



Minnesota State Zoological Board.
Zoo-Related Organizations Files.

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Who Is Involved?

Hundreds of zoological gardens, plus some research institutes and private individuals, from 50 countries on 6 continents, comprise the membership of ISIS. These facilities in the network welcome others who share common goals.

Headquartered on the grounds of the Minnesota Zoo since 1973, ISIS is supported by a combination of membership fees and grants from foundations, governments, professional zoo associations and others. Important continuing assistance has come from both the AAZPA and U.S. Institute of Museum Services. Additional international contributions have been received from the IUDZG and the Australasian zoos. ISIS has also received substantial support from the Pew Charitable Trusts.

The success of ISIS can be measured in part by an impressive membership growth. We encourage all prospective members to apply. For those without reasonable access to hard currency, special arrangements may be possible. Donations made to ISIS are tax-exempt under U.S. law; ISIS is qualified as a U.S. IRS 501(c)3 charitable non-profit organization. ISIS welcomes support through gifts, bequest or other means.

FOR MORE INFORMATION PLEASE CONTACT...

International Species Information System
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151 U.S.A.

Phone: U.S. (612) 431-9295
FAX: U.S. (612) 432-2757
U.S. country code = (1)

There is growing demand for reliable up-to-date information on the global captive population of thousands of species. The demand comes in part from better recognition of the risks facing many remaining wild populations. Sound conservation oriented management of captive populations is necessary, both for their long term continuation and to sustain their value as a kind of conservation insurance. Enlightened management of this kind requires that organizations share specimen information on a broad scale. Such sharing also benefits them in other ways.

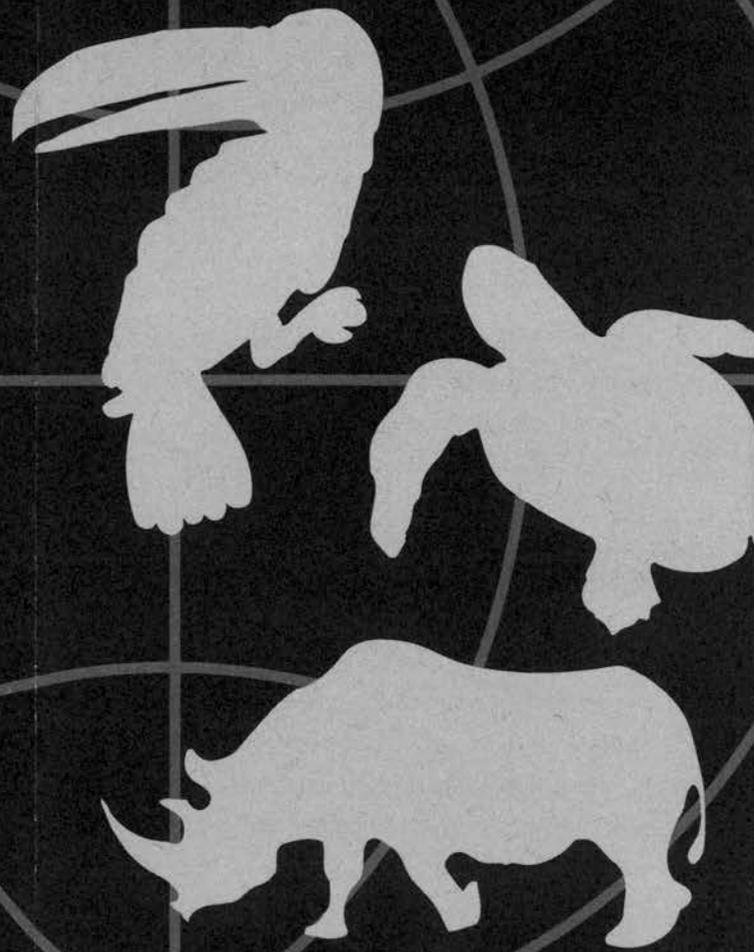
ISIS is the only global database meeting this need.

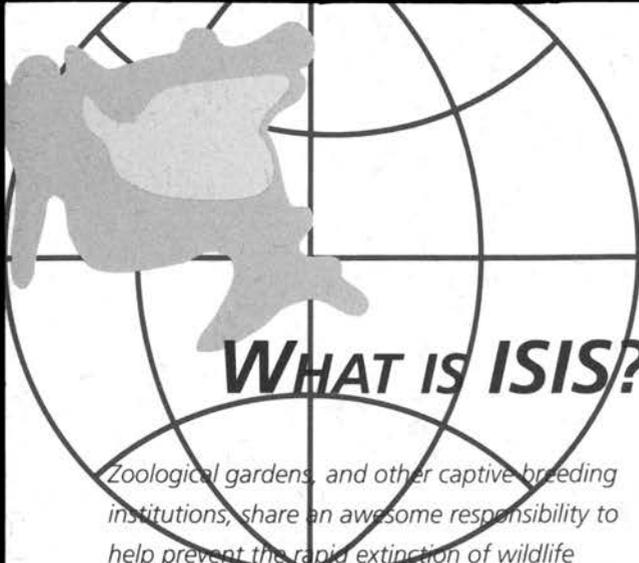


Note: The ISIS logo is the head of a ram in a pair of human hands—the fate of wildlife now depends on human action.



**INTERNATIONAL
SPECIES
INFORMATION
SYSTEM**





WHAT IS ISIS?

Zoological gardens, and other captive breeding institutions, share an awesome responsibility to help prevent the rapid extinction of wildlife species on 'planet earth'. Many scientific skills and disciplines are being applied to this struggle.

Fundamental to the effective application of these methods is detailed knowledge of individual animals within total populations, as well as the populations themselves, on a worldwide basis. Only from such knowledge can appropriate genetic and demographic management decisions be made.

The International Species Information System (ISIS) exists to facilitate and guide these many complex decisions.

ISIS is a non-profit international data and information service organization committed to the conservation and preservation of species. ISIS collects, pools and distributes specimen information, focusing on captive populations. ISIS also develops and distributes computerized information tools. Over four hundred members of ISIS share data worldwide. The network presently includes the majority of the world's recognized zoological gardens plus a number of research institutions.

CENTRAL SPECIMEN DATABASE

ISIS members have contributed to the creation of a central computerized database where over 600,000 individuals are registered. This archive includes pedigree details and population demographics for several thousand species of vertebrates. ISIS provides information on who has what species and who's breeding them successfully. ISIS also provides overviews of the status and trends of individual populations. ISIS further offers partial "studbook" data for any of the thousands of species covered.

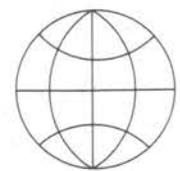
INFORMATION TOOLS FOR ANIMAL MANAGEMENT

Promoting the use of this information, ISIS has developed and supports software packages for member's use with desktop microcomputers (PC's).

ARKS (Animal Record Keeping System) is used by several hundred facilities worldwide for records keeping management on their own animals.

MedARKS (Medical Animal Records Keeping System) is a companion system to ARKS for veterinary medical management and records.

SPARKS (Single Population Analysis and Records Keeping System) is a related system for producing studbooks and applying modern population biology (demographic and genetic analyses) to the entire managed captive population of any one species.

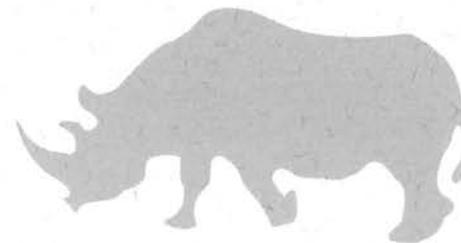
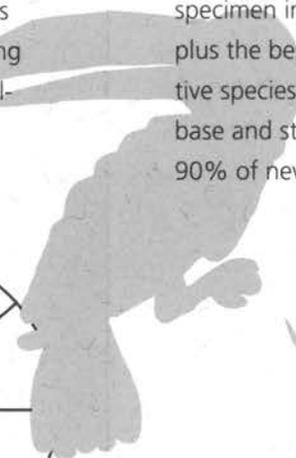
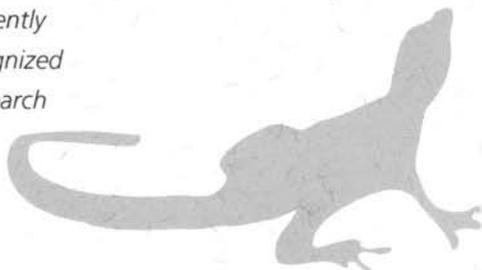


WHY IS IT IMPORTANT?

Any particular breeding center may hold the critical genes for a larger global population. Without the universal involvement of all institutions dedicated to species preservation, such essential information may be lost. It is the goal of ISIS to ensure the necessary information is shared among all species managers.

In a growing list of cases (Mongolian horse, Arabian oryx, European bison, Black-footed ferret, California condor, Moorean land snails) small captive populations were all that remained after total extinction in the wild. The oryx, bison, ferret and condor have already been restored to the wild. Programs for restoration of additional species are under development. For a growing number of species captive populations are important as an insurance policy against the otherwise irrevocable loss of what remains in the wild. Worldwide, species are being lost from the wild at rising and unacceptable rates.

Increasingly, successful management and eventual restoration come from use of detailed specimen information, powerful information tools plus the best science available. For 97% of captive species, ISIS represents the only global database and studbook available. Already more than 90% of new zoo mammals are captive bred.





MINNEAPOLIS:
ISIS Headquarters
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151 USA
Phone: +1 952 997 9500
FAX: +1 952 432 2757
e-mail: isis@isis.org
Website: <http://www.isis.org>



AMSTERDAM:
ISIS European Branch Office c/o European
Association of Zoos and Aquaria (EAZA)
PO Box 20164
1000 HD Amsterdam
The Netherlands
Phone: +31 20 5200 750
FAX: +31 20 5200 754
e-mail: info@eaza.net
Website: www.eaza.net

SYDNEY:
ISIS Australasian Branch Office c/o Australasian
Association of Zoos and Aquaria (ARAZPA)
PO Box 20
Mosman NSW 2088
Australia
Phone: +61 2 9978 4797
FAX: +61 2 9978 4761
e-mail: admin@arazpa.org.au
Website: www.arazpa.org.au

ISIS contributes to the preservation of biotic diversity by providing global specimen and species catalogues and auxiliary information services, to support long-term collective species conservation and preservation programs.

3 November 2003

ISIS Board of Trustees Election

Dear Director:

As an institutional member of ISIS, your institution is entitled, and encouraged, to vote in the election of the ISIS Board of Trustees. The ISIS Board of Trustees decides membership fees, sets policies, and is critical in guiding our way forward.

Four of the elected Institutional Trustee positions need to be filled for a three year term (1 January 2004 – 31 December 2006). The ISIS Board of Trustees Nominating Committee has placed four names on the enclosed ballot. Please vote for four of the four names listed. Terms are three years, and trustees may be elected to a second consecutive term.

We encourage you to submit names of potential candidates for future elections. Suggestions should be addressed to: ISIS Board Nominating Committee, c/o ISIS, 12101 Johnny Cake Ridge Road, Apple Valley, Minnesota 55124-8151 USA. In addition to utilizing the particular talents and strengths of individual trustees, the ISIS Board of Trustees needs to be broadly representative of several regions and both larger and smaller institutions.

Enclosed is a list of the current ISIS Board of Trustees, your ballot, brief candidate biographies, and a specially-marked "ballot" envelope. **Please enclose your ballot in the specially-marked envelope, and mail to ISIS.** Your envelope must be **postmarked NO LATER THAN 12 December 2003.** Ballots received in the specially-marked envelope are set aside to be opened and counted by an independent election judge. Ballots that arrive in the ISIS office in other envelopes are not counted.

Thank you again for your membership and active participation in ISIS.

With regards,

Nathan R. Flesness
Executive Director, ISIS

Encls: 2003 ISIS Board of Trustees List
Biographies for 2004-2006 Term
Ballot
Specially-Marked "Ballot" Envelope

ISIS BOARD OF TRUSTEES - 2003

(sorted by term of office)

19 May 2003

ELECTED:

Mr. Gerald Borin, Chair Columbus Zoological Gardens 9990 Riverside Dr., P.O. Box 400 Powell, OH 43065-0400 USA	TERM (2 nd): 1 Jan 2001 – 31 Dec 2003 INSTCODE: 310536012 PHONE: (cc= 1) 614 645 3494 FAX: (cc= 1) 614 645 3542 E-Mail: jborin@colszoo.org
Prof. Dr. Gunther Nogge Köln Zoo Riehler Strasse 173 D-50735 Köln Germany	TERM (2 nd): 1 Jan 2001 – 31 Dec 2003 INSTCODE: 113023002 PHONE: (cc= 49) 221 778 5101 FAX: (cc= 49) 221 778 5111 E-Mail: direktion@zoo-koeln.de
Mr. Lars Lunding Andersen Copenhagen Zoo Sdr. Fasanvej 79 DK-2000 Frederiksberg Denmark	TERM (2 nd): 1 Jan 2001 – 31 Dec 2003 INSTCODE: 110803002 PHONE: (cc= 45) 72 200 210 FAX: (cc= 45) 72 200 219 E-Mail: lla@zoo.dk
Dr. Jeffrey P. Bonner (To Fill Vacancy) St. Louis Zoological Park 1 Government Drive St. Louis, MO 63110-1395 USA	TERM: 1 Sep 2002 – 31 Dec 2003 INSTCODE: 310526006 PHONE: (cc= 1) 314 781 0900 x219 FAX: (cc= 1) 314 781 6086 E-Mail: bonner@stlzoo.org
Ms. Yolanda Matamoros Hidalgo Zoologico Nacional Simon Bolivar Fundacion pro Zoologicos Apdo. 11594-1000 COSTA RICA	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 320707001 PHONE: (cc= 506) 233 6701 FAX: (cc= 506) 233 1817 E-Mail: fundazoo@sol.racsa.co.cr
Dr. Beth Stevens (To Fill Vacancy) Disney's Animal Kingdom 1200 N. Savannah Circle E., PO Box 10000 Bay Lake, FL 32830-1000 USA	TERM: 1 Sep 2002 – 31 Dec 2004 INSTCODE: 310510072 PHONE: (cc= 1) 407 939 2476 FAX: (cc= 1) 407 938 2525 E-Mail: beth.stevens@disney.com
Dr. Jonathan Wilcken (ARAZPA Appointed) ARAZPA PO Box 20 Mosman 2088, NSW AUSTRALIA	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 500000999 PHONE: (cc= 61) 2 9978 4773 FAX: (cc= 61) 2 9978 4761 E-Mail: jonathan@arazpa.org.au
Ms. Karen Sausman (Elected;WAZA Appointed) The Living Desert 47-900 Portola Ave. Palm Desert, CA 92260 USA	TERM (2 nd): 1 Jan 2002 – 31 Dec 2004 INSTCODE: 310505027 PHONE: (cc= 1) 760 346 5694 x286 FAX: (cc= 1) 760 568 9685 E-Mail: kastld@aol.com
Dr. Koen Brouwer (EAZA Appointed) EAZA C/O Amsterdam Zoo, PO Box 20164 1000 HD Amsterdam THE NETHERLANDS	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 110000999 PHONE: (cc= 31) 20 520 0750 FAX: (cc= 31) 20 520 0754 E-Mail: koen.brouwer@nvdzoos.nl
Mr. Bruce Bohmke (as IADISC Chair) Woodland Park Zoological Gardens 5500 Phinney Ave. N. Seattle, WA 98103-5897	TERM: 15 May 2003 – 31 Dec 2004 INSTCODE: 310548005 PHONE: 206 615 1071 FAX: 206 615 0290 E-Mail: bruce.bohmke@zoo.org

Dr. Anne M. Baker (AZA Appointed) Rosamond Gifford Zoo at Burnet Park 1 Conservation Place Syracuse, NY 13204-2504 USA	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 310533039 PHONE: (cc= 1) 315 435 3774 FAX: (cc= 1) 315 435 8517 E-Mail: abatzoo@aol.com
Mrs. Laura M. Mumaw Melbourne Zoo P.O. Box 74 Parkville, VIC 3052 Australia	TERM (2 nd): 1 Jan 2003 – 31 Dec 2005 INSTCODE: 510307002 PHONE: (cc= 61) 3 9285 9307 FAX: (cc= 61) 3 9285 9330 E-Mail: lmumaw@zoo.org.au
Mr. Dave Morgan (PAAZAB Appointed) PAAZAB 5 Steyn Street, Pierre Van Ryneveld Centurion, Pretoria South Africa	TERM: 1 Jan 2003 – 31 Dec 2005 INSTCODE: 200000999 PHONE: (cc= 27) 12 662 1854 FAX: (cc= 27) 12 662 1854 E-Mail: davetsp@iafrica.com
Dr. Jo Gipps Bristol Clifton West of England Zool. Society Bristol Zoo Gardens Bristol Clifton BS8 3HA England (U.K.)	TERM (2 nd): 1 Jan 2003 - 31 Dec 2005 INSTCODE: 120225003 PHONE: (cc= 44) 117 974 7301 FAX: (cc= 44) 117 973 6814 E-Mail: jgipps@bristolzoo.org.uk
Dr. Robert Lacy (CBSG Appointed) 3647 Pompey Center Road Manlius, NY 13104 USA	TERM: 1 Jan 2003 – 31 Dec 2005 INSTCODE: 310524998 PHONE: (cc= 1) 315 682 3571 FAX: (cc= 1) 315 682 3571 E-Mail: rlacy@ix.netcom.com
Mr. Hans Keller (ISIS Technology Committee Chair) National Aquarium in Baltimore, Inc. 501 E. Pratt Street Pier 3 Baltimore, MD 21202-3194 USA	TERM: 1 May 2003 – 31 Dec 2005 INSTCODE: 310521005 PHONE: 410 659 4226 FAX: 410 576 8641 E-Mail: hkeller@aqua.org
Dr. Jon Ballou (ISIS Scientific Committee Chair) Smithsonian National Zoological Park 3001 Connecticut Ave., NW Washington, DC 20008-2537 USA	TERM: 1 May 2003 – 31 Dec 2005 INSTCODE: 310509004 PHONE: 202 673 4828 FAX: 202 673 4607 E-Mail: balloui@nzp.si.edu
Mr. Hans-Ove Larsson Skansen Foundation, Stiftelsen Skansen P.O. Box 27807 SE-11593 Stockholm Sweden Mr. Hans-Ove Larsson	TERM: 1 Jan 2003 – 31 Dec 2005 INSTCODE: 130719001 PHONE: (cc= 46) 8 442 8000 FAX: (cc= 46) 8 442 8284 E-Mail: hans-ove.larsson@skansen.se TERM: 1 Jan 2003 – 31 Dec 2005
Mr. Nate Flesness International Species Information System (ISIS) 12101 Johnny Cake Ridge Road Apple Valley, MN 55124-8151 USA	TERM: Ex Officio (serves by virtue of office) INSTCODE: 310524999 PHONE: (cc= 1) 952 997 9504 FAX: (cc= 1) 952 432 2757 E-Mail: nate@isis.org

Brief Biographies (in alphabetical order) of the Candidates for The ISIS Board of Trustees (term 1 Jan 2004 – 31 Dec 2006)

Jeffrey P. Bonner – United States

In April 2002, Jeffrey P. Bonner, Ph.D. was appointed President and Chief Executive Officer of the Saint Louis Zoo. From 1993 – 2002 Jeff served as President and CEO of the Indianapolis Zoo, and the White River Gardens.

Dr. Bonner received his B.A. in anthropology from the University of Missouri – Columbia in 1975. He received his M.A. and M. Phil. Degrees in anthropology from Columbia University in New York in 1977 and 1979, along with his Ph.D. from Columbia in 1982. He is a Burgess Fellow, Traveling Fellow, Fulbright Scholar, President's Fellow and a recipient of the National Research Service Award. Dr. Bonner is the author of numerous articles and has written a book based on his doctoral research in northern India.

Jeff serves on numerous boards including the World Zoo Conservation Strategy, the Conservation Breeding Specialist Group, the International Species Information System, the International Center for Tropical Ecology at the University of Missouri – St. Louis, and recently was elected chair of the Madagascar Fauna Group.

Greg Geise – United States

Mr. Geise has been the President and CEO of Binder Park Zoo, Michigan since its creation in 1977. Over the past 26 years Binder Park has evolved as a financial and business leadership model as a mission driven, entrepreneurial, self supporting nonprofit institution without tax support. Greg has a B.A. and M.S. degree in Ethology from the University of Connecticut. He has traveled widely internationally and is active in the African Zoo and Aquarium Association. Greg has been a Professional Fellow member of AZA for many years and has been on AZA's nominating committee, membership committee, regional conference committee, the Protected Areas Initiative and Accreditation Commission. Greg graduated from the Gallup Leadership Institute, Battle Creek community Leadership Academy, AZA Management School, and the Policy Governance Academy. He is a trainer and consultant in nonprofit governance and has been awarded the Benjamin Franklin Award of the National Society of Fund Raising Executives. He has also lead or been a member of fifteen local nonprofit and government boards and commissions.

Jörg Junhold – Germany

Jörg Junhold has been the Director of the Leipzig Zoo since 1997. He graduated with a doctor's degree in veterinary medicine from the Leipzig University in 1977. From 1992 to 1997 he worked for the pet food division of Masterfoods (Mars Inc.) and held diverse leading positions in marketing management. Jörg had a vision of a modern zoo fulfilling today's requirements both of animals and visitors by providing nature-like animal enclosures as well as possibilities for experiencing both nature and adventure for the visitors.

Jörg's personal strong commitment to conservation, combined with his professional experience in marketing and management, predestined him to fulfill the challenge of director to run a zoo of international reputation as a modern company. Under his leadership, a "Zoo of the Future" master plan comprised six theme areas. Development over the last 15 years has evolved the Leipzig Zoo into one of the leading zoos in Europe. During the last six years, under Mr. Junhold's directive, investments of approximately 45 million EURO were made for new state-of-the art exhibits. The Primate example is "Pongoland", the unique facility for great apes that opened in 2001. Other projects followed, which strongly translated his philosophy of interlinking modern husbandry, and mediation of knowledge about species via emotional learning methods to promote awareness on conservation.

Dr. Junhold is Chairman of the Board of the Leipzig Culture Foundation and President of the Saxonia Lions Club.

Esteve Tomàs - Spain

Esteve Tomàs is an agricultural engineer. Mr. Tomàs has been the Executive Director of the Barcelona Zoo since 1996. He has occupied the chairmanship of the Iberian Association of Zoos and Aquaria (the Association of Spanish and Portuguese Zoos and Aquaria) since 1997. In 2002 Esteve was elected as Secretary of the Executive Committee of EAZA (European Association of Zoo and Aquaria) and member of its Membership and Ethics Committee. Recently, he has been elected as member of the council of the WAZA (World Association of Zoo and Aquariums).

Before assuming his present responsibilities at the Barcelona Zoo, Esteve Tomàs worked as General Director of an important water supply public company in Valencia, which provided water for agricultural land and villages and also took care of its purification. He has also acted as advisor for several regional administrative bodies dealing with the protection of natural areas, some of which have become national or natural parks, thus allowing the recovery of important groups of animals and plants.

The Barcelona Zoo has been a member of WAZA since 1963, a member of EAZA since 1988, and has been a member ISIS since 1986.



Mr. Nate Flesness
Executive Director, ISIS
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151

Dear Nate,

As mentioned in the previous letter from Kevin Bell, it is our understanding that ZIMS Phase I will not include many of the features necessary to interface with current and future population management software. These features are critical to the operation of the AZA population management programs that are central to our institutions. The animal records must be useable by the population managers in order to sustain the animal populations we exhibit and conserve.

The Fort Worth Zoo is committed to working with Lincoln Park Zoo and the Minnesota Zoological Garden to support the development of this new software. The new software will cost approximately \$450,000 – c. \$175,000 in “cash” plus c. \$275,000 staff and other “in kind” support. Fort Worth Zoo’s pledge to the ZIMS project will be in the form of support directed at development the population management software so critical to our profession.

If you have any questions about this project, please do not hesitate to contact me or Bob Wiese, Fort Worth Zoo’s Director of Animal Collections.

Sincerely,

Michael Fouraker
Executive Director
Fort Worth Zoo

cc: Bruce Bohmke, Chair, ADISC
Jeff Bonner, ISIS Board of Trustees
Gerry Borin, Chairman, ISIS Board of Trustees
Lee Ehmke, Director, Minnesota Zoological Garden
Kevin Bell, President/CEO, Lincoln Park Zoo
Steve Thompson, VP Conservation and Science, Lincoln Park Zoo
Robert Wiese, Chair, SPMAG
Kevin Willis, Director of Biological Programs, Minnesota Zoological Garden



MINNESOTA ZOO

Changing how you see the world

10 September 2003

Mr. Nate Flesness
Executive Director, ISIS
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151

Dear Nate,

As mentioned in previous letters from Kevin Bell and Michael Fouraker, it is our understanding that Phase 1 of the Zoological Information Management System (ZIMS) project will not include many of the features necessary to interface with current (PM2000, SPARK-plugin) and future (ZORISK) population management software. Population management is critical to the mission and long-term survival of our institutions, and even a short break in our ability to manage populations could have long-term detrimental effects.

The Minnesota Zoo is committed to working with Lincoln Park Zoo and the Fort Worth Zoo to support the development of software that will allow population management to continue during the transition from the current suite of software programs to the version of the integrated ZIMS software that will support population management. The estimated cost of this new software is approximately \$450,000 – c. \$175,000 in “cash” plus c. \$275,000 staff and other “in kind” support. The Minnesota Zoo’s pledge to the ZIMS project will be in the form of in-kind support directed at development the population management software so critical to our profession.

If you have any questions about this project, please do not hesitate to contact me or Kevin Willis, Minnesota Zoo’s Director of Biological Programs.

Sincerely,

Lee C. Ehmke
Director / CEO
Minnesota Zoo

cc: Bruce Bohmke, Chair, ADISC
Gerry Borin, Chairman, ISIS Board of Trustees
Kevin Bell, President/CEO, Lincoln Park Zoo
John Lewis, Director, Los Angeles Zoo
Steve Thompson, VP Conservation and Science, Lincoln Park Zoo
Michael Fouraker, Executive Director, Fort Worth Zoo
Robert Wiese, Chair, SPMAG

file
Lincoln Park
Zoo

P.O Box 14903
Cannon Drive at Fullerton Parkway
Chicago, Illinois 60614

Telephone 312.742.2000 Facsimile 312.742.2137

September 03, 2003

Mr. Nate Flesness
Executive Director, ISIS
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151

Dear Nate,

It is my understanding that ZIMS Phase I will not include many of the features necessary to interface with current and future population management applications. Currently, studbook software (SPARKS and SPARK-plug) is used to store a wide variety of data and assumptions that are not available from either ARKS and/or existing institutional records. Much of this information is transitory and is integrated with studbook data and assumptions into the analytical databases that are the lynchpins of population management.

To provide population planning to the cooperative AZA programs, the SPMAG and PMC must have software to transform the ZIMS Phase I database to the single-species, analytical database and pass those data on to the analytical software. Effective population management requires a stand-alone dataset that can be amended and manipulated prior to and during the planning process. It would be cumbersome and impractical to work directly with the ZIMS database during virtually all aspects of the planning process; it would be particularly impractical to work directly with ZIMS during training sessions such as the AZA Professional Schools. Moreover, authority and documentation of multiple assumptions for each managed specimen, or alternative assumptions for the same variable in a specimen record, would be logistically difficult because it would require interactive access by literally hundreds of studbook keepers, population managers, and SPMAG/PMC advisors.

In recognition of continuing need for analytical databases and on-the-fly sub setting of data during the planning process, AZA's SPMAG has made development of new analytical database software its highest priority (see attached letter from SPMAG to ADISC). This new software will accept a standard data export from ZIMS and combine updated sub setting and analytical database features of SPARKS and SPARK-plug: it will focus primarily on assumptions and export "views" but will also allow entry of data not present in ZIMS (e.g., from institutions not participating in ZIMS, institutions no longer in business, etc.). After an up-to-date export from ZIMS, this new software will be stand-alone on any standard PC, allowing population managers or SPMAG/PMC advisors to conduct analyses at any PC or anywhere they can set up a laptop computer. Although ZIMS Phase I is at least two years from release, the need for this new software is immediate. SPARKS and SPARK-plug are DOS based and Windows 3.x based programs that are increasingly difficult to run under current operating systems. Moreover, SPARKS and SPARK-plug currently need significant modification to export data in formats that will be required by ongoing revisions to the software used for standardized reports and genetic/demographic analyses (PM2000, MateRx and ZooRisk).

Lincoln Park Zoo, The Minnesota Zoo, and the Fort Worth Zoo have a long-standing interest and commitment to population management. Staff at these institutions have developed data standards for SPARKS and ARKS, served as officers in SPMAG, participated in the development and testing of

MateRx, ZooRisk, and SPARK-plugin software, and serve as course leaders for the PM1 and PM2 AZA professional school courses and serve as long-term instructors in those courses. The AZA Population Management Center is currently housed at and administered by Lincoln Park Zoo.

Lincoln Park Zoo, The Minnesota Zoological Gardens, and the Fort Worth Zoo have agreed to support the development of this new software. We anticipate that development of this new software will cost approximately \$450,000 – c. \$175,000 in “cash” plus c. \$275,000 staff and other “in kind” support. Together, the three zoos have agreed to contribute at least \$175,000 for the “cash” costs of the project; it is our intention to apply to the Institute of Museum and Library Services (IMLS) for \$75,000 to defray a portion of these costs. We anticipate that a distribution version will be available at or before the roll-out of ZIMS Phase I. I have attached a draft project proposal from our internal review process; note that this proposal will be used as the template for our proposal to IMLS.

As you know, Lincoln Park Zoo has pledged \$100,000 to the ZIMS project. However, as I have explained to Jeff Bonner, we expect that the majority of those monies will go to development and modification of population management software. Should these software development efforts require less than the \$100,000 we have pledged to the ZIMS project, the balance will be contributed directly to ZIMS Phase II.

If you have any questions about this project, please do not hesitate to contact me or Steve Thompson, Lincoln Park Zoo’s Vice President and Emily and John Alexander Chair of Conservation and Science.

Sincerely,



Kevin Bell
President/CEO
Lincoln Park Zoo

cc: Bruce Bohmke, Chair, ADISC
Jeff Bonner, ISIS Board of Trustees
Jerry Borin, Chairman, ISIS Board of Trustees
Lee Ehmke, Director, Minnesota Zoological Garden
Michael Fouraker, Executive Director, Fort Worth Zoo
Steve Thompson, VP Conservation and Science, Lincoln Park Zoo
Robert Wiese, Ph.D., Chair, SPMAG
Kevin Willis, Director of Biological Programs, Minnesota Zoological Garden

**Lincoln Park Zoo
Research Proposal**

Title: Development of "ZIMS-plug" Software for Creation of Analytical Databases Used in AZA Population Management Planning

PIs: Steve Thompson, Joanne Earnhardt, Kevin Willis [Minnesota Zoo], Bob Wiese [Ft. Worth Zoo], Colleen Lynch, Sarah Long, Katie Cronin, Adrian Lin

Purposes: To develop new software that will allow AZA's population managers, SPMAG advisors, and PMC staff to combine data from the proposed ZIMS database, existing studbook databases, and non-ZIMS sources into the analytical databases that are the basis for all AZA PMP and SSP population management plans. This new software will combine essential elements of the outmoded SPARKS (DOS) and SPARK-plug (Windows 3.x) software into a platform that is compatible with contemporary operating systems (e.g., Windows XP) and analytical software used by AZA programs (e.g., MateRx, PM2000, ZooRisk).

Rationale: **Analytical studbook databases are essential to AZA's population management planning.** At present, the analyses and reports for all AZA SSP and PMP management plans are generated by software (PM2000, SPARK-plug, MateRx, and ZooRisk [currently under development]) that accept genetic and demographic data that are maintained in SPARKS. Studbook keepers currently solicit data from institutional records keepers and or curators for input into SPARKS; this is typically done on an annual basis, often immediately prior to development of an updated breeding and transfer plan (sic master plans for SSPs). The data maintained in SPARKS are supposed to represent the "truth" as represented in the respective records of each institution. However, there is often additional "truth" that is collected and entered in the studbook. The latter may include, but not be limited to, information from private breeders and/or other program participants that do not participate in ISIS, data from institutions that no longer exist, and information that conflicts with that obtained from participating institutions (Figure 1).

Data from SPARKS are imported into SPARK-plug software which allows SPARKS records to be modified with assumptions. Assumptions are complicated, often change from plan to plan, often need to change during the planning process, and must be imposed prior to imposition of queries or analyses. SPARK-plug generates an analytical SPARKS database; SPARKS is used to export the appropriate data from the analytical studbook to the population management software such as PM2000. These SPARKS exports are specifically tailored to each specific planning situation through query options, which SPARKS terms "views", that narrow the scope of exported data for a specific planning objective; often multiple queries, each with different criteria, are required prior to and/or during a planning session (Figure 2).

SPARKS and SPARK-plug are DOS based and Windows 3.x based, respectively: neither performs well in either the Windows 2000 or XP operating environment. SPARKS has received minor upgrades over the past six years but is essentially the same as the last "official" release in June 1997. Proposed changes in demographic analyses (Odom and Smith 2001; Faust et al. 2003)

and the need for additional information related to planning and treatment of individual specimens in analyses would require changes in a major revision of SPARKS. ISIS has said it has no intention of either revising or making significant upgrades to SPARKS. SPARK-plug is three years old and also requires moderate modification; it is based on SPARKS data files and thus would require concomitant modifications to maintain compatibility with any changes to or replacement of SPARKS.

The international zoo community has committed to the development of a new, on-line animal and medical records database – Zoo Information Management System (ZIMS). ZIMS is a multi-million dollar project that will be developed and launched in three Phases. Phase I, currently scheduled for completion in late 2005, has no components to support either the development or maintenance of analytical databases or population management analyses.

To provide population planning to the cooperative AZA programs, the SPMAG and PMC must have software to transform exports from the ZIMS Phase I database to the single-species, analytical databases and export the appropriate subset of data to the analytical software (ZIMS-plug). Moreover, because ZIMS will not include information from many sources currently essential to population management, including some information currently present in SPARKS databases, any new analytical database software must have the capability to incorporate data from ZIMS, SPARKS databases, SPARK-plug, and non-ZIMS participants.

We propose to develop new stand-alone analytical database software that will accept data from ZIMS and other new and existing sources and thus allow population managers, SPMAG advisors, and the AZA PMC to continue population management using existing [and/or updated] analytical and report writing software. This new software, ZIMS-plug, will combine appropriate features of SPARKS and SPARK-plug with new features designed to accept and manipulate data exported from ZIMS. Although we anticipate that by Phase III, ZIMS may incorporate many of the features currently planned for ZIMS-plug, we estimate that ZIMS-plug will be an essential tool for population management from early 2005 through at least 2007.

The lifespan of ZIMS-plug could be substantial. It is possible that, as currently planned it will prove impractical for population managers to work directly with any phase of ZIMS. Authority and documentation of multiple assumptions for each managed specimen, or alternative assumptions for the same variable in a specimen record, would be logistically difficult because it would require interactive access by literally hundreds of studbook keepers, population managers, and SPMAG/PMC advisors. Moreover, most population management planning requires use of multiple laptops and simultaneous use of several software packages; few meeting facilities currently offer multiple access to on-line services. In addition, permanent separation of population management protocols – analytical databases, analyses, and report writing – from ZIMS would ensure that AZA could maintain control over its population management planning process (rather than submit it through international bodies for inclusion in ZIMS).

Design:

The software will be designed in .net which is the same platform currently being used in the design of LPZ's ZooRisk analytical software. ZooRisk currently extracts data from SPARKS files and portions of this technology will be readily incorporated into the new software. As in ZooRisk, Microsoft Excel will be used as an intermediary import/export utility.

Software will be designed in close cooperation with SPMAG. A draft of design elements (features) and analytical routines (e.g., risk or parameter calculation) will be developed by the co-PIs and presented for discussion at the 2004 mid-year meeting of the SPMAG. Modifications to this basic design will be ratified via the SPMAG list server in early summer 2004. Software development will begin in summer 2004.

Initial design will include the following general features: importation of relevant population management data from SPARKS data files; importation of assumptions from SPARK-plugin overlay files; ability to enter new records (specimens); ability to edit all records; ability to append and modify all assumptions; ability to accept data from ZIMS (eventually) and integrate those data with data from SPARKS or other sources; ability to distinguish source of each datum (e.g., SPARKS, ZIMS, assumptions, etc.); ability to store multiple analytical scenarios; ability to create multiple analytical studbooks; ability to analyze data for "best solution" or "possible solution" assumptions (e.g., potential parents analyses in SPARK-plugin); ability to subset data with "views;" and the ability to export data in the appropriate format to the current versions of SPMAG approved analytical software (e.g., MateRx, PM2000, ZooRisk).

Co-PIs from LPZ and programmer will meet weekly to review progress and discuss revision of features. Willis and/or Wiese will attend bimonthly meetings in Chicago. Willis and PMC staff will work closely with programmer on features relevant to PM1 course. Willis will coordinate with ADISC and ZIMS exports to ZIMS-plugs.

PMC staff, particularly the studbook analyst, will be responsible to testing and comparison to results from SPARKS and SPARK-plugin.

Project view will take place at SPMAG annual meeting and mid-year meeting.

Subsequent to release, all substantive changes will be approved by SPMAG (at annual meeting or mid-year meeting) prior to implementation.

International input will be sought at all phases via direct communication with representatives to CIRCC (Committee of Regional Conservation Coordinators) but over-riding priorities will be appropriateness for AZA population planning.

Early (late alpha or early beta) versions of the software will be available in early 2005; release of the initial distributional version will be timed to coincide with the implementation of ZIMS. Programming services will continue to be available for approximately six months post-release of ZIMS to ensure that ZIMS exports are appropriate and can be imported and integrated with other data. ZIMS will

determine the export format and content so programming will be necessary to ensure that ZIMS can be used to update existing future analytical databases.

Budget: The budget is based on previous and ongoing software development and AZA population management planning projects. Programming support is budgeted for 30 months to permit adjustment to the release of ZIMS Phase I. Travel is based on meetings in each of three calendar years.

	Proposal	Match
Salaries	\$113,891	\$78,480
Travel	\$33,965	\$120,423
Supplies	\$3,450	
Phone	\$2,100	
Computers	\$3,800	
Software Library	\$3,500	
Graphics, Internet, Web	\$3,580	
Total	\$164,286	\$198,903
Overhead @ 15%	\$24,643	\$29,835
Total		\$417,667

LPZ will be submitting an IMLS Conservation Grant proposal 15 October 2003, with the Minnesota Zoo and Fort Worth Zoo as collaborators, for \$75,000 to cover a portion of the proposal costs; Fort Worth Zoo will contribute up to \$50,000 in direct costs and in kind support; Lincoln Park Zoo will contribute up to \$100,000 in lieu of its contribution to the ZIMS project. Minnesota Zoo will contribute at least \$25,000 in direct costs and in kind support.

References:

- Ballou, J., Earnhardt, J.E., Thompson, S.D. 2001. MateRx. National Zoological Park, Washington, DC.
- Faust, L.J.; Thompson, S.D.; Earnhardt, J.E.; Brown, E.; Ryan, S.; Yurenka, M. 2003. Using stage-based system dynamics modeling for demographic management of captive populations. **ZOO BIOLOGY** 22:45-64.
- Lacy, R., Ballou, J. 2003. Population Management 2000 (PM2000). Chicago Zoological Society, Brookfield, IL.

Odom, R., Smith, B. 2001. The effects of prorating risk in the development of life-tables. **ZOO BIOLOGY** 20: 279-292.

International Species Information System (ISIS). 1997. Single Population Analysis and Records Keeping System (SPARKS). Apple Valley, MN.

Figure 1. Current flow of data from institutional records at ISIS participants through creation of an analytical database and on to analytical tools (software).

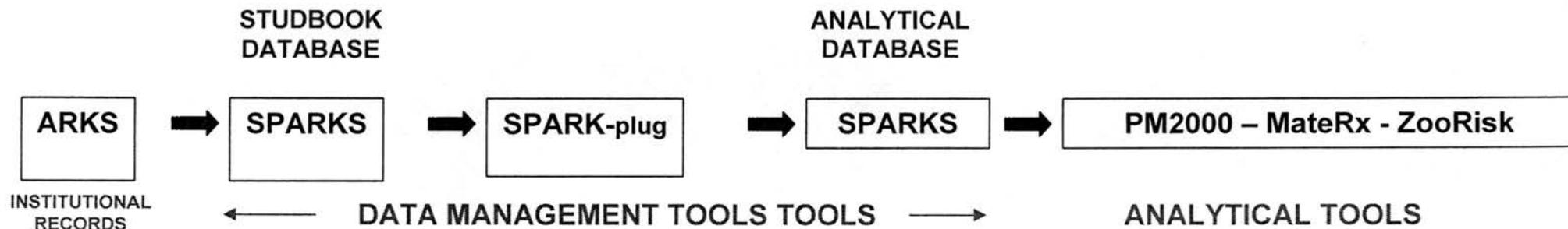


Figure 2. Current flow of data showing sources of additional non-ARKS data in studbooks, assumptions (e.g., hypotheticals) and related changes/additions to studbook data, and data subsetting for analyses (e.g., views).

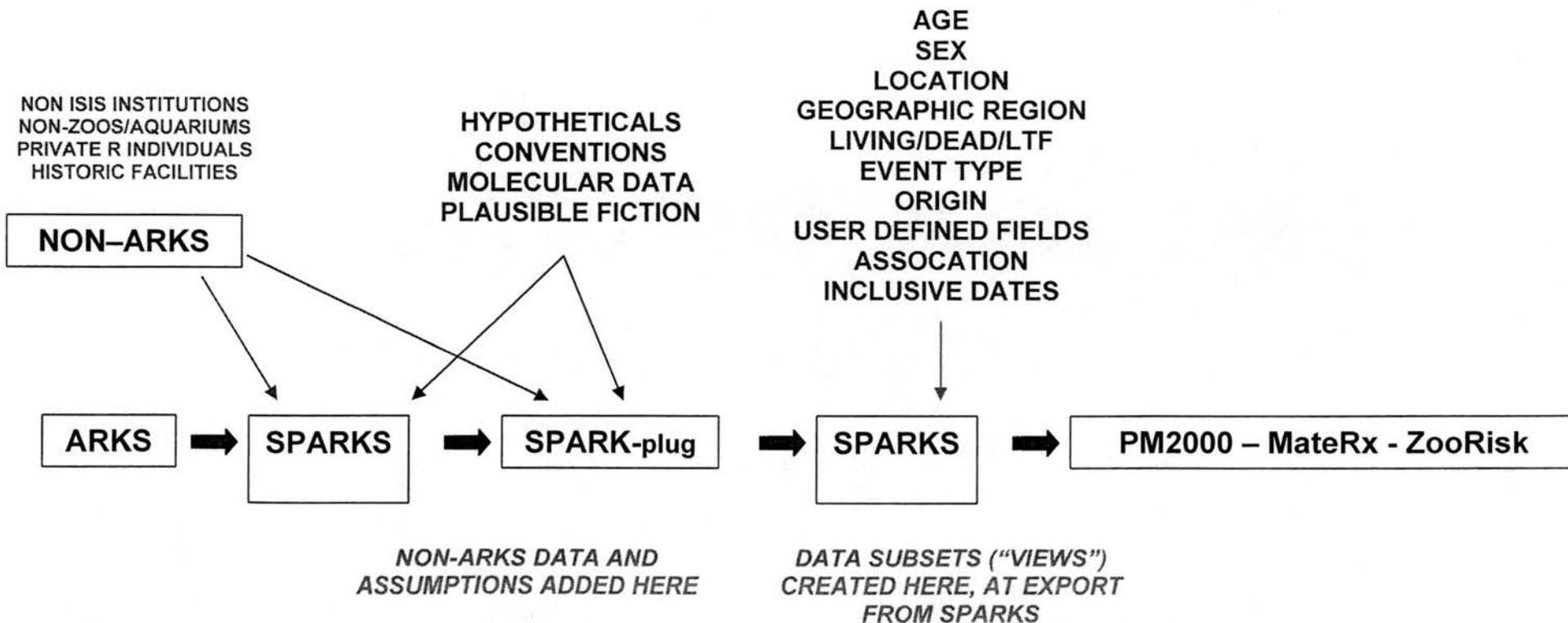
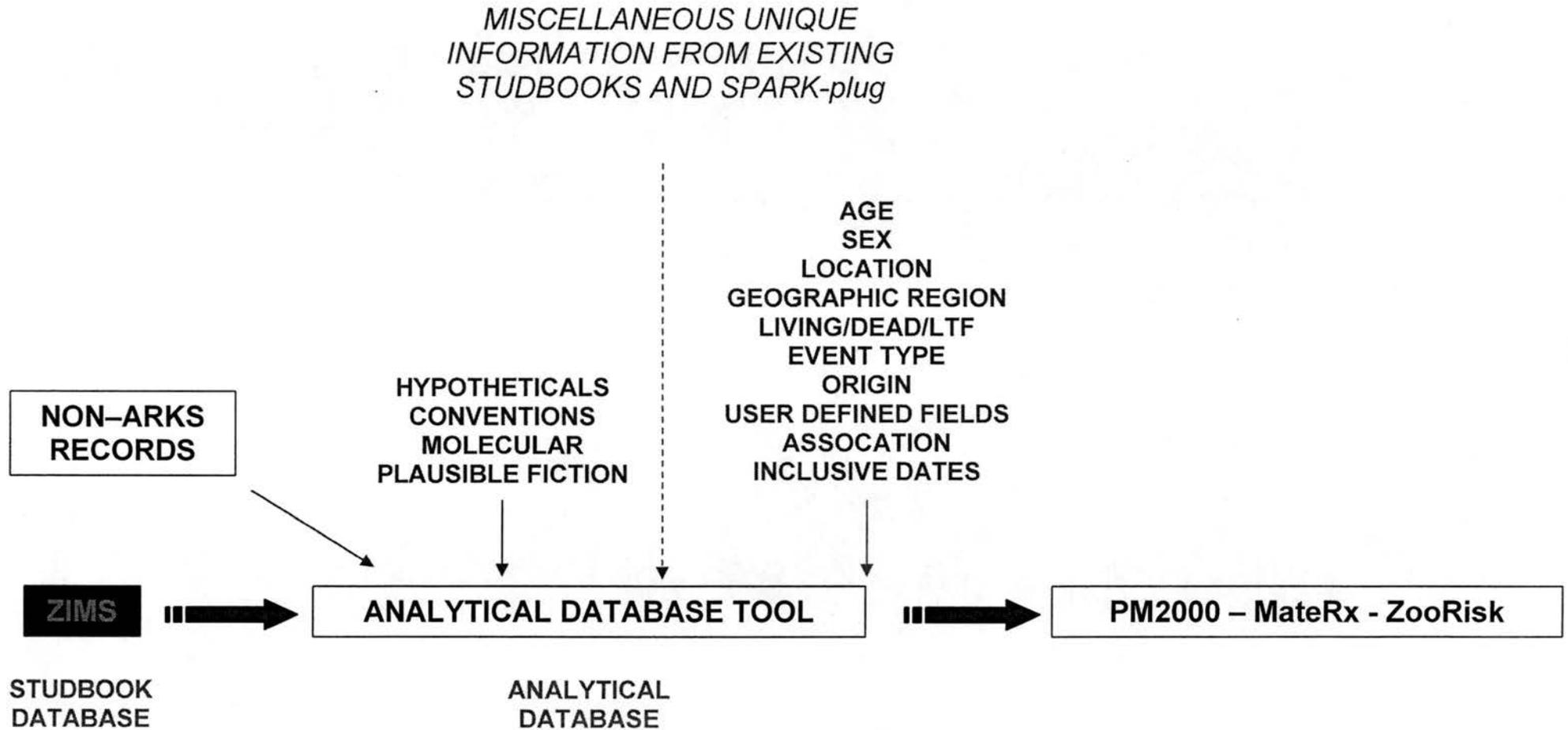


Figure 3. Situation after initial release of ZIMS showing the continued need for a tool to create analytical databases and select/maintain subsets of data for analyses.





06 June 2003

AMERICAN ZOO AND
AQUARIUM ASSOCIATIONMr. Bruce Bohmke
Chair, ADISC
Woodland Park Zoo
601 N. 59th Street
Seattle, WA 98103-5858

Committee

Chairman/Advisor
Dear Bruce,

At the recent SPMAG meeting in North Carolina, participants discussed at length how ZIMS would interface with current and future population management applications. Our understanding is that Phase I of ZIMS will not include genetic and demographic analysis capabilities. Of particular concern during this discussion was the issue of how data from ZIMS could be exported and manipulated into the analytical databases that are the lynchpins of population management.

At present, these applications (PM2000, SPARK-plugin, MateRx, and ZooRisk [currently underdevelopment]), accept genetic and demographic data that are maintained in SPARKS. Studbook keepers currently solicit data from institutional records keepers and/or curators for input into SPARKS; this is typically done on an annual basis, often immediately prior to development of an updated breeding and transfer plan (sic master plans for SSPs). The data maintained in SPARKS are supposed to represent the "truth" as represented in the respective records of each institution. However, there is often additional truth that is collected and entered in the studbook. The latter may include, but not be limited to, information from private breeders and/or other program participants that do not participate in ISIS, data from institutions that no longer exist, and information that conflicts with that obtained from participating institutions.

Data from SPARKS are imported into SPARK-plugin software which allows SPARKS records to be modified with assumptions. Assumptions are complicated, often change from plan to plan, often need to change during the planning process, and must be imposed prior to imposition of queries or analyses. SPARK-plugin generates an analytical SPARKS database; SPARKS is used to export the appropriate data from the analytical studbook to the population management software such as PM2000. These SPARKS exports are specifically tailored to each specific planning situation through query options, which SPARKS terms "views", that narrow the scope of exported data for a specific planning objective; often multiple queries, each with different criteria, are required prior to and/or during a planning session (see attached figure).

To provide population planning to the cooperative AZA programs, the SPMAG and PMC must have software to transform the ZIMS Phase I database to the single-species, analytical database and on to the analysis software. We also need to have a stand-alone dataset that can be amended and manipulated prior to and during the planning process. It would be cumbersome and impractical to work directly with the ZIMS database, as currently planned, during virtually all aspects of the planning process; it would be particularly impractical to work directly with ZIMS during training sessions such as the AZA Professional Schools. Moreover, authority and documentation of multiple assumptions for each managed specimen, or alternative assumptions for the same variable in a specimen record, would be logistically difficult because it would require interactive access by literally hundreds of studbook keepers, population managers, and SPMAG/PMC advisors.

SPARKS and SPARK-plugin are DOS based and Windows 3.x based programs that are increasingly difficult to run under current operating systems. Moreover, each needs significant modification to export data in formats that will be required by ongoing revisions to PM2000 and ZooRisk.



SPMAG plans to pursue development of intermediary software that will bridge the gap between the Phase I ZIMS product and the existing suite of population management software (ZIMS-plug). This software would accept a standard data export from ZIMS and will combine aspects of SPARKS and SPARK-plug: it will focus primarily on assumptions and export "views" but will also allow entry of data not present in ZIMS (e.g., from institutions not participating in ZIMS, institutions no longer in business, etc.). After an up-to-date export from ZIMS, this new software will be stand-alone on any standard PC, allowing population managers or SPMAG/PMC advisors to conduct analyses at any PC or anywhere they can set up a laptop computer.

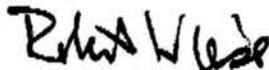
We anticipate that development of this new software will require approximately 12-14 months to develop to the Beta stage; an additional 6-10 months will be required for field-testing and revisions. As with current and previous versions of SPMAG endorsed/supported population management software; the software will be available for use by studbook keepers, SPMAG, and the PMC during the field-testing phase.

As with current analytical software (e.g., PM2000, MateRx, SPARK-plug, and ZooRisk), this new software would be designed and maintained by SPMAG specifically for AZA's population management programs. Unlike previous software, SPMAG will review all proposed "major" changes twice each year. International input will be solicited and accommodated to the greatest extent possible.

A consortium of several zoos with key SPMAG staff and the PMC is exploring development of this software. This group hopes to begin design and development next year at the mid-year SPMAG meeting.

We anticipate that as ZIMS progresses to later versions, some or all of the functions of this new software, along with some or all of those of existing population management software, may be incorporated into ZIMS. However, we perceive that such integration, if it proves practical, is many years away and, in the interim, AZA must have some means of utilizing ZIMS data for population management when phase I is completed.

Sincerely,



Robert Wiese, Ph.D.
Chair, SPMAG
Fort Worth Zoo
1989 Colonial Parkway
Fort Worth, TX 76110



International Species Information System ^{file}

MINNEAPOLIS:
ISIS Headquarters
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151 USA
Phone: +1 952 997 9500
FAX: +1 952 432 2757
e-mail: isis@isis.org
Website: <http://www.isis.org>



AMSTERDAM:
ISIS European Branch Office c/o European
Association of Zoos and Aquaria (EAZA)
PO Box 20164
1000 HD Amsterdam
The Netherlands
Phone: +31 20 5200 750
FAX: +31 20 5200 754
e-mail: info@eaza.net
Website: www.eaza.net

SYDNEY:
ISIS Australasian Branch Office c/o Australasian
Association of Zoos and Aquaria (ARAZPA)
PO Box 20
Mosman NSW 2088
Australia
Phone: +61 2 9978 4797
FAX: +61 2 9978 4761
e-mail: admin@arazpa.org.au
Website: www.arazpa.org.au

ISIS contributes to the preservation of biotic diversity by providing global specimen and species catalogues and auxiliary information services, to support long-term collective species conservation and preservation programs.

29 April 2003

Mr. Lee C. Ehmke, Director
Minnesota Zoological Garden
13000 Zoo Blvd.
Apple Valley, MN 55124-8151

Dear Lee,

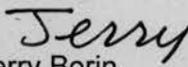
How much does your Zoo spend on software to manage your finances, retail store, or membership program? If your Zoo is similar to ours, you are probably spending far more on programs to manage your donors than your animal data—even though our animal collections are our most important asset, and our most vital responsibility.

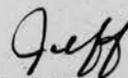
We're writing today to invite you to consider making an investment in a new global animal data solution. ISIS is developing a bold plan to create a state-of-the-art web-based zoological information management system (ZIMS), building on an initiative begun by the AZA and their ADISC Committee. We believe that your investment will bring dividends for your individual Zoo and for the entire global conservation community. This new system, when built, will offer significant improvements in animal management, increase the effectiveness and efficiency of Zoo staff, and meet the collection-management needs of aquariums for the first time. To meet the most urgent and basic needs will require an immediate investment of \$10 million, and an increase in operating support to sustain a truly secure and scalable state-of-the-art system.

In a few days, you will receive a phone call from John Lewis, who will answer your questions, provide additional information, and ask you to consider an investment of \$100,000. Of course, we'd be delighted if you are able to commit more. And we understand that your circumstances may make it necessary to give less. Whatever your level of support, you will join a growing network of supporters among zoos, aquariums, and other conservation organizations. Our collective investment will be an important demonstration of confidence as ISIS begins to approach corporations, foundations, and other grantors to secure financing for this project.

Lee, we appreciate your willingness to consider joining those of us who have already lent our support to the campaign for ISIS. If you have any questions or concerns, please don't hesitate to contact either one of us or Nate Flesness, ISIS Executive Director. When we are successful, we will provide the zoo world with the information resource to be responsible stewards of the remarkable natural heritage entrusted to our care.

Sincerely,


Jerry Borin
Chairman, ISIS Board of Trustees


Jeff Bonner
ISIS Board of Trustees

cc: John Lewis
Encls:



Zoological Information Management System

A Case for Support

The world's zoos and aquariums provide sanctuary for millions of animals representing thousands of species—some highly threatened or even extinct in the wild. As responsible stewards, zoos and aquariums do more than simply provide adequate shelter and food. They meet the specialized needs of each species—each individual specimen—including diet, veterinary care, reproduction, and habitat. But how does a zoo in the Midwest care for a newly discovered population of black-footed ferrets? How does a field biologist in Canada access data to diagnose the cause of a sudden decrease in Musk Ox populations? When the remnants of the California condor population were captured, how did scientists determine their feeding and breeding needs? When zookeepers and wildlife biologists have questions such as these, they turn to ISIS (the International Species Information System), a remarkable data resource with information on 1.6 million animals.

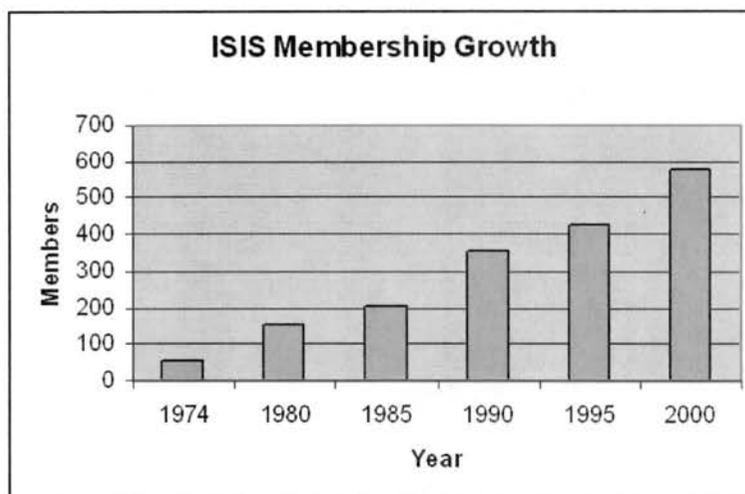
ISIS began collecting data on animals nearly 30 years ago. Today, ISIS is a network of 600 zoos and aquariums on 6 continents, which contribute data on their own animals and consult the pooled data at ISIS when they need information to make good decisions about animal care. This cooperative effort is improving the welfare and survival of zoo and aquarium species while supporting the conservation of wild animal populations. But as a nonprofit organization with a modest budget, ISIS has struggled to keep pace with rapid changes in technology and growing demand for access to information. The board and staff are now working to ensure the viability of ISIS by developing a new high-tech web-based global animal information system. When complete, this incomparable data resource will support efforts by thousands of zoo professionals and field researchers who are working to conserve the earth's natural heritage. The leaders of ISIS are seeking investments from generous foundations, corporations, individuals, and other entities to fund the multi-million dollar cost to develop new technology to sustain access to critical data needed to manage the world's animal species.

A Cooperative Global Network

In 1979, ISIS was launched with 55 members. Today, it counts 600 institutions among its members, including zoos, aquariums, and wildlife parks. This extraordinary global network is one of ISIS' greatest assets. Imagine: organizations in 70 countries have overcome barriers of language, culture, currency, and competition to create universal animal data standards and accumulate

an archive of information on 1.6 million animals. One user in Africa makes a weekly three-hour trek over rutted roads to reach an on-line computer where he can add new data and retrieve information. This level of commitment and

cooperation is based on a common conviction that the ISIS database is crucial in ensuring species' well being and survival.



ISIS has earned the trust and respect that enable a broad international conservation network to thrive. The organization has worked with hundreds of zoos and aquariums and their professional associations around the world. ISIS is a member of the World Conservation Union (IUCN) and the Biodiversity Conservation Information System (BCIS). Branch ISIS offices are located with EAZA in Amsterdam and ARAZPA in Sydney. In the USA, ISIS has long-standing alliances with AZA and with multiple scientific, conservation, and wildlife agencies such as NIH, NSF, USFWS, and NOAA/NMFS.

Keeping Pace

While ISIS' global membership and influence has grown, the organization's administration and information systems have remained relatively modest. The annual budget is just over \$1 million, supporting a staff of just a dozen full-time employees. A frugal approach has

helped the organization balance its annual operating budget while maintaining a fee structure that enables the participation of zoos in disparate economic circumstances, helping ISIS grow to become the world's largest alliance of zoos and aquariums. However, the revenue provided by membership dues and grants has not funded the level of capital investment required by modern information technology.

The animal data management system is functional, but out-of-date. ISIS currently has multiple software programs scattered across different generations of technology: a foothold on the Web, some systems in Windows, and a few still in DOS. The obsolete systems waste users' time and limit sound animal management.

The board and administration of ISIS have responded by developing a bold plan to create a state-of-the-art web-based zoological information management system ("ZIMS"), building on an initiative begun by the American Zoological Association (AZA). AZA has backed the planning and design stage with several hundred thousand dollars, mobilizing technology professionals from some of the largest zoos and aquariums, and hiring a highly qualified systems design consulting firm (Inteq). Preliminary design looks promising. This new system, when built, will offer significant improvements in animal management, increase the effectiveness and efficiency of Zoo staff, and meet the collection-management needs of aquariums for the first time. To meet the most urgent and basic needs will require an immediate investment of \$10 million, and an increase in operating support to sustain a truly secure and scalable state-of-the-art system.

Just imagine the benefits this new system will offer to educators, researchers, zookeepers and—most importantly—the animals in their care:

- An eighth grade class studying South American rainforests can log on to the ZIMS database each day to track a study on the behavior and feeding habits of South American primates held in rainforest exhibits in ten different North American zoos.
- A field researcher studying the highly-endangered Rodrigues fruit bat discovers 3 orphaned bats. Using ZIMS, she discovers that a nutritionist in a North American zoo has developed a successful formula for bat milk. ZIMS provides daily details about bat hand rearing, to which the researcher adds the details of her own experience.

- The Arabian Oryx has rebounded from the brink of extinction thanks to zoo breeding and re-introduction to the wild. In 1964, the Phoenix Zoo had all that remained - a captive breeding group of 3 of the last wild-caught Oryx, one from the London Zoo, and 6 from the King of Saudi Arabia. Today, the population of 600 in zoos worldwide requires continual monitoring of births, deaths, and transfers to ensure the genetic diversity of this fragile population.

As support for the ZIMS project has grown, so too has the realization that it must be based upon the global network that ISIS has patiently developed over 30 years. ISIS is taking a lead role in moving the project beyond the initial stage. ISIS is seeking significant philanthropic investment to ensure that this new zoological information management system ("ZIMS") will build on the strengths of global cooperation for the long-term benefit of captive and *in-situ* animal populations.

With the support of corporations, foundations, conservation organizations, and others in the USA and around the world who care about the welfare of animals, ISIS will continue to provide the world with the information resource to be responsible stewards of the remarkable natural heritage entrusted to our care.

Frequently Asked Questions

What is ISIS?

Think of ISIS as a global "Noah's Ark database" —instead of animals, it collects all of the *data* about animals cared for in zoos and aquariums—and then makes it available to zookeepers, researchers and others who are working to increase our understanding and improve the welfare of animals.

- **Who "owns" ISIS and who are its members?**

ISIS is owned by its members — 600 zoos and aquariums around the world who have gathered their animal data into a single, powerful database. An international board comprised of zoo/aquarium directors governs the organization, along with other experts in animal care.

- **How long has ISIS been around?**

ISIS began nearly 30 years ago when 55 institutions recognized that the fight against extinction would rely—in part—on the ability of zoos and aquariums to obtain and maintain high-quality data on the animals in their care. Since then, ISIS has grown every year, as institutions from every continent have recognized the critical importance of ISIS work.

- **What is the importance of global cooperation?**

Today, it's not unusual for a rhinoceros of African parentage born in an Australian zoo to be relocated to a sanctuary in Texas for breeding and research. ISIS' global network has earned the respect of international regulatory bodies, increasing global cooperation for the benefit of animals. And by reaching out to 600 institutions, the cost of maintaining this global resource can be shared equitably, ensuring that animals in all zoos can benefit, regardless of the institution's financial resources.

- **What is the Zoo Information Management System?**

"ZIMS" is the next-generation data management system that is being developed by ISIS in cooperation with experts in animal care and data management. It will be a single, powerful database containing critical records on more than 1.6 million animals.

- **How will ZIMS be funded?**

It is estimated that development of the core ZIMS database will cost approximately \$10 million. ISIS is seeking initial investments from members of the global zoo and aquarium community, who have already provided \$1.X million in "start-up capital." ISIS will also seek major support from government bodies, corporations, foundations, and individuals around the world.

What is "ZIMS" (Zoo Information Management System)?

The world's zoos and aquariums provide sanctuary for millions of animals representing thousands of species—some highly threatened or even extinct in the wild. As responsible stewards, zoos do more than simply provide adequate shelter and food. They must meet the specialized needs of each animal including diet, veterinary care, reproduction, and habitat. When zookeepers need information to ensure quality care, they will turn to ZIMS—a single, real-time, credible information source.

- **How will ZIMS improve the quality of life for animals in a zoo or aquarium?**
Exotic animals come from exotic places. Today, the National Aquarium in Baltimore might acquire an Asian crocodile from a zoo in Germany. To ensure the animal's well being, the Aquarium will need to know about its pedigree, its health history, and its habitat—which could require tracing animal data through numerous countries over several decades. Real-time access to animal records will ensure that the Aquarium is well equipped to provide the best possible nutrition, habitat, and veterinary care to this rare specimen, and select an appropriate mate.
- **Will ZIMS help species that are facing extinction?**
Consider North America's highly endangered black-footed ferret. The black-footed ferret was thought to be extinct in the wild—When a few surviving animals were unexpectedly found, ISIS provided information on successful captive breeding of closely-related species. This information from ISIS was used by Wyoming Fish & Game, and then many zoos, to successfully breed hundreds of black-footed ferrets, release them to the wild, and continue to protect and nurture these rare animals.
- **Will ZIMS help zoo and aquarium visitors understand animals better?**
Imagine a visitor observing a gorilla family while learning about each animal's parentage and health history from a kiosk in the viewing area. Imagine an eighth grade class logging on to the ZIMS database each day to track a study on the behavior and feeding habits of South American primates held in rainforest exhibits in ten different North American zoos. Suddenly, the animals are transformed from mere curiosities into ambassadors for their species, helping people better understand their own role in sustaining the world's natural heritage.
- **Why can't we wait?**
Animal populations are at risk. The more we know about animals, the better equipped we will be to ensure their survival. We can't allow critical data to be hidden in inaccessible systems or fragmented into multiple databases. In ten or twenty years, the information in this database may hold the key to survival for a species. Only ISIS is positioned to provide a single, unified, information resource that will equip researchers, zookeepers, and others with a powerful tool in the urgent fight against extinction.

How will zoos and aquariums benefit?

ISIS has worked for years with hundreds of zoos and aquariums and their professional associations around the world—in many cases helping them to create their first quality animal records. ZIMS will be an even more powerful, more efficient tool for those who care for animals in zoos and aquariums. A zookeeper will be able to observe an animal's behavior and enter data directly into a handheld PDA—replacing hours that are now spent transcribing handwritten notes into a limited data management system. A veterinarian will be able to take blood samples from a failing musk ox and compare it on-line with analyses of many healthy musk ox to determine which essential protein is missing from its diet—or diagnose what stomach ailment it has, and what treatments have been effective in musk ox.

- **What's the impact on a Zoo's budget?**

Institutions will be asked to make an initial investment in the development of the new software, and then will have an ongoing fee to maintain the database. These expenses will be carefully calculated so that the cost can be distributed equitably among all of the zoos and aquariums in the global network. Although the new system will be more expensive to build and maintain than ISIS' now-aging systems, it will also be a more powerful tool to help zoos and aquariums better manage their most precious assets—the animals in their care. The costs will still be lower than the costs for other software products (accounting, gate management, fund-raising), that are not as critical to the mission of a zoo or aquarium.

- **When will ZIMS be available?**

A team of leaders from zoos and aquariums around the world has already made significant progress in identifying the needs of the global animal-care community and defining the data-management resources that will meet these needs. They anticipate that the first phase of the new Zoo Information Management System will be available two years from the start of construction. The plan is to raise enough funds this year (2003), to start construction soon, and have the first inventory and veterinary components available in 2005. Subsequent modules and updates are planned to be "rolled out" in intervals of twelve to eighteen months. In the meantime, ISIS will continue to support its existing legacy software.

- **What about technology?**

The new ZIMS software is planned to be primarily a web-based application, with additional options for zoos and aquariums without good web access. Integrating animal data from many institutions via the web offers major advantages in accuracy, quality, ease of use, and comprehensiveness. The best solutions for institutions with limited web access are being evaluated.

- **Will the data be secure?**

Sophisticated modern security systems will provide appropriate access to appropriate users. ISIS has a good record of making extensive information available to members, and supporting legitimate scientific, conservation, and education uses of this information. The new ZIMS will have even stronger controls to safeguard individual records while facilitating appropriate access to the pooled database. ISIS policies on security and access will continue to be member-driven.

Kern Willis



May 5, 2003

AMERICAN ZOO AND
AQUARIUM ASSOCIATION

Laura Trechsel
Minnesota Zoological Garden
13000 Zoo Blvd
Apple Valley, MN 55124

8403 Colesville Road
Suite 710
Silver Spring, MD 20910-3314
Phone: 301-562-0777
Fax: 301-562-0888
<http://www.aza.org>

Dear Laura,

It is my pleasure to inform you that your petition to take on the North American regional studbook for Prevost's squirrels (*Callosciurus prevostii*) has been approved by the WCMC.

Your willingness to help the AZA advance its conservation programs by maintaining this studbook is greatly appreciated. As you know, studbook keepers are encouraged also to become the Population Management Plan (PMP) managers for their studbook species; we appreciate your interest in doing so for Prevost's squirrels. Please contact me or the AZA Conservation & Science Office if you need further information.

As per your institution's commitment, please be sure to submit your application for admission to the next offering of the AZA's Studbook Training course prior to the deadline.



Sincerely,

Joanne Earnhardt, Ph.D.
WCMC Vice-Chair – Studbooks
Lincoln Park Zoo
2001 N. Clark St.
Chicago, IL 60657
312-742-7745, fax 312-742-7220
e-mail Joanne@lpzoo.org

cc: Lori Perkins, Chair, WCMC
Brandie Smith, Conservation & Science, AZA
Lee Ehmke, Director, Minnesota Zoological Garden
Pete Riger, Chair, Rodent TAG





Lincoln Park
Zoo

P.O. Box 14903
Cannon Drive at Fullerton Parkway
Chicago, Illinois 60614

1 May 2003

Telephone 312.742.2000 Facsimile 312.742.2137

Nate Flesness
Executive Director
ISIS
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151

Dear Nate,

We are writing to make you aware of a recent disturbing incident involving potential misuse of the ISIS database.

We recently concluded our SPARK-plugin development grant by making a final payment to former ISIS employee Stephen Porter. As you know, Steph developed SPARK-plugin for a project jointly sponsored by Lincoln Park Zoo and the Minnesota Zoological Gardens.

During a disagreement over Mr. Porter's final payment, he made threats against one of us (SDT), against the Minnesota Zoological Gardens and the Lincoln Park Zoo. These initial threats were made in one of three voicemails to Steve Thompson on the afternoon of 1 April (paraphrased as: "you wouldn't be the first person a Lincoln Park Zoo to lose his job over this kind of thing"), in a telephone conversation with Lincoln Park Zoo's comptroller on 1 April (paraphrased as "the reputation of your institution is at stake"), directly to one of us (KW) in a telephone conversation on 1 April, and to Kevin Bell's administrative assistant on 2 April 2003.

In the phone conversation with Kevin Willis on 1 April, Mr. Porter was quite explicit as to what he was capable of doing and what he would do with Lincoln Park Zoo's animal records if he were not paid the amount he felt he was owed. He said that because he was very familiar with the software he could find things that others did not have the skills to find that would be used to damage the reputation of the Lincoln Park Zoo. He did not directly threaten to do the same to the Minnesota Zoo because he felt that one of us (SDT) was controlling the process. Mr. Porter advised Kevin Willis to "stay out of the way."

On 2 April 2003, during a telephone conversation with Steve Thompson, in response to a compromise settlement offer, Mr. Porter stated that if we did not agree to his proposed payment, he would use data from the ISIS CD-ROM to tarnish the reputation of Lincoln Park Zoo. Steve noted that Lincoln Park Zoo has nothing to hide in its records but that he was under the impression that data on the ISIS CD-ROM was not available to the public. Mr. Porter replied that information on the ISIS CD-ROM was in the public domain and that

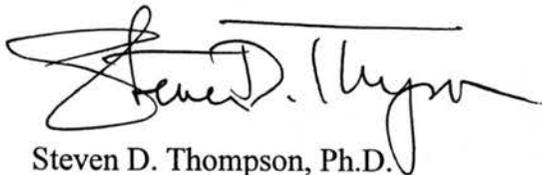
"anyone could get a copy" and "interpret the data." He then implied that he would "FOIA" the information so that he would have the "right" to use the data from the ISIS CD-ROM (Lincoln Park Zoo is a private institution and thus our data cannot be obtained through the FOIA). He went on to say that unlike others who had used these data against zoos, as a former ISIS employee he knew how to interpret the data to "tarnish" Lincoln Park Zoo's reputation (quote: "...it would be so easy"). Although it might be inferred that Mr. Porter has a copy of the ISIS CD-ROM, he did not acknowledge this in his conversations with either of us; and his reference to the CD-ROM suggests he may be unaware that the CD-ROM has been replaced by a DVD.

Because an important issue in the ongoing development of the ZIMS database is security, we felt that it was important that you be aware of Mr. Porter's statements regarding potential access to the ISIS CD-ROM. Again, while neither Lincoln Park Zoo nor the Minnesota Zoological Gardens has any concern about the publication of our animal records, we are concerned about the misrepresentation of those records, particularly in the context of a stated intent to harm either institution's reputation.

We are neither requesting nor suggesting that you or anyone else contact or take action against Mr. Porter. Lincoln Park Zoo and the Minnesota Zoo have reached an agreement with Mr. Porter and, given that he seems satisfied with this agreement, we believe it is unlikely that he will take any action involving data from either of our institutions. We do, however, believe that as this "real life" security issue should be considered during the development of the ZIMS database.

If you so desire, either of us would be willing to clarify any of the above information.

Sincerely,



Steven D. Thompson, Ph.D.
Vice President and
Emily and John Alexander Chair of
Conservation and Science Lincoln Park Zoo



Kevin Willis
Director of Biological Programs
Minnesota Zoological Gardens

cc: Bruce Bohmke, ADISC Chair
Kris Vehrs, Deputy Director, AZA
Kevin Bell, President/CEO, Lincoln Park Zoo
Lee Ehmke, President/CEO, Minnesota Zoo



MINNEAPOLIS:
ISIS Headquarters
12101 Johnny Cake Ridge Road
Apple Valley, MN 55124-8151 USA
Phone: +1 952 997 9500
FAX: +1 952 432 2757
e-mail: isis@isis.org
Website: <http://www.isis.org>



AMSTERDAM:
ISIS European Branch Office c/o European
Association of Zoos and Aquaria (EAZA)
PO Box 20164
1000 HD Amsterdam
The Netherlands
Phone: +31 20 5200 750
FAX: +31 20 5200 754
e-mail: info@ezaa.net
Website: www.eaza.net

SYDNEY:
ISIS Australasian Branch Office c/o Australasian
Association of Zoos and Aquaria (ARAZPA)
PO Box 20
Mosman NSW 2088
Australia
Phone: +61 2 9978 4797
FAX: +61 2 9978 4761
e-mail: admin@arazpa.org.au
Website: www.arazpa.org.au

ISIS contributes to the preservation of biotic diversity by providing global specimen and species catalogues and auxiliary information services, to support long-term collective species conservation and preservation programs.

29 October 2002

ISIS Board of Trustees Election

Dear Director:

As an institutional member of ISIS, your institution is entitled, and encouraged, to vote in the election of ISIS' Board of Trustees. The ISIS Board decides membership fees, sets policies, and is critical in guiding our way forward.

Three of the elected Institutional Trustee positions need to be filled for a three-year term (1 January 2003 – 31 December 2005). The ISIS Board of Trustees Nominating Committee has placed five Institutional Trustee names on the enclosed ballot. Please vote for three of the five names listed. Terms are three years, and trustees may be elected to a second consecutive term.

New on the ballot this year, is voting for the new Association Trustee positions on the ISIS Board. These positions were created by the recent change in the ISIS Bylaws (a copy is enclosed). This year, the ISIS Board and its Nominating Committee decided to run these Associations unopposed. Please vote for four of the four associations listed.

We encourage you to submit names of potential candidates for future elections. Suggestions should be addressed to: ISIS Board Nominating Committee, c/o ISIS, 12101 Johnny Cake Ridge Road, Apple Valley, MN 55124-8151 USA. In addition to utilizing the particular talents and strengths of individual Trustees, the ISIS Board of Trustees needs to be broadly representative of large and small institutions in several regions.

Enclosed is a list of the current ISIS Board of Trustees, your ballot, brief candidate biographies, Bylaws, and a specially marked "ballot enclosed" envelope. **Please enclose your ballot in the specially marked envelope, and mail to ISIS.** Your envelope must be **postmarked NO LATER THAN 1 December 2002.** Ballots are set aside to be opened and counted by an independent election judge.

PLEASE NOTE: Ballots that arrive in the ISIS Office in envelopes other than those specially marked or arrive postmarked later than 1 December 2002, **cannot be counted.**

Thank you again for your membership and active participation in ISIS.

With regards,

Nathan R. Flesness

Executive Director, ISIS

Encls: 2002 ISIS Board of Trustees List

Biographies: Gipps, Hoskins, Jauch, Larsson, Mumaw

Ballot

Specially Marked "Ballot" envelope

Bylaws (30 Sep 2002)

file

Revised and Adopted by ISIS Board 30 Sept 2002

BYLAWS
OF THE
INTERNATIONAL SPECIES INFORMATION SYSTEM

- Article 1 - Members
 - Article 2 - Meetings of Members
 - Article 3 - Trustees
 - Article 4 - Officers
 - Article 5 - Committees
 - Article 6 - Fiscal Year
 - Article 7 - Contracts
 - Article 8 - Indemnification
 - Article 9 - Loans
 - Article 10 - Amendments
-

ARTICLE 1 - MEMBERS

1.1) Membership. The membership shall consist of organizations and persons who are devoted to the conservation and propagation of the world's wildlife and who meet the conditions of membership. Members shall subscribe to the purposes set forth in the Articles of Incorporation, pay annual dues, as from time to time determined by the board, and pay assessments, if any, for expenses and other costs of the corporation. Members shall adhere to the standards for data quantity and quality as shall be established from time to time by the board of trustees.

1.2) Classes of Members. There shall be three classes of members:

(a) Institutional members. Institutional members are biological institutions that maintain collections of living animals and meet such other criteria as the Board of Trustees may set. Institutional members shall be required to provide species management data according to standards as set by the Board, to the corporation. No other persons or organizations may qualify as institutional members. Institutional members have the right to vote in the election of trustees and in other matters properly coming before the members.

(b) Non-subscribing Members. Non-subscribing members are organizations and persons who do not qualify as institutional or association members, but who meet the other conditions of membership. Non-subscribing members have no voting rights.

(c) Association Members. Association members are organizations that are legally incorporated or organized under the laws of the jurisdiction in which the organization is located, and that represent regional, national, or international zoos and aquariums from any geographical regions, throughout the world. Association members shall have no voting rights.

1.3) Election of Members. The corporation may invite new members to join, or prospective members may apply to the corporation for membership. The board shall determine whether the applicant meets the requirements of either institutional, non-subscribing, or association membership. Members shall be admitted by majority vote of the board.

1.4) Provisional Appointment of Members. In the interim between meetings of the board, the executive director may, in accordance with such criteria as shall be established by the board from time to time, grant provisional institutional, non-subscribing, or association membership to applicants. The board shall consider whether to grant full membership at its next meeting. Provisional members shall have all the rights and obligations of full members.

1.5) Membership Records. The corporation shall keep accurate membership records including the name and address of each member.

1.6) Termination of Membership. If an institutional, association, or non-subscribing member fails to continue to meet the conditions and requirements of membership, its membership may be terminated by the board. The board shall provide 60 days' prior written notice of termination to the member whose membership is so terminated. Such notice shall state the reasons for and the effective date of such termination. The member whose membership is proposed to be terminated shall be given an opportunity to be heard, orally or in writing, not less than 20 days before the effective date of the termination, by a member of the board of trustees authorized to decide that the proposed termination not take place. Termination shall not relieve the member so terminated of the obligation to pay dues, assessments, or other charges accrued and unpaid at the time the termination becomes effective. At the option of the board, an institutional member who otherwise qualifies as a member, but who is in arrears on membership dues and assessments, or on whose behalf the dues and assessments of membership are waived or paid by a third party, may, by majority vote of the board, be moved from institutional to non-subscribing membership.

1.7) Resignation. A member may resign from membership at any time. Resignation shall not relieve the member so resigning of the obligation to pay dues, assessments, or other charges accrued and unpaid at the time the resignation becomes effective.

1.8) Residual Rights. A member that is terminated or resigns shall have no residual rights to data or services.

1.9) Transferability. A member may not voluntarily or involuntarily transfer or assign its membership or any right arising therefrom.

1.10) Dues. Dues or other assessments to any class of members shall be as from time to time established by the board of trustees.

ARTICLE 2 - MEETINGS OF MEMBERS

2.1) Meetings of Members. An annual meeting of the members is not required. Special meetings of the members may be called for any purpose at any time by resolution of the board of trustees requesting such a meeting or by written request of not less than ten percent (10%) of all voting members. The executive director or

secretary shall call the meeting by giving notice, as hereinafter provided, of the meeting within thirty (30) days after receiving the request. If the officer fails to give such notice within thirty (30) days, then the members who requested the meeting may fix the time and place of the meeting and give notice in the manner hereinafter provided.

2.2) Purpose of Meeting. At any meeting of members, the members shall transact any business that properly comes before them, excluding, however, the election of trustees, who shall be elected in accordance with the procedures set forth in Article 3 of these Bylaws.

2.3) Place of Meeting. Meetings of the members shall be held at such place as may be designated by the board of trustees.

2.4) Notice of Meeting. The executive director or secretary shall give to each member, at his or her address as shown on the books of the corporation, advance written notice of each meeting of members, and of a membership vote by mail on any issue, at least sixty (60) days prior to the date thereof. A second official notice shall be given at least five but not more than thirty (30) days prior to the meeting or the vote by mail. Such notices shall state the time and place of the meeting and the purpose(s) thereof. Notice of any meeting of members may be waived in writing by members either before, during or after such meeting.

2.5) Waiver of Notice. A member may waive notice of any meeting before, at or after the meeting, in writing, orally or by attendance. Attendance at a meeting by a member is a waiver of notice of that meeting unless the member attends the meeting solely for the purpose of objecting to the transaction of business because the meeting is not lawfully called or convened. Attendance at and participation in a meeting by a member is not waiver of notice of a particular item of business if the member objects before a vote on an item of business on the grounds that the item may not be lawfully considered at such meeting, provided that the member does not participate in the consideration of the item at such meeting.

2.6) Quorum. Ten percent (10%) of the total number of voting members, present in person or by proxy, shall constitute a quorum for the transaction of business at any meeting of members. To establish a quorum in a vote by mail, a minimum of ten percent (10%) of the voting member ballots must be returned by the deadline stated in the ballot. If a quorum is not present at a meeting, those members present may adjourn the meeting until such time as a quorum is present.

At the reconvened meeting, once a quorum is present, any business may be transacted which might have been transacted at the meeting that was adjourned. When a quorum has been present at a meeting and voting members have withdrawn from the meeting so that less than a quorum remains, the voting members still present may continue to transact business until adjournment.

2.7) Voting. Voting rights in elections of trustees shall be as stated in Article 3 of these Bylaws. For all other questions, the following provisions shall govern: At each meeting of members, each voting member may vote in person or by written proxy. All proxies shall be filed with the secretary of the meeting at or before the meeting. Each voting member shall have one vote on any matter on which voting members have the right to vote. Members may vote by voice or by ballot or by other means permitted by these Bylaws. Except as otherwise required by law, the Articles of Incorporation, or these Bylaws, all questions shall be decided by a majority vote of the voting members present in person or by proxy at any meeting at which a quorum is present. There shall be no cumulative voting by the members of the corporation.

2.8) Electronic Conference Meetings. A conference among voting members, or among members of any committee designated by the voting members, by any means of communication through which the participants may simultaneously hear each other during the conference, constitutes a meeting of the voting members, or the committee, if the same notice is given of the conference as would be required for a meeting, and if the number of

persons participating in the conference would be sufficient to constitute a quorum at the meeting. Participation in a meeting by said means constitutes personal presence at the meeting.

2.9) Voting by Mail. Voting for the election of trustees shall be as provided in Article 3. When determined to be advisable by the board of trustees, the entire vote on any other issue may also be as provided in Article 3. The corporation must mail or deliver a written ballot to every voting member. A written ballot must set forth each proposed action, and provide an opportunity to vote for or against each proposed action. Approval by written ballot is valid only if the number of votes cast by ballot equals or exceeds the quorum required to be present at a meeting authorizing the action, and the number of approvals equals or exceeds the number of votes that would be required to approve the matter at a meeting at which the total number of votes cast was the same as the number of votes cast by ballot. Solicitations for votes by written ballot must indicate the number of responses needed to meet the quorum requirements, state the percentage of approvals necessary to approve each matter other than election of trustees, and specify the time by which a ballot must be received by the corporation in order to be counted.

2.10) Authorization Without a Meeting. Any action which may be taken at a meeting of the members may be validly taken without a meeting if consent in writing, setting forth the actions so taken, is signed by all of the members entitled to vote with respect to the subject matter thereof. Any such consent shall be filed with the secretary of the corporation.

ARTICLE 3 - TRUSTEES

3.1) General Powers. The business and affairs of the corporation shall be managed by or under the direction of the board of trustees.

3.2) Number, Term and Qualifications. The board of trustees shall consist of not less than the number of trustees as required by Minnesota law, and not more than twenty-seven trustees. The board of trustees shall be divided into four classes, as follows:

Class	Number/Qualification	Term	Nominated By	Elected By
Institutional Trustees	10	Three years; may serve up to two consecutive terms.	Nominating Committee with Board approval	Institutional members
Association Trustees	Not more than 6; Any ISIS member association representing at least 1/6 th of ISIS institutional members, is guaranteed one of these seats.	Three years; no limit on consecutive terms.	Nominating Committee with Board approval	Institutional members

Class	Number/Qualification	Term	Nominated By	Elected By
Ex Officio Trustees	2 – Current Science Advisory Committee Chair and Current Technology Advisory Committee Chair	Three years; may serve up to two consecutive terms.	Chair of Board of Trustees	Board of Trustees
	1 – Current Executive Director	While serving as the Executive Director		
External Trustees	Not more than 8	Three years; no limit on consecutive terms.	Any trustee	Board of Trustees

3.3) Election of Trustees. Trustees shall be elected as follows:

(a) Institutional Trustees.

(i) Nominations. Nominations for institutional trustees shall be made by the nominating committee not less than ninety (90) days prior to December 31 of each year. The nominating committee is responsible for placing in nomination a number of candidates sufficient to fill all openings for institutional trustee positions. The nominees should be representative of as many constituencies of the corporation's institutional membership as possible, and should, when possible, have expertise in various areas as needed by the corporation. The chair of the nominating committee shall notify each candidate of his or her selection and shall secure, in writing, consent from such person to have his or her name placed in nomination. In addition to its own selections, the nominating committee shall place a nomination for election as institutional trustee any person whose name has been submitted to the committee, not less than ninety (90) days prior to December 31 of each year, by a petition of nomination containing the signatures of at least ten percent (10%) of the number of voting members in good standing on December 31 of the preceding year.

(ii) Election. The election of institutional trustees shall be by secret ballot. The executive director shall prepare and mail the official ballots to all eligible voting members not later than sixty (60) days prior to December 31 of each year. Each voting member shall mark his or her official ballot and return it in the official envelope provided, and no other, and postmarked no later than thirty (30) days prior to December 31 of each year. The election of institutional trustees is "at large," those nominees receiving the most votes from among all the candidates shall fill the open seats.

(b) Association Trustees.

(i) Nominations. Nominations for association trustees shall be made by the nominating committee not less than ninety (90) days prior to December 31 of each year. The nominating committee shall be responsible for placing in nomination a number of candidates for openings for association trustees. The nominating committee may nominate one or more candidates specific to each open seat for association trustees. Any zoological or aquarium association may be nominated for openings for association trustees. However, association trustee seats shall be reserved for any ISIS-member association who represents at least one-sixth (1/6) of the institutional members of the corporation. The nominating committee will make certain that any ISIS-member

association representing at least one-sixth (1/6) of the corporation's institutional members will be continually represented on the board of trustees. The chair of the nominating committee shall notify each association of their selection and shall secure, in writing, consent from each association to be placed in nomination.

(ii) Election. Association trustee elections shall be by secret ballot. The executive director shall prepare and mail the official ballots to all eligible voting members no later than sixty (60) days prior to December 31 of each year. Each voting member shall mark his or her official ballot and return it in the official envelope provided, and no other, and postmark such envelope no later than thirty (30) days prior to December 31 of each year. The election of association trustees is not at large, but rather by seat. The association elected to each seat shall be elected only from those association nominee(s) specifically nominated for such opening. Once the association has been elected, each such association shall notify the chair of the board of trustees in writing of the name of the person who will act as their representative trustee to the ISIS board of trustees.

(c) Ex Officio Trustees.

(i) Nominations. Except for the executive director, who shall serve as an ex officio trustee during the term of his/her executive director term, nominations for ex officio trustees shall be made by the chair of the board of trustees not less than ninety (90) days prior to December 31 of each year. The chair of the board of trustees is responsible for placing in nomination a number of candidates sufficient to fill all openings for ex officio trustees. The chair of the board of trustees shall notify each candidate of his or her selection and shall secure, in writing, consent from such person to have his or her name placed in nomination.

(ii) Election. Ex officio trustees shall be elected by the board of trustees pursuant to the provisions of this Article 3. The ex officio trustees who are elected shall also serve as committee chairs, one as the science advisory committee chair, and the other as the technology advisory committee chair.

(d) External Trustees.

(i) Nominations. Nominations for external trustees may be made by any trustee at any time during the year. The nominees should be associated with or representative of corporate and conservation organizations whose activities and purposes relate to the furtherance of the corporation's purposes, but may also include such other individuals as may be fitting and appropriate to the corporation and its mission. The chair of the board of trustees shall notify each candidate of his or her selection and shall secure, in writing, consent from such person to have his or her name placed in nomination.

(ii) Election. External trustees shall be elected by the board of trustees. A majority vote by the board of trustees is required to elect an external trustee. In the event that the number of individuals nominated for external trustees exceeds the number of vacant positions for external trustees, those nominees receiving the most votes, and receiving votes from at least fifty (50) percent of the trustees, shall fill the open seats.

3.4) Restrictions Relating to Institutional Trustees. There shall be no cumulative voting in the election of institutional trustees, and no member may vote by proxy. Election results shall become official provided that at least ten percent (10%) of members entitled to vote have cast ballots. If fewer than ten percent (10%) of the

voting members have cast ballots, a new election shall be held by again submitting the same ballot to all voting members in the manner provided in subsection 3.3(a)(ii) above. No new nominations will be accepted, and institutional trustees whose terms would have expired shall continue to serve until their successors have been elected and qualified. If the follow up election fails again to produce a return of at least ten percent (10%) of the voting membership, then the board of trustees shall elect or reelect institutional trustees from those candidates nominated on the ballot that was submitted to the members. In such cases, the selections of the institutional trustees shall be final.

3.5) Resignation. Any trustee may resign at any time by giving written notice to the secretary or the executive director. Such resignation shall take effect at the time specified therein, but in no event earlier than the date of receipt by the secretary. Once an ex officio trustee resigns from his/her position as ex officio trustee, he/she also shall resign from his/her position as executive director, science advisory committee chair, or technology advisory committee chair, whichever the case may be.

3.6) Removal. Any trustee, either institutional, association, ex officio or external, may be removed, with or without cause, by a vote of at least two-thirds (2/3) of the total membership of the board. Such a vote may be taken at any meeting for which notice of the removal has been provided at least thirty (30) days prior to the meeting. Once an ex officio trustee is removed from his/her position as ex officio trustee, he/she also shall be removed from his/her position as executive director, science advisory committee chair, or technology advisory committee chair, whichever the case may be.

3.7) Vacancies. Vacancies on the board of trustees may be filled by the affirmative vote of a majority of the remaining members of the board, even if less than a quorum. A person so elected to fill a vacancy shall serve as a trustee for the remainder of the term of office of the trustee whose vacancy is being filled. No vacancy need to be filled by the board of trustees unless necessary to maintain the minimum number of trustees required by these Bylaws. A partial term served by a trustee elected by the board to fill a vacancy shall not be counted against the limit on number of terms that a trustee may serve.

3.8) Quorum and Voting. Fifty percent (50%) of the trustees currently holding office shall constitute a quorum for the transaction of business. In the absence of a quorum, a majority of the trustees present may adjourn a meeting from time to time until a quorum is present. At the reconvened meeting, once a quorum is present, any business may be transacted which might have been transacted at the meeting that was adjourned. If a quorum is present when a duly called or held meeting is convened, the trustees present may continue to transact business until adjournment even through the withdrawal of a number of trustees originally present leaves less than the proportion or number otherwise required for a quorum. Except as otherwise required by law or the Articles of Incorporation, the acts of a majority of that number of trustees present at the convening of a meeting at which a quorum was present shall be the acts of the board of trustees. There shall be no cumulative voting in the election of the association trustees, the ex officio trustees, or external trustees, and no trustee may vote by proxy.

3.9) Board Meetings; Place and Notice. The annual meeting shall be held when determined by the board for the purpose of election of officers and the transaction of any other business properly coming before it. There may be such other meetings of the board as may be held from time to time at any place that the board may designate. In the absence of designation by the board, board meetings shall be held at the principal executive office of the corporation, except as may be otherwise agreed by at least seventy-five percent (75%) of the membership of the board, either orally, in writing, or by attendance.

The executive committee or a majority of the board may call a board meeting by giving sixty (60) days notice to all trustees of the date and time of the meeting. Except as provided herein, the notice need not state the purpose of the meeting, and may be given by mail, telephone, or in person. If a meeting schedule is adopted by the board, or if the date and time of a board meeting has been agreed to at a previous meeting, no notice is required.

3.10) Waiver of Notice. A trustee may waive notice of any meeting before, at or after the meeting, in writing, orally or by attendance. Attendance at a meeting by a trustee is a waiver of notice of that meeting unless the trustee attends the meeting solely for the purpose of objecting to the transaction of business because the meeting is not lawfully called or convened. Attendance at and participation in a meeting by a trustee is not waiver of notice of a particular item of business if the member objects before a vote on an item of business on the grounds that the item may not be lawfully considered at such meeting, provided that the trustee does not participate in the consideration of the item at such meeting.

3.11) Meetings Solely by Means of Remote Communication. A conference among trustees, or among members of any committee designated by the board of trustees, may be conducted solely by one or more means of remote communication through which all of the trustees or members of any committee designated by the board of trustees, may participate in the meeting, if the same notice is given of the meeting required by Minnesota Statutes Section 317A.231, subd. 4, and if the number of trustees (or members of any committee designated by the board of trustees, as the case may be) participating in the meeting is sufficient to constitute a quorum at a meeting. Participation in the meeting by that means constitutes presence at the meeting; provided, however, that all trustees or members of any committee designated by the board of trustees must be able to communicate with each other simultaneously.

3.12) Action Without Meeting. An action required or permitted to be taken at a board meeting may be taken by written action signed by the number of trustees that would be required to take the same action at a meeting of the board at which all trustees were present; provided that all trustees must be notified of the text of the written action prior to the signing by any of the trustees.

3.13) Compensation. No trustee shall receive any compensation for his or her services as a trustee unless such compensation is authorized by resolution of the board of trustees. Trustees may be reimbursed for any expenses of attendance at meetings of the board, if reimbursement is authorized by resolution of the board. These expenses may include travel expenses, lodging, or telephone charges, if for a meeting by electronic conference. Nothing herein contained shall be construed to preclude any trustee from serving the corporation in any other capacity and receiving compensation therefor.

3.14) Advisory Groups. The board may (a) appoint advisory panels for such areas as conservation, development, technology, etc., and members of the advisory panels may be invited to attend board meetings; and (b) create an International Species Information System (ISIS) user group which may include members of liaison committees appointed by professional associations of member institutions.

ARTICLE 4 - OFFICERS

4.1) Number. The elected officers of the corporation shall be a chair, a vice-chair, a secretary, and such other officers as may from time to time be elected by the board of trustees. Any of the offices or functions of the offices may be held or exercised by the same person. In addition, an executive director shall be appointed by the board and shall serve as a non-voting trustee of indefinite term by virtue of office, and shall serve at the board's pleasure.

4.2) Election, Term of Office, and Qualifications. Following the first election of officers, the board shall elect the officers at the annual meeting. Each such officer shall hold office for one year and until his or her

successor is elected and has qualified, or until he or she has been removed in the manner hereinafter provided. The officers may hold the same office only for three terms consecutively and are ineligible for that position until they have not held it for one term.

4.3) Removal. Any officer may be removed, with or without cause, by vote of not less than two-thirds (2/3) of the full board of trustees whenever in its judgment the best interests of the corporation would be served thereby. Such removal shall be without prejudice to the contract rights, if any, of such officer.

4.4) Resignation. Any officer may resign at any time by giving written notice to the corporation. The resignation is effective when notice is given to the corporation, unless a later date is specified in the notice, and acceptance of the resignation shall not be necessary to make it effective.

4.5) Vacancies. If there is a vacancy in any office of the corporation, by reason of death, resignation, removal or otherwise, such vacancy may be filled for the unexpired term by vote of the board of trustees.

4.6) Chair. The chair shall (a) preside at all meetings of the members and of the trustees; (b) see that all orders and resolutions of the board are carried into effect; (c) sign and deliver in the name of the corporation any deeds, mortgages, bonds, contracts or other instruments pertaining to the business of the corporation, except in cases in which the authority to sign and deliver is required by law to be exercised by another person or is expressly delegated by the Articles, these Bylaws, or the board to some other officer or agent of the corporation; (d) appoint members and chairs to committees established by the board; and (e) perform all duties incident to the office of chair, and such other duties as may from time to time be prescribed by the board.

4.7) Vice-Chair. The vice-chair shall act as chair in the absence of the chair and shall perform such other duties as may from time to time be prescribed by the board or delegated by the chair.

4.8) Secretary. The secretary shall (a) attend all meetings of the members and the board of trustees; (b) keep in the minute book proper minutes of the proceedings; (c) give all required notices; (d) have responsibility for the corporate records, which shall be maintained in a safe and secure manner in the corporation offices; and (e) perform such other duties as may from time to time be prescribed by the board.

4.9) Executive Director. The executive director shall (a) be the chief executive officer and registered agent of the corporation; (b) have general active management of the business of the corporation; (c) be a non-voting member of the board of trustees; (d) be a non-voting member of all committees, and shall withdraw from any committee meeting where the executive director's employment, job performance or compensation is being discussed; (e) shall administer and be responsible for the day-to-day financial affairs of the corporation and shall render financial reports, at least annually, to the chair, treasurer, and full board of trustees; (f) perform such other duties that fulfill the purposes of the corporation as may be prescribed by the board of trustees or the chair from time to time. The executive director shall be responsible to the full board of trustees through its executive committee and not to individual board members.

4.10) Treasurer. In recognition of its fiduciary responsibilities, the board of trustees shall annually name one of its members as treasurer. The treasurer shall oversee the financial integrity of ISIS operations and shall make an annual report on the corporation's financial status based on a certified audit. The treasurer shall assist the executive director to assure sound accounting and monitoring standards for financial administration. The treasurer shall perform such other related duties, including presentation of the budget, as the board of trustees may deem appropriate.

4.11) Other Officers and Agents. Any other officers and agents appointed by the board of trustees shall perform such duties and be responsible for such functions as the board of trustees may prescribe.

ARTICLE 5 - COMMITTEES

5.1) Executive Committee. The board shall, by resolution, designate a committee of four trustees, to serve as an executive committee which shall have and exercise the authority of the board in the management of the business of the corporation. The committee shall consist of the chair, the vice-chair, the executive director and one other trustee, three of whom shall constitute a quorum. The executive committee shall act only in the intervals between meetings of the board. Its actions must be ratified at the next meeting of the board.

5.2) Nominating Committee. The chair shall annually designate three individuals who, together with the executive director, shall serve as the nominating committee. At least one of the members must not be a trustee, but he or she shall be a representative of an institutional member. The nominating committee shall nominate candidates for election to the board of trustees in accordance with Article 3. The nominating committee members shall represent as many of the geographical and professional constituencies of the membership as possible.

5.3) Other Committees. The board of trustees may from time to time establish such other committees as it may deem proper, and may prescribe the functions and duties of such committees and the terms of membership of committee members. The chair shall, subject to ratification by the board, appoint all committee members and designate all committee chairpersons.

ARTICLE 6 - FISCAL YEAR

6.1) Fiscal Year. The fiscal year of the corporation shall be established by the board of trustees.

ARTICLE 7 - EXECUTION OF CONTRACTS

7.1) Contracts. The board of trustees may authorize any officer or officers, or agent or agents, to enter into any contract, or execute and deliver any instrument in the name of and on behalf of the corporation. Such authority may be general or confined to specific instances. Except as otherwise provided in these Bylaws and except as from time to time authorized by the board of trustees, no officer, agent, or employee shall have any power or authority to bind the corporation by any contract or engagement, or to pledge its credit, or to render it liable pecuniarily for any purpose or in any amount.

ARTICLE 8 - INDEMNIFICATION

8.1) Indemnification. The corporation shall indemnify such persons, including, but not limited to, officers, trustees and employees of the corporation, for such expenses and liabilities, in such manner, under such circumstances, and to such extent, as permitted by Minnesota Statutes Section 317A.521, as now enacted or hereafter amended.

8.2) Conflicts of Interest. The corporation shall not enter into contracts or transactions between the corporation or a related corporation and a trustee of the corporation or between the corporation and an organization in which a trustee of the corporation is a director, officer or legal representative or has a material financial interest, except in accord with the provisions of Minnesota Statutes Section 317A.255, as now enacted or hereafter amended.

8.3) Standard of Conduct. Each trustee and officer shall discharge his or her duties as a trustee or officer in good faith, in a manner which the trustee or officer reasonably believes to be in the best interests of the corporation, and with the care an ordinarily prudent person in a like position would exercise under similar circumstances.

ARTICLE 9 - LOANS TO OFFICERS OR TRUSTEES

9.1) Loans to Officers or Trustees. In accordance with the provisions of Minnesota Statutes Section 317A.501, the corporation shall not lend any of its assets to an officer or trustee of the corporation. If it does make such a loan, the officers and trustees who make the loan, or assent to it, are jointly and severally liable for its repayment of such loan.

ARTICLE 10 - AMENDMENTS

10.1) Amendments. These Bylaws may be amended or repealed and new Bylaws may be adopted by either of the following methods:

(a) Upon adoption or ratification of these Bylaws by the members, these Bylaws may be altered, amended, added to or repealed by a two-thirds (2/3) vote of all the members of the board of trustees. This authority in the board of trustees is subject to the power of the members either to change or repeal the Bylaws or, by a majority vote of the members voting at a meeting duly called for that purpose, prospectively to revoke the authority of the board to exercise the power to amend the Bylaws; or

(b) The board of trustees may propose the amendment of the Bylaws by resolution setting forth the proposed amendment and directing that it be submitted for adoption at a meeting of the members, or 50 members or 10% of the membership, whichever is the lesser, may set forth a proposed amendment by

petition, which shall be signed by them and filed with the secretary of the corporation. Notice of the meeting of the members, stating the purpose including the proposed amendment, shall be given to each member entitled to vote on the proposed amendment, and to each officer and trustee regardless of his or her voting rights. If notice required by this clause has been given, the proposed amendment may be adopted at any meeting of members. Adoption of a proposed amendment shall be by two-thirds (2/3) vote of all members with voting rights.

#26919972

ISIS BOARD OF TRUSTEES - 2002

(sorted by term of office)

5 Sep 2002

ELECTED:

Dr. Ulrich Schurer Wuppertal Zoological Garten Hubertusallee 30 42117 Wuppertal Germany	TERM (2 nd): 1 Jan 2000 – 31 Dec 2002 INSTCODE: 113023021 PHONE: (cc= 49) 202 2747 139 FAX: (cc= 49) 202 741 888 E-Mail: direktion@zoo-wuppertal.de
Dr. Jo Gipps Bristol Clifton West of England Zool. Society Bristol Zoo Gardens Bristol Clifton BS8 3HA England (U.K.)	TERM: 1 Jan 2000 - 31 Dec 2002 INSTCODE: 120225003 PHONE: (cc= 44) 117 974 7301 FAX: (cc= 44) 117 973 6814 E-Mail: jgipps@bristolzoo.org.uk
Mrs. Laura M. Mumaw Melbourne Zoo P.O. Box 74 Parkville, VIC 3052 Australia	TERM: 1 Jan 2000 - 31 Dec 2002 INSTCODE: 510307002 PHONE: (cc= 61) 3 9285 9300 FAX: (cc= 61) 3 9285 9330 E-Mail: lmumaw@zoo.org.au
Dr. Robert Lacy (ISIS Board Appointed) Chair, ISIS Sc., & Technology Adv. Committee 3647 Pompey Center Road Manlius, NY 13104 USA	TERM: 1 Jan 2001 – 31 Dec 2002 INSTCODE: PHONE: (cc= 1) 315 682 3571 FAX: (cc= 1) 315 682 3571 E-Mail: rlacy@ix.netcom.com
Mr. Gerald Borin, Chair Columbus Zoological Gardens 9990 Riverside Dr., P.O. Box 400 Powell, OH 43065-0400 USA	TERM (2 nd): 1 Jan 2001 – 31 Dec 2003 INSTCODE: 310536012 PHONE: (cc= 1) 614 645 3494 FAX: (cc= 1) 614 645 3542 E-Mail: jborin@colszoo.org
Prof. Dr. Gunther Nogge Köln Zoo Riehler Strasse 173 D-50735 Köln Germany	TERM (2 nd): 1 Jan 2001 – 31 Dec 2003 INSTCODE: 113023002 PHONE: (cc= 49) 221 778 5101 FAX: (cc= 49) 221 778 5111 E-Mail: direction@zoo-koeln.de
Dr. Jeffrey P. Bonner (To Fill Vacancy) St. Louis Zoological Park 1 Government Drive St. Louis, MO 63110-1395 USA	TERM: 1 Sep 2002 – 31 Dec 2003 INSTCODE: 310526006 PHONE: (cc= 1) 314 781 0900 x219 FAX: (cc= 1) 314 781 6086 E-Mail: bonner@stlzoo.org
Mr. Lars Lunding Andersen Copenhagen Zoo Sdr. Fasanvej 79 DK-2000 Frederiksberg Denmark	TERM (2 nd): 1 Jan 2001 – 31 Dec 2003 INSTCODE: 110803002 PHONE: (cc= 45) 72 200 223 FAX: (cc= 45) 72 200 219 E-Mail: lla@zoo.dk
Dr. Koen Brouwer (EAZA Appointed) EAZA C/O Amsterdam Zoo, PO Box 20164 1000 HD Amsterdam THE NETHERLANDS	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 110000999 PHONE: (cc= 31) 20 520 0750 FAX: (cc= 31) 20 520 0754 E-Mail: koen.brouwer@nvdzoos.nl
Dr. Jonathan Wilcken (ARAZPA Appointed) ARAZPA PO Box 20 Mosman 2088, NSW AUSTRALIA	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 500000999 PHONE: (cc= 61) 2 9978 4634 FAX: (cc= 61) 2 9978 4761 E-Mail: jonathan@arazpa.org.au

Ms. Karen Sausman (Elected;WAZA Appointed) The Living Desert 47-900 Portola Ave. Palm Desert, CA 92260 USA	TERM(2 nd): 1 Jan 2002 – 31 Dec 2004 INSTCODE: 310505027 PHONE: (cc= 1) 760 346 5694 FAX: (cc= 1) 760 568 9685 E-Mail: tldkas@aol.com
Ms. Yolanda Matamoros Hidalgo Zoologico Nacional Simon Bolivar Fundacion pro Zoologicos Apdo. 11594-1000 COSTA RICA	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 320707001 PHONE: (cc= 506) 233 6701 FAX: (cc= 506) 233 1817 E-Mail: fundazoo@sol.racsa.co.cr
Dr. Anne M. Baker (AZA Appointed) Rosamond Gifford Zoo at Burnet Park 1 Conservation Place Syracuse, NY 13204-2504 USA	TERM: 1 Jan 2002 – 31 Dec 2004 INSTCODE: 310533039 PHONE: (cc= 1) 315 435 3774 FAX: (cc= 1) 315 435 8517 E-Mail: abatzoo@aol.com
Dr. Beth Stevens (To Fill Vacancy) Disney's Animal Kingdom 1200 N. Savannah Circle E.,PO Box 10000 Bay Lake, FL 32830-1000 USA	TERM: 1 Sep 2002 – 31 Dec 2004 INSTCODE: 310510072 PHONE: (cc= 1) 407 939 2476 FAX: (cc= 1) 407 938 2525 E-Mail: beth.stevens@disney.com
Dr. Ulie Seal Conservation Breeding Specialist Group (CBSG) 12101 Johnny Cake Ridge Road Apple Valley, MN 55124-8151 USA	TERM: Honorary Advisor INSTCODE: 310524998 PHONE: (cc= 1) 952 997 9800 FAX: (cc= 1) 952 432 2757 E-Mail: office@cbsg.org
Mr. Nate Flesness International Species Information System (ISIS) 12101 Johnny Cake Ridge Road Apple Valley, MN 55124-8151 USA	TERM: Ex Officio (serves by virtue of office) INSTCODE: 310524999 PHONE: (cc= 1) 952 997 9504 FAX: (cc= 1) 952 432 2757 E-Mail: nate@isis.org

Brief Biographies (in alphabetical order) of the Candidates for The ISIS Board of Trustees (term 1 Jan 2003 – 31 Dec 2005)

Jo Gipps – United Kingdom

Jo received a degree in Zoology from Imperial College, London University in 1973 and a PhD from Royal Holloway College, London in 1977. He conducted research on the Ecology and Social Behaviour of Small Mammals between 1973 and 1984, including a Research Fellowship at UBC, Vancouver, 1978 to 1980. In 1988 Gipps joined the Zoological Society of London as Curator of Mammals at the London Zoo, becoming Director of London Zoo in March 1993. Gipps became the Director of Bristol Zoo Gardens in September 2001. Jo is a member of the Steering Committee of CBSG, and a member of the Reintroduction Primate Specialist Groups of SSC / IUCN. He has been a member of WAZA since 1993 and Chair of its Conservation Committee since August 2002. Jo is also currently an ISIS Trustee, is a member of the Council of the UK Federation of Zoos, and its Honorary Treasurer from 1998 to 2002; he is also a member of EAZA Council, and was Chair of its Conservation Committee from 1998 to 2002.

Alexander L. Hoskins – United States

Alexander L. Hoskins began his tenure as President of the Zoological Society of Philadelphia in January, 1993. Prior to that, he held a number of positions in city government including serving as Commissioner of Streets for the City of Philadelphia from 1988 to 1993 and as Executive Director of Fairmount Park from 1980 to 1988. From 1972 through 1980, Mr. Hoskins held the position of Management Analyst in the City of Philadelphia's Managing Director's Office. During his tenure at the Philadelphia Zoo the Zoo has adopted a Master Plan to revitalize the entire Zoo. Phase I of plan (over \$45 million) has been completed, including a new Animal Health Center, a renovated Reptile House and PECO Primate Reserve. Several smaller exhibits have been added including Monkey Junction and Parrot Paradise. Equally important extensive investment has been made in upgrading the Zoo's old infrastructure – new roofs, electrical, plumbing, heating and air conditioning systems, and safety systems. Mr. Hoskins is a native of California and received his Bachelor of Arts in Political Science from San Jose University. He received his Masters degree in Public Administration from the University of Minnesota in 1971. He has been actively involved in civic activities for many years. He currently Chairs the Boards of the Greater Philadelphia Cultural Alliance and the Philadelphia Ranger Corps. and is currently a member of the Board of the Philadelphia Convention & Visitors Bureau, the Schuylkill Greenway Association, and the Zoo Conservation Outreach Group, Parkway Council and the Pennsylvania Zoological Council. Mr. Hoskins and his wife, Sharon, reside in Philadelphia. He has two sons and one daughter.

Prof. Dr. Dieter Jauch – Germany

The "Wilhelma" Stuttgart Zoo was one of the first zoos in Europe to join ISIS, and has supported it in many ways. Dieter Jauch thinks it is very important for the International Zoo-Community to be included in captive breeding programs and the general flow of information from zoo to zoo. D. Jauch has worked at Stuttgart's Wilhelma Zoological & Botanical Gardens since 1980 and became Director on October 1, 1989. Dieter is happy to help within the ISIS-Organization wherever he can. He is personally involved in the process of developing close cooperation between European Zoos as a member of the EEP-Coordination-Committee since 1989 (Chairman 1994 - 2000) and as an EAZA Council Member between 1988 and 2000. Jauch was President of Verband Deutscher Zoodirectoren from 1997 to 2000. Dieter also is a Professor at Stuttgart University.

Hans-Ove Larsson - Sweden

Hans-Ove Larsson, 56 years old; Zoologist by profession; Chairman of SAZA (Swedish Association of Zoos and Aquaria); Vice President of EAZA (European Association of Zoos and Aquaria) and member of the Executive Committee; the EEP Committee and the Conservation Committee (EAZA); also in the EAZA Council and representative of SAZA in WAZA (World Association of Zoos and Aquariums); founder and creator of the Nordic Ark (Nordens Ark)- a Zoo committed to endangered fauna, and founder and creator of Jarvzoo (a Zoo committed to nordic fauna); consultant for the Swedish Board of Agriculture and for the Norwegian Department of Agriculture (in both cases the authorities responsible for Zoos); former president of the commission for Biology and Conservation within CMAS (Confederation Mondiale des Activites Subaquatic); species coordinator for Muskox and Brown Bear in SAZA Conservation Projects; member of the EAZA Bear TAG; member of EAZA Bushmeat group; member of IFAW (International Fund for Animal Welfare) advisory board for a Chinese Bear Sanctuary.

Laura Mumaw – Australia

Laura received a B. Sc. Biology from Stanford University and a M. Sc. Fisheries from the University of Washington. She has worked in the Zoo / Aquarium profession for twenty-two years as a biologist, curator, director of the Auckland Zoo, and is currently Director of the Melbourne Zoo. Mumaw was founding President of the Australasian Zoo Association (ARAZPA) in 1990 and has continued her involvement with positions as Board member and ASMP (Australasian Species Management Plan) Committee member. Laura is a Board member of the New Zealand Wildlife Rehabilitation Trust and Lancare Research (a New Zealand Government research agency on biodiversity and sustainable land management issues).