# Arctos

Collaborative Collection Management Solution

**Aren M. Gunderson**

Mammal Collection Manager, University of Alaska Museum

Arctos Advisory Committee

**Link E. Olson**

Curator of Mammals, University of Alaska Museum

Arctos Steering Committee (Chair)

**arctosdb.org**

# Arctos

Collaborative Collection Management Solution

Home | Search Arctos | Data Licensing | Documentation | Governance | Outreach | Contacts | Join Arctos | FAQ

## About Arctos

Arctos is both a community and a comprehensive collection management information system. As a community, it is a collaboration among multiple scientific collections that serves data on over 3M natural history museum records. Approximately half of those records are in a shared instance hosted at the Texas Advanced Computing Center (view institutions and holdings). The remaining specimens and collections are in MCZBase, a single instance at the Museum of Comparative Zoology, Harvard University. Arctos users contribute to data standards, application enhancements, and improved data quality through sharing of authorities for taxonomy, geography, people names, part types, and other data.

Arctos' multidisciplinary collection management information system integrates access to diverse types of collections (botany, entomology, herpetology, mammalogy , ornithology, paleontology, parasitology) and data, including specimen records, observations, tissues,

Search

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My Tweets

### Arctos Tweets

- RT @friel: @Fishy_Hayes @LSU_FISH Specify is great & has served us well @CUMV but we are now currently migrating to Arctos http://t.co/A3Q...
  5 months ago
- RT @friel: @LSU_FISH @fishy_hayes Specify has added web features, but its links are still clunky and primitive compared to Arctos http://t.... 5 months ago
- RT @nature_jcp: Kendall Hildebrandt on using Arctos

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# Arctos

Collaborative Collection Management Solution

In addition to rigorously displaying all that is known about a museum record, Arctos provides solutions to managing and integrating collections data with object tracking (via barcodes or RFID tags), transactions (loans, borrows, accessions, permits), geospatial information (coordinates and descriptive data), agents (people and organizations), and usage (publications, projects, and citations).

diverse types of collections (botany, entomology, herpetology, mammalogy , ornithology, paleontology, parasitology) and data, including specimen records, observations, tissues,

Arctos http://t.... 5 months ago

- RT @nature_jcp: Kendall Hildebrandt on using Arctos

# Arctos Governance

**Steering Committee:**

- Link Olson (Chair), University of Alaska Museum
- Joe Cook, Museum of Southwestern Biology
- James Hanken, Museum of Comparative Zoology (external member)
- Michael Nachman, Museum of Vertebrate Zoology

**Advisory Committee:**

- Carla Cicero (Chair), Museum of Vertebrate Zoology
- Jon Dunnum, Museum of Southwestern Biology
- Linda Ford, Museum of Comparative Zoology (external member)
- Aren Gunderson, University of Alaska Museum
- Brendan Haley, Museum of Comparative Zoology (external member)
- Gordon Jarrell, Museum of Southwestern Biology
- Michelle Koo,  Museum of Vertebrate Zoology
- Dusty McDonald, University of Alaska Museum

# Arctos Governance

**Steering Committee:**

- Link Olson (Chair), University of Alaska Museum
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Arctos is both a ***community*** and a comprehensive collection management information system. As a community, it is a ***collaboration*** among multiple scientific collections…

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- Aren Gunderson, University of Alaska Museum
- Brendan Haley, Museum of Comparative Zoology (external member)
- Gordon Jarrell, Museum of Southwestern Biology
- Michelle Koo,  Museum of Vertebrate Zoology
- Dusty McDonald, University of Alaska Museum


25 institutions
88 collections
3.9 million records
AK
YT
AB
BC
SK
MB
NL
ON
QC
WA
MT
ND
MN
OR
ID
SD
WI
MI
NH
ME
NB
PE
NS
MA
NE
IA
IL
IN
OH
NV
UT
United States
MO
KY
WV
VA
DE
AZ
NM
OK
AR
TN
NC
SC
MS
AL
GA
TX
LA
FL
Gulf of Mexico
Mexico
Cuba
Puerto Rico
HI
Google

| Arctos Institutions | Records |
|---|---|
| Museum of Comparative Zoology (MCZ) | 1,863,412 |
| University of Alaska Museum (UAM) | 1,038,087 |
| Museum of Vertebrate Zoology (MVZ) | 703,169 |
| Museum of Southwestern Biology (MSB) | 348,329 |
| Cornell University Museum of Vertebrates (CUMV) | 193,949 |
| University of Colorado Museum of Natural History (UCM) | 95,208 |
| Denver Museum of Nature and Science (DMNS) | 80,054 |

# Utility in Collections Management

-> accessions
-> specimen data
-> label printing
-> object tracking
-> loans
-> loan invoices
-> permits
-> permit reports
-> publications
-> media
-> projects
-> mapping
-> queryable metadata
-> bulk loading records
-> bulk editing data
-> bulk load media
-> data download
-> links to outside databases
-> relationships among specimens
-> bad data reporting
-> email reminders
-> EVERYTHING

# Utility in Collections Management

Interface is entirely online (since 2002), accessible from any internet-connected computer or mobile device.

Data-editing permissions are customizable.
-> With great power comes great responsibility.

# Utility in Collections Management

Mammal Collection
University of Alaska Museum of the North

Search | Enter Data | Manage Data | Manage Arctos | Reports | Portals | My Stuff | About/Help

**UAM:Mamm:87306**
**AF: 56167**
***Marmota broweri***
<< Return to results
get a DOI

**West side of Tupikchak Mountain.**
North America, United States, Alaska, Misheguk Mtn. Quad, National Petroleum Reserve-Alaska
3 Jul 2007

skin; skull; postcranial skeleton; liver (frozen); spleen (frozen); kidney (frozen); heart (frozen); kidney (frozen) sample; liver (frozen) sample

[ Report Bad Data ]
UAM Mammals
first prev next last
Record 2 of 2

Identification | Accn | Locality | Agents | Parts | Part Locn. | Attributes | Other IDs | Media | Encumbrances

Edit

Marmota broweri
Animalia; Chordata; Mammalia; Rodentia; Sciuridae; Xerinae; Marmotini; Marmota broweri Hall & Gilmore, 1934
Identified by Link E. Olson on 2007-07-03
Nature of ID: student

Marmota broweri
sensu Gunderson et al. 2009
Identified by Brandy K. Jacobsen, Link E. Olson, Aren M. Gunderson
Nature of ID: type specimen
Remarks: ID from citation in Gunderson et al. 2009.

Marmota broweri
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Identified by Link E. Olson, Hayley C. Lanier, Aren M. Gunderson
Nature of ID: type specimen
Remarks: ID from citation in Gunderson et al. 2012.

Citations
voucher of Marmota broweri, page 863 in Gunderson et al. 2009
voucher of Marmota broweri, page 75 in Gunderson et al. 2012

Edit

Identifiers
Edit
AF: 56167
GenBank: JN024593
original identifier: LEO 312

Edit

| Part Name | Condition | Disposition | Qty | Label | Remarks |
|---|---|---|---|---|---|
| heart (frozen) | 4 | being processed | 1 | 117530 | |
| kidney (frozen) | 4 | being processed | 1 | 120124 | |
| kidney (frozen) | 4 | on loan | 1 | UAM Mammals Parentless Void | |
| liver (frozen) | 4 | being processed | 1 | 120125 | |
| liver (frozen) | 4 | on loan | 1 | | |
| postcranial skeleton | complete | in collection | 1 | Container 142659 | |

**UAM:Mamm:87306**

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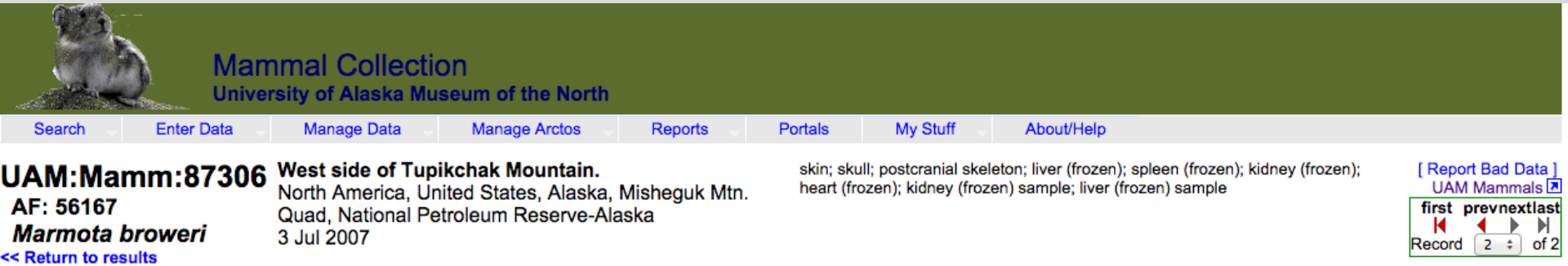
# Utility in Collections Management

Media: publications, images, video, documents, audio, 3D scan, other?



# Utility in Collections Management

## Media: publications

# Utility in Collections Management

Media:

**Publications**

Aren M. Gunderson, Brandy K. Jacobsen, Link E. Olson. 2009. Revised distribution of the Alaska Marmot, *Marmota broweri*, and confirmation of parapatry with Hoary Marmots. Journal of Mammalogy 90(4):859-869.

- Annotate
- 90 Cited Specimens
- http://dx.doi.org/10.1644/08-MAMM-A-253.1
- Edit
- Manage Citations

text (application/pdf)
Media Details
Media Preview Image

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Arctos

Media:

*Journal of Mammalogy*, 90(4):859–869, 2009

# REVISED DISTRIBUTION OF THE ALASKA MARMOT, *MARMOTA BROWERI*, AND CONFIRMATION OF PARAPATRY WITH HOARY MARMOTS

AREN M. GUNDERSON,* BRANDY K. JACOBSEN, AND LINK E. OLSON

*Department of Mammalogy, University of Alaska Museum, University of Alaska Fairbanks, 907 Yukon Drive, Fairbanks, AK 99775, USA (AMG, BKJ, LEO)*
*Institute of Arctic Biology, University of Alaska Fairbanks, Fairbanks, AK 99775, USA (AMG, LEO)*

The distribution and taxonomic status of the Alaska marmot (*Marmota broweri*) have been the subject of much debate and confusion since the taxon was 1st described as a subspecies of the hoary marmot (*M. caligata*). As a result of its early association with *M. caligata* and a lack of focused effort to determine its range, our current understanding of the distribution of *M. broweri* is vague at best and completely erroneous at worst. Through a review of all museum specimens and published accounts of this species, field surveys, and the identification of previously unidentified marmot specimens, we have determined that the current distribution of the Alaska marmot includes not only the Brooks Range, but also the Ray Mountains and Kokrines Hills of northern interior Alaska. We report the 1st confirmed records of this species outside of the Brooks Range and a commensurate range extension of 400 km southward. The Yukon River appears to form the current boundary between the parapatric distributions of *M. broweri* and *M. caligata* in Alaska, but additional fieldwork will be necessary to confirm that the 2 species are not allopatric.

Key words: Alaska marmot, climate change, hoary marmot, *Marmota broweri*, *Marmota caligata*

Alaska marmots (*Marmota broweri*) inhabit boulder fields, talus slopes, and rock outcrops in the alpine tundra of northern Alaska (Bee and Hall 1956). They are locally abundant and generally occur in loose communities (Bee and Hall 1956). *M. broweri* was 1st described by Hall and Gilmore (1934) based on 4 specimens collected by Charles D. Brower from Native residents of Point Lay and Cape Thompson on the northwestern coast of Alaska. Based on cranial morphology and pelage characters, Hall and Gilmore (1934) concluded that those 4 specimens constituted a new subspecies (*M. caligata broweri*) of the hoary marmot, previously known from southern Alaska, western Canada, and alpine areas of Washington, Idaho, and Montana. Since its description, the taxonomy and distribution of this marmot have been the subject of much debate and confusion. With relatively few voucher specimens available for morphological analyses, the taxonomic status of *M. broweri* was tentative for more than 30 years after its discovery. The distributions of *M. broweri* and *M. caligata* have been published erroneously due to this taxonomic confusion and speculation surrounding *M. broweri*, and those errors have been perpetuated through the literature.

Montane and alpine-restricted small mammals, including marmots, were among the 1st taxa suggested as being particularly sensitive to climate change (McDonald and Brown 1992), and alpine marmots are increasingly recognized as potential harbingers thereof (e.g., Krajick 2004; Parmesan 2006). Although relatively few studies have addressed the effects of recent climate change on the distribution of any Alaskan mammal, the state includes the northernmost records of more than 40 species of terrestrial North American mammals (Patterson et al. 2007; Wilson and Ruff 1999), making it an ideal, albeit logistically challenging, venue for such studies. In contrast to the lack of knowledge surrounding their distributional stability, Alaskan mammals appear to be responding to climate change via changes in body size, as suggested by recent studies on Alaskan shrews (*Sorex cinereus*—Yom-Tov and Yom-Tov 2005), lynx (*Lynx canadensis*—Yom-Tov et al. 2007), and martens (*Martes americana*—Yom-Tov et al. 2008). As the only mammal species purportedly endemic to the Brooks Range (the northernmost mountain range in North America), and given its apparent reliance on rocky alpine tundra habitat, the Alaska marmot may be uniquely susceptible to the ongoing upslope and northward encroachment of the tree- and shrubline in Alaska

* *Correspondent: aren.gunderson@uaf.edu*





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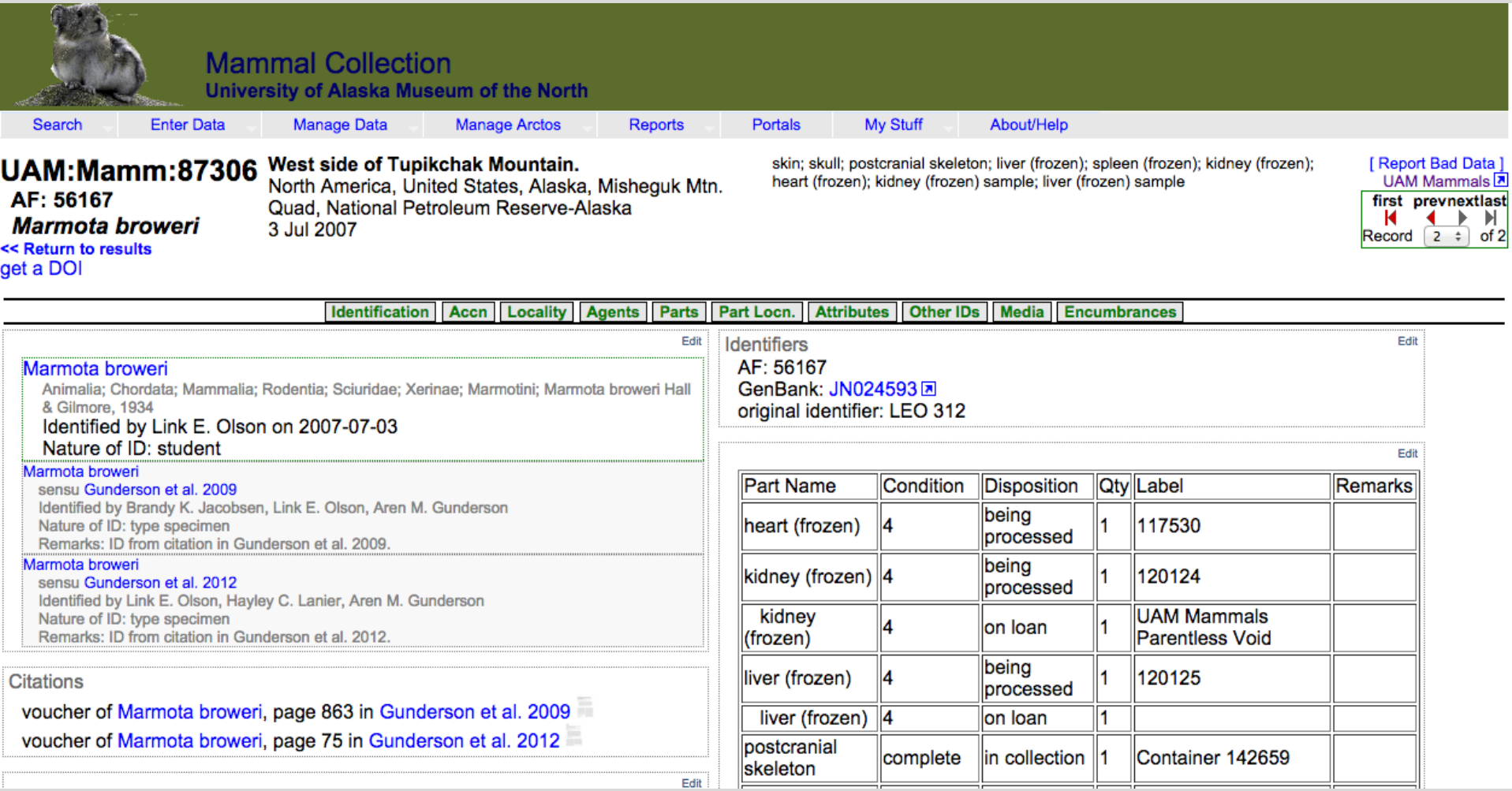
# Utility in Collections Management

## Media: images



Mammal Collection
University of Alaska Museum of the North

Search | Enter Data | Manage Data | Manage Arctos | Reports | Portals | My Stuff | About/Help

**UAM:Mamm:87306**
**AF: 56167**
***Marmota broweri***
<< Return to results
get a DOI

**West side of Tupikchak Mountain.**
North America, United States, Alaska, Misheguk Mtn. Quad, National Petroleum Reserve-Alaska
3 Jul 2007

skin; skull; postcranial skeleton; liver (frozen); spleen (frozen); kidney (frozen); heart (frozen); kidney (frozen) sample; liver (frozen) sample

[ Report Bad Data ]
UAM Mammals
first prev next last
Record 2 of 2

Identification | Accn | Locality | Agents | Parts | Part Locn. | Attributes | Other IDs | Media | Encumbrances

Edit

Marmota broweri
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Marmota broweri
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Identified by Brandy K. Jacobsen, Link E. Olson, Aren M. Gunderson
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Citations
voucher of Marmota broweri, page 863 in Gunderson et al. 2009
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Edit

Identifiers
Edit
AF: 56167
GenBank: JN024593
original identifier: LEO 312

Edit

| Part Name | Condition | Disposition | Qty | Label | Remarks |
|---|---|---|---|---|---|
| heart (frozen) | 4 | being processed | 1 | 117530 | |
| kidney (frozen) | 4 | being processed | 1 | 120124 | |
| kidney (frozen) | 4 | on loan | 1 | UAM Mammals Parentless Void | |
| liver (frozen) | 4 | being processed | 1 | 120125 | |
| liver (frozen) | 4 | on loan | 1 | | |
| postcranial skeleton | complete | in collection | 1 | Container 142659 | |

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# Utility in Collections Management

## Media: images

and collared pika in Alaska.

Loan History: Click for loan list

Media

Showing Media results 5 - 7 of 7 [ [ view details ]

<<Previous

image (image/jpeg)

Media Details

image (image/jpeg)

Media Details

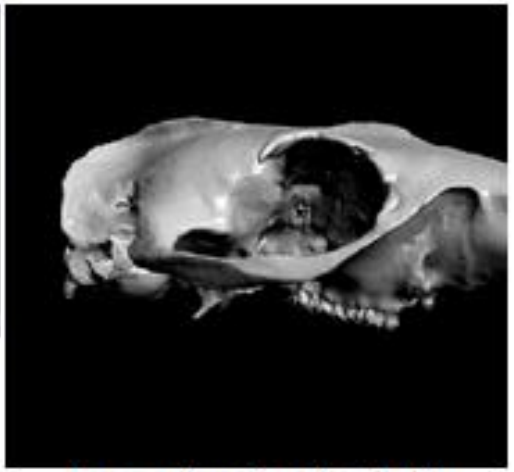


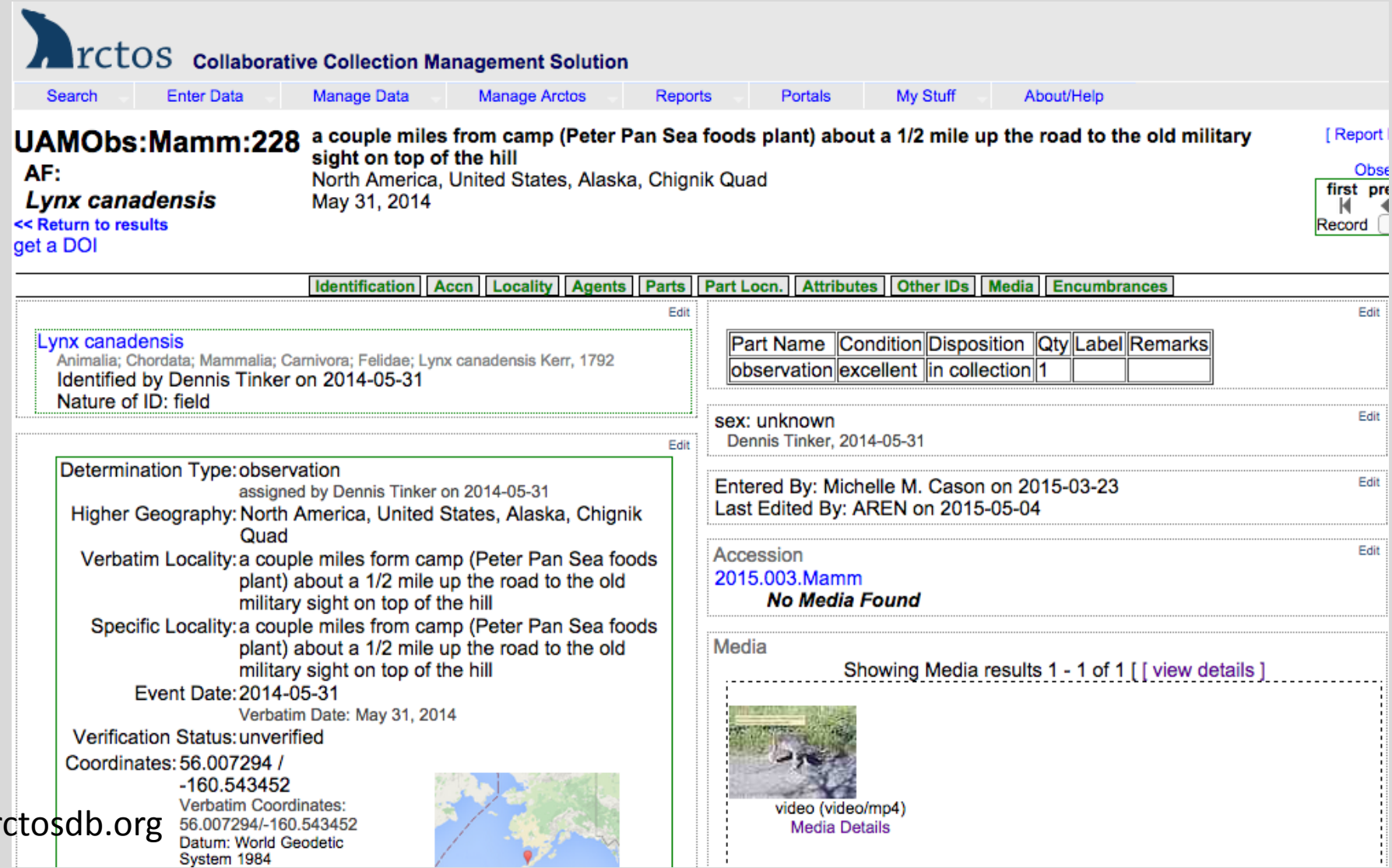
image (application/pdf)

Media Details

# Utility in Collections Management

## Media: video

UAMObs 228

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# Utility in Collections Management

## Media: 3D scans

UAM 87306

Mammal Collection
University of Alaska Museum of the North

Search | Enter Data | Manage Data | Manage Arctos | Reports | Portals | My Stuff | About/Help

**UAM:Mamm:87306**
**AF: 56167**
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[ Report Bad Data ]
UAM Mammals
first prev next last
Record 2 of 2

Identification | Accn | Locality | Agents | Parts | Part Locn. | Attributes | Other IDs | Media | Encumbrances

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Edit

Identifiers
Edit
AF: 56167
GenBank: JN024593
original identifier: LEO 312

Edit

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# Utility in Collections Management

## Media: 3D scans

UAM 87306

and collared pika in Alaska.

Loan History: Click for loan list

Media

Showing Media results 5 - 7 of 7 [ [ view details ]

<<Previous

image (image/jpeg)

Media Details

image (image/jpeg)

Media Details

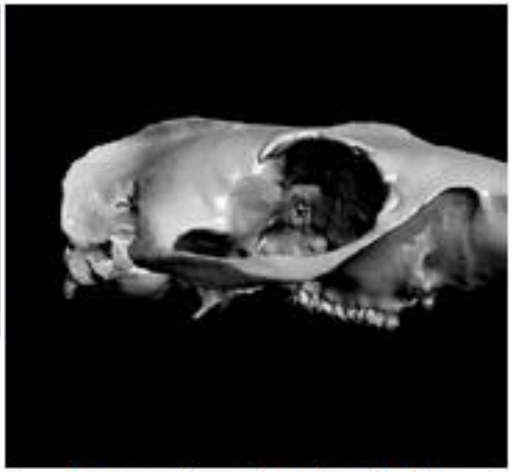
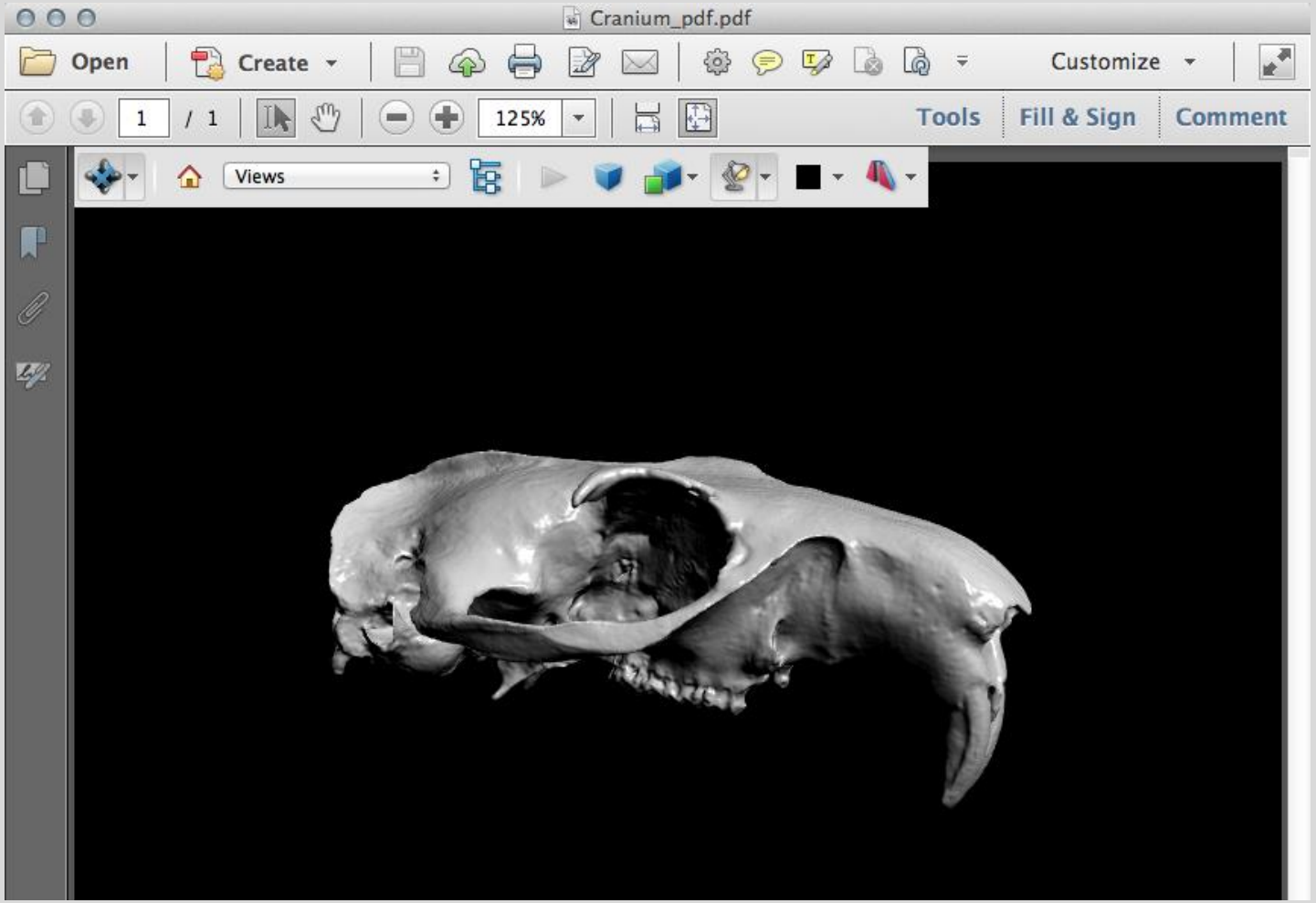


image (application/pdf)

Media Details

# Utility in Collections Management

## Media: 3D scans

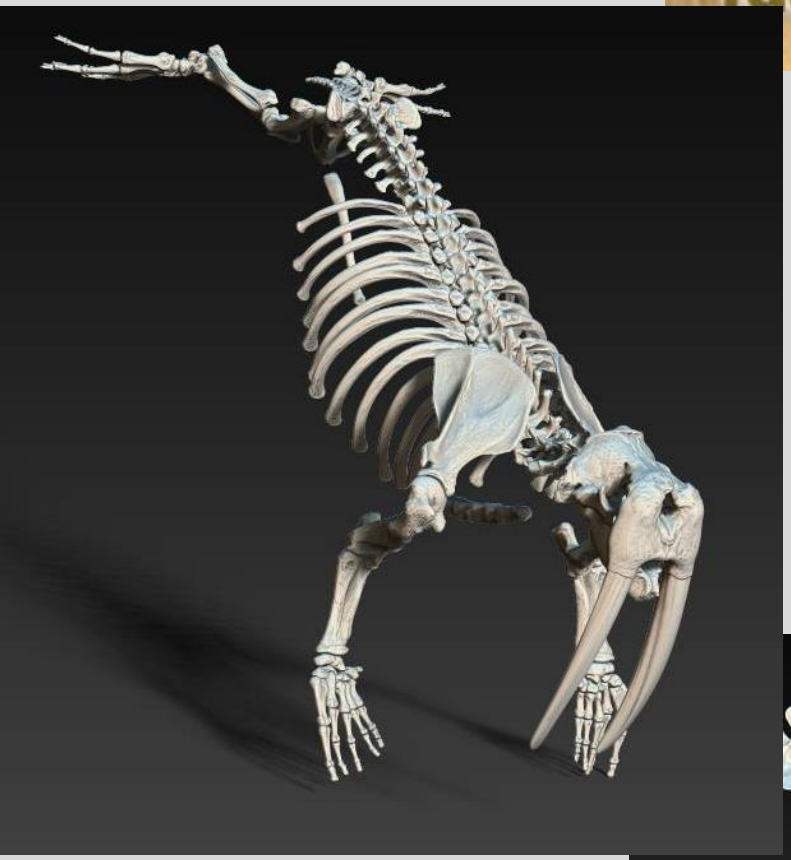


# Utility in Collections Management

Media: 3D scans

Idaho Virtualization Laboratory

VIRTUAL ZOOARCHAEOLOGY OF THE ARCTIC PROJECT



arctosdb.org

# Arctos - OCR Imaging project

Image of specimen label

Image of

Media Confirm Image IDs Edit

image (text/html)
Media Details
ALA 40548: *Cryptogramma acrostichoides* R.Br.

image (image/dng)
Media Details
ALA 40548: *Cryptogramma acrostichoides* R.Br.

image (image/jpeg)
Media Details
ALA 40548: *Cryptogramma acrostichoides* R.Br.

OCR for H1201093

University of Alaska Herbarium (ALA)
Museum of ihe Norih
iii\\ii|\\|\i||il\iNi|\\\i|i\iii
H1201093
TURUN `fi.iOPISTON KLSVIMUSEO
(Turku Uni\.'er~5li:y Herbarium)
Cryptogramma crlspa (L.) R. Br.
Norwayr Troms fyike. Lyngen herad.
Lyngenfjord, Furuflaien. Rocky
slopes on the upper course of
Lyngselva river.
Juiy 25, 1968 Ilmari Kause

# Arctos - OCR Imaging project

## OCR output using Tesseract

Media Confirm Image IDs Edit


image (text/html)
Media Details
ALA 40548: *Cryptogramma acrostichoides* R.Br.


image (image/dng)
Media Details
ALA 40548: *Cryptogramma acrostichoides* R.Br.


image (image/jpeg)
Media Details
ALA 40548: *Cryptogramma acrostichoides* R.Br.

OCR for H1201093

University of Alaska Herbarium (ALA)
Museum of ihe Norih
iii\\ii|\\|\i||il\iNi|\\\i|i\iii
H1201093
TURUN `fi.iOPISTON KLSVIMUSEO
(Turku Uni\.'er~5li:y Herbarium)
Cryptogramma crlspa (L.) R. Br.
Norwayr Troms fyike. Lyngen herad.
Lyngenfjord, Furuflaien. Rocky
slopes on the upper course of
Lyngselva river.
Juiy 25, 1968 Ilmari Kause

## Queryable by OCR output:

**Biological Individual**

Part Name: Define Add = for exact match
Part Attribute....
Part Remark:
Help [ pick an attribute ] equals Pick
OCR Text:

# Arctos - OCR Imaging project

## OCR output using Tesseract

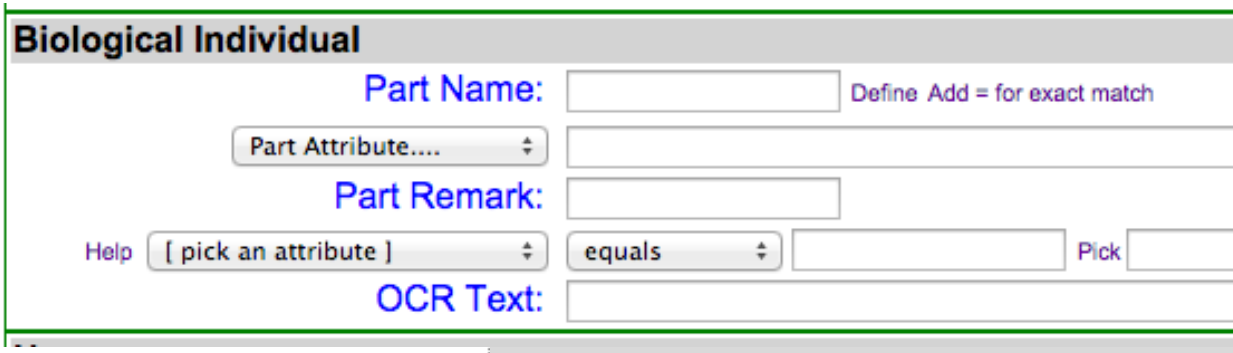
Since 2011 the UAM Herbarium has imaged, with OCR, 207,372 specimens.

UAM Herbarium Curator Steffi Ickert-Bond (NSF funded project)

OCR

University of Alaska Herbarium (ALA)
Museum of ihe Norih
iii\\ii|\\|\i||il\iNi|\\\i|i\iii
H1201093
TURUN `fi.iOPISTON KLSVIMUSEO
(Turku Uni\.'er~5li:y Herbarium)
Cryptogramma crlspa (L.) R. Br.
Norwayr Troms fyike. Lyngen herad.
Lyngenfjord, Furuflaien. Rocky
slopes on the upper course of
Lyngselva river.
Juiy 25, 1968 Ilmari Kause

Queryable by OCR output:



# Utility in Collections Management

## Media: accessions and loans

Arctos Collaborative Collection Management Solution

Search | Enter Data | Manage Data | Manage Arctos | Reports | Portals | My Stuff | About/Help

**Edit Accession**

| Collection | Accn Number | How Obtained? | Status | Received Date | Est. Cnt. |
|---|---|---|---|---|---|
| UAM:Mamm | 2013.060.Mamm | gift | in process | 2013-10-2 | 2 |

**Nature of Material:**
Gray whale skeleton parts from 2 individuals collected by Jon Fish of Palmer. The whales were beachcast in the summer of 2000 and recovered in 2001 from the beach on Kodiak Island, Narrow Cape.

| Agent Name | Role | Delete? | |
|---|---|---|---|
| John Fish | received from | ☐ | Rank |
| Add Agent: | associated with agency | | |

**Remarks:**
Bones consist of the skull, vertebrae, and one humerus from a juvenile and 2 scapula and one vertebra from another, larger individual. Registration of Marine Mammal Parts forms, numbers 01 0076 through 01 0110 and 07 002, from the registration by NMFS in 2001 are in the accession file.

*Entered by* **Aren M. Gunderson** *on* **2013-10-30** | Has Correspondence? Yes | Public? private

Save Changes | Quit without saving | Delete | Specimen List | BerkeleyMapper

**Accn Containers**
Show Locations
Scan New Barcode

**Projects associated with this Accn:**
- None

New Project

**Media associated with this Accn:**
Create Media ~ Link Media
Showing Media results 1 - 1 of 1 [ [ view details ]


ACCN 2013.060

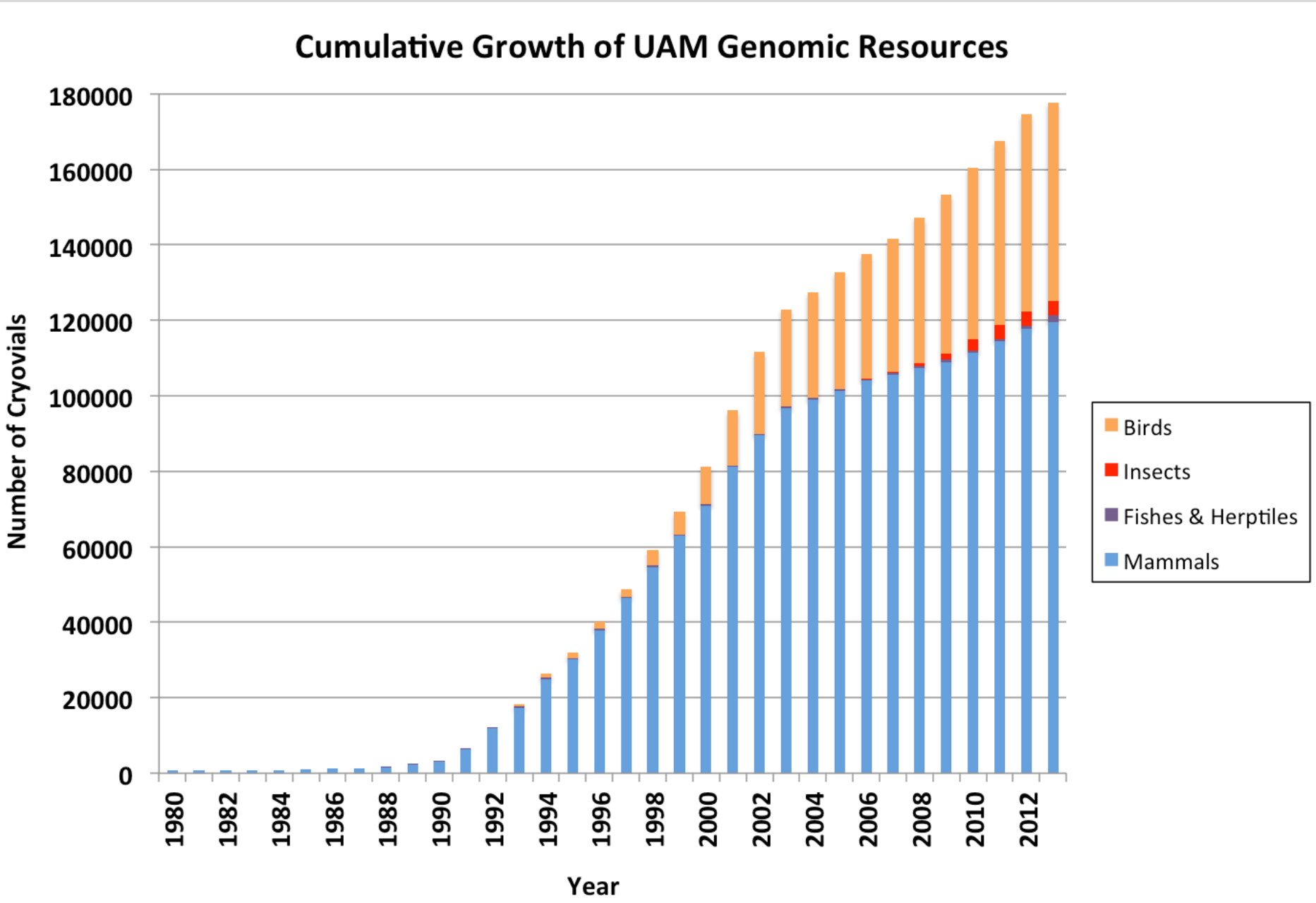
arctosdb.org

# Utility in Collections Management

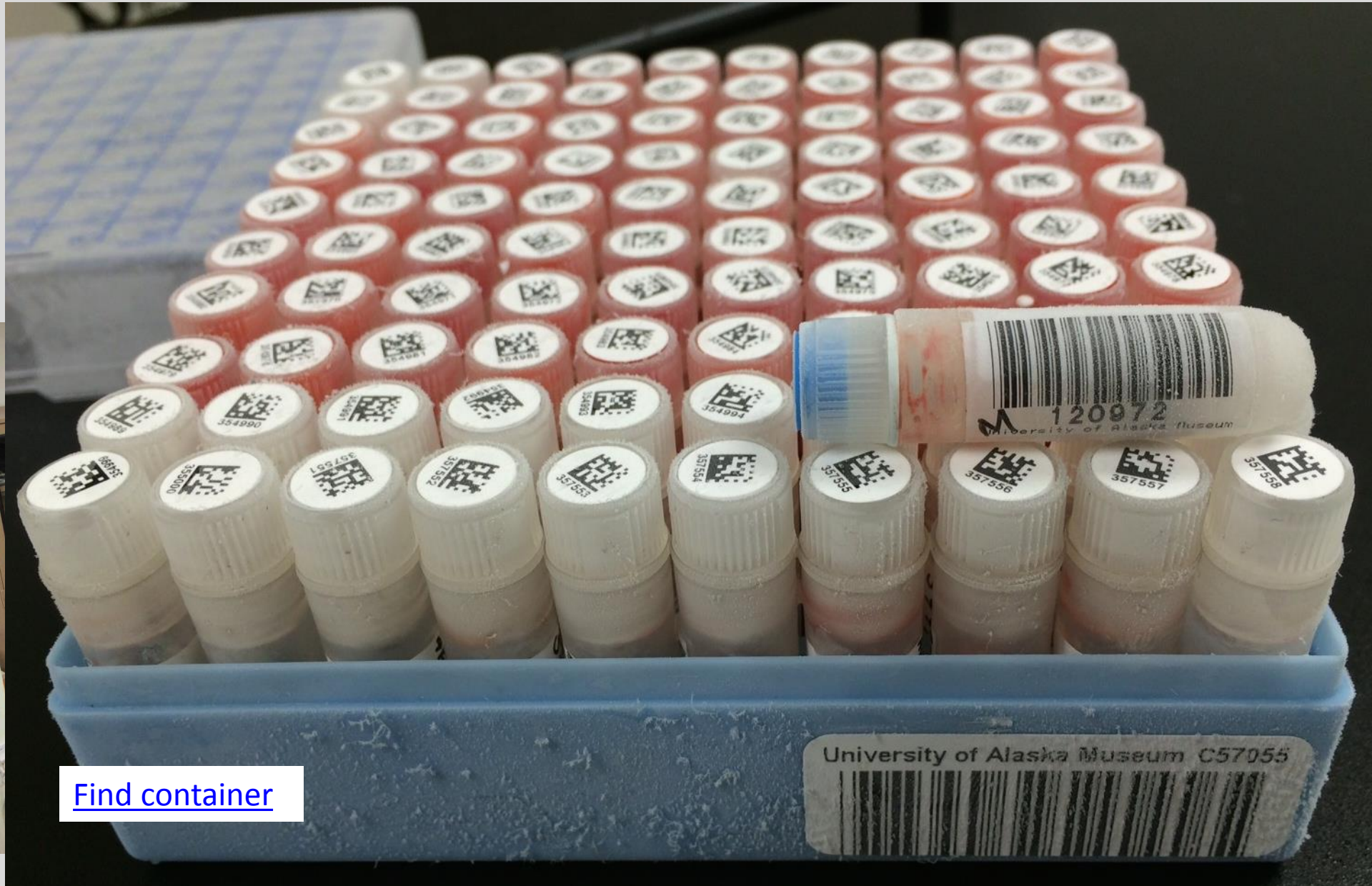
Object tracking using barcodes

## University of Alaska Museum Genomic Resources Collection

arctosdb.org


Cumulative Growth of UAM Genomic Resources
Number of Cryovials
180000
160000
140000
120000
100000
80000
60000
40000
20000
0
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Year
Birds
Insects
Fishes & Herptiles
Mammals

# Object tracking using barcodes




Find container

Arctos

Arctos **Collaborative Collection Management Solution**

Search | Enter Data | Manage Data | Manage Arctos | Reports | Portal

**This parent container is:**
**Label: C55693**
**Barcode: C55693**
**Type: freezer box**

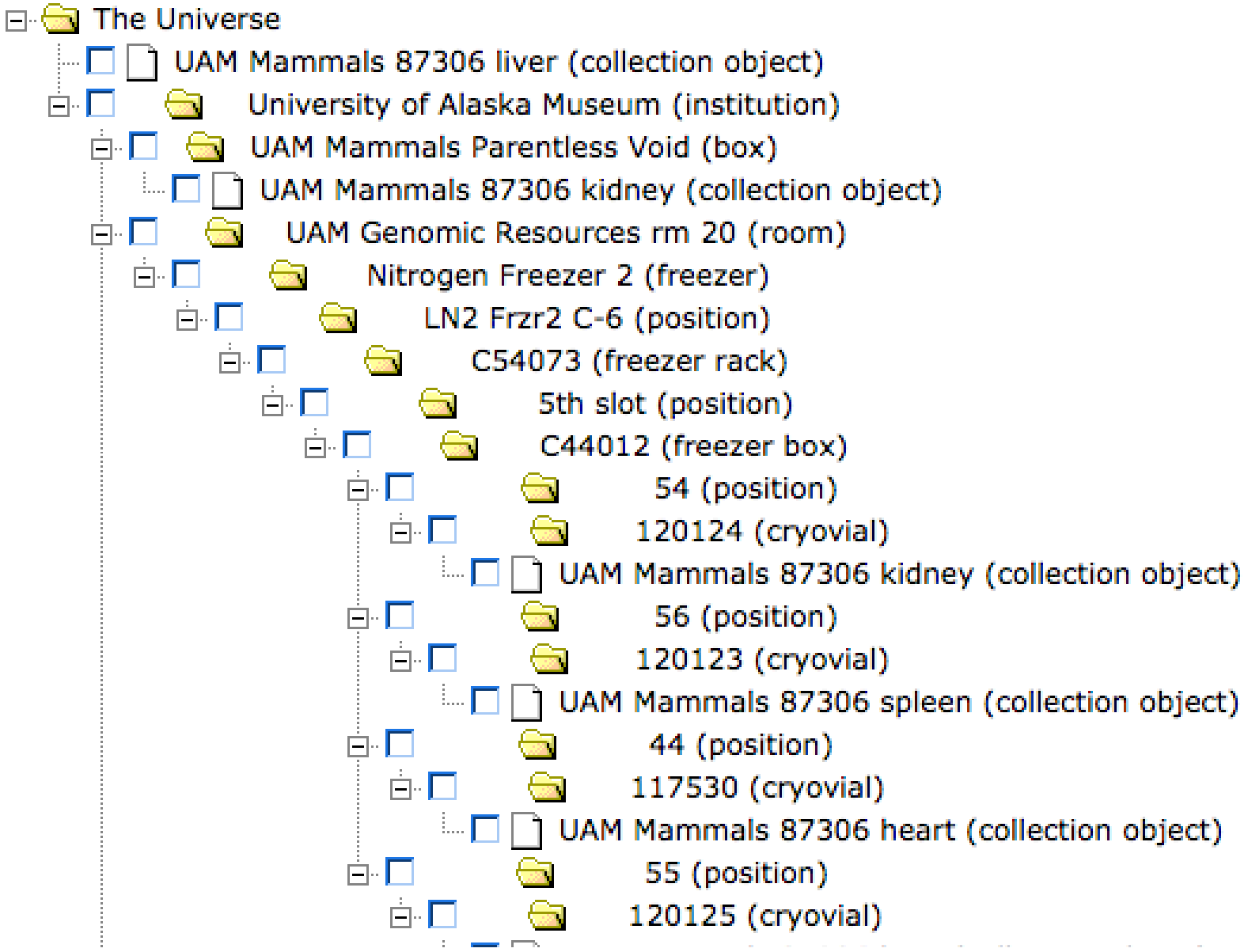
Use this form to:

- Scan cryovials into freezer boxes
- Turn cryovial labels into cryovials while scanning them into freezer boxes
- Turn slide labels into slides while scanning them into slide boxes
- Scan slides into slide boxes

Save happens when you tab out of a cell. You can set your scanner to send a tab after data.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 Barcode: | 2 Barcode: | 3 Barcode: | 4 Barcode: | 5 Barcode: | 6 Barcode: | 7 Barcode: | 8 Barcode: | 9 Barcode: | 10 Barcode: |
| 11 Barcode: | 12 Barcode: | 13 Barcode: | 14 Barcode: | 15 Barcode: | 16 Barcode: | 17 Barcode: | 18 Barcode: | 19 Barcode: | 20 Barcode: |
| 21 Barcode: | 22 Barcode: | 23 Barcode: | 24 Barcode: | 25 Barcode: | 26 Barcode: | 27 Barcode: | 28 Barcode: | 29 Barcode: | 30 Barcode: |
| 31 Barcode: | 32 Barcode: | 33 Barcode: | 34 Barcode: | 35 Barcode: | 36 Barcode: | 37 Barcode: | 38 Barcode: | 39 Barcode: | 40 Barcode: |
| 41 Barcode: | 42 Barcode: | 43 Barcode: | 44 Barcode: | 45 Barcode: | 46 Barcode: | 47 Barcode: | 48 Barcode: | 49 Barcode: | 50 Barcode: |
| 51 Barcode: | 52 Barcode: | 53 Barcode: | 54 Barcode: | 55 Barcode: | 56 Barcode: | 57 Barcode: | 58 Barcode: | 59 Barcode: | 60 Barcode: |
| 61 Barcode: | 62 Barcode: | 63 Barcode: | 64 Barcode: | 65 Barcode: | 66 Barcode: | 67 Barcode: | 68 Barcode: | 69 Barcode: | 70 Barcode: |
| 71 Barcode: | 72 Barcode: | 73 Barcode: | 74 Barcode: | 75 Barcode: | 76 Barcode: | 77 Barcode: | 78 Barcode: | 79 Barcode: | 80 Barcode: |
| 81 Barcode: | 82 Barcode: | 83 Barcode: | 84 Barcode: | 85 Barcode: | 86 Barcode: | 87 Barcode: | 88 Barcode: | 89 Barcode: | 90 Barcode: |
| 91 Barcode: | 92 Barcode: | 93 Barcode: | 94 Barcode: | 95 Barcode: | 96 Barcode: | 97 Barcode: | 98 Barcode: | 99 Barcode: | 100 Barcode: |

# Object tracking using barcodes

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