Strategies for Digitizing Small Vertebrate Collections

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Overview

• MSU Museum vertebrate collections & records
• Digitization history & early strategies employed
• Additional strategies employed
• Standards & best practices
• Data dilemmas
• Digitization status & next steps
• Impacts
A museum of Science & Culture

On the campus of Michigan State University, East Lansing, Michigan

Founded in 1857 – one of the oldest museums in the U.S.
Houses over 111,000 vertebrate specimens
Earliest specimens date from 1844
Specimens are used for research, teaching, & outreach
Vertebrate Specimens

41,395 mammals

14,450 birds

18,745 reptiles & amphibians

4,000 fossils

36,125 fishes
Preparation Types

taxidermy mounts

skeletons & skulls

skeletons

skins

skins & skulls

tanned hides
nests & eggs

anatomical preparations

frozen tissues & DNA

fluid preserved specimens
Over its 158 year history, the MSU Museum has employed multiple cataloging and numbering systems for vertebrate collections.

Separately cataloged research and teaching collections are maintained.
Original Records & Specimen Data Sources

Catalog Ledgers
Cards
Accession & Preparation Documents
Field Notes
Specimen Tags

Egg Slips
Reports (e.g. necropsy, wildlife)
Correspondence
Institution Archives
Library/online Theses & Dissertations
Publications
Digitization History

Began digitizing Vertebrate Collections in 1993

Original goals of digitization were to facilitate collections management & effectively respond to data requests

Key-entered text data into database system
Digitization History and Early Strategies Employed

Entered data directly from catalog ledgers & cards

Wrote protocols for digitization -created data entry manual

Divided digitization activities into smaller discreet components

Same data fields set up for extant vertebrate disciplines

Different data fields for vertebrate paleontology
Strategies Employed for Digitization

Utilized standard resources for taxonomy & geography

ITIS - Integrated Taxonomic Information System online resource
Early Strategies Employed for Digitization

Standardized names of collectors
when absolutely certain and
when affiliated with our collection or institution

J. Alan Holman
instead of J.A. Holman, Al Holman, Holman
Early Strategies Employed for Digitization

Utilized standard terminology for specimen preparation types across all vertebrate groups


Following Hutchison (1991), we employed standard “Collective” terms (skull, skeleton) and expanded the listing to include all preparation types of our vertebrate specimens

We also used “Element” terms of standard comparative anatomy terminology (over vernacular or medical terminology), per Hutchison
Early Strategies Employed for Digitization

Standard terminology for specimen preparation types

• The collective and elements terms were combined to form a pick list in the database for preparation types

• Examples of listed terms: scale, scaphoid, scapholunar, scapula, scapulocoracoid, sclerotic, sesamoid, scute, shell, skeleton, skin, skull, sphenethmoid, sphenoid, spiracular, splenial, squamosal, stapes, supracleithrum…

• A specimen in our collection (and the database) may have multiple preparation types: skull, axis, atlas, baculum, skin
Strategies Employed for Digitization

In 2004, we began using Specify. The Specify team converted our legacy data to Specify database. Database fields were modified to conform to the Darwin Core.
**Strategies Employed for Digitization (2000s)**

In 2004 and subsequent years, the MSU Museum joined several online database consortia

- MaNIS
- ORNIS
- BioGeoMancer (used in past)
- GEOLocate
- FishNet 2
- GBIF

Employed best practices & standard resources for georeferencing

**Point radius method**


**BioGeoMancer (used in past)**

**GEOLocate**

See resources on iDigBio website
Strategies Employed (2000s)

• Performed inventory and reconciled physical specimens with data records. Problems were flagged and tracked
• Utilized multiple original data sources & documents to reconcile records & enhance specimen data

• Accession Records
• Field Notes
• Tags
• Egg Slips
• Reports
• Theses
• Dissertations
• Correspondence
• Archival Records
• Other Publications
Data Dilemmas

Considerations for Digitization

Multiple taxa associated with a specimen

e.g. Brown-headed cowbird (*Molothrus ater*) eggs in a Yellow Warbler (*Dendroica petechia*) nest with eggs
Data Dilemmas

Considerations for Digitization

• Specimens that are hybrid crosses

Hybrid crosses indicated in Ichthyology and Ornithology catalogs

Long series of wolf-dog hybrids in Mammal Collection

• County confusion

City of Lansing in Michigan is at the intersection of 3 counties
2015

Using *Specify* database system

We are listed in GRBio

We have two institution codes for our vertebrate collections
MSU for mammalogy, ornithology, & vertebrate paleontology
MSUM for herpetology & ichthyology

Our data are online via GBIF, iDigBio, VertNET, & FishNET2
Looking to the Future

2015 Specimen imaging activities - passive and driven by researchers

2015 and beyond - planning for targeted, prioritized, active imaging of specimens and utilizing standards and best practices shared through iDigBio
Impacts

Our digitized vertebrate specimen records are publicly accessed every day
Impacts – recent examples

MSU Museum digitized data

Revealed possible voucher of rare *Bufo houstonensis* from Brazos County, Texas

Have informed solutions to problems at other museums

Likewise, others’ digitized data have helped to resolve “old” problems at our Museum

Previously “dark data” have been brought to light through digitization

In April 2014, Dr. Pamela Rasmussen CT-scanned several Passenger Pigeons (*Ectopistes migratorius*) from the MSU Museum as part of a research project
MSU OR.2569 *Ectopistes migratorius*, Michigan, Chamberlain-Warren Collection number 48609, Donated 1925, Taxidermy Mount with no base
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