

PROJECT SUMMARY

to the Agreement between Minnesota Zoo
and the Board of Management of the Toronto Zoo.

PROJECT TITLE: Amur Tiger Conservation

PURPOSE: To protect the small remaining population of Amur tigers in the wild.

PROJECT OUTLINE: N/A

BACKGROUND:

Amur tigers are the largest cats in the world. Sadly, they are also one of the most endangered. Amur tigers are native to the forests of the Russian Far East and northeast China. Approximately 350-400 wild Amur tigers remain, almost all in the Russian Far East. The number one threat to their survival is poaching of tigers and their prey. Habitat loss, tiger-human conflicts, and infectious diseases also threaten the Amur tiger.

GOALS & METHODS:

In the Russian Far East, the campaign supports the Wildlife Conservation Society's efforts to curb poaching. At the heart of these efforts is a strategy that holds anti-poaching teams accountable for their work, provides incentives to those that do a good job, and empowers wildlife managers with information to improve patrolling.

Research also indicates that the development of extensive road networks (that often goes hand in hand with commercial logging) is providing access for poachers. The increasing density of forest roads is posing a major threat to tigers and the prey upon which they depend. By working with local timber companies and local government, we hope to close unneeded forest roads and thus reduce the rates of poaching and illegal logging.

OBJECTIVES:

WCS has achieved considerable success in improving anti-poaching efforts across tiger range countries through a comprehensive program to improve ranger patrol skills, equipment, and strategic approaches. The biggest advantage of this anti-poaching strategy is the opportunity to measure and compare both efforts (e.g. kilometers patrolled) and results (e.g. number of arrests) both spatially and temporally. Together these data provide a more realistic picture of true poaching pressures, and an accurate portrayal of anti-poaching efforts and successes (or failures, as the case may be). This data-driven approach allows park managers to see strategically assess how their effort has been allocated across management units, where violations are most prevalent, and what can be done to rapidly reallocate law enforcement efforts. To date, employment of WCS's anti-poaching strategy has resulted in consistent improvements at six tiger source sites in Russia. Each law enforcement program has five key components:

- i) A training workshop to introduce staff of each protected area to the program, including training sessions and provision of necessary materials for collecting, storing, and managing patrol data (i.e. GPS units, mapping software, laptops).
- ii) Provision of operational support for anti-poaching patrols (i.e. fuel, vehicle maintenance, equipment).
- iii) A performance-based incentive scheme that rewards improvements in anti-poaching results.
- iv) Regular bi-monthly strategic planning meetings where inspectors can review results from the previous patrol cycle, identify new priorities, and discuss tactics for the next cycle of patrol activities.
- v) A biological monitoring program to track changes in tiger/prey densities and to provide insight into trends in tiger population dynamics. We now have several years of data from our first four sites where the

anti-poaching strategy has been implemented, and we have documented significant improvements in anti-poaching effort (Figure 6). The new anti-poaching strategy has also resulted in greater patrol efforts and a reduction in threats. Data show that Amur tiger populations have been stable or increasing (Hotte et al. 2016). After hearing these results with clear measurements of effects, directors from Russian protected areas are strongly advocating adopting this anti-poaching strategy in protected areas across Russia. However, there is still much work to be done before the strategy is fully sustainable. Indeed, the introduction of this kind of information-led approach to law enforcement represents a major cultural shift in operating procedures of Russian protected areas and we therefore institutionalization of the process at protected areas is expected to take 3 – 7 years. During the consolidation phase of this project, WCS efforts will focus on continued capacity building of Protected Area staff, and enhanced collaboration and cooperation between enforcement agencies.

Anticipated date of completion: January 1, 2018; however, the program is ongoing

The total budget for this donation to a larger project is \$1,941 USD.

FUNDING:

Endangered Species Reserve Fund Grant

\$1,941 USD

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT:

Tara Harris
Tiger TAG SSP Coordinator
Minnesota Zoo
13000 Zoo Boulevard
Apple Valley, MN 55124-8199 USA
Tara.Harris@state.mn.us

PROJECT SUMMARY

to the agreement between Toronto Zoo and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Toronto Zoo Conservation in Action: In situ Madagascar

PURPOSE:

To provide enhancement funds for the Toronto Zoo to partner in field conservation with the London Zoological Society and the New York Aquarium (Dr. Paul Loiselle, *Emeritus*) and to support T. McCaskie and Toronto Zoo to participate in the Madagascar conservation program for 2017.

PROJECT OUTLINE:

In 2017, with the support of ESRF, there are two major objectives for the Madagascar SSP field conservation effort.

1. The first objective is to continue the field work efforts to determine the status in the wild of *Pychochromis insolitus*, thought to be extinct, and subsequently located in 2013 & 2014 and established in an aquaculture project. The field program operates with local biologists and Antananarivo University, Madagascar Parks staff and the Ministry of Fisheries. Our team has considerable history working with these partners over the several years of this *in situ* conservation project. These field studies are important investigations on the status of fish community structure in rivers and lakes of Madagascar.
2. The second objective is to work with the Zoological Society of London, New York Aquarium/ Dr. Paul Loiselle and local Malagasy biologists, under the auspices of an MOU to establish an *in situ* breeding population of the critically endangered fishes of Madagascar. An MOU is pending as this application is submitted. It is intended to provide financial support for a three to five year time period to offer stability for establishing the fishes in the local ponds. T. McCaskie will visit and assess project objectives are being met, discuss improvements and changes and any needs identified by the Malagasy partners for the aquaculture initiative.

BACKGROUND:

The unique fauna and flora of Madagascar are considered a global conservation priority as these ecosystems face unsustainable resource use. This proposal builds upon the work of Dr. Paul Loiselle, a leading ichthyologist at the New York Aquarium. Dr. Loiselle is the Program Leader for the Madagascar Fishes SSP. He has worked on Malagasy fishes for close to two decades and is a champion within the zoo and aquarium community for these endangered freshwater fishes. T. McCaskie and C. Lee of Toronto Zoo have worked closely with Dr. Loiselle in the field and with conservation breeding endeavours.

The Toronto Zoo has participated in the Madagascar conservation program for 9 years by sustaining a viable population of one species of *Bedotia*, one species of *Ptychochromis* and one species of *Pachypanchax*. This is an AZA recognized conservation program. Of note, T. McCaskie was awarded 2015 Employee of the Year for his efforts for Madagascar Fishes Conservation. This project is one of very few conservation projects that has direct TZ staff involvement, particularly at the international level.

Objectives for 2017 field season:

- Continue monitoring of eastern watershed, particularly those in protected Malagasy parks for 2.5 weeks.
- Review the need to bring individual fishes to N. America for the Madagascar SSP from the in situ

aquaculture facility.

- Check on *in situ* breeding and assess needs over a two year period.
- Assist with training Malagasy partners in the logistics for shipping fishes.
- Meet with Ministry of Fisheries staff and obtain all permits and permissions.

This conservation project has resulted in Lunch and Learn events, Zoo Volunteer presentations, multiple external speaking events, 2011 refereed paper, 2011 AZA presentation, AZA poster (2010), 2012 CAZA presentation and articles for TZ.

BUDGET:

Note: T. McCaskie has personally fundraised for all field endeavours. In 2014, the Malagasy government specifically requested conservation efforts to occur for fishes to be exported from the region (ie. requiring conservation enhancement contributions for these endangered species).

Note: These ESRF funds will also contribute to the LZS-N.Y.Aq-TZ partnership efforts for *in situ* aquaculture conservation. This is a three to five year contribution request. 2017 represents year four.

2017 Projected Expenses

CDN\$

A. Field Costs:

Flight from Toronto to Antananarivo:	\$3,000
Vehicle and gas	\$1 500
Field support expenses – TZ & Malagasy staffs	\$2,900
Field supplies & guide costs	\$3,500
Medical, insurance, permits	<u>\$1,550</u>
Subtotal:	\$12,450

B. In Situ Aquaculture – Partnership

Operational costs (estimates)	\$5,500
Infrastructure improvements	<u>\$2,000</u>
Subtotal:	<u>\$7,500</u>
Total Expenses:	\$19,950

Revenue

Fundraising events	\$5,000
Grants	\$3,000
ESFR – field conservation	\$3,000
ESRF – <i>in situ</i> aquaculture contribution	\$2,000
LZS – NYAq contributions - Aquaculture	<u>\$7,000</u>
Total:	\$20,500 CDN

FUNDING:

Seeking a total of \$5,000 from the Toronto Zoo Endangered Species Reserve Fund for 2017. Note: the aquaculture *in situ* partnership with the two conservation institutions is a three to five year MOU (discussions are currently underway).

Endangered Species Reserve Fund Grant

\$4,000 CDN

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the CEO and Toronto Zoo.

PROJECT CONTACT: Tim McCaskie, Keeper Grade 4, C. Lee, Curator of Fishes & Marine Invertebrates.

PROJECT SUMMARY

to the Agreement between the Great Lakes Program and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Freshwater Mussels – Great Lakes Conservation (matching funds)

PURPOSE:

To provide \$4,500 as matching funds from the Toronto Zoo when applying for external funding for the conservation of freshwater mussels program.

PROJECT OUTLINE:

Toronto Zoo is a unique leader in the conservation of freshwater mussels in Canada. Key partnerships are being developed with government agencies to combine a public awareness program "I am Important! I am Protected!" and groundbreaking field work in the Lake Ontario watershed. These funds, with matching funds from external sources, will continue Toronto Zoo's work on native freshwater mussels of the inland waters of Lake Ontario.

Little is known about freshwater mussel species presence and distribution in inland water bodies feeding Lake Ontario and the recent discovery of the endangered eastern pond mussel at the mouth of the Rouge River suggests that these waters may be a significant refuge for these and other threatened mussel species.

These funds support grant applications for public awareness campaigns, field surveys in the inland waters of Ontario and rearing efforts for native freshwater mussels under the umbrella of the Toronto Zoo Great Lakes Program.

A major focus for 2017 will be the freshwater mussel captive rearing effort which Toronto Zoo partners with Ontario Ministry of Natural Resources, Dept. Fisheries and Oceans, University of Guelph and Missouri State. Introductions of freshwater mussels will also be discussed with project partners in the upcoming year.

BACKGROUND:

This conservation project places Toronto Zoo at the forefront of the international initiative for mussel conservation. Over 75% of Canadian freshwater mussel species reside in Ontario and 65% of Ontario mussel species are in need of conservation efforts – this is greater than any other taxa. Toronto Zoo has a strong background in local aquatic conservation and has developed many partnerships with conservation organizations through a variety of restoration projects including, Toronto Zoo Fishway construction (OMNR, Ontario Streams, TRCA) and clean-up, tree planting events (Ontario Streams) and Atlantic salmon restoration (OFAH, OMNR).

GOALS & METHODS:

Building on the success of the Great Lakes Outreach Program - which reaches over 17,000 students each year - the 'I am Important! I am Protected!' campaign incorporates freshwater mussel biology and ecology into the Great Lakes Outreach program, and will seek to foster stewardship of these elusive creatures with the launch of a new freshwater mussel reporting smartphone app in the spring of 2017. Field studies will continue to determine the status mussels in Ontario waters and the provincial partnership to culture and introduce mussels will enter year three.

1. Community outreach
2. Freshwater mussel reporting app launch
3. Field surveys within the Great Lakes watershed
4. Rear and release pilot project with academia and government partners

Anticipated date of completion: December 30, 2017

BUDGET:

Total Expenses

- Community outreach	\$10,000
- Field studies	\$15,000
- Rear & release	<u>\$52,000</u>
Total	<u>\$77,000</u>

Revenue

Request from ESRF – matching funds	\$4,000
External funding (confirmed)	\$10,000
External funding (pending)	<u>\$20,000</u>
Subtotal	<u>\$34,000</u>

***Additionally, the scope of this project conforms to the funds available.**

FUNDING:

Endangered Species Reserve Fund Grant **\$4,000 CDN**

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACTS: C. Lee Curator of Fishes and Marine Invertebrates, M.K. Whibbs,
Toronto Zoo & and B. Telford, Toronto Zoo

PROJECT SUMMARY

to the Agreement between the Aqua-Links and the Board of Management of the Toronto Zoo.

PROJECT TITLE: Toronto Zoo Aqua-Links - Matching Funds

PURPOSE:

To provide matching funds support for Toronto Zoo Aqua-Links program. Aqua-Links builds upon the success of the Toronto Zoo Great Lakes Program as an international conservation program. Aqua-Links connects students in Ontario with East African students over the internet. Currently schools in each region partner to use Toronto Zoo lesson plans and classroom aquaria to rear and release Atlantic salmon as teaching tools for experiential learning.

C. Lee has successfully raised partial funding to meet expenses since 2009 to establish this initiative called *Aqua-Links*. The requested funds are used as matching contribution for grant applications.

PROJECT OUTLINE: N/A

BACKGROUND:

The L. Victoria SSP conservation has been on-going at Toronto Zoo since 1988. Our efforts have developed from captive breeding of the endangered African fishes, to support graduate student programs, exhibit development and staff training in Africa, and since 1997, working with our AZA and African colleagues on education related programs in East Africa. Zoo staff worked overseas in 1997, 1999 and 2010. The Zoo has focused on the *in situ* components and has been working on a specific project called Aqua-Links to connect African and Ontario students on Great Lakes issues from each continent.

The 2016/17 academic year is the third year of partnership with Toronto District School Board (TDSB). Arising from the Zoo's Great Lakes Program success, the TDSB has provided funding to support the addition of 10 secondary schools to the Aqua-Links Program.

GOALS & METHODS:

This application represents Toronto Zoo cash contribution used as matching funds for additional support. We are seeking funding of over \$35,000.

This program is endorsed by Lake Victoria SSP and the Freshwater Fishes TAG committees.

2017 Goals are:

- Continue salmon-rearing partnership with TDSB secondary schools
- Continue to add new school from Aqua-Links Program wait-list for salmon rear-and-release component
- Develop plans for a sustainable and participatory program with African partners
- Revitalize partnerships in Uganda and Kenya, including MOU's.
- Implement new Aqua-Links program evaluation
- Continue to seek funding

Anticipated date of completion for this phase: December, 2017

BUDGET:

The total request from the 2017 ESF is \$4,000. Additional program funds are being sought from other SSP institutions, AZA, foundations and corporations to reach 100% funding level. Of note, the *Aqua-Links* project can proceed in increments as funds become available, more classes are added.

2016 Aqua-Links Budget

• Human resources	\$57,000 CDN
• Equipment: linking, etc	\$ 3,000
• Travel for partners	\$ 3,200
• Educational materials	<u>\$ 2,500</u>
	\$65,700

The total budget from the 2017 Endangered Species Reserve Fund for this project is \$4,000.

These ESRF monies will be used as cash matching funds for fundraising efforts. We are currently continuing to seek financial support to operate the program to the full funding level. Our Africa partner continues to be the Fisheries Research Institute, Jinja, Uganda.

FUNDING:

Request from Endangered Species Reserve Fund Grant	\$4,000 CDN
Seeking additional grant funding	\$35,000

Endangered Species Reserve Fund Grant **\$4,000 CDN**

The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Cynthia Lee, Curator of Fishes
Mary Kate Whibbs, Coordinator, Aqua-Links

PROJECT SUMMARY

to the Agreement between the Great Lakes Program and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Great Lakes Program

PURPOSE:

To promote freshwater conservation and ecosystem health for the benefit of all species relying on this unique national resource.

PROJECT OUTLINE:

Provide bilingual outreach presentations to students and teachers across Ontario, from Chatham-Kent to Ottawa. Focus outreach efforts on bringing awareness to aquatic species at risk and freshwater conservation.

Achievements:

- Public events, presentations, libraries
- Bi-lingual classroom outreach: targets over 19,000 students & educators annually geographic range of Windsor to Ottawa
- Bi-lingual lesson plans curriculum based for Science & Technology
- 2014 OMOE/Min. Education partnership to create Great Lakes Teaching & Learning Resource for Grade 8 – province wide resource and separate online, electronic teaching module
- Electronic learning i.e. “Maude the Mussel”: ages 5-7 yrs, American eel game for 10-12 yrs
- Multi lingual materials for Great Lakes: Mandarin, Urdu, Punjabi, French, English. Green initiative all materials are contained on custom designed water drop flash drive to save paper.
- Two educational video podcasts were developed in collaboration binational partners, Great Lakes Discovery World, in Milwaukee, Wisconsin
- Freshwater mussels public campaign: “I am Important. I am Protected”, cottagers, waterfront landowners
- Redside dace (local endangered species) outreach presentations – endangered species

BACKGROUND:

The Great Lakes Program is a free, bilingual, curriculum-based outreach program. Presentations are offered to schools, libraries, scout groups and environmental organizations. The Program is offered in English and French. As a new initiative, brochures are available in Punjabi, Urdu 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 local fish species at risk, freshwater mussels, and water conservation. The Program focuses on several primary fish species at risk including Atlantic salmon (extirpated), redbside dace (endangered), eastern sand darter (threatened), American eel (endangered in Ontario), and lake sturgeon (threatened), while encompassing an ecosystem perspective on multiple species at risk (terrestrial and aquatic). The Great Lakes/ Aqua-Links Programs reaches over 20,000 participants annually.

GOALS & METHODS:

Goals:

Provide outreach presentations and educational materials in English and French for 21,000 students and teachers across Ontario. Educate and inspire the public to conserve water and resources and take action to species at risk.

Methods:

Use database of over 500 teacher contacts to offer presentations in school boards across Ontario, focusing on:

- Toronto District School Board
- Toronto Catholic District School Board
- Durham District School Board
- Durham Catholic District School Board
- Peel District School Board
- Dufferin-Peel Catholic District School Board
- Limestone District School Board (Kingston, ON)
- London District Catholic School Board (London, ON)
- Thames Valley District School Board
- York District School Board
- York Catholic District School Board
- Upper Grand District School Board
- Wellington Catholic District School Board
- Halton District School Board
- District School Board of Niagara

Anticipated date of completion: March 31, 2017

BUDGET:

The total budget from the Endangered Species Reserve Fund for this larger project is \$95,000

FUNDING:

Endangered Species Reserve Fund Grant **\$13,861 CDN**

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Cynthia Lee
361A Old Finch Ave
Toronto, ON M1B 5K7

PROJECT SUMMARY

to the Agreement between the Adopt-A-Pond Wetland Conservation Program and the Board of Management of the Toronto Zoo.

PROJECT TITLE: Blanding's Turtle AND Wood Turtle Head Starting - Matching Funds

PURPOSE:

To provide matching funds from the Toronto Zoo when applying for external funding. Funding sought to leverage matching funds from grant sources for species at Risk recovery.

PROJECT OUTLINE:

Project supported by: Rouge Park; Ontario Multi Species Turtles at Risk Recovery Team.

Results from this project will compliment ongoing recovery efforts for these species across Ontario and will provide valuable long-term data on the use of head starting as a population augmentation tool for reptiles. This project is designed to address threats and provide long-term solutions for population sustainability of turtle SAR. Rouge Park provides one of the largest remaining expanses of habitat for Blanding's turtles and other Species at Risk (SAR) turtles in an otherwise fragmented, urbanized landscape, connecting a large portion of historic turtle habitat from the Oak Ridges Moraine to Lake Ontario. Rouge Park provides a unique opportunity not only to sustain its existing Blanding's turtle population, but also to provide source-protected populations that could colonize other coastal marshes and watersheds in the GTA. Wood turtles are head started for release into SW Ontario river systems. Toronto Zoo maintains two headstart facilities and uses both mark recapture and radio transmitters to establish survival rates of released turtles.

BACKGROUND:

Matching grant funding applications are submitted to support the Toronto Zoo's Urban Turtle Initiative (UTI). UTI has studied movement and habitat use of SAR turtle populations in Rouge Park since 1999 and provided head start expertise for wood turtles since 2009. The UTI has documented that the population is not sustainable at its current size (five adults and one juvenile) and recommended supplementation with head-started hatchlings as part of a comprehensive approach to conserving this species in the Park which also includes habitat creation, road threat mitigation, and education.

GOALS & METHODS:

We will continue head starting Blanding's and wood turtles to achieve sustainable population sizes in Rouge Park and Huron County. Development of long-term protocols for turtle rearing, release and monitoring is essential to ensure that juvenile recruitment is maximized and adult populations can reach sustainable levels through juvenile supplementation. It will promote knowledge and understanding of significant turtle species within the Park and provide nearby residents and park users with interpretive materials and dialogue that will facilitate respect for natural and cultural heritage values. It will protect the natural ecosystem of the Park by increasing awareness about turtle threat mitigation and work towards a long-term strategy for the recovery of native species and habitat. \$1000.00 will be provided to the Huron Stewardship Council to assist in Wood turtle spring surveys, nest monitoring, and egg collection – activities that are crucial to the success of the project.

Anticipated date of completion: December 31, 2017

BUDGET:

The total budget for this project is \$51,000.

Additional funding:

Rouge Park (not confirmed): \$10,000

UTSC (graduate student for field ecology research): \$18,000

Huron Stewardship Council \$15,000

The total budget from the Endangered Species Reserve Fund for this larger project is \$7,101 CDN

FUNDING:

Endangered Species Reserve Fund Grant

\$7,101 CDN

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Leanne Collett

Adopt-A-Pond Wetland Conservation Program

Toronto Zoo

361A Old Finch Ave

Toronto, ON M1B 5K7

Collaborators:

Paul Yannuzzi

Maria Papoulias, Julia Phillips and Leonardo Cabrera, Rouge National Urban Park

Nick Mandrak, UTSC

HURON STEWARDSHIP COUNCIL

PROJECT SUMMARY

to the Agreement between Maria Franke and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Little Brown Myotis Assurance Colony Planning

PURPOSE:

To establish captive husbandry protocols and future assurance colonies of a newly listed Species at Risk, little brown myotis, to mitigate further population decline due to White-nose Syndrome (WNS; *Pseudogymnoascus destructans*)

PROJECT OUTLINE:

To secure funding and as matching funds to allow the Toronto Zoo to investigate feasibility of a captive breeding colony of little brown myotis (*Myotis lucifugus*) and the associated research with the project.

BACKGROUND:

The little brown myotis was once the most abundant mammalian species in North America. In the face of White-nose Syndrome (WNS; *Pseudogymnoascus destructans*), insectivorous bat populations in Canada have been decimated and all efforts to establish effective husbandry protocols for the species have been unsuccessful. The Toronto Zoo is taking first steps in the field of bat conservation research and will pioneer effective husbandry protocols for insectivorous bats in North American.

Further planning and analyses are required in order to successfully implement captive care of the insectivorous bats. With the help of university partners, we will look in to the feasibility of a captive colony of bats and develop research questions to overcome current shortfalls in knowledge of day to day care.

GOALS & METHODS:

1. Research feasibility of the entire scope of the project.
2. Develop husbandry methods for insectivorous bat species.
3. Liaise with industry professionals in the field of bat conservation to better understand species requirements.

Initial talks with experts in the field of bat conservation have taken place but more research is necessary in order to understand the feasibility of the project. The researcher will write a summary report outlining the project and attributed costs. This information will then be used on subsequent grant proposals if the project is considered feasible by the Toronto Zoo.

Toronto Zoo staff will develop new husbandry protocols to best manage a large population of captive bats with intended future release to the wild. These methods will be adapted from other successful captive insectivorous bat populations that have been used to keep big brown bats and other Myotis species for short periods of time. A new husbandry manual will be created by the Toronto Zoo laying out the best management and practices for the species in a captive environment.

Communication and travel to different experts across Canada and the United States is vital to the planning of this project. Ongoing talks will ensure the most amount of information is being collected and put

towards husbandry protocols and feasibility analyses.

PARTNERSHIPS:

University of Winnipeg
Ontario Ministry of Natural Resources and Forestry
Parks Canada (RNUP)
Western University

Anticipated date of completion: January 1, 2018 (although a long term project).

BUDGET:

Little brown myotis project planning

Winter, Spring

Staff time (12 weeks) x1 = \$7,420.80
Mandatory Employer Costs (15.4%) = \$1142.80
Staff travel x3 = \$600.00
Resources = \$836.40

The total budget from the ESRF for this project is \$8,796.00
Submitted for 2017 ESRF

FUNDING:

Endangered Species Reserve Fund Grant

\$8,796 CDN

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Office within 60 days of the anticipated completion date.

PROJECT CONTACT:

Maria Franke
Toronto Zoo
361A Old Finch Ave.
Toronto, ON M1B 5K7
Tel: (416) 392-5967

PROJECT SUMMARY

to the Agreement between Kevin Kerr and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: The Evolving Role of Zoos in Conservation

PURPOSE: To provide support for a master's student to investigate the efficacy of zoo-based conservation

PROJECT OUTLINE:

BACKGROUND

Many modern zoos have adopted conservation as their *raison d'etre*. However, the purported focus on conservation is not reflected in the composition of species maintained at most zoological parks. Recent studies have demonstrated a skew towards larger-bodied species with large native ranges, at least for mammals and birds. The very factors that contribute to risk of extinction (e.g. limited home ranges) might also act as barriers to recruitment for managed populations, which could explain this skew. Recent studies have also demonstrated that while zoos have been essential in saving critically endangered species from becoming extinct, captive breeding is not the most effective solution for *all* species. New thinking is required to determine to most efficacious collection planning method to optimize the conservation impact of zoos.

The role of zoos in conservation can be divided into two main arenas: the direct conservation of species through captive-breeding programs and the indirect conservation of wildlife through visitor education. Species maintained in zoological settings that are not of direct conservation concern are thus frequently said to function as ambassadors for their endangered counterparts, used to foster sympathy and support for threatened species and habitats. But the effectiveness of this association lacks strong support and arguably is too passive in its current incarnation as a conservation tool. Extensive resources, including both staff time and critically-limited holding space, are both occupied by the maintenance and management of Least Concern species in zoos. Thus, it is imperative that the role of non-endangered species in zoos and their effectiveness toward conservation goals be critically examined.

GOALS & METHODS

The goal of this project is to advance our understanding of the influence of non-endangered species on behavioural modification of visitors to a zoological park. This information can then be applied to collection planning to better inform decisions about species composition within zoos. The funding requested for this project is to fund a master's student to more fully explore this area of research. The research will likely rely heavily on survey methodology and should also include a useful synthesis of the current literature. The research will be conducted in collaboration with a professor from an Ontario university, though the collaborator has not yet been finalized.

Anticipated date of completion: August 31, 2019

BUDGET

The total request from the 2017 Endangered Species Reserve Fund for this project is \$6,677. The funds will be applied toward a Mitacs internship to support a master's student.

Expense breakdown:

Organizational sponsorship (Toronto Zoo)	\$7,500 CDN
Mitacs matching contribution	<u>\$6,677 CDN</u>
Total internship support	\$14,177 CDN

FUNDING

Endangered Species Reserve Fund Grant \$6,677CDN
The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Kevin Kerr
Toronto Zoo
361A Old Finch Ave.
Toronto, Ontario
M1B 5K7
Tel: (416) 392-5972

PROJECT SUMMARY

to the Agreement between the Adopt-A-Pond Wetland Conservation Program and the Board of Management of the Toronto Zoo.

PROJECT TITLE: Habitat Assessment and Restoration for Species at Risk - matching funds

PURPOSE:

To provide matching funds from the Toronto Zoo when applying for external funding. Funding sought to leverage matching funds from grant sources for Species at Risk recovery.

PROJECT OUTLINE:

The purpose of this project is to work with waterfront property owners in Ontario to identify water and wildlife preservation priorities and implement a variety of habitat and shoreline protection and restoration actions to improve the ecological health of wetlands and protect the natural heritage values important to each community.

BACKGROUND

The Adopt-A-Pond programme has applied the processes and tools of Community-Based Social Marketing to develop and implement turtle Species at Risk conservation programs that create positive behavior change in participants. Strategies for turtle conservation based on the primary threat of habitat loss have now been developed. Through expert analysis by the Ontario Multi Species Turtles at Risk Recovery Team, property owners were identified as a critical audience for program development and a series of focus groups and surveys were carried out to better understand the values and potential behaviours associated with this particular group. In the past we have made contact with numerous communities and sat down with focus groups to outline an action plan that would help accomplish various stewardship activities. We helped to conduct rapid wetland assessments, create local wetland maps, deliver workshops on local wetland wildlife, conduct educational programming in local schools, and build a turtle nesting beach with community volunteers. Since this time we have established partnerships with additional communities and assessment of the wetland and shorelines areas of each lake is necessary.

GOALS & METHODS

The goal of this program is to work in communities to implement evaluations and protection of critical wetland habitats for all species at risk. We hope to provide training to staff in MNR wetland assessments and continue to work with Lake Associations to empower communities to identify, protect, and restore watershed resources.

While specific actions vary depending on the expressed needs of each property across Ontario, we anticipate that we will 1.) identify important habitats by determining their biological, hydrological and social significance to help protect significant habitat and species, 2.) assess shorelines and engage landowners in stewardship actions to plant native vegetation, remove hardened shoreline, naturalize interfaces etc. to help protect water quality, 3.) work with partners to restore and improve wetlands and surrounding habitat by conducting native planting exercises, and 4.) deliver events and training sessions to involve individuals in stewardship projects and empower them with the information and skills they need to maintain conservation programs on their property into the future. We will teach community members how to begin and maintain long-term monitoring programs for species indicative of wetland habitat diversity by hosting training sessions on Ontario Turtle Tally and FrogWatch Ontario.

Overall, this project will highlight valuable habitat for Species at Risk and will equip property owners with the necessary knowledge to begin habitat restoration and protection initiatives on their properties. This includes a formal report of the assessment and best management practices recommendations. A habitat suitability model will be a valuable asset and will meet the need to protect quality wetland habitat that is fundamental to the conservation of endangered species.

Anticipated date of completion: December 31, 2018

BUDGET

The total budget for these species at risk, shoreline and wetland projects is 24,000.

The total budget from the Endangered Species Reserve Fund for this larger project is \$7,101 CDN

FUNDING

Endangered Species Reserve Fund Grant

\$7,101 CDN

The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Leanne Collett, Adopt-A-Pond Wetland Conservation Program
Toronto Zoo
361A Old Finch Ave
Toronto, ON M1B 5K7

Collaborators:

Paul Yannuzzi

Crystal Robertson

Toronto Region Conservation Authority

Private land owners

PROJECT SUMMARY

to the Agreement between Maria Franke and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Black-footed Ferret Canadian Reintroduction – Post Release Monitoring

PURPOSE:

To secure funding to allow the Toronto Zoo to continue to be a major participant in black-footed ferret and prairie dog field research and assist with reintroductions and post release monitoring of the highly endangered black-footed ferret in Canada.

PROJECT OUTLINE: N/A

BACKGROUND:

The black-footed ferret (BFF) is the only native ferret known to North America. Once thought to be extinct, it is now listed as one of North America's most endangered species. In the 1980s, the last remaining wild ferrets were brought into captivity to set up a breeding and reintroduction program. Over 6,500 kits have been born in six facilities within the Association of Zoos and Aquariums Species Survival Plan (AZA – SSP). Toronto Zoo has been involved in the program since 1992 and is the only Canadian facility breeding BFF for release into the USA and Mexico.

In 2004, the Toronto Zoo, in partnership with Parks Canada, US Fish & Wildlife Service (USFWS), private stakeholders and other organizations established a joint Black-footed Ferret/Black-tailed Prairie Dog Canadian Recovery Team to look at reintroducing black-footed ferrets into Canada. In Canada, the BFF historically ranged from the western prairies, to the south of Calgary, Alberta, and south of Regina, Saskatchewan. It was listed as extirpated in Canada in 1978. The black-tailed prairie dog (*Cynomys ludovicianus*), the ferrets primary prey, has the largest Canadian distribution in Grasslands National Park (GNP), Saskatchewan.

Extensive analyses and planning have already been completed and the first Canadian release occurred in GNP on October 2, 2009. The site will be a small managed release site with the hope of expansion in the future. This exploratory reintroduction will involve frequent monitoring to mitigate threats and bolster the population with additional individuals when necessary.

GOALS & METHODS:

The goals of this project are as follows:

- 1) Transfer of BFF's to Grasslands National Park for reintroduction
- 2) Conduct post release research and monitoring of BFF's

Black-footed ferrets will be monitored to estimate population size, survival and reproduction. The first monitoring period occurred 30 days post-release to determine early survival rates. Because BFF are nocturnal, spotlighting (Clark et al. 1984, Biggins et al. 2006) will be used to locate, count and determine distribution of BFF. This initial monitoring will occur after every additional reintroduction.

Subsequently, BFF will also be surveyed by spotlighting every spring in late March or early April to determine over winter survival and spatial distribution of ferrets. In addition, from late July through September, a combination of spotlighting surveys and live trapping will be used to estimate annual

population size and litter production.

PARTNERSHIPS:

US Fish and Wildlife
BFF Recovery Team
Canadian BFF/Pdog Recovery Team
BFF SSP
Parks Canada
Saskatchewan Lands
Saskatchewan Fish & Wildlife

Anticipated date of completion: This is an ongoing project.

BUDGET:

Black-footed ferret release & monitoring

Summer monitoring and early fall release

Staff travel x 4	\$4,000.00
Food & Accommodations x 4	\$3,000.00
Car rental	\$2,000.00
Total	\$9,000.00

The total budget from the ESRF for this project is \$2,321.00
Submitted for 2017 ESRF

FUNDING:

Endangered Species Reserve Fund Grant

\$2,321 CDN

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT:

Maria Franke
Toronto Zoo
361A Old Finch Ave.
Toronto, ON M1B 5K7
Tel – (416) 392-5967

PROJECT SUMMARY

to the Agreement between Reproductive Physiology and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Variation in Stress hormones in Wild and Captive Vancouver Island Marmots

PURPOSE: Research

PROJECT OUTLINE: N/A

BACKGROUND:

Assessing stress responses in natural populations has been of particular importance from a conservation perspective, as researchers attempt to evaluate the sub-lethal effects of anthropogenic activities on wildlife (Dantzer et al., 2014). Stress-induced effects on physiology and energetics may have significant consequences for individual health and reproductive success (Busch and Hayward, 2009), which ultimately impact population dynamics and viability (Charbonnel et al., 2008). Species brought into captivity can exhibit elevated stress responses as a result of novel stimuli (Franceschini et al., 2008). The role of stress responses in both wild and captive contexts has particular relevance to endangered species that may be subject to anthropogenic pressures in the wild, as well held in captivity for captive breeding programs.

Short-term elevation in response to acute stressors is part of daily life and necessary for an animal's survival in the wild. However, chronic activation of the HPA axis can lead to reproductive dysfunction, reduced fitness and disease (Wingfield and Sapolsky, 2003). Thus, the measurement of cortisol and/or its metabolites has been used to evaluate the degree of physiological stress an animal has experienced and gain an understanding of how environmental stressors affect adrenal function and cortisol production and, potentially, fitness. Recently, we validated the use of hair as a substrate with which to assess cortisol levels in eastern chipmunk (*Tamias striatus*) and used feces and hair to assess the stress response of eastern chipmunk to logging disturbance in Algonquin Provincial Park (Mastromonaco et al., 2104).

The Vancouver Island marmot (*Marmota vancouverensis*) is the subject of a captive breeding program to supplement declining natural populations resulting from a combination of landscape alteration, predation and climate change. As one of a few successful species reintroduction programs, Vancouver Island marmots provide us with the opportunity to better understand the role of stress in predicting reproductive success in captivity and the wild. This study will test several hypotheses. First, we predict that cortisol levels will be correlated with external pressure arising from anthropogenic activities. We also predict that cortisol will be elevated in captive marmots because of the novel environment that they are subjected to. Alternatively, cortisol levels may be lowered in captivity following acclimation because of the relatively benign conditions of captivity.

GOALS & METHODS:

The goal of this study is to compare fecal and hair cortisol levels collected from captive and wild Vancouver Island marmots and correlate them to reproductive hormones and outcomes.

Samples will be collected from wild marmots during the annual catch-ups done by the recovery team and from captive marmots in the same time period. Historical hair samples will also be obtained from the recovery team archive. Samples will be extracted for steroid hormones and evaluated by enzyme

immunoassay for cortisol, testosterone and progesterone. Hormone concentrations will be correlated to the animal's reproductive status (pregnant, non-pregnant females; proven, non-proven males) and environmental condition (captive, wild with high anthropogenic disturbance, wild with low anthropogenic disturbance).

Anticipated date of completion: December 31, 2017

BUDGET

Fecal/hair sample extraction (\$10/sample x 200 samples)	\$2,000
EIA analysis (\$5/sample x 200 samples x 3 hormones)	\$3,000
HPLC analysis (\$100/sample x 10 samples x 3 hormones)	\$3,000

FUNDING

Endangered Species Reserve Fund Grant **\$2,440 CDN**

The Grant will be paid upon execution of this Agreement.

REPORT

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Gabriela Mastromonaco
Curator of Reproductive Programs & Research

PROJECT SUMMARY

to the Agreement between Reproductive Physiology and
the Board of Management of the Toronto Zoo.

PROJECT TITLE: Endocrine correlates of fitness in captive-reared Eastern Loggerhead Shrikes, *Lanius ludovicianus spp.*

PURPOSE: Research

PROJECT OUTLINE: N/A

BACKGROUND

Captive breeding is an integral component of modern species recovery plans (IUCN, 1998) and has been recommended in over 60% of American species recovery plans (Tear et al, 1993). Despite their prevalence in conservation initiatives, outcomes of captive breeding programs are variable (Beck et al, 1994; Nicoll et al, 2004) and seldom successful (reviewed in Fischer and Lindenmayer, 2000). While inquiry into factors influencing program success have provided some insight (ie. removal of natural selection and loss of predator evasion) (Flemming et al, 2000; Gilligan and Frankham, 2003), exploration of the proximate, physiological mechanisms behind success of captive-reared individuals in the wild is lacking.

The Eastern Loggerhead Shrike (*Lanius ludovicianus spp.*, formerly *migrans*) is a migratory passerine subspecies currently listed as endangered in Canada (COSEWIC, 2014). Recent population surveys estimate only 55 breeding pairs across North America (COSEWIC, 2014), 16 of which breed in Southern Ontario (WPC, unpublished). In 1997, a collaborative captive breeding program was established to supplement the Canadian population and has been responsible for the release of over 500 individuals to date (Lagios et al, 2015). While annual return rates are loosely comparable between captive-reared and wild juveniles (average 4.8% for captive-reared and 3-12% for wild individuals: Okines and McCracken, 2003; Lagios et al, 2015), post-fledging survival of captive-reared individuals is highly inconsistent and can limit program efficacy. Parmely et al (2015) identified a prevalence for gastric hemorrhage in deceased, captive-reared fledglings, suggesting stress experienced in captive breeding programs may mediate survival and downstream integration. Indeed, Cebezas et al (2013) allude to elevated baseline levels of corticosterone (the primary glucocorticoid in birds) in captive reared parrots compared to wild individuals. Though temporary elevation of glucocorticoids may enhance fitness by mobilizing energy stores (Sapolsky et al, 2000; Wingfield et al, 1998), chronic elevation can increase risk of morbidity, mortality and decrease reproductive success (Schoech et al, 1991; Boonstra and Singleton, 1993; Sapolsky et al, 2000; Koren et al, 2012). In birds, numerous studies have shown negative correlations between stress and survival (MacDougall-Shackleton et al, 2009 and Koren et al, 2012 for example) and may yield insight into trends of survival of captive-reared Loggerhead Shrikes and subsequent integration into wild populations.

By coupling long-term monitoring efforts with modern endocrine techniques, we aim to investigate the role of chronic stress during development on survival and integration of captive-reared nestlings in a population of wild, Eastern Loggerhead Shrikes. In conjunction with the Toronto Zoo, Wildlife Preservation Canada (WPC) and McMaster University, we first intend to quantify corticosterone deposited in rectrices of captive-reared nestlings to be released at the Carden Alvar (Ontario, Canada) and Napanee breeding grounds (Ontario, Canada) immediately following fledging (16-18 days post-hatch) (Baicich and Harrison, 2005; Lagois et al, 2015). While assessments of plasma corticosterone titers provide acute "snapshots" of stress axis activation, analysis of glucocorticoids deposited in feathers provides an integrative measure of chronic stress (Bortolotti et al, 2008). Sampled individuals will then be measured (tarsus, wing chord and mass) and given unique combinations of one numbered stainless steel

and three coloured, Darvic leg bands for future identification (Wildlife Preservation Canada, 2011). When possible, birds will be fitted with radio tags for remote location according to WPC protocols (Wildlife Preservation Canada, 2015). Pulp cells from inside the calamus of collected feathers will be used to isolate genomic DNA (Harvey et al, 2006) and sex individuals molecularly as per Griffiths et al (1996). The known population range at Carden and Napanee will then be monitored to assess survival of radio-tagged individuals to two months post-hatch, and again in subsequent years for return from wintering grounds, breeding status (presence or absence of mate pairing) and breeding success (as measured by the number of nestlings successfully fledged) (WPS 2011). Where radio tags were assigned, survival will be assessed by locating tagged individuals prior to migration. Correlations between stress in development and each measure of fitness will be assessed using general linear mixed models (GLMMs), with corticosterone deposition (pg/mm), sex and hatching date as fixed effect predictors, and year and individual as random effects.

To our knowledge, studies regarding stress in captivity and efficacy of avian captive breeding programs are lacking. We therefore hope that this research may provide valuable insight into the effects of stress in captivity on likelihood of integration in wild populations.

GOALS & METHODS:

The goal of this study is to compare feather corticosterone levels collected from captive and wild Eastern loggerhead shrikes and correlate them to body condition and reproductive outcome.

Samples will be collected from shrikes during the annual surveys done by the recovery team and from captive shrikes in the same time period. Samples will be extracted for steroid hormones and evaluated by enzyme immunoassay for corticosterone, testosterone and progesterone. Hormone concentrations will be correlated to the animal's reproductive status and measures of fitness.

Anticipated date of completion: August 31, 2020

BUDGET:

Feather sample extraction (\$10/sample x 200 samples)	\$2,000
EIA analysis (\$5/sample x 200 samples x 3 hormones)	\$3,000

FUNDING:

Endangered Species Reserve Fund Grant **\$2,440 CDN**

The Grant will be paid upon execution of this Agreement.

REPORT:

A report shall be completed and forwarded to the Chief Executive Officer within 60 days of the anticipated completion date.

PROJECT CONTACT: Gabriela Mastro Monaco
Curator of Reproductive Programs & Research