The University of New Mexico’s Museum of Southwestern Biology

The Museum of Southwestern Biology (MSB) provides infrastructure to the Department of Biology at the University of New Mexico and to a world-wide community of scientists, educators, public health workers, and natural resource managers that need information on diverse aspects of biodiversity. Our collections and web-accessible databases, managed by a set of dedicated Collection Managers, constitute an informatics resource that contributes to understanding the complexity of planetary life and related ecosystem function on local, regional, and global scales. High research activity at MSB demonstrates the increasing use of collections (both samples and data) in environmental and biomedical research. Our collections now support a tremendous number of peer-reviewed publications (nearly 200 in 2015) and attract significant grant dollars (> $2.6M at UNM in 2015). The museum is an unparalleled informatics resource contributing to applied efforts in conservation as well as theoretical advancements in biology across time and across local, regional, and global scales. MSB faculty curators with active research and graduate programs and their staff build the collections and then exploit the wealth of specimens and data, as they create a permanent and shared resource for the greater scientific community.

We focus on hands-on training of UNM students who gain experience in natural history specimen curation, field expeditions, informatics, and laboratory research. MSB faculty and staff are heavily involved in instructional efforts, including the new Museum Studies Program and through collaborative efforts with other departments and colleges on campus. MSB staff members (8 collection managers and 7 curators) teach courses, provide specimens and offer many opportunities for high quality experiential or inquiry-based educational experiences. As one of the most active university-based natural history museums worldwide, UNM students are afforded world-class opportunities in biodiversity informatics, comparative biology, and cutting-edge genomics that extend their university experiences far beyond those available at other universities in the Southwest.

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>5-YEAR AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collection growth (Specimens Cataloged)</td>
<td>64,598</td>
<td>25,446</td>
<td>34,772</td>
<td>103,947</td>
<td>129,245</td>
<td>71,602</td>
</tr>
<tr>
<td>2. Loans Out</td>
<td>185</td>
<td>99</td>
<td>145</td>
<td>241</td>
<td>176</td>
<td>169</td>
</tr>
<tr>
<td>3. Professional Visitors to the Collections</td>
<td>504</td>
<td>307</td>
<td>344</td>
<td>248</td>
<td>945</td>
<td>470</td>
</tr>
<tr>
<td>4. Collection Database Web Site Hits</td>
<td>160,880</td>
<td>396,362</td>
<td>**</td>
<td>233,079</td>
<td>585,913</td>
<td>275,247</td>
</tr>
<tr>
<td>5. Outside Publications Citing MSB Specimens</td>
<td>134</td>
<td>76</td>
<td>167</td>
<td>147</td>
<td>189</td>
<td>143</td>
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<tr>
<td>6. Peer-Reviewed Publications by Staff</td>
<td>52</td>
<td>77</td>
<td>54</td>
<td>104</td>
<td>80</td>
<td>73</td>
</tr>
<tr>
<td>7. Graduate Students</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>41</td>
<td>27</td>
<td>39</td>
</tr>
<tr>
<td>8. Graduate Theses/Dissertations Completed</td>
<td>3*</td>
<td>9</td>
<td>7</td>
<td>11</td>
<td>11</td>
<td>7</td>
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<tr>
<td>9. Undergraduate Students</td>
<td>75</td>
<td>76</td>
<td>66</td>
<td>63</td>
<td>57</td>
<td>67</td>
</tr>
<tr>
<td>10. Grants/Contracts in Force</td>
<td>78</td>
<td>76</td>
<td>61</td>
<td>61</td>
<td>82</td>
<td>75</td>
</tr>
<tr>
<td>11. Grants In Force Total Costs</td>
<td>$10,132,206</td>
<td>$8,850,955</td>
<td>$8,388,469</td>
<td>$8,489,493</td>
<td>$2,662,014</td>
<td>$7,644,627</td>
</tr>
</tbody>
</table>

* 1 UNM, 2 outside, NR – not reported
MSB has a long history of leading UNM in training students. Many of our students fill jobs with natural resource agencies, the private sector, or in academia in the state and elsewhere. We also lead in mentoring international students, especially those from Latin America, with many returning to leadership positions in their respective countries. MSB-affiliated undergraduate and graduate students have taken leadership positions in biology in the US. Many graduate students work in collections-related activities during their graduate tenure at UNM. Our unit regularly leads the Biology Department in the number of students receiving doctorate or master’s degrees.

MSB is a major contributor at UNM to public service and outreach efforts, especially activities related to evidence-based management of natural resources such as water and riparian environments in the Southwest. We are thoroughly engaged with municipal, county, state and federal agencies through funded projects ranging from South America to New Mexico to Alaska. Many of our outreach efforts are related to developing effective management plans for state and federal resource agencies. International organizations also rely on our specimens, data and expertise to help them design and implement public health initiatives. MSB has built a strong tradition in the public health arena in efforts related to identifying zoonotic pathogens (e.g., hantavirus) and understanding the ecology of zoonotic diseases and wildlife diseases in the western US, but also in a number of international settings including Peru, Mongolia and elsewhere.

Because of the vast spatial and temporal biodiversity data served, MSB is now a key player in national and international efforts in bioinformatics, both environmental and genomic. This activity is recorded in the number of hits (and downloads) from our databases, number of loans and number of publications based on these materials and data. MSB faculty and staff been heavily engaged with faculty in other departments and in other colleges---perhaps more so than other units on campus. We have established and long-term collaborative efforts with the School of Medicine and with the Arts and Ecology Program (College of Fine Arts), and Anthropology, Geography, History, and other disciplines. We have MOUs in place that are active and productive including one with New Mexico Museum of Natural History and Science. Our staff serves on national boards including the Board of Directors of American Society of Mammalogists, Flora of North America, Society of Ichthyologists and Herpetologists, Entomological Society of America, and the Natural Science Collections Alliance, the primary advocacy group of administrators and curators who oversee research-oriented museums of natural history in Washington, DC. MSB staff also serve on Steering Committees for several national initiatives, including VertNet, Aim-Up!, and the National Integrated Biocollections Alliance, a new NSF sponsored Research Coordinating Network (BCoN) focused on translating the vast digital resources of natural history museums into a catalyst for greater research productivity and educational transformation in the US.

Across the primary missions of UNM in research, teaching, and public service, MSB’s metrics attest to the fact that MSB is among the most productive and international units on campus. Follow us on FaceBook or at www.msb.unm.edu.
DIVISION OF AMPHIBIANS AND REPTILES

1. DIVISION HIGHLIGHTS

In 2015, the collection of amphibians and reptiles has increased to a total of 96,591 specimens. The division’s website was queried nearly 1,000 times and served over 8.5 million records via aggregator websites, in addition to handling over 170 data requests in person and hosting several research visitors in the collection. Our outreach activities, in addition to general tours of the collection, included a variety of presentations and consultations. We presented on amphibians and reptiles at Valle de Oro National Wildlife Refuge as well as to the City of Albuquerque and Bernalillo County Open Space Division program. During 2015, we also continued our work with the USGS Colorado Plateau Research Station at Northern Arizona University on projects that examine distributions of southwestern amphibians and reptiles.

2. TABLE OF COLLECTION USE

| Collection Growth                                | 1048 |
| Loans (outgoing/incoming)                        | 6 (4/2) |
| Research Visitors^1                               | 4 |
| Outreach Visitors^1                               | 200+ |
| Information Requests Answered                     | 172 |
| Direct Website Access^2 (“Hits”)                  | 886 |
| Indirect: Specimen Data Queries^3 (“Hits”)        | 2,424 |
| Indirect: Specimen Records Downloaded^3           | 8,649,319 |
| Publications Citing/Using MSB Herpetological Specimens | 16 |

^1Research Visitors are those visiting the collection as part of research activities, Outreach visitors are those visiting as part of tours.

^2Direct Website access represents access to our Division’s webpages.

^3Indirect Collection Access represents access to data associated with our specimens via data aggregator websites: HerpNET and GBIF and does NOT include downloads of entire dataset (287 instances in GBIF).

3. COURSES USING THE COLLECTIONS

BIOL 204, Animal Form and Function, spring and fall semesters, 338 students
BIOL 386, General Vertebrate Zoology, spring and fall semesters, 93 students

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty/Collection Managers

Poe, S.

Spring  BIOL 203 Ecology and Evolution
        BIOL 499 Undergraduate Problems
        BIOL 551 Research Problems
        BIOL 599 Master's Thesis
5. COLLECTION MANAGEMENT

In 2015, the collection has increased by 1048 specimens to a total of 96,591 specimens. The majority of the specimens was collected by division staff and students, primarily during surveys for Arizona Toad throughout New Mexico. Additional specimens were deposited by several biologists from New Mexico Dept. of Game and Fish (NMDGF), a biologist with the US Bureau of Land Management and collaborators of the MSB. Additions from the 13 accessions catalogued during 2015 include amphibians and reptiles from the Gila National Forest, areas in Northern New Mexico, as well as a collection of specimens collected by the late Charlie Painter from NMDGF.

The number of data queries through external portals and downloads continues to show the importance of online availability of our data. During 2015, our website was queried nearly 1,000 times and served over 8.5 million records via aggregator websites. This staggering number of downloads of records does not include 287 instances of users downloading either the entire dataset available or all data that include geospatial coordinates. In addition to data served through aggregator portals, specimens from the division have been cited in at least 12 publications in 2015.

Every year scientists and members of the general public continue to request information on specimens or general aspects of herpetology from our division via telephone, email and directly in person. In 2015, we handled over 170 of these requests and hosted several research visitors in the collection. Our outreach activities, in addition to
general tours of the collection, included a variety of presentations or consultations. We presented on amphibians and reptiles at Valle de Oro National Wildlife Refuge as well as to the City of Albuquerque and Bernalillo County Open Space Division program. In addition, we were involved in judging scientific posters both at UNM and Albuquerque Public Schools, and coordinated or gave invited lectures at UNM.

We continue our involvement in research, in addition to specimen preparation and curation, by advising undergraduate and graduate students and collaborating with universities and agencies. During 2015, we continued our work with the USGS Colorado Plateau Research Station at Northern Arizona University on projects that examine distributions of southwestern amphibians and reptiles. We also maintain participation with colleagues in the museum community by attending workshops and meetings. This year the division’s collection manager presented research at the annual meeting of the Arizona and New Mexico chapters of The Wildlife Society and the biennial conference on research on The Colorado Plateau in Flagstaff, Arizona. This is in addition to several presentations at the University of New Mexico and outreach events at the New Mexico Museum of Natural History and Science.

6. AWARDS, GRANTS, AND CONTRACTS


$10,000. University of New Mexico Research Allocation Committee. Grant to S. Poe.

7. PUBLICATIONS

B. Journal Articles


D. Technical Reports


E. Theses/Dissertations Completed


F. Work In Progress

Ryan, MJ, IM Latella, TJ Giermakowski, HL Snell. Going with the flow: toad breeding behavior and success influenced by stream flows. Target: Freshwater Biology


Poe, S & MJ Ryan. Resurrection of Anolis (Diaphoranolis) brooksi and description of two new species similar to Anolis insignis (Squamata: Iguanidae). Target: Amphibian and Reptile Conservation

Ryan, MJ, IM Latella, JT Giermakowski, HL Snell. No evidence of hybridization between the Arizona Toad (Anaxyrus microscaphus) and Woodhouse’s Toad (A. woodhousii) in the Gila Region of Southwestern New Mexico. Herpetological Conservation and Biology.


G. Publications/Reports Based on MSB Specimens/Data


Reyes Puig, C. D. P. 2015. Un método integrativo para evaluar el estado de conservación de las especies y su aplicación a los reptiles del Ecuador. Pontificia Universidad Católica del Ecuador, Quito, Ecuador.


Stratman, T. S. M. 2015. Finding the Needle and the Haystack: New Insights into Locating Bog Turtles (Glyptemys muhlenbergii) and their Habitat in the Southeastern United States. Clemson University, Clemson, NC, USA.


8. ACTIVITIES IN LEARNED SOCIETIES

B. Contributed Talks/Posters (*presenter)


C. Attendance at Professional Meetings

J.T. Giermakowski
Arizona/New Mexico chapters of The Wildlife Society, Las Cruces, NM. February.
13th Biennial Conference of Science & Management on the Colorado Plateau & Southwest Region, Flagstaff, AZ. October.

**C.L. Loughran**
Joint Meeting of Ichthyologists & Herpetologists, Reno, NV, July.

**M.J. Ryan**
Arizona/New Mexico chapters of The Wildlife Society, Las Cruces, NM. February.

**D. Service as Editor or on Editorial Board of a Journal**

**S. Poe.** Associate Editor. Phyllomedusa.

**H.L. Snell,** Editor of the Museum of Southwestern Biology Publication Series.

**E. Service as Officer of Professional Society/Organization**

**JT Giermakowski.** Webmaster of the Southwestern Partners in Amphibian and Reptile Conservation Steering Committee.

**CL Loughran.** Chair of Publications, Biology Graduate Student Association, University of New Mexico (2015-2016)

**9. OTHER PROFESSIONAL ACTIVITIES**

**A. Presentation to General Audience in a Scholarly Capacity**

**J.T. Giermakowski**


**C. Scholarly Service as a Member of a Local/State/Regional/National Committee, Panel, etc.**

**H.L. Snell.**

Member of IUCN SSC Iguana Specialist Group 2013-2016.

Member of New Mexico Department of Game and Fish Species Recovery Team for Boreal Toads. New Mexico Department of Game & Fish.

Elected Board Member, Tierra Grande Improvement Association (organization that administers 15,000 acres of protected areas in southern Manzano Mountains, Valencia County).

**J.T. Giermakowski.**

Webmaster of the Southwestern Partners in Amphibian and Reptile Conservation Steering Committee.

Member of Collections Committee for the American Society of Ichthyologists and Herpetologists.
Member of New Mexico Department of Game & Fish Species Recovery Board.

Appointed to University of New Mexico Institutional Animal Care and Use Committee. 2012-2015.

D. Journal Referee

S. Poe. Phyllomedusa (Associate Editor)


10. SERVICE

B. Public Service

J.T. Giermakowski

Member NM Department of Game & Fish Species Recovery Board, Santa Fe & Albuquerque, NM

M.J. Ryan

Conservation

Amphibian Ark Prioritizing Captive Amphibians for Conservation in Panama: shared data and reviewed species evaluations.

IUCN Anole Lizard Species Survival Group: shared data and reviewed species evaluations.

Educational & Science Outreach

Museum of Southwestern Biology Research Day Event, Poster and Table session

H.L. Snell

Work with Whitfield Wildlife Conservation Area, Belen, NM

Member NM Department of Game & Fish Species Recovery Board, Santa Fe & Albuquerque, NM

Elected Board Member, Tierra Grande Improvement Association, Valencia County, NM. Organization oversees 15,000+ acres of protected natural habitat in the southern Manzano Mountains.

Work with the New Mexico Mountain Club to promote wilderness activities throughout New Mexico.

11. ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.

C.L. Loughran

Melinda Bealmer Memorial Scholarship, University of New Mexico Biology Department. 2016. “Climate change effects on body condition and resource use in reptiles” $1750

Graduate Resource Allocation Committee, University of New Mexico Biology Department. 2015. “Validation of Quantitative Magnetic Resonance (QMR) imaging to measure body condition in reptiles” $400

Sevilleta Graduate Student Summer Fellowship, Sevilleta National Wildlife Refuge. 2015. “How do seasonal shifts in resource quality and abundance affect capital energy stores for arid-adapted reptiles in the Chihuahuan Desert?” $4000
12. DONATIONS AND GIFTS RECEIVED


13. CURRENT STAFF

A. Faculty/Staff

Snell, H.L. Professor and Curator
Degenhardt, W.D., Curator and Professor Emeritus
Poe, S., Associate Professor and Associate Curator
Giermakowski, J.T. Sr. Collection Manager
Ryan, M.J. Graduate Assistant (Spring)
Loughran, C.L. Graduate Assistant (Fall)

B. Graduate students

Gray, L.N., Ph.D. /Poe
Latella, I.M., Ph.D./Poe
Loughran, C.L., Ph.D/Wolf
Truett, B./Poe

C. Undergraduate Student Workers and Volunteers

Bauernfeind, Selina. Student volunteer.
Clayton, Magen. Student volunteer.
Cruz, Paxton. Student employee.
García, Miranda. Student employee.
Hogland, Sarah. Student employee.
Isom, Kaylee. Student employee.
Johnston, Gary. Student employee.
Preciado, Maria. Student employee.
White, Brittney. Student employee.

14. MUSEUM ASSOCIATES

A. Curatorial Associates

Pierce, L.J.S., New Mexico Dept. of Game & Fish
Stuart, J.N., New Mexico Dept. of Game & Fish

B. Research Associates

Fitzgerald, L., Texas A&M University
Fritts, T.H., retired
DIVISION OF ARTHROPODS

DIVISION HIGHLIGHTS

COLLECTION USE

COURSES USING THE COLLECTIONS

<table>
<thead>
<tr>
<th>TERM</th>
<th>COURSE</th>
<th>TITLE</th>
<th>STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring &amp; Fall</td>
<td>BIOL 203L</td>
<td>Evol/Ecol lab</td>
<td>24</td>
</tr>
<tr>
<td>Spring</td>
<td>BIOL 419</td>
<td>Discovering Arthropods</td>
<td>16</td>
</tr>
<tr>
<td>Spring</td>
<td>BIOL 406</td>
<td>Discovering Arthropods Lab</td>
<td>16</td>
</tr>
<tr>
<td>Summer</td>
<td>BIOL 203L</td>
<td>Evol/Ecol Lab</td>
<td>36</td>
</tr>
</tbody>
</table>

COURSES TAUGHT BY MSB PERSONNEL

<table>
<thead>
<tr>
<th>INSTRUCTOR</th>
<th>TERM</th>
<th>COURSE</th>
<th>TITLE</th>
<th>STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kelly Miller</td>
<td>Spring</td>
<td>BIOL 419</td>
<td>Discovering Arthropods</td>
<td>16</td>
</tr>
<tr>
<td>Rachael Mallis</td>
<td>Spring</td>
<td>BIOL 406</td>
<td>Discovering Arthropods Lab</td>
<td>16</td>
</tr>
<tr>
<td>Rachael Mallis</td>
<td>Summer</td>
<td>BIOL 203L</td>
<td>Evolution/Ecology Lab</td>
<td>36</td>
</tr>
</tbody>
</table>

COLLECTION MANAGEMENT ACTIVITIES

Sandra, Rachael Alfaro (GA) and undergraduate Katie Klonis, made good progress in the alcohol collection in clearing out some of the backlog of specimens from regional and international collecting. The SCAN database project also funded Caitlin Chapman from NAU to georeference database records (completed in February 2016).

Sandra worked with Dan Trujillo, the aquatic invertebrate biologist with NM Game and Fish, to negotiate the transfer of the NM crustacean/mollusk collection to MSB, a process that started several years ago with Kelly, Sandra, and Brian Lang. The majority of the specimens are Brian Lang’s (Dan Trujillo’s predecessor) career collection, going back to 1994.

Every year there are 40-50 public requests for information through email, phone calls, or impromptu visits; our databases and web pages answer many questions, but some people prefer to talk to a person. These requests require tailored responses, can be time-consuming, and are not easily captured in a metric, but they go a long way toward good will with the public.

7,500 specimens from the National Park Service White Sands arthropod inventory project were entered into the Arthropod dry collection database, and 9,169 bee specimens from PhD Candidate Karen Wright were entered into the dry collection database.
A large collection (approximately 10,000) of tropical scarab beetles were donated to the Division of Arthropods collection by the family of the late Mark Rowland. Miller, Lightfoot, Mallis and Gustafson transferred that donated collection to the MSB.

Dr. Paul Opler, Colorado State University, prepared a synoptic collection of butterflies of New Mexico from the collection of the late Richard Holland, Albuquerque, and donated that collection of 448 fully identified and curated specimens to the MSB Division of Arthropods. This donation greatly improved our butterfly collection, especially representing all species known to occur in New Mexico. Lightfoot worked with Opler and transported that collection from Ft. Collins, CO to the MSB.

The HVAC remodeling project was completed; it included improvements for long-standing problems with airflow and noise in the alcohol lab.

AWARDS, GRANTS, AND CONTRACTS


PEER REVIEWED PUBLICATIONS BY MSB STAFF

Journal Articles


Publications Based on MSB Specimens/Data By Other (non-MSB) Authors


Dissertations/Theses Based on MSB Specimens/Data


Reports Based on MSB Specimens/Data

ACTIVITIES IN LEARNED SOCIETIES

Invited/Plenary Talks and Seminars

Brantley, S.L.
Identifying and understanding spiders of the arid southwest. Seminar for the National Pest Management Association, January.

Wright, K.W.
Using the ITS1 gene fragment for barcoding pollen samples and an assessment of accuracy using the BLAST function in GenBank. Entomological Society of America, November.

Contributed Talks and Posters

Alfaro, R.E.

Brantley, S.L.
Spider response to wildfire: 3 families, 3 habitats, and 3 years. Poster presentation. All-Hands Meeting, southwest Jemez Mountains Collaborative Forest Landscape Restoration Project, March.

**Richins, A., D.C. Lightfoot and S. Newsome**
Examining grasshopper herbivory and foraging strategies in a diverse grasshopper community from central New Mexico. Poster presentation, Entomological Society of America, November.

**Wright, K.W.**

### Attendance at Professional Meetings

**Alfaro, R.E.**
American Arachnological Society Annual Meeting, Mitchell, South Dakota, June.

**Brantley, S.L.**
American Arachnological Society Annual Meeting, Mitchell, South Dakota, June.

**Richins, A.**
Entomological Society of America Annual Meeting, Minneapolis, Minnesota, November.

**Wright, K.W.**
Entomological Society of America Annual Meeting, Minneapolis, Minnesota, November.

Bodega Bay Applied Phylogenetics Workshop, Bodega Bay, California, March.

### Service as Editor or on Editorial Board of a Journal

**Lightfoot, D.C.** Associate Editor, Arthropod taxonomy and ecology, for the Western North American Naturalist.

### Service as Officer of Professional Society/Organization

### OTHER PROFESSIONAL ACTIVITIES

### Presentation to General Audience in a Scholarly Capacity

**Brantley, S.L.**
Radio interview on tarantula biology for Here and Now program (host Jeremy Hobson) from WBUR Boston, October.

Radio interview on spiders and women in science for Women’s Focus program (host Carol Boss) from KUNM Albuquerque, October.

**Lightfoot, D.C.**
Television interview and story on insect response to a summer with considerable rainfall in New Mexico, KOB Channel 4 news, Albuquerque, August.
Wright, K.W.
Native Bees of New Mexico. Invited guest lecturer. Native Plant Society of New Mexico, Santa Fe Chapter. April.

PUBLIC SERVICE

Alfaro, R.E.
Treasurer; Biology Graduate Student Association, January - June
Co-chair, Graduate Research Allocation Committee, BGSA, January - June
Part of Brown Bag seminar to celebrate Darwin Day, February
Poster judge for Dept. of Biology Research Day poster sessions, March
Participated in Dept. of Biology Research Day open house at the MSB, March
Reviewer for Dept. of Biology Undergraduate Scholarship Grants, March
Co-President; Biology Graduate Student Association, June – December

Brantley, S.L.
Part of Brown Bag seminar to celebrate Darwin Day, February.
Part of the presentation to Chuck Buxbaum’s Anatomy and Physiology class at Sandia Prep, February.
Participated in job shadowing project for Makayla Simpson, East Mountain High School student.
Participated in Dept. of Biology Research Day open house at the MSB, March.
Invited speaker Bernalillo County Open Space Lecture Series: Eight eyes, eight legs, and sometimes a bad attitude. Albuquerque, October.
Specimen identifications for biologist at Dugway Proving Ground, Utah, and for an undergraduate student in California.

Lightfoot, D.C.
Assisted Friends of the Sevilleta National Wildlife Refuge with an Annual Butterfly Count, August.
Provided specimens to local Albuquerque public schools for teaching students about insects (3 events).

Wright, K.W.
Native plants and pollinators, walk and talk. Bernalillo County Open Space, September 2015.
Pollinator talk and walk. Randall Davey Audubon Center, Santa Fe, August 2015
Specimen identification for Dr. Bryan Bishop, Concordia College; Angie Begosh, PhD student, Oklahoma State University; Dr. Craig Baird, College of Idaho; David Biddinger, Penn State Agriculture Extension; Codey Mathis, Graduate student, Oregon State University.

ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.
Alfaro, R.E.
Alvin R. and Caroline G. Grove Summer Research Scholarship ($2000), April

DONATIONS AND GIFTS RECEIVED

Henry Hespenheide, 9 buprestid beetles, including 6 Brachys from the southwestern US.
Mark Ward, 63 pyralid and crambid moths from the Valles Caldera National Park.
Karen Wright, 150 chrysomelid beetles from her bee traps, 9150 bee specimens.
Mark Rowland, approximately 10,000 scarab beetles.
Paul Opler, 448 butterflies of New Mexico.
Robert Parmenter, 160 moths from Valles Caldera Preserve.
Eric Metzler, 2 complete Malaise traps for capturing flying insects.

CURRENT STAFF
Faculty and Staff
  Miller, K.B., Curator, Associate Professor
  Brantley, S.L., Senior Collection Manager, Research Associate Professor
  Lightfoot, D.C., Senior Collection Manager, Research Associate Professor

Graduate students
Alfaro, R.E., Ph.D. Candidate
Gustafson, G., Ph.D. Candidate
Wright, K. Ph.D. Candidate
Leister, M.P., Master’s Student

Undergraduate Student Workers and Volunteers
  Katie Klonis
  Allyson Richins

MUSEUM ASSOCIATES
Research Associates
Ana Davidson,
  Eric Metzler, Ohio State University, retired
  Robert Parmenter, Valles Caldera National Park
  Ernie Valdez, USGS
  Mark Ward, entomologist, Valles Caldera National Park
DIVISION OF BIRDS

Highlights & Major events in 2015

- Passing of Curator Emeritus, Robert W. Dickerman: See Memorial in The Auk, by Andrew B. Johnson.
- August arrival of Dr. Michael J. Andersen as Assistant Professor and Associate Curator.
- Graduate students Natalie Wright (Ph.D.) & C. Jonathan Schmitt (M.S.) defended successfully and moved on to exciting positions at Univ. Montana and Harvard Univ., respectively.
- Major import of specimens from Australia, including many new species for the collection and even some new bird families.
- Peru expeditions from January through July, including filming for PBS Nature documentary that is expected in Fall 2016.
- New Mexico field work: Manzanos (high & low elevations), Sangre de Cristos (north and south), & San Marcial (Rio Grande Valley).
- First Semi-annual Specimen Preparation Party (SSPP).
- Major paper published on Andean house wren hemoglobin.
- Two new NSF grants for specimen-based research.
- Annual citations for publications based on the collection accelerates past 300.
- Open House in December (UNM’s Hidden Gems: Behind the scenes at the MSB Bird Collection) kicks off annual outreach tradition. 2015: Meaningful endings and hopeful beginnings for the MSB Bird Division.

April 25, 2015, marked the passing of Bob Dickerman, who was not only Curator Emeritus of our collection, but a great friend, mentor, and benefactor, cherished by all who knew him. We celebrated his memory with a small reception in the collection range the week after he passed, and by hosting a giant bash at his house on what would have been his 89th birthday that included his sons, daughter-in-law, friends from as far away as Alaska and Washington, D.C., and many friends from his life here in New Mexico. Senior Collections Manager, Andrew B. Johnson, wrote a touching obituary for Bob in the leading North American ornithology journal, The Auk, http://www.bioone.org/doi/pdf/10.1642/AUK-15-207.1.

We also welcomed Dr. Michael J. Andersen as a new Assistant Professor in the Department of Biology, and Associate Curator of Birds at MSB. Dr. Andersen came directly from a Chapman Postdoctoral Fellowship at the American Museum of Natural History. In December, 2015, he received his first NSF grant for inventory and analysis of the Melanesian avifauna.

Senior Collections Manager, Andrew B. Johnson, spent a month in Australia preparing salvaged specimens at the Australia National Wildlife Collection in Canberra. These specimens, and a generous donation of old no-data specimens comprised a major boost to the taxonomic representation of Australasian birds and included a lot of first specimens and tissues for the Division at the family, genus and species level. Highlights included specimens representing the families Corcoracidae, Aegothelidae, and Maluridae.

Peru expeditions commenced in January with Jonathan Schmitt, Libby Beckman and Matt Baumann heading to two high-altitude sites in the Central Andes. Witt, Johnson, and Blair Wolf joined Jonathan at a high elevation site to study the community of six hummingbird species. We were accompanied by a team of videographers who were filming a special on hummingbirds for the PBS series Nature. Ashley Smiley and Andrea Chavez joined Johnson after this Lima expedition and headed south to Lake Titicaca to sample high elevation species there. Johnson left after this leg of the expedition to be with Bob Dickerman after he had a stroke. Chavez and Smiley stayed and sampled birds of Arequipa with Peruvian collaborator Mauricio Ugarte-Lewis. Field work in Peru continued in July with Jonathan Schmitt, Chauncey Gadek and Matt Segura sampling low elevation sites along the coast of southern Peru to complement the high elevation sampling of Smiley, Chavez and Johnson in March/April.
New Mexico field work consisted of continuing to sample breeding populations of Yellow-rumped warblers and other species in the Manzano and Sangre de Cristo Mountains, winter birds of the southern Sangre de Cristos, an attempt at collecting nesting Yellow Warblers in the Rio Grande valley, and continued collecting in San Juan County by Greg Schmitt, including unprecedented series from the New Mexico portion of the Navajo Nation. Major curation progress was made by publishing over 8100 specimen records from Peru onto our open-access database Arctos. Local cataloging slowed because of a short-term switch back to cataloging directly into Arctos, which had the undesired effect of slowing data entry to glacial speeds. By the end of the year, we switched back to our system of entering data onto spreadsheets before proofing and bulk-loading to Arctos.

Research impacts of the Division continue to accelerate, with exponential citations growth for publications that utilized the specimen materials or specimen data from the division (302 citations for 2015, up from 206 in 2014). We also published a major article on hemoglobin evolution in Andean house wrens, based on the Masters Thesis of MSB Birds graduate student Spencer Galen, and coauthored by MSB Birds graduate students Phred Benham and Andrea Chavez, as well as Curator Witt, in the Proceedings of the National Academy of Sciences. We also obtained two NSF grants in 2015 for collections-based research, one for exploration and analysis of the Melanesian avifauna (Andersen, PI), and one for studying the molecular mechanisms of hemoglobin evolution in Andean birds (Witt, PI).

MSB students and staff surround Bob Dickerman to review the Australia accession, January, 2015.
By the Numbers: MSB’s metrics of productivity for the Bird Division, 2015:

1. Collection Growth (Specimens Cataloged): 8289 in ARCTOS; 173 are newly-cataloged USGS Specimens, others are Peru specimens that were already cataloged, but published online to ARCTOS in 2015.
2. Outgoing Loans 2015: 17
3. Professional visits to collection: 21
4. Collection Database Hits: 9,942 queries returned 877,780 specimen records
5. Outside Publications Citing MSB Specimens: 10 (but 18 publications that were based on collection in 2015, when including those by MSB personnel; we think the latter number is the one that MSB should be tracking)
6. Peer-Reviewed Publications by Staff: 13 (includes curators and research associates and students); Eight of these utilized specimens and/or specimen data from the MSB Bird Collection.
7. UNM Courses using the Collection: 15
8. Graduate Students: 5 (Five were affiliated with MSB Bird Division in 2015).
9. Graduate Theses/Dissertations Completed: 3 (includes UNM and students at other institutions).
10. Undergraduate Students: 5 (Five were affiliated with MSB Bird Division in 2015).

RESEARCH IMPACTS OF THE MSB BIRD DIVISION

Publications by personnel affiliated with the MSB Bird Division. (13 total)
These publications have MSB as part of the authors’ affiliations. They include theses & dissertations.

Baumann, Matthew J; Beckman, Elizabeth J; Bautista, Emil; Witt, Christopher C. 2015. Long-distance dispersal of a sedentary Andean flycatcher species with a small geographic range, Ochthoeca piurae (Aves: Tyrannidae). Check List 11(6) 1795
Benham, Phred M; Cuervo, André M; McGuire, Jimmy A; Witt, Christopher C. 2015. Biogeography of the Andean metaltail hummingbirds: contrasting evolutionary histories of tree line and habitat-generalist clades. Journal of Biogeography 42(4) 763-777
Carriker, CR; Mermier, CM; McLain, TA; Johnson, KE; Beltz, NM; Vaughan, RA; McCormick, JJ; Cole, NH; Witt, CC; Gibson, AL. 2015. Effect of Acute Dietary Nitrate Consumption on Oxygen Consumption During Submaximal Exercise in Hypobaric Hypoxia. International journal of sport nutrition and exercise metabolism.
Galen, Spencer C; Natarajan, Chandrasekhar; Moriyama, Hideaki; Weber, Roy E; Fago, Angela; Benham, Phred M; Chavez, Andrea N; Cheviron, Zachary A; Storz, Jay F; Witt, Christopher C. 2015. Contribution of a mutational hot spot to hemoglobin adaptation in high-altitude Andean house wrens. Proceedings of the National Academy of Sciences 112(45) 13958-13963.
Hosner, Peter A; Andersen, Michael J; Robbins, Mark B; Urbay-Tello, Abraham; Cueto-Aparicio, Luis; Verde-Guerra, Karen; Sánchez-González, Luis A; Navarro-Sigüenza, Adolfo G; Boyd, Roger L; Núñez, Jano. 2015. Avifaunal surveys of the upper Apurímac River Valley, Ayacucho and Cuzco Departments, Peru: New distributional records and biogeographic, taxonomic, and conservation implications. The Wilson Journal of Ornithology 127(4) 563-581

Opazo, Juan C; Hoffmann, Federico G; Natarajan, Chandrasekhar; Witt, Christopher C; Berenbrink, Michael; Storz, Jay F. 2015. Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. Molecular Biology and Evolution 32(4) 871-887.


Publications based on the MSB Bird Collection. (18 total)


Baumann, Matthew J; Beckman, Elizabeth J; Bautista, Emil; Witt, Christopher C. 2015. Long-distance dispersal of a sedentary Andean flycatcher species with a small geographic range, Ochthoeca piurae (Aves: Tyrannidae). Check List 11(6) 1795.


Bothwell, Emma; Montgomerie, Robert; Lougheed, Stephen C; Martin, Paul R. 2015. Closely related species of birds differ more in body size when their ranges overlap—in warm, but not cool, climates. Evolution 69(7) 1701-1712.


Friggens, Megan M; Finch, Deborah M. 2015. Implications of climate change for bird conservation in the southwestern US. Special Publication of the United States Forest Service.

Galen, Spencer C; Natarajan, Chandrasekhar; Moriyama, Hideaki; Weber, Roy E; Fago, Angela; Benham, Phred M; Chavez, Andrea N; Cheviron, Zachary A; Storz, Jay F; Witt, Christopher C. 2015. Contribution of a mutational hot spot to hemoglobin adaptation in high-altitude Andean house wrens. Proceedings of the National Academy of Sciences, USA 112(45) 13958-13963.


Opazo, Juan C; Hoffmann, Federico G; Natarajan, Chandrasekhar; Witt, Christopher C; Berenbrink, Michael; Storz, Jay F. 2015. Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. Molecular Biology and Evolution 32(4) 871-887.


Winger, Benjamin M; Hosner, Peter A; Bravo, Gustavo A; Cuervo, Andrés M; Aristizábal, Natalia; Cueto, Luis E; Bates, John M. 2015. Inferring speciation history in the Andes with reduced-representation sequence data: an example in the bay-backed antpittas (Aves; Grallariidae; *Grallaria hypoleuca*). *Molecular Ecology* 24(24) 6256-6277.


**TEACHING IMPACTS OF THE MSB BIRD DIVISION**

**UNM courses using specimens, data, electronic archives and other resources provided by the MSB Bird Division.**

All except GVZ are courses offered by MSB Bird Division faculty curators and staff.

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Instructor</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Fall</td>
<td>486L</td>
<td>Ornithology</td>
<td>Witt, C.</td>
<td>22</td>
</tr>
<tr>
<td>2015</td>
<td>Spring</td>
<td>300</td>
<td>Evolution</td>
<td>Witt, C.</td>
<td>37</td>
</tr>
<tr>
<td>2015</td>
<td>Fall</td>
<td>203</td>
<td>Ecology and Evolution</td>
<td>Andersen, M. J.</td>
<td>197(total for two sections)</td>
</tr>
<tr>
<td>2015</td>
<td>Spring</td>
<td>400</td>
<td>Senior Honors Thesis</td>
<td>Witt, C.</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Spring</td>
<td>551</td>
<td>Research Problems</td>
<td>Witt, C.</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Spring</td>
<td>599</td>
<td>Masters Thesis</td>
<td>Witt, C.</td>
<td>2</td>
</tr>
<tr>
<td>2015</td>
<td>Spring</td>
<td>699</td>
<td>Dissertation</td>
<td>Witt, C.</td>
<td>3</td>
</tr>
<tr>
<td>2015</td>
<td>Fall</td>
<td>400</td>
<td>Senior Honors Thesis</td>
<td>Witt, C.</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Fall</td>
<td>551</td>
<td>Research Problems</td>
<td>Witt, C.</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Fall</td>
<td>599</td>
<td>Masters Thesis</td>
<td>Witt, C.</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Fall</td>
<td>699</td>
<td>Dissertation</td>
<td>Witt, C.</td>
<td>1</td>
</tr>
<tr>
<td>2015</td>
<td>Fall/Spring</td>
<td>386</td>
<td>GVZ</td>
<td>Rotating faculty</td>
<td>72</td>
</tr>
</tbody>
</table>

**Graduate students affiliated with the MSB Division of Birds in 2015.** Includes graduate students who are formally trained in curatorial practices and standards of field data collection, specimen preservation, field protocols that are consistent with institutional animal care guidelines, directly by faculty and staff of the MSB. It does not include graduate enrollment in formal courses.

1. Natalie Wright: Witt Graduate Student
2. Elizabeth Beckman: Witt Graduate Student
3. Jonathan Schmitt: Witt Graduate Student
4. Andrea Chavez: Witt Graduate Student
5. Ariel Gaffney: Witt Graduate Student

**Graduate theses/dissertations based on MSB Bird Collection, completed in 2015.**


**Undergraduate students trained in MSB Bird Division.** Includes undergraduate students that are employed through Federal Work-Study program, externally funded research grants and contracts, or education programs.

1. Myranda Robinson
2. Chauncey Gadek
3. Celina Aguilar
4. Madeline Cauthen
5. Sarah Crisler
6. Seth Hunter
7. Adam Henry
8. Amber Wingert
9. Kobie Boslaugh

**FUNDING AND PERSONNEL**

**Grants and contracts in force.** Includes all active grants and contracts for curation and/or specimen-based research being conducted by MSB curators and staff.

2011-2017: Montane Biogeography Revealed by Quirks of the Evolutionary Process: Integrative Respiratory Phenotypes for Andean Birds; P.I.: C. C. Witt; co-P.I. Blair Wolf; co-P.I. Joann Mudge; National Science Foundation (Evolutionary Processes Cluster); $673,000; DEB-1146491.


2016-2021: Collaborative Research: Discovery and analysis in the cradle of speciation theory: biotic surveys of Melanesia’s terrestrial vertebrates. PI: Andersen; Co-PI: Fillardi, Moyle.

**Donors who gave to MSB Bird Division in 2015:**

Robert W. Dickerman
David Marchiondo
Thomas P. Witt
Chauncey R. Gadek
Matthew J. Baumann
Ken Cole
Les Hawkins

**CURRENT STAFF**

See webpage. [http://msb.unm.edu/divisions/birds/people/index.html](http://msb.unm.edu/divisions/birds/people/index.html)

**MUSEUM ASSOCIATES**

See webpage. [http://msb.unm.edu/divisions/birds/people/index.html](http://msb.unm.edu/divisions/birds/people/index.html)
DIVISION OF GENOMIC RESOURCES

1. DIVISION HIGHLIGHTS.

The Division of Genomic Resources (DGR) of the Museum of Southwestern Biology (MSB) is a centralized repository for cryogenic material from all MSB divisions at the University of New Mexico, and from the New Mexico Museum of Natural History, the U.S. Fish and Wildlife Service Mexican Wolf Recovery Program, the U. S. Geological Survey, the New Mexico, Chilean, and Panamanian Hantavirus Surveys, and from other individual researchers and institutions worldwide. The DGR frozen tissue collection is taxonomically broad and contains >450,000 tissue samples from over 200,000 specimens, including Mammals, Birds, Reptiles and Fishes. Worldwide, the collection is ranked as the largest cryogenic collection of wild mammal tissues and DNA and one of the top ten cryogenic collections of bird tissues in North America. In 2015 we submitted a proposal to the National Science Foundation to beginning migrating our tissues to liquid nitrogen storage. This proposal received excellent ratings and will be funded in 2016, pending renovations to adjoining space by UNM.

Collection Growth.
1. >12,000 specimen accessioned in the Division of Mammals, and 14,364 specimens cataloged.
2. 8358 specimens cataloged from the Division of Birds.
3. 28 specimens cataloged from the Division of Reptiles and Amphibians
3. Approximately 13,000 specimens and 26,245 tissue vials archived in the DGR frozen collection in the Arctos object tracking system.

Collection Usage.
1. The DGR collection issued 76 loans of frozen tissues from 1736 specimens from the Mammal, Bird, Fish, Herp, and Parasite Divisions in 2015.

Training in specimen based research and curation.
Training in specimen collection, preparation, curation, and data management remains one of the integral goals of all of the MSB divisions. Students gain experience in bioinformatics, natural history collection preparation and curation, and field and laboratory based research

a. 6 UNM students worked in DGR in 2015
   i. 2 graduate students
   ii. 2 paid undergraduates
   iii. 2 post-baccalaureate students

b. 10 Students mentored by DGR Collection Manager:
   i. 1 volunteer undergraduate
   ii. 5 undergraduate interns
   iii. 2 undergraduate students conducting independent study projects
   iv. 2 high school student interns

   Of these,
   1. 8 were females
   2. 2 males
   3. 4 were from under-represented groups
   4. 3 received training in museum field techniques in New Mexico, Canada, and Panama
   5. 4 presented museum-related projects at regional scientific conferences
   6. 4 chose to continue subsequent museum-related independent study/research
   7. 1 accepted to NIH-funded postbaccalaureate UNM Prep Program
Publications citing MSB DGR specimens.

The MSB DGR tissue resource has become a foundation for considerable research worldwide. DGR attempts to track all publications utilizing our tissue specimens and incorporate the manuscripts into the ARCTOS database with linkages to specimen records, loans, and GenBank information. During 2015 DGR specimens were cited in at least 70 studies published in over 53 journals or books. Tracking publications is now easier with the advent of electronic information sharing, but some publications using our specimens or their derivatives (e.g., sequences) are still unreported.

MSB Arctos database and collection accessibility.

B. Arctos database and collection accessibility. The Arctos database is a cutting-edge relational database that continues to provide an invaluable resource for biodiversity and environmental questions for researchers, educators, public health workers, and natural resource managers worldwide. Arctos is web-accessible and greatly enhances the visibility of the MSB. See MSB Mammal summary of Arctos usage.

C. Since the MSB DGR interface was discontinued in 2014, the DGR collection records are now accessed directly from the Arctos interface for the respective divisions. The tissue collections for the Divisions of Mammals and Birds are fully online; MSB Fish and MSB Herps are in the process of upload.

Queries containing records from MSB Mammals, DGR Mammals, MSB Birds, or DGR Birds in 2015:

<table>
<thead>
<tr>
<th>Collection</th>
<th>Queries</th>
<th>Specimen Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGR Mammals</td>
<td>898</td>
<td>81,844</td>
</tr>
<tr>
<td>MSB Mammals</td>
<td>39,649</td>
<td>17,293,086</td>
</tr>
<tr>
<td>DGR Birds</td>
<td>1070</td>
<td>17,700</td>
</tr>
<tr>
<td>MSB Birds</td>
<td>9942</td>
<td>877780</td>
</tr>
<tr>
<td>MSB Fish (tissues)</td>
<td>357</td>
<td>353297</td>
</tr>
<tr>
<td>MSB Herps (tissues)</td>
<td>509</td>
<td>48962</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>52,425</strong></td>
<td><strong>18,672,669</strong></td>
</tr>
</tbody>
</table>

2. COLLECTION USE

<table>
<thead>
<tr>
<th>Collection Growth (samples archived)</th>
<th>Loans (number of specimens)</th>
<th>Visitors</th>
<th>Information Requests Personally Responded to</th>
<th>Publications Citing MSB DGR Specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>~ 26,245 Mamm and Bird Vials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>representing ~13,000 specimens</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSB Mamm 56 (1320)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSB Bird 12 (53)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSB Fish 1 (61)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSB Herp 2 (35)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSB Para 5 (267)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Loans: 76 (1736)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>~70+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Mamm/DGR Mamm combined tissue loans (number of specimens)
** Birds/DGR Birds combined tissue loans (number of specimens)
*** Mammals/Birds/DGR/Fish/Herp/Para
Collection Usage:
MSB DGR issued 17,299 NK numbers in 2015 for collection of new specimens. The Division issued 76 loans of 1736 specimens to researchers in 7 countries: Argentina, Canada, China, Brazil, Denmark, Spain, and multiple institutions across the United States. Specimens were cited in over 70 publications.

3. COURSES USING THE COLLECTION

UNM Classes receiving loans of DGR material for educational purposes
- BIOL 599 – Master’s Thesis. Spring (3 students, 3 tissue loans)
- BIOL 599 – Masters Thesis. Fall (3 students, 8 tissue loans)
- BIOL 699 – Dissertation. Spring (3 students, 7 tissue loans)
- BIOL 699 – Dissertation. Fall (3 students, 5 tissue loans)

UNM courses or programs using the DGR collection through visits or staff presentations.
- UNM Art and Ecology
- MSST Museum Studies Class Group (1 instructor, 12 students)
- UNM Prep Program (1 instructor, 13 students)

Visiting researchers: Institutions or Departments.
- University of Illinois
- Veteran’s Administration Cooperative Studies Program
- Natural History Museum, Arequipa, Peru
- USGS
- University of Arizona
- Angelo State Natural History Collections

K-12 schools and educational group.
See MSB Mammal/MSB Bird Divisional Reports.

Other Visitors:
- UNM President’s Office
- UNM Office of the Vice President
- UNM Contracts and Grants
- UNM Space Management
- UNM Planning, Design, and Construction
- UNM Arts and Sciences, Dean’s Office
- UNM PDB/Project Remodel Management
- ThermoFisher Scientific
- Hope Knows No Boundaries
- QAE Engineering
- JMZ Arquitectos
- Dwight and Louise Harris
- Praxair
- DH Industries USA
- FEMA
- Greiner Bio-One
- MVE Chart
- NCGR
4. COURSES TAUGHT BY DGR PERSONNEL

Collection Manager/Faculty Student Mentoring:
Mariel L. Campbell/Joseph Cook:

Undergraduates
- **Lizon Cenac**, Rausch REU intern in mammalogy, parasitology; *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution*.; BCP Flea Independent Study
- **Laurel Cenac**, Rausch REU intern in mammalogy, parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution*; BCP Flea Independent Study
- **Niccolette Ochoa**, Rausch and CIIBA REU intern in parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution*; UNM Prep Program Panama and *Soboliphyme* inventory
- **Brooke Thurston**, Rausch and CIIBA REU intern in mammalogy, parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution*; Canada Yellowknife Field Parasitology expedition
- **Katelyn Clafton**, CIIBA REU intern in parasitology

High School
- **Victoria Crosby** (Amy Biehl), CIIBA RAHSS intern in parasitology
- **Samuel Nasci** (Homeschool, CNM), CIIBA RAHSS intern in parasitology

5. COLLECTION MANAGEMENT

MSB DGR added ~13,000 new specimens and installed 26,245 frozen tissue vials during 2015. All incoming and legacy tissue samples installed in 2015 were barcoded and scanned in the Arctos Object Tracking System. An additional 17,299 NK numbers were assigned for collection of new specimens. 76 consumable, nonreturnable loans of frozen tissue subsamples from 1736 specimens were processed.

One new -80C freezer (DGR 18) was purchased with Mexican Wolf Recovery Project funds; one -80C freezer (DGR 2) went down due to coolant line failure and was repaired. Tissues in DGR-2 were transferred before rising above -60C. DGR experienced 4 power outages, including one <1 hr backup generator failure, and 7 alarm system/internet outages in 2015. The alarm system installed in 2015 is a wireless ICSI system managed by UNM Energy Services.

Current projects generating specimens for DGR
- Incorporation of other collections (USGS, NMMNHS)
- CIIBA – NSF (JA Cook)
- High Latitude Contact Zones - Andrew Hope, JA Cook – Alaska (USGS, NPS)
- Mexican wolf reintroduction – USFWS (JL Dunnum)
- Panama Hantavirus – ICIDR NIH (JA Cook)
- Bighorn Sheep Reintroduction Program – NMGF
- Black bear /elk predation project – NMDGF
- Mammalogy and Tropical Biology classes (JA Cook)
- Troy Best collections
- Ladder Ranch and Greater Gila Ecoregion Project - (UNM, GPSA) A Jones, JA Cook
- Peruvian Bird Survey – Chris Witt (NSF)
The majority of staff time was spent:

1. Developing the ARCTOS database.
2. Conversion of DGR locator to Arctos object tracking system
3. Integration of all former Arctos DGR specimens into their respective databases in MSB Mamm, MSB Birds, and the transfer of all DGR Fish records to a new MSB Fish portal; DGR has been removed as a separate database in Arctos; all new loans and accessions are processed through respective divisions as of August 2014.
4. Processing MSB mammal and MSB bird tissue loans.
5. Preparation, cataloging, and installation of new specimens.
6. Data entry for new accessions.
7. Supervising and training students and personnel in field and lab specimen and data collection and preparation
8. Equipment maintenance including: 17 ultra-cold freezers, multiple alarm systems, computers, and a biosafety cabinet.
9. Equipment monitoring 24 hours a day, 7 days a week.
10. Maintaining the DGR Bio-safety Level II Laboratory.
11. USDA, UNM Bio-safety inspections and compliance.
12. Student mentoring

6. **AWARDS, GRANTS, AND CONTRACTS**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

7. **PUBLICATIONS**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports
   
   **A. Books, Book Chapters, Edited Volumes**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

   **B. Journal Articles**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

   **C. Web-Based**
   All publications in the MSB series are available via free-download from our website.

   **D. Technical Reports**
   Annual Report, Division of Genomic Resources, Museum of Southwestern Biology

   **E. Theses/Dissertations Completed**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

   **G. Publications/Reports Based on MSB Specimens/Data by Outside Researchers**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

   **H. Theses/Dissertations**
   See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

8. **ACTIVITIES IN LEARNED SOCIETIES**

   **B. Attendance at Professional Meetings (see also other Divisional reports)**
Mariel L. Campbell, Jonathan L. Dunnum, and Joseph A. Cook. *The Role of Museum-Based Biorepositories and Biodiversity Databases in Infectious Disease Discovery and Epidemiology: An Example from the Division of Genomic Resources, Museum of Southwestern Biology.* Presented at the annual meeting of the International Society for Biological and Environmental Repositories, Phoenix, AZ, May 5-9, 2015.


9. **OTHER PROFESSIONAL ACTIVITIES**

A. **Presentations to General Audience in a Scholarly Capacity**

Campbell, Mariel L
Sara V. Brant and Mariel L. Campbell, Bernalillo Co. Open Space --Bachechi Center Naturalists Series.

E. **Scholarly Service as a Member of a Local/State/Regional/National Committee, Panel, etc.**

Campbell, Mariel L.
1. Arctos Database Advisory Committee
2. EnviroBio Working Group, International Society for Biological and Environmental Repositories
3. Global Genome Biodiversity Initiative, MSB representative

9. **SERVICE**

A. **Symposia, Workshops, Conferences, etc. Sponsored, Organized, Held, etc.**

B. **Public Service**

General

A significant portion of DGR staff time is spent providing information or assistance to the public either during visits to the collection, through phone calls, emails or through research tissue loans. This is an important and ongoing activity of all DGR personnel.

Campbell, Mariel L.
Divisional tours and presentations – provided educational tours and information for visitors and school group for MSB DGR, MSB Mamm, and MSB Para, August – December 2015.

10. **DONATIONS AND GIFTS RECEIVED**

11. **CURRENT STAFF**

Faculty/Staff
J.A. Cook, Curator (see Division of Mammals report for all J.A. Cook activities)
Mariel L. Campbell, Collection Manager

Graduate students
Cook, J.A.
(Reported in Mammal Division report)

Grad Student Research Assistant DGR
1. Jocelyn P. Colella (Spring 2015)
2. Dianna Krejsa (Fall 2015)

Undergraduate Student Workers and Volunteers
1. Matthew P. Segura (Spring, Fall 2015)
2. Chauncey Gadeck (Spring 2015)
3. Elisa Gagliano (Fall 2015)
DIVISION OF FISHES

1. DIVISION HIGHLIGHTS
Currently, the MSB Division of Fishes has 99,495 cataloged lots of fishes (4,169,658 specimens). During the year, 2,838 lots of fishes (48,865 specimens) were cataloged and integrated into the main collections. To date, there are 90,925 digital files of field notes and 650 jpg files of habitat photographs and specimens (for color). There are 41,619 specimen locality records, georeferenced using decimal latitude and longitude. Guests hosted: Dr. Armando J. Contreras-Balderas and Dra. Maria de Lordes Lozano Vilano, Universidad Autonoma de Nuevo Leon, Mexico; Dr. Keith B. Gido, Kansas State University, Manhattan KS.

MSB Staff Outreach Summary: Tours and Presentations: Silverton Middle School, Albuquerque; UNM Global Education Office; Jefferson Middle School, Albuquerque; Montessori of the Rio Grande Charter School, Grades 1 to 3, Albuquerque; UNM MSB Open House for Research Day; UNM Recruitment Undergraduate and Graduate Student Tour; UNM Museum Studies Tour; Sandia Preparatory School, High School; Bernalillo County Open Space Naturalist Series: The Middle Rio Grande and its Fishes-100 Years Ago, Bachechi Center, Albuquerque; UNM Honors College Seminar People and Animals UHON302-016 MSB Fishes Teaching Materials Provided: USFWS Native Fish in the Classroom Program for middle school, Albuquerque; New Mexico Museum of Natural History and Science Hall of Curiosities. Mentored High School Project: Albuquerque Institute of Math and Sciences, San Juan River Fishes and Contaminants.

2. TABLE OF COLLECTION USE

<table>
<thead>
<tr>
<th>Collection Growth</th>
<th>Loans Out</th>
<th>Professional Visitors</th>
<th>Collection Web Activity</th>
<th>Publications by MSB Staff</th>
<th>Publications using MSB specimens/data</th>
</tr>
</thead>
<tbody>
<tr>
<td>48,865 specimens</td>
<td>21</td>
<td>39</td>
<td>1,570</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>UNM Courses taught by MSB staff</td>
<td>Graduate Students mentored</td>
<td>Graduate Students' Theses/Dissertation</td>
<td>Undergraduate Students employed</td>
<td>Grants and contracts in force</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>16</td>
<td>3</td>
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3. UNM COURSES USING THE COLLECTIONS

<table>
<thead>
<tr>
<th>TERM</th>
<th>COURSE</th>
<th>TITLE</th>
<th>STUDENTS</th>
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</thead>
<tbody>
<tr>
<td>Spring 2015</td>
<td>BIOL487</td>
<td>Ichthyology</td>
<td>20</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>BIOL386</td>
<td>General Vertebrate Zoology</td>
<td>20</td>
</tr>
<tr>
<td>Fall 2015</td>
<td>BIOL 386</td>
<td>General Vertebrate Zoology</td>
<td>24</td>
</tr>
<tr>
<td>Spring 2015</td>
<td>BIOL 204</td>
<td>Plant and Animal Form and Function</td>
<td>55</td>
</tr>
<tr>
<td>Fall 2015</td>
<td>BIOL 204</td>
<td>Plant and Animal Form and Function</td>
<td>55</td>
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4. UNM COURSES TAUGHT BY MSB STAFF

<table>
<thead>
<tr>
<th>INSTRUCTOR</th>
<th>TERM</th>
<th>COURSE</th>
<th>TITLE</th>
<th>STUDENTS</th>
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<tbody>
<tr>
<td>T.F. Turner</td>
<td>Spring 2015</td>
<td>BIOL 487</td>
<td>Ichthyology</td>
<td>20</td>
</tr>
<tr>
<td>T.F. Turner</td>
<td>Spring &amp; Fall</td>
<td>BIOL 599</td>
<td>Master's Thesis</td>
<td>3</td>
</tr>
<tr>
<td>T.F. Turner</td>
<td>Spring &amp; Fall</td>
<td>BIOL 699</td>
<td>Dissertation</td>
<td>1</td>
</tr>
<tr>
<td>T.F. Turner</td>
<td>Spring &amp; Fall</td>
<td>BIOL 402/502</td>
<td>Ecology and Evolution of Fishes</td>
<td>10</td>
</tr>
<tr>
<td>T.F. Turner</td>
<td>Fall 2015</td>
<td>BIOL 386</td>
<td>General Vertebrate Zoology</td>
<td>24</td>
</tr>
</tbody>
</table>
5. COLLECTION MANAGEMENT

In July 2015, 14 pallets (6,638 lbs.) of AMCO shelving ledges were received and installed on shelves in the fluid preserved (ethanol) collections. These ledges were funded by the NM Department of Homeland Security and Emergency Management (Region 6 FEMA) to help prevent jars of irreplaceable specimens of fishes, amphibians, reptiles, and mammals, conserved in jars, from falling over the edges of the compactor shelves during seismic events. The Collection Manager was invited to join the UNM Pre-Disaster Planning Committee to represent the Museum of Southwestern Biology in the 2015 Plan. The PDM Plan was successfully submitted to the NM Department of Homeland Security and Emergency Management December 2015.

The Collection Manager was responsible for overseeing student projects for BIOL 487, Ichthyology class of 15 students: selection of fish specimens for species descriptions, training students to count and measure relevant morphological characters for diagnosing species, how to access digital libraries for original species descriptions and to interpret those original descriptions, how to use museum databases and mapping programs to determine distribution of species.

In 2015, five undergraduate Curatorial Assistants and two staff (Curatorial Assistant and the Collections Manager) processed specimens (48,865), genetic samples (1,501), and digitized field notes (21,852 pages). Data were entered by Curatorial Assistants (3,489 records, average 40 data points per record), quality checked by Collections Manager and assigned catalog numbers. The Collections Manager responded to 23 data requests, 5 requests for specimen identification, 19 requests for information on curatorial practice and supplies, gave 7 tours, and 3 presentations on MSB Division of Fishes and fish biology.

Collections were received from the following: Wyoming Dept. Game and Fish, USFWS NM/TX Fish and Wildlife Conservation Office (Albuquerque), US Bureau of Reclamation (Salt Lake City and Albuquerque), US Bureau of Land Management (Taos and Las Cruces), BioPark Aquatic Conservation Facility (Albuquerque), American Southwest Ichthyological Researchers, New Mexico Dept. Game and Fish, and New Mexico Dept. of Environment.

Research projects, in the Turner Lab, supported by MSB collection management: Rio Grande Silvery Minnow Genetic Monitoring, Nevada Bonytail Chub Genetic Monitoring, Mariana Islands Reef Fishes Genetic Monitoring, Gila Trout Genetics, Gila River Native Fishes, and Canadian River Native Fishes.

6. AWARDS, GRANTS, AND CONTRACTS: *F&A for MSB at 75%


Relationship of genetic diversity metrics and abundance in two Canadian River fishes, New Mexico. NM Dept. of Game and Fish. M.J. Osborne PI. 19 May 2015 to 31 Dec 2015 Total: $12,898


New Mexico Research Grant-High Priority. Graduate Program Student Association, University of New Mexico. R.A. Reese and T.F. Turner. Jan – May 2016. Total: $5,000


Razorback Sucker Diversity Assessment. T. F. Turner PI. UNM subcontract for Wayne State University, Detroit. 1 Aug 2014 to 30 Jun 2015. Total: $21,125

Effects of the Whitewater-Baldy Complex Fire in the Gila River Basin, New Mexico. T.F. Turner PI New Mexico Department of Game and Fish. 13 Dec 2013 to 31 Dec 2015. Total: $100,997

*Grant Agreement, R13AP40007: MSB Division of Fishes, Curatorial Services and Data Synthesis and Integration, San Juan River Restoration Implementation Program Specimens and Data. A.M. Snyder PI. US Bureau of Reclamation, Salt Lake City UT. 24 Jun 2013 to 30 Sep 2017. Total: $547,639. F&A: $95,837


*Accession and Integration of NMDGF Fish Collections in Museum of Southwestern Biology, Division of Fishes No. T-39-1. A.M. Snyder PI. New Mexico Department of Game and Fish. 1 Jul 2012 to 30 Jun 2015. Total: $60,000. F&A: $6,000.

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

**B. Journal Articles**


Burdett, Ayesha S; Fencl, Jane S; Turner, Thomas F. 2015. Evaluation of freshwater invertebrate sampling methods in a shallow aridland river (Rio Grande, New Mexico) Aquatic Biology (23) 2:139-146


C. Technical Reports


D. Theses/Dissertations Completed:


E. Work In Progress. NONE TO REPORT

F. Publications/Reports Based on MSB Specimens/Data by Outside Researchers


8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited Talks/Plenary NONE TO REPORT

B. Contributed Talks/Posters (Presenters’ name in bold)

**Brandenburg, W. H.**, B. Albrecht , R Kegerries , Adam L. Barkalow, Steven Platania, Mark McKinstry, Brian Healy, Emily Omana, and James Stolberg. Razorback Sucker *Xyrauchen texanus* Research and monitoring in the


C. Attendance at Professional Meetings

W. H. Brandenburg
• San Juan River Basin Recovery Implementation Program, Biology Committee. San Juan Public Lands Center, Durango, CO. February 2015.
• San Juan River Basin Recovery Implementation Program, Environmental Flows Workshop #1 for revised flow recommendations and operation of Navajo Dam. USFWS Ecological Services Office, Albuquerque, NM. February 2015.
• Glen Canyon Dam Adaptive Management Program, Technical Workgroup Meeting.

E.W. Carson
• Desert Fishes Council, 47th Annual Meeting, Death Valley CA 18-22 November 2015.

R.K. Dudley

M.A. Farrington
• San Juan River Basin Recovery Implementation Program, Biology Committee. San Juan Public Lands Center, Durango, CO. February 2015.
• San Juan River Basin Recovery Implementation Program, Environmental Flows Workshop #1 for revised flow recommendations and operation of Navajo Dam. USFWS Ecological Services Office, Albuquerque, NM. February 2015.
• San Juan River Basin Recovery Implementation Program, Coordination Committee. Fort Lewis College, Durango, CO. May 2015.

M.J. Osborne
• Desert Fishes Council, 47th Annual Meeting, Death Valley, California, 18-22 November 2015.
• 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno, Nevada, 15-19 July 2015.
• Colorado River Aquatic Biologist Annual Meeting

T.J. Pilger
• 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno, Nevada, 15-19 July 2015.
• Desert Fishes Council, 47th Annual Meeting, Death Valley, California, 18-22 November 2015.

D.L. Propst

R.A. Reese

S.T. Ross
• San Juan River Recovery Implementation Program, Biology Committee Meeting, Durango, CO, 19-20 February, 2015.
• 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno, NV. 15-19 July 2015

A.M. Snyder
• 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno NV. 12-15 July 2015.

T. F. Turner
• Colorado River Aquatic Biologists (CRAB) Meeting, Laughlin NV. 6-7 Jan 2015
• 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno NV. 12-15 July 2015
• Desert Fishes Council, 47th Annual Meeting, Death Valley CA. 18-22 Nov 2015

D. Service as Editor or on Editorial Board of a Journal
T.F Turner
• Contributing Editor – Aquatic Biology, since 2008

E. Service as Officer of Professional Society/Organization
E.W. Carson
• Conservation Committee for Cuatro Ciénegas, Desert Fishes Council. 2002 to present
• Committee for review of Desert Fishes Council Conservation Award applications. January 2015-present.
S.T. Ross
• Member, Long Range Planning and Policy Committee, American Society of Ichthyologists and Herpetologists, 2007-2015.
A.M. Snyder
• Board of Governors, American Society of Ichthyologists and Herpetologists, 2011-2016.
• Vice Chair, UNM Institutional Animal Care and Use Committee

T. F. Turner
• Board of Governors, American Society of Ichthyologists and Herpetologists, 2013-2018
• Chair, Stoye Award Committee, American Society of Ichthyologists and Herpetologists
• Guest editor, Oecologia
• Contributing editor, Aquatic Biology

9. OTHER PROFESSIONAL ACTIVITIES
A. Presentation to General Audience in a Scholarly Capacity
R.K. Dudley
• Native fishes of New Mexico. Ichthyology (BIOL 487L), T.F. Turner, University of New Mexico, Albuquerque, NM. 16 March 2015.

S. T. Ross

S.P. Platania

B. Presentations in a Scholarly Capacity at Hearings, Workshops, Legislative Committees
R.K. Dudley

C. Scholarly Service as a Member of a Local/State/Regional/Nat’l Committee, Panel
R.K. Dudley
• Member of Technical Subgroup, Rio Grande Silvery Minnow (Hybognathus amarus) Recovery Team, US Fish and Wildlife Service.

M.A. Farrington
• Appointed Member (Conservation Representative) for the Citizen Advisory Committee Habitat Stamp Improvement Program, New Mexico Department of Game and Fish.
• Member, Desert Fishes Council Planning Committee for 2016 annual meeting.

M.J. Osborne
• Member, Rio Grande Silvery Minnow Propagation and Genetics Workgroup
• Member, Rio Grande Silvery Minnow Adaptive Management Team
• Member, Desert Fishes Council Planning Committee for 2016 annual meeting.

D.L. Propst
• Chair, Desert Fishes Council Planning Committee for 2016 annual meeting.

S.T. Ross
• Member, Peer Review Panel, San Juan River Basin Recovery Implementation Program (SJRRIP) 2015
• Member, Desert Fishes Council Planning Committee for 2016 annual meeting.

A.M. Snyder
• Vice Chair and Scientific Member, UNM Institutional Animal Care and Use Committee. 2010-2016.
• Member, University of New Mexico Pre-Disaster Planning Committee

T.F. Turner
• Member, Desert Fishes Council Planning Committee for 2016 annual meeting
• Member, Gila Trout and Chihuahua Chub Recovery Team
• Member, Rio Grande Silvery Minnow Propagation and Genetics Workgroup
• Appointed UNM Representative to the Executive Committee, Middle Rio Grande Endangered Species Act Collaborative Program (MRGESACP).
• Member, Independent Science Advisory Board, Northwest Power and Conservation Council
• UNM Representative to NM Dept. of Game & Fish Statewide Conservation Plan meeting.
• Invited participant, Middle Rio Grande Conservancy District Conservation Planning meeting.
• Chair, Academic Program Review Team, Dept. of Biology, Florida International University
• UNM Animal Research and Care Committee
• UNM Chemical/Laboratory Safety Committee
• UNM Museum Council, College of Arts & Sciences representative
• UNM Research Council
• UNM Search Committee for Vice President of Research FRSO
• PAIS Building Executive Committee
• UNM Higher Learning Commission Accreditation Committee
• MSB Planning Committee
• MSB Publications Editorial board
• MSB Executive Committee

D. Journal Referee
E. W. Carson
• Aquatic Biology (1), Biological Journal of the Linnean Society (1), Conservation Genetics (1), and Current Biology (1)

M.J. Osborne
• Aquaculture Research (1) Transactions American Fisheries Society (1) Journal of Biogeography (1) PLOS One (1)

T.J. Pilger
• Journal of North American Fisheries Management (1)

T.F. Turner
• Oecologia (1), Canadian J Fisheries and Aquatic Sciences (2), Ecology of Freshwater Fishes (2), Evolutionary Applications (1), Aquatic Biology (2)

E. Hosting Professional Colloquia and Groups NONE TO REPORT
10. SERVICE
A. Symposia, Workshops, Conferences etc. Sponsored, Organized, Held, etc. NONE TO REPORT

B. Public Service
R.A. Reese: Mentorship
- Albuquerque Institute of Math and Sciences, San Juan River Fishes and Contaminants.
- UNM Center for Stable Isotope, assisted three student projects by running freeze drier equipment
A.M. Snyder: Lectures, Tours, and Public Engagement
- Silverton Middle School, Albuquerque
- UNM Global Education Office, Andrea Valenzuela Staff
- Jefferson Middle School, Albuquerque, Suzan Dunnunm, Faculty
- Montessori Rio Grande Charter School, Albuquerque Grades 1 to 3, Moss Templeton, Faculty
- UNM MSB Open House for Research Day 4:30pm to 6:00pm
- UNM Recruitment Undergraduate and Graduate Student Tour, Christopher Witt, Faculty
- UNM Museum Studies Tour, Loa Traxler, Faculty
- Sandia Preparatory School, Grade 11, Charles Buxbaum, Faculty
- UNM Honors College Seminar People and Animals UHON302-016

11. ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.
E.W. Carson

12. DONATIONS AND GIFTS RECEIVED (non-specimen)
NONE TO REPORT

13. CURRENT STAFF
A. Faculty/Staff
Evan W. Carson, Research Assistant Professor
Nathan R. Franssen, Postdoctoral Researcher
Megan J. Osborne, Research Assistant Professor
Tyler J. Pilger, Post-doctoral Research Fellow
Steven P. Platania, Associate Curator of Fishes
David L. Propst, Curatorial Associate and UNM Adjunct Professor of Biology
Stephen T. Ross, Curator Emeritus and UNM Adjunct Professor of Biology
Alexandra M. Snyder, Collections Manager
Maribel Solis, Staff Curatorial Assistant
Kendra Brunet Lecomte, Staff Curatorial Assistant
Thomas F. Turner, Curator of Fishes, UNM Professor of Biology, and UNM Associate Dean for Research

B. Graduate students
Museum Research Assistants-Graduate Student TA
Rosalee A. Reese Spring and Fall 2015

MSB Fishes Graduate Students, UNM Biology
Adam L. Barkalow, M.Sc. student
Michael A. Farrington, M.Sc. candidate
Rosalee A. Reese, M.Sc. candidate
David Camak, Ph.D. student

C. Undergraduate Student Employees, Lab and Museum
Kendra Brunet Lecomte, A&S Biology
Holly L Hayes, A&S Psychology
Shiloh Langwell, A&S Art
Larissa E. Garcia, UNM School of Business
Sarah Hogland, A&S Biology
Alyssa Sanchez, A&S Biology

14. MUSEUM ASSOCIATES
B. Research Associates
W. Howard Brandenburg, American Southwest Ichthyological Research, Albuquerque
Stephani Clark Barkalow, M.S. American Southwest Ichthyological Research, Albuquerque
James E. Brooks, US Fish and Wildlife Service, Albuquerque (Ret.)
Brooks M. Burr, Ph.D. Southern Illinois University, Carbondale
John M. Caldwell, M.S. New Mexico Dept. Game and Fish, Santa Fe
Michael Collyer, Ph.D. Western Kentucky University, Bowling Green
Thomas E. Dowling, Ph.D. Wayne State University, Detroit
Robert K. Dudley, Ph.D. American Southwest Ichthyological Research, Albuquerque
Michael A. Farrington, M.S. American Southwest Ichthyological Researchers, Albuquerque
Keith B. Gido, Ph.D. Kansas State University, Manhattan KS
Eliza I. Gilbert, M.S. American Southwest Ichthyological Research, Albuquerque
Jennifer L. Kennedy, American Southwest Ichthyological Research, Albuquerque
Astrid Kodric-Brown, Ph.D. Emeritus, University of New Mexico, Albuquerque
Richard L. Mayden, Ph.D. St. Louis University, St. Louis MO
Andrew Monie, M.S. New Mexico Dept. Game and Fish, Santa Fe
Kirk A. Patten, M.S. and J.D. New Mexico Dept. Game and Fish, Santa Fe
Norman Mercado Silva, Ph.D. El Colegio de la Frontera Sur, Unidad Chetumal & Univ. de la costa Sur, Univ. de Guadalajara
HERBARIUM

1. DIVISION HIGHLIGHTS

The UNM herbarium contained more than 132,910 accessioned specimens of vascular and non-vascular plants at the end of 2015. Each specimen represents the field efforts of the collector and is mounted individually by student employees, databased, stored, and available for web-based, in-house, or outgoing-loan access by the public.

This year our primary focus was on accomplishing much-needed curatorial tasks and modernizing our web-based database for better stability and accessibility by the public.

We have imaged over 18,000 specimens and have been working to make these images web-accessible through SEINet and iDigBio. The Southwest Environmental Information Network or SEINet (120,719 individuals visited the site in 2015; 237,151 total visits to http://swbiodiversity.org/seinet/, with over 1.25 million page views).

Interpretive activities or collections-related outreach includes tours for the public, including K-12 and UNM students. The Herbarium works closely with the Native Plant Society of New Mexico (NPSNM) and the New Mexico Rare Plant Technical Council, as well as local schools and the Bosque Ecosystem Monitoring Project.

2. TABLE OF COLLECTION USE

<table>
<thead>
<tr>
<th>Collection Growth (specimens catalogued &amp; entered in collection)</th>
<th>Loans</th>
<th>Visitors</th>
<th>Information Requests Personally Responded to</th>
<th>Publications Citing MSB Specimens</th>
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</thead>
<tbody>
<tr>
<td>2231</td>
<td>10</td>
<td>224</td>
<td>140</td>
<td>6</td>
</tr>
</tbody>
</table>

3. COURSES USING THE COLLECTIONS

- Fall 2015: Biol. 463-Flora of New Mexico-9 students (8 undergrads, 1 graduate student).
- Summer 2015: Water Resources 573-12 students (12 graduate students)

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty

Lowrey, T.K.

Fall 2015: Biol. 463-Flora of New Mexico-9 students

Graduate Student problems:

Fall 2015: Biol 599. Masters Thesis
Fall 2015: Biol 599. Dissertation
B. Graduate Students/ Research Associates

Bixby, R.J.

Courses taught:
Summer 2015: WR 573 (Water Field Methods) (12 students)
Spring, Summer, Fall 2015: BIOL 551- Research Problems (2 students)

Guest lectures:
BIOL 495 (Limnology): “Bacterioplankton”, undergraduate and graduate, Spring 2015
BIOL 496 (Limnology lab): Algae lab, Spring 2015

5. COLLECTION MANAGEMENT

The UNM Herbarium is remounting specimens from the early 1900s. These specimens, part of the Brother Arsene Collection, were imaged in their original condition and then removed from their acidic paper. Once free they were mounted onto acid-free paper using modern techniques to preserve both the specimen and the historic label.

We processed and added 2231 new acquisitions to the collection. Our division received 5 gifts from various collectors and institutions, resulting in an increase of 752 accessioned specimens. All records were databased and made available for public access via SEINet. In addition we’ve joined a public data portal that serves our Bryophyte collection: Consortium of North American Bryophyte Herbaria.

The herbarium made 10 loans and logged more than 220 visits from the botanical community as well as group visits by schools and organizations. We average 2-3 information requests per week by e-mail and/or phone, and the Biodiversity and SEINet websites receive many hits per month to access specimen data for herbaria in the state.

6. AWARDS, GRANTS, AND CONTRACTS

UNM Herbarium (Museum of SW Biology) Rare Plant of Survey of State Lands on White Mesa, Sandoval County $7,500

A Floristic Inventory of the Vascular Plants of the Ladder Ranch, New Mexico. $1,500


7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes


Journal Articles


**B. Curriculum Development**


**C. Technical Reports**


**By Herbarium Associates:**


**F. Work In Progress**


**Ph.D. Advisement:**


And is a committee member for Karen Wright, Ph.D. candidate.

**Becky Bixby:**

Shannon Rupert, 2008-present, present, Bixby, co-advised with Cliff Dahm

Committee member for doctoral students:

John M. Roegsen, Ph.D., Department of Biology, University of New Mexico, 2013-present

Virginia Thompson, M.S., Department of Biology, University of New Mexico, 2010-present

**M.S. Advisement:**

Committee Member:
Becky Bixby:
Advisor:

April Fox, Master in Water Resources, 2014-present.


Undergraduate Advisement:

Alex Clark, University of New Mexico, directed study, 2012-present. “Epiphytic diatom patterns on macrophytes in the East Fork of the Jemez River.” [Undergraduate Travel Award, Society for Freshwater Science, $600, Honors thesis].

G. Publications/Reports Based on MSB Specimens (including outside researchers)

4) Prather, L. Alan, and Jessie A. Kieth. 2003. Monarda humilis (Lamiaceae), a new combination for a species from New Mexico, and a key to the species of section Cheilyctis. UNM Loan returned in 2015.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/Plenary Talks and/or Seminars
B. Contributed Talks/Posters


C. Attendance at Professional Meetings
Bixby, R.J.
Society for Freshwater Science, Milwaukee, WI, May 2015
North American Diatom Symposium, Beaver Island MI September 2015

D. Service as Editor or on Editorial Board of a Journal
Bixby, Guest editor and co-lead, “Fire impacts on freshwater ecosystems” special issue, *Freshwater Science* (16 accepted manuscripts), published December 2015

D. Service as Officer of Professional Society/Organization
Bixby: R.J.
Co-Chair, Public Information and Publicity Committee, Society for Freshwater Science, 2013-present
Research Associate, New Mexico Museum of Natural History and Science, 2014-present.

Lowrey, T.K.
Research Associate, Missouri Botanical Garden, St. Louis, MO. 1985-present.


9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity (*presenter)
Bixby, participated in MSB Brown bag talk for Darwin Day, Feb 2015

Bixby, “The who and where and how of algal biodiversity” Curator Coffee, New Mexico Museum of Natural History and Science, April 2015

B. Presentations in a Scholarly Capacity at Hearings, Workshops, Legislative Committees, etc.

Master Naturalists Program – Bernalillo County, New Mexico:


C. Scholarly Service as a Member of a Local/State/Regional/National Committee, Panel, etc.

Bixby, R.J.
Science Consultant, Energy in the Bosque curriculum development, supplementing Bosque Education Guide, Fall 2015

Co-PI, Bioalgal component, NM EPSCoR “Energize New Mexico grant, 2015-present.

UNM representative (appointed), Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI), 2013-present
Science-Cyberinfrastructure liaison, Bioalgal energy group, NM EPSCoR “Energize New Mexico” grant, 2013-present

Lead, graduate student externship program (exchange program among NM universities), NM EPSCoR “Energize New Mexico” grant, 2013-present

Member, Literature Review Committee, Society for Freshwater Science, 2013-present

Member, American Society of Limnology and Oceanography
Member, Ecological Society of America
Member, International Society for Diatom Research
Member, New Mexico Academy of Science
Member, Organization for Tropical Studies
Member, Phycological Society of America
Member, Society for Freshwater Science

Lowrey, T.K.
Founding Member, New Mexico Rare Plant Technical Council
Member, Native Plant Society of New Mexico
California Botanical Society, 2008-present.
American Society of Plant Taxonomists, 1975-present.

Sivinski, R.
Member, New Mexico Rare Plant Technical Council
Member, Native Plant Society of New Mexico.
Regional Reviewer for the Flora of North America Project.

Tonne, P.C.
Founding Member, New Mexico Rare Plant Technical Council.
Member, Native Plant Society of New Mexico

D. Journal Referee
Bixby, R.J.
NSF (Biological Oceanography Program)-1
Algal Research-1

Lowrey, T.K.
Systematic Botany-1
Phytotaxa – 1
American Journal of Botany-1
Phytoneuron-1

10. SERVICE
B. Public Service
Lowrey, T.K.
National Science Foundation – Systematics Panelist
Institute of Museum and Library Services - Panelist

Lowrey, T.K., Phil Tonne, and Bob Sivinski:
Plant Identification for the general public in the UNM Herbarium.
Tonne, P., Joy Avritt, and Bob Sivinski. Rare plant conservation and restoration efforts in New Mexico. Current focus is on the conservation botany of the Todsen’s Pennyroyal (*Hedeoma todsenii*).

C. University and Departmental Committees
Lowrey, T.K.
Committee on Governance, Co-chair.
Provost’s Committee on Academic Success
Committee on Academic Assessment
Graduate Policy Committee

Curator, UNM Herbarium, Museum of Southwestern Biology

Bixby, R.J.
Program committee (appointed), Water Resources Program

11. ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.
Alex Clark (undergraduate), Department of Biology Microbiology Award ($1000)

12. DONATIONS AND GIFTS RECEIVED
$500 annually. Native Plant Society donation for New Mexico Herbaria.
Plant Specimens
Wood Block Collection – local and world-wide specimens – David Bleakly

13. CURRENT STAFF (List Faculty/Staff, Students and Volunteers)

A. Faculty/Staff
Lowrey, T.K., Curator and Associate Dean of Graduate Studies.
Tonne, P., Collection Manager

C. Undergraduate Student Workers and Volunteers
Alex Clark, Student and employee for Bixby, Senior (Fall and Spring 2015)

14. MUSEUM ASSOCIATES
A. Curatorial Associates
Sivinski, R., Former New Mexico State Botanist – Forestry Division EMNRD

B. Research Associates
Bixby, R.J. UNM Research Assistant Professor, Diatoms
Carter, J.L., Emeritus Professor, Colorado College and Botanist
Dunmire, W., Retired U.S. National Park Service and Author
Keller, C., Retired, Los Alamos National Laboratory
Knight, P., Botanical Consultant
DIVISION OF MAMMALS

1. DIVISION HIGHLIGHTS.

D. Collection Growth. The DOM added 14,364 new specimens to its catalogue during 2015 and now contains 282,206 cataloged specimens. The collection is the 2nd largest collection in the Western Hemisphere and in the top 3 worldwide. New accessions of mammalian material amounted to >12,000 specimens.

The continued exceptional growth is the result of several facets of our operation:

a. Specimen growth through fieldwork
   i. Directed specimen-based studies within Joseph Cook’s research program.
   ii. Highly successful fieldwork in a wide variety of projects spanning the Western Hemisphere, eastern Asia, and collaborations with state and federal resource agencies in the western US and Canada. Work primarily sponsored by the National Science Foundation, National Institutes of Health, USDA Forest Service and US Fish and Wildlife Service.
   iii. New initiatives focused on building the collection in key geographic regions and for critical taxa.

b. Specimen growth through donation
   i. A well-developed network of researchers and agencies worldwide are now heavily invested in the DOM, by continuing to deposit their material here and later track and retrieve information via the Arctos database.
   ii. Donations of personal collections from individual researchers.
   iii. Transfer of collections from other institutions (i.e. NMMNHS, USGS).

Continued growth and use, in addition to recognition by several agencies that DOM is a primary repository for research material, points to the strength and good standing of this infrastructure in the greater scientific community.

E. Training in specimen based research and curation. Training remains one of the integral goals of the DOM. Students gain experience in bioinformatics, natural history collection preparation and curation, and field and laboratory based research. Students were involved in all activities of the division during 2015.

a. 21 UNM students worked in the division in 2015
   i. 2 graduate students
   ii. 10 paid undergraduates
   iii. 9 volunteer undergraduates
   iv. Of these 21:
      1. 15 were females
      2. 6 males
      3. 8 were from under-represented groups
b. 16 Albuquerque Public Schools high school interns/volunteers

F. Publications utilizing MSB DOM specimens or data. The DOM collection continues to be utilized heavily in a wide range of disciplines and is the basis for a large number of peer-reviewed publications and agency reports. Tracking all publications that utilize our specimens is difficult, as not all authors are careful to acknowledge use of DOM specimens, so number reported is an underestimate.
During 2015 DOM specimens were cited or specimen data was utilized in at least 69 papers published in 51 journals and 3 books:

1. Achievements in the Life Sciences
2. Biological Conservation
3. Biological Journal of the Linnean Society
4. BioScience
5. Bulletin of the Buryat State University
6. Central American Biodiversity
7. Cladistics
8. Collection Forum
9. Comparative Parasitology
10. Conservation Genetics Resources
11. Current Biology
12. Current opinion in virology
13. Ecography
14. Ecological Applications
15. Epidemiology and infection
16. Folia Zoologica
17. Gayana
18. Genome biology and evolution
20. Hystrix, the Italian Journal of Mammalogy
21. Infection, Genetics and Evolution
22. Introduction to forensic anthropology (book)
23. Journal for Nature Conservation
24. Journal of Biogeography
25. Journal of Clinical Virology
27. Journal of Mammalogy
28. Journal of medical virology
29. Journal of Zoological Systematics and Evolutionary Research
30. Landscape Ecology
31. Mammalia
32. Mammals of South America, Volume 2: Rodents (book)
33. MANTER: Journal of Parasite Biodiversity
34. Molecular biology and evolution
35. Mongolian Journal of Biological Sciences
36. Museum of Texas Tech University, Occasional Papers
37. Northwest Science
38. Parasitology research
39. PeerJ
40. Philosophical Transactions of the Royal Society
41. PloS one
42. Proceedings of the Biological Society of Washington
43. Proceedings of the Oklahoma Academy of Science
44. Revista Mexicana de Biodiversidad
45. Theraya
46. The biology and identification of the coccidia (Apicomplexa) of marsupials of the world (book)
47. Trends in parasitology
48. Vector-Borne and Zoonotic Diseases
49. Virus research
50. Western North American Naturalist
51. Zoologia (Curitiba)
52. Zoological Journal of the Linnean Society
53. Zoological Studies
54. Zootaxa

G. Theses/Dissertations.
   a. In 2015, at least 6 theses or dissertations from 6 institutions (UNM, University of California-Berkeley, Texas Tech University, Andrews University, Universidad del Valle (Cali, Colombia), and Universidad de la Republica (Montevideo, Uruguay), were completed that utilized MSB mammal specimens.

H. Arctos database and collection accessibility. The Arctos database is a cutting-edge relational database that continues to provide an invaluable resource for researchers, educators, public health workers, and natural resource managers worldwide. Arctos is web-accessible and greatly enhances the visibility of the MSB.
   a. Web visits to Arctos db tracked via Google analytics = 115,955 visits
   b. 7,641 visitors referred to our site were from GenBank.
   c. From 200 countries
d. Queries containing records from DOM, DGR Mammals, or DOM observations:

<table>
<thead>
<tr>
<th>Collection</th>
<th>Queries</th>
<th>Specimen Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGR Mammals</td>
<td>898</td>
<td>81,844</td>
</tr>
<tr>
<td>MSB Mamm Obs</td>
<td>124</td>
<td>288</td>
</tr>
<tr>
<td>DOM</td>
<td>39,649</td>
<td>17,293,086</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>40,671</strong></td>
<td><strong>17,375,218</strong></td>
</tr>
</tbody>
</table>

I. **Integration and Geo-referencing of USGS collection** – This collection is now completely catalogued, installed, and geo-referenced.

J. **Denver Museum case acquisition** – The MSB received a donation of 149 Lane style museum cases (about $150,000 value). Of these 2/3 went to the DOM and 1/3 to Birds. These have allowed us to double stack the entire collection space and replace old upright cabinets that were holding Perissodactyla and Artiodactyla collections.

K. **New Mexico Museum of Natural History and Science collection** – Official transfer of the 6000 mammal voucher specimens in their collection was begun. The tissue collection was previously transferred.

2. **COLLECTION USE**

<table>
<thead>
<tr>
<th>Collection Growth (specimens catalogued)</th>
<th>Loans (outgoing)</th>
<th>Loans (incoming)</th>
<th>Visitors</th>
<th>Information Requests Personally Responded to</th>
<th>Publications Citing MSB DOM Specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>14,364*</td>
<td>35(652) / 59(1,653)**</td>
<td>3</td>
<td>570***</td>
<td>&gt;500****</td>
<td>69</td>
</tr>
</tbody>
</table>

* Total growth (Newly cataloged/converted from DGR catalog)

** Loans originating in DOM / loans of mammal tissue originating in DGR Combined total of 96 loans of 2,305 specimens of traditional voucher specimens, skin clips and tissue samples.

*** 61 visiting researchers from 17 institutions, 138 students and 16 teachers from 8 K-12 schools, 13 UNM classes (165 students and 10 instructors), 181 other visitors.

**** Estimate of email or phone requests to Jon Dunnum and Joe Cook.

4. **COURSES USING THE COLLECTIONS**

**UNM Classes receiving loans of material for educational purposes (14 classes serving 1,009 students)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 204L</td>
<td>Plant and Animal Form and Function. Spring</td>
<td>(180 students)</td>
</tr>
<tr>
<td>BIOL 204L</td>
<td>Plant and Animal Form and Function. Fall</td>
<td>(180 students)</td>
</tr>
<tr>
<td>BIOL 203L</td>
<td>Ecology and Evolution. Spring</td>
<td>(240 students)</td>
</tr>
<tr>
<td>BIOL 203L</td>
<td>Ecology and Evolution. Fall</td>
<td>(240 students)</td>
</tr>
<tr>
<td>Biol 499/599</td>
<td>Trop Biol-Darien Panama</td>
<td>(15 students)</td>
</tr>
<tr>
<td>BIOL 386L</td>
<td>General Vertebrate Zoology. Fall</td>
<td>(30 students)</td>
</tr>
<tr>
<td>BIOL 386L</td>
<td>General Vertebrate Zoology. Spring</td>
<td>(40 students)</td>
</tr>
<tr>
<td>NTSC 262L</td>
<td>Spring</td>
<td>(32 students)</td>
</tr>
<tr>
<td>Course/Program</td>
<td>Students</td>
<td>Instructors</td>
</tr>
<tr>
<td>----------------------------------------------------</td>
<td>----------</td>
<td>-------------</td>
</tr>
<tr>
<td>NTSC 262L – Fall</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>MSST 507</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>BIOL 599 – Masters Thesis. Spring</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 599 – Masters Thesis. Fall</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>BIOL 699 – Dissertation. Spring</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>BIOL 699 – Dissertation. Fall</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

**UNM courses or programs using collection through visits or staff presentations (248 students, 17 instructors from 15 classes/programs)**

<table>
<thead>
<tr>
<th>Course/Program</th>
<th>Students</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART Studio 141 (Intro art/ecol), Spring</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>ART Studio 141 (Intro art/ecol). 2 sections, Fall</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>ART Land Arts</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>ART /ART HIST – Drawing I. 2 sec, Spring/Fall</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>ART -Adv painting and drawing</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>ANTRO Zooarchaeology</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>ANTRO 350/450 Paleoecology</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>GEOG 350</td>
<td>21</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 499/599 (Tropical Biology)</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>BIOL General Vertebrate Zoology</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Photography 187</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>MSST 476/576 Mus Studies (Traxler)</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>UNM Biology graduate student orientation</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>UNM Honors - Humans and Animals</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>UNM PREP Program</td>
<td>13</td>
<td>1</td>
</tr>
</tbody>
</table>

**K-12 schools and educational groups: 138 students, 16 teachers from 8 schools.**

<table>
<thead>
<tr>
<th>School/Program</th>
<th>Students</th>
<th>Instructors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jefferson Middle school</td>
<td>65</td>
<td>5</td>
</tr>
<tr>
<td>Montessori on the Rio Grande</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Sandia Prep</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Amy Biehl High School</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Albuquerque Academy</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Monte Vista Elementary</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Estancia High School</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Silverton Middle school, Colorado</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

**Visiting researchers: 61 from 17 institutions or departments**

<table>
<thead>
<tr>
<th>Institution</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNM Dept of Anthro/Contract Archaeology</td>
<td>10</td>
</tr>
<tr>
<td>UNM Dept of Biology</td>
<td>10</td>
</tr>
<tr>
<td>University of Nebraska-Kearney</td>
<td>2</td>
</tr>
<tr>
<td>University of Nebraska-Omaha</td>
<td>1</td>
</tr>
<tr>
<td>Eastern New Mexico University</td>
<td>1</td>
</tr>
<tr>
<td>Texas Tech University</td>
<td>4</td>
</tr>
<tr>
<td>National University of Mongolia</td>
<td>1</td>
</tr>
<tr>
<td>USGS</td>
<td>6</td>
</tr>
<tr>
<td>Northern Arizona University</td>
<td>1</td>
</tr>
<tr>
<td>Florida State University</td>
<td>2</td>
</tr>
<tr>
<td>Seattle Central College</td>
<td>2</td>
</tr>
<tr>
<td>University of North Texas</td>
<td>1</td>
</tr>
<tr>
<td>Coastal Carolina</td>
<td>1</td>
</tr>
<tr>
<td>Yavapai College</td>
<td>1</td>
</tr>
<tr>
<td>New Mexico Museum of Natural History/Science</td>
<td>1</td>
</tr>
</tbody>
</table>
New Mexico State University (1)
UNM Maxwell Museum (1)
Other (15)

Other visitors: 181
UNM Presidents Office (8)
UNM PREP Program (13)
UNM Sponsored Projects Office (3)
UNM Scholar Day tour (25)
UNM Research Day Open House (75)
Bernalillo Co. Master Naturalists Program (30)
New Mexico Museum Natural History (4)
Texas Tech University (2)
Humboldt State University (1)
Wartburg College (2)
Other (18)

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty/Collection Managers

Cook, J. A.

Spring:

Biology 561 Tropical Biology 2
Biol 502 006 Animal Hybridization 3
Biol 502-004 Climate Change and Museums 5
Bio 551 Research Problems 1
Biol 699 Dissertation 4
Biol 402/502 006 Animal Hybridization 4
Biology 461 Tropical Biology 14

Fall

Biol 502 053 Human Dimension of Natural History 2
Biol 502-055 Evolutionary Genomics 2
Biol 551 Research Problems 1
Biol 599 Masters thesis 2
Biol 699 Dissertation 4
Biol 402 053 Human Dimension of Natural History 6
Biol 489 Mammalogy 15

Dunnum, J.L.
Biol 502-037 – Mammal Scientific Preparation, Spring 2015

Student Mentoring

Undergraduates

Bell, K.C.

Colella, J.
1. Lindsey Frederick, Marten morphometrics.
2. Ellie Johnson, ermine morphometrics.

Greiman, S.
1. Donavan Jackson, masters student, phylogeographic analyses of the widespread North American meadow vole (Microtus pennsylvanicus).
2. Victoria Crosby, High School Junior, state science fair project studying the parasites of the North American pygmy shrew, Sorex hoyi, using morphology and DNA.
3. Nicolette Ochoa, recent bachelors graduate supported by the NIH PREP program, studying the phylogeography of Mongolian shrews and their associated cestodes.
4. Kaylen Jones, a master’s student in Museum studies at UNM, working as an artist on new species descriptions of mammalian cestodes.

High School Students

Dunnum, J./A. Raniszewski
1. Caroline Pierotti (Albuquerque High)
2. Irving Flores (Amy Biehl)
3. Serina Altamirano (Amy Biehl)

5. COLLECTION MANAGEMENT
The DOM received 100 new accessions of material (>12,000 specimens) and added approximately 14,364 specimens to its catalogue during 2015.
The DOM added new specimens to its catalogue during 2015 and now contains 282,206 cataloged specimens.
The collection is the 2nd largest collection in the Western Hemisphere and in the top 3 worldwide. New accessions of mammalian material amounted to >12,000 specimens.

Current projects generating specimens for DOM
- Incorporation of other collections (USGS, NMMNHS)
- CIIBA – NSF
- Mexican wolf reintroduction – USFWS
- Mongolian Vertebrate Parasite Project – NSF
- Panama Hantavirus – ICIDR NIH
- Bighorn Sheep Reintroduction Program – NMGF
- ISLES---USDA Forest Service
- Black bear/elk predation project – NMDGF
- Robert Rausch parasite host collection
- Mammalogy and Tropical Biology classes
- Troy Best collections
- Survey of the Greater Gila ecosystem

The majority of staff time was spent:
- Development of the Arctos database.
- Reorganizing and relabeling of dry collections.
- Training student technicians in museum work.
- Preparation, cataloging and installation of museum specimens.
• Data entry for the incoming accessions.
• Filling information requests.
• Processing loan material.
• Assisting with UNM courses utilizing MSB specimens and facilities.
• Outreach to K-12 schools.

6. AWARDS, GRANTS, AND CONTRACTS

Bell, K. C.
1. ASM Fellowship, American Society of Mammalogists - $7,500
2. Ernst Mayr Award, Evolution, Society of Systematic Biologists

Carrion, C.

Colella, J.
1. Center for Evolutionary and Theoretical Immunology - $10,000.00
2. American Society of Mammalogists, Grant In Aid of Research - $1,500.00
3. Caroline G. Grove Summer Research Scholarship - $2,000.00
4. Joseph Gaudin Fellowship - $500.00

Cook, J.A.
1. USGS Specimen Georeferencing Supplement - $50,000 (2015)
2. USGS Arctic Supplement - $35,000
3. NM Department of Homeland Security, Museum Seismic Mitigation Supplement (co-PI) - $15,000
4. NSF-REU

Jackson, D.
1. Student Research Grant (SRG), The University of New Mexico, Graduate and Professional Student Association, Fall 2015

Dunnum, J. L.
1. F15AP01070. Improved archiving of Mexican Wolf Specimens. USFWS. (2015-2016) - $10,000
2. USGS Specimen Georeferencing (7/1/14-3/31/15). Co-PI. $49,980. USGS

Frederick, L.
1. Joseph Gaudin Research Scholarship UNM - $1000

Krejsa, D.
1. UNM Biology Department, Joseph Gaudin Award — $500
2. UNM Biology Department, Grove Award — $2,000
3. UNM, Biol Grad Student Assoc, Graduate Resource Allocation Committee Travel Award — $150
4. UNM, Student Research Grant, Graduate and Professional Student Association Research Travel Award — $500
5. American Society of Mammalogists travel grant - $300

McLean, Bryan
Theodore Roosevelt Memorial Grant, American Museum of Natural History - $2275
Student Research Grant, UNM Graduate and Professional Student Assoc. - $500
Professional Development Grant, UNM Graduate Student Professional Association - $500
Travel Grant, UNM Graduate Research Allocations Committee - $225

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

Dunnum, J.L.

B. Journal Articles

Abrahamson, B.L.

Bell, K.C.

Cook, J. A.


McLean, B.
Weber, J.


C. Web-Based
All publications in the MSB series are available via free-download from our website.

D. Technical Reports
Annual Report, Division of Genomic Resources, Museum of Southwestern Biology
Annual Report, Division of Mammals, Museum of Southwestern Biology
Annual Director’s Report, Museum of Southwestern Biology
Annual (4) NSF reports

E. Theses/Dissertations Completed
Abrahamson, Bethany L. Master’s degree, Museum Science.

F. Work In Progress (Only in press and already submitted)
Bell, K.C.


Dunnum, J.

1. Cook JA, McLean BS, Jackson DJ, Colella JP, Greiman SE, Tkach VV, Jung TS, Dunnum JL. First record of the Eurasian Least Shrew (Sorex minutissimus) and associated helminths from Canada: new light on northern Pleistocene refugia. in review at Canadian Journal of Zoology.

Cook, J.A.
2. Cook JA, McLean BS, Jackson DJ, Colella JP, Greiman SE, Tkach VV, Jung TS, Dunnum JL. First record of the Eurasian Least Shrew (Sorex minutissimus) and associated helminths from Canada: new light on northern Pleistocene refugia. In review at Canadian Journal of Zoology

Cook, J.A.


Kang, Hae Ji, Se Hun Gu, Joseph A. Cook, and Richard Yanagihara. 2016. Dahonggou Creek Virus, a Divergent Lineage of Hantavirus Harbored by the Long-tailed Mole (Sapontyonx fusicaudus). Tropical Medicine and Health


Jackson, D.
2. Cook, J.A., B.S. McLean, D.J. Jackson, J.P. Colella, S.E. Greiman, V.V. Tkach, T.S. Jung and J.L.
Dunnum. First Record of the Eurasian Least Shrew (*Sorex minutissimus*) and Associated Helminths from Canada: New Light on Northern Pleistocene Refugia. Accepted, Canadian Journal of Zoology.

McLean, B.

2. McLean, B.S. Urocitellus parryii. in review at Mammalian Species.
4. McLean, B.S., Jackson, D.J. and Cook, J.A. Rapid divergence and gene flow at high latitudes shape the history of Holarctic ground squirrels (Urocitellus). in review at Molecular Phylogenetics and Evolution

G. Publications/Reports Based on MSB Specimens/Data by Outside Researchers


29. Gibb, Gillian C., Fabien L. Condamine, Melanie Kuch, Jacob Enk, Nadia Moraes-Barros, Mariella Superina, Hendrik N. Poinar, and Frédéric Delsuc. "Shotgun Mitogenomics Provides a Reference


Theses/Dissertations

4. Keith, Megan S. "Phylogenetic relationships, divergence and radiation within the subfamily Neotominae (Rodentia: Cricetidae)." PhD diss., Texas Tech University, 2015.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/ Plenary talks

Cook, J.A.
2. “Genomic Archives: Critical Infrastructure for Emerging Pathogen Detection”. Veterans Administration, Cooperative Studies Program Clinical Research Pharmacy Coordinating Center, Albuquerque, 17 Nov. 2015

Dunnum, J.L.

B. Contributed Talks/Posters

Bell, K.C.
Carrion, C.

Colella, J
   • Awarded “Best Student Presentation”

Cook, J.A.
5. SPNHC

Dunnum, J.L.
1. Campbell, M.L., J.L. Dunnum, and J.A. Cook. 2015. The Role of Museum-Based Biorepositories and Biodiversity Databases in Infectious Disease Discovery and Epidemiology: An Example from the
Division of Genomic Resources, Museum of Southwestern Biology. International Society for Biological and Environmental Repositories (ISBER) meeting. Phoenix, AZ. 5-9 May.


Frederick, L.

Jackson, D.

Jones, Amanda K.

Kredja, D.

McLean, B.

C. Attendance at Professional Meetings

Bell, K.C.
American Society of Mammalogists conference, Jacksonville, FL (15 June 2015). Evolution, Guarujá, Brazil, June 2015

Carrion, C.

Cook, JA.

Colella, J.

Dunnum, J.L.

Jackson, D.

Jones, A.
Kresja, D.

McLean, B.

D. Service as Editor or on Editorial Board of a Journal

Cook, J.A.

E. Service as Officer of Professional Society/Organization

Cook, J.A.
Board of Directors, American Society of Mammalogists, Member, 2011-2017 (re-elected in 2014 to 3 year term)

Board of Directors, Natural Science Collections Alliance 2011-2017 (re-elected in 2014)

UNM Representative to the Colorado Plateau Cooperative Extension Studies Unit (federal). 2011-2015 (appointed)

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentations to General Audience in a Scholarly Capacity

Seminars

Cook, J.A.


3. Public Presentation, “Building Research Infrastructure for Mongolia” American Center for Mongolian Studies and US Ambassador, American Culture and Information Center, Ulaanbaatar, Mongolia September 1, 2015

4. UNM STEM Workshop Presentation

Dunnum, J.

Workshops

Cook, J.A.
1. Co-Organizer, AIM-UP! Human Dimensions of Natural History, Sevilleta Field Station.

C. Scholarly Service as a Member of a Local/State/Regional/National Committee, Panel, etc.
Bell, Kayce

2013 - present. Program Committee, American Society of Mammalogists.

Cook, J.A.

1. 2011-2015 - Chair, MSB Executive Committee
2. 2003-2015 - Editorial Board, MSB Publications Series
3. 2012-2015 - Chair, Conservation Awards Committee, American Society of Mammalogists
4. 2009-present - Steering Committee, ARCTOS on-line museum database
5. 2014-present - Steering Committee, National Integrated Biocollections Alliance
6. NSF sponsored RCN
7. External T&P Reviewer, Univ of Minnesota.
8. External T&P Reviewer, Univ of Montana.
9. External T&P Reviewer, CUNY.
11. External T&P Reviewer, SUNY-Buffalo.
12. UNM Institutional Representative-- Colorado Plateau-Cooperative Extension Service Unit
13. National Science Foundation Panel member, 29 proposals.

Dunnum, J.L.

1. Systematic Collections Committee, American Society of Mammalogists
2. Oliver Pearson Award committee, American Society of Mammalogists
3. Arctos database advisory committee

D. Journal Referee

Bell, K

BMC Evolutionary Biology (1)

Cook, J.A.

Canadian Field-Naturalist
Mammalian Species
Molecular Phylogenetics and Evolution
Conservation Biology; Proceedings of the National Academy of Sciences
Northwestern Naturalist
Journal of Biogeography
J. Mammalogy

Dunnum, J.L.

Journal of Zoo and Wildlife Medicine (1)
Ecosphere (1)
Vector-borne Zoonotic Diseases (1)

E. Hosting Professional Colleagues and Groups

We hosted 61 visiting academics and professionals from 17 institutions or departments and they primarily visited collections that we curate for research purposes.
Cook hosted the following individuals:
Dr. Eric Hoberg, USDA National Parasite Lab
Nyamsuren Batsaikhan, National University of Mongolia
Gana Wingard, Denver Museum of Natural History

10. SERVICE

B. Public Service

General

A significant portion of DOM staff time is spent providing information or assistance to the public either during visits to the collection, through phone calls, emails or through outreach endeavors. This is an important and ongoing activity of all DOM personnel.

Colella, J
1. Presentation at Adobe Acres Elementary school on NM mammals.

Cook, J. A.
1. Divisional tours and presentations – provided educational tours and information for many visitors and several school groups.
2. Sponsor of Two Master Naturalists, Bernalillo Co Open Space--Master Naturalist Program

Dunnum, J. L.
1. Divisional tours and presentations – provided educational tours and information for 570 visitors (61 visiting researchers from 17 institutions, 138 students and 16 teachers from 8 K-12 schools, 13 UNM classes (165 students and 10 instructors), 181 other visitors).
2. Tour and presentation on NM mammals and mammalian adaptations for Bernalillo County Master Naturalists program.
3. Presentation on mammalian adaptations to Jefferson Middle School gifted science classes.
4. Jefferson Middle School science fair judge
6. Board member – Albuquerque High School band.
7. Contributed specimens and text for NMMNHS exhibit "Cabinet of curiosities".

Jackson, D.
1. Presentation: Pursuing Science as a Native American at Wingate High School.
2. Presentation: Mammal identification in owl pellets, Jefferson Middle School science classes.

Krejsa, D.
1. Jefferson Middle School Science Fair Judge 1/23/2015

C. University and Departmental Committees

Cook, J.A.
1. Chair, MSB Executive Council*
2. Curator, Division of Genomic Resources, Museum of Southwestern Biology
3. Curator, Division of Mammals, Museum of Southwestern Biology
4. Chair, Annual Faculty Evaluation Committee*
5. Chair, Graduate committees - 13 students
6. Graduate committee – 11 other students
7. College of Arts and Sciences, Deans and Directors Council
8. UNM Museum Studies Exec Council
9. UNM Museum Council—Chair*

**Dunnun, J.L**
1. MSB Space Committee

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12. DONATIONS AND GIFTS RECEIVED

- Virginia Rausch $4000
- New Mexico Museum of Natural History and Science (ca. 6,000 mammalian voucher specimens)
- 149 Lane museum cases (value ~$150,000)

13. CURRENT STAFF

**A. Faculty/Staff**

- Joseph A. Cook, Curator
- J.L. Dunnun, Collection Manager
- M.A. Bogan, Emeritus Curator
- J.S. Findley, Emeritus Curator
- Stephen O. MacDonald, Curator II (retired)
- Adrienne Raniszewski, Curatorial Assistant

**B. Graduate students**

- **Bell, Kayce.** 5th year Ph.D. student. Systematics and phylogeography of chipmunk lice.
- **McLean, Bryan.** 4th year Ph.D. student. Systematics and phylogeography of ground squirrels.
- **Rearick, Jolene.** 9th year Ph.D. Phylogeography and molecular evolution of freeze tolerance in *Lithobates sylvaticus*.
- **Jessica Weber.** 5th year Ph.D student. Hypoxia tolerance and adaptive responses in Caviomorph rodents.
- **Colella, Jocie.** 3rd year Ph.D student. Patterns of phylogeography, hybridization and diversity of mustelids (*Mustela ermine* and *Martes* spp.) across northwestern North America.
- **Liphardt, Schuyler.** 1st year Master’s student. Hantavirus evolution.
- **Jones, Amanda.** 2nd year Master’s student. Mammals of the Gila River ecosystem.
- **Jackson, Donavan.** 1st year Master’s student. Phylogeography of the meadow vole *Microtus pennsylvanicus*.
- **Krejcsa, Diana.** 2nd year Master’s student. Phylogeography and population genetics of North American wolverine (*Gulo gulo luscus*).

**Grad Student workers**

3. Schuyler Liphardt
4. Dianna Krejcsa
C. Undergraduate Student Workers and Volunteers

**Undergraduate Workers (10 total)**
1. Ellie Johnson
2. Lena Bolling
3. Richard Apodaca
4. Shannon O’Brien
5. Stephanie Mladinich
6. Victoria Viola
7. Cindy Smoak
8. Kaylen Jones
9. Lindsey Frederick
10. Nick Freymueller

**Volunteers (37 total and 719 volunteer hours)**

**Undergraduate Volunteers – (9)**
1. Anna Kebler
2. Cindy Smoak
3. Miguel Medina
4. Milena Carvalho
5. Shannen Lopez
6. Shannon O’Brien
7. Steven Guerin
8. Veronica Koomson-Maiden
9. Victoria Bowler

**High School Volunteers – (16)**
4. Caroline Pierotti (Albuquerque High)
5. Irving Flores (Amy Biehl)
6. Serina Altamirano (Amy Biehl)
7. Elora Bruce (homeschool)
8. David Bruce (homeschool)
9. Bobbi Jo Pennington (homeschool)
10. 10 community service students (Amy Biehl), volunteered four times.

**Other Volunteers – (12)**
Anita Bruce (homeschool mom)
Kaylen Jones (recent UNM grad)
Lance Robinson (Mandy’s Farm)
Lindsey Frederick (recent UNM grad)
Mo Hobbs
Susan Stark
Josh Stark
Adrienne Warner (Master Naturalist intern)
Bruce Lambert (Master Naturalist intern)
Lisa Hada (Master Naturalist intern)
Teresa Skiba (Master Naturalist intern)
Jan Henfling (Master Naturalist intern)
14. MUSEUM ASSOCIATES

A. Curatorial Associates
Jerry W. Dragoo, UNM Department of Biology
William Gannon, UNM Graduate Studies
David J. Schmidly, UNM Department of Biology

B. Research Associates
J. Scott Altenbach, UNM Department of Biology (retired), NM
Sydney Anderson, American Museum of Natural History (retired), NY
Robert J. Baker, The Museum, Texas Tech University, Lubbock, TX
Troy L. Best, Department of Biology, Auburn University (retired), AL
Fernando Cervantes, UNAM, Mexico City, Mexico
Paul J. Cryan, Ft. Collins, CO
Natalie Dawson, University of Montana, Missoula, MT
John Demboski, Denver Museum of Science and Nature, Denver, CO
Guillermo D’Elia, Universidad de Valdivia, Chile
Eugene Fleharty, Ft. Hayes University (retired), KS
Melissa Fleming, Poulsbo, WA
Jennifer K. Frey, Las Cruces, NM
Kurt Galbeath, Northern Michigan University, Marquette, MI
Scott L. Gardner, Dept. Nematology, Curator, University Nebraska, NE
Keith Geluso, Lincoln, NE
Ken Geluso, Albuquerque, NM
David J. Hafner, New Mexico Museum Nat. History (retired)
Art Harris, University of Texas (retired), El Paso, Texas
Heikki Henttonen, Finnish Forest Research Institute, Finland
Edward J. Heske, Illinois Biological Survey, IL
Eric Hoberg, Beltsville, MD
Andrew Hope, Kansas State University, Manhattan, KS
Clyde Jones, The Museum Texas Tech University (retired), Lubbock, TX
Tom Jung, Whitehorse, Yukon
Sue Kutz, University of Calgary, Alberta
Enrique Lessa, Universidad de la Republica, Montevideo, Uruguay
Stephen MacDonald, Gila, NM
Jason Malaney, University of Nevada, Reno, NV
Michael Mares, Oklahoma University, Norman, OK
Pablo Marquet, Universidad Catolica, Santiago, Chile
Rodrigo Medillín, UNAM, Mexico City, Mexico
Tony R. Mollhagen, Lubbock, TX
Gary Morgan, New Mexico Museum Natural History, NM
Thomas J. O’Shea, Ft. Collins, CO
Eduardo Palma, Universidad Catolica, Santiago, Chile
Robert Parmenter, Valles Caldera, Jemez, NM
James L. Patton, Museum of Vertebrate Zoology (retired), Berkeley, California
Reggie Rausch, Burke Museum, University of Washington, Seattle, WA
Brett R. Riddle, University of Nevada, Las Vegas, NV
Jorge Salazar Bravo, Texas Tech University, Lubbock, TX
C. Greg Schmitt, Farmington, NM
Fred Szalay, Los Ranchos de la Rio Grande, NM
Sandy Talbot, Molecular Ecology Lab- USGS Anchorage, AK
Fernando Torres Perez, Vina del Mar, Chile
Ernie Valdez, USGS-UNM, Tijeras, NM
Alasdair Veitch, Department of Renewable Resources, Norman Wells, NWT, Canada
Jack Whitman, Ketchum, ID
Don E. Wilson, Smithsonian (retired), Washington, DC
Nyamsuren Batsaikhan, National University of Mongolia, Ulaan Baatar
Natural Heritage New Mexico Division

1. DIVISION HIGHLIGHTS

In 2015, the Natural Heritage New Mexico Division continued to develop conservation biology-related research projects, technological applications, and education and outreach programs within UNM, and among agencies, private partners, and the public. Within the division, there are four working groups: Conservation Data Center, Ecology, Zoology, and Botany.

The Conservation Data Center Group (Rayo McCollough, Lead; Mark Horner, GIS manager) worked on ongoing development of the New Mexico Conservation Information System to make conservation data more readily available via the web and to support effective conservation management. We began the process of converting our main data management system to NatureServe’s Biotics5 platform to increase data exchange frequency and speed data entry. We continued a joint U.S. Fish and Wildlife Service (USFWS) and NMDGF project to database the biological information content found in annual Threatened and Endangered Species science permits required under the Endangered Species Act. In cooperation with NMDGF, NM Energy, Minerals and Natural Resources Department (EMNRD), U.S. Forest Service (USFS), and the Bureau of Land Management (BLM), we also continued to gather and provide quality control on target sensitive species data and build tools for dissemination of that information via the web. Natural Heritage New Mexico’s Conservation Information System added over 10,000 observation records for rare and endangered species at over 7,000 locations. We finalized a data exchange protocol with BLM for sensitive species data. We did a number of Conservation Information System presentations for agencies and have added the New Mexico Dept. of Transportation to our data subscriber list.

The Ecology Group is engaged in numerous projects (Esteban Muldavin, Lead; Elizabeth Milford, Riparian Ecologist; Yvonne Chauvin, Senior Botany Tech; Hannah Varani, Senior Ecology Tech, and Paul Arbetan, Ecologist) continued the development of the “New Mexico Rapid Assessment Method” (NMRAM) for New Mexico’s wetlands and riparian areas in collaboration with New Mexico Environment Department (NMED). The goal of the NMRAM was to develop a tool of easily applied landscape, biotic, and abiotic metrics to evaluate and rank the ecological condition and function of wetlands for conservation, restoration, and management. We added a new module on for the Canadian River Basin montane wetlands plus a module on regulatory applications (in collaboration US Army Corps of Engineers). We also continued our work on the playas module and conducted field-training workshops. We have initiated a new project Army Corps of Engineers in the Middle Rio Grande to evaluate ecosystem change over the past 30 years in the river corridor.

With a grant from the US Geological Survey, we are conducting a revision the northern Chihuahuan Desert vegetation classification as part of updating US National Vegetation Classification (NVC). E. Muldavin continues to serve on the Executive Committee of the Ecological Society of America Vegetation Panel to further the goals of the NVC. We continued a project with the BLM to evaluate their ecological restoration projects in the context of projected climate change scenarios. In the same vein, we initiated a project with the US Forest Service to design a climate change monitoring network using Research Natural Areas in the Southwest. We continued work on the Guadalupe Mountains National Park and White Sands National Monument vegetation maps. Data collected on national parks will provide a valuable reference dataset for comparing the potential conservation value of other sites around the state. We continued providing biological monitoring and assessment for New Mexico Army National Guard lands.

The Zoology Group conducts field research and modeling of the habitats of animal species of conservation concern in New Mexico. We provide habitat management recommendations and create management plans for animals of conservation concern and their habitats. In 2015, we cooperated with Animas Biological Studies, Durango, CO, to begin a landscape-scale habitat model for piñon-juniper birds of conservation concern at the Bureau of Land Management Farmington, NM Resource Area. We continued work on a four-year habitat
modelling project for the dunes sagebrush lizard, a sensitive species of southeastern New Mexico. We completed a habitat use study of grassland and shrubland birds at Holloman Air Force Base (HAFB), surveyed HAFB shrublands for raptors, and continued a long-term monitoring project of wetland invertebrates and birds at the HAFB Wetlands.

The Botany Group (Temporary Lead Esteban Muldavin) worked with the BLM, to conclude a project to survey and analyze the distribution of the rare Brack’s Hardwall Cactus (Sclerocactus cloverae spp. brackii). We are also working with the State Botanist, Daniela Roth, at the NM EMNRD to integrate rare-plant species databases between the department and the division and to develop a ranking protocol for the conservation status of rare plants.

2. TABLE OF COLLECTION USE

<table>
<thead>
<tr>
<th>Collection Growth (specimens catalogued)</th>
<th>Loans (outgoing)</th>
<th>Loans (incoming)</th>
<th>Visitors</th>
<th>Information Requests Personally Respond to</th>
<th>Publications Citing MSB Specimens</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,545 new records, 7,184 updated records</td>
<td>NA</td>
<td>NA</td>
<td>5,081 visitors to web site</td>
<td>124 Custom</td>
<td>Unknown but all downloads carry a citation</td>
</tr>
</tbody>
</table>

3. COURSES USING THE COLLECTIONS

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty/Collection Managers

B. Staff

5. COLLECTION MANAGEMENT

As part of our service role in the museum to provide conservation data to the public and researchers, in 2015 the Conservation Data Management Group worked on several initiatives to add to our conservation information. Under the supervision of our assistant data manager, three student employees added over 10,000 observation records for rare and endangered species at over 7,000 locations across New Mexico. We finalized a data exchange protocol with BLM for sensitive species data. We now have data exchange protocols with all the major land management and wildlife agencies.

We continued our collaborative work with NMDGF to host their BISON-M database and work with them on data exchange and creating decision-support systems. We also worked on several initiatives to build our conservation information system (see Section 1).

6. AWARDS, GRANTS, AND CONTRACTS

NHNM AWARDS:

$25,000. NM Military Affairs Dept. Banner #0480CF. Las Cruces Training Lands conservation species surveys Paul Arbetan, PI. 05/13-04/14. $16,983 (F&A $2,831).

$15,000. NM Military Affairs Dept. Banner #0480CG. Camel Tracks Grey Vireo surveys Paul Arbetan, PI. 05/13-09/14. $4,355 (F&A $726).

$45,000. NM Military Affairs Dept. Banner #0480CH. Roswell WETS bat surveys Paul Arbetan, PI. 04/13-06/15. $25,334 (F&A $4,222).

$48,000. NM Military Affairs Dept. Banner #0480CI. Carlsbad Happy Valley bat surveys Paul Arbetan, PI. 04/13-06/15. $32,686 (F&A $5,448).

$75,000. BLM. Banner #0480C4. Habitat use by pinyon-juniper birds. Kristine Johnson, PI. 10/12-04/14. $7,197 (F&A $1071).


$99,554. Dept. of Defense. Banner #0480AS. Habitat use at multiple scales by pinyon-juniper birds. Kristine Johnson, PI. 08/12-03/14. $61,554 (F&A $5,186).

$34,864. BLM. Banner #0480FO. Habitat use by Grey Vireo and Pinyon Jay in the BLM Farmington Resource Area. Kristine Johnson, PI. 04/14-02/15. $34,097 (F&A $3100).


$40,000. Dept. of Defense. Banner #0480FT. Raptor management at Holloman AFB. Kristine Johnson, PI. 04/14-04/16. $11,024 (F&A $2,478).


$18,000. NM Dept. of Game and Fish. Banner #0480FB. Pinyon Jay monitoring program in New Mexico. Kristine Johnson, PI. 04/14-12/14. $17,925 (F&A $1,630).

$18,750. BLM. Banner #0480GT. BLM data exchange 2014. Rayo McCollough, PI. 06/14-09/17. $11,985 (F&A $1,785).

$275,000. NM Dept. of Game and Fish. Banner #0480A1. BISON-M database management. Rayo McCollough, PI. 06/12-05/17. $62,483 (F&A $5,680).

$120,000. NM Dept. of Game and Fish. Banner #0480D7. NM crucial habitat tool (CHAT). Rayo McCollough, PI. 05/12-09/14. $36,898 (F&A $3,356).
$124,000. NM Dept. of Game and Fish. Banner #0480A5. Organizing federally listed species information. Rayo McCollough, PI. 06/12-10/15. $19,188 (F&A $1,744).

$46,800. NM Dept. of Game and Fish. Banner #0480DA. Information development for species of greatest conservation need. Rayo McCollough, PI. 09/13-06/16. $53,597 (F&A $4,872).


$75,000. BLM. Banner #0480B0. Tharp’s bluestar inventory. Esteban Muldavin, PI. 10/12-09/17. $20,059 (F&A $2,987).

$30,000. BLM. Banner #0480BR. Santa Fe River vegetation and channel morphology monitoring. Esteban Muldavin, PI. 10/12-09/17. $13,861 (F&A $2,064).

$18,749. BLM. Banner #0480GS. Restore New Mexico projects and climate change. Esteban Muldavin, PI. 06/14-09/17. $0 (F&A $0).


$35,000. NPS. Banner #0480X. Assess impacts of Las Conchas fire and suppression activities on park vegetation. Esteban Muldavin, PI. 03/12-3/15. $4,568 (F&A $680).


$18,000. NPS. Banner #0480GN. Monitoring sensitive vegetation after the Carlsbad loop fire: 2014. Esteban Muldavin, PI. 08/14-04/15. $8,770 (F&A $1,306).


$10,000. NM Dept. of Game and Fish. Banner #0480DN. Southern Great Plains CHAT data support. Esteban Muldavin, PI. 07/13-12/15. $2,112 (F&A $192).

$50,000. NM Dept. of Game and Fish. Banner #0480D5. Support for Madrean Archipelago rapid ecological assessment. Esteban Muldavin, PI. 06/13-06/14. $22,177 (F&A $2,016).


$17,000. NM Environment Dept. Banner #0480BH. NMRAM training workshop. Esteban Muldavin, PI. 01/13-07/14. $6,510 (F&A $1,343).

$202,000. NM Environment Dept. Banner #0480CK. Rapid assessment for NM playa region, southern high plains. Esteban Muldavin, PI. 06/13-10/16. $75,976 (F&A $6,907).

$215,000. NM Environment Dept. Banner #0480FY. Rapid assessment for lowland riverine wetlands and regulatory module. Esteban Muldavin, PI. 05/14-09/17. $24,387 (F&A $2,043).

$44,000. NMSU. Banner #0480CZ. Modeling the effects of environmental change on crucial wildlife habitat. Esteban Muldavin, PI. 07/13-08/15. $10,365 (F&A $1,352).


PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

B. Journal Articles


C. Web-Based

D. Technical Reports


F. Work In Progress


G. Publications/Reports Based on MSB Specimens/Data by Outside Researchers

8. ACTIVITIES IN LEARNED SOCIETIES

B. Contributed Talks/Posters

Muldavin, E. and J. Triepke, 2015. A regional-scale analysis of vegetation types of the Northern Chihuahuan Desert in the context of the National Vegetation Classification. Ecological Society of America, Baltimore MD 2015

C. Attendance at Professional Meetings (List division personnel alphabetically then list meetings attended under each)

E. Muldavin: Biodiversity without Boundaries, NatureServe Network annual meeting. Traverse City, MI
E. Muldavin: Ecological Society of America, 2015 Baltimore MD.

E. Service as Officer of Professional Society/Organization

E. Muldavin: Executive Committee, Ecological Society of America Panel on Vegetation Classification.

9. OTHER PROFESSIONAL ACTIVITIES
B. Presentations in a Scholarly Capacity at Hearings, Workshops, Legislative Committees, etc.

E. Milford and E. Muldavin: NM RAM applications, New Mexico Wetlands Roundtable 2015.

C. Scholarly Service as a Member of a Local/State/Regional/National Committee, Panel, etc.

E. Muldavin: Exec. Committee, Ecological Society of America Panel on Vegetation Classification.  
K. Johnson: NM Prairie Dog Working Group, New Mexico Burrowing Owl Working group.  
E. Muldavin, R. McCollough, New Mexico Rare Plant Technical Council.  
R. McCollough: Jemez Mountains salamander recovery team; Dune Sagebrush Lizard GIS Group.

D. Journal Referee

E. Muldavin: Journal of Vegetation Science

10. SERVICE

A. Symposia, Workshops, Conferences etc. Sponsored, Organized, Held, etc.

E. Milford New Mexico Rapid Assessment Training Workshop, Santa Fe, NM, June 2015.

B. Public Service

13. CURRENT STAFF

A. Faculty/Staff
  - Paul Arbetan, Research Assistant Professor
  - Lisa Arnold, GIS Analyst
  - Yvonne Chauvin, Sr. Research Tech/Life Sciences
  - Mitchell East, Data Analyst
  - Kristine Johnson, Research Associate Professor
  - Rebecca Keeshen, Unit Administrator I
  - Rayo McCollough, Database Administrator
  - Elizabeth Milford, Research Scientist III
  - Esteban Muldavin, Research Associate Professor
  - Teri Neville, GIS Analyst
  - Nathan Petersen, Field Research Tech/Life Sciences
  - Jacqueline Smith, Sr. Research Tech/Life Sciences
  - Hannah Varani, Sr. Field Research Tech

B. Graduate students
  - Hannah Varani (M.S.)
  - Jack Triepke (Ph.D.)

C. Undergraduate Student Workers and Volunteers
  - Amy Adams
  - Zach Andres
  - Kimberly Allen
  - Natalia Moore
  - Casey Myers
  - Brett Reynolds
DIVISION OF PARASITES

METRIC DESCRIPTIONS

1. **Collection growth (specimens catalogued):** We have a total of 24,326 catalogued parasite specimens of which 4,848 are new

   The Host Catalogue, maintained by Division of Parasites has total of 21,183 records of which 5,589 are new records.

2. **Loans Out:** 8 (369 specimens)
3. **Professional visits to the collection:** 3
4. **Collection Database Web Site hits:** MSB Parasites UNM webpage had 1,506 views.
   Arctos Database: number of queries 3,149 for 1,246,268 records for Parasites and number of queries 6,392 for Hosts for 1,172,609 records.
5. **Outside Publications citing MSB specimens:** 14 (637 specimens)
6. **Peer-Reviewed Publications by Staff:** 7
7. **UNM courses using the collections:** 2
8. **Graduate Students:** 3
9. **Graduate Theses/dissertations completed:** 1
10. **Undergraduate students:** 5
11. **Grants/contracts in Force:** 5

1. **DIVISION HIGHLIGHTS**

   Our division is now up to 24,615 catalogued parasite specimens and 20,252 catalogued host specimens

   First Division of Parasites display featured at the NM Natural history museum – life cycle and ecology of *Ribeiroia* – for their “Out of the Cabinet” feature

   Acquisition of Olympus Research Compound Microscope with image capture capabilities

   Continuation of NSF and NIH grant work

   Expeditions to Kenya (Loker, Laidemitt), California (Gendron), Colorado (Brant)
   Snail collections for digenetic trematodes (Brant, Gendron)


2. **COURSES USING THE COLLECTIONS**

<table>
<thead>
<tr>
<th>TERM</th>
<th>COURSE</th>
<th>TITLE</th>
<th>STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2015</td>
<td>BIO482/582</td>
<td>Parasitology</td>
<td>15</td>
</tr>
<tr>
<td>Summer</td>
<td>STEM</td>
<td>Field Parasitology and Museum Curation</td>
<td>3</td>
</tr>
</tbody>
</table>
3. COURSES TAUGHT BY MSB PERSONNEL

ERIC S. LOKER

Graduate
Biology 502- Parasites and Hosts – Spring and Fall – 4 students Spring; 4 students Fall
Biology 551 – Research Problems – Spring and Fall – 1 student each semester
Biology 699- Dissertation – Spring and Fall – 4 students each semester

Undergraduate
Biology 402 – Parasites and Hosts – Fall – 1 student
Biology 419 – Concepts in Parasitology (split with Bruce Hofkin) – Spring – 37 students

SARA V. BRANT

Undergraduate
Biology 400 - Senior Honors Thesis - 1 student Spring
Summer STEM course: Field Parasitology and museum curation

Graduate
Biology 551 - Research Problems - 1 student Spring/Fall

Graduate Student laboratory teaching:
NONE

COLLECTION MANAGEMENT ACTIVITIES

Continued development of the Arctos Database for hosts and parasites

Completed the move of specimens into RM 125 Alcohol collection for Arthropods and Parasites as well as labeling, barcoding and organization of the shelves.

With Mariel Campbell, initiated process to transfer and catalogue the parasites collected for the Beringian Coevolution Project from Division of Mammals to Division of Parasites, an ongoing and major project

Curated and catalogued the world mollusk collection of Dr. Eric S. Loker, all data in Arctos Host Catalogue. This included a majority of the GA work.

Integrating schistosomes from Schistosome Diversity Project, about 90% catalogued, thus the largest diversity of schistosomes in world.

We conducted 15 tours through the division; 5 were from classes/groups within UNM, and the rest were from the Albuquerque area (CNM, School classes, special interest groups)

Other than specimens from paper submissions, UNM researchers and projects that generate specimens for the Division include:
Schistosome Diversity Project (Brant and Loker) - NSF;
Nematomorph Diversity Project (Hanelt) - NSF;
Beringia Coevolution Project (Cook) - NSF;
Epidemiology of schistosomiasis in Kenya (Loker) – NIH;
The ongoing cataloguing/integration of the Rauch Helminthological Collection.

Brant spends at least a total of one week a year writing by email correspondences to the parasite community regarding the value of submitting most or all of their survey collections of both parasites and hosts. At all meetings and during tours (where appropriate), the same message is conveyed.

For 2015 there were 20 specific requests about collection, donations, curation and employment that amounted to about 20 hours of contact.

AWARDS, GRANTS, AND CONTRACTS

Awarded:

E.S. Loker (PI) for Gates Foundation Grand Challenges grant entitled: Use of amphistomes to augment control and elimination of schistosomiasis in Africa”. Duration: 1 November 2013–June 2015, $100,000.

S. Brant (PI) NSF DEB-1021427 REVSYS: Phylogenetic and Revisionary Systematics of a Diverse Clade of Avian Schistosomes. 09/01/2010 – 08/31/2015 $60,000 (annual direct cost).

E. S. Loker (PI), COBRE: Center for Evolutionary and Theoretical Immunology. NIH, National Center for Research Resources, P30 GM110907; Total Award: 5 years, total award $5.4M total; Duration: 1 June 2014 – 1July June 2019.

E. S. Loker (PI) Development of a common, untapped resource (amphistome flukes) to control schistosomiasis in snails in Africa OPP1098449 Bill & Melinda Gates Foundation 11/1/2013 - 4/30/2015 $100,000

E.S. Loker (PI) for NIH grant entitled “Snail-related studies of transmission and control of schistosomiasis in Kenya”, Total Award: 5 years, direct costs $1,250,000; Duration: 1 July 2012 – 30 June, 2017.

PEER REVIEWED PUBLICATIONS BY MSB PERSONNEL (BOLDED)

Journal Articles


Pinto HA, de Melo AL, Brant SV. (2015). Where are the South American freshwater turtle blood flukes (Trematoda: Spirorchiidae)? The first morphological and molecular analysis of spirorchiid cercariae from freshwater snails in Brazil. Parasitology International 64: 553-558.


doi:10.1371/journal.pntd.0004131.

PUBLICATIONS USING/donating MSB data/specimens


Crystal M. Wiles and Matthew G. Bolek. 2015. Damselflies (Zygoptera) as paratenic hosts for *Serpinema trispinosum* and its report from turtle hosts from Oklahoma, USA. Folia Parasitologica 62:


**Dissertations/Theses Based on MSB Specimens/Data**

PhD - Devkota, R. Schistosomes of Nepal. University of New Mexico Department of Biology. [http://repository.unm.edu/handle/1928/30382](http://repository.unm.edu/handle/1928/30382). Advisor Dr. Eric S. Loker

**ACTIVITIES IN LEARNED SOCIETIES**

1. Invited/Plenary Talks and Seminars

**Loker ES.** 2015 Schistosomiasis Control. 2nd International, 9th National Iranian Congress of Parasitology, Guilan, Iran 20-22 May.

**Loker, E. S.** Gates Foundation Aquaculture-Schistosomiasis Meeting, Monterey California, 27 Jan – 30 Jan, presented talk entitled “Exploiting Natural Enemies for Schistosomiasis Control” and served advisory role for this Gates Phase II project.

**Loker, E. S.** Lecture at Iowa State University, 7-9 April 2015 “Schistosomes: a biological perspective on a tenacious group of parasites of medical and veterinary significance”.

**Loker, E. S.** 2015. Plenary address: The elimination of schistosomiasis: a role for snail control. VII Congreso Argentino de Parasitología, 1-5 November 2015, San Carlos de Bariloche, Argentina

**Loker E. S.** 2015. Symposium address: Cercarial dermatitis: one disease, a growing number of causative agents. VII Congreso Argentino de Parasitología, 1-5 November 2015, San Carlos de Bariloche, Argentina


2. Contributed Talks and Posters (bolded MSB personnel and ‘*’ the presenter, ‘^’ a student)

**Brant, S.V.** April: New Mexico Museum of Natural History “Out of the Cabinet” contribution of *Riberoria* life cycle.


3. Attendance at Professional Meetings

**Loker, E.S.**
- American Society of Parasitologists, Omaha, Nebraska, June.
- Gates Foundation Aquaculture-Schistosomiasis Meeting, Monterey California 27 Jan – 30 Jan
- 2nd International and 9th National Congress of Parasitology, 20-22 May 2015, Guilan University of Medical Sciences, Iran
- ATMH meeting, 25-29 October, 2015, Philadelphia Marriott
- VII Congreso Argentino de Parasitologia, 1-5 November 2015, San Carlos de Bariloche, Argentina
- Gates-funded Schistosomiasis Consortium for Operational Research and Evaluation (SCORE) Fifth Annual Meeting, 3-5 June 2015, Athens, Georgia
- Western Regional meeting for IDeA Program in Coeur d'Alene, Idaho, October 2015, directly related to CETI duties
- COBRE External Advisory Committee Meeting, Tamiya Resort, October 2015
**Brant, S.V.**
- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.
- American Society of Parasitologists, Omaha, Nebraska, June.
- 2nd International and 9th National Congress of Parasitology, 20-22 May 2015, Guilan University of Medical Sciences, Iran

**Campbell, M.**
- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

**Gendron, E.T.**
- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.
- American Society of Parasitologists, Omaha, Nebraska, June.

**Laidemitt, M.R.**
- Fancy Gap Immuno-Parasitology Workshop 2015

**Thurston, B** (REU undergraduate).
- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

**Ochoa, N.** (REU undergraduate).
- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

4. **Service as Editor or on Editorial Board of a Journal**

**Loker, E. S.** Guest Editor, PLoS Neglected Tropical Diseases, June 2015.
**Loker, E. S.** Editorial Board, Journal of Helminthology

5. **Service as Officer of Professional Society/Organization**

**Brant, S.V.**
- 2015-2020 Council Member-at-Large of the American Society of Parasitologists
- 2015-2020 Chair of the Membership Committee for American Society of Parasitologists

**OTHER PROFESSIONAL ACTIVITIES**

1. **Presentation to General Audience in a Scholarly Capacity**

**Brant, S.V.**
Bernalillo County Open Space Naturalist Series Fall Edition: 21 Nov Revealing the lives of the parasites among us in the Rio Grande Bosque. Sara Brant

**Ebbs (Gendron), E.**
Jan. 2015 - Cafe Scientifique, Around the Science World in 80 minutes - presenter
2. Presentations in a Scholarly Capacity at Hearings, Workshops, Legislative Committees, etc.

Brant SV, Loker ES. 2015. Recovery of schistosomes from avian and molluscan hosts Workshop. 2nd International, 9th National Iranian Congress of Parasitology, Guilan, Iran 20-22 May. This was open to the undergraduate and graduate students of Guilan University.

3. Scholarly Service as a Member of a Local/State/Regional/National Committee, Panel, etc.

Loker, E. S. NIH F13 Infectious Disease and Microbiology Fellowship Panel ZRG1 F13-C (20) L, 18-20 March

4. Journal Referee

Loker, E. S.

Approximately one dozen in 2015

Brant, S. V.


Public Service

- Jefferson Middle School Honors Science Classes tour, Sara Brant

- New Mexico Museum of Natural History “Out of the Cabinet” contribution of Riberoria life cycle. Sara Brant

- Bernalillo County Open Space Naturalist Series Fall Edition: 21 Nov Revealing the lives of the parasites among us in the Rio Grande Bosque. Sara Brant

- Interview with 8th grader Lily Ramsay, at Francis Howell Middle School Missouri, about museums and parasitology. 40 minute conversation. Sara Brant

- Cafe Scientifique, Around the Science World in 80 minutes – Erika Ebbs (Gendron)

ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.

Loker, E. S. awarded the Clark P. Read Mentoring Award by the American Society of Parasitologists, 2015.

CURRENT STAFF

Faculty and Staff

Dr. Eric S. Loker, Curator of Division of Parasites, Director of CETI
Dr. Sara V. Brant, Senior Collections Manager Division of Parasites

Graduate students
Ms. Erika T. (Gendron) Ebbs
Ms. Martina Laidemitt

Undergraduate Student Workers and Volunteers

Emily Sarvis
Brooke Thurston
Niccolette Ochoa

MUSEUM ASSOCIATES

Curatorial Associates

Research Associates