

Tapir Conservation

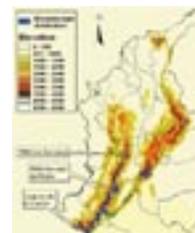
The Newsletter of the IUCN/SSC Tapir Specialist Group

www.tapirspecialistgroup.org

Edited by Leonardo Salas and Stefan Seitz



- From the Chair
- TSG Committee Reports
- Project Updates
- News from the Field
- Contributed Papers
- Ask the Experts
- TSG Membership Directory



Printing and distribution of the Tapir Conservation Newsletter is supported by the Houston Zoo Inc., 1513 N. Mac Gregor, Houston, Texas 77030, United States, <http://www.houstonzoo.org>

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Tapir Conservation

Abbreviation	Tapir Cons.
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Production & Distribution	This issue is kindly sponsored by Houston Zoo Inc., Cons. Program Asst., Kelly Russo, 1513 North Mac Gregor, Houston, Texas 77030, USA.
Website	www.tapirspecialistgroup.org

From the Chair

Letter from the Chair Patrícia Medici

This time around I would like to start this letter by stating how thrilled and awed I am by the level of involvement and commitment of Tapir Specialist Group members. It is fantastic to see how well our TSG structure has been functioning, how wonderfully our committees have been progressing with their goals and actions, and how hard our members have been working. It is truly amazing to observe the commitment and dedication of so many people spread all over the planet. It is mind-boggling to think that it is all voluntary work and that most of these people actually use money from their own pockets to be able to conduct their activities within the group. I strongly believe that the TSG network has reached a level of communication, cooperation and effectiveness never before seen in the history of the group, which certainly has very positive effects on the quality of our work.

As you will probably remember, during the Second International Tapir Symposium held in Panama in January 2004, we developed the TSG Plans for Action 2004-2005. This document consisted of a list of short-term priority goals and actions that we, as a group, should achieve if we were to be more effective advocates for tapir conservation. The document included an ambitious list of **27** priority goals and **55** specific actions that we committed to put into practice before the Third Symposium in Argentina in January 2006. As one of the many activities we have been conducting in order to get prepared for the Third Symposium, we are reviewing the TSG Plans for Action in order to be able to make a presentation in Argentina and inform everyone about the actions that have been completed. So far, my reckoning is that over the past 19 months we have achieved **70%** of the actions listed on the Panama document, which is really impressive and proves my point that our membership is working harder and harder every day.

On the action planning front, we have just come back from Belize, Central America, where we held the

“Baird’s Tapir Conservation Workshop: Population and Habitat Viability Assessment (PHVA)” from August 15 to 19, 2005, the third workshop of a series of four, and another very successful meeting for the TSG. We had 60 participants from Belize, Colombia, Costa Rica, Guatemala, Honduras, Mexico, and Panama, as well as a number of TSG officers and international participants. Considering that there are four tapir species, and that three of them (Malay, mountain and Baird’s tapirs) have been the focus of previous PHVA workshops we have now finalized 75% of the second version of the Tapir Action Plan. We are now left with one last species to work with – the lowland tapir – and this fourth PHVA Workshop will be held by late 2006



Participants of the Baird’s Tapir Conservation Workshop: Population and Habitat Viability Assessment (PHVA), held in Belize, August 2005.

or early 2007 in Brazil. For further details about the PHVA workshops please see the article included in this issue.

Speaking of action planning, I would like to let you know that the Colombian Ministry of Environment has printed and distributed the “Programa Nacional para la Conservación del Género *Tapirus* en Colombia” (National Program for the Conservation of the Genus *Tapirus* in Colombia). The Colombian Action Plan was developed through an inter-institutional partnership between the Colombian Ministry of Environment and the Natural Science Institute of the National University of Colombia, as part of a National Strategic Plan for Endangered Species Conservation in the country. The preliminary version of the document was written by



Cover of the briefing book published for the Baird's Tapir Conservation Workshop in Belize.

TSG member Olga Montenegro and discussed during a national workshop held at the Otún-Quimbaya Flora and Fauna National Sanctuary in August 2002. Fifty professionals attended the workshop, including representatives of the Ministry of Environment, regional environmental agencies, national parks, zoos, research institutions, universities and TSG members. The publication of this document is a major achievement given the fact that the Ministry of Environment officially recognizes tapirs as priority species for conservation under the Colombian policies. Each action listed in the document can be easily turned into a project, therefore the document can be seen as a strategic plan with measurable achievements that can be followed through time, with specific goals and expected results. Moreover, the document also represents the first updated National Action Plan for a tapir range country, which is one of the goals outlined in the Panama meeting.

A major task we have been taking care of right now is the organization of the Third International Tapir Symposium, which will be held in Buenos Aires, Argentina, from January 26 to 31, 2006. The First International Tapir Symposium, held in San José, Costa Rica, in November 2001, and the Second International Tapir Symposium, held in Panama City, Republic of Panama, in January 2004, attracted hundreds of tapir experts and conservationists from over 30 different countries, and proved to be critical occasions for tapir conservation worldwide. The Third International Tapir Symposium, which is being organized by the TSG, the Fundación Temaikén in Argentina, and the Houston Zoo Inc., will once again bring together a multi-faceted group of tapir experts, including field biologists, environmental educators, captivity specialists, academics, researchers, veterinarians, governmental authorities,

politicians and other interested parties. The first part of the symposium will consist of presentations by tapir researchers, keynote speakers and other professionals addressing tapir biology, research, conservation, and management. Session topics will cover a wide range of issues relevant to tapir conservation, such as field research, population management, husbandry, fundraising, marketing, governmental regulations, eco-tourism, education, veterinary issues etc. The second part of the symposium will be devoted to reports from all TSG committee coordinators, and workshops addressing some of the most serious issues facing tapir conservation today, such as action planning, tapir husbandry and captive management, tapir biogeography and paleontology, tapir/human conflicts, and tapir management (reintroductions and translocations). Additionally, we will review the goals and actions listed in the TSG Plans for Action 2004-2005 developed in Panama, and work on a brand new plan of action for the group. All sessions will be conducted in English and simultaneously translated into Spanish. This third symposium promises to be even larger and more successful than the first two meetings and at least 150 participants from over 25 countries are expected to attend the third one. The institutional supporters of the symposium are the American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG) and the European Association of Zoos and Aquaria (EAZA) Tapir Taxon Advisory Group (TAG), and the funding will come from conservation organizations, mostly zoological institutions, in the United States and Europe.

Something else worth mentioning is the production of a tapir documentary by Sky One satellite Television in the United Kingdom. TSG member Charles Foerster, who has been conducting field



Cover of the National Program for the Conservation of the Genus *Tapirus* in Colombia, published by the Colombian Ministry of Environment.

research on Baird's tapirs in Corcovado National Park, Costa Rica, for the past eleven years, was visited by Tiger Aspect documentary filmmakers for the making of "Final Chance to Save..." which broadcasted on Sky One TV in early September. Sky One introduces the start of a new documentary series that highlights the potential extinction of some of the world's most famous species. Working with Tiger Aspect Productions, the series follows a team of experts assisted by a well-known personality. Each documentary highlights the plight of the world's most endangered animals, including the orangutans of Borneo, Kenya's black rhino, Costa Rica's tapirs and the Caribbean's sea turtles. In the case of the tapir documentary, the celebrity involved was the British comedian, Vic Reeves. "Final Chance To Save" also explains what individuals can do to assist with the conservation of the focal species, and both Sky One and the producers of the tapir show were very generous in agreeing to mention TSG and our work and what people can do to help. Additionally, Sky One has linked their website to the TSG website and we have been receiving dozens of e-mail messages from people in the UK who saw the documentary and want to make donations to the TSG Conservation Fund. The kind of publicity that the show brought to the general public is difficult to achieve on our own, considering that we do not have funds for media relationships in our budget.

All in all, our fantastic team of tapir experts, researchers and partners has been moving steadily towards achieving our goals and following our plans. Meanwhile, research on many fronts has also provided new clues vital for our conservation work. Carlos Pedraza reports about the population genetics work his team of TSG members is conducting (a combination of GIS and genetics) to survey Mountain tapir populations in Colombia. Their methodology will represent an important step forward for tapir conservation because it will hopefully allow researchers to census and survey animals with direct non-invasive evidence and also measure potential detrimental effects of fragmentation. Similarly, the WildTrack project is gathering data for the development of preliminary tools for surveying tapir populations with footprints, which is also of paramount importance, because this method could be readily used by any field researcher at a very low cost. Wilson Novarino reports findings with his camera trap study on Malay tapirs and how they use their habitat, while a new publication with the first report of tapir copulation, gestation length and interbirth interval was put out by Juan de Dios Valdez Leal. You will read about all these above research results and progress achievements in this issue of the Newsletter.

I am sure you will find our collective work and synergism as impressive, humbling and awe-inspiring as I do. Let's keep up this momentum.

Hope to see you all in Buenos Aires in January.

My very best wishes from Brazil,

Patrícia Medici

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**Heidi Jean Frohring,
1967-2005**

By Patrícia Medici & Sheryl Todd

It is with great sadness that we write to inform our *Tapir Conservation* Newsletter readers that our dear friend Heidi Frohring, tapir keeper at the Woodland Park Zoo in Seattle, Washington, United States, passed away on May 1st, 2005.



Heidi Frohring and one of her charges, a Malay tapir baby at the Woodland Park Zoo, Seattle.

You might have met Heidi around the tapir enclosure at the zoo. If you did, you would not forget her. Tall, red-haired, vivacious, and always happy to talk to



**Heidi Frohring
visiting Patrícia
Medici in Brazil,
2001.**

Patrícia Medici

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visitors about the Malay tapirs she cared for so much, and about her belief that tapirs in zoos are ambassadors for the endangered animals in the wild. Heidi was an amazing keeper with respect to her attitude towards both the animals and the visitors, and she was a person with irrepressible energy and personality.

In 1998, when Pati (Patrícia Medici) had just started her lowland tapir work in Brazil, Heidi got the Woodland Park Zoo involved supporting the project and IPÊ and WPZ started a partnership that lasts until today. She was also a generous contributor to tapir field research, and made several donations to Pati's project. In 2001 Heidi spent three weeks visiting Morro Do Diabo State Park in Brazil and helping Pati's team with a tapir capture round. Also in 2001, Heidi became a member of the IUCN/SSC Tapir Specialist Group (TSG) and always worked hard to promote tapir conservation worldwide, both in captivity and in the wild.

Heidi's passing has left a huge sadness in many lives. But she was a fun-loving person, and we try to remember her that way.

Her family has suggested creating a memorial in her honor through contributions made to the Tapir Preservation Fund. Hence, the Heidi Frohring Memorial Fund will be kept as a perpetual memorial by the Tapir Preservation Fund. Donations will be used for the tapir projects we believe Heidi would have wanted to fund most. As of August 2, 2005, US\$ 2,595 has been donated. Our many thanks to the contributors to this fund.

The first disbursement of Heidi's fund was to help support Elena Rivadeneyra's Baird's tapir project in Mexico, titled: "Hábitos Alimentarios del Tapir (*Tapirus bairdii*) en la Reserva de la Biósfera Montes Azules, Chiapas, México" (Feeding Habits of the Tapir (*Tapirus bairdii*) in the Montes Azules Biosphere Reserve, Chiapas, Mexico). Support covers US\$ 200 per month and runs from June 2005 to December 2005 or January 2006. Ongoing donations are very welcome, because our goal is to keep a support base in Heidi's fund for additional and future projects.

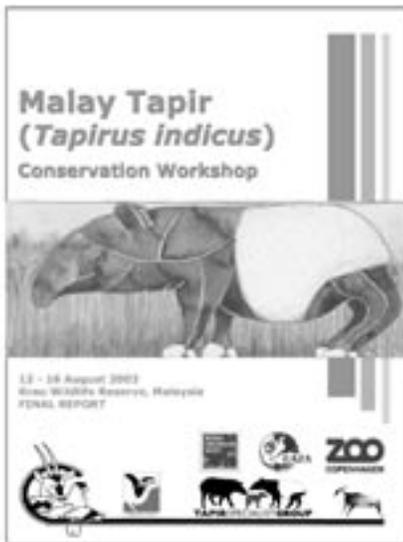
TSG Committee Reports

Action Planning for Tapir Conservation

By Patrícia Medici & Siân Waters

Action plans are designed to promote species conservation strategies backed by sound scientific information, which is synthesized and translated into prioritized conservation recommendations suggesting realistic solutions through specific actions. These documents are designed for any person or decision-making body to promote or catalyze conservation action financially, technically, or logistically, influencing key players in the conservation sphere at local, national, regional, and global levels. They provide a common framework and focus for a range of players from decision-makers at the governmental level, to those who will implement the conservation recommendations on the ground. Scientists, resource managers, agency officials, funding organizations, universities, zoological institutions, and political leaders utilize them when deciding how to allocate available resources. Action plans give all available information needed to explain why species conservation actions must be undertaken, including the conservation status of the species and major problems associated with its viability and long-

term survival; they also provide specific management recommendations to conduct to maintain or improve species' population levels and mitigate threats. Action plans are also "snapshots in time", providing a baseline set of data and information against which to measure change and monitor progress, indicating where changes of emphasis or direction may be needed to conserve the species. Further, they identify gaps in species research and policy and give direction for future endeavors on what data and knowledge are needed most. Lastly, Action Plans are "living documents", to be reviewed and updated periodically as our knowledge on the species and conservation problems improve over time.



Cover of the Malay Tapir PHVA Final Report, published and distributed in 2003. This report is available online on the TSG website and can be downloaded in PDF format.

For the past three years, our TSG Action Planning Committee has been working tirelessly, making every effort to conclude the work of revising and updating the first version of the IUCN/SSC *Tapir Status Survey and*



Cover of the Mountain Tapir PHVA Final Report, published and distributed in 2005. This report is available online on the TSG website and can be downloaded in PDF format.



MOUNTAIN TAPIR PHVA:

Jessica Amanzo, field researcher from Peru, presenting results of the Population Biology working group.



MOUNTAIN TAPIR PHVA:

Dom Ovidio Paya, Governor of the Cabildo Indigena de Gaitania in Tolima, Colombia, presenting results of the Community Participation working group.

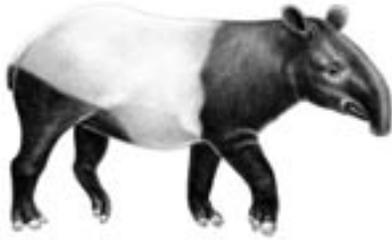
Conservation Action Plan edited by Daniel Brooks, Richard E. Bodmer and Sharon Matola in 1997. To that end, we would like to inform you all that we have all just come back from Belize, Central America, where



MOUNTAIN TAPIR PHVA:

Regional and International Cooperation working group.

MALAY TAPIR CONSERVATION WORKSHOP
Population and Habitat Viability Assessment (PHVA)



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Location: Lanchang Training Center, Krau Wildlife Reserve, Malaysia

Date: 12-16 August, 2003

Number of Participants: 35 (Malaysia - 21; Indonesia - 4; Thailand - 3; TSG Officers, CBSG Facilitators and International Participants - 7)

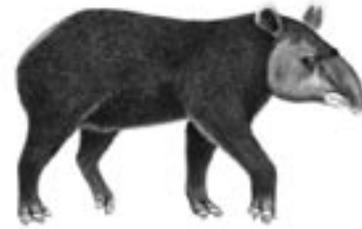
CBSG Facilitator(s): Amy Camacho (CBSG Mexico)

CBSG Modeler(s): Philip Miller (CBSG HQ)

Organization/Institutional Support: IUCN/SSC Tapir Specialist Group (TSG); European Association of Zoos and Aquaria (EAZA) Tapir Taxon Advisory Group (TAG); IUCN/SSC Conservation Breeding Specialist Group (CBSG); Malaysian Department of Wildlife and National Parks (DWNP); and American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG).

Financial Support: Copenhagen Zoo, Denmark; Malaysian Department of Wildlife and National Parks (DWNP); Wildlife Conservation Society – Thailand; and Idea Wild, United States.

MOUNTAIN TAPIR CONSERVATION WORKSHOP
Population and Habitat Viability Assessment (PHVA)



© Stephen Nash 2003

Location: Otún-Quimbaya Fauna and Flora Sanctuary, Pereira, Colombia

Date: 12-15 October, 2004

Number of Participants: 66 (Colombia - 49; Ecuador - 8; Peru - 1; TSG Officers, CBSG Facilitators and International Participants - 8)

CBSG Facilitator(s): Amy Camacho and Luis Carrillo (CBSG Mexico)

CBSG Modeler(s): Philip Miller (CBSG HQ)

Organization/Institutional Support: IUCN/SSC Tapir Specialist Group (TSG); Colombian Tapir Network, Colombia; IUCN/SSC Conservation Breeding Specialist Group (CBSG); American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG); European Association of Zoos and Aquaria (EAZA) Tapir Taxon Advisory Group (TAG); and Houston Zoo Inc., United States.

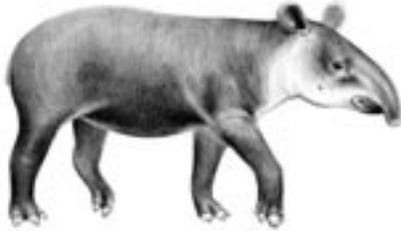
Financial Support: American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG), United States; World Wildlife Fund (WWF) – Colombia; Conservation International – Colombia; Unidad Administrativa Especial del Sistema de Parques Nacionales Naturales de Colombia (UAESPNN); U.S. Fish and Wildlife Service, Division of International Conservation, United States; Houston Zoo Inc., United States; Copenhagen Zoo, Denmark; Los Angeles Zoo, United States; and Cheyenne Mountain Zoo, United States.

we held the “Baird’s Tapir Conservation Workshop: Population and Habitat Viability Assessment (PHVA)” from August 15 to 19, 2005, the third workshop of a series of four, and another very successful event for the Tapir Specialist Group. We had approximately 70 participants from Belize, Colombia, Costa Rica, Guatemala, Honduras, Mexico, and Panama, as well as a number of TSG officers and committee coordinators and members, and international participants. We are all extremely satisfied with the results of the workshop and we now have clear and concrete actions to be put into practice in the short, medium and long-term in order to conserve this endangered species.

As you will probably remember, a few years ago we selected the PHVA methodology as the most appropriate and efficient way to develop updated versions of the Action Plans for each one of the four tapir species.

Many different tools and processes can be used to evaluate the status of wildlife populations and to develop Action Plans. The PHVA workshop process is one of these tools and is designed to bring together the full range of groups with a strong interest in the conservation of the species in its habitat. This allows a shared understanding amongst all the stakeholders about the threats facing the species and of the diversity of perspectives surrounding its management. The primary focus of a PHVA workshop is a risk assessment of the *in situ* and *ex situ* populations and the development

**BAIRD'S TAPIR CONSERVATION WORKSHOP
Population and Habitat Viability Assessment (PHVA)**



© Stephen Nash 2003

Location: The Belize Zoo and Tropical Education Center (TEC), Belize, Central America

Date: 15-19 August, 2005

Number of Participants: 60 (Belize - 4; Colombia - 3; Costa Rica - 9; Guatemala - 11; Honduras - 6; Mexico - 11; Panama - 4; TSG Officers, CBSG Facilitators and International Participants - 12)

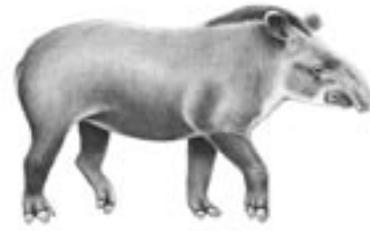
CBSG Facilitator(s): Amy Camacho and Luis Carrillo (CBSG Mexico)

CBSG Modeler(s): Philip Miller (CBSG HQ) and Anders Gonçalves da Silva (CBSG Brasil)

Organization/Institutional Support: IUCN/SSC Tapir Specialist Group (TSG); Houston Zoo Inc., United States; The Belize Zoo and Tropical Education Center (TEC), Belize; IUCN/SSC Conservation Breeding Specialist Group (CBSG); American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG); and European Association of Zoos and Aquaria (EAZA) Tapir Taxon Advisory Group (TAG).

Financial Support: Conservation International's Critical Ecosystem Partnership Fund (CEPF), United States; TSG Conservation Fund (TSGCF); Houston Zoo Inc., United States; U.S. Fish & Wildlife Service, Division of International Conservation, United States; Chicago Board of Trade Endangered Species Fund, Brookfield Zoo, Chicago Zoological Society, United States; Milwaukee County Zoological Gardens, United States; XCARET Zoo, Mexico; World Association of Zoos and Aquariums (WAZA), Switzerland; Nashville Zoo, United States; Sedgwick County Zoo, United States; Virginia Zoo, United States; Bergen County Zoological Park, United States; Los Angeles Zoo, United States; San Diego Zoo, United States; Franklin Park Zoo, United States; Omaha's Henry Doorly Zoo, United States; Jacksonville Zoo and Gardens, United States; Louisiana Purchase Zoo, United States; Wuppertal Zoo, Germany; BREC's Baton Rouge Zoo, United States; Connecticut's Beardsley Zoo Conservation Fund, United States; Brevard Zoo, United States; Lee Richardson Zoo, United States; and Private Donations.

**LOWLAND TAPIR CONSERVATION WORKSHOP
Population and Habitat Viability Assessment (PHVA)**



© Stephen Nash 2003

Location: Brazil (venue to be confirmed)

Date: Late 2006 / Early 2007
(exact dates to be confirmed)

Expected Number of Participants: 60 (Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guyana, Guiana, Paraguay, Peru, Suriname, Venezuela, TSG Officers, CBSG Facilitators and International Participants)

CBSG Facilitator(s): Patrícia Medici (CBSG Brasil)

CBSG Modeler(s): Anders Gonçalves da Silva (CBSG Brasil), Arnaud Desbiez (CBSG Brasil), and Alexandre Nascimento (CBSG Brasil)

Organization/Institutional Support: IUCN/SSC Tapir Specialist Group (TSG); Houston Zoo Inc., United States; IUCN/SSC Conservation Breeding Specialist Group (CBSG) - Brazil Regional Network; IPÊ – Instituto de Pesquisas Ecológicas (Institute for Ecological Research); American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG); and European Association of Zoos and Aquaria (EAZA) Tapir Taxon Advisory Group (TAG).

of recommendations for species conservation. In the PHVA workshop, structured analysis of problems is used to develop creative and inclusive solutions, goals and actions.

Considering that there are four tapir species, and that three of them have been the focus of previous PHVA workshops – Malay Tapir PHVA Workshop held in Malaysia in 2003, Mountain Tapir PHVA Workshop held in Colombia in 2004, and Baird's Tapir PHVA Workshop held in Belize in 2005 – we can now say that we have finalized 75% of the second version of the Tapir Action Plan, listing and prioritizing strategies and actions for the conservation of the three species and their remaining habitats. The English version of the Malay Tapir Action Plan, as well as Spanish and English versions of the Mountain Tapir Action Plan are available online on the TSG website and can be downloaded in PDF format. Spanish and English



MOUNTAIN TAPIR PHVA:
Population Biology working group.



BAIRD'S TAPIR PHVA:
Participants from Costa Rica.



MOUNTAIN TAPIR PHVA:
Community Participation Working Group.



BAIRD'S TAPIR PHVA:
Participants from Guatemala.



MOUNTAIN TAPIR PHVA:
Plenary Session.



BAIRD'S TAPIR PHVA:
Participants from Honduras.



BAIRD'S TAPIR PHVA:
TSG officers and representatives of the AZA Tapir TAG.



BAIRD'S TAPIR PHVA:
Participants from Belize.



BAIRD'S TAPIR PHVA:
Participants from Mexico.



BAIRD'S TAPIR PHVA:
Participants from Colombia.



BAIRD'S TAPIR PHVA:
Participants from Panama.



BAIRD'S TAPIR PHVA:
Dr. Philip Miller, Senior Program Officer of the IUCN/SSC Conservation Breeding Specialist Group (CBSG) presenting results of the Vortex modeling.

versions of the Baird's Tapir Action Plan will be available on the website in early 2006. We are now left with one last species to work with – the Lowland Tapir – and this fourth PHVA Workshop should be held by late 2006 or early 2007 in Brazil. For further details about the previous PHVA workshops and preliminary details about the upcoming Lowland Tapir PHVA, please see the information included below.

In addition, our TSG Country Coordinators keep working hard on the development of their National Action Plans for Tapir Conservation, and we should have at least 30% of these plans ready to be presented at the Third International Tapir Symposium to be held in January 2006, in Buenos Aires, Argentina. Besides producing the Species Action Plans through conducting PHVA Workshops, we strongly believe that the National Action Plans will have a very important role detailing the local/regional realities, conservation status and threats, developing specific goals and actions for each one of the tapir range countries in South and Central America and Southeast Asia. We do expect to have all Species Action Plans and National Action Plans finalized and online on the TSG website by the end of 2007.

A great deal of progress has been made with a lot of hard work going into fundraising and organizing these PHVA workshops around the world. However, the development and publication of these action planning documents cannot be the end of the task. The hardest part of this process is to carry out and accomplish all the goals and actions included in these plans. In order to do this, we believe that assistance and support must be provided to all those TSG members whose names appear beside actions in the Action Plans. To this end we have briefly discussed the development of an Action Plan Taskforce to be constantly reviewing the action plans and providing help and support for proposal development, writing and fundraising, political lobbying, technical assistance for genetic and epidemiological issues, husbandry issues, human/tapir conflict issues, management issues etc. The Malay Tapir Action Plan was developed over two years ago and is already at the halfway stage so we now need to assess how much progress has been made and how much more still needs to be achieved. Many other species action plans have been developed with lots of enthusiasm, hard work and money spent; yet, many sit on shelves never to be looked at again. We want to, and will, find a way to prevent that from happening to the tapir action plans, so please feel free to share your ideas with us on how we can make sure that all our goals in these plans are achieved.

Patricia Medici

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Marketing Committee and Website

By Gilia Angell

During the second half of 2005, TSG saw a rise in public interest in tapirs. Sky One Television of Great Britain aired its "Last Chance to Save... Tapirs" documentary, hosted by comedian Vic Reeves on 11 September. This generated many visits and emails to the TSG site and donations to the TSG Conservation Fund (TSGCF) of over US\$ 1,000. Tapir feature articles written by TSG members ran in AZA's *Communiqué* magazine (August 2005: William Konstant, TSG Deputy Chair) and Germany's *Mannheimer Morgen* newspaper (24 August, 2005: Stefan Seitz, TSG Member and Newsletter Editor). In addition, tapirs made some other curious appearances in the media: "Tapir" was item 18 across "a snouted animal" in the 2 October New York Times Sunday crossword puzzle! Julie Scardina of SeaWorld/Busch Gardens (United States) brought a tapir on the national Tonight Show with Jay Leno earlier this year as well. We are working to get a clip for our archive.

A "tiny artwork" print (5"x5") "Tapir Tapir" artwork by Evah Fan, was featured on Tiny Showcase, an online gallery which each week features a new piece of tiny artwork. Tiny Showcase displays new work weekly by nationally acclaimed and talented illustrators and artists from all over the U.S. Partial proceeds of the sales of "Tapir Tapir" were donated to TSG



Comedian Vic Reeves from Great Britain visiting Baird's tapirs at Corcovado National Park, Costa Rica. Credit: Sky One Television UK 2005.

Conservation Fund! The elevation of the tapir as an art object in a fine arts forum and subsequent exposure for TSGCF are much appreciated.

TSG also gained a very media savvy member in August following the Baird's Tapir PHVA Workshop in Belize: the U.S. Fish and Wildlife's Jeffrey Flocken. Flocken, a 15-year professional endangered species conservationist who has worked on giraffes, koalas and wild cats, among other species, has always had a soft spot for tapirs. With tapirs in mind, he has traveled to the tropics searching for them ten times, but has yet to see a tapir in the wild. In the very short time he has been a TSG member, Jeff has made two big pitches for tapirs:

1. Flocken engaged author Jeffery Masson (*When Elephants Weep*) to include tapirs in Masson's upcoming book *Jeffery Masson's 100 Favorite Animals*. Gilia Angell compiled a list of tapir publications to pique the author's interest in tapirs. Please feel free to contact Gilia if you have any articles or manuscripts available in English to share with Mr. Masson.
2. Nominated tapirs, Patricia Medici's work with tapirs and the upcoming Third International Tapir Symposium together as a story topic for a new media series called "Pura Vida" that will be airing on Hispanic Radio Network (HRN). The show will consist of 26 radio episodes on biodiversity programs, as well as two newspaper columns and a Hispanic focus group that will reach a huge national (U.S.) and international audience: HRN has 194 radio affiliates with an AQH audience of 705,000 listeners and a weekly CUME of 5.3 million, and HRN's 93 affiliate newspapers have a total circulation of 3.7 million.

Upcoming Marketing initiatives:

- Design official TSG letterhead for administrative use;
- Study and possibly model a tapir conservation campaign after the current and comprehensive EAZA's International Rhino Foundation/Save the Rhino campaign;
- Pitch tapir-themed articles written by committee members to alumnae magazines and other niche publications, in addition to targeted mainstream publications (to be determined) – we can help with ideas, support, etc., to those Committee members willing to assist with articles;
- Collect and archive more examples of tapirs in the media. Please share! Send your examples to post in the media archive: Gilia Angell (gilia_angell@earthlink.net) & Kelly Russo (kruosso@houstonzoo.org);
- Solicit the domain owner of "tapir.org" to donate the rights to this domain name when his ownership expires in March, 2006.

Our website content continues to grow with the addition of the following:

- Online Tapir Symposium registration;
- Photos of TSG members and participants in the Baird's Tapir PHVA in Belize, August 2005;
- News and News Archive area where all tapir articles, events, and online publications can be found;
- TSG press kit blurbs – easy to understand and memorable statements about the Tapir Specialist Group contained in a Word document appropriate for distribution to the media or for use in educational materials (in English);
- Educational Brochures designed by Kelly Russo, now translated into Bahasa, Spanish, and Portuguese;
- ALL TSG documents are available for download on our Downloads page – please check it occasionally for updates or if you are looking for a document.



"Tapir Tapir" titles this tiny artwork by Evah Fan.

Upcoming web projects include:

- Committee pages containing content written by each committee chair outlining each committee's goals and documents for distribution;
- Online tapir photo gallery, with indicated pictures available for publication use – fees charged for photo usage will go to the TSG Conservation Fund. Typical photo usage fees for photos used are US\$ 30-50 per photo. Please consider sharing your photos for publication – all photographers are credited and details cited. Please send Gilia Angell your highest resolution photos of your animals (150-300 Dots per inch [DPI]), with details about the shot. Shot ideas: Camera trap photos, wild tapirs in the field, wild baby tapirs, captive tapirs shown in a “natural” type enclosure – all tapir species needed;
- Investigate free options for getting our site higher on search engines.

Anyone wishing to help with any of the specific goals and actions above please e-mail Gilia Angell at gilia_angell@earthlink.net.

Gilia Angell

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Zoo Committee

By Siân S. Waters

Activities for the last few months include the acceptance for publication of a short article on current TSG conservation projects supported by zoos and zoo related activities, in the newsletter of the European Association of Zoos and Aquaria (EAZA). This article will be published in October.

Bengt Holst, the Chair of the EAZA Tapir & Hippo TAG kindly invited Patrícia Medici (TSG Chair) and myself (TSG Deputy Chair) to attend the EAZA Tapir & Hippo TAG held during the EAZA Annual Conference in Bath in the United Kingdom in September. Pati

gave a general presentation about TSG's activities followed by my brief introduction of what the TSG Zoo Committee has been doing and how European zoos can help TSG and tapir conservation in general. This led to a number of European zoos expressing interest in the work of the TSG and particularly in the TSG-endorsed projects list that is in the process of being updated (see this issue).

The final addition to the Tapir Husbandry & Management Package available in various languages off the TSG website is now complete. A volunteer, Maria Elisa Hobbelink, has compiled the list of simple environmental enrichment ideas for tapirs and has also translated it into Spanish. This is now available on the website. Wilson Novarino and Leo Salas have translated this document into the Indonesian language and this will be posted on the website soon. Maria Elisa is also translating the husbandry standards into Spanish to accompany the shorter guidelines already available in that language – very many thanks to Maria Elisa for her help with these tasks.

We are still looking for a volunteer to translate husbandry guidelines and the enrichment list into Thai. Anyone who would like to volunteer for this job should contact Alan Shoemaker – shoe@mindspring.com.

I would like to thank Alan Shoemaker for his invaluable help in persuading volunteers to help with the translation of the husbandry standards and guidelines. Please do distribute this information in the relevant languages to any tapir keepers or curators with whom you have contact as that's who they are for!!

I look forward to seeing many of you in Argentina.

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Project Updates

Lowland Tapir Footprint Identification Technique

By *Patrícia Medici*

As you will probably remember, the last issue of the *Tapir Conservation Newsletter* (Vol. 14/1, No. 17, June 2005) included an article about the development of a Footprint Identification Technique (FIT) for the four tapir species. The FIT is a non-invasive and cost-effective methodology, and may produce data accurate enough for identifying individual tapirs and, consequently, censusing and monitoring wild populations. For this purpose, the IUCN/SSC Tapir Specialist Group (TSG) has been working hand in hand with WildTrack (www.wildtrack.org), an independent research organization based in Portugal. In this issue, I would like to give you an update about the development of the FIT for lowland tapirs.

Silvia Chalukian has already started collecting footprint images for the development of the algorithm for lowland tapirs in Argentina. However we decided to try and obtain a larger sample size and speed up the process a bit. In order to do that, we contacted several zoos and breeding facilities holding lowland tapirs in their collections and invited them to be part of this effort. A number of zoos responded to our initial invitation, including four (4) zoos and breeding facilities in the states of São Paulo, Minas Gerais, Goiás and Santa Catarina in Brazil, two (2) zoos in Colombia (Cali Zoo and Fundación Zoológica Santacruz), five (5) zoos in Europe (Parc Zoologique Branféré, Parc Zoologique d'Amnéville, Safari de Peaugres and Lisieux CERZA in France, and Chester Zoo in the United Kingdom), and three (3) zoos in the United States (Houston Zoo, Dallas Zoo, and John Ball Zoo).

We asked each one of these zoos to take digital pictures of the footprints of their captive lowland tapirs following the WildTrack protocol. Most of the institutions involved are already sending their images to us, and we will soon have a large sample size with a minimum of 50 different individuals to begin analyses. Once the algorithm is developed, it will be validated in the field and widely distributed. This technique may prove to be an extremely useful tool for the work of many lowland tapir researchers worldwide.

If you know of any zoos that would be interested in participating in this effort, please let me know as soon as possible. The collaboration we seek is quite simple:



Lowland tapir footprint measured with the Footprint Identification Technique (FIT) developed by WildTrack organisation.

just digital photographs of footprints following an easy protocol. We will send the instruction files to any interested organizations.

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Lineamientos sobre la Conservación de *Tapirus terrestris* – Primer Encuentro de Instituciones Argentinas

Por Viviana Guse

Durante los días 30 y 31 de mayo de 2005 se realizó el Taller “**Lineamientos sobre la Conservación de *Tapirus terrestris*. Primer Encuentro de Instituciones Argentinas**”, organizado por TEMAIKEN y el Grupo Especialista de Tapires (IUCN/TSG). El mismo se llevó a cabo en las instalaciones de TEMAIKEN y convocó a 21 participantes provenientes de zoológicos e instituciones de diferentes provincias tales como Tucumán, Salta, Córdoba, Santa Fe y Buenos Aires, todos ellos con el tapir amazónico en su colección zoológica.

En Argentina se considera a *T. terrestris* en peligro de extinción, razón por la cual el objetivo principal del encuentro fué de unificar criterios de trabajo sobre la especie de acuerdo a las recomendaciones del TSG para contribuir a la conservación del tapir amazónico en nuestro país.

Durante el primer día de reuniones, expertos presentaron sumarios sobre el conocimiento actual de aspectos de la biología y conservación del tapir amazónico, tanto en cautiverio como en estado salvaje. La información presentada incluyó: el rol de los zoológicos en la conservación de *T. terrestris* (Viviana

Guse), información preliminar sobre el proyecto de investigación y conservación del tapir en el Noroeste de Argentina (provincia de Salta) (Silvia Chalukian), el conocimiento actual sobre la conducta y ecología, manejo y uso, y estatus *T. terrestris* (Andrew Taber), manejo de tapires en la Reserva Experimental Horco Molle (Juan Pablo Juliá), nutrición de tapires en cautiverio (María Julieta Olocco Diz), condicionamiento de tapires en cautiverio (Sergio Feo) y aspectos a considerar para el desarrollo de un studbook para *T. terrestris* en cautiverio en Argentina (Ana Duggan).

Durante el segundo día se llevaron a cabo las discusiones y definiciones de las tareas a desarrollar entre todos los participantes durante los próximos meses siguiendo las recomendaciones del TSG. En base a las mismas, se decidió:

- Llevar adelante la identificación de todos los ejemplares en zoológicos en Argentina;
- Realizar estudios genéticos *ex situ* (en zoológicos) como *in situ* (en estado salvaje);
- Compilar el Studbook de la especie en Argentina;
- Asesorar el estado de nutrición y dieta de ejemplares en cautiverio a través del Departamento de Nutrición de TEMAIKEN;
- Contribuir al Plan Nacional de conservación de la especie;
- Dar soporte técnico – desde el Zoológico de Buenos Aires y TEMAIKEN – a aquellas instituciones que requieran asesoramiento veterinario o sobre el manejo de ejemplares.

Asimismo se estableció la fecha para un segundo encuentro durante el mes de octubre de 2005, a realizarse posiblemente en la Provincia de Tucumán.

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Reunión de participantes del taller, realizado en las instalaciones de TEMAIKEN el pasado mes de mayo.



Ex Situ Progress Resulting from the Baird's Tapir PHVA Workshop

By Alan Shoemaker & Lewis Greene

The recent Baird's Tapir PHVA workshop in Belize was, to members of the Central American zoo community, more than just another tropical meeting. For representatives of zoological parks, this PHVA provided a unique opportunity for zoo staff from a wide variety of zoos in range countries as well as representatives from the AZA, to meet and develop ways to jointly improve their regional collections' management. In several cases it was also the first time that leaders in captive tapir conservation actually met each other face-to-face, an act that in itself is of great importance to future planning. Of the fourteen zoos holding tapirs in Central America, representatives of eight of them (Summit Zoo and El Nispero Zoo, Panama; La Marina Zoo, Costa Rica; Zoológico Nacional La Aurora, Guatemala; Belize Zoo, Belize; and León Zoo, Tuxtla Zoo, and XCARET, Mexico) were in attendance, as was a representative from AZCARM, the International Studbook Keeper for Baird's tapirs, the Chair of the AZA Tapir Taxon Advisory Group (TAG), and the Permit Advisor of the AZA Tapir TAG.

Starting points that were useful in educating tapir holders, as well as field biologists from all range countries, included the wide range of management practices present in Central America versus the United States. AZA zoos are all located within a single country, so international movement is not involved when transferring this highly regulated species from zoo to zoo. The same is not the case for zoos in the other seven countries holding captive tapirs and, in some instances, zoos holding captive tapirs go barely beyond acting as a warehouse for confiscated animals. In those situations, breeding and international management is little more than a dream and indeed, the laws of several of these countries, particularly Nicaragua and Honduras, do not even allow international transfer of Baird's tapirs. In other countries, Panama, Costa Rica, Guatemala, Belize and Mexico, breeding is routine, particularly in Panama and Costa Rica, or can be anticipated sometime in the near future: Belize, Mexico and Guatemala. In those cases, successful breeding centers realized that transfer between zoological institutions is vital to genetic and demographic management, if for no other reason than the fact that tapirs are large and require increased numbers of staff and sizeable enclosures as their numbers increase. Although no representatives were present from the Villa Griselda

collection in Panama, this facility itself possesses 14 Baird's tapirs, most of which were born in captivity; Villa Griselda clearly may profit from an international exchange program. It was also enlightening for the AZA representatives to understand that not only are there more tapirs (49) maintained in 13 Central American zoos than by all 16 AZA zoos combined, but also that 27 of those 49 tapirs were themselves captive born. All 28 captive tapirs in the 16 AZA zoos are also born in captivity. Thus, the time is ripe for setting an international exchange mechanism for management of captive animals.

Communication is always a key element to success in this kind of endeavour and many of the range country zoos wanted access to specialists that could answer questions about problems they encounter. To date, however, there is no electronic list (i.e., a "listserv") that could reach all holders, so one of the most significant results of this conference was the establishment of a listserv that could reach all Central American tapir holders, as well as well key tapir managers within AZA. Test mailings have indicated that the listserv is working and in the future any holder with a problem can ask the listserv for assistance. In that way, questions made to the listserv moderator, Alan Shoemaker, will be forwarded to key people that are likely to be of assistance.

Within the AZA, the Tapir TAG has developed a Regional Collection Plan (RCP) to better coordinate the management of all four species of tapirs within the United States and Canada; this plan was summarized to the entire PHVA participants. In addition, the mandatory participation by all AZA members within the management plan, called a Species Survival Plan or SSP, was also summarized and came as a surprise to some participants. Although relatively simple to orchestrate within a single country, international counterparts to such a plan are more challenging. Regardless, similar plans involving zoos in the U.S. and Canada have been successful after consideration was given to the minimization of cross-border transfers of regulated wildlife. Certainly, the multi-country EEP of Europe deals with international issues involving RCPs on a daily basis and has managed to overcome this problem. The U.S.-Canada and EU examples may provide answers to some of the issues of the SSP among tapir range countries.

In Central America, there have been several instances of international cooperation. Three of the four zoos in Mexico that hold tapirs (León, XCARET and Guadalajara) received them from AZA members, and representatives of at least one more Mexican zoo that attended the meeting in Belize have indicated interest in adding this native species to their collection from either a domestically held collection or from outside the country. La Aurora Zoo in Guatemala present-

ly holds three tapirs, two of which were obtained within that country and a third donated by an AZA member. Although this species has not reproduced in zoos of either Mexico or Guatemala, the ages and sex ratios of captive tapirs in Tuxtla and La Aurora zoos are perfect for reproduction and should be expected to successfully breed within the near future.

In Panama and Costa Rica, four of the five tapir holders routinely breed tapirs and are eager to exchange specimens in order to reduce the already increased levels of inbreeding. Exchange has already occurred in one instance, when a young tapir born at the Summit Zoo was transferred to the collection in Villa Griselda, and the La Marina Zoo has initiated efforts to send one of its surplus males to the U.S. This type of exchange is routine between AZA zoos. The increased interest in this level of cooperation was unquestionably the biggest success that came out of the PHVA for captive managers. Through the leadership of Carlos Caballero, director of the El Nispero Zoo, a collection-planning meeting for zoos of Central America that hold captive tapirs has been proposed, to be hosted in April 2006 by the El Nispero Zoo. Although only representatives from the 13 tapir holding zoos within this region or regional zoos interested in holding them will be invited, their future collection planning will be crucial to the continued success of captive breeding programs within the region. In advance of this meeting, a bilingual questionnaire was developed at the PHVA that all range country holders will be asked to complete. Information sought in the questionnaire not only will include information about their present inventory, but also their future holding capacity and their willingness to participate in a regional collection plan. The results of this information will be invaluable at the upcoming meeting at El Nispero.

In a separate meeting, the International Studbook Keeper, the Baird's Tapir SSP Chair and the Permit Advisor for the Tapir TAG met and completed the RCP for AZA holders, this being the only occasion during the year when all three individuals were likely to be together. As a result, holders of all seven females in potentially breeding situations were asked to breed, while three new pairs were identified and will be asked to breed as soon as the females are of adequate age. Support for an importation from La Marina Zoo to an AZA zoo was also provided. When all these actions are realized, hopefully there will be enough additional young tapirs to provide new specimens for AZA zoos as well as to Central American zoos wanting to add this species to their collections, obtain females or increase the genetic diversity of their existing collections.

Although captive holders were not prominent in previous PHVAs, this meeting brought many players of the captive breeding community together and the results look promising. Upcoming meetings within

the region will hopefully increase interest. We look forward to the coming year.

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News from the Field

Estimating the Genetic Diversity of Mountain Tapir Populations in Colombia: A Joint Effort

By Carlos A. Pedraza & Diego J. Lizcano

In the previous issue of *Tapir Conservation Newsletter* (June 2005), the article of *Ask The Experts* mentions that "...several small populations of tapir are becoming isolated from their core populations" as a result of the fragmentation. If we introduce the fact that there is a reduction in numbers of individuals by over-hunting, we have a perfect scenario for loss of genetic diversity. By genetic diversity of a population we mean the evolutionary potential of populations. If a population has a low genetic diversity this means that this population has a lower chance to survive a detrimental stochastic event than a population with higher genetic diversity. For a changing environment such as the Andes region, considered a region with high rates of land transformation where the natural ecosystems can disappear in relatively short periods of time, we must understand all the dynamics occurring in the ecosystem, as well as the ecology, demography, natural history and the genetic aspects of remaining Mountain tapir populations to be able to overcome their extinction.

Mountain tapir populations in the Colombian

Andes region are under hunting pressure and habitat degradation, resulting in the dwindling in numbers of individuals and areas. In these populations, fragmentation can be the first step for the loss of genetic diversity of Mountain tapir populations, as explained by experts in the *Ask The Experts* article. Certainly, there is much to say about the effects of fragmentation on the loss of genetic diversity, and that we need better tools analyze this information. But we should not sit and wait until technology catches on, or populations go extinct – whatever happens first. We have the responsibility to develop better tools, to start hypothesizing, to start collecting information in the field and working in the laboratory in a joint effort to get a better understanding of fragmented and isolated mountain tapir populations.

At the beginning of 2004, Diego Lizcano and I held several talks about the difficulty of gathering information from Mountain tapir populations, and also about the need to develop a project to produce genetic information. We realized the need to develop methodologies that meet two conditions. First of all, methodologies should permit us to census and monitor populations with reliable results; second they must overcome the difficulty of finding the animals in the field. So, we decided to develop a project to estimate the genetic diversity of three mountain tapir populations in Colombia (Figure 1) living in forest fragments of different size and with different fragmentation degree (Figure 3).

In the field it is very difficult to find a Mountain tapir without the help of trained dogs, but we can identify trails, sleeping and scratching places where tracks, feces and hair samples from the individuals can be collected. In these days we can use different tools to produce information from different evidence of the presence of Mountain tapirs.

Molecular Biology provides the capacity to extract DNA from feces, hair, carcasses, skin, and blood. Each individual is characterized by its unique genetic structure so that, if we have access to DNA of individuals and sample a significant number of individuals of a population (minimum 30 samples per population for statistical significance); we can thereby obtain representative information about a specific population.

In this project we are obtaining information from Mountain tapirs using noninvasive techniques, by collecting hair samples where there is no adverse effects product of the handling of animals (Figure 2). The main objective of this project is to develop protocols and techniques for the analysis of hair samples using molecular biology tools, as well as to estimate the genetic diversity of three apparently isolated populations in Colombia (Figure 1).

There is no doubt that we must put attention to the genetics of the Mountain tapir populations if we want to ensure their survival for a long period of time. To fully understand all ecological processes occurring within

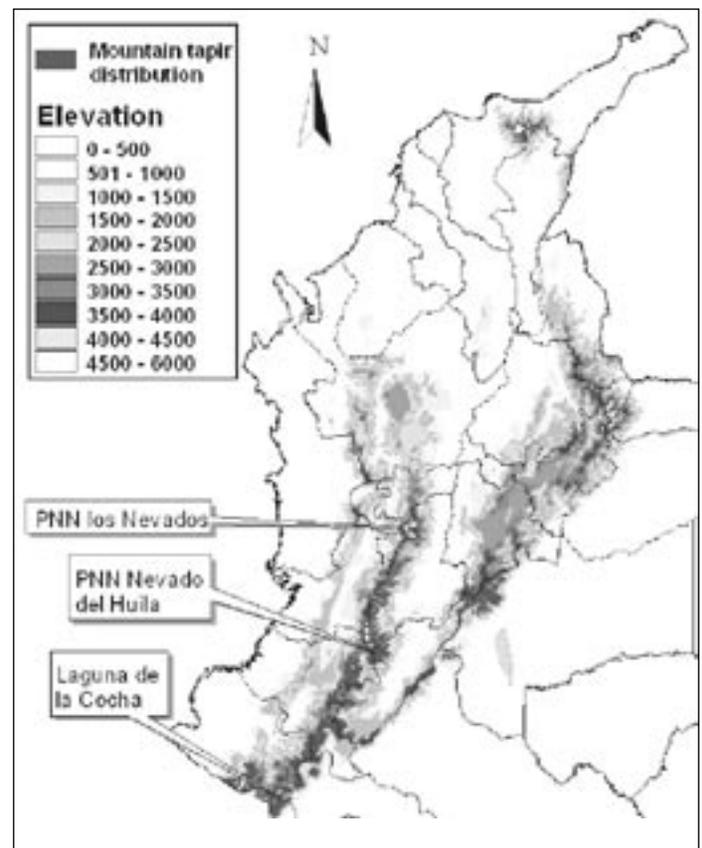


Figure 1. Sampling places: Los Nevados National Park, Nevado del Huila National Park and La Cocha Lake. Blue areas represent Mountain tapir distribution (adapted from Lizcano et al. 2002).

populations and between populations in Colombia, we decide to develop a genetics based project as the first step to answer basic questions about the genetics of Mountain tapir populations: Is there a grade of differentiation in genetic diversity between populations? Is there any gene flow between these populations? Do we have useful tools for the analysis of this kind of information? Does a real effect exist in the genetic diversity as consequence of fragmentation?

We have selected three wild populations to carry out Mountain tapir sample collections (Figure 1): Los Nevados National Park, Nevado del Huila National Park and La Cocha Lake in the Central Andes of Colombia. Between these populations there is a geographic isolation produced by the road, between Bogotá and Armenia, and landscape transformations. The project also includes Mountain tapir samples from three individuals living in the Cheyenne Mountain Zoo; these individuals will contribute to the development of genetic markers (micro satellites) that will help researchers to make better estimations of population numbers and genetic change.

As expected results of this project, we want to con-



Figure 2. Noninvasive hair sampling collection in Los Nevados National Park.

tribute to different researchers interested in the use of molecular biology, providing them with protocols and lab methodologies that will help answer different aspects of the natural history, ecology and genetics of Mountain tapir populations. The indirect and noninvasive techniques for the collection of hair samples used in the project, coupled with molecular biology, can be an alternative method to census and monitor Mountain tapir populations, thus providing key information for the implementation of conservation and management plans.

To date, we have completed four field trips to Los Nevados and Nevado del Huila National Natural Parks, where 38 and 21 hair samples were obtained, respectively. All procedures used are those described by Anders Gonçalves da Silva in the TSG document: **Sampling Techniques for Genetic Analysis**, where the hair samples are preserved dry, in sealed unwaxed envelopes with silica gel. Additionally, GPS points have been recorded for every hair sample. All the samples are kept at room temperature in the laboratory. Those among the readers interested in collecting hair samples must be very carefully to collect just those hairs with follicle (DNA's main source), avoiding those that present white coloration or that easily break (this suggests that may be the DNA present, if any, is already degraded).

Based on our experience and the recommendations of other researchers, we found that Mountain tapir proteins present in hairs are very difficult to break down. "Mountain tapir hair samples, compared to those of other mammals, present difficulties in DNA extraction. Is not an easy job", commented Dr. Manuel Ruiz Garcia, Director of the Population Genetics Laboratory of the Javeriana University in Bogotá. We found that the proteins surrounding the follicle are very resistant to the enzymatic digestion for DNA extraction; we have to break these proteins so we can have access to DNA. For this reason, we had to modify the original protocol. The first step in the laboratory was to standardize the protocols; right now we are performing the first essays of DNA extraction using a variation of the organic method with proteinase K digestion. Despite concerns and difficulties expressed by Dr. Ruiz, organic digestion showed 100% success for the first 25 extraction essays and looks that work is progressing very well.

The development of this project could not be possible without the participation of researchers and members of the IUCN/SSC Tapir Specialist Group (TSG), specially Diego Lizcano, who taught me how to follow Mountain tapirs and since then is an active contributor of the project; Juan Armando Sanchez, Director of the BioMMar Laboratory affiliated to Los Andes University where all the lab procedures are carried out; Patricia Medici, Della Garelle and Alan Shoemaker who always help me, specially with the importation of samples of individuals from Cheyenne Mountain Zoo. Anders Gonçalves da Silva, Carlos Mora, Martha Cardenas and Manuel Ruiz are collaborating with all their knowledge in Molecular Biology and all the methods in the lab.

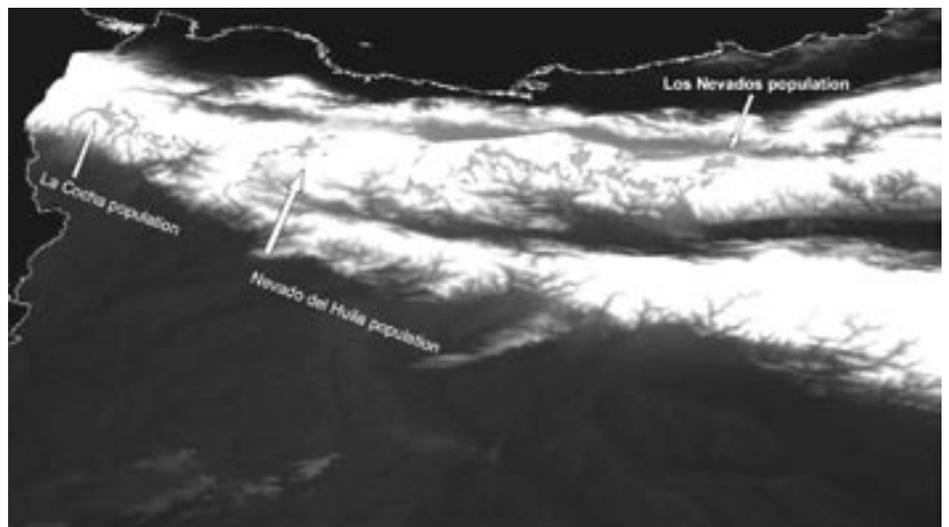


Figure 3. 3-D view of the habitat suitability areas for Mountain tapir populations in Colombia, showing the isolation between the three study populations. The areas were calculated using the Ecological Niche Factor Analysis (ENFA) (Hirzel, 2001). Adapted from Pedraza 2005.

Thanks to the staff at Los Nevados and Nevado del Huila National Parks for all the facilities during the time in the field, also to Andres Guarnizo and Diego Lizcano for their experience and company in the field. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Conservación Internacional Colombia, Idea Wild and BioMMar provided funding.

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First Ever Notes on Tapir Reproduction in the Wild

By **Leonardo Salas**

In late October 2004, Juan de Dios Valdez Leal, working under the supervision of Charles Foerster – in Corcovado National Park, Costa Rica – went to locate the young offspring of one of Charlie’s collared females. Juan De Dios found the female with her offspring, but also something else as important as his observations of mother-infant relationship and infant survival: the first documented copulation of tapirs in the wild. He documented this most unusual observation with photographs and a detailed description of the duration of behaviors and vocalizations.

In all mammals, most investment in the production of offspring is the responsibility of the female. Because of this, and unlike males, females can only produce a limited number of offspring. It follows that they stand to profit most by ensuring that their genes have the best chances of survival and to be passed to another generation (in contrast, males need not be so choosy, because they can ensure their genes are passed on by copulating with as many females as possible). It is pre-

cisely because of this, as noted by Robert Trivers and other behaviorists nearly 30 years ago, that females are expected to be choosy and pick their male consorts with care to ensure that the male’s genetic contribution would result in offspring well equipped for the task of carrying and passing on those genes. This is one of the principles of sexual selection and is well supported by scientific evidence.

Tapirs are no exception to this principle, or at least we do not have a priori reasons to expect otherwise. Thus, Juan De Dios’ observations are all the more intriguing. He noted, for instance, that the female did not seem receptive to the male. The male attempted to mount seven times before eventually succeeding; yet, the female did not run away or confront the male with aggression. Moreover, there was no apparent selection behavior by the female, other than to resist the male for a while. Juan De Dios’ observations seem to indicate that there is no mate choice behavior in females. Perhaps the female knew where the most suitable male could probably be found and opted to spend time within his home range? Perhaps the selection of males happened before Juan De Dios got the “VIP seat”?

That matter aside, the observations are in agreement with either monogamy or a loose social system with a form of facultative polygyny similar to an extended harem, in which male tapirs would overlap (but not fully encompass) home ranges with those of several females. In an extended harem, a male patrols his home-range seeking signs of a female in heat. Upon finding the female, he forces copulation and secures parenthood. Other males may also overlap home ranges with the same female, so it is a matter of chance – being in the right place at the right time to pick up the cues leading to the receptive female – that is, if there is no female choice involved. Monogamy would imply a full overlap of male and female home ranges. I believe Charlie will solve this matter of the social system soon.

These observations are also important because we finally have a detailed report of the length of inter-birth interval in the wild for Baird’s tapirs. It is certainly shorter than I expected. How long? Go to: <http://www.icomvis.una.ac.cr/revista/articulos.htm>, download the article and do the numbers yourself.

*N.B. Although the article was published this year, for some reason it is listed as being in the 2001 volume of *Vida Silvestre Neotropical*. Don't be confused by the journal's volume date!*

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Contributed Papers

Diet of Tapirs (*Tapirus terrestris*) Introduced in a Salt Marsh Area of the Baixada do Massiambu, State Park of the Serra do Tabuleiro – Santa Catarina, South of Brazil

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Abstract

A survey on the food items from salt marsh vegetation in the diet of the tapir was conducted in the Baixada do Massiambu, on the Serra do Tabuleiro State Park. From March to October 2004, eight animals, males and females of different ages kept in semi-captivity in a 160 ha area, were studied by means of direct observations and fecal analyses. Each consumed plant species was collected and identified, the consumed plant part marked, and each feeding event for each species counted. Eighty-two consumption events, from 32 species and 22 families of plants, were recorded. The consumed plant parts were leaves, small stems, flowers, bracts and ripe and unripe fruits. The most sought after plant parts were leaves and stems, followed by flowers and fruits. The most consumed plants were basically those of the herbaceous and shrubby orders. Predominantly, seeds of Butiá (*Butiá capitata*) and Jerivá (*Arecastrum romanzoffianum*) were found in the faeces. Tapirs feed on a great diversity of plant parts and species, thus evidencing, from the point of view of their diet, great plasticity in adaptation to the salt marsh area.

Introduction

Tapirs in the wild, as with the great majority of mammals, face declines in population numbers. These reductions are partly due to hunting (Bodmer, 1991) and partly to continuous loss of habitat (Richard and Juliá, 2000). Large mammals play an important role in molding the plant community, and herbivores are key elements for the dispersion of seeds, thus affecting various species of the understory, both in terms of their distribution and density (Dirzo and Miranda, 1991; Janzen, 1971; Fragoso, 2003). Dirzo and Miranda (1991) also affirm that more critical processes, such as the contemporary loss of animal species, may be a result of the alteration of herbivore patterns; again, due to the absence of the large herbivores.

The lowland tapir (*Tapirus terrestris*) was amply distributed throughout Brazil (Brooks *et al.*, 1997) and today stands among other species in danger of extinction. It has been deemed as vulnerable (IUCN, 2004). Notably, populations in the Atlantic forest are the most reduced and threatened due to habitat loss and fragmentation. Populations of the extreme South of Brazil are rarely, if ever, studied, especially regarding basic information such as management, distribution and density (Brooks *et al.*, 1997; Bevilacqua and Hermes Silva, 2002). The Atlantic forest has received historical pressures for nearly 500 years after colonization (Pádua, 2004). As a result, less than 8% of the forest cover remains in diverse fragments and in forest islands (Carvalho *et al.*, 2004). The constant loss of habitats, alongside the consequent genetic effects of

fragmentation, renders an even more critical scene than that hypothesized by Dirzo and Miranda (1991).

Under the present circumstances, studies for the reintroduction, genetic conservation and enhancement of the living conditions of captive animals are of paramount importance. In 1978, two tapirs brought from the northern Brazilian state of Rondônia (Brazilian Amazon) were introduced as part of the “Project for the Restoration of the Lost Fauna of the Baixada do Massiambu”, in an area of the Serra do Tabuleiro State Park (Parque Estadual da Serra do Tabuleiro – PEST), Southern Brazil. This project originated due to the necessity to restore the ecological balance of the coastal area of the park, which still held reasonably well preserved areas where botanical aspects were yet intact, but certain fauna had perished, especially mammals and certain great birds (Reitz, *et al.*, 1982).

These mammal and bird species were extirpated from the area as a result of human occupation in search of better living conditions in the proximities of the coast (real estate ventures), of tourism at the beaches and other sea attractions, and of the land use for agro-pastoral activities (Quadros and Cáceres, 2001) and other historical colonial pressures (Pádua, 2004). The list of lost species was created with the backing of research from zoological literature and of interviews with technicians and ex-occupants of the area.

Although the project was abandoned due to the lack of human and financial resources, some animals were maintained in an enclosed area at the visitors' center (Bevilacqua and Tortato, 2003). Thus displayed, these animals act as flagship species assisting the park's ecological education program. For 26 years, the tapirs have been held in this system of semi-captivity, where they subsist and reproduce. Consequently, this study was conducted in order to document the dietary adjustment of the tapirs to this environment, since it is characteristic of all areas of salt marshes of the Brazilian coast (Brooks *et al.*, 1997). This unique habitat, today, as a result of human occupation, is rarely found.

Study Area

The PEST is one of the most significant units of Brazilian conservation protecting Atlantic forests, and it is the largest unit of integral protection of the state of Santa Catarina, made up of 90.000 ha (figure 1). Among the ecosystems of the park are: dense rainforests (with umbrophile plants), mixed rainforests, mangroves, high elevation grasslands, salt marshes, cloud forests, as well as insular ecosystems (Klein, 1981).

The park is situated in an important transition area between Atlantic vegetation, subject to strong tropical climatic influences (North of Brazil), and habitats subject to more temperate influences (Southern Brazil).

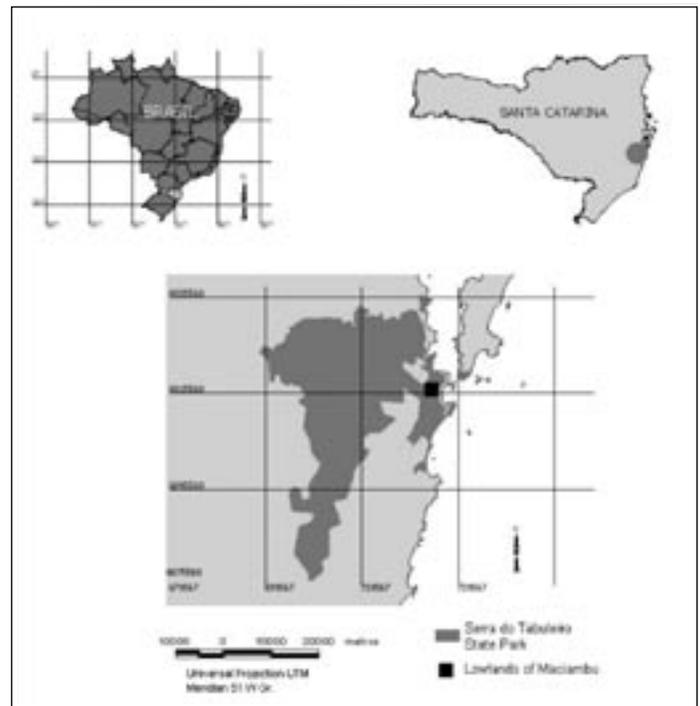


Figure 1. State Park of the Serra do Tabuleiro and area of study (Black Square).

Hence, it houses diverse plant and animal species, with areas of endemism, and for some taxa representing the southernmost geographical distribution limits.

The salt marsh area, located in the grasslands of Massiambu (central-western areas of the Park) (figure 1) is made up of 700 ha at 30-40 m elevation. The grasslands are totally covered with natural vegetation, which, according to Klein (1981), is predominantly constituted of herbaceous and shrubby species, with some sparse arboreal-shrubby agglomerations. Another characteristic of these low quaternary coastal areas is the edaphic condition of the sandy soil, which is distributed in the form of sand bars interspersed by permanent and temporary lakes. The climate is classified as subtropical humid, mesothermic (averages of 22°C), without strong drought seasons.

Within this habitat, a fenced area of semi-captivity was created encompassing 160 ha, retaining the representative prairie characteristics as described above.

Methods

Tapirs have subsisted in semi-captivity for many years and, apparently, have not faced major problems, for, according to handlers and park staff, there is no unfavorable history about them (deaths and disease). From an initial couple, today eight individuals persist



Figure 2. Direct daytime observations conducted when animals were spotted and followed. Note the aspect of the salt marshes (typical Brazilian coastal vegetation).

(various others have been moved to regional zoos), hence demonstrating that these animals have been reproducing – an excellent welfare indicator of wildlife in captivity.

Twice or three times per week, during the morning, the tapirs are fed pumpkin, cassava, cabbage, lettuce, banana, papaya and equine ration (Bevilacqua and Tortato, 2003). This alimentary supplement does not attend to the nutritional requirements of a large herbivore such as the tapir (Deutsch and Puglia, 1988). Furthermore, not all animals come to feed these supplements (personal observations).

To attend to their nutritional needs, the tapirs feed on various items from the vegetation of the salt marshes. To document the diet consumed by the animals within this area, direct daytime observations were made (figure 2) of eight tapirs, males and females alike of different ages. The survey was carried out during the year of 2004, from March to December, making up a total of 30 field days. The observations were done, when necessary, with the help of binoculars and with the largest possible observational distance to lessen any influence on the animals' behaviors. The tapirs were followed as long as observation was possible. Each consumed plant species was collected, identified and had its consumed plant part marked, and the number of feeding events for each plant was thus counted. Macroscopic observations of the feces were also conducted in the field.

Results and Discussion

Eighty-two consumption events of 33 different species in 22 families were registered. The consumed structures were small stems, leaves, flowers, bracts, ripe and unripe fruits (table 1). We observed that tapir consume a large range of plant species as well as diverse plant parts. Similar diets were accounted by Tobler (2002) and Acosta *et al.* (1996) with Baird's tapir (*Tapirus bairdii*) and Mountain tapir (*Tapirus pinchaque*), respectively, in which various genera and families were similarly found.

The first record of the consumption of pteridophytes by tapirs is noted. It was expected that tapirs feed on ferns, as this normally drought-resistant vegetation is widely available at the study site. Tapirs are selective animals (Salas and Fuller, 1996; Terwilliger, 1978) and search for various plant sources according to availability and nutritional need. Bodmer (1990) argues that the strategies of herbivory vary from the low rate of forage on highly nutritional foods (proteins and starch), to intensive forage of low nutritional quality (cellulose). Large non-ruminant ungulates, such as tapir, have the advantage of large fermentation chambers: they can rely on foods of low quality and do not need to expend time finding highly nutritional resources.

Analyses of preference for plant species showed that these approximated a normal distribution, notably with *Piper* (11 events), *Ludwigia multinervia* (9), *Miconia ligustroides* (7) and *Tibouchina urvilleana* (7), totalizing 54% of the consumption events. With exception to *Ludwigia*, the other three genera have been reported in the diet of tapirs: *Piper* (Richard and Juliá, 2000) in lowland tapirs, *Miconia* (Tobler, 2002) and *Tibouchina* (Naranjo e Cruz, 1998) both in Baird's tapir. These genera do not present great nutritional appeal but are more amply distributed in the area and thus seem to be commonly consumed by ungulates (Van Soest, 1982) when facing the absence of fruits of more nutritional value.

When evaluating the preference of plant families, a distribution close to uniformity among consumption events was observed. However, we note that Melastomataceae (16%) and Piperaceae (11%) outstood all, followed by Onagraceae (9%) and Clusiaceae (8%), making up 44% of the total of consumption events per family. Lizcano and Cavelier (2004) noted that the Melastomataceae family had the greatest number of consumed species in their studies with Mountain tapirs in Colombia. They also made note of the importance of *Miconia* (4 sp.) and *Tibouchina* (1 sp.) genera, the most abundant in our study as well.

These most frequent dietary families and species are predominant in the first stages of succession and thus indicate that tapirs can withstand well in modified areas. In figure 3, results show a greater number of

Table 1. Consumed plant species, their families, consumed structures and number of consumption events.

Species	Family (% consumption events per family)	Consumed Structures	N° of events	N° of events (%)	Habit
<i>Alchornea triplinervia</i>	Euphorbiaceae (7)	Leaves	5	6	Shrub
* <i>Blechnum serrulatum</i>	Blechnaceae (4)	Leaves & stems	3	4	Herbaceous
<i>Butia capitata</i>	Arecaceae (4)	Fruits, bracteal inflorescence, bract, unripe fruits	3	4	Shr / ST
Citrus sp.	Rutaceae (4)	Fruits	3	4	Small tree
<i>Clusia Parviflora</i>	Clusiaceae (8)	Leaves & stems	6	6	Shr / ST
<i>Cordia curassavica</i>	Boraginaceae (7)	Leaves, stems and flowers	3	4	Herb / Shr
<i>Cordia monosperma</i>	Boraginaceae	Leaves & stems	2	2	Herb / Shr
<i>Diodia</i> sp.	Rubiaceae (1)	Leaves & stems	1	1	Herbaceous
<i>Erythroxylum amplifolium</i>	Erythroxylaceae	Leaves & stems	1	1	Herb / Shr
<i>Eupatorium</i> sp.1	Asteraceae (3)	Leaves & stems	1	1	Herbaceous
<i>Eupatorium</i> sp.2	Asteraceae	Leaves & stems		1	Herbaceous
<i>Ilex dumosa</i>	Aquifoliaceae (4)	Leaves & stems		1	Herbaceous
<i>Ilex pseudobuxus</i>	Aquifoliaceae	Leaves & stems		3	Herbaceous
<i>Lantana camara</i>	Verbenaceae (4)	Leaves, stems and flowers	2	3	Herbaceous
<i>Ludwigia multinervis</i>	Onagraceae (9)	Leaves, stems and flowers	7	9	Herb / Shr
<i>Miconia ligustroides</i>	Melastomataceae (16)	Leaves & stems	6	7	Herb / Shr
<i>Myrcia rostrata</i>	Myrtaceae (7)	Leaves & stems	2	3	Herbaceous
<i>Ocotea pulchella</i>	Lauraceae (1)	Leaves & stems	1	1	Herbaceous
<i>Oxratea</i> sp.	Ochnaceae (1)	Leaves & stems	1	1	Herbaceous
<i>Philodendron bipinnatifidum</i>	Araceae	Leaves	1	1	Herbaceous
<i>Piper</i> sp.	Piperaceae (11)	Leaves and flowers	8	11	Herbaceous
<i>Psidium cattleianum</i>	Myrtaceae	Fruits	2	3	Shrub
<i>Psidium guajava</i>	Myrtaceae	Leaves	1	1	Small tree
* <i>Samambala</i>	Polypodiaceae (1)	Leaves & stems	1	1	Herbaceous
<i>Sida</i> sp.	Malvaceae (1)	Leaves & stems	1	1	Herbaceous
<i>Smilax campestris</i>	Smilacaceae (1)	Leaves & stems	1	1	Herbaceous
<i>Tibouchina urvilleana</i>	Melastomataceae	Leaves, stems and flowers	6	7	Herbaceous
<i>Tillandsia usneoides</i>	Bromeliaceae (4)	Whole plant	3	4	Climbing plant
<i>Vernonia scorpioides</i>	Asteraceae	Leaves & stems	1	1	Herbaceous
<i>Vernonia</i> sp.	Asteraceae	Leaves & stems	1	1	Herbaceous
<i>Vitex megapotamica</i>	Verbenaceae	Leaves & stems	1	1	Shrub
Non-identified Herbs		Leaves & stems	4	5	Herbaceous

* First record of a pteridophyte in the diet of tapirs. Herb – Herbaceous, Shr – Shrub and ST – Small Tree.

consumption events of plant species of the herbaceous habit (62%), vs. shrubs (26%), small trees (10%) and climbing plants (2%).

Foerster and Vaughan (2002) and Torres *et al.* (2004) found a noteworthy use of areas housing secondary vegetation, even when areas of primary forests were available. This preference is explained by the greater disposition of vegetation in the understory, thus facilitating consumption by tapirs (Foerster and Vaughan, 2002). Secondary areas hold a greater disposal of biomass at ground level and accessible to tapirs;

whereas primary forests concentrate greater biomass (leaves, flowers and fruits) in the upper strata, inaccessible to the animals. Results from other studies corroborate a greater frequency of consumption of plants of the herbaceous, shrubby, or of small tree habits (Torres, 2004; Richard and Juliá, 2000; Tobler, 2002).

In feces, leaves and stems were mostly found, and seeds were only found in some. When the latter were found, they made up the main constituent of the fecal bolus. The seeds were of the *Butia (Butia capitata)*

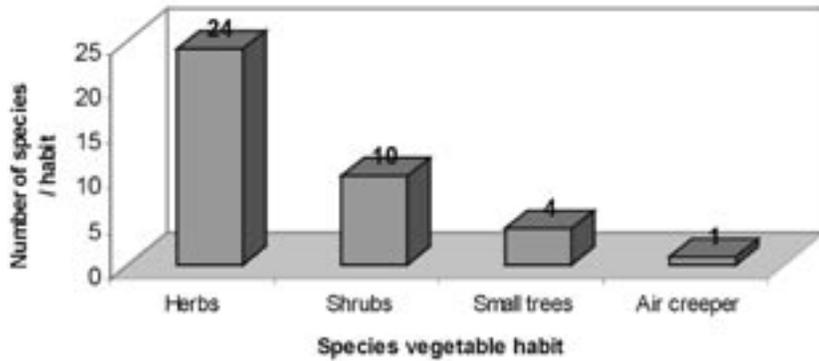


Figure 3. Habit of the plants among the consumed species. Some species occurred in two habits.

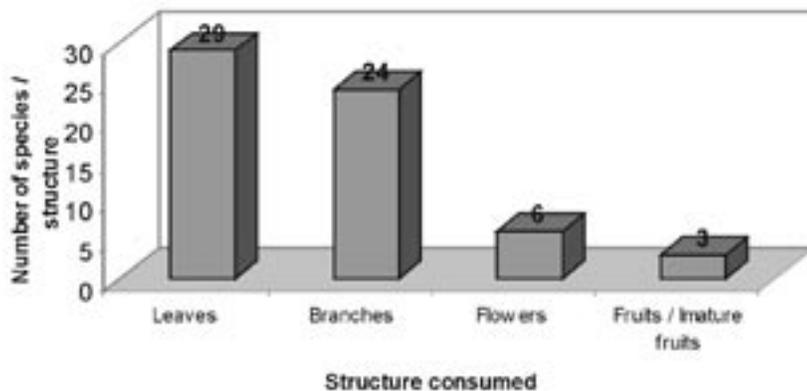


Figure 4. Most consumed plant parts.

and Jerivá (*Arecastrum romanzoffianum*) palm trees, both in the Arecaceae family. The faeces with seeds were found in periods of palm fruitage. When the fruits were ripe, they were intensely consumed, having registered predation over flowers, bracts and unripe fruits as well. This indicates an intense use of better nutritional quality resources when available. Galetti *et al.* (2001) found a low diversity of seeds in the feces of lowland tapirs, notably finding those of the Jerivá tree (*A. romanzoffianum*), achieving an average of $72,54 \pm 181$ seeds in 22 faeces during the dry season and $310 \pm 692,84$ during the rainy season, in a sampling of 10 faeces, where only 12% of the total possessed more than 100 seeds. Seasonal changes in the feces and an intense use of fruits when available were noted, reinforcing the selective behavior of the animals (Fragoso *et al.*, 2003; Janzen, 1982; Bodmer, 1991; Galletti *et al.*, 2001; Rodrigues *et al.*, 1993). Foerster and Vaughan (2002) attribute seasonal differences to the size of the used habitat and to the pattern

of animal distribution in face of the fruitage of certain plants. Another line of evidence is the overlap of areas used among animals which initially occupied different locations.

The presence of many seeds in feces seemingly contradicts the results found by Bodmer (1990), Torres *et al.* (2004) and Naranjo and Cruz (1998) that report in their fecal analyses more proportions of leaves and fibers than seeds. However, in figure 4, we show that the higher occurrence of consumption events of plant parts were for leaves (47%), followed by stems (39%), flowers (9%) and fruits (5%), thus concurring with the above authors.

Differences in number of seeds found in feces may be accounted for by their captive status, where the animals were fenced within a limited space with a much smaller area per animal (20 ha/individual) than found by Foerster and Vaughan (2002) in a natural environment (60-240 ha). Hence the animals were always close to the seasonal sources of fruits for forage.

Conclusions

The introduced tapirs at PEST exhibited high plasticity when adapting to conditions of captivity, using a diverse range of plant species and parts, including local fruits when available. This alimentary plasticity, the pattern of consumption of areas with herbaceous and shrubby vegetation (characteristic of degraded areas) along with selective feeding behavior and tolerance to the congested presence of several animals in small areas, raise questions for new judicious discussions and studies on the reintroduction of tapirs to the wild.

Acknowledgements

We acknowledge FUNCITEC-SC for the financial support of the present study and the Environmental Foundation (Fundação do Meio Ambiente – FATMA) for transportation. We also acknowledge the Laboratory of Applied Ethology of UFSC for assistance during observations.

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Habitat Use and Density of the Malayan Tapir (*Tapirus indicus*) in the Taratak Forest Reserve, Sumatra, Indonesia

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Introduction

The design and implementation of the present study aim to generate more precise estimates of Malayan tapir demographic parameters, which are some of the priority recommendations listed during the Malay Tapir Conservation Workshop held in Malaysia, in August 2003. This report focuses on the occurrence of Malayan tapir in a salt lick area, in the Taratak Forest Reserve, West Sumatra, Indonesia.

Because Malayan tapirs (*Tapirus indicus*) are shy animals, counting their numbers and determining densities is challenging. Use of habitats may be assessed through indirect evidence, such as tracks, or systematic methodologies based on direct evidence, such as radio-telemetry or camera traps. The camera trapping technique has been used by several researchers in order to evaluate tapir populations, distribution, habitat use and daily activity, all crucial pieces of information for the design and implementation of tapir conservation programs (Wallace *et al.* 2002, Holden 2003). This technique is also very useful to study Malayan tapirs due to their character as shy, mainly nocturnal, extremely elusive animals that tend to avoid contact with humans.

In the present study, we used camera traps to determine habitat use and density of Malayan tapirs in the Taratak Forest Reserve, in Sumatra. This is one of the last few remaining forests where tapirs survive in the island of Sumatra. We wanted to assess the number of animals visiting a salt lick in the Reserve.

Material and Methods

Placements of photo-trapping areas was chosen based on results from previous studies (Novarino, 2004), which identified a salt lick and existing animal trails that seemed like adequate locations for the placement of cameras. Eight Photo-Scout cameras (Highlander Sports Inc.) were used in this study; these were put into operation in June, 2005. Cameras were set up

to operate 24 hours, with one minute delay time between pictures. These were checked every two weeks to replace film and batteries. Three cameras were deployed at the salt lick area and five along the animal trails in the surrounding forest. The placement sites varied in habitat, altitude (m a.s.l.) and location (see Table 1). Cameras were set up \pm 50 cm above ground level, attached to trees and hidden with branches for camouflage and protection from animal attacks. The cameras recorded the date and time when pictures were taken.

Results and Discussion

Based on 12,416 hours of camera operations, 176 pictures were taken. Twelve mammals and one bird species were photographed. Pig-tailed monkey (*Macaca nemestrina*) became the most captured photo target, followed by Common Porcupine (*Hystrix brachyura*), Malayan Tapir (*Tapirus indicus*), and Barking Deer (*Muntiacus muntjak*). Other mammal species that also photographed were Wild Boar (*Sus scrofa*), Mitred Leaf Monkey (*Presbytis melalophos*), Crab-eating Monkey (*Macaca fascicularis*), Sumatran Tiger (*Panthera tigris*), Malayan Sun Bear (*Helarctos malayanus*), Sunda Pangolin (*Manis javanica*), Yellow-throated Marten (*Martes flavinuca*) and Malay Mouse-deer (*Tragulus javanicus*). An endangered and important Southeast Asian land bird, the Argus Pheasant (*Argusianus argus*) was also photographed during this study. Activity of local people was also recorded. The identity of animals in nine photos is still unconfirmed due to the low light intensity and small size of targets (Figure 1). The large variety of animals, most strictly forest specialists, evidences that the Taratak forest reserve was previously relatively undisturbed. At least one of the species, the Argus pheasant, is a primary forest specialist. This animal's abundance in Taratak is recently under threat by changes in forest cover by local people seeking to expand their Gambir (*Uncharia gambir*) plantations.

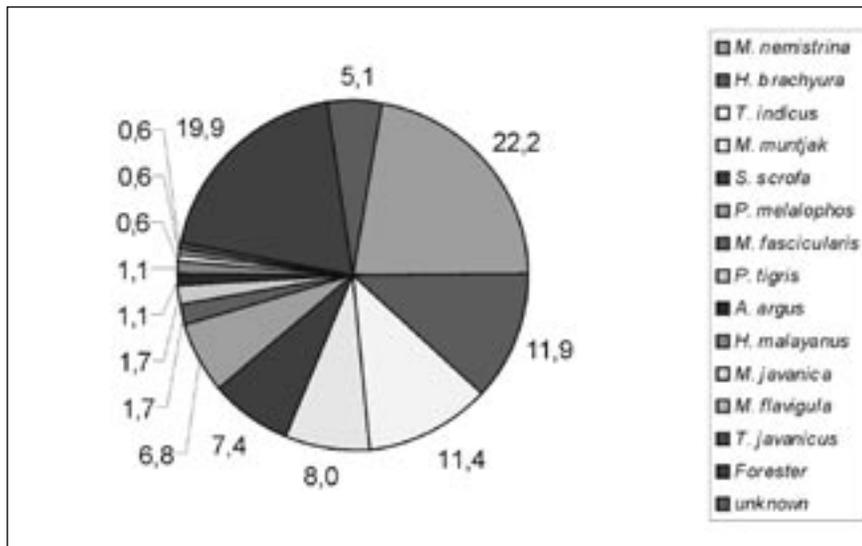


Figure 1. Species list and percent photo-capture of each species through eight camera traps in the Taratak Forest Reserve (176 photos taken in 12,416 hours of monitoring).

With respect to specific camera placements, only four among the eight camera placement sites detected Malayan tapirs; specifically, those points located near or in the salt lick area and below 320 m a.s.l. These four camera placements were also located close to each other, while the four other camera traps were located further away from the salt licks.

The rank in percentage of herbivore image-captured during this study (see Figure 1) is similar to that of Kawanishi *et al.* (2002) in Taman Negara, Malaysia, where they also found Malayan Tapir, Barking Deer and Wild Boar as the three most common large mammals in their study area – in that order. The ratio of tapirs photo-captured per unit sampling effort (number of times that tapirs passed through the camera / number of trapping hours) during this study (0.089) is higher than that of a previous study in Kerinci Seblat National Park, also in Sumatra, where Holden *et al.* (2003) only recorded 0.017-0.081 animals per unit effort. This difference emerges perhaps as an effect of altitude, but most likely the camera placement. In contrast to Holden and colleagues, who placed cameras to maximize tiger photo-captures, in this study cameras were placed near a salt lick located on secondary lowland forest, which seems to be the most preferred habitat of Malayan tapir. Kawanishi *et al.* (2002) also obtained a high number of tapir photographs

when conducting camera trapping near or on the trails leading to salt licks.

Tapirs came to the salt lick in every one of the two-week intervals between checks. This preliminary result highlights the use and importance of this area for Malayan tapirs. Results also show that tapirs seem to prefer flat and damp areas, rather than dry areas with difficult topography and high slope or in hill forest (see Table 1). The tendency of Malayan tapir to prefer secondary forest rather than primary forest was recorded in previous studies (Novarino, 2004); this tendency also was recorded on other species of tapir such as the Baird’s tapir (*T. bairdii*) (Foerster & Vaughan, 2002).

Regarding distance from forest edge, this study’s results show a significant difference between rates of tapirs photographed at the forest edge and in forest interior (see Table 1). However, these differences may perhaps be an effect of forest type and topography, rather than distance from the edge. O’Brien *et al.* (2003), in their studies in Bukit Barisan Selatan National Park (BBSNP), also in Sumatra, found that tapirs were photographed at approximately equal rates near and far from the forest edge.

Preliminary results also indicate that tapirs seem to be active mostly at night and tend to be solitary. All tapir photos are recorded at night and until early morning (19:57 to 04:25) and all are of single individuals. This result is different compared to previous results obtained by Holden *et al.* (2003) in Kerinci Seblat National Park, who recorded tapirs as active since

Table 1. Characteristics of placement sites of eight photo-trapping cameras for the study of Malayan tapirs in the Taratak Forest Reserve, and number of tapir photo-captures.

Camera No.	Forest type	altitude (m a.s.l.)	Distance from forest edge (m)	Habitat type	Location	No. tapir photo-captures
1	edge	183	150	salt lick	valley	7
2	bamboo	250	1500	salt lick	valley	6
3	secondary	319	2000	near salt lick	hill ridge	4
4	secondary	534	2000	forest	hill ridge	0
5	mature secondary	564	3000	forest	hill ridge	0
6	secondary	668	3000	forest	hill ridge	0
7	mixed	209	1000	salt lick	valley	2
8	mature secondary	700	3500	forest	hill ridge	0

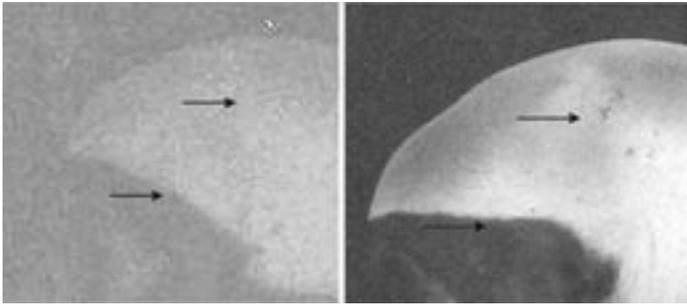


Figure 2. Differences in the pattern of black and white coloration between two individual tapirs photographed at the study area.

17:00 and until 09:00. This difference is perhaps a response of tapirs to the human activities that occur at Taratak. The activities of local people inside the reserve were recorded as the second highest number of image-captures by the cameras. The predominant nocturnal activity of tapirs was also documented for Baird's tapirs (Foerster & Vaughan, 2002), but was proposed as a behavior to avoid the hotter daytime. Wallace *et al.* (2000), too, found that Lowland tapirs (*T. terrestris*) tapirs tend to be nocturnal, although some diurnal activity was recorded. A bimodal pattern of activity was recorded for Mountain tapir (*T. pinchaque*), for which Lizcano and Cavalier (2000) record activity during the early hours of the morning (5:00-7:00) and early hours of the evening (18:00-20:00). More data are needed to determine if indeed there are differences in daily activity patterns among all four tapir species.

Analyses of tapirs image-captured during this study indicate that only two adults of tapirs seem to exist in this area. Identifications were based on scratches, differences in the pattern of white and black on their bodies (Figure 2) and time of photograph. Two individual tapirs were photographed at the same time (difference only 5 seconds) on two different cameras. With the assumption that four cameras detected the tapirs in a 4 km² area and ignoring the four other cameras that did not detect the tapirs, the density of tapirs in this area is 0.5 individuals/km². Further estimates will be carried out at the end of this study, as more data become available.

Conclusions

Early results of this study show preference of Malayan tapir for secondary lowland forest, in relative flat and damp areas. The need of Malayan tapirs for salt licks is evidenced in their visit to these areas every time in each two-week sampling period. Malayan tapirs also seem to be more active at night.

Acknowledgments

This study was supported by Maurice Laing Foundation through the Rufford Small Grant Program. We would like to thank Patrícia Medici, Deborah Martyr & Iwan Setiawan who provided technical support to this project. We also would like to thank Leonardo A. Salas, who provided advice and editorial suggestions to this report. Constructive ideas also were provided by Carl Traeholt and Rob J. Lee during the project design. We also would like to thank Henri, David, Pak Ali, Pak Mantan, Pak Pirin, and Pak Yunus, for helping us during this project.

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Ask the Experts

A Risk in Low Numbers: What Diseases to Look for?

By *Leonardo Salas*

Conservation biologists have long known that as population numbers dwindle, species are more prone to extinction by “catastrophes”. (By “catastrophes” I do not mean hunting or logging, but large forest fires, a disease outbreak, or an unusually long drought/flood). This increased risk stems from two basic principles. First, larger population numbers ensure that more individuals may escape the decimating factor just by simply being away from it. Second, larger populations contain larger allele diversity, which may prove critical to surviving the decimating factor.

Collaborative data-sharing exercises and GIS analyses, such as the workshop on the recent and historic status of lowland tapir populations, would offer insight on those populations that are potentially more prone to succumb to catastrophes. These efforts would identify where populations have been substantially reduced in recent history. But it is not just a matter of small size; connectivity factors need to be considered – those factors that make a population more likely to be exposed/succumb to a catastrophe. Broadly speaking, these are internal factors (e.g., density and spatial spread of the population, movement of individuals within the population, habitat diversity) and external factors (e.g., aspects of the habitats and climate surrounding the population, links to other tapir populations).

Many authors have proposed that diseases are usually the culprit in delivering the *coup de gras* to recently shrunk populations. If correct, then we should be on the lookout for diseases that have the potential to wipe out small tapir populations. What diseases should we be watching for? How are they transmitted and what factors external to tapir populations should be considered to determine the risk of exposure? What internal factors may make diseases spread faster/wider?

The problem of wildlife diseases in shrinking populations is, not surprisingly, quite complex. On one hand, it has to do with exposure to new pathogens and enhanced spread of diseases, as Sonia Hernandez explains: “... As evidenced by canine distemper in lions and the recent introduction of West Nile into the New World (and endless other examples), we should consider that tapirs, already existing in low densities in small and

fragmented populations, might be perfect targets for an ‘emergent’ pathogen from either an introduced non-native species (and the load of pathogens they carry), or changes in land use that facilitate the range of disease vectors.” On the other hand, there is the issue of immuno-suppression. Mitch Finnegan illustrates it with a personal example: “We are currently working with a very endangered species of pygmy rabbit (*Brachylagus idahoensis*) that was reduced to about 18 individuals before they were all captured for captive propagation (we are up to about 100 individuals now). The biggest problems we have had in the species have been parasitism with coccidiosis (*Eimeria* sp.) and infection with *Mycobacterium avium*. Infection with *M. avium* is almost unheard of in non-immuno-compromised mammals and coccidians are usually well adapted to their host and not a serious disease threat. Our rabbits were suffering acute deaths to a coccidian, which is extremely unusual.” Why were these otherwise rare or harmless infections decimating the endangered rabbits? “We tested the rabbits’ immune function and found it to be severely depressed making them susceptible to these otherwise fairly innocuous organisms.”

**“Diseases are usually the culprit
in delivering the *coup de gras*
to recently shrunk populations.”**

Sonia and colleagues highlight the danger of disease outbreaks in dwindling tapir populations in a hot-from-the-press publication. Their article is the first to offer reference values for hematology, blood chemistry, mineral values and antibody profiles in wild tapirs. This kind of studies is important not only to understand what is the normal serology of animals in the wild, but sets a standard against which captive nutrition and health can be compared. She and her colleagues found significant differences between the wild population and captive ones, in particular regarding diseases and antibody seroprevalence (the presence of antibodies in the blood), but also blood chemistry (which they assumed was related to differences in diet). We will return to the issue of health standards from wild populations later on.

What diseases to be on the look out, we asked? Surprisingly, Sonia et al. found that the tapirs in Corcovado did not share ticks and diseases with the livestock surrounding the park. Rather, the diseases and ticks they carried were common among livestock

and wildlife (cattle, horses, domestic cats, but also peccaries, capybaras and jaguars) in Central and South America. However, she readily admits that the animals they tested were at the core of the population, not the periphery – the typical place of contact. So, the jury is still out (and more research and papers are needed, especially comparing wild tapir populations!) about what is the normal chemistry and seroprevalence profile of a wild tapir population and what may be a threat to dwindling tapir populations.

Sonia generously expanded, in response to our question, the caveats of her and colleagues' study. Said she: "First of all, to understand disease prevalence, you need to at least estimate population size and almost as important, age structure (as well as other factors that play a role in infectious disease prevalence, transmission etc)." What she meant by age structure relates to diseases being more (or less) prevalent (and damaging) in different age classes, thereby causing differential survival of individuals at different ages. For example, diseases may affect juveniles and wandering sub-adults more severely than adults. Screening adult animals may not show all the diseases these animals have been exposed to in their lives, or may represent a sample of individuals that already have fended off the diseases. But our ignorance is even more basic, as we do not know differences in behavior of wild tapirs of different ages. These differences may make a segment of the population more exposed to diseases and give us clues on where to look for trouble.

**"Phenotypic plasticity and behavior
can play a role in preventing
disease outbreaks."**

What Sonia meant above by population size relates to sampling theory: it is important to ensure a random, representative sample in order to be able to extrapolate to the population and be able to conduct proper statistical tests. "... In other words, the information we gained would have been more useful if we knew the total number of animals in the area and, based on previous reports of disease prevalence in related species, could figure out a minimum representative sample size." Then, ideally, the sampling should be numerically representative and stratified by age categories. These are requisites unlikely to be fully met by any wildlife disease study, let alone one on the solitary, elusive tapirs.

Sonia has come up with a possible explanation for the relatively few diseases found in the wild tapirs of her study. She explains: "In my opinion, tapirs [...] either have a low prevalence of infectious diseases in general, or the infectious diseases are affecting the

juvenile sector of the population and thus are not detected easily." She does make this assertion with caution, but based on some facts and logic: "1) infectious disease accounts for the minority of morbidity/mortality in captivity, and there are few to no reports of infectious diseases in free-ranging animals (however, we must remember the low densities in which these animals live and the chance of finding sick/dead tapirs is low); 2) the results of my study do not support a high prevalence of infectious agents (although, as I said, this only applies to this region, this group of animals under the circumstances they live); 3) tapirs exist in low densities and do not aggregate, which in and of itself is a roadblock to infectious agents..." Sonia is quick to point out that phenotypic plasticity and behavior can play a role in preventing disease outbreaks.

But the risks are there nevertheless. Tapirs do occasionally congregate under fruiting trees and patches of good browse, at wallowing places, and at salt licks. Indeed, Franz Kaston Flores visited sites "...of borderline overlap between cattle, horses and tapirs in the cloud forests, evidencing even the share of artificial salt licks for cattle, thereby generating areas of high epidemiological risk for Mountain tapirs in Tolima [Colombia]." It remains to be determined whether these are true places for disease spread. Javier Adolfo Sarría offers another intriguing mechanism of transmission: interaction with other species. "If in a given area there are wild herds of (other) infected animals, these may pass the disease on to tapirs." Certainly, the few diseases Sonia found were somehow shared among the tapirs in her study. "Tapirs in my study did have high titers to VEE and it would be worth investigating that, especially [...] where tapirs live in areas with high prevalence of equine encephalitis (as judged by human, domestic horse and bird cases)."

To bring the point home, Javier provided a worrisome example of the importance of monitoring cattle populations. Javier explains that "...more and more we are discovering the devastating effects of diseases brought into wild populations by domesticated animals and through the expansion of the agricultural frontier. [...] We have disturbing reports that must be urgently confirmed of the possible decimating effect of foot-and-mouth disease on populations of Mountain tapirs in northern Peru." Our readers may remember that these populations are largely fragmented and of relatively small sizes.

Sonia's explanations are a bit too technical for me (hopefully I am not alone here!), so let's pause and recoup what she, Franz, Javier and Mitch have explained above. Several factors may be important in determining what diseases to look for, and what other factors to consider when determining the risk of catastrophic death of a dwindling tapir population. Firstly, we lack the basic knowledge of what are normal and

prevalent diseases in wild tapirs (Sonia's paper is the first of its kind). Secondly, we don't know how exposure and disease incidence change with age. Thirdly, we don't know how tapir behavior (including behavioral changes associated with age) may make segments of the population more susceptible to pathogens. What started as a question of "what's there to watch out for" is turning into a good measure of our ignorance and lack of preparedness to manage small tapir populations. And this is not the end of the story – bear with me for a few more paragraphs.

**“More and more we are discovering
the devastating effects of diseases
brought into wild populations
by domesticated animals.”**

Apparently, part of the problem about our limited knowledge of wildlife diseases stems from the lack of interest among veterinary professionals. Franz illustrates this with an example: “The veterinary profession participates minimally in the active conservation of wildlife populations, in great measure because of the limited motivation about the issue in the faculties of veterinary medicine in Colombia. [...] In the year 2001, The Wildlife Conservation Society sent two vets to the Zoologico de Cali to conduct an extraordinary workshop on the role of vet doctors in the conservation of wildlife, where I think the evaluation of *healthy* wildlife populations was mentioned for the first time [in Colombia].” (Italics mine). Javier explains that screening wildlife populations for diseases is becoming an increasingly common monitoring step around the world, known as Conservation Medicine.

Franz took it upon himself to go out and survey cattle ranchers around Tolima and came up with a long list of diseases, all potentially transmissible to tapirs by ecto- and endo-parasites. Javier provided a long list of possibilities too, from diseases known in zoos. Franz and Sonia explicitly advocate for more collaboration between field biologists and veterinarians (Franz mentions that WCS has already developed protocols – even available in Spanish - on how to collect samples). Both mentioned the need to come up with a sample collection standard methodology. Perhaps this should be made a requisite of field studies sponsored by the TSG?

Moreover, Franz adds (Javier concurs), studies should also be conducted “...on domestic stock and wildlife surrounding endangered populations.” He explains that park management in Colombia (but not there only) follows the policy of “parks with people, which implies the permanent presence of domestic animals and their diseases...” in these parks. To make things

worse, adds he: “...the wildlife health [protection] role of park guards is not even contemplated in their duties.” So, we must add two more point to our “ignorance” list above: Fourth, we don't know what diseases are prevalent in wildlife and cattle around tapir populations; and fifth, we lack a standard protocol to collect samples for analysis.

The experience with the rabbits tells Mitch “...that diseases we may need to worry about might be things that are completely off the radar and not really even considered mammalian disease agents (like *M. avium*) or, more likely, things like coccidia that are a minor nuisance now but may become more serious with inbreeding as populations shrink.” Accordingly, much along Franz's and Javier's words, Mitch suggests: “It might be interesting to look at what parasites or potential disease agents are common now and see which ones are likely to exploit a dip in immune function better than others... An immunologist might be able to predict what you need to worry most about if she could be provided with a list of agents the population is currently living with and the risks the population is exposed to (inbreeding, specific pollutants, etc.)” Looking at presently common parasites and diseases was precisely one of the goals of Sonia and colleagues' study; more such studies are sorely needed.

It is apparently not that simple to determine how animals may become immuno-suppressed. Mitch's rabbit example notwithstanding, Sonia contends that “...there is little empirical evidence to support the claim that decreased heterogeneity [in the main set of genes participating in the immune function] is related to disease susceptibility.” In other words, scientists do not fully understand what causes immuno-suppression, or even what constitutes an immuno-suppressed individual. Still, the information our experts suggest be collected is a good starting point to prepare for possible decimating agents.

There are two other important points our experts breached. Mitch explains, again with an example: “We are also working with California condors who suffered a similar decline [as that of the rabbits] to 24 individuals in 1982, but who have essentially no infectious disease problems except WNV, which has recently emerged.” Mitch speculates that the difference between Californian Condors and Idaho Pygmy Rabbits “...may have to do with their life histories and how it contributes to, or protects from, inbreeding. The pygmy rabbits live in large groups and normally suffer very high mortality over winter. Their population expands greatly over the spring and summer and shrinks by as much as 90% over the winter. As the groups shrank and the number of groups became fewer and fewer (reducing recruitment) the effect of this normal cycle of expansion/contraction of the population may have served to concentrate genes and enhance inbreeding

leaving them immuno-compromised and susceptible to infectious diseases.” Mitch admits that he does not understand the life histories of condors well enough to “...know if theirs is especially protective of this effect, or if they just got lucky with the founder individuals they were left with.” This is an interesting path of research too, and we should be as candid as Mitch and openly recognize that we do not know the mating system of tapirs, or whether it ensures a healthy mix of genes in the population. These are important pieces of the puzzle of what may happen to a shrinking tapir population. Thus, we add one more issue to the list: we don’t know the social/mating system of tapirs and cannot predict the likelihood of immuno-compromise in a dwindling population.

If you are keeping track you will have noticed that our veterinary experts are pointing to the need of collaborative work among field ecologists, veterinarians and zoo-keeping specialists, behaviorists and population geneticists (that is, almost all amongst our rank!). Sonia, like Franz, offers tangible recommendations: “Future studies might target juveniles, or might combine efforts between population ecologists that are looking at population growth and age structure with veterinarians studying the prevalence of pathogens at different ages to shed more light on this picture. (...) Several more studies, like mine and the ones others have undertaken, and with more consideration to the principles of disease ecology and epidemiology need to be done to determine what, if any, infectious disease affects, regulates or has the potential to cause significant population effects for free-ranging tapirs. A good first step would be to ask all the veterinarians who have worked with these animals in the field to put together their results in one site (i.e., a website).” Back to Sonia, then: maybe this should be one of the goals of the Tapir Veterinary Committee?

Finally, let’s go back the issue of health standards from wild populations that Sonia mentioned and Franz decried as not of interest to faculties of veterinary medicine in Colombia. It is not just a matter of knowing what diseases wild tapirs are exposed to. Zoos and captive breeding facilities need this information to ensure that their stocks are as healthy as, and resemble in all possible ways, wild animals. Why so? It becomes obvious that if re-introduction/translocation of animals may become a management option to save wild populations, it is necessary that animals to be introduced are not handicapped nutritionally and immunologically. Without getting into too much detail, animals to be re-introduced should have been exposed to the same pathogens as their wild counterparts in order to be successful. Equally as important is not to introduce diseases to populations we are striving to recover. Only with information about pathogens in the wild can captive breeding specialists and veterinarians

ensure they have prepared the animals for their intended destination without threatening those surviving in the wild. Mitch puts it in one line: “You can’t win! They must be clean, but not too clean!” So, the information is needed to know how much clean is not too clean, and of what. Many among us readers will have reservations about re-introducing animals, but we do not know what our options will be in the future and should be prepared with as much information as possible for as many eventualities as we can conceive.

Many thanks to Sonia Hernandez-Divers, veterinary doctor and Doctoral candidate at the Institute of Ecology of the University of Georgia in Athens, to Javier Adolfo Sarría, veterinary doctor, Coordinator of the Andean Ungulates Project of Colombia and of the TSG Genetics Committee, to Mitch Finnegan, veterinary doctor at the Oregon Zoo in Portland, and to Franz Kaston Flores, wildlife veterinary doctor from Colombia.

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You Can Help!

Compiling a Global Literature Database of Tapir Species

Based at the Department of Biological Sciences of Towson University, Melissa Cameron, one of my graduate students, and I are compiling a literature database of the four tapir species occurring worldwide. Our goal is threefold:

- 1) to have this database available for the members of the IUCN/SSC Tapir Specialist Group,
- 2) to stimulate further interest in tapir biology, and
- 3) to facilitate new research initiatives on tapirs.

The database will contain published articles but also unpublished theses (M.S. or Ph.D.) concerned with tapir biology (i.e. ecology, behavior, genetics, and conservation). We are collecting papers in pdf or other electronic format by using the main available search engines.

If you have any reprints, a thesis, or are aware of search engines covering Latin America or Asia please let us know. We hope in the near future to be able to provide the Tapir Specialist Group with a comprehensive global tapir literature database. You may contact us at: hbeck@towson.edu

Harald Beck, Ph.D.

IUCN/SSC Tapir Specialist Group Members

Currently, the TSG has 97 members, including field researchers, educators, veterinarians, governmental agencies and NGO representatives, zoo personnel, university professors and students, from 26 different countries worldwide (Argentina, Australia, Belize, Bolivia, Brazil, Canada, Colombia, Costa Rica, Denmark, Ecuador, France, Germany, Guatemala, Honduras, Indonesia, Malaysia, Mexico, Republic of Panama, Paraguay, Peru, Taiwan, Thailand, The Netherlands, United Kingdom, United States, and Venezuela).



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Scope

This newsletter aims to provide information regarding all aspects of tapir natural history. Items of news, recent events, recent publications, thesis abstracts, workshop proceedings etc concerning tapirs are welcome. Manuscripts should be submitted in MS Word.

Deadlines

There are two deadlines per year: 31 March for publication in June and 30 September for publication in December.

Please include the full name and address of the authors underneath the title of the article and specify who is the corresponding author.

Full length articles on any aspect of tapir natural history are accepted in English, Spanish or Portuguese language. They should not be more than 15 pages in length (including references). In any case, an English abstract is required.

Figures and Maps

Contributions can include black and white photographs, high quality figures and high quality maps and tables. Please send them as separate files (formats preferred: jpg, pdf, cdr, xls).

References

Please refer to these examples when listing references:

Journal Article

Herrera, J.C., Taber, A., Wallace, R.B. & Painter, L. 1999. Lowland tapir (*Tapirus terrestris*) behavioural ecology in a southern Amazonian tropical forest. *Vida Silv. Tropicales* 8:31-37.

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Santiapilli, C. & Ramono, W.S. 1989. *The Status and Conservation of the Malayan tapir (Tapirus indicus) in Sumatra, Indonesia*. Unpublished Report, Worldwide Fund for Nature, Bogor, Indonesia.

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Tapir Conservation

The Newsletter of the IUCN/SSC Tapir Specialist Group

Volume 14/2 ■ No. 18 ■ December 2005

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