SCTI Advisory Group - Full Report

Participants

Onnie Byers, Danny de Man, Candice Dorsey, Taylor Callicrate, Catherine Grueber, Jim Guenter, Mike Jordan, Kristin Leus, Bob Lacy (convenor), Lance Miller, Robin Keith, Paul Pearce-Kelly, Sara Sullivan, Gloria Svampa, Simon Tonge, Kathy Traylor-Holzer, Martín Zordan

Summary

A bold initiative generated out of discussions at CPSG (then, CBSG) meetings, the Species Conservation Toolkit Initiative (SCTI) exists as a small and flexible think-tank with a mission to sustain and grow innovation in species conservation tools. During the first session of this working group, the SCTI team gathered together members of its Advisory Group (representatives of major organizational partners of SCTI, and additional technical experts) to report on programmatic, staffing, and financial updates and to discuss a strategic approach in meeting SCTI's broad mission moving forward. The second session was open for all CPSG meeting attendees and focused on identifying science or technology gaps that could be addressed by convening collaborative technical working meetings.

Overview of SCTI status and activities

New partners

Both the Association of Zoos and Aquariums (AZA) and the European Association of Zoos and Aquaria (EAZA) have joined the SCTI partnership as major sponsors.

Staffing

Bob Lacy announced that he will be retiring from his position at the Chicago Zoological Society (CZS) in early 2019. However, Bob will continue to work with the SCTI team on envisioning and building valuable tools (as Jon Ballou currently does). In addition to Bob's continued commitment to SCTI, Bob reported that CZS is committed to continuing its leadership in population biology and species conservation methods and has begun searching for a Conservation Scientist with expertise in population biology and an eagerness to work with SCTI. Due to the support of all the SCTI partners, SCTI has also recently posted an open position for a second full-time postdoctoral level conservation scientist-programmer and is hoping to fill the position by the end of 2018.

Software

SCTI continually makes refinements in all of its software tools, and Bob Lacy reported on a number of updates. These include various improvements to the user interfaces, adjustments to algorithms for handling unusual species and data, and changes to keep current with evolving operating systems and network implementations. A few specific examples include a completely revised Selection tab and enhanced Demography module in PMx, added ability in Outbreak to describe any input rates as functions of individual or population properties, and improvements in Vortex for modelling captive population management and to the graphical analyses of sensitivity tests of uncertain parameters. Ongoing software enhancements to be released in the near future include a tool for managing gamete banks as components of breeding programs in PMx, a new reproductive tab in the PMx demography module, and the ability to export data from PMx directly to Vortex.

SCTI Website

Taylor Callicrate provided a demonstration of the new SCTI website, which SCTI is hoping to unveil by

the end of 2018. The website will also have a dedicated training section, where SCTI is exploring options to allow toolkit users to access materials through personal accounts, track their activity through user profiles, and interact with other users in dynamic forums. Additionally, the SCTI team should be able to gain insight into learning behaviors and pinpoint areas for improvement by tracking metrics related to completion rates, learner performance, and learner satisfaction.

Training

Earlier this year, SCTI began to develop online training materials for Outbreak and PMx. Among the first products of this effort were a series of introductory videos on the Outbreak software, initially trialed at a Disease Risk Assessment workshop in Brazil. Sara Sullivan reported that toolkit users can access these videos at www.vortex10.org/Outbreak.aspx, along with the first version of the Outbreak manual (thanks to the combined efforts of Carlo Pacioni of Australia, Sara Sullivan of SCTI, Caroline Lees and Phil Miller of CPSG, Bob Lacy of CZS, and some funding from the US National Science Foundation). Online materials are also being designed, developed, and tested for PMx. These materials address priority topics identified during stakeholder discussions and from evaluation of 130 responses (representing 23 countries) to a globally distributed PMx Training Needs Assessment. SCTI also recently held a few workshops, including a half day introduction to Outbreak at the Joint AAZV/EAZWV/IZW Conference and an advanced Vortex workshop, at the request of the Canadian government (and with funding from them) and hosted by the Woodland Park Zoo. Although SCTI will continue to work on Outbreak and PMx training, including development of a user friendly "PMx Lite" and gradual updates to the PMx manual, SCTI will start to shift its primary training focus to addressing Vortex user needs in 2019.

Collaborations

One concern raised by the working group during Bob's report on software updates was the importance making sure SCTI and partners communicate regularly to make sure that tools built to address similar issues complement rather than duplicate each other (e.g., reproductive and life history features built in PMx and ZIMS for Studbooks, gamete banking tools in PMx and ZIMS Medical, etc.) SCTI recognizes the importance of working with its partners and other collaborators and has done so in the following ways over the past year by:

- Working closely with Species360 to ensure full compatibility and exchange of data between ZIMS and PMx;
- Collaborating with San Diego Zoo Global to develop a PMx module for integrating genomic data into pedigree analysis;
- Working with a group of botanical gardens to test the use of PMx and population management methods developed by zoos for guiding collaborative breeding programs for plants; and
- Providing expert advice (and sometimes debugging, as needed) to CPSG as it applies the latest features in Vortex to some of the most complex species risk assessments.

This collaborative approach also extends to training, with SCTI working with partners in the following ways:

- Helping regional zoo associations to test new data exports from ZIMS to PMx;
- Collaborating with Species360 to document data standards and guides to help user groups confirm the accuracy of data exports, including a "Guide to Testing ZIMS Exports" (available using the Species360 website's "Walk Me" tool);
- Working with CPSG to evaluate how best to integrate Outbreak training resources into Disease Risk Analysis training; and
- Ongoing conversations with partners developing customized online training related to SCTI tools, including Species360, CPSG, and EAZA (CPSG and EAZA now also use the same e-learning

building software program as SCTI, which will facilitate sharing and linking of online materials).

Planning for a "strategic thinking" meeting

SCTI is approaching the end of the first three years of the Initiative, and we need to determine how best to meet species conservation needs for the next three years and beyond. Bob explained that the SCTI team wants to utilize the expertise of its partners and Advisory Group to think creatively about how to meet SCTI's broad mission. To do this, SCTI is planning to hold a one and a half to two day strategic thinking meeting with primary partners and advisors and an external facilitator, Robin Keith from San Diego Zoo Global. Robin asked the group for feedback about what they hope will be some priority outcomes of a strategic meeting along with some questions about logistics, including location, dates, and who should attend. The group agreed that it is important to complete a "scan" of the external environment and to discuss how SCTI and the tools fit in the wider context. The SCTI management committee, comprised of Bob Lacy, Jon Ballou, and Onnie Byers, is going to work with Robin to finalize and communicate meeting dates, location, and agenda. In order to gather information for the external environmental scan, the management committee will call on members of the Advisory Group for assistance.

Convening "technical working meetings"

It might be tempting to see SCTI as primarily a "coding shop." However, SCTI was formed to sustain innovation in species conservation tools, and the SCTI team feels that means that they also need to be developing the science in order to identify the next tools (i.e. their mission is to "develop AND do"). One way SCTI can explore the science and identify new innovations needed for species conservation is to convene (or facilitate the convening of) two to three technical working meetings each year. These technical meetings could bring together the right mix of expertise to address specific topics or conservation challenges. For this part of the meeting, Bob invited all CPSG participants to join the working group in order to brainstorm topics important to the conservation community for which further discussion and exploration is needed. The group identified the following topics, which SCTI will prioritize based on factors like conservation need, conservation impact, and feasibility (e.g., available expertise) with the goal of convening as least one (but ideally up to three) technical working meetings in 2019. Additional comments or suggestions can be sent to scti@vortex10.org.

- **Vortex (i.e. population viability analysis) for captive or other intensively managed populations**
    - This is timely and important, because:
        - Using Vortex for captive populations is complicated and not well documented.
        - We could draw on experience from others already using Vortex in this way, including the AZA Reproductive Management Center, which is using Vortex to explore lifetime reproductive planning for AZA populations.
        - Toolkit users would benefit from more guidance on how PMx and Vortex can be used together to guide goal setting and bigger picture thinking.

- **User friendly tools for metapopulation management**
    - For example:
        - The ability to assess a population globally and regionally simultaneously in PMx;
        - Guidelines for answering short term (e.g., who should move now?) and long term questions (e.g., how frequently should moves occur over the next 20 years?); and
        - Strategies or tools to address cases where an international database does not exist.

- **Incorporating habitat dynamics into population viability analyses** (or could also look at it from a different angle – incorporating species modeling into habitat modeling)
    - Questions that could be addressed include:
        - What elements of habitat dynamics can be incorporated into modeling?
        - Habitats are changing so quickly, even moving, so how does that affect the model and predictions? How do we stay ahead of this?
        - What if the animal is the habitat (e.g., corals)?
    - Could draw on expertise from related work already being done, for example:
        - Katia Perez has worked with Kathy Traylor-Holzer on tying together spatial and habitat suitability modeling with Vortex modeling in Brazil.
        - Threat mapping is often incorporated into the PHVA and multi-species planning processes; however, a good way to incorporate this into Vortex does not currently exist.

- **Using genomic data to evaluate how historical demography and genetic load is affecting the extinction probability of populations**
    - Can you factor in types of load risk for models and adjust carrying capacities based on this information?
    - This could also potentially be useful in evaluating whether an inbred captive population still has value.
    - We are in a better position to empirically estimate extinction risk based on genetic load than in the past, and a lot of this can be done sequencing the genome of one individual.

- **Hybridization and adaptive introgression**
    - When you have a really large population and find out there is some kind of introgression, are you not throwing away something valuable if you remove hybrids? → We need to explore what the outcome might be if introgression is negative or positive.
    - Could gain some valuable insight from the plant community, in which "mixed provenancing" is common to create populations for translocation to produce individuals fit for planting out in new environments.
    - Also links to habitat and climate change modeling.

- **User-friendly toolbox to incorporate climate change into the models**
    - For example:
        - Provide databases or other resources to help toolkit users incorporate factors like sea level change and rainfall patterns into vortex models.
            - Do we need a working meeting on "identifying resources"?
        - Develop a "non-techy" step to be integrated into the planning process? (e.g., literature search on "has there been climate modeling in these areas, population, socioeconomic analyses done already?")
        - Many times primary drivers of threats is climate change and human behavior, but our technical tools do little currently to help people map that out.
    - Could leverage expertise from the IUCN SSC Climate Change Specialist Group and others who are attempting to incorporate climate change and human dynamics into species conservation planning (e.g., Whooping Crane PVA, climate change models on Chimpanzees in Tanzania)

- **Group management**
    - Even if we start with "where are we now, what are people doing, how do we plan to work ahead?"

  - Advancements in and lower cost of genetic tools may help.

- **Data gap solutions for reliably evaluating the impact of inbreeding on reproductive success in captive populations**
  - Although a large amount of zoo data is available, it can be difficult to use these data to answer some reproduction related questions. This is due to confounding factors, such as not having data on "opportunity to breed" or on whether population growth has slowed over time due to biological or management factors.
  - Could we identify *ex situ* populations for whom these data have been recorded and use them as model datasets?
    - Possibly tigers – many confounding factors but lots of information is recorded about each recommended breeding pair.
    - Certain group managed species may work well.

- **Better coordination for decision making and goal setting across regions, especially for long-term goals**
  - What software and non-technical tools (e.g., ICAP process) can help with systematic species selection for Regional Collection Plans?
  - We could be losing species or a species' ability for long-term persistence, because of institutional or regional needs that seem good in the short term but actually hinder actions that are needed down the road.

- **Advanced training on the underlying software calculations**
  - Technical documentation is good, but not everyone will learn easily by reviewing equations. It is also important to provide less technical explanations of the underlying algorithms.
  - PMx and Vortex, in particular, were highlighted.

Recommended actions

1. Communicate the final dates and location for an SCTI strategic thinking meeting to relevant Advisory Group members, partner representatives, and other SCTI collaborators by 1 December 2018. *(SCTI management team, Robin Keith)*

2. Identify what information should be collected as part of an "external scan" before the strategic thinking meeting, and delegate tasks to collect this information to Advisory Group members as needed by 1 Jan 2019. *(SCTI team)*

3. Facilitate the convening of at least one (but ideally up to three) technical working meetings to be held in 2019 by (a) prioritizing the suggested topics by 31 Jan 2019, considering factors like conservation need, conservation impact, and available expertise, and (b) confirming by 1 April 2018 a lead person or group to organize each meeting. *(3a, SCTI team; 3b, SCTI team and selected Advisory Group members)*

4. Throw a party to celebrate the successful launch and first three year start-up of SCTI!

Acknowledgements

SCTI Partners (as of August 2018)

- Association of Zoos and Aquariums
- Auckland Zoo
- Chicago Zoological Society
- Copenhagen Zoo
- European Association of Zoos and Aquaria
- Living Desert Zoo & Gardens
- National Zoo/Smithsonian Conservation Biology Institute
- Oceans Initiative
- Raincoast Conservation Foundation
- Saint Louis Zoo
- San Diego Zoo Global
- San Francisco Zoo & Gardens
- Seattle Aquarium
- SOS Rhino
- Species360
- IUCN SSC Conservation Planning Specialist Group
- Zoological Society of London

New Partners announced at the CPSG meeting!

- Chester Zoo
- Wildlife Reserves Singapore
- Taipei Zoo

Current SCTI Advisory Group members who were unable to attend this meeting

- Jon Ballou, Smithsonian Conservation Biology Institute
- Michael Bruford, Cardiff University, SSC Conservation Genetics Specialist Group
- Dalia Conde, Species 360
- Doug Cress, WAZA
- Karen Dixon, SOS Rhino
- Bengt Holst, Copenhagen Zoo
- Richard Jakob-Hoff, Auckland Zoo
- Jamie Ivy, San Diego Zoo Global
- Fabiana Lopes Rocha, CPSG Brasil, Universidade Federal da Paraíba
- Nan Schaffer, SOS Rhino

Thank you from the SCTI Team!

- Jonathan Ballou
- Onnie Byers
- Taylor Callicrate
- Robert Lacy
- Sara Sullivan