

**FELID TAXON ADVISORY GROUP (TAG)
ASSOCIATION OF ZOOS & AQUARIUMS
2007 ANNUAL REPORT**



Special Topic - Tropical Asian Felids

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**ASSOCIATION
OF ZOOS &
AQUARIUMS**



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Executive Summary of the Annual Meeting

The Annual Mid-year Meeting for the AZA's Felid Taxon Advisory Group (TAG) was held April 12th – 14th, 2007 at the Gaylord Opryland Resort & Convention Center in Nashville, TN, hosted by the Nashville Zoo in Grassmere. The Nashville Zoo's Director Rick Schwartz, the Local Host Committee (Jim Bartoo, Rachael Blandford, Stephanie Green, Jessica Huff, Rae Hummell, Peggy Pellett, Connie Phillip, Karen Rice, Tracy Sorensen, Kindell Williams, Hall Whitaker), other staff members (Jason Ahistus, Rita Buice, Bette Jordan, Jac Menish) and volunteers at the Nashville Zoo truly amazed us all by going above and beyond the call of duty. This TAG meeting will not be soon forgotten by anyone who attended - for multiple reasons including the utter insanity of 'Karaoke for Cats' that raised over \$20,000 for cat conservation projects.

The Felid TAG co-chairs, steering committee and meeting participants would like to thank Rick and all of his staff for their tremendous efforts in organizing and hosting an incredibly fun, educational and productive Felid TAG meeting. We also are grateful to the generous companies, institutions and individuals that served as Sponsors (A Thru Z Consulting and Distributing, Inc., Gaylord Hotels, Gray Line, Solomon Builders) and Contributors (Ajax Turner Distributors, Alan Shoemaker, Animal Capture Equipment, Chattanooga Bakery, Christie Cookies, Cincinnati Zoo, Costco, Early's Southern Food & Gifts, Erie Zoo, J & J Printers, Jack Daniels Distillery, Karen Povey, Lipman Brothers, Loveless Café, Nashville Convention and Visitors Bureau, Point Defiance Zoo, Service Systems Associates, Staples and Wild Oats Market) to this meeting.

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 Tropical Asian Felids with the primary focus on Malayan and Sumatran tigers, clouded leopards and fishing cats (i.e., the tropical Asian cat populations managed by the AZA). Accordingly, the Felid TAG invited several speakers working with Asian felids in range countries to present their research findings at the TAG meeting and provided partial financial support to offset their attendance costs. Invited speakers included Dr. Steve O'Brien from the Laboratory of Genomic Diversity at the National Cancer Institute, Dr. Andreas Wilting from Wurzburg University, Dr. John Seidensticker from the Smithsonian's National Zoo and Namfon Cutter from the University of Minnesota.

Other speakers in the Tropical Asian Felid session presented reports on camera trapping surveys for clouded leopards and other felids in Sumatra and other regions of Asia, and the development of captive breeding and research programs for Asian felids in various range countries. Brief updates and overviews also focused on management, veterinary and research issues involving all felids, including recommendations of the Big Cat Task Force regarding cats as program animals, the latest contraception advice and a question and answer period with Mike Carpenter from the US Fish and Wildlife. Working groups were convened during the meeting to

focus on in situ conservation efforts with tropical Asian felids and developing a Small Cat Husbandry Course as a complement to the Large Cat Husbandry Course. At the conclusion of the TAG meeting, brief status updates were provided by population managers for many of the Felid SSPs and PMPs.

Prior the start of the mid-year meeting on April 9th – 11th, the Felid TAG convened its first Large Cat Husbandry Course under the leadership of Hollie Colahan from the Houston Zoo. The course was attended by 19 students and was enthusiastically received by all participants. In addition, several SSPs and PMP's (Clouded Leopard, Amur Leopard, Fishing Cat, Pallas' Cat, Black-footed Cat) took the opportunity to convene population management and/or reporting sessions prior to the TAG meeting. For the fourth year in a row, a Small Felid Workshop, organized by Danny Morris, also was held to discuss progress and priorities involving the eight small cat SSP and PMP species. We appreciate the efforts of all the speakers, program leaders and other meeting participants who attended the husbandry course, SSP and PMP meetings and the mid-year TAG meeting this year.

The 2008 Mid-year Felid TAG meeting will be hosted by the Cincinnati Zoo & Botanical Garden with exact dates in March or April 2008 still to be determined. SSP and PMP meetings will be held prior to the TAG meeting with the TAG's first Small Cat Husbandry Course and a possible repeat of the Large Cat Husbandry Course being planned as well. The special topic for the 2008 meeting will be Felids of the Americas with a primary focus on jaguars, pumas, ocelots, and Canada lynx. The Felid TAG website (www.felidtag.org) is still undergoing renovation but updated meeting information will be distributed 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 Cincinnati.

Bill Swanson and Norah Fletchall, Felid TAG Co-Chairs

Ashlee Pfaff Memorial Training Scholarship

Earlier this year, the Denver Zoological Gardens lost one of its zookeepers in a tragic accident. Ashlee Pfaff was a feline keeper at the Denver Zoo and will be sadly missed by all. The Denver Zoo has established a \$1500 annual scholarship for the Felid Husbandry Training Course in memory of Ashlee. Applications will be solicited by the Felid TAG prior to each year's course and a representative of the Denver Zoo along with members of the Felid TAG steering committee will select the recipient. Other zoos or individuals interested in contributing to this scholarship fund are encouraged to contact either Craig Piper (cpiper@denverzoo.org) or Beth Jo Schoeberl (bjchoeberl@denverzoo.org) of the Denver Zoo.



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) – Special topic: TBD

AZA Felid TAG Steering Committee Mid-year Meeting

In Attendance: Ron Tilson, Kimberly Davidson, Steve Bircher, Dusty Lombardi, Daniel Morris, Tarren Wagener, Jack Grisham, William Swanson, Karen Goodrowe, Alan Sironen, Ken Kaemmerer, Norah Fletchall, Bonnie Breitbeil

Guests: Mike Fouraker Karen Povey, Shasta Bray

Absent: Lee Simmons, Kelley Snodgrass

- 1) **Big Cat Task Force and Program Animals:** Discussion of the issue and how to respond appropriately. Decided to ask that the term “big cats” be removed from all regulatory language used on the part of APHIS as this designation is arbitrary. In addition the committee could not respond to the issue of size and/or age limitations as recommended by the Task Force as the definition of program animals is unclear. Norah will write a letter to Mary Healy outlining the TAG’s response to the Task Force document.
- 2) **Education Issues:**
 - a. Introduction of Shasta Bray, new TAG Co-Education Advisor from the Cincinnati Zoo (Editor’s note: Karen Povey at the Point Defiance Zoo is the TAG’s other Education Advisor)
 - b. Discussion of Felid TAG poster – Everyone email poster comments to Bill and someone can come forward to assist with this project [Action Item: All SC members comment to Bill by May]. Then Bill will contact Nebraska Brand to determine their contribution level for printing posters by the National AZA Meeting. [Editors’ note: Nebraska agreed to produce 2000 posters for distribution by the TAG]
 - c. Felid TAG website revision – suggestion to have Shasta Bray work with Julie Calfee to develop concept. Bonnie will approve changes. Suggestion to start with Home page and have general information such as species programs, program managers, their contact information. Have a template for species information pages. [Ron will send Bonnie the template for species information] [Action Item: everyone look at content and give feed back by May 12th].
- 3) **Working Groups at the TAG meeting:** Over the past several years the TAG has utilized the working group model to help centralize and facilitate projects. This model may need updating or changing. The SC discussed the idea of conducting another strategic planning session similar to the one conducted for the TAG by CBSG in the 1990’s. [Action Item: Kimberley and Ron will contact CBSG by May 12 to determine their level of interest.]
- 4) **Increasing Steering Committee involvement:** There is a need for TAG Steering Committee members other than the Co-chairs and the secretary to become more actively involved in TAG business. Bill and Norah promise to give more thing to members of the SC to do instead of trying to do it all themselves.

- 5) **Great Cats and Rare Canids Act – Action Item:** Bill will send letter to appropriate congressional sub-committee and contact Steve Olsen to determine when the bill will come up and then encourage AZA members via FTAG listserve to contact their Congressional Representatives.
- 6) **IAMS Research Funding – Action Item:** Bill will contact IAMS to explore future funding opportunities as the strongest supporter of Felid TAG activities at IAMS (Dr. Dan Carey) has retired.
- 7) **Proposed delisting of bobcat on CITES – Action Item:** Bill will submit the approved letter on behalf of Felid TAG opposing the delisting. [Editors’ note: U.S. proposal to delist the bobcat was defeated resoundingly at CITES meeting]
- 8) **Closure of horse slaughter plants:** The AZA has chosen not to take a position on this issue and the Felid TAG abides by their decision.
- 9) **USDA Transport Requirements for Dangerous Animals – Action Item:** Norah will circulate the document she has that addresses this subject to Steering Committee members and on the Felid TAG list serve.
- 10) **Future TAG Meetings:** Cincinnati 2008 (Felids of the Americas), Point Defiance 2009 (special topic to be determined).

11) Other Items:

Suggestion for Strategic Planning Meeting at White Oak or Front Royal:

Kim will contact facilities. Recommendation that strategic planning group consist of SC, Advisors and other stakeholders.

Budget: Discussed the budget for holding a Strategic Planning Meeting with CBSG. Norah will circulate an updated financial report after she receives the final figures from this meeting. After this the SC can make a better assessment of our ability to pay for a Strategic Planning Meeting or we may be able to solicit funds.

Snow Leopard SSP coordinator: Jay Tetzloff was elected [Action Item: Norah will contact Jay and the other candidate regarding our vote and she will contact Dan Wharton to notify him and then contact AZA]

Felid Husbandry Course: Suggestion to alternate years between Large and Small Cat Husbandry Course and conduct the Small Cat Husbandry Course next year. Large cat husbandry course status for 2008 is still being discussed but most likely will take place as we could have easily had 75 participants this year.

Meeting adjourned.

Tropical Asian Felids: Current In Situ and Ex Situ Programs and Issues

A Role for Genetics in Recognition and Conservation of Felidae

Steve O'Brien, Valerie Buckley-Beason, Carlos Driscoll, Shu-Jin Luo and Warren Johnson
Laboratory of Genomic Diversity, National Cancer Institute

The 37 modern Felidae species descend from a relatively recent series of divergence and speciation events that produced successful predatory carnivores worldwide, but that have confounded taxonomic classifications. We developed a highly resolved molecular phylogeny with divergence dates for all living cat species derived from multiple autosomal, X-linked, Y-linked and mitochondrial gene segments (22,789 bp) and 16 fossil calibrations. Our results support the hypotheses that the ancestors of modern felids originated 10.2 million years ago in Asia, and through a minimum of 4 Miocene and 6 Pliocene intercontinental migrations facilitated by sea level fluctuations dispersed to eight principal lineages that occur throughout the world. Combining principles of ghost lineage analysis with molecular divergence dates, we infer that available Felidae fossils underestimate (i.e., unrepresented basal branch length-UBBL) first occurrence by an average of 78%, revealing a low representation of Felid lineages in paleontological remains. Comparing different classes of genes of the Felidae indicates that Y-chromosome segments are appreciably more informative than mtDNA, X-linked, or autosomal genes in resolving this recent explosive species radiation.

Among the 37 living species of Felidae, the clouded leopard (*Neofelis nebulosa*) is generally classified as a monotypic genus basal to the Panthera lineage of great cats. This mid-sized (16-23 kg) carnivore, now severely endangered, is traditionally subdivided into four southeast Asian subspecies. We used molecular genetic technologies to reevaluate subspecies partitions and to quantify patterns of population genetic variation among 109 clouded leopards of known geographic origin. Strong phylogeographic monophyly of *N. n. nebulosa* (mainland) and *N. n. diardi* (Borneo; N=3 individuals) with mtDNA (771bp), nuclear DNA (3100bp), and 51 felid microsatellite loci were affirmed by large genetic distance between these subspecies, by AMOVA and by STRUCTURE population genetic analyses. At least 36 fixed nucleotide differences and 20 of 51 microsatellite loci with non-overlapping allele-size ranges distinguish *N. n. nebulosa* from *N. n. diardi*. Along with fixed subspecies-specific chromosomal differences, this level of differentiation is equivalent to or greater than comparable measures among five recognized Panthera species (lion, tiger, leopard, jaguar and snow leopard). If affirmed by morphological analysis and wider sampling of *N. n. diardi* range (Borneo and Sumatra), these distinctions would support reclassification of *N. n. diardi* to species level (*Neofelis diardi*) and clouded leopard conservation strategies should then be re-evaluated.

Eight traditional subspecies of tiger (*Panthera tigris*), of which three recently became extinct, are commonly recognized based upon geographic isolation and morphological characteristics. To investigate the species' recent natural history and to establish objective methods for subspecies recognition, voucher specimens of blood, skin, hair and/or skin biopsies from 134 tigers with verified geographic origins or heritage across the whole distribution range were examined for three molecular markers: 1) 4.0 kb of mitochondrial DNA sequence; 2) allele variation in the

nuclear Major Histocompatibility Complex (MHC) class II DRB gene; and 3) composite nuclear microsatellite genotypes based upon 30 loci. Relatively low genetic variation with mtDNA, DRB, and microsatellite loci was found, but significant population subdivision was nonetheless apparent among five living subspecies. In addition a distinct partition of the Indochinese subspecies *P.t.corbetti* into northern Indochinese and peninsular Malayan populations was discovered. Population genetic structure would suggest recognition of six taxonomic units or subspecies: (1) Amur tiger *P. t. altaica*, (2) northern Indochinese tiger *P. t. corbetti*, (3) South China tiger *P. t. amoyensis*, (4) Peninsular Malayan tiger *P. t. jacksonii*, named for tiger conservationist Peter Jackson (5) Sumatran tiger *P. t. sumatrae* and (6) Bengal tiger *P. t. tigris*. The proposed South China tiger lineage is tentative due to limited sampling. The age of the most recent common ancestor for tiger mtDNA was estimated to be 72,000 – 180,000 years, relatively younger than some other *Panthera* species. A combination of population expansions, genetic drift, and reduced gene flow following the last genetic diminution has led to the distinct genomic partitions among populations. These results provide an explicit basis for subspecies recognition among individual tigers, and will lead to the improved management and conservation of these recently isolated but distinct geographic populations of tigers.

A population and phylogenetic assessment of domestic cats and their wild relatives (*Felis silvestris silvestris* – European wildcat; *F. s. lybica* – Near Eastern wildcat; *F. s. ornata* – Central Asian wildcat; and *F. s. bieti* – Chinese desert cat) revealed an origin for domestication in Near East Asia, the Fertile Crescent, coincident with agricultural village development. The world's domestic cats derive from founder events across this broad region assisted by human transport to Africa, Europe, and East Asia. The molecular genetic partitions derived from 2604 bp of mitochondrial DNA and 36 short tandem repeat (STR) nuclear loci showed phylogeographic patterns that interpreted in the context of archaeological evidence of human-cat association, provide a new view of wildcat population structure and the cat domestication process.

References from which these data are derived:

Luo, S.-J., Kim, J.-H., Johnson, W.E., van der Walt, J., Martenson, J., Yuhki, N., Miquelle, D.G., Uphyrkina, O., Goodrich, J.M., Quigley, H.B., Tilson, R., Brady, G., Martelli, P., Subramaniam, V., McDougal, C., Hean, S., Huang, S.-Q., Pan, W., Karanth, U.K., Sunquist, M., Smith, J.L.D., and O'Brien, S.J. Phylogeography and conservation genetics of tigers (*Panthera tigris*). *PLoS Biology* 2:2277-2293, 2004.

Buckley-Beason, V.A., Johnson, W.E., O'Brien, S.J. Molecular evidence for species-level distinctions in clouded leopards. *Current Biology* 16:2371-2376, 2006.

Johnson, W.E., Eizirik, E., Murphy, W.J., Pecon-Slattery, J., Antunes, A., and O'Brien, S.J. Evolutionary history of the cat family: An explosive late Miocene radiation. *Science* 311:73-77. 2006.

Driscoll, C. A., Yamaguchi, N., Roca, A. L., Menotti-Raymond, M., Pontier, D., Kitchener, A., O'Brien, S. J., and MacDonald, D. Near Eastern origins of cat domestication. Submitted

Peril and Promise for Wild Tigers

John Seidensticker, Smithsonian's National Zoological Park

I represent the Smithsonian's National Zoological Park where we have been actively pursuing wild tiger conservation since 1972 and the Save The Tiger Fund Council, a joint project of the National Fish and Wildlife Foundation (NFWF), Exxon Mobil, and individual donors since 1995, through which we have invested about \$14 million in on the ground tiger conservation (1). We actively seek your zoos' support to partner in our on-the-ground wild tiger conservation efforts.

Recall that it was 1969 when tigers were first recognized internationally as a species threatened with extinction. Before that momentous shift in our thinking, wild tigers were symbols of an endless frontier mentality. Most of what we knew about their ecology and behavior to that time had been gained through the sights of a rifle, to paraphrase George Schaller.

We now know that the tiger is a conservation-dependent, landscape species, and it will always be so. It must have large connected block of habitat with adequate prey for it to survive in the long term. After 40 years of effort, our best science shows that the tiger is in crisis in most of its range! (2, 3)

There is no silver bullet to save wild tigers. Saving wild tigers is not a tame problem than can be addressed with just more money, to do the same things. As the environmental conditions and socio-political climate shift in the landscapes of Asia, and these are always shifting and changing, the conditions and the needs required to keep wild tigers also change. For example: 1) There are about twice the number of people in the tiger's geographic range than there were 40 years ago when the tiger was first declared endangered. 2) India, China, and many of the tiger range countries have exploding economies, creating a demand for natural resources at a level never seen before and placing unprecedented pressure on remaining tiger habitats. 3) China has essentially lost its wild tigers but individual expendable incomes in China have reached unprecedented levels. This is placing unprecedented pressure on its neighbors' remaining wild tigers through the illegal wildlife trade. 4) The political and governance system in all the tiger range countries are in great flux. The legal and governmental structures and institutions that have served wild tiger conservation well are now more than 30 years old. These need to be adjusted, modernized if you will, in each tiger range country to retain effectiveness. Saving wild tigers required continual, complex, coordinated actions at multiple scales. Saving wild tigers is what we call a wicked problem (1).

For all its power -- physical and metaphysical -- the tiger is extremely vulnerable to the changes that are occurring through its historic range in Asia. Tigers are very productive when the reproducing females are left alone and prey populations are optimal for the productivity of a particular land-cover type. However, there are three tiger behavioral traits that do result in low resilience to changing conditions: tiger are not strong dispersers in most human-dominated landscapes; they are very susceptible to the ecological traps created by road construction in their

habitats; and as the top carnivore in Asian forests, tigers need lots of prey, and prey populations in most Asian forests areas are in a sink phase numerically because of human poaching (4).

A key element in conserving wild tigers is to monitor how they, and thus, we, are doing. You can not manage what you can not measure is an old business and engineering adage. Tiger conservationists believed that we had to begin to quantify the changing conditions impacting the tiger's conservation needs as a basis for conservation interventions, if there is to be any chance for wild tigers. This resulted in a two-year effort to establish the status and set priorities in global wild tiger conservation that I am going to briefly describe. This was the combined effort of the primary team including E. Dinerstein, C. Loucks, E. Wikramanayake, S. Klenzendorf from WWF-US; A. Heylauff, G. Bryia, J. Forrest, J. Ginsberg, T. O'Brien, E. Sanderson from Wildlife Conservation Society (WCS), and M. Songer, P. Leimgruber, and myself from the Smithsonian's National Zoo. Our primary supporters have been Save The Tiger Fund, WWF, WCS, US Fish and Wildlife Service, UN Foundation, Zoological Society of London, Critical Ecosystem Partnership Fund, Smithsonian's National Zoological Park, and ExxonMobil. In addition, more than 160 individuals and groups of tiger scientists and tiger conservation practitioners provided the best information they had on tiger status in their geographical areas of interest. (2, 3)

How we determined the status of wild tigers

We sought to update the 1997 *Framework* (5) which was an expert-based assessment designed to create a common narrative for moving wild tiger conservation forward on a global scale in the mid-1990s. We were seeking in this present study to identify areas most likely to support viable tiger populations, to guide future investments, and garner international support for tiger conservation from managers to ministers.

We now have better data on tiger locations than we did a decade ago. We have better habitat maps and improved knowledge of connectivity of habitats. We were seeking to identify ***Tiger Conservation Landscapes***: large areas of connected habitat that show evidence of tigers. Two sobering points emerged:

- Tigers today occupy only 7% of their historical range.
- And the estimate of occupied tiger range has declined 40% in the last decade!

In 1995 it was estimated that less than 20% of the tiger's range was in protected areas. But to our great concern, loss of tiger habitat has not just been in areas outside of protected areas in the last decade but also from within protected areas.

The good news:

- Large areas of tiger habitat remain.
- Many landscapes with tigers are still big.
- "Tigeriness" representation still possible: We still have tigers living in habitats as diverse as tropical rainforests, mangrove forests, tropical dry forests, temperate forests, and the tall grassland areas of India and Nepal.

We developed our assessment using > 3400 points and 400 polygons from the databases STF, WCS, and WWF and others have been maintaining, published papers and reports, a

questionnaire, and the best new land-cover data available to us. Once this was mapped, we went back out for a field review; the response from the field doubled the data points in the data base. We revised maps based on this input. Six sources were used to delineate tiger landscapes: 1) range-wide data on tiger distribution and status, 2) new land-cover map, 3) Human Footprint™ map, 4) ecoregion boundaries, 5) country boundaries, and 6) habitat-specific tiger densities

Table 1. Tiger Landscape Definitions

Tiger Conservation Landscapes (TCLs)	Large areas of potential habitat that show evidence of tigers, and its connecting habitat
Restoration Landscapes	Large areas of potential habitat under low human impact where survey efforts since 1995 have revealed no evidence of tigers.
Survey Landscapes	Large areas of potential habitat under low human impact where tiger status is unknown.
Small Fragments with Tigers	Small areas of potential habitat that show evidence of tigers

Reclassification of a Mystic Species – The Sundaland Clouded Leopard (and what we know about it...)

Andreas Wilting, Würzburg University/Institute for Zoo and Wildlife Research (IZW)

In the first part of my talk I revisited the phylogeny of clouded leopards due to the importance of an accurate taxonomy for the conservation of clouded leopards. I re-evaluated the recently proposed reclassification of Bornean clouded leopards being a distinct species *N. diardi* using additional samples of Bornean clouded leopards (N = 4). I was also able to include specimens from Sumatra (N = 3), which were missing in the previous analysis. I found strong support for the distinction between *N. nebulosa* and *N. diardi* based on three fragments of mtDNA (900 bp) and 18 microsatellites. Sumatran clouded leopards clustered with specimens from Borneo, suggesting that Sumatran individuals also belong to *N. diardi*. Referring to their origin on two Sunda Islands we propose to give *N. diardi* the common name “Sundaland clouded leopard”. Additionally, a significant population subdivision was apparent among *N. diardi* from Sumatra and Borneo based on mtDNA and microsatellite data. The reduced gene flow between these islands suggests the recognition of two subspecies of *N. diardi*. Based on this reclassification of clouded leopards not only the two species *N. nebulosa* and *N. diardi*, but also the populations of *N. diardi* on Borneo and Sumatra should be managed separately. The two species and the distinct populations on Borneo and Sumatra face a much higher risk of extinction due to smaller distribution ranges than previously assessed based on the former classification.

In the second part I gave an overview about our research on Borneo and provided some little insights into the mystic behaviour of wild clouded leopards. I showed that a clouded leopard marked an observation tower by urine-spraying and cheek-rubbing, where the animal deposited its kill (bearded pig). During the field work we showed that a rigorous track classification is useful, cheap and an easy-applied method for research on elusive carnivores, if all limitations of this method are well considered. As a first working hypothesis for further research, we estimated a rough minimum abundance of 8 individuals per 100 km² based on the observed tracks. Our landscape analysis in Sabah confirmed the presence of clouded leopards in 25% of Sabah's surface. However only four isolated areas covering just 5% of Sabah are classified as totally protected reserves and in the remaining areas selective logging and licensed hunting are permitted. Therefore we suggest placing a higher priority on the protection of this species in the commercially used forests to release some of the heavy pressure of extinction on *N. diardi* in Sabah.

Conserving Clouded Leopards in Thailand: Developing an Integrated, In Situ/Ex Situ Conservation Program

JoGayle Howard, Smithsonian's National Zoological Park
 Katharine M. Pelican, Smithsonian's Conservation and Research Center
 Rick Schwartz, Nashville Zoo
 Kenneth Lang, Smithsonian's Conservation and Research Center
 Richard Passaro, Thailand Clouded Leopard Consortium
 Wanchai Tunwattana, Khao Kheow Open Zoo
 Daraka Tongthainan, Khao Kheow Open Zoo
 Sumate Kamolnorrnanath, Zoological Park Organization
 Sophon Dumnuai, Zoological Park Organization
 Kate Jenks, Smithsonian's Conservation and Research Center, Dong Phrayayen-Khao Yai Carnivore Conservation Project
 Kanda Damrongchainarong, Dong Phrayayen-Khao Yai Carnivore Conservation Project, WildAid Foundation
 Tim Redford, WildAid Foundation
 Peter Leimgruber, Smithsonian's Conservation and Research Center
 David E. Wildt, Smithsonian's Conservation and Research Center

The clouded leopard (*Neofelis nebulosa*) is one of the most charismatic and least understood of Asia's many beautiful cat species. Little is known about the behavior or status of this shy and elusive cat in the wild. Rampant habitat loss and fragmentation throughout the clouded leopard forest habitat in Southeast Asia and active poaching of clouded leopards are causing a decline in their already uncertain population. Breeding clouded leopards in zoos has been a challenge world-wide, primarily due to male aggression, decreased breeding activity between paired animals, and high cub mortality. The Thailand zoos maintain a large population of genetically valuable, wild-born clouded leopards, however, health and reproduction were compromised due to poor husbandry, imbalanced diets and inadequate enclosures. To address these challenges, the Smithsonian's National Zoological Park began working in partnership with the Zoological Park

Organization of Thailand, the Nashville Zoo and the Clouded Leopard Species Survival Plan (SSP) to develop a multi-faceted clouded leopard breeding program in Thai zoos focused on improving husbandry, nutrition, veterinary medicine and reproduction. Since 2002, 22 clouded leopard cubs have been born, and two cubs have been imported to the USA for genetic augmentation of the North American Clouded Leopard SSP population. The Smithsonian's National Zoo also began working with the Thailand Department of National Parks, Wildlife and Plant Conservation and the non-profit organization WildAid to assess the numbers of clouded leopards and other carnivores living in nature. In 2003, the Dong Phrayayen-Khao Yai Carnivore Conservation Project was established to provide continuous monitoring of carnivores in Thailand's Khao Yai National Park. A major component to this project is the training of Thai forest rangers to monitor wild carnivore and prey species and also to provide information on poaching in the park. From 2003 through 2006, camera traps were used for a total of 6,172 camera trap nights at 215 camera trap locations. Camera traps recorded a total of 906 animal captures with 14 carnivore species, 12 herbivore species and 4 bird species. The carnivore species included four species of felids (clouded leopard, golden cat, marbled cat, leopard cat), two canid species (Asiatic jackal, dhole) and two ursid species (Asiatic black bear, Malayan sun bear). A high concentration of poaching activity also was observed, and data were provided to the park management and patrol staff. Overall, these international and collaborative breeding programs and field monitoring projects for clouded leopards will serve as a model for conservation programs in Thailand, Southeast Asia and throughout the world.

Captive Clouded Leopards: The Challenge of Introductions

Kate MacKinnon, Washington State University, Smithsonian's National Zoological Park
 Katey Pelican, Smithsonian's National Zoological Park
 Nadja Wielebnowski, Brookfield Zoo
 Ken Lang, Smithsonian's National Zoological Park
 Rick Passaro, Thailand Clouded Leopard Consortium
 Rick Schwartz, Nashville Zoo
 Wanchai Tunwattana, Khao Kheow Open Zoo
 Ruth Newberry, Washington State University
 Jo Gayle Howard, Smithsonian's National Zoological Park

Pairing clouded leopards (*Neofelis nebulosa*) in captivity has been very difficult, primarily due to male aggression toward females and lethal attacks. Yet, little research has investigated the reproductive or behavioral dynamics of pairing clouded leopards. In 2002, the Thailand Clouded Leopard Consortium was formed to develop a clouded leopard breeding program at the Khao Kheow Open Zoo in Thailand. This program assessed the movement of genetically valuable clouded leopards from small enclosures adjacent to large carnivores into large, non-stressful enclosures. Cats were placed on a balanced diet with vitamin/mineral supplementation, and an experienced breeding manager also was present on-site year-round (see Howard et al. in this report for more details). Since the program's inception, 25 cubs have been born to eight successful pairs.

The presence of the on-site manager and complete access to consortium-supported animals has provided an unprecedented opportunity to investigate various pairing strategies in clouded leopards. Previous research in North American clouded leopards has been limited in scope since most North American institutions have a minimal capacity for a large clouded leopard collection that is necessary for pairing this difficult species. Thus, no research to date has been able to compare different pairing techniques to assess successful versus unsuccessful pairs. As a result, the introduction of clouded leopards remains more an 'art' than a 'science' with the most successful introductions occurring under the management of highly experienced clouded leopard keepers.

To improve our understanding of clouded leopard introductions, we are using clouded leopards at the Khao Kheow Open Zoo to compare the impact of different pairing strategies for successful and unsuccessful clouded leopard pairs using a combination of behavioral observations, personality assessments and stress and reproductive fecal hormone assessments. Four categories of pairings are being compared: 1) successful pairings involving juvenile (< 12 months of age) males (n = 3 pairs); 2) successful pairings involving adult males (n = 3); 3) unsuccessful pairings involving juvenile males (n = 2); and 4) unsuccessful pairings involving adult males (n = 7). Behavioral observations were recorded 3-5 times/week on all animals undergoing introductions. Daily fecal samples were collected on both males and females for at least three months prior to the pairing up through the first successful breeding. Fecal samples are being analyzed for reproductive (estrogens, progestins and androgens) and stress (cortisol) hormones using enzyme immunoassays (EIA). Ex post-facto personality surveys also are being completed for each animal by all the project managers involved in the pairings.

Once collected, the data from the fecal samples, behavior sheets, personality surveys and daily reports will provide invaluable information on the impact of pairing introductions on clouded leopard stress and reproduction. For the first time, changes in hormones and behavior can be compared between clouded leopards undergoing different pairing protocols. At the same time, changes in behavior associated with stages of the introduction process can be correlated with changes in stress hormones and reproduction hormones. Preliminary results have revealed that pairing juvenile males to either adult or juvenile females is more successful than pairing adult males. As a result, this technique has been used whenever possible in Thailand, but many males were adult (> 12 months old) when the consortium was initiated and, therefore, necessitated the introduction of adult pairs.

Preliminary behavior analysis of ranked data suggests that early in the pairing process: 1) females meow/cry more in failed pairs than successful pairs ($p < 0.05$); 2) males in juvenile male pairs prusten more ($p < 0.05$) than males in adult male pairs; 3) males in juvenile, successful pairs prusten more than males in other pairing groups ($p < 0.01$); and 4) females lay down more in juvenile male pairs ($p < 0.05$) than in adult male pairs.

Ultimately, important questions will be answered about the pairing process in this species including: 1) does pairing induce stress responses in clouded leopards; 2) do hormonal stress levels show any recurring peaks at certain stages of introduction; 3) do alterations in stress and reproductive hormones correlate with particular behaviors during the pairing process; 4) what are the behavioral and hormonal correlates of pair failure; 5) does personality influence the success

or failure of pairings in this species? Overall, this information will be critical to understanding the biological foundation of successful pairings in this complex and difficult carnivore species.

Almost Famous: The Story of the Clouded Leopard Project and its Rising Star

Karen Povey, Point Defiance Zoo & Aquarium

Despite the public's fascination with big cats, the clouded leopard has consistently kept a lower profile than its more famous cousins. The clouded leopard's secretive nature and the challenges of research in its tropical forest habitat have contributed to a lack of information on its wild behavior. In zoos, the challenges associated with successfully displaying clouded leopards have resulted in limited exhibit opportunities. Despite the clouded leopard's remarkable beauty, unique adaptations, and relatively large size, the challenges associated with studying wild clouded leopards and exhibiting them in zoos have conspired to make this species one of the least recognized or appreciated of the big cats.

After the 1998 arrival of a clouded leopard at Point Defiance Zoo & Aquarium (PDZA) in Tacoma, Washington, zookeepers were frustrated by both a deficiency of information available about clouded leopards and the almost total lack of awareness about clouded leopards demonstrated by PDZA visitors. To remedy this situation, PDZA's chapter of the American Association of Zookeepers founded the Clouded Leopard Project (CLP), a non-profit organization working with the Zoo to bring attention to clouded leopard issues. The Clouded Leopard Project promotes clouded leopard conservation by supporting field research, implementing education initiatives in range countries, and bringing global awareness to clouded leopard conservation issues.

Since the founding of the Clouded Leopard Project in 2000, new details are beginning to emerge about this little known species, thanks to the efforts of scientists working both in clouded leopard range countries and in zoos. The CLP plays an important role in not only providing financial assistance to several of these research projects, but also serving as a vital conduit to channel this new information to the public to increase awareness and support for clouded leopard conservation. As a result, the clouded leopard's public appeal is on the rise, with this charismatic species poised to become a wild cat superstar.

Clouded Leopard Project Fundraising Activities

One of the primary objectives of the CLP is to raise funds to support clouded leopard research and conservation. Several methods are used to raise funds both on PDZA grounds and from the general public. The first method is through a donation station on Zoo grounds. Over \$14,000 has been collected since the station was established in 2002. In addition to collecting donations directly from visitors, other funds are raised by selling Clouded Leopard Project items such as t-shirts, note cards, and posters in the PDZA gift shop. These items are also sold through the CLP's website, www.cloudedleopard.org. The website also augments fundraising by offering Clouded Leopard Protector (\$25), Crusader (\$50), and Conservator (\$100) levels of donation

packages. Newly added for 2007 is a higher end clouded leopard “adoption” opportunity (\$250). The response to the merchandise and donor packages has been increasing steadily, grossing nearly \$30,000 since 2000. In 2005 the CLP also coordinated a dedicated fundraising event, Feast for Felines, raising over \$8,000 for clouded leopard conservation efforts.

Funds raised have been used to support a variety of projects including:

Lon Grassman’s carnivore survey in Phu Khieo Wildlife Sanctuary, Thailand.

Lon Grassman and Jan Janecka’s wild cat genetics evaluation in Thailand.

WildAid & National Zoo’s carnivore monitoring project and ranger support in Khao Yai National Park, Thailand.

Andreas Wilting’s Borneo clouded leopard survey.

Point Defiance Zoo & Aquarium’s Southeast Asia Wild Cat Education Initiative.

Assam Forestry Department’s clouded leopard awareness project, Assam, India.

Khao Kheow Open Zoo’s clouded leopard education festival, Thailand.

Education for Nature, Vietnam’s Green Forest Magazine: Cats of Vietnam.

Clouded Leopard Project Internet-based Education Efforts

The primary vehicle for raising public awareness about clouded leopard conservation issues is the CLP website. This website also serves as the official website of the Clouded Leopard SSP[®]. The comprehensive website was developed pro bono by a Seattle web design firm, elephants & ants, with an estimated value of services of \$35,000. This site has been steadily gaining traffic, with a current monthly average of 200,000 hits. Website traffic increased dramatically in March with the breaking news of the new species of Borneo clouded leopard, reaching nearly 700,000 for that month. From its inception, the Clouded Leopard Project website has been the primary source for in depth clouded leopard information on the Internet.

In addition to offering an overview of clouded leopard natural history, the site provides news about research projects and other noteworthy developments. The site features interactive elements such as an international clouded leopard locator to direct viewers to zoos exhibiting the species and an interactive diagram featuring clouded leopard adaptations. Recently a Kid’s Page was added with an “Ask the Expert” feature, coloring page, fact sheet, and opportunities for submitting clouded leopard art or poetry. In addition, the site features camera trap photos, videos, and other material unavailable to the public through other sources.

Clouded Leopard Education at Point Defiance Zoo & Aquarium

PDZA is committed to a partnership with the efforts of its keepers and volunteers coordinating Clouded Leopard Project activities. Despite not currently having a clouded leopard exhibit at the Zoo, PDZA features clouded leopard education prominently in its visitor experience activities. Special modifications to the program animal exercise yard allow clouded leopards to be shifted onto temporary exhibit for interpretive presentations. A popular interactive costume activity prior to PDZA’s live animal presentation features clouded leopard adaptations and conservation.

One of PDZA’s most significant commitments to clouded leopard conservation is its Southeast Asia Wild Cat Education Initiative, an ongoing project undertaken in 2004 to provide educational materials and awareness programs to communities in clouded leopard range

countries. Through a partnership with the NGO WildAid working in Thailand, PDZA staff have developed a teachers' curriculum guide featuring ecosystem concepts with a wild cat theme. After piloting in communities bordering Khao Yai National Park, the guide will be distributed to educators in other communities in the region. Recently, PDZA staff conducted a teacher training workshop to introduce educators to the guide and obtain feedback for evaluating its appropriateness for their curriculum and ease of use.

Delivery of the curriculum guide to teachers is made possible through a grant from PDZA's Conservation Fund which funds the salary and transportation expenses of a member of WildAid's community outreach team. The team was also provided with a wild cat teaching kit containing biofacts, posters, and a clouded leopard costume to support community based clouded leopard education. This kit was funded through a PDZA conservation grant and a donation from the PDZA AAZK chapter.

The Clouded Leopard Project and PDZA plan to continue support for community outreach and the development of educational materials for teachers in Thailand and other clouded leopard range countries. Future projects include a bilingual (Thai/English) storybook and the development of long-term relationships with schools in communities with high poaching activities.

Almost Famous

With the clouded leopard's escalating media attention, increasing number of zoo displays, and a growing amount of online information seeking, it is clear that interest in clouded leopards is rising. The mounting numbers of studies of both wild and captive clouded leopards is fueling this change in status by revealing new details about the cat's private life. The Clouded Leopard Project hopes to play a pivotal role in continuing to raise the profile of the clouded leopard. By helping the clouded leopard to achieve a more celebrated status, the CLP aims to garner the high level of support necessary to significantly impact clouded leopard conservation.

With the support of the public and working with partners both in the field and in zoos, the Clouded Leopard Project is dedicated to finding ways to protect habitat, eliminate poaching and promote environmental stewardship in clouded leopard range countries to ensure that clouded leopard populations will persist into the future.

The Status of Wild Fishing Cats in Thailand: A Review of Recent Surveys

Passanan (Namfon) Cutter, Conservation Asia

The fishing cat, *Prionailurus viverrinus* is a secretive, relatively small Asian cat ranging from Pakistan, throughout mainland Southeast Asia, to Sumatra and Java. Fishing cats are wetland habitat specialists and habitat loss and degradation are the primary threats to their survival in many areas. Causes of this degradation include human settlement, draining for agriculture, construction of aquaculture facilities, clearance of coastal mangroves, and tree harvesting. Fish population declines caused by unsustainable fishing practices and agricultural pesticide runoff

have also greatly reduced the fishing cat's main prey base. Fishing cats are also hunted as a food item and in retribution for taking domestic stock.

Few studies have documented the ecology of the fishing cat and its status in the wild remains unclear. However, there is mounting anecdotal evidence that the species may be in a precipitous state of decline throughout most of its historical range. Here, we report on results of field surveys carried out between December 2003 and March 2007. During this phase of our long-term project, we used sign survey and camera trapping techniques to document fishing cat occurrence in areas matching published habitat preferences and at sites where fishing cats have recently been documented or reported to occur.

In a preliminary review of surveys conducted throughout Southeast Asia, we found only six irrefutable records of fishing cat occurrence over the last ten years. In Thailand, we carried out extensive surveys in three distinct areas: Klongsaeng Wildlife Sanctuary in Surat Thani Province, Maenam Pachi Wildlife Sanctuary in Ratchaburi Province and Thale Noi Non-Hunting Area in Pattalung Province. We did not detect fishing cats at the first two sites, although a number of other carnivore species were documented through signs and camera trap photos. Fishing cats were documented in Thale Noi in February of 2007 through both distinctive tracks and camera trap photo captures. An extensive reference database of track casts and feces measurements compiled at partner zoos and wildlife breeding centers has proved invaluable for identifying sites for intensive photo trap surveys.

We have actively initiated and encouraged conservation activities related to fishing cats in conjunction with our field surveys. In Thale Noi, we hired local residents and conducted outreach activities such as giving presentations to local village groups to increase awareness of the significance of fishing cats.

The next phase of the project will involve three primary activities. First, we will carry out a regional review of documented fishing cat occurrence to provide a clearer picture of where the species has actually been shown to occur. Second, we will conduct a detailed radio-collar (or perhaps GPS or satellite collars) study to document the behavior, ranging patterns and habitat requirements of fishing cats in Thale Noi, one of the few places in Southeast Asia where fishing cats are still known to occur. Third, we will work with appropriate management agencies to ensure that conservation planning activities respond to the actual conservation status of fishing cats and the forces that threaten their continued survival.

Fishing Cat Project in Sri Lanka

John Seidensticker, Smithsonian's National Zoological Park.

We have undertaken this project to understand the behavioral ecology of fishing cats in a range of environment setting in Sri Lanka and to engage Sri Lankan school children more fully in the conservation of their wild cat legacy. The first phase of the project was to establish the conditions where fishing cats live in the wet, dry, and intermediate zones, the three major habitat

zones, of Sri Lanka through sign surveys and camera trapping. This phase of the project is now complete. One surprising result was finding a substantial number of fishing cats living in a wetland habitat in central Colombo, Sri Lanka's capital. The second phase of the study is to capture, collar, and radio track (using GPS equipped collars) a selected number of fishing cats in this central Colombo wet lands area, but emerging security concerns in Colombo have deferred this plan. The project site for this initial radio tracking work has been moved to an intermediate zone, more rural area. The awareness component of this study is to make Sri Lankan school children fully aware of their wild cat legacy. The field investigator for this project Suchitra Balagalle, a former elementary teacher herself, visits as many schools as time allows, to tell students about Sri Lanka's wild cats and their conservation needs. She provides the classrooms with a poster she designed that allows student to identify wild cats and also to report back to her if they see or know of any living in their neighborhoods. Ms. Balagalle, who is conducting this work as part of her Ph.D., works under the field direction of National Zoo research associate Dr. Eric Wikramanayake. More information on this project is available at <http://nationalzoo.si.edu/ConservationAndScience/SpotlightOnScience/seidenstickerj20030526.cfm> and http://nationalzoo.si.edu/Publications/ZooGoer/2007/2/Small_cats.cfm.

Small Cat Conservation Alliance: Strategies and Projects

Jim Sanderson, IUCN Cat Specialist Group, Small Cat Conservation Alliance, Wildlife Conservation Network

I founded the Small Cat Conservation Alliance (SCCA) in 1998 to address the conservation needs of small wild cats, especially those that are threatened with extinction. I will discuss how SCCA prioritizes its work, what projects SCCA is directly involved in, and list other small wild cat projects.

SCCA priorities

SCCA's work is prioritized using the IUCN Red List of globally threatened species. Since I am a voting member of the IUCN Cat Specialist Group, I am familiar with how the list is created and updated. The present ranking for some of the cats is as follows:

Critically Endangered: Iberian lynx

Endangered: Andean mountain cat, Bay cat, Snow leopard, Tiger

Vulnerable: Cheetah, Chinese mountain cat, Fishing cat, Flat-headed cat, Guigna, Lion, Marbled cat

The next lower categories are:

Threatened that includes Jaguar, and Clouded leopard, and
Least Concern that includes Bobcat, Ocelot, and Serval.

The present status of the Bay cat, Chinese mountain cat, Flat-headed cat, and Marbled cat is poorly understood, and increasing local capacity to deal with this lack of information in the areas where these cats occur is necessary.

Chinese Mountain Cat

There is a serious lack of knowledge and appreciation for the Chinese mountain cat. Presently there are 6 individuals in 3 zoos (Beijing, Lanzhou, Xining) in China. The cat is endemic to Qinghai and Sichuan Provinces. There are no photographs or camera trap pictures of wild Chinese mountain cats. The geographic range and specific habitats where the Chinese mountain cat occurs is very poorly known.

Threats include illegal hunting by Tibetans for accessories, the skin trade is not regulated, and there is widespread rodent poisoning.

Over the past four years SCCA, and PhD candidate Yin Yufeng have discovered that the habitat of the Chinese mountain cat is high elevation (~4000m) grassland. We know if the cats are present in certain areas. We understand the threats and we have a scalable solution. We hope to obtain the first camera trap pictures of the cat in May 2007.

Bay Cat, Flat-Headed Cat, and Marbled Cat

The Bay cat is perhaps the rarest of the world's cats. The Flat-headed cat is the most aquatic of the cats, and the Marbled cat is known to be an arboreal acrobat. Threats include widespread habitat loss, pollution, and illegal hunting. Much of lowland Malaysia has been converted to production landscapes much of which is oil palm. Much of lowland Sumatra and Borneo has also been converted to oil palm. Rivers and streams suffer from illegal floating gold mining dredges, siltation caused by logging along waterways, and raw sewage pollution because of widespread, common use of floating outhouses.

The Bay cat is believed to require pristine habitats however several observations suggested secondary forests can be tolerated. There is almost no information on the ecology and habits of the Bay cat although it is probably similar to the Asian golden cat.

The Marbled cat suffers from illegal hunting and habitat loss. Camera trap studies suggest the Marbled cat is rare throughout its range and so the natural question is: why is the Marbled cat so rare? Perhaps it is because the Marbled cat is highly arboreal, but we do not know.

Other SCCA supported projects

Currently, SCCA is supporting the Andean mountain cat project in Chile, a Margay project in Brazil, a Guigna project in Chile, and various camera trapping programs.

Other small cat projects

There are a number of small wild cat projects around the world including the following:

- (1) Two Pallas cat projects in Mongolia – Steve Ross and Jed Murdoch
- (2) Two Sand cat projects – Saudi Arabia and Israel
- (3) Brazil – finally investing in many carnivore conservation projects across Brazil

- (4) Andean mountain cat status and education programs – supported by Wildlife Conservation Network
- (5) Black-footed cat and Asiatic wild cat – Alex Sliwa
- (6) Amur leopard cat – Olga Upryinka
- (7) Korean leopard cat - Tae Dae Young

There are probably more but SCCA is not aware of them.

Although good science is necessary to support good conservation, it is not sufficient to ensure good conservation. Conservation must be made to happen. The value of an *in situ* conservation biologist should not be underestimated. To this end, more *in situ* field projects should be supported. If you are interested in learning more about small wild cat projects globally, please visit <http://www.smallcats.org>.

Acknowledgements

Thanks to US Fish & Wildlife, National Geographic Society, Feline Conservation Federation, Houston Zoo, the Frankenberg Foundation, and many individuals for their support of small cat conservation projects.

In Situ Conservation of Tropical Asian Felids

Karen Goodrowe, Point Defiance Zoo & Aquarium

Participants

Steve Bircher	Karen Povey
Valerie Buckley-Beason	Stephanie Rhodes
Mike Carpenter	Peter Riger
Namfon Cutter	Jim Sanderson
Kerry Fanson	BJ Schoeberl
JoGayle Howard	Bret Sellers
Sally Hunter	Alan Shoemaker
Cindy Kreider	Ron Tilson
Ken Lang	Tarren Wagener
Lyn Meyers	Andreas Wilting
Barb Palmer	

Tropical Asian felids:

- tiger
- clouded leopard
- fishing cat
- bay cat
- marbled cat
- flat headed cat

What's happening:

The group held a discussion on what types of projects are underway in Asia to get an overview of the research and also to identify common threads and needs.

- Distribution and habitat of tigers
- Distribution and habitat of fishing cats in Thailand
- Threats to small cats in China and Sabah
 - Chinese Mountain cats
 - all 5 small cats in Sabah
- Distribution and habitat of all carnivores in Thailand (Khao Yai)
- Behavioral ecology of fishing cats in Sri Lanka
- Development of effective communication and education programs surrounding Khao Yai
- Tiger Summit (role for zoos)
 - WWF
 - STT Fund
 - WCS
- Census in Iran for Iranian Cheetahs
- Tigers Forever (WCS) - Monitoring tigers in 7 landscapes
- Clouded leopard breeding/behavior
- Illegal wildlife trade (ASEAN-WEN)
 - Wild AID involved
- Enforcement (multi-species issue)
 - Malaysia
 - Sumatra
 - Thailand
- Bushmeat Coalition
- CAWT (Coalition Against Wildlife Trafficking)
 - State Dept. initiative (wants partners)

The group then talked about what could be done to promote felid research in situ. The discussion was broken up into two working groups. Those that could address more immediate needs (smaller scope items), and those that would address larger scope needs.

SMALLER Action Items:

- Fund scientists to come to TAG meetings – provides an excellent forum for communication - steering committee issue
- Provide Ranger support
- Share info with public to get it into the public consciousness and economic incentives (use websites).
 - make Felid TAG website more accessible to the public - increase # of hits, IT advisor
 - bring media into TAG meetings
 - Felid TAG host institution could mobilize local media
 - Use “experts” to talk with public (zoo membership/visitors)

Assigned Tasks (responsible parties listed in red)

- 1) Assemble a list of research projects being conducted in the field for zoos to reference for enhancement actions

*Immediate actions**Barb Palmer & Dusty*

- a. Get list of known projects from SSP/PMP coordinators
- b. Post the list on the Felid TAG listserv & determine if there are other list servers that would also be appropriate

Future actions

- c. Go to researchers to acquire a list of needs
- d. Update the list annually (*Barb Palmer & Dusty*)

- 2) Additions for future meetings - *Host Institutions*

- a. Have the marketing team of the hosting institution contact the media to come to the meeting
- b. Have some of the speakers do public presentations
- c. Select and invite a few field biologists

- 3) Work on resource databank for scientists

*Immediate actions**Namfon Cutter & Andreas – submit to TAG chairs*

- a. Develop a list of needs that field biologists have that zoos can assist with (e.g. track casts for specific ages/sexes/etc.)
- b. Develop specific methodologies for people working in the field (e.g. how to measure tracks)

Future actions

- c. Find zoos to participate in obtaining the information
- d. Compile this databank and possibly develop a book and/or electronic resource

Actions Items that would benefit both hosting zoos and in situ projects:

- Info and photos from the field (example: for clouded leopard website)
- Educate educators on in situ efforts.
- Reference materials for in situ scientists.
- Zoo educators collaborate with in situ scientists.
- Zoos send staff to field projects to learn and work.

BIGGER Action Items:

- Resource Development:
 - Listing of all projects/investigators (a resource)
 - Last done 2005 by survey
 - Needs to be put on the TAG website (currently on Columbus Zoo's website).
 - Add project duration, funds needed, items needed and how to contribute
 - Dusty will update
 - AZA members also can use ARCS as a resource

- Info sharing on species sightings (dump site); standardized methods for data collection.
- Link-up with other TAGs, etc. to coordinate projects – publications, more informal methods
- List serve in Vietnam
 - make available to group – P. Riger/K. Povey
- Link with Cat Specialist Group and other Asian Wildlife Specialist Group.
 - Responsibility of the zoos funding the projects to ask for photos/data that might be beneficial to other TAGs/Specialist Groups.
- AZA to enact government support with other agencies (like IUCN) to obtain mitigation (high level). Felid TAG should talk with S. Olson

Assigned Tasks

- 1) Currently, there are databases of field projects that could be used as a resource
 - a. IUCN
 - b. WCS

Develop a field database that is accessible for zoos and scientists – particularly with reference to what scientists are observing in the field.

www.carnivoreconservation.org - Basic reference database (approx. 20,000 carnivore references on database).

- 2) Update the survey of projects that zoos are supporting or involved in. (Dusty Lombardi; See number 1. below)
- 3) **Valerie Buckley-Beason** will contact PubMed/GenBank to inquire about database set up and format.

Focus
 Researchers
 Where
 Who's funding
 What type of work are you doing....
 Camera
 Signs
 Radio Tel. / Collars
 Scat collection

Are you collecting molecular samples? What are they?

What else have you seen in the project scope?

* The idea is to develop a species grid you can just click on. Have a legend and use different symbols for different types of observations (e.g. footprint symbol for footprints; camera symbol for photos). Would also include link from the TAG to other sites and visa versa.

Tropical Asian Species SSP and PMP Reports

Tiger SSP

Ron Tilson, Minnesota Zoo

No report submitted

Clouded Leopard SSP

Norah Fletchall, Coordinator, John Ball Zoo

The clouded leopard SSP met on April 11, 2007 and conducted a master planning session. A complete master plan will be published following C&S program guidelines. A summary of items discussed is outlined below.

Current worldwide living population is 223 animals (104.118.1) at 69 facilities. There are approximately 50 in Europe (31 of these are in the UK-most of these are related to SSP population); 72 animals in Asian facilities (28 at Khao Kheow, 15 in Japan). Current living SSP population is 32.40 at 31 institutions. This number is down as a result of the closing of AZA related facility Oakhill Center for Rare and Endangered Species and subsequent transfer of 18 clouded leopards out of the SSP population. There were no births within the SSP between January 1, 2006 and April 1, 2007. There were 24 births outside the SSP in the international population during that same time period with 18 animals surviving. There were 22 deaths during that same time period including 8 within the SSP.

An analysis of the current SSP population reveals 8.18 animals that are considered either proven or potential breeding animals. 13 founder animals are represented in the population, however only 4% of animal pedigrees in the SSP can be traced to founder animals. The SSP population has retained 78% of its genetic diversity with an inbreeding coefficient of 0.22. The following conditions were set to allow genetic analysis: Center Hill imported 1.3 animals, presumed wild-caught, in the late 1960s. These produced a large number of cubs over at least the next ~15 years. The current population is descended from 16 descendents of those original 4 animals, presumably through multiple generations. It was decided to make these 16 animals the equivalent of full sibs.

Based upon the genetic analysis of the population 10-12 kittens need to be born within the SSP per year to maintain the population at the currently level. In addition, the SSP will need to import 4 unrelated animals every 5 years for the next 20 years in order to achieve a genetic diversity of 85% in the population.

Import permits are pending for the importation of 4 additional animals from the Thailand project. These imported animals will be placed at the National Zoo Conservation and Research Center and the Nashville Zoo where they will be paired for breeding.

Kate McKinnon presented an overview and status report on her pairing study. She is currently working on correlating behavioral data on pairs with hormonal data. See her summary report included in the Felid TAG proceedings for details.

Over the last several years there have been ongoing studies related to the development of a consistent, repeatable Artificial Insemination protocol in clouded leopards. Drs. Katey Pelican and Jo Gayle Howard recently conducted an AI trial on two females at NZP-CRC utilizing two different hormone doses.

The SSP also endorses conducting AI trials in a number of unpaired females within the SSP population. Dr. Pelican will be utilizing females under the age of approximately 9 years for an upcoming trial. Institutions holding females will be contacted this year to assess level of interest and ability to support this effort. Recommended moves and pairings within the SSP master plan will be made based upon the need to conduct these AI trials.

Throughout the last year, progress has continued on several clouded leopard education projects. Karen Povey (Clouded leopard SSP education advisor) presented an update of several exciting projects. The SSP is indebted to Karen for her passion and the excellent work she has done to greatly raise awareness of this species both within and outside the zoo community.

The Clouded Leopard Project website (www.cloudedleopard.org) serves as the official website of the Clouded Leopard SSP®. The website is the SSP's primary vehicle for raising public awareness about clouded leopard conservation issues. The site has been steadily gaining traffic, with a current monthly average of 200,000 hits. Website traffic increased dramatically in March with the breaking news of the new species of Borneo clouded leopard, reaching nearly 700,000 for that month. From its inception, the Clouded Leopard Project website has been the primary source for in depth clouded leopard information on the Internet.

The website has had some recent additions. A Kid's Page was added with an "Ask the Expert" feature, coloring page, fact sheet, and opportunities for submitting clouded leopard art or poetry. Because response to our highest donor level, "Clouded Leopard Conservator" (\$100) has been so great, we've added a "clouded leopard adoption" package for a donor level of \$250. All donations through this level will support the Khao Yai carnivore monitoring project. We have just received a commitment from a computer engineer to provide pro bono work doing regular site updates. We plan to add several new features and news items in the coming weeks and hope to now have the ability to provide frequent and timely updates. *****Please send any news items to me at karenp@pdza.org for inclusion on the site!***

Progress continues on the Point Defiance Zoo & Aquarium's Southeast Asia Wild Cat Education Initiative, an ongoing project undertaken in 2004 to provide educational materials and awareness programs to communities in clouded leopard range countries. Through a partnership with the NGO WildAid working in Thailand, PDZA staff have developed a teachers' curriculum guide

featuring ecosystem concepts with a wild cat theme. After piloting in communities bordering Khao Yai National Park, the guide will be distributed to educators in other communities in the region. Recently, PDZA staff conducted a teacher training workshop to introduce educators to the guide and obtain feedback for evaluating its appropriateness for their curriculum and ease of use.

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The Clouded Leopard Project and PDZA plan to continue support for community outreach and the development of educational materials for teachers in Thailand and other clouded leopard range countries. Future projects include a bilingual (Thai/English) storybook and the development of long-term relationships with schools in communities with high poaching activities.

An analysis of submitted clouded leopard tissues and necropsies reveals tumors in older animals, adrenal gland tumors, hypertension and detached retinas as some of the more commonly occurring conditions in clouded leopards. Please continue to submit tissues as per the SSP protocol to Dr. Karen Terio, Clouded leopard SSP Pathology Advisor.

Fishing Cat SSP

Bill Swanson, Center for Conservation and Research of Endangered Wildlife, Cincinnati Zoo & Botanical Garden

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The Fishing Cat Species Survival Plan held a SSP meeting and Master Planning session over a four hour period on April 11th, 2007 in Nashville, TN in conjunction with the mid-year Felid TAG meeting. The SSP meeting was attended by 25 individuals representing 14 AZA member institutions and 6 non-AZA institutions (i.e., four private cat facilities/companies and two universities). The current demographic and genetic status of the SSP population was reviewed. As of April 2007, the SSP population consisted of 59 cats (19.40.0) in 24 institutions. There was a net gain of one institution since January 2006 with three additional zoos interested in acquiring fishing cats within the next year. Of the SSP cats, 27 (10.17) are 7 years of age or younger and 32 (9.23) are over 7 years of age. In the past year, there were 8 (4.4) kittens born in two litters at the Minnesota Zoo and one litter at the Feline Conservation Center (FCC, see below) and the death of 3 (2.1) older animals. Of the 7 SSP recommended pairings in 2006, only the pair at the Minnesota Zoo reproduced (twice) - the dam in that pairing is a founder animal from Thailand. One breeding pair at the FCC (a non-AZA institution) produced a litter of two kittens - the dam is a founder animal from Cambodia. Because those latter offspring are not included in the SSP population but are extremely valuable genetically, the two males are being acquired by Omaha's Henry Doorly Zoo for future pairing within the SSP. The current SSP founder population is 13 individuals and no new founders have been imported in the past year. Since initiation of the SSP in 2001, genetic diversity (GD) has improved from 0.83 to 0.873 (with a potential GD of 0.941) and mean inbreeding has decreased from $F = 0.17$ to $F = 0.138$. As of April 2007, the international population consisted of 278 cats (130.136.12) in 87 institutions with 42 births (12.12.18) and 28 deaths (7.9.12) deaths since January 2006. The updated International Fishing Cat Studbook may be obtained by contacting the Studbook Keeper Lynda Curtis at fishingcat@stage3.net.

Breeding recommendations for 2006 were revisited and discussed in a Master Planning session that followed presentation of the SSP reports. The lack of breeding success among SSP institutions (with the exception of Minnesota) and the exclusion by AZA mandate of the FCC as a non-AZA institution required reassessment of potential pairings within the SSP population. The continued production of valuable kittens in Minnesota and the acquisition of founder offspring at the FCC by the Columbus Zoo and Omaha's Henry Doorly Zoo allowed the SSP to recommend a number of new pairings involving younger animals. A total of eight breeding recommendations were made (see below) and a formal Master Plan is in preparation for distribution later in 2007. If each recommended breeding pair produces a litter of two kittens, SSP genetic diversity will increase from 0.873 to 0.89. The FCC currently is trying to breed two

other fishing cat founders from Southeast Asia that are not represented in the SSP population. The SSP strongly encourages AZA institutions interested in acquiring fishing cats to contact the FCC about purchasing these founder offspring. This action would assist the SSP in recovering genetic variation lost due to changes in AZA participation policies while helping the FCC to recoup some of their costs in importing and maintaining these fishing cat founders. The FCC (attention: Joe Maynard) may be contacted via email at cathouse@qnet.com to inquire about animal availability and costs.

2007 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	206034	Columbus	F = 0.000
529	7457	Columbia	664	8819	Columbia	F = 0.000
720	11564	Minnesota	694	206035	Columbus	F = 0.007
440	770313	Oklahoma City	722	11566	Minnesota	F = 0.035
655	13993	Omaha	657	13994	Omaha	F = 0.000
734	(from FCC)	Omaha	541	13423	Omaha	F = 0.000
735	(from FCC)	Omaha	633	114059	NZP	F = 0.007
85	200325	San Jose	542	11066	Minnesota	F = 0.000

Exhibit loan transfers: Female SB# 5 and SB# (Oklahoma City) to Dallas

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. Four breeding pairs are still being maintained at the Khao Kheow Open Zoo and the Dusit Zoo but none have produced any offspring over the last four years and most of the females are reaching advanced age. New pairings should be created but the absence of any new fishing cats coming into captivity has precluded making any changes. The lack of fishing cats confiscated by government authorities in recent years supports our contention that wild fishing cat populations in Thailand are more endangered than commonly believed and stresses the importance of increased *in situ* research with this species.

In situ research studies of wild fishing cats in Sri Lanka and Thailand were continued in 2006. Dr. John Seidensticker of the Smithsonian's National Zoological Park continues to assess the status of wild fishing cat populations in Sri Lanka near the capital of Columbo and presented an overview of this research at the Felid TAG meeting (see his report, this volume). In Thailand, a third camera trapping study was initiated in 2006 by Thai field biologists Passanan (Namfon) Cutter and Budsabong Kanchanasaka, with funding provided by the Fishing Cat SSP, the Cincinnati Zoo, National Zoo, Columbus Zoo and Chicago Zoological Society. This camera trapping survey focused on the Thale Noi Non-Hunting Area and surrounding mangrove swamps in southern Thailand and resulted in our first photos (in three years of searching) of a wild fishing cat. Namfon presented a detailed talk about the camera trap surveys at both the SSP meeting and the Felid TAG meeting (see her report, this volume).

Reproductive research at both the Cincinnati Zoo and the Audubon Zoo has focused on developing semen freezing, in vitro fertilization and embryo transfer as a means to produce offspring and introduce genetic variation into the SSP population. The emphasis of the Cincinnati Zoo studies has been on comparing fertility of fresh versus frozen-thawed fishing cat spermatozoa to help develop genetic linkage between the SSP population and fishing cat populations in Thailand. Dr. Genevieve Magarey, the principal scientist conducting those studies at the Cincinnati Zoo, has completed her research appointment and recently returned to Australia. Her research findings with fishing cats should be published within the next year. In a paper published last year, the Audubon Zoo described the birth of a fishing cat kitten following embryo transfer (Pope et al., 2006) and, in a recent communication, reported the birth of a fishing cat kitten following artificial insemination with freshly collected semen. Because of the aging of the SSP population and the need to breed younger genetically valuable cats for population management and exhibitry, the availability of reproductively viable cats suitable for research purposes has been limited.

The primary veterinary concern remains the high prevalence of transitional cell carcinoma (TCC) in older fishing cats with 12 confirmed cases (representing 13% of all adult deaths from 1995 – 2004). Dr. Karen Terio from the University of Illinois presented an overview at the SSP meeting of her paper (Landolfi et al., 2006) describing the histopathology and immunocytochemistry of tumors from ten fishing cats. All tumors expressed the cyclooxygenase (COX-2) enzyme, suggesting that treatment with non-steroidal anti-inflammatory drugs such as piroxicam might be beneficial therapy for affected cats. The etiology of TCC in fishing cats is still unknown but genetic and nutritional linkages are possible. Please note that Dr. Terio (kterio@lumc.edu) and Dr. Michael Kinsel (mkinsel@lumc.edu) also 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. Dr. Terio is the Pathology Advisor to the Fishing Cat SSP and the SSP encourages all fishing cat holding institutions to submit tissue samples for these pathological assessments.

Please note that the Fishing Cat SSP has a new Veterinary Advisor, Dr. Kristi Fisher, who provides veterinary services to the FCC and the Santa Ana Zoo. She may be contacted at purrdoc@cox.net for questions about fishing cat veterinary issues. The SSP also has a Nutrition Advisor, Dr. Cheryl Dikeman at Omaha's Henry Doorly Zoo, who provides nutritional advice for all of the small cat SSP programs. Dr. Dikeman may be contacted at cheryld@omahazoo.com for questions about fishing cat nutrition.

Because nutrition may be a factor in the high incidence of TCC in fishing cats, a dietary survey of fishing cat institutions was conducted in early 2007 by nutritionists Dr. Jason Williams from the Indianapolis Zoo and Barb Lintzenich from the Cincinnati Zoo in collaboration with the SSP. All 24 fishing cat institutions responded to the survey. Results indicated that most zoos (22/24) provided some fish in their diets, with the amount of fish averaging 21% of the total diet. Most zoos (16/22) fed smelt, capelin or herring as the primary type of fish with other main components including horse meat, beef and chicken, and 7 zoos provided live fish as part of the diet. Of the 24 zoos, 10 have reported confirmed cases of TCC and 2 others currently have suspected cases. Research planning for an in depth nutritional study is ongoing in collaboration with Russ Kelley, a nutritionist at the IAMS Company. The SSP will be assisting the

nutritionists in contacting fishing cat holding institutions to participate in this important study with a projected starting date of late 2007.

Lastly, the SSP continues to raise funding for in situ studies through the sale of limited edition fishing cat prints and note cards. Since 2001, these sales have provided over \$5000 to support the camera trap surveys for fishing cats in Thailand. Several hundred prints (\$60 each) and a few packets of note cards (5 cards/pack; \$6 each) are still available to sell on consignment. Interested parties should contact the SSP coordinator. Finally, with our recent success in producing and marketing a Pallas' cat plush through the Event Network and K & M Toys, we have begun designing a fishing cat plush with a projected release date of December 2007. As with the Pallas' cat plush, the fishing cat plush will be available for purchase by institutions that pledge to dedicate a portion of their proceeds (a minimum of \$5/plush) to support the in situ research program. Production costs have not yet been determined but likely will be ~\$10 per plush. Please contact the SSP coordinator for more information.

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Plenary Session - Felid Conservation and Management

The AZA's Big Cat Task Force and use of Felids as Program (education, outreach, etc.) Animals

Norah Fletchall, John Ball Zoo

Over the last 18 months institutions utilizing cheetahs in outreach and education programs have faced increasing pressure from USDA to curtail and/or discontinue using these cats in that capacity. Earlier this year a task force composed of Felid SSP Coordinators, felid program animal trainers/facilitators and others met to make recommendations to the AZA Board as to how to move forward with this challenge.

Subsequently, the Felid TAG steering committee met to review this document and formulate our own recommendations. These will be submitted to the AZA Board for their consideration.

These recommendations are:

- AZA open discussions with the USDA concerning removing the classification of cats in their policy's based upon 'big cats' and 'small cats'.

- AZA clarify the definition of Program Animals in light of evolution of training/demonstrations/shows and also clarify what “routine” means in regards to animals that only occasionally have contact with the public.
- Felids should only be used as Program/Contact Animals after the holding institution conducts risk and welfare assessments in accordance with that institution’s program animal policy.
 - Ongoing **risk** assessments should be conducted for each individual animal and should factor in:
 - biologic and behavioral factors
 - animal handlers’ expertise, available handling equipment
 - site characteristics.
 - Ongoing **welfare** assessments should be conducted for each individual animal and should include:
 - an evaluation of each specimen’s health and welfare
 - zoo staffs’ ability to recognize and address behavioral indicators of stress.
- The institution should include as part of its program animal policy a statement of lifetime commitment to each individual animal’s welfare.
- The Animal Welfare Committee adds a template to the AZA Standardized Guidelines for Animal Care a section concerning Program/Contact animals and ensure the SG process allows for significant input from AZA professionals with program animal expertise.

Developing the Felid TAG’s Large Cat Husbandry Course

Hollie Colahan, Houston Zoo

The first Large Felid Husbandry Course was held April 9-11. The course had 19 students who ranged from 1-20 years of felid experience, with most falling in the 1-5 year range. The course included a variety of topics including behavior, nutrition, veterinary care, introductions, stress management and birth management/handrearing. Instructors utilized a variety of interactive teaching methods, discussion and problem solving.

Feedback was overwhelmingly positive and many people feel this course should be held annually, which will be discussed in the coming weeks. Another working group was also formed to work on a Small Felid Husbandry Course to be presented in Cincinnati in 2008.



Participants in the Felid TAG's First Large Cat Husbandry Course

Enhancement: Points to Ponder

Alan Shoemaker

In 2001, the U.S. Fish and Wildlife Service (FWS) changed the way they interpreted the Endangered Species Act. As a result, any institution wishing to engage in international activities involving endangered or threatened species must now include some form of support for the species' remaining wild populations if they wish to import or export this type of wildlife. This is called, "Enhancement." Although this new interpretation of the Act startled many zoos at first, most institutions have now accepted it and developed very credible conservation programs as part of their yearly activities. While this not so new requirement seems obvious in definition, three areas of confusion still appear during permit preparation. Hopefully the following comments will correct some of these difficulties still experienced by some of our membership.

1) What is enhancement? While the definition of "enhancement" is understood by most zoo professionals, some members still get confused about the difference between *in situ* and *ex situ* activities. If a zoo is considering international activities involving endangered wildlife, they definitely need to examine their conservation programs and target selected projects that impact the wild populations of those species they may want to become involved with in the future. While it seemed clear that this meant support for *in situ* activities such as funding census

projects by researchers in the field, supporting anti-poaching activities in range countries, providing fuel, supplies and vehicles for scientists, etc., some applications submitted to the Division of Management Authority still contain ex situ projects that do not qualify for approval under the current definitions of enhancement. Indeed, in some cases nearly all areas of support submitted by a few zoos in their endangered species applications involved ex situ work. Indeed, it is laudable that some of our facilities support zoos in range countries, building new enclosures, funding their education facilities, and sending their senior staff to meetings in the U.S. in order to improve their job skills. Unfortunately, none of these actions meet the definition of enhancement and including them in an application only serves to confuse the permit reviewer. If there are questions about what constitutes “enhancement”, zoos should contact the appropriate SSP chair, TAG chair, or other senior TAG members for guidance in identifying qualified projects.

2) Enhancement records: A second point that seems to escape many zoos is the storage of all this information in a retrievable location. Too many times each department within a single institution has information on what kinds of in situ projects it supported. Unfortunately retrieval of this information for permit preparation remains illusive and time-consuming. While the business manager may well have information on all these activities since the finance department wrote the checks, it is highly advisable that at least one individual in the animal division store all this data in a single file that can be quickly downloaded and modified as needed. This can also serve as a review point for zoos needing to consider new projects in support of species they plan to import or export in the future.

3) Documentation: It should be obvious that any institution providing funding should be able to prove that they did so. Regardless, too many zoos remember giving some organization money to do “something” in a range country but don’t have any proof that the money was sent, that the funds were used appropriately or have any information on the project itself. This situation needs to change. In the future, someone at the zoo who is in contact with the individual receiving institutional support should also be responsible for maintaining details about the project as well as requesting an end-of-project report on how the funds were used. Copies of correspondence acknowledging receipt of funds are important and whenever possible, copies of canceled checks should be retained and readily available. While some reviewing biologists are familiar with the recipients of such support, others are not and want full documentation on past projects supported, copies of previous correspondence as well as canceled checks.

These three areas seem so logical that everyone should be doing it. In fact, there are still too many members not fulfilling these areas of good business practice but in the future, there should be little excuse for not having enhancement activities properly identified and retrievable.

The Inconceivable Truth: Overview of Felid Contraception

Sally Boutelle, AZA Wildlife Contraception Center, St. Louis Zoo

The Mission of the AZA Wildlife Contraception Center at the Saint Louis Zoo is to manage reproduction for animal well-being and conservation as a service to AZA institutions. This

management entails monitoring over 21,000 contraceptive records in which efficacy and safety are the highest priority. However the Center also assists in developing and testing new contraceptive methods along with providing advice to animal managers and veterinarians in selecting the appropriate method for their situation.

Below is a summary of both the methods available for felids and concerns regarding their safety and reversibility. The quality and extent of our Recommendations rely on participating institutions submitting complete and accurate reports. We encourage this continued support which is critical for generating the information needed to provide the best animal care and to achieve reproductive management recommendations from AZA, SSPs and PMPs.

The progestin-based melengestrol acetate (MGA) implant, previously the most widely used contraceptive in zoos, has been associated with uterine and mammary pathology in felids (Munson 2006). Instead, the AZA Wildlife Contraception Center now recommends GnRH agonists [e.g., Suprelorin® (deslorelin) implants, leuprolide acetate injectable implants, or Lupron®] as safer alternatives. Suprelorin has been used successfully in domestic cats (Munson et al. 2001) as well as cheetahs, lions, leopards, black-footed cats (Bertschinger et al. 2001). Although it appears safe and effective, dosages and duration of efficacy have not been well established for all species. The GnRH agonists can be used in either females or males, and side effects are generally those associated with gonadectomy, especially weight gain which should be managed through diet.

Gonadotropin releasing hormone (GnRH) agonists [Suprelorin® (deslorelin) implants, leuprolide acetate injectable implants, or Lupron®]: GnRH agonists achieve contraception by reversibly suppressing the reproductive endocrine system, preventing production of pituitary (FSH and LH) and gonadal hormones (estradiol and progesterone in females and testosterone in males). The observed effects are similar to those following either ovariectomy in females or castration in males, but are reversible. GnRH agonists first stimulate the reproductive system, which can result in estrus and ovulation in females or temporary enhancement of testosterone and semen production in males. Then, down-regulation follows the initial stimulation. The stimulatory phase can be prevented in females by daily Ovaban administration for one week before and one week after implant placement (Wright et al. 2001).

GnRH agonists should not be used during pregnancy, since they may cause spontaneous abortion or prevent mammary development necessary for lactation. They may prevent initiation of lactation by inhibiting progesterone secretion, but effects on established lactation are less likely. New data from domestic cats have shown no effect on subsequent reproduction when treatment began before puberty.

A drawback of these products is that time of reversal cannot be controlled. Neither the implants (Suprelorin and leuprolide injectable) nor the depot vehicle (e.g., Lupron) can be removed to shorten the duration of efficacy to time reversals. The most widely used formulations are designed to be effective either 6 or 12 months, but those are for the most part minimum durations, which can be longer in some individuals.

Although they can also be an effective contraceptive in males, they are more commonly used in females, because monitoring efficacy in females by suppression of estrous behavior or gonadal

steroids in feces is usually easier than ensuring continued absence of sperm in males, since most institutions cannot perform regular semen collections. Suprelorin® has been tested primarily in domestic dogs and cats, whereas leuprolide acetate and Lupron® have been used primarily in humans, but should be as effective as Suprelorin®, since the GnRH molecule is identical in all mammalian species.

If used in males, disappearance of sperm from the ejaculate following down-regulation of testosterone may take an additional 6 weeks, as with vasectomy. It should be easier to suppress the onset of spermatogenesis in seasonally breeding species, but that process begins at least 2 months before the first typical appearance of sperm. Thus, treatment should be initiated at least 2 months before the anticipated onset of breeding.

Progestins: Melengestrol acetate (MGA) implants were previously the most commonly used method in felids. Other synthetic progestins include Depo-Provera® (medroxyprogesterone acetate) injections and Ovaban® (megestrol acetate) pills. Although MGA has proven effective in felids, possible side effects include uterine and mammary pathology. Other progestins are also very likely to cause these same side effects, although data are not available for them all.

If progestins must be used, they should be administered for no more than 2 years and then discontinued to allow for a pregnancy. Discontinuing progestin contraception and allowing non-pregnant cycles does not substitute for a pregnancy. Use of progestins for more than a total of 4 years is not recommended. MGA implants last at least 2 years, and clearance of the hormone from the system occurs rapidly after implant removal. Progestins are considered safe to use during lactation.

Vaccines: The porcine zona pellucida (PZP) vaccine may cause permanent sterility in felids after only one or two treatments. This approach is not recommended.

Ovariectomy or Ovariohysterectomy: Removal of ovaries is a safe and effective method to prevent reproduction for animals that are eligible for permanent sterilization. In general, ovariectomy is sufficient in young females, whereas, removal of the uterus as well as ovaries is preferable in older females, due to the increased likelihood of uterine pathology with age.

Vasectomy: Vasectomy of males will not prevent potential adverse effects to females that can result from prolonged, cyclic exposure to the endogenous progesterone associated with the pseudo-pregnancy that follows ovulation induced by copulation. This approach is not recommended.

More details regarding these methods and ordering information are listed on the webpage, www.stlzoo.org/contraception. The recommendations listed are based on the expert knowledge of our advisory board and the contraceptive records listed in our database. We are grateful for the continued support and detailed information provided by AZA institutions in the yearly surveys and applaud everyone's commitment.

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More Than You Ever Wanted to Know About Reproduction in Black-Footed Cats and Sand Cats

Jason Herrick, Center for Conservation and Research of Endangered Wildlife, Cincinnati Zoo and Botanical Garden

Black-footed cats (BFCs) and sand cats (SCs) are 2 of 5 species of small cat managed by Species Survival Plans in U.S. zoos. Like captive populations of other small cats, management of both of these species is hampered by small population size, under- and/or non-represented founders, limited breeding success, limited available cage space, and the need for periodic infusion of new founders or founder genes. An improved understanding of basic reproductive biology would greatly benefit managers of these populations. The objectives of the studies outline here were: 1) To characterize basic reproductive biology in both species; and 2) To begin development of assisted reproductive technologies (ARTs).

Fecal samples were collected from ≥ 5 individuals of each sex of each species and analyzed by enzyme immunoassay (EIA) for concentrations of metabolites of estrogens, progestins, and androgens. In BFCs, 81 cycles were observed with a mean cycle length of 12.4 ± 1.0 days (duration between estrual periods) and a 2.4 ± 0.3 day period of estrus. Overall 30 luteal phases were observed (14.2 ± 1.2 days of elevated progestins), representing 37.5% of all cycles, including females housed by themselves. This indicates that BFCs spontaneously ovulate on a fairly regular basis. In SCs, 120 cycles were observed with a mean cycle length of 11.5 ± 0.6 days and a mean estrus length of 2.9 ± 0.2 days. Only one luteal phase was observed in a female housed alone (12.0 days of elevated progestins), indicating that while spontaneous ovulations do occur they are rare.

Male BFCs excreted 3106.9 ± 53.4 ng androgens/g feces, with a slight decrease during the summer (May thru Sept.). A total of 18 ejaculates were collected from 5 male BFCs, with an average volume of 246.5 ± 11.8 μ l containing $29.9 \pm 5.1 \times 10^6$ spermatozoa. Greater than 80% ($82.5 \pm 1.9\%$) of the spermatozoa were motile and $46.8 \pm 3.0\%$ of spermatozoa exhibited normal morphology ($25.4 \pm 2.6\%$ spermatozoa with bent tails). These values were similar to those

observed in wild-caught BFCs males (n=6). Male SCs excreted 2320.9 ± 48.9 ng androgens/feces, with a slight decrease during summer. A total of 23 ejaculates were collected with an average volume of 200.3 ± 18.0 μ l containing $36.5 \pm 5.7 \times 10^6$ spermatozoa. The majority ($78.3 \pm 1.3\%$) of spermatozoa were motile and $40.4 \pm 3.1\%$ of spermatozoa exhibited normal morphology. The most common abnormalities observed were spermatozoa with a bent midpiece and retained cytoplasmic droplet ($16.7 \pm 2.0\%$) and spermatozoa with a bent tail ($11.2 \pm 1.8\%$).

Using a standardized regimen of equine and human chorionic gonadotropins (BFCs, 100 IU eCG and 75 IU hCG; SCs, 150 IU eCG and 100 IU hCG), 15 to 20 (BFCs, 15.4 ± 3.5 ; SCs, 19.0 ± 3.8) follicles were produced yielding 9.4 ± 2.2 (BFCs) to 12.6 ± 3.0 (SCs) grade 1 oocytes. When co-cultured (6% CO₂, 38.6 °C) with spermatozoa in Feline-Optimized Culture Medium (FOCM) or Ham's F-10 (HF10) embryo development was higher in FOCM than HF10 at both 20 (BFCs, $55.8 \pm 15.1\%$ vs. $16.3 \pm 9.9\%$; SCs, $76.5 \pm 8.7\%$ vs. $29.8 \pm 11.7\%$) and 30 (BFCs, $90.0 \pm 10.0\%$ vs. $63.8 \pm 16.5\%$; SCs, $92.9 \pm 7.1\%$ vs. $55.9 \pm 20.6\%$) hours post-insemination (hpi). Spermatozoa from both species were also cryopreserved either in straws over liquid nitrogen vapor (straws) or in pellets on dry ice (pellets) and evaluated for in vitro function in FOCM or HF10 after thawing. Thawed spermatozoa were cultured (6% CO₂, 38.6 °C) in the presence (5×10^5 motile sperm/ml) or absence ($2-5 \times 10^6$ motile sperm/ml) of mature domestic cat cumulus-oocyte complexes to evaluate the ability to fertilize oocytes (cleavage 20, 30, and 48 h post-insemination, hpi) and motility (0, 1, 3, 6, and 20 h of culture) and acrosomal integrity (0 and 6h of culture), respectively. The sperm motility index (SMI, $[\%+(20*\text{rate})]/2$) and %intact acrosomes immediately after thawing was not affected by cryopreservation method in BFCs, but was improved following cryopreservation in straws for SCs. SMI was higher throughout culture for SC spermatozoa and at 0 and 1 h of culture for BFC spermatozoa after freezing in straws and at 20 h when cultured in FOCM. The decrease in %intact acrosomes during culture was not affected by freezing method or IVF medium in BFCs, but was improved following cryopreservation in straws for SCs. In BFCs, the proportion of oocytes cleaving was not affected by freezing method, but was higher in FOCM than HF10 at all time points, and was not different from oocytes inseminated with fresh domestic cat spermatozoa. In SCs, the combination of cryopreservation in straws and culture in FOCM yielded superior cleavage rates at all time points that were not different from oocytes inseminated with domestic cat spermatozoa.

Overall, this series of studies provide the first characterizations of reproductive norms (patterns of fecal hormone metabolites and semen analysis) for these species and indicate that embryos can be readily produced in vitro using fresh or frozen-thawed spermatozoa. Although the viability of embryos produced in vitro needs to be examined, these early results suggest that in vitro fertilization and embryo transfer could be a powerful tool for captive management of BFCs and SCs. This work was supported by The Morris Animal Foundation (#D04ZO-72).

Open Forum with USFWS

Mike Carpenter, USFWS

An open forum discussion with Felid TAG attendees was held to answer questions they may have involving U.S. Fish and Wildlife Service policy and procedures.

The Great Cat and Rare Canid Act (GCRC Act) - Mike reviewed the details and status of the Act. The Act was reintroduced into the House of Representatives on March 19. So far it has a lot of supporters. If it gets out of Committee, it will go on to the Senate. However even if it gets out of Committee, it may not get the funding that is needed. It protects 13 species of felids and canids.

Permits – The ZAOA is another zoo organization similar to AZA. It will be treated equally as AZA when USFWS looks at their permit applications. Currently it has no established management programs (i.e., TAGs, SSPs).

Importation of wild born felids versus captive born felids - USFWS treats these animals the same for permit applications. It is possible to import wild-born felids that are listed under ESA but it usually is more difficult to meet permit criteria. For example: If an wild-born ocelot is held in a South American facility, the application would need to provide information explaining why the cat is in a zoo, why it is non-releasable, and why the government would allow it to leave the country.

Question and Answer Period:

A question was asked regarding the time it takes to approve permit applications and the number of biologists that are handling permit applications.

Mike: Three term biologists have been hired, but have also lost three biologists. Term biologists are hired on a temporary status and they may, or may not be rehired. Funding has been cut by 5% every year since the Bush administration has been in office. They are processing permits as fast as they can. Permit turnaround is ~60 days, but ESA permits must then be posted in the Federal Register for 90 days.

Karen Povey: Question of whether in situ education programs could serve as the enhancement portion for ESA import permit applications.

Mike: Yes, as long as the programs can demonstrate a benefit to wild populations and habitat preservation.

Ken Kammerer: The Brazilian Ocelot Consortium has members that contribute to the consortium, which in turn designates in situ conservation/research projects for funding. Do these individual members need to contribute separately to conservation/research programs?

Mike: The permit application needs to spell out what the consortium does for conservation/research and this should suffice for the enhancement portion of the permit application.

Ken: If a facility contributes a small amount of money to the consortium would this still qualify?

Mike: The biologist reviewing the application looks at the institutions budget and takes the size of their contribution in relation to their annual budget into account. What they are looking for is a long-term commitment, not a one time “donation”.

Bill Swanson: Who determines the amount of funding for the GCRC Act?

Mike: Congress will determine the level of funding but rarely funds to the maximal amount. For example, 1.4 million dollars has been given as grants to the Tiger/Rhino program.

Bill: Who does the reviewing for this Act? USFWS biologists?

Mike: The USFWS will be inviting input from outside reviewers.

Proposal for a Felid TAG Advisor on Program Animals

Norah Fletchall, John Ball Zoo

Over the last few years, there has been increasing attention paid to issues surrounding the use of several taxa in on-site and outreach programs by AZA accredited facilities. These issues range from the safety of the animal, animal handler and the public to the types and quality of messages received by those who participate in these encounters.

A large number of felid species have been and continue to be utilized in these types of programs. The specialized care, training and ongoing assessments of each situation and individual animal warrant the appointment of an advisor to the Felid TAG who is experienced in the training and care of these species. This advisor(s) would be available to provide insight and information to the TAG on this issue as well as provide advice to program managers and members of the TAG who utilize felids in their programs as well as those who are developing new programs.

APCRO's Growth and Progress with a Focus on the African Lion

Mike Briggs, African Predator Conservation Research Organization

No written report submitted

Felid TAG Working Group Reports

Small Felid Husbandry Course Working Group

Cheryl Dikeman, Omaha's Henry Doorly Zoo

The initial goals for the workshop included:

- 1) Discussion of the large felid husbandry course.
 - a. What worked?
 - b. Areas of improvement.
 - c. Thoughts and discussion on offering large and (or) small cat course (s) in 2008.
 - d. Continuation of the large cat course.

- 2) Identification of lead development committee chair and key group to begin working on the small cat course.
1. Hollie began the discussion regarding the large cat course.
 - a. Student feedback was very positive for the 2007 course and far exceeded the committee's expectations.
 - b. Results of the post course survey were positive and suggestions were appropriate.
 - i. Items of low ranking included:
 1. Time constraints – most students wanted more time.
 - a. Could remove the zoo trip or shorten it substantially.
 - b. Students would have liked more time to work on problem solving.
 - c. Could have included more technology (video) and possible panel discussions.
 2. Scrambled for last minute instructors.
 3. Minority of students did not stay for TAG. This was due to misinformation that most keepers believed the TAG was for curators/management only.
2. A facilitated discussion led by Danny Morris, followed regarding the offering of a large cat and (or) small cat course in 2008:
 - a. There was an overwhelming response from students, instructors, and the development committee from the large cat course, to continue offering the large cat course annually due to need, momentum already built, and future financial commitments.
 - b. The course was discussed in terms of attachment to the TAG meeting and possibilities of development as an AZA course. There was an overwhelming response from attendees that the course not be offered as an AZA course due to cost for the target audience.
 - c. Topics were recapped and additional topics for small cats were listed in order to determine possible overlap, and included:
 1. Natural history
 2. Introductions
 3. Safety
 4. Enrichment and training
 5. Reproduction – breeding
 6. Birthing, hand-rearing
 7. Stress management
 8. Veterinary
 9. Nutrition
 10. Behavior
 11. Facility design/exhibit
 12. People skills
 13. Problem solving
 14. Capture techniques

It was concluded that the topics for both courses were generally the same.

- d. There was concern expressed by many meeting attendees that the small cat course emphasis would not get enough attention if a large cat course was offered at the same time, and there would be an increased strain on instructor commitment.
- e. Discussion followed in favor of offering a Small Cat Pilot Course in 2008, in order to determine best areas for overlap and combined courses beginning in 2009.
 - i. This discussion ended with Danny Morris indicating the topic needed to be addressed by the TAG steering committee.
- f. It was decided that having a previous development committee person for the large cat course in charge of the small cat course development committee would be ideal; therefore, Cheryl Dikeman, offered to take that role.
 - i. Additional key individuals identified for inclusion included Bill Swanson as the initial Cincinnati contact, Danny Morris and Bonnie Breitbeil as steering committee liaisons.
 - ii. A listserv would be developed after the TAG and would initially include all individuals wishing to be included. Cheryl Dikeman will develop and facilitate the listserv.
 - iii. It will be necessary for program managers to get involved early in the development process and specifically will be asked for assistance in:
 - 1. Gathering appropriate resources and references for pre-course background information.
 - 2. Identification of key small cat keepers as potential students and (or) possible instructors.
 - 3. Identification of potential instructors.
 - 4. Identification and compilation of field work.
 - 5. It was decided that a current and updated list of all small cat institutions needed to go to all program managers. Bill Swanson and Steve Wing agreed to update and disseminate this list.

Small Cat Workshop

Danny Morris, Omaha's Henry Doorly Zoo

Education: Shasta Bray from the Cincinnati Zoo will take over from Dan Marsh as the small cat education advisor. Shasta distributed two activity books created by the Cincinnati Zoo that are available for use by other zoos. Shasta has also offered the digital version for tailoring to each institution. Shasta also will continue to work on marketing initiatives for the small cat group.

Nutrition: Dr. Cheryl Dikeman, the Small Cat Nutrition Advisor, reported on nutrition issues.

1. Small cat guidelines will include the National Research Council's 2006 version of feline nutrient requirements, including variations for physiology.
2. Omaha is wrapping up a metabolic study with African wildcats.
 - a. A grad student at the University of Illinois is interested in completing her dissertation with exotic small cat nutrition.
 - b. Two nutrition questionnaires are being developed. One is completed and available at the TAG meeting regarding transitioning cats to different meat diets (horse to beef). The second will be regards to transitioning cats to diets at various physiologic stages (increasing diets during growth and reproductive stages).

Pathology/Disease: Dr. Karen Terrio, the Small Cat Veterinary Advisor, reported that more people are using her pathology services. She extended to the group the offer to continue doing small cat pathology. This service is free and results are returned very quickly.

Progress on goals:

1) Husbandry course: A working group was convened to discuss the results of the large cat workshop and to begin the planning for the Small Cat course that will take place in Cincinnati next year. Cheryl Dikeman has accepted the lead role for coordinating this course. Danny Morris and Bonnie Breitbeil will be the steering committee liaisons.

2) Connect articles: Bill asked for help from the Species Managers in providing short one page articles for the AZA Connect to help raise awareness, and potentially will allow development of larger stories. Steve Wing agreed to provide an article to Bill on Black-footed Cats.

3) Importation of black footed cats: Cincinnati and Omaha are moving forward with getting BFCs from a private breeder in South Africa.

4) Sand Cat In Situ Study: The sand cat project is winding up at the end of 2007. The PI went back to South Africa. It would be good to get another sand cat study going. But we still need funding for other small cat field projects - the anticipated funding from the Morris Animal Foundation did not come through.

5) Small Cat Plushes: Cincinnati is designing the next plush - the fishing cat - to hopefully have produced by the end of the year. Cincinnati is paying for it upfront. It would be helpful if other zoos solicited K&M to make these plushes a part of their normal product line. The Pallas' cat plush was a big hit (700 moved in six months) and more will be made.

Other Business:

Barb Palmer (San Francisco Zoo) was welcomed as the new Studbook Keeper/PMP coordinator for Caracal.

Bonnie Breitbeil (Serval PMP coordinator) raised the issue of the number of Servals being obtained for program animals. Most of these animals are obtained outside the AZA and some discussion ensued on the impact on the PMP population if these animals don't work as program animals.

SSP/PMP and Studbook Updates

Black-Footed Cat SSP

Steven Wing, Coordinator, Louisville Zoo

Advisors

Nadine Lamberski, San Diego Wild Animal Park, Veterinary

Karen Terio, University of Illinois, Pathology

Dan Marsh, Cincinnati Zoo, Education

Dave Hodge, Louisville Zoo, Website

North American Population

The North American population consists of 14.13.1 (28) cats in 14 institutions.

There have been 4 births (2 litters) in the past 12 months.

There have been 2 deaths (1.1) in the past 12 months.

There have been 4 transfers (1.3) 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 28 cats living in the population, 11 are over 7 years old. Four of these cats are 13 years old.

We currently have 3 institutions that are successfully breeding cats: Omaha, Central Florida and Riverbanks.

Mid-Year Meeting

A Black-Footed Cat SSP meeting was held in conjunction with the AZA Felid TAG mid-year meeting in Nashville in April 2007.

Master Planning Session

A master planning session was held at the Population Management Center at the Lincoln Park Zoo on August 25, 2003. Final breeding and transfer recommendations were made on October 17, 2003. The recommendations can be found on the AZA website.

The population founder genome equivalent is 4.01 with 87.5% gene diversity retained. Population mean kinship stands at 0.1247.

All recommended transfers took place and 11 pairs are recommended to breed (Omaha, Riverbanks, Oklahoma City, Cincinnati, Audubon Institute, Santa Barbara, San Antonio, Central Florida, Kansas City and Grand Rapids).

Importations

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

The Cleveland Zoo has expressed interest in building an exhibit. Fresno Zoo is interested in receiving cats in the near future and Louisville may need cats in 2008. Four institutions have unpaired cats, three of which are at or near 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.

Corne Anderson (PhD), Beryl Wilson (Btech), Alex Sliwa (PhD)

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

Investigating Amyloidosis in Black-footed Cats (*Felis nigripes*)

Karen Terio (DVM, PhD), Nadine Lamberski (DVM)

The aim of this study is to determine the pathogenesis of systemic amyloidosis in black-footed cats. The objectives are:

1. To determine the prevalence and tissue distribution of amyloid deposition in black-footed cats;

2. To determine if amyloidosis is associated with concurrent disease conditions or familial lines;
3. To determine the type of amyloid deposited in tissues of black-footed cats.

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. Riverbanks Zoo has provided samples and funding for this project.

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

Jason Herrick (PhD) – see report from Plenary Session, this volume

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

Jason Herrick (PhD), Nadine Lamberski (DVM), Beryl Wilson (Btech), Paul Bartels (DVM), Corne Anderson (PhD), Bill Swanson (DVM, PhD), Alex Sliwa (PhD)

The goal is to characterize reproductive and health parameters in free-ranging animals that can be used to assess the health of captive individuals.

Publications

- **Distribution, Habitat Characteristics, Sub-Specific- and Disease Status of the Black-footed Cat (*Felis nigripes*) in the Northern Cape Province, South Africa.** Corne Anderson (PhD), Beryl Wilson (Btech), Alexander Sliwa (PhD)*. McGregor Museum, PO Box 316, 8300 Kimberley, Northern Cape Province, South Africa. *Wuppertal Zoological Garden, Hubertusallee 30, 42117 Wuppertal, Germany.
- **Amyloidosis in Black-footed Cats (*Felis nigripes*).** Karen Terio (DVM, PhD), Nadine Lamberski (DVM), Timothy D. O'Brien (DVM, PhD), Linda Munson (DVM, PhD).
- **Olfactory Enrichment for the Black-footed Cat, *Felis nigripes*.** Deborah Wells, Justin Egli.

Action Plan

The main focuses for the coming year include:

- Update the breeding and transfer master plan through the AZA Population Management Center in 2007;
- Encourage breeding in all unrelated black-footed cats in North America;
- Import new founders from Africa;
- Continue research into stress-related amyloidosis;
- Identify conservation partners in South Africa, Botswana and Namibia;
- Initiate *in situ* conservation partnerships in range countries.

Cheetah SSP

Jack Grisham, Coordinator, Smithsonian's National Zoological Park

The Cheetah SSP held a mid-year meeting from March 16 – 18, 2007 at the Saint Louis Zoo. All members of the Management Group attended the workshop. The current cheetah population in North America is 120.131 (251) in 54 facilities, this does not include 6.9 (15) education animals. One of the primary goals of the meeting was to meet the institutional needs of facilities needing animals immediately (Kansas City and Hogle Zoos). Animals that were too young to be placed at the 2006 Master Plan were identified by the Management Group to be sent to these two facilities as soon as possible. Additionally recommendations to meet the needs from several other zoos were addressed. All recommended moves from the previous Master Plan were reviewed and a couple of additional suggested breeding were made. Prior to the meeting the needs of all institutions were updated via the two cheetah listserv (Management and IR).

Presentations were made by Sally Boutelle, Saint Louis Zoo and AZA Wildlife Contraception Center, discussing the current contraceptives used in felids, especially cheetahs. Sally will be writing up a section on contraception for both the Cheetah SSP Husbandry manual and AZA Standardized Guidelines.

Adrienne Crossier and Craig Saffoe gave a brief overview of the new cheetah facility at the National Zoo's Conservation and Research Center in Front Royal. Crossier also gave an update on her cheetah research and presented a proposal for use of Namibian cheetah semen in a research project. This proposal will be reviewed by the Management Group.

Discussion was also held on a request from the Pittsburgh Zoo to become a possible regional cheetah breeding center in the future. This also will be reviewed by the Management Group.

A proposal from Bobby Hartslief, Savannah Cheetah Foundation, South Africa for the Cheetah SSP to endorse his proposal to release captive born cheetahs in to the wild. Animals would be habituated to catching prey by being fed live goats. Concern was raised over the use of goats (since goats live in the area of the suggested release site) and expertise in release program. The SSP felt it could not endorse the current project and will write Mr. Hartslief with our reasons for not supporting the project.

Once again the possibility of a cheetah keeper husbandry course was brought up. It was decided to see how the current Felid TAG large cat husbandry worked in Nashville. If it was successful and enough members of the Management Group came forth willing to assist, then we may do it in winter 2008. If we do decide to hold it, it may be immediately after the cheetah master plan in 2008. The Cheetah SSP keeper listserv will be moved to an AZA listserv and will be moderated by Craig Saffoe. Currently the keeper listserv is held on Yahoo and only has 17 members.

Jack Grisham gave an update on the AZA Standardized Guidelines and there has been progress. All new chapters for the husbandry manual have been added. Randy Junge, SSP Vet Advisor, stated that the veterinary and reproductive advisors will be meeting later this year to update all their protocols. Grisham stated that the deadline for submission of Standardized Guidelines is

July 1, 2007. All members of the Management Group and attendees were given copies and asked to comment.

Karen Meeks led a review of six chapters of the new revised cheetah SSP husbandry manual. Ellen Dierenfeld presented the revised nutrition chapter and a body scoring sheet for all to comment. The body scoring sheet was used on the cheetahs at Saint Louis Zoo and comments and suggestions given to Dr. Dierenfeld at the same time. The goal for the husbandry manual is to be completed by Fall 2007 and will be posted on the Cheetah SSP website. It will also be sent electronically to all IR's.

Dusty Lombardi gave an update of the linking *in situ* and *ex situ* cheetah conservation programs. All members of the Management Group were to contact their liaison zoos and ask them to respond to Dusty as soon as possible to update this data base.

A lengthy review of the use of large cats as program animals was led by John Dinon. He discussed the use of cheetahs in education/programs and the recent meeting held by AZA. Great discussion was held and the results of this meeting of the AZA Large Felid Task Force will be reviewed by the AZA Felid TAG at their meeting in Nashville in April.

Dr. Crosier gave an overview of the Cheetah SSP Biomaterials Action Plan. The program 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 Crosier and Junge, as well as the Management Group and Advisors. The Cheetah SSP is one of four programs currently being developed by the group.

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

Clouded Leopard SSP

The Clouded Leopard SSP report can be found in the Tropical Asian Felids section (pp. 27-29).

Fishing Cat SSP

The Fishing Cat SSP report can be found in the Tropical Asian Felids section (pp. 29-33).

Lion SSP

Tarren Wagener, Coordinator, Fort Worth Zoo

The status of the Lion SSP population is 115 (50.63.2) pedigreed lions at 39 institutions. The non-pedigreed population is 313 lions (127.186) in 100 institutions. A registry is maintained by

Annabel Ross, Fort Worth Zoo Registrar (records@fortworthzoo.org) tracks these non-pedigreed cats. In January, the formal 2006-2007 Draft Population Analysis and Breeding Plan was completed and posted on the AZA website. The final recommendations will be completed by May 2007.

Management of the population is complex. As reported, the generic lion population consists of more than 300 cats and thus far outnumbers the pedigreed cats. These cats are not recommended for breeding and are slowly disappearing from AZA institutions due to attrition. As these cats age, institutions seek pedigreed cats for future breeding. Therefore, the SSP is challenged to maintain a delicate balance between these two populations to fill exhibit space, meet institutional needs, and also meet our genetic goals. Unfortunately, we suffered several years of lower than expected reproductive rates from 2000-2003, yet our institutional needs remained, and therefore the number of pedigreed cats available from within the SSP pales in comparison to the institutional need.

Since the institutional needs remain so high, and the supply of pedigreed cats so low, the current recommendations include an aggressive strategy to optimize breeding success. The primary strategy is as follows: In cases where compatible pairs have bred previously, those same cats are recommended for breeding again this year at the same institution. Since we know that these cats have bred in the past, we are capitalizing on the likelihood that they will produce cubs again. In addition, some cats towards the bottom of the mean kinship list are also recommended for breeding. Or, in other cases, cats with relatively high mean kinships are recommended for breeding with cats with low mean kinships. These recommended pairings are not jeopardizing our genetic diversity (97% and holding for the past several years) and will allow us to meet the extremely high institutional need for animals in the short term. Please refer to the Management Strategy section in the draft for a complete understanding of the strategies used in the development of these recommendations, and the priorities used in placement of pedigreed cats. These aggressive strategies have yielded significant growth within the population over the past two years. To continue to meet our population and institutional goals, the most recent recommendations include 28 pairings and 19 transfers.

AZA has delineated lions as a priority species for the standardized guidelines project, and therefore SSP members are also working on completing these standards. A core committee of the management group consisting of Joe Christman (Disney's Animal Kingdom), Lisa New (Knoxville Zoo), Bill Gersonde (Tautphaus Zoo) and Adam Stone (Zoo Atlanta) are leading this effort which will soon be expanded to the entire management group and the advisors.

Reproductive research efforts are coordinated by the SSP Reproductive Advisor Dr. Buddha Pukazhenthhi (Smithsonian) and are measuring fecal hormones and reproductive status in numerous pairs throughout the SSP. Cats are strategically selected for this study based on age, reproductive status and presence (or absence) of on-going issues. An additional study is in the development phase by a graduate student working with Drs. Pukazhenthhi and Brown (Smithsonian) to examine the environment and management of cats at both successful and unsuccessful institutions.

Ocelot SSP

Ken Kaemmerer, Coordinator, Dallas Zoo

Captive Population

Nanette Bragin, Ocelot studbook keeper, reported that the current studbook contained 111 generic ocelots (56.54) in 44 institutions which is down by 8 from last year. However, only 81 (39.42) are from AZA institutions and can be used in the analytical population for reproductive master planning. From 1 January 2006 to present, there have been 2 births (1.1) and 7 deaths (4.3) of generic ocelots.

With Brazilian ocelots, *Leopardus pardalis mitis*, 24 (15.9) live in 12 institutions which has increased from 19 in 8 institutions last year. There have been 2 births (2.0) and no deaths since 1 January 2006.

Although a Master Plan did not get published last year, a number of recommended pairings and transfers were made. A Master Plan will be published for review by July 2007.

Brazilian Ocelot Consortium

After more than two years of trying to import ocelots out of Brazil, we finally had a break-thru and received export permits from IBAMA of Brazil. On 3 August 2006, Bill Swanson personally escorted 2.2 Brazilian ocelots through customs on the way to Cleveland Metroparks Zoo. These are unrelated founder animals. After finishing quarantine, 1.1 moved on to Okalahoma City Zoo. The Cleveland animals have been introduced and the Oklahoma animals are in the process. Thanks go to Bill Swanson for all his efforts to facilitate this importation. We are now in the permit-writing process for the next two pair to be imported for BOC members Caribbean Gardens in Naples, FL and Salisbury Zoo in Virginia.

U.S. Fish and Wildlife Service Ocelot Recovery Team and Plan

The USFWS Ocelot Recovery Team last met in November 2005 and had hoped to have the Recovery Plan ready for public review by Fall 2006, but the Plan is still mired in the Service's review process. Hopefully the Plan will be available for review this Fall 2007.

Research

Last year, I described research to develop the methodology for an experimental Mexican ocelot translocation. The idea was that developing the methodology for translocations is easier and faster in Mexico since there is not the bureaucracy involved with an endangered species in the U.S. and the results can be applicable to any future translocations to or within the U.S. Last year, the Dallas Zoo, a Mexican NGO, Pronatura Noreste, and Mexican field biologist, Arturo Caso, surveyed private ranches in NE Mexico for the presence of ocelots and selected one ranch that would be suitable for an experimental translocation of ocelots within Mexico. The owner was supportive; the ranch historically had ocelots but did not now; there was good and plentiful ocelot habitat; and it was located on a peninsula which would make monitoring of released ocelots easier. In Summer 2006, to systematically assess the ranch, we conducted research to assess the presence of all carnivores on the ranch through a systematic camera trap survey. We

also did a habitat assessment of designated ocelot typical habitat with measurements of density of cover, and a small mammal prey survey over all seasons. The plan was that if these preliminary results were favorable, then 1.2 young adults would be captured from a ranch further west, their health assessed, and then radio-collared, “soft-released” onto the ranch and monitored continuously. To date, after three field sessions and 3.5 months of camera-trapping the only carnivores photographed were bobcats and coyotes. The most recent six-day rodent trapping survey resulted in 174 specimens of 6 species, and for comparison the same type of survey was done one week later in known ocelot habitat at Laguna Atascosa National Wildlife Reserve in S. Texas which resulted in 114 specimens of 9 species. However, an unforeseen development of a concrete plant being constructed on the ranch resulting in severe clearing and habitat disturbance, has forced us to abandon this site for an experimental translocation. We will survey other Mexican ranches and hope to select another by the end of the year, although we will have to repeat our preparatory studies.

Education

The only internationally accessible public education program with the ocelot as its primary focus is “The Ocelot Experience” which was developed by the Dallas Zoo and may be accessed at www.dallaszooed.com. This interactive bilingual web-based program about the ocelot was developed to address school systems and regional cultures specific to northern Mexico, south Texas, and other areas where ocelots occur or may be introduced. This website adds an educational component to conservation work with ocelots and was created to help raise the awareness of its endangered status, and to encourage action in protecting the ocelot. The targeted audience for the website is 4th through 6th grade students with either English or Spanish as the primary language; the opening page allows viewers to switch to either language. The website contains basic information on the natural history and conservation status of the ocelot, as well as an interactive demonstration of field research. Interactive components include a matching game and a section allowing viewers to paint line drawings of ocelots and other wildlife in assorted colors and then print them off. The website encourages students to become field researchers and to utilize math, science, reading, and geography skills. The education components were designed to meet Texas State Education and National Science standards. The new web program also provides a mechanism to evaluate its effectiveness via a pre- and post-experience quiz. Anyone interested in ocelots is encouraged to make use of this educational resource.

Stacy McReynolds from the San Antonio Zoo is the Education Advisor. The education needs of the SSP are being evaluated and any input is appreciated. Contact Stacy at: McReynolds@sazoo-aq.org.

Dr. Danelle Okeson from the Cheyenne Mountain Zoo is the Veterinary Advisor.

Dr. Bill Swanson from the Cincinnati Zoo is the Reproductive Advisor.

Ken Kaemmerer, Dallas Zoo kkaemme@mail.ci.dallas.tx.us 214-671-0778

Pallas' Cat SSP

Martha Caron, Coordinator, Minnesota Zoo

A meeting of the Pallas' Cat SSP was held in conjunction with the mid-year Felid TAG meeting in Nashville, TN on April 11, 2007. The current demographic and genetic status of the SSP population was reviewed. As of March 2007, the SSP population consisted of 37 cats (16.21) in 14 soon to be 15 institutions. A list of several potential new/past holding institutions has been compiled. In the past year there were 7 (2.3.2) kittens born in two litters, with only one of those kittens surviving. 2006 included the deaths of 9 (3.4.2) cats including the previously mentioned neonatal deaths for a net loss of two cats. The current population is based on 15 founders. Genetic diversity currently retained is .9137 with the potential to increase to .9480 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 genetically valuable animals, some minimal inbreeding has had to be allowed to increase the available pairings. Genetic comparative study of the original founder population is currently underway at the National Cancer Institute to confirm true relationships among the original animals to determine the true level of inbreeding present within the current population. Founder genome equivalents currently represented in the population are relatively low at 5.79 but have the potential to increase to 9.61 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 age limit for breeding over the next two years and every effort will be made to breed these females and capture their genes prior to their pending reproductive senescence.

Breeding recommendations for 2007 were increased 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 and 2006 and our need to fill potential exhibits and continue to maintain a balanced age structure within the population. A total of 10 breeding recommendations were made this year. Birth season in Pallas' cats is generally late March-early June. We had one litter born from a recommended pairing in late February 2007 which did not survive. It was the first Pallas' cat litter to have ever recorded a birth in February in the studbook. We are currently hopeful of up to six other pregnancies from these recommendations, one of which is confirmed. This is the female who had a litter last year. She is seropositive for *Toxoplasma* and all but one of her kittens died last year. She will be the oldest dam to give birth in the North American population and the second oldest to give birth in the world. Her kittens will be cross-fostered on to a disease-free domestic dam this year with the hopes that toxoplasmosis and hand-rearing complications can be avoided. A new toxo treatment protocol is also being utilized with the hopes that it will improve on the previous preventative protocol.

An update on the Pallas' Cat Conservation Project, an *in situ* research project studying wild Pallas' cats in Mongolia, was provided by Dr. Bill Swanson. This is an exciting and continually expanding project. Current aspects are continuing to study the disease susceptibility of the wild population, continued radio telemetry tracking of 15 individual wild specimens, and a 3-year natural history study of the species looking at population status, behavior, range use, breeding and the potential for extinction in this wild population will be wrapping up at the end of 2007. A

study on the broad use of rodenticide by the Mongolian government to control the rodent population and its effects on carnivores and scavengers of these rodents including Pallas cats was completed. Bill's report at this meeting was a detailed commentary on the three weeks that he spent with the project in February 2007. He went over to study the reproductive seasonality and physiology of male Pallas' cats and if possible to collect sperm to freeze and bring back as future potential founders to the captive population here in North America. Over the course of four days, all six currently radio-collared males were recaptured by first fixing their general locations with radiotelemetry and then physically finding and restraining them. In most cases, the cats began running as soon as the team approached and disappeared into marmot burrows, requiring 30-60 minutes of strenuous digging for recapture.

Blood samples and excellent quality semen were obtained from each male, frozen for storage in a liquid nitrogen tank and subsequently imported into the U.S. From the six males, 85 semen straws were frozen, each containing one to two million motile spermatozoa. These will potentially provide new founders to the captive population as soon as we can get embryo transfer techniques and/or artificial insemination techniques working sufficiently in this species.

Interestingly, two of the six males had serum antibodies to FIV, indicating prior exposure to this virus in the wild. One of the FIV positive males, unfortunately, had suffered traumatic amputation of both left front and rear paws a few days earlier, likely caused by a leg-hold trap set by poachers or herders to ensnare wolves, and is unlikely to survive the winter. The other FIV positive cat and a third non-infected male had facial or limb injuries, possibly resulting from fights with other males seeking to establish or defend breeding territories and presumably one of the main avenues for spread of FIV. Undoubtedly, it is a tough life being a Pallas' cat, especially during a Mongolian winter. Anesthesia and recovery of each male was uneventful and all were released back into the wild within a few hours of their initial capture.

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 Pallas' cat plush has also been produced by K & M Concessions and is available for order by other Pallas' cat institutions. 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.

Bill Swanson shared an update on reproduction and toxoplasmosis in Pallas' cats including his previous work with diclazuril as a preventative and a new protocol they are experimenting with using injectable clindimycin. Please contact Bill Swanson for the details of this protocol. It is yet to be seen whether it will prevent the transfer of *Toxoplasma* from mother to offspring in utero. The consensus was that the best way to prevent toxo transfer to kittens is to keep breeding females toxo free. He did report a confirmed pregnancy in his nine year old female who is due on May 8th. She is toxo positive and has lost all but one kitten from two litters over the past two years, mostly due to toxoplasmosis so her offspring will be cross-fostered this year with the hopes of keeping them alive.

The meeting was wrapped up with a presentation by Martha Caron, SSP Coordinator, on a possible 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 Small Population Management Advisory Group of the Association of Zoos and Aquariums.

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 supplemental institutions are included. The analysis/comparison between the AZA alone population vs. the AZA and collaborators population is included at the end of this summary.

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 these other institution's animals could be included in the managed population until such time as 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 of benefit 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 cooperate.

The final decision was to hold off on making a recommendation to the Felid TAG steering committee until the end of the birth season for Pallas' cats in late June. At that time, a reassessment will be made based on the litters that are born into the AZA holding institutions this spring. If few litters are produced or infant mortality is fairly high as it has been over the last two years, the decision will be made to make a recommendation to the Steering Committee to change the Pallas' Cat SSP to a PMP. 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.

Appendix 1

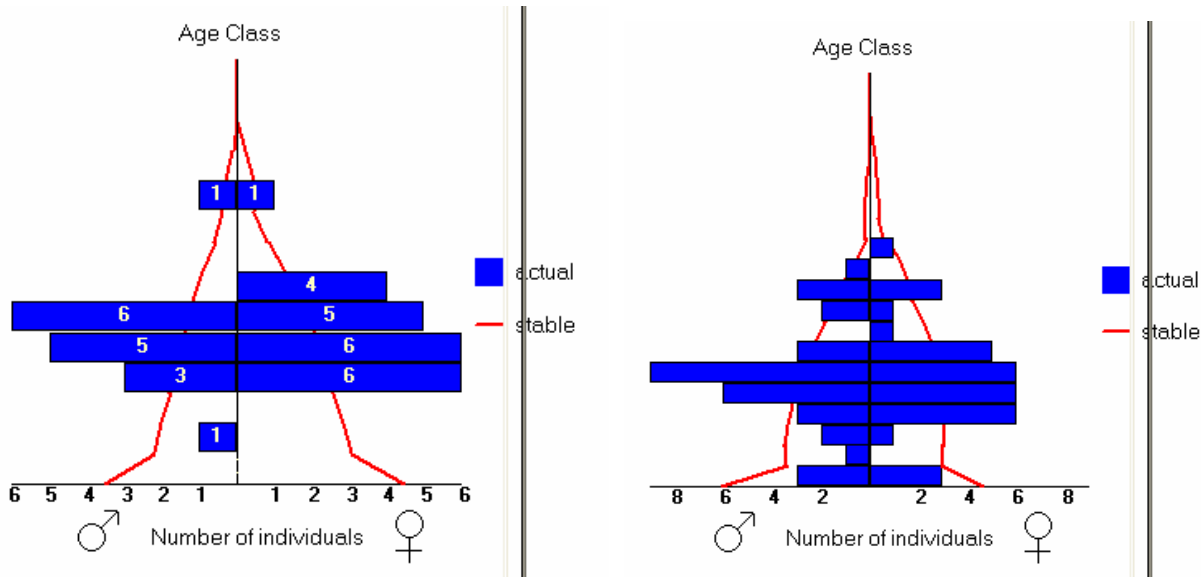
Comparative Demographic Summary Table

	AZA Alone	AZA and Collaborators
Current size of managed population	38 (22.16)	66 (33.33)
# of institutions	14 (soon to be 15)	18 (soon to be 19)
# specimens excluded from management	2.2	2.2
Mean generation time	4.40	4.95
Projected pop. growth	.9354	.946
# Births through 3/2007	7 (2.3.2), 1 surviving	20 (2.3.15), 7 survive
# Deaths through 3/2007	9(3.4.2) including neonatals above	16 (3.4.9) including neonatals above
30-day Mortality	41.8%	49.7%

Comparative Genetic Summary Table

	AZA Alone		AZA and Collaborators	
	Current	Potential	Current	Potential
# Founders	15	0 addt.	24	0 addt.
Founder Genome Equiv.	5.79	9.61	8.34	15.75
Founder Genome Surviving	9.61	9.61	15.75	15.75
Gene diversity retained	.9137	.9480	.9401	.9683
Pop. Mean Kinship	.0897	----	.0599	----
Mean Inbreeding	0.000	0.000	0.006	0.000
Ne/N	.2105	----	.2084	----
% pedigree known	100%	----	100%	----

Comparative Age Pyramids



Comparative ZOORisk Analysis

	Extinction Risk w/in 100 years	Gene Diversity at 100 years	Mean Inbreeding at 50 years	Extinction Risk w/in 50 years
AZA Alone	Endangered (20-49% risk)	Endangered <75% 78% at 50 years	F=0.203	10%
AZA + Collaborators	Vulnerable (10-19% risk)	Vulnerable 75%<x<90% 87% at 50 years	F=0.16	3%

Amur Leopard PMP

Martha Caron, Population Manager, Minnesota Zoo

A meeting of the Amur Leopard PMP was held in conjunction with the mid-year Felid TAG meeting in Nashville, TN on April 11, 2007. The current demographic and genetic status of the PMP population was reviewed. As of March 2007, the PMP population consisted of 86 cats (44.42) in 39 institutions. In the past year there were 6 (1.5) cubs born, with 1.2 of those kittens surviving. 2006 included the deaths of 8 (2.6) cats including the previously mentioned neonatal

deaths for a net loss of three cats. The current population is based on 10 founders. Genetic diversity currently retained is .8508 with the potential to increase to .9136 without further importation or adding new founders of which there are only two others available within the European population. Mean inbreeding is currently 0.0932. Given the small founder base of this population, this level of inbreeding is not really all that bad. Founder genome equivalents currently represented in the population are low at 3.35 but have the potential to increase modestly to 5.78 with careful genetic management and breeding to more equally represent our present founder base.

Breeding recommendations for 2007 were limited due to an extreme space crunch within existing holding facilities. A total of 7 breeding recommendations were made this year with one of those pairs currently being with cubs which will preclude them from breeding again until probably fall at the earliest.

An update on the North American Amur Leopard field conservation initiative was provided by Dr. Ron Tilson. Dr. Tilson spent 2.5 weeks in the Russian Far East Amur Leopard region in October meeting with representatives of the conservation organizations making up the Amur Leopard and Tiger Alliance exploring what is currently being done for Amur leopard conservation and where the North American PMP might be able to contribute to these efforts. He toured the Lasovsky Nature Reserve which is an area in which leopards used to flourish and have since been extirpated. The area has been earmarked as a potential area for reintroduction of captive animals within the next 5-10 years. Ron will be returning to Russia in September for a meeting of all of the major players in the potential reintroduction effort. Concrete plans will be laid out at this time for the future of the project.

The Minnesota Zoo is currently in the process of importing a breeding pair of Amur leopards from Europe who will be genetically suitable to produce cubs that could be used in the reintroduction effort. Russian officials have made a requirement that all animals considered for reintroduction must be no more than 20% Founder 2 and both of the animals being imported will be less than 20% Founder 2. This is because it is believed that Founder 2 was not an Amur leopard but actually a North Chinese leopard. This import should be complete by Spring 2008. At least 1-2 more pairs will need to be imported to the North American population following this original import to enable the North American population to begin to be a major player in the reintroduction effort by producing cubs that are less than 20% Founder 2 and suitable for use by the project. If any institutions are interested in future imports, please let Martha Caron know.

The second half of the field conservation initiative is the fund-raising effort for conservation funds to support the remaining wild Amur leopard population from North American holding institutions. We have so far received funds for the project from the Minnesota Zoo, Utah's Hogle Zoo, Brookfield Zoo, Potawatomi Zoo and the Erie Zoo. Funds are desperately needed to increase anti-poaching efforts to protect the remaining population and to continue to expand fire fighting efforts to protect the remaining habitat available for these animals. A radio-tracking study is underway as is a grass-roots community education project. Donations can be sent to the Minnesota Zoo designated for Amur leopard conservation and they will be forwarded from here to the Amur Leopard and Tiger Alliance partners in the Russian Far East. So far, the North American field effort has raised just over \$40,000 and counting.

The meeting wrapped up with a plea for new holding institutions for this subspecies of leopard. The PMP is very restricted currently in its ability to meet its genetic and demographic goals due to lack of available space for moving animals. We are encouraging all institutions currently holding or considering holding generic leopards to switch to Amur leopards as their generic attrition. Amur leopards are the only subspecies of leopard recommended by the Field TAG's Regional Collection Plan for inclusion in AZA accredited institutions. Anyone interested in exhibiting these amazing and beautiful animals please contact Martha Caron, PMP Coordinator. Animals are immediately available for placement.

Serval PMP

Bonnie Breitbeil, Population Manager, Central Florida Zoological Park

Current Population: Servals are managed as a North American Regional Studbook and Population Management Plan (PMP). The current studbook population is: 82.86.0 (168) at 68 facilities. The current AZA PMP population is 57.58.0 (115) in 57 facilities. The first edition of the PMP was distributed on March 2, 2005. An updated studbook was sent to The Population Management Center in Chicago, IL in December of 2006 with a date set in July to work on the second edition of the PMP.

Changes in the Population: Since January 2006 there were 0 births, 1.3 (4) deaths, 1.1 (2) dispositions out of the studbook population and 3.3.0(6) acquisitions into studbook population. All of these acquisitions are founder animals that were imported from South Africa. With the addition of these servals, the PMP is on its way to achieving the original goal of adding 4 founders every 10 years to increase genetic diversity!

Special note: A number of facilities have contacted me regarding the desire for program animals. Currently zoos are going outside the AZA population to fill this need. I will be addressing this subject when reviewing the population to develop the second edition of the PMP.

Puma Studbook/PMP

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

Living Population is 56.82 (138)

Target Population is 130.

In the past year, we have only **had 3 reported deaths**: a 19 year old female, a wild caught cub who was found unhealthy and was euthanized and a cub who died as a result of an enrichment device accident.

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

Last year 11 orphans found homes in our facilities, this year **11.6 (17) orphans** from 4 states (WY - 6, SD - 5, WA - 3 and ID – 3) were placed.

No orphans were turned away.

Two zoos have requested cubs in the upcoming year.

Remember that was 17 placements and only 3 deaths. Obviously, several zoos opened new North America exhibits this year.

Of our 138 cats, 26 (9.17) are 10 years of age or less, intact, and of known origin – wild caught. These are residing in 14 different institutions. Only four zoos hold unrelated cats, and only one has different sex cats (one or both of these may be neutered soon for use in education programs). In addition, there are **40 cougars that are 15 years of age or over** in the population. If you have an aging cat in a space that will remain a cougar space after their 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.

So if you anticipate a need for cougar cubs in the next couple of years, please contact me to be put on my waiting list. This list facilitates quick placement of 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 **will potentially have 40 spaces requiring cougar cubs in the next 5 years.**

I would like to thank Omaha for holding a cub during the permitting process for the Toronto Zoo and I'd like to encourage other facilities with holding space available for a 3-6 month time period to step up and offer to hold cubs in similar situations.

2007 Felid TAG Participants

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