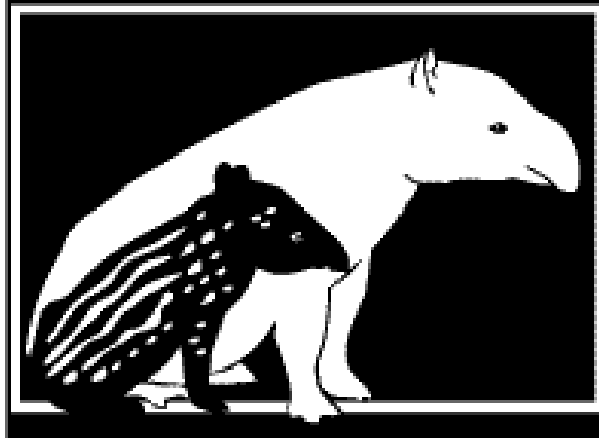


Fourth International Tapir Symposium

**XCARET, Quintana Roo, Mexico
April 26 - May 1st, 2008**

TAPIR SYMPOSIUM



BOOK OF ABSTRACTS

ORGANIZERS

IUCN/SSC Tapir Specialist Group (TSG)

Parque XCARET, Mexico

Association of Zoos & Aquariums (AZA) Tapir Taxon Advisory Group (TAG)

European Association of Zoos & Aquaria (EAZA) Tapir Taxon Advisory Group (TAG)

PLANNING COMMITTEE

Patrícia Medici

Research Coordinator, Lowland Tapir Conservation Initiative, Brazil

IPÊ - Institute for Ecological Research

Chair, IUCN/SSC Tapir Specialist Group (TSG)

Convener, IUCN/SSC Conservation Breeding Specialist Group (CBSG) - Brazil

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Member, IUCN/SSC Tapir Specialist Group (TSG)

Alan Shoemaker

Red List Focal Point, IUCN/SSC Tapir Specialist Group (TSG)

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Manager of Interactive Marketing, Web Communications Department

Houston Zoo Inc., United States

Co-Coordinator, Marketing & Education Committee, IUCN/SSC Tapir Specialist Group (TSG)

Gilia Angell

Senior Designer, Amazon.com

Co-Coordinator, Marketing & Education, IUCN/SSC Tapir Specialist Group (TSG)

Webmaster, TSG www.tapirs.org

INSTITUTIONAL SUPPORT

Association of Zoos & Aquariums (AZA) Tapir Taxon Advisory Group (TAG)

Copenhagen Zoo, Denmark

European Association of Zoos & Aquaria (EAZA) Tapir Taxon Advisory Group (TAG)

Houston Zoo Inc., United States

IPÊ - Instituto de Pesquisas Ecológicas (Institute for Ecological Research), Brazil

IUCN/SSC Conservation Breeding Specialist Group (CBSG) - Brasil & Europe

IUCN/SSC Tapir Specialist Group (TSG)

Parque XCARET, Mexico

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TSG Conservation Fund (TSGCF)
Twycross Zoo, United Kingdom
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Connecticut's Beardsley Zoo Conservation Fund, United States
Copenhagen Zoo, Denmark
Department of Wildlife and National Parks (DWNP), Malaysia
East Tennessee State University, United States
El Colegio de la Frontera Sur (ECOSUR), Mexico
Escuela de Ciencias Biológicas, Universidad Nacional de Costa Rica, Costa Rica
Escuela de Gestión Ambiental de la Universidad Técnica Particular de Loja, Ecuador
Faculdade de Ciências, Universidade de Lisboa, Portugal
Fundación Ecuatoriana de Estudios Ecológicos - EcoCiencia, Ecuador
Fundación Temaikén, Argentina
Houston Zoo Inc., United States
Howletts Wild Animal Park, United Kingdom
Instituto de Ecología, UNAM, Mexico
Instituto de Historia Natural y Ecología, Mexico
International Fund for Animal Welfare (IFAW), United States
IPÊ - Instituto de Pesquisas Ecológicas (Institute for Ecological Research), Brazil
IUCN South America Regional Office, Ecuador
IUCN Species Programme, Switzerland
Kwata Association, French Guiana
León Zoo, Mexico
McGill University, Canada
Nashville Zoo at Grassmere, United States
Parque Municipal Summit, Republic of Panama
Parque XCARET, Mexico
Pronatura Península de Yucatán, Mexico

Rafiki Safari Lodge, Costa Rica
Reserva Ecologica El Eden, Mexico
San Diego Zoo, United States
San Francisco Zoo, United States
Singapore Zoological Gardens, Singapore
Sistema Nacional de Áreas de Conservación, Ministerio del Ambiente y Energía (MINAE),
Costa Rica
Smithsonian National Zoological Park, United States
The Nature Conservancy - Mexico
Universidad de Pamplona, Colombia
Universidad Nacional de Colombia (UNAL), Colombia
University of Texas at Austin, United States
U.S. Fish & Wildlife Service, United States
Virginia Zoological Gardens, United States
Woodland Park Zoo, United States
Zoologico de San Juan de Aragón, Mexico

PROGRAM

Saturday, April 26

- 11:00-18:00 **Arrival and Registration**
- 19:00-22:00 **Opening Ceremony & Icebreaker (XCARET Aquarium)**

Sunday, April 27

- 09:00-10:30 KEYNOTE SPEAKER**
The IUCN Species Survival Commission (SSC) and Species Programme
Dena Cator
SSC Network Support Officer
IUCN - The International Union for the Conservation of Nature, Switzerland

INTRODUCTION: Dena Cator is the SSC Network Support Officer in the Species Programme at IUCN - The International Union for Conservation of Nature, based in Geneva, Switzerland. Her position is to support the more than 100 Specialist Groups and their Chairs that comprise the Species Survival Commission (SSC), a science-based network of more than 7,500 volunteer experts that implement species conservation initiatives globally. On a daily basis, she works on activities such as supporting Specialist Group Chairs in their work, fundraising for Specialist Groups and the IUCN Species Programme (which supports the SSC), producing communications and publication materials, liaising with other IUCN regional offices and conservation organizations as well as representing IUCN and SSC at international fora such as CITES and CBD. Dena has worked for the past 15 years as a biologist, researcher and land use planner both in Canada, her home country, and overseas in areas such as Latin America, Asia and southern Africa. Her love of wildlife and interest in conservation has led her to conduct fieldwork on birds, small mammals, ungulates and plants in a variety of environments. Previous to this position, she worked for IUCN's Forest Conservation Programme and for the Premier's Office of British Columbia developing a new strategic land use planning program for the province in collaboration with First Nations indigenous groups. Dena has a B.Sc. in Biology and Geography from the University of Victoria (with a focus on journalism) and an M.Sc. in Environment and Development from the London School of Economics and Political Science.

- 10:30-11:10 PAPER SESSION 1: Tapir Captive and Reproductive Management**
Session Moderator: Alberto Mendoza

- 10:30-10:50 **Biomedical Survey of Baird's Tapir (*Tapirus bairdii*) in Captivity in Panama**
Budhan S. Pukazhenth
Smithsonian's National Zoological Park, Conservation & Research Center, USA
Member, IUCN/SSC Tapir Specialist Group (TSG)

- 10:50-11:10 **Seminal Traits in the Baird's Tapir (*Tapirus bairdii*) Following Electroejaculation**
Budhan S. Pukazhenth
Smithsonian's National Zoological Park, Conservation & Research Center, USA
Member, IUCN/SSC Tapir Specialist Group (TSG)

- 11:10-11:30 COFFEE BREAK**

- 15:20-15:40 **Capture, Handling and Monitoring of Wild Tapirs in the Zoque Rainforest, Oaxaca, Mexico**
Iván Lira-Torres
Zoologico de San Juan de Aragón, Mexico
Member, IUCN/SSC Tapir Specialist Group (TSG)
- 15:40-16:00 **Baird's Tapir Reintroduction at Rafiki Safari Lodge, Costa Rica**
Lautjie Boshoff & Polly Underdown
Rafiki Safari Lodge, Costa Rica
- 16:00-16:30 COFFEE BREAK & POSTER SESSION**
- 16:30-18:10 PAPER SESSION 4: Tapir Conservation Initiatives: Research, Management & Education (Part 2)**
Session Moderator: Kendra Bauer
- 16:30-16:50 **Ecology and Conservation of Mountain Tapir in a Cattle Ranching Environment**
Diego J. Lizcano
Grupo de Ecología y Biogeografía, Universidad de Pamplona, Colombia
Species Coordinator, Mountain Tapir, IUCN/SSC Tapir Specialist Group (TSG)
- 16:50-17:10 **Movement Patterns and Home Range Use of Lowland Tapirs (*Tapirus terrestris*) in the Peruvian Amazon**
Mathias W. Tobler
Andes to Amazon Biodiversity Program / Botanical Research Institute of Texas, USA
Manager, Virtual Library, IUCN/SSC Tapir Specialist Group (TSG)
- 17:10-17:30 **Distribution Patterns of Capture Places of Tapir (*Tapirus terrestris*) based on Traditional Knowledge of the Andoque and Nonuya Indigenous Communities and the Settlement of Puerto Santander-Araracuara, Colombian Amazon**
Adriana Sarmiento Dueñas
Member, IUCN/SSC Tapir Specialist Group (TSG)
- 17:30-17:50 **Population Estimates of Malay Tapir, *Tapirus indicus*, by Camera Trapping in Krau Wildlife Reserve, Malaysia**
Carl Traeholt
Copenhagen Zoo, Denmark / Department of Wildlife and National Parks, Malaysia
Species Coordinator, Malayan Tapir, IUCN/SSC Tapir Specialist Group (TSG)
- 17:50-18:10 **Felipe, the Conservation Messenger in Quijos Watershed, Ecuador: Using the Tapir as an Environmental Education Tool**
Alejandra Paredes
Fundación Ecuatoriana de Estudios Ecológicos-EcoCiencia, Ecuador
- 18:10-19:10 PAPER SESSION 5: Tapir Action Planning and Identification of Priority Areas**
Session Moderator: Diego J. Lizcano
- 18:10-18:30 **Update and Results of the National Program for Tapir Conservation in Colombia**
Juliana Rodríguez-Ortiz
Instituto de Ciencias Naturales, Universidad Nacional de Colombia
Country Coordinator, Colombia, IUCN/SSC Tapir Specialist Group (TSG)

- 18:30-18:50 **National Strategy for the Conservation of Tapirs in Ecuador (*Tapirus terrestris*, *Tapirus pinchaque*)**
Fernando Nogales
Universidad Técnica Particular de Loja, Escuela de Gestión Ambiental, Ecuador
Country Coordinator, Ecuador, IUCN/SSC Tapir Specialist Group (TSG)
- 18:50-19:10 **A Systematic Approach to Identify Priority Areas for Mountain Tapir in the Northern Andes of Colombia**
Carlos A. Pedraza
Department of Biological Sciences, Universidad de los Andes, Colombia
Member, IUCN/SSC Tapir Specialist Group (TSG)

Monday, April 28

- 09:00-10:00 KEYNOTE SPEAKER**
Improving your Game: 10 Steps to Becoming a Tapir Conservation Guru
Jeffrey Flocken
Director of Washington DC Office, International Fund for Animal Welfare (IFAW), USA
Member, IUCN/SSC Tapir Specialist Group (TSG)

INTRODUCTION: Mr. Flocken is the DC Office Director for the International Fund for Animal Welfare where he leads the organization's team of legislative professionals advocating for U.S. policy initiatives on behalf of wildlife conservation and animal welfare. Before this appointment, Mr. Flocken worked for five years as an International Affairs Specialist in the U.S. Fish & Wildlife Service's Division of International Conservation, where he focused on international species conservation policy, outreach, and global conservation grant programs. Prior to joining the Service, he worked as an Education, Policy and Outreach Director for Conservation International. He has a law degree from Wayne State University, and graduated with honors from the University of Michigan. Before working at Conservation International, Mr. Flocken created and managed the leading national endangered species conservation campaign for the United States' largest conservation organization, National Wildlife Federation. In this capacity he worked on national and regional endangered species policy, orchestrated species conservation initiatives across North America, and developed award winning educational and outreach materials on the need for endangered species conservation. Additionally, Mr. Flocken has worked with the general counsel at Greenpeace, USA; edited for the scholarly publication, *The Yearbook of International Environmental Law*, and served as a toxics policy specialist negotiating for higher water-quality standards in the Great Lakes watershed region. Mr. Flocken has served as a consultant on numerous movies and television shows addressing endangered species topics and his publications include *The Keep the Wild Alive Booklet*, *The Endangered Cats of North America Report*, the *Investigate Biodiversity* website, the *Wildlife Without Borders* website, and an article in *Michigan Today* magazine entitled "Confessions of a Cautiously Optimistic Endangered Species Conservationist." Mr. Flocken is also the founder and Board Chair of the Emerging Wildlife Conservation Leaders initiative which mentors and provides campaign training for up-and-coming leaders in the wildlife field.

- 10:00-11:00 REPORTS: TSG Committees & Taskforces (Part 1)**
Session Moderator: Gilia Angell
- 10:00-10:20 **Genetics Committee**
Anders Gonçalves da Silva
University of British Columbia Okanagan, Canada
Coordinator, TSG Genetics Committee
- 10:20-10:40 **Zoos Committee**
Viviana B. Quse
Senior Veterinarian, Fundación Temaikén, Argentina
Coordinator, TSG Zoo Committee
- 10:40-11:00 **Tapir Re-Introduction and Translocation Taskforce**
Patrícia Medici
Research Coordinator, Lowland Tapir Conservation Initiative
IPÊ - Instituto de Pesquisas Ecológicas, Brazil
Chair, IUCN/SSC Tapir Specialist Group (TSG)
Coordinator, TSG Re-Introduction & Translocation Taskforce

- 11:00-11:20** **COFFEE BREAK & POSTER SESSION**
- 11:20-13:00** **REPORTS: TSG Committees & Taskforces (Part 2)**
Session Moderator: Viviana B. Quse
- 11:20-11:40 **TSG Virtual Library**
Mathias Tobler
 Andes to Amazon Biodiversity Program / Botanical Research Institute of Texas, USA
 Manager, Virtual Library, IUCN/SSC Tapir Specialist Group (TSG)
- 11:40-12:00 **Marketing Committee & Website**
Gilia Angell
 Senior Designer, Amazon.com
 Coordinator, TSG Marketing Committee
 Webmaster, www.tapirs.org
- 12:00-12:20 **Fundraising Committee**
Patrícia Medici
 Research Coordinator, Lowland Tapir Conservation Initiative
 IPÊ - Instituto de Pesquisas Ecológicas, Brazil
 Chair, IUCN/SSC Tapir Specialist Group (TSG)
 Coordinator, TSG Re-Introduction & Translocation Taskforce
- 12:20-12:40 **Education & Outreach Committee**
Kelly Russo
 Manager of Interactive Marketing, Web Communications Department, Houston Zoo, USA
 Coordinator, TSG Education & Outreach Committee
- 12:40-13:00 **Tapir Red List 2008 & Global Mammal Assessment**
Alan Shoemaker
 Permit Advisor, AZA Tapir TAG
 Red List Authority, IUCN/SSC Tapir Specialist Group (TSG)
- 13:00-14:00** **LUNCH**
- 14:00-14:30** **SPECIAL PRESENTATION: Committing to Long-Term *In-Situ* Conservation through Building a Major Exhibit Focusing on Brazilian Species, Ecosystems and Cultures**
Richard Schwartz
 Director, Nashville Zoo, United States
- 14:30-16:00** **WORKSHOP 1 (Part 1): TSG Action Plan Implementation Taskforce**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)
- 16:00-16:30** **COFFEE BREAK & POSTER SESSION**
- 16:30-19:00** **WORKSHOP 1 (Part 2): TSG Action Plan Implementation Taskforce**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)

Tuesday, April 29

VISIT TO PARQUE XCARET

Wednesday, April 30

- 09:00-10:00** **WORKSHOP 1 (Part 3): TSG Action Plan Implementation Taskforce**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)
- 10:00-11:00** **WORKSHOP 2: Paleontology**
Moderator: Matthew Colbert
- 10:00-10:05 **Session Introduction**
Matthew Colbert
High-Resolution X-ray CT Facility, University of Texas at Austin, USA
Evolutionary Consultant, IUCN/SSC Tapir Specialist Group (TSG)
- 10:05-10:20 **Presentation 1: New Fossil Discoveries and the Evolutionary History of Tapirus**
Matthew Colbert
High-Resolution X-ray CT Facility, University of Texas at Austin, USA
Evolutionary Consultant, IUCN/SSC Tapir Specialist Group (TSG)
- 10:20-10:30 **Questions & Discussions**
- 10:30-10:45 **Presentation 2: Intestinal Parasites of *Tapirus polkensis*, from the Gray Fossil Site, Tennessee**
Michael Zavada
Department of Biological Sciences and Center of Excellence in Paleontology
East Tennessee State University, USA
- 10:45-11:00 **Questions & Discussions**
- 11:00-11:30** **COFFEE BREAK & POSTER SESSION**
- 11:30-13:00** **ROUND-TABLE: Dealing with Permit Issues: Regulations for *In-Situ* and *Ex-Situ* Conservation**
Moderators: Alberto Mendoza & Alan Shoemaker
- 11:30-11:45 **Session Introduction: Breadth of Problems and Needs of Tapir Holders and Researchers**
Alberto Mendoza
Member, IUCN/SSC Tapir Specialist Group (TSG)
- 11:45-12:00 **Presentation 1: Scope of International Trade by European Zoos**
Bengt Holst
Director of Conservation and Science, Copenhagen Zoo, Denmark
Chair, EAZA Tapir Taxon Advisory Group (TAG)
Convener, IUCN/SSC Conservation Breeding Specialist Group (CBSG) - Europe
Member, IUCN/SSC Tapir Specialist Group (TSG)
- 12:00-12:15 **Presentation 2: Permitting Issues Impacting Applicants Involved with Captive Tapirs and Biosamples**
Alan Shoemaker
Permit Advisor, AZA Tapir TAG
Red List Authority, IUCN/SSC Tapir Specialist Group (TSG)

- 12:15-12:30 **Presentation 3: Future Needs and Potential for International Conservation Activities among Range Countries (COSTA RICA)**
José Joaquín Calvo Domingo
Head of CITES, Costa Rica
Member, IUCN/SSC Tapir Specialist Group (TSG)
- 12:30-12:45 **Presentation 4: Future Needs and Potential for International Conservation Activities among Range Countries (PANAMA)**
Jorge García
Head of CITES, Panama
- 12:45-13:00 **Presentation 5: The Importance of Becoming Involved in National, Regional and International Management Programs for Captive Tapirs Worldwide**
Alan Shoemaker
Permit Advisor, AZA Tapir TAG
Red List Authority, IUCN/SSC Tapir Specialist Group (TSG)
- 13:00-14:00 LUNCH**
- 14:00-16:00 WORKSHOP 3: Tapir Population Modeling**
Moderator: Anders Gonçalves da Silva
- 14:00-14:30 **Session Introduction: Modeling, VORTEX, and Tapir Baseline Models**
Anders Gonçalves da Silva
University of British Columbia Okanagan, Canada
Coordinator, TSG Genetics Committee
- 14:30-14:45 **Questions & Discussions**
- 14:45-15:00 **Study Case 1 - Presentation: Lowland Tapir Population Densities and Management Strategies in Ecuador**
Andrés Tapiá
Centro FÁTIMA, Ecuador
Member, IUCN/SSC Tapir Specialist Group (TSG)
- 15:00-15:15 **Study Case 2 - Presentation: Long-Term Impact of Road Kill on a Lowland Tapir Population in Morro do Diabo State Park, Atlantic Forest, Brazil**
Patrícia Medici
Research Coordinator, Lowland Tapir Conservation Initiative
IPÊ - Instituto de Pesquisas Ecológicas, Brazil
Chair, IUCN/SSC Tapir Specialist Group (TSG)
Coordinator, TSG Re-Introduction & Translocation Taskforce
- 15:15-15:30 **Study Case 3 - Presentation: Lowland Tapir X Habitat Loss X Hunting in Colombia**
Olga Lucía Montenegro
Instituto de Ciencias Naturales, Universidad Nacional de Colombia
Country Coordinator, Colombia, IUCN/SSC Tapir Specialist Group (TSG)
- 15:30-16:00 **Questions & Discussions**
- 16:00-16:30 COFFEE BREAK & POSTER SESSION**
- 16:30-19:00 WORKSHOP 4 (Part 1): TSG Strategic Planning 2008/2010**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)

Thursday, May 1st

- 09:00-11:00** **WORKSHOP 4 (Part 2): TSG Strategic Planning 2008/2010**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)
- 11:00-11:30** **COFFEE BREAK & POSTER SESSION**
- 11:30-13:00** **WORKSHOP 4 (Part 3): TSG Strategic Planning 2008/2010**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)
- 13:00-14:00** **LUNCH**
- 14:00-17:00** **WORKSHOP 4 (Part 4): TSG Strategic Planning 2008/2010**
Facilitators: Patrícia Medici (CBSG Brasil) & Bengt Holst (CBSG Europe)
- 17:00-18:00** **CLOSING SESSION & FINAL REMARKS**
- 20:00-00:00** **CLOSING PARTY**

Friday, May 2nd

Morning Departures

WORKSHOPS & ROUNDTABLES

WORKSHOP 1: TSG Action Plan Implementation Taskforce

Facilitators: Patrícia Medici & Bengt Holst

STEP 1: Introductory Presentations

The TSG Action Plan Implementation Taskforce: Background Information, Responsibilities & Challenges

Patrícia Medici, Taskforce Coordinator

Session Objectives, Goals, & Dynamics

Patrícia Medici & Bengt Holst

Regional Tapir Symposium in Malaysia (February 2008): The Revision of the Malayan Tapir Action Plan developed during the 2003 Malayan Tapir PHVA Workshop

Carl Traeholt, TSG Malayan Tapir Coordinator

STEP 2: Distribution of participants in WORKING GROUPS

We worked with six (6) different working groups and participants were requested to decide which group they wanted to be part of and work with:

- Baird's Tapir Action Plan
- Lowland Tapir Action Plan
- Malayan Tapir Action Plan
- Mountain Tapir Action Plan
- *Ex-Situ* Tapir Conservation (*ex-situ* actions from of all 4 action plans)
- Marketing, Communication & Website (actions from all 4 action plans)

STEP 3: Brief Review of the Species Action Plans: Goals and Actions

Each working group received a digital copy of their Species Action Plan and was requested to go through the document on a computer and answer the following questions:

- What actions have been implemented?
- What actions are in the process of implementation?
- What actions have become irrelevant, obsolete, no longer necessary, over the past years since the development of each specific action plan?

STEP 4: Necessary Changes, Updates, Additions

Each working group was requested to carry out the following tasks:

- Identify if the people/organizations responsible for the actions are still active in the tapir conservation arena. If not, please suggest alternative names to be responsible for the actions. Please provide contact information.
- Identify if there are any actions that need to be changed? Please justify.
- Identify if there are any actions that need to be updated? Please justify.
- Identify if there are any actions that need to be added? Please justify.
- Re-think deadlines and other related variables.
- Prepare a written report for the taskforce.
- Identify a member of the working group to be a focal person for the TSG Action Plan Implementation Taskforce.

STEP 5: Plenary - Preliminary Presentations

Each working group had 15 minutes to present the preliminary results of their discussions and deliberations.

STEP 6: Plenary - Final Presentation & Discussions

Background Information about the TSG Action Plan Implementation Taskforce

After the development of the new Tapir Action Plan, the IUCN/SSC Tapir Specialist Group (TSG) has made the decision to get actively involved in the implementation of the plan. All TSG members involved in the long, time-consuming process of development of the plan feel that a lot of energy and hard work was necessary to fundraise for and organize these PHVA workshops around the world. Therefore, the publication of this new Tapir Action Plan cannot be the end of the TSG's efforts.

To this end, the TSG has established an **Action Plan Implementation Taskforce**, which has an enormous responsibility, including:

- To promote the new Tapir Action Plan throughout all tapir range countries in Central and South America, and Southeast Asia, reaching all possible stakeholders and key conservation players;
- To promote the active use of the new Tapir Action Plan as the main guide and source of information for all organizations directly or indirectly involved with tapir conservation in the range countries;
- To lead a constant process of review, update and adaptation of the Tapir Action Plan, incorporating any evolving and emerging tapir conservation needs identified through this process. The TSG wants the new Tapir Action Plan to be a "living document" and this is one of the main reasons why the group decided not to print the plan. It will only be available online on the TSG website (in all appropriate languages);
- To provide technical assistance for any initiatives aiming to implementing actions of the Tapir Action Plan, including proposal development and fundraising, and political lobbying;
- To maintain the network of professionals and organizations formed during the process of organizing and holding the PHVA Workshops, including the persons who committed to put in practice all the actions listed as priorities;
- To keep in contact with the persons who committed to put in practice all the actions listed as priorities and make sure they work on their actions accordingly with proposed deadlines;
- To report back to the TSG membership on a regular basis.

The progress made in implementing the Tapir Action Plan will be evaluated during the International Tapir Symposium every three (3) years, where the general TSG audience will be updated on progress in conserving tapirs according to the plan.

On a final note, the Malayan Tapir Chapter of the new Tapir Action Plan (developed during the Malayan Tapir PHVA Workshop held in Malaysia in August 2003) has been reviewed and re-assessed during a Regional Tapir Symposium held in Malaysia in early April 2008. This is the very first step we are taking in terms of keeping the Tapir Action Plan constantly up to date.

WORKSHOP 2: Paleontology

Moderator: Matthew Colbert

Concept of this session: A general overview of the fossil record of tapirs, and what this record - which includes some remarkable fossil assemblages - reveals about patterns and process in the evolution of the group, about biogeography, and about ancient environments and paleoecology.

Goals of this session:

- An overview of the fossil record of the genus *Tapirus*, and its implications to our understanding of evolutionary relationships of living and extinct species, to their biogeographic distribution; and to patterns of morphological change in tapirs.
- A case study of a remarkable new fossil site containing abundant remains of a fossil species of tapir, and what such an extraordinary site can tell us about fossil tapirs, past environments, and paleoecology.

Presentation 1

New Fossil Discoveries and the Evolutionary History of *Tapirus*

Matthew Colbert

High-Resolution X-ray CT Facility, Jackson School of Geosciences, The University of Texas at Austin
Evolutionary Consultant, IUCN/SSC Tapir Specialist Group (TSG)
Austin, TX, 78705, United States
Phone: 512-471-0260 / FAX: 512-471-5257 / E-mail: colbert@mail.utexas.edu

Fossil tapirs tell a fascinating tale of intercontinental dispersal, extinction, and evolution. While their current geographic range is confined to Southeast Asia, South America, and Central America, fossil tapirs prove that as recently as a few thousand years ago tapirs ranged across North America, Europe, and Asia. Fossil evidence also suggests that tapirs were not present in South America until at most a few million years ago. Until recently, however, the evolutionary relationships between the living and fossil species of tapirs was largely unknown, and accordingly, precise patterns of geographic dispersal and evolutionary radiation could not be reliably inferred. New fossil discoveries of tapirs in South and North America in the last several years have begun to change all this, however, as have molecular analyses of the relationships between the extant tapirs. These discoveries have provided an improved understanding of the distribution and morphological evolution of tapirs. The evidence of these new data supports a close relationship between *Tapirus pinchaque* (the Mountain Tapir) and *T. terrestris* (Lowland Tapir), and also suggests that *T. bairdii* (Baird's Tapir) is more closely related to these two taxa than to *T. indicus* (the Malayan Tapir). Knowledge of these relationships, and of relationships between the living and fossil species can now be used to refine scenarios of the evolutionary and geographic radiations within the genus *Tapirus*. In this presentation, I will review some of these new fossil discoveries, and present an overview of current ideas regarding the evolution of *Tapirus*.

Presentation 2

Intestinal Parasites of *Tapirus polkensis*, from the Gray Fossil Site, Tennessee

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The Gray Fossil Site (GFS) was thought to be entirely late Miocene/early Pliocene based on an assemblage of well preserved vertebrate fossils. Detailed palynological study of the GFS-1 core indicate an older age, i.e. Paleocene – Eocene. This is in conflict with the age that has been primarily determined based on the occurrence of Miocene vertebrates that occur higher in the stratigraphic section. These data suggest a more complex basin fill history than previous suspected. The data suggest the possibility of multiple depositional episodes and/or the formation of multiple depositional basins that may have been periodically active through the Tertiary and may preserve a more complete faunal and floristic record of biodiversity in Appalachia during the Cenozoic. The Miocene Faunal assemblage is dominated by *Tapirus polkensis* with over 40 individuals currently known from the site. Sediment was removed from where the gut would be located in a complete articulated skeleton. The sediment was macerated and compared to the palynological assemblage found in the surrounding sediment. The gut sample contains a palynological assemblage of what appear to be the egg casings of intestinal parasite. The eggs casing comprised 96% of the gut palynomorphs. The second most abundant palynomorph found was *Carya* pollen (Hickory) in association with clusters of macroscopic remains of hickory nuts in the gut region. The stratigraphic level from which the Tapirs are derived are associated with fossilized wood that contains numerous false growth rings, generally an indicator of drought. The tapirs are also associated with frequent lenses of charcoal indicating that wildfire was a significant disturbance factor. Among the tapir remains age distribution fits a normal bell curve with about 2/3 of the individuals being fetal or sub-adult. The tapirs exhibit three main types of pathologies, bone cavities that appear to be a result of infection, spongy textures that may be a result of degloving injuries, and arthritis and bone spurs on older individuals. The tapirs are associated with a faunal assemblage indicating Late Miocene, a time of cooling and climatic change.

WORKSHOP 3: Tapir Population Modeling

Moderator: Anders Gonçalves da Silva

Concept of this session: In April 2007, the Lowland Tapir PHVA Workshop held in Sorocaba, São Paulo, Brazil, concluded the current cycle of TSG sponsored tapir action planning workshops. As part of these PHVA Workshops, population dynamic models were developed for each one of the four tapir species. The models were developed within **VORTEX**, a computer simulation program specifically designed for Population Viability Analysis (PVA). Computer modeling is a valuable and versatile tool for assessing risk of decline and extinction of wildlife populations. Complex and interacting factors that influence population persistence and health can be explored, including natural and anthropogenic causes. Models can also be used to evaluate the effects of alternative management strategies to identify the most effective conservation actions for a population or species and to identify research needs.

Tapirs are distributed across different biomes and ecosystems where they face various levels types of threats. **VORTEX** models can be extremely useful to assess these threats and the potential threshold at which the threat may cause extinction of the tapir population. Now, we have at our disposal baseline biological models for each tapir species. In other words, we have models that predict future outcomes of an ideal tapir population growing unconstrained and unhindered by external factors. The parameter values of each of these models are based on current knowledge and years of experience working with the species. These baseline models are now available for download on the website of the IUCN/SSC Tapir Specialist Group (TSG) at <http://www.tapirs.org/action-plan/vortex-modelling.html>. This page also provides articles and additional information about **VORTEX** and modeling.

Starting from these baseline models, we now have the potential to model tapir populations, modifying crucial parameters values to suit the reality of the region or population we are focused on, including threats and other factors we may judge important. The tool can assist in prioritizing threats, scientific goals, and to gather support to effect change in policy.

Goals of this session:

- Illustrate the utility of tapir population modeling;
- Present VORTEX and the baseline models developed during the PHVA Workshops for all four tapir species (Malayan Tapir PHVA Workshop 2003, Mountain Tapir PHVA Workshop 2004, Baird's Tapir PHVA Workshop 2005, and Lowland Tapir PHVA Workshop 2007);
- Showcase specific study cases of modeling results and actions stemming from them by tapir researchers and conservationists working on the ground.

WORKSHOP 4: TSG Strategic Planning 2008-2010

Facilitators: Patrícia Medici & Bengt Holst

During the **TSG Strategic Planning Workshop** symposium participants worked together to set short-term goals for the IUCN/SSC Tapir Specialist Group (TSG). Bengt Holst and Patrícia Medici, both facilitators of the IUCN/SSC Conservation Breeding Specialist Group (CBSG), facilitated the workshop. The main outcome of this session was a list of priority actions that will “guide & drive” the work of the Tapir Specialist Group over the next three years (2008-2010), creating and detailing specific tasks for each one of the TSG’s different committees, taskforces and working groups.

The main questions we asked ourselves during the **TSG Strategic Planning Workshop** in Mexico were “What should we do as a group, what should be our main goals?” and “What actions should we accomplish as a group in order to be more effective in terms of tapir conservation worldwide?”. During this workshop we focused on the functioning and short-term activities of the TSG itself. Long-term issues regarding the conservation of the four tapir species were carefully addressed during the Tapir PHVA Workshops held for each tapir species over the past five years.

We asked each symposium participant to prepare a list of **5 PRIORITY ISSUES** they believed that the TSG should be addressing over the next three years. Participants were requested to prepare their lists of issues in advance of the workshop and bring it with them to Mexico. Workshop facilitators Bengt Holst and Patrícia Medici guided the process of discussing the issues brought up by symposium participants and developing goals and priority actions to deal with them.

Session Schedule

BEFORE THE WORKSHOP

Facilitators Bengt Holst and Patrícia Medici collected lists of issues from all participants between days 1 and 2 of the workshop. Issues were compiled, analyzed and distributed into different categories.

PART 1

Presentation: Guidelines for the Session

Facilitators: Bengt Holst & Patrícia Medici

The different issue categories were presented to all participants as the main topics of discussion of separate **WORKING GROUPS**. Participants were asked to join the working groups at their own discretion. During this first part of the workshop each group was requested to:

1a.) Identify a leader, a flip-chart recorder, a computer recorder, and a plenary presenter. Each working group was designated a working space;

1b.) Briefly review and discuss the TSG Strategic Plan 2006-2007 developed during the TSG Strategic Planning Workshop carried out during the Third Symposium held in Argentina in 2006. We needed all working group members to familiarize themselves with the type of document we were going to produce during this session, the priority goals and actions we addressed over the past two years, the actions we managed to accomplish and the ones we did not;

1c.) Briefly discuss & brainstorm ideas about the issues that generated your working group and explore the different ways to create short-term goals to address those (20 minutes). (The lists of issues mentioned by participants that were combined to create the working groups will be provided)

1d.) Create short-term goals for TSG activities related to the main topics that different working groups were covering (60 minutes).

1e.) Plenary Session 1 - The preliminary goals identified by each working group during initial deliberations were quickly presented in a first plenary session (30 minutes).

PART 2

2a.) Working groups continued the process of development of short-term goals taking into consideration the input and comments from the plenary session. Working group goals were prioritized (90 minutes).

2b.) Plenary Session 2 - Prioritization of Goals (30 minutes) - Working group goals were presented in order of priority in flip-charts up on the walls. Each participant was given **6** sticky dots and was requested to go through all flip charts, all working group goals, and individually vote for the **6** goals they believed should be ranked as priority. The criteria we used was "TSG effectiveness as a tapir conservation group".

PART 3

3a.) Workshop facilitators Bengt Holst and Patrícia Medici presented the group prioritization of TSG goals.

3b.) Working groups were requested to re-assemble and develop specific actions that TSG will need to take in order to reach the priority goals. For each one of the actions, a deadline, an estimated cost, a person to be responsible for its achievement, potential collaborators, and indicators of success were established (90 minutes).

PART 4

4a.) Working groups continued to work on the development of actions.

4b.) Plenary Session 3 - Presentation of Actions

ROUNDTABLE: Dealing with Permit Issues - Regulations for *In-Situ* and *Ex-Situ* Conservation

Moderators: Alberto Mendoza & Alan Shoemaker

Concept of this session: Following the Mountain Tapir PHVA Workshop held in Colombia in 2005, biological samples from captive mountain tapirs in the United States were sent to laboratories in Colombia. More recently, live captive born tapirs have been transferred between zoos in Europe and the United States, and between zoos in Mexico and Costa Rica, with zoos in the United States. As researchers in range countries more closely examine biomaterials from captive tapirs living in other countries in their quest for better understanding of tapir biology and biology as well as ways to further their conservation efforts, and as zoos in range countries and elsewhere further develop captive breeding and management programs, the international transfer of live animals and biomaterials will become increasingly commonplace. To make these transfers as simple as possible, it will be increasingly important that tapir researchers, CITES authorities and managers of captive tapirs all fully understand international law and how to safely and expeditiously ship living tapirs and preserved materials internationally.

Goals of this session:

- To educate shippers of CITES I and II species of regulated tapirs of international laws that impact their trade. Better understanding of this area will reduce problems related to the growing numbers of transfers in live tapirs and preserved materials between zoos, researchers and NGOs worldwide.
- Due to the paucity of tapir holders in range states presently involved in international trade, many officials are unfamiliar with the nature of permissible international movement of live tapirs and parts thereof. This session will clarify this area and hopefully increase the number of such actions.
- Increasingly zoos in some regions transfer tapirs among themselves to better manage the gene pools of tapirs within their individual collections, while zoos in other regions rarely do. Discussions in this session will point out the benefits of such collaboration and hopefully stimulate tapir holders to look beyond their borders if suitable animals are not available locally.

ABSTRACTS

PAPER SESSIONS (20 Papers)

PAPER SESSION 1

Tapir Captive and Reproductive Management

Biomedical Survey of Baird's Tapir (*Tapirus bairdii*) in Captivity in Panama

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The Baird's tapir (*Tapirus bairdii*) is listed as endangered on the IUCN Red List, largely due to loss of habitat, over hunting and subsequent isolation of small populations. The captive Baird's tapir population plays an important role: 1) as a hedge against catastrophic losses in the wild, 2) as a resource for biological studies impossible to conduct in nature, and 3) as an educational resource to raise public awareness about the endangered status of the species. The Republic of Panama is home to 27 Baird's tapirs in captivity, accounting for 48% of the Central American captive population, and distributed among three institutions (two zoos and a private facility). To date, there has been no comprehensive effort to assess the health or reproductive status of this population. Assessments of health and reproductive capabilities of individual tapirs would contribute to the development of a more effective breeding program. Biological materials collected could eventually be used in multi-faceted genetic, reproductive and population studies, including determining relatedness among individuals and establishing paternity. Biomedical surveys were conducted on 23 (11.12) animals during April 2007 and February 2008. Assessments included an interview with animal management staff, review of the reproductive history, a diet evaluation and an extensive medical/reproductive examination under anesthesia. The latter included collection of physiological data using portable monitoring equipment, blood hematology and biochemistry analysis, samples collected for future genetics analysis, physical examination, and ultrasonography focusing on the status of the reproductive tract. Serological analyses assessed exposure to *Leptospira sp.* and *Brucella spp.*, Equine Herpes Virus -1, 3 and 4, Equine Influenza Virus H1, Equine Rhinovirus -1 and 2, Venezuelan Encephalomyelitis H1 Virus, and Vesicular Stomatitis Virus. Mature males were electroejaculated and the semen evaluated and subjected to cryopreservation. Common findings in the captive population of Baird's tapirs in Panama included: 1) dental and gingival disease of varying severity, 2) foot abrasions and cracks in the pads and hooves, 3) high prevalence of *Parascaris*-like eggs in feces, 4) imbalanced diets, and 5) a high prevalence of inbreeding (based on interviews with animal management staff and examination of breeding records). Serum chemistries and hematology values were within reference ranges for this species. Seroconversion to Venezuelan Encephalomyelitis H1 Virus (21%), Vesicular Stomatitis Virus (47%) and West Nile Virus (13%) was noted, although no animals showed clinical signs of any of these diseases. These titers may reflect prior exposure to these agents, or cross reactivity with related viruses based on test methodology used. Four of six adult female tapirs at the Villa Griselda Zoo and one of two at the El Nispero Zoo were pregnant based on ultrasonography. Spermic ejaculates were obtained from 10 of 11 (90%) of males. This database provides an invaluable source of information to refine steps for developing a long term self-sustaining, healthy population of Baird's tapirs in Panama. (Funding was provided by SENACYT, Panama).

Seminal Traits in the Baird's Tapir (*Tapirus Bairdii*) Following Electroejaculation

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The Baird's tapir (*Tapirus bairdii*) is listed as endangered on the IUCN Red List, largely due to loss of habitat, over hunting and subsequent isolation of small populations. The Republic of Panama is home to 27 Baird's tapirs in captivity, accounting for 48% of the Central American captive population, and distributed among three institutions (two zoos and a private facility). Movement of animals among institutions within Panama and other Central American institutions has been limited and the extant captive population of tapirs in Panama is highly inbred. Therefore, reproductive and genetic management of this population is important for maintaining a self-sustaining population in Central America. The present study was conducted to 1) develop a safe and consistent method for semen collection and 2) characterize the seminal traits in the Baird's tapir. Eleven Baird's tapir males from three institutions (Summit Park Zoo, El Nispero Zoo and Villa Griselda) were studied in August (2007) and January (2008). Males were anesthetized using a combination of detomidine hydrochloride (Dormosedan®, Pfizer Animal Health, Exton, PA), butorphanol tartrate (Vedco Inc, St. Joseph, MO) and ketamine hydrochloride (Vedco Inc.). For semen collection, a rectal probe (5.2 cm diameter) with three longitudinal electrodes and an electrostimulator (P.T. Electronics, Boring, OR) were used to provide 40 - 65 stimuli at 2 - 6V over a 30 min interval per animal. Semen was collected in pre-warmed, sterile collection vials, and raw ejaculates were immediately assessed for volume, pH and osmolality, and then extended in pre-warmed (37 °C) skim milk extender (INRA 96; IMV International, Maple Grove, MN). Samples were assessed for percentage total motility, forward progression (progressive status; scale 0 - 5; 5 = best) and concentration (hemocytometer method). For assessment of sperm morphology, an aliquot of the raw ejaculate was fixed in 0.3% glutaraldehyde in phosphate-buffered saline (340 mOsm; pH 7.4), and at least 100 cells were examined (1000×) using a phase contrast microscope. For assessment of acrosomal integrity, an aliquot of the raw ejaculate was smeared on to a glass slide and stained with fluorescein isothiocyanate conjugated peanut agglutinin, and at least 200 cells were examined (1000x) using epifluorescence. Spermic ejaculates (n = 19) were successfully collected from ten of eleven (90%) males. An aspermic ejaculate was obtained from a male <2 years old. Ejaculate volume (0.5 - 65 ml), pH (6.5 - 8.0), osmolality (279 - 413 mOsm), total sperm concentration per ejaculate (0.003 - 4738 ×10⁶), sperm motility (10 - 80%), normal sperm (1 - 24%) and sperm with intact acrosomes (50.5 - 98.5%) was highly variable. Ejaculates also contained high proportions of spermatozoa with abnormal acrosomes (34.4 ± 4.0%; mean ± SEM). These results indicate that electroejaculation can be a valuable tool for conducting fertility assessments in Baird's tapirs, and provides incentive for the future development of semen cryopreservation protocols, genome resource banks, and assisted reproductive technologies as a tool for augmenting the genetic management of tapirs.

PAPER SESSION 2

Tapir Genetics

Genetic Diversity and Management of a Captive Population of Lowland Tapir (*Tapirus terrestris*), in Argentina

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Ex situ conservation has an important role in the conservation of species. It allows for a stock of genetically representative individuals to be kept in reserve for re-introduction into areas where the species has gone extinct or to supplement populations in areas where small population sizes imposes high risk of extinction. In order to meet the "availability of suitable stock for release" criteria under the IUCN Guidelines for Re-introduction and Translocation, effective breeding plans must be designed to minimize inbreeding, reduce the loss of genetic diversity and prevent adaptation to the captive environment. According to the literature, a captive population should be managed through three steps: establishment, growth and maintenance. In the case of the Argentinean population of Lowland tapir (*Tapirus terrestris*), we are somewhere in-between growth and management. Suitable husbandry techniques for tapirs have been published and the population is growing. However, at the moment, there is no organized demographic and genetic plan in place to determine the minimum population size and breeding strategy to minimize mean kinship and maximally avoid inbreeding. To fill this gap, Argentinean tapir holders and other institutions have come together to form a coalition called the "Argentinean *ex situ* Tapir Group" (AexTG), which is composed of 11 zoos and institutions plus three universities. The Group's activities so far have included: 1) training on and implementation of a national studbook for the species; 2) development of educational material; and 3) sampling of blood and hair for genetic analyses. However, to date, genetic analysis has not been possible. To fill this void, we have established a partnership between the Ecological and Conservation Genomics Laboratory at the University of British Columbia Okanagan (UBCO) and AexTG to carry out the necessary genetic data collection and analyses to assist in the drafting of a breeding plan that will retain 90% of the genetic variation for the next 100 years. In particular, we aim to: (1) determine taxonomic unity of the captive population; (2) quantify the genetic variation within the captive population of Lowland tapir in Argentina; (3) estimate degree of inbreeding; (4) reconstruct the pedigree/relatedness structure among program animals; (5) inform possible breeding pairs to minimize mean kinship; and, (6) identify optimal captive population size and structure (i.e. single large or several small) to meet program goals. Furthermore, this approach will allow for an explicit quantification of the necessary balance between genetic variation maintained and minimum number of individuals required to meet program goals. To achieve these goals, we will use a suite of molecular (microsatellites and mitochondrial DNA) and modeling tools (VORTEX) to analyze genetic variation in 49 captive individuals of lowland tapir, and work in close coordination with the local tapir holders to develop a captive management plan.

Evaluating Preservation and Extraction of DNA from Tapir Dung: Tools to Facilitate Conservation Genetic Studies from Non-Invasive Samples

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Non-invasive sampling is becoming a widespread tool used to acquire samples from elusive and/or low density endangered species for genetic studies. Nevertheless, the technique suffers from several shortcomings. The most problematic of which is the quality and quantity of DNA that can be obtained from such samples. In general, DNA obtained from field collected scat is of poor quality and quantity, leading to low polymerase chain reaction (PCR) success, and frequent errors, particularly when genotyping. Some of the factors that contribute to low PCR success rates include: 1) sample age; 2) sample preservation time, method, and storage temperature; 3) DNA extraction method; and 4) marker system (i.e., mitochondrial or nuclear) and size (i.e., length of amplified product in base pairs). Here, we use a factorial design to test different forms of collection and preservation of tapir dung samples, in order to establish guidelines for obtaining better quality and larger quantities of DNA for genetic studies of natural populations within these large and elusive species. In particular, we examine two sampling ages, two collection and storage methods (both at room temperature), two DNA extraction methods, three time periods of storage; and three different markers encompassing both mitochondrial (mtDNA control region) and nuclear systems (microsatellites and homologous zinc-finger regions on the X and Y chromosomes used for sexing). In addition, we chose to evaluate the impact of fragment size on successful PCR amplification targeting mtDNA and microsatellites of three different lengths. Sampling was conducted at the Mountain View Conservation Breeding Centre, in Langley, BC, where we collected samples from five individuals (two *Tapirus pinchaque* individuals, and three *T. indicus* individuals). Samples were collected fresh and after 48 hours exposure to weather from five individuals, acquired by scrapping the surface of a dung ball with a cotton-tipped sterile swab with a 15cm wooden shaft. The tip was then either broken off into a 2ml sterile tube containing 1ml of 100% ethanol or rolled onto the sample area of an FTA card (Whatman, Inc.). Samples were kept at room temperature until DNA extraction. In addition, buccal swabs were taken from each of the five individuals to be used as standard of comparison to measure error rates. Extractions took place at 1 week, 3 months and 6 months after collection. Two methods, one based on Qiagen DNA Stool Kit and another based on the ZymoResearch Fecal DNA Kit were tested. Preliminary results point to extraction method and fragment length as two important factors to consider when designing genetic studies based on non-invasive sampling of dung. The Qiagen kit has produced slightly better results, as measured by amplification success of mitochondrial DNA fragments. Overall, smaller fragments have a higher amplification success than larger ones as predicted. Microsatellite and sexing markers are still being developed at this time, and we have not carried out 3 and 6 month extractions yet. The expectation is that longer storage periods will also decrease amplification success rate.

The Malayan Tapir: A Proposal for New Insights into the Species' Genetic Diversity

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Important questions regarding the taxonomic status and evolutionary history of tapir species, including hybridization and location of hybrid zones, population histories and population genetic structure, remain unanswered. Modern molecular population genetics techniques based on DNA markers can be a powerful approach to answer these questions. Answering these questions will improve our understanding of the evolution of this group, and provide valuable information to assist in directing conservation efforts of these species. In the particular case of the Malayan tapir, genetic studies are already underway that rely mainly on samples from captive individuals and from wild individuals from Malaysia. However, crucial samples from other areas of the species' distribution are still unavailable. Therefore, it is our proposal to establish a more comprehensive sampling strategy, encompassing other countries of the species' distribution, to allow for more detailed information on the genetic structure and history of this species to be available. To reach our goal, we believe we need to: (1) establish partnerships with local tapir scientists and genetics labs for in-country analyses of samples and capacity building (where needed); and, (2) raise funds in order to organize field trips to the aforementioned countries and get samples from places where the species occurs in the wild. Mitochondrial DNA and microsatellites markers will be analysed in close collaboration with the teams that are already working on the genetic analysis of the Malayan Tapir. From a genetics perspective, we expect to describe how and why different populations are related within the species' range; and, uncover areas of genetic singularity, which are essential to the preservation of the species' genetic heritage and evolutionary history. The genetic information will assist in designing action plans which take into account the species' evolutionary history, preserving its evolutionary potential for the future. The information will be of vital importance for the conservation management *in situ* and *ex situ* and will contribute to the overall conservation efforts of the tapir in South East Asia. Furthermore, it is our hope that the project will promote further studies of the same category creating a network among countries that will become an important step for future Tapir studies. We expect that this project will give an impulse to a series of conservation and scientific studies that are underway covering several aspects of Malayan Tapir biology, carried out by researchers in Asia in close cooperation with the IUCN/Tapir Specialist Group.

Genetic Variation in Captive Populations of Baird's Tapir (*Tapirus bairdii*) in Panama

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The Baird's tapir (*Tapirus bairdii*) is one of 80 Panamanian species listed as endangered by the National Authority for the Environment (ANAM) and IUCN. Tapir populations are threatened by loss of habitat, hunting, and a reduction in population size. Panama has the largest captive population of Baird's tapirs in the region, with 24 individuals distributed among three institutions. Although breeding records suggest a high prevalence of inbreeding in the population, there is no definitive information on their genetic variation. Moreover, conservation and breeding programs to manage and protect this species, both in captivity and in the wild, are yet to be established. In order to develop a management plan that takes into account the current status of the species in Panama, it is necessary to better understand the extant gene variability in captive populations. To accomplish this, we conducted a survey of all 24 tapirs maintained in captivity in Panama. Our main goal was to assess the level of genetic diversity and inbreeding in these populations using microsatellite analyses. This technique has proven to be very successful in detecting genetic variation at the population level. Samples (n = 24 animals; blood from 23 animals and hair from one individual) were collected from tapirs maintained in three institutions (Summit Park Zoo and Botanical Garden, Nispero Zoo and Villa Griselda-Private Reserve). Samples were preserved in a lysis buffer solution. Genomic DNA isolation was performed using a commercial kit (Qiagen DNeasy Blood and Tissue Kit[®]). A total of 7 microsatellite loci were used to screen all the individuals. Results indicate a high level of inbreeding and lack of genetic diversity in this population. The analyses to test for Hardy-Weinberg equilibrium were highly significant for most loci, suggesting that the populations are not in genetic equilibrium. Looking at the raw data, we found very high levels of homozygosity (one of the loci was completely monomorphic in two of the three populations). Out of the 7 loci analyzed, we found F_{st} values ranging from -0.03 to 0.18, indicating low levels of genetic diversity. In general, our data confirmed the status of highly inbred captive populations of tapirs in Panama. Our study represents the first assessment of genetic variability performed in Panamanian captive populations, and therefore it provides baseline information for making management decisions for these populations. (Funding was provided by SENACYT, Panama).

PAPER SESSIONS 3 and 4

Tapir Conservation Initiatives: Research, Management & Education

Current Distribution and Conservation Status of Baird's Tapir (*Tapirus bairdii*) in Mexico

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Mexico's tropical forests, mangroves and clouded forests are the ecosystems most affected by deforestation, habitat fragmentation and defaunation. Many Natural Protected Areas have been set up, corresponding to the most diverse areas, with the greatest number of endemic or endangered species. Recently, to identify priority areas for conservation, the ecological niche model concept has been used to determine potential presence of a species or suitable areas from which it has gone extinct. Thus, predictive modeling species' distribution represents an important tool in conservation biology, by helping to maintain the biodiversity of ecosystems, which include species like the Central American tapir (*Tapirus bairdii*), the largest land mammal of Mesoamerica. The tapir is considered endangered in Mexico and is listed in the Appendix I of CITES. In this work we considered both, the historical and the current distribution of the species in Mexico, from 140 records from different localities obtained from the databases of international and national collections, the specialized literature, and interviews to field scientists, in order to determine the extent of the area formerly occupied by the tapir. We modeled the ecological niche of the species using the Genetic Algorithm for Rule-set Prediction (GARP) and Maximum Entropy Modeling (MaxEnt), to identify potential areas where the tapir may be distributed but has not yet been confirmed, like Pantanos de Centla and Laguna de Terminos in the States of Tabasco and Campeche, respectively. And to identify the locations from where it has been extirpated, as those places could be considered for reintroduction, if the original causes of decline are removed. We assessed the conservation status of the Central American tapir in Mexico, to identify priority areas for their conservation. We also found ten tapir records from Acapulco in the State of Guerrero, deposited in the Yale University Peabody Museum, that extend its historical distribution through the Pacific slope 209 km north to the nearest locality in Putla de Guerrero in Oaxaca.

The Tapir's Role in the Ecosystem: Lessons from Experiments in the Forest, Calakmul Mexico

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Mammals are important seed dispersers in the tropics. This role is tightly linked with their movement in the ecosystem and with the deposition of seeds in favorable places. Although central to theories of diversity in tropical ecosystems little is known about how seed dispersal is affected by habitat fragmentation and climate change. Our study focuses on the effects of this environmental change on *Tapirus bairdii* and how its role as a seed disperser in the tropical forests of southern Mexico (the northern limit of its distribution) is being altered. Because of their large size, the Baird's tapir (*Tapirus bairdii*) is one of the few species capable of dispersing large seeded trees, such as the ecologically important *Manilkara zapota* (zapote). *M. zapota* is a dominant species in the Greater Calakmul Region (Southern Yucatan Peninsula) and represents a key element in the diet of all the vertebrate species in the area, especially during the dry season. In the Greater Calakmul region water is a limiting resource and is only found in waterholes (aguadas). We hypothesized that tapir modify their movements in response to acute water shortage brought about by long-term declines in precipitation. We

conducted a large-scale field experiment in the forest of the Greater Calakmul Region to evaluate: 1) does the tapir facilitate zapote seed germination, survival and growth, 2) does seed germination depend upon site deposition as mediated by the tapir. In a fully factorial design, 1920 zapote seeds collected from tapir dung and ripe fruits were planted in either tapir dung or soil. Replicate, caged, germination stations were placed in monodominant non-inundated zapote stands (zapotales) and seasonal waterholes. Initial results show, contrary to previous expectations that tapirs act as zapote seed dispersers. Zapote germination was low (<30%), especially around waterholes. The site of deposition and the presence of tapir dung were important for seed germination near waterholes, and we found an important site effect on germination probability in the zapotales. Seedling survival varied between sites and was greater in the zapotales. These results suggest the importance of understanding the role of tapirs both as seed dispersers and as facilitators of germination. We will complement this experimental data with the use of movement data to create a model of zapote recruitment and regeneration under future scenarios of climate change and forest fragmentation. This is the first project with Baird's tapir in the Greater Calakmul Region. This project provides useful and unique information on the habitat use of this species in a dry tropical forest in Mexico and provides important information on the role of tapirs in the ecosystem. An understanding of the tapir's function in the ecosystem is important because it is facing extirpation in many areas of its range.

The Baird's Tapir Project of Costa Rica

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From 1994 until 2007 Charles Foerster has been the primary investigator of the Baird's Tapir Project in Costa Rica. In 2007 he turned the project over to Kendra Bauer, PhD candidate at the University of Texas. In the 13 years of Charles' work in Costa Rica, there has been a wealth of information collected which allows for the next step in tapir conservation – the continuous monitoring of tapirs using GPS collars. The number one cause of decline of the tapir, like many other species, is habitat loss. There are several organizations that are aware of this problem and are buying up land as it becomes available. However, this tactic has been proven unsuccessful by itself. Many researchers are finding that in an age of global climate change, movement of animals is increasingly important to survival of the species as well as a healthy ecosystem. To help conserve the tapir, along with many other species, these isolated fragments of land need to be connected. The tapir's can show us the connectivity of isolated preserves through the use of GPS tracking collars. Ultimately providing corridors to the tapirs allows access to these isolated areas and will increase genetic and species diversity for an entire ecosystem. GPS collars will also aid in answering questions centered on behavior and social structure of the tapir. The more we know about a species, the easier it is to conserve it for future generations and allow humans and other animals to live more enriched lives in a connected environment.

Preliminary Analysis for the Determination of Baird's Tapir (*Tapirus bairdii*) Potential Habitat in Guatemala

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It was estimated that in Mexico, Belize and Guatemala exists approximately the 50% of the world's population of Baird's Tapir. This is why Guatemala can be considered as a key country for the species survival. It is a priority to develop action plans that ensure the conservation of Baird's tapir and its habitat. The main difficulty is the lack of information about actual distribution, potential habitat, threats, biology and conservation status. With this project, we tried to generate basic information about the species status in Guatemala. We carried out a preliminary analysis to determine the potential habitat of the species in the country. We created a database with field records of sites where the species occurred from year 2000 to 2007. Using Geographic Information System (GIS), we made a geographical correlation of the field records with the Land Use Map (2006) of

Guatemala scale 1:50,000. With this correlation we obtained the parameters of Land Use and minimal area of the sites where the species occurs. With the parameters obtained, we looked for the areas that matched with the specified parameters in the Land Use Map. These areas were classified as potential habitat for Baird's Tapir. The actual Land Use was selected as the principal variable that determines the actual distribution of the species, because it is suspected that the species was originally distributed in the entire country. We found Baird's Tapir to occur in four Land Uses (*Bosque latifoliado*, *Humedal con bosque*, *Arbustos – Matorrales* and *Pastos naturales*). The potential habitat for the species is included in seven *Departamentos* (States) from Guatemala. Petén is the most important *Departamento* for the species conservation because it includes the protected area *Reserva de la Biosfera Maya* (RBM) and its complexes, which represent approximately the 71.8% of the potential habitat for Baird's Tapir in Guatemala. After the RBM there are other important protected areas in the *Departamentos* of Izabal and Alta Verapaz, as well as the *Reserva de Biosfera Sierra de las Minas* (RBSM) which is in four *Departamentos*. With this preliminary analysis we determined where to focus in future research initiatives, conservation actions, educational programs and the development of wildlife management plans in Guatemala that aims to Baird's tapir and its habitat conservation. This is an important step to improve the conservation of Baird's tapir in Guatemala and its entire range of distribution.

Capture, Handling and Monitoring of Baird's Tapirs in the Zoque Rainforest, Oaxaca, Mexico

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Using hunting dogs and with the help of the community, 3.1 adult Baird's tapirs were captured in the Congregación de la Fortaleza, Municipio de Santa María Chimalapa, Oaxaca. With an average weight of 250 to 300 kg, the animals were chemically restrained with a mixture of 1.96mg Hidrocloridrato de Etorphina and 5.90mg of Maleato de Acepromazina, in the same dart (Immobilon Large Animal, C/Vet limited). Induction time was 3 minutes, and of anesthesia 60 minutes approximately for the four animals. During anesthesia, morphometric measures and biological samples (feces, skin, ectoparasites) were taken, and a physical - clinical examination was performed. A VHF transmisor was attached to each animal to be monitored. All the procedures were made near to water and under natural shade to avoid hyperthermia, and as prevention to avoid capture miopathy, each animal was administered vitamin E and Selenium (Mu-Se), Meglumina de Flunixin (Finadyne) and Penicilin G benzatínica (Benzetacil L.A). Animals were reverted with Hydrochloride Diprenorphine (Revivon Large Animal, C/Vet limited) at a dosage of 5.88 mg. None of the animals had any problem during capture, procedures and chemical restraint, nor during the following weeks of monitoring.

Baird's Tapir Reintroduction at Rafiki Safari Lodge, Costa Rica

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The project focuses on the reintroduction of the Baird's tapir into the Savegre Valley through a combination of conservation and sustainable tourism. Using a suitable multi-stage acclimation habitat teamed with access to wilderness corridors, Rafiki plans to trickle release captive tapirs back into the central pacific slope of Costa Rica. The project is located on the northern border of two distinct biological corridors that provide access to intact wild tapir populations. The first corridor is known as the Paso de la Danta, which stretches from the Savegre Valley south to Corcovado National Park. The second corridor links the Pacific to the Caribbean coast and is

defined by Parte Alta la Pantera-Talamanca, Talamanca-Amistad and Amistad-Caribe. The strategic location of Rafiki's 840-acre reserve makes this an ideal launching site for an introduction of this nature. The goal of Rafiki is to prove that through sustainable tourism, the ecology of the Savegre Valley can be conserved and with the success of the tapir project, the corridors leaving the reserve can be preserved and ideally improved. The purpose of this proposal is to engage Rafiki into the network of scientists studying the tapir in order to maximize the probability of a successful reintroduction. The opportunity this project presents for the tapir as a species is unique and the implications of its success could potentially spread. If the model on which Rafiki is based can be repeated in other parts of Costa Rica and the new world, and a trend can be created in conservation, thereby giving fresh hope to the preservation of biological corridors that are currently under tremendous pressure of development and agriculture.

Ecology and Conservation of Mountain Tapir in a Cattle Ranching Environment

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This is a conservation and research project of the most endangered large mammal in the tropical Andes, the mountain tapir (*Tapirus pinchaque*). It is a collaborative effort among Colombian and North American researchers, veterinarians, field biologists and environmental educators. The project is carried out in Los Nevados National Park, in the Risaralda State in the Central Andes of Colombia. The first five free ranging mountain tapirs were monitored using last generation telemetry technology and GPS collars in 2006, with collar retrieval in 2007. Data obtained is providing a better understanding of mountain tapir habitat requirements, as well as practical information needed to develop and implement a cattle ranching and conflict avoidance plan. Preliminary analyses of location, movement patterns, and habitat use of collared tapirs suggest differences in home range size between males and females, habitat preference for covered vegetation areas and avoidance of ranching areas. Paramo and potato crops are also frequently used habitats, the latter being damaged, thus, generating a conflict with *campesinos*.

Movement Patterns and Home Range Use of Lowland Tapirs (*Tapirus terrestris*) in the Peruvian Amazon

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Between 2005 and 2006 six lowland tapirs, four females and two males, were captured and equipped with GPS collars. The collars recorded between seven and 182 days of data resulting in 78 to 6185 locations. Mean fix success rate for all collars was 40%. Tapirs were mostly nocturnal, spending most of the day resting. Kernel home range sizes at the 95% level were between 102 and 386 ha. Home ranges had multiple centers of activity which differed between day and night, showing that there are distinct resting places and feeding areas tapirs frequently visited. The data from two different years for one individual showed that tapirs can have stable home ranges with clearly defined boundaries. Habitat use varied with the availability of habitat types within the animal's home range. Three individuals spend over 90% of their time in terra firme forest while the other two spent between 30 and 50% in terra firme, 30 to 40% in a *Mauritia flexuosa* palm swamp and the rest in floodplain forests. One tapir infrequently visited a palm swamp outside its main range and another individual expanded its range into a nearby palm swamp showing active selection of this habitat. Tapirs walked up to 10 km from their core area to visit mineral licks. The interval of visits varied greatly with as few as one day and as

much as 36 days between subsequent visits. Most individuals visited between two and three different licks, all within the same general area. They had well established trails between their home ranges and the licks. Mineral licks are an important resource for tapirs and require special attention in conservation and management plans for the species.

Distribution Patterns of Capture Places of Tapir (*Tapirus terrestris*) based on Traditional Knowledge of the Andoque and Nonuya Indigenous Communities and the Settlement of Puerto Santander-Araracuara, Colombian Amazon

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Species distribution is determinate by the relationship between biotic and abiotic variables, within these variables, the anthropogenic-origin events are seen as one factor decisive in the distribution pattern. GIS tools and spatial modeling to predict the species distribution has been useful to make decisions and for the management and conservation of wild populations. Due to the difficulty of knowing the distribution of lowland tapir (*Tapirus terrestris*) in the Colombian Amazon, determine patterns of spatial distribution become a useful tool to propose guidelines and to design management plans and conservation. On this basis, a research was proposed to determine the spatial distribution patterns of the lowland tapir's hunting sites, using data from hunting events registered by the native communities (indigenous and colonists) in the Colombian middle basin of the Caquetá river, Amazonas and Caquetá Departments. These data were integrated to a series of environmental variables by means of the spatial modeling software MAXENT and ENFA. Based on the results, the lowland tapir's capture places are mostly those located in low flooded zones with presence of Canangucho palm (*Mauritia flexuosa*) and bodies of water. The hunters utilize those places according to the hydrologic period and local needs. Comparison of the modeling methods it allowed to observe the efficacy of MAXENT. This method explained with greater detail the model due to the natural conditions of the study area. A coordinated work with the native communities is proposed in order to generate a management plan for the lowland tapir, taking into consideration a regulation of the meat consumption, number of tapirs hunted per month and the implementation of the traditional practices of hunting.

Population Estimates of Malay Tapir, *Tapirus indicus*, by Camera Trapping in Krau Wildlife Reserve, Malaysia

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The Malay tapir (*Tapirus indicus*) is the only Old World tapir species. Its distribution ranges from Southern Thailand and Myanmar, Peninsular Malaysia and Sumatra. Due to habitat destruction it is believed that the population density has decreased during the past two decades. There have been no specific population density studies of Malay tapir in the past. This study proposes a new method for identifying tapir individuals and estimating the population density of Malay tapir from photographs. The study took place in Krau Wildlife Reserve, Malaysia, consisting of 63,000ha undisturbed tropical forest. Two camera traps were deployed at 13 different salt-licks where tapirs had been recorded. All animal species photographed were recorded and all photographs containing tapirs were analysed and individuals were identified. The results reveal that using necklines is a reliable method for identifying and distinguishing between individual tapirs. The results also suggest that tapirs frequent salt licks relatively often when compared to other species, and that any individual frequently visit salt licks more than 15km apart. The study estimated approximately 45-50 tapirs in Krau Wildlife Reserve.

Felipe, the Conservation Messenger in Quijos Watershed, Ecuador: Using the Tapir as an Environmental Education Tool

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The Quijos watershed is located in the northern part of the Andes Cordillera of Ecuador, in a conservation area known as Condor Bioserve. This watershed is very important because it provides drinking water to Quito, the capital of Ecuador serving 2 million inhabitants. The water of the area is also used to generate electricity and provide drinking water to smaller populations. The watershed is also important because of the diversity of terrestrial and aquatic ecosystems. The natural systems of the watershed are threatened by agricultural expansion and chaotic management of hydrological systems that affect development and conservation of biological diversity. Taking into account that the pride of belonging to a place, that a profound knowledge of the social and ecological context and that the acquisition of capabilities to change our reality are key elements to achieve conservation, EcoCiencia, The Nature Conservancy and RARE get together in an agreement to develop a pride campaign in the Quijos watershed. This campaign uses commercial marketing methods to influence in the behavior of certain audiences to better their personal and social well-being. One of the key elements of this campaign is the selection of a flagship species by local stakeholders. This species becomes the conservation messenger of the campaign. In the case of the Quijos watershed, the selected species was the mountain tapir. The mountain tapir was named FELIPE. The campaign included activities like school visits, communitarian visits (The Water Parade), summer camps, informative talks, painting contests, training programs, reforestation and other. To reinforce the message a lot of promotional material was developed: posters, stickers, caps, T-shirts, painting books and others. Felipe has become a beloved character in the Quijos watershed and in all the province of Napo. Felipe was chosen as the provincial mascot for the regional games. Felipe is invited to participate in many public and private activities in the watershed. Felipe is an active member of the environmental education program of El Chaco municipality. Due to the success of the campaign the municipality has decided to support the process. Besides good results in the environmental conscience of the local inhabitants in relation to water issues, there are also good results in the recognition and appreciation of mountain tapir. These results were measured by surveys before and after the campaign. This project demonstrated that tapir is a powerful tool for environmental education. It was also very interesting the connection between conservation of water resources and mountain tapir. This experience can be replicated in other places of Ecuador and other tapir distribution range.

PAPER SESSION 5

Tapir Action Planning and Identification of Priority Areas

Update and Results of the National Program for Tapir Conservation in Colombia

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During year 2002 a workshop was held in Colombia to discuss the National Program for Tapir Conservation. That workshop was part of a larger program on conservation and sustainable use of biodiversity supported by the Colombian Ministry of Environment. Many institutions attended the workshop and actively participated of the discussions. This tapir conservation program identified short (1-4 years), mid (5-10 years) and large (more than 10 years) actions oriented to improve conservation of the Colombian populations of the three species of tapirs in this country. Although the tapir conservation program was discussed on year 2002, it was only until 2005 when it was officially published by the Ministry of Environment. That year was considered as the starting date of the program. Today, three years after its publication (and about five years from its formulation) we aimed to evaluate its implementation and advances from the involved institutions. Conducting surveys with the identified responsible institutions we wish to assess the advances towards the main goals of the program. Also, and as an example, we would like to explore a possible cooperation of Colombian TSG members in the outlining of tapir monitoring programs in protected areas, with the Unit of National Parks in Colombia, an ongoing initiative of that institution.

National Strategy for the Conservation of Tapirs in Ecuador **(*Tapirus terrestris*, *Tapirus pinchaque*)**

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The present investigation was carried out between February 2006 and April 2007. The main objective was to determine the current situation and conservation status of tapirs (*Tapirus terrestris* and *Tapirus pinchaque*) in Ecuador. The survey was based on secondary information and the data was used as the basis to structure the National Strategy for the Conservation of Tapirs in Ecuador. This first initiative, beyond being a definitive document, aims at taking a first step in establishing a continuous process of investigation and administration for the conservation of the tapirs in the Ecuador. With the purpose to achieve the objective, three types of surveys were developed differed to each other, which involved field investigators, officials of the Environmental Ministry of the Ecuador, zoological institutions and breeding facilities in the whole country. Surveys that were structured with the purpose to compile information about in-situ and ex-situ conservation, education and communication, politics; and, administration and institutional strength on the national level. Additionally, we checked the existent secondary information for the three tapir species as well as data on tapir occurrence, which were entered into a Geographic Information System (GIS) and represented in several thematic maps of tapir records for the entire Ecuador. As a result, data that was obtained determine that the species *Tapirus bairdii* is at the moment extinct in Ecuador. According to some Ecuadorian investigators, there is no evidence of the presence of this species in the places in which its distribution was probable, at least in the last five years. On the other hand the main threats for the survival of *Tapirus pinchaque* and *Tapirus terrestris* are: habitat fragmentation, hinting in the Ecuadorian Amazon, which is one of the main causes for the local extinction of populations of wild

mammals. There is not enough government commitment to conservation of species, there is a scarce knowledge of workers of protected areas of the effective legislation that protects wild animals, the environmental legislation in general, limited processes of investigation of the gender *Tapirus* in the Ecuador. With the purpose of structuring a first document of the National Strategy for Conservation of the Tapirs in Ecuador, initially we defined a vision and three goals guided in: 1) to preserve the existent areas nucleus in the Ecuador that viable minimum populations guarantee 2) conserve and restore the areas integrate them to the main areas nucleus identified in the country and 3) eradicate or restrict the hunt of the species according to the habitat conditions and local populations. To achieve these strategic goals they thought about five main axes that are: the conservation *in-situ*, conservation *ex-situ*, education and environmental, political communication and environmental legislation, administration and institutional invigoration. Each line strategic bill among with their components: objectives, the time that measures it to their implementation priority, activities and possible institutional actors to be involved in the execution of the outlined work lines.

A Systematic Approach to Identify Priority Areas for Mountain Tapir in the Northern Andes of Colombia

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Mountain tapir populations are highly endangered and face increasing threats throughout their distribution. In order to complete mountain tapir conservation plans, critical areas for the conservation of this species must be identified, including surrogates of biodiversity as well as rare and endangered species. Reserves alone are not sufficient to preserve mountain tapir populations and most of the regional strategies are built on these areas. Here I present a systematic approach to locate mountain tapir priority areas in the northern Andes of Colombia (1000-5765m), where Population Viability Analysis (PVA), Ecological Niche Modeling and Vulnerability Assessment results are integrated. Different PVA scenarios were carried out to determine the goals, to ensure that the selected areas of the final result contain evolutionary viable populations of mountain tapir. Populations of mountain tapir populations were determined using the Ecological Niche Model. Vulnerability Assessment was performed to determine the degree of vulnerability associated to populations. The software MARXAN a decision support for reserve system design was used to meet goals under two different scenarios (1) the selected sites represents viable populations (in terms of area) that are distributed in high vulnerability areas and are urgent conservation targets due to threats; and (2) the selected sites represents viable populations (in terms of area) that are distributed in low vulnerability areas, minimizing the cost of conservation. The mountain tapir priority areas in Colombia were associated to national protected area systems, private reserves, action areas of environmental authorities and indigenous important actors for the conservation of mountain tapir in Colombia. This is the first approach to determine priority areas for mountain tapir populations in Colombia, and its results are a useful tool for decision makers and conservation actors.

POSTERS (12 Posters)

Fruit Consumption and Seed Dispersal by Lowland Tapirs (*Tapirus terrestris*) in the Peruvian Amazon

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To study the fruit consumption of tapirs in the Peruvian Amazon we examined 135 fecal samples collected between 2005 and 2007. A total of 122 species of seeds in 68 genera and 33 families were identified. Species diversity followed a clear seasonal pattern related to fruit availability, with the highest diversity during February and November and a period of low diversity caused by low fruit abundance from June through August. Most species (45%) were only encountered once while only 10% or all species were found in more than 10 samples indicating that tapirs are opportunistic foragers. The most frequently found species was *Mauritia flexuosa* followed by a Bombacacea, *Ficus sp.*, *Perbea sp.* and *Genipa americana*. *Ficus* was the most frequent and diverse genus. Seeds ranged in width from <1 mm to 25 mm. 81% of all species consumed by tapirs were <10 mm in width and species >15 mm only showed up in 6 to 14% of all samples. The size distribution of seeds found in tapir feces generally followed the size distribution of seeds found in the forest with a somewhat lower proportion of seeds found in the smallest size class <2.5 mm and more seed found in the largest size class 20-25 mm. The diversity of seeds found in tapir dung in this study was much higher than in other studies. The high number of small seeds showed that tapir compete for fruits with other frugivores such as brocket deer and peccaries. They are potential dispersers for a large number of species, some of which are only dispersed by large primates and tapirs.

Camera Trapping of *Tapirus bairdii* (Gill, 1865) in the South Area of the Calakmul Biosphere Reserve, Campeche, Mexico

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With the goal of generate baseline information about priority species that inhabit the south area of the Calakmul Biosphere Reserve we conducted a preliminary survey during the dry season to detect large mammals species by the camera trapping method. We used 20 cameras trapping (Deer-Cam DC300). The cameras were placed in three areas: ponds, old human paths and on the course of dry streams within the communal forest of two *ejidos*: Conhuas and Xcupilcacab. Sampling was carried out from January to June 2007. We obtained 23 records of tapir (*Tapirus bairdii*) presence that are believed to represent two females and two males according with the minimum estimate of home range. In four of the seven ponds sampled we obtained the majority of records of this species. This finding highlights the importance of these water-bodies for tapirs during the dry season. Additionally, tapirs are a key species suitable to elaborate conservation strategies that includes protection of the habitat at a local and regional scale. Tapirs also can be used as indicators of the ecosystem health as well as an umbrella species that if is protected will protect other species that share the area.

Population Genetic Analysis of *Tapirus terrestris*

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The genetic structure of *Tapirus terrestris* was investigated using sequences (1135 bp mtDNA) of the cytochrome *b* mitochondrial gene. Inferences were based on the analysis of 21 individuals from Ecuador, Venezuela, Brazil and French Guiana. Animal originating from Ecuador are separated in two distinct clades. Those coming from French Guiana were also separated in two clades: one corresponding to animals coming only from FG and one with animals from the East of the country, clustering with some Brazilian animals. The populations are at mutation-drift genetic equilibrium, with no signal of expansion. Haplotypic and nucleotidic diversities ranged from 1.00 to 0.02 and 0.003 to 0.007, respectively, and were comparable among sampling sites. Information from mitochondrial DNA were completed with the study of nuclear DNA polymorphism in population of Ecuador (n=19) and French Guiana (n=37). Both populations did not present excess or deficit in heterozygote and are at the equilibrium; both showed high and comparable genetic diversity, ranging from 0.70 to 0.90. No signal of demographic expansion could be detected. Despite the geographic distances between the sampling localities, migrants were detectable with both markers (Nm = 1.5 with haplotype information, and 2.2 with nuclear information). This result is in concordance with a continuous and suitable habitat in the northern South America, maintaining gene flows, and highlights the importance of a wide and transboundary conservation initiative in the region.

Chemical Restraint, Hematology and Blood Parasites of Free Ranging Mountain Tapirs in the Central Andes of Colombia

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Mountain tapirs (*Tapirus pinchaque*) were captured at Los Nevados National Park, Colombia during an ecological study of collared individuals. Five tapirs between 130 and 200 kg were immobilized using a 2 mg Medetomidine and 30 mg Butorphanol preparation in a dart, and applying 10 mg Atipamizole and 150 mg de Naltrexone as antagonists. Duration of induction, recumbence and recuperation periods supported this method as rapid, light and secure. Based on hemograms significant differences in leucocytes, lymphocytes and eosinophyles levels between two collared tapirs and reference values were found. Two tick species (*Amblyomma multipunctum* and *Ixodes scapularis*) were identified. *Ex-situ* samples from a tapir maintained by Corporación Regional del Alto Magdalena (CAM) were also analyzed, obtaining significant differences in lymphocytes and eosinophyles levels compared to reference values. Furthermore, this tapir differed significantly from wild tapir in hematocrite, hemoglobine, VCM, HCM, total protein, leucocytes, eosinophyles and platelet levels. Ticks (*Boophilus microplus*) were registered on the captive animal. This study contributes important data on tapir health for *in situ* as well as *ex situ* conservation programs.

Implementation of the First Extensive Conservation Unit for Baird's Tapirs in Mexico

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In southern Mexico and the rest of the tropical region, a series of environmental and evolutionary processes have favored the existence of tropical forests that house extremely diverse biological communities (Krebs 1994; Terborgh 1992). Among the multiple species that inhabit these jungles, large herbivores such as the ungulates (tapirs, peccaries and deer) stand out because of their important functions as herbivores, dispersing and spreading the seeds that contribute to the maintenance of the natural structure and dynamic (Fragoso 1994; Naranjo 2002). In the Sierra Madre de Chiapas, the El Triunfo Biosphere Reserve was declared more than 20 years ago to aid the conservation of these important vertebrate species, including the tapir. Work in the area has diminished hunting and habitat loss while initiating several conservation schemes, one of which is presented here. Some landowners in the reserve and its surroundings have witnessed the benefits that accompany conservation, which is why between Finca Arroyo Negro and Monte Bonito they conserve more than 600 hectares. They are beginning efforts to establish an UMA (extensive habitat area) for the tapir. These lands are within the El Triunfo Reserve, and they seek to declare the entire property as an area of conservation for the species. Research has begun to determine the status and population of the species in the region, as well as activities to conserve its habitat. Located at 900 to 1500 meters above sea level, with jungle vegetation, as well as pine forest, the general area covers an extension of nearly 2000 hectares. Arroyo Negro is a coffee farm that for the past several years has cultivated shade-grown, high-altitude organic coffee, and as part of its mission carries out other conservation activities, most notably the preservation of biodiversity. There will be continuous long term monitoring of tapir populations in the area, with the purpose of learning about the population tendencies, as well as application of different methods of study including motion-sensor photography, monitoring visits, food habits observation, biomedics, along with others to reach an analysis of the threats that confront these populations.

Ecology of the Central American Tapir (*Tapirus bairdii*, Tapiridae) on a High Elevation Mountain Cloud Forest of Costa Rica

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The Central American Tapir is the largest native mammal in the neotropics, and it is considered endangered due to habitat loss and over-hunting. In its entire range the research on mountain ecosystems still remains poor. This study aims to develop valuable information about the ecology of the species in this type of habitat. The objectives of the project were: 1) to determine the diet, 2) habitat use; and 3) relative abundance of the species in mountain ecosystems, the entire research was carried out in Cerro Dantas Wildlife Refuge, a Mountain Cloud Forest located in the Central Volcanic Range of Costa Rica. From March 2004 to April 2005, we sample for tracks and feces of the species using three defined trails: 1) La Calzada (trail; 1km), 2) Paja de agua (water spring; 1.5 km); and 3) Catarata (Waterfall; 1km). A total of 55 fecal samples were collected, where the third trail showed the highest feces abundance (42 fecal samples). The occurrence-versus-weight frequency analysis showed that the feces composition were highly similar ($p < 0.0001$). Leaves were the most abundant part found in the total of feces, which also include seeds and stems ($p < 0.0001$), and it was also the heaviest ($p = 0.0001$). A light interaction between the season and the components of the feces was found ($p < 0.0001$, $p < 0.99$, $p < 0.0001$), but a strong interaction between the weight of these components and the season was determined ($p < 0.0001$, $p < 0.99$, $p < 0.0011$). An index of 1.12 feces/km relative abundance was estimated in

31.5 km sampled. Sixty-nine plant species in 45 families were identified as potential diet for tapir in the zone, where 18 were already reported on the literature. Also, 32 plant species, in 20 families, were found with branching marks made by tapir, and other 3 species were identified through feces. On our study area, the tapir prefers high slope areas (more than 30%) probably for resting and defecation ($p < 0.05$). We discuss the high potential of these kinds of habitats for tapir, the high abundance found, and the need for further research in order to fully understand the ecology of the species in these important biodiversity reservoirs in Central America.

Medical Training in Protected Contact with *Tapirus terrestris*

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The behaviour of the tapir in captivity is unpredictable; therefore special precautions have to be taken when handling the species *ex situ*. In order to develop safe working methods to ensure better care of the captive population of these animals, a new training scheme has been implemented through protected contact, aiming at better clinical management of the species *Tapirus terrestris*. At the Centre for Species Reproduction in TEMAIKEN (CRET) there are at present three specimens of South American tapir, two females and one male, lodged in separate compounds. As a first step, a handling area was set up with protective barriers to train these animals. All the working sessions were carried out in a protected environment, avoiding direct contact of the handlers with the animals. The sessions lasted no more than 20 minutes and were carried out once a day. They included both positive and negative encouragement techniques, such as giving them apples and fondling for the former; and saying the word NO and time out, for the latter. In all cases a clicker was used as bond stimulus. Targets and voice commands were used to achieve basic motions and desired positions in the handling area. Special strategies were devised for the clinical care of the species in general, and for each individual animal in particular. The training procedure in a protected environment has resulted in the welfare of this species in TEMAIKEN. The animals were handled without need of locking them up in containment compounds or sedating them; and veterinary care was provided, both in prevention and cure. In addition to this, biological samples were obtained (blood, milk, swabbing, biopsies, etc) which are essential for sanitary control and for the physiological research of the species. Monthly weight variations were recorded and imaging diagnosis was carried out, through echography and X-rays. As an added bonus, these practices resulted in diminished aggressiveness of the animals towards the keepers and the other members of the species. In conclusion, there is clear, empirical evidence of the importance of implementing the protected environment technique for better animal welfare and safer handling practices. We, therefore, strongly recommend the implementation of this training procedure on all captive specimens of *Tapirus terrestris*.

Basic Physiological Variables of Five Free Ranging Mountain Tapirs in the Central Andes of Colombia

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The mountain Tapir (*Tapirus pinchaque*) is one of the most endangered large mammals of the world and is the largest mammal in the tropical Andes. Basic physiological variables were taken from five immobilized mountain tapirs (*Tapirus pinchaque*), four females and one male, that were captured in Los Nevados National Park between August 2006 and March 2007 to accomplish studies of habitat use using GPS telemetry. The animals were immobilized with darts (5 ml Dan Inject Inc. Denmark) loaded with 30mg of Butorphanol and 2mg of

Medetomidine. Body length (head-tail length) was measured with a flexible measuring tape, while vital signs were obtained with a stethoscope and a digital thermometer. Respiratory rate was estimated through direct observation. Temperature, respiratory rate and cardiac rate were monitored during immobilization taking measures every 10 minutes. Mean length was 185 cm with females slightly larger than males. Female averaged 198 cm while the single measured male was 175 cm. It was not possible to weight all individuals (incl. one pregnant female) due to its size, which did not allow lifting it. Mean weight was 150 kg. Female mean weight was higher (165 kg) than the male (130 kg). Mean heart rate was 59/min and mean respiratory rate was 20.5/min. Rectal temperature was measured at four of the five animals and varied between 33°C and 35.7°C.

Positive Reinforcement Training to Facilitate Medical and Husbandry Management in Malayan Tapirs (*Tapirus indicus*) at the Singapore Night Safari

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The Singapore Zoological Gardens is home to 3.5 Malayan Tapirs. 2.4 animals are housed at the Night Safari, and the Singapore Zoo exhibits a family group of 1.1. In addition to general management and daily husbandry activities, medical check-ups are performed regularly to monitor the health status of our Tapirs. Routine procedures include regular weighing, TB testing, blood sampling, chest-X-rays and trans-abdominal ultrasound imaging i.e. to monitor pregnancies. As Malayan Tapirs are known for their unpredictable nature, anesthesia would be required for most of these procedures to be carried out safely. To avoid the risk involved with anesthesia, the Tapirs, as well as many other animals at Singapore Zoological Gardens, are trained to voluntarily cooperate in husbandry and veterinary procedures through the use of positive reinforcement methods. This presentation will give an introduction to the general management of the Malayan Tapirs at the Night Safari of Singapore Zoological Gardens and the training methods used to facilitate husbandry and routine medical procedures without anesthesia. Furthermore this presentation will discuss the outcome as well as the costs and benefits of such training methods with respect to safety, keeper's time-management and feasibility.

Evaluation of Lowland Tapir Density and Hunting Pressure in two Protected Areas of Colombia: A Starting Research

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Lowland tapir has a wide distribution in Colombia, mainly in the Orinoquia and Amazonia regions. Those two large regions cover about 50% of the country, and probably harbor the most significant populations of lowland tapirs in it. However, since Orinoquia region is mainly dominated by savannas, in contrast to the forested Amazon region, tapir abundances are probably very different among those two regions. Unfortunately, lowland tapir densities in Colombia are poorly known. With few exceptions in the Amazon region, very little have been published on actual estimations of tapir population abundances through their range in this country. On the other hand, there is important hunting pressure on lowland tapir populations in Colombia, both in the Orinoquia and Amazon regions. Estimations of hunting levels are also scarce, although a little more information is available for specific sites, mainly in Amazonia. Most of hunting data come from subsistence hunting estimations at forested areas inhabited by indigenous groups. However, evaluations of how sustainable are the estimated hunting is limited by lack of information on actual tapir abundance in those areas. Differences in tapir density between Orinoquia and Amazonia could not only reflect habitat carrying capacity differences between those two regions, but also they could result in different susceptibility to hunting. To address the possible differences in tapir densities and hunting pressure between Orinoquia and Amazonia in Colombia, we are starting a two-year research in two pilot sites, one at the Orinoquia region (National Park El Tuparro) and another at the Amazon region (National Reserve Puinawai). This research is addressing also other ungulate species in those regions,

mainly collared and white-lipped peccary. This research is being conducted by the Research Group in Wildlife Conservation and Management of National University of Colombia, and involves several researchers, as well as graduate students. This presentation aims to provide background information on this project and its main objectives.

Husbandry Training Program for a Successful Blood Draw on a New Born Malayan Tapir Calf (*Tapirus indicus*)

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On July 3rd 2007, the Woodland Park Zoo's female Malayan tapir (*Tapir indicus*) gave birth to an 11.8 kg female calf. This was the fourth birth for our 1.1 tapirs in a span of nine years. This also was the first female and only the second calf to survive from this breeding pair. In an effort to increase our ability to evaluate the calf's growth and well being, animal care staff made a decision to begin calf and dam separation as well as conditioning the calf to routine vet exams, daily weights, vaccinations, and weekly blood draws. WPZ husbandry guidelines currently call for protected contact management of adult tapirs. For this reason the first step in training was to desensitize the dam to allow staff to separate her from the calf. This was accomplished by shifting the dam into a holding stall right next to the calf and rewarding the dam with food items. The calf was rewarded for being separated with physical contact by scratching her head, ears, neck, and rear. This reward relaxed the calf enough to lie down on her side where we were able to stretch out a back leg and observed a raised vein along the inside surface of the thigh (medial saphenous vein). Training began on day three after birth. The next step was to introduce a pen cap and apply pressure to skin over the target region and this training was captured on day 13 after birth. The final step in the training was to replace the pen cap with the sharp end of a paper clip to simulate a needle. Small increments of time were used until separation of the dam and calf could be performed for periods up to 45 minutes. The first successful blood draw was at day 37 after birth and was performed by WPZ veterinary staff. Routine blood samples were collected from this tapir using behavioral training for all but the initial neonatal exam. Routine blood sampling detected a subclinical anemia and facilitated collection of further blood testing, providing an early diagnosis of iron deficiency anemia. Response to treatment was evaluated through regular blood samples collected under operant conditioning. All blood samples were collected from the medial saphenous vein using a 23-gauge butterfly needle attached to a 3-cc syringe. Response to treatment was positive and symptoms of anemia were never observed. In this case, without the development of the training program, we may never have diagnosed the anemia until the calf began to display clinical symptoms. A search of the available literature regarding anemia in Malayan tapirs revealed little data available on normal blood values, particularly in neonates. Colleagues are encouraged to train tapir calves for blood draws. The cooperative and intelligent nature of tapirs combined with training techniques that facilitate animal relaxation and socialization with caretakers enhances welfare for all aspects of tapir management in captivity.

Notes on Twinning in the Malayan Tapir (*Tapirus indicus*)

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Malayan tapirs are only limited to Southeast Asia and classified as Vulnerable on the IUCN Red List 2004. The species is totally protected in Peninsular Malaysia under the Protection of Wildlife Act No. 76, 1972. There are 32 captive Malayan tapirs within the country with 72% housed within Department of Wildlife and National Parks facilities. In 1995, a displaced female Malayan tapir was acquired from the wild and kept in a zoo. In 2006, she was transferred to the Malayan Tapir Conservation Centre and subsequently bred. She gave birth to a set of twins, born 13 days apart of each other, after a gestation length of 371 days. The first calf, a female, named "May", weighed 10kg and was followed by the 9kg male calf named "Junior". "Junior" was removed at Day 5

for hand-rearing and fed fresh ultra heat treated (UHT) low fat milk (Dutch Lady ®) at 10 – 15% body weight. Analysis of the dam's milk showed a very low fat composition of 1.74%. His milk intake increased from at 1.2 liters at Day 5 to 5.3 liters at 4 weeks and 9 liters at 8 weeks. He defecated every 2-3 days and urinated 3-4 times daily. The daily weight gain for "May" and "Junior" was 900 and 768 grams respectively. Twinning is very rare in tapirs. To date, only three occurrences of twinning have been recorded, involving the Lowland tapir and in all cases, one of or both twins died soon after birth. This twin birth is a first for the Malayan tapir in captivity with both calves still surviving. This is attributed to the removal of the second calf for hand-rearing and perhaps the use of UHT low fat milk as a milk substitute. The 13 day interval between the two births is the longest record for an ungulate species.

KEYNOTE SPEAKERS

The IUCN Species Survival Commission (SSC) and Species Programme

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The IUCN Species Survival Commission (SSC) is a science-based network of some 7,000 volunteer experts from almost every country of the world, all working together towards achieving the vision of "A world that values and conserves present levels of biodiversity." SSC's major role is to provide information to IUCN on biodiversity conservation, the inherent value of species, their role in ecosystem health and functioning, the provision of ecosystem services, and their support to human livelihoods. SSC members also provide scientific advice to conservation organizations, government agencies and other IUCN members, and support the implementation of multilateral environmental agreements. The IUCN Species Programme supports the activities of the IUCN Species Survival Commission and individual Specialist Groups, as well as implementing global species conservation initiatives. It is an integral part of the IUCN Secretariat and is managed from IUCN's international headquarters in Gland, Switzerland. The Species Programme includes a number of technical units covering Species Trade and Use, the Red List, Freshwater Biodiversity Assessments and the Global Biodiversity Assessment Initiative. This presentation will outline in more detail the structure of the SSC and Species Programme and how its staff and functioning can help to support and implement the important work of the SSC Tapir Specialist Group as well as international conservation work on tapirs as a whole.