

Conservation and Education Activities Booklet

2012-2013



"Wildness reminds us what it means to be human, what we are connected to rather than what we are separate from."

Terry Tempest Williams

CONSERVATION AND EDUCATION ACTIVITIES REPORT 2012-2013

The 2012-2013 year was packed with some new and great conservation, education and wildlife initiatives. It was an exciting year, and everyone at the Toronto Zoo has contributed to our success. The Conservation Education Wildlife (CEW) Division remains the backbone of the "invisible Zoo", and our dedicated staff is grateful to all other Divisions for the support and resources they provide. Some of the highlights for 2012-2013 include:

Toronto Zoo was honoured to receive a \$50,000 grant from the RBC Blue Water Project for the Great Lakes Outreach Program. This was one of only 68 RBC Blue Water Project Community Action Grants given in Canada in 2013! The leadership grant will provide educational resources, including the hiring of a zoo biologist, to work in over 700 classrooms through the Zoo's outreach program to continue educating more than 20,000 students and the public about the importance of the Great Lakes and the species that rely on them. This was the second year the Zoo has been awarded an RBC Blue Water Project Leadership Grant.

Toronto Zoo's Aqua-Links program released 200 Atlantic salmon fry (the young) into the wild in partnership with 15 Ontario schools who have been caring for the fry since January as part of the Atlantic Salmon Recovery Strategy. This program is an exciting conservation effort at the Zoo which links students in Ontario with students in Uganda to discuss water conservation. In North America, students gain hands-on experience raising endangered Atlantic salmon in their classrooms through the winter, followed by a field-trip to release the fry in the spring.

Toronto Zoo presented a special award to a young conservationist, Matthew Clowater, an elementary school student, for his outstanding contribution to save the little-known and highly endangered Axolotl, a Mexican salamander. He and five of his friends created an art show fundraiser, selling axolotl-centric artwork, in hopes of raising money to help save the endangered amphibian. The art wall is displayed in the kids' boutique Planet Kid.

The Zoo's internal Polar Bear Interest Group hosted the first-ever Winterfest event at the Polar Bear Exhibit and Tundra Trek in February 2013. The group joined Polar Bears International (PBI) in celebrating International Polar Bear Day and to raise awareness and support for polar bears. Over the two days, visitors participated in fun and educational activities including the crafts with an environmental message and special meet-the keeper polar bear talks and animal visits. Children were encouraged to make a Polar Pledge and identify ways that they could help polar bears and combat climate change. Visitors were entered into a draw for great prizes and money raised was used to support polar bear conservation.

In addition, the Toronto Zoo implemented the "Bundle Up for Polar Bears" initiative to celebrate International Polar Bear Day and invited schools, businesses, families, and individuals to partake in the challenge to "bundle up" and turn down the thermostat by two degrees Celsius between February 25th and March 1st. One hundred thirty-seven participants took part. The combined efforts resulted in savings of approximately 258.06 kg (569 lbs) of CO₂. That's the equivalent of about seven tree seedlings grown for 10 years to remove that amount of CO₂ from our air! We hope participants will continue to take action by reducing their thermostat by two degrees in the winter and increasing it by two degrees in the summer.



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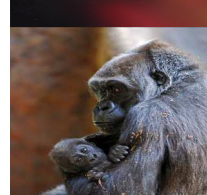
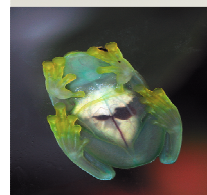
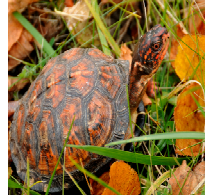



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TORONTO ZOO HIGHLIGHTS

After much anticipation, the Toronto Zoo welcomed two giant pandas, Da Mao and Er Shun, from China on March 25, 2013. The Toronto Zoo will collaborate with other zoos that house giant pandas in an effort to save and protect the numbers needed for scientific research in areas such as animal behaviour, enrichment, nutrition, veterinary science, and reproduction. The Toronto Zoo's reproductive physiology program has the equipment and technical expertise to play a major role in contributing to the preservation of this species.



Scan with a smart phone to learn more about the **Giant Panda Experience** at the Toronto Zoo!



Vancouver Island marmots are only found on Vancouver Island, British Columbia, and wild populations have been suffering due to predation and habitat alteration. Thanks to the Toronto Zoo, in 2012, 32 young Vancouver Island marmots took their first steps on Vancouver Island. In total, 407 captive-born marmots have been reintroduced to the island since the first release in 2003. This is exceptional, considering the wild population consisted of only 30 individuals at one point!

The Toronto Zoo, as part of our ongoing commitment, has successfully bred the critically endangered Puerto Rican crested toad and have sent approximately 26,000 tadpoles back to Puerto Rico for release into the wild in June 2013.



This is the first time that individuals from northern populations have been bred with those from southern populations to increase genetic diversity.

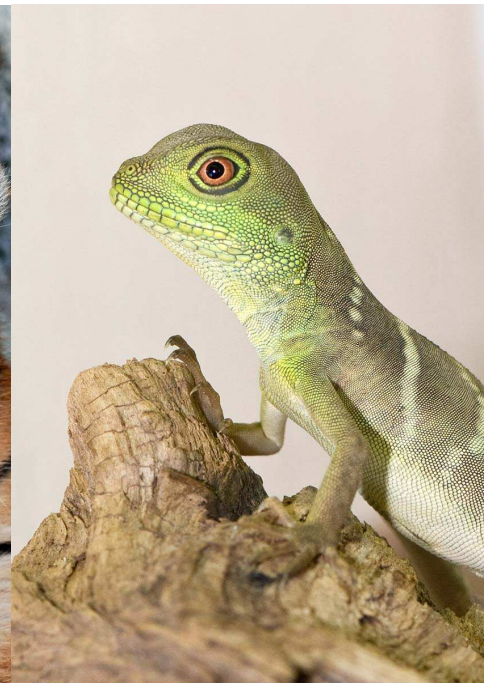


The Education Branch is very proud to announce that, out of a select group of 25 nominees, the Toronto Zoo Camp was voted the BEST summer day camp in the GTA by Toronto 4 Kids, one of the leading parenting and kids' directories in the Toronto area.

MANDATE & RESOURCES

The Conservation, Education, and Wildlife (CEW) division works closely with the Animal Care branch of the Toronto Zoo and ensures that the conservation mandate of the Zoo is fulfilled. This division prepares and implements numerous creative initiatives that work to preserve valuable habitats, educate the public, and carry out lab and field research in animal and plant conservation. Emphasis is placed on stewardship, education, and outreach programs, all aimed at preserving biodiversity and natural ecosystems both on and off the Zoo site.

The three branches: Conservation, Education, and Wildlife, work together to ensure that the optimum standards of animal and plant husbandry are met and exceeded at the Toronto Zoo. The cooperation of these three branches leads to the development of dynamic programs and methods of care for the plants and animals.



OUR VISION

The Toronto Zoo will be a dynamic and exciting action centre that inspires people to love, respect and protect wildlife and wild spaces.

Goals & Objectives

1. Maintain Conservation, Education, and Research as the Primary Focus of the Zoo

- Focus involvement in projects using priority conservation initiatives as outlined in the Strategic Plan
- Maintain and exhibit self-sustaining captive populations for the preservation and promotion of biodiversity
- Support recovery plans for species of concern as designated by country of origin
- Be considered a resource for schools and teachers and provide public programs and activities
- Provide an enjoyable learning experience for Zoo visitors who do not attend a program
- Increase awareness of Toronto Zoo's CEW mandate to the general public

2. Further Reduce the Zoo's Ecological Footprint and Take on a Leadership Role in Green Initiatives

- Implement a Green Plan to guide Zoo procedures, policies, staff, and volunteers' behaviour towards sustainable operation management
- Activate the general public to become better Environmental Citizens
- Support measures for the protection, rehabilitation, interpretation, and enhancement of natural areas within and around the Zoo site, provincially, nationally, and internationally to meet key focus areas
- Engage other Zoo branches in delivering and facilitating CEW goals

3. Secure Financial and Staff Resources to Implement the Conservation Strategy

- Based on the Toronto Zoo's vision, obtain sufficient funding to support and maintain the interactive Education and Conservation goals
- Strengthen partnership with Development
- Seek external partnerships and develop collaborations for funding
- Maintain financial accountability and restraints consistent with income and resources
- Revenue generation and continued support and promotion of the Endangered Species Reserve Fund
- Provide a financial plan to meet the objectives of the CEW Strategic Plan

CONSERVATION, EDUCATION & WILDLIFE DIVISION

The CEW division consists of curators, wildlife health and animal care specialists, nutrition and reproductive experts, conservation biologists, behavioural researchers, educators, and horticulture staff.

The CEW division facilities include a Wildlife Health Centre, Reproductive Physiology Laboratories, Wildlife Nutrition Centre, and Curatorial and Records Branch.



AFFILIATES AND PARTNERSHIPS

To further increase resources offered at the Zoo, a number of external researchers work on various projects. As a result, strong partnerships have been developed with other research institutions and universities. The Toronto Zoo encourages various students and researchers to work in collaboration with the Zoo on projects related to their area of interest.

Toronto Zoo staff in the Conservation, Education & Wildlife Division have adjunct university appointments and provide lectures, advice and/or assistance to student programs. Graduate studies are available through Zoo collaboration and include M.Sc., Ph.D., D.V.Sc., and Post-Doctoral programs. Each summer approximately fifteen university students complete their summer research at the Toronto Zoo. Research project topics range from green plans and wetland conservation to nutrition and reproduction.



PARTNERSHIPS

AGF Funds Inc.	Association of Reptile and Amphibian Veterinarians	AZA (Association of Zoos and Aquariums)
Banrock Station Wetlands Foundation Canada	Biodôme de Montréal	Bullfrog Power
Canadian Environmental Assessment Agency	Canadian Museums Association	Canadian Wildlife Federation
Canadian Wildlife Service	CAZA (Canada's Accredited Zoos and Aquariums)	Cochrane Polar Bear Habitat
COTERC	Conservation Ontario	Direct Energy
Ducks Unlimited	Endangered Species Recovery Fund of Canada	ELSA Wild Animal Appeal of Canada
Evergreen Foundation	Environment Canada	First Nations Partnerships
Federation of Ontario Naturalists	Georgian Bay Biosphere Reptile Awareness Program	Geoffrey H. Wood Foundation
Grasslands National Park – Saskatchewan	Government of Canada, Habitat & Stewardship Fund	Greater Georgian Bay Reptile Awareness Program
Helen McCrea Peacock Foundation	Human Resources Development Canada	International Bear Management Association
Kawartha Turtle Trauma Centre	K.M. Hunter Charitable Foundation	KPMG LLP Charitable Foundation
Marmot Recovery Foundation	Milliken Meats Limited	Morris Animal Foundation
Mountain Equipment Cooperation	National Heritage Information Centre	National Science & Engineering Research Council of Canada
Natural Sciences and Engineering	Nebraska Herpetological Society	Ontario Ministry of Education
Ontario Ministry of Energy	Ontario Ministry of Environment	Ontario Ministry of Natural Resources
Ontario Ministry of Transportation	OMNR – Species at Risk	Ontario Nature
Ontario Parks	Ontario Streams	Ontario Power Authority
Ontario Vernal Pool Association	Ontario Streams/Habitat Stewardship Environment Canada	Parks Canada
Ontario Veterinary College Pet Trust	Pond Life (Liverpool, UK)	Polar Bears International
Ralph Kirk Endowment Fund	Recovery of Nationally Endangered Wildlife	(RENEW) Recovery Teams
Rentokil Tropical Plants	Research Council of Canada	RBC Blue Water Project
Royal Botanical Gardens	Royal Ontario Museum	Shell Environment Fund
Saskatchewan Ministry of Environment	Saskatchewan Ministry of Agriculture	The Richard Ivey Foundation
Sydenham Conservation Foundation	The Henry White Kinnear Foundation	Toronto Humane Society
Tippet Foundation	The W. Garfield Weston Foundation	Toronto Regional Conservation Authority
Toronto Atmospheric Fund	Toronto Parks and Recreation	United States Fish and Wildlife Service
Turtle S.H.E.L.L. Tortue	Toronto Zoo Development Division	Vancouver Island Marmot Foundation
University of British Columbia	US Fish and Wildlife Service	World Wildlife Fund, Canada
Weston Family Foundation	Wildlife Preservation Canada	Young Canada Works – Canadian Museums Association
World Wildlife Fund, USA	Youth Assisting Youth	



Ducks Unlimited Canada
CANADA'S CONSERVATION COMPANY



EDUCATION INITIATIVES



The Education branch is where the connections are made between the urban population and the natural world. This branch of the Toronto Zoo is responsible for the wide variety of programs and activities that are carried out at the Toronto Zoo, and through community outreach, as well as for the preparation of educational materials and Teacher Resources.

The opportunity to view native and exotic animals in simulations of their natural habitats catches the attention of the general public and sets the platform for education; to learn about the biology of these organisms as well as the challenges they are facing in their natural ecosystems. It is through educational initiatives that the public will become inspired to do what they can to preserve the natural world.



EDUCATION AT THE TORONTO ZOO

Conservation-Education Mission:

The Toronto Zoo will engage communities by providing the tools and knowledge to connect to nature and protect our natural world.

The Toronto Zoo provides a perfect setting for individuals of all ages to explore the natural world first hand, by providing the opportunity to observe and interact with plants and animals from around the world. Such opportunities are especially valuable when these experiences are not likely to be gained in the wild, which is an unfortunate reality with the number of species currently facing challenges in their natural environments. The opportunities offered by the Toronto Zoo help to connect people with nature, a bond which creates an unparalleled opportunity to foster conservation through education.

The Education Branch offers a great line of fun-filled programs throughout the year. Whether it's a week at summer day camp, sleeping under the stars at Serengeti Bush Camp, or one of our exciting daytime or evening programs, learning just comes naturally at the Zoo! In addition to the programs mentioned in the coming pages, the Education Branch is also involved with: ongoing development and revisions of educational resources, interpretive graphics/displays; marketing of educational programs; volunteer training; guided tours and outreach; plus assistance at special events.

THERE ARE CURRENTLY 516
VOLUNTEERS AT THE TORONTO
ZOO!

The volunteer team consists of Year-Round Volunteers, Summer Volunteers, Zoo Ambassador Student Volunteers, and Panda Ambassador Volunteers. All Volunteers assist in the delivery of the Zoo's educational programs, helping to raise public awareness and involvement in conservation, interpreting the zoogeographic and ecological relationships of the animal and plant kingdoms, and most importantly, enhancing the experience of each Zoo visitor with whom they come in contact.



Scan with a smart phone to learn more about **becoming a volunteer** at the Toronto Zoo!



EDUCATION PROGRAMS

Formal Education Projects

As of April 2013, fifteen university students have completed summer research projects towards their degrees. Other classroom resources include:

- Student Workshops
- Teacher Workshops
- Internship Programs
- Operation Conservation
- Resources for Teachers/Educators



Zoo School

The Toronto Zoo is registered with the Ministry of Education as a private school for the delivery of Grade 11 Biology, University Preparation (SBI3U) credit courses. This intensive four week summer program is delivered in both a July and an August session.

Non-Formal Educational Programs

- Themed family and children's programs
- Youth Badge programs for Guides and Scouts
- Zoo Camps/Serengeti Bush Camp



Informal Education Activities

Education also takes place in unstructured learning situations such as interacting with a Volunteer, exploring one of the many interpretive displays throughout the Zoo site, attending an animal show or keeper talk, and through free play, interactions and discussions of observations/experiences with family members during a visit.



CURATORIAL PROJECTS

Rouge Park BioBlitz

The Ontario BioBlitz brings together scientists and knowledgeable members of the public to try to identify as many plant, animal, and fungal species as possible over a 24-hour period, so as to document the biodiversity of a designated area of Ontario. It also provides a venue for public education about biodiversity and conservation. In 2012, Toronto Zoo partnered with key conservation organizations – ROM, Rouge Park, TRCA, Rouge Valley Conservation Centre and Ontario Nature – to document all wildlife in Rouge Park while educating Ontario about the importance of our biological diversity.

The inaugural 2012 Ontario BioBlitz – Rouge Park was the largest survey of its kind in Canadian history, attracted more than 225 participants, and identified over 1,450 different species in Rouge Park. Annual surveys will be conducted each year over the next 15 years in the 5 Greater Toronto Area watersheds – Rouge Valley, Humber River, Don River, Credit River and Grand River.



*Scan with a smart phone to see
info and results for the Rouge Park
BioBlitz!*



Black-Footed Ferret & Vancouver Island Marmot Educational Outreach Program

The Toronto Zoo has developed a curriculum-based Black-footed ferret and Vancouver Island marmot outreach program as part of an educational campaign for the captive mammal breeding and release programs. This program has been customized for students in grades 4 to 6, and includes topics such as conservation, endangered species, habitats, and the food chain, which are discussed with students in an interactive and engaging manner.

The project is available to community groups and businesses interested in learning about conservation, as well as schoolchildren in Saskatchewan and the Greater Toronto Area. As the black-footed ferret and Vancouver Island marmot are both native to Canada, these projects will assist the national recovery efforts by increasing awareness and support.



ECOexecutives Program



ECOexecutives is a unique sustainability workshop series offered by the Zoo to engage the corporate world by connecting biodiversity to their bottom line. The business sector is the economic engine of our province and also the largest contributor of carbon emissions. Executives visit the Zoo for inspirational behind the scenes tours, a closer look at the Zoo's green technologies, and lessons in sustainability issues, and are prepared with tools to help reduce the carbon footprint of their company. They leave motivated to return to their businesses and implement change. The program also offers tailor-made workshops to reinvigorate, or create, green team strategies for individual organizations.



Scan here with a smart phone to learn more!



International Migratory Bird Day

Every year visitors who come to the Zoo on International Migratory Bird Day learn about bird conservation, and celebrate the return of our migratory birds. Conservation groups from Ontario join us in talking to visitors, and lucky visitors wishing to see the wild birds in the forests of the Zoo get to wander through the beautiful woods between walkways looking for the elusive migrants hiding in the forest. The 2013 theme was "Life Cycles of Migratory Birds: Conservation across the Americas". The event was very successful with 60 bird species being identified on Zoo grounds. The following organizations set up displays to celebrate the event: COTERC, Toronto Wildlife Centre, Rouge Park, FLAP, and the Wildlife Preservation Trust.

Classroom Hatchery: For the Atlantic Salmon Recovery Program

The Atlantic salmon restoration project's objective is to assist the Atlantic Salmon Recovery Team to provide classroom aquaria to rear Atlantic salmon, and links with the Great Lakes Outreach Program. Each January approximately 100 "eyed" Atlantic salmon eggs are reared at the Zoo and 100 Atlantic salmon eggs are also distributed to each participating school. Students release their salmon fry every spring at specific locations on designated tributaries of Lake Ontario.



Aqua Links - Lake Victoria Education Initiatives

Building upon the success of the Great Lakes Outreach Program, the goal of Aqua-Links is to educate students about the water quality issues facing these two Great Lakes regions of the world, and the importance of conserving this precious resource by putting them in direct contact via the internet. This linking is made possible through contacts gained from the Lake Victoria Species Survival Plan in East Africa. The program objectives are accomplished through classroom visits and lessons by program coordinators in both countries. Additionally, students in Toronto raise Atlantic salmon - a locally endangered species - right in the classroom and release them into the wild, while students in Uganda gain hands-on experience at NaFIRRI – the National Fisheries Resource Research Institute – with locally endangered cichlids.

Great Lakes Outreach Program (V. Vijayakanthan, M. Whibbs, C. Lee)

The Great Lakes Program is a free, curriculum-based outreach program offered during the entire year. Presentations are offered to schools, libraries, scout groups and environmental organizations. The Program is offered in English and French. As a new initiative, our brochures are available in Punjabi and Mandarin, in addition to English and French, to reflect changing cultural communities. Students, educators, and their families are encouraged to “Keep Our Great Lakes Great!” while learning about five local fish species at risk, freshwater mussels, and water conservation. The Program focuses on these five fish species at risk: Atlantic salmon (extirpated), redbside dace (endangered), eastern sand darter (threatened), American eel (endangered in Ontario), and lake sturgeon (threatened).u



Great Lakes: Redside Dace- Conservation and Community Involvement

The redbside dace is federally recognized as an endangered species (COSEWIC). Since the redbside dace was formerly found in the Rouge River located on Toronto Zoo property, it represents a program to conserve a species in the Zoo's own backyard. The Zoo is undertaking rehabilitation projects for the Morningside Tributary and local rivers with our partner, Ontario Streams. Our curatorial team for Fishes and Marine Invertebrates have been members of the national recovery team which are now undertaking its action plan in an effort to responsibly maintain this species.

Scan with a smart phone to learn more about the Great Lakes Programs and to read the blog!

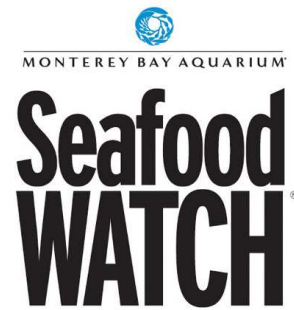


Fish Rescue

Many calls to donate unwanted pet fishes to the Zoo are received throughout the year. As it is not possible to hold them at the Toronto Zoo, we work with a diverse group of partners to relocate unwanted aquaria. By reducing the number of foreign aquarium fish and plants that are released by owners into Canadian ecosystems, the Fish Rescue program hopes to avoid problems with these introduced species that out-compete and prey on native flora and fauna.

Sustainable Seafood and Shark Conservation

Since 2008, the Toronto Zoo has been a partner of Seafood Watch, a program dedicated to raising awareness on sustainable seafood issues, and encouraging sustainable consumer behavior. The Toronto Zoo aims to raise awareness of sustainable seafood and shark conservation issues, dispel myths surrounding sharks, and to ultimately decrease consumption and use of shark products. Early development of the Toronto Zoo's shark conservation program will focus on promoting Seafood Watch, working with existing international organizations, and collaborating with university environmental and cultural clubs.



Community Based Social Marketing (CBSM)

Previous work by many conservation organizations has focused primarily on informing and educating the public about conservation issues. This was done on the assumption that if a particular level of knowledge could be achieved, positive behavioural changes would follow. However, research suggests that the relationship between knowledge and behaviour is much more complex than this, and often times having knowledge of an issue will not elicit an associated behaviour change. The process of Community Based Social Marketing (CBSM) recognizes the complexity of this relationship, and aims to develop programs that foster a change in behaviour rather than simply a change in attitude. For this reason, the Adopt-A-Pond (AAP) Wetland Conservation Programme has identified CBSM as a valuable tool for identifying the perceived barriers and benefits associated



with participating in conservation activities related to water and wildlife. The programme has initiated a number of CBSM research projects to better define the values and needs of target audience groups such as waterfront property owners, naturalist groups and new Canadians. By developing conservation programming that is informed by audience perspectives and values the AAP Programme hopes to elicit meaningful behavioral change and inspire community leadership.

Adopt-a-Pond Wetland Conservation Programme

Adopt-A-Pond is a wetland conservation programme with a number of projects and events that take place on site at the Toronto Zoo. Adopt-A-Pond also works with communities throughout Ontario to develop resources to assist wetland stewards with conservation and restoration projects and to promote the protection of wetland biodiversity through community-based education and stewardship. Adopt-A-Pond runs six distinct outreach initiatives: *FrogWatch Ontario, Ontario Turtle Tally, Wetland Guardians, Urban Turtle Initiative, Healthy Waters - Healthy Wildlife, and Turtle Island Conservation.*



I. FrogWatch Ontario



FrogWatch Ontario is a **citizen** science program designed to engage individuals and families in wetland stewardship by providing them with a fun way to learn about the diversity of amphibians and the significance of wetland habitats. The program's main objective is to educate and empower local landowners, families, and community groups by encouraging them to visit a favourite wetland habitat, record the species of frogs and toads they hear, and report their observations to an online database to assist in the development of species distribution maps which help to track population dynamics

throughout the province. Information about the presence or absence of frogs and toads in Ontario's wetlands will ultimately help scientists determine factors that are affecting amphibian declines at the global level.

*Scan here to learn more about FrogWatch Ontario and to **submit frog and toad sightings!***



II. Ontario Turtle Tally



Ontario Turtle Tally is a community-based citizen naturalist program designed to inspire people to care for local wetland habitats and turtle populations. By submitting sightings of turtles observed in local wetlands to an online database Ontario Turtle Tally participants can provide critical information that helps conservationists map distributions of species across the province and determine priority areas for conservation. The objective of the program is to educate and empower citizens so that they can make a difference for wetlands and wildlife.

*Scan here to learn more about Ontario Turtle Tally and to **submit turtle sightings!***



III. Urban Turtle Initiative



The Urban Turtle Initiative offers a means through which city dwellers can discover the richness of life in their own backyard. The program focuses on the ecology of stressed wetland ecosystems using turtles as a flagship species and provides urban stewards with opportunities to protect the vast diversity of wetlands and wildlife in the urban and urbanizing

environments they call home. The Urban Turtle Initiative also maintains ongoing wetland research projects in the Rouge Valley in the Greater Toronto Area.



IV. Canadian Wetland Guardians Registry



The Wetland Guardians program links communities across Canada and provides a forum where people can share innovative wetland conservation methods and build on the experiences of others. It serves as an information resource for individuals and groups interested in wetland stewardship, restoration, and protection projects. Participants are encouraged to share information on their habitat stewardship and projects by contributing to an online registry where they can share details about the challenges and successes faced.

Other stewards can then search the registry for advice and information and use it to initiate their own wetland stewardship projects. Stories of success or failure to preserve wetlands may help to save wetlands across Canada! To help identify Ontario's important wetland resources, and those that are valuable for species at risk,



our trained wetland evaluators will now provide wetland evaluations for private landowners.

Scan here with a smartphone to learn more and to become a Wetland Guardian!

V. Healthy Water: Healthy Wildlife



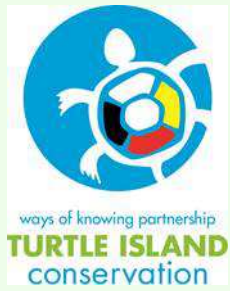
The Healthy Waters Healthy Wildlife (HWHW) program offers opportunities for waterfront property owners and community groups to learn about threats to local wetland species and get involved in stewardship projects that can build community spirit and preserve the natural heritage values that exist within their local region. The program works with community leaders in several different lake communities to develop and lead stewardship action plans that focus on improvement of water quality and sustainability of healthy wildlife populations. The program has reached over 1000 waterfront property owners in seven different areas of Ontario in its first three years.

Adopt-a-Pond Outreach Events and Presentations

There is no better way to garner support for conservation than to go out and ask for it – and this is what 300 Toronto Zoo volunteers and AAP Programme staff do with classroom students, community groups and education programs on a weekly basis. Staff and volunteers are enthusiastic, knowledgeable, and approachable. Adopt-A-Pond outreach events cater to the audience, and are flexible enough to suit any group. Generally, there is no fee for an outreach presentation (with some exceptions); however, it is the client's responsibility to reimburse the AAP Programme for transport of staff to and from the event (e.g. mileage charge).



First Nations Ways of Knowing Partnership: Turtle Island Conservation



Turtle Island Conservation is a partnership between the Toronto Zoo and First Nation communities across Ontario which recognizes the significance of traditional teachings and sciences to conservation initiatives. The intention of this partnership is to facilitate the passing on of traditional ways of knowing from Elders and Knowledge Keepers to youth. We assist First Nations partnerships through collaborations in biodiversity (i.e. Species at Risk) conservation recovery planning, and cultural mapping to document and preserve natural and socially significant landscapes. By working with First Nation communities, the partnership will recognize and incorporate traditional teachings and science into turtle and wetland conservation programming at the Toronto Zoo. Such programming will serve to empower First Nations youth and assist non-Native people in appreciating the rich diversity of First Nation cultures.

Our Objectives are:

1. To foster respect for self, community, Mother Earth and the Creator.
2. To recognize and record significant natural and cultural landscapes valued by First Nations communities.
3. To integrate traditional ways of knowing with western science to monitor, protect, respect and restore landscapes.
4. To integrate language, art, and crafts to sustain traditional ways of knowing and living.
5. To facilitate understanding of diversity of First Nation culture and ways of knowing among non-Aboriginals.



*Scan with a smart phone to learn more about the **Turtle Island Conservation** program and to access useful resources!*

Venomous and Dangerous Reptile Training Workshops

Workshops provide techniques for understanding and avoiding snake bites, first aid and treatment options, and assessing the potential danger of snake bites. Toronto Zoo provides all-day training workshops for specialized professionals from agencies such as the Canadian Forces, the Poison Control Centre, Toronto Animal Services, and hospitals. We deliver Massasauga rattlesnake workshops to cottage associations and for those living within the range of this species-at-risk snake.



ANIMAL OUTREACH

PUBLIC INVOLVEMENT & CURRICULUM LINKS

In many ways, education and conservation are inseparable. For many of the Zoo's research efforts to have an impact, the public must be made aware of the significance of good environmental stewardship and the need to maintain biodiversity in natural ecosystems. The Conservation, Education and Wildlife Centre have several projects that reflect the Zoo's dedication to the preservation of fellowship between biodiversity and the public.



Meet-the-Keeper Talks



Toronto Zoo keepers provide engaging and educational talks to visitors at scheduled times and locations throughout the day. During Meet-the-Keeper talks, keepers discuss individual species along with topics such as their feeding habits in the wild and captivity, family dynamics, gender-based differences, threats to survival in the wild, and conservation efforts that are currently in place or are needed to guarantee species survival.

Amazing Animal Show

The Amazing Animal Show is an interactive opportunity for visitors to see first-hand some of the Zoo's amazing animals in action! Located at the Waterside Theatre, this show is a must see for visitors of all ages, captivating their awe and interest as the performers fly overhead or show-off their incredible natural talents through activities on stage. Our educators have impressed 22,365 visitors from July 2012 to the end of June 2013.



Casual Encounters

The Casual Encounters program offers visitors unexpected opportunities to meet animals and Keepers in public areas across the Zoo site. The interactive and up close encounters with animals outside of their enclosures delight visitors and also offer a perfect photo opportunity and a chance to meet the Keeper.



ANIMAL OUTREACH

Kids Zoo

The Kids Zoo is divided into different Canadian habitat sections, each packed with several fun and interactive activities. The Kids Zoo represents the Toronto Zoo's belief that early positive exposure to animals fosters greater compassion and concern for animals later in life. Kids get up close and personal with rabbits, goats, capybaras, ferrets and more!



Waterside Theatre

This spectacular open air theatre invites visitors to participate in family-friendly events such as interactive animal shows, cultural festivals and concerts. The theatre is completely barrier free and is pleasantly landscaped with surrounding natural plantings. It can seat up to 1,300 people for an event.

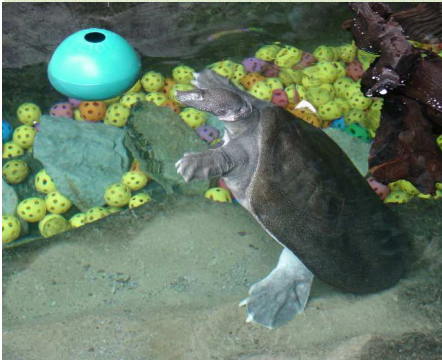


Animal Outreach Program

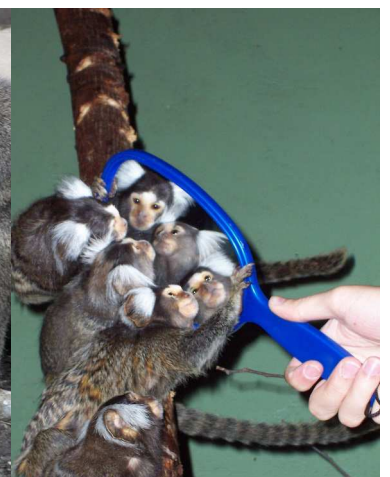
The Toronto Zoo's outreach program introduces some of the Zoo's amazing animals to the community and to further the Zoo's vision of "inspiring people to love, respect and protect wildlife and wild spaces."



ANIMAL ENRICHMENT



Enrichment is a process involving the introduction of stimuli to promote natural behaviours of animals in a captive setting and enhance welfare. The Toronto Zoo's Behavioural Husbandry team has been working to provide animals with choice and control over their environments. This is achieved by introducing various enrichment options on a daily basis. Enrichment is ultimately striving to produce species-specific behaviours and reduce stress. The program is constantly developing new techniques to introduce to animals across the park, giving them a wide variety of activities to enhance their lives each week.



ANIMAL ENRICHMENT PROGRAM

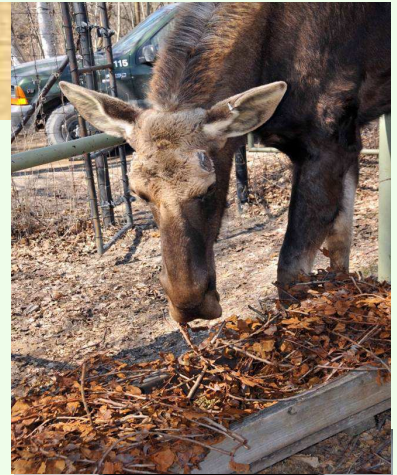
GOALS OF THE PROGRAM:

SENSORY – Substances or activities that lead to the stimulation of the animals key senses, such as sight, olfactory and taste.

FORAGING – Methods to increase time spent searching for food and encourage investigating, hunting, searching and manipulation in order to obtain food. Such examples include feeders, games and puzzles which provide occupational enrichment and mental stimulation.

SOCIAL – Attempts to provide a positive environment by allowing animals to interact with each other or another species.

ENVIRONMENTAL – Species-specific alterations of an exhibit to better meet the needs of the animal physically and socially. Examples include hammocks, waterfalls, substrate materials, platforms, and dens.



Enrichment Devices and Initiatives:

Enrichment provides stimulation of various senses which allows the zoo's animals to gain skills that are learned in the wild and to encourage them to exercise problem-solving techniques. And thus increases brain stimulation.

- Boomer Balls
- Stuffed Shavings Bags/Boxes
- PVC Feeders, Jug Feeders
- Scattered Food
- New Scents
- Nesting Materials, Substrate Piles
- Popsicles
- Environmental Changes

ANIMAL ENRICHMENT PROGRAM

Enrichment Graphics & Signage

“There is garbage in the exhibit” or “There is something in the tree” are common misconceptions made by the public regarding enrichment. Signs are being added to select exhibits across the zoo to inform visitors of enrichment goals, tools and techniques. This will inform the public of what enrichment is, why we do it, and how we are reusing and recycling products to responsibly enrich the lives of the animals.

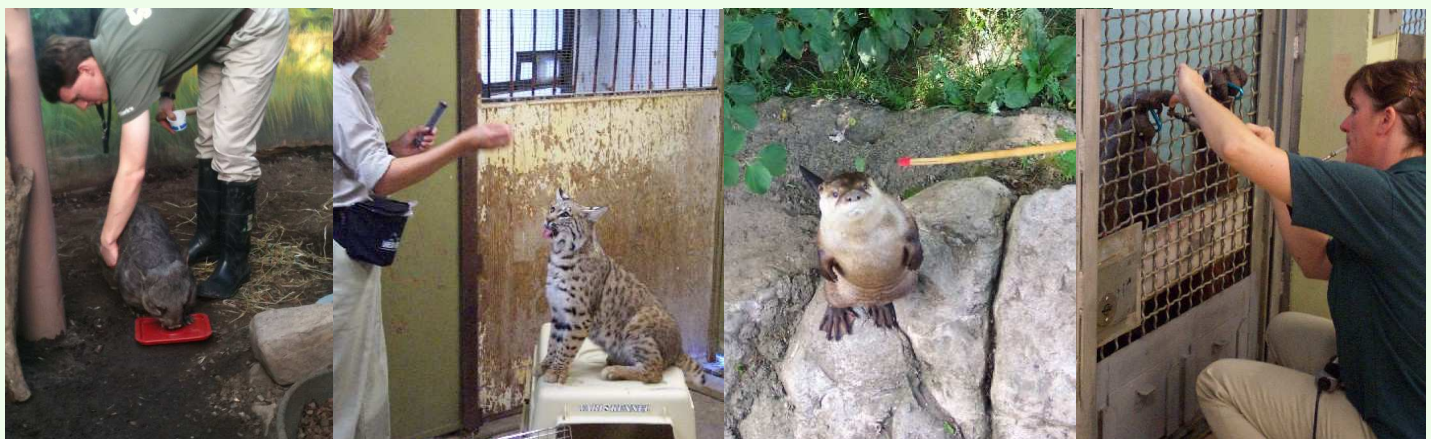


Animal Training

The Behavioural Husbandry Program uses positive re-enforcement training with the goal of making transportation, veterinary visits and human interaction less stressful.

Current training projects include:

- Voluntary blood draws from Great Ape species using specialized sleeves made by our talented maintenance staff
- Voluntary injection training for large cat species and primates
- Crate training for bird species to avoid netting them when medical check-ups are required



Enrichment Projects

Introduction of a New Enrichment Schedule to Decrease Stereotypic Behavior and Increase Activity Levels in the North American River Otter (N. Presley, N. Ferriman, Americas Pavilion staff)

The focus of this study is to examine the behaviour and use of exhibit space for the North American River Otters. The objective of the study is to determine the effectiveness of the current enrichment program in encouraging natural behaviors and decreasing stereotypy. The status of the study indicates an increase in stereotypic behaviour, such as begging or rhythmic swimming, at specific hours of the day. A new enrichment program will be implemented in hopes of diminishing these behaviours and providing more stimulation throughout the day.



Enrichment of Captive White-Handed Gibbons to Increase Natural Behaviours in Comparison to Those Examined in the Wild (N. Presley, B. Vlaming, Indo-Malaya staff)



The purpose of this study was to compare the activity budgets of the White-Handed Gibbons to those in the wild. The gibbons were observed in a baseline captive setting and with an enrichment schedule. Analysis of the time spent engaging in particular activities and use of the enrichment available showed an increase in foraging time and social interaction. There were minimal changes in use of exhibit space with the introduction of new enrichment options.

Assessment of Echidna Activity and an Enrichment Plan (N. Presley, B. Gimblett, Australasia staff)

Echidnas are nocturnal and for most part inactive during the day. By placing cameras throughout the exhibit, observers were able to examine the expenditure of their time throughout the night and determine the effectiveness of the enrichment provided for them. Several enrichment devices were created specific to them in hopes of encouraging natural behaviours.

Assessing the Efficiency of Olfactory Enrichment in Captive Polar Bears (A. Patterson, N. Presley, University of Guelph, Tundra Trek staff)

Four scents: vanilla, mint, salmon oil and hunting lure were used on toys to test the response of the polar bears. The bears were observed over six weeks to obtain baseline time budgets, test a control (unscented) toy, and allow for two repetitions of each scent. Results showed that all four scented toys had a significant increase in time spent investigating compared to the unscented versions of the toy. However, toy interaction significantly decreased between first and second exposures, indicating the novelty of the stimulus may be its main attraction.





RESEARCH INITIATIVES

The goal of the Research branch is to use resources available at the Zoo, such as staff expertise and knowledge of flora and fauna, in recovery efforts for national and international Species at Risk, ultimately preserving biodiversity worldwide. Exhibits at the zoo are linked with conservation projects that work to ensure the security and preservation of the habitats which sustain natural populations.

The public are provided information regarding the zoos programs to save and protect species through several creative mediums, such as signs and large scale diorama models. Additionally, symposia related to these issues and efforts are held at the Toronto Zoo through our partnerships to foster cross-institutional collaborations.

Habitat and Species-Specific

Axolotl and Lake Xochimilco, Mexico, Creating Sanctuaries and Habitat Restoration

(B. Johnson, L. Zambrano, E. Valente)



The goal of this project is to provide lake remediation and save a species from extinction. The axolotl is a Critically Endangered Species found only in Lake Xochimilco, in Mexico City. The Toronto Zoo participated in a stakeholder meeting to develop conservation actions with Restauración Ecológica y Desarrollo A.C and other Mexican partners. These include long-term biological monitoring and research on metapopulation structuring within the lake and captive assurance populations; ecotoxicology of lake sediments; impacts and control of introduced species; zoo-based disease screening and pathology studies of captive and wild axolotl populations; zoo and community outreach programs; community based social studies to evaluate stakeholder attitudes and participation; collaborations with local food producers, farmers (chanamperos) and fishers to restore traditional agricultural practices; and training for Lake Xochimilco boat operators (remeros) to provide ecotourism income and axolotl conservation awareness.

Population and Habitat Assessment of Historic and Extant Blanchard's Cricket Frog (*Acris blanchardi*)

(B. Johnson, J. Phillips, R. Henderson, M. Kula, K. Beauclerc)

This study examines habitats and DNA profiles of Blanchard's cricket frogs across the present and historic range of live and museum specimens. Museum specimens will represent the original Canadian range and frogs from the United States will determine potential source animals for release on Pelee Island, Ontario, as part of Recovery Plan Objective. The Recovery Plan for the cricket frog has been submitted; its focus is on renewed field surveys for existing populations and habitat mapping.



Conservation of Urban Amphibians and Reptiles (B. Johnson)



For over 30 years, data on the distribution of amphibians and reptiles has been collected for the Toronto area. The distribution data is mapped in a GIS database and used in species inventories and watershed planning. Reptile and amphibian conservation hotspots and threatened habitats are identified. Habitat restoration projects are also identified, including the construction of snake hibernacula, turtle nesting areas, and signs for turtle and amphibian road crossings. Although data is used for the recovery of threatened species, maintaining the abundance of common species is a parallel goal in the urban landscape.

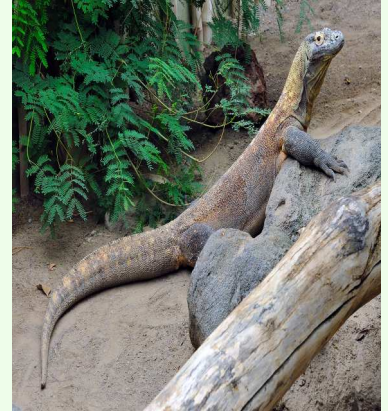
Conservation Partnerships for Recovery of Canadian and other Amphibians and Reptiles

(B. Johnson, Toronto Zoo Endangered Species Recovery Fund, Adopt-A-Pond)

Toronto Zoo Amphibian and Reptile curatorial staff, through the Endangered Species Reserve Fund, target programmes that demonstrate innovation, community partnerships, and applied research projects for the recovery of species at risk.

Past and current projects include:

- Komodo Dragon population and habitat surveys, Indonesia
- Golden frog habitat restoration, Madagascar
- Wood turtle nest surveys, population monitoring, and head starting, Ontario
- Leatherback sea turtle fishermen surveys and newsletter, Nova Scotia
- Wyoming toad population and habitat surveys, USA
- Spotted frog population monitoring, British Columbia
- Frog rescue and invertebrate rearing, El Valle Amphibian Conservation Centre, Panama.
- West African dwarf crocodile population monitoring, Ivory Coast.
- Community Based conservation of the Golden Mantella frog in Madagascar



Long-term Monitoring of an Eastern Massasauga Rattlesnake Population in Southwest Michigan (Project Investigators: L. Faust, M. Redmer, J. Earnhardt, M. McCuiston, Toronto Zoo Participants: A. Lentini, R. Vos, T. Long)



Toronto Zoo is participating in multi-year population surveys being conducted as part of a field conservation project run by the Massasauga Species Survival Plan (SSP) at the Edward Lowe Foundation, a private foundation with property in South Western Michigan. The Massasauga is listed as a Threatened species in Canada and is a candidate species for federal listing in the USA. This long-term monitoring project uses mark-recapture methods for up to five years to study population dynamics over time for these snakes.

Massasauga Rattlesnake Management, Outreach, Research and Husbandry Program (A. Lentini, B. Johnson)

The Massasauga is Ontario's only venomous species and the Toronto Zoo is a founding member of the National Recovery team for this species. The Massasauga is considered endangered, threatened or of special concern within its current range. The Zoo holds two public workshops "Living with Wildlife" that features the Massasauga and other species of at risk snakes. An SSP was established in 2006 to enhance conservation efforts in the field while increasing public awareness through educational programs and exhibits. An AZA Husbandry Manual for the care and breeding of these rattlesnakes was developed for the SSP. Toronto Zoo actively participates in a multi-year field project conducted by the SSP in south-western Michigan. The goal of the research is to gather baseline demographic data, habitat use and behavioral ecology for this species in the wild.



A comprehensive study of the Rouge Park milk snake population and habitat use is currently being conducted to better understand the ecology (e.g. abundance, habitat use, distribution, movements, road mortality impact on population sustainability, etc.) of this Species at Risk (SAR). This study will ultimately result in the development of a Management Plan that will include recommendations for habitat restoration and comprehensive road mitigation measures (such as ecopassages) that target protection of this SAR. Mitigation (habitat mitigation, stewardship and snake crossing road signs) may be necessary to raise awareness and help reduce the occurrence of snake/vehicle collisions.

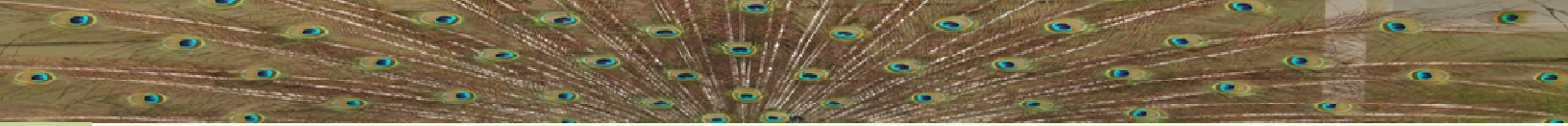
Management, Outreach, Husbandry, Research and Re-introduction Program for the Puerto Rican Crested Toad (A. Lentini, B. Johnson, C. Dutton, G. Crawshaw)

Toronto Zoo has maintained an assurance population of this species since its re-discovery in the 1980's. Captive animals provide a genetic resource to supplement wild populations through re-introduction of over 125,000 tadpoles. An AZA Husbandry Manual for the care and breeding of the Puerto Rican crested toad was developed at the Toronto Zoo and has been translated into Spanish. An International Studbook was completed and published. This important document provided essential demographic and genetic data to the Species Survival Plan (SSP) to genetically and demographically manage the species for re-introduction to the wild. Based on recommendations from a genetic researcher, Toronto Zoo was one of the first to cross breed toads from the northern and southern populations to capture declining genetic diversity and to provide tadpoles for release in areas where it has been extirpated.

Response to Asian Turtle Crisis and the Bushmeat Trade (B. Johnson, A. Lentini, Toronto Zoo staff: Africa, Indo Malaya, and Wildlife Health Centre)

With 90 species, Asia has the richest turtle and tortoise diversity in the world. However, in recent decades, the future of almost every such species has been put at risk for various reasons. Loss of natural forest threatens over 65 of the 90 turtle and tortoise species in South East Asia. Turtles and tortoises have been used by Southeast Asian cultures for thousands of years for nutritional, medicinal and cultural purposes. However, the more recent rise in demand for these species has led to unsustainable and illegal harvesting of turtles and tortoises from the wild. This includes species listed as threatened by IUCN and/or CITES species at risk with either restricted or prohibited trade. This project spreads awareness of the Asian turtle crisis and bushmeat trade, and educates visitors on how they can help to conserve turtle and tortoise species by supporting Certified Wood Products. We support the Turtle Survival Alliance with funding for community based turtle conservation projects in Madagascar, Myanmar, India, Bangladesh, and Malaysia.





Response to Global Amphibian Declines (B. Johnson, A. Lentini, Zoo staff Africa, Americas, Australasia, Indo Malaya; Wildlife Health Centre)

Global declines of amphibians require an urgent response. Staff at Toronto Zoo have contributed to the recovery of endangered amphibians for many years. This is in part due to our success in breeding many amphibian species to maintain demographically and genetically managed assurance populations in case of loss of wild populations and developing educational resources for community involvement in backyard conservation. Toronto Zoo opened an Amphibian Breeding Centre and a new Amphibian Rescue Centre with two new dedicated isolation rooms to increase our capacity to hold and breed at-risk amphibian species from Canada and amphibian decline hotspots.



Turtle Species at Risk Head-Starting Program (A. Lentini, B. Johnson, J. Phillips, C. Robertson, S. Ritchie)

Toronto Zoo participates in head-starting programs for two species of Canadian turtles. Working with partners at the Ontario Ministry of Natural Resources and Parks Canada, hatchling Species at Risk turtles are being raised at Toronto Zoo until they are two years old and ready for release back to the wild. This two year boost in growth helps ensure that a greater proportion of young turtles will survive to adulthood since their larger size means that most predators will not be able to swallow them.



Urban Turtle Initiative – Management of Turtle Populations in Rouge Park (B. Johnson, J. Phillips, C. Robertson; S. Ritchie)

The Urban Turtle Initiative (UTI) is a collection of research projects to investigate habitat use and population recovery of Species at Risk turtles in the Rouge Park in the Greater Toronto Area. Since 1999, Toronto Zoo staff have used radio telemetry to track the movement and habitat use of a variety of species in the Park, including snapping turtles, map turtles and Blanding's turtles. The information collected through this research program helps recovery experts implement projects to protect urban populations and is used to assist land managers in restoring critical wetland and upland habitat for Species at Risk.



Lake Victoria Cichlids Species Survival Plan (C. Lee)

The perch-like fishes of Lake Victoria, Africa have the dubious distinction of being documented in the IUCN Red Book as the greatest extinction in recent times. North American Zoos are working together holding breeding populations of these fishes under an SSP. Toronto Zoo has been an active participant since the program's inception in the late 1980s. We currently hold five species including the pelagic *Oreochromis eculentus*. The Toronto Zoo's Aqua-Links program focuses on connecting students in Ontario with E. African classes and represents a novel *in situ* approach to public awareness of Great Lakes issues.

Freshwater Mussels- Field Research and Public Awareness Campaign (C. Lee)



Since the 2011 launch of the Great Lakes Program “*I am Important, I am Protected*” public awareness campaign for freshwater mussels, outreach education has begun and early field research is already yielding useful data. In spite of being cited by the IUCN as one of the world's most endangered species assemblages, freshwater mussels, especially those in Lake Ontario and inland waters, are little studied and fairly unknown. To fill this knowledge and awareness gap, the Toronto Zoo is currently focusing its “*I am Important, I am Protected*” campaign efforts on Central Ontario’s Kawartha Lakes and Kingston regions, which plans to expand in the near future.

Scan here with a smart phone to learn about freshwater mussels!



Madagascar Freshwater Fishes Breeding (T. McCaskie)

The Toronto Zoo’s Madagascar fishes project works with international partners to conserve the island’s endangered fishes and protect aquatic habitats. The Toronto Zoo sent zookeeper Tim McCaskie to Madagascar in 2010, 2011 and 2013. Tim’s team is responsible for the discovery of a species that was previously thought to have been extinct! They also identified several new fish species. The Toronto Zoo also holds and exhibits three species of Madagascar fishes. Furthermore, the Toronto Zoo has established breeding guidelines for each of these species and has successfully bred all three species and dispersed fish to other AZA institutions. The Toronto Zoo is currently on our second generation for all three species.



Canadian National Parks Malaise Program (J. de Waard (BIO), L. Attard)

Malaise traps are very effective sampling devices for many groups of insects, but there has never been an effort to capitalize on this capacity to gain a more detailed understanding of patterns in Canadian arthropod diversity until now. The Biodiversity Institute of Ontario (BIO) at the University of Guelph, in partnership with Parks Canada, will be using Malaise Traps in 14 national parks each year to collect over 20,000 insect specimens to develop a Barcode of Life Data System that will enable the quantification of diversity patterns in Canada. Toronto Zoo will maintain and monitor a malaise trap to collect insect specimens representing the Rouge Valley.

Butterfly Inventory (North American Butterfly Association, Toronto Entomologist’s Association, Rouge Park)

Since 1993, the Zoo has participated in an annual butterfly survey conducted across North America, from Canada to Mexico. The survey is conducted for, and in association with, the North American Butterfly Association (NABA) and the Toronto Entomologist’s Association (TEA) to examine the cycling of butterflies in East Toronto. The Eastern Toronto count covers a 15-mile diameter, including the Rouge Valley, the eastern portion of the Don Valley and Petticoat Creek. Over 70 species have been observed in the Rouge since the Zoo began the surveys.

CAPTIVE BREEDING AND REINTRODUCTION



Black-Footed Ferret Conservation Recovery Program (M. Franke, G. Crawshaw, P. Roberts)

Since 1992, the Toronto Zoo has been an integral member of the recovery program for the endangered black-footed ferret (*Mustela nigripes*), which is native to Canada. To date we have produced 106 litters and 456 kits, many of which have been reintroduced to sites in North America. The Toronto Zoo spearheaded Canadian black-footed ferret recovery efforts resulting in the release of 75 captive-bred ferrets into Grasslands National Park, Saskatchewan since 2009. The park now supports Canada's first wild population of black-footed ferrets since they were extirpated several decades ago. Toronto Zoo staff have been very active in post-release monitoring, partaking in annual ferret surveys and health assessments. Field research will continue to monitor the health and status of the wild population and to document the survival of released animals. As this highly successful program pertains to an endangered Canadian species, it is of great conservation significance and remains a high priority for the Zoo.

Scan here with a smart phone to learn more about captive breeding and reintroduction efforts at the Toronto Zoo!



Vancouver Island Marmot Conservation Recovery Program (M. Franke, H. Tomaso)

One of only five mammals endemic to Canada, the Vancouver Island marmot (*Marmota vancouverensis*) is a critically-endangered species found only on Vancouver Island, British Columbia.



Their numbers have steadily declined over the past 30 years due to predation and habitat alteration. At one point the wild population dwindled to only 30 individuals making the Vancouver Island marmot North America's most endangered mammal. In 1997, the Toronto Zoo received six wild-caught marmots to found today's captive population. Captive breeding efforts have been very successful – since our first litter in 2002, the Zoo's marmots have produced 112 pups. Since the first release in 2003, captive-born marmots have been released into the wild each year. In 2012, 32 young marmots took their first steps on Vancouver Island. In total,

407 captive-born marmots have been reintroduced to the island since the first release. Approximately 70 marmots were born in the wild this year bringing the population to 350-400 individuals.

Managed Cooperative Breeding Programmes (B. Johnson, A. Lentini)

Many species at risk of extinction have managed assurance populations. Toronto Zoo records staff, curatorial staff, Wildlife Health Centre and Nutrition staff maintain studbook and animal care data to ensure that populations are managed scientifically to maintain demographic and genetic health. Wildlife Care staff maintains appropriate breeding pairs and environmental conditions to facilitate breeding recommendations each year. Through the Curatorial Collection Plan, all amphibian and reptile species in the collection are managed to sustain their populations and are linked to conservation of the species and its habitat in the wild through conservation programmes. In addition to Toronto Zoo's own conservation priorities, some species programmes are managed cooperatively between zoos and these include formal programs for four amphibians and 21 reptiles of the 70 species in our collection.

Captive Reproduction in the Male Puerto Rican Crested Toad (A. Lentini, B. Johnson, G. Mastromonaco)

The Puerto Rican crested toad is a threatened species found in southern Puerto Rico. In collaboration with the US Fish and Wildlife Service and the AZA SSP®, tadpoles hatched at the Toronto Zoo are released in Puerto Rico each year for the purposes of sustaining and rebuilding the wild population. The objective of this study is to determine the optimum husbandry protocol required to induce spermination, and thus ensure consistent reproductive success of this species in captivity. Different environmental conditions and hormone treatments are being tested and the males' responses in terms of sperm production will also be assessed. To date dosages of hormones have been compared and HCG has proved to be more effective in male sperm production than LHRH. An additional study will determine the impact of cooling on sperm production and compare HCG and LHRH in female toads.



Management, Outreach, Husbandry, and Re-introduction Program for the Puerto Rican Crested Toad

(B. Johnson, A. Lentini, G. Crawshaw)

A management program for the care and breeding of the Puerto Rican crested toad was developed at the Toronto Zoo and has been updated as an AZA Husbandry Manual and translated into Spanish. This captive management protocol guides over 20 institutions in the SSP. A complete historical studbook was completed and published as well to provide essential demographic and genetic data to the Species Survival Plan which makes breeding and transfer recommendations based on the mean kinship value and age of toads. This management tool provides the data to genetically and demographically manage the species for re-introduction to the wild.

Amphibian Breeding Centre - Americas Staff

The Amphibian Breeding Centre in the Americas pavilion provides a window into some of the Zoo's important breeding initiatives. This area is dedicated to explain the plight of several Central American frogs, including the iconic Panamanian golden frog (*Atelopus zeteki*), Lemur leaf frog, and glass frog, which are threatened by the chytrid fungus, an emerging disease that is responsible for global amphibian declines.

Amphibian Rescue Centre (ARC) Husbandry and Reintroduction Program for the Oregon Spotted Frog

(B. Johnson, A. Lentini)

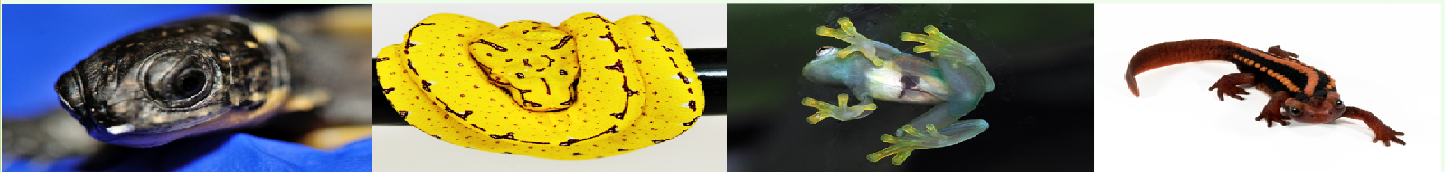
Due to population crashes in the wild, the Oregon spotted frog received an emergency listing as endangered in Canada and is only known from three breeding ponds in British Columbia. At the request of the British Columbia government and the National Recovery Team, Toronto Zoo will hold an assurance colony to ensure that the remaining genetic biodiversity is not lost and to provide frogs for re-introduction to the wild. One of two isolation quarantine rooms in Toronto Zoo's Amphibian Rescue Centre (ARC) is dedicated to this species.



Amphibian Rescue Centre (ARC) Husbandry and Reintroduction Program for the Wyoming Toad

(B. Johnson, A. Lentini)

In 1990, the Toronto Zoo was invited to assist the U.S. Fish and Wildlife Service to provide management recommendations to ensure the survival of the Wyoming toad. Since these first discussions, the species was declared extinct in the wild and only survives from SSP captive managed populations. One of two isolation quarantine rooms in Toronto Zoo's Amphibian Rescue Centre (ARC) is dedicated to this species.



Captive Breeding of the Karner Blue Butterfly

The last Karner blue (*Lycaeides melissa samuelis*) was observed in Ontario in 1991. The Toronto Zoo joined the Karner Blue Recovery Team in 1992 to actively pursue the re-introduction of this species into Ontario. For five years a protocol was developed and produced to rear this species in captivity. Since recovery efforts of the release sites were lagging behind captive breeding efforts, the Toronto Zoo stopped working on the captive breeding and put more emphasis into the study of the microhabitats of restored release sites. In 2008 the Karner Blue was upgraded from "Endangered" to "Extirpated". This simple change has caused several changes in the way that governments look at the species. The Karner Blue has gone from provincial jurisdiction to federal jurisdiction and the movement in the conservation of this species now will require different assessments and studies. Toronto Zoo will continue to work on returning it to Canada.

Eastern Loggerhead Shrike Captive Breeding Program (K. Greenham, S. Hollamby, Wildlife Preservation Trust, McGill University, CWS, OMNR)

The Eastern loggerhead shrike recovery program has released over 550 shrikes and it is now recognized that a significant proportion of the birds returning to breed each year have been produced through captive breeding. Increased predation, increased numbers of mosquitoes and the presence of West Nile Virus are factors that affect birds in captivity and the wild. The loggerhead shrike recovery program has gained some recognition in conservation circles and several zoos in the United States have expressed interest in becoming involved. The ELOSH Recovery Team is actively seeking new institutions to participate as captive breeding centers.



REPRODUCTIVE

Hormonal Evaluation of Reproductive and Adrenal Function (G. Mastromonaco, C. Gilman, S. O'Handley)

As part of service activities in the Reproductive Physiology Laboratory, urine, fecal, serum, saliva, and hair/feather hormone analyses are conducted to aid in evaluation of normal reproductive cycles, assessment of reproductive seasonality, detection of early pregnancy, evaluation of contraceptive effectiveness, gender determination, and effects of stress and environmental changes. Services are provided for a variety of species, including: tiger, cheetah, gorilla, orangutan, caribou, rhinoceros, zebra, wood bison, and many others. Research studies are carried out using samples collected from captive and wild animals. These studies are done in collaboration with other zoos, universities, or wildlife organizations.



Development of Assisted Reproduction Techniques to Revitalize the Bactrian Camel Population (G. Mastromonaco, S. Hayden, C. Gartley, M. Franke, G. Crawshaw) REF NO. 2003-05-02



The global wild Bactrian camel population is critically endangered. Once found over a vast range in Asia, only 100 Bactrian camels now inhabit Mongolia's remote Gobi Desert. The Toronto Zoo and its collaborator Dr. Cathy Gartley, from the University of Guelph, have embarked upon an intensive program to develop assisted breeding techniques that will allow for the maintenance of the maximum degree of extant genetic diversity. Semen collection and cryopreservation techniques are used to store sperm from genetically viable males with the potential to transport samples between captive populations. To determine the appropriate timing for artificial insemination, evaluation of salivary hormone levels is being done in combination with ultrasound imaging to assess the phase of the female's reproductive cycle. This will add to the database of knowledge

that is building regarding reproduction in this species.

Non-surgical Artificial Insemination in the Cheetah (G. Mastromonaco, C. Gartley, M. Franke) REF NO. 2009-05-04

Artificial insemination (AI) has been successfully implemented in cheetahs using a laparoscopic technique. However, recent advancements in AI technique and equipment in small animals (canids and felids) bring about the possibility of obtaining success using non-surgical approach: transcervical insemination. This is a novel approach in large non-domesticated cats, and a valuable, stress-reducing modification to the AI technique. Standard feline electroejaculation techniques are being used to collect sperm for deposition into the female's uterus. The females are prepared for insemination using ovulation and induction protocols.



Assisted Reproductive Technologies as a Method of Embryo Production in the Wood Bison (G.

Mastromonaco, A. King, P. Mackie, M. Franke, G. Crawshaw, Bison Reproduction Research Group (BRRG))

REF NO. 2008-02-01

Wood bison are currently listed as threatened and the conservation of the remaining free-ranging populations



is at risk due to the ongoing presence of disease such as tuberculosis, brucellosis). Reproductive biotechnologies may be the best way to preserve the germplasm of the remaining individuals and develop methods to produce non-infected offspring. The first major objective of the study is to examine basic mechanisms that are involved in embryo development. The second objective of the study is to assist the BRRG with the development of appropriate techniques for embryo production in bison, including ovarian synchronization, superovulation, artificial insemination, and embryo transfer. These data will ultimately be beneficial in understanding why in vitro embryo production techniques have not been overly successful in a variety of bovid species.

Establishment and Characterization of Cell Culture from Freshwater

Fishes (G. Mastromonaco, C. Lee, M. Filice, K. Greenham) REF NO. 2011

-05-02

In response to a global call for action from the IUCN's Freshwater Fishes Specialty Group, the development of regional cell culture banks of native endangered fishes has become a priority. However, an understanding of cell culture parameter is necessary in fishes so that the production of healthy cell lines can be ensured. Fin biopsies from a variety of fish species have been used to evaluate tissue storage and processing techniques on the viability, longevity, and normality of fish cell cultures. This will provide us with the Information required to establish adequate protocols for initiating genome resource banks for endangered freshwater fishes.



Investigation of Key Physiological Measurement to Evaluate Loggerhead Shrike Success in Captivity

(T. Luloff, G. Mastromonaco, G. Burness)



The loggerhead shrike is currently classified as nationally endangered and ongoing threats from habitat loss and other human-related pressures have resulted in a drastic decline in the number of breeding pairs remaining in Southern Ontario. The goals of this study are to evaluate reproductive and stress hormone levels in feces and feathers from loggerhead shrikes in various southern Ontario captive breeding sites in an attempt to understand the underlying factors influencing reproductive success among breeding pairs in the different captive populations. This study will provide valuable information to enhance loggerhead shrike captive breeding programs.

Cytogenic Evaluation of Captive and Free-Range Non-Domestic Animals

(G. Mastromonaco, S. Hayden) REF NO. 2009-03-01

Screening for chromosome abnormalities is an important prerequisite for all animals breeding strategies as they play a role in reduced fertility. Compromised reproductive performance is due to the production of chromosomally unbalanced sperm and oocytes, which lead to the death of the embryos and/or fetuses at early stages of development. Selection of normal donor animals for long-term banking of their genetic material is crucial to the successful production of future embryos and offspring. Biopsy samples taken during routine health procedures are grown to produce cell lines, which are then evaluated for chromosomal composition.

Non-invasive Reproductive Monitoring and Pregnancy Diagnosis in the Polar Bear

(T. Roth, M. Stoops) REF NO. 2010-03-03

Zoos are strategically breeding polar bears in an effort to develop a self-sustaining captive population, and to educate visitors about global climate change and wildlife conservation. The information will hopefully identify a means of distinguishing pregnancy from pseudo-pregnancy, so that zoos prepare accordingly for cubs the next breeding season in a more timely fashion. The second goal is to begin monitoring male bears for testosterone concentrations throughout the year.



Manipulation of the Reproductive Cycle in Veiled Chameleons

(G. Mastromonaco, R. Pimm, B. Johnson, A. Lentini, C. Gilman, S. O'Handley)



Captive female reptiles are prone to the potential loss of body condition resulting from the continuous production of eggs, or loss of reproductive function due to pre- or post-ovulatory egg retention. There is very little conclusive "information on the cause of egg retention. This study evaluated fecal reproductive and stress hormones in an effort to better understand the relationship between stress and reproduction in the female reptiles. Ultrasound imaging of ovarian structures was used to assist with the identification of reproductive condition in the study animals. The outcomes of this study may help us to develop methods for diagnosing and potentially preventing egg binding in female

reptiles.

Researching the Use of Cell Cultures for Freshwater Fishes Conservation (G. Mastromonaco, C. Lee, M. Filice, K. Greenham)

In response to a global call to action from the IUCN's Freshwater Fishes Specialty Group, development of regional cell culture banks of native endangered fishes has become a priority. However, an understanding of cell culture parameters is necessary in fishes so that the production of healthy cell lines can be ensured. Fin biopsies from a variety of fish species have been used to evaluate tissue storage and processing techniques on the viability, longevity, and normality of fish cell cultures. This will provide us with the information required to establish adequate protocols for initiative a genome resource bank for endangered freshwater fishes.



VETERINARY

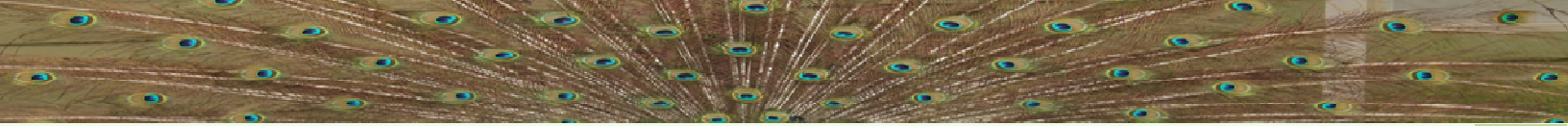
Physiological and Pathological Effects of Surgical Implantation and Handling Procedures in African House Snakes (G. Crawshaw, A. Lentini) REF No. 2009-11-05

In a previous study at Toronto Zoo, the physiological and pathological effects of intracoelomic implants were examined in a group of 24 Eastern massasauga rattlesnakes (*Sistrurus catenatus catenatus*). Inflammation and infection occurred despite careful surgical procedures and advanced veterinary care. This study was designed to continue that work by comparing the responses of the snakes to implants with different coatings – the same transmitter used in the previous study with ones that meet standards for biocompatibility for mammalian implants. Thirty African house snakes were given intracoelomic implants prepared with three different external coatings and monitored for 12 months. The implants were then removed and the snakes evaluated for any physiological and pathological response to the transmitter.

Assessment of Nutrient Parameters of Captive and Wild Eastern Massasauga Rattlesnakes (O. Slater, S. Lavin, L. Faust, D. Mulkerin) REF No. 2011-09-01

This project aims to determine the blood nutrient status of captive and wild Eastern massasauga rattlesnakes (EMR; *Sistrurus catenatus catenatus*) in relation to their respective whole prey nutritional parameters. Little is known about the nutritional needs of reptiles and even less about the regionally endangered EMR's nutrient requirements. With continued population decline in the wild and low reproduction in captivity, both populations are struggling to be sustainable. Research into the cause of the low reproductive rate in captivity is ongoing but to date has focused on environmental variables. This study aims to determine if the captive diet is meeting the nutritional needs of these reptiles which in turn will influence their health and reproductive potential. Comparisons of blood samples from captive and wild snakes will be used to determine the blood nutrient profiles. The nutrient composition of the captive and wild diets will also be analyzed to determine the influence of diet on these blood nutrient parameters with results having the potential to influence diet recommendations and the long term survival of this species in captivity.





Prevalence of Avian Bornavirus in Free-ranging Waterfowl in Ontario and Susceptibility of Wild Canada Geese (*Branta canadensis*) to Natural *in Ovo* Infection with Avian Bornavirus (P. Delnatte, D. Smith, E. Nagy, G. Crawshaw) REF. NO. 2012-03-01

Avian bornavirus (ABV) was recently identified as a cause of neurologic disease in wild waterfowl in Ontario, with several cases diagnosed at the Toronto Zoo in Canada geese and trumpeter swans. This virus is the cause of a neurological disease in parrots, and other avian species may also be susceptible to infection. Infection spreads naturally through the fecal-oral route, thus wild Canada geese could be a source of environmental contamination. Samples were collected from Canada geese, trumpeter swans (*Cygnus buccinator*), mute swans (*Cygnus olor*) and mallards (*Anas platyrhynchos*) at different locations in Ontario in order to estimate the prevalence of ABV infection. Thirteen percent of the geese caught on the Toronto Zoo site shed ABV in feces compared to 0% in geese sampled at three other locations. Serum antibodies were present in birds from all four species and at each sampling site. This study confirmed that ABV infection is widespread in asymptomatic free-ranging waterfowl in Canada. Recent work suggests that ABV can also be transmitted *in ovo*, with the embryo being directly infected with the virus while still in the egg. Canada goose eggs were evaluated at different stages of embryonic development. Avian bornavirus (ABV) was detected in the yolk of one of three non-embryonated eggs. The remaining samples were negative for ABV and antibodies against ABV were not detected in the plasma of the hatched goslings. This is the first report of the detection of ABV RNA in the egg yolk of a wild Canada goose.



The Role of Hecpudin in Iron Regulation in Bats (I. Stasiak, D. Smith, G. Crawshaw) REF No 2011-06-03



Iron storage disease or haemochromatosis results from excessive accumulation of iron in various organs, predominantly the liver, and has been associated with mortality in captive Egyptian fruit bats (*Rousettus aegyptiacus*). Egyptian fruit bats appear to be less able to compensate for increased levels of iron in their diet than other bat species. It is believed that certain frugivorous species with low levels of iron in their diet have developed more efficient means of iron absorption and are unable to down-regulate iron absorption. However, the physiologic basis for this susceptibility has not been defined. We compared the coding region of the hepcidin gene amongst several species of bats and investigated hepcidin response to an

injection of iron amongst three species of bats with variable susceptibility to iron storage disease: the Egyptian fruit bat, the straw-colored fruit bat (*Eidolon helvum*), and the common vampire bat (*Desmodus rotundus*). While a number of genetic differences were identified amongst species, a functional mutation that could result in decreased hepcidin activity was not identified in the Egyptian fruit bat. Bats exhibited marked variation in hepcidin gene expression, with the highest level of hepcidin response to iron challenge in the common vampire bat. While the Egyptian fruit bat exhibited significant hepcidin response to iron challenge, the magnitude of response was lower than that in the common vampire bat and lower than expected based on findings in healthy humans. The straw-colored fruit bat did not exhibit any hepcidin response despite a significant increase in iron stores, which suggests this species may have evolved an alternate mechanism for coping with excessive iron.

NUTRITION

Future Research into the Nutrition on Amphibians and Reptiles (J. Wensvoort, B. Johnson, A. Lentini, G. Crawshaw, L. Attard)

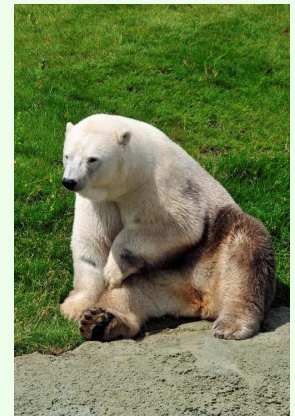
A proposal is prepared to study the efficacy of two cricket gut-loading diets with amphibians. Strategies are currently worked out in cooperation with curators and veterinarians for further investigations in the next 10 years.



Captive Studies to Improve Diet Estimates and Bioenergetic Modeling of Polar Bears in the Wild (G. Thiemann and B. Laforest of York University, I. Duncan of Guelph University, G. Crawshaw, J. Young, E. Di Nuzzo and J. Wensvoort of Toronto Zoo, C. Robbins of Washington State University, Peter Molnar of Princeton University, K. Rode of US Fish and Wildlife Service, S. Cherry of Parks Canada.)



The ongoing reduction of sea ice habitat has led to predictions that the foraging patterns and energy budgets of polar bears will shift accordingly, given the reduced hunting time and altered prey availability associated with decreased ice cover. A deeper understanding of these foraging shifts, and their consequences for polar bear energy budgets, will allow scientists to better predict the effects of climate change on polar bear populations and give managers and policy makers the ability to make more informed management decisions. An



understanding of polar bear nutritional physiology is critical for wild polar bear conservation, and can only be obtained through studies of captive polar bears. The results of this study will provide critical insights into the ecological impacts of ongoing and future environmental change on polar bears.

Food intake, growth, and activity of Hudson, a polar bear born at the Toronto Zoo in 2011, were recorded in the context of the above study, beginning at 16 weeks of age. For a period of 36 weeks, his diet was almost unchanged, and food intake was recorded daily. Diet adjustments were made on a weekly basis and were based on the past week's daily growth. Nutrient and energy intake were established over the total period. Body weight was also recorded weekly, and a growth line was established (see next page). During the summer, for a period of 6 weeks (several days per week) ethograms were made of the cub's activities and ambient temperatures were recorded. Relationships between nutrient intake, energy intake, growth and activity levels of a young growing polar bear cub are documented, and a publication on this work is pending.

Further study on polar bear nutrition and physiology is continuing and will include data collected from captive polar bears in Cochrane, Ontario fed a mimicked wild diet. The inclusion of polar bears fed a mimicked wild diet to the study will ensure that the results gained are more representative of polar bears in general.



Hudson's 1 Year Growth Chart

Hudson's Diet



Inukshuk (Dad)

1100lbs or 499kg.



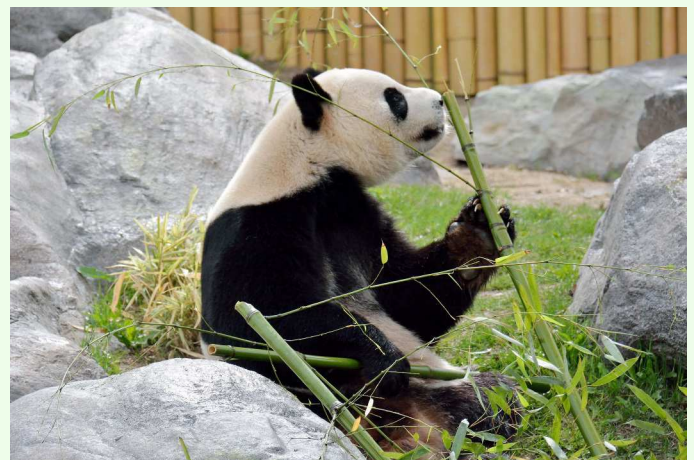
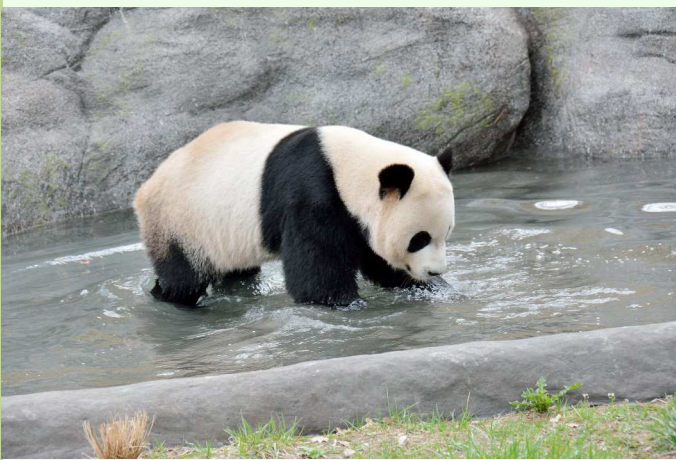
Scan here with a smart phone to read the complete story of Hudson and to learn about where he is now.



BEHAVIOURAL

Behavioural Assessment of Giant Pandas (Maria Franke, Dr. S. MacDonald)

The purpose of this project is to establish baseline data on the behaviour of Er Shun and Da Mao, our two panda visitors. A behavioural profile of the animals will be compiled over the summer months, providing data on what types of behaviours the animals engage in, what their daily schedule is like, what kinds of enrichment items they prefer, and what areas of the exhibits they spend their time in. Observations will be conducted throughout the summer months, both in person as well as via camera recordings, so we can obtain data representing their behaviour over periods of 24 hours, through the day and night.



Behavioural Assessment of Orangutans (Dr. S. MacDonald, S. Ritvo)

The purpose of this project is to provide activities for the orangutans so that they may be mentally stimulated and occupied while off exhibit in the holding area. It provides the orangutans with the opportunity to explore a variety of enrichment activities, including finger-painting, spatial foraging tasks, and computer touch-screen games. Their participation in these activities will be documented and recorded. All of the orangutans, including juveniles, participate enthusiastically in these various "games".



A close-up photograph of a red, fuzzy flower bud on a stem. The bud is covered in fine, white, hair-like structures. It is surrounded by green, fuzzy bracts. The background is a soft, out-of-focus green.

HORTICULTURE INITIATIVES

Most people are surprised to find out that the Toronto Zoo is about way more than just animals! The Zoo's plant collection is more extensive than the animal collection, and can be viewed along the paths, in exhibits, and in the indoor pavilions.

The programs developed by the Horticulture department include conservational studies of endangered plants and habitats and an international seed exchange. They are also involved in restoration ecology, wetland and meadow creation, and forest recovery projects that occur both on and off site.

HORTICULTURE



Horticulture Center

The Horticulture Center is responsible for a myriad of flora related tasks, such as: tropical plant maintenance, bio control of insect pests; plant restoration, propagation, and over-wintering; managing heavy equipment; organic waste and materials collection.



Botany

The Botany Team works to integrate living plants into exhibits and open spaces throughout the zoo, in addition to maintaining up to date plant records, maintaining a browse plant nursery, facilitating cultural connections to zoo visitors, and taking part in research efforts to preserve native Ontario species.

Landscape Development:

Horticulture staff are continuously creating and renovating gardens, animal exhibits, and picnic areas throughout the Zoo.

Cultural Connections:

The Shamba Farm in the Savannah region of the Zoo has been created to represent an authentic West African garden, thanks to horticulture staff and recommendations from the African Cultural Advisors.

Plant Record System:

Signage has been provided for any plants present in public areas of the Zoo, to make visitors aware of the plant presence in addition to the animals on display and to help educate the public about the various species present in the Zoos botanical collection.

Browse:

A browse plant nursery has been established to provide food as a component of the diet for browser animals. This is a reliable source of browse is expected to become available as the plants mature.



Panda Interpretive Center and Exhibit

Plants and landscaping materials were used to maintain a traditional Chinese garden theme in the Panda exhibit and interpretive center. Various species of bamboo have been used throughout the gardens to enhance the exhibit and to provide browse material, which the animals can feed on if they wish.

Research

Ash trees are being injected with a substance that may protect them from the invasive Emerald Ash Borer beetle. The effectiveness of this substance is being investigated through a pilot study at the Zoo.



NATURAL AREAS MANAGEMENT

Waterway

The artificial waterway begins at the Mayan Temple waterfall and flows underneath the Tundra Trek, to surface again and flow under the bridge between the Tundra Trek, through the Eurasia Wilds, and ceases flow at the two ponds near the Zoos front entrance. The waterway has a history of chronic problems, including storm water runoff, nitrogen loading, and algal blooms in the summer heat. A Waterway Study in 2004 found that the waterway is in dire need of care. Wetland areas are planned to be established along the waterway to naturally cleanse the water and provide additional habitat for the animals living in and around the waterway areas.



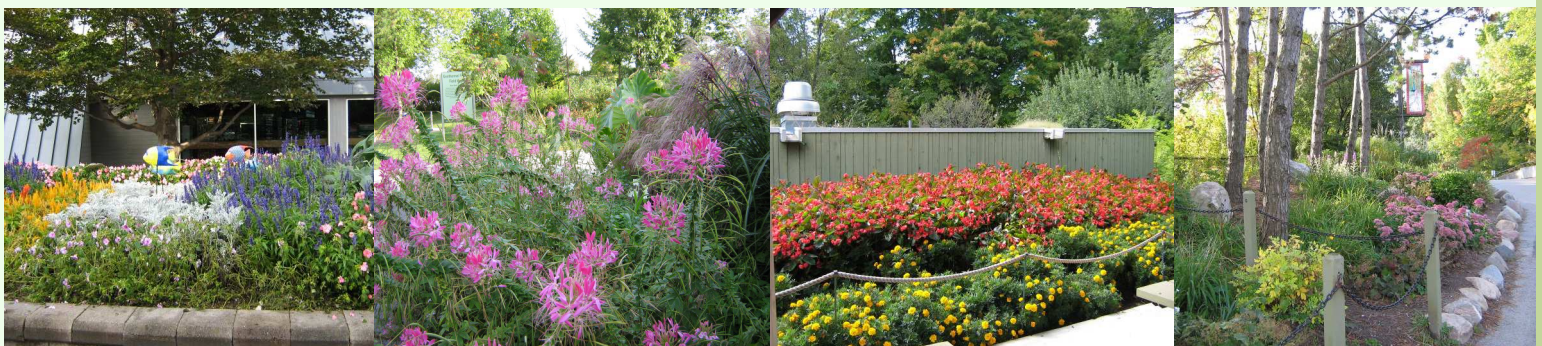
Education Portable Landscape Naturalization:

The area around the Education Portable has been transformed into a celebration of local and native plant species, and into a habitat that can support numerous animals, such as frogs, toads, butterflies, birds, and insects. The area now includes a Carolinian, boreal, and temperate deciduous section. These areas provide a space for youth to learn about the forested habitats that surround them in Southern Ontario.

Invasive Species Management

The Toronto Zoo is currently monitoring and actively managing several invasive species, which are threatening the Great Lakes and the Rough Valley ecosystems, including:

- Canada Goose (*Branta canadensis*)
- Garlic Mustard (*Alliaria petiolata*)
- Dog Strangler Vine (*Vincetoxicum rossicum*)





GREEN INITIATIVES

A main objective of the 21st century zoo or aquarium is to demonstrate the link between wildlife conservation and sustainable human development and lifestyles. The Toronto Zoo has a strong record of environmental protection and of energy efficient operation management. The Zoo has inspired staff, volunteers, and the public to make responsible lifestyle choices in order to live more sustainably and aid in the present day struggle to preserve the natural world.

At the heart of the Toronto Zoo mission statement is the promise to provide a dynamic environment that will inspire staff and visitors alike to respect and protect wildlife and wild spaces. Through engaging the public in discussions about conservation issues and providing realistic solutions, we hope to foster an appreciation of all living things that will last far beyond the days spent at the Zoo, and that will inspire others to lessen their ecological footprint on our earth.

Green Initiatives

VISION STATEMENT

The Toronto Zoo has a strong record of environmental protection and of energy efficient operation management. The Zoo has stimulated staff, volunteers and the public to live sustainably in balance with Nature, encouraging everyone involved to lessen their ecological footprint on the earth.



Green Eco-Zoo Team

The Green Eco-Zoo Team (GEZT) is a non-technical advisory committee to the General Manager and incorporates all divisions and units of the Zoo. The "Green Team" addresses the environmental impacts of Zoo operations, policies and procedures, and makes recommendations that will lessen our ecological footprint in the Rouge Valley and on the earth.

Green Plan 2010-2015

The action-based, goal oriented plan will guide the long-term sustainability of Zoo operations and our impact on the Rouge Park and, more holistically, our earth. The Green Plan has set out ambitious targets of a 95% reduction of Greenhouse Gas (GHG) emissions and a 40% reduction in water consumption, as compared to 1990 levels, by 2027.

Green Policies and Reports

- Environment First Policy
- Environmental Purchasing Policy
- Annual Environmental Initiatives Report
- Smog Alert Plan



Green Events, Programs and Projects

GEZT staff members from the Conservation, Education and Wildlife division coordinate and develop events for Zoo staff, volunteers and visitors, as well as the broader community. In 2012/13, events included solar cooling feasibility, participation in Earth Day, energy audits, lighting retrofits and tree planting events.

- ICE Bear System
- Biogas Facility
- Solar photovoltaic panels
- Solar thermal panels
- PhoneApes™ Program
- Staff Carpooling Program
- Green roofs



Feel the Power of the Earth.

**Geothermal heating and cooling at work!
Put your hand in the mulch.**





Energy and Waste Management

Achieving our Green Plan targets depends equally on staff conservation behaviour, decisions made and projects completed by our Facilities and Services staff. Energy and water consumption and waste production must be reduced substantially over the next 20 years if we are to lower or eliminate our ecological footprint.

Energy Management

The Total GHG Emissions by fuel type (tonnes of CO₂) for 1990, 2008, 2009, 2010, 2011, and 2012 (after adjusting for billing period, weather conditions and energy costs). Our cumulative target goal for 2017 is also shown:

Year	Electricity	Natural Gas	Heating Oil	Petrol	Diesel	Propane	TOTAL
1990	2434.8	2879.5	78.5	134.2	63.9	129.5	5720.3
2008	2567	3434	51	170	160	79	6460
2009	2587	3578	42	174	187	84	6652
2010	2619	3206	47	136	69	44	6120
2011	2608	3504	51	150	56	50	6419
2012	2487	3274	40	189	71	2	6064
2017 Target (50% below 1990 levels)							2860

Waste Management

The total waste (metric tonnes) diverted from landfills itemized by material and year:

MATERIAL	2007	2008	2009	2010	2011	2012
Bones	33	16.8	17.1	4.36	4.2	4.18
Cardboard	63	69	42	44.57	44.06	43.68
Co-mingled recyclables	149	128	132	184.87	176.11	179.46
Fluorescent light-bulbs	0.25	0.31	0.38	1.12	0.95	1.08
Hazardous waste	0.75	4.1	5.2	4.2	5.9	6.46
Organic waste	2050	2130	28	29.5	30.6	29.97
Paper	4.1	9.5	6.2	6.8	8.2	7.8
Plastics	2.5	6.7	5.8	4.3	-	4.15
Skids / Pallets	1.6	10.5	11.2	22	14	16
Wood	36	38	27	47.55	23.93	21.76
Misc. Items*	7.1	49.5	81.2	95.6	181.68	164.68
Total weight recycled (t)	308	335	361	445	491	466.79
Total weight to landfill	255	245	182	189	204	215
Waste Diversion	55%	58%	66%	70%	70%	68.5 %

Misc. Items include oil filters, batteries, scrap metal, tires, cell phones, and furniture.

Transit

Transit staff has initiated many improvements, for example the conversion of 12 vehicles to propane/gas hybrid engines, purchase of 3 solar powered golf carts and 2 solar powered utility carts, purchase of 23 electric vehicles, as well as the full conversion of one of our Zoomobiles from propane showcasing the world's first solar-powered Zoomobile.



APPENDIX

Collaborations with outside researchers and institutions benefit the Toronto Zoo by increasing the resources available at the Zoo. As a result, strong partnerships have been developed with other research organizations.

The Toronto Zoo encourages outside students and researchers to work in collaboration with the Zoo on projects related to their area of interest. This allows others to gain access to resources available at the Zoo, while simultaneously broadening the amount of information held at the Zoo.

Species Survival Plans®

Species Survival Plan (Green SSPs®, Yellow SSPs®, and Red) Programs

The Species Survival Program (SSP) aims to establish population stability for species that have been classified as threatened or endangered in the wild and require immediate aid through conservation, such as the giant panda. The objective of a SSP® is to establish and maintain healthy, genetically diverse populations at various AZA accredited institutions and facilities, to act as a source for species reintroduction and to ensure a sustainable captive population exists, should wild populations die off.

Green SSPs® represent captive populations that are thriving, while Yellow SSP® populations are present but are not yet strong enough to persist long term, and species classified as Red exist in captive populations of very few individuals, and are not sustainable in the long term at present.

The Toronto Zoo gives high priority to research on SSP® animals, and has increased the number of SSP® species studied at the Zoo by 37 species in the past year. As of 2013, the Toronto Zoo's total (Yellow, Red, and Green) SSPs® are as follows:

Class	Green SSP®	Yellow SSP®	Red	All 2011/2012	All 2012/2013
Mammals	9	44	8	51	61
Birds	1	29	15	31	45
Reptiles	1	12	4	12	17
Amphibians	1	1	3	2	5
Fish	0	5	4	4	9
TOTAL	12	91	34	100	137



The Mission of the Toronto Zoo Development Division

The Toronto Zoo Development Division is dedicated to the financial support of the Toronto Zoo in its efforts to conserve species diversity through conservation, education, and research.

The Toronto Zoo Development Division raises funds to support the conservation, education and research endeavours of the Toronto Zoo. Philanthropic support from individuals, grant-making foundations and corporations enables the Zoo to embark on and continue the various programs and projects that aim to preserve our environment and maintain biodiversity. In addition to raising funds to support Zoo programs and research, the Development Division represents the interests of its donors and stewards the gifts entrusted to it.

To support the Toronto Zoo's Partner Organizations call the Development Division at 416-392-9114 or visit www.torontozoo.com

INTERNATIONAL CONSERVATION PROGRAMS

- The World Conservation Union (IUCN) strategies
- Conservation Breeding Specialist Group (CBSG)
- International Species Information System (ISIS)
- Studbooks
- Species Survival Plans (SSPs®)
- Taxon Advisory Groups (TAGs)
- Scientific Advisory Groups (SAGs)
- Conservation Action Partnerships (CAPs)
- AZA – Nutrition Advisory Group
- Botanic Gardens Conservation International (BGCI)
- The Canadian Organization for Tropical Education and Rainforest Conservation (COTERC)

MEMBERSHIPS

- Canadian Accredited Zoos and Aquariums (CAZA)
- Association of Zoos and Aquariums (AZA) Associates
- African Association of Zoos and Aquaria (PAAZAB)
- Biodiversity Education and Awareness Network (BEAN)
- Botanic Gardens Conservation International (BGCI)
- Canadian Botanical Conservation Network (CBCN)
- Comparative Nutrition Society (CNS)
- Canadian Council on Animal Care (CCAC)
- Canadian Museums Association (CMA)
- Conservation Council of Ontario (CCO)
- Education Alliance for Sustainable Ontario (EASO)
- International Association of Amusement Parks and Attractions (IAAPA)
- Ontario Environment Network (OEN)
- Polar Bears International (PBI)
- Recycling Council of Ontario (RCO)
- World Association of Zoos and Aquariums (WAZA)

2013 PROJECTS SUPPORTED BY THE ENDANGERED SPECIES RESERVE FUND

- Giant Panda Nutritional Analysis of Bamboo
- African Penguins
- International Elephant Foundation – Waterways & Dura Recovery Project
- Sulawesi Habitat Preservation and Education Programming
- Sumatran Tiger Conservation
- Hutan Reforestation Efforts in Kinabatangan
- Project Punde Kundo (Red Panda)
- Tree Kangaroo & Biodiversity Conservation in Papua New Guinea
- Saving the Northern River Terrapin
- Burmese Star Tortoise Reintroduction
- Rehabilitation and Management Centre for Indian Turtles in Lucknow
- Puerto Rican Crested Toad Field Conservation and Education
- Madagascan Tortoise
- Great Lakes Program
- Great Lakes Conservation – Freshwater Mussels
- Toronto Zoo Aqua-Links
- Toronto Zoo Conservation in Action: Lake Tseny, Madagascar
- Blanding's Turtles in the Rouge Watershed
- Shoreline and Wetland Assessment, Restoration for Species at Risk
- Black-footed Ferret Canadian Reintroduction – Post Release Monitoring
- Polar Bear Biodiversity Studies
- Panama Frog Rescue Program (Invertebrate Production)
- Karner Blue Recover Group
- Hair Cortisol Analysis
- Lewa Veterinary Conservancy & Vet Program
- Mbeli Bai
- Ape Action Africa, Mefou National Park, Cameroon

2013 OPERATING PROJECT LIST

- Tundra Green Roofs on Polar Bear – Fall Protection
- Camp Drop Off Safety Railing Renovation
- Moat Crossing – Spider Monkey
- Front Entrance/Exit Redesign
- Parking Lots 3 and 4 Site Preparation
- Events Tent Site Preparation & Tent
- Automated Parking Lots 3 & 4
- Refurbish Loading Dock
- Auditorium Refurbishment
- Membership Kiosk Redesign
- Giant Salamander Exhibit – Panda Interpretive Centre
- Conservation Connection Phase II
- Outdoor Gorilla Exhibit Roof Mesh Replacement
- Indo Crocodile Lizard and Newt Refurbishment
- Indo Malayan Aviary Upgrades
- Australian Walk-thru Housing Structures
- Soft Flooring White Rhino
- Australasia Mammal Indoor Exhibit – Heat Issues
- Black-footed Ferret Exterior Exhaust Fan