NORTH AMERICAN RIVER OTTER

Husbandry Notebook, 4th Edition; Chapters 11 - 15

(Photo: Dave Mellenbruch)

NORTH AMERICAN (Nearctic)
RIVER OTTER *(Lontra canadensis)*
Husbandry Notebook, Section 3 Chapters 11 - 15©

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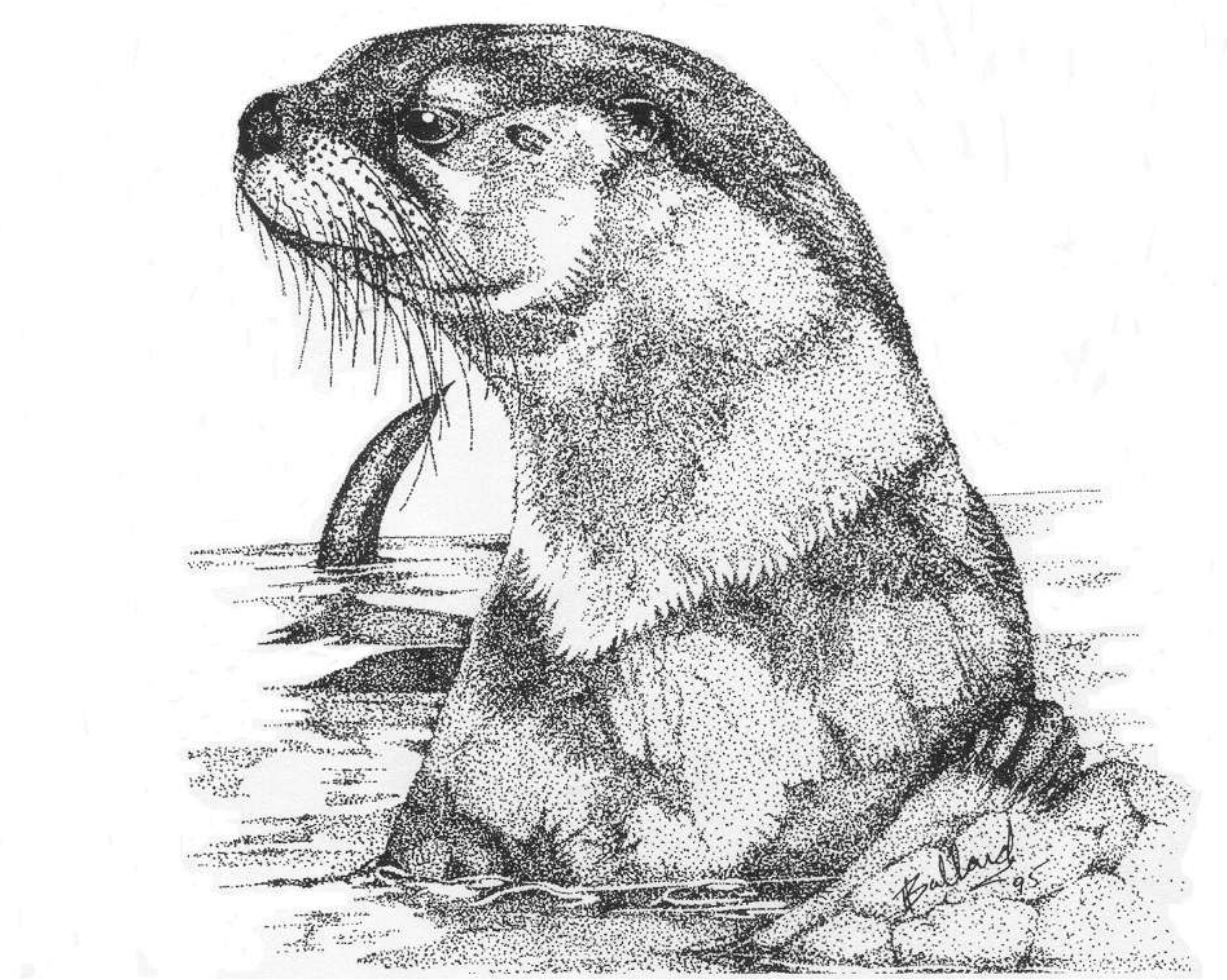

"Alacris ad ludos est."

"It is quick to play"

(Albertus Magnus, 13th Century teacher and naturalist)

North American River Otter Husbandry Notebook
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K. Talcott Photo

In the days when the earth was new and there were no men but only animals the sun was far away in the sky. It was so far away that there was no summer. It was so far away that the trees and the grasses did not grow as they should.

He-Who-Made-the-Animals saw how it was that there was not enough sun to heat the earth, and so he fashioned a snare. The Sun did not see the snare in his path, walked into the snare and the snare held him fast.

The sun was close to the earth. In fact, the snare held the sun so close to the earth that there was no night. Day after day the sun shown and the earth dried and the grasses withered. There was not enough food or water for the animals and they desperately called a council. "Sun," the animals said, "You give too much heat to the earth."

"Set me free from this snare" the Sun said, "and I will go away."

"But if you go away, then there will not be enough heat." "Set me free," the Sun said, "and I will come to the edge of the earth in the morning and in the evening; then at noon-time I will stand straight above the earth and warm it then."

The animals sat around the council fire and they said, "Who is going to set the sun free?"

"I shall not do it," Wildcat said. "Whoever sets the sun free must go so close to the sun that he will be burned to death." Lynx said, "Whoever sets the sun free must chew the leather thong that holds him; the sun will burn him to death before he can do it." "I shall not do it," said the deer, the wolf and the raccoon.

"I shall do it," Otter said. "How can you do it?" said the animals. "You are too small, your teeth are for fish, and your fur has already burned away." None of the other animals liked the otter because he played too much. They did not think he was brave.

"Let him try," Bear said. "He will burn to death, but we will not miss him. He is of no use to us. He looks silly now that his fur is gone." The animals laughed.

Ignoring the taunts, the otter set off to the place in the sky above the earth where the sun was held by the snare. Otter took many days to get to the sun. The sun burned him. The sun was so bright, Otter had to close his eyes. When he reached the sun, Otter began to chew on the leather thong that held the sun. His skin was burning and blistering, his eyes were hot stones. But, Otter did not stop chewing.

Suddenly he chewed through the leather. The animals saw the sun rise into the sky. The animals felt the cool winds begin to blow on the earth. Otter had freed the sun from the snare.

Time passed. Otter lay in the center of the council ring. There was no fur at all left on his body. His skin was burned and scorched and his flesh was falling off his bones. His teeth were only blackened stumps.

He-Who-Made-the-Animals also stood in the center of the council ring. "Otter," he said, "the animals will not forget what you have done for them. I will see that they do not forget," and he gave Otter new strong teeth, tireless muscles, keen eyesight, and a powerful tail to help him in his hunting and in his play. He did not have to give him bravery. But he gave him new fine fur that was like down on his skin, and a second coat of fur to guard the first so that he would not get cold in water or in winter. Then he gave him joy so that he would always be happy in his otter's life, and Otter has so remained until this day.

An Otter Legend derived from the Cree Indians
Contributed by John Mulvihill
The River Otter Journal Vol. VIII, No. 2, Autumn 1999

Contributors

4th Edition

Thank you to all who contributed to the 1st and 2nd editions as well as the 1997 Husbandry Survey (the 3rd edition was never published). Some of this information is still part of this edition. However, the 2nd edition is available on the IUCN Otter Specialist Group website and the original Otter Lore and other deleted sections can be found there.

Contributors to this new edition include: Helen Bateman, Gwen Myers, DVM, Melanie Haire, Tanya Thibodeaux, David Hamilton, Brian Helton, Lynn Hougle, Jennifer Mattive, Kristina Smith, Mike Maslanka, M.S., Barbara Henry, M.S., Monica Anderson, Nicole Barker, Rachael Chappell, Julie Christie, Kristin Clark, Erin Dauenhauer-Dacota, Erin Erbren, Bethany Gates, Katie Jeffrey, Maggie Jensen, Brett Kipley, Marcy Krause, Tara Lieberg, Hilary Maag, Christine Montgomery, Melissa Newkoop, Melanie Pococke, Josh Prince, Nancy Ramsey, Tami Richard, Karen Rifenbury, Jan Sansone, Ashley Snow, Alicia Striggow, Maicie Sykes, Janée Thill, Marla Tullio, Jen Wilson, Andrea Dougall, Victor Alm, Courtney Lewis, Bill Hughes, Jennifer Galbraith, and the Otter Keeper Workshop Attendees (2004, 2006, 2008, 2010, 2012). Thank you to the zoo and aquarium people who contributed photos and to the professionals who gave permission for use of their photographs: Dave Mellenbruch, Haley Anderson, Graham Jones, Gary Woodburn, Debbie Stika, and Herb Reed.

USER GUIDE

INTRODUCTION

***Lontra canadensis* is most commonly known as the North American river otter but also will be referred to here as the N.A. river otter, NARO, and Nearctic otter.**

As soon as the first edition of the North American River Otter Husbandry Notebook was completed additional information became available – that is the way projects of this nature all work. I have no doubt it also will be true for this edition. Each edition should be used as a beginning point when looking for an answer to a particular otter problem or question. Our approach to captive husbandry should be as dynamic as the animals in our care. **This 4th edition includes updated information. Since publication of the last edition significant work has been done on otter reproductive physiology, contraceptive recommendations have changed, and there have been some changes made to recommended routine veterinary care. These changes as well as additional enclosure, training and enrichment information have been included in this digital update of the NARO husbandry notebook. All deleted information and sections (e.g. North American River Otters in European Institutions) are still available in the 2nd edition. The 2nd and 4th editions are available at otterspecialistgroup.org, Otters in Zoos, etc. link (OZ Task Force – Otters in Zoos, Aquariums, Rehabilitation, and Wildlife Sanctuaries).**

Where possible, all measurements and weights have been put into the English and metric systems. This is not true for the weights tables, however. There is some duplication from one chapter to another; some information on a given topic may only appear in one location. This is inconsistent but an attempt was made to at least provide some basic information on pertinent topics where appropriate so a reader would not have to go to all of the sections. For example: there is pup development information in the Reproduction section and Hand Rearing.

Many thanks go out to all of the people who have shared ideas with me over the years, too many of you to name here however, your contributions have all been helpful and have been incorporated in some way in this manual. The notebook has been split into three sections allowing the inclusion of more photos while trying to keep the file sizes manageable. They are as follows:

SECTION 1

SECTION 2

SECTION 3

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CHAPTER 11 Behavioral and Environmental Enrichment

Introduction

> *"What is an enriched environment? It is one that allows animals to perform natural behaviors, gives animals control over their lives, eliminates frustration, makes captive environments more interesting, gives animals more choice, and allows animals to be more active. Enrichment of the enclosure involves the physical environment including shape, size and complexity. Complexity consists of an animal environment such as visual barriers, climbing or traveling structures, substrates, rest/sleep areas and temporal complexity. Manipulable objects such as toys and vegetation, the opportunity to use five senses, and the social environment are all beneficial to the animal. The types of food offered, the frequency and presentation play a large role in enriching the lives of our captive charges.*
>
> (Grams, K. 2000. *Exhibitry and Enrichment of North American River Otters (Lontra canadensis) at The Arizona-Sonora Desert Museum.* Animal Keepers' Forum, Vol. 27, No. 4. Quotation is referencing a presentation given by D. Shepherdson & J. Mellen at the First Environmental Enrichment Conference in Portland, Oregon, 1992.)

The Webster's New Universal Unabridged Dictionary lists these definitions: *Behavior – manner of behaving; conduct….it expresses external appearance or action. Enrich – to make rich or richer; to give greater value or importance to.*

In his book, Behavioral Enrichment in the Zoo (1981), H. Markowitz refers to zoos evolving into the "best possible facilities", defining best as follows: "*1) The best possible home for animals that have been removed from their natural habitat. 2) The best educational recreational experiences for zoo visitors. 3) The best provision for research of all kinds beneficial to the resident species."*

These are all definitions and goals easily agreed upon. How we achieve them is another matter, primarily because every animal is unique and will respond to different stimuli, and all zoo professionals are unique and will develop different solutions.

In the case of *Lontra canadensis*, zoos have a wonderful opportunity to teach our visitors about a native animal. Our enrichment goals should aid this education effort and create an environment that promotes good health and the otters natural high activity level, playfulness, and curiosity.

There are some general guidelines that should be kept in mind when designing an enrichment program for any animal: the target species (in this case, otters) natural history should be researched; goals and objectives should be identified in advance; aberrant or unnatural behaviors should not be promoted; any activity should be approved by the appropriate supervisory personnel; questions regarding toxicity/safety of an item should be reviewed with a veterinarian, nutritionist, chemist, curator, and/or botanist; responses should be documented to determine if an enrichment item/activity is successful, or not; treat delivery methods should not promote begging behavior; not all enrichment should be food, don't forget smell, sight, sounds, and touch; and, remember, when it comes to enrichment, variety is truly the spice of life.

This chapter will cover some of the many enrichment items tried by contributing institutions; keep in mind: not all of them were successful, some were not successful at first but when introduced repeatedly over time they eventually elicited a response; if animals are introduced at a young age to novel situations and items, they will be more responsive to new things through adulthood; and, what may have proven safe for one animal could present a problem for another, vigilance is the key. Caution should be exercised when offering paper products to otters as they can become wet and stuck to faces/ noses, or, may be covered with a thin layer of glue or similar substance.

Abnormal Repetitive Behaviors (ARBs) or Stereotypies

Morabito & Bashaw (2012) provide a good definition of these terms which is quoted here:

> *"A stereotypy is a behavior that is "repetitive, invariant, and has no obvious goal or function" (Mason, 1991, p.1015; Shyne, 2006, p. 317). In zoos, stereotypies most commonly begin when an animal is motivated to perform a certain behavior but cannot succeed because of the captive conditions (Ridley & Baker 1982). For example, lack of control or frustrated appetitive behaviors such as foraging for food or looking for a mate can contribute to the development of stereotypies (Clubb & Vickery 2006). The presence of stereotypies is therefore commonly used to indicate poor welfare in nonhuman animals, although stereotypies may reflect past environments rather than current conditions (Mason 1991, 1993; Mason & Latham 2004).Recent work has suggested a variety of behaviors previously described as stereotypic may vary in form (overgrooming, self-injury) or have a documented function (to reduce arousal, increase stimulation, or allot the animal to cope with the environment). Mason, Clubb, Latham, and Vickery (2007) have suggested that the term "stereotypic" should be limited to cases of "repetitive behaviour induced by frustration, repeated attempts to cope and/or [brain] dysfunction" that are "demonstrably caused by deficits in captive housing" (p. 164). They propose a broader term, abnormal repetitive behavior (ARB), be used for behaviors that have not been experimentally shown to meet these criteria, although they acknowledge that with continuing research most ARBs are likely to be reclassified as stereotypic (Mason et al. 2007).*

Morabito (Morabito & Bashaw 2012) conducted a two-part survey of 106 AZA institutions housing North American river otters; part one consisted of management and exhibit characteristic questions applicable to all otters resident in the enclosure, part two dealt with ARBs in individual otters. Their response rate was 52% representing 61 exhibits in 55 institutions and 129 individual otters (59.70.0). Their results are thought provoking and worthy of further research as they potentially represent a change in how we approach training as well as delivery of food and enrichment to this species. In summary, their findings indicate:

- 46% (~59) of the otters at respondent institutions were reported as exhibiting ARBs.
- Neither age nor sex were significant predictors of ARBs in the otters reported on.
- 21 otters were reported to exhibit more ARBs in winter versus 9 exhibiting more in summer (of these it appeared most were associated with increased public attendance).
- 30 otters were reported as exhibiting pre-feeding ARBs; 6 exhibited post-feeding ARBs.
- NARO are prone to developing ARBs, particularly before feeding.
- Most frequently these ARBs take the form of repetitive swimming or pacing.
- Frequent feeding (>twice per day) and training (>multiple times per week) were both reliable predictors of ARBs. (This could be because individuals who already exhibit ARBs are targeted for more feedings and/or training sessions.)
- Institutions that utilized feeding cues which served to notify the otters that food/enrichment would be coming reported slightly fewer ARBs in their otters, but this was not statistically significant.
- Their recommendations are:
  - ✓ Further study based on observational data versus self-reporting by individual institutions to double check these results.
  - ✓ Looking at what types of exhibit designs reduce the effect of visitor attendance on ARBs.
  - ✓ Experimentally manipulating feeding and training frequency to determine if these changes cause, or are a result of changes in ARBs.
  - ✓ DO NOT recommend reducing number of feedings or training sessions at this time.
  - ✓ ADDING reliable cues before feeding/enrichment and training allowing the otters to distinguish between types of keeper visits to the enclosure should be explored further.
  - ✓ ADD or use feeding techniques that require active foraging.
  - ✓ MINIMIZE the amount of time otters are confined in a less preferred environment (e.g. holding), or, provide hiding places to reduce escape-motivated ARBs.

"How Can a Zoo Enclosure be Enriched?"

From: *Compendium of Enrichment Ideas*, Proceedings of 1st Conference on Environmental Enrichment 1993, Oregon Zoo, 4001 S. W. Canyon Rd., Portland, Oregon 97221.

Physical Environment

Size & Shape
Complexity
- Visual Barriers
- Climbing/Travel Structures
- Substrates
- Rest/Sleep Areas

Temporal Complexity
Manipulable Objects
- Toys
- Vegetation

Social Environment

Conspecific
- Group size and composition (wild as a model)

Contraspecific
- Mixed Species

Occupational Enrichment

Learning
- Training
- Puzzles

Food

Type
- Novelty
- Variety
- Treats

Delivery
- Frequency

Presentation
- Hidden
- Whole Food
- Dispersed
- Live Food
- Processing Time, etc.

Sensory

Auditory
- Taped Vocalizations, sounds

Olfactory
- Scents, spices, herbs, etc.
- Faeces, urines
- Spices

Tactile
- Texture
- Manipulable Objects
- Novelty

Taste
- Variety
- Novelty
- Seasonal Change

Planning an Enrichment Program (Oregon Zoo 1993)

GOAL SETTING QUESTIONS

1. What is this species' wild habitat (e.g., desert, tropical rainforest, cover, moisture, concealment/camouflage options, temperature ranges, barriers from conspecifics)?
2. How does the animal in the wild behave in response to changes in temperature and weather? What temperature/humidity range does it experience in the wild?
3. What are some self-maintenance/comfort behaviors (e.g., preening, grooming, bathing, dust-bathing, wallowing, sunning, panting)? Is there a seasonal molt/shed?
4. When is it most active (diurnal, nocturnal, crepuscular)? Why (e.g., predator avoidance)? Does the activity pattern change seasonally?
5. Does the species in the wild inhabit primarily arboreal, terrestrial or aquatic environments or does it switch between them at times?
6. What are the main threats to the animal in the wild? What is it likely to be afraid of (e.g., conspecifics, humans)? What different types of predators does it have to look out for in the wild? Are there any anti-

predator behaviors (e.g., broken-wing display)? Where and how does the animal seek refuge in the wild from fearful situations (e.g., loud noises like thunder)? What does fearful behaviors look like?
7. What are its primary sensory modalities (e.g., sight, smell, sound) for communicating with conspecifics, detecting predators and for finding food, mates, or other social partners?
8. What is the social structure of this species (e.g., solitary, dyads, "harem," colonial, leks, polyandry)? What is the average/typical group size?
9. What is the average distance between social group members and from neighboring conspecifics?
10. Describe the primary social behaviors of this species (e.g., aggression, courtship, affiliative, play).
11. Does the social structure change seasonally or throughout the animal's life (e.g., juvenile versus adult, bachelor groups)?
12. Does this species defend territories? Does it maintain a home range? What is the size of the home range/territory? Does this species migrate seasonally?
13. How does the animal advertise its home range or territory (e.g., scent marking, song)? How does the animal attract a mate (e.g., displays, scent marks)? Who displays?
14. Where does the animal raise young (nest location/type, den)? What materials does it use to build nests/prepare dens? Are both sexes involved in rearing young? Are the young precocial or altricial? How are the young fed?
15. How does the animal locomote through its habitat?
16. What is the animal's diet type (e.g., omnivore, carnivore, herbivore, nectivore) in the wild? Does diet change seasonally? By age?
17. What does the animal feed on in the wild? What variety of food does it need to eat? What behaviors does it use to locate and procure the different types of food it needs? Does it use tools to obtain food? Store/cache food?
18. Where does the animal sleep or rest? Does that change seasonally?
19. Any other considerations?

Individual History: Review information in ARKS and related studbooks.
1. Does this animal have any medical problems (e.g., arthritic, obese, diabetic, missing digits, wing damage, pinioned)?
2. Does this animal have any behavioral problems (e.g., fearful/aggressive to humans, stereotypy, hand-reared)?
3. Any other considerations (e.g., exhibit at previous institution, hand-raised)?

Current Exhibit: Review information in related husbandry manuals.
1. What is the size of the animal's enclosure (exhibit and holding area)? What are the containment barriers (e.g., chain link, moat)?
2. Can the animal use all components of its exhibit? Can it hide? For example, how many places could this animal be out of view of its cagemate?
3. How functional is the current exhibit? Does the exhibit facilitate/allow the animal to exhibit natural behaviors? How does the animal interact with exhibit elements?
4. Where and how is the animal's food (normal diet, enrichment, browse) provided? Does the animal have a preference for one feeding site over another?
5. Does the physical environment contain elements of novelty (e.g., weather changes, can furniture be changed easily)?
6. What are the animal's opportunities to feed/forage, breed, and socialize in species-appropriate ways? Do/can/should animal interact with other species in exhibit?
7. Can the animal exhibit normal patterns of behavior? Are components of the physical environment available for this to occur?
8. Can the animal make choices about where and how it spends its time? Does the animal have control over acquisition of food? Access to hiding places? Protection from the elements?
9. Are there any hazards in this enclosure?
10. Any other considerations?

RANDOMIZE & EVALUATE

Otters should be enriched several times a day. This can consist of auditory, olfactory, sensory, environmental, social, temporal, foraging, or feeding opportunities as well as novel situations (such as

behind the scenes tours) or interaction with keepers. On the following pages are some examples of enrichment calendars and assessment formats for keeping track of what the otters respond to and how they respond (positively or negatively). Many institutions utilize a ratings scale based on one used by Disney's Animal Kingdom.

Enrichment Rating Scales
1 = no observed interaction with enrichment
2 = animal orients towards enrichment, but does not physically contact enrichment
3 = 1- 5 visits/minutes of interaction
4 = 5 - 10 visits/minutes of interaction
5 = greater than 10 visits/minutes of interaction

Please note: signify ratings made other than immediately following enrichment introduction with + sign. All other ratings will be presumed to be made immediately following enrichment placement.
This 1-5 scale is useful for assessing the degree to which an animal interacts with an enrichment initiative (either novel or familiar) for a specific period of time. This scale can be used to assess how an animal's interest in a particular enrichment changes over time. Important points to note will be that the animals' response to the enrichment may vary depending on the time of day that the animals are observed and the scale used, as well as how long the observation period is. Both of these factors should be made as consistent as possible. For example, all keepers assessing a otter's use of a feeder should come to an agreement as to when and for how long their observations should take place (e.g., 10 minutes when the otters are first let out on exhibit).

ENRICHMENT PHOTOS 1

Pillow case feeders: fish placed in the pillow case and the otters must untie it (Pueblo Zoo).

Plastic fish feeder – otters must get fish through the hole (Pueblo Zoo)

Paper toweling hung from outside – the otters pull in to use as bedding (Pueblo Zoo)

Texas State Aquarium Enrichment Inventory

RIVER OTTER ENRICHMENT INVENTORY

Toy	Quantity	Animal: Dusty (D) Merlin (M)	Supervised Unsupervised Overnight	Animal: Odie (O) Oliver (Ø)	Supervised Unsupervised Overnight	Comments	Repair
Ball-- Basketball	1	D/M:	Overnight	O/Ø:	Overnight		
Ball-- Basketball, sinker	0	D/M:	Supervised	O/Ø:	Supervised		
Ball-- Black float	1	D/M:	Overnight	O/Ø:	Overnight		
Ball-- Boomer, large with holes	2	D/M:	Overnight	O/Ø:	Overnight		
Ball-- Boomer, medium with holes	4	D/M:	Overnight	O/Ø:	Overnight		
Ball-- Boomer, solid	2	D/M:	Overnight	O/Ø:	Overnight		
Ball-- Bowling, blue	1	D/M:	Overnight	O/Ø:	Overnight		
Ball-- Bungee	1	D/M:	Supervised	O/Ø:	Supervised		
Ball-- Jolly, large	0	D/M:	Unsupervised	O/Ø:	Supervised		
Ball-- Jolly, medium	0	D/M:	Unsupervised	O/Ø:	Supervised		
Ball-- Wiffle, medium	6	D/M:	Unsupervised	O/Ø:	Unsupervised		
Ball-- Wiffle, small	11	D/M:	Unsupervised	O/Ø:	Unsupervised		
BC Toy-- Black	1	D/M:	Unsupervised	O/Ø:	Unsupervised		
Bilibo-- Large	4	D/M:	Overnight	O/Ø:	Overnight		
Bilibo-- Mini	2	D/M:	Overnight	O/Ø:	Overnight		
Bin-- Blue toy box	1	D/M:	Unsupervised	O/Ø:	Unsupervised		
Bin-- Recycle	1	D/M:	Overnight	O/Ø:	Overnight		
Bin-- Rubbermaid with holes	1	D/M:	Supervised	O/Ø:	Supervised		
Bin--Rubbermaid, brown	1	D/M:	Overnight	O/Ø:	Overnight		
Bin--Rubbermaid, gray, large	1	D/M:	Supervised	O/Ø:	Supervised		
Bird-- Dove, clip-on	1	D/M:	Unsupervised	O/Ø:	Unsupervised	Never inside area with animals	
Boat seat	1	D/M:	Overnight	O/Ø:	Overnight		
Bone-- Nylabone	1	D/M:	Overnight	O/Ø:	Unsupervised		
Boogie Board	1	D/M:	Unsupervised	O/Ø:	Unsupervised	At Dolphin Bay	
Bowl-- 4-Liter, plastic	2	D/M:	Overnight	O/Ø:	Overnight		
Bowling Pins	6	D/M:	Unsupervised	O/Ø:	Unsupervised		
Box-- Red with holes, 25"x25"x32"	1	D/M:	Overnight	O/Ø:	Overnight		
Buoy-- 12" white	1	D/M:	Supervised	O/Ø:	Supervised		
Buoy-- 16" blue	2	D/M:	Supervised	O/Ø:	Supervised		
Cutting Board	2	D/M:	Overnight	O/Ø:	Overnight		
Dental Toy-- Blue	1	D/M:	Overnight	O/Ø:	Overnight		
Dental Toy-- Red	1	D/M:	Overnight	O/Ø:	Overnight		
Disc-- 6" Bamboo flying	1	D/M:	Unsupervised	O/Ø:	**DO NOT GIVE**		
Disc-- Firehose Flying, large	2	D/M:	Unsupervised	O/Ø:	Unsupervised		
Disc-- Firehose Flying, small	2	D/M:	Unsupervised	O/Ø:	Unsupervised		
Disc-- Green, 40" diameter "cheese wheel"	1	D/M:	Overnight	O/Ø:	Overnight		
Disc-- White, pancake	1	D/M:	Overnight	O/Ø:	Overnight		
Disc-- White, pancake with holes	1	D/M:	Overnight	O/Ø:	Overnight		

Maryland Zoo Enrichment Calendar

ENRICHMENT CALENDAR

ANIMAL/GROUP: _____ MONTH/YEAR: _____

RATINGS: 1 - NO INTERACTION; 2 - ORIENTS TO ENRICHMENT, NO PHYSICAL CONTACT; 3 - 1-5 MINUTES OF INTERACTION; 4 - 5-10 MINUTES OF INTERACTION; 5 - 10+ MINUTES OF INTERACTION

SUNDAY RATING INITALS:	MONDAY RATING INITALS:	TUESDAY RATING INITALS:	WEDNESDAY RATING INITALS:	THURSDAY RATING INITALS:	FRIDAY RATING INITALS:	SATURDAY RATING INITALS:
SUNDAY RATING INITALS:	MONDAY RATING INITALS:	TUESDAY RATING INITALS:	WEDNESDAY RATING INITALS:	THURSDAY RATING INITALS:	FRIDAY RATING INITALS:	SATURDAY RATING INITALS:
SUNDAY RATING INITALS:	MONDAY RATING INITALS:	TUESDAY RATING INITALS:	WEDNESDAY RATING INITALS:	THURSDAY RATING INITALS:	FRIDAY RATING INITALS:	SATURDAY RATING INITALS:
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Blank Park Zoo Enrichment Calendar

BLANK PARK ZOO — ENRICHMENT CALENDAR

Species/group: North American River Otter___ **Month/Year:___January 2012_____ _____**

DATE	ENRICHMENT	RATING	ENRICHMENT	RATING	COMMENTS
1	AM-diet in lunch bags buried in straw	4	PM-diet scattered around dens	4	
2	AM- diet scattered and in toys, carrot on exhibit	3	PM- diet in boxes, paper towels	3	
3	AM-diet in pans with frozen paper towels on top	3	PM- newspaper balls with perfume, meat and kibble in box with holes, blue cylinder	4	
4	AM: kibble in TP tubes	3	PM: lots of paper, some with kibble and some wtihout	3	
5	AM: diet in upside down rimmed bowl	3	PM: diet under boxes	3	
6	AM: diet in cricket cardboard/leaf piles on exh.	3	PM: tubs of snow with carrots./meatballs	3	
7	AM; diets under large black tubs	3	PM- meat in swirly ball, kibble in molecule ball	4	
8	AM: diet between metal bowls	3	PM: dog food on wobbly feeders; meatballs hidden around dens	3	
9	AM- scattered diet, hid diet under metal bowl	3	PM- diet in/under boxes	3	
10	AM- diet in rimmed bowl under boxes, wrapped "presents" on exhibit	4, 2	PM- diet in wrapped "presents"	4	
11	AM: playtime	2	PM: diets spread around holding	3	
12	AM: diet in egg crates	3	PM: diet in cricket containers w paper towels	3	Otters separated overnight
13	AM: diets in rimmed bowls	3	PM: diets in cricket cardboard	3	
14	AM: diets scattered around dens. Dog food wrapped in paper towel	4	PM: diets in cardboard boxes mixed in hay	3	
15	AM-diet in 10 dixie cups	3	PM-diets hid underneath numerous leaf piles	3	
16	AM- scattered diet, diet in kongs	4	PM- diet in paper sacks, kongs	3	
17	AM- diet in between two metal bowls, in kongs, fish in wrapped "presents" on exhibit	3	PM- diet in upside down rimmed bowls, chew toys		
18	AM: diet spread around	3	PM: tower of boxes with snow/fish and meat.	3	PM: k in paper towels
19	AM: diet spread around	3	Exh: perfume	2	PM: kibble in tp tubes
20	AM: diet under upside down bowls	3	Exh: leaf piles on top of rock area	3	
21	AM: L-k in 3hole jollyball with papertowels S-diet in cricket container	3	PM-diet in numerous small boxes	4	
22	AM-meat in swirl balls/dog food scattered	4	PM-diet in cricket containers	3	
23	AM- hid meatballs/ scattered diet	3	PM- diet in paper bag piñatas	3	
24	AM- meat in jollyball covered in paper towel	3	PM- kibble smashed in meat between two bowls.	3	

Table 1 List of enrichments items utilized in 25 zoological institutions from the AZA Otter Keeper Workshop, Dallas World Aquarium, 12 – 16 April 2012

Any item used from this list should be cleared with zoo management and carefully monitored when first introduced. Some items should only be used while otters are supervised. **Many people use paper products however caution should be exercised, there have been problems when the paper becomes wet and "glues" itself to an animal's mouth. The same holds true for cardboard.**

Enrichment Items Used for N. A. River Otters by AZA Institutions (2012)	
Enrichment items contributed by 2012 AZA Otter Keeper Workshop Attendees from 25 institutions (Baton Rouge, Blank Park, Cameron Park, Denver, Detroit, Dickerson Park, EcoTarium, Fort Worth, Great Lakes Aquarium, Houston, Hutchinson, Knoxville, Lake Superior, N. C. Aquarium Roanoke Island, Oregon, Potawatomi, Pueblo, Seattle Aquarium, Seneca Park, St. Louis, Texas State Aquarium, Utah's Hogle, and Zoo of Acadiana). Puzzle feeders, etc. listed as "Delivery"; bedding, tubs, etc. listed as "Environmental". NOTE: * Items not placed inside enclosure but outside where cannot be reached. Paper products should be used near water with caution! Some of these items may have been used under keeper supervision only. All items must be approved by institution's management.	
Delivery	**Food or food-type items**
Aussie foraging ball	Anchovy paste
Aussie hanging food ball	Apples
Automatic food dispenser in a tree which randomly dispenses food to several locations	Balls, swirly with meat
Ball, rubber, Molecule ball that treats can be placed inside	Berries and grapes (strawberries, blueberries)
Bobbin feeder	Biscuits, carrot
Box, cedar forage	Biscuits, dog or cat
Bucket, 5 gallon with holes and lid. Submerged in pool and fastened in place; also live fish placed inside.	Biscuits, monkey
Bullet feeder	Blood balls
Diet, scattered	Blood-sickles
Digging bowl	Boiled eggs
Firehose box (woven with holes for food)	Bones
Fish catapult (wish list)	Bread
Fish, crayfish, shrimp, etc. frozen	Broth ice cubes (chicken, beef)
Floating fish feeder	Canned sardines
Forage pans	Carcasses (pieces of deer, goat, sheep)
Forage pile	Carrots (whole and cut up)
Foraging opportunities	Cat food, moist
Frisbees, frozen with flavored ice/food pieces	Cat treats
Frozen fruits/ veggies: baked, whole, kebabs	Catfish chow
Fruit or meat trails	Cereal
Jolly balls with diet wrapped in paper towels inside; sometimes frozen	Chicken necks

Delivery	Food or food-type Items
Kebobs on branches	Chicken, live
Meat balls tossed into enclosure through mesh	Chicks (day old)
Meat packed in small metal bowls turned upside down	Clams, mussels
Meat packed into creases of no-spill bowls turned upside down	Coconuts
Meat/fish juice trails	Cooked rice
Paper bags with diet/treats inside	Corn hanger
Peanut butter, etc. smeared on branches or toys	Corn stalks
Plastic barrels made into puzzle feeders	Corn-on-the-cob
Puzzle feeder, mesh	Crackers
Puzzle feeders	Cranberries
PVC end caps to hide food under	Crayfish
PVC tube with rubber mat wrapped around it	crickets scattered
Snowman stuffed with treats	Cucumbers, broccoli, zucchini, steamed beats, banana, pears,
Stock tank filled with water and live fish or treats	Dog kibble (also cat kibble)
Teepee feeders	Earthworms
Treat ball: hard plastic with holes, anchored to the bottom of the pool with fish inside	Eggs, emu
Tubs -black stock feeder filled w/straw, etc. and dry food scattered throughout	Eggs, hardboiled egg slushy
Environmental	Eggs, raw (with vet approval only)
Access to different shift area	Eggs, scrambled
Air kennel	Elk bones/roast
Alfalfa	Ferret chow, trout pellets
Animal hair	Fish flakes, dried
Animal pinwheels*	Fish goo
Alpaca fur	Fish juice-sickles
Aquatic plants	Fish-sickle
Bamboo teepee	Flowers; edible and also rose hips
Bamboo with smooth edges	Foods, assorted treats: popcorn, crackers, cereal, marshmallows, croutons, graham crackers, tuna, etc.
Barrel (plastic, all sizes) suspended from chain, in water, on ground, with holes; may have food hidden inside	Frogs
Beaver fur and squirrel tail autoclaved	Frozen fish treats

Environmental	Food or Food-type Items
Behind-the-scenes-tours	Fruit hollowed out and stuffed with treats
Branches	Gelatin jigglers
Browse (approved)	Gourds
Brush groomer	Green peppers
Bubble machine*	Grubs
Burlap	Ham, unsalted
Burlap hammock with PVC frame	Honey
Car wash strips/freezer door flaps	Honey comb
Carpet squares	Honey cone
Carpet, indoor-outdoor	Horse knuckles
Climbing structures (durable children's toys)	Hot dogs
Cloth; green cut to resemble kelp	Ice blocks, layered flavors
Clover (fresh)	Ice blocks, layered food pieces
Coco fiber doormat	Insects (mealworms, wax worms, etc.)
Coke barrel beds	Jell-O, with fish chunks or broth
Comforters	Jelly
Construction pipe tunnel	Knuckle bones, rib bones
Crushed ice	Krill
Dirt piles (fresh)	Lettuce head
Feathers	Live fish (creek chubs, shiners, goldfish, minnows, capelin, herring, trout, blue carp)
Fire hose strips hanging	Melons
Firehose	Mice and rats (whole carcass)
Fleece	Milk bone dog biscuits
Fleece balls	Night crawlers
Fleece blankets	Oatmeal
Furniture changes	Oranges
Furniture from another approved enclosure	Pasta, cooked
Grass piles	Pecans
Hammock, circular and swings	Peanuts
Hammocks	Pegetables (vegetables on wooden pegs)
Hand-held or box fan*	Pine nuts
Hay, straw, leaf litter	Popcorn
Horse trough	Pumpkins (all sizes)
Hula hoops weighed down by bricks	Quail
Ice (also artificial iceberg)	Rabbit legs
Ice (blocks or cubes; hanging, barbells, cubes, blocks, balls, rings, piles)	Raisins
	Rats

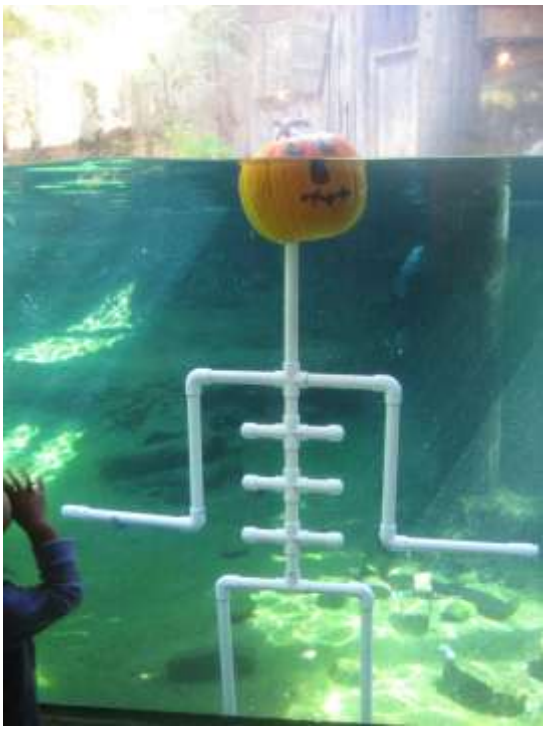
Environmental	Food or Food-type Items
Keeper interaction	Salmon eggs, fresh
Kiddie pool	Sand eels
Kid's turtle shaped sand box	Scare crows made from edible items
Kuzu vines	Shrimp, not peeled
Laser pointers	Shrimp, raw and peeled
Llama/bison fur	Snails, clams; live
Log ladder	Squid, crab legs, sardines
Logs	Worms (red wrigglers, meal, wax)
Logs, hanging	Yogurt
Logs, stumps, shrubs, trees, grass, hollow logs, sticks, drift wood, natural substrates	Acrylic sheet feeder
Milk crate	Acrylic tube feeder
Mirror mobile*	Antlers
Mirror*	Aussie "Lion ball"
Mister fans*	Aussie Ping Thong ball
Mister hose	Balls (whiffle, tennis, jolly, fortex rubber balls, boomer, bowling)
Mollusk shells	Bamboo flying disk, 6"
Moss	Basketball
Mud pits	Bins, heavy plastic, all sizes
Mulch	Bobbin
Natural fiber mat	Boogie board
Novel visual item	Boomer ball
Palm fronds	Boomer ball, extra-large with hole for entry
Pampas grass fronds	Bowling pins
Pillows	Boxes
Pinecones (also scented or with food hidden within)	Bubbles
Pipe, gutter	Buoy
Plants, aquatic purchased at pet store	Buoy toys
Plush dog beds	**Toys or Manipulable Items**
Raft, bamboo	Cardboard, paper bags (not around water)
Rock piles	Chains (large or small enough they cannot become caught
Rock piles	Chew toy shaped like a tire
Rocks, fake	Coconut shells
Rocks, piles	Coke crates
Root balls (tree roots cleaned and placed upside down on trunk stump for climbing one	Cow hooves

Environmental	Toys or Manipulable Items
Sand box, moveable	Dental chew toy, Pas – A – Fier
Sand piles/boxes/tubs, etc.	Diving toys
Seaweed, culinary grade	Dog crates, kennels, igloos
Sheets, towels, washrags	Duck decoy
Shells	Egg cartons
Shifting changes (time)	Faux feathers
Slides	Fly swatter
Snake sheds	Frisbees
Snow	Grain sacks
Snow in holding	Hexagon kong (hollow bones)
Snowman	Jolly balls
Sod	Jugs
Sprinklers and waterfalls	Kegs
Traffic cones	Klinker ball
Training	Kong chew toys
Trees: Christmas tree, privet, pine, beech, iron wood, willow, cypress	Kracor keg and log
Tube, corrugated large black	Milk crate
Vegetable fiber sacks	Nyla rings
Vegetable vines	Nylabones
Visual barriers: camo netting, bamboo, hula skirt, etc.	Painting
Warm water	Paper Mache figures
Warm water hose	Paper towel jungle
Willow branches	Pigs ears and snouts
Woodchips	Plant pots, non-breakable
Wooden raft (heavy duty) on PVC frame	Plastic bottle, 2 liter (no lid) #3 food degree
Wooden scratch post wrapped in Astroturf	Plastic container filled with rocks and put in pool
Wooden swings	Plastic egg (extra-large)
Wood wool	Plastic keg coupled with mop head
Wool	Plastic logs
Wreaths, grapevine	Plexiglas shield
Scents	Plush toys
Allspice	Pool rings that float
Animal feces (non-carnivore)	Pool rings that sink
Animal scents, synthetic	Pool, kiddie
Animal urine (commercially purchased)	PVC Alka-Seltzer tube
Broth	PVC toy (various shapes; incl. tubes, rings, standing figures, trees, etc.

Scents	Toys or Manipulable Items
Butter extract	PVC/fire hose "seaweed" toy
Cheery extract	Rattles
Cinnamon powder	Rawhides
Condiments (ketchup, mustard, vinegar, peanut butter, maple syrup, salad dressing, relish, molasses, applesauce, etc.)	Rocks, small river rocks for carrying or playing with
Cumin	Rope bone
Elephant foot shavings	Rubber duck
Garlic	Rubber feed tubs
Herbs, fresh	Sand box toys
Lavender oil	Scrub brush heads
Lemon extract	Sled
Mint extract (powdered and liquid)	Slip n' Slide
Nutmeg	Spools, plastic
Oils; fragrant/essentials	Tire; floating plastic
Orange marmalade	Tires
Perfumes	Toboggan
Pumpkin paste	Toy barbells
Root beer, strawberry and vanilla extract	Training dummy
Scents, assorted: coffee, cooking spray, catnip, Asian essence, dill weed, bacon bits, black pepper, grill seasoning, crushed red pepper flakes, tarragon, sesame seeds, ground clove, rosemary, onion salt, Mrs. Dash, BBQ seasoning, root beer concentrate, Obsession cologne, eucalyptus spray, coconut-lime spray, parsley, bay leaves, celery salt, paprika, thyme, pickling spice, Ben Gay, breath spray,	Trash can lid, 25 gallon
Vaporub	Trash can; empty, filled with water, filled with bedding
Sounds	Tub - 55 gallon
Echoes of Nature: thunder, forest sounds, frog chorus, morning songbirds, jungle talk, forest wild lands, wolves, night of the owl, echoes of glaciers, etc. Also Sun Catcher CD's and assorted Animal sounds CD*; radio; wind chimes, and noise makers/rattles.	Vinyl tube, clear
Game caller, Bird caller, electronic	Virginia creeper balls
Noise maker/ rattle	Water cooler bottles
Radio	Weeble
Wind chimes*	Wheelbarrow & stroller seat buckets

ENRICHMENT PHOTOS 2

Dickerson Park submerged "sea weed".



John Ball Zoo root-ball-island, fastened to bottom of pool. Fun with just a few feet of water too.

Fort Worth PVC pumpkin man and bamboo raft.

Seneca Park
Hanging hammock

Training as enrichment and good husbandry Seattle Aquarium (Photo: C. Hempstead)

Enrichment Ideas Explained and Quotes

This list is not exhaustive and not all of these ideas have been tried with otters. Before using any of the fabricated toys, i.e. puzzle feeders, etc.; make sure no animals can accidentally become caught inside while under water.

Brush Pile Feeder (Law et. al 1990) – Place meat or other food items under a brush pile; can also use a rock pile or logs.

Dog Chews – Try different things with them, i.e. hang them, soak them in water, fish juice, blood, etc.

Artificial Tree Food Dispenser (Carlstead et. al. 1991) – Mechanism in tree dispenses food items to one of 6 locations around the tree's base at random intervals.

Fish Catapult (Washington Park Zoo; Markowitz 1982; Hawke, L., P. Lauer, D. Bartholomeusz & Z. Steen. 2000) – Catapult fed by conveyor belt ejects fish into the enclosure at varying intervals.

Hard Plastic Balls (Shepherdson 1993) – Variations, e.g. "Boomer Balls" can be covered with a variety of scents or holes drilled in them and filled with food, stones, etc.; or used as day beds.

Meat Trail (Glasgow Zoo, Law et. al. 1990) – Drag meat around the exhibit leaving a trail; the meat may, or may not, be at the end. (Fish juices also could be used.)

Visual Barriers (Mckenzie et. al. 1986; Adams & Babladelis 1987) – Vegetation, rocks, waterfalls, etc. increase the environmental complexity and increase the animals' psychological space.

Rubbing Post (C.E.E. 1993) – "*Begin with a concrete parking bumper or other appropriate substance. Bolt a natural bristle broom head (bristles up) onto the concrete and put into pool. The animals can utilize the bristles for tactile stimulation. Different texture bristles could be used…"* (H. Hellmuth personal communication)

Milk Crate Feeder Puzzle (C. E. E. 1993) – *"Take a metal milk crate, weight it down and place it upside down on the bottom of the pool with fish underneath. If you cannot enter the pool to place fish under, or for a different type of enrichment, put frozen fish blocks under the crate.* Also suggests: *"Take two plastic milk crates and secure them together (or one crate with a makeshift cover). Put fish inside the crates and place them in the pools."* (H. Hellmuth personal communication)

PVC Feeder (C. E. E. 1993) – Idea submitted by the Oregon Coast Aquarium for sea otter.
"4" cellular PVC tube with four holes drilled along its length …with slide-able rings covering them. In addition to the floating cellular PVC, a small float is installed under the fixed cap to avoid sinking. "The four slide-able rings (with retaining tracks) cover the four access holes drilled along the length of the tube. The ring has a hole that matches those on the tube. Once the ring slides to match both holes, items can be reached."

This idea may be better suited to Asian small clawed otters but could be used for N. A. if something like fish pieces were put in (because otters will tend to take the toy out of the water) and the rings made moveable and easily pushed with noses.

Boomer Ball Feeder (C. E. E. 1993) – Adapted from an idea for sea otters submitted by Oregon Coast Aquarium. Drill holes in any size Boomer Ball. Hole size should be large enough to allow the insertion of ice cubes (these help hold the fish in) and fish pieces.

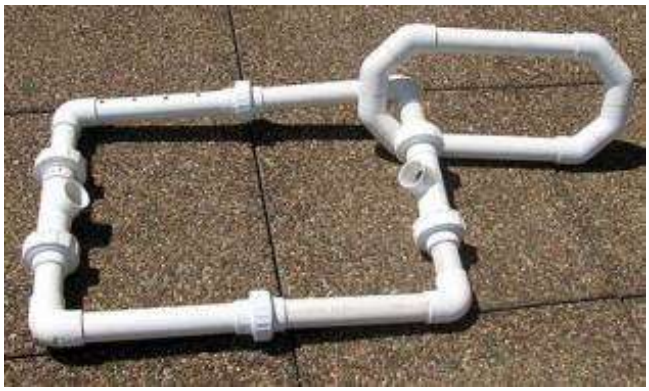
Ice Cube Mountain (C. E. E. 1993) – Oregon Coast Aquarium. *"Large buckets of ice cubes are dumped in piles at various locations on the deck of the exhibit. Frozen butter clams are hidden under the piles of ice."* This idea was used for sea otter but could easily be adapted to river otter.

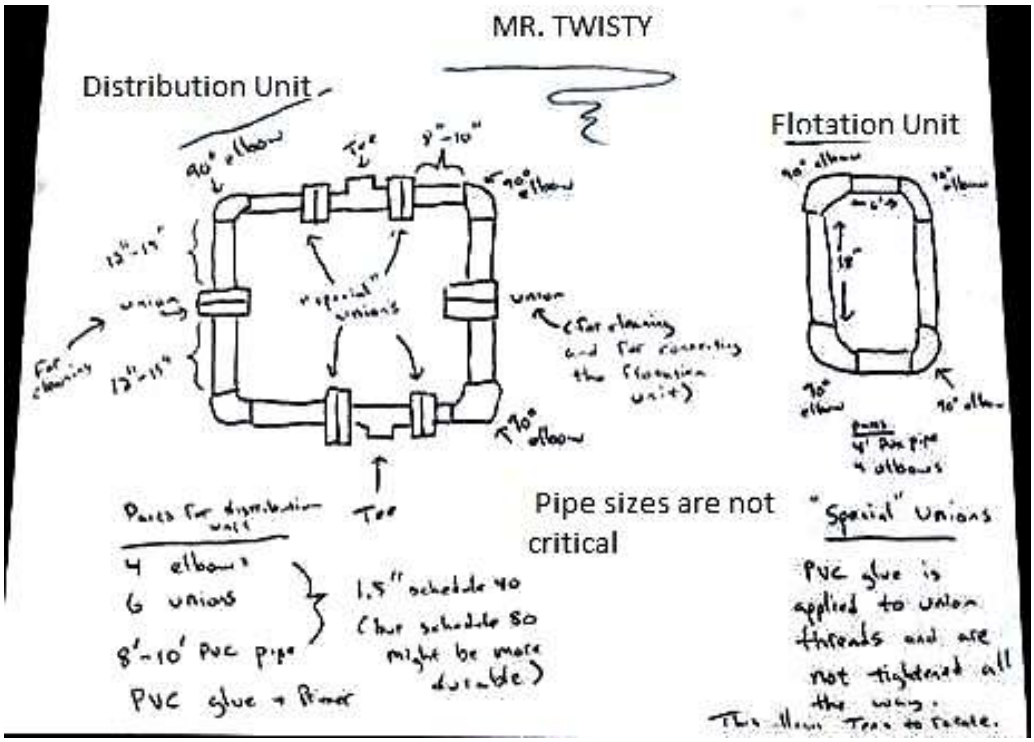
Animal Shower (C. E. E. 1993) – Brookfield Zoo *"Animal can walk or swim to an area in the pool or enclosure and self-activate the operation of a shower head located in the area"* (E. Krajniak). He suggests using a motion sensor like the ones used to turn lights on. Mount a shower head to a water source using a hose. *"Go back to the water valve you are going to hook the hose up to for water. At this point install an electric solenoid valve (you want a solenoid valve that is normally closed when the power is off and opens when you turn the power on.) Next run an electric power line to the motion sensor. Run two wires from the electric wire that would normally turn on lights, when the sensor senses motion, it will turn on the water instead of the lights.*" (E. Krajniak)

Mirrors – Place outside the exhibit, preferably on under water viewing window.

Floating Bag (G. Ziegler personal communication) – *"... food items inside a loosely tied mealworm bag (small muslin cloth bag) and tossed in the pool. Our otter played with it longer than anything I've observed. She had a hard time opening the bag, but finally got it.*" A variation on this is using a pillow case – place fish or fish pieces inside and tie the end (Pueblo Zoo, M. Pococke)

Mr. Twisty – Design by Bill Hughes, submitted by Courtney Lewis;





Car wash strip toy – Kristine Smith, Oregon Zoo (OKWS 2010)

There are an unlimited number of variations and combinations for the enrichment ideas and items listed here. As stated earlier, any one idea may work for some animals and not others; it may take a while for an animal to respond to any given item so try it more than once; be watchful for adverse reactions, even with previously used items; be creative, and, share. If you find a novel approach share it on the AZA river otter or enrichment list serves or one of the other enrichments resources currently available.

Remember!

When developing your otter enrichment program do not forget the importance of your exhibit design. A complex, well thought out exhibit will provide a multitude of enrichment options. Exhibit furniture can be moved (both onshore and "offshore") and should be changed periodically to introduce novelty to the animals' environment. It is preferable to offer a variety of substrates. This affords the animals a choice of where to do their grooming and allows for a range of exploratory behaviors which can be encouraged by planting toys, food items, etc. Pools, streams, waterfalls, etc. need to be varied in depth; if possible, water bodies in the same exhibit should also offer different features such as degree of turbulence, shore composition, and submerged fixtures like logs, rocks, etc. Stones, rocks, pebbles, and sand placed along the shoreline, or as part of shallow water bodies, offer a rich medium for manipulation by the otters and hiding of treats and toys. Temporal enrichment can be a valuable option for those exhibits designed with adequate off-exhibit holding facilities. Animals can be rotated on and off exhibit providing them with the opportunity to explore different spaces, get away from the public or conspecifics for a while, pursue a more natural behavior cycle like following the scent of an estrous female, and finally, periodic rotation of animals stimulates activity in the exhibit and creates an opportunity for keepers to introduce other enrichment items to the exhibit. Indoor exhibits should offer temperature gradients to allow animals the choice of where they want to be and outdoor exhibits should provide varying degrees of shade. Sleeping/hiding place choices should be available in any exhibit type.

And finally, when looking for new enrichment items keep these criteria in mind: *"First, the object must be large enough so that it cannot be ingested. Second, it must be strong enough to stand up to their teeth. Third, it cannot have any sharp edges that could cut the otters. Fourth, it cannot have any small parts that could break off…"* (Gabbert 1999).

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CHAPTER 12 Training or Behavioral Modification

Introduction

Training is a complex and dynamic subject with a vast array of resources available. This section is designed to; a) provide an introduction to training otters for those are new to working with them or just beginning a training program at their facility and, b) to provide examples of behaviors trained by institutions to encourage otters to willingly participate in common husbandry activities. See Chapter 11 Abnormal Repetitive Behaviors for information on the use of training session cues to reduce pre-training/feeding session ABRs.

Basics of Otter Training

Written by: K. McKay. Published by: IUCN/SSC Otter Specialist Group, Otters in Zoos, Aquariums, Rehabilitation, and Wildlife Sanctuaries Task Force (OZ); Edited by: Jan Reed-Smith, OZ Chair Contributors: A. Dougall, M. MacPhee, J. Mellen, S. Tippet (Abridged Version 2012); *http://www.otterspecialistgroup.org/Library/TaskForces/OCT.html*.

The Otters in Captivity Task Force extends special thanks to Disney's Animal Kingdom® staff for their review of this document and contribution of extensive training expertise.

Why we train

A common goal shared by keepers is to provide the best possible care for our otters. The physical well-being of the animals is, perhaps, the most immediate concern of animal caretakers. Training can have an impact on every facet of an animal's health, and can be used in a variety of ways to aid in husbandry and medical care. For example, through training an undernourished otter can be encouraged to eat; an injured otter can be trained to take medication or allow injection; disabled otters can be trained to use their remaining faculties. Healthy otters can benefit from training also. Training otters to stand on a scale allows the keepers to obtain weights reliably without the stress of physical restraint (e.g. netting, grabbing by hand). Otters can be trained to present body parts to the trainer for close inspection. All of these are examples in which the otter participates in its own health care.

Otters are complex animals. Those of you who have worked with otters are probably aware that they are intelligent, curious creatures. They can solve puzzles, use tools, and manipulate their environment. In the wild, otters will use these skills to acquire food and engage in social activities. In captivity, food is provided for them, eliminating the need to work for their meals. How the food is presented to the otters can have an impact on their well-being. A training session during feeding times is one way to allow otters to use those parts of the brain they might use for hunting. Training can be considered activity time, giving otters an opportunity to solve a puzzle and use their memory to achieve training goals. Some otters may respond enthusiastically to training sessions, much like children at playtime. In the absence of pressure to find food or avoid predators, otters may find themselves getting into trouble; in these cases, training can be used to reduce or eliminate undesirable behavior. A consistent training program contributes to the otters' mental health.

Otters have sharp teeth, powerful jaws, and can have aggressive tendencies. Otter and keeper safety, especially with larger species, should always be a priority. Training an otter to voluntarily enter a crate/kennel can eliminate the need to physically restrain or catch with a net, reducing risk of injury for both parties. In some circumstances an otter may be considered too aggressive or dangerous to work with

in close contact. Training methods exist that can be used to achieve goals while keepers remain a safe distance from the otter.

Even the daily management of the otters can benefit from training methods. Otters can be shifted from one area to another without force. If two or more otters show aggression toward each other during feedings, they can be trained to separate into different areas. In some cases aggressive otters can be trained to eat cooperatively without separating. In situations where there is not enough space to separate the group, keepers can place visual barriers between animals during feedings. Otters can also be trained to station, that is to go to a specific location such as a log or rock and stay there for feeding.

An added or unexpected bonus of training is its effect on the quality of care given. Training engages keepers in the care of their otters. Keepers who train daily have an investment in their otters that can translate into better care. Success in training creates positive feedback, or sense of accomplishment, which can motivate keepers to invest more time and energy into the otters in their care.

How we train

Motivation

The foundation of any training program is motivation. Before you begin to train you must understand what motivates your otters. While the most common motivator for training is food, it can take other forms as well. Access to an outdoor exhibit, nest box, or group member can all be motivators, so can a favorite toy or substrate. Training is a two-way process. The trainee offers the behavior and the trainer offers the reinforcement (reward). Keep in mind that each species has a unique set of motivators. Learning the natural history of your species is a good first step toward discovering what will motivate. For example, access to saltwater will likely be less reinforcing to a river otter than to a marine or sea otter. Some species will have preferences for crustaceans or mollusks, while others prefer fish. In addition to natural history, it is equally important to look into your otters' individual history. Two otters within the same family can prefer two different types of fish.

A key element of natural history shared by all species of otter is their high metabolism relative to other mammals (Kruuk et al., 2002). The need to consume a substantial quantity of food relative to their body size makes the diet an excellent motivator. Using their diet to provide reinforcement for a correct behavior provides an opportunity for many behaviors per session versus a single reinforcer such as a toy or access to a favored area. Most fish species can be cut into smaller pieces, allowing for even more rewards per session. Using daily diet items rather than special "treat" foods also makes it easier to maintain healthy weights.

While determining what best motivates your otters, special consideration should be given to the social dynamics of your species as well as to the individuals within the group. At times the desire to be with a family or group member (or to avoid them) can override the desire for food. This fact can make the training of group separations difficult. You may need to work with small approximations, or series of steps, to slowly move individuals farther apart over time.

Creativity

There are a number of books, journal articles, and web sites covering the subject of animal training and for each reference there might be a different way of training. There are many methods that can be successful. Being flexible and creative is important as a trainer. Do not be afraid to try something new or different, even if it does not follow what you have read (including this manual). Knowing your otters will go a long way toward shaping your training plans. In the following example, a keeper overcame a training challenge by looking beyond the designated training time: this particular group of otters was so motivated by food that the beginning of any session was very chaotic. They were so focused on the food they could not focus on the training. The solution was to feed the group a small part of their diet twenty minutes before a session. This had a calming effect on the group and allowed them to focus on the trainers during training time.

Positive Reinforcement and Trust

The concept of positive reinforcement is important in animal training. The basic principle is that a reward is given to the otter for a correct response to a training cue. Over time this can establish a relationship of trust between the trainer and the animal. This trust can be incredibly useful when training behaviors that may normally cause distress. One individual Asian small-clawed otter came to a facility after eleven years in a zoo that did little husbandry training. Her only experience with a crate came from being caught by net and placed in the crate, usually for veterinary procedures. At this new facility, it took several months of training to get this otter to enter a crate willingly. When the time came for her first examination, there was concern that she would, once again, be afraid of the crate. After her exam she was returned to the exhibit and allowed to spend the rest of the day with her mate. During her first training session the following day, when asked to enter the crate, she did so willingly and without hesitation. Her recent and consistent positive reinforcement history was enough to overcome the negative experience of the examination.

Timing

Creating a bond of trust between otter and trainer requires careful timing. This can be one of the more challenging aspects of any kind of training. Otters are known in training circles to be difficult to work with for two reasons: 1) they can move quickly, making it difficult to reinforce at exactly the right moment, and 2) they are very intelligent, which can work against you when training new behaviors. When asked to stand up, your otter may stand, open its mouth, step to the left, hold up its tail, make noise, and put its paw on a rock all in the space of a few seconds! Reinforcement will need to be given at precisely the right time to let the otter know exactly which behavior you want. Accidentally reinforcing inappropriate behavior; such as screaming while feeding or biting at a target, can be very easy to do. Once learned, eliminating the undesirable behavior can be difficult and/or time consuming, especially for a novice trainer. One way to avoid reinforcing these behaviors is to begin with steps that are very short in duration and can be achieved quickly. Doing this gives the otter less time to offer any of the undesired behaviors.

Training Plans and Consistency

Timing of reinforcement goes hand in hand with consistency. This means rewarding at the right time, every time. The right time will be determined by your training plan in a series of steps called 'approximations.' These approximations will provide a map from beginning to end of a new behavior. Having a plan is important, but remember, be flexible. Your otter may not know the plan and will go in a direction that you did not anticipate. A good training plan is one that is adaptable to many situations. Examples of training plans are provided later in this document.

Another recommended technique to maintain consistency is to use one trainer for any new behavior. While going through the steps to produce a new behavior, having the same person with the same timing leading the way can be beneficial. Two or more people with different timing can cause confusion for the otter and tend to slow the process. Ideally sessions occur one or two times a day every day. For some institutions this schedule may not be possible since they have employees or volunteers who work with the otters for only one or two days a week. In these situations, having two trainers who are able to work more sessions per week is preferable over one trainer working fewer sessions. With multiple trainers, having a clear training plan and good communication between trainers is essential for success.

The Bridge

In addition to a good training plan and a single trainer for each new behavior, another tool commonly used to help with consistency and timing is known as a "bridge." In some cases delivering the fish reward at the right moment is easy to do. At other times the otter may be several feet away or behind a fence. In these situations a whistle, clicker, or a verbal "good" can be used to tell the otter that it has just done the right thing and a reward is coming. This is called a "bridging stimulus" or "bridge" because it bridges the gap in time between correct behavior and reward. With practice a bridge can become very precise so the otter knows the exact behavior you are looking for the moment it occurs. There are many different types of bridge. The selection of the bridge will depend on trainer preference, what makes sense to the animal you are working with, and the animal's current situation. A favorite among trainers is the dog whistle, a three to four inch (seven to ten centimeter) metal tube that can emit a range of high frequency tones. It can be held in the mouth keeping hands free for feeding. The whistle can be used to respond quickly and the tone

makes for a very clear bridge. A clicker is a small, rectangular box with a metal plate inside. Sound is produced by pressing down on the metal plate and releasing, creating a double click.

Dog whistle

Clicker

What we train

When starting a training program with an otter that has never been trained before, begin with behaviors that lay a good foundation for future training. Most foundation behaviors are simple but immensely useful for building more complex behaviors later. What follows are examples of common otter foundation behaviors. With each there is a description of the foundation behavior, how it is used, and how it is trained. A sample training plan is provided for a few of the more complex behaviors that can be used as a starting point. Training plans act as the roadmap for a given behavior, where each approximation is mapped out from beginning to end. In those instances where the otter moves two steps ahead, the trainer will already know what the next step will be. Training plans also work in reverse. If an otter becomes stuck on a certain step, the trainer can go back to a previous step, reinforce that, and continue forward, or go in an entirely new direction. The training plans may need to be revised for each institution based upon animal management policies. In some cases plans may need to be altered to better suit individuals within the same group. Once again, be flexible.

Bridging

The first behavior that you train should be to recognize the bridge. Otters do not instinctively know that a whistle or a click means food is coming. This is a good behavior for a new trainer to start with as it is a good way to practice timing. Bridging can be done during every feeding and most otters will learn this quickly.

The training plan is quite simple. Blow your whistle (or use your clicker, or say "good" etc.) followed by giving the otter its food. The bridge can be used once per feeding if the entire meal is given at once, but you can progress faster by dividing each meal into smaller portions and bridging before each one. The goal here is to have the otter associate the bridge with a food reward.

Focus

An often overlooked foundation behavior is having the animal focused on the trainer. The otter attention span is notoriously short, which leads to frustration as you wait for your otter to focus on you. What the behavior looks like is the otter sits or stands calmly in front of the trainer with its eyes focused on what the trainer is doing. Having this behavior trained can do wonders for any other training you plan to do.

Like every other facet of training, knowing your otters will be the first step. Giving undivided attention can be difficult for some otters. Begin by learning their behavior patterns and plan accordingly. Trying to train at the same time that they take a nap every day is not the best way to earn their attention. In some cases otters are shifted from one area to another for training (e.g. from an outside exhibit to indoor holding). This new area may require some scent marking, especially if this area has been cleaned recently. In this situation it can be beneficial to allow the otters a few minutes to sniff around before asking them for attention. Choosing the right time for training will provide your otters with the best opportunity for success.

Training this behavior will look different for each otter that is trained. There are a few behaviors to watch for with all otters. Unless you want your otter to scream throughout your training sessions, be sure to bridge and reward only when it is quiet. This is a good opportunity to get a particularly noisy otter to quiet down a little. If the otter moves around a lot, be sure to bridge and reward only when it is near you. Once the otter is nearby and quiet, watch for it to look in your direction; then bridge and reward. Doing so will

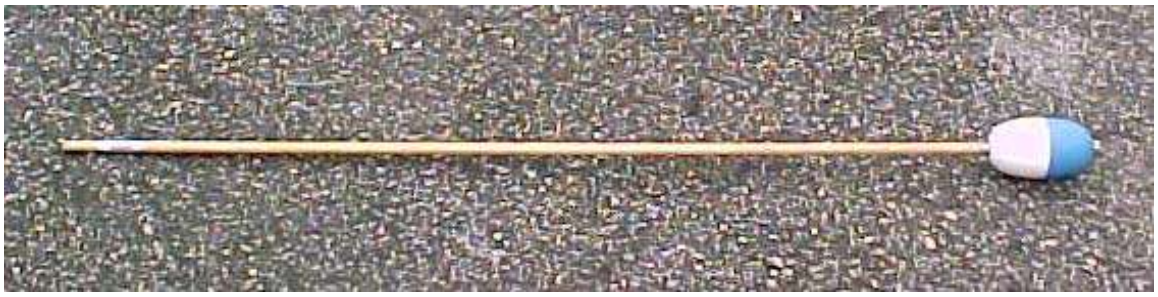
establish you as the focus of each feeding/training session. When you are confident the otter understands what you are looking for you can increase the length of time required for calm, focused behavior before giving the reward.

In some cases it can be useful to have a hand cue to help focus the otters' attention. Any cue can be used, such as holding your arm out in front of you with the palm of your hand facing the otter. A cue is not necessary if you have an attentive otter, but is helpful when working with an otter that needs something specific to hold its attention.

Target

One of the single most useful behaviors an animal can learn is to recognize a target. This is our way of asking them to go to a certain place or touch a certain object without having to learn otter language. A target can be used as the foundation for almost any other behavior.

The first step will be to decide what to use as a target. A common target is a thin pole with a ball or pool buoy attached to the end.



Sample target

The length will vary depending on your circumstances but a common starting point is four feet (1.23 m). The materials used should be safe. Otters may try to bite the target in the beginning so it should not break off in their mouths.

The next step will be to show the target to the otter and reward for calm behavior. When you are confident the otter understands that the target is not bad, bring it close enough to be sniffed. The sense of smell is so important to otters it is likely that the first response to the target will be to sniff it. If that happens, reward the otter as its nose comes close to or in contact with the target. Use your bridge to ensure that you are rewarding at the right moment; your otter may only sniff the target for a second. Some species, notably sea otters, may immediately attempt to grab the target with their paws.

While it is unlikely, there is a chance that the otter will show no interest at all in the target. In this case you can take small steps to bring the target close to the otter's paw. Show the target, then bridge and reward. Bring the target a little closer and, as long as the otter doesn't move away, bridge and reward. Continue until you can touch the otter's paw with the target.

From this point it will be up to the trainer how to proceed. Touching the target with the nose or grabbing the target with both paws are common and acceptable forms of targeting. Touching the target with the top of the head or the tail are also useful at times. Train the behavior in the direction you want it to go according to the plan you have put together.

Now that the otter is touching the target with the body part you have chosen, move the target a few inches (cm) away and allow the otter to go to the target. When the otter understands the concept of "go to the target," you can move to different places and have it follow. At this stage you can also train the otter to hold the target in one place for longer periods of time.

Sample Training Plan: Target

Goal of behavior: To have otters go to a target object and hold its position at the target until bridged

1. Introduce the target at the side of the mesh door while you feed the otters through the mesh.

2. Approximate the target closer to the otters. Once they are comfortable with the target, place target in front of them and cue "target".

3. Reward the otters for touching the target.

4. Approximate that one paw touches the target.

5. Approximate that both paws touch the target.

6. Work on shaping step 5 so that the otters hold their paws to the target for short periods of time.

7. Lengthen the holding time and then vary it. When bridged, they should release the target.

8. Move target a short distance away and bridge when otter goes to the target.

9. Move target a greater distance away. Have otter go to target and hold until bridged.

Crate

When transporting otters from one location to another, a common practice is to place them in a small kennel or crate. Getting untrained otters into a crate can involve baiting (throwing food into the crate and waiting for the otter to go in on its own), leaving the crate in the enclosure to encourage the otter to nest in the crate, or capturing the otter with a net and placing it in by hand. Any of these methods can be effective; however, the first two are unreliable, and the third can be unsafe for both the keepers and the otters. Grabbing an otter by hand is notoriously difficult. Their loose skin and flexible bodies allow them to practically turn in their own skin and bite the grabber. Training the otters to enter the crate can reduce the possibility for injury and stress.

The training plan for crate training will vary depending upon each institution's policies and setup. Some kennels will have side swinging doors while others have guillotine (up and down moving doors) doors. The general training plan provided here should be adaptable for any situation. The first step will be to choose/build your crate. Ideally your crate will be at least as long as the otters. A shorter crate will require an extra training step since the otters will need to turn around in order to get their whole bodies, tail and all, inside.

One benefit to working with otters is they are not often easily frightened by new things. Placing the crate in the otters' enclosure will often result in curious exploration inside and out. If the otters have had negative experiences with the crate in the past, it may be best to introduce it slowly. Have the crate visible but outside the enclosure at first. Once the otters are accustomed to the crate, move it closer until you are confident that it can be placed in the enclosure without causing unnecessary stress. The amount of time this takes will vary depending on the otter and will be up to the trainer to judge. In some cases it can take one session, in others several weeks.

When the otters are comfortable with the crate, the trainer can begin using the target to bring them closer. Having the door to the crate open or removed completely in the beginning can give the otters room to move. The trainer will need to be flexible and be aware of the otter's behavior at all times, and that behavior can certainly be unexpected. For instance, during one otter's crate training there came a point where she would not put more than her head into the crate. In an effort to make some progress the trainer closed the door and asked the otter to enter. Having the door closed gave the otter a task which was enough of a distraction to make her seemingly forget that she did not want to enter. Seeing the door closed, she

opened it herself and entered immediately. The trainer blew the whistle and gave her a reward. By trying something new an obstacle was overcome and the training progressed quickly from that point.
When you are working with otters in free contact (i.e., working inside the enclosure with the animal) having a long target pole can be helpful. Begin by placing the target outside the front of the crate. As the otter becomes comfortable going to the target it can be moved into the crate in a series of small steps until you have reached the back of the crate. Each small step should be rewarded at this point, preferably giving each reward inside the crate. In some cases a target used in this way can become difficult to work with as you try to get the otter and the target to fit in the back of the crate. If your crate has holes in the sides, one trick that can help is to hold the target against the holes on the outside and have the otter touch the target from inside the crate. Another solution can be to create a small target that can fit through the holes. This will allow you to place the target in the back of the crate without going through the front. One advantage of this method is it can be safer since you are not reaching over the otter while targeting.

A complete behavior will often fade the use of a target and introduce a cue. This is accomplished by giving the verbal cue such as "crate" or any hand cue you choose right before you show the target. Once the target and cue are associated together you can remove the target by giving only the cue and waiting for the otter to respond. If the otter responds immediately, you are ready to move on. If the otter hesitates, you can show the target after giving the cue and slowly fade its use until only the cue is needed. If you choose to eliminate the target this is a good place within the plan to do so.

The last step in the process can also be the most challenging. Closing the door can cause some otters to panic and should be done very carefully. Begin by touching the door with your hand while the otter is sitting calmly in the crate. If you work in protected contact (i.e., keepers do not enter the animal's enclosure) the door may have a string or lever that is pulled to close it. If that is the case you can hold the string/lever and apply slight pressure as the otter sits calmly in the crate. Close the door a little at a time and be sure to reward the otter only while it is in the crate. Some otters may try to force open the door as you start to close it. If this happens open the door and start over. This is the stage in the training where you want the otter to trust you. Trying to trick the otter into letting the door close, or shutting it too fast and leaving it closed can cause setbacks for the training process. For the first few times that you close the crate completely, open it again immediately, before the otter has a chance to react. Doing this can show your otter that you can be trusted to open the door at all times. At this point you should be able to increase the amount of time the door is closed with a calm otter sitting in your crate.

Since most crating will involve moving the otter, it can be beneficial to include that in your training plan. As the otter sits calmly in its crate stand next to it and put your hand on the handle. Proceed in small steps to raise the crate off the ground and carry it a short distance, rewarding the otter in the crate during each step.

Sample Training Plan: Crate

Goal of Behavior: To have otter sit calmly in crate with door closed and allow transport to other areas

1. Allow the crate to sit in the holding stall until otters appear comfortable with it there.

2. Use the target behavior to approximate the otters towards the holding crate. Reward as the otter comes closer to the crate.

3. Cue with verbal "crate" or hand cue, place target inside crate and reward otter for going into crate.

4. Fade use of target and use only "crate" cue.

5. Work on closing the door behind the otter.

6. Once the otter is calm, keep door closed for longer periods of time.

7. Pick up crate and carry for increasingly long periods of time

Using these training plans will get you started, but you may find you quickly outgrow the limited offerings herein. You are encouraged to create your own training plans for the behaviors that best suit your otters' needs and environment.

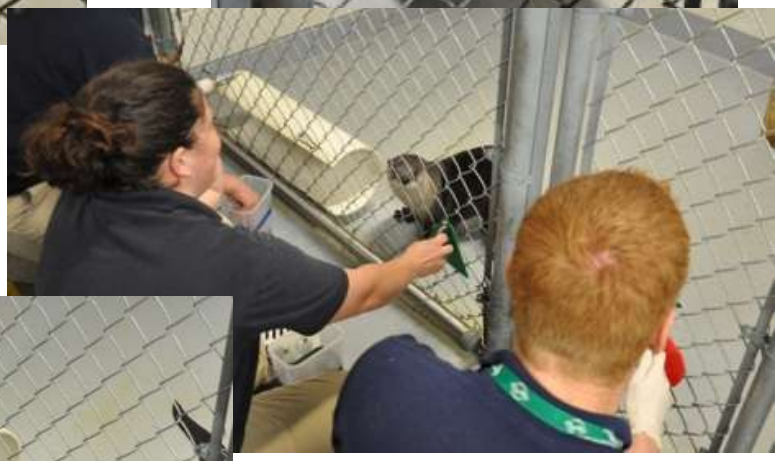
TRAINING PHOTOS

(Photos by K. Talcott, and thank you to the staff of the Downtown Denver Aquarium)

Target

Target to shape (not color)

Paw or foot



An Introduction to Training and the Basic Steps Used to Successfully Introduce Five Males: Behavioral Training of North American River Otters at the Virginia Marine Science Museum.

By: Chip Harshaw, Curator of Marsh and Marine Mammals Virginia Marine Science Museum Virginia Beach, Virginia

While the title of this article and its contents describe some of the Virginia Marine Science Museum's training strategies and methods for *Lontra canadensis*, much of what you will read can be applied to most other types of otters and/or animal species. The physiological makeup and mannerisms in other taxa vary and thus require different approaches; however the concepts and strategies are basically the same. Before moving forward, it is important to have a basic understanding of behavioral training and how it can serve animal management programs. This information is condensed and intended to provide a general overview of behavioral management. There are several books and journals available which can assist interested persons or facilities in furthering their understanding on this subject.

To begin, "What is Training"?

There are different definitions for training. Some of these descriptions can be found in books and journals which can be complex and confusing. To keep this simple we should define training in its most basic form. *Training is teaching. (Ramirez - Animal Training p.8)* For our purposes training is not for teaching tricks but instead to enable animal care staff to teach animals such as otters to live successfully within their zoological environment. Animals under our care look to us to serve many of their physiological, environmental, and behavioral needs. An effective behavioral training program can help to accomplish all of these things and at the same time enhance the lives of the animals under our care.

Why Have A Training Program?

In order to have a successful training program, one should have a clear understanding of why they wish to train. In other words, what do you hope to accomplish by training your animals? Do you desire to have this type of program to enhance the lives of the animals under your care, improve medical husbandry, better facilitate maintenance routines, or all of the above. You should first have clear objectives. The specific training goals will evolve as your program develops.

Training Objectives

Typically, training programs serve a few basic yet critical objectives. These objectives can be broken down into *Primary* and *Secondary* reasons to train.

Primary reasons: Perhaps the most important purpose or *Primary* reason to have a behavioral training program is to teach animals to cooperate in husbandry or veterinary procedures. In the case of our five male N. A. river otters at the Virginia Marine Science Museum, we have taught them a variety of behaviors to assist both the animals and staff caring for them. These behaviors range from very simple shifting on and off exhibit to expedite maintenance, to more complicated behaviors. An example of one of our most complex trained behaviors is allowing our veterinarians and /or myself the ability to sedate each of our otters under protected contact, without physical restraint. We typically conduct this procedure once a year during annual physical examinations. Ultimately, this behavior has allowed us to conduct complete physical examinations with all five otters in about one hour. This process has essentially eliminated any stress associated with restraint. It also eliminates any risk to the otters or keepers if a net and/or a squeeze cage where to be typically used. Other *Primary* reasons to train include mental stimulation (behavioral enrichment) and physical exercise, both of which help to promote the overall well-being of an animal collection. Primary behaviors can be considered behaviors which directly benefit and serve the animal first.

Secondary reasons to train could include public educational programs and presentations, or research projects within a zoological or aquarium facility. Additional *Secondary* reasons with domestic animals could involve police work, rescue work, and assisting the disabled. These behaviors, although beneficial to

the animals, more directly benefit and serve the public first. Now that you have a better understanding of why training is beneficial, the next subject to discuss is where to begin?

How to get started?
If one wishes to begin a behavioral training program with a specific animal group, it is imperative to know as much about the natural history of this animal as possible. In other words, where does the animal normally live? What are its food requirements and typical food preferences? What is its social structure? In a nut shell, how does this animal live and interact within its natural environment. Basic understandings, such as these, help to lay the groundwork to start this type of program. One also should have a clear understanding of the exhibit and holding area's potential as a source of training for the animals. In other words, how can I train the animals within areas I have to work with, and what limitations are there? Finally, a familiarity of behavioral training should be acquired. You may already have a behavioral coordinator within your facility, or someone with experience on site that can be of assistance. Other sources of help can be found in a few selected books and organizations.

- *"Don't Shoot the Dog"* by Karen Pryor and published by Bantam books is an excellent introduction to behavioral modification and in fact is required reading at several facilities involved with this type of work.
- *"Animal Training - Successful Animal Management Through Positive reinforcement"* by Ken Ramirez is another very good source if information.
- Additional sources of information are organizations such as IMATA (International Marine Animal Trainers Association), AZA (American Zoo and Aquarium Association). Of course the Internet can open up many resources in a very short period of time.

The Virginia Marine Science Museum River Otter Training Program
The Virginia Marine Science Museum river otter collection consists of 5 males acquired in two separate groups. The first group consisted of two rehabilitated otters which were born in April or May of 1993. When these two otters were first acquired in 1995 they were placed in an off-site holding location 7 months prior to the opening of their new exhibit. This temporary kennel system was a 20' x 10' chain link enclosure with a small 3' x 5' shifting kennel attached to one end of the structure. The second group of three otters, born in April of 1994, arrived at the museum approximately 2 months prior to the new exhibit's opening. By the time this second group had arrived, the first two otters had been relocated to their permanent holding location attached to the new exhibit. The second group of otters was placed in the original 20' x 10' enclosure that had been relocated to the museum site from its off-site location. This was done to allow for the completion of their quarantine process and to begin their training program.

Prior to the arrival of the second group of otters, and while still working at the off-site location, I began teaching our first two otters basic behaviors. This was even more challenging because our new staff had no training experience and had to learn training fundamentals as well. Our objectives at the time were fairly simple. We understood that we were going to have 5 male otters arriving in two groups at different times and they were going to have to be introduced at some point prior to going onto exhibit and living permanently together. The process of training began with our first group of animals.

Establishing a Wholesome and Effective Diet
We began this process by determining what we felt would be not only a nutritional diet for our collection, but also one that we could feed to each otter by hand in individual pieces through their chain link enclosures. The bulk of our otters' diet (75%) consists of whole smelt cut into 1' to 2' pieces. Each otter also gets two uncooked, skin-on chicken breasts cut up into bite size cubes. This chicken is evenly distributed into the two or three feeding/training sessions that occur each day. Additionally, each otter gets one or two whole mice (frozen then thawed). A vitamin supplement is given to each otter on a daily basis. We use Mazuri Vita-Zu Mammal tablets. These tablets must be cut to the appropriate size for the animals based on their average daily food intake. The vitamin pieces are hidden in the food. In most cases the otters eat the vitamins without hesitation. There is on occasion the need to replace vitamins if an otter spits a piece out. During the rest of the day, at random times, our otters are given various items for both behavioral enrichment and for food diversity. These items include, but are not limited to, live fiddler crabs from our

salt marsh, an occasional blue crab, minnows (Shiners), fruits and/or vegetables frozen in ice, dog bones, eggs, and whatever else we might think up. (*Note: We have been asked on occasion if we have any concerns in regards to giving our otters uncooked chicken breasts. Salmonella is of little concern to our veterinary staff in regards to feeding this food item. Otters will normally eat a variety of food items that might carry salmonella out in the wild such as small amphibians and reptiles. The items we feed are of restaurant quality and are slow thawed in a cooler overnight just prior to their use. We have never encountered any problems with our animals when feeding this diet.)*

It is very important to note that we feed each of our otters by hand. Each animal receives a specific diet based on its individual food requirements. This method of feeding eliminates competition for food which can occur if a facility where to feed animals in a shared food dish. Hand feeding also enables us to visually check on each individual very closely several times a day. It also enables us to medicate the otters in pill form with relative ease. By feeding in this manner we can help to ensure that our otters are eating and acting normally.

The purpose for cutting the otters' diet up into bite size pieces is so that we may use the food as a reinforcement item during training. Bite size items allow staff the ability to control the quantity of food given for each reinforcement. In other words, a successful behavior might earn a "jack pot" of several pieces of food. Accomplished lesser behaviors might earn one or two pieces of food.

How We Started the Training Process

After determining the appropriate diet we began the training process. In our case we work with our otters under protected contact as they have shown unpredictable tendencies. With this in mind, we first started by simply getting the otters to eat from our hands through the chain link enclosure. At the same time we introduced a common but critical training tool called a ***"Bridge***". A Bridge is an audible or visual signal that tells an animal "Good" or "Job Well Done". In other words, this signal "bridges" the gap between the desired response and the reinforcement the animal receives for accomplishing this task. Before an animal can understand that a Bridge means Good, it must be taught this. In our case we chose to use Acme Dog Training whistles as the bridging mechanisms. Our whistles are attached to lanyards that hang from the trainers necks. This type of bridging device leaves our hands free. To teach the otters that the sound of the whistle means good, we began pairing this sound with the process of feeding. At the beginning of each session, we blow the whistle twice as a form of notification that the feeding is about to begin, in other words, "come and get it". After this, the trainer would Bridge (blow the whistle) as a food item was placed in the otters mouth. After a relatively brief period of time, the otters began to associate the whistle with something that was good, food! This repetitious process is called conditioning.

Stationing

Our first objective during this initial phase of training was to get the otters to sit still next to each other at their feeding locations or "stations". The idea is for the animal to eat quietly next to the other otter without being concerned with what he was eating or doing. To clarify, a station, or the act of stationing is when an animal learns to sit at a consistent location during a feeding or training session. This location can be determined in a number of ways, but often is initially determined during the beginning stages of training by the animal itself. It will often sit to the right or left of another animal based on what is most natural and comfortable for it. You could compare this seating arrangement to that of an elementary student who sits at the same desk each day of school. It is a place of familiarity which provides some elements of comfort. Stationing can eventually evolve to the animal sitting not only at a particular location, but sitting where ever the keeper or trainer moves. The trainer at this point essentially becomes the station location. Where the trainer goes, the animal goes.

During this initial process we simply fed and bridged the otters as the food was given. We also began to use the bridge if the otters sat very still at their station and focused on the trainer. For example, if an otter typically fidgeted during a feed or would leave its feeding station to see what another otter was doing we would obviously not bridge and then reinforce, otherwise you would be reinforcing the otter for leaving. Remember the Bridge means "Good". To help correct a problem like this, we wait for approximately 3 seconds after the otter returns to its station and focuses himself on the session before we resume the session. This process is called ***LRS*** or ***Least Reinforcing Stimulus***. LRS is an effective way to extinguish an undesired behavior by simply not reacting. For example, if an animal like an otter leaves, and then

returns to eat at its leisure, the keeper should give no response at all for 3 to 5 seconds. This means that the keeper should not talk, move or do anything, no response. The reason for this is that we do not always understand what is and is not reinforcing, thus LRS is probably the least possible reinforcing action of a trainer. A simple analogy to help understand this could be, if a comedian where to tell an audience several bad jokes, and they did not laugh or respond in any way, chances are, this person would either stop telling jokes, or find new material to use. In the case of our otters, when they remain at station and show focus, we bridge at the peak of this quiet and stable positioning, and then deliver the food as quickly as possible. If by chance the otter is exceptionally good, we offer a jackpot of several pieces of food. By bridging at the peak of a desired behavior such as sitting quietly, this alerts the otters to the fact that what they have done is very good and that positive reinforcement was on the way. This phase of bridging indicated to us that the otters had graduated to a basic understanding of positive reinforcement. They had learned that the whistle meant Good.

Target Training

Target training is an important behavior which can allow a trainer to teach an animal to accomplish many tasks. A target can be described as an extension of a trainer's hand. It can also be described as "A prop which pinpoints a critical location for an animal in training". *(Ramirez - Animal Training p. 552)* In our case, we taught each of our otters to "target" by touching their nose to a small blue and white pool buoy attached to the end of a 3' foot PVC pole. We accomplished this process by first showing the otters the "buoy target" through the chain link. Our otters where curious and immediately approached the buoy to get a closer look. As soon as they placed their nose on the target to smell it, we bridged (blew the whistle) and immediately reinforced. After the bridge, the buoy target was removed and the food reinforcement was given. This process was repeated throughout several sessions until the otters got the hang of it. It did not take long! "Touch the buoy with my nose, and get a few pieces of chicken or fish, not a bad deal."

The next step was to get the otters to not only touch the target, but to maintain contact with it for as long as the trainer desired. This behavior is called extended targeting which can last up to 10 or 15 seconds, and even longer before the bridge and reinforcement. This is accomplished by not bridging right away when the otter touches the target, but instead holding the target in position. When working on this behavior, the otters had a tendency to anticipate the bridge occurring quickly and thus would sometimes touch the target, then immediately break contact from it looking for the reinforcement. When they reacted in this way and did not hear the bridge, but the target was still in place, they would typically place their nose back on it. The task was then to get them to stay locked on to the target for increased increments of time. The trainers would literally count in their heads, one thousand and one...Bridge, reinforce. Present the target again and count, one thousand and one, one thousand and two.....Bridge, reinforce. And so on. After a few days of training the otters got the idea and learned to stay on target for increasing periods of time.

The next behavior to train was to get the otters to follow the target. Remember, our training occurs through chain link. We began by calling the animals to their stations, then bridge and reinforce once they are calmly in place. We then present the target to their right or left sides at random intervals during the sessions. By having them move directionally to each side and make contact with the target, they began to learn to go to, or follow the target. Of course during the same session we would ask them to occasionally extend their targeting at random schedules to ensure that they would lock onto to it for more than just a second. We also would present the target in front of them and then slowly move the target to the left or right sides in a smooth motion. This enables the otters to follow the target directionally. Over a brief period of time (2 or 3 days), one or two feet of side to side targeting increased to greater distances. Eventually, the trainer could walk with the target while the otter followed it. When the trainer stopped, the otter would have to stop and lock on to the target with its nose through the fence. At this stage we could lead the otters around to different points within the holding area. These accomplishments opened up new opportunities for both the otters and animal care staff.

The Introduction of Our Otters

Some of the important benefits achieved by teaching our otters these first basic behaviors were evident during the introduction process. Having five male otters living harmoniously together was the objective, and predictions from other facilities working with otters ranged from "Good luck", to "No way", to "Wow, that will be a dynamic situation". This was a period of time when careful planning, consistent training, and

a little luck would play an important role in the success of this living situation. The introduction began by first establishing an "Introduction Process Plan" while at the same time physically preparing the permanent holding area prior to the arrival of the three newest otters. To fully grasp the plan, it is important to understand the design of our holding area and what we did to make this situation work.

The permanent river otter holding area is made up of two 4'x3' and four 3'x3' kennels constructed of chain link. Each of these kennels can be interconnected, or isolated, from each other and a 1500 gallon pool with clear, Lexan guillotine doors. Initially, we used Plexiglas as doors, but quickly learned that the otters could shatter those doors with little effort. When completed, this design gave us what we felt to be the most options in moving animals around and providing separate enclosures as necessary. The design in fact played a major role in the success of the introduction. It allowed both groups of otters to live, eat, and share both the kennel enclosures and the pool on a rotational basis without ever having physical contact with each other up until the day the two groups were mixed.

The first two otters "Tango" and "Cash" had already been living within the permanent holding area for several weeks. They had essentially gotten used to this new surrounding and continued with training sessions during each of their feeds, approximately 3 x daily. While this was taking place, the three newest otters where completing their quarantine process, learning to eat the same diet as the two other otters, and getting a crash course in basic stationing and target training several times a day. As the animals progressed in their preparation, the animal care staff began lining their interior chain link enclosures with Plexiglas. This glass would allow visual access to each other as well as hearing and smelling each other, but it would reduce the possibility of an animal being bitten through the chain link. The overall design enabled the otters to eat together without the fear of competition for food.

The idea was fairly basic in that one group would typically have access to ½ the kennels and the pool, while the other group had access to the other half of the kennels. We had no means of dividing the pool in ½ so that both groups could use it simultaneously, thus they went through frequent rotations within this area on a daily basis. Frequently, one group was closed in the pool area, while the other group was given access to the entire kennel system so as to have direct contact with the other group's kennels. This was often comical to observe as the group exploring this area would make a point of marking the entire kennel system with feces and urine. During a rotation when one group had no pool access, they were given water to drink and a spray hose to play with to keep them cool as needed. Rotating the animals allowed for the sharing of this entire area without contact. It also allowed one group to investigate the area recently occupied by the other group. This enabled them to get used to the different smells and kennel areas. Of course, the otters always had visual access to each other.

As explained earlier, we feed our otters by hand while they sit side by side. The otters are expected to sit quietly next to each other so that feeding and training can take place with few distractions. During the introductory period, the clear separation doors played a crucial role in the two groups getting comfortable with each other during feeds. Although there was initial aggressiveness during feeds such as growls and screaming, once the otters realized that they could not get to each other and there was no competition for food, they quickly settled down and learned to eat quietly. At each of these feeds, we conditioned the otters to eat at the same spot each time so that they would become used to this location. It would be considered "their feeding station". This location became a comfortable place for them to eat with little concern about the intrusion of the others.

As their comfort level and training progressed over the next couple of weeks, we began to approximate the otters to the actual mixing process. They had become fairly used to living with each other in the same enclosure yet they had not had physical contact. We began to devise our introduction plan with the hope of minimizing stress and potential injury. For this reason, we decided to introduce one otter from each group to each other. This process would allow us to intervene if necessary, but with only two otters and not all five.

We set a date for the mixing to begin. We did this based on a number of factors. We also began seeing both otter groups sleeping next to each other with only chain link separating them. Typically, they would sleep on opposite ends of the kennels. The otters were seen on numerous occasions standing face to face through

the chain link sniffing each other without signs of stress or aggression. Finally, we noticed that the otters had begun to rip off the Plexiglas barriers attached to the interior of the chain link kennels that served to protect them from biting each other through the chain link. In seeing this, we felt the time had come. We chose the least dominant animals from each group as the two to begin with. The plan was to call all of the animals into their kennel areas and close off access to the pool during a feeding session. After the feed, we would then open the guillotine door to the two selected animals' kennels allowing them access to the pool and their kennel enclosure. This would provide them with the most room to run around as needed. Although the plan was well thought out, our newest otters apparently lost patience with us and our slow methodical process of planning. One morning prior to the mix we came in and discovered that Willoughby, an otter from the second group of animals was fast asleep in the kennels with Tango and Cash. We discovered that a pool access door in the newest groups' area had been partially pushed out of its tracts. Although this essentially gave the entire group access to each other Willoughby was the only one we knew for sure had mixed. We thus decided to continue with what Willoughby had started by opening the doors to the other kennels one at a time. We chose Rudee as the next animal to introduce due to his calm nature and less dominant presence. This went fairly well with almost no aggression present. Because of this, we finally opened Pungo's door. He was the last of the newest group to be introduced. After doing this we opened all doors and removed all separation barriers to allow the otters the maximum amount of room to run.

What happened next was interesting in that all of the otters began to chase and play with each other, or at least that is what it initially looked like. They began running around and diving in and out of the water with a fairly high level of energy and enthusiasm. This carried on for approximately 30 to 45 minutes. The interaction after this period of time began to elevate to include some aggression and dominance role playing. The otters began screaming at each other and would also mock bite each other. This carried on at random intervals for several hours. During this time we never left them unattended and kept detailed records of the mix. At about mid-day, the otters where seemingly so worn out that the two groups went to opposite ends of the kennel system and slept. That afternoon, we fed them in their kennel enclosures with the separation doors closed so that they could eat their entire diets without the concern of the intrusion of the other group. During the next few days, we began mixing them at random intervals for longer and longer periods of time until they were spending most of their days as one group. We also began feeding them with the separation doors partially opened for brief periods of time. As this work continued, aggression decreased and a more cohesive group of otters began to develop. A large hurdle had been overcome. The two groups where now one. The next and perhaps most important step was to have all five otters shift out onto exhibit.

Shifting

Several years ago I observed keepers at a large and well known zoo attempting to shift two otters off of exhibit in to their holding area so that the final days cleaning of the exhibit could take place. What should have only taken a few seconds to accomplish, was never successfully completed on this particular day. In fact, the keepers finally gave up frustrated that they could not complete the day's routines. I found it both interesting, and somewhat amusing to see the otters run around chaotically while the keepers attempted to bribe, chase, threaten, and even use a hose to get them to shift. I suspect the keepers' exploits on this and probably other occasions where somewhat reinforcing to the otters. At least, I feel that staying out on exhibit was in this instance more reinforcing than shifting into their holding dens; otherwise they would have done so.

Shifting zoological collections on and off exhibit as needed, and in a controlled and expedient manner has historically been problematic for keepers with little or no behavioral experience. An inability to accomplish this basic behavior can delay or even eliminate some daily husbandry responsibilities. However, if trained properly, this behavior can allow for flexibility with husbandry routines and even the mixing or rotation of different animals. I believe this behavior can, and should, become as routine as diet preparation and cleaning. We accomplished this aspect of training at the museum soon after we relocated our otters from their temporary holding location to their permanent holding area for the opening of their new exhibit in 1996.

We accomplished this behavior with our otters by applying a couple of strategies. First, as the countdown to the exhibit's opening drew near, we began leaving the connection doors from the holding area to the

exhibit open. We felt that the natural curiosity of the otters would get the best of them and they would venture out to explore. This process was of course not as easy as it might seem. Our holding area is connected to the exhibit by an 8" diameter clear acrylic pipe that is approximately 10' long. At each end of the pipe is a guillotine door. When shifting animals on and off exhibit, both doors must be manually opened to allow the otters to pass through these locations. In the initial design, the idea was that when the otters moved on and off exhibit through the pipe, the public could watch. At first, the otters were very hesitant to even stick their heads into the pipe. Every so often, one of them might go ½ way through the pipe, then back up until he was back in holding. This was particularly amusing when one or two other otters followed this individual into the pipe and then had to go into reverse as well. Finally, after a few hours, our first otter ventured out on to exhibit. Of course he sat at the entrance to the exhibit for quite a while before becoming brave enough to explore. By the end of this first day the two otters from the original group where out on exhibit exploring and swimming in their 35,000 gallon pool.

The new group of otters proved to be more of a challenge in getting out on to exhibit. They acted as if they would be more than happy to simply stay in the holding area. Periodically, Tango and Cash from the first group would run into the holding building, instigate play behavior with the others, and then run out to exhibit. It was as if they were trying to get the others to come out. This type of behavior did create curiosity with the otters from the new group, but they continued to resist venturing on to the exhibit. At feeding times, we would begin each of our sessions on exhibit in an effort to coax out the remaining three otters. The keeper area where we feed the otters on exhibit has two access doors on each side of it that allow for exhibit maintenance without the public clearly seeing the doors. These doors have ½ inch Plexiglas panels instead of chain link. The panels help to further hide the door locations from the public. In order to feed the otters at these door locations we had to cut several 2" circular holes at each door in order to slip food items through the holes. When we first began calling the otters to station on exhibit, Tango and Cash quickly learned to go to the door nearest the holding connection access door. This enabled us to establish their feeding / training station immediately. While working with them on exhibit, at the same time we continued to try to coax the others out on to exhibit.

After one week with the second group of otters still refusing to go onto exhibit I decided to cut a series of 2" holes along the top of the acrylic connection pipe to enable the otters to follow a target out to the exhibit. The holes where spaced approximately 1' apart so that successive approximation “baby steps” could take place. The goal was to slowly get the otters to move further through the pipe by going to the target presented at the drilled hole locations. If they moved successfully to a hole and touched the target they would get reinforced with food. After a few days, each of the otters where going as far as the last hole that was approximately 6" before the entrance to the exhibit. At this point, they could see the other two otters playing and thus they quickly went in to the exhibit. It took a total of two weeks to get the second group of otters to enter the exhibit. They missed the public opening of the exhibit by one week. Fortunately the first two otters were on exhibit at this time and were actively exploring their new surroundings. Once the second group went in, they quickly learned that the keeper access door opposite the door closest to the connection pipe was to be their station for feeding and training on exhibit. The first two otters had already established their feeding / training station, thus the second group had only one other option which made this transition easy.

In order to get the otters to shift on and off exhibit as needed we simply started randomly calling the otters to station in holding, then calling them back out to exhibit to their station using food as the primary reinforcer. We also began varying the amount of time the otters would be closed into the holding and/or exhibit area. When they would successfully shift from one area to the next, we not only reinforced with food, but we also had behavioral enrichment ideas in place that made the shifting a fun process. A variety of otter toys, PVC pipes to crawl through, live fish in the holding pool all offered interesting opportunities to the otters. Offering this type of variety is an important factor in maintaining behavioral consistency. To this day, our otters will generally come off of exhibit at a moment’s notice. I say generally because, on occasion some behavioral factor such as breeding season can affect their attention span. They shift with a 95% consistency on a year round basis.

The above information only scratches the surface of potential for training animals such as river otters. By understanding and then applying some of the information within this chapter the doors open up to a more

successful animal care program for both your animal collection and keepers. Additional behaviors that can be taught include:

- ✓ kennel separation,
- ✓ crate training,
- ✓ standing on a scale to be weighed,
- ✓ tactile through chain link,
- ✓ application of topical ointments,
- ✓ oral examinations,
- ✓ retrieval of objects,
- ✓ controlled sedation without restraint.

Sample behaviors & training cues for otters (provided by: *Indianapolis Zoo; **Bronx Zoo; ***Toledo Zoo; ^Santa Barbara Zoo; ^^Point Defiance Zoo; & +Oklahoma City Zoo). Behaviors not identified are trained at all reporting institutions. (Table created by J. Reed-Smith for AZA Otter Care Manual)

Behavior	Verbal cue	Visual cue	Criteria for reinforcement
Down *	"down"	Hand flat in front of abdomen-moved in a downward motion	Animal lays down quietly
Up *	"up"	Index finger moved in upward motion to place you want them to target to	Animal moves to position of index finger
Up ^	"up"	Left index points into the air	Animal stands up
Stand **	"up"	Use left hand and give the thumbs-up sign	Otter keeps both back feet on the ground while standing up against the cage. Front feet should be hanging onto target pole place against the bars.
Kennel *	"in"	Index finger used to point into the kennel	Animal goes in kennel and allows door to be closed
Entering a crate **	"box"	Hand begins in fist in front of chest. As command is said, swing arm out and up in direction of the box and open hand into a high five.	Animal will enter crate and lie down at the far right end. Animal will wait in position until bridged.
Squeeze/Crate ***/^^	"crate"	Target into squeeze cage or point to crate	Animal enters and allows the door to be closed
Crate +		Hand placed on chain link near back of crate	Animal enters and stands in the crate, tail completely in
Scale *	"scale"	Index finger used to point to scale	Animal gets on scale & waits
Target *	"here"	Closed fist presented to front of mesh	Nose placed at position of fist
Target **	"target"	Hold up target pole	Animal grabs with both hands without biting – ASC otters
Target ***/ ^	"target"	Show target pole	Nose placed on target and holds until bridged

Behavior	Verbal cue	Visual cue	Criteria for reinforcement
Target +		Show 15' broom handle on fence	Put nose to target
Stay **	"stay"	Right hand palm down and out. While in this position, push slightly toward animal while saying verbal cue.	Animal stands/sits still while trainer moves away and returns
Stay/remote stay ^	"stay"	Hold hand up, palm towards the animal Hold fist up	Animal stays calmly
Hold ^^	"hold"	Hand cue	Animal stays in place
Lying parallel to cage front	'lie"	Palm flat out and facing down. Sweep arm in direction animal should face.	Animal lays down parallel to and touching cage front. Remains calm and quiet until bridged.
Shift	"over"	Arm begins up and parallel to chest, index finger pointed up. (Use arm that is in the direction you want the animal to shift. Move arm and corresponding foot in a sweeping motion indicating the direction you want the animal to go).	The animal goes to the are indicated, comes to front of cage, stands quietly with eyes on trainer
Come in *	3 whistles-flat tone	None	Animal moves in to location of person whistling
Recall +	Clicker		Animal moves off exhibit to catch area
Station **/^^	None	Trainer stands in specified location with hands at their sides, beginning of training set	Animal comes to the front of the cage, stands quietly with their eyes on the trainer
Station ^	------	Point using two fingers of either hand to station desired	Animal moves to the spot and stays calmly
Follow	"come"	Say come and walk in direction you want the animal to go	The animal follows and stops directly in front of the trainer
Foot present	"toes"	Begin with right arm up parallel to body, index and middle fingers pointed up. Extend arm straight down (palm side down) continuing to point both fingers.	Animal should place both feet under the bottom of cage while lying down in front of trainer. It should be lying still and focused on the trainer.
Paw	"paw" "right" "left"	Visual signal for stand; point or target foot wanted.	Cue each foot to right or left, can use target or catch less dominant foot when opportunity rises; most have dominant foot they learn easily.
Ultrasound **	"up"	Cue as for up, trainer body can be low	Same as stand, animal should wait while being touched on abdomen

Behavior	Verbal cue	Visual cue	Criteria for reinforcement
			with pole or wand.
Ultrasound ***	"touch"	Show wand	Otter stands on back legs and touches target with nose while abdomen/kidneys ultrasounded through cage mesh.
Paint ***	"paint"	Show painting apparatus	Animal grabs paint brush and puts paint on canvas.
Nipple presentation ***	"nipple"	Target up while standing on hind legs. Slowly reach with fingers extended, toward otter	Animal presents chest or abdomen against cage mesh for manipulation
Ventral present +		Target placed high on fence	Animal climbs fence until all feet off the ground and ventrum placed on fence
Jumping into the pool **	"water"	Use right hand with food in it. Start with hand in a fist in front of chest. With a sweeping motion, move fist up to cage. Arm should be parallel. Open hand palm up and out. Tap cage with palm to push the food into the pool	The animal should jump into the water to retrieve food.
Water ^	"water"	Right hand motions towards the water	Animal goes in the water
Circle ^	"circle"	Make a circle with right hand	Animal turns in a circle
Steady ^	"steady"	Verbal cue only	Used to keep the animal calm during tactile body examination

Training for hand-injections

The processes used by two institutions successfully doing hand-injections of their otters are provided here. Both facilities had the objective of training their otters to allow injections while standing calmly in a chute fastened to the front of their holding dens; their chutes differ slightly.

TRAINING NORTH AMERICAN RIVER OTTERS FOR INJECTION IN CHUTE

By: Bethany Gates, Dickerson Park Zoo

This chute, designed by the facilities welder, included heavy brackets and a sturdy door because one of the males was so powerful. It should be noted that the door has never been used to restrain an otter; instead all injections have been done with the otter staying in the chute voluntarily. Their objective was to safely restrain the otter for a hand injection.

Training the otters to use the restraint:

Our otters will do anything for their diet. The word "good" is our bridge along with an immediate food reward. We typically train first thing in the morning when they are the hungriest and are willing to work. But feeding is done twice a day in the chute for comfort.

- Our daily routine is to feed one otter at a time in the chute at both feedings.
- After about two weeks or when the otter seems comfortable we introduce movement.

- We move our hand close to the hip area of the otter as the first thing.
- Once the otter is in the chute we start to move our hand, bringing it up close to the fencing.
- Slowly upon getting used to this (usually two weeks) we introduce a syringe with a blunted needle. This begins just in our hand or in sight of the otter.
- Touch is introduced as a word" touch" and a quick touch of the blunted needle to the hip.
- As the animal learns to accept touch, this touch time is extended.
- We try to use two week intervals so as not to rush things.

Chute is placed against the wall

Door can be slid shut if required but has never been used.

TRAINING FOR HAND-INJECTIONS: THE PROCESS

By: Christine Montgomery & Jessica Ehrgott, Downtown Denver Aquarium

Introduction

Captive animals that require injections either for vaccinations or immobilizations are typically handled using restraint devices such as a squeeze cage. AZA otter SSP recommends cooperative training of these animals to receive injections. At the Downtown Aquarium in Denver, trainers chose to move away from using restraint devices and instead to train a voluntary injection on 2.0 13-year-old river otters. Previously, trainers would move the otters to a crate, then to a squeeze cage and either hand- or pole-inject the sedative. The decision to train the otters to accept hand injections cooperatively was taken as a result of concerns about animal health, animal safety, and trainer safety.

Manufacture of chute

We opted to use a PVC chute for the cooperative injection. The PVC chute was made from an 8" diameter PVC pipe. Pipe was cut to 24" in length. We removed 7" lengthwise and rounded the rough edges (Fig. 1). Four holes were drilled in each corner so that the open side would face the trainers and the pipe could be held to the mesh using zip ties. We chose to place the PVC 8" from the wall, leaving it open on both ends (Fig. 2). We chose to leave it open at both ends to allow the otters to leave at any time. Upon completion of immobilizations, the chute was modified with thin cable wire and carabineers to allow easy removal and placement of the chute for weekly refresher sessions.

Figure 1

Figure 2

Training Plan

We began by habituating the otters to the chute one month before we did our first immobilization. We placed it in the reserve unit, permanently, until physicals were complete. We spent a few days allowing the otters to engage in normal training sessions while alongside the chute before asking them to work the behavior (Fig. 3). Before we started formal training, we observed them going into the chute and observed them more readily entering from trainer's left to right, so we proceeded with the training plan:

Figure 3

1. Work targets on trainer's left side of the chute, pushing the target pole as far into the enclosure as possible.
2. Approximate the target pole closer to the opening of the PVC chute.
3. Using a second target pole, target the animal into the chute. Move the second target pole from left to right to approximate the animal into the chute. Their head will be to the right of the chute (Fig. 4).

Figure 4

4. Reinforcements were then given in the chute to associate the chute with food and to extend the time the animal spends in the chute.
5. Ask for an extended target once animal has all feet in the chute.
6. Once the right target pole is removed, this is the animal's cue that they can exit the chute.
7. Approximate a blunt tool to the hip, eventually putting pressure on hip and rewarding for remaining in chute and calm. (Fig. 5).

Figure 5

8. Approximate the use of a paper clip on a syringe, applying slight pressure on the hip, rewarding for remaining in the chute and calm. (Fig. 6)
9. Begin incorporating second person to work with paper clip syringe.
10. Begin incorporating veterinarian to work with paper clip syringe.

Figure 6

Training for actual immobilization

During the week prior to immobilization, we trained the chute behavior using the same scenario as the morning of immobilization. This was important for several reasons. The otter would only be receiving a small amount of food, practicing allowed trainers to test the strength of the behavior and ability to work through issues with little to no reinforcement. The otters would have normally been fed one to two hours prior to scheduled immobilization, so we practiced with the otter on an altered feed time. Also, the otter would be separated from his exhibit mates during immobilization, which can be stressful. Practice sessions seemed to decrease stress levels among the participating otters. This involved the following training plan:

1. Otter will only be fed 3 smelt, cut into small pieces for immobilization practice session.
2. Otter will be separated from exhibit mates for practice session. Exhibit mates will be on exhibit.
3. Session will be performed around 9 a.m., when actual immobilization is scheduled.
4. Trainer performing immobilization training will be the only trainer who works the practice session.
5. Secondary trainer will act as the "veterinarian," using the paper clip syringe. If possible, second trainer will be the same trainer present for actual immobilization.
6. No other personnel will be in reserve or back up area.
7. Animal is asked to perform the behavior once, receiving as little of the smelt as possible. Once the initial behavior is completed, animal will be asked to perform behavior again. However, this time trainer will jackpot animal for performing the correct behavior to highly reinforce the behavior and end on a positive.

Immobilization

During our first immobilization we asked the veterinarians to use the paper clip syringe first. Then, after re-asking the otter to enter the chute, the anesthetic was injected. The first otter moved out of the chute, upon receiving half the injection. The trainer was able to ask the otter to re-enter the chute and receive the remainder of the injection.

During our second immobilization, the otter moved away from the needle so quickly that the needle broke at the junction between the needle and syringe. The animal was unwilling to re-enter the chute and the immobilization was not completed. We then acquired Luer Lock syringes, (Fig. 7) in which the needle screws into the syringe rather than a non-threaded needle-syringe attachment. The animal was partially sedated with the new syringe, as he moved out of the chute before all sedative could be received. Due to the sedation level of the animal, we were unable to move him back into the chute. We were able to ask him to come close to the mesh, where he was pole injected with the remaining sedative.

Figure 7

Conclusion

Doing cooperative injection training was a success. With little stress and no injuries to the animals, we were able to perform immobilization quickly. The animals also were able to receive a few pieces of fish for preforming the behavior during immobilization. The animals had little to no association of the injection with the PVC chute. One animal voluntarily re-entered the chute while recovering. The behavior took one to two months to shape, and we currently work the behavior once a week until our next immobilization.

OTHER RESOURCES

Morabito, P. M., & Dunn, M. (2007). *Injection Training 1.1 North American River Otters (Lontra canadensis) Using a PVC Chute*. ABMA Wellspring, 8(4), 12-13.

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CHAPTER 13 Rehabilitation of Otters

Introduction

This section contains two papers written by wildlife rehabilitators with extensive otter experience. The goal is to reintroduce these orphans or injured otters back to the habitat from which they came. However, it is not easily done. An assessment must first be made as to whether or not the rehabilitator is set up to allow for reintroduction or if the otters will be better placed in an *ex-situ* situation such as a zoo or aquarium. For resources on keeping otters out of fish ponds and suggestions on removing females and cubs from under buildings see Appendix A and B. The two companion documents to the Haire (2011) When to rehabilitate, young pup care, formula feeding and weaning, titled: Section 2: Otter housing, vocalizations, and health care, and Section 3: Otter release, resources, and suggested reading are available from the IUCN Otter Specialist Group website (otterspecialistgroup.org), Otters in Zoos, etc. link.

POST-RELEASE ASSESSMENT

An important element of successful release is planning for the release method. Haire (2009) evaluated post-release data collected on 17 hand-reared orphaned river otters returned to the wild over a 14 year period. The method used was "*soft release*" versus "*hard release*". Hard release is defined as a method "*of returning an animal to the wild without any further contact or follow-up care, which is usually best suited for adult animals returned to familiar territory".* Soft release is described as: "*the method of returning an animal to the wild and providing some level of supportive care such as a feeding station and a nest box*. Haire (2009) and T. Thibodeaux (Arc for Wildlife, personal experience) both recommend using the soft method for hand-reared river otter orphans. For an example of successful hard release see the Cochrane Ecological Institute article following; however, their technique is to release when the cubs are approaching 2 years of age and their facility offers ample room and opportunities for the otters to practice foraging techniques.

Haire's study showed that 100% of the released otters returned to the feeding station (hack site) between 3 weeks and 8 months post-release; of these, 28% returned as a result of an injury. Her return visit data was based on monitoring post-release food intake and spraint content as well as documented otter behavior, home range size, and dispersal times. Thibodeaux monitored 6 yearlings released into two different pond systems on a large private ranch by using digital camera traps, staff sighting reports, and personal observation. In Thibodeaux's case the otters are currently just 4 months post-release and are no longer being offered supplemental feedings; food provisioning stopped at about 3 months post-release because the otters were no longer visiting the hack site. The released otters are doing well and beginning to disperse out based on reports from personal observations by the land owners. Both rehabilitators suggest that a key element to successful release is finding a suitable site that meets optimal criteria; "*The foremost criterion is that the site must be an environment that is appropriate for the target species, providing proper habitat, food, water, shelter, and a viable population of conspecifics. Ideal site criteria for otters include good water quality without serious pollution, isolation from humans, a safe distance from roadways, and a current suboptimal otter population."* (Haire 2009, Thibodeaux personal communication). **Photo**: T. Thibodeaux: Yearlings returning to hack site 5 ½ weeks after release. Amount of food left was gradually reduced and visit frequency decreased until provisioning stopped at 3 months.

OTTER MANAGEMENT AT THE COCHRANE ECOLOGICAL INSTITUTE

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Description of Facility:

The Cochrane Ecological Institute (CEI), founded in 1971, is a registered charity, a non-profit, non-government organization established as a center for the captive-breeding for re-introduction of extirpated or endangered indigenous species into their historic range, and the rescue, rehabilitation and release of injured and orphaned wildlife. In addition, the CEI provides Field Station facilities for individuals interested in undertaking behavioural research on the species maintained and managed at the Institute. Although the CEI operates under a zoo permit (2986GP,Alberta Environment) all species held there are intended for re-introduction and release, not for exhibit, trade or sale. As none of the animals held at the CEI are on exhibit, some of the management constraints that influence the way animals are kept within the zoo community are not applicable at the Institute. For example, enclosure size varies from a minimum of 60 meters by 90 meters, 2 1/2 acres, 20 acres, up to a maximum of 130 acres, and no enclosure is designed to facilitate public observation of the animals housed within it.

The CEI is set at 4,700 ft above sea level in the foothills of the Rocky Mountains, and consists of 160 acres of natural prairie/montane habitat, enclosed by an 8ft game fence with 4ft. ground-wire mesh along its base and surmounted by a 4ft. wire-mesh overhang. Within the enclosed 160 acres are three spring-fed bodies of water, a large bog, aspen bluffs and spruce groves.

Situated at the center of the CEI is a fenced-off 30 acre enclosure containing the three CEI buildings (main building containing office facilities, staff housing, and library, Animal Health center, Interpretive center), the swift fox, V*ulpes velox-V.v.hebes,* captive-breeding facility, Mews and raptor flight pens, as well as enclosures designed to house other orphaned species destined for rehabilitation and release.

The CEI has been working with the North American river otter, *Lutra (Lontra) canadensis,* since 1983 and over that period has both successfully raised orphaned otter cubs for release into the wild, and undertaken the capture, translocation, and release into suitable habitat of adult and juvenile "nuisance" individuals.

Captive otter management at the CEI.

CEI facility designed to house orphaned otters:
The otters housed at the CEI have all been orphaned animals and, in general, arrive at the Institute severely dehydrated and often close to death. It is vital that otter cubs, of any age, should be kept in a quiet, dim area that is warm, dry, free of droughts and where the animals are easily, non-intrusively, observable over 24 hours.

The area set aside, at the CEI, for newly arrived otter cubs is 10 ft. by 12 ft. in size, within the CEI main building and referred to as the "otter room". The otter room is heavily insulated to reduce any noise disturbance, and to keep it at a warm, even temperature. The floor is linoleum, while the walls have stainless steel sheeting up to a height of 18 in., above which they are painted wood. A thermostatically controlled infra-red lamp, set 5 ft. above the floor, ensures that the animals are never chilled. Both hot and cold water is provided within the otter room. Two sets of 3 ft. deep wood shelves are set on two sides of the room up to a height of five feet. If the room is occupied, these shelves are covered with toweling. Set along one wall there is an 8 in. deep, 8 ft. by 4 ft. fiberglass bath, with a steel grid covered drain. Adjacent to that is a 2 ft. by 4 ft. by 8 inches deep "drying" area containing sawdust or fine sand. The bathing and drying area is divided from the main body of the room by a four foot high wall and door. It is essential that the bathing area can be closed to very young cubs, and also, when the area is made available to the animals, that there is a large space where the otters can dry off.

Within the otter room, a 6 inch deep, 4 ft. by 6 ft. box of dry powdered peat covered by a layer of hay is set against one wall, under the shelving. We have found well-cured fine hay to be more suitable than the coarser oat or wheat straw more commonly used as bedding, as hay is equally absorbent and holds together better than straw when the cubs burrow into it. The peat and hay "nest" gives the otter cubs shelter and privacy while still making it possible for the keeper to keep them under observation. Also, while the room is in use by otter cubs, the linoleum floor is thickly covered with newspaper. The otter room is entered, from the CEI library, through a horizontally divided "stable" or "Dutch" door.

The whole area can be observed, through plexi-glass windows, from the CEI main library and also from outside through double paned insulated glass windows. The CEI library has an alternative access giving directly onto the CEI's, fenced, 130 acres. When the animals become old enough to leave the otter room and go outside they then have free access to 130 acres of land through a specially constructed, insulated, "otter exit" in the CEI library wall built next to the library's outside door.

The "otter exit" consists of a 2 ft. by 2 ft. by 8 ft. insulated, lidded wooden box containing 3 baffles set at 2 ft. intervals along the inside of the box. The baffles are designed to reduce the amount of winter draught and cold that would otherwise whistle into the library. Entry, exit, and passage past the 3 interior baffles is through holes that are 7 inches in diameter.

Immediately outside the CEI library are three specially constructed ponds linked by a shallow creek. Initially, the young otters will make use of these ponds only when in the company of their keeper and spend the rest of their time, voluntarily, in the "otter room". When the animals are 6 months of age, the keeper will spend a great deal of time taking them for walks all over the CEI's 130 acres and

introducing them to the CEI's three large water bodies. These ponds contain, as well as amphibians native to the area, introduced rainbow trout (*Oncorhynchus mykiss*). The natural prairie habitat of the CEI's 130 acres also houses wildlife indigenous to the area, large mammals such as moose, elk, white-tail and mule deer, small predators such as coyotes, red foxes, and bobcats as well as a wide range of prey species.

The largest, seven-acre, pond has an artificially built otter holt, a six foot by three foot insulated box with direct access to the pond. This "holt" is set within a section of the machine room at the base of a windmill. The pump operated by the windmill keeps the water open and ice-free all winter, enabling the adolescent animals to use the water throughout that period. By midwinter of their first year, most young otters will be living in the windmill holt, and will spend little time in the otter room. By the time of release, September, they will spend no time at all in the otter room

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Handling and hand-rearing North American otter cubs:

Otters are an active, lively, vocal, and intensely social species. Work undertaken at the CEI has demonstrated that it is essential both for the well-being of the orphaned animals and for success in re-introduction and release, that the orphaned animals have significant interaction with their keepers, that they be taken, from the age of five months on walks with the keeper and introduced to natural water bodies. This exercise cannot, and must not, be hurried. As the animals get older, it is important that they are introduced to fishing and to the other indigenous species that occupy their native habitat. Although otter cubs are as dependent upon their Keeper for reassurance as any dog is to its master, at the age of 18 months, most hand raised otter cubs will exhibit a large measure of independence and will cease to be reliant upon their Keeper.

<u>On Arrival</u>:

Otter cubs have been brought to the CEI from within 24 hours of their birth to four months of age, one thing is in common for all new arrivals; they are dehydrated and severely stressed. The skin of the new arrival should be pinched between forefinger and thumb to check for "tenting". Ideally, the pinched skin should slide smoothly back into position and not stay peaked. The animal's gums should be examined for colour (rose pink, not white), while doing this, the body temperature can be estimated by sticking your little finger into the animal's mouth (it should not feel cold to the touch). If possible, little other veterinary action should be taken until the animals are accustomed to their new accommodation and feeding well.

The newly arrived otter cubs should be kept isolated from other animals for 2 weeks, or until it is certain that they are disease-free.

All handling of otter cubs should be done without gloves*, and should be undertaken quickly, firmly, but gently. North American otter cubs do not open their eyes until the 34th to 36th day after birth (Liers 1958 &1960, Harris 1968) and handling them without gloves at that age is of no risk to the keeper. Older otter cubs also offer no threat if properly and confidently handled. The handler, no matter how idiotic it seems, should speak continuously and reassuringly to the animal. Otters are a vocal species and respond well to vocalization, even of a human sort.

The first essential, after its arrival, is to re-hydrate the animal. Using electrolytes, we have found that injection, rather than the use of an I.V. drip, is more efficient and less stressful to the cubs.

If the animal is caked and filthy with dried faeces, (this is more likely if it is single, because a group of cubs will suckle each other clean) it is essential to clean the animal up, using a moist, blood heat, cloth and a slow rhythmic motion to remove detritus. This gentle rhythmic cleaning action is generally reassuring to the young animal being treated.

Formula and Diet:

At the CEI we give otter cubs, that come in toothless and with their eyes still shut, a formula consisting of Esbilac (PetAg, Hampshire, Il. USA, www.petag.com) mixed as recommended by the company, plus 4ml of cod liver or halibut oil per 240ml of formula. This formula is fed, at blood heat, every hour during the day, every 2 hours during the night. At approximately 2 ½ weeks after arrival, or when the milk teeth erupt, one tablespoon of infant's Rice or Oatmeal Cereal is added (Heinz, H. J. Heinz Company of Canada

Ltd.5700 Yonge St, North York, Toronto Ontario M2M 4K6, Canada), included is 40ml of liquidized raw meat (beef or chicken heart) per 240 ml of formula, plus one raw egg per day. Any un-used formula should be disposed of and not kept, even under refrigeration.

We use very soft nipples (Gerber; 0 to 3 months), with the nipple hole enlarged, for feeding young cubs. As the animals increase their formula intake, the number of feedings can be reduced, but there must never be a gap of more than 3 hours between feedings until the animals are eating solid food. Usually, by six weeks of age young otters will be eating solid food, and taking milk formula on demand. At the CEI we wean otter cubs at five months old, unless an animal has been ill or is noticeably undersized, in which case we will continue to provide formula in order to enhance weight gain.

When the animals are eating solid food, they should be provided with an ample supply of food at regular intervals, in individual bowls, at a minimum of four times a day in the summer months. We have found that an adult North American river otter will easily eat an average of 3 to 5lbs of meat per day, although rarely more than 1lb per meal.

Because the animals maintained at the CEI are intended for release, once on solid food, they are fed raw trout, herring, smelt, anchovies, chicken necks, whole chicken hearts, chopped beef heart or liver, day-old chicks, and mice. The daily composition of the feed must vary, as otters get easily bored. The otters also are given access to limited amounts of fresh berries and fruit. As five-month old otters kept at the CEI also have free access to 130 acres, they are supplementing their feed (with varying levels of success) by hunting.

Any animal that is looking slightly "off-colour" is given mice. In Europe, where eels are readily available, they are fed eels as a pick-me-up in preference to mice (Harris 1968).

Prior to release, captive-raised rainbow trout (*Oncorhynchus mykiss*) are released into the CEI ponds, so that the juvenile otters can hunt them. The young otters also take the indigenous species naturally occurring on CEI land: amphibians, Richardson's ground squirrels *Spermophilus richardsonii*, pocket gophers *Thomomys talpoides* and other small mammals.

Estimating age:
It is the experience of the CEI personnel that it is practically impossible to estimate the age of orphaned North American otter cubs, once their eyes are open. Size varies in direct ratio to the amount of feed available to the lactating female and the number of cubs in a litter. If the animal has been abandoned for some time, it will be smaller than a normal cub of similar age.

We have noted the size and weight of four blind and toothless cubs at 24 hours old (the otter bitch was observed whelping) to be 4 in. to 6 in. in length, and weighing between 5 and 6 oz. At 16 days of age their size and weight had increased substantially to between 7 and 9 inches in length and 12 to 16 oz. in weight. Their eyes opened at 35 to 36 days, by which time they each weighed in at 2 ½ to 3 ½ lbs. In contrast, we have had otter cubs brought in whose eyes have been open and whose milk teeth are all in place, (meaning that they must have been older than 39 days) , that have weighed less than 20 oz. and measured 12in. in total length.

Scat:
After each feeding, the otter cub's stomach, abdomen and anus should be massaged with a damp finger (the finger will inevitably become damper) to ensure a bowel movement. This action takes the place of the licking a mother would naturally give her cub and contributes significantly to the animal's well-being. The procedure should be following each feed until the cub's eyes are open and they are able to leave their "nest" by themselves. Otters, even little cubs, are naturally clean, and, as soon as their eyes are open will leave their "bed" to defecate on the paper provided. Once they have decided upon a suitable site within the inner enclosure, it will become a "latrine" and will be used by all the otter cubs contained in the enclosure. If the otter's bed gets damp or dirty from faeces it is a warning sign of potential ill health.

A milk-fed otter's scat should look like a row of small amber beads in a translucent jelly. As they begin to eat solid food the colour and size of the "beads" will change to reflect the changes in the animal's feed, for

example, chicken hearts can result in dark red “beads”, and some insect chiton will pass unchanged right through the otter.

Otters are very formal in the use of latrines, and once they are using a larger enclosure, or in the case of the CEI, 130 acres, they will continue to use the same areas as latrines. These are generally distinctive sites; prominent rocks or fallen logs, a site where two trails cross, the end of a rocky promontory in a lake, or sometimes a site, which to the human eye, has nothing distinctive to recommend it. The regular use of latrine sites by otters is a useful trait, and makes it easier to monitor the animals over a large area.

Singles versus Groups:
North American river otter cubs are seldom alone in the wild and they are intensely dependent upon their family group. If the cubs brought in are in a group, the level of stress is greatly lessened. Single cubs are sometimes reduced to a coma-like behaviour by prolonged anxiety. This coma-like condition will be alleviated by the keeper putting the cub inside his/her shirt until the animal has warmed-up and revived. Once the single cub has revived and is feeding well, it is possible to put it in the hay bed in the otter room, if the keeper takes off his/her worn T-shirt, wraps it around a ticking clock and provides a stuffed animal for company. If the intention is to produce a healthy well- balanced individual, it is essential to spend at least an hour with the single cub at each feeding, handling it, massaging it, and talking to it.

Introduction to other otters:
At the CEI we have had success introducing otter cubs, of any age up to and including 8 month old animals, to each other. If their milk teeth have not yet erupted, cubs can easily be put together, and will accept each other, without any obvious stress or aggression. In the case of older animals (6 to 8 months of age), as otter cubs will follow their keepers anywhere, our policy has always been to take the litter-mates for long (4 km) walks and to introduce newcomers during these walks. We have experienced no aggression between newly introduced animals.

We have, once, introduced a single cub to an adult female (as our aim is to introduce singles to groups as soon as possible,) because at that time we did not have a group of cubs of a similar age to introduce it to. Initially the female rejected the cub, but after one month she accepted the animal. We have not introduced adult animals to each other as we have not had the occasion to do so.

Introduction to other species:
Juvenile otters, hand-reared at the CEI come in contact with most of the species native to the eastern slopes of the Rocky Mountains. Moose *Alces alces*, elk *Cervus elaphus*, mule deer O*docoileus hemionus,* and white-tailed deer *Odocoileus virginianus*, occur on the 130 acres in use by the otters, as do coyotes *Canis latrans*, red fox *Vulpes vulpes*, swift fox *Vulpes velox*, bobcat *Felis rufus*, skunk *Mephitis mephitis*, porcupine *Erethizon dorsatum* , and black bear *Ursus americanus.* Although the otters have been observed near to these animals there has been no observed adverse reaction between the species.

Health:
North American river otters are capable of survival on an insufficient diet in improper housing, but they will not do well. If maintained as a zoological exhibit they will prove unsatisfactory and unappealing to the public. They will be in poor condition, solitary, lethargic, depressed, a wasteful exhibit in a Zoo, and unlikely to survive if released. Their coats will be patchy when wet and dull when dry.. A healthy otter is active, curious, and extremely lively. It’s coat is slick when wet, and, as soon as it comes out of the water and shakes will form into paintbrush tips, before drying to a shiny evenness.

Otters are susceptible to both canine and feline distemper, parvo virus and its mutations, feline panleukopenia, human jaundice and hepatitis. Pneumonia, abscesses, and perforated ulcers can be caused by improper management and housing. Death from over-heating and stress can occur very rapidly if the animal is improperly confined, or transported in an unsuitable travel crate. At the CEI we have lost one animal to intestinal torsion, “twisted gut”. We have had five adult otters (four of them dead) brought in to us with mercury poisoning, and one cub.

Release methodology:
The CEI works with the Canadian Provincial government, the Environmental Agencies of British Columbia and Alberta, in order to identify potential release sites for otters. It is also necessary to obtain import, export, and transport permits from the relevant government jurisdictions prior to the animals' release into the wild. After review of the information provided by provincial government agencies, CEI personnel will examine potential release sites for prey availability, existence of other otters, and possibility of adverse human/otter interface. The policy is to release animals into areas on coastal rivers where there is no human occupancy of the land.

CEI hand-reared otters are prepared for release in their second year and are released onto suitable, previously identified, coastal rivers when the salmon (*Oncorhynchus nerka, Oncorhynchus keta, Oncorhynchus tshawytscha, Oncorhynchus kisutch*), are running in September. We have noted groups of two-year old otters wintering together along the seacoast of British Columbia, and also, if there is sufficient feed available, there is a marked increase of otter use in estuarine habitat. The choice of the Fall of the year for the release of juvenile otters at the time of their natural dispersal, and when there is an ample supply of readily obtainable fish, appears to enhance survival.

Transport:
Crates are best constructed of heavy gauge, fine mesh, welded wire with a solid metal or wood roof and floor. The crate should be large enough to comfortably contain the animal when divided in half, one half being dark and draught-proof, and the other half open to the air on three sides, with an 8 inch diameter entrance hole giving the animal access to both halves. A heavy metal water-bowl should be bolted to the floor. The crate and all its fastenings should be made extremely stoutly, and the enormous strength of adult otters constantly considered while the crate is under construction. Crated animals should never be exposed to heat, direct sun, wind and rain. Otters have little heat tolerance and will die rapidly from being over-heated (Best, A. 1962, The Canadian otter, *Lutra canadensis*, in captivity. *Int. Zoo. Yb.* 4: 42- 44)

Capture of adults for translocation:
The CEI has most frequently been requested to remove adult animals from the crawl-space under the main building of sea-side cottages in early Fall or over the Winter. In general, these animals are either single, or very small groups of juveniles. After checking that the otter is in occupation and discovering which entrance to the cottage's crawl-space is most used by the animals, an un-baited drop-trap (Pied Piper, Model 301, 15" x 15" x 46"), covered with plywood, is set in the otter's entryway. All other entrances to the crawl-space are stopped up (again, the enormous strength and power of the otter must be taken into consideration). Like many mustelids, otters seem to be attracted to tunnels, and, if the drop trap is properly covered by a fitted wooden box, will willingly explore it. The trap should be unobtrusively checked, using binoculars, every hour. Once the animal has been removed, the entryway should be firmly and permanently blocked. Any adult animals intended for translocation are not maintained at the CEI facility but translocated to a suitable site, not less than 15 miles away, as soon as possible after being trapped.

Design of permanent otter facility.
For the successful management of otters in captivity it is essential to provide them with sufficient food, clean running water, and a ratio of $2/3^{rd}$ dry land to $1/3^{rd}$ water. Water is essential for otters, both for their health and also to provide the public with the entrancing and educational sight of healthy happy otters behaving in a natural fashion. If the pool is an artificial one, the drain outlet should be designed in such a way that the otters cannot stop it up. Sufficient land, not a cement pit, is equally essential for the animal's well-being. Provided with the enrichment of sufficient land, running water, and ample food otters will repay their care, by providing a fascinating exhibit.

*I appreciate that handling without gloves is a difficult requirement within an accredited Zoo, but there are no gloves that can withstand the bite of a determined otter, but the contact or bond formed between keeper and animal, between bare hand and fur, is beyond price.

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Successful Hand-rearing and Rehabilitation of North American River Otters

Successful Hand-rearing and Rehabilitation of North American River Otter (*Lontra canadensis*)
Section 1 – When to rehabilitate, young pup care, formula feeding, and weaning.

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This document, a compilation of advice from multiple individuals with otter rehabilitation experience, is designed to provide guidelines and techniques of river otter care for licensed wildlife rehabilitators or wildlife care centers that may be unfamiliar with this species. Due to its length it has been divided into 3 Sections. The remaining 2 sections are available at Otterspecialistgroup.org; Otters in Zoos, etc.; OZ Task Force documents

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OTTER PUPS – FIRST ARRIVAL

- North American river otter's give birth once annually, or biennially, usually between the months of January and June with the earlier part of the range being in the southernmost latitudes.
- Otter pups tend to come into rehabilitation facilities most often when they are old enough to begin venturing out of the den on their own (8 - 12 weeks of age) and get separated from mom due to predators, flooding, construction, injury to or death of mom, etc.
- Orphaned or lost pups may approach people or wander into sheds, roadways, golf courses, garages, or other areas of human habitation in search of mom and food. At this point they may appear "tame" or already "imprinted' on people but usually that is not the case. Once they are taken into proper care and treated appropriately they typically revert to normal behavior.
- Most pups arrive hypothermic and dehydrated. It is vital to attend to these issues before attempting to feed or treat minor injuries. Hypoglycemia often closely follows the previous two conditions. At this stage experienced veterinarians should be consulted.

ATTEMPT TO REUNITE WITH MOTHER

- In some situations the pups may get separated from mom when their dens flood with rapidly rising river water, often due to heavy spring rains. In these cases they most often float out and down river not yet being strong enough to swim against the current. This typically prevents them from returning to the den area. Another reason for separation is den relocation. When the mother is moving pups to another den site she sometimes gets interrupted by unknown causes causing her to lose track of pups, **or their discovery before she returns**.
- If the mother is known or believed to be alive and the pup appears healthy, an attempt to reunite a lost pup with its mother should be tried by first attempting to locate the entrance hole to the den.
- Many otter dens are in or on the banks of rivers or ponds. The den may have several connecting tunnels and holes, sometimes with tree roots exposed in and surrounding the opening. The soil is usually worn down smooth around the entrance with paths leading to the water. Often times the entrance is best spotted by searching the bank from the opposite side of the river. Also search for signs of daily activity such as sand/soil diggings, foot tracks, scat, or scent mark mounds mixed with vegetation and soil nearby.
- Place the pup near the entrance and hide nearby, upwind, to observe. Often times the pup will chirp when it gets cold, hungry, or restless. This loud, high pitched distress call should attract the mother if she is able to respond. In some cases the mother may be the one doing the chirping in hopes of persuading the pup to chirp back so she can better locate it.
- Otters can see movement quite a long distance away so be sure to hide carefully and refrain from any quick movements. If the pup is in danger of rolling down the bank or wondering off, it can be placed inside a box or kennel with the top off. This will keep the pup in place but allow the mother access to it by hopping inside or knocking over the container.
- If the mother is thought or known to be dead, the baby is cold, dehydrated, weak, or the den location is unknown the decision to rehabilitate should be made.

WHO SHOULD REHABILITATE OTTERS?

To maximize the chance of successful rearing and potential release of rehabilitated otters these questions should be asked first:

- Does the rehabilitator have adequate facilities and time to raise the animal properly?
- Does the rehabilitator have adequate funds to supply formula and weaning diets to, and perhaps after, release?
- Is there an appropriate release area available? What is the current state of the otter population in the area?
- Are facilities and resources available to support and monitor release?
- Is another rehabilitator more qualified and/or does someone else already have an orphan(s)? If so, it is better for the orphans to be raised together. There is a lower risk of imprinting and they learn from one another.
- Does the rehabilitator have access daily to large amounts of whole fresh fish?
- Does the rehabilitator have access to live fish and a pool with a fresh water source for the animal to fish and swim in?
- Does the rehabilitator have an established relationship with an experienced otter veterinarian?
- Does the rehabilitator already have an otter diet, husbandry, medical, and release plan established?

- Does the rehabilitator have a suitably isolated, natural pen (no dogs and limited human presence) where the orphans can be placed as they become more independent?
- Does the rehabilitator have facilities to hold the otter for at least 9 months?
- If release is not an option, rehabilitators should begin researching good placement options early.

ONCE THE DECISION TO REHABILITATE IS MADE

If the pup is indeed an orphan and the decision to hand rear is made, the following rules apply.

- Know the animal's natural history and development time line.
- Have as few care takers as possible (ideally just one). **Keep human contact to a minimum.** The animal will not be releasable if it becomes imprinted, tame, or too accustomed to humans. This becomes even more critical in the case of single pups.
- Few otter pups are suitable for release. Before this is attempted experienced professionals should be consulted and a plan put in place.
- **Do not** house these animals near human or pet trafficked areas.
- There **must not** be any positive exposure to dogs.
- Be prepared ahead of time for the next stage of the animal's growth so he/she need not face undue delays when reaching the next point in development.
- If you receive a single pup, network with regional rehabilitators in an attempt to locate another orphan(s) so pups can be raised together. Otters are very social, active and playful and do much better in groups than when raised alone. The development of normal social behavior skills, natural companionship, healthy competition, added body heat, and physiological comforts are just a few of the benefits of rearing otter pups together.
- Introducing unfamiliar otter pups to one another is easier the younger they are. Expect a rough and tumble introduction (lots of vocalizations and perhaps some play biting and wrestling) if the pups are over 3 months old when they first meet. Introduce new animals slowly and with a barrier initially.
- Pups 6 - 12 months of age may take longer to introduce, however, typically introductions before sexual maturity are successful unless either animal is excessively imprinted.
- Always use caution and careful observation when introducing otter pups of different ages/sizes. Injuries may occur to the smaller of the two. Offer pups multiple hiding places to provide 'safe zones".
- Raising a single otter pup to successful release can be challenging but is possible. **This is not the preferred method.**

HANDLING

- Young pups tend to settle down and accept captivity quickly. Typically, all that may be needed to handle them is a pair of leather gloves and/or a towel for wrapping them in.
- After the age of about 10 - 12 weeks of age, otters can become quite difficult to handle and nearly impossible to restrain by hand. Otters can roll around in their hide while being held by the nape of the neck and are quite capable of biting your "scruffing" hand in mid restraint.
- Older juveniles and adults become quite desperate to escape and can harm themselves in their attempts. They will chew, dig, and/or climb which may result in injuries or death if the caging is not appropriate. Handling these otters should only be done if absolutely necessary and requires wearing heavy leather gloves, long pants, and heavy boots.
- If utilizing a rabies or snare pole to restrain an otter be sure the loop goes behind one front leg as well as the neck otherwise the loop will slip right off the head since their neck is the same circumference.
- Nets are useful for quickly moving an animal from one secured spot to another as long as the net is heavy duty. It also must be long enough to properly contain the body and have room to "flip" the net on itself to temporarily keep the otter closed inside while being lifted. Nets also have been used for securing an animal to the ground long enough to allow administration of an IM or SQ injection through the netting. Padding the net rim is advisable to help prevent injury to the otter's teeth or mouth in the event he bites it.

- Squeeze cages (available from many sources) are generally a safe method (for both animal and handler) of restraint for injections as they allow the handler access to many body parts of the otter. They also offer quick and reliable immobility of the animal. However, the safest and best method is to train the otters to receive hand-injections. This method also tends to be the least stressful as it reduces the potential of otters harming themselves when they are habituated to the hand injection procedure. (See training section for hand-injections procedures.)

OTTER DIET AND FEEDING – NURSING ORPHANS

- **Formula:** Stomach capacity is 50 - 60 ml/kg; begin with 50 ml/kg to reduce chances of diarrhea. Use the formula 0.05 X B.W. (in grams) =_____ml. to calculate the amount to be fed. There are 30 ml. / fluid ounce.
- 20 - 40% (30% is a good starting point) B.W. (body weight) per day should be fed. This should be divided by the number of feedings and given over a 24 hour period.
- When evening feedings are no longer necessary, stagger the remaining meals so that the otter never goes more than 8 hours without eating (ideally no more than 6 hours for the pre-weaned). Do not overfeed in volume in order to eliminate a feeding or make up for a missed session.
- Prepare and date each day's formula and discard any unused refrigerated formula after 24 hours.
- Warm measured formula to body temperature prior to feeding and discard any uneaten portions.
- Do not refrigerate formula after it has been heated.
- If milk has recently been mixed in a blender or rigorously shaken, allow time for the bubbles to settle out before offering bottle to the animal. Too many bubbles may cause gas and G.I. upset.

See the hand-rearing section for formula information retained from earlier editions. Updated information on formulas used for hand-rearing orphaned otters is listed below.

Formula Note

Recent change (2009) in the manufacturing process of Esbilac powder has been causing some growth and digestibility problems in squirrels, opossums and raccoons for some wildlife rehabilitators using this milk replacer. Problems regarding this product with other wildlife species have not yet been reported or published to author's knowledge.

Pet Ag®, manufacturer of Esbilac and the Zoologic Milk Matrix line of milk replacers, reminds wildlife rehabilitators that using Esbilac on wildlife is "off label" usage and they recommend that instead rehabilitators use the Zoologic Milk Matrix products such as Zoologic 33/40 since it is manufactured and labeled for use in wild orphan mammals.

The addition of an anti-gas build-up product to the formula should be considered (milk sugars can cause the build-up of gas). Lact-aid® is an enzyme that has been used successfully with many species. Add two drops of Lact-aid® to 100ml of mixed formula. The formula then must be refrigerated for 24 hours prior to feeding for the enzyme to perform correctly (Grant 2005). *Lactobacillus* spp., in Bene-bac® or Probios®, is a group of beneficial gut bacteria that also break down milk sugars in the digestive tract. Follow label instructions for these products.

Wildlife rehabilitators are advised to know about these issues in order to make informed decisions on the formulas we choose to feed. Current updates on milk replacers, feeding practices, and information on gastrointestinal conditions in wildlife are available at www.ewildagain.org.

Substitute milk formulas for otters. Values taken from product composition documents available from PetAg™ (K.Grant, personal communication)

Formula	% Solids	% Fat	% Protein	% Carb	Kcal/ml
Formula #1 1 part Esbilac® or Milk Matrix® 33/40 1 part Multi-Milk® or Milk Matrix® 30/55 2 parts water	30.9	15.6	10.5	2.7	1.78
Formula #2 1 part Multi-Milk® or Milk Matrix 30/55® 1 part water	31.3	17.8	10.4	1.1	1.91

At this time (2004), the preferred formula is canned Esbilac® due to palatability and good pup growth. Milk Matrix® based formulas also are nutritionally suitable but some facilities have had pups refuse this formula (Blum 2004) while others have had good success.

Formulas:
The following are examples of formulas successfully used to raise N. A. river otter (2011).

- 1 part powdered Esbilac® + 2 parts water + Lactobacillus (Avian Benebac™) powder (1t/cup of formula) (provided by M. Haire)
- 1 part powdered Esbilac® + 2 parts water + 1 part heavy whipping cream + 1 part Multi-Milk® (provided by M. Caine-Stage)
- 2 part liquid Esbilac® + 1 part whipping cream
- Multi-Milk ®30/55 until eyes open, than;
  2 parts liquid Esbilac + 1 part Multi-Milk® (Provided by S. Beckwith)
- Canned Esbilac® (as is)
- 1 part powdered Esbilac® or Milk Matrix® 33/40 + 1 part powdered Multi-Milk® or Milk Matrix® 30/55 + 2 parts water
- Multi-Milk® 30/55 until eyes open then transition to Esbilac® (Zoologic milk substitute 30/55 has low level of lactose)
- Esbilac® 2 T/4 oz BW divided into 5 - 7 feedings every 2 - 3 hours until 10:00pm
  4 weeks old consume 1 oz/feeding 4 - 6 x/day
  6 weeks old consume 2.5 oz/feeding 4 x/day (provided by Blasidell)

Care Timeline

North American River Otter (Lutra Canadensis) Care Sheet					
Age (Weeks)	**Weights (g)**	**Age Determinates**	**Diet**	**Amount**	**Frequency**
birth	110 - 170	Dark brown-grayish black fur, eyes closed, 25 - 30 cm long, toothless, needs stimulation, auditory canals open and able to chirp at birth.	Formula plus Probiotic	Volume by B.W. (body weight)	Every 2 - 3 hours 24/7
1	266 - 333				Every 2 - 3 hours 24/7
2	428 - 671				Every 3 hrs. Min. 5 - 6 feedings. No PM feedings.
3	566 - 912	Can growl; developed olfactory senses. Tooth eruption begins.			Every 3 hrs. Min. 5 - 6 feedings. No PM feedings.
4	721 - 1180	Able to toddle & thermoregulate; housing 75°F w/ lamp. Muzzle hairs begin to lighten; whiskers still undeveloped, body 11 - 13 inches			Every 3 hrs. Min. 5 - 6 feedings. No PM feedings.
5	997 - 1562	Crawling on belly. Eyes open-bluish in color (day35 -40).			Every 3 hrs. Min. 5 feedings. No PM feedings.
6	1200 - 1428	Eyes focused and tracking, localized latrine use. Able to walk holding head up.			Every 3 - 4 hrs. Min. 5 feedings. No PM feedings.
7	1161 - 2072	Urogenital stimulation can be discontinued should be defecating on own.			Every 3 - 4 hrs. 4 - 5 feedings. No PM feedings.
8	1656 - 1907	Introduce to water dish.	Add Canned Food	Solids- Ad Lib.	Every 4 hrs. 4 feedings. No PM feedings.
9	1914 - 2247				Feed 4 times /day
10	1678 - 2419		Add Fish	Fish- Ad Lib.	Feed 4 times /day

Weights- from North American River Otter Husbandry Manual (Reed Smith 2001)

Feeding Nursing Pups:

- Weigh pups at the same time each day (preferably before first AM feeding) to calculate feeding volume.
- For bottle feeding, place infant in a sternal recumbent (belly down) position with the head straight out and slightly up.
- Due to their competitive and sometimes aggressive nature, multiple pups may need to be offered bottles simultaneously or physically separated to feed one at a time to avoid injury to the other otters or the care giver.

- Newborns have been successfully fed by syringes with a cut off portion of a rubber catheter attached to needle hub for a nipple.
- Another option is a Cat-tac® nipple attached to syringe tip than switching to a Pet AG™ Pet nurser with a nipple (size F or LD) from Wombarroo™ as they get a little older. The nipple size depends on the individual otter's preference. (McBride, personal communication)
- Juveniles (4 - 12 weeks of age) are often fed with human baby bottles and soft preemie nipples.
- Otters may get frustrated if the nipple hole does not suit the suckling reflex or if the nipple is too hard.
- Avoid the temptation to enlarge the nipple's hole size. If the otter is outgrowing the nipple, it is safer to go up one nipple size rather than to widen the hole.
- Playtex brand silicone, preemie nipples (hole size 1) generally work well for very young pups as they are soft and PBA free. These nipples are often available at many large chain drug stores and Walmart. (S. Beckwith personal communication)
- Two other brands of nipples that often work well are Similac™ Special Care Nipple and Enfamil™ Neonatal Nipple. Both offer a tip smaller than most other preemie nipples.
- New intakes may take several days to become accustomed to the new diet and feeding equipment.
- One method used to get infants to adjust to nursing from an artificial nipple is to cover the pup's eyes and hold the mouth firmly closed over the nipple until pup stops chewing and resisting and calms down enough to attempt suckling. Squeeze the bottle gently to allow a small amount of milk to flow into the mouth to encourage them to swallow and get used to the taste of the unfamiliar formula.

Clamping jaws over nipple to encourage nursing.

- Line up the nipple/bottle with the center of the mouth (equal distance between canine teeth) because if the nipple is offset to one side of the mouth the pup tends to want to chew and tug on the nipple instead of suckle.
- Otters are obligate nose breathers so they cannot breathe from their mouth and nurse at the same time. This may create a difficult nursing session if the pup has a respiratory infection and is congested. In this case, hopefully the pup is old enough and will eat enough from a bowl. In severe cases, a nasogastric feeding tube may need to be placed by a veterinarian.

Photo: Nasogastric tube sutured in place for stomach tube feeding a young otter unable to eat normally due to neurological issues.

- Bottle aged pups that will not suckle can be successfully transitioned by feeding formula and blended solids (fish and kitten chow) with a **large tipped (gastric) irrigation syringe** (as shown) until they are able to feed from a bowl.

- Once otter pups get the hang of bottle nursing, the rest of the feeding times are spent trying to slow them down. They tend to drink very fast and you may have to pull the empty bottle away quickly to prevent them from swallowing air or chewing the nipple in half due to excitement.
- Unfortunately, not all bottle-aged pups will learn to suckle from the bottle and some choose to just chew on the nipple and force the milk out instead. Although this "drinking" method works well enough, close attention must be paid to the condition of the nipple throughout the entire feeding because they can (and probably will) suddenly puncture and tear the nipple spilling the formula out in a rush.
- Aggressive bottle drinkers can become quite fractious at the end of the feeding sessions so be prepared for possible scratches/bites. Wear leather gloves and keep fingers and face away from the "bite zone" when pulling the empty bottle away.
- Baby otter's abdomens should be nicely rounded after mealtime but never tight or doughy. A healthy well fed otter pup should never show shoulder, hip, or rib bones.

Photo: Healthy well fed baby river otter

- After a bottle feeding, attempt to burp the pup by patting firmly between the shoulder blades and down the infant's back as otter pups tend to accumulate air in their stomachs while nursing. This may cause them to stop feeding before they have ingested the entire meal.

FEEDING VERY YOUNG PUPS THAT WILL NOT NURSE

If very young pups will not nurse they can be tube fed. Prior to attempting for the first time, the tube feeding procedure should be demonstrated by a veterinarian or experienced person. This should only be tried on pups without teeth. The procedure below has been used successfully on N. A. river otter pups.

- Typically, a size 5 Fr. feeding tube (such as a red rubber catheter) is sufficient for feeding most young pups but size is dependent on the individual. The next size down (3.5 Fr.) and next size up (8 Fr.) should be available in case they are needed.

- Pre-load the catheter with formula before passing it into the stomach to avoid injecting a large bubble of air ahead of the meal. This is accomplished by filling the syringe with formula, attaching to catheter, depressing plunger slowly until formula is coming out the end of the catheter. Using this method, you will have an accurate amount of fluid entering the pup, without air bubbles being pumped through first.
- Measure to the last rib and mark the spot on the catheter with a sharpie. Passing the tube is similar to tube-feeding almost any other neonatal carnivore.
- Generally start the first feeding with just Pedialyte® to make sure they are hydrated before putting any actual formula in them.
- Second feeding +/- third feeding is 50% Pedialyte®/50% formula, then 25%/75%, then full strength formula. This is a dynamic process, though, and changes are made based on the neonate – constipation/diarrhea will require adjusting the strength and amount.
- Typically aim to feed 20 - 40% of the pup's body weight daily, divided evenly over a 24 hour period. It is important for the caretaker/keeper to be in touch with their veterinarian during this process so that concerns can be discussed and addressed right away (diarrhea, constipation, aspiration of formula, dehydration, weakness, etc).
- It helps to soak the catheter in warm water before using it. This softens the rubber a little and is gentler on the pup.

STIMULATION TO URINATE/DEFECATE

- Stimulate for urination and defecation with a damp cloth before feeding. This should be done until eyes open and self-elimination is evident (~ 7 weeks).
- Otters on formula have a variety of stool types and consistencies but their feces generally should be soft, but formed, and yellow in color (See photo).
- When the pups begin to eat solid food their feces tend to take on the look and texture of what they ate last (See photo). Anywhere from light tan to almost black feces are typically normal.

- Otters have a mucous lined intestinal tract to protect themselves from fish bones, crayfish shells, and other ingested sharp food items. It is normal for them to occasionally pass mucous in/on their stool.
- Due to their high metabolism otters may urinate/defecate every 2 - 3 hours and they usually do both functions at the same time.
- Generally they defecate in a place away from the food and sleeping quarters but often in a water bowl or pool.
- Occasionally otter pups will use a litter box, with shredded paper or pelleted paper litter, if a shallow pan is provided in their favorite latrine corner or spot.
- Some rehabilitators offer a separate kennel for the pup to use as a latrine.

Photo: Providing a litter box may help with cage cleaning.

Bowl Feeding:

- Juveniles (6 weeks and older) may prefer to take formula out of a bowl and should be encouraged to do so as early as possible.
- Early lappers tend to be easier to wean, form less of a bond with the care giver, and have less chance of aspirating milk than those individuals that are being bottle fed.

- One challenge of bowl feeding the formula is the mess. Be prepared to rinse and dry off the baby (and enclosure) after each feeding.
- **Note**: Offering formula in a bowl makes it more difficult to measure actual formula consumption vs. wasted "milk splatter."
- It is usually best to feed multiple pups separately so they are less likely to fight and to help ensure that each animal is getting the measured volume that he needs.
- **Feeding Tip**: A stainless steel puppy bowl with a cone in the middle helps to reduce face to face contact with other pups and reduces the likelihood of the pups submerging their entire heads into the food bowl.
- When a new pup is introduced to one already familiar with the feeding routine the food competitiveness that often develops may be helpful in stimulating the new animal into defending (and therefore to begin eating) his new and unfamiliar diet.
- Bowl feeding mess clean-up may be easier if pups are first moved to a cleanable "feeding station," such as a stock tank, plastic baby pool, deep sink, or bath tub, away from bedding and sleeping quarters during the meal time.
- Clean and dry the pups immediately following the feeding sessions so as not to allow the pups to chill or the food to dry onto the skin and fur.
- Regardless of the feeding technique used, the true measure of how the individuals are doing is by careful observation of body condition, fur quality, and daily weight gain.

Introduce a scale to the pups when they are young in order to improve your chances of getting routine weights up to release age.

Weaning

- At weeks 6 - 8, gradually begin introducing solid foods such as blended fish or small soft-boned fish (e.g. minnow, smelt), chicken baby food, canned or moistened kitten food into the bottle or formula bowl.
- Only introduce one new weaning food component to the diet every few days until they have adjusted well to solids.
- Gradually decrease the number of formula feedings until weaned (usually by 16 weeks).
- Once they have a taste for the kitten food in the formula, start offering it dry ad lib. Some otters will eat the dry cat food in between meals.
- **Weaning tip**: Remove the nipple and put fish parts, solids, shrimp in the bottle. They will play with the bottle while retrieving the bits. Also stimulates their intellect.
- **Weaning tip:** Weaning off formula can happen overnight or sometimes takes months. Offer small fish/canned kitten food before each formula feeding, while they are still very hungry, to encourage them to begin eating on their own.
- **Weaning tip**: If pups show no interest in kitten chow try tossing it in the pool, they may forage for it naturally.
- Do not skip a bottle feeding in order to make the pups "extra hungry" in an attempt to coax them to eat solid food.
- When weaning an overly excited/anxious pup from bottle to bowl you may try to offer half of the formula from the bottle first, than present a bowl containing the remainder. When the pups are really hungry (and familiar only with a bottle) they may need some food in their bellies first to calm them down enough to allow them to concentrate on the rest of the meal presented in an unfamiliar object (bowl).
- **Weaning tip**: With bottle nursers that are resistant to trying solid food on their own, try slipping small pieces of fish in their mouths along with the nipple to "trick" them into chewing and swallowing the fish.
- If a pup starts to nurse on its', or its sibling's, tail tip or toes, an extra formula feeding may need to be added back in for a few days. This behavior should be dealt with immediately to prevent it from becoming permanent.

Photo: Tail tip after being self- nursed upon.

- Putting orange oil on the genitals to discourage sucking has worked well with *Lutra lutra* and is not harmful to the otter (G. Yoxon, personal communication)
- Some otter pups choose to go from formula straight to fish and are not interested in the baby or kitten food. While feeding a strictly fish diet in captivity may seem to be more natural, be aware that in the wild they would be getting a broad variety of fresh fish species, amphibians, crayfish, invertebrates, birds, small mammals, and other food types that make up a nutritional balance which is often difficult to replicate in captivity. Frozen fish, while easier for the care giver to acquire, is deficient in thiamine and therefore not nutritionally complete so fresh whole fish, vitamin/mineral supplementation, and/or other commercial diets may also be required.
- If weaning pups from formula straight onto adult diet, substitute a single feeding at first with small fish or fish pieces and then gradually replace the number of bottles with fish until they are weaned.
- Begin to offer drinking water in a shallow bowl when otters can walk and begin to eat solid foods but plan to refill the water bowl several times a day because they will climb repeatedly in and out of the bowl.
- Young otters tend to defecate in the water and often soil their water bowls and pools multiple times a day. These should be regularly cleaned and refilled.
- When first introducing live food, start with small harmless prey such as minnows, goldfish, tadpoles, and frogs. Once the otters develop the skill and taste to capture and eat these easy targets then progress to the prey that may fight back such as crayfish, catfish, mice, etc.

Photo: Novel way to introduce live prey.

- Some rehabilitators have reported seeing otters regurgitate bones and scales shortly after a meal. This is probably a natural process and should be ruled out before considering a health condition involving vomiting.
- A variety of whole carcass fish plus a balanced good quality dry and canned kitten food should constitute 90% of the post-weaning diet.
- Every effort should be made to feed live fish and other native prey items daily. Natural diets vary by location and season but mainly consist of fish, crayfish, frogs, water invertebrates, small mammals, and birds.
- Some captive otters eagerly consume mice and chicks as part of their diet.
- Wild adult otters eat 15 - 20 % of their body weight per day.
- Captive weaned pups and adult river otters should be fed at least 3 to 4 times a day due to their high metabolism and caloric needs with 4 daily feedings being ideal.

SOURCES/SUPPLIES:

- **Enfamil™ Neonatal Nipple** Latex-Free by Mead Johnson Nutritionals #4202-02.
- **Esbilac, Multimilk, Benebac, Pet Nurser bottle:** Pet Ag™, 255 keyes Ave., Hampshire, Illinois, 60140, 1-800-323-6878
- **Milk Matrix:** Pet Ag™, 255 keyes Ave., Hampshire, Illinois, 60140, 1-800-323-6878
- **SnuggleSafe™** microwavable heating pad (www.snugglesafe.co.uk).
- **Similac™ Special Care™ Nipple** by Ross Pediatrics- Ross Production Division Abbott Laboratories Item # 00095. Special on line order.
- **Syringes, feeding tubes/catheters, Catac nipples, etc.:** Most of these products are available on-line at Chris's Squirrels and More: www.squirrelsandmore.com
- **Wombaroo™ formula nipples** (Size F or LD)- www.wombarroo.com or www.perfectpets.com
- **Zoologic milk replacer:** Pet Ag™, 255 keyes Ave., Hampshire, Illinois, 60140, 1-800-323-6878

Contacts and Resources

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Otterspotter, http://otterspotter.com/
IUCN/SSC Otter Specialist Group, http://www.otterspecialistgroup.org/

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APPENDIX A – RESOURCES PROVIDED BY INTERNATIONAL OTTER SURVIVAL FUND (WWW.OTTER.ORG)

The following article gives a lot of information on how to keep otters out of fisheries:
http://www.environment-agency.gov.uk/static/documents/Leisure/otters_and_stillwater_fisheriesv4_080501_FINAL_PRINT-CGS3.pdf

A new form of fencing has been developed:
http://www.farminguk.com/news/Otter-Exclusion-With-X-FENCE-Premier-Wire-Netting_18954.html
For more details call tel: 0845 1207755 or look at www.mcveighparker.co.uk Contact -Chris Hambridge 01622 892541, chris@mcveighparker.co.uk

Paper from France - http://www.iucnosg.org/Bulletin/Volume20/Leblanc_2003.html

Use of Lion dung as deterrent - http://www.independent.co.uk/environment/nature/anglers-call-on-new-weapon-to-ward-otters-off-their-fish-ndash-lions-2254765.html

If you have other suggestions of techniques successful at keeping otter out of fish farms or backyard ponds please contact IOSF so they can add them to an important resource database.

APPENDIX B – REMOVING FEMALE OTTERS WITH CUBS FROM UNDER BUILDINGS

If possible, suggest to the site owners that the female's occupancy will cease when the cubs are old enough, typically at about 4 weeks of age after which they can address the issue of preventing future use [Natal Dens - Females frequently use dens dug by other animals as natal holts. These natal holts are generally removed from water; Reid et. al. (1986) reported one female utilized an abandoned fox den 300 meters (984.25 feet) from the shore. The pups were moved closer to water when about three to four weeks old. Liers (1951) reported natal dens located 150 yards (137.16 m) from water and 150 feet (45.72 m) above high-water (female 1) and ½ mile (.085 km) from the water and about 500 feet (152.4 m) above high-water (female 2)].

If the owners are adamant that the female must be moved the method outlined below can be attempted.

Notes on removing a female otter and cubs from under buildings. Clio Smeeton, Cochrane Ecological Institute; CEI, www.ceinst.org.

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- If cubs are very young (eyes shut/no teeth) a female will typically abandon them if disturbed. However, if there is an obvious alternative den site nearby, she may move them.
- Look for alternate sites nearby. Should be removed from possible flooding, with good cover, and a water/foraging source close enough for her to forage and move the cubs when they are old enough (which means good cover along the river/lake shore).
- An artificial holt can be constructed but it must it must be out of any flooding zone. It must be long and dry (she recommends use of an auger for digging the tunnel). Recommends leaving some stucco wire and steel pins at the site of the artificial holt to be used later (as well as some large rocks). If possible a trail camera should be set up focused on the entrance to monitor activity.
    - Females frequently use dens dug by other animals as natal holts. These natal holts are generally removed from water; Reid et. al. (1986) reported one female utilized an abandoned fox den 300 meters (984.25 feet) from the shore. The pups were moved closer to water when about three to four weeks old. Liers (1951) reported natal dens located 150 yards (137.16 m) from water and 150 feet (45.72 m) above high-water (female 1) and ½ mile (.085 km) from the water and about 500 feet (152.4 m) above high-water (female 2).

- An experienced trapper should be asked to live-trap the female and the cubs collected separately.
- The live trap with the otter in it should be completely enclosed using a thick duvet (she does not recommend a tarp as they are stiff and noisy), so that there is no light entering the live trap. Cubs should be placed in a cardboard box, or similar.
- Transport both containers together with the cub box next to, or on top of, the live trap. This allows the female to smell and hear the cubs.
- IMPORTANT; Otters overheat easily and stress is contributory to that. They can be killed by overheating and this should always be considered when handling, transporting capturing otters.
- Take another duvet and fresh fish along during the move to release site.
- Place fresh fish as far down into the artificial/new holt as possible.
- Place the cubs at the entrance to the new holt, no further than arms-length in case the female leaves and the cubs must be retrieved.
- Position the opening of the live trap as close to the opening of the holt as possible. Use the stucco wire, steel pins and rocks to cover all gaps between the holt entrance and the live trap opening. Cover the join with the 2nd duvet.
- Fold back the 2nd duvet only enough so the trap can be opened; if using a guillotine type door completely remove it. Once the trap door is open fold the duvet back over so it joins the duvet already wrapping the live trap. NO LIGHT should be allowed to get in around the join and the door and the entrance to the artificial holt.
- Wait 15 to 20 minutes.

- Begin to slowly fold the duvet back from the end furthest from the artificial holt entrance, moving the folded end up and towards the entrance to the holt. This will let light in and hopefully encourage the otter to move away from it and towards the holt entrance. Keep folding until she is in the holt.
- Stuff the entrance – the stucco wire join – with the duvet and remove the trap.
- LEAVE THE DUVET STUFFED IN THE ENTRANCE TO THE HOLT with one corner sticking out and to the side. When ready to remove the duvet pull the corner very gently and slowly until entrance is open (do not do this yet).
- If possible, and you have time, move about 100m plus away (downwind) and remain watching for at least two hours.
- Leave the duvet for at least a couple of hours; she can push her way out if she is going to do it right away.
- If she immediately pushes aside the duvet and goes to the river wait two hours and then remove the cubs (make sure you are downwind from where the female would most likely return).
- If she does not come out right away, after a minimum of 2 hours (longer is better) cautiously approach the holt FROM THE SIDE and taking hold of the duvet corner slowly and quietly pull it away.
- Go away.
- Return the next day and collect the trail camera, see what the photos show (dating should allow you to know if she left and returned and did not leave again).
- If she is leaving and returning over the 24 - 48 hours since being translocated everything should be ok.
- After a few days of her leaving and returning it should be possible to return and remove the stucco wire, or leave it there if it is not too obvious that it will draw attention.

CHAPTER 14 Websites & Professional Resources

Websites

Otter Specialist Group. Run by the IUCN/SSC Otter Specialist Group this site offers information on all otter species, access to the OSG Bulletin publication, and the OZ Task Force (otters in zoos, aquariums, rehabilitation, and wildlife sanctuaries) publication list. Otterspecialistgroup.org.

International Otter Survival Fund (IOSF). This organization is dedicated to the conservation of all 13 species of otter. They can be reached at **iosf@otter.org** and located at: http://www.otter.org/

The Otter Spotter. Website offering information as well as lesson plans on all otter species. Otterspotter.com

http://bobarnebeck.com/otters/habitat.html

Enchanted Learning.com. This site has an animal print out page for the river otter. http://www.enchantedlearning.com.

Defenders of Wildlife. Their otter information is available at: http://www.defenders.org/north-american-river-otter/basic-facts?gclid=COWGw-ya368CFUOo4AodKFQHWg

The Shape of Enrichment. http://www.enrichment.org/

American Association of Zoo Keepers. Aazk.org

Professional Resources

Studbook Keeper: David Hamilton, dhamilton@monroecounty.gov
AZA Otter SSP Chair: Dusty Lombardi, dusty.lombardi@columbuszoo.org
AZA Otter SSP NARO Co-point person: Jan Reed-Smith, jrsotter@gmail.com or jrsotter@iserv.net
American Association of Zoos and Aquariums (AZA). http://www.aza.org/
American Association of Zoo Keepers (AAZK). http://www.aazk.org/
International Species Information System (ISIS). A network of zoos and aquariums from 54 countries that share information on more than one million specimens (living and dead). Web site can be found at: http://www.worldzoo.org/ 12101 Johnny Cake Ridge Road, Bldg. A, Rm. 6, Apple Valley, MN 55124-8151. 952-997-9500. Fax: 952-432-2757. isis@isis.org
IUCN/SSC Otter Specialist Group, OZ Task Force Coordinator: Jan Reed-Smith, jrsotter@iserv.net
Experienced Rehabilitators:

- Melanie Haire (Georgia) – mahaire@comcast.net
- Clio Smeeton (Canada) - www.ceinst.org; cei@nucleus.com Cochrane Ecological Institute
- Tanya Thibodeaux (Texas) – www.ARCforWILDLIFE.com; TanyaThibodeaux@aol.com ARC for Wildlife
- Doris Duncan, Exec. Director, Sonoma County Wildlife Rescue, Petaluma, California. animalcare@scwildliferescue.org, education@scwildliferescue.org, scwrdoris@scwildliferescue.org

CHAPTER 15 General Bibliography

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