

CBSG NEWS



Newsletter of the Conservation Breeding Specialist Group, Species Survival Commission, IUCN-The World Conservation Union

From The Chairman

Can Conservation Breeding Work?

Recently, several reports of scientific studies have caused people to rethink the value of *ex situ* conservation programs for threatened species. A paper published by Araki *et al.* in *Science* (318: 100-103) reported that genetic adaptation of trout to the captive environment can be so rapid that within just one generation the reproductive performance was reduced by 40% when the fish were moved back into a natural habitat. At a recent Conservation Genetics conference, CBSG member Richard Frankham gave the keynote address, in which he described a series of studies that show that *Drosophila* flies become so adapted to captivity over 50 generations in the lab that they have only 14% of normal fitness when put back in a wild-like environment, a loss of 1.7% of fitness each generation. At the same conference, I described work in my lab that shows significant behavioral, morphological, physiological, and reproductive changes within nine generations of captive breeding of *Peromyscus* mice.

Not surprisingly, these reports of rapid genetic change have led many people to ask whether wildlife propagated in captivity should or could ever be used for restoration of wild populations. Should we abandon the Amphibian Ark, cooperative breeding programs such as the EEPs of European zoos, SSPs in North America, and ASMPs in Australasia, and reintroduction programs that rely on captive-bred animals such as the Arabian oryx, Przewalski's horse, Mexican wolves, California condors, and eastern barred bandicoots? I don't think that we need to, that we should, or that we can.

Some in the media, some critics of zoos and aquariums, and some people who just like to be argumentative, seem almost delighted with these reports of worrisome genetic changes in conservation breeding programs. However, I think that they are overlooking a number of considerations. First, the existence of a considerable and growing number of successful releases of captive-born animals (e.g., golden lion tamarins, peregrine falcons, Puerto Rican crested toads, and the reintroduction programs mentioned above) demonstrates that we can reestablish and reinforce populations in the wild. As pointed out by the authors of the trout study, the focus of their study was a program that relied on regular releases of hatchery-reared fish, over many generations, to reinforce an existing wild population that was in decline. Such a program can lead to the replacement of a remnant wild-adapted population with captive-adapted genotypes, and would seem to be a poorly conceived conservation strategy. However, this is very different from the use of a short-term release to reestablish a wild population where it had been extirpated, followed by rigorous protection of the habitat to allow the population to reestablish and evolve. As Dick Frankham's studies have shown, even the extremely captive-adapted populations can readapt to the wild: his flies recovered 70% of wild fitness after 14 generations back in the wild conditions. (The



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rate of re-adaptation to the wild was more than twice the rate of the original loss of wild fitness during the generations in captivity.)

In fact, you might only need to look as far as your own backyard to observe a species that, despite a long history of selective breeding, adapts quickly and successfully to a wild environment—the domestic cat.

Frankham's work, my studies, and work by others have shown that well managed captive breeding programs can both retard (but not stop) the rate of adaptation to captivity and can help preserve the variation that is needed to allow re-adaptation to the wild or other future environments. Also, although captive populations do lose genetic diversity, sadly wild populations are not immune from the problems of genetic decay, and in some cases (such as Amur tigers), the small remnant wild populations have lost even more of the original diversity of the ancestral population than have the well-managed captive populations.



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We do need to manage *ex situ* breeding programs well, with attention to minimizing the rate of genetic change and retaining as much of the original genetic diversity as possible. Many of our CBSG colleagues have contributed important thinking, data, and tools to help guide conservation breeding programs. We need to increase further our understanding of the changes that can occur in captivity, the impacts on conservation efforts, and means to counter these problems.

Fundamentally, however, the recent studies reinforce what we already knew: species conservation is much easier and more likely to succeed if we can protect species in natural habitats so that we will not need to reinforce or restore them from captive stocks. When that is not possible, we need to use sound scientific management of *ex situ* programs to slow the loss of adaptations, and we need to minimize the number of generations in captivity (or use managed exchanges of genetic material with wild populations) to minimize the unavoidable changes. Of course, restoration programs will be possible only if the natural habitats were protected or restored during the time that the species was extirpated from the wild, and there is little reason to release captive stock – which we know will be handicapped for at least several generations – unless the original causes of decline have been removed. *Ex situ* conservation breeding programs are an uncertain insurance policy to maintain options for species at risk, and become the conservation measure of last resort when we need to re-build wild populations. Unfortunately, an increasing number of species are down to their last chance for survival, and I do not think it is ethical to forego even a difficult option that might prevent extinction.

Very best regards,

Dr. Robert C. Lacy
Chairman, CBSG

CBSG News

CBSG News is published by the Conservation Breeding Specialist Group, Species Survival Commission, IUCN-the World Conservation Union. *CBSG News* is intended to inform CBSG members, and other individuals concerned with the conservation of plants and animals, of the activities of CBSG in particular, and the conservation community in general. We are interested in exchanging newsletters and receiving notices of your meetings.

CBSG News

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Hellbender PHVA Workshop

7-10 August 2006

Saint Louis, MO, USA

At the request of the Saint Louis Zoo's Wildcare Institute, CBSG facilitated a PHVA for the Ozark (*Cryptobranchus alleganiensis bishopi*) and Eastern hellbender (*C.a. alleganiensis*). The hellbender is a giant, long-lived salamander native to shallow mountain streams of the eastern United States. Once common, hellbender populations in some areas have declined by 77% since the 1970s, likely due to a combination of factors such as declining water quality, siltation, and direct collection and persecution. Chytrid fungus has recently been observed in parts of the species' range. Few young hellbenders are now found, leaving the population composed primarily of adults. Thirty workshop participants came together to explore threats to hellbender populations and develop management actions aimed at understanding and halting this precipitous decline.

A baseline model of hellbender population dynamics was prepared before the meeting, and optimized by the participants. The group chose the same goal for each population: double the population size in 15 years, through increased recruitment in the early age classes. A structured brainstorming exercise identified the key issues affecting the long-term survival of the species. The results of this exercise were themed into three threat-based working groups:

- Biological/human (exotic species, predation, over-collection, disease, and management/research techniques);
- Land use (land use, siltation, agricultural runoff, and water quality); and
- Public use (public use and recreation).



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Two additional groups were formed as the workshop progressed. One group focused on the role captive breeding can play toward species survival, and the other was devoted to identifying management and research recommendations specifically for the hellbender populations in the eastern United States.

Participants were encouraged that the model projected improved viability of hellbender populations if the stated population goals were achieved. Model results suggested ways in which population viability could be improved – for instance, by reducing or eliminating the risk of intensive collection events. Prior to the workshop, the general consensus was that the eastern subspecies was not at risk; however, model projections differed substantially for these populations depending upon estimated demographic rates that are not well known. The need for better demographic and population status data, especially for the main eastern populations, was identified as vital for accurately projecting the future viability of hellbender populations and the potential impact of management actions.

Workshop participants used the best available information and their expertise to develop recommendations addressing the key issues facing the survival of hellbenders. Central themes included the need for a comprehensive threats assessment; standardized monitoring and research efforts; increased protected status; expanded outreach efforts to reduce human impacts on hellbenders; and development of captive husbandry and reintroduction protocols.

Beach Mice Captive Population Feasibility Workshop

7-9 March 2007

Topsail Hill Preserve State Park, FL, USA

Seven subspecies of beach mice (*Peromyscus polionotus*) inhabit the beautiful white sand coastal areas of Alabama and portions of Florida. Development of this prime beach real estate, including high elevation habitat refugia, has increased the vulnerability of these fragmented populations and habitat patches to the effects of hurricanes and the ability to recover from storm-related population crashes. Several local populations have been extirpated in recent years, and five subspecies are now federally listed as Endangered, and one is classified as Critically Endangered by the IUCN.

At the request of the U.S. Fish and Wildlife Service (FWS), CBSG convened a three-day workshop at Topsail Hill Preserve State Park, Florida to explore the feasibility of developing a captive management program for beach mice. CBSG has been involved with population viability analyses (PVA) of the Alabama beach mouse for several years, starting with a PHVA workshop in June 2004 and continuing with revised PVAs in 2005 and 2006, following several significant hurricane events along the Gulf coast. These analyses emphasized the potential role of hurricanes in local extinctions of beach mice populations, and contributed to FWS's decision to explore the potential role of captive management to offset this risk.

The purpose of this workshop was to explore the potential usefulness and feasibility of using captive management as an additional management tool to promote viable wild populations of beach mice and to minimize the risk of subspecies extinction. Eighteen FWS staff



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and external experts gathered at the workshop to discuss the primary threats to each beach mouse population and ways in which captive management might be used to mitigate those threats.

Various short-term and long-term captive options were explored in working groups, including the pros and cons of each approach, conservation benefits, risks, knowledge gaps, and estimated resources needed. Eleven strategies were considered, both proactive and reactive, and ranged from the establishment of long-term, self-sustaining populations to *in situ* management only. Working groups evaluated the feasibility and cost effectiveness of each approach and developed recommendations for each subspecies for further consideration by FWS. Rescue efforts in the face of emergency situations were developed by the Short-Term Strategies Working Group, while the Long-Term Strategies Group considered several options, including colonies with periodic exchange with wild populations.

Participants recognized that *in situ* conservation efforts are critical to beach mouse preservation, including minimizing habitat loss, reducing threats, and using strategies such as habitat restoration and translocation as appropriate. There was strong agreement that the use of any captive management strategy should not replace *in situ* conservation efforts, but rather should be viewed as an additional potential management tool to increase subspecies viability.



Creating a National Costa Rican Amphibian Conservation Strategy

28 September-1 October 2006

Simón Bolívar Zoo, San Jose, Costa Rica

The Costa Rican Amphibian CAMP (2002) and the Global Amphibian Assessment (2004) defined the problems facing amphibians in Costa Rica, and demonstrated the need for a national conservation strategy for these species. CBSG Mesoamerica, the Amphibian Ark and the Biology School of the University of Costa Rica, with the support of Sea World, Chester Zoo, Twycross Zoo and Denver Zoo, developed a workshop to create this national strategy.

Fifty-four people, representing 29 national and international institutions, met to analyze the amphibian situation in Costa Rica and to propose a strategy for their conservation. Three working groups focused on the major issues facing Costa Rican amphibians: *ex situ* conservation; *in situ* conservation; and training and education. The working groups developed objectives and actions to collaborate in the solutions of the problems.

Workshop Recommendations

- Compile all published information available related to *ex situ* and *in situ* research, and work with the Global Amphibian Assessment and (GAA) Amphibia Web to update information and help Amphibia Web to create a Spanish version for Costa Rica.
- Develop multidisciplinary research programs related to *in situ* research in taxonomy, ecology, physiology, reproduction, population genetics, natural history studies, socioeconomic value, distribution, and monitoring.
- Determine the threat level of all Costa Rican species, especially those that are data deficient.
- Identify potential sites for an *ex situ* Conservation Center.
- Train staff in charge of amphibian management in captivity. Develop an *ex situ* program that covers research in areas of biology, nutrition and veterinary medicine.
- Review the population status of Costa Rican species to update the GAA and define the list of high-priority species for an *ex situ* program. Develop programs concerning reintroduction, translocation and repopulation, as well as population monitoring and habitat and threats evaluation.

- Analyze the problem of confiscated amphibians and discuss the confiscation policies in Costa Rica.
- Conduct an interdisciplinary workshop to create an action plan of environmental education for amphibian conservation.
- Establish links between researchers and educators to make scientific information available to the general public.
- Establish a link with the news media to make scientific information available to the community. Take advantage of the communications media to provide information about the importance of amphibian conservation.



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Some of the proposed actions have already been addressed. A course for the management of amphibians in captivity for member institutions of the Central American and the Caribbean Association of Zoos and Aquariums (AMACZOOA) is being organized, as is a regional workshop to establish a regional strategy for the conservation of amphibians. In Costa Rica, an Amphibian Reproduction and Research Center is being designed and will be constructed at Santa Ana Conservation Center. Several educational activities are being developed for national zoos. A CAMP workshop has been planned for November 2007 to review and update the information on the taxa evaluated in 2002, and to prioritize species for *ex situ* projects.

Submitted by CBSG Mesoamerica

The Indian Mygalomorph Spider Project

Giant spiders are attractive creatures. The tarantulas of Central and South America are popular pets all over the world, and now tarantulas from other regions are gaining popularity in the pet market. A lack of field data led to the *Poecilotheria* spiders not being listed on CITES in 1999, and prompted a thorough distribution and status survey of theraphosid spiders in India. This program has been supported by the Conservation Treaty Support Fund, Rufford Maurice Laing Foundation, Brookfield Zoo, Oakland Zoo, Fauna and Flora International and Cleveland Metroparks Zoo.

As a collaborative project with the US Fish and Wildlife Service, a five-day hands-on training workshop on tarantula studies, identification and taxonomy was organized for biologists in India. The workshop generated interest and helped create a community of people who now report sightings of tarantulas from other parts of the country. Studies on tarantulas have resulted in many new mygalomorphs being described, including



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the first one of the genus *Plesiophrictus* described in the 2007 October issue of *Zoos' Print Journal*. Status assessments have been carried out on 14 of the 60 species of tarantulas described in India. According to the 2001 IUCN Red List Categories and Criteria, eight of the 14 species are classified as threatened (two Critically Endangered, four Endangered and two Vulnerable), one is Near Threatened, and two species described recently are Data Deficient. Three species with a wide distribution are categorized as Least Concern.

Before the Indian Tarantula Project, very little distribution information was available, and it could not be gleaned with any certainty from publications by traders or in associated journals or magazines. The 14 species chosen for the first assessment were submitted to the IUCN for inclusion in the Red List of Threatened Species.

Indian Mygalomorph / Tarantula Project Achievements

- Rediscovered a beautiful arboreal tarantula, the peacock parachute spider, *Poecilotheria metallica*, after an absence of sightings for 102 years.
- Rediscovered the Parambikulam large burrowing spider, *Haploclostus kayi*, after an absence of sightings for 86 years.
- Updated distribution records and status of several mygalomorph species.
- Described new mygalomorph spiders of different families.
- Organized training workshop that has led to much interest in these spiders in the region. A new arboreal spider was recently described by a team of members.
- Population and ecological data are being gathered for a few species.
- Lobbied for more protection of *Poecilotheria* species under the Indian Wildlife Protection Act.
- Conducted status assessments based on the IUCN Red List criteria and categories.

Threatened tarantulas are categorized based on a combination of factors, especially restricted distribution with loss in quality of habitat and additional threats such as habitat loss, habitat fragmentation and harvest for trade. Depending on the range of distribution, the threatened species were categorized as Critically Endangered, Endangered or Vulnerable. The Indian tarantulas, although traded, are not protected under the Indian Wildlife (Protection) Act. A protection status on this Act would also help in recommending these spiders for CITES protection.

Submitted by CBSG South Asia

White-tailed and Gunnison's Prairie Dogs in Colorado Workshops

16-18 May 2007

Grand Junction, CO, USA

Concern over the long-term viability of Gunnison's prairie dog (*Cynomys gunnisoni*) and white-tailed prairie dog (*C. leucurus*) populations in the United States resulted in a recent petition to list the species under the Endangered Species Act. The petition cited habitat loss and conversion, shooting, disease, a history of eradication efforts, and inadequate federal and state regulatory mechanisms as threats to the long-term viability of the species.

CBSG was invited by the Colorado Division of Wildlife (CDOW) to design and conduct a set of workshops to produce a population viability analysis and a set of draft conservation strategies for Gunnison's and white-tailed prairie dogs in Colorado. Following the successful protocol of recent workshops, the stakeholder-driven planning workshop was preceded by a detailed population viability analysis (PVA) process in which a group of scientists and species managers developed simulation models of prairie dog population dynamics in the presence of a number of human-mediated threats and their management. A major focus of this modeling effort was to consider the impact of sylvatic plague on the dynamics of prairie dog populations, and what broad level of plague management would be required to mitigate the impact of this deadly disease.

More than 50 people from diverse backgrounds and perspectives, including private cattle ranchers, animal control experts, state and Federal government officials, academic scientists, and wildlife management experts



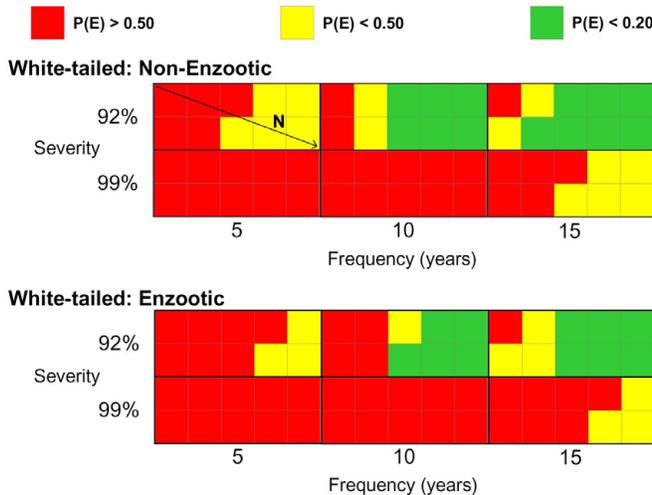
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gathered in Grand Junction, Colorado for the PHVA workshop. As in previous workshops with CDOW, a team of CBSG-trained facilitators was on hand to lead working group discussions. Six working groups were formed, based on specific human activities of potential concern: oil and gas development; plague; poisoning / agriculture; range conditions / livestock management; shooting, and urbanization. Each group identified and prioritized important issues of concern to the broader issue of prairie dog management, evaluated the extent of information available to assist in creating meaningful management strategies, identified and prioritized short- and long-term goals to achieve resolution of the identified issues, and to outline detailed actions that can collectively achieve the specific goals. This progression of activities is a hallmark of CBSG decision-making workshop processes and has been recognized as an effective process for stimulating discussions among diverse stakeholders.

The PVA effort set the stage for focusing working group discussion on those management options that could most effectively reduce risk of population decline. The analyses clearly indicated the severe risk that out-



Extinction risk ($P(E)$) in simulated populations of white-tailed prairie dogs in Colorado exposed to periodic plague epidemics of varying frequency and severity. VORTEX simulations assume that, in addition to the severe epidemics, plague as a chronic disease is either perpetually present at low levels (“Enzootic”, top panel) or is absent (“Non-Enzootic”, bottom panel). The two panels are composed of six grids, with each grid itself subdivided into ten boxes representing a specific population size. The trend in population size within each grid increases from the upper-left ($N = 25$ animals) corner to the lower-right corner ($N = 3000$ animals).

breaks of sylvatic plague pose to the survival of individual prairie dog colonies and assemblages of interacting colonies. Additional models were developed that simulated a given level of disease management in the form of dusting colonies with a compound that kills fleas – the vector responsible for transmitting the infectious agent that results in plague. Relatively modest levels of dusting activity could lead to a significant reduction in the severity of a given plague outbreak, even if the frequency of the outbreak is not affected. This could have major implications for the management of small prairie dog colonies that are already compromised by other factors.

Other important conclusions from the working groups included, but were certainly not restricted to, the following high-priority issues and recommended management objectives:

- Collect data related to oil and gas development impacts on prairie dogs and their ecosystems.
- Minimize the effects of prairie dogs and agriculture on each other to improve long-term management of prairie dogs.
- Develop a prioritized, collaborative research program for white-tailed and Gunnison’s prairie dogs to address key conservation practices related to these major gaps in knowledge.
- Improve public understanding of the effects of shooting on prairie dog populations, the status and trends of prairie dog populations (population numbers and distribution), and current regulatory and management actions.
- Minimize the impact of current development within existing prairie dog habitat, especially in relation to habitat loss and fragmentation in rural areas.

Recommendations from each working group were prioritized by the larger group. Each management objective was considered, based on the value of that objective in contributing to a Statewide Conservation Strategy that will provide for prairie dog population viability in a socially supportive environment. Using this process, five general objectives rose to prominence:

1. Develop effective management techniques to ensure large-scale prairie dog population resilience in the presence of plague.
2. Develop a prioritized, collaborative prairie dog research program that addresses key conservation practices to include (i) “healthy” prairie dog populations, (ii) interactions between livestock grazing and prairie dog populations, (iii) prairie dog distribution across land ownership classes, (iv) and the relationship between fire ecology and prairie dog population ecology.
3. Improve our understanding of the epidemiology and dynamics of plague in prairie dog communities.
4. Minimize habitat loss and degradation in the context of oil and gas development.
5. Conserve the functional integrity of the ecosystem in order to sustain all of the dependent components in the context of oil and gas development.

With conservationists and private citizens working together on this difficult issue, it is our hope that meaningful dialogue can continue among the many parties concerned with the sustainable utilization and management of natural resources in Colorado – and that this can serve as a model for similar efforts around the country and around the world.

Oribi PHVA Workshop

19-22 June 2006

Hebron Haven, ZwaZulu-Natal, South Africa

Oribi antelope have a wide distribution on the African continent, stretching from Senegal towards Ethiopia and southwards towards South Africa, but their habitat is patchy and discontinuously distributed within this area. Recent population estimates indicate that the total population of oribi in South Africa is likely to be between 2500 and 4500 individuals. Due to the small, discontinuous population and estimated rate of decline, oribi were recently classified as Endangered.

The main cause of population decline is loss of grassland habitat to agricultural practices. In addition, many remaining grassland fragments are in poor condition due to poor veld management and incorrect burning regimes. Oribi are not adequately protected by the protected area network of South Africa, and conservation strategies to conserve oribi on private land are important for the survival of the species.

At the PHVA, 36 participants developed conservation objectives including: each of the 13 subpopulations must have a 95% chance of survival over a 50-year period; each population must maintain 80% of its original genetic diversity; and overall there must be a 0% chance of extinction of the metapopulation.

Realistic, achievable conservation actions and recommendations for improving the current status of oribi in South Africa were identified. The top five solutions chosen by the participants are listed below:

1. Develop an appropriate tool kit for use by extension officers throughout the oribi range and ensure implementation.
2. Create incentives for landowners to conserve oribi.
3. Place oribi and oribi habitat conservation issues around redistribution of land firmly on the agenda of stakeholders to ensure that protection of oribi is dealt with prior to change of ownership.
4. Undertake a nationwide baseline census both within and outside protected areas. The census must include population numbers as well as population age and sex structure and any historical mortality information.
5. Establish an oribi conservation area network per genetic management zone that ensures persistence of the species.



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An Oribi Working Group Committee was established prior to the PHVA and provided basic management guidelines for oribi conservation. Since the PHVA, the focus of this group has changed to include the outcomes of this workshop, and implementation of these actions. The KwaZulu-Natal Committee has brought experience and hands-on support to field staff and implementation of the PHVA solutions. The establishment of a Mpumalanga and Western Cape committee will contribute to oribi conservation in these areas.

Incentives for landowners to conserve oribi have been undertaken by biodiversity stewardship programs. KwaZulu-Natal is making significant headway, and recently established the KwaZulu-Natal Biodiversity Stewardship Program. The program is achieving conservation goals, where positive, proactive partnerships and cooperative management with landowners are the key components of natural resource management and custodianship. The main difference between this approach and other historic approaches is that these stewardship agreements are bound within the legal context.

The Oribi PHVA led to the use of translocation as a conservation tool for subpopulations facing extinction, and the Oribi Working Group and provincial conservation authorities are capturing and translocating threatened oribi populations to suitable areas.

Submitted by CBSG Southern Africa

Conserving Mexican Primates

16-20 October 2006

Xalapa, Veracruz, México

More than 10 years ago, a group of Mexican primatologists invited CBSG to conduct a CAMP workshop on México's primate species. As a result of this workshop, a large body of new research has been conducted on many Mexican primate species, greatly expanding our library of knowledge of species biology, ecology, and interactions with human activities across the country.

Despite this increase in knowledge, Mexican primate populations continue to decline at a steady rate, largely due to destruction of habitat and capture of individuals for the pet trade. A group of researchers from Universidad Veracruzana invited CBSG to design and facilitate an updated CAMP workshop process on Mexican primates and a PHVA for the Mexican mantled howler monkey to re-evaluate the status, threats and extinction risk of the species.

The Mexican Primates CAMP and Mexican Mantled Howler Monkey PHVA were organized and financially supported by Universidad Veracruzana and co-facilitated in a collaborative manner by CBSG México and CBSG South Asia staff. Eighteen researchers from México and overseas participated in the CAMP process, and 25 participants attended the PHVA workshop.

The workshop evaluated the status of the four species of Mexican primates: Mexican mantled howler monkey (*Alouatta palliata Mexicana*), black howler monkey (*Alouatta pigra*), Central American spider monkey (*Ateles geoffroyi vellerosus*), and Yucatan spider monkey (*Ateles geoffroyi yucatanensis*). These contemporary results were compared with the 1995 CAMP workshop and the results from the 2003 IUCN Red List evaluation. In addition, workshop participants were asked to propose management and research recommendations for all species. The PHVA objective was to determine the best strategies for *Alouatta palliata mexicana* conservation and to propose an action plan to maintain a viable population of the species for the next 100 years.

CAMP Results

The black howler monkey was previously categorized as Endangered in the IUCN 2003 Red List, and was re-categorized by the workshop participants as Vulnerable. Recommendations were for census and life history research, habitat management, and population monitoring.



The Mexican mantled howler monkey was previously categorized as Endangered in the IUCN 2003 Red List and was re-categorized by the workshop participants as Vulnerable. Recommendations were for field studies, genetic research, taxonomy and life history research, habitat and population management, public education, monitoring and translocation of select populations.

The Yucatan howler monkey's status was maintained as Vulnerable. Recommendations were for census, life history research, habitat management and population monitoring, and public education.

Not enough specialists on the Central American spider monkey attended the workshop, and the participants were not able to accurately assess this species' status.

PHVA Workshop

Most of the research on the Mexican howler monkey has been conducted in the Los Tuxtlas Reserve in southern México. Workshop participants recommended that more research effort is needed in other areas where the species is found. The results of the assessment were based on the studies in the Los Tuxtlas Reserve and, since the species is rather flexible in its habitat preferences, there is no possibility to extrapolate these results to other areas. One of the most important recommendations from this workshop was to create a National Primate Conservation Council to address the problems faced by the primate species that inhabit México.

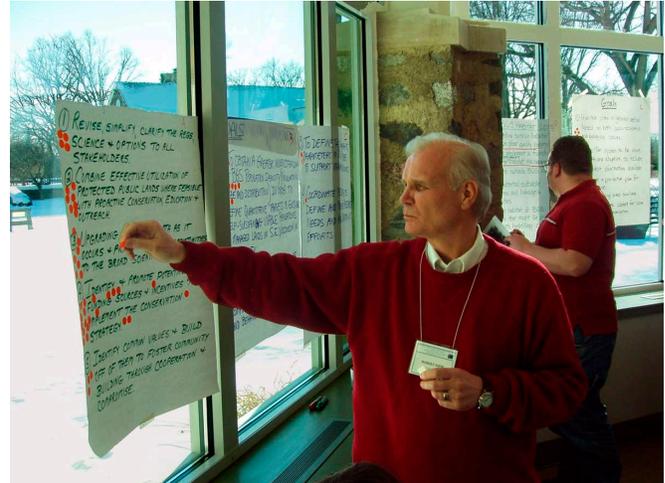
Submitted by CBSG México

Butler's Gartersnake PHVA Workshop

5-8 February 2007
Milwaukee, WI, USA

Butler's gartersnake (*Thamnophis butleri*), the smallest of five species of gartersnake found in Wisconsin, is restricted to the greater Milwaukee area in the south-eastern corner of the state. Fragmented populations of the species are reproductively isolated from other Butler's populations in Indiana, Michigan, northwestern Ohio, and Canada's province of Ontario. The Wisconsin Department of Natural Resources (WDNR) listed this species as Threatened in 1997, due to high levels of habitat fragmentation and habitat loss within its range. The future of this species must be considered in the context of a rapidly expanding human population in the greater Milwaukee area. It is vitally important to strike a balance between the ecological requirements of the snake and a responsible economic development plan for the region that promotes controlled growth in appropriate sections of the landscape.

CBSG was invited by WDNR to design and conduct a PHVA workshop process to outline a detailed action plan for future management of the Butler's gartersnake and selected elements of its habitat within Wisconsin. A population viability analysis or PVA was conducted for this species in order to gain a more complete under-



standing of the species and threats posed by human activities that compromise the integrity of individual populations or the surrounding habitat.

Based on participants' statements of primary conservation challenges, and information presented throughout the workshop's first day, five working group topics were identified:

1. Site characterization and prioritization
2. Biological aspects of habitat management
3. Socio-economic aspects of habitat management
4. Population management
5. Communications and outreach

A challenge throughout the workshop was the long-standing and difficult issues surrounding conservation of threatened species on private lands.

The PVA conducted before the full stakeholder workshop indicated that simulation models of Butler's gartersnake demography are highly sensitive to changes in female juvenile survival rates as well as broader components of adult female reproductive success (i.e., annual frequency of breeding, clutch size, and adult female survival). General management recommendations targeting these aspects of the species' biology are therefore expected to have the greatest positive impact on long-term population viability. Both drought and severe winter were seen to be major factors influencing population viability. Given our best understanding of Butler's gartersnake biology, populations composed of fewer than 40 to 50 adult females are predicted to be at a significantly higher risk of becoming extinct through demographic instability, compared to their larger counterparts. Moreover, the destabilizing impact



Butler's Garter Snake Range in Wisconsin, USA
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of small population size is increased if the population's underlying mortality rates are increased in so-called "urban" habitats, characterized by higher densities of snake predators such as raccoons and domestic cats. Compared to more "rural" environments. Finally, preliminary analyses suggest that translocation of groups of snakes, when conducted under optimal conditions, might be possible as a feasible strategy for either augmenting existing snake populations or establishing new populations within patches of suitable habitat. Further research on this subject, however, is still necessary. It is also important to recognize that successful translocation is extremely complicated and requires considerable vigilance if it is to achieve the desired result.

Below is a prioritized list of the top goals identified by each working group. Prioritization was based on each participant's perception of the importance of achieving these goals for successful management of Butler's gartersnake in a heavily urbanized environment.

- Identify and promote potential funding sources and incentives to implement the Conservation Strategy.
- Develop and implement a funding strategy for habitat management.
- Obtain a greater understanding of Butler's gartersnake population density (population size and distribution) in order to refine quantitative targets to ensure self sustaining viable populations in managed lands in southeastern Wisconsin in perpetuity.
- Develop methods to equally and fairly share costs associated with habitat management and protection.
- Maintain existing suitable habitat and enhance poor quality habitat.



While the activities of all working groups were critical to the evolution of the current Conservation Strategy, the work of the Site Characterization and Prioritization group was of particular relevance to the clarification of quantitative management targets for the species in the region. This issue has been particularly contentious in the early phases of Strategy development and implementation. Near the conclusion of the workshop, the full body of participants agreed to further clarify the value of individual sites for Butler's gartersnake conservation, and with the results of the PVA as further guidance, a revised target for the number of sites required for successful management of the species is now within reach.

By combining the use of rigorous scientific analysis of biological data with thoughtful and structured discussion of the needs of diverse stakeholder domains, the PHVA workshop was a valuable tool for natural resource management priority setting in the greater Milwaukee area. Those involved in its organization and implementation hope that it will serve as a model for responsible rare species conservation planning in and around the region.



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PHVA for Greater Sage Grouse in Colorado

9-11 May 2006

Steamboat Springs, CO, USA

The greater sage grouse (*Centrocercus urophasianus*) was once distributed across 12 states of the western United States and three provinces of Canada. Almost half of the species' original habitat in sagebrush ecosystems has since been eliminated, with localized extinction documented in both countries. As a result of these global declines, petitions have been filed to list the species under the United States Endangered Species Act.

The Colorado Division of Wildlife (CDOW) was charged with creating a Statewide Species Conservation Plan, and approached CBSG to design and facilitate a PHVA workshop on the species. To create an effective conservation plan, the PHVA addressed concern over a variety of human activities and their potential impacts on local wildlife, which could increase the risk of local extinction. The greatest challenge for sage grouse conservation was identified as the prospect of widespread and intensive oil and natural gas exploration.

Nearly 80 stakeholders from the public and private sector – including national, state and local government representatives, landowners, wildlife managers, and industry leaders – came together in Steamboat Springs, Colorado to participate in this workshop.

A population viability analysis (PVA) was conducted prior to the PHVA to analyze threats to the species. The analyses indicated that oil and natural gas development could have particularly severe consequences for the long-term viability of local grouse populations.

In preparation for the PHVA, the Statewide Conservation Plan Steering Committee and CBSG workshop facilitators identified five important topics to serve as the central focus of a series of working groups that would convene during the workshop and discuss relevant issues and strategies. These topics were: housing development; grazing; hunting; predation; and energy (oil and natural gas) development. Participants split into these five groups, with CBSG team members and a local mediation / facilitation expert serving as the leader of each group.

The participants identified and prioritized management goals and action steps for each high-priority goal. These action steps will be incorporated into the State-



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wide Conservation Plan, allowing sustainable management of greater sage grouse in a way that addresses the needs of a broad diversity of stakeholders.

Conservation management goals that clearly emerged from the workshop were:

- Reduce the loss of seasonally important sage grouse habitat, and protect important habitat within the current range.
- Determine if there is a relationship between grazing, sage grouse habitat quality, and population fluctuations.
- Improve public understanding of the role of predation on greater sage grouse populations and encourage timely, innovative strategies that include an adaptive management and monitoring scheme.
- Identify and secure necessary funding to implement predation strategies and goals in local plans.
- Proactively provide accurate information about the sage grouse population, management, and sustainability of hunting.
- Reduce the spatial and temporal influence of oil and gas development in both occupied and suitable unoccupied greater sage grouse habitat.

Tensions between wildlife managers, livestock ranchers, and natural gas community representatives are almost inevitable when discussing biodiversity conservation, but are also (when properly facilitated) important sources of productive discussion around alternative views of a given problem.

CBSG Schedule

Dates	Meeting Description	Location
NOVEMBER 2007		
3-5	Felid TAG Strategic Planning	Yulee, FL, USA
5-8	Green Toad PHVA	Hunnebostrand, SWEDEN
15	Giant Panda Technical Meeting	Chengdu, CHINA
13-15	WildCare Institute Strategic Planning	St. Louis, MO, USA
15-17	CBSG South Asia/RSG, South Asia Joint Meeting	Ahmedabad, Gujarat, INDIA
26	U of MN Conservation Biology Seminar Series	St. Paul, MN, USA
Late	Amphibian Biology and Management Course	VENEZUELA
DECEMBER 2007		
1-8	SAZARC Meeting	Ahmedabad, Gujarat, INDIA
4-7	Rio Grande Silvery Minnow PHVA	Albuquerque, NM, USA
10-18	Amphibian Conservation Biology Training	Periyar Wildlife Res, INDIA
JANUARY 2008		
10-13	Ogasawara Wood Pigeon PHVA	Chi-chi Jima, JAPAN
mid	Chicago Wilderness Meeting	Chicago, IL, USA
FEBRUARY 2008		
9-15	SSC Specialist Group Chairs Meeting	Abu Dhabi, UAE
18-21	Indonesian Gibbon Conservation Planning	Jakarta, INDONESIA
12-24	Conference on India's Conservation Breeding Initiative	New Delhi, INDIA
MARCH 2008		
APRIL 2008		
17	CIRCC Meeting	Berne, SWITZERLAND
18	CBSG Steering Committee Meeting	Berne, SWITZERLAND
19	ISIS Board Meeting	Berne, SWITZERLAND
26-1 May	International Tapir Symposium	Cancun, MEXICO



CBSG DONOR NEWS



A Special Thank You to Our Increasing Donors

In late 2006, we asked our donors to consider increasing their annual contribution by 20%. The response was remarkable. Over one-third increased their annual donation, for a total of almost US\$18,000. We are grateful for this show of support for our shared mission of endangered species conservation. The added support of these dedicated institutions and individuals has made it possible for us to achieve a number of goals that have been high on our list of organizational priorities including training of our regional network staff in modeling and knowledge-based facilitation; launching a new and improved website; reducing our environmental footprint by using higher cost, 100% post-consumer waste paper and offsetting our carbon emissions through contributions to the [World Land Trust's](#) program in Tapichalaca Reserve, Ecuador.

In addition to these activities, CBSG has remained focused on saving threatened species worldwide. The constant support of our donors is what makes all of this possible and we cannot thank you enough. In partnership with you, CBSG will continue to work to save threatened species by increasing the effectiveness of conservation efforts worldwide.



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2007 Increasing Donors

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Fort Worth Zoo
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America, Inc.
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Lincoln Park Zoo
Lisbon Zoo
Little Rock Zoo
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Nordens Ark
Odense Zoo
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Stiftung Natur-und Artenschutz in
den Tropen
Touro Parc - France

Butler's Gartersnake PHVA Workshop Participants 5-8 February 2007

American Transmission Co.

Johanna Howard
Bielinski Homes
Brian Depies

Brookfield Parks

William Kolstad

Cedarburg Science

Lesley Brotkowski
Chris Heston
Heather Patti
Ginny Plumeau
Christ Church
Robert Suhr

CBSG

Phil Miller

Damplands Research LLC

Kathleen Griswold

Havenwoods State Forest

Beth Mittermaier

Interstate Partners

Jeff Whipple

JJB Commercial Real Estate

James Hartung

Landowners

Mark Eisenmann
Justin Haasch
Mathew Haasch
Richard Krings
Corinne Sommers
Jacque Sommers

**Metropolitan Builders
Association**

J. Scott Mathie

Milwaukee Area Land

Conservancy

Richard Barloga
Delene Hanson

Milwaukee County Parks

Kevin Haley

Milwaukee County Zoo

Craig Berg
Craig Pelke

**Milwaukee Metropolitan Sewer
District**

Krista Chapdelaine

**Natural Resources Consulting
Inc.**

Brian Bub
William Poole

**Ozaukee Washington Land
Trust**

Angela Curtes

Retzer Nature Center

Larry Kascht

River Revitalization Foundation

Vince Bushell
Kristen Wilhelm
Riveredge Nature Center
Mary Holleback
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Simon Group
Craig Donze

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Rebecca Kirby
Perri Liebl
Gary Casper
Josh Kapfer

Urban Ecology Center

Billie Harrison

Waukesha County

Sheri Mount
Jason Dare
Marlin Johnson
Pamela Linn

WE Energies

Susan Schumacher

WI Department of Transportation

Doug Haag
Robert Hay
Signe Holtz
Terrell Hyde
Rori Paloski
Patricia Trochlell
Owen Boyle
Sharon Gayan
Dan Kaemmerer
James McNelly

Mike Thompson

Karla Leithoff

WI Wildlife Federation

Chuck Matyska

Yaggy Colby Associates

Michael Warwick



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Beach Mouse Captive Population Feasibility Workshop Participants 7-9 March 2007

Birmingham Zoo

Anna Ogburn

Brevard Zoo

Michelle Smurl

CBSG

Bob Lacy

Kathy Traylor-Holzer

Florida Fish & Wildlife

Conservation Commission

Jeff Gore

Ron Loggins

Peromyscus Genetic Stock

Center

Julie Glenn

St. Joe Timberland Co.

Bill Lynn

US Fish and Wildlife Service

Carl Couret

Tylan Dean

Annie Dziergowski

Darren LeBlanc

Rob Tawes

Sandra Sneckenburger

US Geological Survey

Tim King

University of Florida

Jim Austin



Costa Rican Amphibian Conservation Strategy Participants 28 September-1 October 2006

ACEBIO

Marco Barquero Arroyo

Viviana Arguedas Porras Guido

Saborío Rodríguez

Area de Conservación

Tortuguero SINAC MINAE

Christian Robles Puchi

Atlanta Botanical Garden

Ronald Gagliardo

CBSG/Amphibian Ark

Kevin Zippel

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Randall Arguedas Porras

Colegio de Biólogos de C.R

Noemy Margarita Canet

Conservation International

Jaime García Moreno

Costa Rican Amphibian

Research Center

Brian Kubicki

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Jorge Hernández Benavides

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Ana Lorena Orozco Alvarado

Cecilia Calderón Solano

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Nature Serve

Bruce Young

Pontificia Universidad Católica

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Reserva Biológica Monteverde

J. Alan Pounds

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Gilberth Alvarado Barboza

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Gerardo Chaves

Adrian García

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Ana María Monge Ortiz

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Marvelee H Wake

Zoo Atlanta/IUCN

Joseph Mendelson

Zoológico Nacional

José Hernández Calderón

Luisa Valle Bourrouct



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Recent CBSG Training Efforts

In response to numerous requests, CBSG recently offered two training courses to promote the development of population modeling and facilitation skills among our members and colleagues. An Advanced Vortex Modeling course was held at the National Zoo's Conservation and Research Center (CRC) in Front Royal, VA in June 2007. Building upon an earlier Vortex course at CRC held four years ago, this course explored some of the software options available for developing complex population models, and took advantage of the presence of many CBSG members involved in metamodel development (see article in this issue). A different approach was taken for the Facilitation Skills course held in August 2007 and hosted

by Omaha's Henry Doorly Zoo. Participants worked, not behind computer screens, but in working groups to practice communication, facilitation and process design tools discussed during the course.

Both training courses targeted CBSG members interested in broadening their skills for use in CBSG and other conservation-related activities. While most participants came from North America, both courses had international participation, with attendees from Costa Rica, Spain, India, Korea and Australia. Additional courses in population modeling, facilitation or other topics may be offered periodically based upon demand; please contact Kathy Traylor-Holzer (kathy@cbsg.org) at the CBSG office if you would like to be notified of potential future training sessions.

Post-Workshop Modeling for Maned Wolves

CBSG Brasil is committed to increasing the effectiveness and conservation benefits from the PHVA workshops facilitated by the network. One of the strategies used is post-workshop modeling to help interested participants use and apply Vortex modeling results. Following is an example of post-workshop modeling following the 2004 Maned Wolf PHVA workshop.

The maned wolf population in Águas Emendadas Ecological Station in Brazil is currently threatened by the constant loss of animals through road kill. Data collected in recent years show that 15% of the population is killed by cars every year. CBSG Brasil was asked to use Vortex to evaluate two different

management options: supplementation of the population through translocation of maned wolves from a neighboring population, and decreasing the mortality of maned wolves due to road kill.

The baseline model was adapted to reflect the situation in Águas Emendadas Ecological Station, and the model indicated that unless conservation measures are taken, the population will become extinct within 100 years. However, the model indicates that a reduction in mortality rates due to road kill will have a strong impact on the population, and a 50% reduction in road kill mortality may ensure the survival of the population in the long term. The model demonstrated that supplementation through translocation of animals alone will only delay the extinction of the population if the causes of high mortality rates, such as road kill, are not reduced.

The results of this modeling exercise are now being used to guide conservation measures and research for the maned wolf population in Águas Emendadas Ecological Station. It shows how important it is to follow up after workshops, and make sure that the baseline model continues to evolve and be used to promote research and conservation. It is our belief that post-workshop modeling gives continuity to the hard work accomplished during the workshop and promotes the application and direct use of Vortex results in conservation. CBSG Brasil hopes to continue to provide this kind of service and support when each workshop is over.



Submitted Article

The Houbara Bustard in the Kingdom of Saudi Arabia

The Saudi Arabian houbara bustard breeding program was started in an attempt to restore the population of this native species after the breeding population virtually disappeared. The re-introduction of captive birds to the wild is critical for the survival of the houbara population. During 1986 to 1988 fertile eggs were collected from resident populations in the Baluchistan in Pakistan. By the 1990s, through the application of artificial insemination techniques, the National Wildlife Research Centre (NWRC) was able to produce enough houbara chicks for the first trial release.

Two sites were selected for houbara re-introduction sites: Mahazat as-Sayd and Saja Umm Ar-Rimth, both protected areas in Saudi Arabia. All re-introductions were done in accordance with the *IUCN Guidelines for Re-introductions*.

Release of houbara in protected areas

In the Mahazat as-Sayd protected area a total of 781 houbara have been released (374 males and 407 females). Since 1991, 781 houbara have been released, and 133 died within the first month of release and 648 have survived. Mortalities were mainly due to mammal predation and to a lesser extent, starvation.

The re-introduction program in Saja Umm Ar-Rimth Protected Area was started in 2003. By 2006, a total of 145 houbara bustard had been released (67 females and 78 males). Around 35 houbara still survive as of May 2007. Most of the birds died due to predation by mammals (foxes and cats), with some cases of starvation and poaching.

The creation of a predator-free enclosure would allow houbara to become better acclimatized to the natural environment, which would significantly improve survival rate.

Total population in Mahazat as-Sayd Protected Area

The total houbara population in the reserve is calculated using a number of parameters, including the number of birds released, number of wild-hatched chicks, and number of birds that have died post release. The current population of houbara in Mahazat as-Sayd Protected Area is estimated to be greater than 500 individuals.



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Acknowledgements

We thank HH Prince Bandar bin Saud Al Saud (Secretary General, NCWCD) for his support towards the research and conservation work by the NWRC in the Kingdom. We also thank Mr. Abdulrahman Khoja, Mr. Ali Zahrani, Mr. Chukkans, and Rangers in the protected areas for their continuous support of the field work.

Submitted by M. Zafar-ul Islam, Mohammed Basheer P., Moayyad Sher Shah, Hajid al-Subai and Mohammad Shobrak*

National Wildlife Research Centre, P.O. Box 1086, Taif, Kingdom of Saudi Arabia

**Avian Research and Field Monitoring Manager
e-mail: zafar@nwrc-sa.org*

Recent Events in Metamodeling

Background

For more than a decade, CBSG staff and experts worldwide have been collaborating on a broad research project aimed at better incorporating “the human dimension” into wildlife conservation planning processes. In the context of our approach to conservation, this takes on two forms: expanding the diversity of stakeholders that participate in CBSG workshops, and improving our ability to incorporate the information that these stakeholders bring to a workshop process. Listening to and utilizing information from a range of perspectives is a critical element of effective species conservation planning, but one that has traditionally evaded conservation biologists trained in the traditional academic framework. Through this biocomplexity research initiative, we hope to change this trend.

In our book *Experiments in Consilience* (2003), we described the early phases of this integration of data and information into the traditional methods of assessing risk of wildlife population decline and extinction in the face of human pressures – a powerful simulation modeling tool known as population viability analysis, or PVA. Our idea focuses on the construction of metamodels: individual models that “communicate” with one another to enhance the wildlife risk assessment process. For example, a model of wildlife disease epidemiology could be linked to our most frequently used PVA model, *Vortex*, in order to more accurately simulate the impact of disease on the risk of population extinction. This approach to enhancing the richness of traditional PVA methodologies is considerably easier than the alternative “megamodeling” approaches, where many varied human-mediated processes that cause species endangerment are a required element of each multi-disciplinary model. This all-inclusive philosophy inevitably leads to a level of abstraction and complexity that can make megamodels unusable. We have received enthusiastic responses to our metamodeling concept and, consequently, have worked to make this idea a reality.

New Developments

CBSG was very fortunate to have the enthusiastic collaboration of two advanced degree students in our metamodeling research. Jennifer Burton from the University of Illinois College of Veterinary Medicine came to the CBSG office to review and revise *Outbreak*, our wildlife disease epidemiology simulation model. Jen worked with J.P. Pollak, a software developer currently studying at Cornell University and



lead programmer of *Outbreak*, to provide a detailed set of questions concerning the underlying algorithms that define the software. In addition, she provided valuable recommendations for how the software may be improved, both in terms of scientific rigor and ease of use. When Jen’s suggestions are incorporated, *Outbreak* will be an even more valuable contribution to our metamodeling tool box.

Becky Gasper, a graduate student in the Conservation Biology program at the University of Maryland, worked on a “Meta-*Vortex*”, in which two copies of *Vortex* run on a single computer simultaneously, allowing the simulation of two separate species dynamics as they interact demographically and ecologically. A two-species PVA methodology will be a valuable contribution to the general practice of such viability analyses, where the typical single-species approach has been criticized almost since the inception of the technique. This capability has been in the early phases of discussion for many years but, thanks to Becky’s dedicated work over the past summer, is now many steps closer to reality. Becky used North America’s highly endangered black-footed ferret and its obligate prey, the prairie dogs, as a model system for initially designing the meta-model and defining the rules by which one species’ rates of birth and/or death would be influenced by the population size or density of the second species.

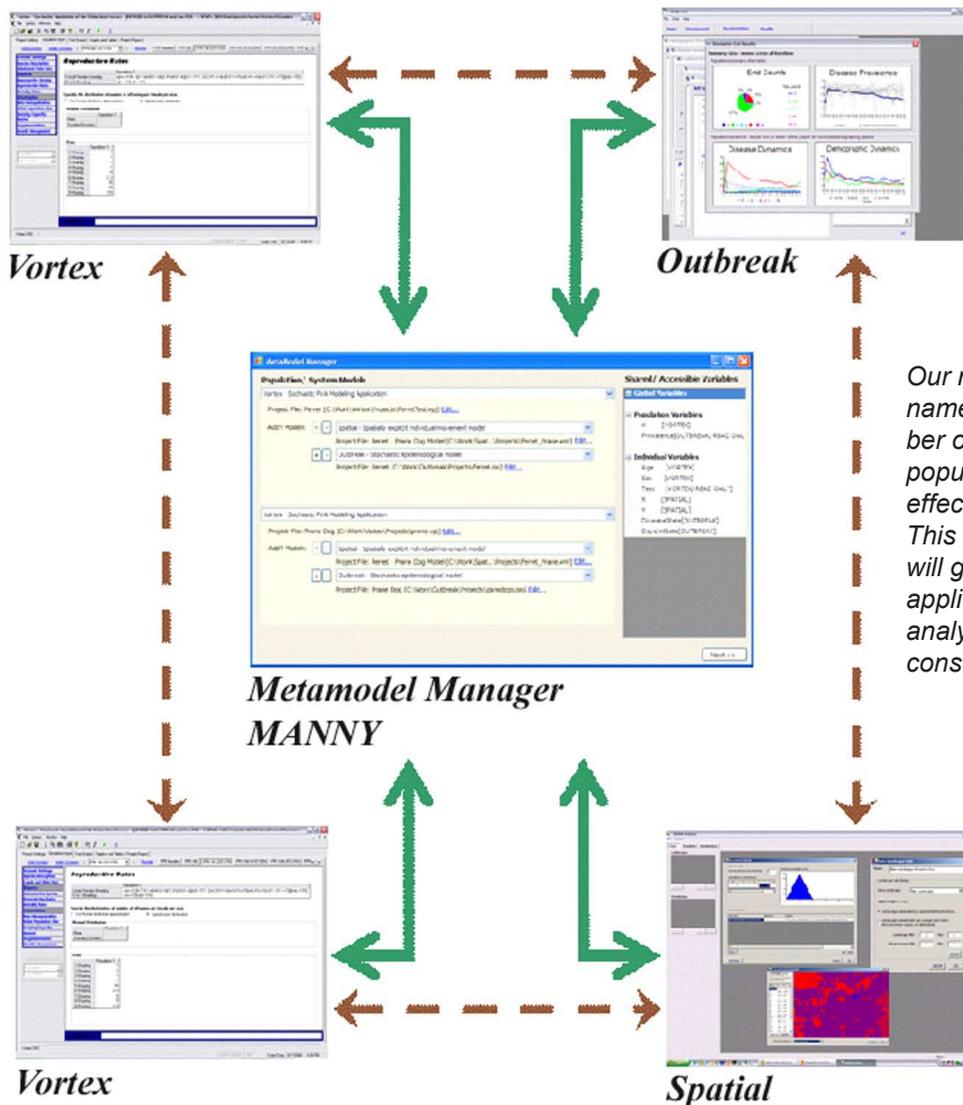
Successful implementation of both *Meta-Vortex* and a linked *Vortex-Outbreak* metamodel requires a third software component: a “communications hub” that controls which programs comprise the metamodel and how they interact. J.P. Pollak has created a prototype of this interface, tentatively called the *Metamodel Manager* or *Manny* for short. *Manny* will make the development of metamodels much more intuitive and transparent as the

user specifies which components will be linked together and how (see figure below). In fact, *Manny* will have sufficient flexibility that any simulation modeling software could link to something like *Vortex* or *Outbreak*. This capability could potentially make our metamodeling tool extremely valuable as different types of issues and modeling environments become involved in the species conservation planning process.

An early version of *Manny* was unveiled at a recent metamodel development meeting held at the National Zoo's Conservation and Research Center in Front Royal, Virginia, US. A group of GIS-based metamodelers gathered together to move forward on the other primary metamodeling component, the animal movement model *Spatial*. This program will allow the user to import a map of a given landscape and,

through the explicit description of movement rules, will help to determine the spatial arrangement of animals through the duration of the simulation. This will be another valuable addition to the metamodeling toolkit. The *Spatial* group also renewed discussions on the feasibility of teaming up with ESRI, Inc., authors of the immensely popular ARC-GIS spatial landscape analysis software, to create a tool for dynamic changes to a landscape brought about by human development. While only two days long, the Front Royal metamodeling meeting was very productive and provided a sorely-needed "shot in the arm" for our metamodeling efforts worldwide

Don't forget to look in future issues of *CBSG News* for more updates on our metamodeling project!



Our new Metamodel Manager, nicknamed *Manny*, will allow any number of models of interest to wildlife population risk assessment to more effectively "talk" to one another. This metamodeling environment will greatly enhance the practical application of population viability analysis in endangered species conservation planning.



Newsletter of the Conservation Breeding Specialist Group, Species Survival Commission, The World Conservation Union

CBSG's mission is to save threatened species by increasing the effectiveness of conservation efforts worldwide.

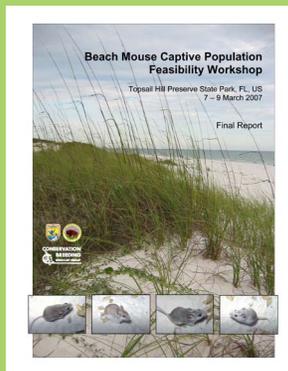
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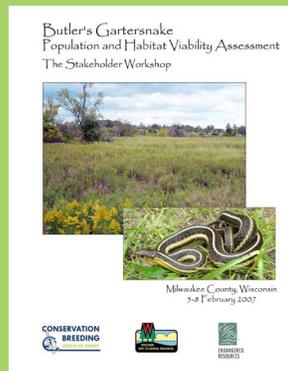
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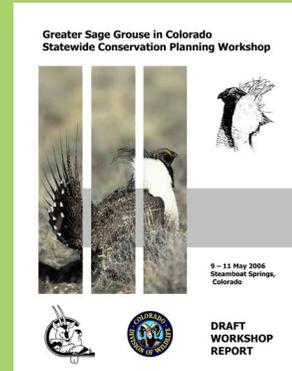
Please contact the CBSG office for details



Beach Mouse Captive Population Feasibility



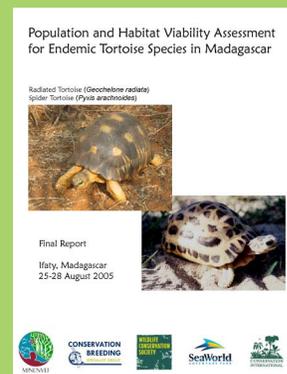
Butler's Garter Snake PHVA



Greater Sage Grouse PHVA



Mexican Jaguar PHVA



Madagascar Tortoise PHVA