Digitization of Bird Collections

iDigBio Webinar
29 September 2015
Carla Cicero
Museum of Vertebrate Zoology
University of California, Berkeley

Why Digitize?

- Provide long-term preservation/longevity
- Increase access to specimens and data
 - -- researchers, educators, government agencies, NGOs, artists and scientific illustrators
- Promote and increase usage of collections
- Enhance opportunities for funding (grants, institutional support)
- Increase public appreciation of collections
- Provide opportunities for student training

What to Digitize?

- Ledger/catalog card data
- Label data
- Field notes, data slips
- Specimen images
- Attribute images
- Habitat images
- Audio/video recordings

The more data you add per specimen, the greater the value and fitness for use

"The camera is as important a part of his outfit as the trap or gun. These field notes and photographs are filed so as to be as readily accessible to the student in the museum as are the specimens themselves." Joseph Grinnell 1910



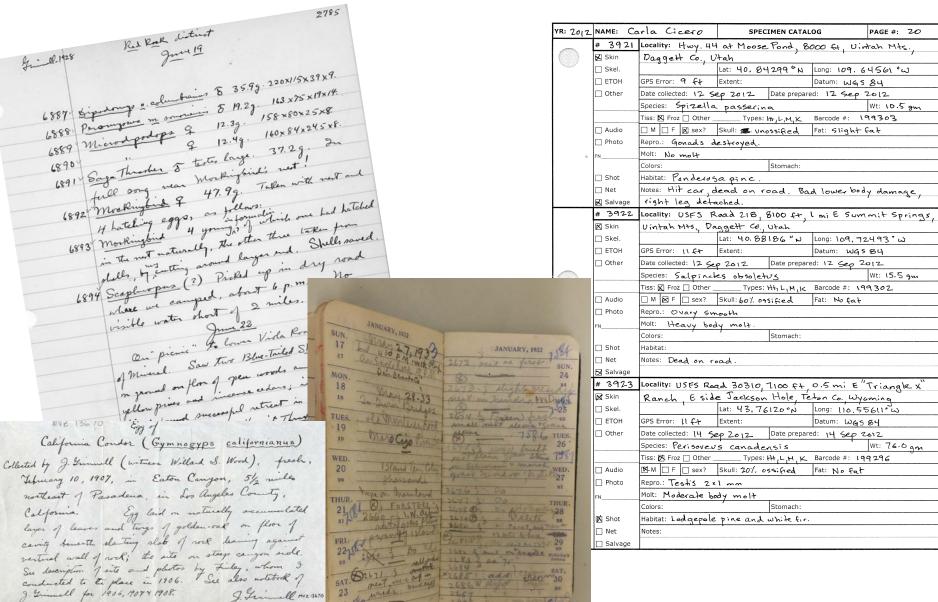




Ledgers, Cards, and Labels

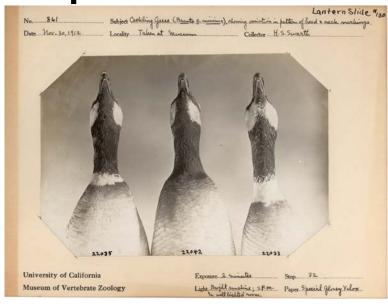


Field Notes and Data Slips





Specimen and Attribute Images



phenotypic traits



unusual phenotypes



specimens not loaned



reproductive organs

Other Priorities for Digitization

- Deteriorating/old collections
- Type material
- Rare/threatened/endangered species
- Taxonomic identification
- Tissue vouchers
- Range extensions



Habitat, Audio/Video, etc.





Collaborative Collection Management Solution

Search

Portals

My Stuff

About/Help





- · audio cues count: 96
- audio cut number: MVZ 3124
- audio digitization protocol: 128 kbps @ 48000 Hz, converted from wav by Texas Advanced Computing Center
- audio original source: MVZ tape 377B (cassette)
- audio vocal type: song
- · comment: Noted as individual # 1 on recording.
- · created by agent Carla Cicero
- shows cataloged item MVZ:Bird 180101 (Pipilo maculatus ssp.)
- derived from media http://web.corral.tacc.utexas.edu/MVZ/audio/wav/377_3124.wav

Path of Digitization

Bird Collections

Primary Secondary Web Undigitized Digitization Accessibility Digitization

Primary source materials

- -- catalogs
- -- ledgers
- -- data slips
- -- field notes
- -- labels

Object records in database

Georeferencing Specimen images Habitat images Audio/video

Local database portal iDigBio Data VertNet Aggregators

GBIF

Modified from Andy Bentley

How to Digitize?

- Choice of database and data model
 - -- Flat versus relational data structure
- Opportunistic versus systematic
- Standardized protocols**
- Dynamic versus static (methods, data)
- Data quality and fitness for use

^{**} MVZ Egg Photography Project Protocol: https://goo.gl/SJ4icf



Flat Data Structure

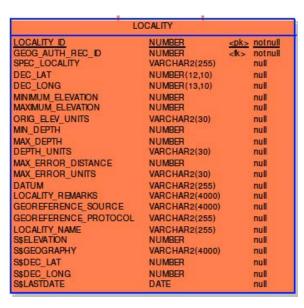
- Rows and Columns
- Each column consistent in data type (fields)
- Each row self-contained (records)
- All rows have related data and same structure
- Example: Excel

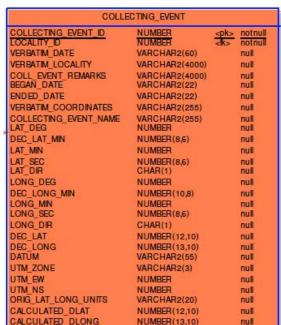
Cat_num	Field_num	Species	Date	Collector	Locality
182412	3220	Poecile gambeli	13 Jul 2006	Carla Cicero	Wilson Lake, 5300 ft, Tehama County, California
182413	3228	Poecile gambeli	14 Jul 2006	Carla Cicero	Wilson Lake, 5300 ft, Tehama County, California
182414	9	Poecile gambeli	13 Jul 2006	Allison J. Shultz	Wilson Lake, 5300 ft, Tehama County, California
182415	114	Poecile gambeli	13 Jul 2006	Christopher J. Clark	Wilson Lake, 5300 ft, Tehama County, California

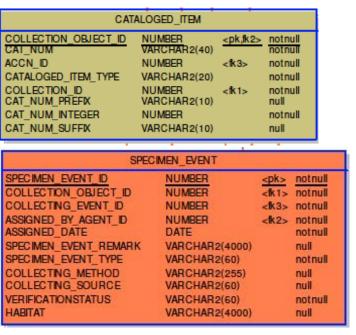


Relational Data Structure

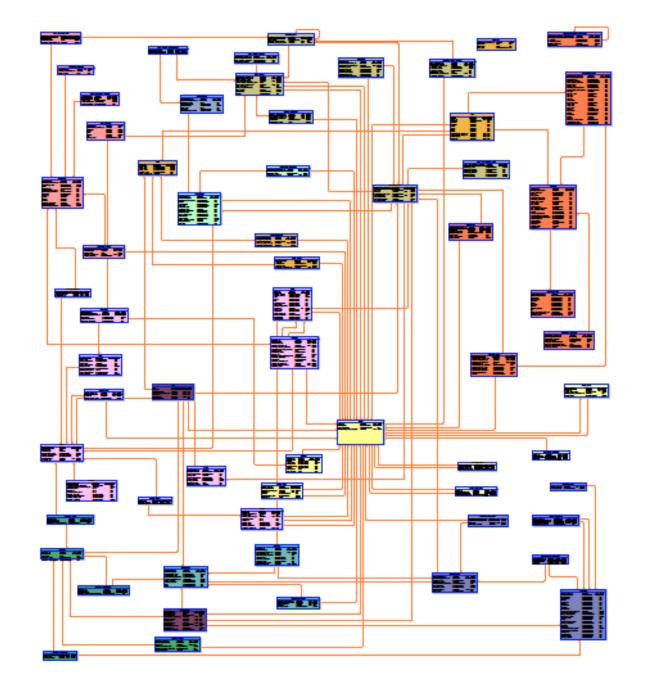
- Relates tables in 1:1 up to many:many relations
- Example: Collection Management Information Systems









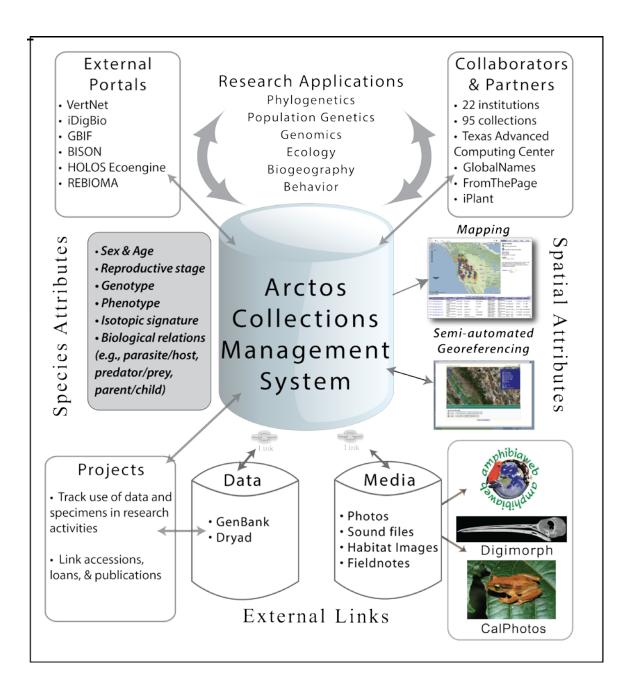


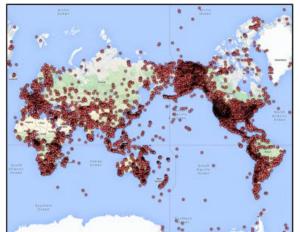
Most Common Relational Databases for Bird Collections

Arctos (http://arctosdb.org): Collaborative,
 web-based, shared database and applications

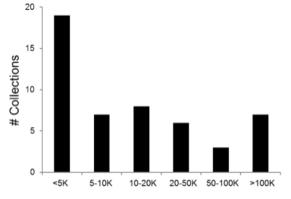
Specify (http://specifyx.specifysoftware.org):
 Free, locally installed software (Specify 6) or web platform (Specify 7)

KE Emu (https://emu.kesoftware.com):
 Commercial, locally installed software





Arctos records



Arctos collection sizes

Data Quality: It's not only what you record, but how you record it

- Shared data standards (Darwin Core)
- Controlled data structure (where possible)
- Standardized authorities (taxonomy, geography, names)
- Standardized protocols (georeferencing, imaging)



Fitness for Use

To maximize usefulness of digitized data, you should include clear and complete metadata with as much description and explanation as necessary to allow users of a given data set *all of the information* necessary to make informed decisions about the data contained within the data set.



Distinct Values:

"Male" 189"Female" 184Unresolved 331

From subset of 2.7M records







Distinct preparations: 10,712

Distinct terms: 2,969

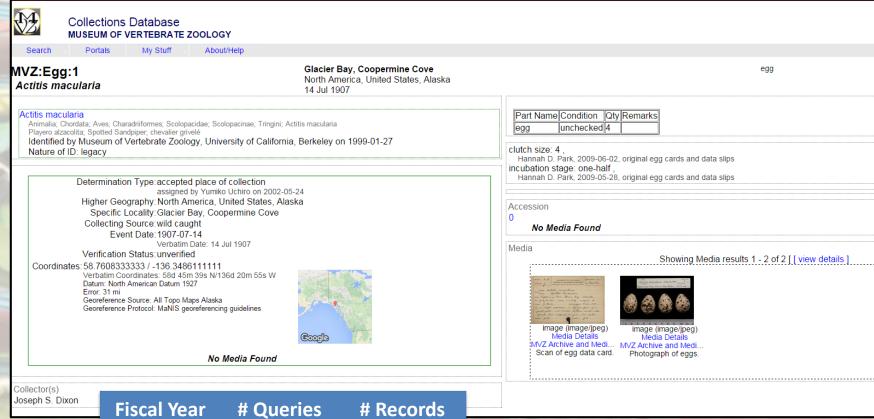
Distinct tissues: 26 (tissue, liver, higado, +t,...)

"vodka!00," "surf," "stst01"

Digitization Challenges

- Storage and backups especially for large media files
- Personnel student opportunities, training
- Prioritization primary digitization first, then add value through secondary digitization (georeferencing, imaging)
- Naming files simple but informative (e.g., 377_3124.wav, 1_egg.jpg, img_861, MVZ_Bird_183189_1.jpg)

Value of Digitization



Accessed
2010-2011 22,259 588,100
2011-2012 61,382 1.15 M

2-3X increase in usage after images and data slips for MVZ egg/nest collection went online!

Report for Institution Code MVZ, Resource mvz_bird

Usage stats for March, 2015, generated on 2015/04/02

Number of searches that retrieved data from the resource: 348

Number of records retrieved in searches: 6081

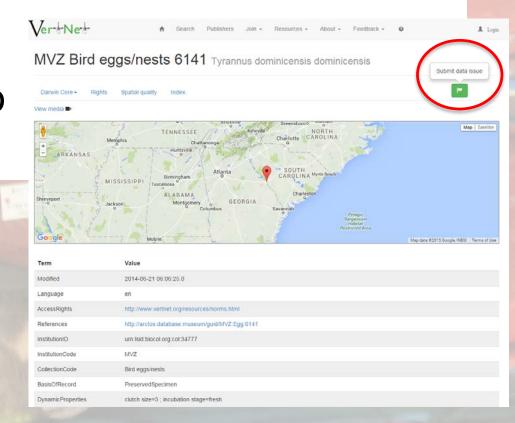
List of queries that retrieved data from the resource:

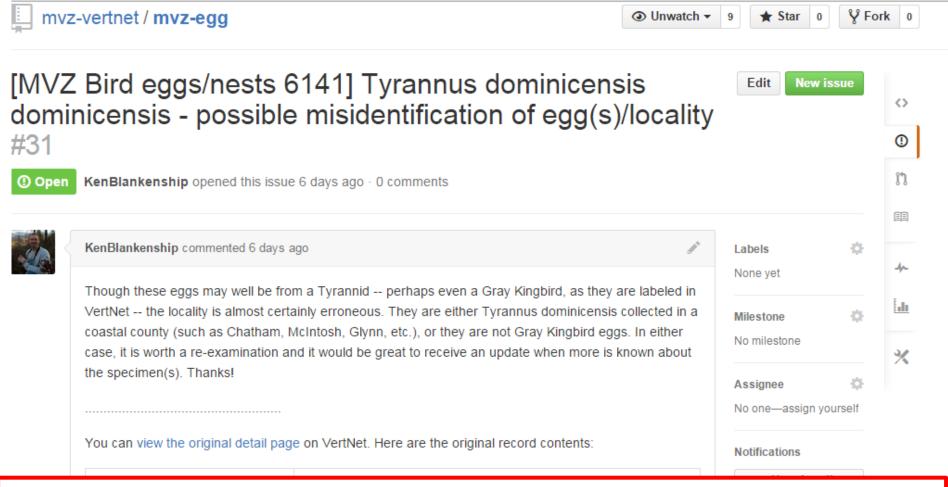
List of queries that fetrieved data from the resource:		
Query	Times	
Dinemelli	1	
lamprotornis caud <u>atus</u>	1	
Chordeiles minor	1	
melanerpes formi Cumulative values for this year	1	
ramphastos vitelli	1	
Cotinga Number of search events that retrieved data from the resource: 3371	1	
catalognumber:15 Total number of records retrieved from searches: 72381	1	
type:specimen spe Number of download events that retrieved data from the resource: 183	1	
pipra Total number of records downloaded: 68902	1	
Trogon rufus	2	
"Ficedula narcissi Cumulative values since the beginning	2	
mallard	1	
Phegornis mitchel Number of search events that retrieved data from the resource: 3964	1	
collin county	1	
Total number of records retrieved from searches: 82935	1	
Number of download events that retrieved data from the resource: 665	1	
class:aves recorde Total number of records downloaded: 489735	1	
colinus cristatus leacous year - 1950 year - 2015	1	
stateprovince:"alaska" specificepithet:acuminata class:aves	1	
country: "Panama" (passeriformes OR picidae OR cuculiformes)		
tricholaema		
D. 1		

Value of Digitization

<u>Fallacy</u>: Data must be perfect before they are put online.

Truth: Digitization and online access leads to improved data quality.





All VertNet collections have GitHub repositories...in process of preparing repositories so that iDigBio, GBIF, and other data aggregators can use them to provide reporting and issue tracking all in one location

If you want to receive usage reports and user feedback, contact VertNet to gain access

Results Detail – Spatial Quality

Darwin Core ▼

Rights Spatial quality Ind



Warning: Some validations could not be performed. Check below.

				_
Data	com	plete	ness	Œ

Are coordinates present?	1	Yes
Is the country value present?	*	Yes
Are both coordinates 0 (zero)?	*	No
Do coordinates have three or more decimal figures?	*	Yes
Do coordinates have datum?	*	Yes

Data inconsistencies 6

Are coordinates within specified country? ¹	✓	Yes
Distance outside of specified country (in degrees) ¹	✓	0
Distance outside of species range map (in degrees) ¹	0	Could not be assessed

Data Errors 0

Is latitude between 90 and -90?	•	Yes
Is longitude between 180 and -180?	~	Yes
Are coordinates transposed? ¹	•	No
Is latitude hemisphere correct? ¹	•	Yes
Is longitude hemisphere correct? ¹	*	Yes

Licensing

- What can we license?
 - Media (images, recordings)
 - Creative products and content (publications or other written works that express unique ideas, concepts, beliefs)

- What can't we license?
 - Facts (data most of the content of collection management systems)

- Useful Resources:
 - http://www.vertnet.org/resources/datalicensingguide.html
 - http://www.vertnet.org/resources/norms.html

Student Training



MVZ, 2005-2015:

32,600 specimens entered by students (87% of records), 28,300 (61%) by undergrads

14,600 eggs/nests imaged

13,400 original data slips scanned

7,000 audio recordings digitized