

CBSG News

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Futures Planning Process for CBSG

We thank the many people who offered written comments and who are participating in the Futures Planning Process for CBSG. Thirty-three people from 120 countries met for three intense days in a workshop conducted under the guidance of two consultants who were knowledgeable about conservation, zoos, and CBSG. After a review is completed, copies of the report will be available and a summary will be printed in the *CBSG News*. A set of themes for the future direction of CBSG emerged from the discussions. This resulted in a detailed recommendation for short- and long-term actions with priorities. Two central themes identified were (1) the central importance of the information transfer, communication, and project coordination potential of the global CBSG network and (2) the critical role of the CBSG-developed Workshops relative to their scientific content, facilitation of local conservation management planning, facilitation of networking processes, and potential as training and public relation devices.

The Workshops include the CAMPs, PHVAs, GCAPs and GASPs (acronyms are defined in an article beginning on page 5). Directions identified for CBSG focused on continuation and expansion of the Workshops, training of facilitators for the Workshops, addition of program officers to the CBSG staff to increase the number of Workshops, and expansion of the scientific base of the Workshops to include geographic information systems analysis, human micro-demography projections, and disease risk epidemiology. The recommendations for captive programs made in the CAMP Workshops serve as a basis for the Global Captive Action Plans Workshops by providing a set of priorities for integration into regional collection planning. Many of these species (and subspecies) will not be suitable for programs because of lack of founders, lack of knowledge about captive husbandry, lack of resources, or other constraints.

The completion of more than 20 CAMPs in the past two years has produced a body of recommendations for captive propagation programs that need to be evaluated for inclusion in Regional Collection Planning activities. One original intention of the CAMP process was to develop lists of priority species for guidance in choice of species for captive conservation programs. The next step is to make systematic use of this information to coordinate regional collection planning priorities. This is being done through the GCAP Workshops and the regional planning activities.

We have undertaken a new information document with the Global Zoo Directory (see page 34). It includes mailing and telephone information for about 1,800 of the world's zoos. There are listings of regional and international captive breeding conservation programs. Also included is the international CBSG membership (more than 575 people in 57 countries) and a list of the members of CBSG-INDIA. We know that much work is needed to update the entries with current information and will depend on you, the users, to assist in this process. We plan to prepare a new edition annually. We welcome your suggestions for other information to include in the Directory.

Our annual meeting for 1993 will be in Antwerp on 3-5 September just before the IUDZG meeting as usual. You can still register and attend (see page 33). A draft agenda for the meeting is printed on page 4. There is an emphasis this year on organized global collection planning workshops - GCAPs - for groups of taxa. The GASPs will assist coordination of programs for species held in more than one region and whose wild populations may extend across national boundaries, such as tigers. There will also be a series of working groups based upon regional interests, groups of taxa requiring continuing coordination efforts for assistance of programs in the wild, and special topics such as genetic resource banking and reproductive technology. These are working meetings. We welcome the attendance by all who have an interest in contribution to these programs.

Ulie S. Seal, CBSG Chairman



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

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Odense Zoo
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Porter Charitable Trust
Rostock Zoo
Royal Zoological Society of Southern Australia
Rotterdam Zoo
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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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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:

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





1993 CBSG Annual Meeting Agenda

The 1993 CBSG Annual Meeting will be held this year from 3–5 September 1993 in Antwerp, Belgium. Following is a *tentative* agenda. Registration information for this meeting can be found on page 33 in this issue of *CBSG News*.

Thursday, 2 September 1993

09.00 - 17.00 CBSG Steering Committee Meeting
Recommendations from Jamaica
meeting of the Steering Committee
Strategic Plan Report
Agenda Items

18.00 - 20.00 Registration at the Zoo and Ice-Breaker

Friday, 3 September 1993

08.00 - 08.45 Registration at the Hilton
08.45 Opening: Introductions and Local Arrangements
09.00 - 18.30 Regional Conservation Coordinators Meeting
09.00 Agenda review and organization of the Working Groups and Workshops (GCAPs and GASPs)
09.15 Summary of CBSG's Past Year Accomplishments
09.30 Review of CBSG Futures Plan (Westley, Seal)
10.00 Thailand Zoo Program (Khun Usum, General Director)
10.30 - 11.00 Coffee break
11.00 International Studbooks Report (Olney)
11.15 Review of new CAMP Reports (Ellis)
11.30 Genetic Resource Banking Prototype Plans (Wildt)
12.00 Overview of GCAP and GASP process (Seal)
12.30 - 13.30 Lunch
13.30 Convene GCAP and GASP Workshops and Working Groups

GCAPs:

Cervids
Caprines
Felids
Small Carnivores
Bears
Cranes
Reptiles (Pythons, Boids, Varanids)

Antelopes
Rhinoceroses
Marsupials

GASPs:

Tigers
Orangutans
Red Pandas

WORKING GROUPS:

Genetic Resource Banking

Aquatics
Marine Mammals
Avian Group
Conservation Coordinators
Madagascar
Philippines
Southeast Asia
Disease & Health
Invertebrates
Coffee break
Plenary Session
Preliminary Reports from Workshops
Preliminary Reports from Working Groups
Regional Reports
Cocktail Drinks and Dinner
Slideshow on the Zoo
Guided Tour through the illuminated garden

16.00 - 16.15

16.15

17.00 - 18.30

19.00 - 21.30

21.30 - 22.00

22.00 -

Saturday, 4 September

08.30 Reconvene Plenary meeting & General Meeting
08.30 - 18.30 Regional Conservation Coordinators Meeting
08.45 Regional Reports
10.00 - 12.30 Reconvene Workshops and Working Groups
New Working Groups
(10.30 - 11.00 Coffee available; each group break as desired)
12.30 - 13.30 Lunch
13.30 - 16.00 Reconvene Plenary Session & General Meeting
Working Groups Reports
16.00 - 16.30 Coffee break
16.30 - 18.30 Reconvene Workshops and Working Groups

Sunday, 5 September 1993

08.30 Reconvene Plenary Session & General Meeting
08.30 - 15.00 Regional Conservation Coordinators Meeting
09.00 GCAP Workshop Reports
10.30 - 10.45 Coffee break
10.45 GASP Workshop Reports
11.15 Working Group Final Reports
12.00 Conservation Coordinators Report
12.30 Lunch
13.30 Reconvene Plenary Session
Final Workshop & Working Group Reports
Close
15.00 Visit Antwerp Zoo and Planckendael (opt.)

Conservation Assessment and Management Plans (CAMPs) and Global Captive Action Plans (GCAPs)



Ulysses S. Seal, Sue A. Ellis, Thomas J. Foose, and Ann P. Byers

Reduction and fragmentation of wildlife populations and habitats are occurring at a rapid and accelerating rate. The implications for an increasing number of taxa are small and isolated populations that are at risk of extinction. For such populations, more intensive management becomes necessary for their survival and recovery. To an ever-increasing extent, this intensive management will include, but not be limited to, habitat management and restoration, intensified information gathering, and captive breeding.

The problems for wildlife are so enormous that it is vital to apply the limited resources available for intensive management as efficiently and effectively as possible. Conservation Assessment and Management Plans (or CAMPs) and their derivative Global Captive Action Plans (GCAPs) are being developed to respond to this need.

Conservation Assessment and Management Plans (CAMPs)

Conservation Assessment and Management Plans are intended to provide strategic guidance for application of intensive management and information collection techniques to threatened taxa. Conservation Assessment and Management Plans provide a rational and comprehensive means of assessing priorities for intensive management, sometimes including captive breeding, within the context of the broader conservation needs of threatened taxa.

Within the Species Survival Commission (SSC) of IUCN, the primary goal of the Captive Breeding Specialist Group (CBSG) is to contribute to the development of holistic (i.e. integrating *in situ* and *ex situ*) and viable conservation strategies and action plans by the taxon-based Specialist Groups of the SSC and the International Council for Bird Preservation (ICBP). Conservation Assessment and Management Plans are conducted as collaborative ventures of CBSG with the taxon-based Specialist Groups of the IUCN and ICBP. Generally, representatives of Taxon Advisory Groups (TAGs) of the organized Regional Captive Breeding Programs of the zoo/aquarium world are also included. Hence, the CAMP process assembles a broad spectrum of expertise on wild and captive management of the taxa under review.

A CAMP workshop brings together 10-40 experts (e.g., Specialist Group members, wildlife managers, representatives of the academic community or the private sector, and captive managers) to evaluate the threat status of all taxa in a broad group (e.g., an order or family) to set conservation action and information-gathering priorities. It is an attempt to develop a process that will: 1) make broad-based recommendations concerning management and 2) recommend specific conserva-

tion-oriented research that might be required to directly contribute to the knowledge needed to develop comprehensive management and recovery programs.

The CAMP process is also providing an opportunity to test the applicability of the Mace-Lande Categories and Criteria (Mace and Lande, 1991) for assessment of threat. The Mace-Lande system is being considered as the temporary template for the IUCN Categories of Threat which are still under active development. The scheme attempts to assess threat in terms of likelihood of extinction within a specified period of time. The proposed system defines three categories for threatened taxa:

Critical - 50% probability of extinction within five years or two generations, whichever is longer.

Endangered - 20% probability of extinction within 20 years or ten generations, whichever is longer.

Vulnerable - 10% probability of extinction within 100 years.

Criteria are proposed to estimate the probability for extinction of taxa based on information about size, distribution, and trend of their population as well as conditions of their habitat now and in the future. Their purpose is to provide a system that makes the categories of threat more explicit with wider applicability to multiple taxa. This system is more objective and rational than previous schemes have been. Characteristics are that it:

1. is simple, with few categories;
2. is a probabilistic assessment of risk;
3. has flexible data requirements;
4. can use flexible population units;
5. uses clear terminology;
6. uses a biologic time-scale of years and generations.

The criteria are based on population viability theory (Gilpin and Soulé, 1986; Soulé 1987a, 1987b). Mace and Lande acknowledge that in most cases there will be insufficient data and imperfect models on which to base formal probabilistic analysis. For broader and cruder assessments, they propose "more qualitative" but, in large part, still quantitative criteria for assessing threat in terms of population sizes (total and effective), fragmentation, trends, and stochasticity for each category.

The CAMP process itself is intensive and interactive. Workshop participants develop the assessments of risks and formulate recommendations for action using a spreadsheet with columns that require participants to provide data on the status of populations and habitat in the wild. These sheets also permit entry of the recommendations for intensive action. Spreadsheets are augmented with Taxon Data Sheets for each taxon under review. Taxon Data Sheets provide documentation of reasoning behind recommendations and may include data that does not fit into the spreadsheet format or details of other pertinent information.

CAMPs, GCAPs...

During a CAMP workshop, the wild and captive status of all taxa are reviewed on a taxon-by-taxon basis for the broad taxonomic group under consideration. There is an especial attempt to estimate the total population of each taxon. It is often very difficult, even agonizing, to be numerate because so little quantitative data on population sizes and distribution exists. However, with encouragement and mediation from workshop organizers, it is frequently possible to provide order-of-magnitude estimates, especially whether the total population is greater or less than the numerical thresholds for the three Mace-Lande categories of threat. The CAMP process attempts to be as quantitative or numerate as possible for two major reasons: 1) action plans ultimately must establish numerical objectives for population sizes and distribution if they are to be viable, and 2) numbers provide for more objectivity, less ambiguity, more comparability, better communication, and hence cooperation.

Conservation Assessment and Management Plans assess the degree of threat for each taxon in the wild and recommend intensive action that may reduce the risks for threatened taxa. For this purpose, the process utilizes information from SSC Action Plans that may already have been formulated by the taxon-based Specialist Groups as well as additional data from experts on the taxa. Conservation Assessment and Management Plans have been endorsed by the SSC as the logical first step toward the development of taxonomic Action Plans where they do not yet exist. The CAMP process produces the necessary assessment of status and prospects to facilitate formulation of Global Action Plans for both *ex situ* and *in situ* efforts.

In assessing threat, the CAMP process also uses information on the status and interaction of other population and habitat characteristics in addition to the "guesstimates" of total number. Recent CAMP spreadsheets have included a "data quality" column so that guesstimates can be distinguished from population estimates based on solid documentation. Information about population fragmentation and trends as well as habitat changes and environmental stochasticity are also considered. For example, total numbers alone might indicate that a taxon be assigned to the Vulnerable category. However, the taxon may be assigned to the Endangered category based on knowledge that the population is severely fragmented, is declining rapidly, or that its habitat is under serious threat so that the probability of and time to extinction place it at higher risk.

During the CAMP process, each taxon is assigned to one of five categories: Critical, Endangered, Vulnerable, Safe, or Unknown. Assignment to Mace-Lande categories of threats for all CAMPs held thus far, except marsupials, are summarized in Table I. In assigning priorities, there is also an attempt to consider the taxonomic distinctiveness of each taxon, although this aspect of the process is at an earlier stage of evolution. Concerning taxonomy, the most conservative approach relative to the preservation of biodiversity is to attempt risk assessment and management recommendations initially in terms of the maximal distinction among possible "subspecies" until taxo-

nomic relationships are better elucidated. Splitting rather than lumping maximizes preservation of options. Taxa can always be merged ("lumped") later if further information invalidates the distinctions or if biological or logistic realities of sustaining viable populations precludes maintaining taxa as separate units for conservation.

Based on assessments carried out during CAMP workshops, a set of recommendations about which taxa are in need of various kinds of intensive management and information gathering is generated. The kinds of recommendations include:

1. the need for Population and Habitat Viability Assessment (PHVA) workshops;
2. broad-based recommendations for intensive protection and management in the wild;
3. *in situ* and *ex situ* conservation-oriented research that can directly contribute to the knowledge needed to develop comprehensive management and recovery programs;
4. captive propagation programs;
5. genetic resource banking and application of reproductive technology

These last techniques will become increasingly available to enhance populations of animals in captivity and the wild. Major initiatives are under way to establish a comprehensive and coordinated system of genetic resource banks.

Recommendations for intensive action for CAMPs conducted thus far are presented in Table 2 (with the exception of marsupials and Galliformes which are still being summarized).

Over the past two years, CAMPs have been carried out for a wide spectrum of the vertebrates including: boid, pythonid, and tropid snakes, varanids and iguanids, parrots, waterfowl, penguins, cranes, Asian hornbills, Hawaiian forest birds, pigeons and doves, pheasants, quail, partridges francolins, megapodes, marsupials, primates, felids, canids, antelope, Caprinae, and deer. The first plant CAMP was conducted for St. Helena Island in May 1993. Conservation Assessment and Management Plan workshops have been conducted around the world including parrots, waterfowl, pheasants, Megapodes, quail, partridges and francolins in the United Kingdom; Asian hornbills in Singapore; marsupials in Australia; penguins in New Zealand; Caprinae, primates, felids, canids, and deer in the United States; antelope in the United States and in South Africa. Review sessions for these CAMPs are being conducted in conjunction with regional CBSG meetings in Venezuela, Australia, Japan, the United Kingdom, India, and South Africa. More than 450 persons representing 14 taxon-based Specialist Groups and the 12 organized regional captive propagation programs of the zoo world have participated in the initial workshops and review sessions. Reports from CAMP workshops are available from the CBSG office.

Global Captive Action Plans

An important product that comes from the CAMP process is a Global Captive Action Plan (GCAP) which provides a strategic overview and framework for effective and efficient application and allocation of captive resources to conservation of the broad

group of taxa of concern (i.e., an order, family, etc.). Global Captive Action Plans provide strategic guidance for captive programs at the Global and Regional level in terms of captive breeding and also possible other support (technical, financial) for *in situ* conservation. More specifically, GCAPs recommend which taxa are most in need of captive propagation and hence

1. which taxa in captivity should remain there,
2. which taxa not yet in captivity should be there, and
3. which taxa currently in captivity should no longer be maintained there.

Where captive programs are indicated, there is an attempt to propose the level of captive programs required, reflecting status and prospects in the wild as well as taxonomic distinctiveness. The level of captive program is defined by its genetic and demographic objectives which translate into a target population size that will be required to achieve these objectives. Target population depends on a number of factors, such as the

- level of demographic security
- kind and amount of genetic diversity
- period of time
- size of the wild population
- size of other captive populations of similar species
- reproductive technology available

There will be multiple genetic and demographic objectives depending on the status and prospects of the taxon in the wild and hence different captive population targets: some taxa need large populations for a long time; others need small incipient nuclei or reduced gene pools that can be expanded later if needed. Computer models and software now exist to establish rough targets. Adjustments to current sizes of captive populations will be a result of these recommendations. The approximate scheme that has evolved so far for Global Captive Action Plans is:

<u>Captive Recommendation</u>	<u>Level of Captive Program</u>
I-1 =	Captive population should be developed and managed that is sufficient to preserve 90% of the genetic diversity of a population for 100 years (90%/100). Program should be developed within three years. This is an emergency program based on the present availability of genetically diverse founders.
I-2 =	Initiate a captive program in the future, within three or more years. Captive population should be developed and managed that is a nucleus of 50-100 individuals organized with the aim to represent as much of the wild gene pool as possible. This program may require periodic importation of individuals from the wild population to maintain this high level of genetic diversity in a limited captive population. This type of program should be viewed as protection against potential extirpation of wild populations.

N = A captive program is not currently recommended.

Np = A captive program is not currently recommended but may be reconsidered pending further data

This system proposes that captive populations should be treated as an integral part of the metapopulations being managed by conservation strategies and action plans. Viable metapopulations often may need to include captive components (Foose et al., 1987). The IUCN Policy Statement on Captive Breeding (IUCN, 1987) recommends in general that captive propagation programs be a component of conservation strategies for taxa whose wild population is below 1,000 individuals. It is proposed that captive and wild populations should and can be intensively and interactively managed with interchanges of animals occurring as needed and as feasible. There may be many problems with such interchanges including epidemiological risks, logistic difficulties, financial limitations, etc. But with effort and based on limited but growing experience, these can be resolved. The bottom line is that strategies and priorities should try to maximize options and minimize regrets. Captive populations are support, not a substitute, for wild populations. This kind of system is the premise on which the proposals for captive nuclei are predicated. Basically, these nuclei would be small populations in captivity that would need to be subsidized genetically, and perhaps demographically, from the wild while natural populations are still large enough to fulfill this function without significant detriment ("Not of Concern", "Vulnerable"). This system would normally require the addition of one or two wild-caught individuals per generation to the captive nucleus. If and when the wild populations declined into a greater state of threat (i.e. "Endangered"), this subsidization would cease and the nucleus could be expanded into a full program that ultimately would reinforce (subsidize) the wild population.

The program goal for 90%/100 Years is different from what has been recommended as the general guideline for captive programs in the past, i.e., 90% of genetic diversity for 200 years (Foose, et al., 1986). A shorter time period is proposed for two reasons: 1) it buys time for more taxa that might be excluded from captive programs if a longer time period (e.g., 200 years) is adopted, and 2) it maintains more incentive to secure or restore viable populations *in situ*.

Global Captive Action Plans are developed by a Global Action Plan Working Group which includes representatives from each of the Regional Captive Programs. The GCAPs provide a strategic framework within which the Taxon Advisory Groups (TAGs) in the various organized Regions (ASMP, EEP, SSP, SSCJ) of the zoo and aquarium world will formulate and implement their own Strategic Regional Collection Plans. In reality, Global and the Regional Plans will be interactively and iteratively developed. The Regional TAGs are integrally involved in the development of the Global Captive Action Plans.

Ideally, the Regional TAGs then consider this first draft of the GCAP within a regional context to develop a draft of a

CAMPs, GCAPs...

Regional Collection Plan (RCP). Once draft Regional Plans are formulated, the GCAP process continues as the RCPs of various regions are reviewed at the global level in an attempt to coordinate and, where necessary and agreeable, adjust Regional priorities in an attempt to maximize effectiveness of the international captive community in responding to conservation needs. The GCAP and RCP processes are thus both interactive and iterative. In this way RCPs of the various Regions will not develop in isolation from one another and captive resources can be allocated efficiently and effectively to taxa in need.

Ultimately, the GCAP will recommend how responsibilities for captive programs might best be distributed among organized Regions of the global captive community. Further, the Global Captive Action Plan Working Groups will facilitate interaction and coordination among Regional TAGs as they develop their Regional Collection Plans and Regional Breeding Programs in an attempt to optimize use of captive space and resources for conservation on an international basis.

The GCAPs must confront the realities of limitation in captive habitat (i.e., space and other resources). The priorities for

captive propagation must be reconciled by the potential or capacity of zoos and aquaria. Taxon Advisory Groups in many Regions are now conducting surveys of the amount of captive space available. These surveys are rather sophisticated considering the captive ecologies and taxonomic affinities of the taxa and zoogeographic themes of the institutions. Obviously, the size of populations that can be maintained will be determined by the number of taxa for which programs are developed. The Regional TAGs will most accurately assess captive holding/exhibit space in their Regions using surveys and censuses to supplement studbook databases, ISIS records, national or regional inventories, etc.

It is through the Regional Collection Plans and the Regional Breeding Programs developed under them that the recommendations of the Global Captive Action Plans will be realized. However, to maximize the efficiency and effectiveness of captive resources, Regional Programs will need to be integrated and coordinated to form global programs or Global Animal Survival Plans (GASPs). Programs and masterplans for propagation and management now exceed 200 in the various regions of the zoo/aquarium world and development is in progress to form global programs (GASPs) for at least a dozen taxa.

TABLE 1
ASSESSMENT OF THREAT

	TOTAL TAXA	CRITICAL	ENDANG.	VULNER.	SAFE	UNK	TOTAL THREATENED
BOIDAE/PYTHONIDAE	159	4	13	31	108	3	48 (30%)
VARANIDAE	65	0	2	23	29	11	25 (38%)
IGUANIDAE	66	3	10	27	14	12	40 (60%)
PENGUINS (preliminary)	24	0	3	7	11	3	10 (41%)
WATERFOWL	234	10	24	43	157	0	77 (33%)
GALLIFORMES (excl. Cracidae)	245	5	25	61	142	12	91 (37%)
PIGEONS & DOVES	352	15	28	51	222	36	94 (27%)
CRANES	31	9	7	7	8	0	23 (74%)
PARROTS	428	25	36	78	228	61	139 (32%)
ASIAN HORNBILLS	52	5	15	24	9	0	44 (85%)
HAWAIIAN FOREST BIRDS	65	22	12	23	0	8	57 (88%)
PRIMATES	512	59	69	93	291	0	221 (43%)
CANIDS, HYAENAS	225	8	10	16	191	0	34 (15%)
PROCYONIDAE	20	7	3	2	7	1	12 (60%)
MUSTELIDAE	60	3	5	12	35	5	20 (33%)
LUTRINAE	19	0	4	9	3	3	13 (68%)
VIVERRIDAE	49	2	12	11	20	4	25 (51%)
HERPESTINAE	42	0	4	8	23	7	12 (28%)
FELIDS	264	31	60	104	69	0	195 (74%)
CERVIDS	164	21	29	23	60	31	73 (44%)
ANTELOPE	395	9	21	46	87	232	76 (19%)
CAPRINES	87	10	22	30	25	0	62 (71%) ^a
TOTAL (%)	3,559	246 (6%)	414 (12%)	730 (20%)	1,739 (49%)	429 (12%)	1,345 (38%)

Any and all taxa that are maintained in captivity should be managed as populations. Hence, once taxa are selected for captive propagation, they must be managed by Regional (RCP) and Global (GCPP or GASP) Captive Propagation Programs. Therefore, there should be studbooks, coordinators, masterplans, taxon advisory groups, or other management provisions for these taxa. Moreover, animal spaces as well as the animals themselves should be managed. If zoos and aquaria are to respond to the great need for captive programs, management will increasingly need to be more collective, i.e., more through Taxon Advisory Groups rather than individual taxon management and/or propagation committees.

While captive breeding programs are emphasized in the GCAPs, the Plans also attempt: 1) to identify where and how the captive community can assist with transfer of intensive management information and technology, and 2) develop priorities for the limited financial support the captive community can provide for *in situ* conservation (e.g., adopt-a-sanctuary programs).

The Review Process for CAMPs and GCAPs.

The results of the initial CAMP and GCAP workshops are

published as a Review Edition of a Conservation Assessment and Management Plan. Draft CAMPs are reviewed: 1) by distribution to 100-200 wildlife managers and regional captive programs worldwide for comment, and 2) at regional review sessions at various CBSG meetings and workshops utilizing local expertise with the taxonomic group in question. Thus, CAMP and GCAP workshops are not single events, although sometimes they are singular events. Instead, they are part of a continuing and evolving process of developing conservation and recovery plans for the taxa involved. The CAMP review process allows extraction of information from experts worldwide. Conservation Assessment and Management Plans are continuously evolving as new information becomes available and as global and regional situations and priorities shift. In nearly all cases, follow-up workshops will be required to consider particular issues in greater depth or on a regional basis. Moreover, some form of follow-up will always be necessary to monitor the implementation and effectiveness of the recommendation resulting from the workshop. In many cases, a range of PHVA workshops will result from the CAMP workshops.

Conservation Assessment and Management Plans are "living" documents that will be continually reassessed and

TABLE 2
NUMBER OF INTENSIVE ACTION RECOMMENDATIONS

	TOTAL TAXA	PHVA	MORE <i>IN SITU</i> MGMT	RESEARCH	CAPTIVE BREEDING
BOIDS/PYTHONIDS	159	20	29	94	57
VARANIDS	65	5	32	57	26
IGUANIDS	66	21	42	62	30
PENGUINS (preliminary)	24	17	14	24	13
WATERFOWL	234	92	173	166	150
PIGEONS & DOVES	352	35	77	53	40
CRANES	31	25	23	27	24
PARROTS	428	125	175	199	169
ASIAN HORNBILL	52	35	15	50	45
HAWAIIAN FOREST BIRDS	65	23	59	59	15
PRIMATES	512	136	37	192	229
CANIDS, HYAENAS	225	14	22	47	33
PROCYONIDS	20	10	9	40	12
MUSTELIDS	60	7	37	78	12
LUTRINAE	19	3	19	39	2
VIVERRIDS	49	9	20	56	7
HERPESTINAE	42	5	13	40	6
FELIDS	264	30	80	120	98
CERVIDS	164	45	27	127	55
ANTELOPE	395	62	111	119	138
CAPRINAE	87	51	73	93	31
TOTAL (%)	3,314	770	1,087	1,742	1,192

CAMPs, GCAPs...

revised based upon new information and shifting needs. The current CAMP and GCAP process will continue both by its application to new groups of taxa and the refinement of the ones already under way. Over the next five years, it is intended to initiate the CAMP/GCAP process for all terrestrial vertebrate groups (the so-called tetrapods) and for selected fish groups. Conservation Assessment and Management Plans will also be conducted for selected invertebrate and plant groups.

The CAMP process is central to establishment of global priorities for intensive conservation action. Conservation Assessment and Management Plans provide a global framework for intensive management in the wild for captivity. Wildlife agencies and Regional Captive Breeding Programs can use the CAMPs as guides as they develop their own action plans. The long-term impact of the CAMP process on global priority setting will be important. For the first time within the near future, wildlife and zoo animal managers worldwide will have a set of comprehensive documents at their disposal, collaboratively, and scientifically developed which establish priorities for global wild and captive species management and conservation. Ultimately, these processes will catalyze the wise worldwide use of limited resources for species conservation.

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Proposed ISO Standards for Transponders

Recently, concern has developed with respect to the proposed establishment of international standards for transponders by the International Standards Organization (ISO). The standards, which are being established for radio frequency identification (RFID), are an attempt to unify the incompatible operating systems currently in use by different manufacturers. Parameters under consideration for standardization include: transmission system (full duplex vs. half duplex), transmission and reception frequencies, information coding, and performance standards. It should be pointed out, however, that the development of these standards is for agricultural applications only and have no relevance to applications involving pets, wildlife, or zoological specimens.

Competing proposals for consideration by ISO have been advanced by two groups of manufacturers (Group #1 = Destron/IDI/Hughes and Texas Instruments; Group #2 = AEG, Datamars, NEDAP, and Trovan/Euro ID). The CBSG Task Force on electronic identification has investigated this situation and has determined the proposed standards submitted by either group appear to be beyond what is technically possible for an implant of the acceptable size and cost for agricultural use. Representatives of several manufacturers have also suggested that they do not feel that the proposed ISO standardization will ever become reality.

When recommendations were made to the CBSG as to which system should be used, they were based on several assumptions. The most overriding assumption was that the technology would continue to develop. However, it was necessary to make a decision based on the equipment which was available at a given point in time. With that information and the currently available products, *it is our opinion that the Trovan system is still the most appropriate choice for conservation applications.*

Recently, representatives from several of the major manufacturers (Trovan, Destron, Texas Instruments, AVID) met in Dallas, Texas, USA to attempt to resolve some of the inter-manufacturer conflict. It is our understanding that an agreement was reached in principle to share technologies such that any manufacturer will be able to legally manufacture a reader which will be able to read transponders from all of the competing systems. Such a device is currently being manufactured by a third party, but there are some legal issues that must be resolved before it can be mass produced and made available on the open market.

This report was submitted by Evan Blumer, VMD.

AAZPA Species Survival Plan

Genetic Variation Maintenance Strategy



Maintenance of genetic variation is one of the most important goals of an organized captive breeding program. There are three types of genetic variation that can be managed.

1. Heterozygosity is genetic variation within an animal and is lower in inbred animals.

2. Gene diversity is a measure of the variation in allele frequencies in the population, and can be thought of as the variation of founder's representations in the living descendant population. Gene diversity is lost when founder lines become overrepresented relative to and at the expense of other founder lines.

3. Allelic diversity is a measure of the total number of different alleles at a locus in the living descendant population. Allelic diversity is also lost when founder lines become overrepresented, but allelic diversity is lost at a different rate than gene diversity and can be managed independently and at the expense of gene diversity.

There are a number of breeding strategies that have been developed for captive breeding programs. The different strategies were designed to maximize maintenance of some form of genetic variation. Although all three types of manageable genetic variation are important, it is not possible to maximize retention of all three simultaneously. The AAZPA Species Survival Plan uses a strategy called Mean Kinship that maximizes retention of gene diversity. It has also been shown to be one of the best strategies for the long-term maintenance of all three types of genetic variation. Mean Kinship replaced Founder Importance Coefficients as the method of choice because it takes into account loss of founder alleles and yields much greater maintenance of all types of genetic variation.

Mean Kinship is the average relatedness of an animal to all animals in the living descendant population. Individuals with low Mean Kinships have genes that are on average underrepresented in the population and are therefore animals with high breeding priority. By pairing animals with similar Mean Kinships, rare and common genes are not combined in a single animal. This is important as animals that carry both rare and common genes cannot be used to increase the frequency of rare genes in the population because the frequency of common genes would also increase when they produce offspring.

A drawback to using Mean Kinship is that full siblings have identical Mean Kinship values until they produce offspring. This means that full siblings would often be paired if only Mean Kinship was used to make pairings, resulting in substantial loss of heterozygosity. Therefore, the inbreeding coefficient of potential offspring is evaluated secondarily when pairings are made. There can be a slight relaxation of the rule to pair animals with similar Mean Kinships in cases where the relatedness of the paired animals is relatively high. However, inbreeding is not heritable and can be eliminated in succeeding generations by pairing the inbred animals with an unrelated mate. The same is

not true in the case of combining rare and common alleles in a single animal. Once rare and common alleles are contained in a single animal its utility in the population is diminished. Therefore, relatedness among mates should only be a secondary consideration when animals are paired.

A related topic is selection of individuals for gamete banking and artificial insemination. Stored gametes can be used to infuse genetic variation into the captive population in the future. Selection of important individuals for gamete banking is a completely distinct process from selection of important individuals for breeding today. Mean Kinship values are relative to the living descendant population only and change whenever there is a birth or death in the population. Therefore, Mean Kinship values are only relevant for present day pairings and artificial insemination and cannot be used for selection of animals for gamete banking for future use.

This report was submitted by Kevin Willis and Robert Wiese, AAZPA Conservation Center.

Import Bans and Quotas of Exotic Birds

The United States Fish & Wildlife Service (USFWS) has placed an immediate prohibition on the importation of ten species of exotic birds listed in the Appendices to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; also see article on pg. 22-23). The ten species placed under immediate import prohibition include:

- Agapornis fischeri* (Fisher's lovebird)
- Amazona oratrix* (Double yellow-headed amazon)
- Amazona viridigenalis* (Green-cheeked amazon)
- Aratinga auricapilla* (Golden-capped conure)
- Brotogeris pyrrhopterus* (Grey-cheeked parakeet)
- Cacatua alba* (White cockatoo)
- Cacatua goffini* (Goffin's cockatoo)
- Cacatua haematopygia* (Red-vented cockatoo)
- Cacatua sulphurea* (Lesser sulphur-crested cockatoo)
- Lorius garrulus* (Chattering lory)

In addition, for any species of birds listed in the Appendices to CITES, there will be an importation quota on the maximum number that can be imported into the United States from 23 October 1992 - 22 October 1993. Species affected by the importation quota are listed in the 4 December 1992 *Federal Register*. As of 22 October 1993, the importation of all species of exotic birds listed in any Appendices to CITES will be prohibited unless the species is listed in an approved list.



The History of Captive Breeding Specialist Group



First called the Zoo Liaison Committee, the CBSG had several chairmen before Dr. U.S. Seal was appointed to its chairmanship by Sir Peter Scott in 1979. The CBSG originally was formed to meet the need for interface between the academic or field conservation community, as traditionally represented by the SSC taxon-based Specialist Groups, and the captive breeding community. The IUCN developed Terms of Reference for CBSG at the time of Dr. Seal's appointment which clearly defined IUCN's expectations and goals for what became its most rapidly-evolving interdisciplinary Specialist Group.

The initial members of the newly-restructured CBSG met informally at the World Conference on Breeding Endangered Species in Captivity held in San Diego in 1979. The first formal CBSG annual meeting was held in Jersey in 1980. The following year, the annual meeting was held in London.

In 1981, Dr. Seal was re-appointed CBSG Chairman for the 1982-84 triennium. During this triennium, Dr. Seal developed the first model for a Species Survival Plan (SSP) following the International Tiger Symposium in Leipzig. Several participants vividly recall Dr. Seal calculating Siberian tiger inbreeding coefficients by hand during a long journey by bus in what was then East Germany. In 1983, the first formal SSP (Siberian tigers) was presented by Dr. Seal to the American Association of Zoological Parks and Aquariums (AAZPA) institutions holding the species. All subsequent SSPs were modeled after the Siberian tiger program. The 1984 CBSG annual meeting began an active

IUCN review of studbooks and was attended by most of the membership – 15 delegates – in a living room at St. Catherine's Island.

A major turning point came in 1985, when CBSG became involved with the development of the recovery program for the critically-endangered black-footed ferret. This effort laid the foundation for the Population Viability Assessment program which incorporated a computer-simulation modeling tool later to become VORTEX. Central to the development and subsequent effective recovery of the black-footed ferret were experts on breeding viverrids and mustelids. They were included as advisors to develop the captive breeding program on which the success of the recovery subsequently hinged. The CBSG published a book on the black-footed ferret effort which won a Wildlife Society award one year later. In 1985, for the first time, the CBSG annual meeting was held in conjunction with the annual meeting of the International Union of Directors of Zoological Gardens in Calgary.

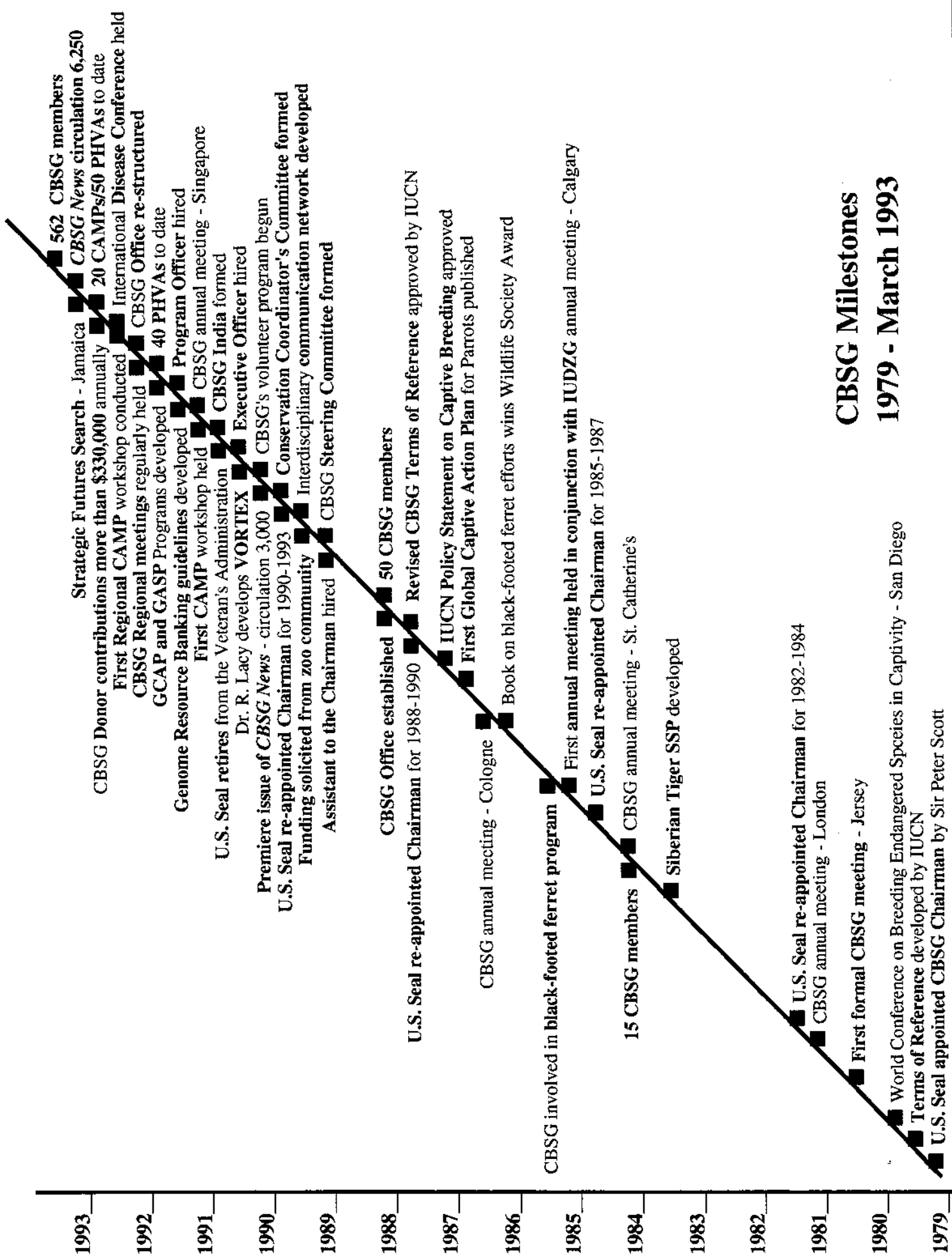
In 1986, the first Global Captive Action Plan for Parrots was developed and distributed. The 1986 annual CBSG meeting took place in Cologne where the IUCN Policy Statement on Captive Breeding was drafted. The meeting in 1987 was convened in Bristol, U.K. The official IUCN Policy on Captive Breeding, developed with input from CBSG, was approved in 1987. Dr. Seal was re-appointed CBSG Chairman for the 1988-1990 triennium. The CBSG Terms of Reference were re-drafted and approved by the IUCN. By this time, CBSG membership had grown to 50 individuals. In 1988, a CBSG office was established at the Minnesota Zoo, staffed by Dr. Seal and Dr. Terry Kreeger. The 1988 annual meeting was held in Stuttgart. Judi Mikolai joined CBSG as Assistant to the Chairman in January 1989.

At the 1989 annual CBSG and IUDZG meetings in San Antonio, pledges for donations to provide core support for the CBSG office were solicited from attending zoo directors. In all, 57 institutions pledged \$228,500, with pledges ranging from \$500 to \$10,000 annually. The CBSG Steering Committee was officially formed at the San Antonio meeting. Following the proliferation of numerous SSPs, the Global Conservation Coordinator's Committee was also created.

As CBSG grew, wildlife managers, non-governmental organizations, governments, and the private sector became more integrally involved in CBSG's activities in addition to the captive breeding community. The CBSG's network became widespread and highly effective, providing an interdisciplinary vehicle for communication and collaboration between individuals from each of the sectors mentioned above. The expansion of this network prompted the publication of *CBSG News*. The premiere issue of *CBSG News* was sent to 3,000 individuals and institutions in March 1990. Dr. Terry Kreeger was retained in the capacity of Editor. The CBSG's volunteer program also began early in 1990.



Dr. Ulysses S. Seal, Chairman CBSG



1993
1992
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- Strategic Futures Search - Jamaica
- CBSG News circulation 6,250
- 562 CBSG members
- CBSG Donor contributions more than \$330,000 annually
- 20 CAMPS/50 PHVAs to date
- First Regional CAMP workshop conducted
- International Disease Conference held
- CBSG Regional meetings regularly held
- CBSG Office re-structured
- GCAP and GASP Programs developed
- 40 PHVAs to date
- Genome Resource Banking guidelines developed
- Program Officer hired
- First CAMP workshop held
- CBSG annual meeting - Singapore
- U.S. Seal retires from the Veteran's Administration
- CBSG India formed
- Dr. R. Lacy develops VORTEX
- Executive Officer hired
- Premiere issue of CBSG News - circulation 3,000
- CBSG's volunteer program begun
- U.S. Seal re-appointed Chairman for 1990-1993
- Conservation Coordinator's Committee formed
- Funding solicited from zoo community
- Interdisciplinary communication network developed
- Assistant to the Chairman hired
- CBSG Steering Committee formed
- CBSG Office established
- 50 CBSG members
- U.S. Seal re-appointed Chairman for 1988-1990
- Revised CBSG Terms of Reference approved by IUCN
- IUCN Policy Statement on Captive Breeding approved
- First Global Captive Action Plan for Parrots published
- CBSG annual meeting - Cologne
- Book on black-footed ferret efforts wins Wildlife Society Award
- CBSG involved in black-footed ferret program
- First annual meeting held in conjunction with IUDZG annual meeting - Calgary
- U.S. Seal re-appointed Chairman for 1985-1987
- 15 CBSG members
- CBSG annual meeting - St. Catherine's
- Siberian Tiger SSP developed
- U.S. Seal re-appointed Chairman for 1982-1984
- CBSG annual meeting - London
- First formal CBSG meeting - Jersey
- World Conference on Breeding Endangered Species in Captivity - San Diego
- Terms of Reference developed by IUCN
- U.S. Seal appointed CBSG Chairman by Sir Peter Scott

CBSG Milestones 1979 - March 1993

CBSG History...

One of CBSG's primary strengths is that it has brought a scientific approach to defining problems and determining management strategies for conservation activities, both in captivity and in the wild. Dr. Robert Lacy's development of the VORTEX program was pivotal in moving CBSG programs forward. This user-friendly small population biology tool was immediately integrated into CBSG's workshops, further expanding the Population and Habitat Viability Assessment (PHVA) program. Combining field and captive data and expertise, PHVAs continue to provide a unique forum in which wildlife managers, academics, and captive breeding experts can work together in species management and recovery planning.

In May 1990, Dr. Tom Foose was hired as CBSG Executive Officer. The CBSG annual meeting was held in Copenhagen.

In late 1990, Dr. Seal retired from the Veteran's Administration Hospital after 30 years of service to devote himself full-time to conservation activities as CBSG's Chairman. His chairmanship was renewed for the 1991-1993 triennium. Lisa Laqua joined the staff as Secretary in 1991. The first Conservation and Management Plan (CAMP) workshop (for primates) was held in Minnesota in March 1991. Following a CAMP for waterfowl in August, a CAMP workshop for Asian hornbills was held in conjunction with the CBSG annual meeting in Singapore. At this meeting, Genome Resource Banking guidelines were developed and subsequently published. The CBSG's first satellite, CBSG India, also evolved in 1991. In December, CBSG's staff expanded again with the addition of Dr. Sue Ellis as Program Officer.

As outgrowths of the CAMP program, the Global Captive Action Plan (GCAP) and Global Animal Survival Plan (GASP) programs were developed in 1992. The first GCAP was held in London for rhinos. The first GASP workshop was held in Scotland for tigers. By the end of 1992, nearly 40 PHVA workshops had been conducted. The CBSG regional meetings were now regularly held in conjunction with regional zoo association meetings worldwide. In 1992, several major changes occurred in CBSG's infrastructure. The funding year was changed from a October-September cycle to a January 1-December 31 cycle. The CBSG office was restructured with the elimination of the Executive Officer position.

The landmark International Conference on Implications of Infectious Diseases for Captive Propagation and Reintroduction Programs of Threatened Species, co-hosted by CBSG in November, was immensely successful. In December, the first regional CAMP was carried out on Hawaiian forest birds in conjunction with the U.S. Fish and Wildlife Service. Shelly O'Brien joined CBSG as Secretary, bringing the full-time paid staff to four.

By 1993, the institutional donor base had doubled in number from 57 institutions in 1989 and the funding base had increased by more than \$100,000. The total amount pledged has increased to \$331,500 from 117 institutions. In February 1993, CBSG held a Futures Search Workshop in Jamaica to plot its direction and strategy for the next decade. By the end of March, the 20th

CAMP workshop had been conducted and PHVAs completed for 50 species. There were 562 members of CBSG and CBSG News had a circulation of 6,250.

The history of CBSG is filled with many critical events which have shaped the development of the organization including workshops and meetings, programs, sharing of information, and informal conversations. During the 1993 Futures Search Workshop, a foundation for new directions and vision was established starting with an amplification of the current network and programs as well as an aim to secure the future of CBSG.

Many positive organizational qualities were identified by workshop participants. Highly-valued organizational characteristics centered around three main areas:

1. The CBSG Network

One of the primary qualities identified was the priority that CBSG places on the exchange and sharing of information with free dissemination of products and data. The communication network of CBSG was seen as critical to keep members and constituents up-to-date on technology and new programs. Its facilitation of problem-identification and problem-solving, as well as being a forum for discussion of global conservation issues, is highly valued. Its ability to facilitate mutual problem-solving by people with diverse interests is appreciated and was identified as the foundation upon which most, if not all, the workshop successes are based.

2. CBSG's Programs, Processes, and Products

The continuous evolution of CBSG in terms of both the organization itself and in terms of its programs, processes, and products is a creative, vital force within the conservation community, providing a forum for inter-regional, interdisciplinary cooperation and collaboration. Its constituents value CBSG's continual innovation, as well as the scientific approach that it has brought to conservation problem-solving. The CBSG has a reputation for being a highly ethical and scientifically-credible organization. Although the speed with which CBSG's programs move has been perceived as chaotic or threatening by some factions, the rapidity with which CBSG has been able to respond to crises was seen as a valuable model for the conservation community. As stated by one participant, "CBSG has shown us that we can respond faster than we thought."

3. CBSG's Leadership

The CBSG's acknowledged leadership in the conservation community is highly valued. The dedication of the chairman and the driving force that he has provided for both the zoo and wildlife community were felt to be essential to the success of the organization. Questions of succession were raised.

Requisite, however, to ensuring continuity in the organization and expanding the base of individuals who can carry forth CBSG's life-force into the future is the securing of a stable funding base. The CBSG history has established a legacy of commitment, leadership, and action. The future should see the expansion of CBSG's role in the international effort to preserve our natural heritage.

This report was prepared by S. Ellis, CBSG Program Officer

Status of the Amur Leopard

Status in the wild

The Amur leopard (*Panthera pardus orientalis*) is one of the most distinctive and the most northerly of all leopard subspecies. It is also among the most critically-endangered mammals in the world. It is believed to be extinct in South Korea and either extinct or critically-endangered in China. Its status in North Korea is unknown. About 15–25 were thought to survive in the Russian far east before the present wave of uncontrolled poaching occurred in this region. Almost certainly fewer now survive and the Russian Amur leopard population may be approaching extinction.

Status in Captivity

The 1991 International Leopard Studbook lists 129 Amur leopards in 34 collections. The captive population is faced with three major problems:

1. Strong genetic over-representation of two founders (F2 and F3)
2. High levels of inbreeding in many animals derived from F2 and F3
3. Hybridization (see below)

Founder F2 was almost certainly not *Panthera pardus orientalis*. It was obtained from Hong Kong and its place of birth is unknown. Furthermore, most experts now agree that its coat pattern and body morphology is highly atypical of the subspecies *P. p. orientalis*. These atypical traits are now expressed in most animals derived from the F2/F3 founders pair. Furthermore, this line also produces melanistic animals, which have never been recorded among Amur leopards in the wild. Although the appearance of melanism as a spontaneous mutation is not completely impossible, it seems more likely that the gene was brought into the captive "Amur leopard" population through founder F2. Melanism has been recorded in the wild in the Himalayan leopard (*Panthera pardus pernigra*) which is another thick-coated and cold-adapted subspecies. Founder F2 and many of its offspring resemble the Himalayan leopard much more closely than they resemble *P. p. orientalis*. In addition to founder F2, the origin and subspecies identity of founder F89 may also be questionable.

Only few living captive Amur leopards have received a genetic contribution from F89, but most have (often strong) genetic contribution from F2. Of the >130 Amur leopards in captivity outside China and Korea, only seven males and two females are not related to founder F2 and can, therefore, be considered pure *P. p. orientalis*. All of these nine animals are either wild-caught or derived from the Pyongyang Zoo (North Korea). At present, only one of the two females is paired to a pure male and, so far, no pure offspring has been produced from these nine animals (although a number of hybrids have). There is an additional pair of pure Amur leopards of North Korean origin in the Beijing zoo (China) and an unknown number of animals in

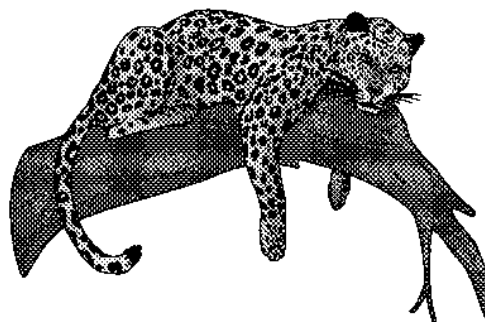
the Pyongyang Zoo which are not registered in the studbook. However, these animals may not be available for a coordinated breeding program.

Captive Breeding Program

With only two pure females and seven males potentially available for a coordinated breeding program, establishing a genetically-healthy purebred population of Amur leopards may be difficult, but not impossible. To achieve this goal, an Amur Leopard Breeding Station is now planned in the Russian far east and it is hoped that a few juvenile leopards can be obtained from the wild to supplement the captive-bred population.

Establishment of the Amur Leopard Breeding Station is spearheaded by Anatole P. Bragin, the world's leading authority on this rare cat, who is concerned that the Amur leopard will slip to extinction soon.

A 190-hectare compound has already been obtained close to where the last wild Amur leopards survive in the Russian far east.



However, establishment of the complete breeding center can only happen if enough financial and logistic support can be obtained from the international captive breeding community.

Another alliance is needed, like the one between the AAZPA Tiger SSP and Indonesian authorities which led to the building of a Sumatran tiger breeding compound in Indonesia.

The widely-accepted fact that much of the existing captive population is hybridized should be discussed as a matter of some urgency and recommendations should be drawn up as to how to manage both the pure and the hybrid populations.

Iberian Lynx Breeding Center Opened

A captive breeding center for the Iberian lynx (*Lynx pardinus*) was recently opened in the National Park of Doñana, Spain. It is believed that the center will play an important role in protecting the limited gene pool of the species as well as provide detailed information of the animal's biology.

Additional information may be obtained from Juan Manuel de Benito, ICONA, El Subdirector General de Espacios Naturales, Oficina de Anillamiento, Gran Via de San Francisco, 35, 28005 Madrid, Spain.

Report and Recommendations...

Arabian Gazelle Conservation Workshop in Saudi Arabia

Four recognized species of gazelles inhabit the Arabian peninsula: *Gazella gazella*, *G. subgutturosa*, *G. dorcas*, and *G. saudiya*. Putatively, there are two additional peninsular species: *G. bilkis* and *G. arabica*. Wild populations of *Gazella dorcas*, *G. gazella*, and *G. subgutturosa* are considered threatened by IUCN, *G. saudiya* may exist only in captivity, and *G. bilkis* and *G. arabica* are known only from museum specimens. Conservation efforts for these gazelles are thwarted by taxonomic confusion and the doubtful origin of captive populations. In some cases, captive populations are substantial in size and/or exceed numbers known to exist in the wild.

During the last five years, there has been tremendous progress in gazelle conservation and taxonomy in the Arabian peninsula. The taxonomic status of some of the taxa has been clarified and the implementation of the first conservation measures has allowed the recovery of some wild populations. However, there was a real need to summarize information and to define the research and conservation needs that will allow progress in gazelle conservation to continue. For this purpose, a workshop entitled "Establishing Priorities for Gazelle Conservation in the Arabian Peninsula" was held at the National Commission for Wildlife Conservation and Development (NCWCD) in Riyadh, Saudi Arabia from 31 October to 3 November 1992. Seventy-five biologists, including NCWCD staff and invited speakers from the Middle-East, Australia, Europe, North America, and Africa, participated in this workshop. Presentation topics (authors in parentheses) included:

- Developments in gazelle conservation and taxonomy in Saudi Arabia since the creation of the NCWCD in 1986 (A. Greth, National Wildlife Research Center, NCWCD, and D. Williamson, King Khalid Wildlife Research Center, NCWCD).
- Gazelle taxonomy: state-of-the-art and uncertainties of species and subspecies classification (C. Groves, Australian National University).
- Current status of wild and captive gazelle populations in Saudi Arabia (D. Williamson and H. Tatwani, NCWCD).
- Implications of taxonomic problems for conservation (D. Williamson).
- Systematic approach to assessing subspecies validity, utilizing considerations of distribution, natural history, and ecology, along with taxonomic investigation by morphometric, cytogenetic, allozyme and DNA analysis, with two case studies: *G. gazella* and *G. subgutturosa* (A. Greth et al.).
- Modern techniques in taxonomy and their reliability (E. Harley, University of Cape Town, and M. Vassart, National Veterinary School of Toulouse).
- Chromosomal evolution in gazelles and its relevance to

conservation (S. Kingswood and A. Kumamoto, Center for Reproduction of Endangered Species, Zoological Society of San Diego).

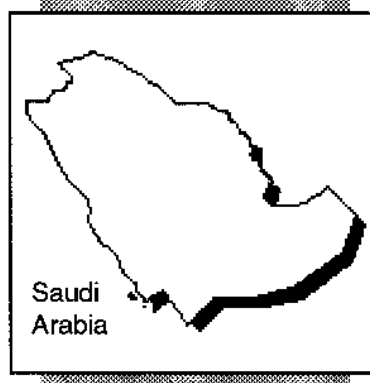
- DNA-based methods in mammalian taxonomy and population genetics (E. Harley et al.).
- Taxonomic relationships between the different subspecies of *G. gazella* as determined by cytogenetic and electrophoretic techniques (M. Vassart).
- Systematics of *G. subgutturosa* and practical implications for gazelle conservation (S. Kingswood et al.).
- Enigmatic *G. bilkis* and urgency of field research and conservation in Yemen (A. Greth et al.).
- Genetic studies of *G. dorcas* and putative *G. saudiya* (P. Rebholz, Institute of Zoology, Zoological Society of London, and D. Williamson).

- Measures to conserve wildlife in Kuwait (S. Omar, Kuwait Institute for Scientific Research).
- Captive breeding programs for gazelles in Bahrain (M. Al-Dosary, Al-Areen Wildlife Park) and in United Arab Emirates (M. Abu-Zaid, Al-Ain Zoo and Aquarium).
- Ungulate conservation in Ethiopia: a case study for objectives and actions of the IUCN/SSC/ASG (C. Hillman, Wildlife Conservation International-Ethiopia).
- Gazelle survey in southwestern Saudi Arabia, preliminary results (C. Magin, World Conservation Monitoring Center and National Wildlife Research Center).

The following guidelines were adopted as priority conservation and research needs in the Arabian peninsula for the next years. Emphasis is placed on *in situ* protection of remnant gazelle populations.

Recommendations for *in situ* Conservation and Research (in chronological order):

1. Survey all areas to determine the current status of gazelle populations; augment historical data with information from locals and ground and aerial surveys.
2. Protect areas relevant and significant to gazelle and ecosystem conservation, not necessarily as totally protected areas, but including conservation integrated with other land use, and using local people to implement and participate in the conservation process; particularly for all remnant populations in the Hejaz Mountains.
3. Obtain tissue samples from wild gazelle populations to determine their taxonomic status.
4. Conduct field studies of the ecology, behavior, and dynamics of wild gazelle populations using radio-telemetry and other techniques to record any periodic temporal variation.
5. Monitor the status of known wild populations annually.



Recommendations for *ex situ* Conservation and Research (in chronological order):

1. Create and/or maintain minimum viable captive populations of the following threatened taxa: *G. g. cora*, *G. g. erlangeri*, *G. s. marica*, *G. saudiya*, and *G. dorcas ssp.* If possible, founders should be wild-caught and/or of known provenance.

2. For captive populations of critical taxa involving specimens of doubtful provenance, maintain until their origin is determined or wild-caught specimens become available.

3. Define and describe both extant and extinct gazelle taxa (species, subspecies) in the Arabian peninsula through interdisciplinary analysis of data on morphology, distribution, ecology, behavior and genetics; complete the analysis of mitochondrial genes, which seems to be an appropriate tool, on representative samples from each taxon.

4. Reduce captive populations of non-critical species.

5. Reintroduce threatened taxa into suitable areas of their historical range or into areas closest to their historical range when their original range is no longer and cannot be safe for re-introduction. When the indigenous taxon (i.e., subspecies) is extinct, the most closely related taxon may be considered for reintroduction.

6. Use specimens from the present captive populations of questionable provenance for re-introduction only when no other suitable form is available or likely to become available in the near future.

Recommendations for Particular Taxa:

Gazella gazella ssp.:

1. Compare the mitochondrial DNA of *G. g. gazella* (wild-caught specimens from Palestine) with *G. g. cora* (wild-caught specimens from southwestern Saudi Arabia).

2. Determine the taxonomic status of animals at King Khalid Wildlife Research Center (KKWRC) by comparison with these two populations.

3. With the same technique, determine the taxonomic status of the putative subspecies: *erlangeri* (KKWRC specimens), *farasani* (wild-caught specimens), and *muscatensis* (collaborate with Oman to sample wild-caught specimens).

4. Conduct a survey in Oman to assess the status of the subspecies *muscatensis*, and in Yemen to assess the status of the subspecies *erlangeri*.

Gazella bilkis:

1. Conduct a survey in Yemen of all gazelle populations to assess the status of this species.

2. If not extinct, collect samples for comparison with *G. g. erlangeri*.

3. Continue attempts to extract DNA from museum specimens for comparison with the different subspecies of *G. gazella*.

Gazella subgutturosa ssp.:

1. Compare samples with cytogenetic, electrophoresis and mitochondrial DNA techniques from native population of *G. s.*

subgutturosa (e.g., wild-caught specimens from Iran or captive specimens at Al Wabra, Qatar, that are originally from Pakistan) with wild-caught specimens from northern Saudi Arabia (Harrat al Harrah or Al Khunfah protected areas) and from the southern Arabian peninsula (Oman and Yemen, if possible) and with captive specimens at KKWRC.

Gazella dorcas:

1. Survey Al Khunfah protected area and Al Hijr proposed protected area to determine the status of what is referred to as the "red gazelle".

2. Create a captive population of *G. dorcas* putatively from the Arabian peninsula with specimens from Al Wabra (Qatar) for future reintroductions.

Gazella saudiya:

1. Attempt to extract DNA from museum specimens (Natural History Museum, London) for comparison with captive specimens of putative *Gazella saudiya* at Al Areen Wildlife Park (Bahrain) and Al Ain Zoo and Aquarium (United Arab Emirates).

2. If the taxonomic status of these captive populations is confirmed, create a captive population with collaborative efforts between KKWRC, Al Ain Zoo and Aquarium, and Al Areen Wildlife Park for future reintroductions.

Gazella arabica:

1. Attempt to extract DNA from museum specimens (Berlin Zoological Museum) for comparison with other gazelle species of the Arabian peninsula, and particularly *G. gazella farasani*.

Proceedings will be published in 1994. A free copy of the workshop program and abstracts may be obtained by contacting Arnaud Greth.

This report was submitted by Arnaud Greth, head of the Veterinary and Mammals departments at the National Wildlife Research Center (National Commission for Wildlife Conservation and Development), P.O. Box 1086, Taif, Saudi Arabia, and Steve Kingswood, research associate at the Center for Reproduction of Endangered Species, Zoological Society of San Diego, P.O. Box 551, San Diego 92112, USA.





Recent Developments in Captive-breeding and Reintroduction of the Arabian Oryx in Saudi Arabia

The Arabian oryx (*Oryx leucoryx*) has become one of the most illustrative symbols of the recovery of a species extinct in the wild by *ex situ* conservation measures. After its successful reintroduction during a pilot project in Oman in the 1980's (Stanley-Price, 1989), the reintroduction of the species over a wide range also seems promising in Saudi Arabia.

The captive breeding of the Arabian oryx began in the Kingdom of Saudi Arabia in April 1986, when 57 animals were transported from the late King Khalid farm in Thumamah to the National Wildlife Research Center (NWRC) at Taif. Unfortunately, a severe outbreak of tuberculosis drastically reduced the number to 37 individuals in October, 1986. The implementation of a strategy based on (1) drastic sanitary measures, (2) a systematic nine-month antibiotic treatment, (3) annual checks for the evidence of the infection and (4) the hand-rearing of calves from infected animals, allowed the breeding of tuberculosis free animals. The founder population, called A generation, is now kept isolated to avoid any risk of tuberculosis transmission. The second generation, called B generation, is comprised of the hand-reared tuberculosis-free oryx. This group will become the main herd for the production of suitable animals for reintroduction. Animals of the third generation, called C generation, are reared by their mother in large enclosures and transported to the reintroduction site when 9–15 months old.

After the eradication of tuberculosis, efforts were directed towards a rapid growth of the captive population, as well as genetic research and management. In a survey of allozyme variation in 61 individuals from Taif, it was found that three out of 18 loci were polymorphic ($P = 16.7\%$) and that the mean heterozygosity ($H = 0.052$) was relatively high compared to other species of artiodactyls (Vassart et al., 1991). A chromosomal Robertsonian translocation was discovered in Taif (Cribiu et al., 1990), resulting of the fusion of chromosomes of the acrocentric pairs 17 and 19. The same translocation was then described in Jordanian, Omani, and Qatari individuals. After a meeting of the International Wild Arabian Oryx Advisory Panel in 1990, it was decided to leave translocation carriers in wild populations but to reintroduce only individuals with normal karyotype ($2n = 58$). It was decided to remove the three carriers in Mahazat As Said because the situation was still under control.

According to the strategy of the oryx reintroduction program in Saudi Arabia, sustainable wild populations should be built up in 50–100 years. Therefore, the goal for the genetic management program was the maintenance of 90% of the genetic variation of the original population over a period of 100 years. As a satisfactory growth rate is attained at the NWRC, it was calculated (Ballou, 1990) that we will reach this goal with a minimum viable population size of 200 B generation oryx, actively managed for genetic purposes. Although the pedigree of

the founders was unknown, a genetic management program was constructed using a reasonable hypothesis about the history of the herd, possible relatedness between founder individuals, and multilocus DNA fingerprinting data (Greth et al., 1992).

To increase the genetic variability, exchanges have been developed with other Middle Eastern herds. Animals from Bahrain, Qatar, Abu Dhabi, and the U.S. were introduced within the A generation and considered as unrelated founders. Because the herds of Abu Dhabi, Qatar, and Bahrain have different founder origins with few contacts with the "World Herd", the NWRC herd is now the most genetically diverse oryx herd in the world having identified blood lineages.

On 15 December 1992, the NWRC herd numbered 146 (73.73) animals. Considering the success over the past five years and the expertise gained in the breeding of the Arabian oryx, a herd of 200 B generation animals by 1998 seems realistic assuming that no stochastic events happen. The B generation group should be maintained at this level. More than 100 oryx suitable for reintroduction should then be produced each year. Twenty-two NWRC C generation oryx have already been successfully reintroduced.

The protected 2,200 km² area of Mahazat As Said, located about 150 km northeast of Taif, was chosen as the first potential reintroduction site for Arabian oryx and it was fenced off against hunting and to allow recovery of the vegetation. On 1 March 1990, the first herd of 17 captive-bred Arabian oryx was released. The Mahazat As Said population has shown a rapid constant growth with an increase of more than 900% in four years. As of 31 December 1992, the oryx numbered 84 with 60 free-ranging animals within the reserve and 24 animals in the pre-release area scheduled for release in January, 1993. Overall, 47 oryx have been born in Mahazat and 55 were immigrants. The sex and age structure of the population reflects a good future reproduction potential with a high percentage of females being young animals. Natural mortality among adult individuals was predominantly caused by injuries received in dominance fights. Five males have died in this manner.

All animals adapted swiftly and integrally to their new environment without any need for supplemented food or water. Also, the remarkable recovery of the habitat in terms of plant recolonization and production gives a good perspective for the successful re-establishment of a self-sustaining population in Mahazat As Said. A strategy for a countrywide re-establishment of the Arabian oryx has been developed by the NWRC and the National Commission for Wildlife Conservation and Development. This way, the successful return of the Arabian oryx, as a flagship species for conservation, will hopefully continue to provide one of the primary stimuli for the development and establishment of further conservation programs in Saudi Arabia.

ISIS

NEWS



Newsletter of the International Species Information System

Vol. 3, No. 1

E-MAIL

E-mail (electronic mail) is a system whose "time has been about to come" for several years. It offers speed and convenience, can move data files or programs as well as e-mail messages, and is increasingly inexpensive, or even free in some cases. It is now commonplace in academia worldwide thanks to an informal global system called the INTERNET and several other systems which link directly to INTERNET, such as BITNET and JANUS. For those with large budgets, one can become an INTERNET node - but for most of us off campus, the best way to get access to INTERNET is to contact a local University about opening a small computer account and acquiring an INTERNET address. Many Universities are quite willing to do this, especially for an education-oriented non-profit organization. If this can be arranged, you need a computer and modem and communications software; messaging costs should be nominal. ISIS now has an INTERNET address, isis@staff.tc.umn.edu, (at our local University of Minnesota) which we check daily - moving messages addressed to any individual staff member to them.

There are also commercial electronic information systems that offer e-mail among multiple other services. Recently, these became more economical. Compuserve is one of these services which offers access to a number of computer-oriented "forums", such as the FOXPRO Forum. One can go to, and from, INTERNET from Compuserve and several of its competitors. ISIS' ID number on Compuserve is 76077,561. We normally check daily for messages.

ISIS also operates our own Bulletin Board System, which anyone can call (by modem) at their own expense, leaving messages, transferring files, etc. This service has been utilized mostly by several individuals who co-develop software with ISIS, and also by several member organizations who choose to upload their monthly ARKS data by modem to the Bulletin Board. Our Bulletin Board service was unreliable during late 1992, due to multiple failures of the 10-year-old IBM PC which operated it! However, new and improved BBS software is again operational on a spry 6-year-old PC AT. Our Bulletin Board number is U.S. (612)432-9292.

We are engaged in learning our way around these new global communication highways, which have a few potholes and some tricky on- and off-ramps. They look quite promising for multiple uses in the ISIS network. For those not about to tackle telecommunications at present, do not be concerned. All of ISIS' services continue to be available to you by mail, FAX, or phone.

ISIS BBS is back!

As mentioned in the "e-mail" article, the Bulletin Board System operated by ISIS is functioning once again. Its intended purpose is for ISIS members and cooperating organizations to share messages and files with each other and with ISIS.

To call the ISIS BBS, use the phone number (612)432-9292. Our BBS uses a 2400 baud modem and its settings are N,8,1. Give it a try and let us know what you think!



ISIS 3 and "Hybrids"

Thanks to our new ISIS 3 central database, we now have the capability to do a better job of dealing with hybrid specimens. Many records-keepers and other users of ISIS reports have requested such improvements over the years. Reports such as ISIS Abstracts produced by our new central system now show hybrids separately, and at appropriate taxonomic levels. The time-honored "Hybrid" flag on ISIS' Paper Inventory Data Forms and in ARKS version 2.05, actually covered two distinct cases - very rare hybrids between two different species, and the more common case of hybrids between two named subspecies, or between a parent of a named subspecies and a parent not classified to subspecies level. Our ISIS Abstracts and TAG Report now show any reported hybrid specimens whose parents are identified as different.

So what does this mean for your institutional records? Many records keepers will have noticed that the ISIS 3 Edit/Update Reports mention automatic registration of specimens submitted as Hybrid, to the appropriate taxonomic level (the level common to both parents). This more appropriate reporting of specimens marked hybrid is the first step in handling hybrids more appropriately throughout ISIS systems. You will want to consider adopting the convention of registering hybrid specimens at the level common to both parents in your collection records now. The pending release of ARKS 3 will allow another step - better classification of hybrid specimens within each collection's records. ARKS 3 is designed to handle hybrids appropriately and automatically, and no longer records hybrid specimens under their Dam's taxon, as ISIS traditional instructions indicated. This old tradition was actually an accommodation to the limitations of the earlier ISIS central systems, rather than good records keeping practice. The ARKS 2 to ARKS 3 conversion utility (which is now being tested) will make the conversion and improvement from the ARKS 2 hybrid standard, easy to accomplish.

ISIS TAG Report - A New Service

The ISIS TAG Report is a new service which offers a review of the captive status of each species and/or subspecies in a genus or family, as reported to ISIS. Thirteen different indicators of the census, crude demographics, and crude genetics of the captive population reported to ISIS are provided. Figures are presented for the "Global" population - meaning everything reported to ISIS, and optionally for one region (i.e. Europe or Australasia or North America).

In addition to paper reports, the information is optionally available on a floppy disk, as a .dbf file, for ready import into your own database or spreadsheet.

This work was accomplished with partial funding from an AAZPA CEF grant. Much of the programming work was accomplished by Frank Princee of the NFRZG/EEP Office, Amsterdam, who wrote an underlying POPTAG "library" routine in C, supported by ISIS. Paul Scobie of ISIS developed the shell program which extracts ISIS 3 data and passes it to POPTAG. This library is planned to be the ancestor of a future analytical program library for a second generation population record keeping program (like SPARKS or ZRBOOK).

Future Plans for SPARKS

SPARKS is the most technically sophisticated software package produced by ISIS. It has additional technical components contributed by Bob Lacy (GENES), and Laurie Bingaman and Jon Ballou (DEMOG). It was developed with two years of grant funding, as most ISIS software has been (ISIS Membership fees pay for ISIS routine operations, but not much software development). At the end of the two years of development, SPARKS 1.0 was released, as was promised to the funding agencies. At that point in time (3 1/2 years ago), our developmental priorities and funding had to shift to replacing the ISIS central database. As a result, over a three year period we have not been able to do as much maintenance and enhancement of SPARKS as we would wish.

This year, thanks in part to an IMS Grant to Riverbanks Zoo, and an AAZPA CEF Grant to ISIS, we have the resources to make some further improvements to SPARKS. Our first priority is to change its development environment from Quicksilver to FOXPRO. This allows us to take advantage of the improved speed and other capabilities of FOXPRO, which ISIS now uses for development of all new software. This conversion has been accomplished and is now out for testing. A long list of other user-suggested items is being tackled, and we will deliver another upgrade later in the year with as many of these improvements as we can accomplish.

Over the longer term, it is time to plan for development of a second-generation product . . . We've learned a great deal over the last 6 years, since development of SPARKS 1 began. It will take multiple years to develop a new and greatly improved system, and we first must find the funding to support the



No More Lab Data Forms!

For those of you who have been using ISIS Lab Data forms, they are no longer available. Since the end of the ISIS mainframe and with the invention of the Clinical Pathology module of MedARKS, those old forms which took so long to fill out, are no longer necessary. The Clinical Pathology module collects all of the information which was on the forms and more. It also allows you to calculate your own physiological normals. If you have MedARKS version 4.02, you have the ability to send ISIS your Clinical Pathology data on a diskette. We are asking that you do this on a quarterly basis. The utility for downloading the Clinical Pathology information can be found in the Clinical Pathology Utilities of MedARKS. The disk may be sent to Ms. Cyd Shields Mayer at the ISIS Milwaukee office.

Sponsors / Donations

We are grateful to the Fossil Rim Wildlife Center for continuing to sponsor the ISIS Membership of Chippangali Wildlife Trust in Bulawayo, Zimbabwe. Many other institutions around the world would like to join ISIS but cannot presently afford the minimum costs of membership. During 1992, a "Sponsor" Donation from the Washington Zoological Park allowed us to cover the costs of membership for two more institutions. Perhaps you have direct connections with a facility in a developing country, or perhaps your city has a Sister City with such an institution needing sponsorship. Please consider helping another zoological institution establish a records-keeping system and participate in the global network, by contacting the ISIS Office.

New ISIS Members Since July 1992

<u>INSTCODE</u>	<u>ABBREV</u>	<u>INSTITUTION</u>	<u>COUNTRY</u>
230908002	PARCPPM	Parc President Mobutu/N'Sele	Zaire
250301001	BLANTYRE	City of Blantyre Zoo	Malawi
310210352	LAVAL	International Zoological Distributors	Canada
310210901	ENDANGREP	Center For Endangered Reptiles	Canada
430804004	TATA	Tata Steel Zoological Park	India
310201003	COCHRANE	Cochrane Wildlife Reserve	Canada
310533023	FLUSHINGP	Queens Zoo	USA
310522001	ATTLEBORO	Capron Park Zoo	USA
112009350	ALPHEN	Birdpark Avifauna	Netherlands
112214002	LISBON	Jardim Zool. E De Aclimacao Em Portugal	Portugal
250604001	JOHANSBRG	Johannesburg Zoological Gardens	South Africa
310510050	ST AUG GA	St. Augustine Alligator Farm	USA
310505911	SOCSCICAR	Society of Scientific Care Inc.	USA
310524714	WORLDBIRD	World of Birds Show	USA
110940001	FONTAINE	Zoo De Doue	France
110704003	USTI	Zoologicka Zahrada	Czech Republic
110708001	DVURKRALV	Zool. Garden Dvur Kralove nad Labem	Czech Republic
310541005	MURRELSIN	Brookgreen Gardens	USA
431309001	KHAOKHEOW	Khao Kheow Open Zoo	Thailand
431364002	BANGKOK	Dusit Zoo	Thailand
310211002	MOOSE JAW	Moose Jaw Zoo & Recreational Park	Canada
431307001	CHIANGMAI	Chiangmai Zoological Garden	Thailand
321412900	ARCAS	Wildlife Rescue & Conservation Assoc.	Guatemala
430827400	HALDWANI	Forest Training Institute	India
421204001	DUBAI	Dubai Zoo	United Arab Emirates
310550016	GREENBAY	NEW Zoo	USA
310510039	SILVER SP	Silver Springs Attraction	USA
310510063	SPRINGHIL	Weeki Wachee Springs	USA
111419001	VESZPREM	Kittenberger Zoological Garden	Hungary
310511700	GRAY PARR	Vasa Parrot Research Center	USA
310545004	WILLOW PK	Willow Park Zoo	USA

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This report was submitted by Arnaud Greth and Georg Schwede, National Wildlife Research Center (National Commission for Wildlife Conservation and Development), P.O. Box 1086, Taif, Saudi Arabia.

Proposal to Expand the Red Wolf Reintroduction Project

The red wolf reintroduction experiment which began in 1987 and concluded in September 1992. During the five years, 42 wolves were released in the Alligator River National Wildlife Refuge (ARNWR). Additionally, at least 23 wolves were born in the wild during that period. As of 31 January 1993, the population included 30 to 35 wolves.

By almost every measure the experiment was a success and generated benefits that extended beyond the immediate preservation of red wolves to positively affect local citizens and communities, larger conservation efforts, and other imperiled species. During the last five years four important points surfaced:

1. Since every management problem that arose was solved without inflicting long-term damage to animals and with little inconvenience to residents of the area, it was learned that wolves can be restored in a controlled manner.

2. Significant land-use restrictions were not necessary in order for wolves to survive. Indeed, hunting and trapping regulations for ARNWR remained unchanged or were further relaxed during the experiment.

3. The annual budget for the project was about \$200,000. Assuming a multiplier effect of about 3.0, the project generated

about \$600,000 of "money movement" annually. Since most of this money moved through eastern North Carolina, the experiment significantly stimulated the local economy.

4. The reintroduction area, which encompasses about 250,000 acres, probably cannot support 29 wolves for an extended period of time. Indeed, dispersal has taken place and will continue as 17 wolves (60% of the population) are two-years-old or younger. During 1991, two wolves dispersed to lands west of Alligator River. In addition to dispersal, the future of the wolf population is threatened by its smallness; many events (e.g., disease outbreaks) can cause small populations to go extinct.

Threats to the wolf population can be minimized by increasing its size. The size of the reintroduction area limits the size of the wolf population. Fortunately, the reintroduction area can be enlarged by integrating federal, state, and private lands to the south and west of Alligator River into the program. For example, Pocosin Lakes National Wildlife Refuge is an ideal addition because of its remoteness, proximity to Alligator River NWR, and healthy prey populations. Inclusion of Pocosin Lakes NWR would provide the U. S. Fish and Wildlife Service (USFWS) the impetus and justification to query citizens about allowing wolves to inhabit remote private land adjacent to or near Pocosin Lakes NWR. Additionally, the North Carolina Wildlife Resources Commission could be queried about allowing wolves to inhabit

State land in the three counties (e.g., Gull Rock State Game Lands).

Through inclusion of Pocosin Lakes NWR, and with cooperation from private citizens and the North Carolina Wildlife Resources Commission, the reintroduction area could encompass over 500,000 acres of ideal wolf habitat. With adequate funding (approximately \$250,000 per



year), it is reasonable to expect that 50-100 wolves could be restored to such an area within 5-10 years.

The significance of such a population is threefold. First, an important objective of the Red Wolf Recovery Plan is to maintain 225 animals in the wild. The "northeastern North Carolina red wolf project" could single-handedly assume responsibility for 25% to 50% of that objective. Since such a project would utilize the infrastructure that the USFWS created for the Alligator River reintroduction, a significant monetary savings would be realized over a five- to ten-year period compared with the cost of developing a similar population elsewhere in the southeast. Second, at the species level a population of 50 to 100 wolves would provide significant protection to the red wolf's already limited genetic diversity. Third, at the population level a group of 50 to 100 wolves would be able to withstand many stochastic events that threaten smaller populations.

This report was submitted by Mike Phillips, Coordinator of Field Projects, Red Wolf Recovery Program, USFWS.

Lizard Reports

Jamaican Iguana Symposium and Workshop

An international symposium and workshop on the conservation of the Jamaican iguana, *Cyclura collei*, was held in Kingston, Jamaica, 22-24 February 1993. The meeting was organized cooperatively by the Jamaican Iguana Research and Conservation Group, the Department of Zoology - University of the West Indies, the IUCN/SSC Captive Breeding Specialist Group, and the Fort Worth Zoo. Funding was provided by the Bermuda Zoological Society, the Indianapolis Zoo, and the Fort Worth Zoological Association.

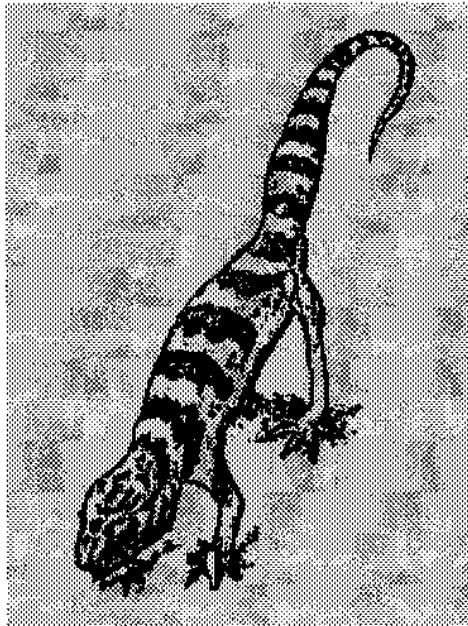
Fearred extinct for 50 years, the Jamaican iguana was rediscovered in 1990 and has since been the subject of an intensive field investigation. A small remnant population, probably less than 50 adults, still exists in the remote forests of the Hellshire Hills. This unique and restricted habitat is under considerable threat due to encroachment and development.

The meeting convened members of the Jamaican Natural Resources Authority, local government officials, conservation and field biologists, and captive managers from seven foreign countries to help focus local, regional, and international attention on the plight of this rare iguana and to formulate a conservation action plan for their survival. The event had over 40 local and foreign participants and received excellent media coverage by local TV stations. The meeting was divided into three distinct sessions:

General Symposium

Attended by approximately 75 people, this session featured presentations by representatives of governmental agencies, local conservation groups, and biologists. One central theme carried throughout these opening-day remarks: the importance of protecting the Hellshire Hills ecosystem as being the key element in saving the Jamaican iguana. This pristine habitat is the last remaining example of West Indian dry forest remaining in Jamaica and must be preserved if the Jamaican iguana is to have a chance for survival in the wild.

The highlight of the symposium was the unveiling of a color poster which commemorates the survival of the Jamaican iguana. The poster, which will be distributed in Jamaica to heighten public awareness for this critically-endangered species, was presented to Rhema Kerr, Hope Zoo Curator, on behalf of the Fort Worth Zoo and Barron Litho of Fort Worth, Texas. A limited number are being offered for sale in order to generate funds to support ongoing field research and conservation efforts in Jamaica.



Population and Habitat Viability Assessment Workshop

The PHVA process is a systematic evaluation of the relative importance of factors that place populations at risk of extinction and attempts to identify the most important factors for the survival of the population. A population model (VORTEX) simulated population growth or decline over time and estimated the likelihood of extinction. Data obtained on the wild population during the field research project (1990-1992) and long-term studies on similar taxa, provided the life history information needed to run VORTEX simulations. The initial results were not encouraging. Based on current threats (feral predators) to this small population, extinction could be expected within 60-100 years, depending on survivorship values. Juvenile mortality is extremely high in the wild population. If this can be reduced, the population has a high probability for survival. A juvenile headstart/release program designed to reduce mortality in the first 3-4 years produced a clear benefit. Subsequent VORTEX simulations

incorporating this headstart/release program produced no chance of extinction in 150 years. Unless a recovery program is implemented immediately, this population is at high risk of extinction in the wild. This program will consist of three primary components:

1. A well-monitored headstart/release program to assist in recovery of the wild population;
2. An active mongoose and dog control effort to improve juvenile survivorship and reduce adult mortality;
3. An *ex-situ* captive population to serve as a genetic reservoir and safeguard against a catastrophic loss of the wild population. Other working groups organized during the workshop produced drafts of documents that will be incorporated into the final PHVA report. They specifically address the following topics:

1. **Captive Management Strategy** - This document provided details for the future harvesting of eggs and hatchlings, the time frame and strategy for the headstart/release program, the design and implementation of an *ex-situ* captive population, the *in-situ* captive population, husbandry recommendations, and genetic evaluation of both wild and captive populations. A captive nucleus of 40 offspring (hatched 1991-1992) being reared at the Hope Zoo will provide a basis to initiate these activities.

2. **Threats to Survival** - This document provided a review of the status of introduced and natural predators and provided recommendations for their control with accompanying budgets. It also discussed habitat alteration (past and present), future development, solutions, and remedial measures including a proposal for a National Park.

3. **Public Education** - This document presented a budget for developing an active iguana conservation education program in the public school system and elsewhere in Jamaica.

West Indian Iguana Workshop

On 25 February, a full-day session devoted to the conservation and research of West Indian iguanas, including both *Cyclura* and *Iguana delicatissima*, was held following the PHVA. Ten speakers gave summary presentations dealing with various aspects of their work, including natural history, conservation efforts, systematics, and captive breeding and management. What began as an attempt to assign conservation and research priorities within this group developed into the formative stages of an Iguana Specialist Group. A petition has since been sent to the IUCN Species Survival Commission urging their recognition of the group. The first mission of the group would be to compile a Conservation Action Plan for West Indian Iguanas. Dr. Allison Alberts, San Diego Zoo Center for Reproduction of Endangered Species, has agreed to compile and edit the Action Plan. Writers for each species account have been identified. A draft outline has been prepared and circulated.

CAMP Review Process

The Reptile CAMP reports for the families Varanidae and Iguanidae that were produced at the Vancouver workshop in September 1992 are being distributed for review. In order to produce a meaningful document that accurately reflects the conservation status of these groups of lizards, it is essential that we receive input from those most familiar with their status in nature. A preliminary report was published in the last CBSG News (Vol. 3, No. 2) and it is expected that some of the assessments and recommendations will change based on new data that was unavailable when the CAMP was conducted.

We are currently seeking input from anyone having accurate data on wild populations of both varanids and iguanids. We are especially in need of information regarding population size and distribution, current field studies, present and future threats, and recommendations for research including PHVA modeling, survey work, husbandry, and taxonomic studies. If you would like to contribute to this process and comment on species in either group, we ask that you contact one of the following: For Iguanidae, contact Allison Alberts, Center for Reproduction of Endangered Species, San Diego Zoo, P.O. Box 551 San Diego, CA 92112. Telephone: 619-557-3955, Fax: 619-557-3959. For Varanidae, contact Rick Hudson, Fort Worth Zoo, 1989 Colonial Parkway, Fort Worth, TX 76110. Telephone: 817-871-7431, Fax: 817-871-7081.

Agamidae CAMP

Plans to conduct a CAMP workshop for agamid lizards are still tentative. This meeting was planned to coincide with the Second World Congress on Herpetology in Adelaide on 29 December 1993 to 6 January 1994 in order to utilize the expertise of such a large gathering of herpetologists. The family Agamidae is a large and diverse group comprising over 300 species with a wide geographic distribution. For this reason, conducting a successful workshop will require input from a large number of biologists from the many countries where they occur. A primary coordinator for this CAMP has not been identified, though

several colleagues from the U.S. and Sri Lanka have offered support and assistance. Those interested in participating or helping to organize this workshop should contact Andy Snider, Department of Herpetology, Audubon Zoo, P.O. Box 4327, New Orleans, LA 70178. Telephone: 504-861-5108, Fax: 504-866-0819

Philippines CAMP

There has been a recent initiative on behalf of William Oliver (IUCN/SSC) and Roland Wirth (Bird Life International) to conduct a comprehensive CAMP workshop for all Philippine endemic vertebrates. No firm date has yet been established. Assistance has been requested in compiling a list of endemic reptiles and amphibians. Anyone with a good working knowledge of the herpetofauna of this region that wishes to contribute to this endeavor should contact Roland Wirth or Rick Hudson.

Cuban Aquarium Seeks Aid to Repair Storm Damage

On March 13, 1993, the National Aquarium of Cuba was pummeled for two full days by continuous storm waves. The storm caused extensive damage to both buildings and equipment amounting to well over \$500,000. In order to hasten rebuilding, the aquarium is launching a program entitled, "Call for Solidarity."

The Aquarium of Cuba is a non-profit organization aimed primarily at children. The 33-year-old aquarium receives over a million visitors per year and offers them recreation linked with scientific instruction emphasizing the conservation of the marine environment and its fauna.

The aquarium would be most appreciative of either monetary or in-kind contributions. Individuals or organizations wishing to help the Aquarium of Cuba recover from this disaster are urged to contact Guillermo Garcia Montero, Director, Aquario Nacional/Cuba Azenida la y Calle, Miramar Playa, Ciudad de la Habana, Cuba. Fax: 537-338212 or 537-338213

A Look at CITES



What Is CITES?

The international wildlife trade, worth billions of dollars annually, has been responsible for massive declines in the numbers of many species of animals and plants. The scale of over-exploitation for trade aroused such concern for the survival of species that an international treaty was drawn up in 1973 to protect wildlife against such over-exploitation and to prevent international trade from threatening species with extinction.

Known as CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora entered into force on 1 July 1975 and now has more than 115 member countries. These countries act by banning commercial international trade in an agreed list of endangered species and by regulating and monitoring trade in others that might become endangered.

CITES' aims are major components of "Caring for the Earth, A Strategy for Sustainable Living," launched in 1991 by the United Nations Environment Program (UNEP), IUCN - The World Conservation Union, and the World Wide Fund for Nature (WWF).

Why CITES Is Needed

There are over 13,000 known species of mammals and birds, as well as thousands of reptiles, amphibians and fish, millions of invertebrates and some 250,000 flowering plants. Extinction is a natural feature of the evolution of life on earth. But in recent times, humans have been responsible for the loss of most of the animals and plants that have disappeared. Gone forever, for example, are 17 species or subspecies of bears, five of wolves and foxes, four of cats, ten of cattle, sheep, goats or antelopes, five of horses, zebras and asses, three of deer, and an indeterminable number of plants, including at least one slipper orchid.

The last dodo, a large flightless bird, was killed in Mauritius in 1681, while the passenger pigeon, whose huge flocks darkened the skies of North America barely a hundred years ago, was also wiped out for food early this century.

Many species are declining in numbers because of loss of habitat and increased exploitation as human populations grow. Trade has now also become a major factor in the decline as improvement in transport facilities has made it possible to ship live animals and plants and their products anywhere in the world.

A dramatic example is the vicuna, a gazelle-like relative of the camel which lives in the high Andes. Because of its exceptionally fine and warm wool, which has been in great demand in North America and Europe, nearly half a million were slaughtered after the Second World War before Peru pioneered protection in the 1960s to save the species.

The wildlife trade is a highly lucrative business and involves a wide variety of species, both as live specimens and as products. Millions of live animals and plants are shipped around the world each year to supply the pet trade and to meet the demand for ornamental plants. Fur skins, leather and timber, and articles manufactured from them are all traded in large quantities.

How CITES Works

CITES has established a worldwide system of controls on international trade in threatened wildlife and wildlife products by stipulating that government permits are required for such trade. Security paper and stamps are often used for these permits to prevent abuses such as forgery. Protection is provided for species in two main categories:

The Most Endangered Species

These are listed in Appendix I to the Convention and are species threatened with extinction which are, or may be, affected by trade. So as not to endanger them further, no permits are issued for international trade in these species unless there are exceptional circumstances.

Among those listed are all the apes, lemurs, the giant panda, many South American monkeys, great whales, cheetah, leopards, tiger, elephants, all rhinoceroses, many birds of prey, cranes, pheasants, parrots, all sea turtles, some crocodiles, tortoises and lizards, giant salamanders and some mussels, orchids, cycads and cacti.

Other Species at Serious Risk

Included in this category are species which might become endangered if trade in them is not controlled and monitored "in order to avoid utilization incompatible with their survival." They are listed in Appendix II to the Convention. To prevent threatened species from being traded under the guise of non-threatened species similar in appearance, some of the latter species are also included in this appendix.

International trade in Appendix II species is permitted with proper documentation issued by the government of the exporting country. The list includes, amongst others, all species in the following groups which are not already in Appendix I: primates, cats, otters, whales, dolphins and porpoises, birds of prey, tortoises, crocodiles, cacti, and orchids, as well as many other species such as fur seals, the black stork, flamingoes, cranes, birds of paradise, the coelacanth, some snails, butterflies, corals, and some timber species.

In addition, countries may enforce even stricter control than required by CITES if they wish to give special protection to a listed species. They may even ban trade in all wildlife.

When member States hold their biennial meetings, they review the working of the Convention and discuss changes to the lists of protected species. Species may be added to or removed from an appendix or moved from one appendix to another with the agreement of the Conference of the Parties.

Enforcement

Enforcement of CITES is the responsibility of member States, which are required to establish management and scientific authorities for the purpose. In most countries, customs officers are given the task of enforcing CITES regulations. Governments are also required to submit reports, including trade records, to the CITES Secretariat in Switzerland.

To ensure effective enforcement, the Secretariat acts as a

clearing house for the exchange of information and liaison between the member States and with other authorities and organizations.

Monitoring the Trade

On behalf of the CITES Secretariat, data on world trade in wildlife are collected and analyzed by the Wildlife Trade Monitoring Unit (WTMU), which is a part of the World Conservation Monitoring Center in Cambridge, United Kingdom. Additional information on the use of and trade in wildlife is collected by the IUCN/WWF TRAFFIC (Trade Records Analysis of Flora and Fauna in Commerce) offices in several countries. By monitoring the trade closely, WTMU and the TRAFFIC network are able to assist the CITES Secretariat in spotting problem areas and prompting remedial action.

Achievements

CITES has brought a wide measure of control in the wildlife trade, and this control is being steadily improved as action is taken to deal with gaps and inconsistencies revealed by the analysis of export and import records.

Annual reports from member States and the flow of documentation are improving and helping to make CITES more effective. Many exporting countries are strengthening their ability to control exploitation of their natural resources and are developing better legislation to enforce CITES. Many wildlife traders who initially regarded CITES with suspicion are now cooperating, as they have realized that well-controlled trade is in their business interest. Some are even providing funds for surveys and projects.

Funding

The CITES Secretariat is financed by contributions from member States. However, additional funding from other sources is always needed for a wide range of special projects, such as the preparation of an identification manual to assist officers in recognizing specimens of protected species and the holding of training seminars throughout the world.

Public Co-operation

Like most laws and conventions, CITES needs the support and co-operation of the public. The Convention is not designed to ban all trade in wildlife products, but to ensure that trade does not contribute to possible extinction of animals and plants. Commercial trade in Appendix I species is illegal and the public should, therefore, be cautious in the purchase of wildlife and wildlife products and always check whether they were legally acquired.

Chief Seathl (Seattle) of the Suwamish tribe of the State of Washington, in a letter to the President of the United States, 1855, wrote: *"If all the beasts were gone, men would die from great loneliness of spirit, for whatever happens to the beasts also happens to the man. All things are connected. Whatever befalls the earth befalls the sons of the earth."*

This report was excerpted from CITES publication, April, 1993.

U. S. Fish & Wildlife News

Canada Geese Return to Russia

An endangered species success story in the United States may have a Russian chapter if an effort to bring rare Aleutian Canada geese back to Russia is successful. After being virtually extinct in Asia for decades, the geese that once migrated between Japan and Russia will be returning, thanks to a permanent loan of 10 nesting pairs from the United States. The Aleutian Canada goose was once listed as endangered in the United States, but recovery efforts by the Interior Department's U.S. Fish and Wildlife Service (USFWS) brought populations back from a low of fewer than 800 in 1967 to a current estimate of 8,000 birds. The species' status in the United States has been upgraded to threatened. The birds sent to Russia will be the start of an extensive captive breeding program. In time, Russian biologists hope to duplicate the success of the recovery effort and re-establish a migrating Aleutian Canada goose population in Asia.

Conservation Agreement Will Help Rare Plants

The USFWS and the Center for Plant Conservation have signed a cooperative agreement aimed at benefiting rare plant species in the United States. The agreement paves the way for the Service to provide funding and technical expertise in support of the Center's research and development of techniques for propagation and reintroduction of endangered and rare plants. The Center is a private, non-profit organization dedicated to the conservation of the nation's most critically endangered plants.

P. Horse Propagation Group

The reintroduction of *Equus przewalskii* as part of a larger project to conserve the biological diversity of the Dzungarian Gobi in Mongolia has been approved as a Pre-Investment Facility of the United Nations Development Program in anticipation of its adoption by the Global Environmental Facility of World Bank.

In essence, this means that through the United Nations international funds will be devoted to conserving the biological diversity of Mongolia. An important part of this effort will be the protection of a large area of the Gobi and the reintroduction of captive bred *Equus przewalskii* into this area.

Progress towards implementing the reintroduction is already underway. A UNDP mission to Mongolia will occur in June-July, 1993 and will include members and advisors of the Przewalski's horse Global Management Plan Working Group.

After much effort by many dedicated individuals over many years, it appears that a true program of reintroduction will now proceed within the historic range of the species.

Excerpted from a report by Dr. Oliver Ryder, Asian Wild Horse SSP, Species Coordinator

Australasian News

Following are excerpts from the December, 1992 and January, 1993 newsletters of the Australian Regional Association of Zoological Parks and Aquaria (ARAZPA)

Chuditch Program Update

The initial Chuditch (*Dasyura geoffroyi*) breeding colony was established at Perth Zoo in December, 1988. The founding group was comprised of two adult males and six adult females acquired from Melody Serena and Todd Soderquist from the University of Western Australia (UWA). Most of the animals had been bred at UWA while researching the species in the Collie district southwest of Perth.

Wild animals usually only live for about three years, while captive specimens have reached six years old. In the wild, a female would usually only breed in the first two years. The breeding season extends from late April to early July with the females in estrus for 5-10 days. Females that do not conceive during their first estrus may come into season again from late July to early August. Gestation is 16 days, at which time 2-6 young are born. In their first breeding season, females normally produce six young.

No young were produced in the first year of the captive breeding program. Through the experience gained in 1989, the breeding protocol was changed dramatically for the 1990 season. As a result, two females produced litters of six young each. Three wild-caught specimens (two males and one female) were added to the colony, enhancing the group's gene pool. During 1991, three females conceived and produced litters totaling 17 young, while the 1992 season produced 22 young from six females. This was significant, as first and second generation captive-bred females produced young. At this stage, 51 Chuditch have been born in captivity, with a ratio of 20 males, 29 females and two unsexed. The program will run for five years until 1997.

On 18 September this year, 24 adults were released, mostly captive-bred but including 1.2 of the original founders, into "Julimar" reserve northeast of Perth. This 24,000-ha reserve has had extensive fox control measures applied through a 1080 baiting program, as the fox is the Chuditch's greatest threat. Before they were released, the animals underwent DNA fingerprinting, given ID implants and fitted with radio collars so they could be monitored and tracked by research scientists. So far, the animals appear to be coping well in their new home. It is hoped that they will become a self-sustaining breeding colony over the next few years. Meanwhile, the captive breeding program continues to improve and progress.

World's First Hippo Castration

Following extensive communication with zoos around the world, only one recorded attempt at castration of a hippopotamus was found and this had failed. An equal dearth of information exists on the anatomy of the male reproductive tract of Nile Hippos. Only a single 1923 report exists from San Diego Zoo.

The 4.5-year-old male hippo at Auckland Zoo had been exhibiting increasingly aggressive behavior towards the other male in the herd of four. Serious injuries were likely and it was decided that castration should be attempted to calm the animal. Six weeks of intensive research and planning preceded the operation. Hippo testes are contained within body fat in the groin and are not visible externally. This, combined with the animal's size (estimated weight is 1000 kg) and the anesthetic risk, provided a significant challenge to consultant and staff veterinarians.

The animal was restrained in a drafting race and injected with a combination of Immobilon and xylazine. As the animal went down in the race, approximately one hour was required to position him for surgery and connect him to the gas anesthesia machine, where he was maintained on 3% isoflurane and oxygen. The Zoo's veterinary officer, Dr. Wayne Boardman, assisted by consultant veterinarian, Dr. Kathy Allen, successfully performed the surgery in 50 minutes. The hippo was standing within 15 minutes of receiving the anesthetic antidote and there have been no complications in the two weeks since the operation. He is still just as aggressive, but it is anticipated that this will subside as the male hormones in his system decline.

Helmeted Honeyeater Setback

The program to build up numbers of the helmeted honeyeater, Victoria's highly-endangered official bird emblem, received a set-back recently with the death of 15 birds from Healesville Sanctuary's captive colony.

The cause of death appears to be associated with the introduction of a vitamin D₃ supplement to the bird's food. This was designed to overcome a series of egg and embryo losses, which were directly attributable to thin egg shells, believed to be a result of mineral and vitamin deficiencies in the captive diet. Vitamin D supplements have been used previously at the Sanctuary for other species without adverse consequences. The surviving eight birds from the captive population have been hospitalized and are receiving intensive veterinary care.

The wild population is unaffected and continues to grow from 15 breeding pairs in 1989-1990 to a current level of at least 21 pairs.

The captive colony was established at very little cost to the wild population because only chicks and eggs, rather than adults, were targeted for captivity. The survival of eggs and nestlings is low, due to predation and bad weather. Because they are quickly replaced by a new clutch, removal of selected clutches has very little impact on reproductive output of the population. Steps are being taken to review the future thrust of the captive management program so that its important role in the overall recovery of this species can be maximized.

Adelaide in Vietnam

In February, 1992, Bruce Campbell, Curator of Mammals at Adelaide Zoo, traveled to Vietnam to investigate the feasibility of the Royal Zoological Society of South Australia becoming involved with an *in situ* project on colobine primates.

The funding for this investigation was from a research grant. The Society is applying to the Australian Federal Government Aid Agencies for more substantial funding available in 1993.

In early November, 1992, the Adelaide project was presented at the meeting of the Australian Committee for Scientific Cooperation with Vietnam (ACSCV), convened in Canberra and covered health issues, scientific cooperation, future role of NGOs, and environmental issues. In the absence of the Premier of South Australia, Bruce Campbell was asked to open the meeting.

On 10 November, Vern Weitzel from the Australian National University left for Hanoi to commence a field study for several of the primates that are of concern at this time. He is working under the guidance of the Society, with the information gathered, as the first step in the project development. There is a team of seven people on the expedition: Vern Weitzel, Dr. Le Xuan Canh, Dr. Ha Dinh Duc, our local representative Mr. Than, and students from the Institute of Ecological & Biological Resources and the Hanoi University. The survey will last for three months and will be confined to the lime-tone kast formations in the north of the country. The expedition has been funded through the Society's Vietnam Project.

The IUCN has asked Adelaide Zoo to send a representative to Hanoi in March, 1993. Hence, it is intended that Bruce will accompany people from IUCN, Conservation International, Munster Zoological Gardens and WWF to develop stronger working relationships with the Vietnamese to be able to start a Primate Rescue Unit in Hanoi.

The Yellowhead Program

The Yellowhead is a small insectivorous bird from New Zealand's South Island, where it occupies a warbler-like niche in the upper canopies in beech forests. It has been severely impacted by stoats (weasels) introduced into New Zealand in the late 1800s. Due to the incubation characteristics of this species, the female suffers a disproportionate mortality of up to 70%, which has resulted in a drastic reduction of the Yellowhead population over much of its range. This program, one of the first for New Zealand insectivorous forest birds, will team WWF, DOC, and Orana Park Wildlife Trust in a captive breeding program.

Reintroduction Conference

Healesville Sanctuary, in cooperation with the Chicago Zoological Society, is undertaking a major reintroduction of Brush-tailed Phascogales. More than 60 have been released into suitable habitat in Central Gippsland where the species has been extinct for several decades. Their progress is being monitored using radio-tracking. The Sanctuary's Phascogale Reintroduction Program is now in its third year and is allowing for testing and refinement of reintroduction techniques in general.

Recognizing the importance of establishing a communication network for workers in this field, the Sanctuary hosted the meeting on Reintroduction Biology of Australasian Fauna on 19-21 April 1993. Although the focus was on native fauna,



reintroduction experts from around the world participated, and expressions of interest were received from biologists in New Zealand, U.S.A., Morocco, India, Indonesia, Spain, Mauritius, Oman, and Jordan. This wealth of experience, gained from work on such diverse species as the Javan rhinoceros, pink pigeon, barbary stag, kakapo, Arabian oryx and monk seal, added new depth to the symposium and benefited all those conducting reintroductions.

Victorian Wildlife Forum

The Victorian Wildlife Forum grew out of the Australian Wildlife Rehabilitation & Release Workshop held at Melbourne Zoo on 31 August - 1 September 1992. The main aims of the Workshop included: an intention to develop a wildlife rehabilitation and release forum, using the existing Taronga programs as a basis; develop and recommend methods of data collection amongst government and nongovernment organizations; and, most importantly, review and recommend training and community education requirements.

As such, it is an ongoing complementary exercise to the Reintroduction Conference planned for Healesville in 1993. Many wildlife shelters and similar groups were represented at the Melbourne meeting; proceedings from the workshop are now in preparation.

Rehabilitating Bushland

Milyu Nature Reserve is close to Perth along the Swan River. It is one of three conservation areas on the River. It is significant because 22 species of migratory birds feed in the area, some from as far as Alaska and Siberia. Perth Zoo has been coordinating a rehabilitation program in the Reserve. The land has been badly degraded by the construction of a bikepath and neighboring freeway. It is estimated that it will take a decade to rehabilitate the land and provide a vegetation buffer, to reduce noise from the freeway and to provide protection and roosting sites for both local and migratory birds. The South Perth Primary School has adopted a stewardship role of the Reserve and incorporated curriculum topics into Milyu activities.

ARAZPA...

Seed collections by the students resulted in over 800 trees, shrubs and reeds being planted on the site in 1992. Students from the school were taught horticultural skills by the horticultural staff of Perth Zoo and the local council, who also propagated the plants. Recently, a local service club has provided funds to build a greenhouse in the school. A further seed collection by the school will result in an expanded program of planting 1450 trees and shrubs in 1993.

Marine Turtle Study

The Pet Porpoise Pool at Coffs Harbor is participating in a promotional and rehabilitation program for stranded and/or injured marine turtles. The study is centered on the Solitary Islands Marine Reserve (SIMR) and the species most commonly encountered is the Green Turtle, although the Loggerhead Turtle may also occur in the area. An informational booklet has been produced to help local people understand what to do if they find a stranded turtle, and a Marine Turtle Sighting Card will assist wildlife authorities and researchers to gain a clearer picture of strandings and turtle movements.

Barred Bandicoot Progress

The Eastern Barred Bandicoot program is proceeding at full steam with the completion of a 50-page "Handbook for the Captive Management of the Eastern Barred Bandicoot," by the Project Officer, Jenny Kingston, of Melbourne Zoo. The Handbook covers housing, transport, handling, field trapping, husbandry, diet, breeding, record keeping, health and veterinary care, and five appendices.

Animals have been transferred to Taronga Zoo and Kyabram Fauna Park, and, in the near future, will be sent to Western Plains Zoo. The captive population within zoos at present has increased to over 140. Animals are now being selected and released into a fenced property at Gellibrand Hill near Melbourne Airport. These releases will continue over the next few months, with another release site being identified and made operational early in 1993. The animals being released are captive-bred. They are initially transferred to a quarter-acre enclosure, where their captive diet is reduced and they acclimate to their surroundings. They are then released over a month-long period.

Black Rhino Update

Director John Kelly, veterinarian David Blyde, and keepers Phil Whalen and Glen Cleary have left Australia for Zimbabwe to collect ten (2.8) Black Rhinoceros for Western Plains Zoo as part of the International Breeding Program for this species. The animals were scheduled to leave Harare on 1 December and will spend two months on Cocos Island before being transferred to Dubbo.

Back from Extinction

Adelaide Zoo is the proud host to specimens of the recently "re-discovered" Adelaide bluetongue (*Tiliqua adelaidensis*).

Thought to be extinct and last sighted in 1959 at Marion, South Australia, a specimen was found inside a road-killed Eastern Brown Snake in the Burra area by two private herpetologists in early October. That first specimen is lodged at the South Australian Museum, but further individuals have been found. Some are housed at Adelaide Zoo to learn the species' biology and lifestyle. The lizard is a "scaled down" eastern bluetongue and grows to a length of 15-18 cm.

Important Vietnam Finds

Teams from WWF, surveying remote areas of Vietnam, have made encouraging discoveries about some of the world's rarest primates. Several groups of the Tonkin snub-nosed Monkey (*Rhinopithecus avunculus*) were found in Tuyen Quang province, north of Hanoi; all, unfortunately, were outside protected areas. Further south, in Vu Quang Nature Reserve on the Laos border, the Douc Langur (*Pygathrix nemaeus*) is commonly reported. However, the most exciting discovery in Vu Quang was three sets of upper skull and horns belonging to a seemingly unknown bovid. The horns resemble those of the lowland anoa of Sulawesi, and a specimen of skin and hair has been sent to the U.S.A. for DNA analysis.

Scimitar-horned Oryx Research

Orana Park is continuing with its artificial insemination project for scimitar-horned oryx. In cooperation with the AAZPA SSP, a donor bull at the Toronto Zoo is being used as the next source of semen to be used this year. This will allow the addition of several new founder genes into our genetic pool.

A laparoscopic AI attempt last April was unsuccessful and will probably not be repeated. An estrus cycle determination project is being established in conjunction with Lincoln University. Using a vasectomized bull and five adult cows, blood samples will be taken serially to establish estrus parameters in this species.

Kokako Success

It is believed that the first successful hand-rearing of a Kokako chick, or wattled crow (*Callaeus cinerea*), outside its natural habitat has been accomplished. The chick, named "Freefall," has been recuperating at the Otorohanga Kiwi House for the past eight weeks after receiving a fractured right humerus after falling 30 m during a banding operation. Now fully recovered, the chick is to be joined by another juvenile and displayed within the park in order to promote public interest in the DOC Kokako Recovery Plan.

Woma Hatchings

Two clutches of Woma eggs have hatched in the Reptile Department's incubators at Adelaide Zoo. The Woma (*Aspidites ramsayi*) is a regionally-managed species under the Reptile TAG and this recent success is very valuable for improving knowledge and benefiting management. The two female pythons laid eggs in October and November, 1992. The first clutch hatched over a nine-day period commencing on 30 December. Thirteen of the

17 eggs hatched successfully and six of the second clutch of nine eggs hatched in early February, 1993.

New Zealand Primate Births

A male chimpanzee was born at Wellington Zoo on 4 February, the first birth in the expanded group of nine animals and the first since the new park opened. The baby is being mother-raised which is a first for this female. Auckland Zoo recorded its third birth of a Siamang gibbon on St. Valentine's Day. The group is now comprised of two males, two females and the new offspring, whose sex is not yet known.

Western Swamp Tortoise Update

The Western Swamp Tortoise breeding project began in 1988 with four breeding ponds at Perth Zoo and a limited number of adult tortoises. A total of 47 hatchlings, including three wild-born, have now been raised in four years, with death being recorded only in the first year. Thirty-two eggs from seven females (six captive and one wild caught) plus one egg from a nest in Ellenbrook Nature Reserve (EBNR) are currently being incubated.

Perth Zoo currently holds 14,12,47 tortoises. It is planned to hold a maximum of 76 zoo-bred juveniles with the excess, once having reached 100 gm and/or four years of age, to be released into Twin Swamps Nature Reserve (TSNR), 30 km northeast of Perth.

Dr. Gerald Kutchling recently found six previously unrecorded tortoises living in a dam on private property adjacent to the protected area of EBNR. This is significant for two reasons; first, the obvious boost in numbers it gives to the critically-small population and, second, they were found in November when the protected area of EBNR had dried out and the tortoises had begun aestivation.

Recently, the Australian National Parks & Wildlife Service made a substantial grant for an electrified fence to be erected around TSNR, which will secure it from one of the tortoises major predators, the fox. This should enable tortoises to be released into the Reserve by the winter of 1994.

Asiatic Elephants

After eight years work, Perth Zoo successfully imported 1.3 elephants from Malaysia on 15 December 1992. The two-year-olds have settled in comfortably and Tricia, the Zoo's 35-year-old matriarch, has accepted the young ones graciously. Lee Sambrook from UK and Jim Sanford from USA and their colleagues will be working hard to train the new animals for meeting Zoo visitors in the grounds and for eventual participation in a breeding program.

The new elephant night yard flooring is working well for animals and staff. This system has not been used in the region before and promises to successfully address the chronic shortcomings endemic to other systems. For information, see the Zoo's presentation at the ARAZPA Conference, or call George McKnight in Maintenance.

Zoo New Zealand Joins Tuatara Program

Zoo New Zealand at Hamilton has joined the captive breeding program for Tuatara. The animals' accommodation is open to the weather, but is also equipped with a viewing gallery of glass panels enclosed in a lockable shelter. The gallery runs the length of the house and has a graphics wall and rubberized floor to reduce vibration. The enclosure is heavily planted and has nine artificial burrows. Irrigation and pool replenishment can be done by two separate remote water systems. The facility also has units for rearing juveniles. The intention is not to have the unit open to general zoo visitors, but depending on the animals' behavior, is available to organized learning groups.

Foose Named as IRF Program Officer

Thomas J. Foose, PhD. has been named Program Officer for the International Rhino Foundation (IRF) and will be based at the WILDS in Columbus, Ohio.

Dr. Foose will be devoting his time to rhino conservation projects around the world with an emphasis on the existing International Black Rhino Foundation (IBRF) programs in Zimbabwe. He also will be coordinating the Global Captive Action Plan (GCAP) for rhinos, providing some administrative/technical support for the World Conservation Union (IUCN) Asian and African Rhino Specialist Groups, developing other rhino conservation projects involving the captive community, and facilitating special rhino programs such as subspecies issues and reproductive biology.

The WILDS will be utilizing Dr. Foose's strong background in captive propagation to integrate its rhino program into regional and global strategies. Additionally, Dr. Foose will be assisting in the development of other animal programs at the WILDS.

Prior to joining the WILDS, Dr. Foose served as executive officer for the CBSG. Some examples of his many contributions to the conservation field include developing and coordinating the Species Survival Program for the American Association of Zoological Parks and Aquariums and originating and coordinating the Rhino GCAP.

Dr. Foose is also one of the founders of the IBRF, recently expanded to the International Rhino Foundation, a non-profit corporation of conservation organizations dedicated to the preservation of the rhinoceros. Support for Dr. Foose's position is being provided by a \$90,000 grant from the IRF.

1991-1992 Annual Report

AAZPA Conservation Program

This report marks the tenth anniversary of the establishment of the AAZPA Species Survival Plan (SSP). It has now also been two years since the Conservation and Science (C&S) Office was moved from the Minnesota Zoological Garden to become part of the AAZPA Conservation Center in Bethesda, MD. Since that time, considerable progress has been made. Of particular significance has been the expansion and reorganization of the SSP and related AAZPA conservation and scientific efforts into a unified Conservation Program. The Conservation and Science Office continues to pursue the general goals outlined in the AAZPA's Long-Range Strategic Plan (LRSP). These include:

1. to reorganize and expand the SSP and related AAZPA conservation efforts (the AAZPA LRSP calls for 100 SSPs by 1995);
2. to integrate the North American SSP with other regional breeding programs worldwide (e.g., EEP, ASMP, etc.) through the IUCN/SSC Captive Breeding Specialist Group (CBSG);
3. to organize and expand the role of science in support of the SSP, including greater collaboration with the academic community;
4. to develop and facilitate stronger linkages between zoos and field conservation efforts;
5. to improve training opportunities and technical support for current and future studbook keepers, SSP coordinators, taxon advisory group and fauna interest group chairs; and
6. to work toward resolution of some of the ethical issues that could affect the long-term success of our cooperative breeding, reintroduction and field conservation programs.

The following is a summary of progress during the 1991-92 reporting cycle:

Conservation Resource Guide Distributed

The first edition of the AAZPA Conservation Resource Guide was completed and distributed to all institutional directors, SSP coordinators, studbook keepers, TAG chairs, FIG chairs, and AAZPA Board members. The 70-page document, prepared by the WCMC and the C&S Office, provides the first written descriptions of AAZPA Conservation Program protocols and committee responsibilities. Copies have also been sent to all regional conservation coordinators recognized by the IUCN/SSC CBSG.

New Book On SSP Completed

An exciting new book describing AAZPA's SSP program, *Species Survival Plans: Strategies for Wildlife Conservation*, has been completed and sent to the printer. Photos were donated by AAZPA staff and member institutions. Text for the 64-page illustrated volume was written by AAZPA Conservation Center Staff. The book should be extremely useful when applying for grants or when approaching potential donors. It should also be appropriate for sale in zoo and aquarium bookstores.

Studbooks

Twelve new regional studbooks were approved during the last year, including those for African lion (Sue Ellen Maney, Riverbanks Zoological Park); bottlenose dolphin (Dr. Pete Schroeder, Sea World Inc.); Chilean and lesser flamingos (Dr. Elizabeth Stevens, Zoo Atlanta); Caribbean and greater flamingos (Peter Shannon, Audubon Park & Zoological Garden); galagos (Mark Edwards, Potter Park Zoo); gharial (Mark Wise, St. Augustine Alligator Farm); Inca tern (Fawn Dunnemann, San Antonio Zoological Gardens & Aquarium); pancake tortoise (Rusty Grimpe, Tulsa Zoological Park); polar bear (Pierre Poirier, Jardin Zool. de Granby); sifakas (David Haring, Duke University Primate Center); spectacled owl (Steven Sarro, Baltimore Zoo); and white handed gibbon (Don Moore, Burnet Park Zoo). This brings the total number of studbooks, both regional and international, managed by the North American region to 168. However, the number of taxa represented is actually greater because some studbooks cover multiple species and/or subspecies.

Species Survival Plans

Only one new SSP was established this year (Pink Pigeons: Kurt Hundgen, New York Zoological Park, Coordinator). This brings the total number of species covered by the SSP to 68, managed under 54 programs. Multiple species SSPs include Tree Kangaroos (four species), Gibbons (three species), Elephants (two species), Condors (two species) and *Partula* (five species). No petitions are pending.

Taxon Advisory Groups

Five new taxon advisory groups were approved, bringing the total number of North American TAGs to 35. The new TAGs are Charadriiformes (Bruce Bohmke, St. Louis Zoological Park, Chair), Marine Fishes (Jeff Marliave, Vancouver Public Aquarium, Chair), Cracids (Rochelle Plasse, Houston Zoological Gardens, Chair), Buffaloes/Bison/Cattle (Bruce Read, St. Louis Zoological Park, Chair), and Penguins (Sherry Branch, Sea World of Florida). The Small Carnivores TAG (Mustelids, Viverrids and Procyonids) is currently pending.

Fauna Interest Groups

No new fauna interest groups (FIGs) were approved this year, although a petition is pending for the establishment of a Zaire FIG. Two North American FIGs currently exist: Madagascar and Indonesia/Malaysia.

Conservation Academy

The AAZPA Conservation Academy held its second annual training session at the St. Louis Zoological Park in February 1992. Two classes are now being offered: one on studbook management and one on SSP coordination. A total of 39 students,

representing 37 different institutions have now completed the studbook management course. An additional 14 students, representing 14 institutions, have completed the SSP coordination course, for an overall total of 53 students. Both courses received high student ratings. Initial development of the Conservation Academy has been supported largely by an AAZPA Conservation Endowment Fund grant. However, project managers, Bruce Read and Bruce Carr (St. Louis Zoological Park) are actively seeking outside funding for the project. A \$120,000 grant proposal has been submitted to the Institute of Museum Services (IMS) to help support this important program over a two-year period.

Board Approves Guidelines for International Conservation Programs

A set of guidelines has been developed for AAZPA endorsement of international field conservation projects, including consortia, trusts and similar cooperative ventures. The guidelines were approved by the AAZPA Board of Directors and are intended to provide direction to the Association and Board in deciding when to endorse various international programs. The guidelines emphasize conservation impact, transfer of technology and cooperation.

Reintroduction Advisory Group Develops Guidelines

The AAZPA Reintroduction Advisory Group, chaired by Dr. Benjamin Beck (National Zoological Park), has developed a set of guidelines for reintroduction projects to be conducted by or supported by AAZPA member institutions. The guidelines emphasize the importance of a systematic, scientific approach to reintroduction. The guidelines were approved by the AAZPA Board of Directors at its 2-4 August Annual Meeting in Cleveland, OH.

Small Population Management Advisory Group

The Small Population Management Advisory Group (SPMAG) has proven to be a particularly useful concept. Coordinated by Dr. Robert Wiese, AAZPA Assistant Director of Conservation and Science, the SPMAG is a cadre of highly trained population biologists who serve as advisors to the SSP masterplanning process and to ISIS. A second SPMAG training workshop was held this year, bringing the total number of members to 29. SPMAG members assisted with population analyses for 35 different species this year and helped to convert 11 studbook databases to SPARKS format. They also consulted frequently with ISIS staff, assisting them in identifying long-term priorities for software development and in "debugging." The training workshop and travel expenses of volunteer SPMAG members was supported by a generous grant from the AAZPA Conservation Endowment Fund.

Working Conference Held On Ethical Issues Facing the SSP

Co-principle Investigators, B. Norton (Georgia Tech University), M. Hutchins (AAZPA C&S Office), and T. Maple (Zoo

Atlanta and Georgia Tech University) received a \$57,000 grant from the National Science Foundation to support a working conference on ethical issues facing the SSP. Titled "Animal Welfare and Conservation: Ethical Paradoxes in Modern Zoos and Aquariums" the conference was held in Atlanta, GA from 19-21 March 1992. Nearly 50 experts in animal welfare, animal rights, wildlife conservation, environmental ethics and zoo biology attended. The topics covered by speakers were wide-ranging and included the acquisition of wild animals for captive breeding programs, disposition of surplus animals, and use of animals in research. Participants found it difficult to agree on all issues, but a dialogue was established and barriers to communication were broken down. A set of recommendations from various working groups will be presented to the AAZPA Board for their consideration and possible action.

Proceedings of the conference will be published as a book by the American Association for the Advancement of Science. The volume will be edited by Drs. B. Norton (Georgia Tech University), M. Hutchins (AAZPA C&S Office), T. Maple (Zoo Atlanta and Georgia Tech University), and B. Stevens (Zoo Atlanta).

AAZPA Attains PVO Status From USAID

The AAZPA has been granted Private Voluntary Organization (PVO) status by the United States Agency for International Development (USAID). The implications of PVO status are being investigated by Conservation Center staff, but it is possible that it will provide future funding opportunities for the conservation activities of AAZPA and its member institutions when working in certain foreign countries. USAID administers a number of granting programs which might be applicable to various AAZPA activities, especially those of the evolving Fauna Interest Groups (FIGs). Additional reports on this topic will be forthcoming.

Conservation Endowment Fund and Big Cat Survival Fund

The AAZPA Conservation and Science Office received a total of 28 complete proposals (representing \$551,779 in requests) by the 15 June deadline for consideration by the CEF Scientific Advisory Committee (SAC) and the AAZPA Board. Based on the SAC's review and recommendations, the AAZPA Board awarded \$322,325 to support 14 projects in 1993. A total of \$247,325 from the AAZPA/Ralston Purina Big Cat Survival Fund will support a variety of initiatives, including a study of the potential pathological effects associated with the long-term use of melengestrol acetate as a contraceptive in felids, establishment of an international felid breeding and conservation center at the Sao Paulo Zoo, Brazil, support of PHVA workshops for Sumatran tigers in Indonesia and Asian lions in India, and a study of taxonomic and phylogenetic relationships among South American and Asian cats.

The Board allocated an additional \$75,000 in support of regular Conservation Endowment Fund (CEF) applications. These monies will support several on-going and new initiatives, including operation of the AAZPA Conservation Academy and

AAZPA...

Small Population Management Advisory Group (SPMAG), production and distribution of contraceptive implants for zoo animals, reintroduction programs for the Virgin Island boa and Bali mynah in Puerto Rico and Indonesia, respectively, further improvements in ISIS SPARKS, and a study of the metabolic basis for hemolytic anemia in black rhinos.

Since 1991, the AAZPA Board has awarded \$180,000 in regular CEF funds and \$349,725 from the AAZPA/Ralston Purina Big Cat Survival Fund, for a total of \$529,725 in support of 24 different zoo- and aquarium-based conservation/scientific projects.

1991-92 Annual Report on Conservation and Science
Conservation and Science Office staff completed editing of

the second AAZPA Annual Report on Conservation and Science. The volume contains standardized progress reports from all approved Species Survival Plans (SSPs), Taxon Advisory Groups (TAGs), and Fauna Interest Groups (FIGs) for 1991-92. Also included is a listing of conservation and scientific projects supported by AAZPA member institutions and a bibliography of scientific and conservation-related publications written by zoo/aquarium personnel and their academic collaborators. Copies of the report can be obtained by writing to AAZPA Conservation Center office.

This report was submitted by Michael Hutchins, Director of Conservation and Science, Robert Wiese, Assistant Director of Conservation and Science, and Kevin Willis, Conservation Biologist

International Conference

Implications of Infectious Diseases on Captive Propagation and Reintroduction Programs of Threatened Species

A conference entitled, "International Conference on the Implications of Infectious Diseases on Captive Propagation and Reintroduction Programs of Threatened Species" was held on 13-15 November 1992 in Oakland, California, USA. One hundred and thirty-three participants representing 19 countries attended the conference which was jointly sponsored by the American Association of Zoological Parks and Aquariums, American Association of Zoo Veterinarians, and the IUCN/SSC Captive Breeding Specialist Group (CBSG).

Conference participants received a briefing book which included 65 papers related to issues of infectious diseases and captive propagation/reintroduction programs. The conference consisted of two major parts: speaker presentations and working groups.

Papers were presented on the first two days of the conference. The presentations were meant to be overviews of pertinent topics rather than specific disease case histories. Papers will be published in the September, 1993 issue of the *Journal of Zoo and Wildlife Medicine*. Members of the American Association of Zoo Veterinarians or *Journal* subscribers will automatically receive a copy of this issue. Extra copies of this issue will be printed and available for sale through the CBSG.

Five working groups composed of interested participants were formed. Appropriate speakers or participants were designated as group chairpersons. The working groups and a synopsis of their reports were as follows:

1. Monitoring, Investigation and Surveillance of Dis-

ease in Captive Wildlife: The report is to act as guidelines for Regional Conservation Program Veterinary Advisors.

2. Monitoring, Investigation and Surveillance of Disease in Free-Ranging Wildlife: The report contained very broad recommendations for investigation or prevention of infectious diseases in reintroduction, repatriation and translocation (RRT) projects.

3. Infectious Disease Considerations in Reintroduction Programs for Captive Wildlife: The report contained guidelines for use as reference prior to movement of wildlife from captive environments to the wild, between wild environments, and between captive environments.

4. Risk Assessment and Population Dynamics: The report outlined specific recommendations for integrating the assessment of the risk of infectious disease into species conservation programs.

5. Diagnostic Technology: The report outlined specific objectives to be taken to develop a data set that would serve all of the other groups.

All working group reports were designed to be generic. Specific geographic problems or diseases can be inserted into protocols for regional customization.

Final drafts of the working group reports should be available for distribution in early May. For copies of the reports or the briefing book (cost \$50.00), contact Peregrine L. Wolff, c/o CBSG, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124, USA. Telephone: 1-612-431-9361, telefax: 1-612-432-2757.

CBSG Schedule - 1993-94

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, (L) Lisa Laqua, (O) Shelly O'Brien.

April

6 - 18 Thailand: (S)
18 - 21 Taiwan: Taipei Zoo Int'l Conference (S)
22 - 23 Houston: Lecture (S)
23 - 25 Omaha: Lecture (S)

May

1 - 10 London: Kew PHVA Selected Plants (S)
CAMP Endangered Plants of St. Helena Island (S)
24 - 25 Gland: SSC Meeting (S)

June

27 May - 4 China: Baiji PHVA Workshop (S, E)
6 - 7 Africa: Mountain Zebra PHVA (S)
8 - 10 PAAZAB
11 - 12 Workshop
9 - 13 Phoenix, AZ: Conservation Biology Society (E)
19 - 22 Guatemala: AMAZOO, Regional CBSG (S)
24 St. Louis: AAZPA/CBSG Task Force (S)
28 - 30 Salzburg: EEP (S)

July

6 - 8 Maine: Plant Workshop (S, E)
18 - Aug 8 Virginia: Ulie's vacation

August

9 - 15 Thailand
16 - 20 Idaho: Falconiformes CAMP (S, E)

September

3 - 5 Antwerp: CBSG (S, E, B, M, O)
6 - 9 IUDZG
12 - 16 Omaha, NE: AAZPA Annual Mtg (S, E)
18 Georgia: Emory (S)

October

4 - 8 Gland: SSC Staff Meeting (S, E)
10 - 16 Madras: Lion-tailed Macaque PHVA (S)
17 - 23 Gujarat: Indian Lion PHVA (S)
27 - 29 Uruguay: Pampas Deer PHVA (S)

November

8 - 13 Indonesia: Asian Elephant & Sumatran Rhino PHVAs

December

4 Calcutta: Regional CBSG meeting
6 - 10 Jaldapara: Indian Rhino PHVA

1994

January

? Brazil: Marsh Deer PHVA
13 - 14 Buenos Aires: SSC Steering Cmt.
15 - 24 Argentina: SSC & IUCN General Assembly
? Albuquerque: Heteromyids & Scuriids
CAMP

February

? Phoenix: Insectivora CAMP (& Pholidata)
? Lagomorph CAMP?

April

17 - 23 Australia: ASMP Meeting

CBSG News Notes...

For those of you who keep track of such things, you are correct in wondering what happened to the first issue in 1993 of *CBSG News*; we did not print issue Number 1.

Contributors wishing to publish in the *CBSG News* should have their materials submitted on, or preferably before, the below deadlines. Articles received past the deadline may be published in the subsequent issue.

Editorial Deadlines 1993-94

Issue No.	Deadline
3	July 1, 1993
4	October 1, 1993
1	January 1, 1994
2	April 1, 1994
3	July 1, 1993
4	October 1, 1993

Manuscripts should be typed or printed on a computer laser printer. If at all possible, submit your manuscript on a computer disk. We can translate most common word processing programs for use on our systems. Submission of manuscripts by fax is *discouraged* unless no other means are possible. Send submissions to: CBSG News, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124 USA.

The International Zoo Yearbook

The Yearbook serves as an international forum for the exchange of information amongst zoos. For zoologists, veterinarians, educators, and anyone concerned with the care, conservation, biology and behaviour of wild animals, it is an indispensable reference and source book of much data unobtainable elsewhere. The Yearbook is comprised of a selection of papers which relate to a special subject, a section of papers on new developments in the zoo world, and a reference section which includes annually-updated lists of vertebrate species bred in captivity, a census of rare animals in captivity, and lists of international studbooks and world registers; plus, in even-numbered editions, an international directory of zoos and aquaria.

"...in these days of ever-increasing international cooperation between zoos - a process of which the Yearbook is the most obvious symbol - the value of such a reference source can hardly be exaggerated." International Zoo News

Special topics in recent volumes:

Volume 28, Reptiles and Amphibians \$97.00 hb \$86.00 sb. The 40 papers contributed by some of the world's leading herpetologists offer a wide view of the latest developments in herpetological conservation activities now being undertaken by zoos and zoological institutions world-wide.

Volume 29, Horticulture in Zoos \$97.00 hb \$86.00 sb. The papers in this section illustrate zoo managements' increasing concern with educating the public on the importance of conserving total habitats as it is clear that zoo exhibits must demonstrate not only the role of the animals in the environment but the integration of plants and animals as well.

Volume 30, Invertebrates \$104.00 hb \$90.00 sb. Although they represent over 95% of animal species, "animals without backbones" are neglected and misunderstood by the public at large. The 21 articles in this section argue impressively for the inclusion of invertebrates in zoo exhibits and educational and conservation projects.

Volume 31, Australasian Fauna \$104.00 hb \$90.00 sb. Throughout the world, the unique fauna of Australasia has enduring fascination. The 22 articles in this section give an overall view of the action being taken by the zoos of Australia and New Zealand to protect threatened species and to educate the people about the importance of their natural heritage.

Name _____
Institution _____
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Please invoice/find check enclosed for the following volume(s) plus \$9.00 per book for postage:

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Prices quoted in \$U.S.; pound sterling prices available on request. Fax #: 44-071-483-4436



1993 Annual Meeting of the Captive Breeding Specialist Group



**3-5 September 1993
Antwerp, Belgium**

The 1993 Annual Meeting of the Captive Breeding Specialist Group will take place this year in Antwerp, Belgium on September 3-5. The host for this year's meeting is the Royal Zoological Society of Antwerp. The Antwerp Zoo is also celebrating its 150th anniversary this year with many interesting events planned.

The CBSG meeting precedes the Annual Conference of the IUDZG (International Union of Directors of Zoological Gardens) which will be held on September 5-9, 1993 also at Antwerp.

Before the CBSG meeting, several workshops will take place and after the IUDZG meeting, the Annual Conference of the World Pheasant Association will be held at the Antwerp Zoo on September 10-12, 1993.

If you are planning to attend the CBSG meeting, please complete the below registration form and **mail to the address shown below** as soon as possible.

Circle one: Mr. Mrs. Ms. Dr. Prof.

Name: _____

Affiliation: _____

Address: _____

City: _____ Country: _____

Postal Code: _____ Telephone: _____ Fax: _____

Please check: Yes, I plan to attend the CBSG Annual Meeting
 No, I will not be able to attend the CBSG Annual Meeting
 I wish to participate in the visit of the Antwerp Zoo and Planckendael

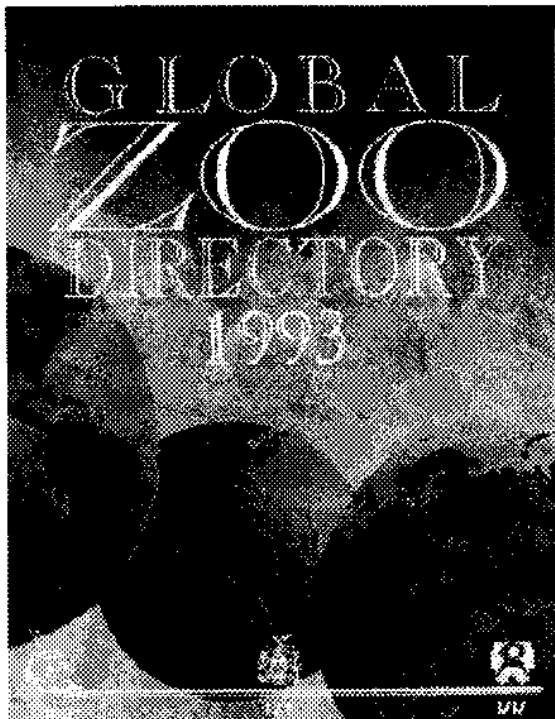
Please send me information regarding accommodations (check preferred hotels):
 Hilton: Single = 5.900 BF (app. \$185 U.S.), double = 6.700 BF (app. \$210 U.S.)
 Arcade: Single = 2.850 BF (app. \$89 U.S.), double = 3.350 BF (app. \$105 U.S.)
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Introducing the...

1993 Global Zoo Directory

Published by the the IUCN/SSC Captive Breeding Specialist Group in collaboration with the International Species Information System and International Zoo Yearbook. Edited by Frederick B. Swengel.



Featuring...

- Directory of Zoos of the World
- Regional Conservation Coordinators
- International Studbook Listing
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- Taxon Advisory Groups
- Conservation Assessment and Management Plans (CAMPs)
- SSC Specialist Groups
- SSC Action Plans
- SSC Specialist Group Addresses
- CBSG Member Addresses

Please send me _____ copies of the 1993 Global Zoo Directory. Cost is \$35.00 per directory, postage paid. My mailing address is:

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Looking at Small Populations?

CBSG is seeking information on zoo support of small population conservation projects. If your institution is actively supporting research projects, reintroductions, translocations, or other projects related to the study and conservation of critically-threatened populations of either plants or animals, we would like to know about it. The results of this survey will be presented in a future issue of *CBSG News*. Please send us any abstracts, project summaries, or reports describing such activities.

YOUR NAME: _____

ADDRESS: _____

CITY: _____ COUNTRY _____ POSTAL CODE _____

TELEPHONE: _____ FAX: _____

PROGRAM NAME/AREA SUPPORTED: _____

SUPPORTING INSTITUTION: _____

INSTITUTION ADDRESS: _____

PLEASE COMPLETE AND RETURN TO: CBSG, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124 USA

MAY WE DISCUSS ANOTHER ISSUE?



The *CBSG News* is currently distributed to a network of over 7,000 CBSG members and conservation professionals in 170 countries. In order to keep up with increasing expenses for the printing and distribution of the *CBSG News*, we are asking for contributions from readers in hard-currency countries who feel they can afford to help us defray these costs. If you would like to assist the CBSG with these expenses, please take a moment to fill out the coupon below. *Suggested contribution is \$25 (U.S.) - sorry, but we cannot accept credit cards or non-U.S. currency.*

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Institution _____

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- Yes! I am enclosing _____ to the CBSG to help defray costs for publication and distribution of the *CBSG News*
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CBSG News



*Newsletter of the Captive Breeding Specialist Group
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