

Felid Taxon Advisory Group (TAG)

Association of Zoos & Aquariums

2008 Annual Report



Special Topic – Felids of the Americas

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**ASSOCIATION
OF ZOOS &
AQUARIUMS**



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EXECUTIVE SUMMARY OF ANNUAL MEETING

The Annual Mid-year Meeting of the Association of Zoos & Aquariums (AZA) Felid Taxon Advisory Group (TAG) was held April 11th – 13th, 2008 at the Vernon Manor Hotel in Cincinnati, OH, hosted by the Cincinnati Zoo & Botanical Gardens. The Felid TAG co-chairs, steering committee and meeting participants wish to thank the Cincinnati Zoo's Director Thane Maynard, the Local Host Committee (Helen Bateman, Lynn Blattman, Shasta Bray, Pat Callahan, Valeria Conforti, Sheri Foster, Katie Gilday, Mike Land, Sue Metheny, Jackie Newsom, Mary Noell and Dawn Strasser) and the numerous other staff members and volunteers at the Cincinnati Zoo & Botanical Garden for their tremendous efforts in hosting the FTAG mid-year meeting.

We also are grateful to several businesses and individuals for providing financial and in-kind support for the meeting, including Siegfried & Roy, the Newport Aquarium and Jean-Robert French Restaurant Group (Ice Breaker), Central Nebraska Packing (Friday breakfast), Natural Balance Zoologic Formulas (Saturday breakfast), Glaserworks (Zoo Day cocktail hour), Sodexo (Zoo restaurant discounts), and the Event Network (Zoo gift shop discounts). Lastly, we also wish to thank numerous other individuals and companies (Proctor & Gamble, Donnellon McCarthy, Jergens, Hamilton Country Park Rangers, Bill Leaman, Cincinnati Zoo Shops, Carolyn Friedman, the Willings family, Bob Danner, and Kathie Doyle) for donation of various items for the overflowing gift bags. Special thanks to the local Brazilian restaurant Boi na Braza for helping to educate the TAG membership about Brazil's national cocktail, the caipirinha.

Beginning in 2005, the Felid TAG decided that the mid-year meeting each year should be focused on one special topic to allow more in-depth interaction and discussion of specific felid-related issues. This year, the special topic selected was Felids of the Americas with the primary focus on the four managed species within the AZA (i.e., jaguar, puma, Canada lynx, and ocelot). Several speakers were invited by the Felid TAG to present updated information about the population status and ongoing research with these species throughout their natural range in the Americas. The Felid TAG was able to offer partial financial support to cover most of their attendance costs and donate additional funding to each of the speaker's conservation programs (in lieu of providing support to other conservation programs to offset carbon emissions associated with holding the TAG meeting). Invited speakers this year included Dr. Tanya Shenk from the Colorado Division of Wildlife (Canada lynx), Dr. Travis Perry from Furman University (pumas), Arturo Caso from Texas A&M University-Kingsville (jaguars and ocelots) and Dr. Cristina Adania from the Associação Mata Ciliar (ocelots).

Other speakers in the Felids of the Americas session presented reports on stress monitoring of re-introduced lynx, reproductive research in ocelots, prey and nutrition studies in ocelots, and the status of the respective SSP (jaguar, ocelot) and PMP (puma, Canada lynx) programs. Brief updates and overviews also were presented on disease issues, aggression control and breeding success in clouded leopards, the role of felid education programs, linking captive

and wild Pallas' cat populations, and the creation of the AZA's Animal Safety Task Force. Working groups were convened during the meeting to revisit and revise the Felid Regional Collection Plan (RCP) for large and small cats, address in situ conservation efforts with Felids of the Americas and further develop felid education initiatives. The revised Felid RCP reaffirmed continuation of our current management programs for the 8 large cat and 8 small cats species, but with Pallas' cats moving from an SSP to a PMP, and the addition of bobcats as a DERP species and jaguarundis as a Phase-In species. The Felid RCP is currently awaiting review by the Population Management Center before submitting for final approval by the AZA.

Prior the start of the mid-year meeting, the Felid TAG convened both Large Cat and Small Cat Husbandry Courses on April 7th – 9th, under the leadership of Hollie Colahan from the Houston Zoo (large cats), Dr. Cheryl Dikeman from Omaha's Henry Doorly Zoo and Bonnie Breitbeil from Central Florida Zoo (small cats). This three-day course used a combination of oral talks, video presentations, interactive discussions and problem-solving exercises to help educate a total of 48 students about the intricacies of husbandry and management of captive felids. In addition, several SSPs (fishing cat, ocelot, lion) took the opportunity to convene reporting and/or working sessions prior to the TAG meeting. The Felid TAG appreciates the efforts of all the speakers, program leaders and other meeting participants who attended the husbandry courses, SSP meetings and the mid-year TAG meeting this year.

The 2009 Mid-year Felid TAG meeting will be hosted by the Point Defiance Zoo & Aquarium in Tacoma, WA, on May 1st – 3rd, 2009. The special topic next year will be Felid Education and Veterinary Medicine. Large and small cat husbandry courses will be held on April 27th – 30th with SSP/PMP meetings on April 30th – 31st. Additional meeting information will be distributed later this year on the Felid TAG list serve or may be obtained by contacting the Felid TAG Co-chairs or TAG secretary Bonnie Breitbeil. We look forward to seeing each of you at next year's mid-year TAG meeting in Tacoma.

Bill Swanson and Norah Fletchall, Felid TAG Co-Chairs

Past and Future Sites and Hosts of Felid TAG Meetings

- 1991 – Conservation and Research Center, Front Royal, VA (David Wildt)
- 1992 – Conservation and Research Center, Front Royal, VA (David Wildt)
- 1993 – Conservation and Research Center, Front Royal, VA (David Wildt)
- 1994 – Conservation and Research Center, Front Royal, VA (David Wildt)
- 1995 – S.O.S. Care, Inc., Escondido, CA (Pat Quillen)
- 1996 – S.O.S. Care, Inc., Escondido, CA (Pat Quillen)
- 1997 – S.O.S. Care, Inc., Escondido, CA (Pat Quillen)
- 1998 – Oklahoma City Zoo, Oklahoma City, OK (Jack Grisham)
- 1999 – Disney’s Animal Kingdom, Lake Buena Vista, FL (Jill Mellen)
- 2000 – Riverbanks Zoo and Garden, Columbia, SC (Alan Shoemaker)
- 2001 – Regional AZA Conference, Chattanooga, TN
- 2002 – Oregon Zoo, Portland, OR (Michelle Schireman)
- 2003 – Dallas Zoo, Dallas, TX (Ken Kaemmerer)
- 2004 – Albuquerque Biological Park, Albuquerque, NM (Lynn Tupa)
- 2005 – Saint Louis Zoo, St. Louis, MO (Steve Bircher) - Special topic: African felids
- 2006 – Denver Zoo, Denver, CO (B.J. Schoeberl) – Special topic: Temperate Asian felids
- 2007 – Nashville Zoo, Nashville, TN (Rick Schwartz) – Special topic: Tropical Asian felids
- 2008 – Cincinnati Zoo & Botanical Garden, Cincinnati, OH (Bill Swanson) – Special topic:
Felids of the Americas
- 2009 – Point Defiance Zoo & Aquarium, Tacoma, WA (Karen Goodrowe and Karen Povey) –
Special topic: Felid education and veterinary medicine
- 2010 – The 20th Annual Felid TAG Meeting - At your Zoo (?) – Contact Kim Davidson
(Kdavidson@hoglezoo.org) if interested in hosting

Felid TAG Steering Committee Members

Member	Institution	E-mail Address
Alan Sironen	Cleveland Metroparks Zoo	als@clevelandmetroparks.com
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Felid TAG Cat Program Coordinators

Cat Program	Program Coordinator	E-mail Address
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Fishing Cat SSP	Bill Swanson	william.swanson@cincinnati-zoo.org
Ocelot SSP	Ken Kaemmerer	kenneth.kaemmerer@dallascityhall.com
Sand Cat SSP	Kara Akers	kakers@livingdesert.org
Canada Lynx PMP	Don Goff	dgoff@beardsleyzoo.org
Caracal PMP	Barb Palmer	bpalmer@sfzoo.org
Serval PMP	Bonnie Breitbeil	bonnieb@centralfloridazoo.org

Felid TAG Steering Committee Meeting

April 11th, 2008

Present: Don Goff, Alan Sironen, Bill Swanson, Karen Goodrowe-Beck, Kim Davidson, Norah Fletchall, Hollie Colahan, Steve Bircher, Ken Kammerer, Bonnie Breitbeil

Absent: Ron Tilson, Kelley Snodgrass, Tarren Wagener, Danny Morris, Dusty Lombardi

Large Cat Safety Task Force

As result of recent incidents with large cats, the AZA is establishing a task force to review standards, husbandry, etc. in the keeping of large felids. Five AZA members have been selected to serve on this task force, including Norah Fletchall, Hollie Colahan and Jack Grisham to represent the FTAG. The mission is to effectively address performance standards for large cat exhibit enclosures. Husbandry manuals, animal care manuals (formally know as standardized guidelines) and other documents will be referenced in order to produce recommendations. The first Task Force meeting in expected to be scheduled in mid-May.

Regional Collection Plan

Because the RCP for the FTAG is past due, a 6-month extension was requested from the WCMC. The space survey has been completed and the RCP will be revised at this year's (2008) meeting. The PMC or SPMAG has to review the RCP before it can become official. Because the PMC schedule is back-logged into 2009, we will seek to identify a SPMAG advisor as an alternative reviewer.

Standardized Guidelines (now Animal Care Manuals)

Standardized Guidelines for jaguar are posted on the AZA website and available for comment. Other large felid guidelines (tiger, clouded leopard, and lion) are in various stages of completion and should be available soon.

Space Survey

Thanks to the efforts of Danny Morris, the felid space survey (required every 5 years) has been completed and the data compiled for use with the RCP. For the first time, the space survey was conducted entirely on-line. A summary of the survey findings will be included in the RCP document.

Felid TAG Website

Craig Saffoe from the National Zoo will oversee the development of the website and act as liaison for this project. The site will be hosted on the National Zoo's server and can be accessed at www.felidtag.org. Norah has contacts with a local company in Grand Rapids willing to do the design for a fee but Craig indicated that the IT person from National Zoo was willing to develop both content and design. A draft will be submitted to FTAG by August. TAG members would be the immediate audience.

Action item: SC members should communicate any ideas about the website to Craig.

Point person: Ken K. will be the SC liaison to the website group.

Great Cat & Rare Canid Act

The Act was marked-up in the House subcommittee and passed on to the full House. It is believed that there will be no action on this item in the Congress until after fall elections. Bill will stay apprised of the Act and let the SC know of any action.

Field Conservation Committee Report

This AZA committee is to be used as a resource for evaluating field projects. The AZA FCC has recently gone through a strategic plan, but they are still evaluating their direction. This committee could present us with projects we may be unaware of (i.e., that aren't listed as one of the Felid TAG's In Situ Projects on the Columbus Zoo website).

Action Plan: Karen G will continue to follow up with the Chair of the FCC and.

Don will follow up with the FTAG Conservation working group.

Point Persons: Karen G and Don

Strategic Planning Meeting

Strategic Planning Meeting for the FTAG, facilitated by CBSG, was held at White Oak in November (see report this volume). The action plan is slowly being implemented.

FTAG History

Bonnie has received a draft from Alan Shoemaker and some comments from Jack Grisham. This document will need further input and a draft needs to be developed.

Action item: Seek more input and develop a draft.

Point Person: Bonnie will seek input from others. Kim will follow up with Jack.

Mid-year Meeting Planning

The subjects of themed meetings, field scientists being invited to give presentations and TAG working groups were discussed. Previous meeting themes have covered all of the major geographic regions (Africa, Asia, etc.). Other themes such as education, veterinary medicine, husbandry, etc. are possible options. Decision was made to continue with themed meetings for the time being. Next year will focus on education and vet medicine for felids. Presentations by field scientists and others outside of the AZA also still considered important for the TAG's advancement and networking with new colleagues. The TAG will continue to invite (and cover expenses for) several outside speakers each year (finances permitting). For working groups to be valuable, we need to have defined products with definite outcomes and follow-up on action plans.

Action Plan: Kim will follow up.

Point Person: Kim

Finances

Current account: \$9,000.00. The Cincinnati Zoo covered all of the mid-meeting expenses, including the balance of the husbandry course costs and the expenses of the invited speakers, through Zoo budgeted support, registration fees and donations. A surplus of ~\$900 will be sent to the TAG, leaving \$8,000-10,000 in the TAG account. The FTAG account and the Husbandry Course account are audited annually and kept by John Ball Zoo Society. Denver provided funding (\$1500) through the Ashley Pfaff Memorial Training Scholarship for the large cat husbandry course. Two applications were received so both received one half of the scholarship.

In lieu of offsetting the carbon footprint generated by this meeting, it was decided to support the projects of the four field researchers that were the invited speakers this year. Each field researcher will receive \$750.00 for their travel expenses and \$250.00 to support their project. Suggestion was made to contact vendors/donors to sponsor the mid-year meeting every year, allowing vendors to set up a table with information/product. This would help to offset the costs of hosting the meeting. Cincinnati received \$3000 from three vendors for this year's meeting. It was also suggested that the TAG should set the dates of the mid-year meeting as early as possible to facilitate planning, reserving the hotel and inviting speakers.

Action: None at this time

TRAFFIC Recommendations for Tigers

This is a tiger-specific issue so the TAG will defer to Ron to comment on behalf of the Tiger SSP

Vet Advisor

The TAG is looking to add a Veterinary Advisor. Karen Goodrowe has received inquiries from a couple of zoo veterinarians interested in applying for the position. Suggestion made to develop a Vet Advisor position description and check with the SSP Vet Advisors first to see if they have any interest in the position or, possibly, have co-advisors. Gary Riggs, the chair of the AAZV's SSP Vet Advisory Group, could post the position description on their list serve.

Action: Karen G will write a job description and submit to SC for review. Bill will contact Gary about posting the position description and assessing interest in co-advisors.

Point Person: Bill & Karen

Program Animals

The TAG also is waiting for clear direction from AZA on the definition of program animals.

Husbandry Course

Both Large Cat and Small Cat Husbandry courses were held this year. They were well presented and well received by the students. Hollie will need to step down from planning for next year. The TAG needs to determine how frequently to hold the courses and whether to hold both courses each year. One option is to have husbandry courses one year and a training/enrichment workshop the next year.

Action: Both husbandry courses will be held next year at Point Defiance.

Point Person: Norah, Hollie, Bonnie and Cheryl Dikeman will mentor the next instructors.

Fishing Cat International Studbook

The current TAG guidelines for selecting studbook keepers do not recognize institutional history as a criterion. The issue came up with awarding the Fishing Cat International Studbook. After discussion with WCMC, the TAG agreed to award the studbook to Jessica Kinzer at the Riverbanks Zoo.



Your Felid TAG Steering Committee hard at work

Narrative Summations – Special Topic: Felids of the Americas

Colorado Lynx Reintroduction Program: An Overview and Current Status

Tanya Shenk, Colorado Division of Wildlife

In an effort to establish a viable population of lynx (*Lynx canadensis*) in Colorado, the Colorado Division of Wildlife (CDOW) initiated a reintroduction effort in 1997 with the first lynx released in February 1999. From 1999-2006, 218 lynx were released in Colorado.

We documented survival, movement patterns, reproduction, and landscape habitat-use through aerial ($n = 9496$) and satellite ($n = 23,791$) tracking. Most lynx remained near the core release area in southwestern Colorado. From 1999-March 2008, there were 101 known mortalities of released adult lynx. Approximately 30.6% were human-induced which were attributed to collisions with vehicles or gunshot. Starvation and disease/illness accounted for 19.4% of the deaths while 35.7% of the deaths were from unknown causes. Reproductive females had the smallest 90% utilization distribution home ranges ($\bar{x} = 75.2 \text{ km}^2$, $\text{SE} = 15.9 \text{ km}^2$), followed by attending males ($\bar{x} = 102.5 \text{ km}^2$, $\text{SE} = 39.7 \text{ km}^2$) and non-reproductive animals ($\bar{x} = 653.8 \text{ km}^2$, $\text{SE} = 145.4 \text{ km}^2$). Reproduction was first documented in 2003 with subsequent successful reproduction in 2004, 2005 and 2006. No dens were documented in 2007. From snow-tracking, the primary winter prey species ($n = 506$ kills) were snowshoe hare (*Lepus americanus*, annual $\bar{x} = 74.9\%$, $\text{SE} = 4.6$, $n = 9$) and red squirrel (*Tamiasciurus hudsonicus*, annual $\bar{x} = 16.5\%$, $\text{SE} = 4.1$, $n = 9$); other mammals and birds formed a minor part of the winter diet.

Lynx use-density surfaces were generated to illustrate relative use of areas throughout Colorado and areas of use in New Mexico, Utah and Wyoming. Within the areas of high use in southwestern Colorado, site-scale habitat use, documented through snow-tracking, supports mature Engelmann spruce (*Picea engelmannii*)-subalpine fir (*Abies lasiocarpa*) forest stands with 42-65% canopy cover and 15-20% conifer understory cover as the most commonly used areas in southwestern Colorado. Little difference in aspect (slight preference for north-facing slopes), slope ($\bar{x} = 15.7^\circ$) or elevation ($\bar{x} = 3173 \text{ m}$) were detected for long beds, travel and kill sites ($n = 1841$). Den sites ($n = 37$) however, were located at higher elevations ($\bar{x} = 3354 \text{ m}$, $\text{SE} = 31 \text{ m}$) on steeper ($\bar{x} = 30^\circ$, $\text{SE} = 2^\circ$) and more commonly north-facing slopes with a dense understory of coarse woody debris.

We continue to evaluate snowshoe hare densities, demography and seasonal movement patterns among small and medium and large tree-sized lodgepole pine stands and mature spruce/fir stands. Results to date have demonstrated that CDOW has developed lynx release protocols that ensure high initial post-release survival followed by high long-term survival, site fidelity, reproduction and recruitment of Colorado-born lynx into the Colorado breeding population. What is yet to be demonstrated is whether Colorado can support sufficient recruitment to offset annual mortality for a viable lynx population over time. Monitoring continues in an effort to document such viability.

Letting the Cat Out of the Bag: Monitoring Hormone Expression in Reintroduced Canada Lynx

Kerry Fanson, Purdue University

The objective of this project is to monitor physiological changes in reintroduced Canada lynx using the non-invasive technique of fecal glucocorticoid metabolite (fGC) analysis. Fecal samples were collected from known individuals, both in holding pens and post-release via snow-tracking. Following transport, fGC levels in the holding pens are initially quite high, but then decrease to a stable, “baseline” level fairly quickly. Lynx also exhibited stress responses to several other events in the holding pens (e.g. exams and increased human activity).

In the field, we showed that fGCs remain stable for ~4 days in winter field conditions. Females exhibit much higher fGC levels than males, and, for both sexes, fGC levels are higher in holding pens than post-release. Post-release, fGC levels are generally much lower than holding pen levels by the following season. However, in a few cases generally with males, fGC levels in the field are not much different than in pens.

We also have preliminary results of how fGC levels correlate with several environmental parameters. First, fGC levels are consistently higher in habitats with higher competitor density and lower prey density (although neither of these results are statistically significant at this time). Interestingly, we did not observe any trends in fGC expression across different types (snow-mobiling, skiing, showshoeing, or road density) or different levels of human activity.

In the future, we will continue our analysis of the relationship between fGC levels and environmental or behavioral factors. Additionally, we plan to investigate whether individuals with different stress response patterns have different post-release survival rates.

Behavioral Modification in *Puma concolor* as a Non-Lethal, Cost-Effective Management Technique

Travis Perry, Furman University

Our research addresses two areas of puma (*Puma concolor*) – human interaction: (1) the expanding puma population into the mid-western U.S. and (2) puma-human conflict, which includes conservation issues, property damage and loss, and human safety. Land managers in the Midwest need standard tools to detect dispersing pumas and emerging populations. Using GPS collared puma in conjunction with standard remote camera arrays, we plan to develop detection probability models that will allow land managers across the Midwest to standardize their survey methods and that will enable them to quantify their confidence in detection rates on a survey by survey basis. Bighorn predation by puma, Florida panther vehicle collisions, loss of livestock and pets to puma predation, and puma attacks on humans are all essentially the result of puma presence in sensitive areas. Numerous studies have documented that pumas exhibit mutual avoidance behavior to reduce damaging or even lethal encounters. Indeed, resident male pumas

are a primary source of mortality for both genders and all age groups in puma populations, suggesting strong selection for the intra-specific communication puma need to avoid encounters. It is also well known that pumas, particularly resident males, make scrapes (scent marks) throughout their home range and some studies have documented that the distribution of scrapes is concentrated along boundaries and in areas of male-male overlap. Based on this knowledge of behavioral ecology, we hypothesize that the distribution of puma at the landscape level may be manipulated with the use of artificial scent marks. Currently, we have four puma collared in south-central New Mexico. We are currently collecting baseline home range data that will allow the placement of standardized remote camera arrays to be used in the calculation of detection probabilities. To date we have anecdotal evidence that puma will avoid artificial scent marks (in the form of male tiger urine) in the field and that they exhibit significant behavioral responses to these scent marks in captivity. As of March, 2008 we have conducted one field trial of tiger urine placement within the home range of a GPS collared resident male puma with striking results. We collected baseline home range data on this male for 10 months before strategically placing tiger urine in a constricted travel way within his home range. The week following the application of scent this resident male was recorded moving several miles to the west of his known home range. We intend to continue this study with a rigorous examination of the effects of artificial scent marks on puma movement and distribution across genders and age-classes.

Puma PMP 2008 Mid-Year Report

Michelle Schireman, Oregon Zoo, *Puma Population Manager and Regional Studbook Keeper*

Date Range : 1 Jan 2006 to 8 April 2008

Living Population : 55.85 (140)

Target Population : 130

Deaths : 8

Births : None

In the past year, we had eight reported deaths. Six of these cats were over 15 years of age and two were cubs. One cub died as a result of an enrichment device accident and one entered the population sickly and was euthanized. 2007 deaths also included Reno, a 22 year old male at Living Desert who was our oldest cat.

The breeding moratorium is still in place and we had no births again this year.

In 2005, 11 wild-born orphans were placed in our facilities, last year 17, and this year between Thanksgiving and Christmas, 19 cubs from 5 states and Canada were transferred into our zoos plus five more in the past month. Three were then transferred out.

Please note: that was 24 placements and 8 deaths this year.

Again, no orphans were euthanized. One was placed in a well respected non-AZA accredited facility and two were placed in temporary holding and then placed in permanent homes within a month.

Of our 140 cats, 37.43 (80) are ten years of age or less.
In addition, there are 34 pumas that are 15 years of age and over in this population.

If you have an ageing cat in a space that will remain puma space after its death, if possible, please contact me prior to the cat's death. This will shorten your wait to fill the space and lessen the possibility of euthanizing a cub and then finding out soon afterwards that someone needs one. With an aging population such as this one, many people may have a need for cubs in the next five years. Be sure if you are one of those zoos that you are on the top of my list! This list facilitates quick placement of puma cubs from state agencies that have little or no holding space. It also lets us know what your needs are for the near future. Also, if you are contacted by a local game agent trying to place cubs and you can't take them, feel free to give out my contact information or drop a note to the Felid TAG List Serve as others have done. Remember we potentially have over 30 spaces requiring puma cubs in the next five years.

I would like to thank Omaha's Henry Doorly Zoo and Joe Maynard's Exotic Feline Breeding Center for holding cubs for me on very short notice this year. I'd like to encourage other facilities with holding space available for a 3-6 month period of time to step up and offer to hold cubs in similar situations.

The Brazilian Ocelot Consortium: A Model for International, Holistic Conservation Partnerships

Cristina Adania, Associação Mata Ciliar (Brazil)

In 2002, the Associação Mata Ciliar established an agreement with the American Zoo and Aquarium Association: The Brazilian Ocelot Consortium.

The Associação Mata Ciliar (AMC) is an (NGO) non-governmental and non-profit organization, which acts throughout Brazil. It is 21 years old and it was declared a Federal Public Interest in 1999. The main goal of AMC is to develop conservational actions and protect natural resources.

The AMC is divided into different Departments:

- 1) *Flora* (seedling production and reforestation programs)
- 2) *Environmental Education* ("Nursery School" project, "Keep your eyes on the Rivers" project, and others)
- 3) *Rural Extension* (providing economic alternatives to local communities)
- 4) *Fauna*

At the *Fauna* department we have 2 main programs:

- 1) *Rehabilitation Center for Wild Animals (CRAS)*: 24 hours a day, CRAS receives and provides medical treatment to animals rescued by rangers, local police, firefighters and other public institutions. Unfortunately, we receive an average of 2 animals per day from the illegal animal

trade, wildfire, deforestation, auto accidents, and other problems. When possible, we release these animals back to their original origin, but only 40% return to the wild.

2) *Brazilian Center for Conservation of Neotropical Felids (Centro de Felinos)*: The Brazilian Feline Center currently keeps more than 70 felids of the 8 Brazilian species. Initially these animals came from other Brazilian zoos, where they were considered surplus and kept under poor housing conditions. We keep the Studbooks for all 8 species. With financial support from FNMA (Environment Ministry) and FAPESP (São Paulo State Funding Agency), we travel throughout Brazil visiting all institutions that keep Brazilian felines. We traveled more than 100,000 km, visited 87 institutions, performed more than 1000 anesthesia procedures, tattooed 850 animals and micro-chipped 70 animals. We created studbooks with 1316 specimens, in which 382 were ocelots.

Ocelot management started in 1992 and was officially recognized by IBAMA in 1994. Because of the results, the other small felid species were included in our activities, and in 1995 it was recognized as the Small Felid Management Plan. In December 1997, IBAMA requested us to work with the genealogic register of the big cats too. In 2002, it was recognized as the Felid Management Plan, but we are still waiting for the official publication.

Considering the critical situation of captive Brazilian felines in captivity and the generic status of almost all ocelots in U.S. zoos, ocelot conservation requires concerted efforts both in the U.S. and Brazil to more efficiently manage captive populations while preserving remaining habitat and populations in the wild.

After a long period of discussion with IBAMA, AMC, Brazilian Zoos, AZA, AZA's CAP and SSP, and the Brazilian Zoo Society (since 1999), for the first time in Brazil there was a union of effective efforts for the conservation of an endangered cat species resulting in the **Brazilian Ocelot Consortium**. The primary goal of the Brazilian Ocelot Consortium was to identify priority issues affecting the survival of the Brazilian ocelot and develop a comprehensive management strategy that addresses both in situ and ex situ conservation needs. Six priority projects were identified by the BOC for funding to improve the genetic management of captive populations in both the U.S. and Brazil, and enhance in situ conservation and education programs in Brazil. The results that we present here are based on the 2007 Annual Report of the Brazilian Ocelot Consortium.

1) *Captive Propagation of Ocelots*: The goal is to manage the Ocelot SSP and Brazilian zoo populations as a global meta-population while maintaining strong linkages to conservation efforts with wild ocelots in Brazil. So it was necessary to expand the capacity of collaborating Brazilian wildlife facilities to house and successfully breed Brazilian ocelots.

2) *Environmental Education Programs*: The environmental education programs involve the local communities near the Japi Biosphere reserve. The first program involves the interaction of AMC educators with students and teachers at 15 local primary and secondary schools. AMC educators work with students and teachers in interactive discussions at each school to identify one environmental concern affecting that local community (eg., garbage, sewage effluent, deforestation, stream degradation, hunting), developing an action plan to correct or alleviate the specific problem and, then hopefully, involve the students in implementing these corrective

actions. The second BOC-supported education program, called “Yellow Sign”, is conducted in collaboration with the Jundiai city government to intervene with juveniles at risk (i.e., teenagers arrested for minor criminal infractions). Participants work at AMC twice a week for three months, helping with nursery operations, animal care and educational programs. A new component to the program this year is termed “Art and Conservation” in which the teens help to create artwork (wall hangings, jewelry, etc) from recycled materials. The third education program supported by BOC funding is the annual environmental training course for the Forestry Police that work in the Japi Biosphere Reserve and other Reserves in São Paulo State as well as other Brazilian states. In this one day course, the attendees are given basic ecological instruction, including identification of the local flora and fauna via direct observation and evaluation of tracks and scat.

3) *Biological Resource Banking*: The Consortium is helping to maintain and increase the size of our genetic resource bank. Hundreds of samples of fur, skin and blood, as well as ocelot embryos, and more than 10,000 serum samples are stored for genetic, epidemiologic, physiologic and reproduction research. Samples have been used by more than 20 researchers working on Master’s or Doctoral degrees.

4) *Jaguar and Puma Studbook Publication*: The first studbooks for any felid species in Brazil were published and over 300 copies were distributed free-of-charge to Brazilian zoos, NGOs and universities.

5) *Habitat Restoration in the Japi Biosphere Reserve*: Habitat restoration has been one of the primary focuses of the BOC over the past five years. Serra do Japi represents the largest and best preserved area of semi-deciduous forest remaining in the interior portion of São Paulo state (at 400 km² or ~100,000 acres), and has been designated a Biosphere Reserve by the United Nation’s Educational, Scientific and Cultural Organization (UNESCO) as well as an Area de Proteção Ambiental (APA) or Environmental Protection Area by São Paulo state. Through other Brazilian partnerships with AMC, we planted over 50,000 trees, representing 80 native Brazilian species, in the ocelot habitat restoration areas abutting the Japi Biosphere Reserve.

6) *Field Research in the Japi Biosphere Reserve*: In 2006, a camera trapping survey was initiated in the Japi as a preliminary assessment of the resident carnivore population. Camera trapping over a relatively short time period documented the existence of multiple ocelots and at least one puma in the surveyed areas. In 2007, camera trapping in a different region of the Reserve recorded additional ocelots and possibly the first photograph of a margay. In total, we have documented the existence of five cat species in the Japi reserve. At AMC, we periodically receive ocelot, tigrina and jaguarundi species from the local area injured by collision with automobiles. About 2 weeks ago, we found puma tracks on the AMC property.

Population Management Workshop for Brazilian Wildlife

From August 22 -24, 2007 the BOC funded and convened a population management workshop for Brazilian wildlife. Dr. William Swanson, Nanette Bragin and Dr. Jennifer Mickelburg were the instructors for this course. The resulting PMP is the first developed for any Brazilian carnivore species and the first established for any endemic felid maintained in Latin American

zoos. Successful PMP implementation will help ensure the long-term genetic viability of Brazilian ocelots by improving breeding management in Brazilian zoos.

Increasing the U.S. captive population of Brazilian ocelots

Over the past five years, the BOC has facilitated the importation of 4 Brazilian ocelot founders to the U.S. (the first ocelots exported from Brazil since 1999) and laid the foundation for importing up to 16 additional founders to the U.S. over the next several years. In August of 2006, the first four Brazilian ocelot founders were imported to the U.S. under the auspices of the BOC. These two breeding pairs were transferred to the Cleveland Metroparks Zoo and the Oklahoma City Zoo, and the pair housed at Oklahoma City just produced their first kitten.

This year we had the successful birth of 3 healthy ocelots by embryo transfer (ET) at AMC. This is the first exotic animal born by ET in Brazil, thanks to the partnership with the Cincinnati Zoo and also to the Brazilian Zoos that helped us by transferring their ocelots to AMC for this project.

Significance and accomplishments of the BOC:

- 1) The first multi-institutional, international program focused on both in situ and ex situ conservation of any felid species in Latin America.
- 2) The first holistic conservation program, encompassing both ex situ management and in situ preservation, established for any carnivore species in Brazil.
- 3) A model program for addressing the conservation needs of other endangered wildlife species that are endemic to developing countries.

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American Zoo and Aquarium Association, Ocelot Species Survival Plan, Felid Taxon Advisory Group, Brazil Conservation Action Partnership, Bergen County Zoological Park, Cincinnati Zoo & Botanical Garden, Cleveland Metroparks Zoo, Dallas Zoo, El Paso Zoo, Oklahoma City Zoological Park, Oregon Zoo, Salisbury Zoo, Santa Ana Zoo, The Zoo in Naples, Denver Zoological Gardens, Little Rock Zoo, Rosamond Gifford Zoo, SOS Care, Brazilian Institutions (Zoos and B.Centers), Animal Reproduction Dept.- USP, BOC Steering Committee Members (Dr. Bill Swanson, Ken Kaemmerer, Alan Sironen, Nanete Bragin, Marcelo da Silva Gomes, Aduino Veloso Nunes, Maria Emília Boldini Santiago, Paulo Felipe Anselmo), Jean Carlos Ramos, Jennifer Mickelburg, Wanderlei de Moraes, and AMC staff.

Application of Assisted Reproduction for Management and Conservation of the Brazilian Ocelot (*Leopardus pardalis mitis*)

Valeria Conforti, Cincinnati Zoo & Botanical Garden

Reproductive sciences, including the disciplines of gamete biology, endocrinology and cryobiology, have been used extensively in the ocelot for both characterization of basal reproductive traits as well as development of assisted reproduction, including artificial insemination, in vitro fertilization and embryo transfer. After 15 years of research, assisted reproduction in ocelots has achieved adequate efficiency for applied usage as one component of

an international consortium established to conserve the Brazilian ocelot. The integration of assisted reproduction into this population management program may serve as a model for the application of reproductive technology to conservation of other endangered felid species. These research findings and progress with ocelots are summarized in the following narrative.

In female ocelots, estrous cyclicity has been studied noninvasively by assessing hormone metabolite concentrations in fecal samples¹. Fecal estrogens have been reported to peak every 18 days on average (range, 7-31 days), whereas estrus itself ranged from 1 to 6 days. Fecal progestins did not increase above basal levels in singly housed females indicating that ocelots were induced ovulators. In male ocelots, electroejaculation procedures have contributed to semen characterization in the species. A comprehensive reproductive survey of endemic felids housed in Latin American zoos studied a total of 185 males of 8 cat species, including the ocelot ($n = 38$; 36 wild-born)². Forty-four zoos and private facilities distributed in 12 countries were involved in that study. Most of these cats received inadequate nutrition. Housing conditions for several small cats were considered suboptimal, and might have contributed to chronic stress. Total sperm ($\times 10^6 \pm \text{SEM}$) per ejaculate for ocelots, margays, and tigrinas in that study were 34.2 ± 11.9 , 6.4 ± 2.8 , and 10.0 ± 3.8 , respectively; percentages of normal sperm were 58.4 ± 5.8 , 39.5 ± 7.7 , and 35.6 ± 6.0 , respectively. In a subsequent study in Brazil, involving two institutions, animals were kept off exhibit and were fed a meat-based diet with vitamin and mineral supplementation³. For ocelots, margays, and tigrinas, the total sperm ($\times 10^6 \pm \text{SEM}$) per ejaculate were 137.9 ± 18.7 , 32.0 ± 3.9 , and 103.7 ± 12.6 , respectively; percentages of normal sperm were 82.4 ± 1.2 , 57.4 ± 2.8 , and 59.2 ± 3.5 , respectively. Although these data come from two different studies, and therefore cannot be directly compared, the observed differences suggest that nutrition has a pronounced impact on reproductive function in felids. In the Brazil study, animals were presumably maintained under less stressful housing conditions (singly-housed, off-exhibit) and fed a higher quality diet, including vitamin and mineral supplementation, which, as suggested by the authors, might have contributed to superior sperm production.

In 1994, the first ocelot kitten ever produced by artificial insemination (AI) was born in the U.S.⁴. This birth, resulting from AI with frozen-thawed sperm, showed that ocelot semen collected by electroejaculation could be cryopreserved, thawed and used to successfully fertilize a female, opening up new avenues for the application of assisted reproduction technologies in ocelot conservation. Interestingly, the most challenging aspect of that study was the establishment of a hormone regimen for the female that would result in proper ovarian stimulation. The first attempts to stimulate ovarian function in ocelots using exogenous hormones failed; the doses were calculated by extrapolating established gonadotropin doses used for other cat species based on body mass. The lack of ovarian response suggested that female ocelots were relatively insensitive to exogenous gonadotropins; therefore, increased amounts of gonadotropins were tested to produce successful ovarian stimulation. The AI procedure was performed using laparoscopy – a minimally invasive surgical technique where a laparoscope is inserted into the abdominal cavity to allow visualization of the reproductive organs. A catheter is inserted through the abdominal wall and into the lumen of the uterine horn for deposition of sperm. In a subsequent study conducted in Brazil, a female ocelot gave birth to six kittens after a normal gestation (78 days) produced by AI using fresh sperm obtained by electroejaculation⁵.

In the late 1990's, the AZA's Felid Taxon Advisory Group (TAG) decided that North American zoos should strive to manage a genetically-defined ocelot population in captivity. Since almost all of the ~100 ocelots in U.S. zoos were generic, the goal was to identify a suitable ocelot subspecies to serve as a replacement population. One of the candidate subspecies was the Southern Brazilian ocelot (*Leopardus pardalis mitis*). This subspecies has a large historical range and is highly represented in Brazilian zoos with a considerable number of wild-born individuals and some first generation offspring born in captivity. If a founder population could be obtained for North American zoos, it would allow the two countries to expand total exhibit space for this subspecies, benefiting genetic diversity, and eventually begin managing the two populations as one larger metapopulation. In 1999, the AZA, along with a Brazilian non-governmental conservation organization (Associação Mata Ciliar), and the Brazilian Environmental Agency (IBAMA) started working on the creation of the Brazilian Ocelot Consortium (BOC) to make this goal a reality. In 2002, the BOC was formally initiated, with ten AZA institutions providing financial support for a 5-year term, with one goal being to import 20 founders to the U.S. to establish a North American population of Brazilian ocelots.

During this same time period, additional studies of assisted reproduction were being initiated in Brazil and the U.S, specifically investigating the potential of in vitro fertilization (IVF) and embryo transfer (ET) for ocelot propagation. If IVF/ET proved to have adequate efficiency, it could provide another means to transport ocelots (as frozen embryos rather than living cats) between the two countries. In studies in Brazil in 1999 and 2000, 20 female Southern Brazilian ocelots (16 were wild-born) were treated with gonadotropins and subjected to oocyte recovery via laparoscopic aspiration. Five captive males of the same subspecies were used for semen collection by electroejaculation. In this study, a total of 76 embryos were produced after insemination of oocytes from 8 females with semen from 5 males, representing 13 potential new founders for the U.S. captive population. These embryos were frozen and kept in liquid nitrogen in Brazil.

In 2000, the first ocelot kitten ever produced by IVF/ET was born in the U.S. after transfer of frozen embryos⁶. In that study, the hormone regimen used for recipient synchronization required the females to be in natural estrus for administration of 2 injections of gonadotropin-releasing hormone (GnRH), with a 12-hour interval between injections, to induce ovulation. To determine the proper timing for GnRH administration, estrous cyclicity of potential recipients was monitored daily by fecal estrone enzyme immunoassay. Approximately 50 hours after the second GnRH injection, the ovarian response of the recipient was evaluated via laparoscopy and, if at least one fresh corpus luteum (CL) was present, frozen embryos were thawed and transferred via laparoscopic intraoviductal ET. The major challenge with using this protocol is that the timing of ET is controlled by the embryo recipient since the female must be in natural estrus at the time of GnRH treatment.

More recent studies in the domestic cat have tested new hormone regimens for recipient synchronization that would provide better control of ovarian function and an improved maternal environment for embryo survival. One novel protocol for recipient synchronization consists of a sequential combination of equine chorionic gonadotropin (eCG) and porcine luteinizing hormone (pLH) to stimulate ovarian follicular development and induce ovulation, respectively⁷. One advantage of this protocol is that the hormone treatment starts when the female is between estrus

phases, which gives a wider window of opportunity for synchronization. In a comparative study in domestic cats, three hormone regimens were assessed: eCG followed by pLH 84 hours later; eCG followed by GnRH 80 hours later; eCG followed by GnRH 92 hours later. Neither eCG/GnRH protocol produced consistent ovulation, likely due to feedback inhibition of eCG on the pituitary gland (the site of action for GnRH). In contrast, almost all females treated with eCG/pLH ovulated. Moreover, the eCG/pLH regimen resulted in development of an appropriate number of CLs, without producing additional (and undesirable) secondary CLs in the week following ovulation. Subsequent embryo transfers to domestic cat recipients synchronized using eCG and pLH resulted in high pregnancy (~70%) and embryo survival (~60%) percentages.

In 2007, this improved regimen for recipient synchronization was tested for the first time in ocelots housed at the Associação Mata Ciliar⁸. Eight females (4 proven breeders; 4 nulliparous) were selected as potential recipients. Fecal samples were collected from all females on a daily basis for assessment of estrone concentrations via enzyme immunoassay. Two novel hormone regimens for recipient synchronization were tested: 1) females ($n = 4$) in natural estrus received two injections of pLH (~13 hours apart); and 2) nonestrous females ($n = 4$) received single injections of eCG and pLH (~85 hours apart). Approximately 50 h after the last injection, ovaries and uterine horns were examined laparoscopically. All eight females had healthy reproductive tracts and fresh CLs on their ovaries, allowing ET procedures to be performed with all 8 recipients. A total of ten embryo straws, frozen in 1999 and 2000, were thawed and 24 embryos transferred laparoscopically (~3 embryos/recipient). Three females became pregnant (1 female treated with the first hormone regimen; 2 females treated with the second regimen) and three live kittens were born (1 kitten per female). These kittens are founders for the North American population and one or more may be imported to the U.S. in the near future. More importantly, results demonstrated that IVF, embryo cryopreservation and embryo transfer have adequate efficiency for applied usage in ocelots and may be used as an effective alternative to transporting living ocelots thousands of miles between Brazil and the U.S.

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Conservation and Status of the Ocelot (*Leopardus pardalis albescens*) in Texas, U.S.A. and Tamaulipas, Mexico

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The ocelot (*Leopardus pardalis*) is a federally endangered species in the U.S. and Mexico (U.S. Fish and Wildlife Service 1982; NOM-ECOL-059-2001), and is classified by the Convention on International Trade in Endangered Species (CITES) as an Appendix I species. The northeastern distribution limit for ocelots occurs in the Tamaulipan Biotic Province of northeast Mexico and southern Texas (Tewes and Everett, 1986). The State of Tamaulipas is the most northeastern state of Mexico and borders the United States at Texas.

Current Biological Status

The U.S. range of the Texas (Tamaulipan) ocelot, *L. p. albescens*, consists of only two breeding populations in southern Texas (Tewes and Everett, 1986). One population is on protected federal land at Laguna Atascosa National Wildlife Refuge (LANWR) while the other population is distributed over two nearby counties on private ranches. While there is some dispersal from these populations, there is considerable distance between them and no linkage has been documented in the past 25 years of research. In the mid-1980s, Laack (1991) estimated a population of 30 ocelots at LANWR. More recently Haines et al (2005) estimated an effective breeding population of 19 in LANWR and a total population of 38 in the entire county. Genetic data suggest that the second population is even smaller (Janečka et al., 2007). Previous estimates of totals for Texas were 80 – 120 (Tewes and Everett, 1986), but this recent data suggest

considerably smaller numbers. The small population sizes are due to the loss of suitable habitat as a result of the burgeoning human population and associated activities including agriculture, urbanization, roads, fencing, etc. Moreover, these Texas populations may be vulnerable to demographic catastrophes, including infectious diseases, wildfires, drought, hurricanes, etc. It is important to mention that in 2007, trapping attempts for ocelots in south Texas showed a lower success rate than in previous years (J. Mays, pers. comm.). Further studies are necessary to figure out the reasons for this low yield and also to understand the actual ocelot population dynamics in south Texas and northeast Mexico.

In Tamaulipas, Mexico, a much larger population occurs, perhaps >1000 based on available ocelot preferred habitat, although we don't have complete data on population sizes or distribution. The Tamaulipan population is separated from the Texas populations by at least 60 miles and recent studies in genetic variation have found that the populations in Texas have lower genetic variation compared to the one in Mexico (Walker, 1997).

History and Chronology of Ocelot Conservation Efforts

Prior to 1981, there were only a few studies and reports documenting location, habitat and diet (Hall, 1981). In 1981 the United States Fish and Wildlife Service (USFWS) contracted with the Caesar Kleberg Wildlife Research Institute (CKWRI) of Texas A&I University (now Texas A&M University) at Kingsville to investigate natural populations in south Texas. During the 1980s, field research focused on documentation of geographic distribution (Tewes and Everett, 1986), ecology and habitat analysis (Tewes, 1986; Laack, 1991), population density analysis (Tewes and Everett, 1986), and basic biological parameters (Tewes and Schmidly, 1987; Laack, 1991). Much of these studies focused on the population at Laguna Atascosa National Wildlife Refuge outside of Harlingen, Texas near the U.S.-Mexico border.

By 1990 the USFWS had commissioned the first written "recovery" plan (U.S. Fish and Wildlife Service 1990) with the purpose of summarizing everything known to date about native ocelots and producing recommendations for steps necessary to recover or remove the ocelot from the Endangered Species list.

Field research on private ranches in southern Texas began in the 1980s, but by the 1990's had expanded into northeastern Mexico (Shindle and Tewes, 1998). Caso (1994) documented and began a long-term study of ocelots and other wildlife on cattle ranches in Tamaulipas approximately 150 miles south of Harlingen, Texas. He was able to initiate studies on population ecology to compare to those from southern Texas (Caso 1994); these studies continue today. In addition, over the last eight years private ranches in eastern and northern Tamaulipas have been surveyed to document ocelot existence (Caso and Tewes, in prep.).

In 2003, USFWS convened a bi-national Ocelot Recovery Team to produce an update of the 1990 Ocelot Recovery Plan. The Team is composed of two subcommittees: a Technical Subcommittee and an Implementation Subcommittee. The Technical Subcommittee is responsible for identifying deficiencies in knowledge, threats to ocelot existence and recovery, and the action steps necessary to down-list and eventually de-list the ocelot from the Endangered Species list. Since this subspecies is endangered on both sides of the border, the Team has two co-leaders (A. Caso – Mexico; D. Maehr – U.S.) as well as bi-national members with science

backgrounds from universities, governmental wildlife agencies (USFWS, Texas Parks and Wildlife Department, Arizona Game and Fish Department), and non-governmental organizations (Environmental Defense and Association of Zoos and Aquariums - AZA). The Implementation Subcommittee is responsible for taking the Recovery Plan written by the Technical Subcommittee and putting it into effect. This committee has a broad and large membership and includes bi-national members from universities, governmental agencies, non-governmental organizations, private landowners, AZA institutions, and others. The Ocelot Recovery Plan is in final draft form, under review by USFWS, and is supposed to be published in the Federal Register for public comment later this year. After that process is complete, it will be formally presented to the Implementation Subcommittee. Action steps will then be enacted and conservation projects carried out.

What projects are planned for ocelot conservation in Texas and Tamaulipas?

1) *Translocation*: Translocation of ocelots from Mexico to Texas will need to be a priority to augment the genetic variation of the Texas ocelot population (Janečka et al., 2007) and is a strategy being discussed by the USFWS Ocelot Recovery Team. Likewise, in Mexico translocations can also be a future conservation tool, and translocations within Mexico do not involve the political bureaucracy incumbent with moving an endangered species within the U.S. Therefore, one early objective will consist of doing a translocation of ocelots within Tamaulipas to assess what factors need to be considered for future translocations. From that point, the Ocelot Recovery Team will need to determine the priorities for translocations from Mexico to Texas, between populations within Texas, and even to set up new populations on federally protected lands. The first translocation will serve as an important precedent for ocelot recovery in both countries.

2) *Habitat Restoration*: In the past, there have been some attempts to restore ocelot habitat in South Texas (Young and Tewes, 1994; Sternberg, 2003). However, after more than 12 years, not one acre of ocelot habitat has been restored (M. Tewes, pers. comm.). Upon review, this has been due, in part, to poor planting techniques (too much space between seedlings) and an inability to control non-native grasses (e.g., buffel grass). The science of habitat restoration to manage for ocelots is still being learned and the time and required resources will be considerable. Yet habitat restoration will be one of the most important of the ocelot recovery strategies in order to expand available habitat and to establish corridors that will connect ocelot populations within Texas and eventually from Mexico to Texas.

3) *Monitoring of Wild Populations*: It is important to continue the ongoing programs that monitor wild ocelot populations in south Texas and northeast Mexico in order to assess trends in population dynamics and genetic variation. In south Texas, monitoring has shown that the most important source of ocelot mortality around Laguna Atascosa NWR is from cars or trucks (Haines et al., 2005). As corridors to link habitat patches are developed, ocelots will regularly have to cross the increasing number of roads. USFWS personnel have been working with Department of Transportation officials to design and build wildlife underpasses beneath roadways and are continuing to investigate other methods to facilitate safe crossing of roads.

Because of the high population density in Texas, there is a high risk of a disease outbreak, so the permanent establishment of a health monitoring program is a necessity. A program with the

National University of Mexico in which infectious diseases, parasites and bacteria are being evaluated has been initiated for health monitoring of ocelots in northeast Mexico. Similarly, Gladys Porter Zoo is assisting USFWS staff with health monitoring of the Laguna Atascosa population.

We will need to continue doing surveys to document ocelot populations and suitable habitat in northeastern Mexico. Just as in the U.S., much of the suitable habitat is on private lands and knowledge of the local populace and very careful solicitation and education will be critical to obtaining permission to survey on private lands. Yet the largest continuous habitat occurs in western Tamaulipas in the Sierra de Tamaulipas mountains, most of it privately owned. This area will probably be the source population of Tamaulipan ocelots for future translocations to northern Tamaulipas and to Texas. It is vitally important that we have thorough knowledge of the status and distribution of this population.

4) *Conservation Education*: As everyone knows, good conservation can not occur without good education. Since much of present and potential ocelot habitat occurs on private lands on both sides of the border, we have to find methods to inform and educate ranchers and their families about the importance of ocelots and other wildlife. Some landowners don't realize the existence of ocelots, yet if you can show them some proof, they often become instant advocates, and through word-of-mouth, this can help the conservation biologist in the surrounding area.

Zoos can and will play a critical role in ocelot conservation education. A good first effort was initiated by the Dallas Zoo with its bilingual web-based program entitled "The Ocelot Experience" (www.dallaszooed.com). It was created to help raise awareness of the species' endangered status and encourage its protection, and is directed at 4th through 6th grade students with either English or Spanish as a primary language.

The annual Ocelot Conservation Festival and "Adopt-an-Ocelot" program put on by the Friends of Laguna Atascosa National Wildlife Refuge raise awareness of the plight of the Texas ocelot and promote ocelot and habitat conservation in local communities. In addition to talks with ocelot biologists and volunteers, along with educational displays and materials, live education ocelots on loan from AZA zoos have been utilized for demonstration.

All of the aforementioned have been a good start, but much more will be needed to aid the conservationists' efforts. The USFWS Ocelot Recovery Team anticipates the need for a future series of meetings specifically focused on improving ocelot conservation education; individuals from many zoos, non-governmental organizations and governmental agencies will be needed with ideas and resources to meet the challenges.

Conclusion: What needs to be done to recover Texas/Tamaulipan ocelots?

Identifying the needs to recover ocelots is easy, but devising the solutions will be complex. We need to find methods to increase ocelot numbers and genetic diversity in Texas. We need to restore the gene flow between Tamaulipas and Texas. We need to restore habitat and establish protected corridors amongst habitat patches and populations. We need to completely survey the State of Tamaulipas to outline ocelot distribution, determine the overall size of the population, and assess the security of the population from threats. We need to mount an extensive and

effective education and marketing campaign on both sides of the border to highlight this keystone species and the ecosystem it represents. Finally, we will need the enthusiasm, the time and efforts, and the resources of many committed individuals, young and old, professional and volunteer, to recover the ocelot throughout its range.

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Ocelot SSP 2008 Mid-Year Report

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Bill Swanson, Reproductive Advisor, Cincinnati Zoo & Botanical Garden

An Ocelot SSP meeting was held at the Cincinnati Zoo on April 10, 2008.

Nanette Bragin gave a studbook update and reported that the generic ocelots have a population of 88 (45.43) in 51 institutions. From 1 January 2007 to 10 April 2008, there were 4.1 births in two institutions, 3.6 deaths in nine institutions and 4.5 transfers in eight institutions. For the Brazilian ocelot population, there are 25 (16.9) in 13 institutions. From 1 January 2007 to 10 April 2008, there was 1.0 birth in one institution, 1.0 death in one institution and 2.2 transfers in three institutions.

Between July 2007 and February 2008, a Masterplan was completed and sent out to all IR's on the Ocelot and Felid TAG listserves. All unrelated Brazilian ocelot pairs were recommended for breeding, resulting in 9 breeding recommendations. In addition, we adopted a strategy of pairing lone Brazilian males with generic females on deslorelin in order to give the males some socialization experience. The two newly imported Brazilian pairs from 2006 have been paired, but one pair has had some compatibility problems which are being managed; neither pair has yet reproduced. Since the Brazilian population is still growing very slowly and since there has been increased demand for exhibition, we decided to increase our breeding of the generic population and made 15 breeding recommendations with a goal of 10 births. Even with this increase, the growth rate of the generic population has been calculated to be 0.99 for this Masterplan.

The U.S. Fish and Wildlife Service Ocelot Recovery Plan has been delayed further in being published in the Federal Register until this Fall. When that occurs, the Recovery Team will meet and the Recovery Plan will be turned over to the Implementation Subcommittee which has

representatives from a couple AZA zoos plus many nongovernmental organizations (including Feline Conservation Federation), various federal and state governmental organizations, private citizens and land owners. This committee will be responsible for taking the action items from the Recovery Plan and coming up with the methods and the resources to enact the recovery actions. AZA will play a significant role, both in research and education, and the SSP will be looking for more assistance from zoos and individuals in the future.

We reviewed progress with the Brazilian Ocelot Consortium although much of that is detailed elsewhere in this Felid TAG report. We are still awaiting permits from IBAMA in Brazil in order to import the next two pairs of ocelots to the Salisbury Zoo and Naples Zoo hopefully by the end of the year. The 2007 BOC Report has been available since last year and is available from either Ken Kaemmerer or Bill Swanson. While we have formally finished 5 years of the original agreement, we have not met all our accomplishments including finishing the importation of eight more founder pairs. We want to extend the agreement with the original zoos for another 5 years and continue to support the excellent *in situ* and *ex situ* Brazilian ocelot conservation that has occurred with our Brazilian partners. We will be asking for the original ten zoos to renew their commitment, but with much less financial responsibility. Dr. Bill Swanson will be circulating and explaining the new agreement in the next couple months to the institutions' Directors and IR's for review. We will also be opening this up to other zoos which have acquired captive Brazilian ocelots or who have an interest in supporting these conservation initiatives. Please contact either Bill Swanson or Ken Kaemmerer if you are interested or have any questions. In addition, in the May issue of AZA's Connect, Bill has written an article reviewing the successful history of the BOC and the international conservation example it has become.

Prey and Nutrition Studies for Conservation and Recovery of Ocelots in the U.S.

Susan D. Booth-Binczik, Cynthia L. Bennett, and Kerri A. Slifka, Dallas Zoo

The ocelot is a critically endangered species in the U.S., restricted to two small genetically depauperate populations isolated by habitat destruction. Effective recovery efforts will depend on a comprehensive understanding of the species' biology and ecological requirements. We are conducting a series of studies aimed at elucidating the dietary and nutritional status and needs of ocelots in the U.S. We analyzed nutritional composition and digestibility of five species fed to ocelots in captivity to assess the nutritional worth to ocelots of different types of prey. We surveyed rodent and rabbit populations at Laguna Atascosa National Wildlife Refuge (LANWR) throughout a year to obtain an index of potential prey availability to the resident ocelot population. We are currently conducting a study comparing physiological indicators of nutritional status in the ocelot and bobcat populations at LANWR. We are preparing an investigation of ocelot diet composition at LANWR, which will document which prey species are most important to ocelots in the U.S., how much dietary overlap there is between ocelots and bobcats, and how relative importance of different prey types changes over the course of a year. The combined results of these studies will provide us with a powerful tool to assess the

nutritional health status of the remnant ocelot populations and evaluate the suitability of potential sites to support new populations.

Efforts to Lessen Jaguar Problems in Northeast Mexico

Arturo Caso and Sasha Carvajal, Texas A&M University-Kingsville

The jaguar (*Panthera onca*) is distributed from northern Argentina to Arizona, U.S.A. and depredation on cattle from this large feline is still common throughout its range. Some options to minimize jaguar problems have been proposed in the past; however, to date, efforts to fully prevent this problem have not been accomplished.

Past options proposed to alleviate jaguar problems have included the following:

- 1) Capture of problem jaguars and placing them in captivity
- 2) Translocation away from conflict areas
- 3) Cattle corrals
- 4) Cattle management (especially for calves)
- 5) Landowner reimbursement for cattle losses
- 6) Hunting of problem jaguars
- 7) Environmental education

However, not all apply to every site and a combination of them may be the key to lessen this problem.

Historically, the State of Tamaulipas in northeast Mexico, has been an area of conflict between landowners and jaguar. In the past, these cats were killed on sight; however, in 1987 jaguar hunting was banned in Mexico by the Federal Government. Even though legal hunting is no longer allowed, poaching still exists and many times this is related to the problems caused by jaguars in cattle operations.

The Federal Agency CONANP (Protected Areas Commission) of Mexico, which is in charge of protection of endangered species, initiated a program in 2007 to devise various options to reduce jaguar problems throughout Mexico.

The objectives of this program are as follows:

- 1) Measure the extent of the problem
- 2) Find mechanisms for landowners to report losses
- 3) Find ways to reimburse landowners
- 4) Translocate problem jaguars elsewhere (last resort)

Since 2007, we have been evaluating jaguar problems using interviews, questionnaires, and camera traps within northeast Mexico, specifically in the states of Tamaulipas and Nuevo Leon. Our results have shown that Nuevo Leon has few problems with jaguars, mostly because jaguars are not abundant in this state; the only confirmed report of a jaguar causing problems was in rural areas close to the city of Zaragoza. In Tamaulipas, we have found more reports of jaguars

causing problems. Problems were found in two sites along the Sierra Madre Oriental, three sites on Sierra de Tamaulipas, and one site on Sierra de Maratinez. We found that all of these areas have in common a small availability of natural jaguar prey (i.e. deer, coatimundi, javelina) due to illegal hunting of this prey. Therefore we have made recommendations to the local authorities to enforce all laws against hunting in these areas. We have also given educational presentations to the local people who have had these problems, on how cattle can be more effectively managed to reduce interactions with jaguars, and also on how and with whom they should report any cattle losses from jaguars. These presentations have included the free distribution of two types of easy-to-understand pamphlets. One black and white pamphlet has simple diagrams along with telephone contacts, suitable for posting in community meeting places. The second is a tri-fold color brochure to be taken home, complete with photos and brief facts, to describe the jaguars' biology, as well as information on what to do if suspected jaguar-killed cattle are discovered and which authorities to contact.

The second and future stage of this project will focus on the mechanisms to reimburse landowners when confirmed jaguar (and puma) losses occur in these areas. If an individual jaguar is identified (using remote-sensing cameras) as frequently causing problems in an area, then as a last resort, it will be translocated to another area with suitable habitat and prey and away from interactions with livestock and humans.

Jaguar SSP 2008 Mid-Year Report

Stacey Johnson, Lehigh Valley Zoo, *Jaguar SSP Coordinator*

Management Group

Keith Lovett, Palm Beach Zoo (Vice-Chair)

Hollie Colahan, Houston Zoo

Karen Dunn, Tulsa Zoo

Farshid Mehrdadfar, San Diego Zoo

Danny Morris, Omaha's Henry Doorly Zoo

Alan Rost, Jacksonville Zoo

Jim Schnormeier, Sacramento Zoo

Advisors

Cheri Asa, St Louis Zoo, MesoAmerica CAP

Sharon Deem, St Louis Zoo, Health

Mike Fouraker, Fort Worth Zoo, Husbandry

Jack Grisham, St Louis Zoo, Husbandry

Sunni Robertson, San Diego Zoo, Education*

Dick Sheffield, Zoo León, AZCARM Liaison

Scott Silver, Queens Zoo, Field Conservation

Ann Ward, Fort Worth Zoo, Nutrition

Bob Wiese, San Diego Zoo, SPMAG

*In December 2007, Sunni Robertson of San Diego Zoo volunteered and was confirmed as Jaguar SSP Education Liaison.

Studbook

A new studbook edition is nearly due. Institutions holding jaguars will be contacted over the summer for updates.

Master Plan

The 2007-09 Master Plan was completed last May and is available on the AZA website. Many of the recommended moves are underway or have been completed.

Currently, 123 total animals reside in 50 participating institutions. Of those, 46 (19.27) pedigreed animals are in 19 institutions. Genetic diversity stands at 93 percent. The target population size designated by the Felid Taxon Advisory Group is 100-120. This goal is to be achieved by allowing non-pedigreed animals to age out of the population while recommending a sustainable number of pedigreed pairings every three years.

Since the 2005 Master Plan, the pedigreed population (animals whose ancestry is traceable back to the wild) has increased 25 percent, resulting from a combination of recommended births and importations. Nonetheless, maintaining 90 percent genetic diversity over a 100-year period is not sustainable without incorporating all the potential founders and additional imports. Eight transfers and 16 pairings were recommended for the period 2007 – 2009.

The following changes occurred in the SSP population over the past year:

Births: 0.1 Brevard Zoo, 0.1 Cameron Park Zoo. (Both were recommended births.)

Deaths: 0.1 Montgomery Zoo, 0.1 El Paso Zoo, 0.1 Phoenix Zoo, 0.1 Dallas World Aquarium. (All were cats excluded from the breeding population.)

Imports: 1.1 Philadelphia Zoo

*There are three importation efforts underway at present:

Milwaukee County Zoo has a Belizean import pending final transport arrangements.

San Diego Zoo and Nashville Zoo are each considering import projects.

Warner Park Zoo has two import permits in process from Argentine zoos.

Standardized Guidelines

The 2003 Husbandry manual has been adapted to fit SG format. It was reviewed by the Management Group, and an internal review (AZA) was completed by Dr. Sharon Deem, Ann Ward and Danny Morris. The Jaguar SG was posted to AZA website for comment prior to the AZA Board of Directors placing the Standardized Guidelines process on hold at the Birmingham meeting.

Husbandry Manual

The husbandry manual was set for review and revision this year. Chris Law, Philadelphia Zoo, has volunteered to lead that effort again and is well underway with the project. A draft edition should be ready for management group review for the AZA annual conference in September.

Narrative Summations – Plenary Sessions Presentations

The Role of Education in the Felid TAG

Shasta Bray, Cincinnati Zoo & Botanical Garden
Karen Povey, Point Defiance Zoo & Aquarium

The Felid TAG strategic plan developed in October 2007 identified education as a fundamental desired component of TAG efforts. The Education Advisors and working group work to identify educational needs of the TAG and facilitate the inclusion of education into the overall TAG conservation philosophy.

Who are Felid TAG educators?

The TAG welcomes inclusion of a wide range of interest and talents to participate in developing education initiatives. Working groups fluctuate in members from meeting to meeting, but we are working toward developing a core group that can provide some consistency working on issues over several years. We have recruited interested people through the listserv and will work on continuing communication beyond the meeting.

There are also Education Advisors working with some of the SSPs on issues specific to their species. We will work on liaising with these individuals to keep TAG participants fully informed on their efforts.

Who is our audience?

The strategic planning process identified that the primary audience for educational efforts is internal – people working with felids managed by AZA programs. There are plenty of other resources for the general public who seek cat information so that is considered a peripheral audience. Other audiences include in and ex situ educators looking for support on education initiatives.

Including education within the Felid TAG

Felid TAG educators will serve to facilitate the inclusion of education into the overall conservation philosophy of the TAG by:

- 1) Providing regular reporting on the education activities of the SSPs (see below).
- 2) Providing support for program developers to include education components to their projects by sharing resources and providing program models.

Facilitating Communication within the TAG

The primary role of TAG educators is to help spread news about the great work of the programs within the TAG.

To achieve this we will be working on two initiatives this year:

- 1) *Quarterly conservation e-newsletter*: This will provide brief updates, project profiles, news, collaborative opportunities, etc. You will be solicited for contributions, but why wait? Shasta is in charge of this project so contact her (email above) to share your news!

2) *Website*: There is an immediate need to get the site up and running. The National Zoo has generously offered to provide hosting and technical support for the site. Craig Saffoe (National Zoo) will serve as site coordinator for receiving content and working with the webmaster. Although it will be maintained through the Zoo, it can still be accessed through a redirection of the old URL: www.felidtag.org. The site will be live right away, with content added as it is developed. The education team and the Steering Committee will evaluate the site design and navigation in the early stages and provide feedback to Craig. Content will include general TAG info, history, news, calendar, & reports; TAG documents (RCP, husbandry manuals, etc.); conservation & research summaries; husbandry info; education; publications; careers with cats, etc.

Tacoma 2009 Meeting

One of the themes of the next Felid TAG will be felid education. The education team will work on identifying presenters for that meeting, especially those delivering exceptional in situ programs or innovative ex situ efforts. Anyone with suggestions for speakers is encouraged to contact Karen Povey (karenp@pdza.org).

Behavior and Corticosteroids Predict Breeding Success in the Clouded Leopard

Katherine MacKinnon, Washington State University, Smithsonian's National Zoological Park
Ruth Newberry, Washington State University
Nadja Wielebnowski, Brookfield Zoo
Wanchai Tunwattana, Khao Kheow Open Zoo
David Wildt, Smithsonian's National Zoological Park
JoGayle Howard, Smithsonian's National Zoological Park
Katharine Pelican, University of Minnesota, Smithsonian's National Zoological Park

Pairing the endangered clouded leopard (*Neofelis nebulosa*) for reproduction in captivity is risky due to unpredictable male aggression toward females, which can result in lethal attacks or a need to intervene and separate the pair due to injury or expected injury. To assess potential early indicators for successful pairings (i.e., pairings producing cubs), behavioral observations and fecal hormones were evaluated on four juvenile-male (< 1 y) and nine adult-male (> 1 y) pairs of clouded leopards in a breeding program in the Thailand Clouded Leopard Consortium at the Khao Kheow Open Zoo. Fecal cortisol concentrations, stereotyped pacing behavior and fighting were predicted to be lower in successful than failed pairs, and animals in successful pairs were predicted to display more affiliative behaviors than those in failed pairs. It also was predicted that pairs are more likely to be successful when females are paired with a juvenile male, rather than an adult male. Behavioral observations were conducted on paired males and females 2-5 times weekly. Daily fecal samples were collected for hormonal analysis of cortisol by enzyme immunoassay. Data were analyzed to identify predictors of successful (n = 5) versus failed (n = 8) pairings using generalized linear models.

As predicted, animals in successful pairs exhibited higher ($p < 0.05$) levels of affiliative behaviors (grooming, sniffing and rubbing on other cat, analyzed separately and combined) than animals in failed pairs. No significant differences between animals in successful versus failed

pairings were observed in pacing or exploratory behaviors. Male cortisol baseline mean and peak mean were higher in failed than successful pairs ($p < 0.005$). No differences were observed ($p > 0.05$) in female cortisol concentrations (mean, baseline or peak mean); however, fecal cortisol coefficient of variation (CV) around the mean was higher ($p < 0.05$) in successful than failed females. Although pairing females with juvenile versus adult males did not directly predict ($p > 0.05$) success, specific male and female behaviors (i.e., groom other cat, female rub on other cat, and combined male affiliative behaviors) did predict success ($p < 0.05$) when the juvenile/adult-male variable was included in the model. These results suggest that behavior and hormone levels could be used to predict whether a pair of clouded leopards will reproduce successfully.

Characterization and Control of Male Aggression in Clouded Leopards (*Neofelis nebulosa*)

Heather DeCaluwe, University of Maryland, Smithsonian's National Zoological Park
Katharine Pelican, University of Minnesota
Mary Ann Ottinger, University of Maryland
JoGayle Howard, Smithsonian's National Zoological Park

The endangered clouded leopard is a highly charismatic felid species. Unfortunately, breeding this species *ex situ* is a challenge, primarily due to male aggression and fatal attacks on females. In the current North American population of 75 animals, there are only four animals successfully maintained in male-female pairs, and no cubs have been born in over 3 years. As a result, the population is aging and has declined over the past five years from a high of ~120 animals. Prior studies offer two possible mechanisms for aggression in this species: personality (anxiety) and physiology (testosterone). Research suggests that male clouded leopards have two basic personality types, anxious and calm, and studies have correlated these types with failed and successful pairings, respectively. Physiologically, there is evidence that testosterone plays a role in clouded leopard aggression, with juvenile pairs known to experience lower rates of failure due to hostile behavior than pairs formed with a post-pubertal male.

The planned research seeks to characterize and control aggression in the male clouded leopard through the use of pharmaceutical therapies. Specific objectives are to: 1) assess the effect of personality on stress-sensitivity in the male clouded leopard; 2) determine the effect of two anxiety-reducing psychotropic drugs (clomipramine versus fluoxetine), each with differing mechanisms of action, on stress response and aggression; 3) assess the impact of testosterone suppression through gonadotropin releasing hormone (GnRH) agonist (deslorelin) treatment on stress response and aggression; and 4) determine the most effective drug therapy for controlling aggression in the male clouded leopard.

The study will be carried out in three phases. In Study 1, twenty unpaired male clouded leopards will be categorized by personality as either anxious or calm, using a keeper survey, endocrine data and behavioral data. Males then will be exposed to stress-response tests. Analysis of both fecal hormones and behavior will provide, for the first time, a systematic understanding of the relationship between personality and stress-sensitivity, a trait correlated with aggression in clouded leopards.

In Study 2, the same 20 clouded leopards will be blocked by age and assigned to one of four treatments (n = 5 cats/treatment): 1) clomipramine; 2) fluoxetine; 3) GnRH agonist; or 4) no treatment (control). Drugs will be administered for 90 days prior to testing. Once the drugs have reached therapeutic levels, the same stress-response tests will be performed, followed by a second keeper survey. During both studies 1 and 2, animal responses will be assessed by fecal hormones and behavior. The pre- and post-drug treatment responses will be compared to determine the impact of drug therapy. Efficacy of drug classes in mediating male response to stress will be compared to determine the relative contribution of personality versus physiology to stress-sensitivity, and the optimal psychotropic drug will be identified.

In Study 3, twelve adult males (6 anxious and 6 calm) will be moved to enclosures adjacent to twelve adult females to assess male behavior toward females in a ‘howdy’ situation. This initial introduction stage will be conducted for 2 months first without drugs, with the animals acting as their own controls, and again at 90 days after initiation of drug therapy using the optimal psychotropic drug from Study 2 (n = 6) versus the GnRH agonist (n = 6). Endocrine and behavioral responses will be compared before and after drug therapy.

We anticipate that suppressing either anxiety (personality) or testosterone (physiology) will reduce stress responses, decrease corticoid concentrations and control aggression in the male clouded leopard. Ultimately, this information will be critical for developing a method for improving male-female pairing success in breeding programs.

Cancer in Clouded Leopards (*Neofelis nebulosa*)

Karen A. Terio, University of Illinois Zoological Pathology Program
Tabitha Viner, Smithsonian Institution, National Zoological Park

A retrospective survey of necropsy tissues and slides was conducted to investigate an apparent high incidence of cancer in the Clouded Leopard SSP population. Biomaterials from 41 clouded leopards housed at 17 different institutions were reviewed including 22 cats from the National Zoological Park archives. Cancer was present in 83% of the clouded leopards at the time of necropsy and was the cause of death in 37% of the cases. Many leopards had more than one tumor at the time of necropsy. The most common types of tumors included pheochromocytoma, thyroid adenoma, seminoma (males), leiomyoma (females), lymphoma, meningioma, mesothelioma, and intestinal adenocarcinoma. Pheochromocytomas were especially prevalent and in a few cases, invasion of the vena cava resulted in acute fatal hemorrhage. Despite the high prevalence of cancer, affected animals were generally older cats (median age of 14) and no significant health concerns were noted in younger animals. Cancer needs to be considered in health evaluations of older clouded leopards.

Developing In Situ-Ex Situ Linkages in Pallas' Cats

Bill Swanson, Cincinnati Zoo & Botanical Garden

Creating connections between captive and wild populations is a vital component of effective conservation efforts for felid species. For the Pallas' cat (*Otocolobus manul*), developing in situ-ex situ linkages has involved a series of progressive steps over the past fifteen years, beginning with knowledge acquisition from comparative studies with captive and wild populations followed by increasing scientific capacity through research training in Mongolia, establishing gene flow from wild cats via assisted reproduction, and securing continual zoo funding for in situ conservation programs. The long-term survival of both captive and wild Pallas' cats may well depend on successful completion of these successive, ongoing activities.

Population modeling indicates that the current captive population, managed by the Pallas' Cat Species Survival Plan (SSP), will lose substantial genetic diversity over the next 50 years without either a dramatic increase in population size (from 40 to 400 cats) or the periodic introduction of new founders (2 founders every 5 years). The latter solution is more practical logistically but the traditional method of founder acquisition (i.e., capturing wild, free-living individuals for placement in zoos) is no longer desirable from ecological, philosophical or political perspectives. As an alternative, the genetic contribution of wild males may be obtained by capturing cats in the field for anesthesia, semen collection and sperm freezing followed by the release of the males back into the wild (Swanson et al., 2007).

As one component of the Pallas' Cat Conservation Project in Mongolia, radiocollars have been placed on several male Pallas' cats living in the 650 km² study site southwest of Ulaanbaatar. Beginning in the fall of 2005, radiocollared males have been recaptured periodically based on season (pre-breeding, breeding, post-breeding) to permit semen collection, evaluation and freezing. Over the past two years, a total of 21 semen collection procedures have been conducted with 11 males captured on the steppes of Mongolia. Seminal analysis has revealed that wild Pallas' cats show the same seasonal patterns in sperm production and quality as seen with captive cats, with peaks observed during the winter breeding season (Oyuntuya et al., in press). As part of this project, a Mongolian graduate student, Bariushaa Oyuntuya (Oyuna), from the National University of Mongolia is receiving hands-on training in reproductive sciences and molecular genetics at the Cincinnati Zoo and the National Cancer Institute's Laboratory of Genomic Diversity. These research findings will form the basis for her PhD thesis.

To date, a total of 115 frozen semen straws, representing 10 potential founders for the Pallas' Cat SSP, have been imported to the U.S. for use with assisted reproduction procedures. In studies conducted at the Cincinnati Zoo, the functionality of this frozen-thawed Pallas' cat sperm was assessed initially by insemination of viable domestic cat oocytes, resulting in relatively high fertilization percentages (54%, overall). Subsequently, oocytes were collected laparoscopically from two gonadotropin-treated female Pallas' cats for in vitro fertilization (IVF), culminating in production of 30 embryos (~50% fertilization). Of these, 28 embryos (14 non-frozen, 14 frozen-thawed) were transferred laparoscopically into the oviducts of five synchronized female Pallas' cats housed at the Erie Zoo and Utah's Hogle Zoo. Although all recipient females ovulated in

response to gonadotropin treatment and exhibited physiologically-normal ovarian responses (i.e., average of 7 ovulation sites or corpora lutea per female), none of the females became pregnant.

In the near future, efforts will continue to establish these valuable population linkages. Two additional field expeditions are planned for 2008/2009 in Mongolia to complete the seasonal assessment of reproductive traits in wild Pallas' cats. The Mongolian graduate student Oyuna will be receiving further training in molecular genetics in the U.S. in 2008 before completing her research and defending her dissertation by the end of 2009. Additional IVF and embryo transfer procedures have been scheduled for the winter of 2009 to hopefully produce founder offspring in U.S. zoos using frozen-thawed sperm from Mongolia. Lastly, we will begin exploring the next phase of the Pallas' Cat Conservation Project in Mongolia and soliciting support for this evolving program from other AZA institutions that share our concern and passion for Pallas' cat conservation. Acknowledgements: The assistance of collaborators in Mongolia (Bariushaa Oyuntuya, Dr. Bariushaa Munkhtsog, Dr. Meredith Brown, Dr. Amanda Fine, Steve Ross) and the U.S. (Erie Zoo, Hogle Zoo) is gratefully acknowledged.

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Working Group Reports

In Situ Research for New World Felids

Working Group Participants:

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Sue Booth-Binczik
Arturo Caso
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Kerry Fanson
Brigitte Thompson
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Marie Martinez
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Valeria Conforti
Susan Sabik
Stuart Wells
Travis Perry
Don Goff
Nanette Bragin

WHAT DO RESEARCHERS NEED FROM THE ZOO COMMUNITY?

WHAT DO ZOOS NEED FROM THE RESEARCH COMMUNITY?

A discussion between the attendees centered around how to improve or increase communication between in situ and ex situ groups. The topics ranged from researchers needing access to money to opening up communication to researchers about what is available in zoos. Examples of small grant opportunities were given to the researchers and examples of research projects in zoo, i.e. using zoo scat to train detection dogs for in situ research. Some researchers were not aware of enrichment programs and possible applications that might have for using scents to lure animals to trap areas etc. Using zoo personnel to assist research was discussed and some of the pros and cons were discussed. It would depend on the research and what governing body was guiding the research to determine if it was beneficial. Topics covered included amount of time to train volunteers, insurance coverage for volunteers, and a couple of examples were brought up where zoo volunteers were used in research projects and how positive that was for zoo employees.

Ideas to help foster communication included links on AZA and Felid Tag websites to other sites such as those for the Wildlife Society or Texas A&M University, where lots of field researchers go looking for grant information. This might include a list of small of zoos offering small grants, possible resources for training in animal handling and highlighting projects where zoos have had a positive impact on participation in field research.

Topics Discussed:

- *Funding*: Where do researchers go for grants? AZA, Zoo-based grants, etc. Develop a web site listing zoo grants and other resources.
- *Getting cats to go in traps*: Allow researchers to work with zoos to investigate what traps and methods work. What attracts the cats? Keepers use various enrichment items and scents to see which works to trap animals? Which traps are successful?
- *Use zoo scats for training*: Detecting scat in the wild. May have issues with different diets in the wild vs. captivity?

- *Zoo Involvement*: Small zoo staff have to apply for grants to participate in research. Keepers may feel a sense of fulfillment with involvement in experiment? Zoo staff are a resource for knowing animal behaviors and dealing with medical situations. Specialized projects may not be practical if training takes 3-4 months. Other projects may allow volunteers to work in the field for a couple of weeks. Danger from snowmobiling, snow tracking, etc. present liability issues. Ocelot volunteers in Mexico, pay for helping. Administered through Dallas Zoo. Researchers contact a zoo for IACUC expertise.
- *Resources to Locate Projects*: Getting word out through internet. Link on AZA site. Talk to other agencies to get a link on their web site. Talk with university professors to establish link. Texas A & M has great links. Education committee for Felid Tag may be able to help with design of link. Other countries usually go through their universities for links.
- Pro-active in getting word out that zoo community is a resource.
- Have AZA put logo of organization that needs help. This would provide link.
- Animal Behavior is a good area for participation.
- Create excitement about a program and you will get repeat funding.
- What are critical issues in the wild - global warming and diseases.
- Researchers need cameras.
- Pat Medici: brought together researchers from different areas to start communication.
- Recovery team in Mexico. Standardized all materials that went out.
- How do you tie in species that you don't have with more of an ecosystem message?
- Researchers would like to be sure keepers doing the work get acknowledged and a copy of the research results.
- Do zoos need carcasses of lynx? Legal issues?
- Felid TAG listserv is also a conduit for communications from researchers

Action Items:

- Create link to AZA or Felid Tag web-site about zoos as a resource for researchers
 - Focal items for inclusion:
 - Animal behavior
 - Trapping cats
 - Enrichment
 - Animal handling
 - IACUC expertise
 - Researchers need cameras
 - Information on how to apply for small grant
 - Explore international research connections by establishing links between web-sites in those regions (Wildlife Society)
 - Reach out to field researchers who do not know about us
 - Vet services for darting, placing transponder, etc.
 - Volunteers for research
 - Planting trees
 - Surveys
 - Building fences
- Consult Felid TAG education committee for help with link design

- Send Felid TAG representative to The Wildlife Society (TWS) conferences

Working Group: Felid Regional Collection Plan (RCP)

Norah Fletchall, John Ball Zoological Garden, Felid TAG Co-chair

The group was split into two separate working groups: large cats and small cats. Each group reviewed space survey data (compiled by Danny Morris) and evaluated the status of all existing programs utilizing the prescribed WCMC Management Assessment Criteria (MAC). These criteria must be utilized to define the program level (SSP, PMP, DERP, Phase-In, Phase-Out) for each species of felid housed in AZA facilities. In addition, felid species not currently managed under the umbrella of the TAG were discussed. After review, one additional specie (Jaguarundi) will be recommended in the RCP as a Phase-In.

Results of the working groups efforts will be incorporated into the RCP document to be reviewed by WCMC in September 08 at the AZA National Conference.

Working Group: Felid Education

Shasta Bray, Cincinnati Zoo & Botanical Garden, Education Co-Advisor
Karen Povey, Point Defiance Zoo and Aquarium, Education Co-Advisor

E-newsletter

We discussed how to organize and disseminate a quarterly e-newsletter, the purpose of which is to communicate information between Felid TAG members. Information may include brief updates on conservation and education projects, announcements, upcoming events, and more. The newsletter will be managed at the Cincinnati Zoo with Shasta as the editor. We discussed theming the issues by region or topic so that we could target our solicitations for submissions each quarter. The newsletter will be distributed through the list serv as well as posted on the web site. The target date for publishing the first issue will be June 1st.

Web site

The majority of the working group's time was spent discussing how to organize the web site, prioritize content, and assign people to specific tasks. The primary audience of the web site is the Felid TAG. The web site will be hosted and maintained by the Smithsonian Institution/National Zoo with Craig Saffoe as the conduit. Nette Pletcher will assist Craig in editing content. Although the web site will be incorporated into the Smithsonian's web site, you will still be able to access it through www.felidtag.org. The web site is currently live and content will be added as possible. The priority information includes the dates of the next meetings and the list of Felid TAG Steering Committee Members and SSP Coordinators. Overall, the content will include the following sections. Designated assignments are due to Craig by 8/1/08, and he will have them up by 9/1/08.

Home page

About the Felid TAG (History, Contact info, regional collection plans, etc)—Karen

Calendar/events (Meeting dates, course dates, etc)

Conference proceedings

News/newsletter

Fact sheets—Ken

Photo gallery—Alicia

Careers with Cats—Linda

Professional Development

Categories (leads to pages on each managed species)

Conservation Education—Shasta

Conservation & Research Projects (begin with Dusty's database)—Nette

Husbandry (Manuals, exhibit design, vet info, etc)—Wendy

Links to outside resources—Kathy

Publications

Next Year's Meeting

The 2009 conference will have a focus on education. Karen will be putting together the program schedule. Please email her your presenter suggestions.

Attendees:

Name	Institution	E-mail address
Karen Povey	Point Defiance Zoo	karenp@pdza.org
Shasta Bray	Cincinnati Zoo & Botanical Garden	Shasta.bray@cincinnati-zoo.org
Alicia Sampson	Cincinnati Zoo & Botanical Garden	Alicia.sampson@cincinnati-zoo.org
Dan Marsh	Cincinnati Zoo & Botanical Garden	Dan.marsh@cincinnati-zoo.org
Cathryn Hilker	Cincinnati Zoo & Botanical Garden	Email Alicia Sampson
Linda Casteneda	Cincinnati Zoo & Botanical Garden	Linda.casteneda@cincinnati-zoo.org
Kathy Watkins	Cincinnati Zoo & Botanical Garden	Kathy.watkins@cincinnati-zoo.org
Victoria Sokol	Houston Zoo	vsokol@houstonzoo.org
Wendy Green	North Carolina Zoo	Wendy.green@nczoo.org
Judy Berens	Panther Ridge	pantheridge@aol.com
Ken Kaemmerer	Dallas Zoo	Kenneth.kaemmerer@dallascityhall.com
Craig Saffoe	National Zoo	saffoec@si.edu
Nette Pletcher	National Zoo	pletchern@si.edu

Executive Summary of the Felid TAG's Strategic Plan*

Introduction

At the 2007 Felid TAG Annual Meeting, the Steering Committee recommended that the TAG conduct a strategic planning meeting to chart the course for the organization over the next several years. Seventeen people, including Felid TAG Steering Committee members and invited guests, participated in this workshop which was facilitated by the Conservation Breeding Specialist Group and held from November 2-5, 2007 at White Oak Conservation Center in Yulee, Florida (see list of participants below). This workshop was organized to assist the Felid TAG by developing a shared vision for the future of the organization and drafting goals and actions to create this desired future, working with the resources and opportunities of today.

A variation of the classic futures search process was used for this workshop. On day one, the participants began by looking at how they got to where they are today, then they were asked to consider the present situation in which the Felid TAG finds itself, and finally to look ahead to the future they want to work towards together. Days two and three were devoted to planning how to get from the current state to the desired future. This involved development of a set of shared ideals and the identification of specific goals, and actions to achieve those goals. Three major areas were identified and addressed during the workshop: Communication and Transfer of Knowledge, *In situ/Ex situ* Issues, and Management Issues.

Working Group Goals

The main goals of each of the three working groups are listed below. The details of each step of the process, and the resulting action plan, can be found in sections II through V of the final report.

Communication and Transfer of Knowledge

Develop, maintain, and expand a website that can become a resource for worldwide felid conservation.

Continue to develop and conduct the annual husbandry course.

Develop a written historical evolution of captive felid management programs in North America.

Develop an active list of tasks and activities, with contact people, that TAG members can utilize to direct individuals wanting to become more involved within the FTAG.

Develop specific expectations about SSPs and PMPs for program continuity.

Expose students to the zoo industry and recruit zoo professionals to the TAG.

***In situ/Ex situ* Issues Working Group Report**

Prioritize *in situ* projects based on SSP and Felid TAG recommended guidelines.

Update and evaluate the Felid TAG *in situ* project database and post on the Felid TAG website.

Develop a component on *in situ* conservation for the Felid TAG website.

Expand communication between the Felid TAG and stakeholders.

Facilitate cross-training opportunities for range country stakeholders.

Identify and recruit a team of educators to help the TAG identify and implement Felid TAG initiatives.

Insert education principles into the Felid TAG conservation philosophy.

Develop and utilize public relations to promote the *in situ* programs facilitated by the Felid TAG.

Management Issues Working Group Report

Work with USDA and AZA to provide a definition of felid program animals and to change the USDA definition of 'big cat'.

Establish guidelines for using felids as program animals in reference to animal welfare, human safety and education messages

Have an approved RCP as soon as realistically possible.

Contact AZA regarding our interest in establishing methods of communication and policy formulation that are more collaborative in nature.

Develop liaisons with non-AZA organizations interested in felids.

Expand the size of our managed populations.

Complete the standardized guidelines for large and small felids.

Encourage broader veterinary involvement in the TAG.

Define basic research questions with felids and transition research findings into practice.

Educate zoo directors about scientific management, and program managers about meeting their constituents' needs.

Explore new approaches to develop new systems to maintain viable felid populations long-term.

In addition to developing an action plan for the Felid TAG, the workshop participants summarized the essence of the TAG, its key characteristics, and the elements that they feel are essential to retain into the future, in the following set of shared ideals. A commitment was made that all work on behalf of the Felid TAG will be conducted in accordance with these ideals and they will be used to guide decision-making.

Felid TAG Ideals

1. Preserving the Felid TAG's integrity (fun), productivity and viability
2. Sustainable felid populations in situ and ex situ (animal welfare)
3. Develop current and future felid conservationists (education, mentoring)
4. Reduce environmental footprint

5. Inclusivity, partnerships, and collaborations

The Felid TAG chose to immediately live up to its ideal of reducing their environmental footprint by offsetting the carbon emissions of those traveling to this workshop. The carbon footprint calculation for was: 10.87 metric tons at a cost of \$10.00 per metric ton equaling \$108.65. The FTAG has contributed this amount to The World Land Trust for the Tropical Forest Project in Ecuador.

*From: Byers O and K Traylor-Holzer. 2008. Final Report - Felid TAG Strategic Planning Workshop. Conservation Breeding Specialist Group (CBSG), Apple Valley, MN. 41 pp.

Felid TAG Strategic Planning Workshop Participants

Jill Mellen	Disney's Animal Kingdom
Bonnie Breitbeil	Central Florida Zoo
Hollie Colahan	Houston Zoo
Norah Fletchall	John Ball Zoo
Mel Sunquist	University of Florida
Craig Saffoe	Smithsonian National Zoological Park
Bill Swanson	Cincinnati Zoo & Botanical Garden
Kelley Snodgrass	Fossil Rim
Danny Morris	Omaha's Henry Doorly Zoo
Cheryl Dikeman	Omaha's Henry Doorly Zoo
Ron Tilson	Minnesota Zoo
Steve Bircher	St. Louis Zoo
Karen Goodrowe	Point Defiance Zoo & Aquarium
Karen Povey	Point Defiance Zoo & Aquarium
Jack Grisham	St. Louis Zoo
Linda Penfold	White Oak Conservation Center
Karen Meeks	White Oak Conservation Center
Onnie Byers	CBSG (meeting facilitator)
Kathy Traylor Holzer	CBSG (meeting facilitator)

SSP and PMP Reports

Black-Footed Cat SSP 2008 Mid-Year Report

Steven M. Wing, Louisville Zoo, *Black-Footed Cat SSP Coordinator*

Liz Harmon, Kansas City Zoo, *Black-Footed Cat Regional Studbook Keeper*

Advisors

Nadine Lamberski, San Diego Wild Animal Park, Veterinary Medicine

Karen Terio, University of Illinois, Pathology

Jason Herrick, Cincinnati Zoo & Botanical Garden/University of Illinois, Reproduction

Dave Hodge, Louisville Zoo, Website

North American Population

The North American population consists of 15.15.3 (33) cats in 15 institutions.

There have been 9 births (4 litters) in the past 12 months.

There have been 2 deaths (0.1.1) in the past 12 months.

There have been 4 transfers (2.2) in the past 12 months.

Longevity has been a problem for this species in North America and Europe. In 1995, life expectancy was only 4.2 years. Dr. Lamberski has been gathering necropsy reports and age data and reports that the average age at death has climbed to 7.0 years. Of the 33 cats living in the population, 11 are over 7 years old. Four of these cats are over 14 years old.

We currently have 5 institutions that are successfully breeding cats: Omaha, Central Florida, Riverbanks, Kansas City and San Antonio.

Masterplan Session

A masterplanning session was held in conjunction with the PMC via email in August 2007.

Final breeding and transfer recommendations are in process and were made in October 2007.

The recommendations can be found on the AZA website.

The population founder genome equivalent is 2.67 with 81.27% gene diversity retained.

Population mean kinship stands at 0.1873.

All recommended transfers have taken place and 11 pairs are recommended to breed (Omaha, Riverbanks, Cincinnati, Audubon Institute, Santa Barbara, San Antonio, Central Florida, Kansas City and Grand Rapids). Hogle and Fresno will be pairing cats in the near future.

Embryos have been produced with sperm from a wild caught male and oocytes from the female at Hogle. Dr. Herrick is looking for a female to transfer the embryos into. Dr.'s Herrick, Lamberski and Sliwa will be returning to South Africa on April 14 to catch more cats. A permit has been obtained to import semen from 10 additional males.

Importations

Cincinnati and Omaha are in the process of importing 5 cats from South Africa. These cats will infuse much needed genetics into the population. The SSP needs to import new cats from Africa and a list of contact persons and institutions in South Africa, Botswana and Namibia has been created. If anybody knows of any contacts in Africa we may use, we would be most grateful.

Preliminary discussions have occurred with the DeWildt Cheetah and Wildlife Centre on the possibility of setting up a black-footed cat breeding and release center. Institutions will be needed to aid with this project.

New Institutions

Fresno and Louisville have received cats. Four institutions have unpaired cats, all of which are at reproductive senescence.

The European EEP has requested any cats that we can send to them. We will be working towards helping out their populations.

Conservation and Research Programs

Distribution, Habitat Characteristics and Sub-Specific and Disease Status of the Black-Footed Cat (Felis nigripes) in the Northern Cape Province, South Africa.

- Beryl Wilson (Btech), Alex Sliwa (PhD), Jason Herrick (PhD), Nadine Lamberski (DVM, DACZM)
- There is very limited knowledge of the distribution and numbers of smaller cat species. The distribution of each species and the habitat available to it needs to be established in detail to the level of discrete populations. Research to increase understanding of these factors is essential in planning and implementation of effective conservation measures. While the basic work on the natural history of the black-footed cat has been done through a 6-year field study by Dr. Sliwa, with 17 individual cats radio-marked, this will be a start for the survey work to verify the existence of this elusive cat species in areas that have been worked out by GIS models. The collection of a larger number of blood samples for determination of sub-specific status of several populations, their health and genetic makeup is of great value. These samples will be stored and made available to other research institutions.
- Funding for this research has been received by:
 - Chicago Zoological Society
 - Cincinnati Zoo
 - Columbus Zoo
 - The Living Desert
 - Riverbanks Zoo
 - Zoological Society of San Diego

Analysis and Interpretation of Vaccine Serology in Black-footed Cats

- Nadine Lamberski (DVM)
- A partnership has been set up between the San Diego Wild Animal Park and Cornell University to analyze serum from young black-footed cats. Assistance with this project is requested.

Reproductive Biology of the Black-footed Cat (Felis nigripes) and Sand Cat (Felis margarita)

- Jason Herrick (PhD)

Reproductive and Health Assessment of Black-Footed Cats (Felis nigripes) on Benfontein

- Jason Herrick (PhD), Nadine Lamberski (DVM), Beryl Wilson (Btech), Alex Sliwa (PhD)
- To characterize reproductive and health parameters in free-ranging animals that can be used to assess the health of captive individuals.

Prevalence of Selected Infectious Diseases in Black-Footed Cats (Felis nigripes) and Sympatric Carnivores in the Northern Cape, South Africa: Preliminary Results

- Nadine Lamberski (DVM), Alex Sliwa (Ph.D.), Beryl Wilson (Btech), Jason Herrick (Ph.D.), Edward J. Dubovi (Ph.D.)
- This study is part of a larger conservation initiative to determine the ecology, reproductive biology, genetics, and health of the black-footed cat in the Northern Cape Province of the Republic of South Africa. It is based on the hypothesis that an assessment of distribution, genetic diversity, disease exposure, and reproductive fitness in free-ranging black-footed cats will allow for better characterization of the species' conservation status and provide comparative data that can be used to monitor the health of in situ and ex situ populations over time. As natural habitat disappears or becomes fragmented, populations of black-footed cats may become genetically isolated, which could result in reduced reproductive fitness and increased susceptibility to disease. Further consequences include increased contact with other carnivores and the pathogens they carry including domestic dogs and cats. Black-footed cats share their territory, prey base, and infectious disease susceptibility with many small carnivores including genets, caracals, African wildcats, yellow mongoose, suricates, Cape fox, bat-eared fox, black-backed jackals, and striped polecats providing numerous opportunities for disease transmission. If wild populations of black-footed cats are fragmented and facing disease challenges, the conservation status of this species may be more critical than currently believed. Determining the seroprevalence of diseases in black-footed cats and other small carnivores may help elucidate the infectious diseases that can place fragile populations at risk. Additionally, comparing disease prevalence among populations may help identify populations at an increased risk of catastrophic disease outbreaks.
- Significant findings to date (2004-2007):
 - 32 samples were submitted for rabies serology and only one from a black-backed jackal pup (collected in 2005) was positive. This result likely reflects maternal antibody. Additional samples will be sent to the CDC in Atlanta, Georgia for additional lyssa virus testing. All samples were negative.
 - A few black-footed cats had evidence of exposure to Feline Calicivirus, Canine Distemper virus, and West Nile Virus.
 - One of two domestic cats sampled (in 2005 and 2007) were positive for Feline Immunodeficiency Virus, Feline Calicivirus, and Feline Parvovirus.
 - One of four Cape fox had serologic evidence of Canine Distemper Virus and three of four were exposed to West Nile Virus.
 - Both domestic dogs sampled were exposed to Canine Distemper Virus and Canine Parvovirus.

- 27 o 29 yellow mongoose sampled had serologic evidence of exposure to Canine Distemper Virus. These data require additional investigation to determine if mongoose are reservoirs for Canine Distemper Virus, if mongoose sera reacts nonspecifically with the reagents used, or if the results are due to cross-reactivity with exposure to a related virus.

Publications

Terio, K.A., O'Brien T., Lamberski N., Famula T.R., Munson L.
Amyloidosis in black-footed cats (*Felis nigripes*). Veterinary Pathology, In press.

Action Plan

The main focuses for the coming year include:

- Update the breeding and transfer masterplan through the AZA Population Management Center in November 2008
- Encourage breeding in all unrelated black-footed cats in North America
- Import new founders from Africa
- Determine if amyloid protein in some lineages of black-footed cats contains mutations predisposing them to disease.
- Identify conservation partners in South Africa, Botswana and Namibia;
- Initiate in situ conservation partnerships in range countries.

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Fishing Cat SSP 2008 Mid-Year Report

Bill Swanson, Cincinnati Zoo & Botanical Garden, *Fishing Cat SSP Coordinator*

Attendee's Name	Institution	E-mail Address
Shasta Bray	Cincinnati Zoo	shasta.bray@cincinnati-zoo.org
Julia Chosy	Lincoln Park Zoo	jchosy@lpzoo.org
Cheryl Dikeman	Omaha's Henry Doorly Zoo	cheryld@omahazoo.com
Jilian Fazio	National Zoo	fazioj@si.edu
Kristi Fisher	FCC/Santa Ana Zoo	purrdoc@cox.net
Rich Freitag	Central Nebraska Packing	info@nebraskabrand.com
Zoli Gyimesi	Louisville Zoo	zoli.gyimesi@insightbb.com
Jason Herrick	University of Illinois	jherrick@uiuc.edu
JoGayle Howard	National Zoo	howardjg@si.edu
Gail Karr	Memphis Zoo	gkarr@memphiszoo.org
Ken Kaemmerer	Dallas Zoo	kenneth.kaemmerer@dallascityhall.com
Cindy Krieder	Erie Zoo	ckreider@eriezoo.org
Russ Kelley	P & G Pet Care	kelley.rl@pg.com

Barbara Lintzenich	Cincinnati Zoo	barbara.lintzenich@cincinnati-zoo.org
Emily Lutz	Oklahoma City Zoo	catforest@okc-zoo.com
Joe Maynard	Feline Conservation Center	cathouse@qnet.com
Farshid Mehrdadfar	San Diego Zoo	fmehrdadfar@sandiegozoo.org
Barb Palmer	San Francisco Zoo	barbarap@sfzoo.org
John Perentesis	CCHMC	john.perentesis@cchmc.org
Gretchen Radloff	CCHMC	gretchen.radloff@cchmc.org
Ann Petric	Brookfield Zoo	ann.petric@czs.org
Stephanie Rhodes	Brookfield Zoo	stephanie.rhodes@czs.org
Ingrid Russell-White	San Francisco Zoo	ingridr@sfzoo.org
Craig Saffoe	National Zoo	saffoec@si.edu
Erin Sarrat	Audubon SSC	esarrat@auduboninstitute.org
BJ Schoeberl	Denver Zoo	bjschoeberl@denverzoo.org
Alan Shoemaker	non-affiliated	sshoe@mindspring.com
Karen Terio	University of Illinois	kterio@uiuc.edu
Bridget Tighe	San Diego Zoo	bmulholland@sandiegozoo.org
Debbie Thompson	Little Rock Zoo	dthompson@littlerock.org
Rhonda Votino	Amarillo Zoo	Rhonda.votino@ci.amarillo.tx.us
Stu Wells	Phoenix Zoo	swells@thephxzoo.com

The Fishing Cat Species Survival Plan held a SSP meeting and Bladder Cancer Working Group meeting over a three hour period on April 10th, 2008 in Cincinnati, OH in conjunction with the mid-year Felid TAG meeting. The SSP meeting was attended by 33 individuals representing 18 AZA member institutions and 5 non-AZA institutions (i.e., one private cat facility, two cat food companies, one hospital-based research program and one university). Since the primary focus of this year's meeting was to address the issue of bladder cancer in fishing cats, only a brief overview was provided of the status of the SSP population and related programs.

The current demographic and genetic status of the SSP population was reviewed. As of April 2008, the SSP population consisted of 60 cats (22.38.0) in 25 institutions. Genetic diversity (GD) currently stands at 89.7%, close to our target of 90%, with a founder size of 15, FGE of 4.84, and mean inbreeding coefficient (F) of 0.110. There are three new zoos interested in acquiring fishing cats within the next year and several current SSP institutions are looking to replace older animals. Of the SSP cats, 29 (12.17) are 7 years of age or younger and 31 (10.21) are over 7 years of age. In the past year, there has been one litter born (0.2 kittens) and seven deaths. Of the 8 SSP recommended pairings in 2007, only the pair at the Columbus Zoo has reproduced – notably, the dam is descended from a Cambodian founder and the sire from a Thailand founder. There have been no new founders imported in the past year. Regarding the wild population, fishing cats will be classified as 'endangered' (formerly as 'vulnerable') in the 2008 IUCN Red List, reflecting negative findings about species distribution and population status from ongoing field studies in Southeast Asia.

Please note that the Fishing Cat International Studbook keeper, Lynda Curtis at the Riverbanks Zoo, has resigned from her studbook position. The SSP thanks Lynda for her years of dedicated service to managing this studbook and assisting the SSP. The new studbook keeper is Jessica Kinzer at the Riverbanks Zoo. Please direct your studbook updates and inquiries to her at

jkinzer@riverbanks.org. Also note that the SSP Veterinary Advisor is Dr. Kristi Fisher (purrdoc@cox.net), the SSP Pathology Advisor is Dr. Karen Terio (kterio@lumc.edu) and the SSP Nutrition Advisor is Dr. Cheryl Dikeman (cheryld@omazazoo.com). Inquiries about veterinary care, disease concerns, and dietary issues should be directed to these individuals. Also note that Dr. Terio and Dr. Michael Kinsel (mkinsel@lumc.edu) continue to provide (free of charge) full histopathological evaluations of deceased individuals managed in all five of the small cat SSPs, including the fishing cat.

Breeding recommendations from 2007 were revisited briefly and all eight reaffirmed for 2008. Since the SSP meeting in April 2008, two other breeding recommendations have been added, pairing a male obtained from the Feline Conservation Center (FCC) by the San Diego Zoo with both the older resident female at San Diego and a younger female on loan to San Diego from the Minnesota Zoo (see recommendations below). If all ten breeding pairs were to produce offspring (2 kittens/litter), the SSP population size would increase from 60 to 80 animals and GD would improve from 89.7% to 90.8%.

The SSP thanks the San Diego Zoo for taking the initiative to acquire this founder male offspring from the FCC, a non-AZA institution that maintains multiple breeding pairs of genetically-valuable fishing cats. Given the poor breeding success of SSP recommended pairings, the SSP still strongly encourages AZA zoos interested in acquiring fishing cats to contact the FCC about purchasing additional offspring from that institution, especially offspring from their Sri Lankan and Cambodian founders. The FCC (attention: Joe Maynard) may be contacted via email at cathouse@qnet.com to inquire about animal availability and costs.

2008 Fishing Cat SSP Breeding Recommendations

<u>Sire SB#</u>	<u>Local ID#</u>	<u>Institution</u>	<u>Dam SB#</u>	<u>Local ID#</u>	<u>Institution</u>	<u>F Value</u>
497	104061	Cincinnati	692	107052	Cincinnati	F = 0.000
529	7457	Columbia	664	8819	Columbia	F = 0.000
720	-	Columbus	694	206035	Columbus	F = 0.007
440	770313	Oklahoma City	722	-	Oklahoma City	F = 0.035
655	13993	Omaha	657	13994	Omaha	F = 0.000
734	-	Omaha	541	13423	Omaha	F = 0.000
735	-	NZP	633	114059	NZP	F = 0.007
85	-	Minnesota	542	11066	Minnesota	F = 0.000
661	508020	San Diego	484	599290	San Diego	F = 0.000
661	508020	San Diego	732	11851	Minnesota	F = 0.000

Breeding/Exhibit loan transfers:

Female SB# 731 (Minnesota, #11850) to Dallas
 Female SB#732 (Minnesota, #11851) to San Diego
 Female SB#733 (Minnesota, #11852) to Cleveland

In 2006, the Fishing Cat SSP renewed its three-year Memorandum of Understanding with the Thai Zoological Parks Organization (ZPO) to manage fishing cats in Thai zoos and produce founder offspring for possible importation to the U.S. Several breeding pairs are still being maintained at the Khao Kheow Open Zoo and the Dusit Zoo but offspring production over the last five years has been almost nonexistent and most of the females are reaching advanced age. Efforts are currently underway to obtain some younger captive cats from a northern Thai zoo to attempt to revitalize the breeding program in the Thai ZPO institutions.

In situ research studies with wild fishing cats are continuing in Thailand. Thai field biologist Passanan (Namfon) Cutter, who conducted the initial camera trap surveys for fishing cats in Thailand, has matriculated in the Department of Fisheries, Wildlife and Conservation Biology at the University of Minnesota as a Master's Degree candidate. Namfon will be continuing her research with wild fishing cats as part of her M.S. studies under the guidance of Dr. J.L. David Smith. More information about her project and progress can be accessed at her new website (<http://fishingcatproject.info/index.php/home>). Additional funding is always needed for these vital studies and always appreciated.

Bladder Cancer Working Group

The primary veterinary concern remains the high prevalence of transitional cell carcinoma (TCC) in older fishing cats with ~15 confirmed cases over the past ten years. The SSP convened a Bladder Cancer Working Group meeting following the SSP meeting to discuss this disease and develop an action plan to address the issue. Initially, several speakers presented talks about our current knowledge and understanding of this disease in fishing cats and other species. Dr. Karen Terio, the SSP Pathology Advisor, presented an overview of TCC in fishing cats, including her research into the histopathology and immunocytochemistry of fishing cat tumors. Dr. Kristi Fisher, the SSP Veterinary Advisor, presented information about current diagnostics and veterinary therapy for TCC in domestic cats and fishing cats and Dr. John Perentesis, Director of the Oncology Program at Cincinnati Children's Hospital Medical Center, gave an overview of TCC in humans and molecular diagnostic methods that may be applicable to fishing cats. Lastly, Barbara Lintzenich and Russ Kelley, nutritionists at the Cincinnati Zoo and the Iams Company, respectively, presented recent findings from a dietary survey of fishing cat institutions and initial nutrient analysis of several representative fishing cat diets.

In a subsequent open discussion, a research action plan was developed to address four main aspects of the disease: Epidemiology/Risk Factors, Diagnostics, Veterinary Therapy, and Dietary Issues. A more thorough assessment of studbook data will be initiated to identify all TCC cases in North American and global populations and assess the relationship of TCC cases to diets and genetic relatedness of individuals. New diagnostic methods, based on TCC biomarkers in urine, blood and tissue, will be evaluated for tumor characterization and early cancer detection. These findings will help establish veterinary diagnostic recommendations for age-specific TCC screening and provide insight to the most appropriate veterinary therapy, especially non-steroidal anti-inflammatory drugs, for alleviating clinical signs and slowing disease progression. Lastly, nutritional issues will be assessed in a follow-up dietary survey of fishing cat institutions as well as further assessment of nutrient levels, especially anti-oxidants, in blood and urine of captive fishing cats with comparison of these values to that of wild fishing cats in

Thailand. A more detailed action plan is being finalized and will be distributed to fishing cat institutions by the end of 2008.

Relevant References

Landolfi JA and KA Terio. 2006. Transitional cell carcinoma in fishing cats (*Prionailurus viverrinus*): pathology and expression of cyclooxygenase-1, -2 and *p53*. *Veterinary Pathology* 43:674-681.

Lintzenich BA, JJ Williams, CL Dikeman, WF Swanson and RL Kelley. Quantification of nutrient data from the diets of captive fishing cats (*Prionailurus viverrinus*). *Proceedings of the 7th Biennial Symposium of the Comparative Nutrition Society* (in press).

Mar Vista Animal Medical Center. 2007. Transitional cell carcinoma. Pet Web Library. Accessible on-line at: <http://marvistavet.com>.

Sutherland-Smith M, C Harvey, M Campbell, D McAloose, B Rideout and P Morris. 2004. Transitional cell carcinomas in four fishing cats (*Prionailurus viverrinus*). *Journal of Zoo and Wildlife Medicine* 35:370-380.

Wilson HM, R Chun, VS Larson, ID Kurzman and DM Vail. 2007. Clinical signs, treatments, and outcome in cats with transitional cell carcinoma of the urinary bladder: 20 cases (1990-2004). *Journal of the American Veterinary Medical Association* 231:101-106.

Pallas Cat SSP 2008 Mid-Year Report

Martha Caron, *Pallas Cat SSP Coordinator*

As of March 2008, the SSP population consisted of 40 cats (17.23) in 15 soon to be 16 institutions. A list of several potential new holding institutions is in place and they are waiting for animals to become available. In the past year, there were 7 (3.2.2) kittens born in two litters, with five of the seven kittens surviving. 2007 included the deaths of 4 (2.0.2) cats including the previously mentioned neonatal deaths for a net gain of three cats. The current population is based on 14 founders. Genetic diversity currently retained is .9177 with the potential to increase to .9444 without further importation or adding new founders. Mean inbreeding is currently 0.000 based on all original founders being unrelated. Due to our lack of successful births and limited number of aging genetically valuable animals, some minimal inbreeding has had to be allowed to increase the available pairings. Founder genome equivalents currently represented in the population are relatively low at 6.08 but have the potential to increase to 9.00 with careful genetic management and breeding to more equally represent our present founder base. We have several minimally represented founder females that are reaching their probable age limit for breeding over the next two years and every effort is being made to breed these females and capture their genes prior to their pending reproductive senescence.

Our entire female breeding population currently is between 5-7 years old with four of our seven current breeding females at age seven. Pallas cat females generally do not breed past the age of eight, although we did have our first nine-yr-old produce a successful litter last year. Therefore, technically speaking, these four females probably only have one more viable year to breed beyond this breeding season. We currently only have five females in the population that are four-yr-old or younger as replacement breeding females. If we are not successful at producing several female kittens from multiple litters in the next two years, this population has the potential to collapse unless importation from Europe of new breeding females occurs.

Breeding recommendations for 2008 were maximized in number but still mostly concentrated on the most genetically valuable animals, especially those nearing reproductive senescence, due to lack of successful breeding recommendations in 2005-2007 and our dire need to fill potential exhibits and continue to try to maintain a balanced age structure within the population which currently is somewhat precarious. A total of eight breeding recommendations were made this year which included all previously paired animals. Birth season in Pallas cats is generally late March-early June. We have one confirmed pregnancy currently, and two litters have been born so far this month. The first litter of four is at Bramble Park. Two kittens are surviving from that litter and currently being mother-raised. The 2nd litter was born at Great Plains Zoo on April 5th. That litter of two is currently also being mother-raised and both females are toxo free so hopes are high for these two litters. The litter due at the end of the month in Cincinnati is in a toxo positive female who currently is refusing to take our best anti-toxo treatment protocol medications. She is taking diclazuril but that treatment protocol has been iffy in the past with prevention of transmission in utero. That litter will be somewhat iffy for survival since we know that kittens can receive toxo from their mothers in utero. The litter will be pulled from the dam within 12 hours after birth and fostered onto a disease-free domestic cat. This protocol was successful with Cincinnati's litter born to a different toxo positive female last year so we will keep our fingers crossed that the litter ends up toxo free and healthy. There are still slight possibilities for 3-4 other pregnancies within the population yet this season but in previous years those possibilities have not come to fruition.

We have been conducting a voluntary fecal hormone assay assessment of almost all of our breeding females this breeding season. All but two of our breeding institutions are participating and it has been used to monitor our females for ovulation and potential pregnancies. The last three breeding seasons have seen very few pregnancies even though breeding has been reported by multiple institutions. Cincinnati stepped forward to conduct a reproductive study on our population to try to determine where the problem lies. So far we have confirmed ovulation in over half of the participating females with 2 of those four being confirmed pregnant following ovulation. Two females were thought to be pregnant but may have actually experienced false pregnancies. We are still confirming this.

Some potential good news for the population is that Bill Swanson has collected, frozen and imported sperm from 10 wild Pallas cat males in Mongolia over the past two breeding seasons and this frozen sperm was used to conduct embryo transfers into five females at Hogle Zoo and Erie Zoo which hold females only. Ultrasounds recently confirmed that we did not get any pregnancies from this first attempt but we now have the sperm and are able to continue to work with it into the future. If we achieve pregnancies using this technique in the future it will be a

first for this SSP by adding founders without actually having the founders in the population. This would add a much needed genetic boost to the population, as well as potentially providing new breeding females for the population. This is a very exciting possibility and if successful can potentially be used in other small cat populations to up their genetic potential. Kudos to Cincinnati and to Bill Swanson for making this possible. We know Bill certainly suffered his share of bitter Mongolian winter weather to make this possibility happen. Very exciting!

The Pallas Cat Conservation Project which is an *in situ* research project with the wild Pallas cat population in Mongolia continues to monitor several radio-collared cats, studying aspects of their ecology, biology, land use and reproduction. This is an exciting project. It has produced quite a body of knowledge so far. Bill Swanson returned to the project in Mongolia this winter to continue his study of reproductive parameters in wild male Pallas cats and attempt to collect and freeze more wild Pallas cat sperm (see his report in this volume). He was successful in collecting sperm on a further four males although this winter was much different from last year's mild winter in Mongolia. Bill learned what real winter field research in Mongolia was like to achieve his results this year! Great job Bill!

Much has been learned through this project regarding the lives and needs of wild Pallas cats. However, much is still left to be learned. The goal of the project now is to continue in-country capacity building for local Mongolian students who, once trained, can continue this vital work. The long-term conservation of wild Pallas' cats will depend on increasing local awareness and involvement, controlling poaching and illegal trade, and promoting the development of scientific infrastructure in Mongolia. By supporting these *in situ* – *ex situ* connections involving native Mongolian scientists, conservation-minded North American zoos, and free-ranging and captive Pallas' cat populations, the Pallas' Cat Conservation Project is working to ensure that wild Pallas' cats will continue to survive and thrive on the steppes of Mongolia well into the future.

A T-shirt supporting this project has been produced and is for sale with proceeds going to support this vital research. A plush Pallas cat has also been produced by K and M Concessions and is available for order by any interested institutions. These plushes are now included as a standard item in the K & M catalog but it is highly recommended that \$5 of the purchase price goes to provide funding for this *in situ* research project. Please contact Bill Swanson at the Cincinnati Zoo with your interest. Please also contact Martha Caron with questions regarding potential support opportunities, needs of the project or interest in sending staff to volunteer with this conservation project.

A proposal was presented by Martha Caron, SSP Coordinator, on a potential switch from a Species Survival Plan to managing the population as a Population Management Plan (based on a ZooRisk analysis conducted by Dr. Bob Wiese of the San Diego Zoo and the AZA's Small Population Management Advisory Group). This change was discussed and endorsed by the Felid TAG steering committee meeting and was included in the reevaluation of the Regional Collection Plan for small cats. This proposal also was considered by the Pallas Cat SSP Management Committee. After a lengthy discussion, the conclusion that was drawn was that the majority of the management committee was in favor of switching to a PMP so that the portion of the North American Pallas cat population that is in private, non-AZA institutions could be included in the managed population. This change in management status would be maintained

until either AZA's policies regarding non-AZA participation changes and/or the benefit to the captive population from the animals found in such collaborating institutions decreases to a level which is no longer beneficial to the captive population. We all agreed that all collaborating institutions need to be held to a high standard of animal care and that inclusion in the PMP is not a given but would be evaluated on a case-by-case basis. Institutional representatives present agreed not to lower their commitment to the current level of population management even though under a PMP they are not required to follow all recommendations. This is a decision being made for the cats and the species preservation as a whole as an insurance policy against extinction of the captive population due to current lack of reproduction in most of the AZA holding institutions.

The subject was raised by several institutions regarding the new AZA policies disallowing non-AZA open-to-the-public institutions from participating in Species Survival Plans. The Pallas cat North American captive population has almost 1/3 of its animals within these non-AZA (potentially collaborating) institutions. Many of these animals are highly genetically valuable, particularly those located at the Endangered Feline Breeding Compound in Rosamond, CA. The population also contains more than 1/3 again as many founders if these non-AZA institutions are included in the managed population.

Sand Cat SSP 2008 Mid-Year Report

Kara Akers, The Living Desert Zoo and Garden, *Sand Cat SSP Coordinator*

A new edition of the International Sand cat studbook can be found on the AZA website current through 31 Dec 2006. The 2007 SSP report is now also available. The target population for the sand cat SSP continues to be 80 specimens. Currently, the AZA population size consists of 35 individuals – 15 males and 20 females. Due to the efforts made to make the smaller cat species as desirable to exhibit as the larger cat species, I have had numerous inquiries within the past six months regarding sand cats. I am pleased to say that the El Paso Zoo in Texas and Rosamond Grifford Zoo in New York will soon be adding sand cats to their collections.

Jason Herrick from The University of Illinois – Champaign-Urbana who has been working with CREW for the past few years has completed his study on basic reproductive characterization of male and female sand cats. He has written up his findings in a scientific manuscript and anticipates the paper being published within the next year.

Unfortunately, last year, breeding recommendations were not possible due to the decrease in interest in exhibiting sand cats. The kittens that were born in 2005 still had no place to go. Luckily, that has all changed. I am happy to say that there are five breeding recommendations for the next year. These recommendations require the transfer of a number of cats. As a result, sand cats will be traveling from coast to coast with the hope of getting a boost to the AZA population's numbers after being stagnant for the past couple of years.

Currently, no potential founders remain in the AZA population. A change on the horizon may occur thanks to Bill Swanson. Tentatively, he is planning a trip to the Middle East to obtain

some new genetic material for the U.S. population. There are a number of founders there who are of no relation to the U.S. population. The past couple of years have showed little promise for expanding the sand cat SSP population. However, 2008 looks like it will generate some renewed hope.

Serval PMP 2008 Mid-Year Report

Bonnie Breitbeil, Central Florida Zoological Park, *Serval Population Manager*

Current Population

Servals are managed as a North American Regional Studbook and Population Management Plan (PMP). The studbook was updated on 7 June 2007. The current AZA PMP population is 58.54.0 (112) in 56 facilities. An analysis of the population was performed at the Population Management Center in Chicago, IL in July 2007 and the second edition of the PMP was published on 3 October 2008.

Recommendations were for 6 breeding pairs and three transfers. An additional single transfer was recommended after the PMP was published, but this was strictly for companionship and was not a breeding transfer.

Changes in the Population

Since Jan 2007 there have been 0.1.0 (1) births, 1.3.0 (4) deaths and 3.2.0 (5) transfers into AZA populations. These five transfers were for cats that were born from facilities outside the PMP population and transferred to AZA facilities as education/program animals.

Status of Population

At the time of analysis, the population size was 102 specimens (51.50.1). The target population set in the Regional Collection Plan is 80 servals. The current PMP population is descended from 14 founders, 4 of which are hypothetical. There are four potential founders remaining. Current gene diversity is 89%. Of special concern to this population is the high degree of unknown pedigree. Overall, the population has a pedigree less than 8% known. Only three individuals have pedigrees that are 100% known. Even with the application of all reasonable assumptions, the pedigree remains less than 28% known. 50 specimens were excluded due to sterility, age or medical reasons. The exclusion of an additional 26 animals with less than 25% known pedigrees leaves only 26 specimens as potential breeders.

Special Note

A number of servals continue to be recruited from outside the AZA population and from the private sector (34 since 2002). Most of these cats are being brought into AZA zoos as education or program cats. Many of these cats are neutered or spayed so there is little concern of them adding additional unknown genetics to the PMP population; however, they are taking up important serval spaces. As the PMP encourages breeding of genetically valuable cats, it will be important to work with the Population Manager to locate known-pedigree specimens and to ensure space is available for subsequent offspring.

Caracal PMP 2008 Mid-Year Report

Barbara Palmer, San Francisco Zoo, *Caracal Population Manager*

The last studbook published was in 2006, and has not been completely updated.

Captive Populations of All Subspecies and Generics

Worldwide: 143.148.4 (295)

North American: 61.78.0 (139)

AZA facilities: 15.31.0 (46) in 24 institutions

Target population in AZA facilities: 80

Captive Populations of *Caracal caracal caracal*

Worldwide: 29.34.2 (65)

North American: 11.12.0 (23)

Caracal PMP: 7.8.0 (15) in 10 institutions

Recorded births in the PMP: 0

Recorded deaths in the PMP: 5.0

Recorded deaths in AZA facilities: 7.2

The Caracal PMP encourages only animals of the subspecies *C. c. caracal* to breed in the North American population. This subspecies was chosen by the PMP because of the existing genetic diversity in the North American population, and the availability of more founders both from the wild population and zoos worldwide.

Clouded Leopard SSP 2008 Mid-Year Report

Norah Fletchall, John Ball Zoological Garden, *Clouded Leopard SSP Coordinator*

- SSP Coordinator/Intl. Studbook Keeper-Norah Fletchall, John Ball Zoo
- Veterinary Advisor-Dr. Luis Padilla, National Zoo
- Pathology Advisor-Dr. Karen Terio, Univ of Ill
- Various behavior experts-Bonnie Breitbeil, BJ Schoeberl, Ken Lang

A Bit of History

The Clouded leopard SSP was established in 1989. In 1993 several established pairs who had successfully reproduced were separated due to concerns regarding the genetic diversity of the population. This coupled with the inability to re-pair adults animals has resulted in ongoing significant challenges within this population. Efforts at developing artificial reproduction in this species are ongoing. There has been one successful Artificial Insemination trial in 1992. The 2007 Masterplan is available on the AZA website or by contacting the SSP Coordinator.

Thailand Clouded leopard Consortium

The Thailand Clouded leopard Consortium was formed in 2002. This program supports capacity building in Thailand for the management and breeding of Clouded leopards within the Zoological Parks Organization in Thailand. In addition, this program supports in-situ conservation efforts for this species in Thailand. 100% of the pedigrees for the living animals within the consortium can be traced to founders. Thirty-five animals (29 surviving) have been born since the consortium was formed. Since development of this program 6 new founder animals have been imported into the North American SSP program. **The Clouded leopard SSP is focused strongly on supporting this consortium. Zoos wishing to obtain clouded leopards are expected to support this consortium at an appropriate level. More information can be obtained concerning this program by contacting the SSP Coordinator (norah.fletcher@kentcountymi.gov) or Dr. Jo Gayle Howard (HowardJG@si.edu).**

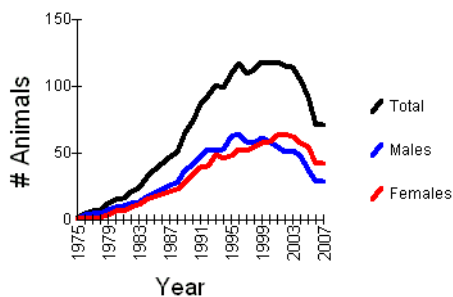
Research Population

The SSP population was declared a research population in 1998 and continues to be managed as such. This means that breeding and transfer recommendations are not made solely on the basis of genetic needs of the population. The SSP recognizes the ongoing need to address behavior management challenges and support further research into the development of artificial reproduction of this species.

Major Challenges with this species

- Mate Incompatibility-typically animals must be paired before they reach 2 years of age
- Males aggressive to females resulting in severe injury and oftentimes death
- Low genetic diversity
- Aging population and very low levels of reproduction
- Clouded leopards can be a challenge to exhibit effectively

SSP Census



The SSP population did experience some growth in the 1990's. However, the separation of viable breeding pairs resulted in a loss of younger animals in the population due to the reduction in reproductive rates. In addition, in 2005 a large number of animals were removed from the SSP as a result of the closing of a AZA facility and subsequent transfer of approximately 18 animals out of the SSP>

SSP Demographics and Genetics

Forty seven animals in the population are not considered part of the potential breeding population due either to age, previous aggression (males), permanent contraception or use as a education outreach animal. As a result of these removals only 8 males and 18 females are currently considered part of the breeding population.

Genetic analysis

- 4% of the pedigrees for the living animals can be traced to founders.
- Population has retained 78.2% of its original genetic diversity.
- Equates to 2.30 founder genome equivalents - in other words, if the present population was founded again today, you'd need 2 and a bit wild-caught animals to equal the amount of genetic diversity in the current population.
- There has been a very high level of inbreeding in this population. The average inbreeding level is 0.2152, on a scale where 0.2500 represents full sibs or parent/offspring crosses.
- Inbreeding ranges up to 0.4407.
- 4 animals were imported from Thailand this year and if a further 4 animals can be imported every 5 years thereafter, for a total of 4 imports/20 animals, the population can meet the goal of 85%/20 years with a total population of about 125 animals.

Demographic analysis

- In order to maintain the current population at its present size, 10-12 kittens per year are required; more if the population is to grow.
- No kittens were born in 07 or so far in 08 in SSP Population

Snow Leopard SSP 2008 Mid-Year Report

Jay Tetzloff, Great Plains Zoo, *Snow Leopard SSP Coordinator*

New Steering Committee (elections were held in July 2007)

Mark Ryan, Sunset Zoo, Vice-Coordinator (term ends 2008)

Lynn Tupa, Albuquerque Biological Park, Studbook Keeper

B.J. Schoeberl, Denver Zoo (term ends 2010)

Kimberly Davidson, Utah's Hogle Zoo (term ends 2010)

Steve Bircher, St. Louis Zoo (term ends 2009)

Jim Schnormeier, Sacramento Zoo (term ends 2009)

Patrick Thomas, Bronx Zoo (term ends 2008)

David Hodge, Louisville Zoo (term ends 2008)

Elections will be held in June 08 for those whose terms expire

Current Population

Current numbers based since 1/1/07 to present

Living: 72.93 (165)

Deaths: 8.7.1

Births: 4.4.1

Transfers: 4.1

Based on 2000 Felid TAG RCP, Target Population is 200.

Demography

Current Population Size (N)	154
Specimens Excluded from Analyses	22
Target Population Size	200
Mean Generation Time (T, in years)	7.39
Projected Population Growth Rate (lambda)	1.04

Genetics

	Current	Potential
Number of Founders	43	1
Founder Genome Equivalents	12.20	21.34
Gene Diversity Retained (%)	95.90	97.66
Population Mean Kinship	0.043	
Mean Inbreeding (F)	0.020	
% Known Pedigree (prior to assumptions)	100	
Ne/N	0.299	
Years To 90% Gene Diversity	44	
Gene Diversity at 100 Years From Present (%)	84	

Snow Leopard SSP will be meeting on 23 July 08 in Toledo, OH in conjunction with the Tiger SSP. The main focus will be to complete the master plan and other business as time allows.

Dr. Cheryl Dikeman	Omaha's Henry Doorly Zoo	Nutrition
Dr. Ellen Dierenfeld	St. Louis Zoo	Nutrition
Dr. Naida Loskutoff	Omaha's Henry Doorly Zoo	Reproduction
Dr. Karl Hill	Santa Barbara Zoo	Veterinary
Jennifer Snell-Rullman	Snow Leopard Trust	Conservation

Goals of the SSP:

- Go live with webpage hosted by the Snow Leopard Trust
- Compile an active list of advisors
- Compile exhibit and management file for reference and new institutions (survey distributed summer '07)
- Standardized Guidelines
- Health Concerns (Papilloma virus, FIV, FIP)
- Improve communication between Coordinator, Steering Committee, and holding institutions
- Develop necropsy protocols
- Pursue research to improve reproduction success
- In-situ projects
- Develop husbandry protocols to aid institutions (introductions, training, birthing, enrichment)

- Complete export/import with EEP (via Bronx Zoo)
- Look into potential for more export/import possibilities with other regions

Cheetah SSP 2008 Mid-Year Report

Jack Grisham, Saint Louis Zoo, *Cheetah SSP Coordinator*

The Cheetah SSP held a mid-year meeting from January 18 – 20, 2008 at White Oak Conservation Center in Yulee, FL. The majority of the members of the Management Group (eight out of nine members) attended the workshop. In 2007, the SSP reported 28 births and 34 deaths, declining slightly by 1.5%. Out of 34 breeding recommendations, there were only six successful litters to date. The current cheetah population in North America is 120.131 (251) in 54 facilities; this does not include 6.9 (15) education animals. Current gene diversity for the managed population is 98.02% and is equivalent to the genetic diversity of a population descended from approximately 25 founders. Most AZA managed populations have set a genetic goal of maintaining 90% gene diversity for 100 years. When gene diversity falls below 90%, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights, smaller litter sizes, and greater neonatal mortality. Under the current conditions, with a growth rate of 0%, gene diversity can be maintained at or above 90% gene diversity for 37 years. Increasing the population growth rate, breeding the 3 potential founders, and increasing the proportion of breeders in the population (effective population size = 0.30) would allow this SSP to meet the genetic goal of 90% for 100 years.

To achieve demographic and genetic goals, 30 births (approximately 10 litters) are recommended for the coming year. The SSP recommends 28 pairs to achieve this goal, taking into account an average litter size of three and a probability of success of breedings as low as 25%. With additional spaces available for this species in the next few years, the SSP will continue to push for a growth rate of 3%. Approximately 30 births are necessary to grow the population at a rate of 3%. Based on an average litter size of 3, approximately 10 litters are required to achieve this growth rate. Projections show that with an average annual growth rate of 3%, the population would grow to the target size of 300 specimens in 6 - 10 years.

The age structure of this population appears relatively stable with a good number of animals in reproductive age classes and a relatively wide base due to recent births over the past few years. Births may need to increase even more in the coming years as the population ages and natural attrition occurs.

Demographic data indicate that while female cheetahs in North America zoos have bred from 2 to 12 years of age, the prime reproductive age classes are between 3 and 8 years old. Male cheetahs have been shown to breed between the ages of 2 and 13, and the uppermost age is expected to be extended as opportunities are increased due to management changes and artificial insemination procedures.

Another important strategy to prevent the loss of gene diversity is minimized by breeding under-represented lineages. Pairing animals with the lowest mean kinships helps to equalize founder representation and should be considered a priority for genetically valuable animals that may soon be too old to reproduce. Care should also be taken so that mean kinships of males and females are well-matched, so that rare and common lineages are not linked.

As with all PMP and SSP populations, pairings are based on mean kinships, avoidance of inbreeding, avoidance of linking rare and common lineages, and logistical constraints identified by the participating institutions. Generally, individuals with low mean kinship values have been prioritized for breeding. In addition, due to an insufficient number of genetically valuable females and the need to make sufficient pairs to meet demographic goals, several genetically average animals have been recommended to breed.

All institutional requests were considered in the development of the breeding and transfer recommendations. However, in many cases insufficient space for introductions and the decision not to move out older animals has made it difficult to meet all institutional requests for new exhibit animals in this year's plan. Where possible, attempts were made to find companions for solitary animals. Institutional requests not addressed in these recommendations will be considered as deaths occur and space becomes available or during the next planning meeting. Institutions wishing to place or receive animals should continue to contact the species coordinator and work cooperatively to meet population goals. All recommended moves from the previous Master Plan were reviewed. Prior to the meeting, the needs of all institutions were updated via the two cheetah listserv (Management and IR).

Jack Grisham continues to finalize the Standardized Guidelines for Cheetahs. Karen Meeks led a review of the new revised cheetah SSP husbandry manual. Ellen Dierenfeld distributed the body scoring sheet to all SSP institutions via the listserv to be used as a universal method for describing body conditions for all cheetahs.

The Cheetah SSP Biomaterials Action Plan is being headed by Dr. Cathi Lehn, chair of the AZA Biomaterials Banking Advisory Group and Cleveland MetroParks Zoo. The process is currently under way and is reviewing all current protocols and working with Drs. Adrienne Crosier and Randy Junge, as well as the Management Group and Advisors. The Cheetah SSP is one of four biomaterials programs currently being developed by the group.

There was not a Cheetah SSP meeting during the Felid TAG mid-year meeting in Cincinnati.

Lion SSP 2008 Mid-Year Report

Hollie Colahan, Houston Zoo, *Lion SSP Coordinator*

The transition to a new SSP Coordinator for this species is complete. Many thanks to Tarren Wagener, Fort Worth Zoo, for her leadership over the last several years. Over the next few months all institutions holding lions (both pedigreed and generic) will be contacted to assess

status of their cats, future needs and ongoing challenges. A full master planning meeting will be scheduled for the summer with a focus on making breeding and transfer recommendations.

For institutions who are planning to build new or renovate existing exhibits over the next 5 years please contact the SSP Coordinator now to assure your future plans are incorporated into the master planning process.

Felid TAG Meeting Attendees

First Name	Last Name	Institution	Email Address
Cristina	Adania	Associação Mata Ciliar	chadania@uol.com.br
Eric	Albers	Akron Zoological Park	eralbers@akronzoo.org
Laura	Arriaga	Potawatomi Zoo	larriaga@southbendin.gov
Judy	Berens	Panther Ridge Conservation Center	pantherridge@aol.com
Steve	Bircher	St. Louis Zoo	bircher@stlzoo.org
Sue	Booth-Binczik	Dallas Zoo	sue.boothbinczik@dallascityhall.com
Nanette	Bragin	Denver Zoo	nbragin@denverzoo.org
Shasta	Bray	Cincinnati Zoo & Botanical Garden	shasta.bray@cincinnati-zoo.org
Bonnie	Breitbeil	Central Florida Zoo & Botanical Gardens	bonnieb@centralfloridazoo.org
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Jeremy	Carpenter	Columbus Zoo & Aquarium	jeremy.carpenter@columbuszoo.org
Arturo	Caso	Feline Research Center	ksac054@tamuk.edu
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Kristi	Fisher	Exotic Feline Breeding Compound	purrdoc@cox.net
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Don	Goff	Connecticut Beardsley Zoo	dgooff@beardsleyzoo.org
Karen	Goodrowe	Point Defiance Zoo & Aquarium	kareng@tacomaparks.com
Wendy	Green	North Carolina Zoological Park	wendy.green@nczoo.org
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Amanda	Hall	Scovill Zoo	ahall@decparcs.com
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Amanda	Haug	Palm Beach Zoo at Dreher Park	amandahaug@hotmail.com
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Kevin	Hodge	Houston Zoo, Inc.	khodge@houstonzoo.org
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JoGayle	Howard	Smithsonian National Zoological Park	howardjg@si.edu
Chris	John	Milwaukee County Zoological Gardens	chrisjohn0725@msn.com
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Gail	Karr	Memphis Zoo	gkarr@memphiszoo.org
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Cindy	Kreider	Erie Zoo	ckreider@eriezoo.org

Keith	Lovett	Palm Beach Zoo at Dreher Park	klovett@palmbeachzoo.org
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Kristi	Newland	Lee Richardson Zoo	knewland@garden-city.org
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Barbara	Palmer	San Francisco Zoological Garden	barbarap@sfzoo.org
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