



To: Board of Management

From: Dr. William A. Rapley  
Executive Director  
Conservation, Education & Wildlife

Subject: **UNIVERSITY/COLLEGE PARTNERSHIPS – 2015 SUMMARY**

Date: 2016-03-30

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### **Summary:**

The Toronto Zoo makes contributions in the areas of wildlife care, reproductive, veterinary, behavioural and nutritional sciences, and species preservation and habitats with many partners, including conservation groups, governmental organizations, environmental organizations, other wildlife care facilities, as well as universities and colleges.

This report focuses on the partnerships with universities and colleges related to collaborations on projects related to their area of interest. The strong partnerships formed with other research and academic institutions allow the Zoo to share resources such as personnel, expertise, equipment and training which assist us in advancing towards our common goals.

### **Recommendations:**

**It is recommended that this report be received for information.**

### **Background:**

The Toronto Zoo is a key centre of learning for other professionals, from similar or diverse fields, and for the next generation of wildlife biologists, veterinarians, animal nutritionists, reproductive physiologists, animal keepers, and teachers/educators.

The Toronto Zoo has full research status and is assessed every three years by the Canadian Council on Animal Care (CCAC). In addition, the Toronto Zoo is registered and inspected by the Ontario Ministry of Agriculture, Food & Rural Affairs (OMAFRA) under the Animals for Research Act. This status allows the Toronto Zoo active participation with many universities and colleges and student programs.

Toronto Zoo staff in the CEW Division have adjunct university appointments and provide lectures, advice and assistance to student programs. Graduate studies are available through Zoo collaborations and include internships and special programs such as 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.

As part of its multi-disciplinary approach towards conservation research, the Zoo has developed a partnership for over 25 years with the Psychology and Biology Departments of York University. Dr.

Suzanne MacDonald, Professor at York University, collaborates as the Zoo's Animal Behaviourist. Currently, the Zoo is working with the various SSP<sup>®</sup> programs, integrating behavioural and hormonal research into the breeding of endangered species.

As a result of this partnership, not only are Dr. MacDonald and her students able to use the Zoo as a research facility, but the Zoo also has the opportunity to benefit from important and unique research. Dr. William Rapley and other CEW staff serve as faculty advisors for these programs and assist with student supervision, project review and examination.

Specialty training in zoological medicine and pathology has been offered in collaboration with the Ontario Veterinary College (O.V.C.) since 1979. Presently, two graduate veterinarians are gaining first-hand clinical experience and working on original research projects as part of their three-year Doctor of Veterinary Science (D.V.Sc.) degree programs. The objective of the program is to train veterinarians to become clinically competent in zoological medicine, and to develop a strong understanding of diagnostic tools and the ability to perform pathological studies. Graduates of the program will have the background to practice and teach zoological medicine and to carry out conservation work and research, with the capability to contribute fully to the scientific activities expected in a modern zoo or wildlife-related organization.

The Wildlife Health Centre accommodates senior veterinary students on externships throughout the year from veterinary colleges around the world.

Toronto Zoo veterinarians hold adjunct appointments at the University of Guelph and provide lectures to students at Ontario Veterinary College (OVC).

Post-graduate level training has been offered in reproductive physiology and biotechnology for M.Sc. and Ph.D. programs and post-doctoral fellowships for over 25 years. Students gain a thorough understanding of experimental design and in-depth knowledge of reproductive physiology and laboratory techniques associated with different aspects of assisted reproductive technologies as applied to zoo species.

In addition, Toronto Zoo scientists hold adjunct appointments at Ontario universities and the Wildlife Health Centre and Reproductive Laboratories host/accommodate students on externships and co-operative placements in veterinary medicine, biomedical science, and animal health technology throughout the year.

Since 2008 Conservation, Education and Wildlife staff, including Curators, Veterinarians, Nutritionists and the Executive Director, have taught a 3<sup>rd</sup> level course in the Biology and Environmental Science program at the University of Toronto, Scarborough Campus. Lectures ranged from population management to animal care to greening initiatives. The course is called "The Role of Zoos, Aquariums and Botanical Gardens in Conservation". The course has generated financial support for the Toronto Zoo's Endangered Species Reserve Fund. Dr. William Rapley and Dr. Gabriela Mastro Monaco have adjunct appointments at UTSC.

UTSC hired an additional professor in Conservation Biology and began a new Masters of Science program in 2012. Partners will include the Toronto Zoo, Rouge Park, OMNR, and Parks Canada.

Many special opportunities are created for various university courses in behaviour, primatology and anthropology so that students may observe wildlife at the Zoo for various undergraduate courses. The students receive observation passes to complete their studies.

### Comments/Discussion:

#### Key accomplishments in 2015:

#### University of Guelph

- Dr. Dave Barney is an Adjunct Faculty and holds a special graduate faculty position in the Department of Animal and Poultry Science.
- Dr. Gabriela Mastromonaco is an Adjunct Professor and holds a special graduate faculty position in the Department of Biomedical Sciences.
- Dr. Mastromonaco was the Co-Advisor for a Post-Doctoral Fellow, Ph.D. student, M.Sc. student, and an undergraduate research student, and was an Advisory Committee Member for a Ph.D. student.
- Dr. Mastromonaco provided lectures for veterinary and reproductive physiology courses in the Departments of Animal and Poultry Science, Biomedical Sciences, Pathobiology and Population Medicine
- Graduate Programs in Biomedical Sciences
  - Dr. A. Cordova started a post-doctoral fellowship evaluating bison oocyte maturation in vitro to develop improved culture techniques for the production of wood bison embryos. This research will enhance our understanding of seasonal differences in oocyte competence and allow us to cryopreserve female genetic material from wood bison, a threatened Canadian species. Dr. L. Gonzalez completed a PhD degree that investigated the role of mitochondria in embryo development using bison somatic cell nuclear transfer embryos. The study demonstrated the complex role of mitochondria in embryo development and highlighted some of the problems observed with nuclear transfer embryos.
  - Jessica Magerman started a M.Sc. degree on red panda reproductive endocrinology. The goal of her study is to determine whether differences in reproductive hormone concentrations exist in pregnant vs pseudopregnant females. These data are important to better understanding pregnancy in this species, thereby providing us with improved strategies for animal management.
  - Brendan Donaldson began an undergraduate research project evaluating the relationship between sperm morphometry and freezability in carnivore species to better understand the role of sperm size and shape in cryopreservation outcomes.
- J. Wensvoort was Advisor of the Nutrition Internship with liaison Dr. J. Atkinson. The internship exposes new graduates in wildlife nutrition to the field of practical zoo wildlife nutrition and related research, while strengthening and formalizing the academic component of the zoo's wildlife nutrition program. The intern works 20 hours in wildlife nutrition production and a minimum of 20 hours on a wildlife nutrition research project per week. The intern must complete a relevant research thesis and present the research on an international conference on zoo wildlife nutrition. Intern, S. Gourlie, conducted a M.Sc. thesis project entitled "Assessing Locally Available Apple Browse as a Suitable Edible Enrichment Item for Captive Western Lowland Gorilla." The study was carried out in three stages: assessed the amount of apple (*Malus sp.*) browse and bark stripped and consumed by gorillas; branches were harvested from the same tree and bark was manually stripped and analyzed for chemical and nutritional components; and the palatability of apple bark and leaves in domestic rabbits was determined.
- Maria Franke worked with Dr. Laura Graham on polar bear research looking into thermos-regulation and behaviours.

### University of Guelph - Ontario Veterinary College (OVC)

- Drs. William Rapley, and Chris Dutton are Adjunct Professors in the Department of Pathobiology.
- Tours and Presentations were conducted for students from the Animal Science Society, Pre-Vets Club, Zoo, Exotic and Wildlife Club, and Summer Leadership Program.
- D.V.Sc. Program
  - Dr. E. Milnes started the Veterinary Residency Program  
Veterinary Resident, Dr. A. Pastor entered her third and final year and worked on a thesis project entitled, “Investigating Enteric Coccidiosis in the Endangered Black-Footed Ferret (*Mustela nigripes*).” Black-footed ferrets are the only native North American ferret species and are one of the most endangered North American carnivores. *Coccidia* are microscopic parasites that affect many different animal species, and disease caused by these parasites is a major cause of death in young black-footed ferrets. The signs of this disease include mucoid diarrhea, lethargy, appetite loss, vomiting, and dehydration; often animals may be found dead without any previous signs. There is a significant information gap regarding the nature of this disease in ferrets, including methods for treatment and prevention. Ponazuril, an anti-parasitic medication, is currently recommended for the treatment of coccidiosis in black-footed ferrets. No information exists on the safety or efficacy of ponazuril in any ferret species, and there have not been studies validating the use of this medication at the current recommended dosage and dosage schedule. Furthermore, previous frequent use of another anti-parasitic, sulfadimethoxine, in black-footed ferrets is believed to have resulted in resistance to the drug and other side-effects. In order to continue successful captive breeding efforts, the management of coccidiosis is imperative. However, without further investigation, inappropriate and ubiquitous use of current drug therapies may result in the loss of effective treatments. In this study, we will attempt to better characterize the *coccidia* isolated from the black-footed ferret population, assess potential alternative anti-parasitic medications, and investigate the production of an anti-coccidial vaccine.
- Diploma in Pathobiology
  - Veterinary Resident, Dr. A. Nielsen finished her third and final year and completed a thesis project entitled, “Anesthesia of Puerto Rican Crested Toads (*Peltophyryne* [Bufo] lemur) by Intracoelomic Administration of Alfaxan (alfaxalone).” Currently, the method of choice for amphibian anesthesia is by immersion in buffered tricaine methanesulfonate (MS-222). This method is reliable, efficient, and is presumed to have analgesic as well as anesthetic effects. However, this product is supplied as a powder and is very acidic. It must be weighed out accurately, mixed in water, and buffered to appropriate pH prior to each anesthesia, which is time consuming, requires sensitive scales, and increases the risk of self-exposure. The aim of this study is to investigate an alternative method of anaesthetic induction in anurans, more specifically, to investigate the safety and effectiveness of Alfaxan (alfaxalone) administered into the coelom at different doses in Puerto Rican crested toads. Alfaxalone is a neuroactive steroid and general anaesthetic. It is available as an injectable aqueous solution and so can be easily diluted. It has been used safely and effectively in mammals, reptiles, amphibians, and fish.
- Veterinary Externship Program
  - K. Carlton, 4<sup>th</sup> year veterinary student from the University of Guelph, participated in the externship program. Externs ordinarily assist with the day-to-day clinical routine, and are welcome to participate in activities in the laboratory and pathology areas. There is opportunity to spend time with our Nutritionist who does research and oversees our

Wildlife Nutrition Centre, Dr. Mastromonaco, and with the Wildlife Care Supervisors, if the extern has a particular interest in these areas. If the externship occurs during a “quiet time”, then a special study project may be assigned, depending on our current needs and interests. Externships are approximately three weeks in duration. Our theoretical work day is 8:30 to 17:00, but we often start earlier and/or work later, depending on the days’ clinical and pathology loads.

#### Biodiversity Institute of Ontario, University of Guelph

- Dr. Kevin Kerr worked with liaison, Dr. Jeremy deWaard on a project entitled, “DNA Barcoding Animals of the Toronto Zoo.” ‘DNA Barcoding’ is a method for species identification that uses the DNA sequence of a standardized gene region found in all animals. This gene region tends to be the same within species and differs between species. Once a library of reference sequences from previously identified ‘voucher’ specimens is compiled, sequences from unidentified specimens can be compared to this database to reveal their identity. Sometimes DNA barcodes even reveal genetically distinctive species that have not been previously recognized. The DNA Barcoding initiative was developed nearby at the University of Guelph. The Toronto Zoo aims to be the first zoo in North America to barcode all of the animals species that it cares for. This will contribute to the completeness of the DNA Barcode database and might shed light on the taxonomy of some of the Zoo’s lesser known animals.

#### University of Toronto, Scarborough Campus

- Dr. Mastromonaco is the Course Liaison for BIOC62H3 – Roles of Zoos in Conservation and holds an adjunct faculty position. A lecture course that examines the changing role of zoos through time, but emphasizing contemporary topics such as: captive breeding and re-introduction of species vs. new technologies to assist reproduction in wild populations; the importance of nutrition and behavioural enrichment in captive animals; zoos and public involvement/education; endangered species in Canada; and habitat restoration.
- Dr. Lentini, was the Co-Advisor for a MSc. Candidate, Jethro Valido, for the Masters of Science Program. The student conducted a research project to determine critical habitat use of Blanding’s turtles during foraging, nesting and overwintering activities in Rouge National Urban Park. This project investigated the survival and habitat use of “head-start” Blanding’s turtle juveniles following their release into Rouge Park. Blanding’s turtles that had been reared by the Toronto Zoo as part of a Parks Canada recovery partnership and were released into Rouge Park wetlands in June 2014 and 2015. A sub-set of the juveniles released each year (10 individuals) were tracked one to three times per week via radio-telemetry to determine survivorship and habitat use.
- Dr. Rapley is the M.Sc. project liaison and Memorandum of Understanding liaison, and holds an adjunct faculty position.
- Kyla Greenham was the Advisor for student S. Huang for the Master of Environmental Science in Conservation and Biodiversity Program. The student conducted a 2 day (16 hours) per week internship at no cost to the Zoo from October 2015 to April 2016. The student worked on manual migration of Biocon animal data records to ZIMS as well as database management analysis for errors.

#### Laurentian University

- Dr. Gabriela Mastromonaco is an Adjunct Professor in the Department of Biology.
- Dr. Mastromonaco was Co-Advisor of two M.Sc. students and an Advisory Committee Member for a M.Sc. student

- Graduate Programs in Biology
  - Michelle Lawrence completed her M.Sc. degree on a study that assessed the relationship between sperm morphometrics and inbreeding in various carnivore species, including the cheetah, red wolf and black-footed ferret. Her results demonstrated that variations are observed based on selection pressures in animals both in captivity and the wild.
  - Madison Acker started her M.Sc. degree investigating stress physiology in Vancouver Island marmot using hair cortisol analysis. The goal of her project is to identify differences in chronic stress levels in captive vs wild individuals.

#### Trent University

- Dr. Gabriela Mastromonaco is an Adjunct Professor in the Department of Biology and was an Advisory Committee Member for one M.Sc. student.
- Dr. Kevin Kerr holds a special graduate faculty position in the Department of Environmental and Life Sciences. In 2015, he served as Co-Advisor for the following project a project entitled, “Investigating the Diet Composition of a Threatened Ontario Songbird, the Barn Swallow (M.Sc. thesis project for Beverly McClenaghan.” The project focused on the barn swallow (*Hirundo rustica*), one of the few native species at risk that naturally inhabits the Toronto Zoo site and is likely the only one encountered by visitors. Sadly, this species has declined in the province by 66% since 1970. The province has identified the filling of knowledge gaps as one of the key objectives in the recovery strategy. We will be using a genetic identification method – namely, DNA barcoding – to determine the abundance of diversity of insect species in barn swallow diet and habitat. The influence of these factors on barn swallow nesting success will be assessed to gauge the recovery needs for this species.

#### York University

- Maria Franke continued to work with Dr. Suzanne MacDonald on several projects with a key focus on giant panda behavioural data analysis looking at enrichment and stereotypical behavior. The purpose of this project is to establish baseline data on the behaviour of giant pandas (*Ailuropoda melanoleuca*) Er Shun and Da Mao. A behavioural profile of the animals will be compiled, 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. As well, important breeding behaviours and morphological changes will be recorded and correlated with hormone profiles to better understand giant panda estrus and timing of breeding. Observations will be conducted throughout the year, 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.

#### University of Saskatchewan

- Dr. Gabriela Mastromonaco maintains an active research collaboration with the Wood Bison Reproductive Research Group at the Western College of Veterinary Medicine and was an Advisory Committee Member for a Ph.D. student.

#### University of Manitoba

- Dr. Gabriela Mastromonaco collaborated on a research study and was an Advisory Committee Member for a M.Sc. student.

### Fleming College

- Dr. Gabriela Mastromonaco is a Program Committee Advisor for the Biotechnology Program and was an Advisor for an internship student.
  - Stephanie Matteer completed a 4 month internship in the Reproductive Labs as part of her Biotechnology diploma. She was trained in reproductive hormone analyses and assisted us with the evaluation of reproductive parameters in breeding animals at the Zoo.

### Seneca College

- Dr. Gabriela Mastromonaco was an Advisor for a co-op student.
  - Chantal Seguin completed an 8 month co-op placement in the Reproductive Labs as part of her Technology diploma. She was trained in reproductive hormone analyses and assisted us with the evaluation of reproductive parameters in breeding animals at the Zoo.
- Kyla Greenham was the Advisor for student, T. Haight for the Graduate Business Management Sustainability Internship Program. The program is a 2 day (16 hours) per week internship at no cost to the Zoo from October 2015 to April 2016. The student has completed an environmental energy and waste audit of the Zoo's Operations Complex and is completing an Environmental Management System Business Case Analysis for certifying Toronto Zoo with ISO14001 or equivalent Third Party Auditing system.

### Human Resources Development Canada

Canada Summer Jobs provides funding to help employers create summer job opportunities for students. It is designed to focus on local priorities, while helping both students and their communities. It provides funding to not-for-profit organizations, public-sector employers and small businesses with 50 or fewer employees to create summer job opportunities for young people aged 15 to 30 years who are full-time students intending to return to their studies in the next school year. In 2015, CEW- Curatorial Branch received 3 positions:

- Veterinary Research Assistant
- Invertebrate Curatorial Assistant
- Species at Risk Turtle Research Assistant

The CEW Division continues to build new partnerships and strengthen current relationships. CEW continued to have a successful year despite the need to decrease the number student placements, new initiatives, and talks and tours in the area of veterinary science and reproduction due to the construction of the new Wildlife Health Centre. The new 2016 year is expected to be a very positive year with new partnerships and relationships.

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William A. Rapley, D.V.M., M.Sc.  
Executive Director  
Conservation, Education & Wildlife