrichment items are more effective than non-food items at deterring the stereotyped swimming behavior. However, there was significant difference between the  $2^{\text{nd}}$  and  $3^{\text{rd}}$  half hour for food items and a slight increase between the  $2^{\text{nd}}$  to the  $3^{\text{rd}}$  half hour for non-food items suggesting the enrichment is only effective in the time it is applied. Comparing placement of all enrichment items showed no significant differences, by food or non-food items.

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## THE EFFECTS OF ENVIRONMENTAL ENRICHMENT (CONT'D)

BY KENNETH O. NELSON

(Continued from page 8)

### RESULTS AND DISCUSSION FOR THE AM SESSION

There was little activity for the morning session. Percent time spent in stereotyped swimming decreased successively for the AM session for all enrichment treatments (1<sup>st</sup> = 27.27%, 2<sup>nd</sup> = 2.42%, 3<sup>rd</sup> = 1.08%). There was significant difference between the half hours which could be attributed to the enrichment presentation, but more likely due to daily rhythmic schedule of the otter. The otter spent 41.57% of the time inactive for the 1<sup>st</sup> half hour, 72.36% for the 2<sup>nd</sup> and 91.02% for the third for all enrichment items. There was no significant difference between any of the items for the 2<sup>nd</sup> or 3<sup>rd</sup> half hours and the baselines, or within each item between the 2<sup>nd</sup> and 3<sup>rd</sup> half hours. There was no significance by food, non-food items or placement of the item. However, there was significant difference between the 2<sup>nd</sup> half hour for lower level food items (0.00%) compared to lower level non-food items (8.53%) and the 2<sup>nd</sup> half hour upper level food items (4.78%). The difference in the results was small and the statistical significance is most likely the result of a low sample size ( $n = 7$  for lower level food,  $n = 3$  for lower level non-food,  $n = 4$  for upper level food) and low occurrences of the behavior. Therefore, these results are not considered accurate representations of the otter's behavior.

### GENERAL DISCUSSION

Results presented here are similar to those presented by Shepherdson et al., (1990) where a kinkajou, a small South American rainforest mammal related to the ringtail cat or raccoon, was provided with food that required exploration and object manipulation, resulted in increased exploratory behaviors and a corresponding decrease in stereotyped behaviors. The enrichment with the kinkajou restored the contingency between foraging and finding food (Shepherdson, 1994). Because food items seemed to hold the otter's attention more so than non-food items, it is likely that the otter is missing a foraging stimulus. Performance of the stereotyped swimming pattern may occur due to a relationship between the performance of the behavior and the consequence in the form of a scheduled feeding time. The stereotyped pattern is a substitution for hunting. In fact, the otter was given his AM diet in the time between the 1<sup>st</sup> and 2<sup>nd</sup> half hour period, hence the high levels of stereotyped swimming in the 1<sup>st</sup> half hour and lower levels in the 2<sup>nd</sup> and 3<sup>rd</sup> half hours in the AM session. The PM diet was not given until after the observation session, hence the successive increase in the behavior from the 1<sup>st</sup> to the 3<sup>rd</sup> half hour. Enrichment mitigated the performance of the behavior, but only in the time period it was applied. It could be that the enrichment was effective, but because the otter knew that an afternoon feeding was approaching, continued to perform the behavior in anticipation.

River otters may eat up to four times a day due to a fast metabolism (Benyus, 1989) and a short straight digestive tract (Davis et al., 1992). Estimates have shown that river otters will spend up to 62% of their active time in feeding related behaviors (Melquist and Hornocker, 1983; Davis et al., 1992). During the study the live fish and the frozen-ice-block of fish acted as an accomplished goal of a behavior other than stereotyped



Photo © Jeff Gerow

swimming, with live fish being more effective than the frozen-ice-block of fish. This supports the initial hypothesis. The non-food items showed little influence, but did meet the assumption of the hypothesis that the enrichment would be a substitute for a lack of focal stimuli such as prey. Being the closest enrichment item to the otter's natural environment, the live fish was the most effective deterrent to the stereotyped behavior.

Mason et al., (2007) argues that performance of stereotyped behaviors is a sign that the animal's welfare is not at a peak level and should be examined. Stereotyped behaviors, depending on frequency and duration, may raise ethical issues challenging both the indirect conservation value of a species (e.g., education through exhibition), and the direct conservation value of a species (e.g., reproduction through captive management programs) (Mason et al., 2007). It is known that high levels of stress result in high levels of pituitary-adrenal activity, which can have negative effects on reproduction, as well as reduce immune response, growth and digestion (Sapolski, 1989; Moburg, 1991; Shepherdson, 1994). This is not to say that the Seneca Park Zoo does not provide adequate care for the otter. In fact, the zoo is accredited by the Association of Zoos and Aquariums [AZA], meeting standards set by the zoo community at large to provide top quality care for all animals at the facility. What this study does assess is that there is a realization of a welfare issue for captive animals, which proven by results here, as well as results of other enrichment studies, can be mitigated and managed through behavioral modification as a result of environmental enrichment.

It should be pointed out that the low sample sizes and repeated measures of the same otter under the same conditions may have resulted in biased data. If one specific day in the study saw an exceptionally high level of stereotyped swimming, it would greatly influence the averages. Furthermore, there were factors which could not be controlled or were not taken into

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## THE EFFECTS OF ENVIRONMENTAL ENRICHMENT (CONT'D)

By KENNETH O. NELSON

(Continued from page 9)



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consideration. These factors included the zookeeper/otter interaction, public visitation and weather conditions. Even with the low sample sizes and other factors mentioned above, results seem to follow assumptions from subjective observations during behavioral recording. First, the otter most frequently performed the stereotyped behavior in the afternoon and second, the food enrichment was most effective, but only in the time it was applied.

I would argue for more frequent feeding enrichment applied during the afternoon, possibly incorporating the otter's

daily diet into the enrichment. However, this argument complicates husbandry practices. For example, if two otters are in the same enclosure, monitoring dietary intake would be difficult. This is concerning because zookeepers often monitor animal diets closely to notice changes in health. Also, providing high levels of enrichment can be time intensive, and in some cases, expensive depending on the extent of the enrichment initiative. River otters, known to be nocturnal, may be performing the behavior when zookeepers are not able to provide enrichment to mitigate it. Despite the complications of providing a captive animal with a high level of enrichment, the realization that enrichment can be used to manage abnormal behaviors should make enrichment practices a high priority in the daily husbandry of a captive animal. I would argue that all captive animal facilities develop and implement environmental enrichment programs.

### CONCLUSION

Based on the results, it is apparent that only food enrichment items were influential in deterring the stereotyped swimming pattern. Enrichment was most effective when applied in the PM, opposed to AM session. The effects of all individual items as well as food and non-food items combined were confined only to the time the enrichment was applied. There was a daily rhythmic pattern influencing the occurrence of the stereotyped swimming pattern in both the AM and PM session. There seems to be a seasonal rhythmic pattern influencing the activity times of the PM session, which will ultimately influence the occurrence of the stereotyped swimming behavior.

### ACKNOWLEDGEMENTS

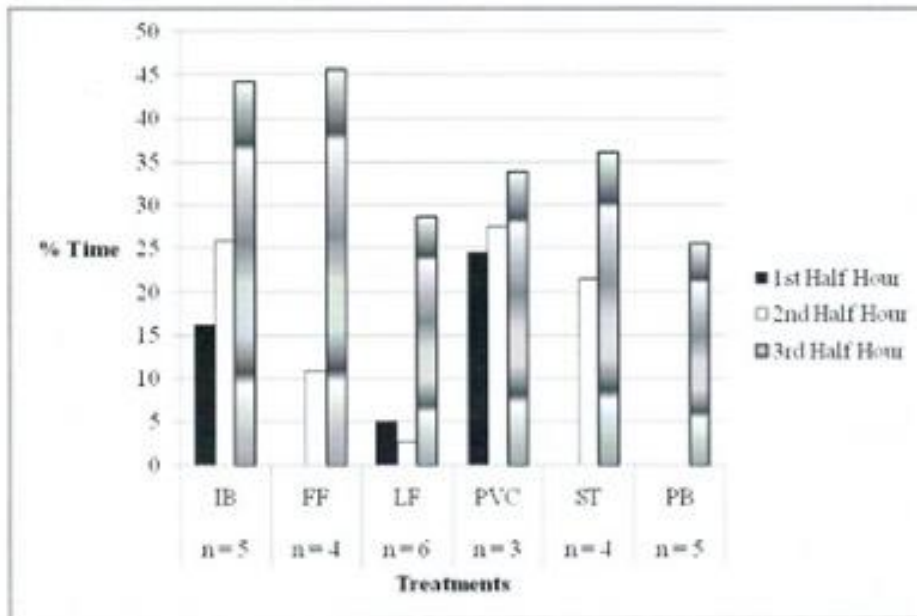
I would like to thank The River Otter Alliance for providing funding for enrichment items. I would like to thank my advisor Dr. Lei Lani Stelle (Redlands University), and my committee members David Hamilton (Seneca Park Zoo) and Dr. Carol Marchetti (Rochester Institute of Technology) for their crucial guidance. I would also like to thank Katina Link (otter keeper at the Seneca Park Zoo) for all of her insight and patience with me throughout the study, and the other zookeepers at the Seneca Park Zoo, who were always willing to accommodate my needs. Thank you to Ted Universal of Coolwater Fish Farm for providing me with live fish and a bio-filtration system to keep the fish alive on sight. Special thanks to Erin Strobl for volunteering so much time to help with observations and for always being supportive and encouraging. Thanks to my family and friends for the support and encouragement, my dogs for always brightening my days and lastly, Admiral (the river otter), without whom I could not have done my graduate work.

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**THE EFFECTS OF ENVIRONMENTAL ENRICHMENT (CONT'D)**

By KENNETH O. NELSON



← Fig. 1. Percent time spent stereotyped swimming in the upper level PM for all half hour sessions by Treatment. IB = initial baseline FF = fish frozen in ice block LF = live fish PVC = scent tubes ST = swim tube PB = post-baseline.

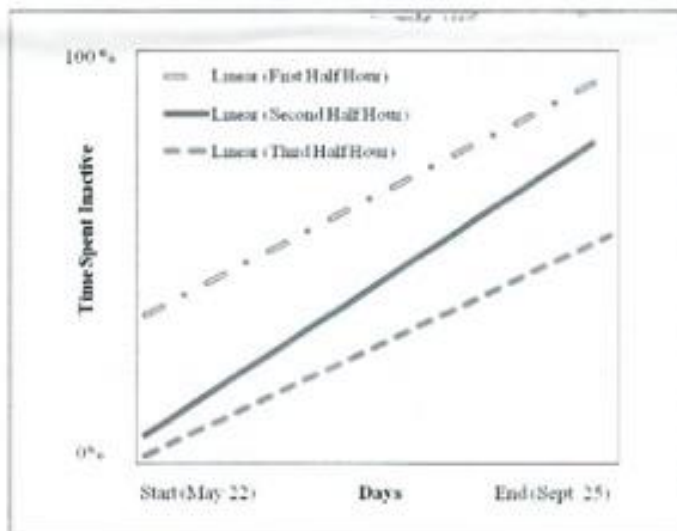


Fig. 2. Trend lines for inactive time by half hour in the upper level PM session throughout the study. Data encompassed all enrichment treatments and both baselines.

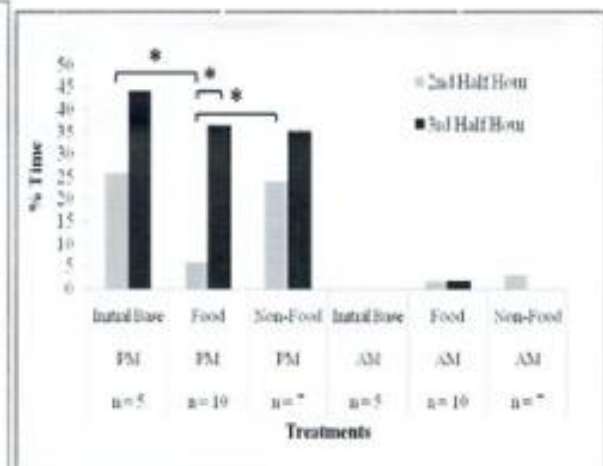


Fig. 3. Percent time spent in stereotyped swimming for the 2<sup>nd</sup> and 3<sup>rd</sup> Half Hours by food and non-food enrichment items in the AM and PM sessions and the Initial Baseline Condition. Asterisks indicate significant difference at  $P < 0.05$ .



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