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BOOK OF ABSTRACTS

KEYNOTE SPEAKERS

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Collapse of the New World's Largest Herbivores, the Tapir, and its Ecological Consequences

Most of the 74 largest terrestrial herbivore species on Earth are facing dramatic population declines. The importance of these species and the significance of their collapse are often overlooked. Large herbivores are unique in dispersing large-seeded plants, important for promoting plant gene flow, and indirectly linked to carbon storage in tropical rainforests. Tapirs are the largest Neotropical herbivores and through selective browsing and seed dispersal they play a key role in shaping the dynamics of forest succession and regeneration throughout their range. Here I will present the scale of megaherbivore defaunation globally and the cascading consequences that these extinctions have on key ecosystem processes.

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The One Plan Approach: The Philosophy and Implementation of Integrated Species Conservation Planning

There are 70,294 species on the IUCN Red List and 20,934 are threatened with extinction. An increasing number of these are dependent on continuing management for their survival. For these species, it makes little sense to conduct separate and independent conservation planning efforts based on whether these interventions take place in the wild, in increasingly managed parks and reserves or in zoos. The One Plan approach proposed by the IUCN SSC Conservation Breeding Specialist Group (CBSG) promotes integrated species conservation planning, which considers all populations of the species, inside and outside their natural range, under all conditions of management, engaging all responsible parties and all available resources from the very start of any species conservation planning initiative. The One Plan approach aims to: establish new partnerships; ensure that intensively managed populations are as useful as possible to species conservation; increase the level of trust and understanding among conservationists across all conditions of management of a species; accelerate the evolution of species planning tools; and ultimately lead species conservation towards the aspirations embodied in the Aichi Biodiversity Targets. Collaboration is essential if we are to successfully address the complex problems facing our planet. The real value of zoo and aquarium managers to species conservation can only be realized by working in collaboration with wild population managers, and vice versa. While each strives for the viability of a particular population, too seldom are they working together to maximize the conservation benefits to the species. When existence in the wild is threatened, a planning process that includes all populations of a species, inside and outside their natural range, would be a tremendous enhancement to species conservation. Also essential is collection planning for conservation. Currently, only 23% of terrestrial vertebrate species in ISIS zoos are threatened. Tapir programs, thanks in large part to the efforts of the IUCN SSC Tapir Specialist Group, are models of collaboration yet twice as many zoo spaces are devoted to the one species listed as vulnerable than to the three endangered tapir species combined. For intensively managed populations to be as useful as possible to species conservation, zoo and aquarium spaces must be devoted to the species that most need them. The One Plan approach is a working model of how the benefits of conservation collaboration can be fully realized. The name One Plan approach has joined many efforts of integrated conservation and united them under the same title. The results will be conservation programs that mobilize the full suite of skills and resources available to species in trouble, giving them a better chance at a future in the wild.

PAPER SESSIONS

LOWLAND TAPIR

Lowland Tapir Conservation Initiative, Brazil

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The main goal of the Lowland Tapir Conservation Initiative (LTCI) – led by Brazilian conservationist Patrícia Medici – is to use tapirs as ambassadors for conservation, catalyzing habitat conservation and protection, environmental education, outreach and awareness, training and capacity-building, and scientific tourism initiatives. The research component of the LTCI gathers high-quality scientific data and information to substantiate the development and implementation of biome-based Action Plans for tapirs and their remaining habitat in Brazil. The LTCI was first established in the Atlantic Forest in 1996. This pioneer program has included studies in basic ecology, population demography, health, genetics, habitat requirements and effects of habitat fragmentation, as well as promotion of community involvement, environmental education and habitat restoration efforts. One of the main achievements of the Atlantic Forest Tapir Program has been working with communities on the establishment of agro-forestry projects to restore tapir habitat (corridors, stepping-stones) identified through telemetry, while creating economic alternatives for local families. In 2008, the LTCI expanded to the Pantanal, the largest continuous freshwater wetland on the planet. The Pantanal Tapir Program has been extremely successful in obtaining tapir information from the most natural habitat mosaic in the country and precious data for tapir population modelling (such as on reproduction and social organization) have been gathered. At the moment, Patrícia Medici is preparing to expand the LTCI once again, this time to the Cerrado biome, the epicenter of development in Brazil. The Cerrado Tapir Program will completely shift gears and focus on evaluating the effects of different threats on tapirs including deforestation and fragmentation, road-kill, poaching, fire, spread of agricultural crops such as sugar-cane and soy-bean among others. The final step will be the establishment of the LTCI in the Amazon biome in a few more years.

Frugivory by the Lowland Tapir *Tapirus terrestris* in the Atlantic Forest of North Espírito Santo, Southeast Brazil

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The lowland tapir is the last terrestrial mega-herbivore in the lowland Neotropical region, and one of the last long-distance disperser of plants with large seeds, influencing the ecology of plant species in the landscape. The aim of this study was to describe the pattern of frugivory of the lowland tapir in two distinct landscapes of Atlantic Forest, in the north of the state of Espírito Santo, southeastern Brazil. We collected fecal samples between the years of 2011 and 2013, in the Córrego do Veado Biological Reserve (CVBR), in Pinheiros, and in the Private Natural Heritage Reserve Recanto das Antas (PNHRRA), in Linhares. After the biological material triage, we identified each seed to the lowest taxonomic level possible. We also measured each seed and classified them as belonging to ecological groups. We collected 325 fecal samples, which 173 (53.2%) were collected in the CVBR, and 152 (46.8%) in the PNHRRA. From the samples, 136 (41.8%) were deposited in or near water bodies, and 189 (58.2%) were collected from the litter or dry substrate. We found 93 fecal samples (28.6%) with at least one type of seed (30 samples were from the CVBR, and 63 from the RPPNRA). From the 30 morpho-species found in the samples, 15 were identified at species level, from eight families. The most representative families in the diet of *T. terrestris* were Anacardiaceae, Fabaceae and Myrtaceae. We found 12 species, from the 15 identified, with seed size varying from large to very large, with zoochoric dispersion syndrome. Five seeds origin dry fruits types, and ten were classified as fleshy fruits. From all identified families, four were located in both protected areas, ten only in the PNHRRA, and one was found only in the CVBR. This may indicate that the PNHRRA can provide higher availability of fruits than in the CVBR, which may be a result of anthropogenic disturbances occurred in the CVBR. This protected area had a fire in the 1980s, when about 80% of the reserve was burnt. It is also a completely

isolated forest fragment, surrounded mainly by pastures. In the contrary, the PNHRRA had its area extensively explored in the 1950s, but it is still inserted within the largest remaining of Atlantic Forest in Espírito Santo. Although the lowland tapir has a diet composed of a variety of fruits, in our study areas it appears to be less frugivorous than in other areas of the Atlantic Forest. However, it is evident the importance of *T. terrestris* to the dispersion of a large number of plants, especially of those with large seeds, increasing the recruitment of plants that are not dispersed by small animals.

Estimating Tapir Densities with Camera Traps and Spatially Explicit Capture-Recapture Models

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Camera traps in combination with capture-recapture models have been used for almost 20 years to estimate densities of animals that can be identified by their unique markings; mostly cats. Over a relatively short period of time tapirs can be distinguished in camera trap photos based on markings such as scares, ear notches, tail shape, size, and unique color variations. A few studies taken advantage of this and have used camera traps to estimate tapir densities. Spatially explicit capture-recapture (SECR) models provide an advanced method for calculating densities from sampling arrays such as camera traps. They integrate the estimation of abundance and the sampling area into a single model and allow for the inclusion of additional covariates such as sex or habitat type. We illustrate the use of SECR models on four years of camera traps data from the Nouragues Natural Reserve in French Guiana. We tested for differences in home range size and encounter rates for males and females and evaluated if encounter rates varied by camera model. We identified 9 individuals in the first two survey years and 10 individuals in the second two years. Density estimates for all four surveys were very similar and model selection indicated a difference in encounter rate for the two different camera models used but no difference in encounter rate or home range size for male and females or between years. The mean density for all years was 0.32 ind. km^{-2} (CI: 0.21-0.45 ind. km^{-2}) and densities varied little among the four years. We conclude that camera trap surveys can reliably estimate tapir densities. We make recommendations on how to design camera trap surveys for estimating tapir densities and point out possible issues with the method under certain condition.

Niche Modelling helps to identify Sources, Connections, and Gaps in Protected Areas for the Lowland Tapir: A Case Study in French Guiana

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Species Distribution Models (SDMs) have become increasingly useful for conservation issues. Initially designed to predict distributions of species from incomplete datasets, SDMs may also identify environmental conditions associated with higher occurrences and abundances of widely distributed taxa. Using > 350 records of the lowland tapir in French Guiana and estimates of abundance based on Kilometric index of tracks measured on 18 sites, we used three concurrent SDMs --based on (i) entropy, (ii) genetic algorithm, (iii) Mahalanobis distance -- to investigate relationships between tapir occurrence, abundances, and predictive variables such as vegetation, biogeographic units, climate, and disturbance index. Maximal entropy procedures resulted in more accurate projected conditions, with an accuracy of the predicted distributions > 95%, and predicted occurrences well correlated to field measured abundances ($p<0.01$). Map projection summarized more appropriate environmental conditions and identified areas likely acting as sources. Consequently, relevance of the current network of Protected Areas, with putative gaps in the protection of more favorable habitats, could be easily assessed. Then, we propose to use those predicted appropriate environmental conditions as a proxy of conductance for landscape connectivity planning. This could help to identify potential needs of connections and corridors between protected areas. We provide evidence here that SDMs can identify not only more suitable environmental conditions, but also areas hosting higher abundances. The method was successfully tested here at a small country (80,000 km^2) but is expected to contribute to a wider assessment of the key areas for conservation of the tapir, including at the overall species distribution scale.

BAIRD'S TAPIR

Baird's Tapir Conservation Nicaragua's Awaltara Territory and its Indigenous Ulwa Communities

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For the past several years we have worked in and around the indigenous Ulwa Communities of the Awaltara Territory in Nicaragua. Starting in 2010 we began camera trapping and traditional knowledge research in the communities of Kara and Karawala. We recently expanded camera trapping and began tapir capture expeditions in the Karawala region and conservation efforts throughout the territory. For instance, by using our research results to engage community members, we worked with the Territorial Government to pass a territory wide ban on tapir hunting. In addition, we have worked extensively with the mayor of the region to demarcate and create a reserve for tapirs at one of our primary study sites near the community of Karawala. This presentation reviews the recent history of the Nicaraguan Ulwa communities, then documents the processes of engaging community members through this history and our research and collaborating with them to design and approve both the hunting ban and the Karawala Reserve. It includes detail on reserve location, size, examples of the autonomous legislative processes of Nicaragua's indigenous peoples and the enforcement strategies for the tapir hunting ban.

Local Extinctions of the Baird's Tapir in Guatemala

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The Baird's tapir (*Tapirus bairdii*) is the largest terrestrial mammal and the only native representative of the Order Perissodactyla in Central America. Based on historical records, is known that this species distributed in both Caribbean and Pacific slopes throughout the entire region. At present the species has been extirpated from many localities due the loss of habitat and hunting pressure. Historical and current tapir records from Guatemala were obtained from literature review, interviews to local researchers, and field expeditions from 2006 to 2012. Localities with historical or current tapir records were overlaid with the potential habitat for Guatemala developed by García *et al.* (2008). The records dates range is from the Maya civilization to present, from both slopes. Comparing the localities that corresponding to tapir records and the current distribution of the species is evident that the species was extirpated from the Guatemalan's Pacific slope in the beginning of the 20th century, and other localities from the Caribbean slope, presumably in the following decades. The species still persisted in the highland cloud forests and lowland rainforests from the Pacific slope by 1940s, when coffee, cotton and sugar cane plantations expanded in the region causing habitat loss and increasing hunting pressure. On the Caribbean slope, in the Gulf of Honduras area the species was extirpated from several localities by the same time as the Pacific slope, when banana plantations expanded in this region. On the Usumacinta river basin, the local extinction of the Baird's tapir accelerated since 1960s to present, when oil palm and rubber plantations and cattle ranching are replacing the last remaining habitats, and protected areas are too small and with no connectivity between them to maintain viable tapir populations. The Maya Biosphere Reserve in the northern region of the country seems to be the area with less human pressure to tapir wild populations since its declaration in 1990s. Currently, the most vulnerable areas in Guatemala, were Baird's tapir local extinctions are occurring are located in the Departamento (State) of Izabal and the southern region of the Departamento of Petén. Historically, the extirpation of the Baird's tapir populations has been the result of the replacement of native forests by crops for international trade, and thus influenced by global economic trends, representing high monetary incomes, but at the very high price of biological diversity loss in a Megabiodiverse country. It is necessary that rural development plans and strategies including exploitation of natural resources and land use change don't comprise the long term existence of the Baird's tapir and its habitat. This goal can only be achieved by the integration of conservation and productive activities, specific to local environments and ecosystems.

Distribution and Occupancy of Baird's Tapir in Panama

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The Baird's tapir (*Tapirus bairdii*) is an endangered species whose home range runs from southeastern Mexico to Colombia. Within this area, the Isthmus of Panama is a key area because it connects populations of Central America and South America. Given the rapid degeneration of forest habitat in Panama, and because conservation planning is seriously limited by a lack of basic information on *T. bairdi*'s distribution and ecology, considerable emphasis should now be placed on developing quantitative indicators for evaluating the trend of its population. Although, the IUCN describes the tapir as resident in central Panama and probably extant in the rest of the country, reports of the species in Central Panama in the last decades are almost nonexistent and information on its distribution across the rest of the country scarce. We first compiled information from existing reports and local people, indigenes, farmers, guides, biologists and game-wardens on tapir's occurrence and hunting episodes in Panama to update its current distribution. The various sources of data gave strong evidence that outside of Barro Colorado Island in Lake Gatun, Baird's tapir is very rare in central Panama. We then applied a detection/non-detection sampling technique using camera traps to estimate tapir occupancy from nine tropical forest study areas with different levels of degradation and protection status. The environmental covariates included were the altitude and nearest distances to road, human settlements and rivers. Tapirs were detected in just four of these sites, all protected: Donoso Protected Area, Barro Colorado Island, Nargana Wildlands area and Darién National Park. Tapir occupancy was the highest on BCI and in the Darién NP, but since BCI is very small, it cannot support a large population of tapirs whereas the Darién NP with its large tracts of intact forest acts as a source area. This study gives some insight into the habitat used by tapirs for delineating more adequately the Atlantic Mesoamerican Biological Corridor in Panama, especially in Central Panama where restoring the connectivity is essential for gene flow between tapir populations, and the long-term survival of the species. The connection could be re-established by working with the various stakeholders, especially with 1.) local communities who coexist with wildlife to prevent small and large-scale deforestation and poaching, and 2.) the authorities to develop a national action plan for tapirs. Finally, surveying more sites and estimating occupancy on an annual rate will enable monitoring the trend of the tapir's population in Panama.

Tapirs on the Go: Are Protected Areas Ensuring Tapir Protection?

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Given the current rates of land use transformation and climate change, the maintenance of landscape connectivity is important for tapirs and their habitat. Landscape connectivity is considered a priority for ecosystem conservation because it may mitigate the synergistic effects of climate change and habitat loss. In this study, we focused on the importance of the connectivity of critical resources, such as water, for the maintenance of tapir populations within and outside the Calakmul Biosphere Reserve in Mexico. In this study, we performed a graph analysis of the potential connectivity of a waterhole network Baird's tapir (*Tapirus bairdii*). In our study area in the Yucatan Peninsula, Mexico, climate change has caused a decrease in precipitation over the last 30 years that has greatly diminished water availability during the dry season. In this area, water is only present in seasonal waterholes, and therefore represents a spatially and temporally dynamic resource. Using graph measures we found that the waterhole network was very sensitive to the loss of waterholes due to seasonal drying. The network fragmented easily when small waterholes were lost, and this, most surprisingly, especially inside the protected area. The change in resource connectivity we observed is hypothesized to influence the movement patterns of tapirs in the forest, which in turn may affect their functional role (e.g. long distance seed dispersal) with possible detrimental consequences for forest ecosystem functioning services. These results emphasize the need to assess how the variability in the availability of seasonal water resource may affect the viability of animal populations under current climate change inside and outside protected areas.

MOUNTAIN TAPIR

Mountain Tapir Conservation in the Rio Papallacta Watershed and its Surrounding Areas, Ecuador

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In November 2010, three Ecuadorian NGOs began a mountain tapir conservation program in the Rio Papallacta watershed. At that time five individuals (two females and three males) were tagged with satellite collars to obtain preliminary data of their home ranges, population density and health status. When the monitoring phase ended in June 2012, it was decided to continue and expand the existing tapir research project incorporating a study of the Andean bear. This within the same time frame in order to explore the ecological interactions of these charismatic mammals. During the second monitoring phase, two male tapirs were caught and collared, and one female tapir was recaptured. One of the male tapirs lives in high elevation Andean forest and the second male individual lives in cloud forest. The female tapir lives in the páramo ecosystem. Also the movements of a herd of cattle that resides in the study area were monitored by satellite. The tapirs living in the páramo ecosystem never descended towards the forest. In contrast, the individual that was captured in the high elevation Andean forest maintained movements between the forest and the páramo. The tapir residing in the cloud forest has never climbed up to the páramo but often crosses a highway. This is a fact that has never been reported before. All of the tapirs showed higher nocturnal activity (6:30 pm – 6 am) then diurnal. The males are more active during the last quarter moon, while the females are more active during new moon. The activity of a pregnant female increased during full moon and decreased during new moon. From the moment the female tapir had her offspring, her activity increased in the same proportion during full moon and new moon. Male tapirs have an average movement of 585 m during daytime and 776 m during night time. Female tapirs move with an average of 362 m during daytime and 647 m during night time. The pregnant female decreased her movements to 248 m during daytime and 264 m during night time. The tapirs under study showed a preference to move within sites that have slopes between 25 and 50%. The cattle herd moved over lager distances compared to the tapirs, with an average of 1922 m per day taking advantage of the dirt roads which can be found within the study area. The cattle searches for the plains to graze, in this way avoiding terrain with pronounced slopes. The collected data will help generate a more realistic and updated threat map (the first version was published in 2012) and will help to conserve and protect the Mountain Tapir in the Rio Papallacta watershed and its surrounding areas.

Distribution of the Mountain Tapir in Ecuador: Assessing the Importance of Protected Areas under Global Warming Scenarios

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In Ecuador, *T. pinchaque* is considered as critically endangered. In spite it has been registered in several localities, its geographic distribution in country is unclear. Additionally the effects of habitat loss and climate change have not been studied. We compiled records of *T. pinchaque* and modeled its ecological niche in Ecuador, in order to: 1) Estimate the distribution areas in present and under futures climate change scenarios; 2) To identify important vegetation types and ecosystem availability along the distributional area of *T. pinchaque*; 3) Evaluate the importance of the Ecuadorian System of Protected Areas in scenarios of habitat loss and climate change, and 4) Analyze the implications for the biogeography and conservation of the species. Models were generated using MaxEnt ver 3.3a, and environmental variables from Worldclim, and RCP45/RCP85 climate change scenarios for year 2050. The importance of the protected areas for the ENMs obtained was evaluated calculating available area per protected areas. The importance of each ecosystem was assessed extracting the suitability area from the model and dividing this value by the total availability area per ecosystem in Ecuador. The effect of the altitude was evaluated by applying GLMs for proportional data, and the trend of their relationship was assessed adding a

smoother by a GAM; both analyses made using the R software. The occurrence extension range include ca. 15,240 Km^2 . Maxent model for environmental suitability was 47,713 Km^2. A total of ten ecosystems keep ~90% of the ENM' in Ecuador, being the Herbaceous *páramo*, Northeastern Andes montane evergreen forest and Southeastern Andes montane evergreen forest, the most important. The model shows a reduction of 23% by habitat loss in a national scale. Protected areas protected only the ~33% of the area in the potential distribution model for *T. pinchaque*, being Sangay, Cayambe-Coca and Llanganates the most important, harboring best suitability areas. Models under climate change showed a reduction of 32.7 to 42.7% of the distribution area. Synergetic effects of climate change and habitat loss might represent imminent risk showing reduction of 49-52% of modeled area. Maintaining the national categorization of Critical in Ecuador is a good precautionary measure.

MALAYAN TAPIR

Displacement and Road-Kill Issues of Malayan Tapir, *Tapirus indicus*, in Peninsular Malaysia

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The frequency of displacement of Malayan tapir, *Tapirus indicus*, is becoming a major concern in Peninsular Malaysia. The number of displaced individuals increased from 2006 to 2013 during which the Department of Wildlife and National Parks recorded a total of 198 displaced tapir individuals. Habitat disturbance, loss and fragmentation are considered the main factors forcing the tapirs to forage near forest fringes, agricultural areas and human settlements. Many incidents implicate humans and displaced Malayan tapirs, and from 2006 to 2013 a total of 34 tapir were killed or severely injured in road accidents. To mitigate the problems the Department of Wildlife and National Parks identified 126 hotspots, where Malayan tapirs frequently crossed roads and erected signboards at all hotspots to caution drivers. A total of 54 Malayan tapirs were rescued throughout Peninsular Malaysia in the same period, of which 18 were released back to the wild. Of the remaining individuals 29 were deemed in too poor state of health to be released and were brought in for treatment and rehabilitation at Zoo Melaka or Sungai Dusun Tapir Conservation Centre. The last seven died from severe injuries. A few released tapirs were equipped with satellite collar for monitoring purposes. In 2011, the Malaysian Government launched a Master Plan of Ecological Linkages for the Central Forest Spine complex with an aim to connect fragmented forest habitats in West Malaysia with the main forest complexes. Hopefully, this will provide an excellent foundation for the future Malayan tapir conservation in Peninsular Malaysia.

Effects of Wildlife Activities on Forest Floor Vegetation at Krau Wildlife Reserve, Pahang, Malaysia

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A study of the effects of wildlife activities on the forest floor vegetation was carried out at three different locations of Krau Wildlife Reserve, Pahang (KWR) namely Wan Bulan Salt-lick, Bayek Salt-lick and a Fruiting Tree Area. The objectives of this study were to i) determine which species of vegetation that wildlife prefer in the study locations, ii) measure duration and feeding behavior of wildlife species, and iii) evaluate regeneration level of forest floor vegetation after browsed by the wildlife. A total of 10 plots measuring 5 x 5 m each were set up in the three study locations. For each study location, five plots were enclosed with a 1.5 m fence and five were left open and marked with colored PVC. Camera traps were used to record behavior and forest floor vegetation by wildlife. A total of 16 mammal species and two bird species were recorded at the study locations. The five most dominant species were pig-tailed macaque (*Macaca nemestrina*), Malayan tapir (*Tapirus indicus*), wild boar (*Sus scrofa*), barking deer (*Muntiacus muntjak*) and Malayan porcupine (*Hystrix brachyura*). Malayan tapirs were active from 18:00 to 06:00 hours and exhibited foraging behavior from 23:00 to 05:00 hour only. Video records revealed that tapirs spend most of its feeding behavior by scenting selected vegetation types. Wild boars do not exhibit any specific active period but showed foraging behavior from 06:00 to 18:00 hours (dusk to dawn). Barking deer was recorded from 06:00 to 17:00 hours. There are three categories of animal activity which are diurnal (active during the day) such as *M. muntjak*, nocturnal (active at night) such as *T. indicus* and cathemeral (active in the day and at

night) such as *S. scrofa.* These status are dependent on the active period as well as the majority of time spent by each species. Each species also has different ways of eating, for example *M. muntjak* will chew only parts of the leaves while *T. indicus* will snap twigs and top shoot, while *S. scrofa* will dig the soil to find food. The regeneration rate of forest floor vegetation was analyzed by measuring the relative regeneration rate of seedlings using the parameters of height, diameter, shoot length, number of leaves and number of twigs. In total, 89 vegetation samples were eaten, consisting of 24 families and 35 genus. The results show that wildlife in KWR selected 66% of seedlings, followed by 28% shrub, 3% climber, 2% palm and 1% herb of the total plants eaten. The comparisons of seedlings relative regeneration growth showed that the regeneration of forest floor vegetation between open and closed plots vary according to study location and treatment. At Bayek Salt-lick, the relative growth rate and diameter of trees were higher inside fenced plots than in open plots (Independent t-test, df = 1, $p<0.05$). The opposite pattern was found for the number of leaves at Fruiting Tree study location (Independent t-test, df = 1, $p<0.05$). At Wan Bulan salt-lick, all parameters of the relative growth rate were not significantly different between open and closed plots. This study can contribute to a more systematic forest management specifically to determine the relationship between flora and fauna and their needs.

Malayan Tapir and Oil Palm

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Malayan tapir population in Sumatra is threatened by large-scale habitat loss, fragmentation and increasing hunting pressure. Forest conversion into oil palm plantations, mining areas, and agricultural encroachments were identified as main factor. However, there is no such study specifically addressed to compare the occurrence of Malayan tapir in such different habitat type. Currently we set up our camera trap on large continuous secondary forest, forest edge, and fragmented forest inside of oil palm area. Preliminary results show that, Malayan tapir were observed in continuous secondary and edge forest. In contrast there is no image of Malayan tapir captured in fragmented forest in oil palm plantation. Malayan tapir is only one large herbivore species absence in oil palm, meanwhile we still got image of muntjak and sambar deer, wild boar, even a tiger. The loss of basal vegetation perhaps may affect the absent of Malayan tapir.

Malayan Tapir Conservation: An Overview

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Many of Southeast Asia's large ungulate species such as gaur (*Bos gaurus*), Sumatran rhino (*Dicerorhinus sumatrenesis*), Javan rhino (*Rhinoceros sondaicus*), Banteng (*Bos javanicus*) and Malayan tapir (*Tapirus indicus*) are progressively facing extinction in what is considered their natural habitats. All species ranged from the Indian subcontinent, Southern plains of China, Indochina across Peninsular Malaysia, Java, Sumatra and Borneo, where they were believed to prefer open woodland and savannahs mixed with open forests. This type of habitat was abundant during the last ice-age, but the rising sea levels spelled the demise of Sundaland with its large savannahs and open woodland, and forced its ungulates to higher ground with tropical rainforest. Despite the habitat similarity between Peninsular Malaysia, Sumatra and Borneo gaur, tapirs and Javan rhino went extinct from Borneo, Javan rhino and gaur on Sumatra and the two species of rhinos on Peninsular Malaysia, where gaurs are only found in critical low numbers. For the past 12 years, Copenhagen Zoo has studied a variety of the Malayan tapir's ecology and behavior. Our studies include the Malay tapir's foraging behavior, vocalization, seed dispersal and dietary dependency on mineral licks. Results from the past 12 years of work suggest that the species is not well adapted to tropical rainforest, and Borneo, with large tracts of peat-forest, are notoriously void of mineral licks. Indeed, Borneo's remaining Sumatran rhinos and elephants are found in Sabah where the landscape is not dominated by peat and swamp forests. Future conservation interventions of Malayan tapir and other large ungulates must consider integrating the evolutionary history of these species.

VETERINARY ISSUES & REPRODUCTIVE BIOLOGY

Health Assessment of Wild Lowland Tapir Populations in the Atlantic Forest and Pantanal Biomes, Brazil (1996-2012)

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The lowland tapir (*Tapirus terrestris*) occurs in South America and is listed as Vulnerable to Extinction by the IUCN Red List of Threatened Species. Health issues, particularly infectious diseases, are potential threats for the species. Health data from 65 wild tapirs from two Brazilian biomes – Atlantic Forest (AF) and Pantanal (PA) – was collected during a long-term study (1996–2012). The study included physical, hematological and biochemical evaluations, microbiological cultures, urinalysis, and serologic analyses for antibodies against 13 infectious agents (viral and bacterial). The resulting extensive datasets can be used as reference values for wild tapirs. Physical abnormalities were mostly explained by age (e.g., tooth wear, ocular senile halo) or social behavior (e.g., scars, wounds) rather than disease. The AF and PA tapirs were significantly different for several hematological and biochemical parameters, as well as between wild (AF+PA) and captive tapirs (ISIS - International Species Information System). Some differences may be explained by seasonal availability of resources in the wild, diet, competition, and reproductive state. Ten bacteria taxa were identified in the AF, and 26 in the PA, and a low similarity between sites was observed. *Staphylococcus aureus* and *Escherichia coli* were the most common. Some of the isolated bacteria are considered opportunistic microorganisms that can cause disease in immune depressed animals. Antibodies against five viruses were detected: Bluetongue virus (95% CI: 0.3–12.6% in AF, and 4.7–26.5% in PA), eastern equine encephalitis virus (95% CI: 7–30.4% only in AF), western equine encephalitis virus (95% CI: 0.06–15.7% only in AF), infectious bovine rhinotracheitis virus (95% CI: 0.06–15.7% in AF, and 0.3–12.3% in PA), and porcine parvovirus (95% CI: 90.3–100% only in PA). A high prevalence of exposure to *Leptospira interrogans* (10 serovars: Autumnalis, Bratislava, Canicola, Copenhageni, Grippotyphosa, Hardjo, Hebdomadis, Icterohaemorrhagiae, Pomona, and Pyrogenes) was detected in both the AF (95% CI: 12–38%) and PA (95% CI: 66.1–83.9% for minimum estimated tapir population size, and 63.7–86.3% for maximum estimated tapir population size). A greater diversity of serovars and higher antibody titers were found in the PA. Leptospirosis is a zoonotic disease and its incidence is strongly associated with heavy rains, standing water, and hot climate. The Pantanal is a seasonally inundated floodplain and its intrinsic environmental characteristics may be favorable to pathogens whose epidemiologic cycles depend on water. Another feature of the Pantanal is the presence of feral pigs throughout the region. Domestic pigs were introduced to the biome 200 years ago and became feral, and could be potential reservoirs of several pathogens, which could explain the high prevalence of porcine parvovirus in the PA. Based on the results, both AF and PA populations were considered to be healthy. Nevertheless, potential health issues caused by exposure to infectious agents cannot be disregarded. Wildlife health studies using ecological approaches can indicate possible relationships between infectious agents, humans, domestic animals, and wildlife facing different environmental conditions. It will be important to monitor the influence of these interactions over time.

Antibodies against *Leptospira interrogans* and Preliminary Infection Risk Analysis in Wild Lowland Tapirs in the Pantanal, Brazil

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Leptospirosis is an emerging zoonosis that has been detected in humans and several domestic and wild animal species worldwide. In horses, a species closely related to tapirs, leptospirosis has been recognized as an important disease of the reproductive system, besides systemic and ocular manifestations. The infection can shows seasonal nature in some regions of the tropics and its incidence is strongly associated with heavy rains, standing water, and hot climate. The objective of the present study was to investigate the epidemiological situation of *Leptospira* spp. infection in wild lowland tapirs (*Tapirus terrestris*) from Brazilian Pantanal, a seasonally inundated floodplain. The study was carried out in a private cattle ranch in the Nhecolândia sub-region of the Pantanal, in the State of Mato Grosso do Sul, Brazil (19º20''S; 55º43'W); where tapirs are in close contact with Nellore cattle (*Bos indicus*) and

horses (*Equus ferus caballus*). The owners of the ranch have a prophylaxis protocol for cattle health, which includes vaccination for leptospirosis. Sixty-two blood samples from 38 wild lowland tapirs (23♂ and 15♀) were collected between September 2008 and December 2013. Microscopic agglutination test (MAT) was used as serological analysis, with 26 serovars of *Leptospira* spp. as antigens. In order to identify the major risk factors for infection in wild lowland tapirs, descriptive analysis was used to evaluate serological response according to following variables: sex (male and female); age class (adult, sub-adult, and juvenile); seasonality (dry and wet season); temporal variation of antibody titers (for resampled individuals; *n*=15); and spatial ecology (intra-specific interactions, by home range overlap analysis). Antibodies against *L. interrogans* were observed in 66% (95% CI: 50 – 79%) of tapirs and in 76% (95% CI: 64 – 85%) of tested samples. Nine *L. interrogans* serovars with considerably high antibody titers were found: Pomona 100–3200, Icterohaemorrhagiae 100–800, Bratislava 100–800, Grippotyphosa 100-400, Canicola 100, Copenhageni 100–400, Pyrogenes 800, Wolfii 200, and Hardjo 200. Pomona (98%) and Icterohaemorrhagiae (36%) were the most common. Twenty samples had antibody to more than one serovar. Antibodies against five serovars (Pomona, Icterohaemorrhagiae, Grippotyphosa, Wolfii and Hardjo) were found in the same sample of an adult female tapir. All juveniles were negative (*n*=6). Despite unbalanced sampling, an apparent high prevalence was observed in dry season (68%). Temporal analysis showed decreased titers in eight resampled tapirs throughout time; increased titers in two and constant titers in five tapirs. Considering spatial ecology, neighboring individuals that show strong home range overlap apparently have similar profile for antibody titers. However, statistical analysis and further evaluation will be necessary. Despite the high antibody titers found in lowland tapirs in this study, there were no clinical signs or laboratory results indicating disease. Nevertheless, potential health issues caused by exposure to *Leptospira* spp. cannot be disregarded. Long-term monitoring, sampling and properly data evaluation can provide important insights to leptospirosis risk analysis, as well as for other possible threats for wild lowland tapirs.

Characterization of Fatty Acid Profile of Lowland Tapir Milk during Different Lactation Periods

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Milk represents a highly complex food produced by mammary gland to supply all the nutritional requirements of mammalian newborns, reason for which its composition varied among different animals. The knowledge of gross milk composition of wild animals is a key factor for the care and management, allowing the manipulation of different feedings strategies to ensure the survival of the newborn. In the present study we evaluated the fatty acid profile of colostrum, transitional and mature milk of lowland tapir (*Tapirus terrestris* L., 1758). Samples were obtained from six healthy animals kept in captive or semi-captive conditions from Argentina and maintained at -20ªC until it analysis. Lipids were extracted by Folch procedure by using chloroform:methanol (2:1, v/v) solution, derivatized and injected into a gaseous chromatograph. All samples were processed by duplicate. Results showed that tapir milk fat is characterized by high saturated fatty acid (SFA) content that decreased as lactation progressed from 73.2 % to 55.6 %. Fatty acid profile revealed a unique pattern for this specie, showing great amounts of lauric (C12:0), miristic (C14:0) and pentadecanoic (C15:0) acids compared with other Perissodactyla mammals. The overall unsaturated fatty acid (UFA) content increased over time from 26.77 % to 43.73 %. The most abundant fatty acids were oleic acid (C18:1n9) among monounsaturated fatty acids (MUFA) and linoleic (C18:2n6) acid among polyunsaturated fatty acid (PUFA). Neither butyric (C4:0) acid nor fatty acids longer than C18 were determined. Traces of conjugated linoleic acid (CLA) were measured, being the only *trans*fatty acid detected. The SFA/UFA ratio was 2.73, 1.75 and 1.24 for colostrum, transitional and mature milk, respectively. The n3/n6 ratio was also higher in colostrum than other periods (0.88 vs. 0.27 and 0.36, respectively). Desaturase indexes also showed changes over time for C14 and C16, while no significant differences were determined for C18 index. As first time, fatty acid profile of tapir milk in different periods of lactation using more than one sample was reported, contributing to the general knowledge of milk from other unknown members of Perissodactyla Order. The current study must be taken as a point to know tapir fatty acid metabolism as well as the nutritional requirement of the newborn, contributing to the general knowledge of milk from other unknown members of Perissodactyla Order.

Validation of Fecal Progesterone Analysis for Assessing Reproductive Status in Female Lowland and Malayan Tapirs

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Validation of non-invasive reproductive hormone monitoring techniques would be a valuable tool for managing reproduction and investigating reproductive failure in captive tapirs. In this study, biological validation of a fecal progestagen analysis methodology was attempted in female lowland (*Tapirus terrestris*) and Malayan (*Tapirus indicus*) tapir. Fecal samples were collected from four lowland and eight Malayan tapir over a 3 to 26 week period. Animal selection incorporated individuals of varying age, reproductive status, and social grouping. Institutions collected feces three times per week and samples were frozen at -20˚C until analysis. The hormone extraction technique was based on Watson et al (2013) and has shown good efficacy in a range of species. Fecal progesterone metabolite concentrations were determined using a standard competitive enzyme immunoassay adapted from Munro and Stabenfledt (1984). The assay was validated both biochemically (Watson et al, 2013) and biolologically using observed oestrus behaviour and diagnosed pregnancy in the tapirs. Faecal progestrone profiles were assessed for evidence of cyclic patterns of excretion using methods adapted from Brown et al (2001). For the lowland species, increased excretion during pregnancy, reduced excretion whilst on contraception, and low excretion in prepubescence provided some evidence of validity but cyclical patterns of excretion were not identified. Cyclicity had been expected in one animal based on observed signs of estrus, however the progestagen profile showed no surges in concentrations suggestive of luteal phase onset. This may have been caused by poor sample quality, insufficient sampling period or that this methodology is unsuitable for detecting progesterone excretion in this species. For the Malayan species, detection of increasing excretion during late pregnancy, low excretion during prepubescence, and surges typical of luteal phase onset, provided reasonable evidence of validity. Two Malayan tapirs showed evidence of luteal surges in fecal progestagen concentrations of approximately 10-fold elevations from baseline, consistent with the magnitude of luteal surges reported in plasma progesterone studies. Two tapirs, one of each species, were known to be pregnant. In both, mean preparturient concentrations of fecal progestagen were markedly higher than mean postparturient concentrations however levels fluctuated dramatically. The magnitude of peak progestagen concentrations was lower than expected from plasma progesterone studies. Female lowland tapir are reported to reach sexual maturity at 14-24 months, whilst a range of 31-44 months is reported for Malayan tapirs. One lowland and two Malayan tapir were below the reported age of onset of sexual maturity. No evidence of reproductive cycling was detected and mean progestagen concentrations remained low and fluctuated minimally, consistent with acyclic immature animals. One lowland and one Malayan tapir had histories of poor conception rates (both were nulliparous) and no observations of estrous. In the lowland tapir detectable fecal progestagen concentrations remained very low throughout the study. Conversely, the mean progestagen concentration in the Malayan tapir was the highest recorded in the acyclic tapirs (including the pregnant individual). Whilst results for both animals therefore appeared abnormal, further diagnosis to elucidate the underlying aetiologies has not been performed. Continued utilization of this methodology in a larger study to improve biological validation is planned and will be used alongside other diagnostic techniques to investigate causes of abnormal cycling and poor reproductive performance in the European zoo programs.

A Preliminary Report on the Reproductive Biology of the Endangered Mountain Tapir

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The mountain tapir (*Tapirus pinchaque*) is listed as endangered by the IUCN Red List, largely due to loss of habitat, over hunting and subsequent isolation of small populations. Captive populations play an important role: 1) as a hedge against catastrophic losses in the wild, 2) as a resource for biological studies impossible to conduct in nature, and 3) as an educational resource to raise public awareness about the endangered status of the species. However, there are fewer than 10 mountain tapirs managed in captivity globally. As a result of their rarity, to date, there has been no comprehensive effort to understand their fundamental reproductive biology. Hormone monitoring, vaginal cytology, and semen collection technologies are crucial for the development of assisted reproductive technologies including artificial insemination. The overall objective of this project was to begin to

develop artificial insemination technologies in a pair of mountain tapir housed at the Cheyenne Mountain Zoo, Colorado, USA. Blood samples from a single female (age, 18 yr; 1-3 samples/week) were collected and analyzed for serum progesterone and luteinizing hormone (LH) using radioimmunoassay for over a year. Matched vaginal cytology samples also were collected for two cycles. A single male (age, 12 yr) was anesthetized using a combination of xylazine hydrochloride, ketamine hydrochloride, and butorphanol tartrate and subjected to semen collection via electroejaculation. Ejaculates were assessed for volume, sperm concentration, sperm total motility, progressive motility, pH and sperm morphology. Based on progesterone concentrations, the the female's estrous cycle length was estimated to be ~30 days (eight days follicular phase and 22 days luteal phase) and she appeared to cycle consistently year round. Rise in progesterone was preceded (~5-6 days) by an increase in LH suggestive of impending ovulation. Vaginal cytology exhibited a shift from high proportions of intermediate and parabasal cells (anestrus/diestrus) to predominantly superficial cells (estrus) and correlated with serum progesterone levels. A single rectal ultrasound examination was performed under standing sedation (xylazine) to evaluate her ovaries but no abnormalities were detected. Semen volume, pH, sperm concentration, sperm total motility, progressive motility, normal sperm were 6.5 ml, 8.7, 49 $\times 10^6$, 60%, and 3%, respectively. These results demonstrate that protocols developed for other tapir species can be applied to the mountain tapir but warrants additional research. Furthermore, it may be feasible to develop assisted reproductive technologies such as semen cryopreservation and artificial insemination for augmenting the genetic management and conservation of mountain tapirs.

Application of Advanced Reproductive Technology in Malayan Tapir

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The use of Advanced Reproductive Technology (ART) in domestic animals has long been documented although in the equids opposition to research into ART, including artificial insemination and embryo transfer, hindered the development of new techniques in the field of assisted reproduction. ART in wild and zoo animals is usually limited to ultrasonography, endoscopic exams and semen collection, mainly due to high cost of ART equipment, risks to animals during restraint and limited expertise. A 3-day ART workshop for Malayan Tapir was conducted in Malaysia in May 2014 to: (i) train six veterinarians and seven wildlife officers on the application of ART in Malayan tapirs (ii) evaluate semen and cryo-banking (iii) evaluate reproductive status of female tapirs (iv) experiment with anesthetic drugs (opioid analgesic, opioid antagonist, alpha-2-agonists and antagonists). Two males and three females were used during the workshop. The males were evaluated for semen qualities and the semen cryopreserved. The females were examined for reproductive status and blood was taken for progesterone profiling. The two bulls were tranquilized for semen collection using two models of electro ejaculators (Seiger Electro – Ejaculator ® and Electrojack6®). Two females were sedated for ultrasonograhic examination and one female was conditioned in a chute for the procedure. Semen volume ranged from 0.1 to 3 milliliters. Semen qualities were evaluated for motility, concentration, live – dead ratio and abnormalities. Both bulls had low sperm motility (1 – 2% forward motility) and 72 – 95% abnormal spermatozoa, mostly bend tail. Concentration ranged from 912.5 – 1,625 x 10^6 spermatozoa per milliliter. Live spermatozoa accounted for 6.5 – 38%. A total of 23 straws were obtained and cryopreserved. One female was confirmed pregnant. There were no apparent pathologies in all the females.

POSTER SESSIONS

LOWLAND TAPIR

Updates about the Tapir Conservation Project in the Chaco and Formosa Provinces, Argentina

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In Argentina, the tapir is considered *Endangered* by the Red book of Mammals and *Threatened Species* by the National Secretariat of Environment and Sustainable Development (Resolution 1030/04). In order to contribute to the conservation of this emblematic species, Fundación Temaikèn works in collaboration with governmental agencies, NGOs and the community developing the Tapir`s Conservation Project.
The project is composed by 3 goals: To keep a viable ex situ population, in health, genetics and behavior; To preserve the existing tapir populations in two regions with high conservation value in Chaco and Formosa provinces, north of Argentina; and to contribute to fulfill the species National Action Plan. In order to manage the ex situ population we perform health studies, specific treatments and genetic studies with all the captive specimens kept in Argentina. This way, we try to guarantee a healthy genetic population. Is is developed a genealogical registry and we can recommend the optimum crosses based on the genetic information. In Temaikèn Biopark, different activities are plan to increase visitor's knowledge about tapirs. In the field, in 2012 we started studies to estimate the abundance and distribution of the species in places with high survival possibilities, such as Bañado La Estrella in Formosa province and Pampa del Indio in Chaco province. In order to estimate the abundance of the Tapir and to characterize the structure of the populations and the demographical patterns it is being developing a study in Posta Cambio Zalazar, located in the Department of Patiño, in the Center-North of the Province of Formosa, on the intersection of Provincial Route 28 and National Route 86. This town is one of the Important Units pro Conservation defined in the action plan of the Tapir Conservation Project in Argentina (Chalukian *et al.*, 2009), and is located in one of the northern boundaries of the Bañado la Estrella. Until now, we performed eight field campaigns. In the other place, the aim is to survey a population of Tapir in the extreme south of its distribution within a reserve area and develop, based on these results, a management plan to prevent extinction in this zone. This work will be carried out in the Provincial Reserve Pampa del Indio, Chaco Province. Cameras trap were placed there. Since 2010, a community related task is being held, with the aim of diagnose the level of knowledge, assessment and perception that the local people have about the species In 2013 we started a proposal for leaders and multipliers to develop environmental projects and we are working in the establishment of different strategies to decrease the impact of threats in tapirs and its environment. These strategies promote the increase of: Knowledge about native endangered species, community commitment to biodiversity conservation, recovery of native species individuals, number of community environmental projects, alliances with governmental agencies, universities, NGOs, etc. ,reinforcement of policies to protect wildlife, capacity building, empowered communities. We are convinced that this is the way to conserve not only tapir but its natural environment as well.

Activity Patterns of the Lowland tapir (*Tapirus terrestris*) in the Private Natural Heritage Reserve Recanto das Antas, Southeast Brazil

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Knowledge of population parameters (e.g., activity patterns) of Neotropical rainforest mammals is poorly known, especially for large-bodied mammals like the lowland tapir (*Tapirus terrestris*). Tapirs are an important component of Neotropical rainforest ecosystems because they fulfil ecological roles, including seed dispersal. The use of camera-traps has shown exceptionally potential for studying forest mammals in comparison with the more traditional methods and enabled researchers to describe daily activity patterns with a level of detail not possible

before. Because tapir is a threatened species, determining its activity patterns is important and critical for assessing their conservation status and designing management strategies. In this study we used camera-trap data to describe the daily activity of the lowland tapir in a landscape interposed by eucalyptus plantations in the Atlantic Forest. The study was conducted in the Private Natural Heritage Reserve Recanto das Antas, part of the largest lowland forest remnant in the state of Espírito Santo, southeastern Brazil. The camera trapping surveys were conducted from March 2012 to March 2013, especially to identify the sites with high frequency of tapirs in order to build box traps. We followed a systematic protocol to keep records independent from each other. The camera-traps were placed at regular intervals, and to reduce repetitive recording of tapirs, we created grids of 4 km^2 superimposed to the map of the study site. Camera-trapping stations were located at a minimum interval distance of 2 km. We set up seven camera-trapping stations, and one camera trap (Reconix PC 800) per station. We programmed the camera traps to operate 24 hours/day and to record the date and time of each shot. We grouped the number of tapir events per hour of the day: The diurnal event was considered after the sunrise time; nocturnal event began one hour after the sunset. The crepuscular dawn was defined from one hour before to the sunrise, and the crepuscular dusk until one hour after the sunset. We used the software Sun Time v7.1 to obtain the information about sunrise and sunset times for our study area. All stations recorded tapir events, but approximately 70% of the tapir events were concentrated in only two stations. The sampling effort of 47,783.52 hours of camera trapping produced 386 independent lowland tapir photographic events, demonstrating an impressive nocturnal activity pattern between 1800 and 0200 hours, with 64.5% of events classified as nocturnal, 18.1% as crepuscular and 17.3% as diurnal. There is a sharp drop in activity of the lowland tapir between 0800 and 1600 hours. This is the first report on the activity patterns for the lowland tapir in the Atlantic Forest in Espírito Santo. The camera trapping was quite effective to document the activity of this highly secretive species, increasing the kind of evidence needed to advance our understanding of *T. terrestris*'s ecology and conservation status in a landscape inserted in one of the last remaining Tabuleiro Forest from the Atlantic Forest.

Occurrence of Ticks (Acari: Ixodidae) in Wild Lowland Tapirs (*Tapirus terrestris*) in the Atlantic Forest and Pantanal Biomes, Brazil

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In Brazil, tapirs (*Tapirus terrestris*) have been recognized as very important hosts for the maintenance of several native tick species. The goal of this study was to evaluate the diversity of ticks in wild tapirs captured in two Brazilian biomes: Atlantic Forest – AF (Morro do Diabo State Park, Municipality of Teodoro Sampaio, São Paulo State) and Pantanal – PA (private cattle ranch, Municipality of Aquidauana, Mato Grosso do Sul State). From July 2006 to July 2008, 14 tapirs were examined for the presence of ticks in the AF site, whereas 38 tapirs (including 33 recaptures), were sampled in the PA site from September 2008 to December 2013, totalizing 71 samples. Collected ticks were kept alive and sent to the laboratory, where they were taxonomically identified based on current literature, and further deposited in the tick collection of the Faculty of Veterinary of the University of São Paulo. Five tick species were found in the AF site: *Amblyomma sculptum* previous synonym of *Amblyomma cajennense* (33♂, 37♀, 40 nymphs); *Amblyomma coelebs* (34♂, 36♀, 1 nymph); *Amblyomma brasiliense* (6♂, 24♀, 1 nymph); *Amblyomma ovale* (1♂, 2♀); *Amblyomma* sp. (23 nymphs, 3 larvae); *Haemaphysalis juxtakochi* (1♀). In the PA site, four tick species were found: *Amblyomma sculptum* (211♂, 658♀, 348 nymphs); *Amblyomma parvum* (2♂, 12♀); *Amblyomma ovale* (2♂, 6♀); *Amblyomma* sp. (23 nymphs, 15 larvae); *Rhipicephalus microplus* (2♂, 1 nymph). Overall, 7 different tick species were found on tapirs, corroborating their role as hosts for a great variety of tick species in South America. Because ticks are widely recognized as vectors of a great diversity of pathogens to animals and humans, further studies on the occurrence of tick-borne pathogens on tapir ticks would be very important. In fact, most of the tick species found in this study have been found infected by tick-borne pathogens in other South American sites where tapirs are absent.

Survey of Ticks in Free-Ranging *Tapirus terrestris* in Two Protected Areas in the State of Espirito Santo, Southeastern Brazil

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The Atlantic Forest is one of the most endangered ecosystems in the world, with forest restricted to small fragments and isolated by pastures, agricultural crops and urban areas. This reduction of continuous forests affects mainly large animals such as the lowland tapir (*Tapirus terrestris*). The synergy between anthropogenic threats and the intrinsic characteristics of this species can lead to population decline of tapirs in different regions throughout their distribution. For example, in the Espirito Santo state, southeastern Brazil, the intense process of deforestation and fragmentation negatively impacted the abundance of tapirs. In addition, the changes in the landscape increased the contact between human communities, pets and wild animals, changing the regime and pathways for the spread of pathogens between different groups of hosts. Thus, we conducted a survey of ectoparasites with the goal of identifying ticks species infesting free-ranging tapirs in Espirito Santo state. We collected two samples of ticks from wild life tapirs (November 2011 and June 2012) in two different protected areas, during field campaigns carried out by the project Pro-Tapir: the Corrego do Veado Biological Reserve (RBCV) and the Private Natural Heritage Reserve Recanto das Antas (Reserva Particular do Patrimônio Natural, in Portuguese, hereafter “RPPN”). The first tapir was captured in a trap in RPPN and the second was found in RBCV cornered by domestic dogs. The species of ticks, *Amblyomma naponense* (2 females and 3 nymphs), *Amblyomma brasiliense* (4 males, 6 females and 3 nymphs) and *Amblyomma incisum* (1 male, 8 females, 4 nymphs) were identified in both individuals, and *Amblyomma oblongoguttatum* (7 males and 3 females) was found in the individual sampled in RBCV. Zoonotic pathogens that can be transmitted by ticks should be investigated to understand the epidemiological importance to wildlife, domestic animals and human populations, as well as the risk associated with a fragmented environment, where interaction among these are demonstrated to be increasing intensively.

Use of agricultural areas by Lowland Tapir (*Tapirus terrestris*) in buffer zone of Carlos Botelho State Park, Paranapiacaba Ecological Continuum, São Paulo, Brazil

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The lowland tapir (Tapirus terrestris) is the largest Brazilian terrestrial mammal, being classified as "Endangered" in the Atlantic Forest biome. In this biome there are only three areas that harbor viable populations of the species; among them is the Carlos Botelho State Park (PECB), inserted in the Paranapiacaba Ecological Continuum, State of Sao Paulo. Although there’re no studies about population estimates in this region, parallel studies with other species suggest that there is a high density of tapirs in PECB, especially in the northern region; including its Buffer Zone, in particular properties. This region presents a mosaic of habitat with fruit production, forestry, livestock and native forest, where is possible to observe the tapirs frequently. The area used in this study is the Elguero Farm, adjacent to the PECB, with an area of 525 hectares, which works with fruit production (persimmon, plum, grape, apple, tangerine, tomato and peppers) and forestry (production of Pinus for extracting its resin). Additionally, about 40% of Elguero Farm consists of remnants of Atlantic Forest; and in the biggest part, connects to the PECB forests. Thus, Elguero Farm consists of a perfect mosaic for studies focused at Landscape Ecology of the Buffer Zone of PECB, priority to increase knowledge and facilitate the conservation of tapirs. As a first step in the expansion of knowledge of the local fauna, was accomplished a survey of medium and large mammals through the use of camera traps, interviews with workers and local residents and active search for traces. As a partial result of this survey the tapir was registered at all habitats that compound the mosaic in Elguero Farm; even using persimmon and plum as a food resource. Many records in the region area of antagonistic interactions with people and their livelihoods: the family agriculture. For residents of the Buffer Zone of PECB, tapirs can be a problem, because of the production damage. There are several reports of cases where people need to adopt measures that are often harmful to the tapirs, which may cause injury, behavioral disturbance, diseases, infections and even death. In this sense, the records obtained in this first survey demonstrate the importance of the areas present in the Buffer Zone of PECB, as well as the urgency to obtain more precise data on the use of

these areas. With this data, is possible to elaborate a Tapirs Management Plan in PECB Buffer Zone, which can guide farmers to adopt measures without threat the tapirs and preserving their productivity.

Reporting on the Development of the Educational Campaign: "Minha Amiga É Uma Anta" at Parque das Aves, Foz do Iguaçu, Paraná, Brazil

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Parque das Aves [Bird Park] is a private zoo associated to the Sociedade de Zoológicos e Aquários do Brasil [Society of Zoos and Aquariums in Brazil] - SZB, and it receives about 500,000 visitors a year. Its Department of Environmental Education was established in 2006, and it receives approximately 30,000 students a year. About 20% of the visitors come from other Brazilian states. The remaining come from Foz do Iguaçu and surrounding region, and from Paraná. In 2013 Parque das Aves joined the campaign "Minha Amiga é uma Anta" [My Friend is a Tapir], adopted by SZB in partnership with the National Initiative for the Preservation of the Brazilian Tapir. Parque das Aves is located in the western of Paraná, where some stretches of rainforest can still be found, such as the Iguaçu National Park. Although tapirs are not kept at Parque das Aves, it joined the campaign and sought ways to promote the work being conducted with the species. Pedagogically, various Environmental Education tools and methodologies were used to sensitize the different audiences that visit the zoo through its Environmental Education program, from elementary grade students all the way to higher education students. Some partnerships were created, such as with Refúgio Biológico Bela Vista [Bela Vista Biological Sanctuary] (RBV) from Itaipu Binacional, which allowed the Park's Environmental Education team to follow the behavior of adult and baby tapirs in captivity, in order to obtain information on the species to be shared during the campaign. Parque das Aves has prepared an alternative trail in the midst of the rainforest for guests and students who participate in monitored educational visits. The trail features a replica of a tapir and a number of plaster cast footprints produced at RBV, which make the visitors feel that the trail is actually used by tapirs. Approximately 30 schools (more than one thousand students) have visited this trail and received brochures about the campaign. A theater play was developed for the younger audience, providing information on the biology of the species, its ecological importance, and some interesting facts. A tapir costume was created to represent Antanita, the Park's campaign mascot, which had quite an impact on visitors. Approximately 450 children from 15 schools attended the theatrical presentation. On average, over two thousand educators from more than 50 cities have been mobilized in the region. In addition to the educational activities conducted with the community, the campaign was disseminated through a social network: Facebook. A total of five posts were published, which had more than 3,000 hits, likes and shares. The results obtained with the campaign indicate that it is possible to use zoos as a link between the work developed in the field and the work developed in captivity, and that the zoos' transformative potential can be used to promote preservation. The campaign was the first to establish partnerships between zoos and field projects, enabling the integration of zoo staff and researchers, paving the way so that new campaigns and projects can be disseminated by zoos.

Threats to the Lowland Tapir Population in the Atlantic Rainforest of Northern Paraná, Brazil

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Fragmentation, degradation and habitat loss are the main threats to conservation of Brazilian land mammals. Hunting, urbanization, livestock and agriculture, hydroelectric developments and roads increasing are largely responsible for the impact to natural ecosystems and consequently to animal populations. The lowland tapir, *Tapirus terrestris*, is distributed throughout Brazil and is classified as "vulnerable" to extinction in the country. In the Atlantic Rainforest biome its classified as "in danger" of extinction because just has large populations only in the Atlantic coast of São Paulo and Paraná state. Northern Paraná landscape has changed in agriculture and livestock matrix and fragments of deciduous forest from Atlantic Rainforest biome. Since 2008 many records of lowland tapirs in the parks of Londrina were achieved in a fieldworks of researchers and visitors photographs. The last six documented registers with photos were marked on the Londrina map. These six records were tabulated and classified types of threats to habitats and *Tapirus terrestris* individuals. Records are from August 2008 in Mata

dos Godoy State Park (PEMG), by "Dynamics of PEMG Felids population" project; September 2009 at the Municipal Park Três Bocas by amateur photographer; December 2009 in the forest reserve of Colorado Farm by mammals survey project; October 2010 in the forest reserve of Monjolão Farm by birds survey project; April 2011 in the forest reserve of Bulle Farm by floristic project; and September 2013 at São Francisco Farm by "Londrina Verde" project. The threats were classified as 1 - hunting: any cause for arrest and killing of individuals of *T. terrestris*; 2 – roads: the presence of the loop road next occurrence of populations of *T. terrestris*; 3 - urbanization: presence of urban structures near the occurrence of *T. terrestris*; 4 - habitat degradation: fragmented habitat with illegal forest exploitation and the presence of domestic dogs; and 5 - Genetic loss: inbreeding. *T. terretris* are commonly observed in Mata dos Godoy State Park due to the large capacity of this forest remnant in support animal populations. In this protected area there are still reports of hunting and basic structure of animal protection does not exist. Other illegal activity practiced is the exploitation of juçara palm (*Euterpe edulis*). Other records are in the buffer zone of the state park, probably *T. terrestris* individuals from the park, establishing foraging territories. Threats in these areas are the roads, hunting and persecution by domestic dogs. In the forest reserve of Colorado Farm was photographed an individual of *T. terrestris* and another individual also photographed in the dam of Três Bocas Park, 2 km distance between them. For this population several impacts of urbanization pressure on habitats of *T. terrestris*, including recent landfill installation near to the forest fragment and the law that approved urban expansion into the region. This small population of lowland tapir in Colorado Farm cannot have contact with PEMG population existing because among them there is a road of high vehicle flow, the state road: PR-445. In this case could have benn genetic loss by inbreeding between individuals of this population.

Seed Dispersal by *Tapirus terrestris* (Linnaeus, 1758) in the Atlantic Forest Fragmented Landscape

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The Atlantic Forest is one of the most diverse and threatened biomes on the planet, with the seasonal semi-deciduous forest its most threatened vegetation type. In northern of Paraná State, this forest fragments remain in the agricultural landscape matrix with little connectivity between them. In this area there is a large information gap regarding the population ecology of *Tapirus terrestris*, and considering the role of the species as a disperser of seeds and their mobility across the landscape, the objective of this study is to analyze seed dispersal by *T. terrestris* in the fragmented landscape in northern Paraná State. Hypotheses will be tested: (i) the excrements of *T. terrestris* found near protected areas contain seeds diversity similar to each other and greater than that found in remote locations; (ii) seed dispersal of *T. terrestris* include large seeds in the material obtained in and around protected areas, but not in other places. The study area has 100,000 hectares and is located in the Lower Tibagi River basin, Cfa climate and average rainfall of 1500 mm. The area has four protected areas, plus two areas identified as priorities for conservation by the Brazilian Environment Ministry. Data collection began in June 2014 and will last until May 2015. Transects are being made in larger fragments than 50 ha and surveys are being applied with local residents in order to verify the presence of the lowland tapir. If there are positive indications of occurrence, the indicated areas are covered to verify the presence of the specie. Records are considered: views, footprints, tracks, excrements, carcasses and vocalizations. Such records are being georeferenced using a GPS unit. Fecal samples are being collected, numbered, packaged and in the laboratory, washed to obtain seeds. The seeds are being separated from the fiber and all the material is heavy. Intact and damaged seeds are being quantified, classified by size based on length of major axis, being small (<6 mm), mean (6,1-15 mm) and large (>15,1 mm). To generate a distribution modeling of lowland tapir Maxent software will be used, based on the attendance registers, incorporating the environmental variables, namely: climate, topography and landscape: vegetation, cities, roads, protected areas and rivers. To generate images of the GRASS GIS modeling software will be used and to estimate which variables contribute more in the jackknife test model will be used. The variables of diversity (Simpson's diversity, richness and abundance of all species, forest species and species with large seeds) and the composition of excrements (dry weight of seed and fiber and the number of whole and damaged seeds) will be compared between seasons, between individual fragments and fragments between groups (near and far from protected areas, large and small) by t test and ANOVA.

Genetic Diversity of Lowland Tapirs (*Tapirus terrestris*) in European Zoos

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The lowland tapir (*Tapirus terrestris*) is a vulnerable species of the Tapiridae family living in South America's tropical forests. Its constantly decreasing number of individuals has resulted in an intensification of conservation efforts aimed at stopping the population decline and at protection of biodiversity. To analyze genetic its diversity and to compare the captive population to wild South American tapirs we analyzed pedigrees and four mitochondrial genes (cytb, D-loop, cox II, 16S rRNA). Average value of diversity coefficient calculated on the basis of pedigree was high ($G_{D=}$0.969) and homozygosity indicator was low (ƒ=0.05). Analyzed mtDNA genes were moderately diverse with haplotype diversity from 0.18 to 0.896. The captive breeding population had 57% of mtDNA haplotypes in common with the wild population and had representatives in three of the four main phylogenetic clades present in wild populations. We did not find among all the analyzed *ex situ* individuals mtDNA haplotypes characteristic for the new tapir species – *Tapirus kabomani*. The high level of genetic diversity among the screened DNA markers is a result of the high number of diverse founders collected from different geographical locations. Based on actual mtDNA analyses (unfortunately with small sampling, with few individuals per location, few locations and large areas of *T. terrestris* distribution not sampled) the analyzed *ex situ* population is a good reservoir of wild lowland tapirs' genetic diversity and may be a source for reconstruction of the *in situ* population.

BAIRD'S TAPIR

Reducing Tapir Vehicle Collisions along the Burrell Boom Road in Central Belize

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The Central American Tapir also called the Baird's Tapir, is the national animal of Belize. This Endangered species is facing a serious threat to its already low population; vehicle collisions incidents in central Belize District have been responsible for 13 tapir mortality during the period June 2008 and December 2012.Using GPS points of each collision, two areas were identified as hot spots. Spot speed surveys conducted in the area showed that speeding is a problem and therefore a mitigation measure to reduce speeding was carried out. Wildlife warning signs to alert drivers of the species presence in the area were installed and a significant drop in speed was noted immediately after the installation of the signs. For the year 2013 no tapir vehicle collisions were reported or recorded on the Burrell Boom Road. In light of this, camera-trapping and track surveys were carried to detect the species continued presence in the area. Efforts were made to determine how the species presence differs in areas treated with warning signs versus those that do not have warning signs. A total of 12 Moultrie (M-880) digital game cameras were placed along three different transects along the east and west side of the Burrell Boom road; two track surveys were also conducted along transects. After 360 camera days of trapping and two track surveys, it was confirmed that the Central American Tapir continues to use the immediate landscape along the Burrell Boom Road, and might be successfully crossing the road as drivers have been alerted of their use of the road.

Rafiki Tapir Project, Costa Rica

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Rafiki Safari Lodge is a sustainable tourism destination in the Lower Savegre Valley of Costa Rica. The lodge sits on a 700 acre private reserve of lowland tropical forest. Utilizing ecotourism, the lodge strives to protect the forest and its connectivity to the biological corridors of the southern Pacific coast of Costa Rica. Originally the vision of the Boshoff family was to reintroduce tapirs back into the wild in the Savegre Valley. The plan was well intended, but quite grandiose and perhaps ahead of its time. With the help of the TSG, local agencies within Costa Rica, international institutions and scientists, Rafiki has learned a tremendous amount about the species and its needs. The Rafiki Tapir Project has faced many challenges, but still the dream of wild tapir in the Savegre Valley continues to evolve. At the Tapir Symposium in 2008, Rafiki learned that tapir reintroduction is a relevant goal, and necessary for preservation of the species. We also learned that due to its intact populations of tapir, Costa

Rica is not an ideal country to carry out a reintroduction, especially not as an experimental project. Nonetheless we have learned that Costa Rica can play a critical role in the future of tapir. Costa Rica depends largely on ecological tourism as a source of revenue. Travelers from around the world are attracted to the country due to its "green" philosophy. Costa Rica has made incredible changes in the past 20 years, shifting from an agricultural country with one of the fastest rates of deforestation in the world, to a place where forestry is outlawed and tourism ranks as the major industry. Costa Rica provides a perfect platform to engage the world into understanding what tapirs are, what threats they face and what humans can do to keep them around for future generations. The planning for a 25 hectare fenced enclosure started 14 years ago. The biologists of Rafiki along with the help of tapir specialists have created ideal habitat where captive tapirs would have a chance to live and adapt to a wild environment. Scientists will have a chance to study the animals, the environment itself, and gain information necessary to understand the journey captive tapir would have to make to get back in to the wild. The ultimate goal would be to provide genetic stock of tapirs that are capable of surviving in the wild. These animals could then be translocated domestically or internationally to repopulate areas where tapir are extinct or threatened. Rafiki has teamed up with ASANA, a local non-profit organization dedicated to the biological corridor known as "Paso de La Danta". ASANA is looking to Rafiki to provide a model of sustainable land use within its corridor. We have come to this symposium to collaborate with the world's experts on tapir to come up with a responsible plan that will maximally benefit the future of Baird's tapir and its identity in the world.

New Book: El Tapir en México: Estudios de Caso y Conservación

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Mexico hosts one of the biggest populations of Baird's tapir (*Tapirus bairdii*). However, Mexico's exponential increase in population represents a constant pressure to transform natural habitats, increase road development, and promote agricultural activities. All these actions represent major threats to tapir populations in the country. Habitat transformation, increase in agricultural activities, hunting and road kills represent just some of the major threats to this species in Mexico. In an effort to further understand the status of tapir research in Mexico, to identify gaps in our knowledge and future steps that will help tapir conservation, we have compiled a broad range of studies that represent the up to date research status on tapirs in Mexico. Our book, entitled "El tapir en México: Estudios de Caso y Conservación" is the first book on tapirs in Mexico. This book includes 18 chapters with topics ranging from veterinary medicine, tapir distribution, ecology and conservation, field techniques to study tapirs, capture and management protocols, diseases and habitat use and tapir's role in the ecosystem, among other topics. The main purpose of this book is to further promote collaboration among researchers and tapir specialists and to raise awareness among the general public, researchers and conservationists that can help us promote tapir conservation inside and outside protected areas, in zoos and throughout the country.

Diet Diversity and Feeding Behavior of a Semi-Captive Baird´s tapir (*Tapirus bairdii*) in Wawashang, Nicaragua

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In March, 2013 we confiscated a juvenile tapir in the Batata region of the Wawashang Reserve, Nicaragua. Since this time she has resided in the Kahka Creek Reserve, a 630 hectare protected forest within the larger Wawashang Reserve that is managed by a local NGO. She sleeps within enclosures but is allowed to roam free during the early mornings and some evenings. In 2013 and 2014, we began systematically observing and documenting her eating habits within the reserve's forest. We conduct week long surveys once a month during which we follow the tapir around the reserve for three hours daily. For each plant she consumes, we record the species, the part of the plant eaten, the geographic coordinates, the time, and take a photo of the food item. We also document important feeding behaviors and interesting behaviors during our observation periods. After five weeks or approximately 105 hours of observation, she has eaten 106 different species of native plant. Diversity indices indicate that she should learn to eat additional species in the coming months. We have also documented and taken videos and photos of important behaviors, including chewing bark and rubbing against trees, and taken a basic look at the importance of certain hardwood species to these behaviors. Our data will be used as a component of our plan to design a tapir re-introduction program in that they provide information on how quickly

juvenile tapirs can adapt to a natural environment. This study also underscores the importance of tapirs in shaping the floral diversity of Neotropical rainforests.

Bait Efficacy and Trapping Success in a GPS Telemetry Study in Caribbean Coast Nicaragua

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This presentation details the processes we undertook to plan and carry out expeditions for our tapir GPS telemetry project in Nicaragua. In late 2012, we established a series of bait stations at locations we planned to trap tapirs in Caribbean Coast Nicaragua. At each location we installed a Bushnell Trophy Cam and placed one of the following in a clear spot on the forest floor: 1) Ripe Bananas, 2) Corn, 3) Cassava Root and Bark, 4) Pineapple, or 5) Salt. In over a year of observations, tapirs only consumed bait a handful of times and were very timid around the bait, often spending 5-10 months observing baits before consuming them. Visitation rates at bait stations were not significantly different than visitation rates at cameras with no bait, indicating that none of our baits succeeded in attracting tapirs. We hypothesize that the tapirs' timidity is due to the presence of hunters and nearby habitat destruction. For other species, including lowland paca and tayra, baits were quite effective. Given the lack of success in baiting tapirs, we used non-baited pitfall traps to capture animals for our GPS telemetry project. In one pilot expedition and a second, longer expedition, we constructed a combined 23 pitfall traps (4.5' wide x6.5' long x6' deep) on known tapir trails. We carefully camouflaged traps to minimize their visibility to tapirs, which, along with careful decisions about trap location, we believe are key components of successful trap building as only our best disguised traps were successful. In the longer expedition we captured one adult male tapir and one adult female tapir. Our capture rates are slightly lower than those reported in other countries.

MALAYAN TAPIR

Feeding Strategy of the Malayan Tapir (*Tapirus indicus*) under Semi-wild Conditions

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Foraging theory dictates that tapirs, as generalist herbivores, will browse widely, selecting a suitable diet from the multitude of forest plants. Food selection and feeding strategy, however, has received little attention in the Malayan tapir (*Tapirus indicus*). We undertook a study to assess the feeding preferences and strategy of captive Malayan tapirs in a 30 ha natural forest enclosure in Malaysia. Data was gathered on the plant species consumed, and compared to the availability of forest plants, using Manly's alpha index of selectivity. More than 200 plant species, from 49 families, were consumed. And, although tapirs browsed on a wide range of mostly woody species, more than half (54%) of the diet was comprised from just 20 species, with the majority of consumed plants being rarely eaten. Selectivity analysis showed that tapirs were highly selective in their food choice, with many of the common plants being rarely eaten. Plants common in the diet were actively sort out and consumed in a 'favoured' or preferred manner, rather than just being randomly taken from common forest species. Preferred species were the sub-canopy and understorey trees *Xerospermum noronhianum*, *Aporosa prainiana* and *Baccaurea parviflora*, while the Phyllanthaceae (leaf flowers), Myristicaceae (nutmegs) and Myrtaceae (myrtles) were favoured families. The overall feeding strategy was then to browse widely, taking many species in low numbers and in a 'neglected' manner. A moderate number of species were consumed randomly, while the vast bulk of the tapirs' diet comprised a moderate number of 'favoured' species. Such a feeding strategy may have implications for ranging behavior and habitat utilization.

VETERINARY ISSUES

Reversible Chemical Immobilization of Wild Lowland Tapirs (*Tapirus terrestris*) using a combination of Butorphanol, Medetomidine and Ketamine

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The lowland tapir (*Tapirus terrestris*) occurs in South America and is commonly kept in captivity in zoos worldwide. Several anesthetic protocols have been developed and tested for wild and captive tapirs, and adverse effects are often reported. The main objective of this study was to determine a safe anesthetic protocol for lowland tapirs, one that provides rapid induction and recovery time, adequate immobilization and muscle relaxation, loss of consciousness, stable physiologic parameters, and reversal. The study was carried out in a private cattle ranch in the Nhecolândia sub-region of the Pantanal, in the State of Mato Grosso do Sul, Brazil (19º20''S; 55º43'W). Forty chemical immobilizations in 26 wild lowland tapirs (12♀ and 14♂) were performed between November 2011 and May 2014. Tapirs were captured in box traps and anesthetized for fitting of radio-collars, subcutaneous insertion of microchips, morphometric measurements, sex and age determination, physical examination, and collection of biological samples (blood, skin biopsies, hair, ectoparasites, swabs of anatomical cavities and active wounds, and urine in cases of spontaneous urination). Drug doses were based on estimated body mass. Tapirs were estimated to weigh from 80 to 250 kg. The anesthesia was performed with a combination of Butorphanol (0.15 mg/kg), Medetomidine (0.012 mg/kg) and Ketamine (0.6 mg/kg), by intramuscular injection with 5 ml darts. The concentrated version of Medetomidine (20mg/ml) was used to reduce final volume. Atropine (0.03mg/kg) was added to the protocol in order to inhibit excessive salivation and respiratory secretions, commonly observed in lowland tapirs (*n*=33). Physiologic parameters were monitored and recorded at intervals throughout anesthesia. Atipamezole (0.04 mg/kg) was used to reverse the alpha-2 adrenergic agonistic effects of Medetomidine, and Naltrexone (0.3 mg/kg) was used to reverse the opioid agonistic effects of Butorphanol. Reversal agents were administered intramuscularly and/or intravenous in the same syringe no sooner than 35 minutes from the administration of the anesthetics in order to prevent adverse effects of residual Ketamine. In nine cases, anesthetic supplementation was needed due to insufficient doses in the first dart or dart failure. The average procedure time was 47 minutes. Mean induction time was 4±1 minutes (ranging between 2-7 minutes; *n*=31). Mean recovery time was 2±1.5 minutes after reversal administered ½ IM and ½ IV (ranging between 0.5-6.5 minutes; *n*=34) and 8±6 minutes after reversal administered IM only (ranging from 4-17 minutes; *n*=4). Physiologic responses to immobilizations where Atropine was added to the protocol were: mean respiratory rate - 30±12 breaths per minute, cardiac rate - 74±16 beats per minute, relative hemoglobin oxygen saturation (SpO2) - 90±10%, and body temperature - 36.5±1°C. The level of muscle relaxation was considered satisfactory. Adverse effects included apnea (*n*=5) and salivation or respiratory secretion (*n*=12), despite the addition of Atropine. The Butorphanol/Medetomidine/Ketamine combination with Atipamezole/Naltrexone reversal proved to be an effective protocol which can be considered safe and adequate for the immobilization of wild lowland tapirs in box traps, as well as for captive tapirs.

Evaluation of a Chemical Restraint Protocol for Lowland Tapir in Captivity

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The chemical restraint tapir (*Tapirus terrestris*) is the safest method for the management of this species in captivity, because although animals apparently calm, avail themselves of great strength and weight to thwart any attempt at containment. The aim of this study was to assess the quality of a protocol for dissociative anesthesia in chemical restraint tapir aimed at collecting biological material. Eight animals, 2 males and 6 females, aged between 2 and 13 years, and an estimated weight of between 120 and 250 kg, were studied at the Scientific Breeding of Wild Animals for Conservation Purposes (Authorization Management IBAMA 021/2010) of Companhia Brasileira de Metalurgia e Mineração (CBMM), in Araxá, Brazil. The animals were fasted 12 hours and water for 2 hours, and contained in management areas measuring 9m^2. Animals that did not allow the manipulation, were placed in containment boxes to administration of anesthesia. Anesthesia was induced with

the combination of 2 mg / kg xylazine, 3 mg / kg ketamine, 0.15 mg / kg midazolam and 0.04 mg / kg atropine administered intramuscularly. The maintenance of anesthesia was performed by continuous intravenous infusion of a solution containing 213.5 ml of 0.9% NaCl, 21 ml of xylazine 2%, 5 ml of midazolam 5% and 10 ml of 10% ketamine, with the infusion rate of 1 ml/ kg/hr for 60 minutes. After this period, 0.12 mg / kg ketamine, intravenously, for recovery from anesthesia was applied. The animals were kept in the right lateral decubitus position. At the beginning of general anesthesia, we assessed the effects of time and induction of anesthesia, as well as physiological parameters of heart rate (HR) monitored by auscultation, respiratory rate (f) determined by the movements of the rib cage, and rectal temperature (TR) for digital thermometry, every 10 minutes for 1 hour (T1 to T7). The quality of recovery and return, and an evaluation of anesthesia were observed. The average induction time or latency was 16.87 ± 15.47 minutes, lowering the head, mild ataxia, lip relaxation, opening quad support, followed by sternal recumbency were verified in this period. The HR measured during maintenance of anesthesia were: T1 = 89.75 ± 18.77; T2 = 82.25 ± 34.81; T3 = 89 ± 16.77; T4 = 85.75 ± 17.25; T5 = 77.25 ± 32.91; T6 = 83.75 ± 17.09 and 82.00 ± 16.14 = T7. Values were checked f: T1 = 35.75 ± 12.62; T2 = 34.25 ± 12.71; T3 = 34.25 ± 11.93; T4 = 34.25 ± 12.71; T5 = 32.75 ± 10.36; T6 = 32.00 ± 14.77; T7 = 27.75 ± 6.45. The TR values were: T1 = 37.49 ± 0.88; T2 = 37.56 ± 1.13; T3 = 37.48 ± 1.24; T4 = 37.40 ± 1.21; T5 = 37.43 ± 1.28; T6 = 37.33 ± 1.44 and 37.25 ± 1.49 = T7. The animals studied showed good muscle relaxation, sedation and tranquilization intense without excitement, and good analgesia that allowed for procedures on the skin (n=8). Vocalization were observed in transit anesthetic (n=5) and reflux nostrils (n=2). The response was assessed as normal (n=6) and prolonged (n=2). Nystagmus, continuous movements of ears and tail, and vocalization were observed in response to stimulation of calves in all animals (n=8). Anesthesia was evaluated as excellent (n=5), good (n=2) and moderate (n=1). The protocol used allowed a good restraint of the animals and procedures can be used both in the field and in captivity.

Anesthetics Protocols used in Tapirs at “Quinzinho de Barros” Municipal Zoo Park, Sorocaba, São Paulo, Brazil

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This work intents to report the anesthetics protocols used in tapirs at PZMQB, to assist others institutions and researches with the management of the specie. Fifteen anesthetics protocols were evaluate in a eight years retrospective study which 10 of those were adults and 5 were young animals. Weighting the animals before the procedure is almost inviable once the specie’s weight is among 150 – 300 kg (200 – 600 pounds). This institution elaborated anesthetic files and uses it as routine during procedures that involve chemical restraint to monitor anesthesia and keep it as a consultive file for future procedures. Physiologic parameters and important information about the procedure are subscribed on the anesthetic file, resulting in a qualitative evaluation: excellent, good, average and bad. It’s very important to evaluate the recovery, if it was normal or if it was prolonged. The protocols were based on use of only one anesthetic agent and associated anesthetic agents. Among the associations, the most common protocol was xylazine with butorphanol and azaperone with butorphanol. The association of butorphanol (0,15mg/kg) with alfa-2-agonist (xylazine 0,3mg/kg and detomidine 0,05mg/kg) were used with evaluation “excellent” to “good” in nine of the procedures, allowing clinical examination, odontologic examination, blood draw, microchip implantation, biometry, all with good recovery. Three procedures used butorphanol (0,12 mg/kg) with azaperone (0,5mg/kg) and were classified as good, allowing the collect of biological material and full clinical exam. Two alfa-2-agonist were used isolated in two different cases and both were evaluated as “averaged” and had normal recovery, but were used with success in case of transportation, guiding the animal into the transportation facility for the reason that the animals didn’t recumbency and stayed conscious. In only one procedure ketamine (3mg/kg) with xylazine (0,7mg/kg) were used, being evaluated as “good” with normal recovery. Sharing information as anesthetics protocol data are extremely important to help the conservation by allowing a successful management of the specie *in situ* and *ex situ*.

Endotoxemic Shock Caused By Intestinal Torsion on Tapirs (*Tapirus terrestris*) In Captivity: Two Cases Report

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Tapirs (*Tapiridae* family), rhinoceros (*Rhinocerotidae*) and equines (*Equidae*) are ungulates mammals from *Perissodactyla* order. These herbivores digestive system is characterized by small stomach, cecum and well development colon, and vesicular bladder absent. Colic and rectum prolapse are the two intestinal affection related in tapirs. They can occur because of bacterium enterocolitis, foreign object or sand, torsion, among others. Two captivity tapirs (*Tapirus terrestris*), an adult female and subadult (3 years), at "Quinzinho de Barros" Municipal Zoologic Park showed typical clinical signs of colic in different moments. The signs were: hyperactivity, rolling, abdominal distention, neck distention and superior lip movement, suggesting abdominal discomfort. The diet consisted in commercial horse food, pumpkin, banana, orange, fresh and dry alfafa. Xylazine chloride 0,3mg.kg^{-1} , ketamine hydrochloride 4mg.kg^{-1} and butorphanol tartarate 0,15mg.kg^{-1} were administrated intramuscular (IM) to facilitate the management and attenuate inquietation. An intravenous fluidtherapy with ringer lactate was done, and so sodic dypirone with N-butilescopolamine bromide 28mg kg^{-1} and IM each 2 hours and flunixim meglumine 0,8mg.kg^{-1} IM. Beside, an enema and gastric lavage were done. Both animals didn't respond well the treatment; therefore they were transported to Paulist Stadual University (UNESP) in Botucatu-SP to complementary exams. However, the first animal, the female, died during the transportation, and the second animal, the male, died the next day of his arrival to the university. Both animals presented as *causa mortis* an endotoxemic shock. In the necropsy exam, the female presented good body condition, light dehydration, congestion of mucosa and pressure sores. There was a completely torsion of the proximal segment of the cecum, and consequently a necrosant enteritis from small intestine until caecum region. The secondary processes were characterized by erosive gastritis, especially the glandular part and hepatomegaly. The second animal presented at necroscopy exam good body condition, pale mucosa and multiple abrasions on face and thorax. Differing from the female, the 360° torsion occurred in small intestine, jejune and ileum portion, result in in severe difuse necrohaemorrhagic gastroenteritis. In addition, presented large colon full of rocks, coconut seeds and small amount of sand, mixed with fibrous content. The stomach was dilated and compacted, replete of orange peel. The secondary processes occurred by aspiration of intestinal content, pulmonary and cardiac congestion, splenic contraction, renal congestion with intense capsule adherence. An vast hepatic congestion associate with yellowish multifocal areas were found compared with the first case, wich has only an hepatomegaly. The causes of torsion were not clarified, however, clinical and necropsy findings suggest impaction caused by fibrous feed. The tapirs of PZMQB are composed by six individuals, apparently well adapted to captivity, for the reason that there are registered new borns annually over the years. However, gastrointestinal reports in captivity tapirs in Brazil are scarce, therefore the exchange of experience in management are extremely important.

The Presence of *Ochrobactrum anthropi* in Oral Cavity of a Wild *Tapirus terrestris* Captured in a Landscape Mosaic of Atlantic Forest and Eucalyptus Monoculture in Southeast Brazil

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We provide the first report of *Ochrobactrum anthropi* found in the oral cavity of a wild *Tapirus terrestris* specimen. We also discuss the possible implications of this bacteriological finding in wild tapirs living in a mosaic landscape composed mainly by forest fragments of Atlantic Forest, and *Eucalyptus* sp. plantations. In September

2013 we captured an adult male of *T. terrestris* in the region of Linhares, north of the state of Espírito Santo, Brazil, using an anesthetic dart (darting methodology). The captured individual was submitted to biometrics, biological samples collection (blood, swab of natural cavities, and skin biopsy) and installation of VHF radio telemetry/GPS. The swabs for microbiology were kept in Stuart medium for 48 hours and submitted for bacteriological culture and identification (BioMérieux Automation VITEK by mass spectrometry MALDI-TOF: *Matrix Assisted Laser Desorption Ionization – Time Of Flight*). In the oral cavity we only found the development of colonies of *O. anthropi*. In the other cavities sampled, the bacterial profile was compatible with other studies of wild *T. terrestris*: *Aeromonas hydrophila/caviae* (nasal cavity); *Serratia marcescens* (foreskin); *Streptococcus suis* (conjunctiva); *Staphylococcus aureus* (conjunctiva, ear and anal cavity); *Staphylococcus xylosus* (nasal cavity) and *Escherichia coli* (anal cavity). It is noteworthy that *O. anthropi* is not a bacterium usually associated with oral cavity in mammals. The organism described by HOLMES (1988) is a gram-negative flagellate bacillus which belongs to the Brucellaceae family. It is now recognized as a common organism in soil that can colonize or interact with a wide range of eukaryotic organisms, influencing the growth of some plants, or pathogenic cases. Despite being somewhat referenced as pathogenic, it was identified in association with spinal ankylosis and pyogranulomas in amphibians. Currently, it has been classified as an emerging pathogen, being identified as an opportunistic infectious agent to humans that can cause septicemia, peritonitis, pneumonia, and other clinical conditions. The most interesting aspect of the association with tapir's oral cavity is that *O. anthropi* has genes that confer resistance and tolerance to the herbicide glyphosate (N-phosphonomethyl glycine), used in research of new agricultural technologies for transgenesis in plant crops. The microorganism can efficiently utilize glyphosate molecules as a source of phosphorus. This makes us suppose that contaminated soils confer adaptive advantages for the bacteria. At the capture site, the crops of *Eucalyptus* sp. are extensively present in the landscape matrix, and herbicides containing glyphosate are used on large areas, in different stages of production. The presence of *O. anthropi* in the oral cavity of the captured tapir may be a result from the contamination of the swab technique. But the characteristics of this bacterium are strong indicators that the colonization of the oral cavity of *T. terrestris* may also be due to the more expressive presence of *O. anthropi* in the landscape. This indicates that the management and the use of agricultural defensives in this kind of landscape may influence the microbiota associated with the regional fauna, but other studies are needed to confirm this association.

Computed Tomography and Magnetic Resonance Imaging of the Head of a Juvenile Baird's Tapir (*Tapirus bairdii*)

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A 1 year old, hand reared, male Baird's tapir (*Tapir bairdii*) presented for ataxia, weakness of the rear legs and collapsing of the legs when the head was raised above resting level. During its hand rearing this animal experienced periodic episodes of weakness of the rear legs and ataxia that appeared to be responsive to vitamin E and vitamin C supplementation. The latest episode prompted a visual examination by a veterinary neurologist. The calf was determined to have a right sided facial weakness and neurologic deficits that could be consistent with vestibular disease or atlantoaxial injury. During preparations for performing a neurologic examination of this animal, treatment was initiated with omeprazole at 2 mg/kg orally once daily for five days. Omeprazole can reduce cerebrospinal pressure in some patients. The tapir was transported under general anesthesia to the specialty clinic (Palm Beach Veterinary Specialists) for diagnostics including computed tomography (CT) and magnetic resonance imaging (MRI). Results of the studies revealed several clinically significant findings. The CT study showed no atlantoaxial abnormalities but did reveal a healed skull fracture at the dorsal left mid-cranium. MRI imaging showed a flattening of the left hemisphere. Right sided hydrocephalus was discovered accompanied by compressed cortical tissue. This hydrocephalus likely occurred during in utero development. Additionally there was bilateral locculated fluid in the guttural pouches. The remainder of the study was unremarkable. Cerebrospinal fluid cytology and culture showed normal sterile fluid. Following the neurologic work up therapy included one gram sucralfate orally twice daily as needed, chloramphenicol 7.62 grams orally twice a day for 21 days, and a probiotic daily as needed. Several days later purulent discharge was cultured from the right nostril. Results yielded heavy growth of *Aeromonas caviae*. Based on sensitivities antibiotics were changed to marbofloxacin 750 mg orally once daily for 28 days. Meclizine was administered orally at 12.5 mg once daily for 5 days to help with residual disorientation and ataxia. Neurologic deficits resolved within the first few days of therapy and have not recurred. The calf was transferred to another zoological facility to be paired with a young female for breeding. Follow up with the receiving institution 7 months following transfer revealed no neurologic abnormalities and no recurrence of guttural pouch infection.

TSG REPORTS

Peruvian Tapirs Conservation Plan, Lowland & Mountain Tapir

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Peru has two species of tapirs, the mountain tapir or pinchaque (*Tapirus pinchaque*) and the lowland tapir or sachavaca (*Tapirus terrestris*). Very threatened throughout its range, is estimated around 300 mountain tapir individuals in Peru, considered in Critically Endangered status by Peruvian law and Endangered by IUCN criteria. The lowland tapir, widely distributed in the Peruvian Amazonia, is considered as Vulnerable by Peruvian law and by IUCN criteria. Both species are threatened mainly by habitat loss and fragmentation as a result of extensive cattle ranching, settlement, agriculture and infrastructure projects and cause population decline and isolation. Also are affected by hunting for meat consumption and parts trade. Action Plans and strategies for species conservation are used worldwide as guidelines for researchers, academic institutions, NGOs aimed at conserving biodiversity and entities. The aim of this Tapirs National Plan is to compile the current scenario and knowledge of the species to develop and prioritize goals, actions, stakeholders and recommendations specially designed for the conservation of these species in a range of 10 years. As a goal of the TSG, in mid-2010 the Peruvian National Plan for the Conservation of the Tapirs gets started. The first workshop, focused in both tapir species, was held between in March 2011 in Lima with participants from government and academic institutions, zoos and breeding centers, NGOs involved in conservation and independent researchers; the workshop was led by the TSG Peruvian team with the support of other members from Brasil, Colombia and Argentina. The second workshop, focused on the mountain tapir, was held in the Biological Station of the National Sanctuary Tabaconas Namballe inside the mountain tapir distribution. These second workshop had an important participation of local people of communities, regional governments and local NGO's. Also we had being working in collaboration with the Agriculture Ministry and Environmental Ministry allowed us to have the institutional support of the Peruvian government. In both workshops, the structure of the workshops was developed with the information available deciding to divide in three working areas: In situ conservation, Ex situ conservation and Legislation and Education. As a workshops result we developed a compilation document which have overview of the necessary actions to be implemented for the conservation of tapir species in Peru. As a next steps, it is planned to develop one additional workshop focused on lowland tapir in within the species distribution range for include an important participation of local stakeholders such as hunters, wildlife managers and educators, followed by a Population Viability Analysis and the final document developed with the national institutions collaboration and support.

Grupo de Especialistas de Tapir Mexico: An Insight into Mexico's Tapir Research Group

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The Baird's tapir (*Tapirus bairdii*) is a species catalogued in danger of extinction by Mexican law. Conservation actions in this country have been proposed to promote tapir research and conservation, such as the Programa de Acción para la Conservación de la Especie; however further efforts are necessary to raise awareness of tapir presence, functional role and conservation status in this country. Despite the hard work of researchers, conservationists and government agencies to ensure the persistence of this species, the Grupo de Especialistas de Tapir Mexico has identified several threats to tapir populations that put at risk the survival of this species in several parts of the country; these threats include habitat loss, agriculture expansion, fire, and road kills. Further collaboration and communication among researchers, conservationists and the general public is necessary to promote tapir research and to raise awareness among the general public on the importance of this species and its habitat. For this reason, we decided to re-structure the existing group and to create a formal group called Grupo de Especialistas de Tapir Mexico. The group's mission is to promote research, knowledge and conservation of the Baird's tapir in Mexico. To further promote this group's actions and enhance communication, we created a group logo, a web page and use social media.

From Field Data to Action for the Baird's Tapir Conservation in Central and South America

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The *information life cycle* in conservation biology enables field data from species to be used in action planning for conservation through different processes of data management. The *life cycle* begins when organizational processes turns *Field data* into *Information*, which in turn, is synthesized into *Informing knowledge*. Through judgmental processes that analyze the options, advantages and disadvantages of the obtained knowledge at this stage, turns it into *Productive knowledge* which can be transformed to *Action* when applied to a decision process. Very good examples of this *information life cycle* are the Tapir Specialist Group Baird's tapir Action Plan and the National Action Plans from Mexico, Honduras, Colombia and Ecuador, which all of them based their action planning on information from the field and local expertise. There are other local examples in the whole distribution range of the species. In order to promote the *information life cycle* is completed for the Baird's tapir conservation, a database was designed to contain the *Information* and *Informing knowledge* generated through researches related to the species. A literature review was performed to compile the first inputs for the database. A total of 163 publications were found and entered into the database. The publications edition date range from 1966 to present. For the country of origin of the publications, 60 correspond to Mexico, 40 from Costa Rica, and 63 from other countries. The thematic category of the publications corresponds to, 83 for Ecology, 32 for veterinary aspects, 21 for species distribution, and 27 for other topics. For the type of publications 82 correspond to scientific papers, 22 for thesis (1 PhD., 10 M.Sc and 11 B.Sc), 11 for technical reports and 48 for other types. The created database correspond to the stage of the information life cycle for *Informing knowledge* were data is organized and synthesized, and ready for judgement and decision processes that led to action. This knowledge will be continue its *life cycle* through the update of IUCN Red List assessments, species and nationals action plans, and TSG strategic planning, but it is still the compromise of TSG members, researchers, local wildlife agencies, local natural resources managers and citizens to transform the generated *Informing knowledge* into *Action*.

WORKSHOPS

WORKSHOP 1
Evaluating Tapir Hunting Sustainability And its Impact on Populations

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Tapirs have been traditionally hunted for food throughout their distribution range in Central and South America as well as in Southeast Asia. A few animals taken every year by subsistence hunters within a very large territory could not seem risky for a tapir population to survive. This idea has been considered by authorities of some countries to talk about sustainable sport hunting schemes involving tapirs that could be implemented in extensive tracts of tropical forests managed by social groups or private landowners. However, extremely low reproductive rates and densities of all tapir species constitute serious constrains for population recovery and persistence over the long term, especially if factors additional to heavy hunting pressure (e.g., habitat loss and fragmentation) occur in the same area. The sustainability and impact of hunting practices of any kind on tapir populations may be quantitatively assessed through a diversity of methods. Some of these methods are relatively simple and straightforward (i.e., density comparisons, catch per unit effort), while others are more robust and require more field data (i.e., unified harvest model, source-sink model). Properly applied, these models may provide valuable information for decision-making about tapir hunting regulations and habitat management. Nevertheless, good data sets on tapir densities, reproductive rates, harvest rates and catchment areas are often difficult to obtain and test for sustainability. This workshop aims to: 1) provide basic information to the audience about tapir hunting practices and the risks implied for populations; 2) present a concise review of methods available for the assessment of tapir hunting sustainability; and 3) promote discussion on the viability or unviability of legalizing subsistence or sport tapir hunting in different countries and regions. After brief presentations of basic information by the workshop coordinator, attendants will be asked to share their views about the biological, social, and ethical implications of hunting on all tapir species. A number of sound proposals for collaborative ways to improve our understanding of tapir hunting are expected to arise from this workshop. The Tapir Specialist Group might take advantage of this information for planning future tapir conservation actions.

WORKSHOP 2
Field Methods for Tapir Studies

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Tapirs can be difficult to study because they are generally solitary and occur at low densities. Researchers have employed many methods to successfully study tapirs in the wild; including camera traps, line transects, radio-telemetry, and the Footprint Identification Technique (FIT) for identifying individuals. Given the ecology of the species, deciding which method to implement is an important and often difficult decision that depends on a project's principle research questions and conservation objectives. For the first half of this workshop we will give an overview of the various tapir field methods and discuss their applications, requirements, study designs, and advantages and disadvantages. The overview will include very brief case studies for most methods. Following this, we will engage participants in a discussion on tapir research. The objectives of the discussion will be to: 1) Share various field experiences with and concerns about tapir field methods, and 2) Discuss recent developments in tapir sampling techniques and potential future directions.

WORKSHOP 3
Tapir Communications: Working with Media and Funders

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At the 5th International Tapir Symposium, the Working Group on Communications, Marketing and Fundraising stated the following goals: (1) To have a funding mechanism to support TSG activities by the next International Tapir Symposium in 2014, (2) To increase the average annual number of tapir awareness opportunities through 2014, (3) To increase the communication resources available to connect TSG groups and members, and (4) To make all TSG communications materials accessible to key audiences. In order to effectively meet and build off of the second and third goals, as well as support the first and fourth goals, it is vital that tapir conservationists understand and have readily available the tools and skills necessary to convey consistent and compelling tapir education and conservation messages to target audiences such as the press, decision-makers, funders and the local people. For this reason we will be offering participants at the 6th International Tapir Symposium a workshop on effective Tapir Communications. This workshop will review existing TSG outreach materials such as the website, the Tapir Press Kit, Action Plans and the TSG Newsletter, and provide guidance in how best to use and leverage them. Additionally, we will do a gap analysis of what other tools currently missing from the TSG toolbox, which might be helpful in advocating on behalf of tapirs. And lastly, we will provide basic outreach lessons, training, and tips, for communicating with key audiences about tapirs. Participants will leave this session more confident about communicating with outside persons and key audiences about tapirs, and will have a greater understanding of existing tools available to help assist in such outreach.

WORKSHOP 4
Working Together to Improve Care and Husbandry of Tapirs in Captivity

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The International Tapir Symposium is designed to share information and update colleagues on new and innovative advances in in-situ and ex-situ management. The ex-situ roundtable will be provide as an avenue for zookeepers, managers, geneticists to share trends and the exchange of information related to diet, behavior, reproduction and challenges of keeping small populations sustainable in captivity. The main goal in gathering an international contingent of zoo professionals who manage tapirs in captivity is to improve communication in order to optimize the welfare of the population. The roundtable objectives are: to expand the knowledge about tapir husbandry globally; to promote the exchange of experiences between zoos and other institutions far away; and to provide information on the most relevant issues for optimal ex- situ management of the species to ensure tapir welfare. Discussion for updates to the Tapir Animal Care Manual will be solicited as well as language translation status. Masterplanning for sustainability of captive tapirs in Europe and the US will be shared. Import and export methods for increasing genetic information will be addressed. Dialogue will be initiated to discuss challenges in ex-situ management including private ownership, geriatric and/or over represented animals, facilities working outside of approved Regional Collection Plans and the impact this has on available space. In

addition, zoos are looking for conservation programs to support their mission of providing for and protecting resources for wild animals. The ex-situ roundtable will be a resource to create new and maintain existing collaborations with regional programs ie AZA, EAZA, ALPZA, ARAZPA and the Tapir Specialist Group with regards to vetting and supporting a variety of conservation programs benefitting all four species of tapirs to ensure protection and research continues.

PRESENTATION 1: Working Together to Improve Tapir's Maintenance in Captivity in Argentina

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The Argentinean Tapir Group consists of different commissions. Last year, the Ex situ Commission organized the workshop “Ex situ management in captivity”. It was organized and carried out in collaboration with Córdoba Zoo and the Argentinean wildlife zookeeper`s Group (GACAS). The main goal consisted in gathering all the institutions and zoo professionals that managed tapirs in captivity and improve the development and diffusion of more and better management in order to optimize the welfare of the population in captivity. The workshop objectives were: w to expand the knowledge about the characteristics of tapir`s husbandry in Argentina; to promote the exchange of experiences between zoos and other institutions; and to provide information on the most relevant issues for optimal ex situ management of the species and ensure tapir`s welfare. During the first day of the workshop, representatives of the institutions that keep tapirs in captivity shared, through oral presentations, the maintenance features of their animals. Secondly, presentations on relevant topics such as health, nutrition, reproductive management and safety were performed, considering its possible application in Argentinean institutions. In addition, a practical activity was developed in the exhibit of tapir that consist in making a handle area; and a round table was developed to work in the ex situ action plan for the species. It is important to note that representatives of 7 of the 11 zoos that keep tapirs in captivity attended the workshop. In conclusion this meeting helped to collect and clarify outstanding information to the national studbook; short term lines of action and specific recommendations were outlined for the institutions; and especially it continues to strengthen collaborative work that unites us as a group and allows us to continue improving the management of the species.

PRESENTATION 2: Health Issues in the Lowland Tapir EEP Population: Synthesis of a Veterinary Questionnaire

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Even if the lowland tapir EEP population is thriving, some health issues look recurrent, without having been precisely objectified. In 2013, the vet questionnaire has been launched on line. Anesthesia, infectious diseases, medical training, and major functions were there investigated. The goals were to precise the main pathologies of the lowland tapir in captivity, and target the future research directions. 46 European vets working with lowland tapirs have answered, making the analysis of such questionnaire very interesting. Thereby, per function, some frequent health problems have been highlighted thanks to the large number of data collected. Some anesthetic protocols have also been taking out. It finally appeared that some health matters have to be more explored, like the quite frequent vesicular skin disease, or else contraceptive methods, on which we still need long term feedback.

WORKSHOP 5
Tapir Action Plan Implementation

Bengt Holst & Patrícia Medici

Further information: Please see attached

WORKSHOP 6
TSG Strategic Planning 2015-2017

Bengt Holst & Patrícia Medici

Further information: Please see attached

ROUND-TABLES

ROUND-TABLE 1
Indigenous Communities and Tapir Conservation

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The relationship between indigenous communities and wildlife species conservation is permanent over time. Different species, including tapirs, have been seen by indigenous cultures as sacred animals or ancestral medicine. Even thought, there has been a relationship of wildlife impact by the same cultures, which concerns the long-term conservation of the species as well as food security for future generations. Some Amazonian communities have implemented conservation efforts focused on the protection and conservation of lowland tapirs. One of the experiences is the Amazonian tapir conservation project by the Kichwa community. Other similar experiences were carried out with mountain tapirs and local farming communities in the Ecuadorian Andes. Furthermore, it is necessary to present a review of current regulations about genetic resources uses associated with the local indigenous communities in our countries. The Convention on Biological Diversity (CBD) establishes: “Subject to its national legislation preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life styles relevant for the conservation and sustainable use of biological diversity, and promote their wider application with the approval and involvement of the holders of such knowledge innovations and practice and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices”. In that sense, it represents a tool not also to encourage tapir conservation efforts from local communities, but also to strengthen existing processes, which themselves reinforce national action plans for tapir conservation as occurs in Ecuador. Beyond the information presented here, this round-table is a proposal for deep discussion on several instances related to tapir conservation around the importance of involving local communities in conservation processes of key species such as tapir, given about existing successful attempts, as well as reflections and contributions collected in this context over the years to enrich the Tapir Action Plan and subsequent efforts to protect four species in their range countries.

ROUND-TABLE 2
Strategies for Important Tapir Habitat Shared by Two or More Countries

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The current distribution of all species is the result of a sequence of migrations and evolutionary events through time and space. Thus the current distribution of tapirs, with three species in Central and South America and one in Asia offer details about past events of migrations and the evolution into their current distribution from the estimated origin of the genus in Europe. Given that these events occurred over large time scales and across multiple continents, distribution areas of current tapir species are spread out across large territories, thus each species occurs across multiple modern countries. Baird's tapirs (*Tapirus bairdii*) range across a reported nine countries, and Mountain tapir (*T. pinchaque*), Lowland tapir (*T. terrestris*) and Malayan tapir (*T. indicus*) occur across three, twelve and four countries respectively. On a local scale, the current distribution of all four tapir species has been reduced and fragmented as a consequence of habitat loss and land use change from forests to other land covers. Due to this, viable populations remain in just a few large tracts of forest. Many of these forests are shared by two or more countries, which is typically the result of each country involved declaring a nationally protected area exist on their side of the political border. There are examples of this phenomenon for each of the four tapir species. When developing local strategies for tapir conservation in these multinational forests, political divisions can be an obstacle. Territorial disputes and other disagreements can compromise diplomatic relations between countries and hinder international collaboration, including that related to natural resources management and conservation. Academic exchanges and other kinds of cooperation between countries remain viable in these contexts, but working with central governments on both sides of the border to develop and sign conservation agreements can be extremely costly in terms of time and money. Global and regional initiatives related to endangered species conservation can be a way to promote the coordination between countries despite acrimony on a more local scale. International agreements such as the Convention of International Trade of Endangered Species (CITES) and the Convention on Biological Diversity (CBD), aim to have a positive impact on many endangered species conservation all over their distribution range, including for tapirs. The Tapir Specialist Group (TSG) makes a similar contribution to fostering international tapir conservation solutions by developing regional strategies and action plans, which establish shared goals for all the countries involved. The establishment of specialist networks, including a coordinator for each species *and* a coordinator for each country, also contributes to overcoming political obstacles by serving as a platform for the exchange of information and the international coordination of actions. These specialist networks help ensure that tapir conservation activities in all countries contribute to the shared international goals defined by regional strategies. This round table includes the presentation of experiences working in important habitats for tapir conservation shared by two or more countries, and the strategies implemented to resolve conflicts and overcome obstacles in each case.

ROUND-TABLE 3
Defining a Strategy for the TSG regarding *Tapirus kabomani*

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In 2013, the description of new tapir species was published in the Journal of Mammalogy by Mario Cozzuol and colleagues (Cozzuol *et al.* 2013 J of Mammalogy). The authors describe a smaller, darker, tapir species living in western Amazonia that has until now remained undescribed by western science. They named the new species *Tapirus kabomani*. In response to the description, a panel of experts was convened to define an appropriate strategy for the TSG given the evidence presented by Cozzuol *et al.* 2013. In particular, the panel was requested to critically assess the available information and elect one of three possible recommendations: (1) there is sufficient evidence to consider *Tapirus kabomani* as a new species, and the TSG should initiate a species-specific conservation action plan and IUCN Red Listing procedures; (2) there is insufficient evidence to consider *Tapirus kabomani* a new species, however there is sufficient evidence that *Tapirus kabomani* is a distinct and important conservation unit, thus the TSG should initiate a specific action plan and IUCN Red Listing procedure; and (3) there is insufficient evidence to consider *Tapirus kabomani* a new species, and more evidence is required before the TSG should take any action. During this session, we will present the results of the expert consultation, an opportunity will then be given to the authors of the species description to state their case and respond to the expert recommendation, and this will be followed by open floor discussion with the TSG membership.

PRESENTATION: Revisiting *Tapirus kabomani*

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Soon after the description of the new species of living tapir, *T. kabomani*, was out, some specialists expressed doubts about the status of the new taxon. Some concerns focus on methods and sample sizes, other pointed on some factual aspects, including partial sympatric distribution with *T. terrestris*, short time of divergence, geographic variability and others. We intend to reply to those concerns with some new information and a revisit to the original data. Even using PCA and removing subadults specimens, all the Neotropical species are well separated. No gradual morphological variation between *T. terrestris* and *T. kabomani* exist. Specimens of *T. terrestris* from Amazon and Mato Grosso are more distant from *T. kabomani* than specimens from South Cone or Southeastern and South of Brazil in multivariate space. *Tapirus terrestris* show no geographic separation based on morphology. Doubts about the discrete distribution about certain qualitative morphological characters were also raised, but we showed that not only those characters are significant, but that available data indicates that the skull development in *T. kabomani* may be similar to *T. pinchaque* and different from the unique skull development pattern of *T. terrestris*. No young specimens of *T. kabomani* are known, but available information suggest it is similar to *T. pinchaque* in skull development. The data on folk taxonomy was criticized by absence of extensive ethnozoological and linguistic studies. However the focus here was not how a particular indigenous group see the zoological diversity, but how local people, indigenous or not, are able to recognize *T. kabomani* as different of *T. terrestris*. We show that, when both species coexists, locals recognize them effectively, which was corroborated by morphological and DNA tests. Since also non-indigenous people are involved, the linguistic and ethnological barriers are much less important here. Alternative DNA analysis was presented, obtaining even stronger support for the *T. kabomani* clade that we found originally, but *T. pinchaque* pops up as paraphyletic. That lead to suggested that not only *T. kabomani*, but also *T. pinchaque* should be merged with the already paraphyletic *T. terrestris* in a single species. We failed to replicate these results, and always get well supported monophyletic *T. kabomani* and *T. pinchaque* four well supported clades of a paraphyletic *T. terrestris*. The suggestion that *T. pinchaque* should be merged in a single species with *T. terrestris* is contradicted not only by the morphology (see above) but by cariotype information of both species. Nuclear markers and cariotype studies of *T. kabomani* are on progress. To dismiss *T. kabomani* as a separate species makes difficult to support *T. pinchaque*, as several critics of our work already concluded. We think that the best conclusion is that we have two well supported monophyletic clade, *T. pinchaque* and *T. kabomani*, and a paraphyletic complex under the name of *T. terrestris* in need of careful review. To ignore the status of *T. kabomani* as a separate taxonomic entity may lead to a disservice to conservation of the Neotropical biodiversity.