The Lindner Center for Conservation and Research of Endangered Wildlife

SAVING SPECIES WITH SCIENCE®
SITUATION

Conservation is critical to the Cincinnati Zoo & Botanical Garden’s mission and the sustainability of the world’s valuable natural resources. The world’s plants and animals are facing difficult times ahead because of both climate change and the competition for natural resources that is unavoidable on a planet now occupied by over 7 billion people. However, some of those same people offer hope for the animals and plants struggling to survive against all odds. At CREW, researchers work hard every day using science to learn, and applying knowledge to save a future for wildlife.

GOAL

CREW’s mission is: Saving Species with Science. We achieve our mission using the latest in cutting edge technology guided by a heavy dose of common sense and driven by heartfelt passion. Channeling the strengths and expertise of the scientific staff, CREW takes a focused approach to wildlife conservation by identifying a few programs (Signature Projects) where we believe our impact can be significant.
History of CREW:
A snapshot across the decades

CREW was first established in 1981 as the Cincinnati Wildlife Research Federation. A decade later, the state-of-the-art Lindner Center for Reproduction of Endangered Wildlife (CREW) opened on the grounds of the Cincinnati Zoo & Botanical Garden becoming the first facility of its kind dedicated to both animal and plant conservation. As it grew and became more established, CREW’s impact became broader than just reproduction and to reflect this growth, its name was changed to the Lindner Center for Conservation and Research of Endangered Wildlife. By 2011, CREW was known worldwide for its three Signature Projects: Endangered Plants, Small Cats, and Rhinos.

CREW’s Signature Projects

• CREW coined the term “Signature Projects” in 2001 during its strategic planning sessions
• Signature Projects are large-scale, comprehensive conservation efforts in which CREW plays an integral, leadership role
• Signature Projects comprise five components:
  1) education,
  2) research,
  3) propagation,
  4) in situ protection, and
  5) Cincinnati Zoo & Botanical Garden presence

CREW currently has three Signature Projects:

SMALL CATS

RHINOS

ENDANGERED PLANTS
SITUATION
Of the 37 wild cat species in the world, 28 are small in size, weighing less than 50 lbs. Many of these small cats are threatened with extinction in the wild but have received little conservation attention compared to the larger cats. The Association of Zoos & Aquariums (AZA) has established breeding management programs for several small cat species including the ocelot, fishing cat, Pallas’ cat, black-footed cat, and sand cat. As a global leader in cat conservation, the Cincinnati Zoo & Botanical Garden maintains the most diverse felid population of any North American zoo, including all five of these small cat species.

GOAL
Concerted, collaborative efforts of zoos and other conservation organizations will be necessary if small cats are to survive and thrive in both the wild and captivity. CREW’s goal is to ensure that Zoos become more effective at breeding small cats in captivity, educate the public about these amazing animals and support research and conservation efforts with wild populations.

SMALL CAT signature project
PROGRESS
CREW scientists study the reproductive biology of all five small cat species to optimize captive propagation and develop assisted reproductive technologies for population management. CREW uses tools such as fecal hormone analysis and semen collection to characterize basal reproductive traits in small cats and improve breeding success. This basic reproductive knowledge also is applied in developing techniques such as sperm and embryo freezing, in vitro fertilization, embryo transfer and artificial insemination to produce viable offspring in ocelots, Pallas’ cats, and sand cats.

In collaboration with field biologists, CREW also works to conserve small cat populations found in Mongolia (Pallas’ cats), Thailand (fishing cats), South Africa (black-footed cats) and Brazil (ocelots). Field studies supported by CREW have used camera trapping to determine the location of cats in the wild, radiotelemetry to monitor cat movements and reforestation to restore degraded habitats. CREW scientists also work with field biologists to collect and freeze semen from wild cats which allows us to establish genetic exchange between wild and captive populations.

FUTURE
Conservation efforts for small cats must be collaborative and international in scope for long-term success. One key for the future will be developing global management programs, connecting the various regional zoo populations to form one larger metapopulation to maximize genetic viability. CREW’s ongoing research to improve both natural and assisted reproduction of small cats and its international network of dedicated collaborators are invaluable assets in linking captive populations with one another and with small cats surviving in the wild.

Pallas’ Cats in Mongolia
Species: Pallas’ cats (Otocolobus manul)
Status: Near Threatened (IUCN Redlist) in Mongolia due to poaching, vermin control programs and habitat loss.

• CREW helped to initiate the first comprehensive ecological study of wild Pallas’ cats in Mongolia to assess their general health, disease exposure, habitat and prey needs, and population status.
• CREW scientists have characterized the seasonal reproductive traits of Mongolian Pallas’ cats and have cryopreserved semen from wild males to improve genetic diversity of zoo populations (without removing any cats from the wild).
• Scientific capacity building in Mongolia has included training a Mongolian graduate student in reproductive sciences for research with Pallas’ cats and other native species.

Brazilian Ocelots
Species: Brazilian ocelot (Leopardus pardalis mitis)
Status: Vulnerable to extinction (IUCN Redlist) in southern Brazil, primarily due to habitat loss and poaching.

• CREW scientists helped spearhead efforts to establish the Brazilian Ocelot Consortium, an international collaboration focused on conserving Brazilian ocelots in the wild and captivity.
• CREW’s reproductive research with Brazilian ocelots has resulted in the birth of several healthy kittens from artificial insemination and embryo transfer using frozen semen and frozen embryos.
• CREW is applying these proven reproductive technologies to optimize captive management and facilitate international exchange of genetic diversity without transporting live ocelots between countries.
SITUATION
The exact number of endangered plant species is not yet known, but it has been estimated that from 10% to 30% of flora is in danger of being lost worldwide. The causes for this include habitat loss to agriculture and development, competition from invasive species, over-collecting of medicinal and other plants of special interest, and climate change. The Global Strategy for Plant Conservation is a worldwide effort to document and conserve the world’s plant diversity. The Plant Division at CREW contributes to several of the strategy’s goals: ex situ conservation, or the preservation of plants, seeds, and tissues in protected collections; the production of plants for recovery of species in the wild; the development of protocols for these activities; and the use of these projects to educate students and visitors on the importance of plant conservation.

GOAL
CREW’s Plant Division is contributing to the conservation of the world’s flora by developing and applying protocols of nontraditional methods of propagation and preservation for the exceptional plant species that need them, and using these methods for the recovery of species in the wild.
PROGRESS
CREW’s Plant Division is internationally recognized for its expertise in using in vitro methods, or plant tissue culture, to propagate endangered plants and to provide tissues for long-term cryopreservation storage in CREW’s CryoBioBank. This work has focused primarily on “exceptional” species—those that produce few or no seeds in the wild, and on species with short-lived seeds, for which traditional methods of propagation and seed banking are not adequate. Protocols have been developed for the tissue culture propagation of some of the most highly endangered species of seed plants and ferns in the U.S. Methods for cryopreserving shoot tip tissues of numerous endangered seed plants and spores and gametophytes of ferns and mosses have also been developed, and these tissues, along with seeds of regionally endangered plants, have been banked in liquid nitrogen. The Plant Division also supports conservation research on Saintpaulia (African violets) in Africa and is conducting research on tissue cryopreservation methods for these species.

FUTURE
The Plant Division will continue to develop protocols for in vitro propagation and cryopreservation of endangered plants, both for those from the U.S. and elsewhere, and will work for the recovery of those species in the wild. Currently, five species are in recovery programs in Florida, Utah, Ohio, and Kentucky. This growing body of knowledge on tissue culture propagation will contribute to the science of plant growth in vitro and to our understanding of how to direct that growth. This should, in turn, help in the design of future protocols for new species and should quicken the pace of the application of in vitro methods to plant conservation.

Returning to the Wild
Species: Autumn buttercup (*Ranunculus aestivalis*)
Status: Endangered, U.S.
Location: Nature Conservancy, Sevier Valley Preserve, Panguitch, Utah

Project: Use tissue culture to propagate plants to support the restoration of this highly endangered species.
- Tissue culture-propagated lines have been initiated from seeds and are maintained at CREW.
- Plants in culture are sent to The Arboretum at Flagstaff for acclimatization to soil.
- Acclimated plants are used for in situ restoration and to build an ex situ living collection of this species.
SITUATION
Although most people think “Africa” when they hear “rhinoceros,” the three Asian rhino species are far more endangered than the two African species. A two-pronged approach involving both captive breeding and protection in the wild was established to help ensure the long-term survival of Indian and Sumatran rhinos. The Sumatran rhino captive breeding program was initiated in the mid 1980s, but breeding efforts initially failed and mortality rates were high. The Indian rhino breeding program fared better, but genetic diversity has been reduced because some males are too aggressive towards females and never sire calves. Whereas strict protection has recently improved the outlook for wild Indian rhinos, the Sumatran rhino continues to fight for survival.

GOAL
CREW scientists are using ultrasonography and hormone monitoring to better understand Sumatran and Indian rhino reproductive idiosyncrasies. After unraveling the mysteries of these species’ reproductive processes, CREW scientists are now armed with the necessary information to assist natural breeding efforts and to develop artificial insemination. Ultimately, the goal is to be able to transfer sperm between wild and captive populations on a global scale to ensure the genetic diversity of both populations is maintained while maximizing the number of rhinos successfully reproducing.
PROGRESS
CREW’s scientific breakthroughs led to the birth of the first Sumatran rhino calf bred in captivity in 112 years. The subsequent birth of two additional calves at the Cincinnati Zoo demonstrated the repeatability of the scientific methods employed. These same methodologies now are being used by CREW’s Indonesian colleagues in Sumatra. Similarly, CREW’s scientific achievements have led to the first and second pregnancy in an Indian rhino by artificial insemination. Adding to the significance of these Indian rhino pregnancies is the fact that both were produced with sperm that had been collected and stored frozen in CREW’s CryoBioBank. With CREW’s viable rhino sperm bank, the genetic life of founder animals can be prolonged and the genetic potential of male rhinos that may otherwise never contribute to the captive population can be preserved.

FUTURE
As a result of CREW’s scientific breakthroughs, it is now possible to produce rhino calves from behaviorally incompatible pairs and allow new genetic material to be exchanged between wild and captive rhinos globally. CREW scientists are empowering international colleagues and organizations in range countries with the information and technologies developed at CREW in an effort to more effectively manage captive and wild populations of Indian and Sumatran rhinos worldwide. By empowering others, CREW scientists believe their work will have an even greater impact on the rhinos’ struggle against extinction.

Species: Sumatran rhino (*Dicerorhinus sumatrensis*)
Status: Critically endangered (IUCN Redlist)
Location: Sumatra and Borneo

- Only ~200 Sumatran rhinos exist worldwide.
- The wild population has decreased by 50% in the last 15 years.
- In 2011, the captive population consisted of just nine rhinos (three of which were produced at the Cincinnati Zoo) in three countries.
- The Sumatran is the smallest rhino (1300-1700 lbs), and is also known as the hairy rhinoceros.
- Sumatran rhinos love to wallow in mud.

Species: Indian rhino (*Rhinoceros unicornis*)
Status: Threatened (IUCN Redlist)
Location: Southern Nepal and Northern India (Assam)

- Indian rhinos appear armor plated and possess a single horn.
- Indian rhinos love water.
- The largest of the Asian rhino species weighing 4000-6000 lbs.
- Worldwide population is estimated at ~2700.
- Gestation lasts 16-17 months.
SITUATION

Genetic diversity is critical for the long-term survival and adaptation of species. Faced with years of almost certain decline, rare plant and animal populations may contain more genetic variation now than they will for decades or centuries to come. Therefore, their genetic material must be preserved today so it is available for bolstering waning populations in the future and not forever lost. Furthermore, the ability to cryopreserve samples that can then be used to infuse valuable genetic variation into populations across the globe provides a much needed alternative to translocating live, wild animals or plants.

GOAL

In the heart of the CREW building and vital to CREW’s mission is the CryoBioBank. CREW’s CryoBioBank was created to provide a safe haven for some of the world’s most valuable and irreplaceable biological samples from rare and endangered plants and animals. However, the CryoBioBank’s reservoir of genetic diversity is not a static collection. Instead, samples are added to and removed from these tanks year-round as CREW scientists use them to further their research and to produce genetically valuable offspring and seedlings so desperately needed by rare populations in decline. The CryoBioBank is essential to CREW’s goal of integrating the gene pool of wild and captive populations with minimal disruption to the wild plants and animals still struggling to survive in their native habitats.
Animal Samples in CREW’s CryoBioBank

- Samples represent over 75 animal species ranging from toads to elephants.
- Animal samples preserved in CREW’s CryoBioBank include primarily embryos, oocytes, and sperm.
- Some samples date back as far as 1982.

PROGRESS

It is not just the sample numbers or species represented in the CREW CryoBioBank that are important to CREW scientists. Rather, the products of those samples are what really matter. Using valuable biological samples (embryos and sperm) from the CryoBioBank, CREW’s animal scientists have been able to produce ocelot kittens and Indian rhino calves. Similarly, CREW’s plant scientists have used frozen shoot tips to preserve and propagate numerous endangered plants including the Cumberland sandwort and four-petal pawpaw. These achievements clearly demonstrate the power, potential and value of CREW’s CryoBioBank in the broader effort of conserving plants and animals from extinction.

FUTURE

CREW’s CryoBioBank will continue to serve as a resource of genetic diversity for endangered populations of plants and animals now and in the future. Through sound science, CREW researchers have demonstrated that CryoBioBank samples can be used to propagate animals and plants. Now CREW is perfectly positioned to demonstrate that CryoBioBanks can be used to integrate genetic material from captive and wild populations of endangered plants and animals around the world.

CREW’s Frozen Garden

- The collection of plant samples within the CryoBioBank is called the Frozen Garden.
- There are over 125 different plant species represented in the Frozen Garden.
- Samples include shoot tips, pollen, seeds and spores.
MILESTONES

THE ERA OF TECHNOLOGY DEVELOPMENT

1981-1985
CREW begins as a founding member of the Cincinnati Wildlife Research Federation under the direction of Dr. Betsy Dresser.

CryoBioBank is created to store sperm and embryos from endangered animals.

Antelope embryo transfer in eland and bongo results in many “world firsts.”

1986-1990
Kittens produced from cryopreserved domestic cat embryos demonstrate the feasibility of using cryopreservation to help conserve endangered cats.

Dr. Valerie Pence establishes the Plant Research Division at CREW and initiates the Endangered Plant Propagation Program.

CREW’s first endangered plant species, Trillium, is successfully propagated in vitro.

In vitro fertilization and embryo transfer results in the birth of an Indian desert cat kitten to a domestic cat mother.

1991-1995
The Carl H. Lindner, Jr. Family Center for Conservation and Research of Endangered Wildlife (CREW) opens its doors in 1991—the first facility at a zoo dedicated to both animal and plant conservation research.

Working with the government of Trinidad and Tobago, CREW spearheads the reintroduction of extirpated blue and gold macaws to the Nariva Swamp of Trinidad.

“Test-tube” gorilla born after in vitro fertilization and embryo transfer demonstrating the application of human reproductive technologies to help propagate great apes.
### THE ERA OF MAKING SCIENCE WORK FOR CONSERVATION

#### 1996-2000

Dr. Terri Roth becomes the new Director of CREW in 1996 and initiates the Rhino Conservation Program.

CREW pioneers “in vitro collecting” technique, and demonstrates its effectiveness in collecting plant tissues from Trinidad, Costa Rica, and several habitats in the United States.

CREW initiates a post-doctoral training program to produce future leaders of conservation research programs worldwide.

Dr. Bill Swanson joins CREW in 1997 as Director of Animal Research and expands CREW’s global small cat conservation program to Mongolia, Brazil, Thailand and South Africa.

CREW’s amphibian research program is initiated with Wyoming and Boreal toads.

First endangered cat, an ocelot, born following the transfer of frozen embryos.

#### 2001-2005

Strategic planning in 2001 leads to the creation of “Signature Conservation Projects.”

Successful 2001 birth of first Sumatran rhino (a male) produced in captivity since 1889 followed by a second calf (a female) in 2004.

Successful propagation of CREW’s 20th rare plant species.

Tree embryos shown to be viable after 10 years in CREW’s CryoBioBank.

CREW establishes molecular genetics lab and research program.

#### 2006-2011

Ocelots in Brazil and sand cats in the United Arab Emirates produced by embryo transfer.

Two term pregnancies produced in the Indian rhino after artificial insemination with cryopreserved sperm.

First Sumatran rhino calf sent to Sumatra and third Sumatran rhino calf born at the Cincinnati Zoo.

Successful establishment in southern Kentucky of an experimental population of the Cumberland sandwort with plants propagated through tissue culture at CREW.

The reintroduction of blue and gold macaws to Trinidad declared a success with 84% of translocated adults surviving and producing 48 chicks in the wild.

CREW becomes the nation’s headquarters for monitoring captive polar bear reproduction.

Avon Park harebells successfully outplanted in Florida after tissue culture propagation at CREW.

Pollen, spores, and shoot tips in CREW’s CryoBioBank prove viable after 10-15 years in storage.

Ocelot and Pallas’ cat kittens produced by new oviductal artificial insemination technique.
CHARACTERIZATION OF REPRODUCTION IN OTTERS

SITUATION
Eight of the world’s thirteen otter species are considered to be endangered or vulnerable to extinction. Water pollution, climate change, fishing nets, and poaching for the fur trade continue to threaten these charismatic animals. Therefore, captive otters have become more important both for learning about basic otter biology and as a potential genetic reservoir for otter species. However, captive breeding efforts have failed to achieve the level of success necessary for maintaining genetically healthy, self-sustaining otter populations.

GOAL
Our goal at CREW is to determine normal otter reproductive parameters to assist captive propagation programs in four otter species (North American river, Asian small-clawed, spotted-necked, and giant otters). Additionally, semen is being collected, cryopreserved, and stored in CREW’s CryoBioBank for eventual use in more advanced reproductive technologies like artificial insemination.

CREW’S POLAR BEAR CONSERVATION PROJECT

SITUATION
The polar bear has become an icon for global warming in political and public arenas. Because sea ice is an essential component of the polar bear’s ecosystem, a change in its distribution and longevity could profoundly affect the species’ future. Zoos are trying to breed this species in an effort to develop a self-sustaining, captive population, while employing these charismatic ambassadors to educate visitors about global warming and wildlife conservation. Unfortunately, poor reproductive success in captive bears threatens the genetic health and long-term viability of this species in zoos.

GOAL
CREW’s three-pronged approach to help save polar bears includes: 1) conducting endocrine research on zoo bears to shed light on seasonal and climatological effects and factors contributing to poor reproductive success; 2) offering teen educational overnight programs to raise awareness about climate change while creating next generation polar bear advocates; and 3) partnering with Polar Bears International, to stimulate teens and adults to...
take real actions that reduce CO₂ emissions, thereby helping to preserve the arctic ice for polar bears and other wildlife.

**PROGRESS/FUTURE**

CREW scientists have established the largest polar bear endocrine database in the world and are honing in on the causes of reproductive failure in captive bears. Because CREW’s methodologies are noninvasive, they can also be applied to study wild bears. However, the ability to distinguish between true pregnancy and pseudopregnancy continues to be a challenge and is the focus of ongoing research efforts. Sperm banking has also been initiated to start preserving the species’ genetic diversity in CREW’s CryoBioBank. In addition, the first year we participated in Project Polar Bear, we had more teen teams participate than any other zoo, and were one of four finalists in the national competition. We anticipate even more interest in future years, which means more CO₂ emission reductions and more ice for arctic wildlife.

**Lords of the Arctic**

**Species:** Polar Bear (*Ursus maritimus*)  
**Status:** Vulnerable (IUCN Redlist)  
An estimated 25,000 polar bears exist today and the species is threatened with extinction.  
Males can weigh up to 1500 lbs and stand 11 ft high.  
Polar bears primarily eat ringed seals and bearded seals that they hunt on arctic sea ice.  
Only pregnant bears enter a den for the winter and emerge in spring with 1 to 3 cubs.

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**Otter, Otter Everywhere**

**Species:** Asian small-clawed otter (*Aonyx cinerea*)  
**Status:** Vulnerable (IUCN Redlist)  
**Location:** Southeast Asia

**Species:** North American river otter (*Lontra canadensis*)  
**Status:** Least concern (IUCN Redlist)  
**Location:** North America from Alaska to Florida

**Species:** Spotted-necked otter (*Hydrictis maculicollis*)  
**Status:** Least concern but population decreasing (IUCN Redlist)  
**Location:** Africa (south of Sahara)

**Species:** Giant otter (*Pteronura brasiliensis*)  
**Status:** Critically Endangered (IUCN Redlist)  
**Location:** Tropical lowland rainforests of South America

**PROGRESS/FUTURE**

CREW leads the world in otter reproduction research. Already CREW has been able to assist otter breeding programs by detecting hormonal changes associated with seasonality, estrus, pregnancy, pseudopregnancy, and embryo(s) implantation. However, definitively distinguishing pregnant from pseudopregnant otters has been challenging and will be the focus of future research. Ultimately, a comprehensive understanding of the complexities involved with otter reproduction should both enhance captive breeding efforts and help guide conservation strategies for wild populations.
SITUATION
The Greater Cincinnati area has undergone immense changes over the past 200 years, including the species of plants that inhabit the region. Some natives remain, but their habitat has become more restricted, and they share space with non-native species. Scientists, past and present, have collected and preserved pressed specimens of plants from this region and have conducted inventories of natural areas, providing lists of plant species found in those locations.

GOAL
CREW is computerizing past and present records of plants and their locations in this region and making this information available for researchers and students.

PROGRESS/FUTURE
A computerized database for plants in the Greater Cincinnati area has been created, known as Flora Finder. The database currently...
quality, CREW implemented a conservation strategy to safeguard their survival. Through long-term biological monitoring, establishing captive assurance populations and conducting zoo-based research, CREW aims to conserve this North American amphibian and the aquatic ecosystem in which they live.

PROGRESS/FUTURE
By learning the necessary techniques of captive reproduction and long-term husbandry for black warrior waterdogs, CREW will both establish a safety net for a species that might otherwise go extinct and help conserve genetic diversity of the remaining wild population. Developing innovative hormone regimens and artificial fertilization techniques will further increase reproductive output and provide the assurance population needed to bolster wild stock.

Aquatic Salamanders

Species: Black warrior waterdog

(Necturus alabamensis)

Status: Endangered (IUCN Redlist)

Waterdogs are fully aquatic salamanders that maintain bushy, red external gills throughout their lives.

The waterdog employs the reproductive strategy of internal fertilization, a trait not commonly exhibited by amphibians.

After laying up to 60 eggs on the underside of a rock, a female waterdog will guard her clutch until the eggs hatch.

Waterdogs are carnivores, preying on small fish, mussels, crayfish, insects, and insect larvae.

Flora Finder

Location: 50 mile radius of downtown Cincinnati

Species status: All species, past and present, in the Greater Cincinnati area.

Originally, the Greater Cincinnati area was primarily woodland habitat, but today there is a metro area of over one million people with natural areas largely in parks and preserves. It is thought that the federally endangered running buffalo clover, a native species, is now endangered because it depended on bison for its habitat.

Many non-native species share space with native species, and some non-natives have become invasive, taking over habitat from native wildflowers and trees.

Scientists have been studying and collecting plant samples in this region for more than 150 years, providing a wealth of information on our native flora.

Flora finder provides a way to access this information for a glimpse into the past and a resource for the future.

contains over 30,000 entries, from herbarium records at the University of Cincinnati and Northern Kentucky University, as well as from plant surveys of the region. Flora Finder is accessible online and can be used by students and teachers as the basis for a variety of educational, plant-related projects, in conjunction with resources (GPS units, plant presses, etc.) available at CREW. CREW researchers will continue to add to the database, providing a resource for the future.
TRAINING THE NEXT GENERATION
CREW’S POST-DOCTORAL FELLOWSHIP
AND STUDENT INTERNSHIP PROGRAM

SITUATION
Many wildlife populations are becoming increasingly threatened by a host of environmental factors from habitat loss to pollution to poaching to climate change. Skilled scientists are greatly needed to address these conservation challenges but few training opportunities are available to provide these individuals with the specialized skills and knowledge to work with endangered wildlife.

GOAL
The primary goal of CREW’s Post-Doctoral Fellowship and Student Internship Program is to build scientific and conservation capacity through a network of specially trained researchers in the United States and internationally.

AN INTERPRETIVE EXPERIENCE ON
SAVING SPECIES WITH SCIENCE

SITUATION
Even though CREW is world-renowned for its ground-breaking research on endangered plants and animals, this state-of-the-art research facility continues to be one of the Cincinnati Zoo & Botanical Garden’s best kept secrets despite our efforts to share CREW with our visitors. CREW staff and volunteers offer many opportunities for visitors, schools and special groups to learn first-hand about the exciting conservation research conducted daily at CREW.

GOAL
The goals of CREW’s education programs are to expose special groups and schools to the science and technology that is used to conserve endangered plants and animals, provide hands-on experiences for students interested in a wildlife science career path, and offer visitors a unique glimpse into the scientific side of the zoo’s mission.
Meet Two of CREW’s Post-Doctoral Alumni

Dr. Justine O’Brien
• PhD from the University of Sydney
Research focus: Semen collection and freezing in birds and rhinos
Current position: Scientific Director, Reproductive Research Center, SeaWorld and Busch Gardens

Dr. Jason Herrick
• CREW Post-Doc (2004–2007)
• PhD from Purdue University
Research focus: Reproductive biology of black-footed cats and sand cats
Current position: Senior Scientist, National Foundation for Fertility Research

Educational Opportunities
• CREW Public Exhibit & Cart
• Presentations on Saving Species with Science, Evergreen World and Green Cincinnati
• Guided tours of the building
• Scientists for the Future Overnight programs
• Behind the Scenes tours
• Off-site lectures to Universities and other organizations
• Visit our website: cincinnatizoo.org/conservation/crew to learn more about CREW.
FINANCIAL OVERVIEW

CREW remains one of the leading conservation and research facilities in the world due to the generosity of individual, corporate and foundation philanthropic support. There are many ways to get involved. To the right is a snapshot of our recent funding sources. We hope you will become inspired to help CREW in its mission: Saving Species with Science.

CREW was one of the first research centers in the world with resources allocated to conserving both animal and plant species. Over the years, CREW has unraveled many scientific secrets. We are world leaders in small cat and rhino conservation as well as internationally known for our success using in vitro methods to propagate and preserve endangered plants.

The Cincinnati Zoo & Botanical Garden is committed to the conservation and research success of CREW. We have a strategic plan in place to continue raising funds for CREW by growing current philanthropic funding sources, identifying new individual donors, corporate and foundation support, as well as developing new supporters through our Toast to the Wild event series.
How You Can Become Involved

It is easy to become a part of CREW and to get involved with its noble mission. We hope you will join us in one or more of the following ways:

FRIENDS OF CREW
Become a Friend of CREW by giving a gift to support CREW’s work.

CREW ENDOWMENT
CREW has its own endowment that allows donors to support CREW’s conservation and research in perpetuity through a bequest, trust or other planned giving vehicle specifically restricted to CREW.

CHALLENGE GRANTS
Support CREW by giving towards a challenge grant or offer a challenge grant to raise funds to support a Signature conservation project.

FREEWAY’S FOREVER FUND
Honor or memorialize a special pet in your life or someone else’s by making a gift in their name to Freeway’s Forever Fund. This fund was created by a special CREW donor in memory of her canine companion, Freeway, upon Freeway’s passing in April 2010. All gifts to Freeway’s Forever Fund support CREW’s endowment.

A TOAST TO THE WILD
This five-event martini, wine and beer tasting series works to raise funds and spread awareness for CREW while providing guests with a night of grown-up fun at the Zoo. Each event includes multiple beverage tastings, dinner-by-the-bit from local restaurants and up-close animal encounters. This wildly popular series includes Zootini in early spring, three Wild About Wine events throughout the summer and Zoo Brew in the fall.

For more information on these events and how you can purchase tickets, please visit cincinnatizoo.org/events.

WANT TO KNOW MORE?
For more information about these opportunities and how you can become involved, please visit cincinnatizoo.org/conservation/CREW, or call 513-487-3327.

Meet Some of CREW’s Supporters

Through their bequest to CREW’s endowment, Stanley and Marion Eisenberg established the Eisenberg Fellowship at CREW for young, aspiring plant scientists.

As expressed by his daughter, Marilyn:

“He was enthralled by science and innovation and greatly disturbed by man’s greed which led to harming the environment, eliminating species of plants and animals and causing huge disparities in income.”

Through their annual gift to CREW, Roger and Kathy Gross support CREW’s Small Cat Signature Project which has enabled the program to expand to include field conservation efforts for five imperiled small cat species.

“The started out as a small donation relating to cats, has blossomed into a wonderful partnership with the Zoo. We were introduced to Bill Swanson and his work at CREW. We did not realize all the ‘behind the scenes’ work that goes on, and most of which is accomplished through donations. We have often said this was the best investment we’ve ever made!”

Their passion for rhinos has inspired Michael and Tucker Coombe to support the Rhino Signature Project annually in addition to their generous contribution to a new Sumatran rhino exhibit at the Zoo.

“We have for years appreciated CREW’s intelligent approach to conservation. The organization has tremendous integrity, and we have learned that when CREW takes on a project, it’s worth supporting. The work is challenging, often daunting, but what could be more important than saving these threatened species?”
CREW HELPING THE ZOO

SITUATION
CREW scientists use their skills and expertise to facilitate the management of the Zoo's animal collection, in addition to conducting groundbreaking conservation research projects. In CREW’s endocrine lab, scientists analyze hormones in species ranging from elephants to pottos in an effort to help keepers time breeding introductions appropriately and to diagnose pregnancy. Similarly, ultrasound exams are often conducted on animals that keepers can condition for the procedure such as red river hogs, fennec foxes, red pandas and camels to confirm a pregnancy and/or monitor fetal development.

GOAL
In addition to species conservation, CREW scientists are very concerned about animal well-being. The goal of offering CREW’s reproductive expertise to the animal care staff is to enhance the quality of animal care by providing information regarding an animal’s reproductive status. This knowledge allows keepers to manage their animals appropriately, reduce risks and adequately prepare for offspring.

PROGRESS/FUTURE
CREW scientists have helped the Cincinnati Zoo with many of its animal reproductive assessments, but the offer of assistance extends far beyond Cincinnati. CREW assists zoos across the nation when contacted for help whether it entails an ultrasound exam of an Indian rhino at the Bronx Zoo in New York, an artificial insemination attempt in an ocelot at the Beardsley Zoo in Connecticut or the diagnosis of an otter pregnancy at the Columbus Zoo in Ohio. Although we cannot accommodate every request, CREW researchers do as much as they can because they want to help their colleagues, and most of all, they want to help the animals.
ACKNOWLEDGEMENTS

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Terri L. Roth
Director of CREW and Vice President of Conservation & Science
PhD in Animal Science, Louisiana State University
“"I love the challenge of using science to unravel the mysteries of nature, but for me, the effort is only truly worthwhile when it is for a nobler cause; that cause is conservation.”

William F. Swanson
Director of Animal Research
DVM - Texas A&M University; PhD in Animal Science, Louisiana State University
“Our efforts at CREW are having a significant impact on the conservation of small cats in captivity and the wild at this pivotal moment in human history when we either learn to co-exist with nature or risk losing it forever.”

Valerie C. Pence
Director of Plant Research
PhD in Biological Sciences, Northwestern University
“We face the prospect of losing much of the plant diversity that exists today, CREW’s Plant Division is using science and technology to help restore endangered plants and preserve them into the future.”