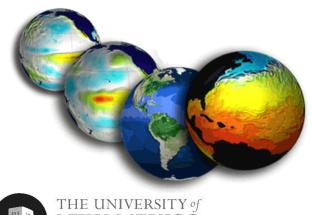
Collections as a source of data for education, conservation and monitoring change in a time of extinction: an amphibian example

J. Tomasz Giermakowski, Mason J. Ryan, Joseph A. Cook Museum of Southwestern Biology, University of New Mexico Albuquerque, New Mexico, USA



Outline

- How to increase our visibility and importance?
 - Shift focus from documenting species to <u>conserving</u> species:
 - Enhance and provide data to wide audiences
 - Integrate data into education & conservation
 - AIM-UP! project
 - Conservation case studies: amphibians





Increase visibility and importance

Enhance specimen data

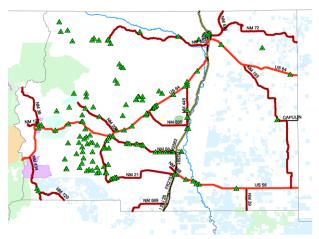
- Georeferencing
- Collection digitization
 - Specimen imaging
 - Scanning of original documentation
 - Transcription of field notes



provides context and allows for new approaches in applied research and conservation

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Increase visibility and importance

- Provide data
 - Examples of efforts:
 - Vertnet
 - Arctos (Cicero's presentation)





- Integrate collections into education
 - AIM-UP!
 - Create & disseminate specimen-based educational modules



Increase visibility and importance

- Emphasize collections as an educational <u>resource</u>
 - Teachers & students can study biodiversity by examining specimens and their associated data
 - Promote multiple core competencies in biology
- AIM-UP!
 (poster presentation)





AIM-UP!

 Advancing Integration of Museums into Undergraduate Programs



- Research Coordinating Network funded by the US National Science Foundation
- Specific goals:
 - 1. train students in specimen-based research
 - 2. develop instructional tools based on online databases
 - 3. inform educators at non-museum institutions of the learning potential of museum collections
 - 4. interact with the public to increase awareness of the educational importance of natural history museums



AIM-UP!

- Themes over five years:
 - 1. Integrative inventories: complex biotic associations across space & time
 - 2. Geographic variation
 - 3. Evolutionary dynamics of genomes
 - 4. Biotic response to climate change



 Co-evolving communities of pathogens and hosts as related to emerging disease



AIM-UP!

Educational modules (available @ aim-up.org)

- Explore many topics in ecology & evolution
 - e.g. geographic variation, genome evolution, response to environmental change, range shifts, etc
- Focus on upper-level undergraduates

<u>Comparative Biology Educational Module</u> Written by Bryan McLean and Libby Beckman (Museum of Southwestern Biology) Spring 2013

Part I - Data Acquisition

Navigate to **'dryad'** data repository (http://datadrya Data repositories like dryad are an important sourc studies, which allow scientists to further test and b others.

Available on this page are data from a study by Ma frequency of polyploidy in vascular plants. Polyploi number of chromosomes an organism has. It is ac

University of Alaska Fairbanks

LESSON PLAN: Range and Distribution

Laura Conner (Research Assistant Prof., ESTES, Idconner@alaska.edu) Steffi Ickert-Bond (Associate Prof., Dept. Biology & Wildlife, smickertbond@alaska.edu)

Overview

ALASKA

In this activity, students will explore the effects of geography and other abiotic factors on plant range and distribution.

Objectives

- The student will:
 - Compare ranges of three different plant species;
 Examine temperature, precipitation, and elevation maps of Alaska; and
- Explain what abiotic factors are responsible for plant ranges.

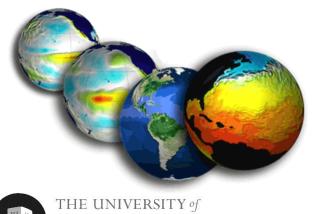
Materials

Access to ARCTOS herbarium database (http://arctos.database.museum/SpecimenSearch.cfm) Student Worksheet: "Range and Distribution"



Outline

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Amphibian conservation

Current status of amphibians

- Single greatest taxa-focused conservation crisis of 21st century
- >32% of 6,300 species in immediate threat of extinction
- >43% species in decline
- Occurring rapidly with hundreds of die-offs in last 30 yrs

Shifting role of collections

- Historical, specimen-based records
- Access to field notes
- Opportunity to make well-informed surveys & management decisions





Amphibian conservation

Direct role of collections

- Examination of specimens and data
 - Species distributions collecting localities
- Field notes
 - Qualitative treatment of abundance
 - If rare set as low priority
 - If common set as a high priority

Two case studies:

- Rediscovery of Craugastor fleischmanni in Costa Rica
- Status of Anaxyrus microscaphus in New Mexico, USA





Rediscovery of *Craugastor fleischmanni* in Costa Rica

- Considered extinct and not detected for 26 years
- Threatened by disease & habitat loss
- Examination of historical field notes determined that species was common and easily detected at collection localities

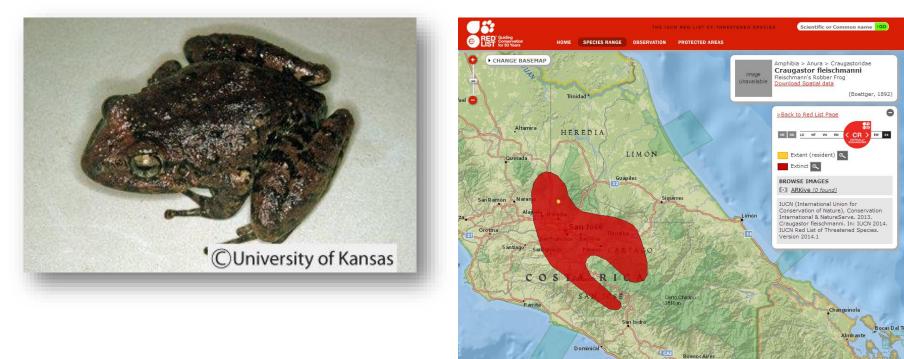


- Determined high priority to be rediscovered
 - Survey efforts began in 2005





- Rediscovery of *Craugastor fleischmanni* in Costa Rica
 - Rediscovered in 2010!
 - Instant conservation improvement & proof that it is not extinct







C INSET MAP

DONATE NOW

- Status of Anaxyrus microscaphus in New Mexico, USA
 - Declining in Arizona, Nevada, & Utah
 - Threatened by hybridization, drought, and habitat loss
 - Restricted to mountainous areas of southwestern New Mexico
 - Population status unknown
 - Systematic surveys began in 2013 and continuing (2014)



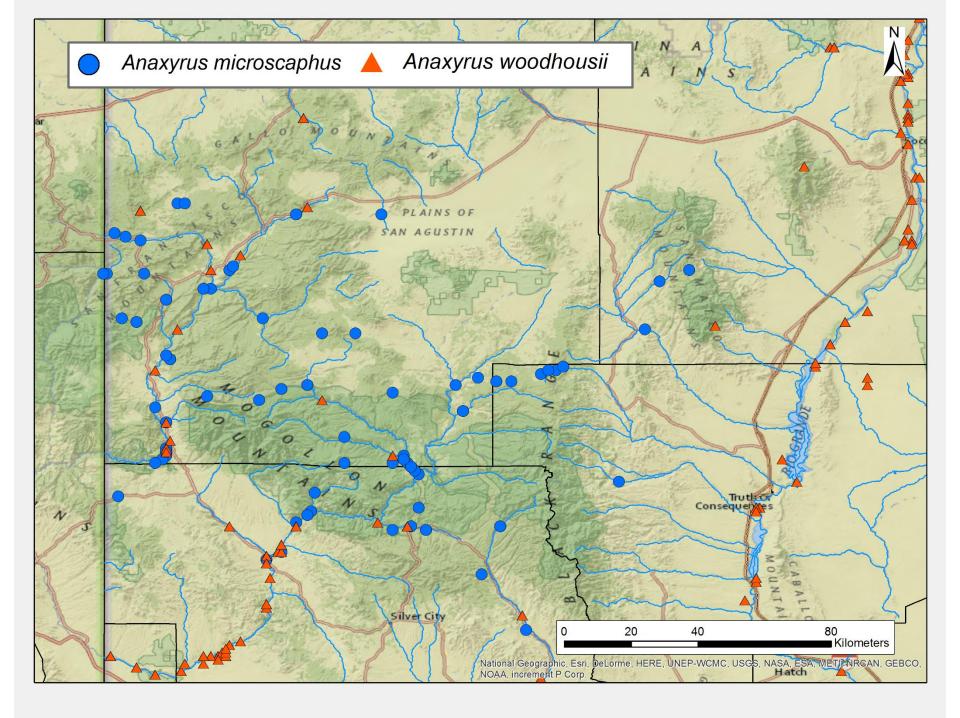


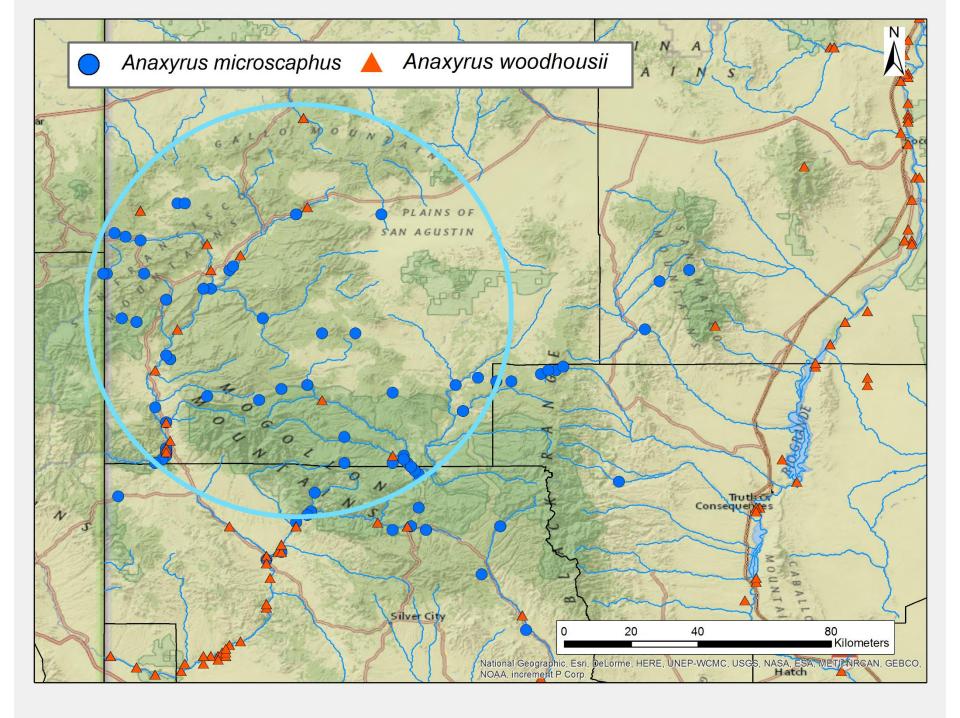
Established 91 survey localities

- based on historical collection data
 Identified March-April breeding seasor
- most specimens collected outside of breeding season
- Compared with distribution of Anaxyrus woodhousii
- congener known to hybridize in AZ

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- All records of A. woodhousii in
 Catron Co. are those of A. microscaphus!
- 15 localities
- Combination of tadpoles, juveniles and adults
- Different collections, collecting dates, collectors, etc...

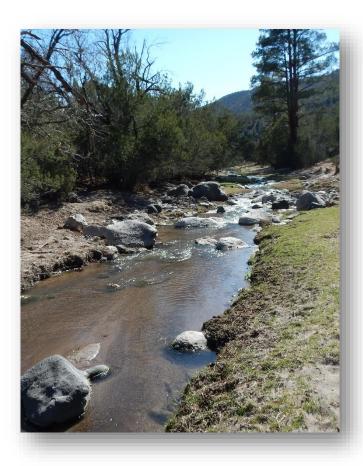




Re-evaluate distribution of both species in New Mexico



Importance of data quality AND Responsibility of researchers/end users





Conclusions

- Need to expand educational and scientific potential of natural history collections
 - Collections have much potential for integration into curricula (university and other)
 - Train students to think beyond traditional role of museums
- Expand role to conservation
 - Specimens & field notes as a crucial aid in setting conservation priorities
 - Can help in evaluation of conservation status of ALL endangered species



Conclusions

- In both education and research need to review specimens and associated data for errors
 - Quality of data increases value & credibility of collections
 - Accuracy of data associated with specimens potentially overlooked by both keepers and users of collections







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- IdeaWild!
- University of New Mexico Department of Biology
- Bin Zayed Conservation Fund
- Tinker Foundation

