Integration of In Situ and Ex Situ Data Management for Biodiversity Conservation Via the ISIS Zoological Information Management System

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Abstract

For conservation action to mitigate biodiversity loss there is an increasing need for a “one plan approach” to develop multi-disciplinary conservation strategies that include the integration of in situ (in the wild) and ex situ (under human care in managed zoological facilities) management processes. This integration necessitates collaboration at all levels of conservation action including planning, implementation, monitoring and finally assessment to drive adaptive management processes. Each component of conservation action is fully dependent on the availability and accuracy of data in order to guide the formation of action plans and carry out management processes. The Zoological Information Management System (ZIMS ), managed by the International Species Information System (ISIS), is a centralized Web-based system that pools data on global ex situ animal populations including basic information on life history, physiology, behavior, and health to facilitate animal husbandry and breeding management programs. ZIMS offers a new opportunity to link data management processes for animals that spend a part of their lives under human care and part in their natural environment and potentially for use monitored wild populations.

This project encompassed a global collaboration of conservationists including zoo and wildlife professionals, academics, government authorities, IUCN Specialist Groups, and regional and global zoo associations. The dissertation had three main goals: 1) to identify data needed to manage and assess threatened species conservation programs; 2) to identify the data management tools currently in use by both in situ and ex situ partners for representative species recovery programs; and 3) to develop the framework to expand the use of ZIMS by aligning the in situ and ex situ data needs with ZIMS functionality.

First, case studies of conservation translocations for representative invertebrate, fish, amphibian, reptile, bird, and mammal species, published in three volumes of the Reintroduction Specialist Group’s Global Re-introduction Perspectives (Soorae 2008, 2010, 2011) were reviewed to identify parameters used in management and evaluation of success of the projects. Results showed that for all animal groups, important management and assessment parameters included basic data components on life history attributes, genetic diversity, habitat and resources, health assessments, husbandry and release methodologies, and long-term monitoring. Overriding
themes included the lack of evidence-based information on life history, biology and ecology of the species and the need for scientific research for each step of the conservation translocation programs.

Second, data collection and management tools were identified for five categories of threatened species programs, each in some way impacted by the integration of in situ and ex situ research or management (see Appendix I). Ex situ species coordinators and registrars were consulted to identify data management practices for animals in zoological institutions and field researchers’ data collection methods were investigated through direct observation or electronic communication (see Appendix II). Overall data management processes included the use of ISIS programs for ex situ programs and a combination of database programs (Access, Excel), Word documents, paper forms, and media (photos, videos, diagnostic images) for both ex situ and in situ programs such that compiling data for analysis was inefficient. Communication between ex situ and in situ partners required duplicate efforts in reporting resulting in lag times that compromised effective conservation action.

Third, data requirements and data management tools for each program were aligned with ZIMS functionality to illustrate how this information system could integrate in situ and ex situ data management processes. Acknowledging that ZIMS has current functionality to cover many of the collective data management processes, limitations for comprehensive in situ data management were identified and recommendations were made for further development. Use of ZIMS can facilitate coordination of data management processes between conservation partners, thus improving the efficacy of biodiversity conservation programs.

Appendix I

The five categories with the species surveyed are:

A. Endangered species whose wild population became dangerously low and captive breeding or head-start program was implemented for purposes of release for reintroduction.
   
   American burying beetle (*Nicrophorus americanus*)
   Takahē (*Porphyrio hochstetteri*)
   Western pond turtle (*Actinemys marmorata*)

B. Endangered species brought into captivity due to threat of extinction in the wild. At one time, listed as IUCN Extinct in the Wild. Reintroduction program well developed through captive breeding or head-starting with managed release and established monitoring program for assessment.

   Kākāpo (*Strigops habroptila*)
   Kihansi spray toad (*Nectophrynoides asperginis*)
   Red wolf (*Canis rufus*)
C. Endangered species that does not currently have a reintroduction program but future conservation efforts include such a program. Current ex situ programs contribute data to PHVA for the species and integrated plan is developed for overall conservation.

Lowland tapir (*Tapirus terrestris*)

D. Endangered species that has a rescue/rehabilitation/release program but no current reintroduction program of captive animals to the wild.

Cheetah (*Acinonyx jubatus*)

E. Endangered species with a research program for the wild populations but no current reintroductions from the captive population (if present).

Giant armadillo (*Priodontes maximus*)
Armenian viper (*Montivipera raddei*)

Appendix II

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American burying beetle
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Takahē and Kākāpo
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Dr. Richard Jakob-Hoff, Manager, Conservation Science and Research, Auckland Zoo
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Western pond turtle
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Kihansi spray toad
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**References**