



CBSG News

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Developing Species Conservation Priorities

From its inception as an SSC Specialist Group in 1978, a critical task for CBSG has been to develop conservation-based priorities for recommendation of vertebrates species for scientifically-managed captive breeding programs. These recommendations are needed to assist in managing a response to the severe decline in populations of many vertebrate species and their increasing risk of extinction. Globally, about 500,000 specimens of 4,000 tetrapod vertebrate species occupy most of the space in captive breeding facilities. A similar number of fish species are held in aquariums.

In response to this challenge, the CBSG has assisted in the development and application of a series of tools based upon small population and conservation biology and the use of intense workshop processes both to apply these tools and produce useful products. These tools include: (1) the Mace/Lande criteria for evaluation of threat, (2) VORTEX, a stochastic small population simulation modeling tool, (3) mapping and Geographical Information Systems (GIS) to indicate the consequences of planned land uses, (4) local human demography for protection of threats to local protected areas, and (5) assessments of workshop effectiveness.

The tools are used in different processes which CBSG has developed including: (1) Conservation and Assessment Management Planning (CAMP) Workshops, (2) Population and Habitat Viability Assessment (PHVA) Workshops, (3) Global Captive Animal Recommendations (GCAR) Workshops, (4) special topic workshops, and (5) facilitators training workshops. A combined total of more than 80 such workshops in 30 countries have been conducted over the past five years.

A comprehensive listing of all vertebrate species with an assessment of threat for each did not exist in 1978 when CBSG was formed and does not yet. At that time, partial lists, encompassing only a fraction of the 23,000 tetrapod vertebrate species, were available. The definitions and criteria for selection of species and assignment of category of threat were ambiguous and were not comparable between publications and taxonomic groups. Recommendations for conservation action were broad, non-specific, and rarely the result of consultation with management authorities in the range countries of the species.

Experiments to develop processes for systematic review of groups of taxa were begun in 1985. It became apparent that assignment of a category of threat would benefit from explicit and scientific definitions of categories of threat and flexible criteria for assignment of species to a threat category. The use of definitions based upon population biology was recognized as essential if progress were to be made. The SSC requested Dr. Mace to undertake the task with the result that a series of proposals (Mace/Lande definitions and criteria; IUCN revised definitions) have been made and are being tested and revised through a systematic review and revision process. The CBSG, in collaboration with other SSC Specialist Groups and more than 1,800 wildlife biologists and scientists, has employed these definitions and criteria as a foundation for assessing the status of groups of species in a series of more than 25 Conservation and Assessment and Management Plan (CAMP) Workshops in several countries.

The wildlife biologists and managers in the CAMP Workshops provide recommendations on (1) management and research management needs, (2) the need for further risk assessment and management planning for the wild population (Population and Habitat Viability Assessment or PHVA), and (3) the need or not for a captive population as a conservation action. This process is still under development, but we are now near achieving one of our earliest goals to provide the wildlife agencies and zoos of the world a systematic body of wild populations-based conservation priorities for selection of species for captive programs.



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


Ulie S. Seal, Chairman

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CBSG News

The CBSG news is published by the Captive Breeding Specialist Group, Species Survival Commission, World Conservation Union. CBSG News is intended to inform CBSG members and other individuals and organizations concerned with the conservation of plants and animals of the activities of the CBSG in particular and the conservation community in general. We are interested in exchanging newsletters and receiving notices of your meetings. Contributions of \$25 (U.S.) to help defray the cost of publication would be most appreciated. Please send contributions or news items to:

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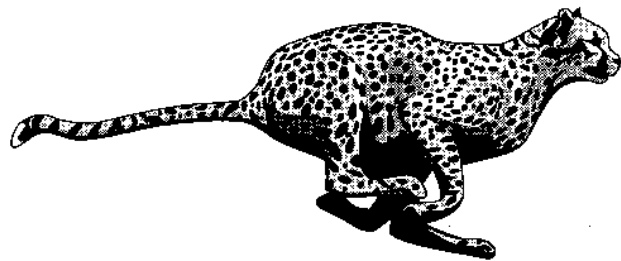
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CBSG Mission Statement

The mission of the Captive Breeding Specialist Group is the conservation or establishment of viable populations of threatened species.

The goals of the CBSG are to:

1. Organize a global network of people and resources.
2. Collect, analyze and distribute information.
3. Develop global captive breeding programs.
4. Integrate management programs for captive and wild populations.



Executive Summary...

St. Helena Island CAMP and PHVAs

The objective of the exercise was to review the applicability of Conservation Assessment and Management Plans (CAMPs) and Population and Habitat Viability Assessments (PHVAs) to botanical conservation and to conservation planning for island biotas. The workshop aims were as follows:

1) To introduce the CAMP and PHVA procedures to the botanical garden community.

2) To hold a preliminary CAMP review for the endemic biota of St. Helena.

The results of the workshop will be used to support the Sustainable Environment and Development Strategy for St. Helena, currently managed by Conservation Unit, Royal Botanic Gardens, Kew. This program recognizes the need to balance economic, social, and ecological systems to reach the goal of sustainable development. International experience has shown that strategies focusing on any one or two of these systems alone will not succeed. Cross-sectional planning arrangements and the involvement of government, non-governmental offices (NGOs) and the public are central to the success of such a strategy.

A conservation strategy has been developed within the Sustainable Environment and Development Strategy (SEDS), which builds upon the successes already achieved over the last decade by the Agricultural and Forestry Department. While developing a strategy to conserve the remnant habitats and species, it also recognizes the need to balance the needs of St. Helena's residents.



George Benjamin with the last individual of the St. Helena Olive, Nesiota elliptica. The plant is dying from old age and systemic fungal infection and only a single living branch remains.

Results of CAMP and Preliminary PHVAs

Flora: The review was restricted to endemic species of St. Helena. The list of 61 species includes: 1) 32 dicotyledons (all evaluated) of which six are extinct, two are extinct in the wild, 19 are threatened, including seven critical; 2) five monocotyledons (all evaluated) of which one is extinct, four are threatened; and 3) 24 pteridophytes, 19 of which were not evaluated but likely to be threatened, and three of the five evaluated considered threatened. Recommendations were made for detailed assessments and management planning (PHVAs) for 20 of the species, some 54 research management projects were suggested, and 16 captive programs to reduce the risk of species extinction were recommended. Another 15 species need further evaluation to determine how they may need to be managed.

Preliminary PHVAs were conducted on two species (*Commidendrum rotundifolium* and *Trichetiopsis melanoxyton*). The existing populations of both species are derived from very few founders and re-introduction programs are underway.

Invertebrates: The species list includes 203 insects (including 157 species of Coleoptera of which 112 were not evaluated) from seven orders of which 55 were evaluated with three extinct and 25 classified as threatened. A total of 16 species were classified as 'Critical'. None of the 46 listed species of Arachnida, the 18 species of Heteroptera, and four species of Lepidoptera were evaluated and only two of 15 species of Diptera were evaluated. One of three endemic Mollusca species was evaluated

as was one of six endemic species of Crustacea. Population and Habitat Viability Assessments were recommended for 16 species, 59 research management needs were identified, and captive populations were recommended for 15 species, 13 of which had been classified as Critical.

Preliminary PHVAs were conducted on two species (*Succinea sanctaehelenae* and *Labidura herculeana*), which illustrated the problems of restricted habitat and introduced threats.

Vertebrates: The wirebird

(*Charadrius pecuarius sanctaehelena*), the one endemic terrestrial vertebrate, was classified as 'Endangered' and a preliminary PHVA exercise indicated this species is at the limits of its ability to respond to demographic challenges. There appears to be a deficiency of juveniles in the population which may be a result of cat predation. Three of 10 endemic species of marine fish are listed and three were evaluated, of which two may be critical. More information is needed.

Recommendations

- 1) Initiate immediate conservation programs for the 60 endemic plant species, with the aim of attaining no net loss of both relic habitat and populations of endemic and threatened taxa.
- 2) Establish captive propagation programs for the recognized priority species. This should aim to retain 90-100% of the surviving founder's genetic diversity for the next 100 years. This is the only management intervention that can assure survival for the nodes of species.
- 3) Further incorporate St. Helena's unique biota into St. Helena's educational programs.
- 4) For Priority threatened plant and animal species:
 - a) Obtain representation from each surviving founder specimen.
 - b) Maintain representation in field gene banks on St. Helena with aim of producing propagation material for re-introduction.
 - c) Develop a seed bank facility on St. Helena and upgrade nursery facilities.
 - d) Initiate and train a conservation team on St. Helena to support endemic species programs.
 - e) Critically review policy and management for plant re-introductions as evidence suggests a number of re-introductions are not proving successful in the long term.
 - f) Develop a coordinated and managed program to encourage Botanic Garden support for conservation activities on St. Helena. This support will be expressed through technical aid, training, *ex situ* cultivation, public education and fund raising.
 - g) Further refine the PHVA and CAMP procedure in collaboration with CBSG to prepare for a full workshop on St. Helena as an integral part of the SEDS program.
 - h) Conduct urgent and comprehensive survey work, and associated ecological research, for all of St. Helena's endemic invertebrate fauna.
 - i) Examine the case for legal protection of key invertebrate sites not presently covered.
 - j) Survey and conduct ecological research on the marine endemics to determine species locations, status, and ecology.

This report was taken from the St. Helena Island CAMP and PHVA (full report available from the CBSG office).

British Zoo Federation May Develop Overseas Program

The Federation of Zoological Gardens of Great Britain and Ireland is conducting a four-month feasibility study into ways in which British zoos can help zoos in the developing world to achieve their conservation and education objectives better in line with the World Zoo Conservation Strategy.

The feasibility study is being conducted by Dr. Brian Bertram, former Director-General of the Wildfowl & Wetlands Trust and previously Curator of Mammals at the Zoological Society of London. The study is funded by the Darwin Earth Summit in Rio in 1992 as a vehicle whereby British expertise could be made available to assist with the conservation of biodiversity in the developing world.

The aims of the study are to investigate what zoo personnel training programs can be established and funded and to look at other ways in which some of the expertise of the British zoo community can be channeled effectively towards countries which are rich in biodiversity but poor in resources.

The study is still at an early stage. Nonetheless, it is likely that a British Zoos Overseas Program will concentrate its efforts particularly, but not exclusively, on Africa. The Program will try to establish lasting links between the British zoo world and zoos and other wildlife organizations in Africa. It will also deal with sharing expertise at different levels and in various fields of work as well as have a stronger emphasis on public awareness than has been customary.

An overseas program of this sort depends on good cooperation among organizations. It is expected that there will be close working relations with relevant national and regional zoo and wildlife bodies. It is also hoped that such a program will stimulate other zoo organizations to establish complementary cooperative overseas programs.

Any comments and suggestions would be welcome and can be sent to: Brian Bertram, Fieldhead, Amberley, Stroud, Glos. GL5 5AG, United Kingdom; tel: 0453 872796.

Executive Summary...

Thai Zoo Masterplan for Conservation

The *Thai Zoo Masterplan for Conservation* for the five zoos of the Zoological Parks Organization of Thailand was submitted on 10 August 1993 by the IUCN/SSC Captive Breeding Specialist Group (CBSG). The *Masterplan for Conservation* was based on five visits totaling 70 days in Thailand and an equal number of days at the CBSG Office during 1992-1993. During these visits, there were intensive analyses of data, discussions with board members and zoo staff, and on-site planning sessions and training workshops at Dusit Zoo (Bangkok), Khao Kheow Open Zoo (Chonburi), Chiang Mai Zoo, Nakorn Ratchasima Zoo (Korat), and the Songkla Zoo site.

The CBSG team members also visited Safari World (Bangkok), PATA Zoo (Bangkok), two Gibbon Rescue Centers in Bangkok, several Royal Forest Department Wildlife Centers, Sumutprakarn Crocodile Farm and Zoo, and Samphran Elephant Ground and Zoo. Issues were discussed with individuals from the Siam Scientific Society, Mahidol University's Center for Wildlife Research, The Asia Foundation, Wildlife Fund Thailand, Thailand Institute of Scientific and Technological Research, the Zoo and Wildlife Veterinarians' Society, and the Royal Forestry Department.

The IUCN/SSC CBSG principal investigator was Ulysses Seal (Chairman of the IUCN/SSC CBSG) and the Project Coordinator was Ronald Tilson (Director of Conservation, Minnesota Zoo). The principal Thai counterparts were Khun Usum Nimmanheminda (Director General of the Zoological Park Organization) and the Directors of the five National Zoos: Khun Sophon Dumnui (Khao Kheow Open Zoo), Khun Supoj Methaphivat (Chiang Mai Zoo), Khun Prayud Navacharoen (Nakorn Ratchasima Zoo), Khun Somchai Kruea-net (Songkla Zoo), and Dr. Alongkorn Mahannop (Dusit Zoo). Khun Chaichana (Zoological Parks Organization) contributed significantly to the workshop by translating many documents and discussions.

The *Masterplan for Conservation* was improved immensely by the skillful concept drawings rendered by Khun Sasipong Chatinan (Jet Stream Co.), Khun Weerapan Paisarnnan (P&L Design), and Keith Scarmuzza (P&L Design).

The first visit of the IUCN/SSC CBSG team in August 1992 was spent with Zoological Parks Organization staff at all five zoos in planning sessions that included zoo concept design, program priorities, and exhibit critique. Integration of Thai zoo architects also occurred at this time. Specifications for primate, hoofstock, and carnivore holding facilities at Khao Kheow were reviewed and revised. Groundwork for preparing collection plans at each zoo was begun. Information regarding national conservation strategies of Thailand was provided by the Royal Forestry Department, Siam Scientific Society, Mahidol University, and Wildlife Fund Thailand. For this first phase, Michael DonCarlos (Minnesota Zoo, USA) and Ann Baker (Chicago Zoological Society, USA) joined the CBSG team.

The second visit occurred in October 1992. Four workshops with staff from all five zoos were held. The first workshop was on animal health programs, policies, buildings, and equipment. The second was on collection plans and exhibit designs. The third covered evaluations for hoofstock and carnivore programs. At the fourth workshop, participants reviewed the botanical garden plan for Khao Kheow. Groundwork for developing zoo masterplans was begun. For this phase of the project, Michael DonCarlos, Paul Garland (Orana Park Wildlife Trust, New Zealand), Bruce Williams (Fossil Rim Wildlife Center, USA), and Douglas Armstrong (Henry Doorly Zoo, USA) joined the CBSG team.

The third visit of the CBSG Masterplan Team occurred during January - February 1993. A three-day workshop at Khao Kheow focused on training staff in the use of the Animal Record Keeping System (ARKS). Other workshops focused on establishing individual animal identities, establishing exhibit or holding locations at each zoo, and expanding upon zoo collection plans at Khao Kheow, Nakorn Ratchasima, and Chiang Mai.

Schomburgk's deer, now extinct, is the symbol of the Zoological Parks Organization of Thailand.



Zoo concept designs for Khao Kheow and Dusit were intensively reviewed. A major effort of this visit was the development of collection plans, exhibit designs, and management protocols and policies for birds. Schematics for the construction of animal hospitals were completed. For this phase of the project, Graeme Phipps (Taronga Zoo, Australia) and Lee Simmons (Henry Doorly Zoo, USA) joined the CBSG team.

The fourth visit occurred during April 1993. The focus was five-fold: 1) to complete collection plans and continue developing masterplans for each zoo; 2) to complete exhibit designs as far as possible; 3) to provide additional training in veterinary procedures; 4) to introduce zoo staff to Single Population Analysis and Record Keeping System (SPARKS); and 5) to begin preparing Zoological Parks Organization staff for a Population and Habitat Viability Analysis (PHVA) Workshop in collaboration with the Royal Forest Department and Mahidol University. The PHVA would be designed to address the growing problem of gibbons (*Hylobates* spp.) in Thailand. This is the first step in CON-LINK, which is the linking of conservation agendas of *in situ* and *ex situ* organizations in Thailand. During this phase of the project, Paul Garland, Graeme Phipps, and Robert Cook (International Wildlife Conservation Park, USA) joined the CBSG team.

A fifth visit was made by the CBSG Masterplan Team in July 1993 to confer with the Thai zoo architects and to consult with Zoological Parks Organization counterparts regarding scope and content of the *Masterplan for Conservation*. The focus of this visit was to complete the masterplan drawings, verify the collection plans, and refine the CON-LINK concept. This team was comprised of Ronald Tilson and Paul Garland.

The directions set forth in this *Thai Zoo Masterplan for Conservation* focus on change that will lead to a new and improved modern zoo system for Thailand. The *Masterplan for Conservation* is presented in a manner that is intended to be forthright, clear, and concise. The directions and priorities will assist the Zoological Parks Organization in making immediate and long-range decisions within the context of a comprehensive strategic conservation plan for endangered species of Thailand. This report specifies immediate recommendations regarding current and future development processes and gives comprehensive recommendations regarding development of each zoo. The recommendations in the report are integrated so that similar issues can have single resolutions, provide an economy of discussion, and move from analysis to decision.

The *Thai Zoo Masterplan for Conservation* completes the conditions of agreement between the Zoological Parks Organization and the IUCN/SSC CBSG. It provides the foundation upon which masterplanning and collection planning for each zoo can continue to be developed and implemented. When fully implemented, the Zoological Parks Organization of Thailand will be nationally and internationally recognized for its conservation programs for endangered Thai wildlife.

This summary was prepared by Ulysses S. Seal, IUCN/SSC CBSG Chairman.

The Evolution of a Workshop... Global Captive Action Recommendations

A series of workshops, termed Global Captive Action Plans (GCAP), were held at the 1993 Annual CBSG meeting. The goals of the GCAP process were to 1) review Conservation Assessment and Management Plan (CAMP) data for captive recommendations and discuss required changes; 2) prioritize taxa in need of captive management and to identify global target population sizes; and 3) determine regional responsibilities for carrying out the recommended captive programs and to identify regional target population sizes.

The intention, as with all CBSG programs, was to conduct these GCAP workshops and simultaneously evaluate their focus and effectiveness. This strategy encourages the continual evolution and improvement of the processes and allows CBSG to respond to the changing needs of our constituents.

Although the primary focus remains the same, this program has been modified to better meet the needs of the global captive community based on feedback received from participants in the GCAP workshops. The new version of this program is the Global Captive Action Recommendations (GCAR) workshop.

Global Captive Action Recommendations (GCARs)

The GCARs are derived from the CAMP process. The CAMP recommends which species/subspecies deserve attention and the GCAR determines a target number of animals required to sustain a healthy world captive population. This system assumes that captive populations be treated as an integral part of the metapopulations being managed by conservation strategies and action plans. Viable metapopulations may need to include captive components. The IUCN Policy Statement on Captive Breeding recommends, in general, that captive propagation programs be a component of conservation strategies for taxa in which the wild population is below 1,000 individuals. Captive and wild populations should and can be intensively and interactively managed with interchanges of animals occurring as needed and as feasible, after appropriate analysis. There may be problems with interchanges including epidemiological risks, logistic difficulties, and financial limitations. However, limited but growing experience suggests that these problems can be resolved. Strategies and priorities should maximize options while minimizing regrets for species conservation.

Captive populations are a support and a reservoir, not a substitute, for wild populations. A primary focus of the GCAR is on captive propagation programs that can serve as genetic and demographic reservoirs to support survival and recovery of wild populations in the future. The purpose of the GCAR workshop is to provide strategic guidance for captive programs at both the global and regional level in terms of captive breeding. The GCAR workshop activities include considering how the various

Recommendations...

regional programs for each group of taxa might interact and combine to catalyze a truly effective global effort. An important aspect is establishing global target population size goals (i.e., how many individuals ultimately to maintain).

GCAR Workshop Goals

The goals of the GCAR are:

- 1) to review CAMP data and discuss required changes;
- 2) to prioritize taxa in need of captive management and to identify global target population sizes; and
- 3) to evaluate the direction of regional collection plans on the basis of global conservation priorities identified by the GCAR process.

The GCAR Process

The GCAR process begins by compiling as much background information as possible on the status of taxa in the wild and in captivity. For this purpose, the CBSG utilizes information from Action Plans that may have been formulated by taxonomic Specialist Groups of the SSC or BirdLife International. When such plans do not exist, the CBSG attempts to collaborate with the appropriate Specialist Group to produce the necessary data that will allow the GCAR process to proceed. In most cases, the priorities and program goals determined by the CAMP process, as well as the number of individuals in captivity and the degree of experience and difficulty of captive management for each taxon, are available in the CAMP document. Information briefing books, prepared before the workshop, also contain this information. A current census of captive animals found in ISIS abstracts and TAG reports, studbooks, and regional inventories also is useful.

A major consideration in establishing priority species for captive management is the category of threat assigned to the taxon. Mace-Lande criteria are applied to each taxon during the CAMP process. This process assesses threat in terms of the likelihood of extinction within a specified time period and defines three categories:

Critical	50% probability of extinction within 5 years or two generations, whichever is longer
Endangered	20% probability of extinction within 20 years or 10 generations, whichever is longer
Vulnerable	10% probability of extinction within 100 years

Definitions of these criteria are based on population viability theory. To assist in making recommendations, participants in the workshop are encouraged to be as quantitative or numerate as possible for two reasons:

- 1) the CAMPs ultimately must establish numerical objectives for viable population sizes and distributions;

- 2) numbers provide for more objectivity, less ambiguity, more comparability, better communication, and, hence, cooperation.

During the workshop, there are many attempts to estimate if the total population of each taxon was greater or less than the numerical thresholds for the three Mace-Lande categories of threat. In many cases, current population estimates for certain taxa are unavailable or available for species/subspecies within a limited part of their distribution. In all cases, conservative numerical estimates are used. When population numbers are estimated, these estimates represent first-attempt, order-of-magnitude educated guesses that are hypotheses for falsification. As such, the workshop participants emphasize that these estimates should not be authoritative for any other purpose than is intended by this process.

In assessing threat according to Mace-Lande criteria, workshop participants also use information on the status and interaction of habitat and other characteristics. Information about population trends, fragmentation, range, and stochastic environmental events, real and potential, also are considered. Most recent CAMP workshops also are applying and testing the new Draft IUCN Red List Categories.

When *ex situ* management is recommended, the "level" of captive program is also proposed, reflecting status, prospects in the wild, and taxonomic distinctiveness. The captive levels used during the CAMP workshop are defined as:

Level 1 (1):

A captive population is recommended as a component of a conservation program. This program has a tentative goal of developing and managing a population sufficient to preserve 90% of the genetic diversity of a population for 100 years (90%/100). The program should be further defined with a species management plan encompassing the wild and captive populations and implemented immediately with available stock in captivity. If the current stock is insufficient to meet program goals, a species management plan should be developed to specify the need for additional founder stock. If no stock is present in captivity then the program should be developed collaboratively with appropriate wildlife agencies, SSC Specialist Groups, and cooperating institutions.

Level 2 (2):

Similar to the above except a species/subspecies management plan would include periodic reinforcement of captive population with new genetic material from the wild. The levels and amount of genetic exchange needed should be defined in terms of the program goals, a population model, and species management plan. It is anticipated that periodic supplementation with new genetic material will allow management of a smaller captive population. The time period for implementation of a Level 2 program will depend on recommendations made at the CAMP workshop.

Level 3 (3):

A captive program is not currently recommended for the conservation of the species/subspecies but is recommended for education, research, or husbandry.

Other captive recommendations include:

No (N):

A captive program is not currently recommended as a demographic or genetic contribution to the conservation of the species/subspecies. Taxa already held in captivity may be included in this category. In this case, species/subspecies should be evaluated either for management toward a decrease in numbers or for complete elimination from captive programs as part of a strategy to accommodate as many species/subspecies as possible of higher conservation priority as identified in the CAMP or in SSC Action Plans.

Pending (P):

A decision on a captive program will depend upon further data either from a PHVA, a survey, or existing identified sources to be queried.

The GCAR workshop process entails considering all relevant data in intensive and interactive discussion involving experts representing the various organized world regions of the zoo and aquarium world. The objectives are systematic decision-making, captive program prioritization, initial selection of global species target population sizes, and identification of regional distribution of each taxon. Second, a determination needs to be made about which species/subspecies and how many individual animals should be included in this global captive program. Target population sizes can be computed using the program CAPACITY 3.

CAPACITY 3

Using the CAPACITY program, global target population sizes can be determined to achieve the captive program goals recommended for a particular taxon. The CAMP and GCAR processes attempt to achieve goal of maintenance of 90% of the population's original founders' heterozygosity for 100 years. Other program parameters to be set and manipulated are:

- generation length
- annual growth rate of the population
- size of the current captive population, and the effective population size
- the estimated Ne/N ratio
- percent diversity retained to date
- current year

General steps for computing global target populations using Ballou's CAPACITY Program 3.0 are:

- 1) Calculate the N by assessing the total number of individuals in captivity (from the ISIS TAG report).
- 2) Estimate the generation length by determining the median between the earliest age of reproduction and oldest age for reproduction, adjusting for decreasing reproduction with increasing age, if applicable.
- 3) Determine the crude lambda value which is the projected growth rate of the population under ideal conditions. If no better data are available, lambda can be estimated as the crude rate of change (CRC) found in the ISIS TAG report. When the CRC value is less than 1.0, it is necessary to artificially increase lambda to 1.1.

4) Determine the Ne (effective population size) as the number of living breeders (LivBr) taken from the ISIS TAG report, unless more accurate data are available.

5) Calculate the NE/N ratio (effective population divided by the total population) by dividing the number of living breeders by the total number in captivity.

6) Consider 100% diversity at the onset of the program, and the current year as 0 unless the population has been in captivity for a period of time and the loss of genetic diversity is known.

7) Using the above parameters, the target populations are computed for different program lengths (50, 100, 150, 200 years). All world target numbers are based on a 100-year management program with 90% retention of heterozygosity.

8) In some cases, it may be necessary to modify the variables of effective population size (i.e., the number of available animals may be too few to establish a viable program, and it will be necessary to plan to import new founders into the management program).

9) Where more accurate information is available (from current international studbooks, for example) those data should be used in place of ISIS values.

10) It is imperative that all details involving the computation of global target populations are documented and included in the final GCAR report. The GCAR spreadsheets are constructed with columns for identification of regions currently holding the taxon and the number of specimens in captivity within that region. Depending on the current captive population distribution and the global target recommendations for the taxon, regional populations targets can then be set by each organized region of the zoo and aquarium community.

There are multiple genetic and demographic objectives affecting the captive population target: some taxa require large population sizes for a long time, whereas others need small nuclei or reduced gene pools that can be expanded later, if needed. One result of the GCAR will be an ability to logically adjust current captive population sizes in various regions, hopefully to better sustain threatened taxa as well as to identify new space available for conserving other species/subspecies receiving insufficient attention.

A review draft of the GCAR report is produced at the workshop. This draft will be distributed by the CBSG to all participants and to TAG chairs and Species Conservation Coordinators for review and final comments before the document is finalized and distributed globally. The intent is to facilitate regional interaction to optimize the use of captive space and resources for international conservation. The GCAR document is a "living" set of guidelines, meaning that it will be reassessed and revised continually based upon new information and needs.

In summary, the GCAR provides the strategic framework for establishing global priorities that, in turn, can be used by all regional taxon advisory groups to formulate, coordinate, and implement effective Regional Collection Plans that together will have a true global conservation impact.

This report was submitted by Onnie Byers, CBSG.

Executive Summary...**Mississippi Sandhill Crane PHVA**

The Mississippi sandhill crane (MSC), an endangered subspecies, has become geographically isolated from other sandhill populations and is in danger of extinction. The objective in the recovery is to reduce the risk of extinction to an acceptable level. Risk is a major concern in endangered species management. A set of tools to quantitatively evaluate risk is available and is included as a part of Population and Habitat Viability Assessment (PHVA). These techniques can improve identification and ranking of risks and can assist assessment of management options.

Eighteen biologists, managers, and decision makers attended a PHVA in Pascagoula, Mississippi on 22-24 September 1992 to apply these recently-developed procedures to the MSC. Such a workshop was first proposed for this subspecies by the U. S. Fish & Wildlife Service (USFWS) Jackson Endangered Species Field Office and was a collaborative effort of the USFWS and the Captive Breeding Specialist Group (CBSG) SSC/IUCN. The purpose was to review data from both the wild and captive flocks as a basis for developing stochastic simulation models. These models provide estimates of risk of extinction and rates of genetic loss for use as a tool in the ongoing management of the subspecies. Other goals included determination of habitat and capacity requirements, role of captive propagation, and prioritized research needs.

The first morning consisted of a series of presentations on the status of the wild and captive flocks. After a presentation on the PHVA process by facilitator Ulysses Seal, CBSG, the participants broke off into three working groups (habitat, health and disease issues, and the captive flock) to review current information in detail, brainstorm, and develop recommendations. Concurrently, Seal developed models initiated with different values of the key variables to estimate the viability of the wild population using the VORTEX software modeling package.

The workshop report includes a set of recommendations for research and management of the wild and captive populations as well as sections on the history of the population, release programs, and the modeling of the population using VORTEX.

The minimum wild population estimate at the time of the PHVA was 108 cranes, 88 of which are captive-reared and released. However, before augmentation, wild population numbers were below 50 with no more than 10 breeding pairs for >3 generations. Because of the small effective population size, potential genetic problems were addressed and evaluated. High reproductive success in the captive flock derived from eggs removed from wild nests indicates no reduction in these traits due to inbreeding. The subspecies has at least two unique alleles and moderate levels of allelic diversity. Detailed analysis of the actual nesting data at the PHVA indicated that the reproductive problem are probably not centered on the crane. Calculated viability and hatchability were well within the limits of other sandhill populations.

Data on the population biology of the MSC for use in population viability modeling were provided by published reports, Jane Nicolich, Jake Valentine, and Scott Hereford.

In the modeling, all adult males were assumed to be available for breeding. The risk of drought and hurricanes as stochastic events were included in the model. Initial population size was set at 150 with an equal sex ratio and stable age distribution. Effects of inbreeding were also included. Carrying capacity was set at 150, as a population of 130-170 birds was considered maximum after intensive habitat restoration. Juvenile mortality (20 and 30%), annual adult mortality (7.7, 8.7, and 9.7%), and recruitment (rates of hatchling production per adult female from 10 to 60%) were varied systematically to see which combinations would produce a viable population, i.e. a positive stochastic growth rate and reduction in risk of extinction to less than 5% in 50 years. Projections were done for 100 years with ten-year summary reports. Each scenario was repeated 500 times.

Under the present 10% fledgling production rate, the risk of extinction is 100% regardless of mortality and inbreeding. For 40% fledgling production rates, the 50-year extinction risk is 5%, but the 100-year risk varies from 5-85%. Even at 50% production rates, all populations with 30% mortality are in decline in spite of no extinctions at 50 years. It is only with 50% fledgling production and 20% juvenile mortality that positive stochastic growth rates are projected. Extinction always occurs in populations with negative growth rates. Fifty-year population sizes are regularly near habitat carrying capacity only at 60% fledgling production.

The models indicate the reproductive and mortality rates that will have to be achieved for recovery. The best chance of recovery has 60% fledgling production, 20% juvenile mortality, and 7.7% adult mortality. The resulting population growth rate is $r = 0.033$ with a zero probability of extinction over 100 years. The management implications are striking. Reducing the current 30% juvenile mortality rate to 20% is an important step toward recovery. As predation is the leading cause of juvenile mortality, increased predator control must be a high priority.

Reproductive rates are another problem, but not as significant as it first seems. Although rates are only 10% now in the wild MSC and 40% in the Florida sandhills, fledgling production in the captive MSC flock is 60% and approaches 50-60% in whooping cranes. Egg and chick loss are the key events in low nest success. Normal productivity in the captive flock, occasional high success years in the wild, and other factors seem to point to extrinsic reasons for nest failure. Here again, enhanced predator control (during nest season) should help.

There is a gradually increasing effect of inbreeding with lower populations, with the effect highest at higher mortality rates. The loss of heterozygosity was estimated at 7-8% even under the best of conditions. This loss is higher than a recommended maximum rate of 5% loss in ten generations.

Until fledgling production attains rates of 50-60%, population augmentation with captive-produced birds will be necessary. However, the number of birds needed to be added to the population each year is far less than previously thought. This replacement number is estimated to be 14 per year. As current production is capable of 40 birds annually, more attention can be given to quality versus quantity. This includes consideration of not releasing heart-murmur birds, and giving special attention to genetic management as this could lead to problems down the road.

Increased crane use off refuge in the last year prompted a number of questions. Are we providing sufficient feeding and roosting habitat? Has the refuge reached carrying capacity? There did seem to be evidence of density-dependent mortality near the Ben Williams release site. Although there currently seems to be many suitable nesting areas not being used, the expectations of a larger number of breeding age birds in the near future due to successful restocking highlights the need for a more rapid rate of conversion of pine scrub habitat to suitable savanna. A detailed review of habitat analysis data at the PHVA identified a number of current and potential areas of mesic and hydric savanna suitable for nesting. Habitat management, especially hand and machine clearing and the effective use of prescribed fire, based on crane response was developed.

There is evidence of an increased parasite problem, particularly at the Ocean Springs release site area. This site has more year-round crane activity than the other two sites. Larger numbers of birds from the recent release site may be intensifying the problem. More crane activity at current release sites may be interfering with initiation of nesting at nearby savannas. Additional release sites (Fontainebeau, East Oceans Springs Unit) should be constructed to alleviate the problem and an alternation of sites be instituted. New release site locations should be selected and constructed to help increase crane use of the areas now on the periphery. Although some productive pairs are probably not affected, lack of activity in some areas may be thus affected.

At the onset of the PHVA there were number of concerns and problems regarding this subspecies, including viability and chance for recovery. After this exercise, it appears that most of the important problems, i.e. predation and habitat enhancement, can be effectively addressed.

Habitat Management Recommendations

- 1) Verify if the 34 existing nesting areas are actually in immediate need of habitat maintenance treatments.
- 2) Prioritize management activities to assure that nesting areas are available in proximity to active or recently inactive nesting areas.
- 3) Establish habitat restoration program for abandoned and potential nesting areas.
- 4) Locate potential nesting territories on the DeSoto National Forest, the Weber Tract, and Jordan Tract. Encourage partnership with the Forest Service and private concerns in implementing habitat management on these tracts.

5) Evaluate feasibility of establishing an experimental population at Grand Bay NWR and/or other sites within the historical range of the MSC.

6) Determine the levels of manpower and costs required to implement above listed recommendations.

7) Assess impacts to species recovery if resources are insufficient to improve and maintain required amounts of habitat.

8) Implement research projects to assess:

- a) Effects of altered wetland hydrology on nesting areas.
- b) Effects of increasing population size on nesting success and utilization of foraging, loafing, and roosting habitats.
- c) Other components of reproductive success, including mating, egg viability, and nest success following the provision of suitable habitat.

Predator Management Recommendations

- 1) Obtain necessary approval for use of leg-hold traps.
- 2) Concentrate control within:
 - a) Half-mile radius of release enclosure several months pre-occupancy and post-release.
 - b) Half-mile of active and recently active nesting areas. Consider control for a period beginning one month prior to nesting and continuing for four months.
- 3) Target coyote, bobcat, and possibly great horned owl. Control methods should be carefully scrutinized to avoid incidental take of cranes.
- 4) Investigate research to radio-tag coyotes.
- 5) Investigate other state-of-the-art predator management, i.e. removal, exclusion, deterrents, etc.

Health Issue Recommendations

Management Recommendations

- 1)
 - a) Reassess policy of releasing birds identified as having a heart murmur (transient or persistent).
 - b) Make decisions on the disposition of heart murmur affected birds dependent on the management needs of the captive flock, e.g. genetic diversity, surrogate rearers, research birds.
- 2)
 - a) Continue development and implementation of protocols for captive flock, pre-release, pre-transfer, and release pen health screening (especially for Disseminated Visceral Coccidiosis [DVC] and *Salmonella*).
 - b) Move release pens regularly to control build-up of pathogens.
 - c) Coccidial infections should be cleared (treated and minimized) from birds before transfer to new captive propagation sites.
- 3)
 - a) Continue intensive necropsy surveillance of all birds dying in captivity and the wild.
 - b) Identify one institution to perform all necropsies or develop a detailed uniform necropsy protocol for all institutions.

Cranes...

- c) Establish a skin/skeleton/tissue/egg bank at the Mississippi Museum of Natural Science, supported by a cooperative agreement between the U.S. Fish and Wildlife Service and the Museum.

Prioritized Research Recommendations

- 1) Heart Defects/Murmurs:
 - a) Quantitative computer analysis of the pedigrees of affected birds to explore the genetic basis.
 - b) Explore diagnostic techniques to better define the heart abnormalities present, elucidate the etiology, and develop optimal techniques for early identification of affected chicks.
- 2) Tumors/Contaminant Exposure:
 - a) Continue ongoing MSC, wildlife, and environmental biomonitoring and surveillance projects.
 - b) Feeding/exposure trials with identified potential toxins (polycyclic aromatic hydrocarbons, aflatoxins) to measure tumor induction, liver pathology, mortality, and reproductive depression.
- 3) Salmonella:
 - a) Screening of eggs, eggshells, nests, and captured birds to determine prevalence of *Salmonella* species.
 - b) Virulence testing of the isolated *Salmonella* serotypes to determine morbidity and mortality for eggs and chicks, and secondarily, effects on fertility.
- 4) Disseminated Visceral Coccidiosis:
 - a) Retrospective study of PWRC necropsy records to explore the relationship between release of captive birds and appearance of DVC in the wild flock.
 - b) Further research on identifying effective coccidiostats (especially if birds remain at PWRC).
- 5) Fractures: Investigate etiologic factors and treatment strategies.
- 6) Exteriorized Yolk Sacs:
 - a) Continue video monitoring of nests to document nest behaviors.
 - b) Investigate the pedigrees of affected chicks.
 - c) Develop a photographic/keyed embryo aging chart.

Recommendation for Captive Flock*Management Recommendations*

- 1) Establish a second captive flock as soon as possible at the Audubon Institute. Develop another captive facility at Noxubee National Wildlife Refuge.
- 2) Leave half the captive flock at PWRC and move other half to Audubon.
- 3) Stage the move to minimize loss of production.
- 4) The PWRC would be designated a parent-rearing facility and Audubon a costume-rearing facility.
- 5) To maintain the wild population at its present level, about 20 birds would be needed for release annually.
- 6) Develop protocols for routine health screening and

disease detection based upon whooping crane recommendations.

- 7) Preserve 50 semen samples from each founder line.
- 8) Establish a second wild flock.

Research Recommendations

- 1) Need further research in germ plasm banking and preservation of ova, embryos, and tissues.
- 2) Faster turn-round in genetic identification.
- 3) Need research on microclimate of wild and captive nests.
- 4) Develop screening techniques for disease prior to release.
- 5) Explore feasibility of pairs raising two chicks in captivity.
- 6) Continue research on development of rearing techniques that result in released birds breeding in the wild.
- 7) Improve artificial incubation of eggs.

This report was taken from the U. S. Fish & Wildlife Sandhill Crane PHVA Report - 1994 (full report is available from the CBSG office).

Hornbill Conservation Assessment and Management Plan

The 54 species of Bucerotidae, or hornbills, are distributed in the old world tropics in two types of habitat - tropical rain forest and savanna. The 30 Asian species are primarily forest dwellers, while the 24 African species inhabit the savanna and woodland. They vary in size from 40-150 cm, but are uniformly colored black and white or brown. Their most vivid color is found on their uniquely-shaped bills and casques, which are also their identifying characteristic. Although often quite large, the casques are made of a lightweight, spongy material. Only the Asian helmeted hornbill (*Rhinoplax vigil*) has a solid casque which was once in great demand as ivory for carvings.

The unusual breeding behavior of the hornbill, in which the female seals herself into the nest cavity, makes them dependent upon large-diameter trees for nesting sites. These same trees, usually dipterocarps, are in great demand for the logging industry. Throughout their distribution, particularly in Asia, hornbills are under tremendous pressure from habitat loss and degradation of the environment.

Hunting is also a threat to hornbill populations. The female is especially vulnerable when she is sealed into her nest. With nest cavities in short supply, competition from other animals makes it even more difficult to find suitable nest sites.

The unusual appearance and large size of most hornbills

make them excellent candidates for flagship species for conservation action. In Asia, they are often the largest avian fruit-eaters in their habitat. Undigested remains, such as seeds, are regurgitated or defecated. There have been several studies over the past decade showing their importance as primary seed dispersers. Their densities also correspond with the level of habitat deterioration making them important indicators of forest health.

Because of hornbills' conspicuous and appealing presence combined with the drastic alteration of their habitat, they are considered keystone species. Some of the endemic island species have very vulnerable populations and mainland species are similarly threatened.

In September of 1991, 49 persons, representing 15 countries, met in Singapore to develop conservation strategies for hornbills. This group was largely self-selected from over 100 individuals invited to attend, but represented field biologists, non-governmental organizations, wildlife and forestry experts, conservation biologists, taxonomists, geneticists, captive managers, and veterinarians. This group attempted to review and refine conservation strategies for hornbills. One outcome of this meeting was the development of a Conservation Assessment and Management Plan (CAMP) for hornbills.

During the workshop, hornbill taxa were reviewed taxon-by-taxon to assign a category of threat and to recommend intensive conservation action. The recommendations contained in the Hornbill Conservation Assessment and Management Plan

document were based only on conservation criteria. This document should serve as a guideline and reference for conservation and management priorities for hornbills worldwide.

For this exercise, 84 distinct taxa (subspecies or species if no subspecies are contained therein) of hornbills were considered. Forty-seven of the 84 taxa (56%) were assigned to one of three categories of threat, based on the Mace-Lande criteria:

Critical	5 taxa
Endangered	13 taxa
Vulnerable	29 taxa

Thirty-seven taxa were assigned to the Secure category, according to Mace-Lande criteria. Thirty-three of the 84 taxa (39%) were recommended for Population and Habitat Viability Assessment (PHVA) workshops. Seventeen of the 84 taxa (20%) were recommended for more intensive *in situ* management. Sixty-three of the 84 taxa (76%) are recommended for research:

Survey	45 taxa
Taxonomic Research	39 taxa
Husbandry Research	4 taxa

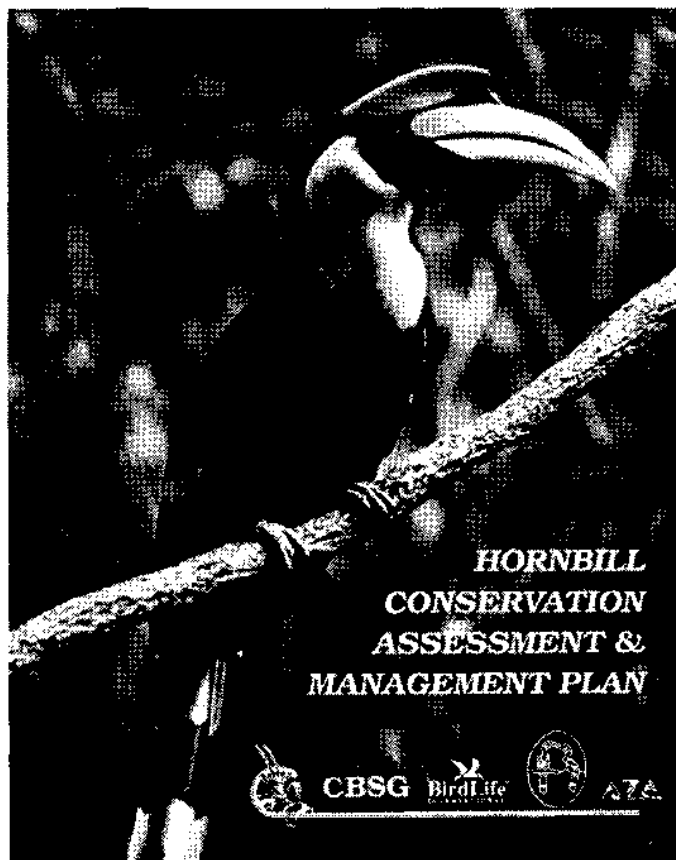
Thirty of the 84 hornbill taxa (36%) were recommended for one of two time frames for development of captive programs (based in part on Mace-Lande criteria):

Intensive program, initiated within 0-3 years	11 taxa
Initiate in the future (>3 years)	19 taxa

However, husbandry techniques are not in place for these taxa at present, and these techniques will need to be worked out with surrogate species.

An additional 13 taxa were not currently recommended for captive programs, but may be reconsidered following a formal Population and Habitat Viability Assessment or when further data or husbandry techniques become available. Twelve taxa were not recommended for captive programs. Copies of the Hornbill CAMP document are available from the CBSG workshop.

This report was submitted by Susie Ellis, CBSG, Chris Sheppard and Wendy Worth, co-chairs of the BirdLife International Hornbill Specialist Group.



Orangutan Population and Habitat Viability Analysis

The first Population and Habitat Viability Analysis (PHVA) Workshop for Orangutan (*Pongo pygmaeus*) was held in Medan, North Sumatra, Indonesia on 18-20 January 1993. The PHVA workshops use computer models (called Vortex) to simulate the deterministic and stochastic, or random, processes that threaten small populations and to explore what effects various management options may produce on the survival of the population. The workshop was conducted by Ulysses Seal (CBSG Chairman) and Ronald Tilson (Director of Conservation, Minnesota Zoo)

Orangutan...

and it was coordinated by the CBSG and the Indonesian Directorate of Forest Protection and Nature Conservation (PHPA). Widodo Ramono (Sub-directorate of Species Conservation, PHPA), Mike Griffiths (WWF-Gunung Leuser National Park), Sukianto Lusli (WWF-Kerinci Seblat National Park), and Jansen Manansang (Taman Safari Indonesia) were the organizers. Close to 40 people, primarily Indonesians and a significant number of orangutan field workers, were in attendance. Sponsors of the workshop included the IUCN/SSC CBSG, Indonesian PHPA, Zoo Atlanta and the Orangutan AZA Species Survival Plan (SSP), Taronga Zoo and the Orangutan ASMP (Australia), and Jersey Wildlife Preservation Trust, U.K.

The workshop focused on the status of wild populations of orangutans on Sumatra and Borneo, with major emphasis on the Sumatran population (*Pongo pygmaeus abelii*). A Sumatran Tiger PHVA Workshop previously held in November 1992 had created a map-linked database that integrated vegetation types, satellite imagery, and land use patterns for the protected areas of Sumatra. The map for Gunung Leuser National Park proved invaluable for developing more precise estimates of the size and distribution of orangutan populations in the park. At the workshop, three working groups were established: Sumatra, Borneo and Life History Characteristics, and Vortex Modeling. The workshop provided a unique opportunity to bring together field workers who have studied, or are presently studying, orangutans at Ketambe in Gunung Leuser National Park (Sumatra). These workers include Herman Rijksen, Jito Sugardjito, Carel van Schaik, Suharto Djojosedharmo, Tatang Mitra Setia, and Sri Suci Utami.

Estimates of habitat and population numbers for orangutans were derived in the working groups through consensus of the field biologists. The estimates for Sumatra were probably more reliable because of the database than they were for Bornean populations of orangutans. For Sumatra, the exact boundaries of orangutan distribution are not known, but there are several distinct populations, including the lesser-known Singkil population and the Sembabala-Dolok Sembelin population. The Greater Leuser orangutan population, which extends beyond the national park boundaries, is thought to cover approximately 11,710 km² and has two distinct populations. Using a correction or "safety" factor to derive population estimates, the western population is thought to number 5,700, and it is the most important orangutan population in Sumatra. The eastern population is thought to number 3,500. Within the more restricted boundaries of Gunung Leuser National Park, the area covered by the western population is 5,570 km² and the corrected population size is about 3,450. The area covered by the eastern population is 2,957 km² and the corrected population size is about 2,400. The total number of orangutans in the park probably is about 5,800. The Greater Leuser populations were judged to be among the best in the world



in terms of numbers and potential for protection and Gunung Leuser National Park was considered to be vital to the long-term survival of the Sumatran orangutan.

Long-term study and familiarity with Gunung Leuser National Park and surrounding areas made possible the identification of specific threats to its integrity, such as road construction and illegal encroachment and logging in lowland areas, and the effects that these threats would have on components of the orangutan population. The following are some of the recommendations made to safeguard the Greater Leuser

population:

- Add forested lowland areas to the park wherever possible (lowland and swamp forests are optimum orangutan habitats).
- Restore the connection between western and eastern populations to create a larger unit to minimize the effects of genetic erosion (the population should be no less than 10,000 to ensure the long-term survival of the species).
- Refrain from building roads dissecting the park.
- Maintain an absolute commitment to protection of the park, establishing buffer zones wherever possible.

A recommendation also was made to continue to keep poaching to a minimum because "the population is known not to withstand any significant poaching pressure."

For Borneo (Kalimantan, Sabah and Sarawak), the known distribution of orangutans comprises eight regions with currently isolated populations. No published or unpublished data are available on population numbers for any of these areas, with the exception of Gunung Palung, Kalimantan, where long-term research is being carried out by M. Leighton. For each region, the area in square kilometers and orangutan density based on habitat type were estimated, again using a correction factor to compensate for the inherent overestimation caused by studies being conducted in lowland prime habitat. An additional 5,000 km² were added to account for regions where significant orangutan populations may occur in unprotected or unidentified areas. The total area of orangutan habitat on Borneo was calculated at 22,360 km² and the estimate of total population numbers ranged from a minimum of 10,282 to a maximum of 15,546. These figures suggest a more serious decline in the Bornean population than was previously thought.

A degree of specificity comparable to that for Sumatra could not be achieved for Borneo in identifying threats to known populations, and an "estimate of impact" of a variety of threats on population survival was calculated instead. The primary recommendation stemming from this exercise was that protection of existing national parks and other protected areas should be improved. At least 60% of the present orangutan populations on Borneo could be protected by implementation of current authority or protection laws. As an adjunct to enhanced enforcement, logging and habitat degradation should be banned in parks

and proposed conservation areas, and funding should be secured for boundary demarcation.

The working group on Life History Characteristics relied primarily on unpublished data collected at Ketambe, Gunung Leuser National Park, and Tanjung Puting National Park, Kalimantan. The orangutan appears to be the ultimate K-selected species, in that survivorship is high, interbirth interval is long (mean = 8 years), and the female makes a high investment in her offspring. Vortex modeling indicated that adult females are the most valuable members of an orangutan population and that the death of an adult female has the greatest influence on increasing extinction rates of all life history variables. Infants in illegal trade may be thought of as representing dead females.

On the last day of the workshop, a comprehensive set of recommendations for the conservation management of orangutans were reviewed, intensively discussed, and consensus was reached. These recommendations covered the following issues:

- Management strategies for orangutans and protected areas occupied by orangutans in Sumatra and Borneo. As stated above, this included stronger protection measures for orangutans and forest, prevention of fragmentation (both species and habitat), and restoration of degraded habitat.
- Reintroduction of captive orangutans into wild populations has no conservation value in terms of enhancing population viability and may even have negative effects through the introduction of diseases or inappropriate genetic subspecies.
- Establishment of new viable populations of ex-captive orangutans in habitat formerly occupied by orangutans, but where they do not now occur, may contribute to the viability of metapopulations.
- Updated recommendations on medical procedures during quarantine for orangutans intended for reintroduction.
- Additional surveys and more comprehensive map-linked databases are needed for Borneo before an in-depth PHVA can be performed for Bornean orangutan populations.

At the request of the Sub-directorate for Species Conservation (PHPA), a series of guidelines concerning the reintroduction of orangutans was prepared. The Borneo Working Group had recommended reintroduction of orangutans into forests without wild orangutans (if possible) to protect/conservate worthwhile forests (production/protection forests). The Sub-directorate was holding approximately 100 orangutans in anticipation of returning them to the wild. The problem of orangutan reintroduction was not addressed by a specific working group at the workshop, but questions concerning the captive population of orangutans (and reintroduction) should be examined at a workshop of the IUCN/SSC Reintroduction Specialist Group.

Following the workshop on 21 January, the Bohorok River Visitor Center in Gunung Leuser National Park was dedicated by WWF-Indonesia to the Directorate General of Forest Protection and Nature Conservation of Indonesia.

Executive Summary...

Asiatic Lion Population and Habitat Viability Assessment

An Asiatic Lion Population and Habitat Viability Assessment (PHVA) was held in Baroda, India on 18-21 October 1993. The workshop was conducted with working groups operating in parallel sessions with several plenary sessions for presentation, review, and integration of the individual reports. Following is a summary of the various working groups' reports:

Habitat

The Habitat Groups assessed the suitability of the following sites: Barda (Gujarat), Sitamata, Darrah-Jawahar Sagar, Kumbhalgarh (Rajasthan), and Palpar Kuno (Madhya Pradesh) for lion translocation using 11 parameters. The sites were assessed on the basis of prey populations (both including and excluding livestock) by the Prey Requirements Group.

The proposed translocation sites were ranked as follows for suitability as a habitat for lions, based upon a synthesis of the results of the above two groups: 1) Palpar Kuno, 2) Sitamata, 3) Darrah-Jawahar Sagar, 4) Kumbhalgarh, and 5) Barda.

Translocation

The Translocation Group outlined a protocol to be adopted prior to the release of the lions and which was drawn up after consulting the guidelines of the IUCN/SSC Reintroduction Specialist Group.

Lion-Human Interaction

The Lion-Human Interaction Group considered all the possible types of interaction between lions and people and analyzed the circumstances and consequences of such interaction. It has strongly recommended the need for population management of lions outside the Gir Forest and the need for an education and awareness program for the people living adjacent to the forest boundary.

Genetics

The Genetics Group described the procedure for identifying hybrid lions. It has also highlighted the urgent need to systematically sample the free-ranging lion population to assess the genetic diversity in the population. Genetic management strategies are suggested, especially for the captive population.

Captive Population

The Captive Population Group has very clearly outlined the objectives of the captive breeding program and also fixed a regional limit on the number of lions that can be held in captivity. Maintaining the purity of the stock of Asiatic lions and retaining the maximum amount of genetic diversity are amongst the major goals identified. This would involve facilitating the integration

Asiatic Lion...

of wild-caught problem lions outside the Gir Forest. All lions would have transponders implanted in them to enable definite identification. A detailed protocol for breeding and husbandry of the lions has also been provided.

Diseases and Veterinary Research

The Diseases and Veterinary Research Group has compiled a comprehensive list of all diseases reported from captive and free-ranging lions and identified areas for research. Some of the surveys for diseases and parasites assume great importance and immediate relevance as these are currently the major threats facing the Gir lions.

Reproduction Research

The Reproduction Research Group has summarized the information available on the reproductive biology of Asiatic lions and identified subjects that need research attention. Detailed outlines and justification have been provided for the proposed research. Emphasis was placed on the need for genome banking to preserve genetic diversity and also on developing artificial insemination techniques as part of the suggested research programs.

**Monitoring and Research**

The Monitoring and Research Group has stressed the need for constant monitoring of the lion population in Gir and also the translocated populations. Maintaining long-term records and intensively studying numerous lion groups using radio telemetry were recommended.

The Workshop participants as a group felt the need for a continuous research program and a permanent research base in Gir. Research on prey species, other carnivores like leopard and striped hyena, and animal habitat relationships have also been recommended.

Ecocodevelopment

The Ecocodevelopment Group looked at a wide variety of possible initiatives which could better the life of the people living in and around the Gir forest and at the same time reduce their dependence on the natural resources of this tract.

Public Education

The Public Education Group stressed the need to educate the population at large of the values of conservation and of endangered species in particular. Various strategies have been outlined in the report.

Reprinted from ZOOS' PRINT, Vol. VIII, No. 12, December, 1993. A report is also available from the CBSG office.

Moth Captive Breeding Program

In 1991 David Hughes, Chairman of The Invertebrate Working Group (a small and wriggly Sub-Committee of The Zoo Federation) contacted English Nature offering the assistance of Federation Zoos with regard to the captive breeding of any species with which they required help. English Nature responded quickly with a request for help with three species of endangered Moths - The Barberry Carpet, Essex Emerald, and Reddish Buff.

English Nature and The Joint Nature Conservancy Committee (both Government Conservation Agencies formerly combined as The Nature Conservancy Council) had jointly funded a program which involved one man, Dr. Paul Waring, who was responsible for effectively saving the moths from extinction in Britain. However, the program could not be funded indefinitely and the large numbers of moths needed to be bred in captivity to make reintroduction feasible were more moths than one man could handle! Two other lepidopterists had originally taken on colonies using different techniques, but these died out after a few generations.

In 1987 the total population of the British sub-species of the Essex Emerald Moth was just eleven caterpillars. The Barberry Carpet Moth was restricted to a single hedgerow in Suffolk. The Reddish Buff Moth was thought to be extinct in Britain but was rediscovered the following year on a site in the Isle of Wight.

The Briefing Session

In March 1992, David Hughes and Ian Hughes met with Nature Conservancy officials in Peterborough and visited the nearby Moth Breeding Center run meticulously by Paul Waring. The following was learned about each of the species of concern:

Reddish Buff (*Acosmetia caliginosa*)

Formerly found at various localities on the Isle of Wight and in Hampshire. Now surviving at only one site on the Isle of Wight where it was rediscovered in 1988. Its decline is due to habitat destruction and deforestation. One generation per year. Larval food plant - Saw-Wort (*Serratula tinctoria*).

Barberry Carpet (*Pareulype berberata*)

Previously widespread in England and Wales as far north as Yorkshire. Now known from only a handful of vulnerable sites. Its decline has been due to hedgerow loss and the eradication by farmers of the Common Barberry. Two generations per year. Larval food plant - Common Barberry (*Berberis vulgaris*), but will feed on *B. ottawensis* and *B. thunbergii*.

Essex Emerald (*Thetidia smaragdaria maritima*)

Previously found in the upper salt marsh zones along the Essex and North Kent coastline. Now extinct in the wild due to

habitat destruction. There can be two generations per year in captivity. The existing population of Essex Emerald *maritima* (a British sub-species) originates from just eleven larvae. Though numbers have now built up to over 600, breeding success has been poor due probably to inbreeding. Larval food plant - Sea Wormwood (*Artemisia maritima*).

Status and Husbandry

All three moths are fully protected under The Wildlife and Countryside Act 1981 and are listed in the British Red Data Book (Insects) as endangered - a category for species which are in danger of extinction unless the factors causing their decline are removed.

The moths are kept on their larval food plant where they breed and lay eggs. The subsequent larvae are then thinned out as their numbers build up, with the surplus being transferred to new food plants where they metamorphose into adults. The adults are thinned out and transferred onto further food plants where they mate and lay eggs.

The larval food plants are kept in 14-inch diameter plastic pots and are covered with terylene nets to keep the moths in and pests and predators out. Most of the work takes place between May and September with virtually no attention required through October to April. The moths are well camouflaged, difficult to count, and can die and disintegrate on the day they emerge. Larvae are almost invisible (often the only evidence is the characteristic leaf damage) and are prone to parasites and predators even in the nets. Pupae are hidden just beneath the litter in the pots and are rarely visible.

The Project Starts

At the meeting in March, it was agreed to outline a cooperative breeding plan with the Invertebrate Working Group by circulating letters to all zoos south of Peterborough (for climatic reasons) asking for assistance in this project. Five zoos have since responded: Dudley, Marwell, Paignton, Pencynor, and Whipnade (this last zoo to join the project in 1994). These establishments and the individuals involved are to be commended for their hard work, enthusiasm, and patience throughout the last year and on into the future. In October 1992, representatives from the participating zoos gathered in Peterborough for a briefing session on the moths and the aims of the project.

The Aims

- 1) The main purpose of the project is to raise captive population levels of the moths as much as possible over the next two to three years.
- 2) By 1994-95, several wild colonies should have been established for each species.
- 3) The long-term aim is to reestablish the species over their former geographical ranges.

The First Year

Each zoo was asked to sign a captive breeding loan agree-

ment as the moths remain the property of English Nature and the JNCC. Each zoo also had to obtain licenses for the species kept. The Barberry Carpet was taken on by Dudley, Paignton, and Pencynor and the Reddish Buff by Paignton and Marwell. The Essex Emerald, due to its precarious situation, was withheld this year.

The Invertebrate Working Group (now Terrestrial, Invertebrate TAG) applied for Species Recovery Program Grant from English Nature and the Zoo Federation was duly awarded £1,087.90 towards materials which was distributed between the participating zoos.

In March 1993, 11 potted plants with pupae were collected from Paul Waring and were disseminated between the participating zoos. Approximately 40 Reddish Buff Moths emerged on 9 May and an estimated zoo population of 200 pupae is now at the mercy of the 1993-94 winter. Approximately 150 Barberry Carpets emerged on 30 April 1993 with an estimated 1,300 pupae now hibernating. Winter mortalities can be high, only half the expected moths emerged this spring.

Further Progress

In June 1993, Rob Colley (Curator of Pencynor Wildlife Park) applied to the Association of British Wild Animal Keepers (ABWAK) for grant aid for the Moth Project. The ABWAK generously donated £100 which is being used to produce an information panel about the moths and the cooperative project. The panel is to be displayed at all the collections involved.

In July 1993, Dr. Paul Waring delivered a further experimental batch of Barberry Carpet Moths to Dudley Zoo and these have been kept in sleeves on Barberry bushes around the site. Breeding has been successful and seven sleeves now hold approximately 80 caterpillars each. Paignton and Dudley are earmarked as release sites for this moth next year.

A release program for the Reddish Buff is already under way in the south of England.

Moths Matter

Moths do not share the popularity of butterflies, They are considered to be pale brown and uninteresting pests that chew

Moth breeding center.



Moths...

holes in clothes. While just a few of the smaller species do enjoy munching the occasional garment (if they are allowed access to it) and some moths are brown - uninteresting pests they are not! For example:

- There are 150,000 species of moths; some microscopic, some 12 inches (300 mm) across the wings.
- Moths are important pollinators.
- They have a significant place in numerous organic and ecological cycles.
- They are an invaluable food source for birds, bats, and countless other insectivorous species.
- They have a tremendous diversity of lifestyles; many species are actually beautiful and all are fascinating if you look closely enough.
- Sadly many species of moths are declining in numbers due mainly to pollution, habitat destruction, and changes in land management.

This project is the first cooperative project between the Federation and English Nature/JNCC. Hopefully it is the beginning of a long and fruitful relationship. The Terrestrial Invertebrate TAG is a sub-committee of the Joint Management of Species Committee which in turn is a committee of the Zoo Federation. This newly-formed group is made up of enthusiastic representatives from a variety of zoos and related organizations. The aims of the TAG are:

- 1) To promote and instigate captive breeding of rare and endangered invertebrates in zoos.
- 2) To serve as a communication forum on invertebrate matters and thus become part of a network between other invertebrate organizations.
- 3) To promote awareness of the vital ecological roles played by invertebrates and the need to conserve invertebrates as important natural resources.
- 4) To support the proper use of invertebrates as educational exhibits in zoos and aquaria.
- 5) To encourage research, particularly into captive husbandry techniques and habitat management.

Acknowledgments

Particular appreciation is given to Dr. Paul Waring for his time, enthusiasm and help in assisting the collection in the development of this project. Thanks also to the staff of both English Nature and JNCC who have smoothed the path through the grant and licensing process. Finally thanks go again to the individual collections and the decision makers within them who have allowed their institutions to become involved in this pioneering project (for the Federation).

Hopefully, this will be just the first of many such projects that the Federation can be involved in to aid these native species from their perilous situation.

This report was submitted by Ian Hughes, Terrestrial Invertebrate TAG.

Invertebrate Taxon Advisory Group Report

The AZA Invertebrate Taxon Advisory Group (ITAG) had two very successful meetings this year. The mid-year meeting was held in Tucson, Arizona from 13-15 August 1993 in conjunction with the Sonoran Arthropods Studies, Inc. (SASI). It was well attended by more than 100 enthusiastic participants. Over 25 papers on captive husbandry of invertebrates were presented. The 161-page proceedings have been published and are available from the Sonoran Arthropods Studies Inc. for a cost of \$20.00. Information includes papers on the husbandry of carnivorous katydids to dinosaur ants.

Steve Prchal, the director of SASI and treasurer of the Invertebrate Taxon Advisory Group is also compiling a list of people wishing to receive the newly-formed ITAG newsletter. Just send \$10.00 to SASI and let him know that it is for the *Spineless Times*. The newsletter is designed to let people know what is happening in invertebrate displays and where meetings and events are taking place. The *Spineless Times* is being put together by Art Evans of the Los Angeles County Museum and Jane McEvoy of Columbus Zoo. It provides a perfect method of communication among invertebrate people in education and displays. The address for SASI is: Sonoran Arthropod Studies, Inc., PO Box 5624, Tucson AZ, 85745 USA.

The annual general meeting took place in September during the AZA National Meeting. At this time, the new executive committee was chosen. For this year the chair persons will be:

- Chair - David Hodge, Louisville Zoological Gardens
- Past Chair - Frank Elia, Day Butterfly Center
- Chair Elect - Sue Kenny, Shedd Aquarium
- Secretary - Jane McEvoy, Columbus Zoo
- Treasurer - Steve Prchal, Sonoran Arthropods Studies, Inc.
- Terrestrial & Freshwater Invertebrate Group Chair - Leslic Saul, San Francisco Zoo
- Marine Invertebrate Group Chair - Stewart Keefer, Baltimore Aquarium

Some of the programs underway with ITAG members include:

- Lesly Saul of the San Francisco Zoo has become involved with an educational program funded by a NSF grant. The basis of the program is to teach elementary school students utilizing living invertebrates in the classrooms. The American Association for the Advancement of Science will also be holding a workshop on invertebrates at San Francisco Zoo during their annual convention.

- Randy Goodlet of the Pittsburgh Zoo and Aquarium and Stuart Keefer of the National Aquarium in Baltimore established another workshop on IATA Shipping Regulations for Corals. The session occurred on 26 February 1994. The reason for this workshop is to develop and to specify shipping techniques for corals to help reduce mortality in transit. A workshop on marine invertebrates in closed systems is being planned for April or

ISIS NEWS



Newsletter of the International Species Information System

July 1994

New Services for Studbook Keepers

• Studbook Keeper Update Report

In May, ISIS mailed a new report to approximately 400 known global and regional studbook keepers. This new "Studbook Keeper Update Report" provides a studbook keeper with whatever update information ISIS has recently received for their taxon. Until now, studbook keepers were provided, on request, with all the data ISIS had ever received for their taxon. The new report should make it much easier for a studbook keeper to check their data against what has recently been reported to ISIS, and perhaps to temporarily fill in some gaps when information has not yet been received directly from a facility. We intend to distribute this update report twice each year, summarizing the first 6 months for the midyear report, and summarizing the full year for the end-of-year report. We hope that this will help improve the efficiency and timeliness of studbooks, which is increasingly critical for the various regional cooperative management programs. Grant support from the Institute of Museum Services (IMS), and the programming work of Steph Porter, made this report possible.

• SPARKS 1.3

A new version of SPARKS is now being distributed. It contains many new features for studbook keepers, including mailing labels, as well as some new features for species management. We hope that this will further assist studbook keepers. SPARKS 1.3 was made possible by grant support from IMS through the cooperation and assistance of Riverbanks Zoo, Columbia SC (notably Bob Seibels and Alan Shoemaker), AZA support, and the systems development work of Paul Scobie.

• Future Services

We are investigating ways ISIS might further assist studbook keepers in meeting the needs of cooperative management programs. A grant proposal has been submitted for 1995 to raise funding for a service that would allow SPARKS users to exchange data both-ways with the ISIS database, similar to the data exchange currently used by the ARKS system. This would permit detection and, hopefully, reconciliation of differences between studbook records and facilities' records. Currently, information only flows from the ISIS database to the studbook keeper, in the form of studbook-like data extracts. The system to be developed would allow studbook data to come back into ISIS as well.

Routing List	
<input type="checkbox"/>	ISIS Rep
<input type="checkbox"/>	Director
<input type="checkbox"/>	Veterinarian
<input type="checkbox"/>	Curatorial Staff
<input type="checkbox"/>	_____



Rearing Data

We have recently become aware that some rearing data on ISIS' central database was lost in mid-1992, due to an error in the program that transferred the database information from the old University mainframe computer to our new system located at the ISIS offices. We're grateful to Laurie Bingaman Lackey for identifying the problem. We expect to distribute soon a utility program that is being developed to allow you to automatically "re-send" this information to ISIS. Thank you in advance for your cooperation.

WINDOWS and ISIS programs

ARKS, SPARKS and MedARKS can all be run under Windows 3.1. We will provide icons on request for these programs. However, some cautionary notes are in order. ISIS has received reports that ARKS 2, when run as a DOS subtask (click on the DOS icon, type ARKS), produces inventory reports with scrambled dates, but will work fine when you click on the ARKS icon directly. Thus far we have been unable to replicate this problem. SPARKS 1.2 will also run under Windows, but is forced by the language it is based upon (FOXPRO-for-DOS) to use conventional memory (below 640K) under Windows. SPARKS 1.3 will run in extended memory under Windows, but you may experience out-of-memory problems when SPARKS "shells out" to run DEMOG or GENES.

ISIS' software could be modified to benefit from the advantages of Windows, however it will require significant re-writing to utilize FOXPRO features that did not exist at the time the programs were developed, and as it competes against adding desirable new features, we are currently unable to commit scarce programming resources to this end.

ISIS 3 Edit/Update Hints for records keepers

We strongly urge you to scan the Edit/Update reports returned to you each time you send information to ISIS. You may find information which will improve your records (i.e. exact specimen birth dates, etc.), and you will want to be aware of any identified problems. It is also useful to double check that all the data arrived at ISIS and was

processed (check first and last specimens). If you experienced a hardware problem during that period and performed a RESTORE, it is possible that some transactions might not have been sent to ISIS.

ARKS 2 has a hidden RESEND feature which is known to most, but apparently not all, users. You find it under System Utilities by selecting option zero (0), which is not listed on the menu. This allows you to re-send to ISIS all the information for the Specimen ID you indicate. We recommend that you do this anytime you receive an Edit/Update report where ISIS rejected the information you sent. Rejection usually happens when, for some reason, ISIS and your ARKS system are "out of sync" for a specimen. Resending the information will help fix the discrepancy. We are beginning work on a new "ISIS Procedures" document which is intended to provide more information on how the current ISIS system works, including how to handle Edit/Update Reports.

Search for the Missing Links

We are now working on a new report for records keepers to point out inconsistencies between institutions who have reported holding the same specimen. For example, if a facility has reported acquiring your specimen #865, but you have not reported a removal (and more than 90 days has elapsed), one section of the report would call this situation to your attention.

Other parts of the new report would highlight specimens where ISIS cannot find or match-up records from both parties to "link" the records into the history of one specimen. Including historical data, about 8% of the specimens in ISIS have such problems. To keep the volume manageable, priority taxa would be selected for the first reports. A feature we plan to add later will identify transactions where only one party has reported a loan.

This report improves on the current ISIS 3 Edit/Update information returned to you with each update you have sent to ISIS and should simultaneously help you maintain complete, accurate records and improve the value of the data sent in to ISIS. The ISIS information is typically the starting place for TAG reviews, new studbooks, etc., so your efforts to improve the quality of the data will have considerable benefits.



This new service, plus instructions and documentation, will be tested by volunteer records staff at several sites and will be put into operation in stages. We expect it will be a few months before the first reports are distributed.

Extra ISIS Abstracts Available

We have a limited supply of the 31 December 1993 ISIS Abstracts. If you or your institution would benefit from a single class volume or an entire extra set, please contact Kim Hastings at the ISIS office by fax or phone.

Get ready for Fall!

Summer is swiftly flying by, so start planning for the Fall conferences. If you need an ISIS dataset extract for this Fall, we suggest you put in your request in mid-August. This will allow time for the mid-year data to be assimilated into ISIS3 and give you the most up-to-date information available.

SPARKS



• Version 1.3 has been released.

This version includes built-in help available by pressing the [F1] key - see the "What's New" topic there for more details. Significant enhancements include: a quick on-screen view of a facility's current inventory; mailing labels and contact name management; enhanced ability to customize pagination, margins, introduction, etc. for formal studbook printing; a greatly expanded list of readily installed printers; the built-in capability to print parts of the ISIS Institution List; a new Demographic Report with useful Crude Demographic Rate parameters; a new generation-counting report called F_{gen} ; the ability to run DEMOG and GENES directly from within SPARKS; and a series of "canned" UDF fields for recording Specimen management decisions is available by pressing the [F8] key.

Repaired bugs include: (1) fixing the DEMOG export file - previously, if a View was set, erroneously inflated values for the number of living specimens in each age class were sent to DEMOG, causing inflated 20 year projections. (2) DEMOG 4.1 now completely overwrites previous data in the spreadsheet with imported data - in past versions short-lifetime species' data did not completely

overwrite previous data in DEMOG, causing incorrect calculation of λ , R_0 , r , and T , as well as anything that utilized these parameters.

ARKS



• ARKS 3

Another ARKS 3 beta test (#6) was distributed to 20 test sites. There are 156 built-in user help topics now in final form, and work is underway on a new User Manual.

• Upgrading to a 486 for ARKS?

If you are planning to move your ARKS system to a 486 (or larger) class computer, contact ISIS for a ARKS 2 486 upgrade disk. The standard ARKS 2 system distributed years ago is incompatible with 486 machines, but we have developed a fix and are happy to send it out when you need it.

MedARKS



• MedARKS 5.0

At long last... RELEASE OF THE CLINICAL NOTES MODULE OF MedARKS!! Distribution of the new FoxPro version of MedARKS has begun, starting with those institutions who volunteered as testers while version 5.0 was being developed. We would like to thank them for their time and effort.

MedARKS version 5.0 is the first version of the software to be written in the programming language FoxPro, which makes MedARKS faster and more powerful. Previous versions were written in the language dBase. As of this time all modules except for Parasitology and Treatments have been converted to Foxpro. Eventually these modules will also be converted to the new format once funding is received. For the time being, you must continue to use MedARKS Version 4.03 for the Parasitology and Treatments modules. MedARKS 5.0 has the capability to run in a network environment and to use a mouse. You will need approximately 25 MB of free disk space.

As a reminder, the **minimum** recommended system requirements for ISIS software are as follows:

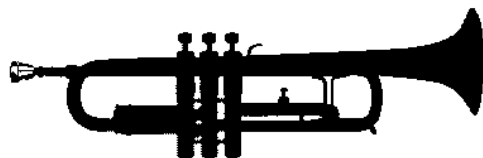
- 386 class or larger Computer
- 120 MB Hard disk
- 4 MB RAM - 8 MB with a Network and/or Windows
- Mouse
- Color Monitor



20th Anniversary

We felt it worth a small note to mention that ISIS' first operational pooled specimen inventory information was assembled during 1974. ISIS has now been operating for 20 years. When the first pooled information was mailed out in May 1975, it covered 3,517 live mammal specimens from 55 mostly North American facilities as of 31 December 1974. The 31 December 1993 reports covered over 201,000 live specimens from 465 member facilities, only half of which are North American.

Somewhat to our surprise, members' own volunteered efforts to assemble their historical information have considerably improved the data ISIS *now* has available for 1974. Re-running the 31 December 1974 Abstracts shows that there were 66,206 specimens living as of that date, of which 37,661 were mammals. Thank you for helping make this information-sharing network grow.



20 Years!!!

Number Crunching

Each month, Larry Grahn, the ISIS3 Systems Coordinator, runs a program which calculates, among other things, the total number of specimens and taxa in ISIS3 and compares these values with the totals from the previous month. To give you an idea of the current size of the ISIS database and of the amount of data being processed, here are the results from 1 July 1994.

Total Number of Animals (living, dead, and removed)	797688
Total Number of Animals, 31 May 1994	790707
Change from previous month's values	+6981
Total Number of Species	5918
Total Number of Species, 31 May 1994	5906
Change from previous month's values	+12
Total Number of Taxa, including subspecies	8351
Total Number of Taxa, including subspecies, 31 May 1994	8332
Change from previous month's values	+19
Total Captive Born Animals	428543
Percentage of Total Number of Animals	53.72%
Total Captive Born Animals, 31 May 1994	424150
Percentage of Total Number of Animals, 31 May 1994	53.64%



May. Randy is also working on collecting field data on levels of UV exposure on corals in the wild. These data will be useful in developing criteria for light in captive situations.

- Frank Elia of the Day Butterfly Gardens is studying the Stock Island Tree Snail (*Ortholythus rese*) as a potential for an SSP. This Florida species is presently extinct in the wild due to impact of development and the introduction of the fire ant. A remaining population exists in one lab in Florida and if the possibility of habitat restoration is planned, it may have all the necessary requirements for the Species Survival Program.

- Ron Goellner of the St. Louis Zoo and the coordinator for the Partula SSP states that the American populations of *Partula* are in a holding pattern for the species represented in North American collections. Roger Klocek and Sue Kenny from the Shedd Aquarium and Dave Hodge of Louisville Zoo will be representing the AZA at the annual general meetings for the *Partula* in London this year.

- David Hodge of the Louisville Zoo is presently working on the captive husbandry of the Moss Mat Tarantula (*Microhexura montiveaa*). This little Diplurid spider is losing ground quickly in the wild. Once captive husbandry techniques are established, specimens will be dispersed for propagation.

- Tom Mason of the Metro Toronto Zoo is working on the captive propagation of the Karner Blue butterfly (*Lyceades melissa samuelis*). Plans are to mass-produce the butterfly at the zoo for re-release into rehabilitated oak savanna in southern Ontario.

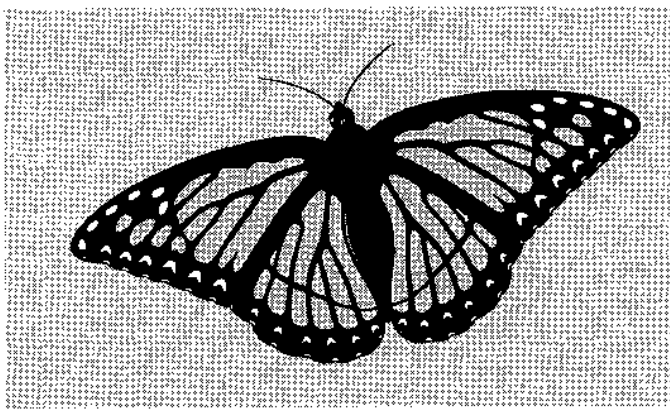
The 1994 time schedule for meetings includes:

- A marine invertebrate workshop on maintenance in closed systems being arranged for April or May of this year (contact Randy Goodlet at Pittsburgh Zoo or Stuart Keefer at the National Aquarium, Baltimore);

- The second semi-annual ITAG meetings in Tucson at the Sonoran Arthropods Studies, Inc., from 28-31 July 1994 (note that both terrestrial and marine invertebrate papers are given).

- The annual general meeting for ITAG will be held in Atlanta in conjunction with the AZA Annual Conference in September.

This report was submitted by Tom Mason, Metropolitan Toronto Zoo.



CBSG India Report...

PHVA and Mini-CAMP Workshops in India

The end of 1993 and beginning of 1994 was full of conservation workshops utilizing the tools and processes of the Captive Breeding Specialist Group as organized by Zoo Outreach Organization/CBSG, India in collaboration with the Forest and Wildlife establishments in the central and state governments in India.

The objectives of holding so many Population and Habitat Viability Assessments (PHVAs) in such a short time were:

- 1) to focus on three critically-endangered species,
- 2) to acquaint as many zoo and wildlife persons as possible with the science of small population biology and its application in practical conservation;
- 3) to acquaint zoo and wildlife persons with the innovative methods developed by CBSG (e.g., PHVAs and CAMPs) as aids in decision-making;
- 4) to bring together the *in situ* and *ex situ* field, research and non-governmental office (NGO) conservation programs; and
- 5) to foster discussion of global breeding programs of Indian species and their relevance to Indian conservation.

The major activities, e.g., PHVAs and "mini" Conservation Assessment and Management Plans (CAMPs), took place in Madras, Baroda and Jaldapara.

A series of regional and CBSG meetings took place before the PHVAs for the southern and the western regions. These were held following Regional Species Coordinators meetings conducted by the Central Zoo Authority and calling all the southern and western area zoo directors.

The Southern area meeting was presided over by Mr. S. C. Dey who discussed the role of zoos and the need for systematic programs if they were to play a role in conserving endangered Indian wildlife. He stated that programs which involved reintroductions using animals from outside of India should be considered with great caution.

The southern and western regional CBSG, India meetings were conducted as mini-CAMPs by Dr. U.S. Seal, utilizing comprehensive lists of regional species which had been compiled by the India office from a variety of sources, most notably Ranit Daniel's list from the south and a list taken from Prater assembled by Ravi Chellam. Thirty to forty persons participated enthusiastically in each mini-CAMP, working well into the evening. The resulting documentation will be published as a preparatory working exercise in anticipation of a larger exercise to be held in the future.

Manipur Brow-antlered Deer PHVA Draft Review

There was a meeting following the CAMP in Madras to review and finalize the Draft of the Manipur Brow-antlered deer PHVA, which was held in Mysore in October 1992. The meeting

CBSG India...

was chaired by S. C. Sharma, member secretary, Central Zoo Authority assisted by Dr. U. S. Seal. A detailed discussion was held about what action should be taken in the coming year with regard to *in situ* and *ex situ* populations for recovery of this critically-endangered species. The problems of loss of heterozygosity due to drift in the wild population and of genetic diversity in the captive population were reviewed. As the captive population is not likely to have retained more than about 3% of the genetic diversity present in the wild population, it was felt that import of genetic material from the captive population to the wild population would not be of any value. Moreover, the captive population as presently composed would not be the ideal source for establishing new populations; founders from the wild population would provide the broadest genetic base for this purpose. Priority must be given to the selection of alternative habitats and establishment of multiple populations in order to expand the gene pool and provide protection against catastrophic events. In addition, the captive population requires genetic supplement from the wild population if it is intended to provide representation of the wild gene pool as a safeguard against extinction. The present two lineages in captivity may be crossed with productive results and this should be done immediately. The issue of tuberculosis (TB) in the herd needs to be addressed with a disease-free herd set up and measures taken to extinguish and prevent TB in the existing herds.

Lion-tailed Macaque PHVA

The Lion-tailed Macaque PHVA, hosted by the Arignar Anna Zoological Park and the Forest Department of Tamil Nadu was held in conjunction with the 4th International Symposium of Lion-tailed Macaque with nearly 100 representatives from the lion-tailed macaque range state's wildlife establishments, zoos throughout India, other Indian scientific and research institutions, Indian NGOs, and several representatives from around the world, particularly the LTM SSP. The AZA LTM SSP Zoos, the San Diego Zoo Friends, British Airways Assisting Nature Conservation, and the Banham Zoo contributed financially towards the workshop.

The lion-tailed macaque is a primate endemic to the mountain ranges of three south Indian states. An estimated 3000-4000 LTMs in groups varying from six to several dozen remain in about two dozen isolated and fragmented areas. Inbreeding and vulnerability to chance events make this species highly endangered despite its relatively large size. The captive population in Indian facilities needs coordinated management. The global captive population outside of India has been managed efficiently and is stable.

Recommendations for effective *in situ* management included:

- 1) surveying all rainforest patches in the LTM range for size, contiguity, and status of LTM;
- 2) enhanced protection to all habitats holding viable populations;

- 3) research for determining carrying capacity of patches and pathology in the population;

- 4) implementation of "ecodevelopment" projects for tribal and rural populations in and adjacent to LTM areas; and

- 5) educational and publicity campaigns for LTM and management of captive population for maintenance of genetic diversity. A Global Animal Survival Plan (GASP) was also held which laid out preliminary strategy for a long-term captive plan for LTM which included establishment and assigning of minimum population goals to different regions with appropriate founder representation, establishment of genome banks within range states, compilation and distribution of an LTM husbandry manual, formation of a GASP committee, and development of a masterplan to achieve goals of the GASP.

Indian/Nepali Rhino PHVA

An Indian/Nepali Rhinoceros PHVA was held in November 1993 in Jaldapara, West Bengal hosted by the Forest Department of W. Bengal, supported by the Asian Rhino Specialist Group which held a full meeting concurrently. The Indian rhinoceros numbers about 1900 with 400 in Nepal and the remainder in seven major areas in India, inclusive of the reintroduced populations in Dudhwa National Park. Although the Kaziranga National Park population numbers more than 1000, there has been increased concern about poaching in Kaziranga and even protected areas with smaller populations. The workshop was attended by 69 persons, including representatives from the Ministry of Environment and Forests, Government of India, the Indian Forest Departments of the three range states, Indian zoos holding rhinoceros, and NGOs from India and members of the AsRSG, Rhino SSP, IUCN, and International Rhino Trust.

The Population/Habitat Group figured population parameters varying from 30-60% of estimated carrying capacity. Growth rate was relatively less than mortality rate due to a high degree of poaching. Flooding and grazing were other significant factors. The Translocation/Reintroduction Working Group suggested means for strengthening non-viable populations and they laid down parameters for establishing new populations by reintroduction. They stressed selection of "preferred" areas once inhabited by rhinos where:

- 1) the cause of extermination had been eliminated;
- 2) where the carrying capacity was sufficient for more than 100 rhinos;
- 3) where the strictest protection was carried out; and
- 4) where there was a management plan and adequate infrastructure.

The Captive Breeding group made specific recommendations for pairing single animals, suggesting that surplus males could be used for reintroduction research. Recommendations for research into specific disease problems were made. The First Indian National Studbook for the great Indian one-horned rhinoceros was published and distributed at the workshop.

The Studbook Keeper for Indian Rhino is the Allen Forest Zoo in Kanpur; the Kanpur Zoo provided the data which were keyed into SPARKS at the Zoo Outreach Office.

Species Survival Commission (SSC) Triennial Report: 1991-1993

Mandate

The mission of the SSC is to conserve biological diversity by developing and executing programs to save, restore, and manage wisely species and their habitats. The mission has been addressed by providing leadership with respect to the following five goals: 1) to assess the conservation status of species worldwide; 2) to assess conservation priorities for species and their habitats and to develop plans for their conservation; 3) to initiate the actions needed for the survival of species; 4) to develop and promote policies for species conservation; and 5) to provide an expert resource network on the conservation of biodiversity.

Structure and Membership

During the 1991-1993 triennium, the SSC was structured as follows:

Chair and Steering Committee. The overall direction and policy-setting of the Commission was carried out by the Chair and the Steering Committee, which has 24 members from 20 countries, including the Deputy Chair, Senior Vice-Chair, and the 12 Regional Vice-Chairs.

Regional Members. The SSC has almost 600 regional members, typically senior figures in wildlife conservation and management from both government agencies and non-governmental organizations, constituting part of the delivery mechanism for the technical recommendations arising from the Specialist Groups.

Specialist Groups. The SSC has 100 Specialist Groups (36 on mammals, 16 on birds (shared with BirdLife International and IWRB), ten on reptiles and amphibians, five on fish, six on invertebrates, 21 on plants and six inter-disciplinary (covering captive breeding, trade, re-introductions, sustainable use of wild species, veterinary matters, and invasive species). The following new Specialist Groups were formed during the triennium: Pangolins, China Reptiles and Amphibians, Madagascar Reptiles and Amphibians, South American Reptiles and Amphibians, Sharks, Sturgeon, Orthopteroid, Water Beetles, Waterbirds, Pheasants, Partridges/Quails/Francolins, Megapodes, Pigeons and Doves, and Bryophytes. The former African Elephant and Rhino Specialist Group was divided into two, covering the African elephant and the African rhinos respectively. The SSC also established two Task Forces during the triennium to link the work of the various taxonomic groups: Plant Conservation, and Invertebrate Conservation and a third on the problem of Declining Amphibian Populations.

Cooperating Organizations. The SSC includes 111 Cooperating Organizations, in recognition of the logistical and financial assistance that many of them provide, and as a mechanism for delivering conservation action based on the recommendations of the Specialist Groups.

Members Emeritus. The SSC has 90 Members Emeritus, who have served the Commission in the past but who have stepped down from active day-to-day service. In addition, there is a small and prestigious Roll of Honor, reserved for distinguished individuals who have made major contributions to species conservation in general and to SSC in particular.

Overall, SSC has about 5,000 members in 176 countries and territories. The membership has doubled during the triennium.

The SSC Program is managed at a global level from the following four offices: 1) IUCN Headquarters in Gland, Switzerland (responsible for program management and administration); 2) the SSC Chairman's Office in Chicago, United States (responsible for financial development, editing and production of Species newsletter, and direct support to the Chair); 3) the office of the Captive Breeding Specialist Group in Minneapolis, United States (responsible for the Commission's program of workshops on species population viability and conservation assessment, and not just captive breeding); and 4) the office of the Trade Specialist Group in Cambridge, United Kingdom (responsible for SSC inputs to CITES). During the triennium, SSC obtained its first-ever staff support in regional offices: East Africa (1992); and South America (1993).

Activities and Achievements

Planning for Species Conservation Action

Fourteen SSC Action Plans were published or completed during the triennium: Australasian Marsupials and Monotremes, Asian Insectivores and Tree-Shrews, Old World Fruit Bats, Lemurs of Madagascar, Procyonids, Cats, Seals, Pigs/Peccaries/Hippos, Zebras/Horses/Asses, South American Camelids, Parrots, Crocodiles, Swallowtail Butterflies, and Palms. It is particularly gratifying to see the first Action Plans appearing on plants, invertebrates and birds, and this trend is likely to continue in the next triennium. In addition, four Action Plans were being updated during the triennium: African Primates (second edition), Cetaceans (third edition), African Rhinos (second edition), and Asian Rhinos (second edition). A further 25 Action Plans are currently being written (including Bears, Deer, North African and Asian Antelopes, Wild Sheep and Goats, Pheasants, Cranes, Marine Turtles, Freshwater Fish, Coral Reef Fish, Dragonflies and Damselflies, Milkweed Butterflies, Molluscs, Ferns, and Cacti and Succulents. An additional 25 are in the concept stage. Much of this work is being supported by the Peter Scott IUCN/SSC Action Plan Fund, and by other donors.

A major analysis of the effectiveness of the implementation of the Action Plans produced so far was carried out during 1992. The results showed that a very large amount of implementation has taken place (amounting to several million dollars of projects), though in some cases it was not clear whether or not the Action

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Plans themselves had stimulated this. Implementation of the Action Plans has been uneven, with some Specialist Groups being much more successful than others. Several lessons have been drawn from this that are being fed into SSC's strategic planning exercise. It is likely that implementation will be enhanced by placing staff in regional offices to ensure that SSC recommendations are combined into broader biodiversity initiatives. It is clear that the Action Plans themselves have provided a very useful yardstick against which to determine the extent to which conservation activities are addressing regional and global biodiversity priorities.

Certain high profile Specialist Groups employed staff to work with them to promote Action Plan implementation and to assist in other Group activities. During the triennium, these staff worked with the following Specialist Groups: Canids, Cetaceans, African Elephant, Asian Elephant, Crocodiles, Tortoises and Freshwater Turtles, Captive Breeding, Re-introductions, Trade, and the Task Force on Declining Amphibian Populations.

In 1993, SSC took over the Centers of Plant Diversity project from the former Plants Program. This vast summary of the distribution, status and conservation of the world's plant biodiversity will be published soon, and will be an unparalleled reference work for plant conservation. It will also lay much of the groundwork for SSC's regional plant Action Plans.

Responding to alarms from the herpetological community that unexplained declines in amphibian populations were occurring around the world, the SSC established the Task Force on Declining Amphibian Populations. During the triennium, the Task Force established a network of 1,200 researchers around the world with 70 separate regional working groups in 30 countries. The Task Force has stimulated public interest in the problem of amphibian declines, gathered data to understand the causes and extent of declines better, has supported fieldwork to address particular problem areas, and published a quarterly newsletter to keep the network informed.

During the triennium, the SSC started a new program of Conservation Assessment and Management Planning (CAMP) workshops as a support to the Action Planning program. The CAMP workshops were held on Australasian marsupials and monotremes, primates, canids and hyaenas, mustelids (including otters)/viverrids/procyonids, cats, rhinos, deer, antelopes, wild sheep and goats, penguins, waterfowl, pheasants/partridges/quail/megapodes, cranes, pigeons and doves, parrots, hornbills, Hawaiian forest birds, iguanid and varanid lizards, and threatened plants of St Helena. The CAMP process reviews the wild and captive status of all species in the taxonomic group under consideration. This information is then used as a basis for planning (either for starting an Action Plan by a Specialist Group, or redeveloping an existing one).

The CAMP workshops also provided the basis for the following global captive breeding action plans that were developed by the Captive Breeding Specialist Group: primates, cats, rhinos, deer, and antelopes.

Population and Habitat Viability Analysis (PHVA) workshops were carried out on the following species: cotton-top tamarin, Tana River red colobus, Tana River mangabey, lion-tailed macaque, orang utan, African wild dog, Sumatran tiger, Indian lion, baiji, black rhinoceros (Kenya population), Indian rhinoceros, mountain zebra, Manipur brow-antlered deer, yellow-eyed penguin, fjordland crested penguin, Snares crested penguin, erect-crested penguin, rockhopper penguin, royal penguin, waldrapp ibis, Edwards' pheasant, Mississippi sandhill crane, whooping crane, pink pigeon, kea, kaka, Spix's macaw, Kirtland's warbler, Aruba Island rattlesnake, and the Karner blue butterfly. In 1992, a special workshop was held to assess the possibility of extending the PHVA process to plants, and it was agreed that certain adjustments in the overall approach would first need to be made. The PHVAs use computer models to explore extinction processes that operate on small and often fragmented populations of threatened taxa, and examine the probable consequences for the viability of the population of various management actions or inactions. As a result, a coherent recovery plan is developed. The PHVA workshops are held with responsible management agencies, field conservationists, and conservation biologists. The SSC uses a PHVA computer program termed VORTEX (developed by the chief geneticist of the Chicago Zoological Society, the SSC Chair's home institution). The first users manual of VORTEX was produced during 1992.

The SSC continued to follow-up and promote the implementation of recommendations arising from some PHVA workshops carried out in the previous triennium. These include the Florida panther, the black-footed ferret, and the Javan rhinoceros. With respect to this last species, the SSC, in collaboration with the Indonesian Government, convened a workshop in October 1991 to develop an overall conservation strategy for both it and the Sumatran rhinoceros in Indonesia. This meeting was of particular importance in building bridges between disparate wings of the conservation community, and establishing consensus on the priority actions ahead for both species. After considerable internal debate in Indonesia, the Government adopted the strategy, and it was presented at the UNEP-sponsored rhino conference in Nairobi in June 1993.

The SSC organized three workshops at the IVth World Congress on National Parks and Protected Areas: "Management of Small Populations of Wild Species in Protected Areas"; "Re-introductions and Introductions in Protected Areas"; and "Species Research in Protected Areas". Each of these produced clear guidelines for follow-up. These include preparation of manuals for protected area managers on key species conservation issues. The SSC also helped to organize the workshop on "Sustainable Use in Protected Areas", which has contributed to the guidelines on sustainable use of wild species.

Developing a Global Database on Species Conservation Status and Needs

This activity is a collaboration between SSC and the World Conservation Monitoring Center (WCMC). At present, the

program is still mainly in the planning stage, though work has started on developing standard taxonomies and transfer formats. The aim is to develop a network of databases, both among SSC Specialist Groups and at a national level, that can interact and exchange data with each other and with the central repository at WCMC. Three such databases already exist within the SSC: African Elephant, Asian Elephant, and Coral Reef Fish. Considerable work has been carried out on exploring how the African Elephant Database can be integrated in a larger database network.

A program of activities focused on building this network has been planned as part of the workplan, and significant advances are expected during the 1994-1996 triennium.

Development of Policies and Guidelines Pertaining to the Conservation of Species

The SSC took the lead in developing IUCN's policies on a number of key issues during the triennium. The IUCN position statements were prepared for each of the annual meetings of the International Whaling Commission. In general, the statements called for the adoption of the Revised Management Procedure, but also for a continuation of the whaling moratorium and the establishment of whaling sanctuaries. The SSC also took a high profile in policy development during the CITES Conference of the Parties held in Japan in March 1992. Policies were developed on: the African elephant (for the CITES Conference, in which we called for a continuation of the ivory moratorium, but also for opening of trade in other elephant products from certain southern African countries); rhino horn (in which we called for a continuation of the international trade ban, but also for studies on the possible effects of eventual trade resumption); the Atlantic bluefin tuna (in which we called for the placing of the West Atlantic population on Appendix I); and tropical timber trade (we called for several timber species to be added to the CITES Appendices). As regards the rhino horn trade, the African Rhino Specialist Group commissioned a number of studies in conjunction with TRAFFIC on the possible negative and positive impacts of resuming a legal trade.

In January 1992, the SSC convened a workshop to examine the criteria for listing species on the CITES Appendices. As a result of this, the Parties established a mechanism for revising the criteria at the CITES Conference in Kyoto. The IUCN was subsequently contracted by the CITES Secretariat to carry out the technical work in developing the criteria, and a workshop was held in November 1992. This workshop developed a new system for both the IUCN Categories of Threat for species, and also for the CITES listing criteria. From SSC's perspective, the initial work on the CITES listing criteria was completed in March 1993, and it has been submitted to a thorough review process by CITES Parties, on which SSC continues to advise informally. Also in March 1993, the draft new criteria for IUCN's own categories were completed, and went out for review by the entire SSC network. Further changes will be made as a result of this review, after which they will be sent to all IUCN members for comment. The review by SSC has included testing out of the criteria to

determine whether they are practical, robust, suitable for all taxonomic groups, and discriminate sufficiently between different levels of threat. This SSC also carried out tests of the CITES criteria, and the results were made publicly available. In early 1993, the SSC was contracted to explore the possibilities for applying these criteria to assessing stocks of timber species within the framework of the International Tropical Timber Organization (ITTO).

The Specialist Group on the Sustainable Use of Wild Species, in conjunction with the IUCN Sustainable Use of Wildlife Program, has been working through most of the triennium on the draft IUCN Guidelines for the Sustainability of Nonconsumptive and Consumptive Use of Wild Species. The first draft was prepared for the Caracas workshop in February 1992. This workshop resulted in the second draft, that was then circulated to the entire IUCN membership and all SSC Specialist Groups. A very large response resulted that was then built into the third draft, which was submitted to the SSC Steering Committee and a few other experts in November 1992. Minor comments are now being incorporated into a fourth and then a fifth draft that was adopted by IUCN Council as IUCN policy in May 1993. More detailed sets of guidelines on sustainable use will follow this, and one set on the ethical aspects of wildlife use is already well advanced (as a collaboration between SSC and the IUCN Commission on Environmental Strategy and Planning (CESP).

The SSC is also working on re-introduction guidelines as a follow-up to the IUCN Policy Statement on the Translocation of Living Organisms. A new statement is also being prepared on the return of confiscated specimens of species to the wild. The SSC continues to review applications to establish international studbooks for captive populations of threatened animal species, and carried out a thorough review of the draft Global Zoo Conservation Strategy, prepared by the International Union of Directors of Zoological Gardens (IUDZG). In 1991, the SSC started a new program on animal genetic resource banking, under the auspices of the Captive Breeding Specialist Group.

In June 1992, the SSC in collaboration with CNPPA and COE organized a workshop, entitled Beyond Hotspots, in London on evaluating biodiversity conservation priorities. Among the recommendations arising was the need for SSC to collaborate with WCMC and ICBP to promote a major GIS species mapping project. The rationale was to make biodiversity-related data which is often held in developing countries available to managers and users in the developing world.

A proposal along these lines was submitted to Global Environment Facility (GEF), but was not successful in the fourth tranche. This proposal is now being broken up into regional components, and priority is being given to developing a module in the East African Region, as part of the process to support the emerging national biodiversity units in each country within the region.

The SSC has started to collaborate with the IUCN Social Policy Program to broaden the PHVA VORTEX program to include human demographic and social concerns. This activity will be pursued further during the next triennium.

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The SSC analyzed all the proposals to amend the Appendices of CITES and provide the results as impartial reviews. These were circulated to all CITES Parties in three languages. A third edition of CITES: A Conservation Tool was published in 1992 before the CITES Conference. This booklet provides information to governments and non-governmental organizations (NGOs) on how they can use CITES more effectively.

The SSC has also continued to support the CITES Significant Trade Program, reviewing the status of species on Appendix II subject to heavy levels of trade. A major review, carried out by the SSC network, of the animal species on CITES Appendix II that are subject to significant trade, was coordinated by the Trade Specialist Group in 1991. This was submitted to the CITES Animals Committee and has resulted in some changes to the CITES Significant Trade list. It has also resulted in some field projects, described in the next section. The SSC participated in meetings of both the CITES Animals and Plants Committees and has maintained regular meetings with the CITES Secretariat.

The SSC provided technical input to the annual meetings of the Standing Committee of the Berne Convention and also attended a number of the specialized workshops held under this Convention. The Commission represented IUCN at the Conference of the Parties to the Convention on the Conservation of Migratory Species in 1991. The Commission has continued to provide technical support to WWF in terms of screening species-related proposals, providing supervision of ongoing field projects, and advising on species-related policy issues (in particular in relation to CITES). A major joint program of IUCN and WWF is the trade-monitoring network, TRAFFIC, and SSC has interacted very closely with TRAFFIC throughout the triennium, in particular on ivory trade, rhino horn trade, and the wild bird trade. Links were established for the first time with the National Wildlife Federation, and a joint project was launched in Vietnam and Cambodia.

The SSC has continued to serve as a major advisor to governments and inter-governmental organizations of species conservation issues. The SSC Chair has acted as a formal advisor to several aspects of the environmental program of the World Bank. The SSC Specialist Groups have maintained close links with professional and academic societies within their spheres of interest.

The SSC has provided representation for IUCN on various inter-organizational agreements during the triennium, notably the African Elephant Conservation Coordinating Group (AECCG) and the Planning and Coordinating Committee of the UNEP-sponsored Marine Mammal Action Plan. The AECCG catalyzed the UNEP-sponsored range states and donors conference on African elephant conservation which was held in Nairobi in January 1992 and which resulted in significant new resources being promised. The SSC also participated actively in the UNEP-sponsored meetings on rhinoceros conservation, aimed

at securing additional resources to safeguard these critically threatened species.

Supporting Field Projects

The SSC Program is not designed to implement field projects, but rather to provide technical support to projects being carried out by others. The SSC Specialist Groups catalyze large numbers of field projects around the world, in particular as a result of the Action Planning program. One set of projects that SSC does manage is those that are in support of the CITES Significant Trade Program, evaluating the biological status of species listed on Appendix II that are subject to significant levels of trade. The aim of the program is to determine whether or not such trade levels are managed to ensure that harvesting is sustainable, and to make subsequent recommendations. Projects have been carried out on the red-vented cockatoo in the Philippines, various parrot species on Obi and Bacan in Indonesia, on the pancake tortoise in Tanzania, and on Fischer's lovebird in Tanzania. In the Philippines, our project resulted in the species being listed on CITES Appendix I. In Indonesia, the project resulted in a workshop in 1993 to discuss trade management, and we hope that changes to the management of the use of these species will be brought into effect. Recommendations for major changes in the trade management of the pancake tortoise were also made. The final results of the Fischer's lovebird survey are still awaited. New funding proposals for Significant Trade Surveys have been written for several species, including various parrot and pigeon species in Indonesia, and pangolins in Malaysia.

Other projects with which SSC has had very close involvement include: the development of a marine turtle conservation program in Aru in Indonesia; surveys to find kouprey in southern Laos (unfortunately unsuccessful) and a number of other highly threatened species in Vietnam and Cambodia (through a joint program generously funded by the National Wildlife Federation and WWF); and development of a program for the conservation and sustainable management of saiga antelope in the Autonomous Republic of Kalmykia in the Russian Federation.

Development and Management of the SSC Network

Considerable efforts were devoted during the triennium to strengthening SSC Specialist Groups. Grants totaling some SFr 400,000 were made from the Peter Scott IUCN/SSC Action Plan Fund (established by the Sultanate of Oman), to Specialist Groups to enhance their efforts, in particular in relation to Action Planning. Other funds for Specialist Group support were secured from a wide variety of donors, resulting in an ever-increasing level of activity in the network. The SSC has supported financially the Specialist Group Officer of the BirdLife International (ICBP), and considerably increased effectiveness has been observed among the bird Specialist Groups. A new, large Waterbird Specialist Group has been formed jointly by the International Waterfowl and Wetlands Research Bureau (IWRB), SSC, and BirdLife International, with IWRB taking the lead. The SSC provided financial support to IWRB to enhance the work of this Group.

Many SSC Specialist Groups met once or more during the triennium, including the following: Asian Elephant, Asian Rhino, African Rhino, African Elephant, Crocodile, Wolf, Seal, Indian Subcontinent Reptile and Amphibian, European Reptile and Amphibian, Marine Turtle, Odonata, Mollusc, Orchid, Cactus and Succulent, Cycad, and Captive Breeding. Many of these meetings, especially of the Groups that meet regularly, have become of critical importance in developing priorities and policies for the species concerned.

When IUCN's plant conservation office in Kew, U.K. closed at the end of 1992, the SSC took the lead for the Union on plant conservation activities. In October 1992, interviews were held for a new headquarters-based Plants Program Officer, and the successful candidate took up the position in February 1993. The first task of this officer was to review and re-develop IUCN's and SSC's work on plants, and the result will be a fully integrated program on plant conservation for the next IUCN triennium.

In early 1992, new terms of reference were developed and approved for the five SSC inter-disciplinary Specialist Groups: Captive Breeding, Re-introductions, Sustainable Use of Wild Species, Trade, and Veterinary. These terms of reference provide increased focus to the activities of each of these groups (all of them being very active) and prevent duplication of work. A very important new group, on Invasive Species, was established in 1993.

There was an initiative to increase the strength of the SSC regionally, providing a means to ensure more effective delivery of the Commission's work on the ground. A joint SSC-CNPPA officer was placed at the IUCN South American Regional Office in Quito in 1993. A staff officer to work on SSC affairs as part of a biodiversity program was appointed to the East African Regional Office in July 1992. These new initiatives are part of a longer-term program to achieve more effective networking in the Commission at regional and national levels.

The SSC Steering Committee met four times during the triennium to apply its wide diversity of experience to the SSC mission and program. It approved the annual SSC Program and the related staff workplans, and reviewed progress annually. In a major development, the Steering Committee started a Strategic Planning process for the SSC that took both the IUCN Strategic Planning process and the external review of the Commissions into much greater depth within the Commission. A special strategic planning meeting was held in May 1993, and the final plan is now being prepared for implementation starting at the beginning of the 1994-1996 IUCN triennium. Through the second half of 1992 and early part of 1993, SSC interacted closely with the IUCN Commission review team, and comments were provided on their interim report.

A regional meeting of the SSC was held in Caracas on 22-24 February 1992, at which two main topics were discussed: improving SSC's networking in South America; and developing the joint SSC/CNPPA Regional Biodiversity Assessment for South America. A second draft of the Assessment, which contains a biodiversity profile for each country, was produced in April 1992 and sent to over 700 people for critical comments (and

was also discussed at the IUCN South American members meeting in Brazil in September 1992). These comments were then edited into the document to form a third draft that will go into the final review and approval process, prior to adoption at the SSC meeting scheduled for Buenos Aires in January 1994.

At the IVth World Congress on National Parks and Protected Areas, the SSC Chair awarded the Peter Scott Award for Conservation Merit to the Instituto Biodiversidad de Costa Rica (INBio). Other awards will be made in Buenos Aires in 1994.

Enhancing Communications on the Work of the Program

For the first time to enhance internal communications in an increasingly large network, the SSC produced *SSC: A Members' Guide*, available in English, French, and Spanish. This is given to all members when they join the Commission, and it briefs them on the work of IUCN, SSC and the Specialist Groups. Also as part of the internal communications, six issues of the SSC Newsletter, *Species*, were produced and circulated to all SSC and IUCN members. Over 30 Specialist Groups produced newsletters during the triennium, each of which was widely circulated. The triennial Directory of SSC Members was published in 1993 and circulated to all SSC and IUCN members.

As regards external communications, the Cetacean Red Data Book (Whales, Dolphins and Porpoises of the World) was published in 1991, and this has proved to be enormously useful as the standard reference on the subject. The Lemur Red Data Book (Lemurs of Madagascar and the Comoros) was published in 1990 at the very beginning of the triennium. Work has continued on the Antelope Red Data Book, which is now almost complete. The latest revision of the IUCN Red List of Threatened Animals will be published at the end of 1993, as will the first edition of the IUCN Red List of Threatened Plants. This will be the first ever global listing of threatened plant species. SSC published three Occasional Papers: Proceedings of the 10th Working Meeting of the Polar Bear Specialist Group; Conservation Biology of Molluscs; and Conservation Biology of Lycaenid Butterflies. The second edition of the Directory of Crocodile Farming Operations was published in 1992, and the Proceedings of the 10th Working Meeting of the Crocodile Specialist Group were published in 1991. Popular booklets on wild dogs and their relatives, otters, and seals were published and widely distributed, and others on procyonids and cats are nearing completion. Another major communications project is the Encyclopedia of Endangered Species, aimed very much at a popular market, to be published during 1994. The SSC also produced a number of Factsheets on threatened species in collaboration with WWF as follows: Elephants, Rhinos, Dolphins and Porpoises, Whales, Foxes and Wolves, Wild Dogs and Jackals, Tigers, and Chimpanzees and Bonobos. These are designed to bring species conservation to a wider audience.

The SSC attracted a certain amount of media attention during the triennium. A press release on the severe decline of tigers in the wild, as a result of poaching for their bones for use in the Chinese medicinal industry, received very wide coverage throughout the world. Another of wide interest was on the

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decline of amphibian populations worldwide, and the work of SSC's Task Force on Declining Amphibian Populations to understand this phenomenon. Other press releases covered otters and lagomorphs. The SSC, and the Union as a whole, also featured very prominently in the press, radio, and television as a result of the CITES Conference in March 1992 in Japan. The launch of the Australasian Marsupial and Monotreme Action plan received very wide press coverage in Australia in mid-1992.

The work of SSC's program is now being disseminated to a wide audience through *International Wildlife*, one of the magazines of the National Wildlife Federation. The SSC also has a regular page in *Oryx*, the journal of the Fauna and Flora Preservation Society, and similar arrangements are being explored with other SSC Cooperating Organizations.

Developing a Fund-raising Initiative for the Species Survival Program

A professional position to develop an SSC fund-raising program was established at the end of the last triennium, the purpose being to establish long-term financial stability for the SSC and its programs. Early in the development of the fund-raising program, a brochure was produced and has been used regularly to assist with funding proposals. Relationships were built with a number of private funding sources, primarily corporations and foundations in the United States of America, which has resulted in support for general network activities and the activities of Specialist Groups.

To help secure more general support for specific SSC programs, several program-related funds have been established, including the SSC Conservation Communications Fund, designed to support the Commission's ever-growing publications output. A significant new development has been marketing agreements with corporations. During the triennium, several such agreements were reached. These have the advantage of providing unrestricted funds to the program.

To enhance higher-level fund-raising for the program and to increase linkages with other programs, the SSC established a Special Support Council of eminent individuals who will provide assistance in fund-raising and establishing donor contacts, particularly among corporations, foundations, and wealthy individuals.

Evaluation

In general, the 1991-1993 SSC program was implemented successfully. Key highlights include:

- 1) Highly professional and effective involvement in the Eighth Meeting of the Conference of the Parties to CITES.
- 2) Significant advances in developing new IUCN Categories of Threat and CITES listing criteria.
- 3) Fourteen high quality action plans produced, including the first on plants, invertebrates and birds.
- 4) Useful meetings of certain key groups, including African Elephant, Asian Elephant, African Rhino and Crocodile

Specialist Groups that involved scientists and managers from range states in an effective way.

5) A new tool, the CAMP workshop, that has been of great assistance in developing the Action Plans for many groups of species.

6) A very effective set of PHVA workshops that provided guidance and assistance to management agencies charged with addressing critical endangered species problems.

7) Drafting of the guidelines on sustainable use of wild species in a manner that has involved very wide consultation through the IUCN and SSC memberships.

8) Development of marketing agreements with the corporate sector to support the program.

9) The appointment of SSC's first ever full-time professional to facilitate the Commission's work on plant conservation.

10) Increased core support secured for the Trade, Captive Breeding, and African Elephant Specialist Groups, and the Task Force on Declining Amphibian Populations.

Weaker points during the triennium have included:

1) The SSC plants program is weak and needs more strengthening (see above for action taken to address this).

2) Little progress has been made on the database network, partly due to insufficiently defined objectives in regard to users. The SSC has now concluded more focused program of activities for the next triennium.

3) There have been internal disputes within SSC concerning lead responsibility for the CAMP workshops. This was addressed through the strategic planning process.

4) Action Plan implementation has been patchy. The placing of staff in regional offices and in the Specialist Groups is designed to address this.

5) The SSC needs to interact more closely with other IUCN programs. Again this will be addressed most easily through the regionalization process.

6) There has been an increasingly sharp divergence within the conservation community concerning sustainable use as a conservation tool. The SSC needs to do more to communicate in this area, and to build broadly-based alliances to address some of the more difficult issues.

7) There is also continuing divergence of opinion on the use of *ex situ* conservation options. Again, SSC needs to communicate better in this area and to build bridges within the conservation community.

8) The SSC has grown very rapidly, and there is a constant problem of maintaining even minimal staff support to the voluntary network.

The SSC's strategic plan, which is in the context of that of the Union as a whole, is exploring and addressing all areas of weakness and will be designing mechanisms to build on strengths. The plan will be finalized before the 19th Session of the IUCN General Assembly and ready for implementation in the new triennium.

Future Prospects

The SSC faces both major challenges and opportunities over

the coming years. The SSC's challenge is to remain an impartial, professional and highly-respected network, despite the increasingly polarized environment in which we work. I believe that this polarization makes the work of SSC even more crucial. The SSC also faces the challenge of securing far greater resources, both in finance and manpower, if it is to respond adequately to the expectations increasingly being placed upon it. The SSC's opportunity lies in the greater attention being given globally to biodiversity conservation, especially following the signing of the Convention on Biological Diversity. The SSC's exact role in relation to this convention needs to be clarified, but there is little doubt that, as a global network of biodiversity experts, our role must be a significant one. Opportunities are also emerging for the SSC in the regionalization of IUCN, and this could have a major impact on the way we go about our business.

The SSC must maintain its clear focus. Throughout its history, the concentration on saving species has ensured that the focus remains clear. The SSC strategic planning process is exploring how far SSC should work on broader biodiversity or sustainable use issues without losing the focus that up until now has been central to the Commission's strength and success.

Acknowledgments

I wish to thank all those who have assisted in making the 1991-1993 triennium a successful one for the SSC. In particular I must thank those who do the real work: the SSC members, and

in particular the members of the Steering Committee and the Chairs of the Specialist Groups, who have contributed untold hours in the service of the Commission over the last three years. I also wish to thank the IUCN Director General, Dr. Martin Holdgate, for his continuing support, and most especially for the increase in financial support that we have received during the triennium. Special thanks are also due to the World Wide Fund for Nature for their continuing, long-term support of our program. The SSC's work would be very difficult without the Peter Scott Action Plan Fund, established by the Sultanate of Oman, which has provided essential support to the Specialist Groups. The U.S. State Department has also provided important financial help and encouragement. Other donors to SSC are too numerous to mention individually, but all - including government agencies, private foundations, corporations, international agencies, non-governmental organizations, and individuals - are very greatly appreciated. I owe particular thanks to the board of my own institution, the Chicago Zoological Society, for their continuing assistance, and for allowing me and other Society staff to devote so much time to the work of the SSC. My final thanks are to the staff, in Chicago, Gland, Minneapolis, Cambridge and in various Specialist Groups, who do the behind-the-scenes work that keeps the SSC a significant force in conservation.

This report was submitted by George Rabb, Chairman, Species Survival Commission.

Special CBSG Report...

Summary of Activities for the 1991-1993 Triennium

The 1991-1993 triennium has been one of tremendous growth and activity for the CBSG. Highlights of this growth, both in terms membership and activities, are presented in Figure 1, and include:

Membership

CBSG membership has more than tripled in this triennium, growing from 166 to 593 members.

Funding Base

The CBSG is now supported by 149 donor institutions and organizations, primarily zoos and zoological associations, for a total annual donor funding base of \$332,900 (U.S.). This represents an increase of approximately \$132,000 (U.S.) from the January 1991 funding base of \$200,000 (U.S.). The CBSG also began an individual donor program in 1992. There are now 73 individual donors contributing a total of \$2,146 per year. A brochure describing the CBSG and its programs was developed in 1992. This brochure is used to promote the CBSG and its activities and is also used in fundraising efforts.

Programs

A major development in this triennium has been the Conservation Assessment and Management Plan (CAMP) process. Data gathered in the CAMP process is then used as a basis for new Action Plans generated by taxon-based SSC and BirdLife International Specialist Groups, or in the refinement of existing Action Plans. The success of this as well as the expansion of Population and Habitat Viability Assessment (PHVA) programs, has established them as valuable, widely-accepted processes for the development of scientifically-developed species management plans. In addition to testing the applicability of the Mace-Lande Criteria for Threat in CAMP workshops, the CBSG has participated in several IUCN/SSC meetings held to refine the new IUCN Criteria for Threat. The value of these workshops in linking *in situ* and *ex situ* conservation is unparalleled within the SSC.

The CAMP and Global Captive Action Plan (GCAP) programs have been instrumental in serving as conservation reference guides to assist with species prioritization and the development of regional collection plans within the various zoo regions.

1994

46 final CBSG documents generated for 1993 • CBSG News circulation 7,000
CBSG Contingency Planning meeting • CBSG annual meeting - Antwerp
Genome Resource Banking guidelines revised • 60 PHVA workshops conducted to date
593 CBSG members •

CBSG Donor contributions more than \$335,000 annually •

562 CBSG members • 20 CAMP workshops conducted to date

Dr. Onnie Byers joins staff as Program Officer • Dr. Susie Ellis assumes supervision of CBSG Office

CBSG Strategic Futures Search - Jamaica • CBSG News circulation 6,250

1993

CBSG Donor contributions nearly \$330,000 annually • 50 PHVA workshops conducted to date

First Regional CAMP workshop conducted • Shelly O'Brien joins staff as Secretary - CBSG staff size 4

CBSG annual meeting - Vancouver • International Disease Conference held

CBSG Office re-structured

Fiscal year changed to January - December cycle

40 PHVA workshops conducted to date

421 CBSG members • CBSG Regional meetings regularly held

GCAP and GASP Programs developed

Dr. Susie Ellis joins staff as Program Officer

270 CBSG members • CBSG India, CBSG's first satellite, formed

Genome Resource Banking guidelines developed

CBSG annual meeting - Singapore

First CAMP workshop held

Lisa Laqua joins staff as Secretary

166 CBSG members

CBSG staff size 2

1991

U.S. Seal re-appointed as Chairman for 1991-1993 triennium

Figure 1.

CBSG Milestones

1991 - 1993 Triennium

CBSG Report...

The CBSG's international zoo network was strengthened by CBSG meetings held in conjunction with regional zoo association meetings, including Africa, Australasia, Brazil, Europe, India, Indonesia, Japan, North America, and Thailand.

An emphasis on products continues to be a driving force in CBSG's success. More than 100 CBSG documents have now been generated. Forty-six of these documents were produced in 1993 alone. A Global Zoo Directory has been produced which lists information concerning all the zoos of the world, and has been very well-received by the zoo community.

The CBSG conducted and/or participated in 136 workshops/meetings between January 1, 1991 and December 31, 1993 including 38 in 1991, 46 in 1992, and 52 in 1993. The CBSG conducted three annual meetings in this triennium in Singapore (1991), Vancouver (1992), and Antwerp (1993). Other workshops include 35 formal PHVA workshops, 22 formal CAMP workshops, eight formal GCAP workshops, 20 Regional Zoo Association/Regional CBSG Meetings, 42 Special Interest Meetings, and eight miscellaneous lectures or seminars.

The CBSG collaborated with 24 other SSC and BirdLife International Specialist Groups on projects and workshops, including: the African Rhino, Antelope, Asian Elephant, Asian Rhino, Australasian Marsupial and Monotreme, Bear, Canid, Caprinae, Cat, Cetacean, Deer, Hyaena, Mustelid/Viverrid/Procyonid, Otter, Primate, Crane, Hornbill, Megapode, Parrot, Partridge/Quail/Francolin, Pheasant, Pigeon and Dove, and Veterinary Specialist Groups.

For the next triennium, thus far plans have been laid for ten PHVA workshops and 14 CAMP workshops in and outside of North America, including among others: Tapir, Panamanian endemics, Freshwater Fish, Gibbons, Indonesian Primates, Marsh Deer, Fiordland Crested Penguin, Costa Rican endemics, Heteromyid rodents, Canids, Felids, and Cracids. In the next triennium, the CAMP program will begin to move further away from a taxonomic approach to a regionally-focused program with integration of members of the CNPPA emphasized.

Genome Resource Banking

At the CBSG Annual Meeting in 1991, a detailed, scientifically-based plan for international genome resource banking for species at risk was developed for global/regional cooperation. A second draft of the Genome Resource document, *Tiger Genome Resource Banking (GRB) Action Plan*, was prepared for the 1993 CBSG Annual Meeting held in Antwerp.

CBSG Strategic Plan

The first formal strategic planning session for CBSG was held in 1993. The first draft of the CBSG Futures Search document was circulated to the CBSG Steering Committee in April 1993, comments were incorporated, and a second draft of the document was provided to CBSG Steering Committee and the SSC Chairman at the 1993 Annual Meeting.

Newsletter

At the beginning of this triennium, the quarterly circulation of CBSG News was approximately 3,000 in 147 countries. The CBSG News is now distributed quarterly to more than 7,000 persons in 170 countries.

IUCN/SSC

A Workplan for CBSG was submitted to the SSC Office in 1993 to assist in better integration of CBSG's activities into the SSC Workplan. The CBSG staff now regularly attend SSC staff meetings.

Staff

The CBSG staff has expanded in this triennium from three to five people, in addition to the Chairman. Dr. Susie Ellis joined the staff in December 1991 as Program Officer and now oversees the CBSG office in the Chairman's absence. Dr. Onnie Byers joined the staff half-time as a Program Officer in April 1993. Other staff include: Judi Mikolai, Administrative Officer; Lisa Laqua, Program Assistant; and Shelly O'Brien, Secretary.

Software Links GIS with PVA

A new software bridges the gap between geographic information systems (GIS) and metapopulation modeling for population viability analysis (PVA). Called RAMAS/GIS, the software is designed to link GIS-generated landscape data with a detailed metapopulation model for PVA, reserve design, and wildlife management. The program imports spatial data produced by a GIS as one or more map layers. Information in different map layers are then combined to make a map of habitat suitability indices (HSI) with a user-defined function. A patch-recognition algorithm is employed to find patches in the HSI map and finally the spatial structure of the habitat is exported to a metapopulation model.

The outputs of RAMAS/GIS include risk-based measures of viability, such as risk of extinction, risk of decline, time to extinction, as well as metapopulation occupancy, local occupancy, predicted abundance, and its variation for the metapopulation and for each population. Other features include a facility for sensitivity analysis which lets the user vary input parameters automatically and a facility to compare results of different simulations by superimposing graphs for risk of extinction, time to extinction, and other outputs.

For more information, contact Applied Biomathematics, 100 North Country Road, Setauket, NY 11733 USA. Tel: 516-751-4350. RAMAS/GIS requires an IBM-compatible computer using MS-DOS 3.0+. The program can import raster map layers from GRASS, IDRISI, ARC/INFO, and others.

You are invited...

The Captive Breeding Specialist Group is pleased to invite you to attend the 1994 Annual CBSG Meeting to be held Friday through Sunday, 26-28 August 1994 in São Paulo, Brazil. It will be hosted by the São Paulo Zoological Park and it will directly precede the IUDZG Meeting which will be held 29 August - 1 September.

The conference hotel will be the São Paulo Hilton where all of the CBSG meetings will be conducted. Room rates are \$120 (U.S.) per day for a single or double room, including a continental breakfast. You may also book rooms at the Hotel Bourbon, four blocks from the conference hotel. The rate is \$100 (U.S.) for a single or double, including a continental breakfast. Hotel rooms at the São Paulo Hilton or Hotel Bourbon cannot be guaranteed after 26 July, but accommodations may be available at a third hotel.

The meeting registration fee, including lunches on Friday and Saturday, will be \$280 (U.S.) if paid before 25 June; \$308 (U.S.) if paid before 26 July; and \$400 (U.S.) thereafter. *So, please register early!*

A non-binding registration form can be found below. Sending this form in will allow the CBSG Conference Coordinator to establish a list of interested participants. The São Paulo Zoo will then send you a letter of invitation by 1 April with final details regarding registration, transportation, weather, etc. Continue to watch the 1994 CBSG News Vol. 5 for agenda updates.

We hope you are able to attend the 1994 Annual CBSG Meeting. We look forward to seeing you in São Paulo!

Please return this registration form to:

CBSG Conference Coordinator
 Marsans International
 Rua Sete de Abril, 404-11 andar
 01044-000 São Paulo, SP, Brazil
 Phone: (55-11)255-5744
 Fax: (55-11)255-2478

<input type="checkbox"/> I plan to stay in the <u>São Paulo Hilton Hotel</u>	<input type="checkbox"/> I plan to stay in the <u>Hotel Bourbon</u>
<input type="checkbox"/> # persons/room	<input type="checkbox"/> # persons/room
<input type="checkbox"/> sharing with _____	<input type="checkbox"/> sharing with _____
<input type="checkbox"/> single	<input type="checkbox"/> single
<input type="checkbox"/> double	<input type="checkbox"/> double

Name _____

Address _____

Phone _____ Fax _____

Note: Please submit the registration fee, one day's hotel cost, plus a \$15 airport to hotel taxi fee to the CBSG Conference Coordinator, Marsans International, **before 26 July 1994.**

Please mail form to the CBSG Conference Coordinator at the address listed above. Thank you for helping us make this a successful meeting. We're looking forward to seeing you in São Paulo!

CBSG Annual Meeting Agenda

The annual meeting of the CBSG will be held in São Paulo, Brazil on 26-28 August 1994. Following is the tentative agenda for this meeting. See page 30 for registration details.

Thursday, 25 August

1800 - 2000 Registration at hotel

Friday, 26 August

0800 - 0845 Registration at hotel
0845 Opening: Introductions and Local Arrangements
0900 Summary of CBSG's Past year: Progress on the Futures Plan
0930 International Studbooks Report (Olney)
1000 Expansion of PHVAs: Human Demography, GIS, Evaluation, RSMPs
1030 - 1100 Coffee Break
1100 Wildlife Linkage and Small Zoos (Wixom)
1115 Report on the Facilitator's Workshops
1130 ISIS
1145 Genetic Resource Banking Tiger Prototype Plan (Wildt)
1200 Review of CAMP Reports (Ellis)
1230-1330 Lunch
1330 Overview of GCAR Process and Organization of the Working Groups and Workshops (GCARs)(Byers)
1400 Convene GCAR and GASP Workshops and Working Groups

CAMP/GCARs:

Marsupials	Felids
Equids	Tapirs
Cervids	Canids
Rhinoceroses	Wild Cattle
Antelope	

Working Groups:

Tigers	CITES Permits
Red Pandas	Storks, Ibises, Spoonbills
Gibbons	Sustainable Utilization
Behavior	Madagascar
Meso-America	Southeast Asia
Reptiles	

1600 - 1 630 Coffee Break
1630 Plenary Session
Preliminary Reports from Workshops
Preliminary Reports from Working Groups
1700 - 1830 Regional Reports

Saturday, 27 August

0830 Reconvene Plenary Meeting and General Meeting
0845 Regional Reports
Costa Rica CAMP (Matamoros)
Partula CAMP (Pearce-Kelly)
Mediterranean Monk Seal PHVA
1030 - 1230 Reconvene Workshops and Working Groups

Working Groups:

Avian	Genetic Resource Banking
Primates	Conservation Coordinators
Invertebrates	Latin America
Madagascar	Marine Mammals
Aquatic Fishes	Southeast Asia

1030 - 1100 Each group breaks as desired
1230 - 1330 Lunch
1330 - 1600 Reconvene plenary Session and General Meeting
Working Group Reports
1600 - 1630 Coffee Break
1630 - 1830 Reconvene Workshops and Working Groups

Sunday, 28 August

0830 Reconvene Plenary Session and General Meeting
0830 Regional Conservation Coordinator Report
0900 GCAR Workshop Reports
1030 - 1045 Coffee Break
1045 Species Workshop reports
1115 Working Group Final reports
1230 - 1330 Lunch
1330 Reconvene Plenary Session
1500 Close

Other Meetings...

Molecular Genetic Approaches in Conservation, 21-22 June 1994, San Francisco, California, USA. Contact: Tom Smith, Department of Biology, San Francisco State University, San Francisco, CA 94132 USA. Tel: 415-752-1554.

Symposium on Marine Mammal Genetics, 23-24 September 1994, La Jolla, California, USA. Contact: Marine Mammal Genetics Symposium, c/o A. E. Dizon and W. F. Perrin, Southwest Fisheries Science Center, P.O. Box 271, La Jolla, CA 92038 USA. Fax: 619-546-7003.

CBSG Schedule - 1994-95

Following is a *tentative* schedule of events that the CBSG staff will be attending. This schedule is presented for those wishing to meet with the staff at opportune times and places. Personnel abbreviations are: (S) Ulysses Seal, (E) Sue Ellis, (B) Onnie Byers, (M) Judi Mikolai, (O) Shelly O'Brien.

1994

August

- 4 - 5 Knoxville, Tenn.: American Federation of Aviculture Meeting (S)
 22 - 24 Sao Paulo: Felid CAMP & GCAR (S,E,B)
 24 - 25 Sao Paulo: CBSG Steering Committee Meeting (S,E,B)
 26 - 28 Sao Paulo: CBSG Annual Meeting; Regional Felid Meeting (S,E,B)
 29 - Sep 1 Sao Paulo: IUDZG Annual Meeting (S,E,B)
 31 - Sep 2 Sao Paulo: Marsh Deer PHVA (S)

September

- 10 - 13 Yulee, Florida: Florida Panther Genetic Management Workshop (S)
 14 - 17 Loro Parque: Parrots (S)
 17 - 21 Atlanta, Georgia: AAZPA Annual Meeting (S)
 26 - 30 Coli, Columbia: ALZPA (S)
 29 - Oct 3 Houston, Texas: Cracid CAMP (E, B)

October

- 17 - 28 Thailand: Crane PHVAs; Stork, Ibises, Spoonbills CAMPS; Wild Cattle CAMP; Felid CAMP (S)
 24 - Nov 7 Vacation (B)

November

- 1 - 7 Venezuela: Crocodile PHVA (S)
 5 - 6 Ft. Lauderdale, Florida: SSC Steering Committee Meeting (S)
 7 - 18 Ft. Lauderdale, Florida: Ninth Conference of CITES Parties (S)
 15 - 19 Hong Kong: SEAZA (S)
 21 - 25 Vietnam: Saigon Zoo (S)
 27 - Dec 3 Panama: Endemics CAMP and Tapir PHVA (S,E)

December

- 12 - 18 Morocco: Mediterranean Monk Seal PHVA

1995

January

- 8 - 18 Belo Horizonte: Muriqui PHVA & Primate CAMP
 23 - 27 Mexico: Sian Kaan CAMP (S)

February

- Kalimantan: Bornean Orangutan PHVA (S)

March

- 1 - 7 Jersey: PHVA Training Course
 20 - 24 Minnesota: Demography Workshop

April

- Dehra Dun, India: PHVAs and Training Workshop (S)
 India: Wild Ass PHVA (S)
 3 - 7 Perth: ARAZPA Conference
 14 - 16 Badajoz, Spain: Holarctic Birds of Prey Conference (E)
 Raptor CAMP Review
 14 - 16 Cologne: CBSG, GCCN, ISIS Board Meetings

May

- 15 - 17 New Zealand: Fiordland Crested Penguin PHVA (S,E)

CBSG Office Notes...

E-mail Available

The CBSG Office now has E-mail capability. For those wishing to use this computer communications, the address is:

cbsg@staff.tc.umn.edu

New Banking Information

Banking information for the CBSG Office has been changed. Please send wire transfers to:

**FIRST BANK NA ABA No. 091000022
 for credit to CBSG Account No. 1100-1210-1736**

As in the past, checks should be payable to CBSG in U.S. funds drawn on a U.S. bank.

New!

VORTEX Version 6.2

Users Manual Second Edition for
Version 6.2 with disk
\$35.00 (U.S.)

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1100 1210 1736.

Additional copies of VORTEX Version 6 can ALSO be obtained from the CBSG Office, the official distributors of VORTEX, for a cost of \$35.00 in U.S. funds. Any questions and comments regarding the software should be referred directly to Dr. Robert Lacy or Dr. Kimberly Hughes at the Chicago Zoological Park, Brookfield, Illinois 60513 USA. Telephone 1-708-485-0263; fax 1-708-485-3532.

THANK YOU FOR YOUR ORDER!

12101 Johnny Cake Ridge Road, Apple Valley, MN 55124, USA tel 612-431-9325 fax 612-432-2757
e-mail: cbsg@maroon.tc.umn.edu

Coming soon...Summer/Fall 1994

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Captive Breeding Specialist Group

Species Survival Commission, IUCN - The World Conservation Union
U.S. Seal, CBSG Chairman

12101 Johnny Cake Ridge Road, Apple Valley, MN 55124-8151 USA PHONE: 612-431-9325 FAX: 612-432-2757

PUBLICATIONS INVOICE

Invoice Date: _____

Sold To: _____

CONSERVATION ASSESSMENT & MANAGEMENT PLANS (CAMPs)

Reference Material:

- _____ CAMP Core Material Book
- _____ CAMP Core Material Packet
- _____ CAMP Summary Document (Vol. 1)
- _____ CAMP & GCAP Summary Document (Vol. 2)

Reports:

- _____ Antelope CAMP Draft II
- _____ Asian Hornbill CAMP
- _____ Canids, Hyena & Aardwolf CAMP
- _____ Caprinae CAMP
- _____ Costa Rican Endemics CAMP
- _____ Crane CAMP (draft)
- _____ Felid CAMP
- _____ Hawaiian Forest Birds CAMP
- _____ Pigeons & Doves CAMP (draft)
- _____ Saint Helena Island CAMP
- _____ Saint Helena Island CAMP Summary
- _____ Small Carnivore
- _____ Waterfowl CAMP

Briefing Books:

- _____ African Antelope and Parrot CAMP
- _____ Australian Marsupials/Monotreme CAMP
- _____ Canids, Hyena & Aardwolf CAMP
- _____ Costa Rican Endemics CAMP
- _____ Crane Conservation Workshop - Calgary
- _____ Galliformes CAMP
- _____ Hawaiian Forest Birds CAMP & PHVA
- _____ Asian Hornbill CAMP
- _____ Iguanas & Varanids/Boas & Pythons CAMP
- _____ Penguin PHVA & CAMP
- _____ Pigeon & Dove CAMP
- _____ Primates CAMP
- _____ Saint Helena Island CAMP
- _____ Sheep, Goat & Rupicaprine CAMP
- _____ Small Carnivore CAMP

GLOBAL CONSERVATION ASSESSMENT RECOMMENDATIONS (GCARs) (formerly GCAPs)

- _____ Cervid GCAP Proposal
- _____ Cervid GCAP Briefing Book
- _____ GCAR Reference Material Packet
- _____ Primate GCAP - 1992 Edition
- _____ Rhino Global Captive Action Plan (GCAP) Report
- _____ Rhino GCAP Briefing Book

GLOBAL ANIMAL SURVIVAL PLAN (GASPs)

- _____ Tiger Global Animal Survival Plan Report

_____ Tiger GASP Briefing Book

POPULATION HABITAT VIABILITY ANALYSES (PHVAs)

Reference Material:

- _____ PHVA Core Material Book
- _____ PHVA Core Material Packet

Reports:

- _____ 'Alala, Akohekohe & Palila (Hawaiian Forest Birds)
- _____ Aruba Island Rattlesnake PHVA
- _____ Asian Elephant PHVA
- _____ Attwater's Prairie Chicken PHVA
- _____ Baiji Dolphin PHVA
- _____ Bali Mynah PVA
- _____ Black Footed Ferret Recovery Plan Review
- _____ Florida Key Deer PVA
- _____ Florida Panther Viability Assessment
- _____ Houston Toad PHVA (draft)
- _____ Javan Gibbon PHVA
- _____ Javan Rhino PVA
- _____ Karner Blue Butterfly PHVA (in publication)
- _____ Kea/Kaka PVA
- _____ Kenya Black Rhino Metapopulation Workshop
- _____ Leontopithecus Population Viability Workshop (4 species)
- _____ Mexican Wolf (draft)
- _____ Mississippi Sandhill Crane PHVA
- _____ Orang utan PHVA
- _____ Pampas Deer PHVA (draft)
- _____ Pink Pigeon Conservation Viability Assessment
- _____ Puerto Rican Parrot PVA
- _____ Sumatran Rhino PHVA
- _____ Sumatran Tiger PHVA
- _____ Tana River Primate Reserve Conservation Assessment
- _____ White-Winged Wood Duck PHVA
- _____ Whooping Crane Conservation Viability Assessment

Briefing Books:

- _____ Aruba Island Rattlesnake PHVA
- _____ Asian Elephant PHVA
- _____ Asiatic Black Bear PHVA
- _____ Asiatic Lion PHVA/GASP
- _____ Attwater's Prairie Chicken PHVA
- _____ Baiji Dolphin PHVA
- _____ Bali Mynah PVA
- _____ Black Footed Ferret Workshop
- _____ Blue Macaw Conservation Workshop
- _____ Caribbean Parrots Conservation Viability Assessment
- _____ Cotton-top Tamarin Conservation Viability Assessment
- _____ Hawaiian Forest Birds CAMP & PHVA
- _____ Houston Toad PHVA

(PHVAs Continued)

Briefing Books:

- _____ Indian/Nepali Rhino PHVA
- _____ Jamaican Iguana PHVA
- _____ Javan Gibbon PHVA
- _____ Kerner Blue Butterfly PHVA
- _____ Kea/Kaka PVA
- _____ Kenya Black Rhino Metapopulation Workshop
- _____ Kirtland's Warbler PHVA
- _____ Lion-tailed Macaque PHVA/GASP
- _____ Mediterranean Monk Seal PHVA
- _____ Mississippi Sandhill Crane PHVA
- _____ Orangutan PHVA
- _____ Pampas Deer PHVA
- _____ Penguin CAMP & PHVA
- _____ Pink Pigeon PVA
- _____ Sandplain Gerardia PHVA
- _____ Sangai PHVA
- _____ Spix Macaw PHVA
- _____ Squirrel Monkey (*Saimiri oerstedii*) PHVA
- _____ Sumatran Rhino PHVA
- _____ Sumatran Tiger PHVA
- _____ Tana River Primate Reserve Conservation Assessment
- _____ Thai Gibbon PHVA
- _____ Waldrapp Ibis PHVA
- _____ White-winged Wood Duck PHVA
- _____ Whooping Crane PHVA
- _____ Wild Dog (African) PVA

OTHERS

- _____ Aridland Antelopes Conservation Plan
- _____ Asian Rhino Conservation Workshop
- _____ Genetic Management Strategies and Population Viability of the Florida Panther Briefing Book
- _____ Genetic Management Strategies and Population Viability of the Florida Panther Report
- _____ Genome Resource Banking for Wild Species Conservation
- _____ Genome Resource Banking (*draft*)
- _____ International Conference on Implications of Disease Briefing Book
- _____ Int'l Conference on Disease Working Group Reports
- _____ Population Biology Aspects of Genome Resource Banking
- _____ Przewalski's Horse Draft Global Conservation Plan
- _____ Sumatran Tiger Regional Captive Breeding Workshop
- _____ Wild Cattle Symposium Proceedings
- _____ Other _____

THAI ZOO MASTERPLAN FOR CONSERVATION

- _____ Thai Zoo Masterplan for Conservation Final Report (cost \$50.00)
- _____ Thai Zoo Association Planning Materials (4 document set - \$250.00)

CBSG

- _____ CBSG Brochure (No Charge)
- _____ CBSG Newsletters (note volume & number desired)
- _____ CBSG Annual Meetings Briefing Books & Reports (")
- _____ Strategic Planning Report
- _____ VORTEX 6.0 Population Modeling Software & Manual

WORLD ZOO CONSERVATION STRATEGY

- _____ World Zoo Conservation Strategy Summary (cost \$3.00)
- _____ World Zoo Conservation Strategy (cost \$10.00)

_____ GLOBAL ZOO DIRECTORY 1994 (*in preparation*)

ALL BOOKS = \$35.00 EACH (THIS INCLUDES POSTAGE)

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This issue of the *CBSG News* has been printed in limited numbers for CBSG members, donors and newsletter subscribers. It was assembled in May, but it was printed and distributed in August. We are seeking sponsorship for the *CBSG News* so we can continue widespread global distribution. Please contact us if you are interested in underwriting an issue of the *CBSG News*.

CBSG News



*Newsletter of the Captive Breeding Specialist Group
Species Survival Commission
World Conservation Union*



CBSG News
12101 Johnny Cake Ridge Road
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