

2-15-2015

2014 Annual Report

Joseph A. Cook

Follow this and additional works at: https://digitalrepository.unm.edu/msb_annual_reports

Recommended Citation

Cook, Joseph A.. "2014 Annual Report." (2015). https://digitalrepository.unm.edu/msb_annual_reports/3

This Annual Report is brought to you for free and open access by the Museum of Southwestern Biology at UNM Digital Repository. It has been accepted for inclusion in Annual Reports by an authorized administrator of UNM Digital Repository. For more information, please contact disc@unm.edu.

**Museum of Southwestern Biology
2014 Annual Report**



Joseph A. Cook, Director
2 May 2015

The University of New Mexico's Museum of Southwestern Biology

The Museum of Southwestern Biology (MSB) is a research and teaching facility in the Department of Biology, University of New Mexico. MSB houses collections of vertebrates, arthropods, plants and genomic materials from the American West, Latin America, and from throughout the world. MSB consists of 8 divisions, and one special program (Natural Heritage Program New Mexico). MSB also manages the second largest US Geological Survey (federal) collection of biological specimens (second to only the Smithsonian Institution). MSB's collections are among the finest biological resources currently available to scientists and educators who are interested in learning about significant environmental and health issues facing society such as emerging zoonotic pathogens, climate change, invasive species, habitat conversion, and decreasing biodiversity in the Southwest and now worldwide. Our web-accessible archives and associated databases constitute an informatics resource that contributes to understanding the complexity of planetary life and related ecosystem function on local, regional, and global scales.

MSB is a research leader at UNM. At >\$5.3 million, **MSB had the third highest research activity in the College of Arts and Science** as measured by extramural dollars spent in 2014, ranking just below all other activity in the Biology Department and in the Physics and Astronomy Department. High research activity demonstrates the increasing use of collections (both samples and data) in environmental and biomedical research in addition to the very productive faculty, staff and students associated with the museum. Annually, our **collections now support a tremendous number (>145 in 2014) of peer-reviewed publications** and attract significant grant dollars. Web-accessible archives and databases constitute an unparalleled informatics resource contributing to applied efforts in conservation as well as theoretical advancements ranging from unraveling the complexity of planetary life with nucleic acids to using isotopes or community assemblies probe ecosystem function on local, regional, and global scales. MSB curators with active research and graduate programs build the collections and then exploit the wealth of specimens and data, as they also commit considerable time and effort to build **a shared resource for the greater scientific community**.

A primary strength of the Museum of Southwestern Biology is the focus on hands-on training and education of students at all levels (as I write this I am sitting in Panama City having just returned from a fieldtrip (with undergraduate and graduate students) that took us to the unexplored and remote Darien, near the Columbian border). Training remains one of the primary goals of the MSB. Numerous UNM and local high school students gain experience in bioinformatics, natural history specimen preparation and curation, and field and laboratory based research. Students were involved in all activities in the MSB during 2014 from fieldwork to curation of specimens to database development. MSB has been the locus of large student-training efforts for many years, in fieldwork, museum curatorial procedures, and molecular and morphological research. Because MSB provides an extensive sample archive (specimens) and web-associated data, A large percentage of undergraduate projects or graduate dissertations in Biology, Anthropology, Chemistry, and elsewhere used MSB specimens as a basis for their studies. MSB has become central to educational initiatives at UNM in informatics. MSB faculty and staff are heavily involved in instructional efforts and curriculum development through the Department of Biology, 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. In Spring 2014, we co-taught a class with the University of California Berkeley (8 students) on Climate Change and Museums. That course included a number of speakers covering topics related to how museum resources address the biology of climate change. We also developed web-based educational modules using museum specimens to illustrate various climate change concepts that can be viewed online and used by K-12 or undergraduate instructors. A publication outlining those approaches was published in *Bioscience* this year and co-authored by Curators at other leading natural history

museums in the US. As one of the largest and most active university-based natural history museums worldwide, UNM students are afforded world-class opportunities in biodiversity informatics, comparative biology, cutting-edge genomics (and more!) that extend their university experiences far beyond those available at other Research Intensive universities in the Southwest (from Austin to San Diego). Our infrastructure delivers outstanding opportunities for students to engage in authentic, hands-on discovery.

	2010	2011	2012	2013	2014	5-YEAR AVERAGE
1. Collection growth (Specimens Cataloged)	301268	64598	25446	34772	103947	106006
2. Loans Out	167	185	99	145	241	167
3. Professional Visitors to the Collections	692	504	307	344	248	419
4. Collection Database Web Site Hits	298360	160880	396362	**	233079	272170
5. RFIs Answered in Person	1214	1354	522	1626	1635	1270
6. Outside Publications Citing MSB Specimens	61	134	76	167	147	117
7. Peer-Reviewed Publications by Staff	72	52	77	54	104	72
8. Technical Reports	29	29	23	35	35	30
9. UNM Courses using the Collection	23	58	79	50	47	51
10. UNM Courses taught	22	68	109	69	66	67
11. Graduate Students	39	42	42	42	41	41
12. Graduate Theses/Dissertations Completed	5	3*	9	7	11	7
13. Undergraduate Students	102	75	76	66	63	76
14. Grants/Contracts in Force	98	78	76	61	61	75
15. Grants In Force Total Costs	\$10,471,063	\$10,132,206	\$8,850,955	\$8,388,469	\$8,489,493	\$9,266,437
16. Estimated F&A return	NR	\$398,059	\$528,950	\$410,871	436,680	\$ 443,640

* 1 UNM, 2 outside, NR – not reported

MSB also has a long history of leading UNM in training students. Many of our students fill jobs with natural resource agencies 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. For example, eight of the 45 past presidents of the American Society of Mammalogists (including the immediate past President and the current President) over the past century come from UNM. A number of leading scientists and administrators at the US National Museum of Natural History (Smithsonian Institution) have been UNM alums. A number of graduate students also work in collections-related activities during their graduate tenure at UNM. Most MSB Curators sponsor a significant number of graduate students and our unit regularly leads the Biology Department in the number of students receiving doctorate or masters degrees.

MSB also is a major contributor at UNM to public service and outreach efforts, especially activities related to thoughtful (science-based) management of dwindling natural resources. We are heavily involved with municipal (Albuquerque and Bernalillo County Open Space Initiatives), state (NM State Lands Office, NM Game and Fish, Rare Plant Society, regional BioBlitz's, etc.) and federal (USDA Forest Service, US Fish and Wildlife Service, Bureau of Reclamation, National Park Service, etc.) agencies through funded projects ranging from 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. In 2014 due to Ebola emergence, I was keynote speaker at the SciColl Forum at the October Smithsonian Forum on Emerging pathogens and natural history collections.

Because of the vast spatial and temporal biodiversity data served and the world's largest frozen tissue collection for mammals (and growing repositories for birds, fishes, and herps), MSB is also 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. In 2014, working through the UNM Museum Council, we drafted a shared document (4 October 2014) for the College of Arts and Sciences that codifies curatorial duties. The Dean has instructed all departments with Curators to develop a plan and process for annual evaluation, tenure and promotion evaluation, and revisiting workload, reviews and annual activities with regard to other departmental duties. This impacts primarily Biology, Earth and Planetary Sciences, and Anthropology. We have MOUs in place that are active and productive including one with New Mexico Museum of Natural History and Science (e.g., new exhibits and a video opened there in 2014) & NM State Lands Office (e.g., biotic inventories of sensitive species on state lands slated for development). 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. This alliance is closely tied to American Institute for Biological Sciences in Washington, DC. MSB staff also serve on Steering Committees for several national initiatives, including VertNet, CollectionsWeb (completed in 2014), Aim-Up!, and the National Integrated Biocollections Alliance, a new NSF sponsored Research Coordinating Network 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 units on campus.

MONTH	AWARD OR EVENT
January 2014	<p>Jon Dunnum (MSB Coll Mgr Mammal Division), Tom Giermakowski (MSB Coll Mgr Amphibians and Reptiles), Tom Turner (MSB Curator of Fishes), and Bill Gannon (MSB Research Associate Mammal Division) judged science exhibits at Jefferson Middle School</p> <p>The Southwest Carex Working Group visited the MSB Herbarium and reviewed the 1739 specimens of <i>Carex</i>, the sedge genus</p> <p>"Combing Chipmunks". Jefferson Middle School's Suzy Dunnum and her 7th grade gifted science class and MSB's Kayce Bell (Ph.D. candidate MSB Mammal Division) teamed up to help Kayce's Ph.D. Dissertation research on chipmunks and their parasites.</p> <p>Heidi Hopkins, a Ph.D. candidate of Assoc. Professor Kelly Miller recently published a monograph in entitled "A revision of the genus <i>Arenivaga</i> (Rehn) (Blattodea, Corydiidae), with descriptions of new species and key to the males of the genus". <i>ZooKeys</i> 384 (2014) Special Issue.</p> <p>Rachel Mallis, Matt Leister and Kelly Miller (Assoc Professor and Curator of Arthropods) published a "The male of <i>Tengella perfuga</i> Dahl, 1901 with re-description of the female and comparisons with <i>T. radiata</i> (Kulczynski, 1909) (Araneae: Tenggellidae)". <i>Zootaxa</i>, 3709: 185-199, a Nicaraguan spider. Rachel is a graduate student and Matt is an undergraduate student, both working in Assoc. Professor Miller's lab.</p>
February	<p>The Mammal Division has a new Facebook page https://www.facebook.com/MSBDivisionofMammals</p> <p>Here is the Miller Lab website detailing their research http://www.kellymillerlab.com/default.asp?action=show_personnel&id=kelly.</p> <p>Our Bird Division also has a website detailing their research http://biology.unm.edu/witt/index.html.</p>
March	<p>The digital archives of William Jacob Koster, Ph.D. (UNM Professor of Biology 1938-1975) are now available through the University of New Mexico Institutional Repository ("LoboVault") including PDF files of original field notes linked to the cataloged records of New Mexico fishes he collected during his tenure at the University of New Mexico.</p> <p>Christopher W. Hoagstrom, Ph.D. Associate Professor of Zoology at Weber State University, Ogden UT arrived in October 2013 to spend a year sabbatical at the University of New Mexico, collaborating with Tom Turner, in the ecology of pelagic-broadcast spawning freshwater fishes. http://faculty.weber.edu/choagstrom/index.htm</p> <p>Heidi Hopkins successfully defended her Ph.D. dissertation.</p> <p>Tom Giermakowski (Coll Mgr of Amphibians and Reptiles) gave a talk March 22, 2014 on Frogs and Toads of the Rio Grande Valley in conjunction with the Bernalillo County Open Space program.</p> <p>AIM-UP! (Advancing the Integration of Museums into Undergraduate Programs) is a National Science Foundation sponsored network that focuses on how to integrate museum specimens and data into undergraduate teaching held its annual meeting in Asilomar, CA from 27 February to 2</p> <p>The staff from the UNM Office of Sponsored Projects (Pre-Award) toured the MSB on March 7, 2014 to learn what the MSB is all about.</p>

Natalie Blea, a native burquena and former UnO Undergraduate Scholar in Steve Poe's laboratory was accepted into the graduate program in Marine Biodiversity and Conservation at Scripps Oceanography at the University of California, San Diego.

Students from New Mexico State University in Dr. Jennifer Frey's class "The Natural History Museum in Modern Society" traveled to the MSB and met with a series of collections managers to expose the students to all of the purposes and functions of modern natural history museums, especially their role in research, public education, the biodiversity crisis, and service to society.

The Division of Amphibians and Reptiles has recently cataloged its 95,000th specimen and is continuing cataloging of newly deposited specimens from New Mexico's state and federal agency biologists.

Tom Giermakowski (Coll Mgr Amphibians and Reptiles) and Howard Snell (Curator of Amphibians and Reptiles) have recently been awarded a contract from New Mexico Department of Game and Fish to evaluate the status of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico.

April

Tom Giermakowski (Coll Mgr Amphibians and Reptiles) was part of an inter-institutional team that recently published a report on the climate effects on several bird and reptile species in the west. van Riper, C., III., Hatten, J.R., Giermakowski, J.T., Mattson, D., Holmes, J.A., Johnson, M.J., Nowak, E.M., Ironside, K., Peters, M., Heinrich, P., Cole, K.L., Truettner, C., and Schwalbe, C.R., *In press*, Projecting climate effects on birds and reptiles of the Southwestern United States: U.S. Geological Survey Open-File Report 2014–
<http://pubs.usgs.gov/ofr/2014/XXX/>.

The MSB now has a Facebook page! www.facebook.com/msb.unm.edu

On April 1, 2014 the MSB's Divisions of Arthropods and Parasites received the go ahead to start using the new wet collection space

April 4, 2014, the MSB held a mini open house for Research Day. The Biology Department Research Day chose the lucky recipient of the Departmental Staff Award. Alexandra (Lex) Snyder, Collection Manager of the MSB's Division of Fishes is this year's winner. When congratulated, Lex responded "Yes, it IS quite a honor...not to mention a total surprise".

Congratulations to Natalie Wright, who received the Best Oral Presentation as a Graduate Student for her talk: A New Island Rule for Birds: Evolution Towards Flightlessness

Bryan McLean, a doctoral student in the Division of Mammals at MSB, was recently award a Smithsonian Graduate Fellowship for 2014-2015. Bryan will spend a year at the Smithsonian investigating squirrel evolution. His project is entitled "Right on Time?: Towards an Absolute Timescale for Understanding the Radiation of Ground-dwelling Squirrels."

MSB has two Outstanding Colleagues, as nominated by the Biology Department: Alexandra (Lex) Snyder and Chris Witt. Each will receive a \$1000 award to go toward professional development. Congratulations to both Lex and Chris.
<http://biology.unm.edu/.../OutstandingColleaguesAwards-2014.p...>

"Diversification and adaptation in the Andes: insights from phylogeography, malaria, and hemoglobin of the house wren (*Troglodytes aedon*)" is the title of Spencer Galen's Master Thesis for Biology. Chris Witt is his major advisor and Spencer passed with Distinction on Monday, April 14, 2014.

Friday, April 11, 2014, Bethany Abrahamson successfully defended her Master of Biology. Bethany has been with the MSB first as an undergraduate, and as a graduate student. She is also the first person to complete the requirements for the new Museum Curatorial studies concentration.

Rachael Mallis and Sandy Brantley went to Nicaragua to coffee plantations with preserved

	<p>cloudforests, May 18-29, 2014. Two were remote locations, and the other was a well established coffee plantation and preserve. "We went with the goal of collecting Rachael's study spider, <i>Tengella perfuga</i>, as well as more spider specimens for the museum to help document the arthropod diversity of Nicaragua, in partnership with Dr. Jean-Michel Maes, a local entomology professor and museum director."</p>
May	<p>Ben Hanelt, of UNM Biology, was recently interviewed about parasites and crickets. Ben is a Research Associate of the MSB Parasite Division. http://www.wired.com/2014/05/absurd-creature-horsehair-worm/</p> <p>Colleague Julie Allen of AIM-UP! attended the Datasphere at the Biosphere meeting and wrote a great blog about it! http://aim-up.blogspot.com/</p> <p>Grasshoppers Abound! Our own Dave Lightfoot was interviewed for an article in the UNM Daily Lobo regarding the abundance of grasshoppers this spring: http://www.dailylobo.com/article/2014/05/5-27-grasshoppers</p> <p>Natural history collections at universities have a way of changing student trajectories. On behalf of the Sam Noble Museum, Dr. Michael Mares just received the National Medal for Museums. Mike was raised in Albuquerque and started his museum odyssey as an undergraduate at the Museum of Southwestern Biology a few decades ago under the tutelage of Jim Findley.</p> <p>Here is a prime example why museum collections are so important: http://www.livescience.com/45705-mexican-nightsnake-species...</p> <p>One of the research goals of the MSB is to work collaboratively within UNM. Will Taylor a doctoral student in Anthropology recently reported: "Received some good news recently regarding the horse crania project at the annual Society for American Archaeology conference in Austin: I wanted to thank you and the MSB folks for laying the foundations for this project through your help with collections study of wild and domestic horses. The MSB was the primary source of my data, and deserves much of the recognition." http://socarchsci.org/awards.html</p> <p>On May 13, 2014 a group of MESA students from Robertson High School (Las Vegas, NM) toured the MSB.</p> <p>The Bird Division has another new publication: Jones, M. R., & C. C. Witt. 2014. Migrate small, sound big: Functional constraints on body size promote tracheal elongation in cranes. <i>Journal of Evolutionary Biology</i>. http://onlinelibrary.wiley.com/d.../10.1111/jeb.12397/abstract</p>
June	<p>Don Wilson, a student of Jim Findley's has a new publication: http://www.lynxeds.com/hmw/handbook-mammals-world-volume-4</p> <p>American Society of Mammalogists 2014 annual meeting in Oklahoma City. Jocie Colella, MS student from the MSB Mammal Division, won the award for Best Poster Presentation for her work entitled "Molecular analysis of species limits and hybridization in ermine".</p> <p>June 13, 2014 finds the MSB hosting 7 and 8 year olds from a Summer Camp trip from the New Mexico Museum of Natural History. Jon Dunnum, the Collection Manager for the Mammal Division has pulled a number of specimens for the kids to look at and draw.</p> <p>Congratulations to Sam Loker, Curator of the Parasite Division, on receiving \$5.4 million for five years from The National Institutes of Health (NIH), Centers of Biomedical Research Excellence (COBRE) program.</p> <p>June 26, 2014 Jon Dunnum hosted 20 people from the Bernalillo County Master Naturalists Program. https://www.bernco.gov/master-naturalist-program-221782/</p>
July	<p>Effective July 1, 2014, Chris Witt was appointed the new Assistant Director of the MSB.</p> <p>Mike Medrano successfully defended his dissertation titled "A taxonomic revision of the</p>

	<p>millipede family Atopetholidae (Chamberlin) (Diplopoda: Spirobolida) with descriptions of new species and the conservation status of <i>Comanchelus chihuani</i> (Chamberlin 1947) (Diplopoda: Spirobolida: Atopetholidae), a species of concern” on Thursday, 24 July 2014 at 10:30.</p>
	<p>The MSB is losing Cheryl Parmenter, Collection Manager for the Division of Genomic Resources to retirement at the close of business on Thursday July 31, 2014. Cheryl was with UNM for 21 years starting at the Health Sciences Center. She was actively involved with the hanta virus discovery and with the development of the DGR.</p>
August	<p>Mariel L Campbell has accepted the position as Collection Manager of the Division of Genomic Resources. Mariel holds a Masters from the University of California Davis and BS from UNM. Mariel has had a long association with MSB, first working on NSF funded projects in Bolivia in the late 1980s and later in hantavirus monitoring efforts. Most recently Mariel has been the key individual in accessioning, cataloging and data basing the incomparable Rausch collections (parasites and mammals).</p>
September	<p>Congratulations to Tom Turner, the MSB Curator of the Fishes Division on his appointment as Associate Dean of Research in the College of Arts and Sciences.</p>
October	<p>Dr. Ric Yanagihara, University of Hawaii, will present a talk on hantavirus discovery as part of our weekly distributed seminar in the "Advancing the Integration of Museums into Undergraduate Biology" series. He was recently chosen by NIH as one of 13 Biomedical Faces of Science, selected as role models in their fields. He is leader of a COBRE award at the University of Hawaii and has published extensively throughout his career.</p> <p>Sadie Yurista (MSB Mammals 2010-2013) was admitted to the University of Wisconsin-Madison School of Veterinary Medicine. Sadie worked as an undergraduate curatorial assistant while completing her BS in Biology. In addition to a two month collecting trip to Mongolia, Sadie was a key contributor to specimen curation and database development.</p> <p>MSB undergrad students helped with the Sandia Vista Elementary School (Rio Rancho) first ever Spooky Science Night. They brought pelts for the kids to touch, a baby shark, toads, insects, and an alligator skin (courtesy of US Fish and Wildlife).</p>
November	<p>Earlier this year the Travel Channel filmed a segment at the MSB for 'Mysteries at the Museum'. That segment aired on Friday, October 24, 2014.</p> <p>Dr. Ben Hanelt's (Parasitology) research is featured in the November 2014 issue of National Geographic. He studies parasite manipulation of hosts, a common feature of the horse-hair worms. All videos and photography were done here at UNM, and the worms are in the MSB Division of Parasites! http://ngm.nationalgeographic.com/.../minds.../varma-photography Mindsuckers.</p>
December	<p>Near Peer Mentoring! Lindsey Frederick, a student curatorial assistant in the Mammal Division at MSB, won a \$500 scholarship from the College of Arts & Sciences Undergraduate Student Research Initiative to travel to the Smithsonian Institute in Washington D.C. in January 2015. Lindsey is collaborating with a graduate student (Jocelyn Colella) on a geometric-morphometric study of variation in stoats (aka ermine, <i>Mustela erminea</i>). She'll be taking high-resolution images of over 200 specimens of ermine to test the validity of the 20 North American subspecies.</p>

DIVISION REPORTS FOR 2014

DIVISION OF AMPHIBIANS AND REPTILES

1. DIVISION HIGHLIGHTS

The collection has increased by 485 specimens in 2014 to a total of 95,543 specimens. The majority of the specimens were collected by division staff and students, primarily during surveys for Arizona Toad throughout New Mexico. Additional specimens were deposited by New Mexico Dept. of Game and Fish personnel and collaborators of the MSB. Additions from the 19 accessions catalogued during 2014 include amphibians and reptiles from the Gila National Forest, several records of different species of rattlesnakes, as well as a collection of historical specimens donated by the US Geological Survey.

The number of hits (data queries through external portals) and data downloads is comparable to previous years. During 2014, the collection was queried 8,362 times and served 5,616,861 records via HerpNET, while the Global Biodiversity Information Facility (GBIF) has reported 2,426 searches and a total download of 29,014,367 records from our collection. This staggering number of downloads of records reflects 450 instances of users downloading either the entire dataset available or all data that include geospatial coordinates. More specific searches (e.g. by country or taxon) amounted to a total of 1,759,498 records downloaded and are comparable to previous years. In addition to data served through aggregator portals, specimens from the division have been cited in at least 14 publications in 2014.

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 2014, we handled over 160 of these requests, hosted six research visitors in the collection and individually compiled data on 11 occasions. 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 Open Space Division program. In addition, we were involved in judging scientific posters both at UNM and Albuquerque Public Schools, hosted two high-school interns, and coordinated or gave invited lectures at UNM.

We continue our involvement in research, on top of specimen preparation and curation, by advising undergraduate and graduate students, lending equipment, and collaborating with universities and agencies. During 2014, 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. This work resulted in a USGS report published in 2014 and our current efforts are now focused on examining riparian areas in the southwestern US. We maintain participation with colleagues in the museum community by attending workshops and meetings. This year the division's collection manager presented both a talk and a poster at the annual meeting of The Society for Preservation of Natural History Collections in United Kingdom.

2. TABLE OF COLLECTION USE

Collection Growth	485
Loans (outgoing/incoming)	14 (6/8)
Research Visitors ¹	6
Outreach Visitors ¹	160+
Information Requests Answered	162

Direct Website Access ² (“Hits”)	2,216
Indirect: Specimen Data Queries ³ (“Hits”)	10,788
Indirect: Specimen Records Downloaded ³	7,376,359
Downloads of Division Documents	593
Publications Citing/Using MSB Herpetological Specimens	14

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 (450 instances in GBIF).

3. COURSES USING THE COLLECTIONS

BIOL 204, Animal Form and Function, spring and fall semesters, 362 students
 BIOL 386, General Vertebrate Zoology, spring and fall semesters, 30 students

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty/Collection Managers

Giermakowski, J.T.

Spring BIOL 402 – Topics in Collections Research, 3 students
 BIOL 502 – Topics in Collections Research, 1 student

Fall BIOL 502 – Topics in Collections Research, 1 student

Poe, S.

Spring BIOL 499 – Undergraduate Problems, 1 student
 BIOL 551 – Graduate Research Problems, 1 student
 BIOL 599 – Master’s Thesis, 1 student
 BIOL 651 – Advanced Field Biology, 1 student
 BIOL 699 – Dissertation, 2 students

Fall BIOL 499 – Undergraduate Problems, 2 students
 BIOL 551 – Graduate Research Problems, 1 student
 BIOL 699 – Dissertation, 2 students

Snell, H.L.

Spring BIOL 386 – General Vertebrate Zoology, 16 students
 BIOL 402 – Conservation Biology, 11 students
 BIOL 402 – Topics in Collections Research, 3 students
 BIOL 502 – Topics in Collections Research, 1 student

Fall BIOL 379 – Conservation Biology, 38 students

BIOL 402 – Conservation Biology Seminar, 11 students
BIOL 502 – Topics in Collections Research, 1 student

B. Graduate Students

Gray, L.N

BIOL 247 – Anatomy and Physiology Lab, 64 students
BIOL 248 – Anatomy and Physiology Lab II, 99 students

Latella, I.M.

BIOL 386 – General Vertebrate Zoology, spring and fall, 36 students

Truett, B.

BIOL 247 – Anatomy and Physiology Lab, 70 students

5. COLLECTION MANAGEMENT

The collection has increased by 485 specimens in 2014 to a total of 95,543 specimens. The majority of the specimens were collected by division staff and students, primarily during surveys for Arizona Toad. Additional specimens were deposited by New Mexico Dept. of Game and Fish personnel and collaborators of the MSB. Additions from the 19 accessions catalogued during 2014 include amphibians and reptiles from the Gila National Forest, several records of different species of rattlesnakes, as well as a collection of historical specimens donated by the US Geological Survey.

The number of hits (data queries through external portals) and data downloads is comparable to previous years. During 2014, the collection was queried 8,362 times and served 5,616,861 records via HerpNET, while the Global Biodiversity Information Facility (GBIF) has reported 2,426 searches and a total download of 29,014,367 records from our collection. This number of downloads of records reflects 450 instances when the user downloaded either the entire dataset available or all data that included geospatial coordinates. More specific searches (e.g. by country or taxon) amounted to a total of 1,759,498 records downloaded. In addition to data served through aggregator portals, specimens from the division have been cited in at least 14 publications in 2014.

6. AWARDS, GRANTS, AND CONTRACTS

\$153,163. Information Development for Species of Greatest Conservation Need. Charles McCollough and **J.T. Giermakowski**. New Mexico Department of Game and Fish. Sep 2013-Jun 2016.

\$20,000. Surveys of Arizona Toad (*Anaxyrus microscaphus*) throughout its range in New Mexico. **Howard L. Snell** and **J.T. Giermakowski**. New Mexico Department of Game and Fish. Mar 2014-Dec 2014.

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

Geist, D, **H.L. Snell**, H.M. Snell, C. Goddard, and M. Kurz. 2014. A Paleogeographic Model of the Galápagos Islands and Biogeographical and Evolutionary Implications. Pages 143 – 164 In: *The Galápagos: A National Laboratory for the Earth Sciences, Geophysical Monograph 204*. First Edition. (Eds) K. S. Harpp, E. Mittelstaedt, N. d'Ozouville, and D. W. Graham. John Wiley & Sons, Inc.

B. Journal Articles

- Poe, S.** 2014. The travels of Thomas Barbour on the ship Utowana in 1931 and the taxonomic status of *Anolis utowanae*. *Breviora* 538:1-9.
- Poe, S.** 2014. Comparison of natural and nonnative two-species communities of *Anolis* lizards. *American Naturalist* 184:132-40.
- Poe, S., B Armijo.** 2014. Lack of effect of herpetological collecting on the population structure of a community of *Anolis* (Squamata: Dactyloidae) in a disturbed habitat. *Herpetology Notes* 7:153-7.
- Ryan, MJ, MM Fuller, NJ Scott, JA Cook, S Poe, B Willink, G Chaves & F Bolaños.** Individualistic population responses of five frog species in two changing tropical environments over time. *PLOS ONE* 9(5):e98351.
- Rocha, LA, et al. (MJ Ryan, 66th author)** 2014. Collecting biological specimens is essential in science and conservation. *Science* 344:814-815.
- Ryan, MJ & S Poe.** 2014. Seasonal shifts in forest and riparian habitat use in the lizard *Anolis polylepis*. *Journal of Herpetology* 48:495-499.
- Ryan, MJ, IM Latella, CW Painter, JT Giermakowski, B Christman, RD Jennings & J Voyles.** First record *Batrachochytrium dendrobatidis* in the toad *Anaxyrus microscaphus*. *Herpetological Review* 45:616-618.
- Chaves, G, A Garcia-Rodriguez, H Zumbado-Ulate, E Gomez, V. Vredenberg & MJ Ryan.** Rediscovery of the critically endangered streamside frog *Craugastor taurus* (Craugastoridae) in Costa Rica. *Tropical Conservation Science* 7:628-638.
- Koehler, JJ, S Poe, MJ Ryan & G Kohler.** *Anolis marsupialis* Taylor 1956, a valid species from southern Pacific Costa Rica (Reptilia, Squamata, Dactyloidae). *Zootaxa* XXXX .In press.

C. Web-Based

M.J. Ryan:

Anole Annals, Seasonal shifts in forest and riparian habitat use in the lizard *Anolis polylepis* (<http://www.anoleannals.org/2014/09/21/seasonal-shifts-in-relative-density-of-the-lizard-anolis-polylepis-squamata-dactyloidae-in-forest-and-riparian-habitats/>)

D. Technical Reports

- Ryan, MJ, IM Latella, JT Giermakowski and HL Snell.** Current status of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico: Identification and evaluation of potential threats to its persistence. Report submitted to New Mexico Game and Fish. December 2014.
- Ryan, MJ.** Report to Sevilleta National Wildlife Refuge. Lizard diversity in prairie dog towns in a New Mexico desert grassland: Lizard species richness in different aged prairie dog towns. 5 pp.

Rios-Sotelo, G, JL Voyles, & **MJ Ryan**. Effects of *Batrachochytrium dendrobatidis* on amphibian communities in New Mexico. Report submitted to New Mexico Game and Fish. December 2014.

E. Theses/Dissertations Completed

None

F. Work In Progress

Poe, S, A Nieto-Montes de Oca, O Torres-Carvajal, B Truett, G Köhler, **MJ Ryan**, **LN Gray**, F Ayala-Varela, JA Velasco, **IM Latella**. In review. Adaptive radiation in island and mainland lizards. *Nature* sent out for review 16 December 2014.

Scarpetta, S, **LN Gray**, A Nieto-Montes de Oca, MR Castañeda, A Herrel, J Losos, R Luna-Reyes, NJ Lang, **S Poe**. In review. Morphology and ecology of the Mexican cave anole *Anolis alvarezdeltoroi*. *Herpetology Notes* submitted 21 November 2014.

Poe, S, **IM Latella**, F Ayala-Varela, C Yañez-Miranda, O Torres-Carvajal. In review. A new species of phenacosaur *Anolis* (Squamata; Iguanidae) from Peru and a comprehensive phylogeny of *Dactyloa*-clade *Anolis* based on new DNA sequences and morphology. *Copeia* submitted 25 August 2014.

Chaves, G, MJ Ryan, F Bolaños, C Marquez, G Köhler, **S Poe**. In review. Two new species of semiaquatic *Anolis* (Squamata: Iguanidae) from Costa Rica. *Zootaxa* submitted 15 August 2014.

Armstead, J, **S Poe**. 2015. Use of an exemplar versus use of a sample for calculating summary metrics of morphological traits in comparative studies of *Anolis* lizards. *Herpetological Review* in press.

G. Publications/Reports Based on MSB Specimens/Data

Bezy, R. L., and C. J. Cole. 2014. Amphibians and reptiles of the Madrean Archipelago of Arizona and New Mexico. *American Museum Novitates* **3810**:1-24.

Cole, C. J., H. L. Taylor, D. P. Baumann, and P. Baumann. 2014. Neaves' Whiptail Lizard: The First Known Tetraploid Parthenogenetic Tetrapod (Reptilia: Squamata: Teiidae). *Breviora* **539**:1-20.

Crandell, K. E., A. Herrel, M. Sasa, J. B. Losos, and K. Autumn. 2014. Stick or grip? Co-evolution of adhesive toepads and claws in *Anolis* lizards. *Zoology* **117**:363-369.

Ficetola, G. F., C. Rondinini, A. Bonardi, D. Baisero, E. Padoa-Schioppa, and D. Richardson. 2014. Habitat availability for amphibians and extinction threat: a global analysis. *Diversity and Distributions* DOI:10.1111/ddi.12296.

Garcia-Diaz, P., J. V. Ross, C. Ayres, and P. Cassey. 2014. Understanding the biological invasion risk posed by the global wildlife trade: propagule pressure drives the introduction and establishment of Nearctic turtles. *Global Change Biology* DOI: 10.1111/gcb.12790.

Goldberg, S. R. 2014. Reproduction of the Sagebrush Lizard, *Sceloporus graciosus* (Squamata: Phrynosomatidae) from New Mexico. *Sonoran Herpetologist* **27**:36-38.

Liu, X., X. Li, Z. Liu, R. Tingley, F. Kraus, Z. Guo, and Y. Li. 2014. Congener diversity, topographic heterogeneity and human-assisted dispersal predict spread rates of alien herpetofauna at a global scale. *Ecology Letters* **17**:821-829.

Luja, V. H., I. T. Ahumada-Carrillo, P. Ponce-Campos, and E. Figueroa-Esquivel. 2014. Checklist of amphibians of Nayarit, western Mexico. *Check List* **10**:1336.

Masin, S., A. Bonardi, E. Padoa-Schioppa, L. Bottoni, and G. F. Ficetola. 2014. Risk of invasion by frequently traded freshwater turtles. *Biological Invasions* **16**:217-231.

- Prival, D., and M. Goode. 2014. A Herpetological Inventory of Chihuahuan Desert National Parks. In: C.A. Hoyt & J. Karges (editors). Proceedings of the Sixth Symposium on the Natural Resources of the Chihuahuan Desert Region. October 14–17. Chihuahuan Desert Research Institute, Fort Davis, TX. pp. 283–319.
- Robertson, T., M. Döring, R. Guralnick, D. Bloom, J. Wiecek, K. Braak, J. Otegui, L. Russell, and P. Desmet. 2014. The GBIF integrated publishing toolkit: facilitating the efficient publishing of biodiversity data on the internet. PLoS One 9:e102623.
- Ryan, M. J., I. M. Latella, C. W. Painter, J. T. Giermakowski, B. L. Christman, R. D. Jennings, and J. L. Voyles. 2014. First Record of Batrachochytrium dendrobatidis in the Arizona Toad (*Anaxyrus microscaphus*) in Southwestern New Mexico, USA. Herpetological Review 45:616-618.
- Sillero, N., R. Creemers, M. Denoël, J. Campos, M. Vences, P.-A. Crochet, J. Gonçalves, P. de Pous, S. Kuzmin, J. Speybroeck, B. Toxopeus, C. Corti, D. R. Vieites, G. F. Ficetola, A. Bonardi, J. Crnobrnja Isailović, A. Rodríguez, P. Lymberakis, and R. Sindaco. 2014. Updated distribution and biogeography of amphibians and reptiles of Europe. Amphibia-Reptilia 35:1-31.
- Zeng, C., I. Gomez-Mestre, and J. J. Wiens. 2014. Evolution of Rapid Development in Spadefoot Toads Is Unrelated to Arid Environments. PLoS One 9:e96637.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/Plenary Talks and/or Seminars

H.L. Snell

- Impacts of the 2001 *Jessica* oil spill on endemic and native Galápagos birds, reptiles, and mammals. H. L. Snell, L. Loughheed, C. Loughheed, H. M. Snell, M. Velasquez, C. Marquez. Pacific Sea Bird Group Annual Meetings, January 2014, Juneau, AK. Invited.
- Early restoration ecology efforts for Galapagos Land Iguanas (*Conolophus subcristatus*). H. L. Snell, H. M. Snell, C. Marquez, C. Barrera, F. Llerena, A. Llerena. Galapagos Land and Marine Iguana Workshop, IUCN Iguana Specialist Group Annual Meetings, October 2014, Isla Santa Cruz, Galapagos, Ecuador. Invited.
- Autecology of hybrid land/marine iguanas: intermediate or skewed? H. L. Snell, H. M. Snell, P. Stone. Galapagos Land and Marine Iguana Workshop, IUCN Iguana Specialist Group Annual Meetings, October 2014, Isla Santa Cruz, Galapagos, Ecuador. Invited.

M.J. Ryan

Conservation Biology, Amphibian declines and conservation actions, Fall 2014
Tropical Biology, Climate change and tropical amphibians, Spring 2014

B. Contributed Talks/Posters (*presenter)

- Armstead, J and S Poe. Use of an exemplar versus use of a sample for calculating summary metrics of morphological traits in comparative studies of *Anolis* lizards. UNM Research Day. April.
- Giermakowski, J.T., E.M. Nowak*, J. Schofer, M. Amarello, J.J. Smith. Using ecological data to inform species distribution models: Climate change and an Arizona-New Mexico endemic rattlesnake (*Crotalus cerberus*). Poster presentation. Biology of the Pitvipers II. Tulsa, Oklahoma. June.

Giermakowski J.T.*, A.K. Monfils, S. Ickert-Bond, S. V. Edwards, E. A. Lacey, K. Bell, J. A. Cook. AIM-UP! New specimen-based approaches to higher education. Poster presentation. The Society for Preservation of Natural History Collections. Cardiff, Wales, United Kingdom. June.

Giermakowski, J.T*, M.J. Ryan, J.A. Cook. Collections as a source of data for education, conservation and monitoring change in a time of extinction: an amphibian example. Oral presentation. The Society for Preservation of Natural History Collections. Cardiff, Wales, United Kingdom. June.

C. Attendance at Professional Meetings

J.T. Giermakowski

The Society for Preservation of Natural History Collections. Cardiff, Wales, United Kingdom. June.

H.L. Snell

Annual Meetings of the Pacific Seabird Group, Juneau, AK, January 2014.

IUCN Iguana Specialist Group Meetings, Puerto Ayora, Galapagos, Ecuador, October 2014.

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. Major activity in 2014 was working on a 300+ page manuscript “Reptiles of Paraguay” which I hope to have out in 2015.

E. Service as Officer of Professional Society/Organization

JT Giermakowski. Senior Co-chair of the Southwestern Partners in Amphibian and Reptile Conservation Steering Committee.

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity

J.T. Giermakowski

Frogs and Toads of the Rio Grande Valley. Presentation to the Bernalillo Open Space Program, Albuquerque, New Mexico. March.

Frogs and Toads of the Rio Grande Valley. Presentation to the Valle del Oro National Wildlife Refuge, New Mexico. August.

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

H.L. Snell Provided scholarly input at BLM scoping meeting regarding a Kinder-Morgan permit request for an easement for a CO₂ pipeline across North Central New Mexico.

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.

Senior Co-chair 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

J.T. Giermakowski. Ecological Modelling

S. Poe. Systematic Biology (1), Phyllomedusa (3), Zootaxa (2)

M.J. Ryan. Herpetological Review: (4), Herpetological Notes (2), Journal of Natural History (2), Herpetologica, Zootaxa, Alytes

E. Hosting Professional Colloquia and Groups

None.

10. SERVICE

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

None

B. Public Service

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.

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.

UNM Class Contribution

Contributor to AIM-UP!, Advancing Integration of Museums into Undergraduate Programs, website: <http://aim-up.blogspot.com/>

50th Anniversary of Wilderness Act

Contributed photo to Anniversary Calendar; facilitated MSB specimens to be used at event

Educational & Science Outreach

iNaturalist Project to monitor Gopher snakes in New Mexico,
website: <http://www.inaturalist.org/projects/new-mexico-gopher-snake-monitoring-2014>

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

Bachechi Open Space Naturalist Series, Frogs and Toads of the Rio Grande

Mentoring:

Jari Javier, Sevilleta National Wildlife Refuge LTER Research Experience for Undergraduates
Brittney White, Independent Undergraduate Research, UNM

11. ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.**I.M. Latella**

New Mexico Share with Wildlife: Current status of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico: Identification and evaluation of potential threats to its persistence. \$10,800

New Mexico Department of Game and Fish: Conservation of Endangered, Threatened, and Sensitive Amphibians and Reptiles. \$12,000 (Field Work, Report Writing)

M.J. Ryan

Lewis and Clark Exploration Fellowship: In search of missing frog species in Costa Rica: rediscovering critically endangered species in a time of extinction, \$5,000 (PI)

LTER Graduate Student Fellowship for Summer Research: Lizard Community Response to Short-Term Rainfall Manipulation, \$4,500 (PI)

New Mexico Share With Wildlife: Current status of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico: Identification and evaluation of potential threats to its persistence, \$10,800 (PI)

Crowd-funding: Search for Missing Frogs, \$1,500

Rufford Conservation Fund. **\$9,800.** In search of missing frog species in Costa Rica: rediscovering critically endangered species in a time of extinction. **M.J. Ryan.** (Co-PI with Juan Abarca, Cerro Dantas Wildlife Refuge & Research Center)

New Mexico Department of Game and Fish. **\$10,000.** Effects of *Batrachochytrium dendrobatidis* on amphibian communities in New Mexico. **M.J. Ryan.** (Co-PI with Jamie Voyles, New Mexico Institute of Mining and Technology).

12. DONATIONS AND GIFTS RECEIVED

Donation of 2014 issues of the Southwestern Naturalist and Texas Journal of Science.

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 and Fall)

B. Graduate students

Gray, L.N., Ph.D. /Poe
Latella, I.M., Ph.D./Poe
Ryan, M.J., Ph.D./Poe
Truett, B./Poe

C. Undergraduate Student Workers and Volunteers

Cruz, Paxton. Student employee.
Garcia, Miranda. Student employee.
Hogland, Sarah. Student employee.
Isom, Kaylee. Student employee.
Johnston, Gary. Student employee.
Olivas, Samantha. Student employee.
Ryan, Anastassia. Student employee.
White, Brittney. Student employee.

14. MUSEUM ASSOCIATES

A. Curatorial Associates

Painter, C.W., 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 BIRDS

Collections Growth and Maintenance:

The Division of Birds was productive in 2014. We added ~500 new specimens from the USA (New Mexico, Alaska, New Jersey, Maine, Florida, & Arizona), and ~450 from Peru. The major accomplishments of the Division of Birds this year include a major expedition to Peru, the first systematic efforts to sample the winter avifauna of New Mexico, a major overhaul to the website, and the public release of Arctos records for the first 10% of the MSB Peru Collection.

Our Peru field program restarted in 2014, after permit delays in 2013. We obtained a Genetic Resources Access Permit (activated in November 2013), an outstandingly generous collecting permit (July 2014), and an export permit for 4000 birds or bird parts (September 2014). Our current Peru collections represent over 750 species, of which over 95% are new species or subspecies for the MSB collection. Our avian tissue collection is now gaining international recognition for these outstanding holdings (over 10,000 Peru tissues collected to date, as of January 2015), and this is reflected in the growing research importance of our collection.

>900 specimens actively collected: Peru, Alaska, New Mexico.

>1750 specimens cataloged, including Peru, Alaska, New Mexico, Arizona.

Collecting expeditions in 2014:

2014: New Mexico Winter Expeditions to the Middle Rio Grande Valley, January-February.

2014: New Mexico: Jemez and Sandia and Gila hummingbird research expeditions, May-July.

2014: Alaska: Central Alaska breeding birds and their parasites, July.

2014: PERU: Lima, Ancash, Lambayeque, and Cajamarca, June-September.

Development and maintenance of digital relational databases:

All catalogued specimens are fully digitized and web accessible, via the Arctos database (Note: recently collected research specimens are not made public right away in order to allow MSB researchers to capitalize on proprietary data). **These online specimen records are directly linked from nine of our peer-reviewed publications listed in this report**, and MSB Bird specimens were cited in an additional 14 peer-reviewed publications or theses by other researchers.

A major endeavor that we started in 2014 is the barcoding and mapping of all of our Peru collected tissues into the Arctos system in collaboration with the DGR collections manager, Mariel Campbell. We anticipate that this project will be completed in 2016.

The Bird Division has a new webpage as of 2014, thanks to efforts of many individuals at the MSB (Tom Giermakowski, Adrienne Raniszewski, and Joe Cook), including easy web access to specimen data, publications by division personnel, and publications based on specimens in the collection.

In 2014, personnel of the MSB Bird Division published 14 peer-reviewed articles, plus additional web articles such as blog posts, two technical reports, one MS Thesis (with distinction), and one undergraduate honors thesis (*summa cum laude*). In 2014, we initiated a Google Scholar account to track the publications and citations impact of MSB Bird Division personnel:

https://scholar.google.com/citations?hl=en&user=XpGDgBQAAAAJ&view_op=list_works&authuser=1&sortby=pubdate.

In total, **25 peer-reviewed publications in 2014 utilized MSB Bird Division specimens**; this is a new single-year high (previous high was 13), reflecting the rapid increase in the research importance and public profile of our division. In 2014, we initiated a Google Scholar account to track the publications and citations impact of MSB Bird specimens:

https://scholar.google.com/citations?hl=en&user=ul8boF0AAAAJ&view_op=list_works&authuser=2&sortby=pubdate

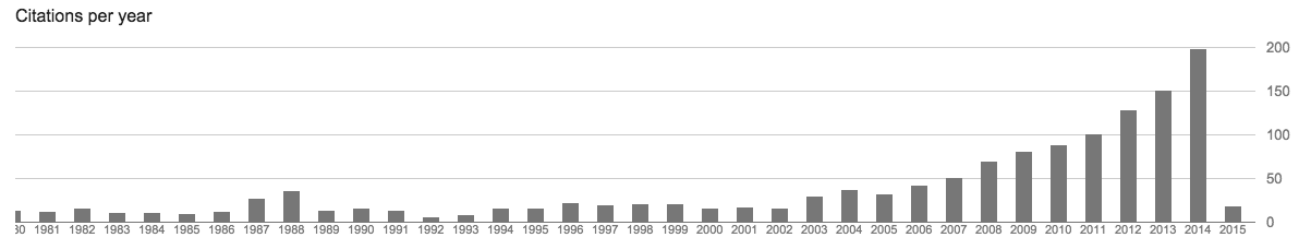


Figure 1. Citations per year for publications based on MSB bird specimens. Significant financial gifts from Robert W. Dickerman totaling over \$60,000. (\$50K for Collection Manager fund, plus Alaska, and Australia field trips). Smaller (but no less significant) donations from Christopher Witt, Thomas and Loretta Witt, David Marchiondo, and Sandy Williams.

Table 1. 2014 metrics for Bird Division.

	2014
1. Collection growth (Specimens Cataloged)	1753
2. Loans Out	35
3. Professional Visitors to the Collections	12
4. Collection Database Web Site Hits	30714
5. RFIs Answered in Person	105
6. Peer-Reviewed Pubs by MSB	14
7. Pubs (Peer-R) Citing MSB Specimens	12
by Other (non-MSB) Authors	
8. Technical Reports	2
9. UNM Courses using the Collection	21
10. UNM Courses taught	12
11. Graduate Students	14
12. Graduate Theses/Dissertations Completed	2
13. Undergraduate Students	9
14. Grants/Contracts in Force	2

NR – not reported

METRIC DESCRIPTIONS

1. Collection growth is the number of newly cataloged specimens and is an important measure of activity. This metric also tracks the annual increase in value of the collections.

1753 = 794 (AK, NM, AZ) +959 (Peru)

2. Number of specimen loans made to outside researchers and institutions. These are specimens, groups of specimens, or tissues loaned in support of ongoing research at other institutions. Loans help establish UNM's reputation as a significant contributor to research initiatives nationally and internationally.

35 loans were made in 2014.

3. Professional Visitors to the Collections. This metric reflects the number of visiting scientists and other professionals seeking to review specimens. It does not include casual visits by members of the UNM Biology Department.

Twelve visits to MSB birds by outside professionals.

4. Collection web activity. This metric (web hits) is under-reported because of electronic dissemination of MSB specimen and locality data that extends beyond our site (e.g., Global Biodiversity Information Facility). Major internal databases supported by the MSB are ARCTOS, the New Mexico Biodiversity Collections Consortium (NMBCC), and conservation databases of the New Mexico Natural Heritage Program.

30,714 hits in *Arctos*

5. Requests for information (RFIs) answered in person. Natural history collections staff also perform important advisory functions as indicated by the number of requests for information. Such requests come from academic and government scientists, natural resource management agency personnel, and/or the general public.

105 (40 CCW + 65 ABJ)

6. Publications by museum staff. This metric includes all publications in bona fide outlets such as books, journals, compendia, and other publications. Gray literature and quasi-public reports (e.g., technical reports, agency reports – see below) are not included.

Fourteen total:

Galen, S. C., & C. C. Witt*. 2014. Diverse avian malaria and other haemosporidian parasites in Andean house wrens: evidence for regional co-diversification by host-switching. *Journal of Avian Biology*, 45:374-386.

Benham, P. M., A. M. Cuervo, J. A. McGuire, & C. C. Witt*. 2014. Biogeography of the Andean metaltail hummingbirds: contrasting evolutionary histories of treeline and habitat-generalist clades. *Journal of Biogeography*, doi:10.1111/jbi.12452

DuBay, S. G., & C. C. Witt. 2014*. Differential high-altitude adaptation and limited gene flow between elevational replacement species of Andean tit-tyrant flycatchers. *Molecular Ecology*

23:3551–3565. <http://onlinelibrary.wiley.com/doi/10.1111/mec.12836/abstract>

Baumann, M. J., N. D. Pederson, **S. C. Galen**, & C. C. Witt*. 2014. Simple technique for distinguishing Yellow-bellied Flycatchers from Cordilleran and Pacific-slope flycatchers. *Journal of Field Ornithology* 85:391-396.

Cheviron, Z. A., Natarajan, C., Projecto-Garcia, J., Eddy, D. K., Jones, J., Carling, M. D., C. C. Witt, et al. (2014). Integrating evolutionary and functional tests of adaptive hypotheses: A case study of altitudinal differentiation in hemoglobin function in an Andean sparrow, *Zonotrichia capensis*. *Molecular Biology and Evolution*, 31(11), 2948–2962.

Rocha, L. A., [120 additional authors], & C. C. Witt. 2014. Specimen collection: an essential tool. *Science*, 344:814:815.

Wright, N. A., T. R. Gregory, & C. C. Witt*. 2014. Metabolic ‘engines’ of flight drive genome size reduction in birds. *Proceedings of the Royal Society B*, 281(1779).

Grady, J.M., B.J. Enquist, E. Dettweiler-Robinson, **N.A. Wright**, and F.A. Smith. 2014. Evidence for mesothermy in dinosaurs. *Science* 344:1268-1272.

Opazo, JC, FG Hoffmann, C Natarajan, CC Witt*, M Berenbrink, JF Storz. 2014. Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. *Molecular Biology and Evolution* 32: msu341.

Jones, MR, CC Witt*. 2014. Migrate small, sound big: functional constraints on body size promote tracheal elongation in cranes. *Journal of evolutionary biology* 27: 1256-1264

JA McGuire, CC Witt*, JV Remsen, A Corl, DL Rabosky, DL Altshuler. 2014. Molecular phylogenetics and the diversification of hummingbirds. *Current Biology* 24: 910-916.

Dubay, SG, AB Johnson*. 2014. Underweight American Woodcock specimens from New Mexico. *NMOS Bulletin* 42: 21-24.

Howe, WH and SO Williams. 2014. First nesting of the California Gull in New Mexico. *Western Birds* 45: 199-203.

Hubbard, JP*, CJ Dove. 2014. A proposed emendation of the Gray Flycatcher’s type locality and formal designation of its lectotype. *Occasional Papers of the Museum of Southwestern Biology* 11. 7 pages.

7. Publications by scientists outside of the MSB. Curatorial management has direct impact on scholarly production through the provision of specimens and data to other researchers.

Twelve.

Adams, R. V., and T. M. Burg. 2014. Influence of ecological and geological features on rangewide patterns of genetic structure in a widespread passerine. *Heredity* 114: 143-154.

Freshwater, C, CK Ghalambor, PR Martin. 2014. Repeated patterns of trait divergence between closely related dominant and subordinate bird species. *Ecology* 95: 2334-2345

García Bravo, J Barrio. A. 2014. New distribution records of the Buff-fronted Owl *Aegolius harrisii* Cassin, 1849 (Aves: Strigidae) in Peru. *CheckList* 10 (1)

Grimstead, D. N., Reynolds, A. C., Hudson, A. M., Akins, N. J., & Betancourt, J. L. (2014). Reduced Population Variance in Strontium Isotope Ratios Informs Domesticated Turkey Use at Chaco Canyon, New Mexico, USA. *Journal of Archaeological Method and Theory*, 1–23.

Hayes, FE. 2014. Inland records of the Black Skimmer in the western United States. *Western Birds* 45: 327-331

Manthey, JD, J Klicka, GM Spellman 2014. Effects of climate change on the evolution of Brown Creeper (*Certhia americana*) lineages. *Auk* 131: 559-570.

Montalvo AE, RA Powell, MD MacDonald, D Ransom, RR Lopez. 2014. A morphometric sex determination model for adult greater roadrunners (*Geococcyx californianus*) *Wildlife Society Bulletin* 38 (4): 837-841

Pinto, HA, SV Brant, AL de Melo. 2014. *Physa marmorata* (Mollusca: Physidae) as a natural intermediate host of *Trichobilharzia* (Trematoda: Schistosomatidae), a potential causative agent of avian cercarial dermatitis in Brazil. *Acta Tropica* 138: 38-43.

Ruegg, K., Anderson, E. C., Boone, J., Pouls, J., & Smith, T. B. (2014). A role for migration-linked genes and genomic islands in divergence of a songbird. *Molecular Ecology*, 23(19), 4757–4769.

Rutt, CL, P. Pyle, PW Collins, ML Brady, JR Tietz, JL Dunn 2014. The nominate subspecies of the Purple Finch in California and western North America. *Western Birds* 45: 284-295.

Thomas, DB, KJ McGraw, MW Butler, MT Carrano, O Madden, HF James. 2014. Ancient origins and multiple appearances of carotenoid-pigmented feathers in birds. *Proceedings of the Royal Society of London B: Biological Sciences* 281, no. 1788

Weinstein, BG, B Tinoco, JL Parra, LM Brown, JA McGuire, FG Stiles. 2014. Taxonomic, phylogenetic, and trait beta diversity in South American hummingbirds. *The American Naturalist* 184 (2), 211-224

8. Technical reports by museum staff include reports to agencies in fulfillment of contract deliverables. **Two.**

Mercado-Silva, N., S. A. Bonar, C. Schwalbe, and C. C. Witt. 2014. Natural resource condition assessment of the reservoirs of the Aspinall Unit, Curecanti National Recreation Area. Arizona Cooperative Fish and Wildlife Research Unit. Northern Colorado Plateau Network; Inventory and Monitoring, Natural Resource Condition Assessment Program, National Park Service, USA. 163 pp.

Witt, C. C., and T. Valqui. 2014. Informe a DGGFFS del Contrato de Acceso Marco a recursos Genéticos No. 006-2013-MINAGRI-DGFFS/DGEFFS. 14 June 2014. 10 pp.

9. UNM courses using specimens, data, electronic archives and other resources provided by the MSB. This number is increasing due largely to new courses and independent studies offered by faculty curators and their staff.

COURSES USING THE COLLECTIONS

Semester

Course Title

Fall 2014	BIOL 699	Dissertation	2	
Fall 2014	BIOL 599	Masters Thesis	3	
Fall 2014	BIOL 402	T: Ecology Seminar	16	
Fall 2014	BIOL 402	T: Molecular Seminar	6	
Fall 2014	BIOL 502	T: Molecular Systematics Disc	2	
Spring 2014	BIOL 699	Dissertation	2	
Spring 2014	BIOL 300	Evolution	40	
Spring 2014	BIOL 599	Masters Thesis	2	
Spring 2014	BIOL 551	Research Problems	1	
Spring 2014	BIOL 400	Senior Honors Thesis	2	
Spring 2014	BIOL 402	T: Avian Sci Specimen Prep	9	
Spring 2014	BIOL 402	T: Ecology Seminar	17	
Spring 2014	BIOL 402	T: Molecular Seminar	9	
Spring 2014	BIOL 402	T: Molecular Systematic Discus	8	
Spring 2014	BIOL 499	Undergraduate Problems	1	
Spring 2014	BIOL 386	General Vertebrate Zoology	40	
Fall 2014	BIOL 386	General Vertebrate Zoology	30	
Spring 2014	BIOL 204L	Plant & Animal Frm & Fnction	180	
Fall 2014	BIOL 204L	Plant & Animal Frm & Fnction	180	
Fall 2014	BIOL 203L	Ecology and Evolution	240	
Spring 2014	BIOL 203L	Ecology and Evolution	240	

10. UNM courses provided by museum staff include lecture courses taught by faculty curators or paid staff of the MSB. It also includes laboratory teaching by graduate students paid through MSB GA's.

Witt:

Fall 2014	BIOL 502	002 (csv) (xml)	38520	T: Molecular Seminar	1
Fall 2014	BIOL 502	001 (csv) (xml)	30562	T: Ecology Seminar	1
Fall 2014	BIOL 502	026 (csv) (xml)	39141	T: Molecular Systematics Disc	1
Fall 2014	BIOL 509	001 (csv) (xml)	47601	T: High Altitude Biology	1
Fall 2014	BIOL 599	035 (csv) (xml)	13612	Masters Thesis	2
Fall 2014	BIOL 699	035 (csv) (xml)	13711	Dissertation	3
Spring 2014	BIOL 502	002 (csv) (xml)	28294	T: Molecular Seminar	1
Spring 2014	BIOL 502	045 (csv) (xml)	38947	T: Molecular Systematic Disc	3
Spring 2014	BIOL 502	001 (csv) (xml)	25366	T: Ecology Seminar	9
Spring 2014	BIOL 599	035 (csv) (xml)	13617	Masters Thesis	3
Spring 2014	BIOL 402	025 (csv) (xml)	32914	T: Avian Sci Specimen Prep	1

Johnson:

Spring 2014	BIOL 402	025 (csv) (xml)	32914	T: Avian Sci Specimen Prep	1
-------------	----------	---------------------	-------	----------------------------	---

11. Number of graduate students mentored by MSB staff per year 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. Rachel Mallis, Comprehensive Exam, May 2, 2014; Dr. Kelly Miller, Chair.
2. Jessica Weber, Comprehensive Exam, April 30, 2014; Dr. Joseph A. Cook, Chair.
3. Marisa Lim, Stony Brook University (outside committee member); Qualifying Exam, 2014; Dr. Catherine Graham, Chair.
4. Heidi Hopkins, Dissertation Defense, March 24, 2014; Dr. Kelly Miller, Chair.
5. Yadeeh Sawyer, Dissertation Defense, April 28, 2014; Dr. Joseph A. Cook, Chair.
6. Colin Carriker, Dissertation Defense, June 13, 2014; UNM Exercise Science Dept., Dr. Ann Gibson, Chair.
7. Kirsten McDonnell-Cruz, Master's Thesis Defense, November 24, 2014; Dr. Blair O. Wolf, Chair.
8. John Grady, Comprehensive Exam, September 18, 2014; Dr. James H. Brown, Chair.
9. Natalie Wright: Witt Graduate Student
10. Elizabeth Beckman: Witt Graduate Student
11. Jonathan Schmitt: Witt Graduate Student
12. Andrea Chavez: Witt Graduate Student
13. Spencer Galen: Witt Graduate Student
14. Ariel Gaffney: Witt Graduate Student

12. Number of graduate theses/dissertations includes all the graduate students who graduated in 2014 that were mentored by MSB faculty as primary advisor or co-advisor.

Two.

Galen, Spencer C. 2014. Diversification and adaptation in the Andes: insights from phylogeography, malaria, and hemoglobin of the house wren (*Troglodytes aedon*). Master's Degree awarded with distinction, Spring 2014.

Abrahamson, B. (2014). *Evaluating the Utility of Natural History Collections in Research and for the Public*. Master's Thesis, 2014.

13. Number of undergraduate students trained in the MSB includes undergraduate students that are employed through Federal Work-Study program, externally funded research grants and contracts, or education programs

Nine.

14. Number of grants and contracts in force includes all active grants and contracts that are available to specimen-based research and are being conducted by MSB staff.

2011-2015: 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); \$650,000; DEB-1146491.

2013-2015: NSF-DEB: DISSERTATION RESEARCH: The Effects of Ecology and Evolution on Avian Flight Morphology. PI: C. C. Witt; Co-PI: Natalie Wright. \$14,742.

REU Supplement for Montane Biogeography Revealed by Quirks of the Evolutionary Process: Integrative Respiratory Phenotypes for Andean Birds; P.I.: C. C. Witt; \$8,000; DEB-1146491-supplement.

ACTIVITIES IN LEARNED SOCIETIES

Invited/Plenary Talks and Seminars

Witt, C. C. 2014. *Biogeografía de la hemoglobina de aves andinas: ¿Qué especies toman el ascensor a la extinción?* IX Congreso Nacional de Ornitología, 20-25 Abril de 2014, Ayacucho – Perú.

INVITED SEMINAR: University of Miami, Dept. of Biology, Coral Gables, FL, Oct. 27, 2014.

Hummingbird hemoglobin and the evolution of Andean biodiversity. Host: Dr. Kevin G. McCracken.

Contributed Talks and Posters

Schmitt, C. J., C. J. Wolf, and C. C. Witt. 2014. The geographic origins of wintering yellow-rumped warblers (*Setophaga coronata*) in New Mexico: Implications for the migration-adapted mitochondria hypothesis. 52nd New Mexico Ornithological Society Meeting, Albuquerque, New Mexico.

Wolf, C. J., C. J. Schmitt, and C. C. Witt. 2014. Characterization of the yellow-rumped warbler mitochondrial DNA contact zone: natural selection or neutral diffusion? 52nd New Mexico Ornithological Society Meeting, Albuquerque, New Mexico.

Galen, S. C., C. J. Wolf, C. J. Schmitt, and C. C. Witt. 2014. Rampant avian malaria is diverse and geographically structured in the yellow-rumped warbler populations of the southwestern United States. 52nd New Mexico Ornithological Society Meeting, Albuquerque, New Mexico.

Storz, J. F., C. Natarajan, Danielle Tufts, Joana Projecto-Garcia, **Christopher C. Witt**, H. Moriyama, Roy E. Weber, & Angela Fago. 2014. Causes and consequences of nonadditive mutational effects in the functional evolution of vertebrate hemoglobins. 'O₂-binding and sensing proteins' (O₂BiP) Meeting, Sheffield, England.

Storz, J. F., C. Natarajan, J. Projecto-Garcia, N. Inoguchi, H. Moriyama, **C. C. Witt**, R. E. Weber, A. Fago. 2014. Mechanisms of hemoglobin adaptation to hypoxia in high-altitude vertebrates. Keystone Symposium on Molecular and Cellular Biology: Sensing and Signaling of Hypoxia, January 7-12, Breckenridge, CO, USA.

Toomey, M. B., Jennifer M. Enright, Olle Lind, Rikard Frederiksen, David Wilby, Ken M. Riedl, Steven J. Schwartz, **Christopher C. Witt**, Earl H. Harrison, Kevin J. McGraw, Nicholas W. Roberts, M. Carter Cornwall, Almut Kelber, and Joseph C. Corbo. 2014. Carotenoid metabolism and opsin tuning have co-evolved to facilitate avian color discrimination. International Society for Behavioral Ecology, New York, New York.

Storz, J., C. C. Witt, et al. 2014. *Repeated adaptation of hummingbird hemoglobin*. X World Congress on High Altitude Medicine and Physiology & Mountain Emergency Medicine Hypoxia and Cold—From Science to Treatment May 25–31, 2014 Bozen/Bolzano, Italy.

Wright, N.A., T.R. Gregory, and C.C. Witt. Metabolic ‘engines’ of flight drive genome size reduction in birds. Gordon Research Seminar: Unifying Ecology Across Scales. Biddeford, ME. July 2014.

Wright, N.A., and C.C. Witt. 2014. A new island rule for birds: evolution towards flightlessness. Evolution. Raleigh, NC. June 2014.

Beckman, E. J., and **C. C. Witt**. 2014. Introgression among high Andean siskins. AOU-COS-SCO Joint Ornithology Meeting, Estes Park, Colorado, September 24-27, 2014.

Witt, C. C. and J. F. Storz. 2014. Repeated genetic adaptation to altitude in hummingbird hemoglobins. AOU-COS-SCO Joint Ornithology Meeting, Estes Park, Colorado, September 24-27, 2014.

Johnson, AB, and R. W. Dickerman. 2014. A taxonomic revision of Flammulated Owls *Psiloscops flammeolus*. 52nd New Mexico Ornithological Society Meeting, Albuquerque, New Mexico.

Attendance at Professional Meetings

Johnson, A.B.

American Ornithologists’Union. Estes Park, CO

New Mexico Ornithological Society annual meeting Albuquerque, NM

Witt, C.C

American Ornithologists’Union. Estes Park, CO

New Mexico Ornithological Society annual meeting Albuquerque, NM

Wolf, C.J.

New Mexico Ornithological Society annual meeting Albuquerque, NM

Wolf, B.O.

American Ornithologists’Union. Estes Park, CO

Baumann, M. J.

American Ornithologists’Union. Estes Park, CO

New Mexico Ornithological Society annual meeting Albuquerque, NM

Schmitt, C. J.

American Ornithologists’Union. Estes Park, CO

New Mexico Ornithological Society annual meeting Albuquerque, NM

Beckman, E. J.

American Ornithologists’Union. Estes Park, CO

New Mexico Ornithological Society annual meeting Albuquerque, NM

Gaffney, A.M.

American Ornithologists’Union. Estes Park, CO

New Mexico Ornithological Society annual meeting Albuquerque, NM

Williams, S.O.

New Mexico Ornithological Society annual meeting Albuquerque, NM

Western Field Ornithologists’ annual meeting San Diego, CA

Dickerman, R.W.

New Mexico Ornithological Society annual meeting Albuquerque, NM

Western Field Ornithologists’ annual meeting San Diego, CA

Service as Editor or on Editorial Board of a Journal

Williams, S.O.
Editor, NMOS Bulletin

OTHER PROFESSIONAL ACTIVITIES

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

Witt, C.C.
NSF Panelist for review of grant proposals, October 22-24, 2014; Division of Environmental Biology, Evolutionary Processes Cluster, Evolutionary Ecology Panel, National Science Foundation, Arlington, VA. (Reviewed 17 full proposals).

American Ornithologists Student Travel and Awards Committee Member (2009-2014)

Reviewer for 15 student & postdoc travel award proposals for AOU-COS-SCO 2014 Meeting.

Student Presentation Judge, AOU-COS-SCO 2014 Meeting, Estes Park, Colorado

Reviewer for American Philosophical Society Lewis & Clark Research Grants, 2014.

Reviewer for Wilson Ornithological Society Fuertes Award, 2014.
Service as Officer of Professional Society/Organization

Journal Referee

Witt, C.C.
PLoS One (2), Wildlife Society Bulletin (1), Zootaxa (2), Auk (2), Molecular Ecology (1), Proceedings of the National Academy of Sciences (1), Journal of Ethology (1), Genome Biology and Evolution (1), International Journal of Biodiversity (1).

Wright, N.A.
Ibis (1)

Johnson, A.B.
Western Birds (1)

PUBLIC SERVICE

DONATIONS AND GIFTS RECEIVED

\$50K from Robert Dickerman, PLUS Alaska Field work, Australia donation – another 10K
David Marchiondo
Sartor O. Williams III
Christopher C. Witt
Thomas and Loretta Witt

CURRENT STAFF

Faculty and Staff

Christopher Witt
Andrew Johnson
Adrienne Raniszewski

Graduate students (affiliated with division in 2014)

Natalie Wright
Elizabeth Beckman
Jonathan Schmitt
Andrea Chavez
Spencer Galen
Ariel Gaffney

Undergraduate Student Workers and Volunteers

1. Jason Kitting; 2012-2014; UNM; Red Blood Cell Concentration, and avian specimen preparation.
2. Ashley Smiley; 2010-2014; UNM; Navajo; UNO and MARC Programs; Avian cardiac morphology; Undergraduate thesis in progress.
3. Cole Wolf; 2011-2014; UNM; *Avian malaria is diverse and geographically structured in the Yellow-rumped warbler (Setophaga coronata) of the southwestern United States*; Honors thesis completed in April 2014, *summa cum laude*.
4. Jessica Allen; 2013-2014; UNM; Avian malaria survey of Peru.
5. Chauncey Gadek; 2014-; UNM; Avian specimen curation. Honors thesis in progress.
6. Schuyler Liphardt; 2013-2014; UNM; History of avian specimen collecting. 499 credit.
7. Nick Wilson; 2013-2014; postbac lab associate; Feather growth bars/ Trinidad expedition.
8. Laura Pagés; 2013-2014; postbac lab associate; Hispanic; Avian malaria screening and lab management.
9. Ariel Gaffney; 2014-; postbac lab associate; Avian malaria and hemoglobin evolution in the Andes. (started as MS student in August 2014).

MUSEUM ASSOCIATES

Curatorial Associates

Robert Dickerman
John Hubbard

Research Associates

Donna Schmitt
Gregory Schmitt
Sartor O. Williams III
Matthew J. Baumann

DIVISION OF ARTHROPODS

1. DIVISION HIGHLIGHTS

Renovation of the collection room for alcohol specimens arthropods and parasites was completed. All specimens were moved out of the vertebrate alcohol range into their new space and specimens were completely reorganized to reflect recent taxonomic changes.

Graduate student Rachael Mallis and collection manager Sandra Brantley traveled to Nicaragua in May to collect specimens for Rachael's dissertation work. In the process, many other spiders and other arachnids were collected for the MSBA. Sites visited were in cloud forest on coffee plantations with old-growth forest remnants

Kelly Miller engaged in a collecting expedition to Sweden and he and graduate student Grey Gustafson collected in Madagascar including numerous specimens for the MSBA.

Eric Metzler and Dave Lightfoot published the description of a new species of moth that was found during our National Park Service funded inventory of arthropods of White Sands National Monument (NM) and Cuatrocienegas Protected Area (Coahuila, MX). Metzler and Lightfoot also presented on the new moth at the 2014 meeting of the Lepidopterist's Society in Park City, UT. The holotype and paratypes were deposited in the MSB, Div. Arthropods, Type Collection. Over 3,000 arthropod specimens from the White Sands-Cuatrocienegas project were databased.

Michael Medrano finished his PhD on millipedes based in large part on specimens in the MSBA.

2. COLLECTION.

Collection Growth: 13,220

Number of outgoing loans (of our specimens) 6

Number of visits from professionals: 6

Number of webpage/database hits: 16,695 for all scan collections

Number of information requests answered in person: 50 + ~70

Number of grad students mentored by MSB staff: 5

Number of grad student theses/dissertations: 2

Number of undergrads trained in the MSB: 6

Number of grants and contracts in force during the year: 5

4. COURSES TAUGHT BY MSB PERSONNEL

INSTRUCTOR	TERM	COURSE	TITLE	STUDENTS
K.B. Miller	Spring	Biol203	Ecology and Evolution	181
K.B. Miller	Fall	Biol409	Animal Sexual Strategies	35

5. COLLECTION MANAGEMENT ACTIVITIES

With the new collection space, we sorted specimens into genus or species jars (most had previously been grouped by family because of lack of space), which required a couple of shifts, many new labels, and some taxonomic changes.

We received several donations of specimens, especially from the Valles Caldera National Preserve, New Mexico, ordered and received 72 new specimens drawers and pinning trays, coordinated the donation of a comprehensive New Mexico butterfly collection, databased over 3,000 specimens from the White Sands arthropod inventory project, responded to and sent 6 specimen loans for research, contributed and prepared specimens for a special display “Conserving New Mexico” at the New Mexico Museum of Natural History and Science, accessioned the holotype and paratypes of a new species of moth from New Mexico.

6. AWARDS, GRANTS, AND CONTRACTS

MCZ Ernst Mayr Travel Grants in Animal Systematics. Summer 2014 **G.T. Gustafson**. \$1,500

NSF Systematic Biology and Biodiversity Inventories Grant #DEB–1353426 (**K.B. Miller, PI**). The Phylogeny of Diving Beetles and Extreme Diversification of Sexual Strategies (\$520,000), 2014-2016.

NSF CAREER #DEB–0845984 (**K.B. Miller, PI**). Phylogenetic Revisions of South American Water Beetles (Coleoptera: Adepaga: Hydradephaga): A Model for Teaching Systematic Biology (\$675,000), 2009-2015.

National Science Foundation. Doctoral Dissertation Improvement Grand (DDIG): Evolution of Diet Breadth in *Melissodes* Latreille. Award #1402113. June 2014 - June 2015. **PI. K.B. Miller Co-PI K.W. Wright** \$19,102.00.

National Science Foundation. Doctoral Dissertation Improvement Grant (DDIG): A phylogenetic study of speciation in whirligig beetles. Award #1402446. May 2014 – May 2015. **PI. K.B. Miller Co-PI G.T. Gustafson** \$19,606.00.

Sevilleta Long-Term Ecological Research Program graduate student summer support. June - July 2014. **K.W. Wright**.

Alvin R. and Caroline G. Grove Summer Research Scholarship. Summer 2014 **R.E. Mallis**. \$1, 250.

Biology Graduate Student Association GRAC Research Grant. Spring 2014. **R.E. Mallis**. \$400.

Biology Graduate Student Association GRAC Travel Grant. Summer 2014. **R.E. Mallis**. \$150.

Office of Graduate Studies Research Project and Travel Grant Spring-Fall 2014. **R.E. Mallis**. \$455.

7. PEER REVIEWED PUBLICATIONS BY MSB FACULTY/STAFF

Journal Articles

- Baca, S.M., **G.T. Gustafson**, M. Toledo, & **K.B. Miller**. 2014. Revision of the Neotropical burrowing water beetle genus *Liocanthhydrus* Guignot (Coleoptera: Noteridae: Noterinae: Noterini) with the description of two new species. *Zootaxa*, 3793(2): 231 – 246.
- Delph, R.J., M.J. Clifford, N.S. Cobb, P.L. Ford, and **S.L. Brantley**. 2014. Pinyon pine mortality alters communities of ground-dwelling arthropods. *Western North American Naturalist* 74: 162-184.
- Gustafson, G.T.**, C.A. Maier, S.M. Baca, & C.K. Faris. 2014. Scientific Note: Rediscovery of *Lutrochus laticeps* Casey, 1893 (Coleoptera: Lutrochidae) and the Discovery of *Dineutus productus* Roberts, 1895 and *Dineutus serrulatus analis* Régimbart, 1882 (Coleoptera: Gyrinidae) in Kansas, with Notes on Habitat Preference. *The Coleopterists Bulletin* 68(4): 714 – 718.
- Higgins, J.W., N.S. Cobb, S. Somer, R.J. Delph, and **S.L. Brantley**. 2014. Ground-dwelling arthropod responses to succession in a pinyon-juniper woodland. *Ecosphere* 5(1):5.
[dx.doi.org/10.1890/ES13-00270.1](https://doi.org/10.1890/ES13-00270.1)
- LeBuhn, G., S. Droege, E.F. Connor, B. Gemmill-Herren, S.G. Potts, R.L. Minckley, R. Jean, E. Kula, D.W. Roubik, **K.W. Wright**, G. Frankie, F. Parker. 2014. Evidence-based conservation: reply to Tepedino et al. *Conservation Biology* 29(1): 283-285.
- Leister, M. & K. Miller**. 2014. A new species of ant mimicking spider, *Myrmecotypus jasmineae* (Araneae: Corinnidae: Castianeirinae), from Nicaragua. *Zootaxa*, 3838(4): 495-500.
- Leister, M. & K. Miller**. 2014. First description of the male of *Sphecotypus niger* (Perty, 1833), with notes on behavioral and morphological mimicry (Araneae: Corinnidae: Castianeirinae). *Zootaxa*, 3814(1): 146-150.
- Metzler, E. H. and D. C. Lightfoot**. 2014. The Lepidoptera of White Sands National Monument 6: A new species of the genus *Areniscythris* (Scythrididae), a recently discovered iconic species from the Monument. *Journal of the Lepidopterists' Society* 68:185-290.
- Touroult, J., A. Asenjo, A. Ballerio, P. Batista Dos Santos, O. Boilly, S. Boucher, J. Chassain, A. Cline, R. Constantin, P-H. Dalens, N. Degallier, C. Dheurle, T. Erwin, F. Feer, C. Fediuk de Castro-Guedes, C.A.H. Flechtmann, D. Gonzales, **G.T. Gustafson**, A. Herrmann, M-L. Jameson, P. Leblanc, D. Lohez, A. Mantilleri, L. Massutti de Almeida, M.A. Morón Rios, I. Paulmier, Y. Ponchel, P. Queney, S. Rojkoff, J. Rheinheimer, C.S. Ribeiro-Costa, F. Wachtel, I. Witté, J-H. Yvines, S. Brûlé. 2014. Combien y a-t-il d'espèces de coléoptères en Guyane? Une première analyse du référentiel TAXREF. pp. 3 – 18. *In* Coléoptères de Guyane. Tome VIII. ACOREP, France. 104 pp.
- Miller, K.B.**, & J. Bergsten. 2014. The phylogeny and classification of diving beetles (Coleoptera: Dytiscidae). Pages 49-172 in D.A. Yee, editor. *Ecology, Systematics, and Natural History of Predaceous Diving Beetles* (Coleoptera: Dytiscidae). Springer, New York.
- Miller, K.B.**, & J. Bergsten. 2014. Predaceous diving beetle sexual systems. Pages 199-234 in D.A. Yee, editor. *Ecology, Systematics, and Natural History of Predaceous Diving Beetles* (Coleoptera: Dytiscidae). Springer, New York.

- Miller, K.B. & E.T. Montano.** 2014. Review of the genus *Fontidessus* Miller & Spangler, 2008 (Coleoptera, Dytiscidae, Hydroporinae, Bidessini) with description of four new species. *ZooKeys*, 426: 65-85.
- Cline, A.R., T.R. Smith, **K.B. Miller**, M. Moulton, M. Whiting, & P. Audisio. 2014. Molecular phylogeny of Nitidulidae: assessment of subfamilial and tribal classification and formalization of the family Cybocephalidae (Coleoptera: Cucujoidea). *Systematic Entomology*, 1-15.
- Leister, M. & K. Miller.** 2014. First description of the male of *Sphecotypus niger* (Perty, 1833), with notes on behavioral and morphological mimicry (Araneae: Corinnidae: Castianeirinae). *Zootaxa*, 3814(1): 146-150.
- Miller, K.B.** 2014. *Agaporomorphus sharynae*, a new species of diving beetle (Coleoptera: Dytiscidae: Copelatinae) from Venezuela. *Zootaxa*, 3790(1): 177-184.
- Hopkins, H.** 2014. A revision of the genus *Arenivaga* (Rehn) (Blattodea, Corydiidae), with descriptions of new species and key to the males of the genus. *ZooKeys*, 384: 1-256.
- Bukontaite, R., **K.B. Miller**, & J. Bergsten. 2014. The utility of CAD in recovering Gondwanan vicariance events and the evolutionary history of Aciliini (Coleoptera: Dytiscidae). *BMC Evolutionary Biology*, 14: 5.

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

Dissertations/Theses Based on MSB Specimens/Data

Medrano, M. 2014. A taxonomic revision of the millipede family Atopetholidae (Chamberlin) (Diplopoda: Spirobolida) with descriptions of new species and the conservation status of *Comanchelus chihuensis* (Chamberlin 1947) (Diplopoda: Spirobolida: Atopetholidae), a species of concern. The University of New Mexico, Doctoral Dissertation.

Reports Based on MSB Specimens/Data

8. ACTIVITIES IN LEARNED SOCIETIES

Invited/Plenary Talks and Seminars

Contributed Talks and Posters

Brantley, S.L. The challenge of imaging small invertebrates. Invited poster, Invertebrates Imaging Group, iDigBio Summit IV, Gainesville, Florida. October.

Brantley, S.L. and M.P. Leister. Spider imaging at the Museum of Southwestern Biology. Invited webinar, iDigBio, February.

Brantley, S.L. and M. Ward. Changes in spider communities following wildfire in northern New Mexico. Oral presentation. American Arachnological Society Annual Meeting, Newark, Ohio. June.

Mallis, R.E. Spigot ontogeny in *Tengella perfuga*. Oral presentation. American Arachnological Society Annual Meeting, Newark, Ohio, June.

Metzler, E. H. and D. C. Lightfoot. A new species of the genus *Areniscythriss* (Scythrididae), a recently discovered iconic species from White Sands National Monument. Oral presentation. 63rd Annual Meeting of the Lepidopterist's Society. Park City, UT.

Ward, M. and **Brantley, S.L.** Monitoring: Insects, spiders, and other invertebrates. All-Hands Meeting, Southwest Jemez Mountains Collaborative Forest Landscape Restoration Project. Oral presentation. Santa Fe, New Mexico, March.

Wright, K.W.

Wright, K.W. 2014. Molecular techniques for identifying pollen. Oral presentation. Entomological Society of America Annual Meeting, Portland, Oregon, November 2014.

Miller, K.B.

Diving Beetle Sexual Strategies, Seminar talk, European Congress of Entomology, York, England. August 2014.

Attendance at Professional Meetings

Brantley, S.L.

Southwest Jemez Mountains Collaborative Forest Landscape Restoration Project, March;
American Arachnological Society Annual Meeting, Newark, Ohio. June; iDigBio Summit IV, October.

Wright, K.W.

Entomological Society of America Annual Meeting. Portland, Oregon, November 2014

Mallis, R.E.

American Arachnological Society Annual Meeting. Newark, Ohio. June.

Metzler, E. H. and D. C. Lightfoot. 63rd Annual Meeting of the Lepidopterist's Society. Park City, UT.

Miller, K.B.

European Congress of Entomology, York, England, August 2014.

Service as Editor or on Editorial Board of a Journal

Gustafson, G.T.

ACTA Entomologica Musei Nationalis Pragae: English language editor

Lightfoot, D. C. Associate Editor (Entomology), Western North American Naturalist

Service as Officer of Professional Society/Organization

9. OTHER PROFESSIONAL ACTIVITIES

Presentation to General Audience in a Scholarly Capacity

Brantley, S.L.

Introduction to local arthropods for Bernalillo County Open Space Master Naturalists Program, July.

Wright, K.W.

Native Bees of New Mexico. Invited speaker. Rockhound State Park Lecture Series. August 2014.

How do our restoration efforts affect native bee communities? Invited speaker. USFWS National and Regional Integrated Pest Management and Invasive Species Coordinators Meeting. March 2014

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

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

Journal Referee

Gustafson, G.T. Peer Review for articles published in following journals: Zootaxa, Zookeys, Journal of the Kansas Entomological Society

Lightfoot, D. C. Peer Review for 2 articles published in: PLOS ONE.

Miller, K.B. Zootaxa, Systematic Entomology, Molecular Phylogenetics and Evolution.

Public Service

Brantley, S.L. (and collection managers from Amphibians and Reptiles, Fishes, Birds, and Mammals). Presentation to Chuck Buxbaum's Comparative Anatomy and Physiology class at Sandia Prep, 40 students, January.

Brantley, S.L. Presentation to visiting MESA students from Robinson High School, 8 students, May.

Brantley, S.L. Arthropod identifications and information for Experts' Day at the New Mexico Museum of Natural History and Science, October.

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

11. DONATIONS AND GIFTS RECEIVED

12. CURRENT STAFF

Faculty and Staff

Kelly Miller, Ph.D., curator
Sandra Brantley, Ph.D, senior collection manager
David Lightfoot, Ph.D, senior collection manager

Graduate students

Grey Gustafson, Ph.D candidate
Karen Wright, Ph.D. candidate
Rachael Mallis, Ph.D candidate

Undergraduate Student Workers and Volunteers

Matthew Leister, undergraduate
Emma Cleary, undergraduate
Desiree Sanchez, post-bacc (PREP)
Jennifer Gammage, undergraduate
Anna Gillette, undergraduate
Sharyn Davidson, volunteer

13. MUSEUM ASSOCIATES

Curatorial Associates

Research Associates

Ana Davidson, PhD
Eric Metzler, PhD
Manuel Molles, PhD
Robert Parmenter, PhD
Gavin J. Svenson, PhD
Ernest Valdez, PhD

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 multiple tissue samples from over 160,000 specimens, including Mammals, Birds, Reptiles and Fishes. 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 worldwide.

Collection Growth.

1. 11,470 cataloged specimens from the Division of Mammals.
2. 959 cataloged specimens from the Division of Birds.
3. Over 2,000 tissue vials from the Division of Amphibians and Reptiles
4. Approximately 27,600 tissue vials archived in the DGR frozen collection, including 18,000 in the new Arctos object tracking system.

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. DGR supported one graduate student each semester; one undergraduate and one post-baccalaureate student were hired in DGR through MSB Birds in Fall 2014.

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 2014 DGR specimens were cited in at least 78 studies published in over 35 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.

Theses/Dissertations.

MSB Arctos database and collection accessibility.

- A. **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.

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

Collection	Queries	Specimen Records
DGR Mammals	3,559	227,106
MSB Mammals	66,789	34,619,220
DGR Birds	2,095	26,853
MSB Birds	30,728	2,146,283
MSB Fish (tissues)	571	93,314
MSB Herps (tissues)	594	28,227
TOTAL	104,336	37,141,003

2. COLLECTION USE

Collection Growth (specimens catalogued)	Loans (outgoing)	Loans (incoming)	Visitors	Information Requests Personally Responded to	Publications Citing MSB DGR Specimens
11,469 * 959 ** 12,428 Total ~ 27,600 Mamm and Bird Vials ~ 2,000 MSB Herp ~ 30,000 vials Total	33(614)*** 15 (214)***** 48 (828) Total	0		>500*****	78+

- * Mammals
- ** Birds
- *** Mamm/DGR Mamm combined tissue loans
- **** Birds/DGR Birds combined tissue loans
- ***** Mammals/Birds/DGR

Collection Usage. In total, 28,300 new NK numbers were issued from DGR to the MSB mammal and MSB bird divisions for use in their projects in Panama, Mongolia, Alaska, Peru, Canada, the Pacific Northwest and New Mexico. In 2014 the DGR received close to 30,000 tissue vials. Loans processed include 33 tissue loans for the MSB Mammal division containing 614 specimens, and 15 loans for the MSB Bird division, containing 214 bird specimens, for a total of 48 loans (828 specimens) to 14 states, and 4 foreign countries. Loans included 15 tissue loans for 6 UNM post-baccalaureate, graduate, and postdoctoral students.

3. COURSES USING THE COLLECTION

UNM Classes receiving loans of DGR material for educational purposes

BIOL 599 – Masters Thesis. Spring	(1 student, 3 tissue loans)
BIOL 699 – Dissertation. Spring	(3 students, 4 tissue loans)
BIOL 699 – Dissertation. Fall	(2 students, 3 tissue loans)

UNM courses or programs using the DGR collection through visits or staff presentations.

BIOL 486L - Mammalogy, Fall	(19 students, 2 instructors)
UNM Biology student interest group	(10 students, 1 instructor)
UNM prospective grad students' tour	(24 students, 1 instructor)

Visiting researchers: Institutions or Departments:

UNM Stable Isotopes Group	(25)
UNM Pre-Award Office	(10)

Other Visitors:

Dr. Jennifer K. Frey, New Mexico State University	(with 11 students)
---	--------------------

4. COURSES TAUGHT BY MSB PERSONNEL

Faculty/Collection Managers

See MSB Mammal/MSB Bird Division reports

5. COLLECTION MANAGEMENT

MSB DGR added ~12,428 new specimens and approximately 30,000 new frozen vials during 2014.

Current projects generating specimens for DGR

Collaborative Integrative Investigations of Biomes of the Arctic (CIIBA)
– Joseph Cook, Kurt Galbreath, Eric Hoberg—NSF 1258010
High Latitude Contact Zones - Andrew Hope, Joseph Cook – Alaska (USGS, NPS)
Ladder Ranch and Greater Gila Ecosystems Project Project - Joseph Cook, Amanda Jones (UNM, GPSA)
Peruvian Bird Survey –Chris Witt (NSF)
Mexican wolf reintroduction – ongoing, Jon Dunnum, USFWS
Panama Hantavirus – Joseph Cook, Jon Dunnum, Blas Arrien—Gorgas Institute
Mammalogy and Tropical Biology classes - Joseph Cook (UNM)

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: 16 ultra-cold freezers, multiple alarm systems, computers, and a bio-safety 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. Rausch specimen integration NSF 1057383

6. AWARDS, GRANTS, AND CONTRACTS

See MSB Mammal/MSB Bird/MSB Parasite divisional reports

7. PUBLICATIONS

MSB Bird Publications referencing DGR (see MSB Bird Division Report):

1. Adams, R. V., and T. M. Burg. 2014. Influence of ecological and geological features on rangewide patterns of genetic structure in a widespread passerine. *Heredity* 114: 143-154.
2. Baumann, M. J., N. D. Pederson, S. C. Galen, & C. C. Witt. 2014. Simple technique for distinguishing Yellow-bellied Flycatchers from Cordilleran and Pacific-slope flycatchers. *Journal of Field Ornithology* 85:391-396.
3. Baumann, M. (2014). *Tracing Deuterium through the food web and into Birds and Mammals along an elevational gradient in the Southern Rocky Mountains* (Doctoral dissertation).
4. Benham, Phred M., et al. "Biogeography of the Andean metaltail hummingbirds: contrasting evolutionary histories of tree line and habitat-generalist clades." *Journal of Biogeography* (2014). DOI: 10.1111/jbi.12452
5. Cheviron, Z. A., Natarajan, C., Projecto-Garcia, J., Eddy, D. K., Jones, J., Carling, M. D., ... & Storz, J. F. (2014). Integrating evolutionary and functional tests of adaptive hypotheses: a case study of altitudinal differentiation in hemoglobin function in an Andean sparrow, *Zonotrichia capensis*. *Molecular biology and evolution*, 31(11), 2948-2962.
6. DuBay, S. G., & Witt, C. C. (2014). Differential high-altitude adaptation and restricted gene flow across a mid-elevation hybrid zone in Andean tit-tyrant flycatchers. *Molecular ecology*, 23(14), 3551-3565. DOI: 10.1111/mec.12836
7. Galen, Spencer. Diversification and Adaptation in the Andes: Insights from Phylogeography, Malaria, and Hemoglobin in the House Wren (TROGLODYTES AEDON). Diss. 2014.
8. Galen, Spencer C., and Christopher C. Witt. "Diverse avian malaria and other haemosporidian parasites in Andean house wrens: evidence for regional co-diversification by host-switching." *Journal of Avian Biology* 45.4 (2014): 374-386.
9. Manthey, JD, J Klicka, GM Spellman 2014. Effects of climate change on the evolution of Brown Creeper (*Certhia americana*) lineages. *Auk* 131: 559-570.
10. McGuire, J. A., Witt, C. C., Remsen, J. V., Corl, A., Rabosky, D. L., Altshuler, D. L., & Dudley, R. (2014). Molecular phylogenetics and the diversification of hummingbirds. *Current Biology*, 24(8), 910-916.

11. Juan C. Opazo, Federico G. Hoffmann, Chandrasekhar Natarajan, Christopher C. Witt, Michael Berenbrink, and Jay F. Storz. **Gene Turnover in the Avian Globin Gene Families and Evolutionary Changes in Hemoglobin Isoform Expression.** Mol. Biol. Evol. 2015 : msu341v2-msu341.

12. Weinstein, BG, B Tinoco, JL Parra, LM Brown, JA McGuire, FG Stiles. 2014. Taxonomic, phylogenetic, and trait beta diversity in South American hummingbirds. *The American Naturalist* 184 (2), 211-224.

13. Wright NA, Gregory TR, Witt CC. 2014 Metabolic 'engines' of flight drive genome size reduction in birds. *Proc. R. Soc. B* 281: 20132780. <http://dx.doi.org/10.1098/rspb.2013.2780>

MSB Mammal Publications referencing DGR (see MSB Mammal Division Report):

1. de Barros Lopes, L., Guterres, A., Rozental, T., de Oliveira, R. C., Mares-Guia, M. A., Fernandes, J., ... & de Lemos, E. R. S. (2014). Rickettsia bellii, Rickettsia amblyommii, and Laguna Negra hantavirus in an Indian reserve in the Brazilian Amazon. *Parasites & vectors*, 7(1), 1-7.
2. Bennett, S. N., Gu, S. H., Kang, H. J., Arai, S., & Yanagihara, R. (2014). Reconstructing the evolutionary origins and phylogeography of hantaviruses. *Trends in microbiology*.
3. Bezy, R. L., & Cole, C. J. (2014). Amphibians and Reptiles of the Madrean Archipelago of Arizona and New Mexico. *American Museum Novitates*, (3810), 1-24.
4. Cañón, C., Mir, D., Pardiñas, U. F., Lessa, E. P., & D'Elía, G. (2014). A multilocus perspective on the phylogenetic relationships and diversification of rodents of the tribe Abrotrichini (Cricetidae: Sigmodontinae). *Zoologica Scripta*, 43(5), 443-454.
5. Chavez, A. S., Maher, S. P., Arbogast, B. S., & Kenagy, G. J. (2014). Diversification and Gene Flow in Nascent Lineages of Island and Mainland North American Tree Squirrels (Tamiasciurus). *Evolution*, 68(4), 1094-1109.
6. Cronin, M., Cánovas, A., Bannasch, D. L., Oberbauer, A. M., & Medrano, J. F. (2014). Single Nucleotide Polymorphism (SNP) Variation of Wolves (Canis lupus) in Southeast Alaska and Comparison with Wolves, Dogs, and Coyotes in North America. *Journal of Heredity*, esu075.
7. Dawson, N. G., Hope, A. G., Talbot, S. L., & Cook, J. A. (2014). A multilocus evaluation of ermine (Mustela erminea) across the Holarctic, testing hypotheses of Pleistocene diversification in response to climate change. *Journal of Biogeography*, 41(3), 464-475.
8. Fernández, J. A. (2014). Mitochondrial phylogenetics of a rare Mexican endemic: Nelson's woodrat, Neotoma nelsoni (Rodentia: Cricetidae), with comments on its biogeographic history. *The Southwestern Naturalist*, 59(1), 81-90.
9. Figueiredo, L. T. M., Souza, W. M. D., Ferrés, M., & Enria, D. A. (2014). Hantaviruses and cardiopulmonary syndrome in South America. *Virus research*.
10. Giarla, T. C., Voss, R. S., & Jansa, S. A. (2014). Hidden diversity in the Andes: comparison of species delimitation methods in montane marsupials. *Molecular phylogenetics and evolution*, 70, 137-151.
11. Gu, S. H., Dormion, J., Hugot, J. P., & Yanagihara, R. (2014). High prevalence of Nova hantavirus infection in the European mole (< i> Talpa europaea</i>) in France. *Epidemiology and infection*, 142(06), 1167-1171.
12. Gu, S. H., Hejduk, J., Markowski, J., Kang, H. J., Markowski, M., Połatyńska, M., ... & Yanagihara, R. (2014). Co-circulation of Soricid-and Talpid-borne Hantaviruses in Poland. *Infection, Genetics and Evolution*.

13. Gu, S. H., Lim, B. K., Kadjo, B., Arai, S., Kim, J. A., Nicolas, V., ... & Yanagihara, R. (2014). Molecular Phylogeny of Hantaviruses Harbored by Insectivorous Bats in Côte d'Ivoire and Vietnam. *Viruses*, 6(5), 1897-1910.
14. González-Ittig, R. E., Kandel, N., Levis, S., Calderón, G., Salazar-Bravo, J., & Gardenal, C. N. (2014). Molecular systematics of the South American rodent *Calomys laucha* (Cricetidae: Sigmodontinae), a reservoir of the Laguna Negra hantavirus. *Canadian Journal of Zoology*, 92(12), 1093-1098.
15. González-Ittig, R. E., Rivera, P. C., Levis, S. C., Calderón, G. E., & Gardenal, C. N. (2014). The molecular phylogenetics of the genus *Oligoryzomys* (Rodentia: Cricetidae) clarifies rodent host–hantavirus associations. *Zoological Journal of the Linnean Society*, 171(2), 457-474.
16. Guterres, A., de Oliveira, R. C., Fernandes, J., Strecht, L., Casado, F., Gomes de Oliveira, F. C., ... & Sampaio de Lemos, E. R. (2014). Characterization of Juquitiba Virus in *Oligoryzomys furnesi* from Brazilian Cerrado. *Viruses*, 6(4), 1473-1482.
17. Gutiérrez, E. E., Anderson, R. P., Voss, R. S., Ochoa-G, J., Aguilera, M., & Jansa, S. A. (2014). Phylogeography of *Marmosa robinsoni*: insights into the biogeography of dry forests in northern South America. *Journal of Mammalogy*, 95(6), 1175-1188.
18. Hope, A. G., Ho, S. Y., Malaney, J. L., Cook, J. A., & Talbot, S. L. (2014). Accounting for rate variation among lineages in comparative demographic analyses. *Evolution*, 68(9), 2689-2700.
19. Hope, A. G., Panter, N., Cook, J. A., Talbot, S. L., & Nagorsen, D. W. (2014). Multilocus phylogeography and systematic revision of North American water shrews (genus: *Sorex*). *Journal of Mammalogy*, 95(4), 722-738.
20. Hugot, J. P., Gu, S. H., Feliu, C., Ventur, J., Ribas, A., Dormion, J., ... & Nicolas, V. (2014). Genetic Diversity of *Talpa europaea* and Nova Hanta Virus (NVAV) in France. *Bulletin de l'Academie veterinaire de France*, 167(3).
21. Jansa, Sharon A., F. Keith Barker, and Robert S. Voss. 2014. The early diversification history of didelphid marsupials: a window into South America's "Splendid Isolation. *Evolution* 68.3 684-695.
22. Kang, H. J., Stanley, W. T., Esselstyn, J. A., Gu, S. H., & Yanagihara, R. (2014). Expanded Host Diversity and Geographic Distribution of Hantaviruses in Sub-Saharan Africa. *Journal of virology*, 88(13), 7663-7667.
23. Kohli, B. A., Fedorov, V. B., Waltari, E., & Cook, J. A. (2014). Phylogeography of a Holarctic rodent (*Myodes rutilus*): testing high-latitude biogeographical hypotheses and the dynamics of range shifts. *Journal of Biogeography*.
24. Kohli, B. A., Speer, K. A., Kilpatrick, C. W., Batsaikhan, N., Damdinbaza, D., & Cook, J. A. (2014). Multilocus systematics and non-punctuated evolution of Holarctic *Myodini* (Rodentia: Arvicolinae). *Molecular phylogenetics and evolution*, 76, 18-29.
25. Kruger, D. H., Figueiredo, L. T. M., Song, J. W., & Klempa, B. (2014). Hantaviruses—Globally emerging pathogens. *Journal of Clinical Virology*.
26. Lee, J. G., Gu, S. H., Baek, L. J., Shin, O. S., Park, K. S., Kim, H. C., ... & Song, J. W. (2014). Muju Virus, Harbored by *Myodes regulus* in Korea, Might Represent a Genetic Variant of Puumala Virus, the Prototype Arvicolid Rodent-Borne Hantavirus. *Viruses*, 6(4), 1701-1714.
27. Leite, R. N., Kolokotronis, S. O., Almeida, F. C., Werneck, F. P., Rogers, D. S., & Weksler, M. (2014). In the wake of invasion: tracing the historical biogeography of the South American cricetid radiation (Rodentia, Sigmodontinae). *PloS one*, 9(6), e100687.

28. Lin, X. D., Zhou, R. H., Fan, F. N., Ying, X. H., Sun, X. Y., Wang, W., ... & Zhang, Y. Z. (2014). Biodiversity and Evolution of Imjin virus and Thottapalayam virus in Crocidurinae shrews in Zhejiang Province, China. *Virus research*.
29. Ling, J., Sironen, T., Voutilainen, L., Hepojoki, S., Niemimaa, J., Isoviita, V. M., ... & Vapalahti, O. (2014). Hantaviruses in Finnish soricomorphs: Evidence for two distinct hantaviruses carried by *Sorex araneus* suggesting ancient host-switch. *Infection, Genetics and Evolution*, 27, 51-61.
30. Martínez-Lanfranco, J. A., Flores, D., Jayat, J. P., & D'Elía, G. (2014). A new species of lutrine opossum, genus *Lutreolina* Thomas (Didelphidae), from the South American Yungas. *Journal of Mammalogy*, 95(2), 225-240.
31. Mathis, V. L., Hafner, M. S., & Hafner, D. J. (2014). Evolution and phylogeography of the *Thomomys umbrinus* species complex (Rodentia: Geomyidae). *Journal of Mammalogy*, 95(4), 754-771.
32. Mitchell, K. J., Pratt, R. C., Watson, L. N., Gibb, G. C., Llamas, B., Kasper, M., ... & Cooper, A. (2014). Molecular phylogeny, biogeography, and habitat preference evolution of marsupials. *Molecular biology and evolution*, msu176.
33. Montoya-Ruiz, C., Diaz, F. J., & Rodas, J. D. (2014). Recent Evidence of Hantavirus Circulation in the American Tropic. *Viruses*, 6(3), 1274-1293.
34. Opazo, J. C., Hoffmann, F. G., Natarajan, C., Witt, C. C., Berenbrink, M., & Storz, J. F. (2014). Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. *Molecular Biology and Evolution*, msu341.
35. de Oliveira, R. C., Cordeiro-Santos, M., Guterres, A., Fernandes, J., de Melo, A. X., João, G. A., ... & de Lemos, E. R. S. (2014). Rio Mamore Virus and Hantavirus Pulmonary Syndrome, Brazil. *Emerging infectious diseases*, 20(9), 1568.
36. de Oliveira, R. C., Guterres, A., Fernandes, J., D'Andrea, P. S., Bonvicino, C. R., & de Lemos, E. R. S. (2014). Hantavirus Reservoirs: Current Status with an Emphasis on Data from Brazil. *Viruses*, 6(5), 1929-1973.
37. Ordóñez-Garza, N., Thompson, C. W., Unkefer, M. K., Edwards, C. W., Owen, J. G., & Bradley, R. D. (2014). Systematics of the *Neotoma mexicana* species group (Mammalia: Rodentia: Cricetidae) in Mesoamerica: new molecular evidence on the status and relationships of *N. ferruginea* Tomes, 1862. *Proceedings of the Biological Society of Washington*, 127(3), 518-532.
38. Orozco, M. M., Piccinali, R. V., Mora, M. S., Enriquez, G. F., Cardinal, M., & Gürtler, R. E. (2014). The role of sigmodontine rodents as sylvatic hosts of *Trypanosoma cruzi* in the Argentinean Chaco. *Infection, Genetics and Evolution*, 22, 12-22.
39. Palma, R. E., Boric-Bargetto, D., Jayat, J. P., Flores, D. A., Zeballos, H., Pacheco, V., ... & Pardiñas, U. F. (2014). Molecular phylogenetics of mouse opossums: new findings on the phylogeny of *Thylamys* (Didelphimorphia, Didelphidae). *Zoologica Scripta*, 43(3), 217-234.
40. Pardiñas, U. F., D'Elía, G., Lessa, G., Passamani, M., & Teta, P. (2014). Nuevos datos morfológicos y una hipótesis filogenética para *phaenomys* (rodentia, cricetidae). *Mastozoología Neotropical*, 21(2):251-261
41. L. E. Patrick and R. D. Stevens. 2014. Investigating sensitivity of phylogenetic community structure metrics using North American desert bats. *Journal of Mammalogy*,
42. Pavan, S. E., Jansa, S. A., & Voss, R. S. (2014). Molecular phylogeny of short-tailed opossums (Didelphidae: *Monodelphis*): Taxonomic implications and tests of evolutionary hypotheses. *Molecular Phylogenetics and Evolution*.

43. Phuong, M. A., Lim, M. C., Wait, D. R., Rowe, K. C., & Moritz, C. (2014). Delimiting species in the genus *Otospermophilus* (Rodentia: Sciuridae), using genetics, ecology, and morphology. *Biological Journal of the Linnean Society*, 113(4), 1136-1151.
44. Plyusnin, A., & Sironen, T. (2014). Evolution of hantaviruses: Co-speciation with reservoir hosts for more than 100MYR. *Virus research*.
45. Razuri, H., Tokarz, R., Gherzi, B. M., Salmon-Mulanovich, B., Guezala, M. C., & Albyjasr, C. (2014). Andes hantavirus variant in rodents, southern Amazon Basin, Peru. *Emerg Infect Dis*, 20, 257-60.
46. Roratto, P. A., Fernandes, F. A., & Freitas, T. R. (2014). Phylogeography of the subterranean rodent *Ctenomys torquatus*: an evaluation of the riverine barrier hypothesis. *Journal of Biogeography*.
47. Schwalm, D., Waits, L. P., & Ballard, W. B. (2014). Little fox on the prairie: genetic structure and diversity throughout the distribution of a grassland carnivore in the United States. *Conservation Genetics*, 15(6), 1503-1514.
48. Semedo, T. B. F., Brandão, M. V., Carmignotto, A. P., Da Silva Nunes, M., Farias, I. P., Da Silva, M. N. F., & Rossi, R. V. (2014). Taxonomic status and phylogenetic relationships of *Marmosa agilis peruana* Tate, 1931 (Didelphimorphia: Didelphidae), with comments on the morphological variation of *Gracilinanus* from central–western Brazil. *Zoological Journal of the Linnean Society*.
49. Sobrero, R., Inostroza-Michael, O., Hernández, C. E., & Ebensperger, L. A. (2014). Phylogeny modulates the effects of ecological conditions on group living across hystricognath rodents. *Animal Behaviour*, 94, 27-34.
50. Souza, W. M., Bello, G., Amarilla, A. A., Alfonso, H. L., Aquino, V. H., & Figueiredo, L. T. M. (2014). Phylogeography and evolutionary history of rodent-borne hantaviruses. *Infection, Genetics and Evolution*, 21, 198-204.
51. Souza, W. M., & Figueiredo, L. T. M. (2014). Analysis of the nucleocapsid gene brings new insights to the classification of Sigmodontinae-borne hantaviruses. *Archives of virology*, 1-3.
52. Sullivan, J., Demboski, J. R., Bell, K. C., Hird, S., Sarver, B., Reid, N., & Good, J. M. (2014). Divergence with gene flow within the recent chipmunk radiation (*Tamias*). *Heredity* 113, 185–194.
53. de Thoisy, B., Matheus, S., Catzefflis, F., Clément, L., Barrioz, S., Guidez, A., ... & Lavergne, A. (2014). Maripa Hantavirus in French Guiana: Phylogenetic Position and Predicted Spatial Distribution of Rodent Hosts. *The American journal of tropical medicine and hygiene*, 90(6), 988-992.
54. Tkachenko, E. A., Witkowski, P. T., Radosa, L., Dzagurova, T. K., Okulova, N. M., Yunicheva, Y. V., ... & Klempa, B. (2014). Adler hantavirus, a new genetic variant of Tula virus identified in Major's pine voles (*Microtus majori*) sampled in southern European Russia. *Infection, Genetics and Evolution*.
55. Tomasco, I. H., & Lessa, E. P. (2014). Two mitochondrial genes under episodic positive selection in subterranean octodontoid rodents. *Gene*, 534(2), 371-378.
56. Verzi, D. H. (2014). Phylogeny and evolutionary patterns of South American octodontoid rodents Diego H. Verzi, A. Itatí Olivares, and Cecilia C. Morgan. *Acta Palaeontologica Polonica*, 59(4), 757-769.
57. Voss, R. S., Gutiérrez, E. E., Solari, S., Rossi, R. V., & Jansa, S. A. (2014). Phylogenetic Relationships of Mouse Opossums (Didelphidae, *Marmosa*) with a Revised Subgeneric Classification and Notes on Sympatric Diversity. *American Museum Novitates*, (3817), 1-27.

58. Walker, F. M., Foster, J. T., Drees, K. P., & Chambers, C. L. (2014). Spotted bat (*Euderma maculatum*) microsatellite discovery using illumina sequencing. *Conservation Genetics Resources*, 6(2), 457-459.
59. Wang, C. Q., Gao, J. H., Li, M., Guo, W. P., Lu, M. Q., Wang, W., ... & Zhang, Y. Z. (2014). Co-circulation of Hantaan, Kenkeme, and Khabarovsk Hantaviruses in Bolshoy Ussuriysky Island, China. *Virus research*, 191, 51-58.
60. Witkowski, P. T., Klempa, B., Ithete, N. L., Auste, B., Mfunne, J. K., Hoveka, J., ... & Kruger, D. H. (2014). Hantaviruses in Africa. *Virus research*.
61. Yanagihara, R., Gu, S. H., Arai, S., Kang, H. J., & Song, J. W. (2014). Hantaviruses: Rediscovery and new beginnings. *Virus research*.
62. Yoshimatsu, K., & Arikawa, J. (2014). Serological diagnosis with recombinant N antigen for hantavirus infection. *Virus research*.
63. Zeballos, H., Palma, E., Marquet, P. A., & González, G. C. (2014). Phylogenetic relationships of *Calomys sorellus* complex (Rodentia: Cricetidae), with the description of two new species. *Revista mexicana de mastozoología (nueva época)*, 4(1), 1-23.
64. Zhang, Y. Z. (2014). Discovery of hantaviruses in bats and insectivores and the evolution of the genus *Hantavirus*. *Virus research*.
65. Zuo, S. Q., Gong, Z. D., Fang, L. Q., Jiang, J. F., Zhang, J. S., Zhao, Q. M., & Cao, W. C. (2014). A new hantavirus from the stripe-backed shrew (*Sorex cylindricauda*) in the People's Republic of China. *Virus research*, 184, 82-86.

A. Books, Book Chapters, Edited Volumes

B. Journal Articles

See Bird and Mammal Division 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 Bird and Mammal Division reports

F. Work In Progress (Only *in press* and already submitted)

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

See Bird and Mammal Division Reports

H. Theses/Dissertations

See Bird and Mammal Division Reports

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/ Plenary talks

B. Attendance at Professional Meetings

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

D. Service as Officer or Professional Society/Organization

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentations to General Audience in a Scholarly Capacity

B. Seminars

C. Workshops

Campbell, Mariel L.

Arctos Database and Collections Management System Demo Workshop, University of Michigan, Ann Arbor, Dec 14-16, 2014

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

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

Campbell, Mariel L.

Arctos database advisory committee

F. Journal Referee

G. Hosting Professional Colleagues and Groups

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.

Parmenter, C.A.

Divisional tours and presentations – provided educational tours and information for visitors and school groups, January – July 2014

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 2014.

C. University and Departmental Committees

10. DONATIONS AND GIFTS RECEIVED

11. CURRENT STAFF

Faculty/Staff

J.A. Cook, Curator

C.A. Parmenter, Collection Manager (retired July 2014)

Mariel L. Campbell, Collection Manager (August 2014 to present)

Graduate students

Cook, J.A.

(Reported in Mammal Division report)

Witt, C.

(Reported in Bird Division report)

Grad Student Research Assistant DGR

1. Bryan Mclean (Spring 2014)
2. Jocelyn P. Colella (Fall 2014)

Undergraduate Student Workers and Volunteers

1. Matthew P. Segura (Fall 2014)
2. Chauncey Gadeck (Fall 2014)

12. MUSEUM ASSOCIATES

Curatorial Associates

Research Associates

See Bird and Mammal Division Reports

DIVISION OF FISHES

1. DIVISION HIGHLIGHTS

Currently, the MSB Division of Fishes has **96,657** cataloged lots of fishes (4,169,658 specimens). During the year, 1,894 lots of fishes (61,140 specimens) were cataloged and integrated into the main collections. To date, there are 69,073 digital files of field notes and 650 jpg files of habitat photographs and specimens (for color). There are 38,881 specimen locality records, georeferenced using decimal latitude and longitude.

MSB fish records are now available through FishNet2, <http://fishnet2.net/aboutFishNet.html> and can be mapped using this portal. Through a three year NSF grant, *Collaborative Research: Georeferencing US Fish Collections, a community-based model for georeferencing natural history collections*, the Division hired a full-time georeferencing technician to work collaboratively with other museum georeferencing technicians, to assign mapping coordinates to specimen records for 15 collections of fishes, including the MSB.

Guests hosted by Dr. Thomas F. Turner, Curator of Fishes: Dr. Christopher Hoagstrom, Associate Professor, Weber State University, sabbatical visitor AY 2013-2014. Dr. Mark Pyron, Professor, Ball State University, sabbatical visitor, 1 November 2014 – 4 November 2014, seminar speaker. Also hosted were Dr. Allison Pease, Assistant Professor, seminar speaker from Texas Tech University and Dr. Manda Jost, Professor, seminar speaker from Western New Mexico University.

Outreach Summary: Sandia Preparatory School, January 2014 (3 hours), UNM Museum Studies Program 476/576 (1 hour), UNM College Arts and Sciences tour (1 hour), UNM Stable Isotope Seminar Group Tour (15min), UNM Biology New Graduate Student Tour (15min), UNM Honors College 201 *People and Animals* (1 hour), Montessori of the Rio Grande Charter School 1st to 3rd Grades Tour (1 hour), New Mexico Natural History Museum *Meet the Experts* (3 hours).

2. TABLE OF COLLECTION USE

Collection Growth	Loans Out	Professional Visitors	Collection Web Activity	Requests for Information	Publications by MSB Staff & Assoc.
61,140 specimens	11	28		47	27
Publications by others using MSB specimens/data	Technical Reports by MSB Staff	UNM Courses using MSB resources	UNM Courses taught by MSB staff	Graduate Students MSB mentored	MSB Graduate Students' Theses/Dissertation
2	20	4	4	3	0
Undergraduate Students employed	Grants and contracts in force				
4	18				

3. UNM COURSES USING THE COLLECTIONS

TERM	COURSE	TITLE	STUDENTS
Fall	ART 106	Drawing I	22
Spring & Fall	BIOL 204L	Plant and Animal Form and Function	60
Spring	MSST 476/576	Museum Collection Management	12
Spring	NMSU-FWCE 450	The Natural History Museum in Modern Society	9

4. UNM COURSES TAUGHT BY MSB STAFF

INSTRUCTOR	TERM	COURSE	TITLE	STUDENTS
T.F. Turner	Spring & Fall	BIOL. 402/502	Ecology and Evolution of Fishes	15
T.F. Turner	Spring & Fall	BIOL. 599	Master's Thesis	3
T.F. Turner	Spring & Fall	BIOL. 699	Dissertation	1
T.F. Turner	Spring	BIOL. 400	Senior Thesis	1

5. COLLECTION MANAGEMENT

On 24 July 2014, the NM Department of Homeland Security and Emergency Management (Region 6 FEMA) awarded the Museum of Southwestern Biology funds to purchase restraint bars for the shelves that hold all of the MSB fluid preserved collections. These shelving bars will help prevent jars of irreplaceable collections from falling over the edges of the shelves during seismic events.

Four undergraduate student Research and Curatorial Assistants and one staff Curatorial Assistant and the Collections Manager processed specimens, genetic samples, and digitized field notes received from several ongoing projects: 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, New Mexico Dept. of Environment, and supported Turner Lab research: Megan J. Osborn, Ph.D., Evan W. Carson, Ph.D., Nathan R Franssen, Ph.D., and Michael Schwemm, Ph.D.

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

Acquisition of Instrumentation for Compound-Specific Stable Isotope Analysis at the University of New Mexico. National Science Foundation S. Newsome (PI) & T. Turner (co-PI with 4 others). Total: \$314,315 F&A: \$160,300

Rio Grande Silvery Minnow Genetics Sampling and Analysis and Reporting. US Bureau of Reclamation. E.W. Carson, PI, M.J. Osborne & T.F. Turner (co-PIs). 17 April 2014 to 30 December 2014. Total: \$164,000 F&A: \$63,200

Razorback Sucker Diversity Assessment. T. F. Turner (PI) UNM subcontract for Wayne State University, Detroit. 1 August 2014 to 30 June 2015. Total: \$21,125 F&A: \$3,146.

Effects of the Whitewater-Baldy Complex Fire. T.F. Turner (PI) and T. J. Pilger (coPI) New Mexico Department of Game and Fish. 1 March 2014 to 30 June 2016. Total: \$72,000 Annual: \$24,000 F&A: \$4,800.

Genetic Studies to Guide Conservation and Management of Bonytail Chub. M. J. Osborne (PI) T. F. Turner (coPI) US Bureau of Reclamation. 2 December 2014 to 30 November 2016. Total: \$282,404 Annual: \$94,135 F&A: \$49,420.

*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 and T.F. Turner, CoPI. U.S. Bureau of Reclamation, Salt Lake City UT. 24 June 2013 to 30 Sept 2017. Total Award (UNM): \$521,862. Annual budget \$118,734 F&A: \$91,326

*Accession and Integration of NMDGF Fish Collections in Museum of Southwestern Biology, Division of Fishes No. T-39-1. A.M. Snyder PI and T.F. Turner CoPI. New Mexico Department of Game and Fish. 1 July 2012 to 30 Jun 2015. Total: \$140,000. Annual: \$20,000 F&A: \$1,818.

*Collaborative Research: CSBR: Natural History Collections: Georeferencing U.S. Fish Collections: a community-based model to georeferencing natural history collections. National Science Foundation. T.F. Turner, PI and A. M. Snyder, CoPI. 1 August 2012 to 31 July 2015. Total: \$140,350. Annual: \$70,000 F&A: \$71,578.

Genetic and demographic studies to guide conservation management of Bonytail Chub and Razorback Sucker in off-channel habitats. T. Dowling PI Arizona State University and T.F. Turner CoPI subaward. US Bureau of Reclamation. 1 October 2010 to 30 September 2015. Total: \$44,760. Annual: \$8,000 F&A \$7,609.

Metacommunity dynamics of Gila River fishes. K. Gido PI, T. F. Turner CoPI, D. L. Propst CoPI and J. Falke CoPI. US Bureau of Reclamation, Desert LCC. 1 October 2011 to 30 September 2014. Total: \$78,000. Annual: \$37,500. F&A: \$13,260.

Razorback Sucker Genetic Diversity Assessment. T. Dowling PI Arizona State University and T.F. Turner, CoPI. US Bureau of Reclamation. 1 October 2011 to 30 September 2015. Total: \$32,891. Annual: \$7,500. F&A: \$5,9147.

Genetic monitoring in support of Gila Trout recovery from a catastrophic fire. T.F. Turner, PI. New Mexico Department of Game & Fish. 1 October 2012 to 30 June 2018. Total: \$415,800. Annual: \$60,000. F&A: \$83,160.

Development and characterizing microsatellite DNA markers for assessing relatedness of Bonytail Chub produced in off-channel habitats. U.S. Bureau of Reclamation: Lower Colorado River Multi-Species Conservation Program. M.J. Osborne, PI. 1 October 2013 to 30 September 2014. Total: \$34,265. F&A: \$5,825.

*Seismic Mitigation for Museum of Southwestern Biology Fluid Preserved Collections. Federal Emergency Management Agency (FEMA), NM Dept. Homeland Security. A.M. Snyder and J.A. Cook, PIs. 25 July 2014 to 25 July 2016. Total: \$75,778 F&A: \$16,238 (imputed used as part of cost share obligation).

*Assessment of mtDNA and nuclear DNA introgression in Pecos Pupfish in New Mexico. New Mexico Department of Game and Fish. 1 July 2013-30 June 2014. Total: \$17,702. F&A: \$1,770.

Assessment of population genetic variation and population genetic structure of coral reef fishes of the Marianas Archipelago. E.W. Carson, PI. Western Pacific Regional Fishery Management Council. \$115,910. 2014-2015. No UNM F&A

Conservation of the Carbonera Pupfish: sustainable development, community outreach, and monitoring of endemic and refuge populations of *Cyprinodon fontinalis* in the Desierto de Samalayuca basin, Chihuahua, México. The Mohamed bin Zayed Species Conservation Fund. E.W. Carson, co-PI Pronatura Noreste, A.C. 1 Jan 2014 to 31 December 2014. Total: \$12,000. F&A: \$1,200.

Fine-scale genetic structuring of American Paddlefish populations in Oklahoma. Oklahoma State University Grant. 1 January 2014 to 30 June 2015. M.R. Schwemm, PI, J.M. Long and J.D. Schooley, Co-PI. Total: \$136,000. No UNM F&A

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

De la Maza-Benignos, M., L. Vela-Valladares, E. W. Carson, M. L. Lozano-Vilano. 2014. Plan de acción para la conservación de los peces endémicos del estado de Chihuahua como el pez cachorrito de Julimes (*Cyprinodon julimes*). Pp 105-109 in De la Maza-Benignos, M., N. Gonzalez-Hernandez, I. Banda-Villanueva y L. Vela-Valladares (Compiladores). 2014. Plan de acción para la conservación y recuperación de especies de fauna silvestre prioritaria en el estado de Chihuahua. De la Maza-Benignos, M. (Ed.), Pronatura Noreste, A.C. y Gobierno del Estado de Chihuahua, México.

De la Maza-Benignos, M., Ma. de Lourdes Lozano-Vilano, and E.W. Carson (eds.) Conservation of desert wetlands and their biotas, Special Publications, Museum of Southwestern Biology, Pronatura Noreste, and Universidad Autónoma de Nuevo León Volume1.

Ross, S. T. and W. J. Matthews. 2014. Chapter 1. Evolution and ecology of North American freshwater fish assemblages. In: North American Freshwater Fishes: Ecology, Evolution, and Behavior. M. L. Warren, Jr. and B. M. Burr (eds.). Johns Hopkins University Press.

Turner, T. F. and D. L. Propst. 2014. Effects of altered flow regimes and habitat fragmentation on Gila River fishes. Pp. 228 – 318 in Gori, D., et al. Gila River Flow Needs Assessment. A report by The Nature Conservancy. <http://nmconservation.org/Gila/GilaFlowNeedsAssessment.pdf>.

B. Journal Articles

Carson, E. W., M. De la Maza-Benignos, M. de Lourdes Lozano-Vilano, L. Vela-Valladares, I. Banda-Villanueva, and T. F. Turner. 2014. Conservation genetic assessment of the critically endangered Julimes Pupfish, *Cyprinodon julimes*. Conservation Genetics 15:483-488. DOI:10.1007/s10592-013-0548-x.

Carson, E.W., A.H. Hanna, G.P. Garrett, and J.R. Gold. 2014. Conservation genetics of cyprinid fishes in the upper Nueces River basin in Central Texas. Southwestern Naturalist 59:1-8.

Dowling, T. E., T. F. Turner, E. W. Carson, M. J. Saltzgiver, D. Adams, B. Kesner, and P. C. Marsh. 2014. Time-series analysis reveals genetic responses to intensive management of Razorback Sucker (*Xyrauchen texanus*). Evolutionary Applications 7:349-354.

Durst, S. L. and N. R. Franssen. 2014. Movement and growth of juvenile Colorado Pikeminnow (*Ptychocheilus lucius*) in the San Juan River, NM and UT. Transactions of the American Fisheries Society 143:519-527.

Echelle A.A., Schwemm M.R., Lang N.J., Nagle B.C., Simons A.M., Unmack P.J., Fisher W.L., Hoagstrom C.W. 2014. Molecular systematics and historical biogeography of the *Nocomis biguttatus* species group (Teleostei: Cyprinidae): Nuclear and mitochondrial introgression and a cryptic Ozark species. Molecular Phylogenetics and Evolution. 81: 109-119.

Franssen, N.R., S.L. Durst, K.B. Gido, D.W. Ryden, V. Lamarra, and D.L. Propst. 2014. Long-term dynamics of large-bodied fishes assessed from spatially intensive monitoring of a managed desert river. *River Research and Applications* DOI: 10.1002/rra.2855.

Franssen, N.R. , E.I. Gilbert, and D.L. Propst. 2014. Effects of longitudinal and lateral stream channel complexity on native and non-native fishes in an invaded desert stream. *Freshwater Biology* 60: 16-30.

Franssen, N. R., J. E. Davis, D. Ryden and K. B. Gido. 2014. Fish community responses to mechanical removal of nonnative fishes in a large southwestern river. *Fisheries* 39:352-363.

Franssen, N. R. and S. L. Durst. 2014. Prey and nonnative fish predict the distribution of Colorado Pikeminnow (*Ptychocheilus lucius*) in a southwestern river in North America. *Ecology of Freshwater Fish* 23:395-404.

Hershler, R., J. Landye, H.P. Liu, M. De la Maza-Benignos, P. Ornelas, and E.W. Carson. 2014. New species and records of Chihuahuan Desert springsnails, with a new combination for *Tryonia brunei*. *Western North American Naturalist* 71:47-65.

Krabbenhoft, T. J., S. P. Platania, and T. F. Turner. 2014. Interannual variation in reproductive phenology in a riverine fish community: implications for predicting effects of climate change and alteration of flow regimes. *Freshwater Biology* 59:1744-1754.

Krabbenhoft, T. J. and T. F. Turner. 2014. Clock gene variation: seasonal timing, phylogenetic signal, or functional constraint? *Journal of Heredity* 105:407-415.

Mercado-Silva, N. y L.M. Martínez-Rivera. 2014. Nuevo registro de *Dactyloscopus amins* (Pisces: Dactyloscopidae) (Miraestrella) para el Estado de Jalisco, México. *Revista Mexicana de Biodiversidad* 85: 630-632. DOI: 10.7550/rmb.41599

Osborne, M. J., J. S. Perkin, K. B. Gido, and T. F. Turner. 2014. Comparative riverscape genetics reveals reservoirs of genetic diversity for conservation and restoration of Great Plains fishes. *Molecular Ecology* 23:5663-5679.

Perkin J. S., K. B. Gido, A. R. Cooper, T. F. Turner, M. J. Osborne, E. R. Johnson, and K. B. Mayes. 2014. Fragmentation and dewatering transform Great Plains stream fish communities. *Ecological Monographs* 85:73-92.

Propst, D.L., K.B. Gido, J.E. Whitney, E.I. Gilbert, T.J. Pilger, A.M. Monie, Y.M. Paroz, J.M. Wick, J.A. Monzingo, and D.M. Myers. 2014. Efficacy of mechanically removing nonnative predators from a desert stream. *River Research and Applications* DOI: 10.1002/rra.2768.

Ramírez-Herrejón, J.P., L. Zambrano, N. Mercado-Silva, A. Torres-Téllez, F. Pineda-García, J. Caraveo-Patiño, y E. F. Balart. 2014. Long term changes in the fish fauna of Lago de Pátzcuaro in Central Mexico. *Latin American Journal of Aquatic Research* 42 (1): 137-149.

Schwemm MR, Echelle AA and Van Den Bussche RA. 2014. Isolation and characterization of 10 polymorphic microsatellite markers for the Ouachita Highlands endemic *Notropis suttkusi* (Teleostei: Cyprinidae). *Conservation Genetics Resources*, 6, 209-210.

Schwemm MR, Echelle AA, Van Den Bussche RA, and Schooley JD. 2014. Development of diploid microsatellite markers for the North American Paddlefish (*Polyodon spathula*). Conservation Genetics Resources 6: 209-210.

Turner, T. F., M. J. Osborne, M. V. McPhee, and C. G. Kruse. 2014. High and dry: intermittent watersheds provide a test case for genetic response of desert fishes to climate change. Conservation Genetics. Online First doi10.1007/s10592-014-0666-0.

Turner, T.F. and D.L. Propst. 2014. Effects of altered flow regimes and habitat fragmentation on Gila River fishes. in D. Gori, et al. Gila River Flow Needs Assessment. The Nature Conservancy, Santa Fe, NM. 228-287.

Whitney, J.E., K.B. Gido, and D.L. Propst. 2014. Factors associated with the success of native and nonnative species in an unfragmented arid-land riverscape. Canadian Journal of Fisheries and Aquatic Sciences 71: xx-xx dx.doi.org/10.1139/cjfas-2014-0153.

Zamor, R. M., N. R. Franssen, C. Porter, T. M. Patton, and K. D. Hambright. 2014. Rapid recovery of a fish assemblage following an ecosystem disruptive algal bloom. Freshwater Science 33:390-401.

C. Technical Reports

Albrecht, B., R. Kegerries, J.M. Barkstedt, W.H. Brandenburg, A.L. Barkalow, S.P. Platania, M. McKinstry, B. Healy, J. Stolberg, and Z. Shattuck. 2014. Razorback Sucker (*Xyrauchen texanus*) Research and monitoring in the Colorado River inflow area of Lake Mead and the lower Grand Canyon, Arizona and Nevada. Report prepared by BIO-WEST, Inc., for U.S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City, UT. 142pp.

Brandenburg, W.H., J. L. Kennedy and M. A. Farrington. 2014. Determining the historical distribution of the *Gila robusta* complex (*Gila* Chub, *Gila intermedia*, Headwater Chub, *Gila nigra*, and Roundtail Chub, *Gila robusta*) in the Gila River Basin, New Mexico, using morphological analysis. Report for Share with Wildlife Program, New Mexico Department of Game and Fish, Santa Fe. 122pp.

Carson, E. W. Final Report on Mitochondrial DNA variation in the Pupfishes (Cyprinodontidae) of Chihuahua, México. Desert Fishes Council. 31 December 2014.

Carson, E. W. 2014. CNMI collections Progress Report- Tissue and data collection for contract: Assessment of population genetic variation and population genetic structure of reef fishes of the Marianas Archipelago. Western Pacific Regional Fishery Management Council.

Carson, E. W., Megan J. Osborne, and Thomas F. Turner. Genetic monitoring of the Rio Grande Silvery Minnow: Genetic status of wild and captive stocks in 2014. Annual report FY 2014 US Bureau of Reclamation-UC-AAO Albuquerque, New Mexico. 2 December 2014.

Carson, E.W., Megan J. Osborne, and Thomas F. Turner. 2014. Report for Budget Period I: Rio Grande Silvery Minnow wild, and captive stock genetic sample collection. US Bureau of Reclamation-UC-AAO Albuquerque Area Office.

Carson, E. W., Megan J. Osborne, and Thomas F. Turner. 2014. Final Report on Rio Grande Silvery Minnow fish passage feasibility study: validation of the model, estimators of NeI and NeV, and observed Ne in Rio Grande Silvery Minnow USFWS New Mexico Fish and Wildlife Conservation Office (NMWFCO).

Carson, E.W., and M. De la Maza-Benignos. 2014. Feasibility, design, and establishment of a refuge population for the critically endangered Carbonera Pupfish, *Cyprinodon fontinalis*. Final Report to the Desert Fishes Council. 30 April 2014.

Dudley, R.K. and S.P. Platania. 2014. Summary of the Rio Grande Silvery Minnow population monitoring program results (February 2014 to December 2014). Nine reports to the Middle Rio Grande Endangered Species Collaborative Program and the US Bureau of Reclamation, Albuquerque, NM. 270 pp.

Dudley, R.K. and S.P. Platania. 2014. Rio Grande Silvery Minnow population monitoring program results from May to December 2013. Report to the Middle Rio Grande Endangered Species Collaborative Program and the US Bureau of Reclamation, Albuquerque, NM. 142 pp.

Dudley, R.K. and S.P. Platania. 2014. Monitoring of the Rio Grande Silvery Minnow reproductive effort during 2014 in the Rio Grande and selected irrigation canals. Report to the Middle Rio Grande Endangered Species Collaborative Program and the US Bureau of Reclamation, Albuquerque, NM. 39 pp.

Farrington M. A., R. K. Dudley, W. H. Brandenburg and S. P. Platania. 2014. San Juan River 2013 Colorado Pikeminnow and Razorback Sucker larval fish survey. Research report submitted to San Juan River Implementation Recovery Program. 61 pp.

Gido, K., J. Whitney, T. Turner, T. Pilger, and D. Propst. 2014. Metacommunity dynamics of Gila River fishes (R11AC81531). Report for US Bureau of Reclamation, Denver, CO. 124 pp.

Farrington M.A., R.K. Dudley, W. H. Brandenburg and S. P. Platania. 2014. San Juan River 2013 Colorado Pikeminnow and Razorback Sucker larval fish survey. Report for San Juan River Implementation Recovery Program (SJRRIP). 61pp.

Osborne, M.J. and T.F. Turner. 2014. Genetic Studies to Guide Conservation and Management of Bonytail Chub. Report to the Lower Colorado Multispecies Conservation Program. 23 pp.

Perkin, J.S., K.B. Gido, A.R. Cooper, T.F. Turner, M.J. Osborne, E.R. Johnson, K.B. Mayes. 2014. Final Report: Conservation priorities for Great Plains fish communities based on riverscape connectivity and genetic integrity of populations. http://www.greatplainslcc.org/wp-content/uploads/2012/10/FY2012_Conservation-Priorities-for-Great-Plains-Fish-Communities_Gido.pdf 51 pp.

Snyder, A.M. and T.F. Turner. 2014. Curation of the 2012 San Juan River collections of fishes, University of New Mexico, Museum of Southwestern Biology. Award R13AP40007. Annual Report to San Juan River Basin Recovery Implementation Program, US Bureau of Reclamation, UT. 22 pp.

Snyder, A.M. and T.F. Turner. 2014. Accession and integration of New Mexico Dept. Game and Fish State Reference Collections of fishes by the University of New Mexico, Museum of Southwestern Biology. Contract T-39-1. Annual Report to Conservation Services, NMDGF, Santa Fe. 5 pp. plus 421 appendix pages.

Schwemm M.R., Long J.M., Echelle A.A., Schooley J.D. 2014. Annual Report: Fine-scale genetic structuring of American Paddlefish populations in Oklahoma. Report for Oklahoma Department of Wildlife, Tulsa.

Turner, T. F., M. J. Osborne, W.D. Wilson, and D. L. Propst. 2014. Genetic monitoring of Gila Trout lineages restored to the upper West Fork Gila River and implications for future conservation strategies. Project Work Order CSD 120731-B. Final Report to Conservation Services, NMDGF, Sante Fe. 15 pp.

D. Theses/Dissertations Completed: NONE TO REPORT

E. Work In Progress

Bertrand, K.N., J.A. VanDeHey, T.J. Pilger, E.A. Felts and T.F. Turner. Genetic structure of a disjunct peripheral population of Mountain Sucker *Pantosteus jordani* in the Black Hills, South Dakota, USA. *In review*. Conservation Genetics.

Burdett, A. S., J. S. Fencl, and T. F. Turner. 2015. Comparison of aquatic invertebrate sampling methods in a shallow aridland river (Rio Grande, New Mexico). *In press*. Aquatic Biology.

Carson, E. W., V. Souza, H. Espinosa-Pérez, and T. F. Turner. 2015. Mitochondrial DNA diversity and phylogeography of *Lucania interioris* inform biodiversity conservation in the Cuatro Ciénegas Basin, México. *In press*. Western North American Naturalist 75(2).

Carson, E.W., T.F. Turner, M.J. Saltzgeber, D. Adams, B.R. Kesner, P.C. Marsh and T.E. Dowling. Transmission of genetic variation from larval adult stages life-stages in Razorback Sucker. *In review* Journal of Heredity.

Dugas, M. B., N. R. Franssen, M. O. Bastille, and R. A. Martin. Morphological correlates of river velocity and reproductive development in an ornamented stream fish. *In review*.

Echelle A.A., Schwemm M.R., Lang N.J., Baker J.S., Wood R.M., Near T.J., Fisher W.L. 2015. Molecular Systematics of the Least Darter (Percidae: Etheostoma microperca): Historical Biogeography and Conservation Implications. *Accepted* Copeia.103(1): 87-98.

Franssen, N. R., S. L. Durst, K. B. Gido, D. W. Ryden, V. Lamarra, and D. L. Propst. 2015. Long-term dynamics of large-bodied fishes assessed from spatially intensive monitoring of a managed desert river. *In press*. River Research and Applications.

Franssen, N. R., E. I. Gilbert, and D. L. Propst. 2015. Effects of longitudinal and lateral stream channel complexity on native and non-native fishes in an invaded desert stream. *In press*. Freshwater Biology.

Gido, K.B., J.S. Perkin, J.S. Whitney, and T.F. Turner. 2015. Fragmentation, connectivity and species persistence. *In press*. In: Closs, G., M. Krkosek, and J. Olden, Eds. Conservation of Freshwater Fishes, Cambridge University Press.

Hanna, A.H., E.W. Carson, G.P. Garrett, and J.R. Gold. 2015. Conservation genetics of six species of genus *Dionda* (Cyprinidae) in the southwestern United States. *In press*. Western North American Naturalist Monographs.

Marsh P.C., T.E. Dowling, B.R. Kesner, T.F. Turner, and W.L. Minckley. 2015. Conservation to stem imminent extinction: the fight to save Razorback Sucker *Xyrauchen texanus* in Lake Mohave and its implications for species recovery. *In press*. Copeia.

Osborne, M.J., Diver, T.A., Hoagstrom, C.W. and Turner, T.F. Mitochondrial sampling of *Cyprinella lutrensis* from the Pecos River ‘melting pot’ reveals ancient and cryptic diversity that further expands the clade. *In revision*. Evolution.

Pilger, T.J., J. E. Whitney, K.B. Gido, D. L. Propst, T. F. Turner. 2015. Comparative conservation genetics of protected endemic fishes in an arid-land riverscape. *In press*. Conservation Genetics.

Ross, S. T. 2015. Fish Out of Water: Evolutionary and Ecological Issues in the Conservation of Fishes in Water-Altered Environments: Introduction to the Symposium: Eco-Evolutionary Change and the Conundrum of Darwinian Debt. *In press*. Copeia

Turner, T. F., M. J. Osborne, M. V. McPhee, and C. G. Kruse. 2015. High and dry: intermittent watersheds provide a test case for genetic response of desert fishes to climate change. *Online First doi10.1007/s10592-014-0666-0*. Conservation Genetics.

Whitney, J.E., K.B. Gido, T.J. Pilger, D.L. Propst, and T.F. Turner. 2015. Biotic Responses to consecutive wildfires in a warm water dryland river network. *In press*. Freshwater Science.

Whitney, J. E., K. B. Gido, T. J. Pilger, D. L. Propst, and T. F. Turner. 2015. Metapopulation dynamics of native and nonnative fishes in response to broad-scale disturbance in an American southwest riverscape. *In press*. Ecology of Freshwater Fishes.

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

Portnoy, D.S., C.M. Hollenbeck, J.S. Johnston, H.M. Casman, and J.R. Gold. 2014. Parthenogenesis in a Whitetip Reef Shark *Triaenodon obesus* involves a reduction in ploidy. *Journal of Fish Biology* 85 (2): 502-508.

Robison, H.W., R.C. Cashner, M.E. Raley, and T.J. Near. 2014. A new species of darter from the Ouachita Highlands in Arkansas related to *Percina nasuta* (Percidae: Etheostomatinae). *Bull. Peabody Mus. Nat. Hist.* 55(2): 237-252.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/Plenary Talks and/or Seminars (Presenters' name in bold)

Osborne, M.J. United States Fish and Wildlife Service, National Conservation Training Center, Advanced Conservation Genetics Webinar Series. Native and Introduced Populations as Genetics Reservoirs. September 4, 2014

Schwemm M.R., Long J.M., Echelle A.A., Schooley J.D. Paddlefish management and stocking recommendations in the Arkansas and Red rivers, Oklahoma. Mississippi Interstate Cooperative Resource Association, Paddlefish and Sturgeon Steering Committee, Miami, OK. March 3, 2014.

Schwemm M.R. Translocation and management considerations of the threatened Leopard Darter. Arkansas Valley Nature Center. Invited talk for USFWS/USFS, Fort Smith, AR. December 3, 2014.

Franssen, N.R. Ecological and evolutionary consequences of altered environmental flows: insights from stream fishes. Utah State University, Logan, UT. March 24, 2014.

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

Carson, E. W., M. L. Lozano-Vilano, I. Banda-Villanueva, L. Vela-Valladares, L. Sepúlveda, A. Cantú, A. Contreras, and M. De la Maza-Benignos. 2014. A program for long-term genetic, habitat, and population monitoring of *Cyprinodon fontinalis* and associated species in Ojo Solo and the Ojo Caliente

Refuge. 46th annual meeting of the Desert Fishes Council, San José del Cabo, Baja California Sur, México.

M.A. Farrington, R. K. Dudley, W.H. Brandenburg and S.P. Platania. Results of the 2013 larval ichthyofaunal survey in the San Juan River, NM, CO, and UT. San Juan River Recovery Implementation Program, Biology Committee. Fort Lewis College, Durango, CO. February 2014.

Perkin, J. S., K. B. Gido, T. F. Turner, and M.J. Osborne. Multi-scale effects of stream fragmentation and dewatering on great plains fishes: community dynamics, species distributions, and genetic diversity. First Annual Joint Aquatic Sciences Meeting, Portland Oregon, 18 – 23 May 2014.

Perkin, J.S., K.B. Gido, K.H. Costigan, M.D. Daniels, T.F. Turner, **M.J. Osborne**, A.R. Cooper, E.R. Johnson, and K.B. Mayes. Fish diversity loss among fragmented and dewatered riverscapes in the central Great Plains. American Fisheries Society Oklahoma and Texas Chapter Annual Meeting, Pottsboro, Texas. 13-15 February 2014.

Whitney J. E., K. B. Gido, T. J. Pilger, D.L. Propst, and T. F. Turner. The influence of ecological traits and spatiotemporal variability on metapopulation parameters in an unfragmented arid-land riverscape. First Annual Joint Aquatic Sciences Meeting, Portland Oregon, 18 – 23 May 2014.

Turner, T. F., M. J. Osborne, W. D. Wilson, and D. L. Propst. Genetics helps guide recovery of Gila Trout following the Whitewater-Baldy Fire. Fifth Natural History of the Gila Symposium, Silver City New Mexico. 27 February – 1 March 2014.

Dudley, R.K., G.C. White, M.A. Farrington, W.H. Brandenburg, and S.P. Platania. San Juan River larval fish sampling and analysis: What do density values really tell us? San Juan River Basin Recovery Implementation Program, Biology Committee. Fort Lewis College, Durango, CO. 26–27 February 2014.

Brandenburg, W.H. and A.S. Burdett. Native fishes of the San Juan River Basin and Recovery Program Activities. Biology Committee for San Juan River Recovery Implementation Program (SJRRIP), Fort Lewis College, Durango, CO. February 2014.

Schwemm M.R., J.M. Long, A.A.Echelle, J.D. Schooley. Fine-scale genetic structuring of American Paddlefish populations in Oklahoma. Oklahoma Natural Resource Conference. Tulsa, OK. February 2015.

Schwemm M.R., A.A. Echelle, J.M. Long, R.A. Van Den Bussche, and J.D. Schooley. Demographic dynamics and effective population size of the American Paddlefish in Grand Lake, Oklahoma. American Society of Ichthyologists and Herpetologists. Chattanooga, TN. July 2014.

C. Attendance at Professional Meetings

E.W. Carson

- Desert Fishes Council, 46th Annual Meeting, Cabo San Jose, Baja Sur, 19-23 November 2014.

R.K. Dudley

- San Juan River Basin Recovery Implementation Program, Biology Committee. Fort Lewis College, Durango, CO. 26–27 February 2014.

M.A. Farrington

- San Juan River Recovery Implementation Program, Biology Committee. Fort Lewis College, Durango, CO. February 2014.

N.R. Franssen

- San Juan River Recovery Implementation Program, Biology Committee. San Juan Public Lands Center, Durango, CO. 26-27 February 2014.
- Southwestern Association of Naturalists. Stillwater, OK. April 17-20 2014.
- San Juan River Recovery Implementation Program, Biology Committee. San Juan Public Lands Center, Durango, CO. 21-22 May 2014.
- San Juan River Recovery Implementation Program, Biology Committee. San Juan Public Lands Center, Durango, CO. November 3-4 2014.
- San Juan River Recovery Implementation Program, Biology Committee. San Juan Public Lands Center, Durango, CO. December 3-4 2014.

D.L. Propst

- Desert Fishes Council, 46th Annual Meeting, Cabo San Jose, Baja Sur, 19-23 November 2014.

S.T. Ross

- San Juan River Recovery Implementation Program, Biology Committee. U.S. Forrest Service Office Fort Lewis College, Durango, CO. 25-26 February 2014.
- San Juan River Recovery Implementation Program, Biology, Public, and Coordination Committee meetings. U.S. Forrest Service Office, Durango, CO. 21-23 May 2014.
- 94th annual meeting of the American Society of Ichthyologists and Herpetologists, Chattanooga, TN. 30 July- 3 August 2014
- San Juan River Recovery Implementation Program, Biology Committee. U.S. Forrest Service Office Public Lands Office, Durango, CO. 3-4 December 2014.

A.M. Snyder

- 94th annual meeting of the American Society of Ichthyologists and Herpetologists, Chattanooga, TN. 12-15 July 2014

M.R. Schwemm

- Mississippi Interstate Cooperative Resource Association, Paddlefish and Sturgeon Steering Committee, Miami, OK. March 2015.
- Joint Meeting of the Oklahoma chapters of the American Fisheries Society and The Wildlife Society, Tulsa, Oklahoma. February 2015.
- Southern Division of the American Fisheries Society, Charleston, SC. January 2014.
- 94th annual meeting of the American Society of Ichthyologists and Herpetologists, Chattanooga, TN. 12-15 July 2014.
- 61st annual meeting of the Southwestern Association of Naturalists, Stillwater in Oklahoma. April 2014.
- Oklahoma and Texas chapters of the American Fisheries, Pottsboro, Texas. January 2014.
- Southern Division of the American Fisheries Society, Charleston, SC. January 2014.

T. F. Turner

- 94th annual meeting of the American Society of Ichthyologists and Herpetologists, Chattanooga, TN. 12-15 July 2014

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

N.R. Franssen

- Contributing Editor - Southeastern Naturalist, since 2012.

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. 2002-present. Desert Fishes Council.

T.J. Pilger

- Treasurer of University of New Mexico Biology Graduate Student Association
- Graduate Student Representative UNM Faculty Search Committee

S.T. Ross

- Member, Long Range Planning and Policy Committee, American Society of Ichthyologists and Herpetologists, 2007-2014.
- Board of Governors, American Society of Ichthyologists and Herpetologists, 2012-2017

A.M. Snyder

- Board of Governors, American Society of Ichthyologists and Herpetologists, 2011-2016.

T. F. Turner

- Board of Governors, American Society of Ichthyologists and Herpetologists, 2013-2018

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity

T.J. Pilger

- Pilger, T.J., D.L. Propst and T.F. Turner. A Tale of 3 Species: Conserving the Gila's Other Protected Fishes. 5th Natural History of the Gila Symposium. Silver City, New Mexico. February 2014.

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

D.L. Propst

- Aquatic Ecologist, TNC Gila River Flows Workshop, Silver City, NM, 8-9 January 2014.
- Aquatic Ecologist, NM Legislature Interim Water and Natural Resources Committee, Environmental Effects of Modified Flows on Gila River Aquatic Fauna, Las Vegas, NM, 1 October 2014.

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

- Member (Conservation Representative) for the Citizen Advisory Committee Habitat Stamp Improvement Program, New Mexico Department of Game and Fish.

M.J. Osborne

- Member, Rio Grande Silvery Minnow Propagation and Genetics Workgroup

D.L. Propst

- Member & Team Leader, Gila Trout and Chihuahua Chub Recovery Team (U.S. Fish and Wildlife Service)
- National Conservation Training Center. Rotenone & Antimycin Use in Fisheries Management. 4-8 March 2014, Albuquerque, NM

S.T. Ross

- Member, Peer Review Panel, San Juan River Basin Recovery Implementation Program (SJRRIP). 2014

A.M. Snyder

- Vice Chair and Scientific Member, UNM Institutional Animal Care and Use Committee. 2010-2016.

T.F. Turner

- *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 New Mexico Department of Game & Fish Statewide Conservation Plan meeting.*
- *Invited participant, Middle Rio Grande Conservancy District Conservation Planning meeting.*

D. Journal Referee

E. W. Carson

Biological Conservation (1), Conservation Genetics (3) Ecology of Freshwater Fishes (1), Environmental Biology of Fishes (1), Evolutionary Ecology (3), Hydrobiologia (1), Journal of Fish Biology (1)

N.R. Franssen

Biological Journal of the Linnean Society (2), Evolutionary Applications (1), Hydrobiologia (3), Environmental Biology of Fishes (1), Freshwater Science (1), Freshwater Biology (2), Copeia (1), Diversity and Distributions (1), Journal of Fish Biology (1), Aquatic Conservation: Marine and Freshwater Ecosystems (1), PLOS ONE (1), Southeastern Naturalist (3)

M.J. Osborne

Molecular Ecology (1) Conservation Genetics (1)

D.L. Propst

Freshwater Biology (1), Southwestern Naturalist (1)

S.T. Ross

Aquatic Biology (1)

M.R. Schwemm

Ecology of Freshwater Fishes (1), Environmental Biology of Fishes (1), Southeastern Fishes Council Proceedings (1)

T.F. Turner

American Midland Naturalist (1), Bioscience (2), Copeia (1), Ecology (1), Evolution (1), Fishes of Arkansas – Book Chapter (1), Freshwater Biology (2), J Heredity (1), Marine Ecology Progress Series (1), NSF Proposals (2).

E. Hosting Professional Colloquia and Groups NONE TO REPORT

10. SERVICE

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

T. F. Turner

- Panelist and Presenter, Workshop on Biological Impacts of Proposed Diversion under the Arizona Water Settlement Act (AWSA). Organized by The Nature Conservancy and hosted by the University of New Mexico.

- 2014: Invited speaker and panelist for Biorama-UNM Department of Biology, *Life After a Bachelor's in Biology? Working in Research*.
- 2014: Panelist for Graduate Student Funding Initiative session, *I.B.#10 Research Collaborations and Scholarly Research Partnerships - How to Create and Manage Them*. PI Eligibility Certificate Program, sponsored by the UNM Graduate Student Funding Initiative. <http://research.unm.edu/graduatefunding/>.

B. Public Service NONE TO REPORT

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

E.W. Carson

- 2014 Desert Fishes Council Conservation Award, Mitochondrial DNA variation in the Pupfishes (Cyprinodontidae) of Chihuahua, México. \$980
- 2014 Desert Fishes Council Conservation Award, Feasibility, design, and establishment of a refuge population for the critically endangered Carbonera Pupfish, *Cyprinodon fontinalis*. Shared award with Mauricio De la Maza-Benignos, Pronatura Noreste, A.C. \$5,000

D.L. Propst

- 2014 Lifetime of Achievement, in Conservation, Education and Research Award, Fifth Natural History of the Gila Symposium, Silver City, NM
- 2014 Trout Unlimited—Trout Conservation Award: Professional, Santa Fe, NM

A.M. Snyder

- 2014 UNM Biology Dept. Staff Award \$1,000

12. DONATIONS AND GIFTS RECEIVED (non-specimen)

Astrid Kodric-Brown, UNM Emeritus. Donation of ichthyological books for MSB library

13. CURRENT STAFF

A. Faculty/Staff

Evan W. Carson, Research Assistant Professor

Nathan R. Franssen, Postdoctoral Researcher

Megan J. Osborne, Research Assistant Professor

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

Michael Schwemm, Visiting Research Scholar

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 Fall 2014

MSB Fishes Graduate Students, UNM Biology

Adam L. Barkalow, M.Sci. student

Michael A. Farrington, M.Sci. student

Tyler J. Pilger, Ph.D. student

Rosalee A. Reese, M.Sci. student

C. Undergraduate Student Employees, Lab and Museum
Kendra Brunet Lecomte, A&S Biology
Larissa E. Garcia, UNM School of Business
Alyssa Sanchez, A&S Biology

14. MUSEUM ASSOCIATES

A. Curatorial 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, retired US Fish and Wildlife Service, Albuquerque
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, American Southwest Ichthyological Researchers, Albuquerque
Keith B. Gido, Ph.D. Kansas State University, Manhattan KS
Eliza I. Gilbert, M.S. New Mexico Dept. Game and Fish, Santa Fe
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 130,680 accessioned specimens of vascular and non-vascular plants at the end of 2014. 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.

Two projects of note are the Brother Arsene collection that was given to UNM by the College of Santa Fe and the recent gift of 1317 specimens from the Bureau of Land Management, Rio Puerco office. Each of the Brother Arsene specimens, most from the 1920s, was imaged in its original condition and then removed from its paper and remounted, preserving the original label. Many of the specimens in the Rio Puerco gift are not archival in their present condition and will require careful attention as part of the accessioning process.

We have imaged over 11,000 specimens and have been working with the UNM libraries to make these images web-accessible in 2015. These images will be tied to a new mirror of the Arizona-based bioinformatics server SEINet, making herbarium records available to the public. The Southwest Environmental Information Network or SEINet (121,701 individuals visited the site in 2014; 224,320 total visits to <http://swbiodiversity.org/seinet/>, with over 1 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

Collection Growth (specimens catalogued & entered in collection)	Loans/# specimens (outgoing)	Visitors (not including some tour groups)	Information Requests Personally Responded to	Publications Citing MSB Specimens
752	15/441	146	130	XXX

3. COURSES USING THE COLLECTIONS

Fall 2014: Biol. 463-Flora of New Mexico-11 students (9 undergrads, 1 graduate student, 1 audit).
Summer 2014: Water Resources 573-12 student (10 graduate, 2 undergraduate)

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty

Lowrey, T.K.

Fall 2014: Biol. 463-Flora of New Mexico-11 students

Biology 502- The Impact on Botany on Society in Western Europe. UNM Summer Program at Schloss Dyck, Germany-5 students.

B. Graduate Students/ Research Associates

Bixby, R.J.

Courses taught:

Summer 2014: WR 573 (Water Field Methods) (12 students)

Spring, Summer 2014: BIOL 551- Research Problems (2 students)

Guest lectures:

BIOL 495 (Limnology): “Chemical composition of waters”, “Benthic algae I and II”, undergraduate and graduate, Spring 2014

BIOL 496 (Limnology lab): Algae lab, Spring 2014

BIO 535 (Freshwater Ecology): “Southwestern rivers”, Fall 2014

5. COLLECTION MANAGEMENT

The UNM Herbarium remounted 1100 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 752 new acquisitions to the collection. Our division received 10 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.

The herbarium made 15 loans and logged more than 140 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

NM Water Resources Research Institute Student Water Research Grant, “Fire ash influences on aquatic primary producers through changes in water quality, \$5220, Awarded to Clark and Bixby, 2014-2015

Survey of State Trust Land for *Townsendia gypsophila* Lowrey & P.Knight (Asteraceae) and *Abronia bigelovii* Heimerl. T. Lowrey. New Mexico State Land Office. \$7500. 1 March 2014-30 June 2014.

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

Pringle, C.M., E.P. Anderson, M. Ardón, **R.J. Bixby**, S. Connelly, J.H. Duff, A.P. Jackman, P. Paaby, A. Ramírez, G.E. Small, M.N. Snyder, and F.J. Triska. In press. Rivers of Costa Rica. In: M. Kappelle (ed.) Costa Rican Ecosystems. The University of Chicago Press, Chicago, Illinois.

B. Journal Articles

Porras-Alfaro, A., S. Raghavan, M. Garcia, R. Sinsabaugh, D. Natvig, and T. Lowrey. 2014. Endophytic fungal symbionts associated with gypsophilous plants. *BOTANY* 92(4): 295-301.

C. Curriculum Development

Biology 402/502. HIST 300, INTS410: The Impact on Botany on Society in Western Europe. UNM Summer Program at Schloss Dyck, Germany.

D. Technical Reports

Survey of State Trust Land for *Townsendia gypsophila* Lowrey & P.Knight (Asteraceae) and *Abronia bigelovii* Heimerl. T. Lowrey. New Mexico State Land Office.

Bixby, R.J. and A.S. Burdett. 2014. Resource utilization by the Rio Grande silvery minnow at the Los Lunas Silvery Minnow Refugium, Annual Report (2012-2013). Interstate Stream Commission, 43 pp.

By Herbarium Associates:

Robert C. Sivinski, Teri B. Neville, Esteban Muldavin and Hugh Hulse. 2014. Status Survey for Tharp's Blue-star in the Carlsbad, New Mexico Area. Natural Heritage New Mexico Report – 14-GTR-384.

Daniela Roth and Robert Sivinski. 2014. Status report for Zuni Fleabane on Cibola National Forest, New Mexico. Submitted to U.S. Forest Service, Region 3, Albuquerque, NM.

E. Theses/Dissertations Completed

Spring 2014, Maureen Meyer, M.S. Geography

Spring 2014, Heidi Hopkins, Ph.D. Biology

Spring 2014, Michael Medrano, Ph.D. Biology

Summer 2014, Roxanne Candelaria-Ley, M.S. Biology

F. Work In Progress

Jewson, D.H. and **R.J. Bixby**. In review. Lake level fluctuation and its impact on the abundance and life cycle of *Hannaea baicalensis* in Lake Baikal. Submitted to European Journal of Phycology.

Jones, C., **R.J. Bixby**, B. Lewis, and B.M. Thomson. In revision. Evaluating the potential risk of establishment of two aquatic invasive plants in New Mexico. Submitted to Journal of the American Water Resources Association.

Hamilton, A., C. Dahm, **R. Bixby**, G. Jacobi, B. Shafer, L. Sherson, V. Thompson, A. Clark, and S. Stringer. In revision. Short-Term Effects of the Las Conchas Fire on Benthos in the East Fork Jemez River in the Valles Caldera, New Mexico. Submitted to *Freshwater Biology*.

Bixby, R.J., A.S. Burdett and R.G. Verb. In revision. Importance of tumbleweed (*Salsola tragus*) as an algal substrate in arid land rivers. Submitted to *Hydrobiologia*.

Ph.D. Advisement:

University of New Mexico

Jack Triepke, 2011. Tim Lowrey, Co-supervised with Esteban Muldavin. In Progress.

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. Roesgen, Ph.D., Department of Biology, University of New Mexico, 2013-present

Mark Horner, Ph.D., Department of Biology, University of New Mexico, 2011-present

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

M.S. Advisement:

Committee Member:

Tim Lowrey. Spring 2013, William Maxwell, M.S. Geography Department

Tim Lowrey, Spring and Fall 2013, Maureen Meyer, M.S. Geography Department

Becky Bixby:

Advisor:

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

Ryan Kelly, Master in Water Resources, 2013-present.

Committee Member for completed M.S. degree

Committee member for additional master student

Steve Scholle, M.S. Department of Biology, University of New Mexico, 2009-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)

Older, but not reported previously:

Bell, Hester L.; Columbus, J. Travis; and Ingram, Amanda L. (2012) "Kalinia, a New North American Genus for a Species Long Misplaced in Eragrostis (Poaceae, Chloridoideae)," *Aliso: A Journal of Systematic and Evolutionary Botany*: Vol. 30: Iss. 2, Article 3.
Available at: <http://scholarship.claremont.edu/aliso/vol30/iss2/3>

Lara, Desiree Rochelle, "Population Genetic Structure of Bromus tectorum in the American Desert Southwest" (2013). All Theses and Dissertations. Paper 4273. Brigham Young University.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/Plenary Talks and/or Seminars

C. Contributed Talks/Posters

Alley, L. D., Rosebrook, S. K., Riley, L. A., Verb, R. G., Bixby, R. J. 2014. Spatial and temporal algal community variation in a drought-resistant spring system in the Sandia Mountains, New Mexico. Joint Aquatic Sciences Meeting, Portland, Oregon.

Bixby, R. J., Hamilton, A. T., Jacobi, G. Z., Dahm, C. N. 2014. Resistance and resilience of biological organisms in response to fire disturbance. Joint Aquatic Sciences Meeting, Portland, Oregon.

Burdett, A. S., Bixby, R. J., Tave, D., Hutson, A. M., Toya, L. A. 2014. Food consumption by the endangered Rio Grande Silvery Minnow (*Hybognathus amarus*) in the Los Lunas Silvery Minnow Refugium – a study of availability and use. Joint Aquatic Sciences Meeting, Portland, Oregon.

Clark, A. L., Bixby, R. J., Thompson, V. F., Dahm, C. N. 2014. Does macrophyte availability and habitat shape diatom community response to fire impacts? Joint Aquatic Sciences Meeting, Portland, Oregon.

Thompson, V. F., Bixby, R. J., Dahm, C. N. 2014. Effects of catastrophic forest fire on submerged aquatic macrophytes in a mountain stream. Joint Aquatic Sciences Meeting, Portland, Oregon.

Verb, R. G., Bixby, R. J., Price, R. L. 2014. Survey of benthic algal assemblages from geothermal influenced aquatic systems in the Valles Caldera National Preserve. Joint Aquatic Sciences Meeting, Portland, Oregon.

C. Attendance at Professional Meetings

Lowrey, T.K. Botany 2014, National botanical meetings. Boise, Idaho. July 2014

Bixby, R.J. Joint Aquatic Sciences Meeting, Portland, OR, May 2014

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

Co-organizer and associate editor for special issue of Freshwater Science, "Impacts of fire on freshwater ecosystems" (publication 12/15, 25 papers)

E. Service as Officer of Professional Society/Organization

Lowrey, T.K.

Member, Board of Directors, Flora North America, Elected.

Flora North America Editorial Board

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

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.

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity (*presenter)

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

Museum Studies Degree Program, Higher Education Department, State of New Mexico March 2013

N.M. State Board of Finance, July 2014

Grant Proposal Reviewer, Institute of Museum and Library Services, Washington, D.C. April 2013

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

Bixby, R.J.

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

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.

Member, Editorial Board of Flora North America (still current).

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.

Member, New Mexico Rare Plant Technical Council.
Member, Native Plant Society of New Mexico

D. Journal Referee

Bixby, R.J.

Algal Research-1
Diatom Research-1
Hydrobiologia-1
New Mexico Journal of Geology-1

Lowrey, T.K.

Taxon – 1
Systematic Botany-1

E. Hosting Professional Colloquia and Groups

F. Field Research

10. SERVICE

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

Special session on fire impacts of ecosystems at Joint Aquatic Sciences Meeting, Portland, OR,
May 2014, 16 presenters

B. Public Service

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 Todsens' Pennyroyal (*Hedeoma todsenii*).

Bixby, R.J. Hosted Integrated Field Program, University of Georgia, Field exercise comparing vegetation and groundwater levels in the Rio Grande bosque, June 2014

C. University and Departmental Committees

Lowrey, T.K.

Committee on Governance, Co-chair.
Associate Deans of Research Committee
UNM Economic Development Committee
UNM Academic Program Review Committee
OGSnet
Provost's Committee on Academic Success
Administrative Units Assessment Committee

Bixby, R.J.

Program committee (appointed), Water Resources Program

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

Alex Clark (undergraduate), Water Resources Research Institute Student Research Grant, \$5220

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

B. Graduate students

Wetherill, Karen (Spring/Summer/Fall 2014)
Gautreaux, Matthew (Fall 2014).

C. Undergraduate Student Workers and Volunteers

Robinson, Kyle. Work-study Employee. Spring/Fall 2014.
Alex Clark, Student and employee for Bixby, Junior (Fall and Spring 2014)
Melissa Bacigalupa - Volunteer (Spring/Summer 2014)
Ali Fretz – Volunteer (Summer 2014).

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
Bleakly, D., Botanical Consultant
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.

- B. **Collection Growth.** The DOM added 11,469 new specimens to its catalogue during 2013 and now contains 267,842 cataloged specimens. The collection is currently the 3rd largest collection in the Western Hemisphere and in the top 4 worldwide. New accessions of mammalian material amounted to >11,000 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.

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.

- C. **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 2014.

- a. 21 UNM students worked in the division in 2014
 - i. 4 graduate students
 - ii. 9 paid undergraduates
 - iii. 7 volunteer undergraduates
- b. Of these 23:
 - i. 15 were females
 - ii. 5 males
 - iii. 5 were from under-represented groups
- c. 13 Albuquerque Public Schools high school interns/volunteers

Publications citing MSB DOM specimens. 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. Thus the number of publications that are based on our material should be viewed as an underestimate.

During 2014 DOM specimens were cited or specimen data was utilized in at least **79** studies published in **44** journals:

1. Acta Palaeontologica Polonica
2. American Museum Novitates
3. Animal Behaviour
4. Annales Zoologici Fennici
5. Archives of Virology
6. Biological Journal of the Linnean Society
7. BioScience
8. Bulletin de l'Academie veterinaire de France
9. Canadian Journal of Zoology
10. Check List
11. Comparative Parasitology
12. Conservation Genetics
13. Conservation Genetics Resources
14. Emerging Infectious Diseases
15. Epidemiology and Infection
16. Evolution
17. Gene
18. Heredity
19. Infection, Genetics and Evolution
20. Journal of Biogeography
21. Journal of Clinical Virology.
22. Journal of Heredity
23. Journal of Mammalogy
24. Journal of Virology
25. Mammalia
26. Mastozoología Neotropical
27. Methods in Ecology and Evolution
28. Molecular Biology and Evolution
29. Molecular Phylogenetics and Evolution
30. Northwestern Naturalist
31. Occasional Papers, Museum of Texas Tech University
32. Parasites & Vectors
33. PloS One
34. Proceedings of the Biological Society of Washington
35. Revista Mexicana de Mastozoología
36. Special Publications, Museum of Texas Tech University
37. The American Journal of Tropical Medicine and Hygiene
38. The Southwestern Naturalist
39. Trends in Microbiology
40. Virus research
41. Viruses
42. ZooKeys
43. Zoologica Scripta
44. Zoological Journal of the Linnean Society

D. Theses/Dissertations.

- a. In 2014, at least 3 theses or dissertations from 3 institutions (UNM, Louisiana State University, and Universidade da Lisboa (Portugal), were completed that utilized MSB mammal specimens.

- E. **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.

- Web visits to Arctos db tracked via Google analytics = 123,084 visits
- 5,909 visitors referred to our site were from GenBank.
- From 211 countries
- Queries containing records from DOM, DGR Mammals, or DOM observations:

Collection	Queries	Specimen Records
DGR Mammals	3,559	227,106
MSB Mamm Obs	198	497
DOM	66,789	34,619,220
TOTAL	70,546	34,846,823

F. **Educational Modules.**

In Spring 2014, Joe Cook co-taught a class with Eileen Lacey at the University of California Berkeley (8 students) on Climate Change and Museums. This course included a number of speakers (mostly from Berkeley and Stanford) covering topics related to how museum resources address the biology of climate change. We also developed web-based educational modules using museum specimens to illustrate various climate change concepts that can be viewed online and used by K-12 or undergraduate instructors. A paper outlining these approaches was published in *Bioscience*.

In Fall 2014, Joe Cook taught a web-distributed seminar on the Human Dimension of Natural History. This course included a series of speakers from biology, art, and geography departments on campus and elsewhere (e.g., Rob Dunn (North Carolina State University), Allison Miller (St Louis University), Sue Kutz (University of Calgary), Nancy Huntly (Utah State University), Eric Hoberg (USDA), Ric Yanagihara (U Hawaii), Szu-Han Ho (UNM)) who explored how museum collections impact various aspects of humanity (invasive species, pathogens, food security, domestic crops, etc). A module using hosts and parasites is now under development that will be accessible via the AIM-UP! website.

2. COLLECTION USE

Collection Growth (specimens catalogued)	Loans (outgoing)	Loans (incoming)	Visitors	Information Requests Personally Responded to	Publications Citing MSB DOM Specimens
11,469	42(707) / 20(461)**	4	447***	>500****	79

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

** Loans originating in DOM / loans of mammal tissue originating in DGR Combined total of 62 loans of 1,168 specimens of traditional voucher specimens, skin clips and tissue samples.

- *** 47 visiting researchers from 17 institutions, 62 students and 7 teachers from 5 K-12 schools, 14 UNM classes (179 students and 14 instructors), 138 other visitors.
- **** Estimate of email or phone requests to Jon Dunnum and Joe Cook.

3. COURSES USING THE COLLECTIONS

UNM Classes receiving loans of material for educational purposes (14 classes serving 1,036 students)

BIOL 204L - Plant and Animal Form and Function. Spring	(180 students)
BIOL 204L - Plant and Animal Form and Function. Fall	(180 students)
BIOL 203L – Ecology and Evolution. Spring	(240 students)
BIOL 203L – Ecology and Evolution. Fall	(240 students)
Biol 419/519 – Ecology of the Past	(10 students)
BIOL 486L – Mammalogy. Fall	(18 students)
BIOL 386L – General Vertebrate Zoology. Fall	(30 students)
BIOL 386L – General Vertebrate Zoology. Spring	(40 students)
BIOL 599 – Masters Thesis. Spring	(1 student, 3 loan)
BIOL 599 – Masters Thesis. Fall	(1 student, 1 loan)
BIOL 699 – Dissertation. Spring	(2 students, 3 loans)
BIOL 699 – Dissertation. Fall	(2 students, 4 loans)
NTSC 262L – Spring	(46 students)
NTSC 262L – Fall	(46 students)

UNM courses or programs using collection through visits or staff presentations (179 students, 14 instructors from 14 classes/programs).

ART Studio 141 (Intro art/ecol), Spring	(7 students, 1 instructor)
ART Studio 141 (Intro art/ecol). 2 sections, Fall	(28 students, 2 instructor)
ART /ART HIST	(20 students, 1 instructor)
ART /ART HIST – Drawing I. 2 sec, Spring/Fall	(39 students, 2 instructors)
Bio Art/Design (Polli)	(7 students, 1 instructors)
BIOL 486L - Mammalogy, Fall	(18 students, 1 instructors)
MSST 476/576 Mus Studies (Traxler)	(10 students, 1 instructor)
UNM Mus Studies (Szabo)	(8 students, 1 instructor)
UNM Biology graduate student orientation	(22 students, 1 instructor)
UNM MARC Program	(5 students, 1 instructor)
UNM Honor's students' tour	(7 students, 1 instructor)
UNM Summer Teaching Program	(8 students, 1 instructor)

K-12 schools and educational groups: 62 students, 7 teachers from 5 schools.

Jefferson Middle school	(1 student)
Montessori on the Rio Grande	(11 students, 2 teachers)
Bosque School	(36 students, 3 teachers)
Amy Biehl High School	(1 teacher)
Cleveland Middle School AVID Program	(13 students, 2 teachers)

Visiting researchers: 47 from 17 institutions or departments

UNM Dept of Anthro/Contract Archaeology	(20)
UNM Dept of Biology	(6)
University of Nebraska-Kearney	(1)

University of Nebraska-Lincoln	(1)
George Mason University	(1)
Brown University	(1)
National University of Mongolia	(1)
USGS Western Ecological Research	(3)
University of Sydney	(5)
New Mexico Dept Game and Fish	(1)
Wyoming Dept Game and Fish	(1)
North Dakota Dept Game and Fish	(1)
Montana Dept Wildlife and Parks	(1)
University of Alberta, Edmonton	(1)
World Wildlife Fund	(1)
USDI NPS Badlands NP	(1)
New Mexico Museum of Natural History / Science	(1)

Other visitors: 138

UNM Stable Isotope Working Group	(25)
UNM Geo-Epidemiology Workshop	(7)
UNM Alumni Office	(2)
UNM Pre-Award Office	(10)
UNM Biology	(4)
NMSU Wildlife Resources class (J.K. Frey)	(11)
CNM STEM Program	(10)
Catholic University of Ecuador	(3)
New Mexico Museum Natural History	(8)
Los Alamos National Labs	(1)
Sandia National Labs	(4)
Middle Rio Grande ESA	(11)
Travel Channel	(3)
Other	(39)

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 Master thesis	2

Biol 699 Dissertation	4
Biol 402 053 Human Dimension of Natural History	6
Biol 489 Mammalogy	15

Student Mentoring

Undergraduates

1. Ryan Barber, *UNM*, May 1 to December 17.
2. Fernando Salazar-Miralles, *Minority Access to Research Careers Program, UNM* January 1 to August 30.
3. Kendall Calhoun, MARC, Summer visiting student from UC Berkeley, June-August.
4. Schuyler Liphardt, volunteer/paid, *UNM*, January to December.

High School Students

NSF-Research Activities for High School Students (RAHSS) 2014:

1. Moses Nagurski, Amy Biehl High School
2. Victoria Crosby, Amy Biehl High School
3. Gabriella Albert, Sandia Prep High School
4. Hannah Qualls, Sandia Prep High School

B. Graduate Students (labs, etc.)

BIOL 486L – Mammalogy

BIOL 402/502 - AIM-UP

5. COLLECTION MANAGEMENT

The DOM received 115 new accessions of material (>11,000 specimens) and added approximately 11,500 specimens to its catalogue during 2014.

Current projects generating specimens for DOM

Beringian Coevolution Project - NSF
 Mexican wolf reintroduction – USFWS
 Mongolian Vertebrate Parasite Project – NSF
 Panama Hantavirus – ICIDR NIH
 Bighorn Sheep Reintroduction Program – NMGF
 ISLES---USDA Forest Service
 Jackson Whitman Idaho collection
 Black bear /elk predation project – NMDGF
 Robert Rausch parasite host collection
 Mammalogy and Tropical Biology classes
 Troy Best collections

The majority of staff time was spent:

13. Development of the Arctos database.
14. Reorganizing and relabeling of dry collections.
15. Training student technicians in museum work.
16. Preparation, cataloging and installation of museum specimens.
17. Data entry for the incoming accessions.
18. Filling information requests.
19. Processing loan material.
20. Assisting with UNM courses utilizing MSB specimens and facilities.
21. Outreach to K-12 schools.

6. AWARDS, GRANTS, AND CONTRACTS

Bell, K. C.

- | | |
|--|---------|
| 1. Grant-in-Aid of Research,
<i>American Society of Mammalogists</i> | \$3,000 |
| 2. Joseph Alvin Gaudin Jr. Scholarship
<i>Biology Department, UNM</i> | \$2750 |

Colella, J.

- | | |
|--|---------|
| 1. NESCent Academy Phylogenetic Analysis
Using RevBayes, Travel Grant | \$600 |
| 2. University of New Mexico, Joseph Gaudin Fellowship | \$1,000 |
| 3. University of New Mexico, Graduate and Professional Student
Association. Professional Development Grant | \$500 |
| 5. University of New Mexico, Biology Graduate Student
Association, Graduate Resource Allocation Committee | \$400 |
| 6. University of New Mexico, Biology Graduate Student
Association, Graduate Research, Allocation Committee,
Travel Grant | \$150 |

Cook, J.A.

- | | |
|--|-----------|
| 1. USGS Specimen Georeferencing (7/1/14-3/31/15) | \$49,980 |
| 2. NSF-REU Supplement to DEB 1258010 (3/1/13-2/28/16) | \$6000 |
| 3. NSF-REU Supplement to DEB 1057383 1 /1/14-12/31/14 | \$11,000 |
| 4. NSF-RAHSS Supplement to DEB 1057383 1/1/14-12/31/14 | \$5,400 |
| 5. NM Department of Homeland Security, Museum Seismic
Mitigation 8/30/14-6/30/15 (co-PI) | \$81,829 |
| 6. USGS Cooperative Agreement, Tundra Preserves (6/11-12/14) now | \$123,000 |
| 7. RCN-UBE: Advancing Integration of Museums into Undergraduate
Programs (AIM-UP!) (w/ co-PIs E. Lacey (UC Berkeley), S. Edwards (Harvard), S. Ickert-Bond
(U Alaska)). NSF-DEB 0956129 5/01/2010-4/30/2015. | \$485,648 |
| 8. NSF-DEB 1057383 1/1/11-12/32/14
Integration and Curation of the Robert and Virginia Rausch Helminthological
Collection- A Resource for Science and Society in the MSB Division of Parasitology | \$489,490 |
| 9. College of Arts and Sciences, Turner Ranch Research Fund | \$10,000 |

Dunnum, J. L.

- | | |
|---|----------|
| 1. USGS Specimen Georeferencing (7/1/14-3/31/15) Co-PI | \$49,980 |
| 2. Improved housing of Mexican wolf (<i>Canis lupus baileyi</i>) specimens and its conservation in New
Mexico. U. S. Fish and Wildlife Service. Total \$10,000 (No F&A). | |

Jones, Amanda K.

- | | |
|---|--------|
| 1. <i>The Joseph Gaudin Scholarship</i> , UNM Department of Biology | \$2500 |
| 2. UNM GPSA New Mexico High Priority Research Grant | \$5000 |

McLean, Bryan

- | | |
|---|----------|
| 1. Research Grant, UNM Graduate Research Allocations Committee | \$400 |
| 2. <i>Horner Award & Grant-in-Aid of Research</i> ,
American Society of Mammalogists | \$2000 |
| 3. <i>The Joseph Gaudin Scholarship</i> , UNM Department of Biology | \$2750 |
| 4. Student Research Grant, UNM Graduate and Professional
Student Assoc. | \$500 |
| 5. Research Grant, UNM Graduate Research Allocations Committee | \$400 |
| 6. Travel Grant, UNM Graduate Research Allocations Committee | \$150 |
| 7. <i>Peter Buck Predoctoral Fellowship</i> ,
National Museum of Natural History, Washington, DC | \$32,000 |

7. PUBLICATIONS**A. Books, Book Chapters, Edited Volumes****B. Journal Articles****Bell, K.C**

1. Cook, J.A., S. V. Edwards, E. Lacey, R. P. Guralnick, P. S. Soltis, D. E. Soltis, C. Welch, K. C. Bell, K. E. Galbreath, C. Himes, J. M. Allen, T. A. Heath, A. C. Carnaval, K. L. Cooper, M. Liu, J. Hanken, and S. Ickert-Bond. 2014. Natural History Collections as Emerging Resources for Innovative Education in Biology. *BioScience* 64:725-734.
2. Sullivan, J., J.R. Demboski, K.C. Bell, S. Hird, B. Sarver, N. Reid, J.M. Good. 2014. Divergence-with-gene-flow within the recent chipmunk radiation (*Tamias*). *Heredity* 113: 185-194.

Cook, J. A.

3. Powers, K. E., L. A. Prather, J. A. Cook, J. Woolley, H. L. Bart, Jr., A. K. Monfils, M. Blackwell, and P. Sierwald. 2014. Revolutionizing the Use of Natural History Collections in Education. *The Science Education Review* 13:24-33.
4. Bradley, R. D., L. K. Ammerman, R. J. Baker, L. C. Bradley, J. A. Cook, R. C. Dowler, C. Jones, D. J. Schmidly, F. B. Stangl, Jr., R. A. Van Den Bussche, and B. Würsig. 2014. Revised checklist of North American mammals north of Mexico, 2014. Museum of Texas Tech University, Occasional Papers, 327:1-27.
5. Lessa, EP, Cook JA, D'Elia G, and. Opazo JC. 2014. Rodent diversity in South America: transitioning into the genomics era. *Frontiers in Ecology and Evolution*. 2 (39):1-7.
6. Kohli, B. A., K. A. Speer, C. W. Kilpatrick, N. Batsaikhan, D. Damdinbaza, J. A. Cook. 2014. Evolution in the subarctic: Multilocus systematics of a recent radiation of boreal rodents (Arvicolinae: Myodini). *Molecular Phylogenetics and Evolution* 76:18-29.
7. Hope, A. G., S, Y. W. Ho, J. L. Malaney, J. A. Cook, S. L. Talbot. 2014. Calibrating molecular evolutionary rates for comparative demographic inference of multiple species. *Evolution*. 68: 2689-2700.

8. Gardner, S. L., J. Salazar-Bravo, and J. A. Cook. 2014. New species of *Ctenomys* Blainville 1826 (Rodentia: Ctenomyidae) from the lowlands and central highlands of Bolivia. *Special Publications, Museum of Texas Tech University*, 62:1-34.
9. Hope, A.G., N. Panter, J. A. Cook, S. L. Talbot, and D. Nagorsen. 2014. Multi-locus phylogeography and systematic revision of North American water shrews (genus: *Sorex*). *Journal of Mammalogy*. 95:722-738.
10. Gu, S.H., B. K. Lim, B. Kadjo, S. Arai, J.-W. Song, J.-A. Kim, V. Nicolas, C. Denys, J. A. Cook, S. R. Dominguez, K. V. Holmes, and R. Yanagihara. 2014. Molecular phylogeny of hantaviruses harbored by insectivorous bats in Côte d'Ivoire and Vietnam. *Viruses* 6:1897-1910.
11. Cook, J.A., S. V. Edwards, E. Lacey, R. P. Guralnick, P. S. Soltis, D. E. Soltis, C. Welch, K. C. Bell, K. E. Galbreath, C. Himes, J. M. Allen, T. A. Heath, A. C. Carnaval, K. L. Cooper, M. Liu, J. Hanken, and S. Ickert-Bond. 2014. Natural History Collections as Emerging Resources for Innovative Education in Biology. *BioScience* 64:725-734.
12. Ryan, M. J., M. Fuller, N. J. Scott, J. A. Cook, S. Poe, B. Willink, G. Chaves, and F. Bolaños. 2014. Individualistic population responses of five frog species over 42-years in two changing tropical environments. *PLoS One* 9(5):e98351.
13. Dawson, N. G., A. G. Hope, S. L. Talbot, and J. A. Cook. 2014. A multi-locus evaluation of ermine (*Mustela erminea*) across the Holarctic, testing hypotheses of Pleistocene diversification in response to climate change. *Journal of Biogeography* 41:464-475.

McLean, B.

McLean, B.S., Ward, J.K., Polito, M.J. and Emslie, S.D. (2014). Responses of high-elevation herbaceous plant assemblages to low glacial CO₂ concentrations revealed by fossil marmot (*Marmota*) teeth. *Oecologia* 175: 1117-1127

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

Evaluating the utility of natural history collections in research and for the public. Master's thesis. University of New Mexico.

Sawyer, Yadeeh Escobedo

Living on the Edge: A comparative phylogeographic study of refugial and insular fragmentation. Ph. D. Dissertation. University of New Mexico.

F. Work In Progress (Only *in press* and already submitted)

Dunnum, J.

1. Dunnum, J. L. 2015. Family Caviidae, *In* Mammals of South America. Volume 2, Rodents, edited by J. L. Patton, U. F. J. Pardiñas, and G. D'Elia, pp. xxx-xxx. The University of Chicago Press, Chicago, IL. In press.

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

66. de Barros Lopes, L., Guterres, A., Rozental, T., de Oliveira, R. C., Mares-Guia, M. A., Fernandes, J., ... & de Lemos, E. R. S. (2014). Rickettsia bellii, Rickettsia amblyommii, and Laguna Negra hantavirus in an Indian reserve in the Brazilian Amazon. *Parasites & vectors*, 7(1), 1-7.
67. Bennett, S. N., Gu, S. H., Kang, H. J., Arai, S., & Yanagihara, R. (2014). Reconstructing the evolutionary origins and phylogeography of hantaviruses. *Trends in microbiology*.
68. Bezy, R. L., & Cole, C. J. (2014). Amphibians and Reptiles of the Madrean Archipelago of Arizona and New Mexico. *American Museum Novitates*, (3810), 1-24.
69. Cañón, C., Mir, D., Pardiñas, U. F., Lessa, E. P., & D'Elia, G. (2014). A multilocus perspective on the phylogenetic relationships and diversification of rodents of the tribe Abrotrichini (Cricetidae: Sigmodontinae). *Zoologica Scripta*, 43(5), 443-454.
70. Chavez, A. S., Maher, S. P., Arbogast, B. S., & Kenagy, G. J. (2014). Diversification and Gene Flow in Nascent Lineages of Island and Mainland North American Tree Squirrels (Tamiasciurus). *Evolution*, 68(4), 1094-1109.
71. Cronin, M., Cánovas, A., Bannasch, D. L., Oberbauer, A. M., & Medrano, J. F. (2014). Single Nucleotide Polymorphism (SNP) Variation of Wolves (Canis lupus) in Southeast Alaska and Comparison with Wolves, Dogs, and Coyotes in North America. *Journal of Heredity*, esu075.
72. Dawson, N. G., Hope, A. G., Talbot, S. L., & Cook, J. A. (2014). A multilocus evaluation of ermine (Mustela erminea) across the Holarctic, testing hypotheses of Pleistocene diversification in response to climate change. *Journal of Biogeography*, 41(3), 464-475.
73. Fernández, J. A. (2014). Mitochondrial phylogenetics of a rare Mexican endemic: Nelson's woodrat, Neotoma nelsoni (Rodentia: Cricetidae), with comments on its biogeographic history. *The Southwestern Naturalist*, 59(1), 81-90.
74. Figueiredo, L. T. M., Souza, W. M. D., Ferrés, M., & Enria, D. A. (2014). Hantaviruses and cardiopulmonary syndrome in South America. *Virus research*.
75. Frey, J. K., & Calkins, M. T. (2014). Snow cover and riparian habitat determine the distribution of the short-tailed weasel (Mustela erminea) at its southern range limits in arid western North America. *mammalia*, 78(1), 45-56.
76. Gardner, S. L., Luedders, B. A., & Duszyński, D. W. (2014). Hymenolepis robertrauschi n. sp. from Grasshopper Mice Onychomys spp. in New Mexico and Nebraska, USA. *Occasional Papers, Museum of Texas Tech University* number 322, 10 pages.
77. Gardner, S. L., Salazar-Bravo, J., & Cook, J. A. 2014. New Species of Ctenomys Blainville 1826 (Rodentia:Ctenomyidae) from the Lowlands and Central Valleys of Bolivia. Special Publications. Museum of Texas Tech University number 62:1-34.

78. Giarla, T. C., & Jansa, S. A. (2014). The role of physical geography and habitat type in shaping the biogeographical history of a recent radiation of Neotropical marsupials (Thylamys: Didelphidae). *Journal of Biogeography* 41(8): 1547–1558.
79. Giarla, T. C., Voss, R. S., & Jansa, S. A. (2014). Hidden diversity in the Andes: comparison of species delimitation methods in montane marsupials. *Molecular phylogenetics and evolution*, 70, 137-151.
80. Gu, S. H., Dormion, J., Hugot, J. P., & Yanagihara, R. (2014). High prevalence of Nova hantavirus infection in the European mole (< i> Talpa europaea</i>) in France. *Epidemiology and infection*, 142(06), 1167-1171.
81. Gu, S. H., Hejduk, J., Markowski, J., Kang, H. J., Markowski, M., Połatyńska, M., ... & Yanagihara, R. (2014). Co-circulation of Soricid-and Talpid-borne Hantaviruses in Poland. *Infection, Genetics and Evolution*.
82. Gu, S. H., Lim, B. K., Kadjo, B., Arai, S., Kim, J. A., Nicolas, V., ... & Yanagihara, R. (2014). Molecular Phylogeny of Hantaviruses Harbored by Insectivorous Bats in Côte d'Ivoire and Vietnam. *Viruses*, 6(5), 1897-1910.
83. González-Ittig, R. E., Kandel, N., Levis, S., Calderón, G., Salazar-Bravo, J., & Gardenal, C. N. (2014). Molecular systematics of the South American rodent Calomys laucha (Cricetidae: Sigmodontinae), a reservoir of the Laguna Negra hantavirus. *Canadian Journal of Zoology*, 92(12), 1093-1098.
84. González-Ittig, R. E., Rivera, P. C., Levis, S. C., Calderón, G. E., & Gardenal, C. N. (2014). The molecular phylogenetics of the genus Oligoryzomys (Rodentia: Cricetidae) clarifies rodent host–hantavirus associations. *Zoological Journal of the Linnean Society*, 171(2), 457-474.
85. Guralnick, R., Conlin, T., Deck, J., Stucky, B. J., & Cellinese, N. (2014). The Trouble with Triplets in Biodiversity Informatics: A Data-Driven Case against Current Identifier Practices. *PloS one*, 9(12), e114069.
86. Guterres, A., de Oliveira, R. C., Fernandes, J., Strecht, L., Casado, F., Gomes de Oliveira, F. C., ... & Sampaio de Lemos, E. R. (2014). Characterization of Juquitiba Virus in Oligoryzomys fornesi from Brazilian Cerrado. *Viruses*, 6(4), 1473-1482.
87. Gutiérrez, E. E., Anderson, R. P., Voss, R. S., Ochoa-G, J., Aguilera, M., & Jansa, S. A. (2014). Phylogeography of Marmosa robinsoni: insights into the biogeography of dry forests in northern South America. *Journal of Mammalogy*, 95(6), 1175-1188.
88. Hope, A. G., Ho, S. Y., Malaney, J. L., Cook, J. A., & Talbot, S. L. (2014). Accounting for rate variation among lineages in comparative demographic analyses. *Evolution*, 68(9), 2689-2700.
89. Hope, A. G., Panter, N., Cook, J. A., Talbot, S. L., & Nagorsen, D. W. (2014). Multilocus phylogeography and systematic revision of North American water shrews (genus: Sorex). *Journal of Mammalogy*, 95(4), 722-738.
90. Hugot, J. P., Gu, S. H., Feliu, C., Ventur, J., Ribas, A., Dormion, J., ... & Nicolas, V. (2014). Genetic Diversity of Talpa Europaea and Nova Hanta Virus (NVAV) in France. *Bulletin de l'Academie veterinaire de France*, 167(3).
91. Jansa, Sharon A., F. Keith Barker, and Robert S. Voss. 2014. The early diversification history of didelphid marsupials: a window into South America's "Splendid Isolation. *Evolution* 68.3 684-695.

92. Kang, H. J., Stanley, W. T., Esselstyn, J. A., Gu, S. H., & Yanagihara, R. (2014). Expanded Host Diversity and Geographic Distribution of Hantaviruses in Sub-Saharan Africa. *Journal of virology*, 88(13), 7663-7667.
93. Kohli, B. A., Fedorov, V. B., Waltari, E., & Cook, J. A. (2014). Phylogeography of a Holarctic rodent (*Myodes rutilus*): testing high-latitude biogeographical hypotheses and the dynamics of range shifts. *Journal of Biogeography*.
94. Kohli, B. A., Speer, K. A., Kilpatrick, C. W., Batsaikhan, N., Damdinbaza, D., & Cook, J. A. (2014). Multilocus systematics and non-punctuated evolution of Holarctic Myodini (Rodentia: Arvicolinae). *Molecular phylogenetics and evolution*, 76, 18-29.
95. Kruger, D. H., Figueiredo, L. T. M., Song, J. W., & Klempa, B. (2014). Hantaviruses—Globally emerging pathogens. *Journal of Clinical Virology*.
96. Lee, J. G., Gu, S. H., Baek, L. J., Shin, O. S., Park, K. S., Kim, H. C., ... & Song, J. W. (2014). Muju Virus, Harbored by *Myodes regulus* in Korea, Might Represent a Genetic Variant of Puumala Virus, the Prototype Arvicolid Rodent-Borne Hantavirus. *Viruses*, 6(4), 1701-1714.
97. Leite, R. N., Kolokotronis, S. O., Almeida, F. C., Werneck, F. P., Rogers, D. S., & Weksler, M. (2014). In the wake of invasion: tracing the historical biogeography of the South American cricetid radiation (Rodentia, Sigmodontinae). *PloS one*, 9(6), e100687.
98. Lin, X. D., Zhou, R. H., Fan, F. N., Ying, X. H., Sun, X. Y., Wang, W., ... & Zhang, Y. Z. (2014). Biodiversity and Evolution of Imjin virus and Thottapalayam virus in Crocidurinae shrews in Zhejiang Province, China. *Virus research*.
99. Ling, J., Sironen, T., Voutilainen, L., Hepojoki, S., Niemimaa, J., Isoviita, V. M., ... & Vapalahti, O. (2014). Hantaviruses in Finnish soricomorphs: Evidence for two distinct hantaviruses carried by *Sorex araneus* suggesting ancient host-switch. *Infection, Genetics and Evolution*, 27, 51-61.
100. Martínez-Lanfranco, J. A., Flores, D., Jayat, J. P., & D'Elía, G. (2014). A new species of lutrine opossum, genus *Lutreolina* Thomas (Didelphidae), from the South American Yungas. *Journal of Mammalogy*, 95(2), 225-240.
101. Mathis, V. L., Hafner, M. S., & Hafner, D. J. (2014). Evolution and phylogeography of the *Thomomys umbrinus* species complex (Rodentia: Geomyidae). *Journal of Mammalogy*, 95(4), 754-771.
102. Mitchell, K. J., Pratt, R. C., Watson, L. N., Gibb, G. C., Llamas, B., Kasper, M., ... & Cooper, A. (2014). Molecular phylogeny, biogeography, and habitat preference evolution of marsupials. *Molecular biology and evolution*, msu176.
103. Montoya-Ruiz, C., Diaz, F. J., & Rodas, J. D. (2014). Recent Evidence of Hantavirus Circulation in the American Tropic. *Viruses*, 6(3), 1274-1293.
104. Opazo, J. C., Hoffmann, F. G., Natarajan, C., Witt, C. C., Berenbrink, M., & Storz, J. F. (2014). Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. *Molecular Biology and Evolution*, msu341.
105. de Oliveira, R. C., Cordeiro-Santos, M., Guterres, A., Fernandes, J., de Melo, A. X., João, G. A., ... & de Lemos, E. R. S. (2014). Rio Mamore Virus and Hantavirus Pulmonary Syndrome, Brazil. *Emerging infectious diseases*, 20(9), 1568.
106. de Oliveira, R. C., Guterres, A., Fernandes, J., D'Andrea, P. S., Bonvicino, C. R., & de Lemos, E. R. S. (2014). Hantavirus Reservoirs: Current Status with an Emphasis on Data from Brazil. *Viruses*, 6(5), 1929-1973.

107. Ordóñez-Garza, N., Thompson, C. W., Unkefer, M. K., Edwards, C. W., Owen, J. G., & Bradley, R. D. (2014). Systematics of the *Neotoma mexicana* species group (Mammalia: Rodentia: Cricetidae) in Mesoamerica: new molecular evidence on the status and relationships of *N. ferruginea* Tomes, 1862. *Proceedings of the Biological Society of Washington*, 127(3), 518-532.
108. Orozco, M. M., Piccinali, R. V., Mora, M. S., Enriquez, G. F., Cardinal, M., & Gürtler, R. E. (2014). The role of sigmodontine rodents as sylvatic hosts of *Trypanosoma cruzi* in the Argentinean Chaco. *Infection, Genetics and Evolution*, 22, 12-22.
109. Palma, R. E., Boric-Bargetto, D., Jayat, J. P., Flores, D. A., Zeballos, H., Pacheco, V., ... & Pardiñas, U. F. (2014). Molecular phylogenetics of mouse opossums: new findings on the phylogeny of *Thylamys* (Didelphimorphia, Didelphidae). *Zoologica Scripta*, 43(3), 217-234.
110. Pardiñas, U. F., D'Elia, G., Lessa, G., Passamani, M., & Teta, P. (2014). Nuevos datos morfológicos y una hipótesis filogenética para *phaenomys* (rodentia, cricetidae). *Mastozoología Neotropical*, 21(2):251-261
111. Patrick, L. E., & Stevens, R. D. (2014). Investigating sensitivity of phylogenetic community struct
112. Pavan, S. E., Jansa, S. A., & Voss, R. S. (2014). Molecular phylogeny of short-tailed opossums (Didelphidae: *Monodelphis*): Taxonomic implications and tests of evolutionary hypotheses. *Molecular Phylogenetics and Evolution*.
113. Phuong, M. A., Lim, M. C., Wait, D. R., Rowe, K. C., & Moritz, C. (2014). Delimiting species in the genus *Otospermophilus* (Rodentia: Sciuridae), using genetics, ecology, and morphology. *Biological Journal of the Linnean Society*, 113(4), 1136-1151.
114. Plyusnin, A., & Sironen, T. (2014). Evolution of hantaviruses: Co-speciation with reservoir hosts for more than 100MYR. *Virus research*.
115. Polly, P. D., & Sarwar, S. (2014, April). Extinction, extirpation, and exotics: effects on the correlation between traits and environment at the continental level. In *Annales Zoologici Fennici* (Vol. 51, pp. 209-226). Finnish Zoological and Botanical Publishing.
116. Pucu, E., Lareschi, M., & Gardner, S. L. (2014). Bolivian Ectoparasites: A Survey of the Fleas of *Ctenomys* (Rodentia: Ctenomyidae). *Comparative Parasitology*, 81(1), 114-118.
117. Quintela, F. M., da Silveira, E. C., Dellagnese, D. G., & Cademartori, C. V. (2014). *Calomys tener* (Winge, 1887)(Rodentia: Cricetidae: Sigmodontinae): Filling gaps. *Check List*, 10(3), 650-654.
118. Razuri, H., Tokarz, R., Ghersi, B. M., Salmon-Mulanovich, B., Guezala, M. C., & Albyjasr, C. (2014). Andes hantavirus variant in rodents, southern Amazon Basin, Peru. *Emerg Infect Dis*, 20, 257-60.
119. Roratto, P. A., Fernandes, F. A., & Freitas, T. R. (2014). Phylogeography of the subterranean rodent *Ctenomys torquatus*: an evaluation of the riverine barrier hypothesis. *Journal of Biogeography*.
120. Schwalm, D., Waits, L. P., & Ballard, W. B. (2014). Little fox on the prairie: genetic structure and diversity throughout the distribution of a grassland carnivore in the United States. *Conservation Genetics*, 15(6), 1503-1514.
121. Semedo, T. B. F., Brandão, M. V., Carmignotto, A. P., Da Silva Nunes, M., Farias, I. P., Da Silva, M. N. F., & Rossi, R. V. (2014). Taxonomic status and phylogenetic relationships of *Marmosa agilis peruana* Tate, 1931 (Didelphimorphia: Didelphidae), with comments on the

morphological variation of Gracilinanus from central–western Brazil. *Zoological Journal of the Linnean Society*.

122. Smith, F. A., Murray, I. W., Harding, L. E., Lease, H. M., & Martin, J. (2014). Life in an extreme environment: a historical perspective on the influence of temperature on the ecology and evolution of woodrats. *Journal of Mammalogy*, 95(6), 1128-1143.
123. Sobrero, R., Inostroza-Michael, O., Hernández, C. E., & Ebensperger, L. A. (2014). Phylogeny modulates the effects of ecological conditions on group living across hystricognath rodents. *Animal Behaviour*, 94, 27-34.
124. Souza, W. M., Bello, G., Amarilla, A. A., Alfonso, H. L., Aquino, V. H., & Figueiredo, L. T. M. (2014). Phylogeography and evolutionary history of rodent-borne hantaviruses. *Infection, Genetics and Evolution*, 21, 198-204.
125. Souza, W. M., & Figueiredo, L. T. M. (2014). Analysis of the nucleocapsid gene brings new insights to the classification of Sigmodontinae-borne hantaviruses. *Archives of virology*, 1-3.
126. Sullivan, J., Demboski, J. R., Bell, K. C., Hird, S., Sarver, B., Reid, N., & Good, J. M. (2014). Divergence with gene flow within the recent chipmunk radiation (Tamias). *Heredity* 113, 185–194.
127. de Thoisy, B., Matheus, S., Catzefflis, F., Clément, L., Barrioz, S., Guidez, A., ... & Lavergne, A. (2014). Maripa Hantavirus in French Guiana: Phylogenetic Position and Predicted Spatial Distribution of Rodent Hosts. *The American journal of tropical medicine and hygiene*, 90(6), 988-992.
128. Tkachenko, E. A., Witkowski, P. T., Radosa, L., Dzagurova, T. K., Okulova, N. M., Yunicheva, Y. V., ... & Klempa, B. (2014). Adler hantavirus, a new genetic variant of Tula virus identified in Major's pine voles (< i> Microtus majori</i>) sampled in southern European Russia. *Infection, Genetics and Evolution*.
129. Tomasco, I. H., & Lessa, E. P. (2014). Two mitochondrial genes under episodic positive selection in subterranean octodontoid rodents. *Gene*, 534(2), 371-378.
130. Ubelaker, J. E., Griffin, B. S., Konicke, G. M., Duszynski, D. W., & Harrison, R. L. (2014). Helminth Parasites from the Kit Fox, *Vulpes macrotis* (Carnivora: Canidae), from New Mexico. *Comparative Parasitology*, 81(1), 100-104.
131. Ubelaker, J. E., Griffin, B. S., Mendoza, K. M., Duszynski, D. W., & Harrison, R. L. (2014). Distributional records of helminths of the swift fox (*Vulpes velox*) from New Mexico. *The Southwestern Naturalist*, 59(1), 129-132.
132. Velazco, P. M., & Patterson, B. D. (2014). Two new species of yellow-shouldered bats, genus *Sturnira* Gray, 1842 (Chiroptera, Phyllostomidae) from Costa Rica, Panama and western Ecuador. *ZooKeys*, (402), 43.
133. Verzi, D. H. (2014). Phylogeny and evolutionary patterns of South American octodontoid rodents Diego H. Verzi, A. Itatí Olivares, and Cecilia C. Morgan. *Acta Palaeontologica Polonica*, 59(4), 757-769.
134. Voss, R. S., Gutiérrez, E. E., Solari, S., Rossi, R. V., & Jansa, S. A. (2014). Phylogenetic Relationships of Mouse Opossums (Didelphidae, Marmosa) with a Revised Subgeneric Classification and Notes on Sympatric Diversity. *American Museum Novitates*, (3817), 1-27.
135. Walker, F. M., Foster, J. T., Drees, K. P., & Chambers, C. L. (2014). Spotted bat (*Euderma maculatum*) microsatellite discovery using illumina sequencing. *Conservation Genetics Resources*, 6(2), 457-459.

136. Waltari, E., Schroeder, R., McDonald, K., Anderson, R. P., & Carnaval, A. (2014). Bioclimatic variables derived from remote sensing: assessment and application for species distribution modelling. *Methods in Ecology and Evolution*, 5(10), 1033-1042.
137. Wang, C. Q., Gao, J. H., Li, M., Guo, W. P., Lu, M. Q., Wang, W., ... & Zhang, Y. Z. (2014). Co-circulation of Hantaan, Kenkeme, and Khabarovsk Hantaviruses in Bolshoy Ussuriysky Island, China. *Virus research*, 191, 51-58.
138. Wilson, J. M., Reimer, J. P., Allaire, D., & Lausen, C. L. (2014). Diversity and distribution of bats in the Northwest Territories. *Northwestern Naturalist*, 95(3), 197-218.
139. Witkowski, P. T., Klempa, B., Ithete, N. L., Auste, B., Mfunne, J. K., Hoveka, J., ... & Kruger, D. H. (2014). Hantaviruses in Africa. *Virus research*.
140. Yanagihara, R., Gu, S. H., Arai, S., Kang, H. J., & Song, J. W. (2014). Hantaviruses: Rediscovery and new beginnings. *Virus research*.
141. Yoshimatsu, K., & Arikawa, J. (2014). Serological diagnosis with recombinant N antigen for hantavirus infection. *Virus research*.
142. Zeballos, H., Palma, E., Marquet, P. A., & González, G. C. (2014). Phylogenetic relationships of *Calomys sorellus* complex (Rodentia: Cricetidae), with the description of two new species. *Revista mexicana de mastozoología (nueva época)*, 4(1), 1-23.
143. Zhang, Y. Z. (2014). Discovery of hantaviruses in bats and insectivores and the evolution of the genus *Hantavirus*. *Virus research*.
144. Zuo, S. Q., Gong, Z. D., Fang, L. Q., Jiang, J. F., Zhang, J. S., Zhao, Q. M., & Cao, W. C. (2014). A new hantavirus from the stripe-backed shrew (*Sorex cylindricauda*) in the People's Republic of China. *Virus research*, 184, 82-86.

Theses/Dissertations

1. Patrick, Lorelei Elizabeth. 2014. Phylogenetic and Morphological Community Structure of North American Desert Bats. Ph.D. dissertation, Louisiana State University.
2. Sawyer, Y. 2014. Living on the edge: A comparative phylogeographic study of refugial and insular fragmentation. Ph.D. dissertation, University of New Mexico.
3. Tapisso, Joaquim Severino Torres. 2014. How historical and present climate conditions affected the distribution of the Mediterranean water shrew?: a phylogeographical and ecological approach. Ph.D. dissertation, Universidade da Lisboa.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/ Plenary talks

Cook, J.A.

1. "Beringia Coevolution Project: Building integrated biodiversity infrastructure for the Arctic" Arctic Biodiversity Congress, Trondheim, Norway, December 2014.
2. "Hantavirus Emergence and Detection: A Case Study" at SciColl's Engaging Scientific Collections in Emerging Infectious Disease Research. Smithsonian Institution, Washington DC, October 2014.
3. "Societal Challenges, Big Data, and Long-term Archives", Ecological Society of America, Implementing Vision and Changes, Workshop on Specimen-Based Educational Modules, San Jose State University, CA, October 2014.
4. "Advancing the Integration of Museums into Undergraduate Education". Symposium on Museum resources in Undergraduate Education at the American Society of Mammalogists 94th Annual

Meeting, Oklahoma City, OK. June 2014.

5. "Building Critical Scientific Infrastructure for Key Societal Issues". University of Florida, Gainesville. May 2014.
6. "Introduction to AIM-UP!". iDigBio Education and Outreach Workshop. University of Florida, Gainesville, January 2014.

B. Contributed Talks/Posters

Bell, K.C.

1. Calhoun, K., K. Bell, J. Cook. 17 October 2014. Parasite and Host Co-evolution: Comparative Phylogenetics of Chipmunks (Rodentia) and Pinworms (Oxyurida). SACNAS, Los Angeles, CA.
2. Calhoun, K., K. Bell, J. Cook. 8 August 2014. Parasite and Host Coevolution: Comparative Phylogenetics of Chipmunks (Rodentia) and Pinworms (Oxyurida). UNM Biomedical Symposium, Albuquerque, NM.
3. Bell, K., J. Demboski, J. Cook. 22 June 2014. Who's your chipmunk? Co-divergence, host-switching, and diversification in a widespread pinworm. Evolution, Raleigh, NC.
4. Heath, T.A., E.A. Lacey, S.M. Ickert-Bond, S.V. Edwards K.C. Bell, & J.A. Cook. November 2014. AIM-UP! Museum-Based Approaches to Increasing Core Competencies in Undergraduate Education. Society for Vertebrate Paleontology, Berlin, Germany.
5. Giermakowski, J.T., A.K. Monfils, S. Ickert-Bond, S.V. Edwards, E.A. Lacey, K.C. Bell, and J. A. Cook. June 2014. Advancing Integration of Museums into Undergraduate Programs. Society for the Preservation of Natural History Collections, Cardiff, Wales.
6. Bell, K. C. 9 June 2014. Engaging Biology Students Through Digital Data. American Society of Mammalogists Annual Meeting, Oklahoma City, OK.

Colella, J

1. Colella, J. Molecular analysis of species limits and hybridization in ermine (*Mustela erminea*) in southeast Alaska. June 2014. American Society of Mammalogists Annual Meeting, Oklahoma City, OK.

Cook, J.A.

1. Gu, S. H., S. Arai, H.J. Kang, J.A. Cook, R. Yanagihara. 2014. Co-circulation of distinct hantavirus lineages in syntopic populations of northern short-tailed shrews (*Blarina brevicauda*) in North America. Molecular Epidemiology and Evolutionary Genetics of Infectious Diseases. Bangkok, Thailand. December.
2. Galbreath, K., E. Hoberg., & J. A. Cook. 2014. Looking back to look forward: what Beringia's past may tell us about its future. Arctic Biodiversity Congress, Trondheim, Norway, December.
3. Hope, A., E. Waltari, J. Malaney, D. Payer, J.A. Cook, and S. Talbot. 2014. Trends in Arctic biodiversity: A multi-disciplinary and inter-agency approach to investigate and predict community changes through time. Arctic Biodiversity Congress, Trondheim, Norway, December.
4. Heath, T. A., E. A. Lacey, S. M. Ickert-Bond, S. V. Edwards K. C. Bell, & J. A. Cook. 2014. AIM-UP! Museum-Based Approaches to Increasing Core Competencies in Undergraduate Education. Society for Vertebrate Paleontology, Berlin, Germany, November.
5. Lessa, E.P., Cook, J.A., D'Elia, G., Opazo, J.C.. 2014. Estudios de la diversidad de roedores sudamericanos: la transición hacia la era genómica. SAREM annual meeting, Esquel, Argentina, November.
6. Campbell, M. L. G. H. Jarrell, S. V. Brant, J. A. Cook, E. P. Hoberg, E. S. Loker. 2014. A Legacy for the Future: The Robert L. and Virginia R. Rausch Helminthological Collection. American Society of Parasitologists Annual Meeting, New Orleans, July.
7. Giermakowski, JT, MJ Ryan, & JA Cook. 2014. Collections as a source of data for education, conservation and monitoring change in a time of extinction: an amphibian example. SPNHC,

England. July.

8. Kang, H.J., Se Hun Gu, Shannon Bennett, Satoru Arai, Liudmila N. Yashina, Jin-Won Song, J. A. Cook, R. Yanagihara. 2014 Discovery of a divergent hantavirus lineage in soricine shrews in Siberia International Union of Microbiological Societies/Congresses Montreal, Canada. July.
9. Bell, K., J. Demboski, Joseph Cook. 2014. Who's your chipmunk? Co-divergence, host-switching, and diversification in a widespread pinworm. Annual Evolution Society Meeting, Durham, NC, July.
10. McLean, B. S. & J. A. Cook. 2014. A History of High Latitude Adaptation in Holarctic Ground Squirrels (*Urocitellus*). Annual Evolution Society Meeting, Durham, NC, July.
11. Arbogast, B. S., K. I. Schumacher, A. Bidlack, J. A. Cook, and G. J. Kenagy, 2014. Multilocus analyses reveal new North American flying squirrel species (*Glaucomys*). Annual Evolution Society Meeting, Durham, NC, July.
12. Hope, A., E. Waltari, J. Malaney, D. Payer, J.A. Cook, and S. L. Talbot. 2014. Small mammal comparative phylogeography in the Arctic. American Society of Mammalogists annual meeting, Oklahoma City, OK, June.
13. Jones, A., J.A. Cook. 2014. Mammals of the Gila. American Society of Mammalogists annual meeting, Oklahoma City, OK, June.
14. Gardner, S., J. Salazar-Bravo, J. A. Cook. 2014. Phylogenetic diversification of *Ctenomys* in South America with focus on Bolivian species. American Society of Mammalogists annual meeting, Oklahoma City, OK, June.

Jones, Amanda K.

1. *Mammals of the Gila* - American Society of Mammalogists Conference, Oklahoma City, June 2014.

McLean, B.

1. McLean, B.S. A history of high-latitude adaptation in Holarctic ground squirrels. *Evolution*, **oral presentation (June 2014)**. <https://www.youtube.com/watch?v=iIsG5SQJkdk>

Rearick, Jolene

1. The Wildlife Society Meeting, Pittsburgh, PA. Oct 25-30, 2014. "Using Genomics to Understand Complex Physiological Adaptations: Amphibian Freeze Tolerance." Jolene Rearick*, Sandra Talbot, Joseph A. Cook, University of New Mexico and USGS Alaska Science Center.

C. Attendance at Professional Meetings

Bell, K.C.

Annual Meeting of the American Society of Mammalogists, Oklahoma City, June
Evolution 2014, Raleigh, NC, June 2014
Tree of Life Hackathon. Ann Arbor Michigan, September.

Cook, JA.

Annual Meeting of the American Society of Mammalogists, Oklahoma City, June
Joint meeting on Education, Ecological Society of America and others, Implementing Vision and Changes, San Jose State University, CA, October.

Arctic Biodiversity Congress, Trondheim, Norway, December.

Colella, J.

Annual Meeting of the American Society of Mammalogists, Oklahoma City, June
Whalefest (Sitka, AK - November)

Workshop: RevBayes (Durham, NC - September)

Dunnum, J.L.

Annual Meeting of the American Society of Mammalogists, Oklahoma City, June

Jackson, D. Evolution 2014, Raleigh, NC, June 2014

Jones, A.

Annual Meeting of the American Society of Mammalogists, Oklahoma City, June

McLean, B.

Annual Meeting of the American Society of Mammalogists, Oklahoma City, June

Evolution 2014, Raleigh, NC, June 2014

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

E. Service as Officer of Professional Society/Organization

Bell, Kayce

Board of Directors (elected student member), American Society of Mammalogists
6/2011- 2014.

Public Education Committee, American Society of Mammalogists. 1/2011 - 6/2014.

Program Committee, American Society of Mammalogists. 1/2013 - present.

Cook, J.A.

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

Board of Directors, National Systematics Collection 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

Colella, J.

1. Molecular analysis of species limits and hybridization in ermine (*Mustela erminea*) in southeast Alaska. University of Alaska SE. Whalefest, Sitka, AK.
2. Island biogeography: A mammalian perspective in southeast Alaska. University of Alaska SE. Whalefest, Sitka, AK.

Cook, J.A.

1. Opportunities for Graduate Education at the Museum of Southwestern Biology, Department of Biology (in Spanish). Presentation during 3 day UNM recruiting trip to Universidad Central,

- Quito, Ecuador. June 2014.
2. “Advancing the Integration of Museums into Undergraduate Education”. Symposium on Museum resources in Undergraduate Education at the American Society of Mammalogists 94th Annual Meeting, Oklahoma City, OK. June 2014.

Workshops

Cook, J.A.

1. “Societal Challenges, Big Data, and Long-term Archives”, Ecological Society of America, Implementing Vision and Changes, Workshop on Specimen-Based Educational Modules, San Jose State University, CA, October 2014.
2. Co-Organizer, AIM-UP! Climate Change and Museums Workshop, 26 Feb.-2 March 2014, Asilomar, CA.
3. Organizer, Next Steps for the Research Coordinating Network, Workshop, 2-5 May 2014, Hale Key, FL.
4. Organizer, Museums and Indigenous Educators, Flagstaff, AZ 15-16 Aug. 2014.
5. Co-Organizer, AIM-UP! Leadership, What’s Next for Museums and Education, Moss Landing, CA, 4-5 October 2014.

Bell, K.

1. Co-Organizer, Advancing the Integration of Museums into Undergraduate Education (AIM-UP!) NSF-funded RCN-UBE: including 3 day workshop at Asilomar in April 2014.

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

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

Cook, J.A.

2011-2014	Member Steering Committee, VertNet
2010-2014	Chair, Steering Committee, AIM-UP! Research Coordinating Network in Undergraduate Biology Education
2011-2015	Chair, MSB Executive Committee
2003-2015	Editorial Board, MSB Publications Series
2012-2015	Chair, Conservation Awards Committee, American Society of Mammalogists
2009-present	Steering Committee, ARCTOS on-line museum database
2014-present	Steering Committee, National Integrated Biocollections Alliance, NSF sponsored RCN
External Tenure and Promotion review for faculty member at Southern Illinois University	
NSF Proposal reviewer—Sept 2014, Systematic Biology	
UnO-Undergraduate Opportunities-Director	

Although funding for UnO ended in 2013, several additional papers were published with partial support from this grant in 2014 bringing the total number of publications to 21 over a 6 year period.

UNM Institutional Representative-- Colorado Plateau-Cooperative Extension Service Unit

Dunnum, J.L.

Systematic Collections Committee, American Society of Mammalogists
Arctos database advisory committee

D. Journal Referee

Bell, K

Journal of Mammalogy (1)
BMC Evolutionary Biology (1)

Cook, J.A.

Conservation Biology (1, 2x)
Trends in Parasitology (1)
Journal of Biogeography (1)
Journal of Mammalogy (1)
USGS External manuscript reviewer (1 ms-Yellow Loon genetics)

Dunnum, J.L.

Mammalia (1)
Southwestern Naturalist (1)
Journal of Zoo and Wildlife Medicine (1)

E. Hosting Professional Colleagues and Groups

We hosted 47 visiting academics and professionals from 17 institutions or departments and they primarily visited collections that I curate for research purposes.

Cook personally hosted the following individuals:

Dr. Eric Hoberg, USDA National Parasite Lab
Nyamsuren Batsaikhan, National University of Mongolia
Altangerel Tsogetsaikhan Dursahinhan, University of Nebraska State Museum

10. SERVICE

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

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. NM Museum of Natural History and Science - Meet The Expert Day
2. Introduction to collecting and the scientific importance of museums. Sitka High School.

Cook, J. A.

1. Divisional tours and presentations – provided educational tours and information for over many visitors and several school groups.

Dunnum, J. L.

1. Divisional tours and presentations – provided educational tours and information for 447 visitors including 47 visiting researchers from 17 institutions, 62 students and 7 teachers from 5 K-12 schools, 14 UNM classes (179 students and 14 instructors), and 138 other visitors.
2. Tour and presentation on NM mammals and mammalian adaptations for Bernalillo County Master Naturalists program.
3. Jefferson Middle School science fair judge
4. Presentation at Sandia Prep High School on MSB and the use and value of natural history research collections.
5. Volunteer coach for Duke City Soccer Organization. 15 girls.

C. University and Departmental Committees**Cook, J.A.**

1. Chair, MSB Executive Committee*
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. College of Arts and Sciences, Deans and Directors Council
6. UNM Museum Council—Chair*

Dunnum, J.L

1. MSB Space Committee

12. DONATIONS AND GIFTS RECEIVED

Robert and Virginia Rausch mammal specimens (2000) + \$5000

Troy Best mammal specimens (1000)

Bruce Hayward endowment (\$250,000)

Jack Whitman (1500 specimens)

New Mexico Museum of Natural History and Science (ca. 3500 mammalian tissue samples)

13. CURRENT STAFF**A. Faculty/Staff**

J.A. Cook, Curator

J.L. Dunnum, Collection Manager

C.A. Ramotnik, USGS Collection Manager (retired)

M.A. Bogan, Emeritus Curator

J.S. Findley, Emeritus Curator

Stephen O. MacDonald, Curator II (retired)

Gordon Jarrell, Cyber Coordinator

Adrienne Ranszewski, Curatorial Assistant

B. Graduate students

Bell, Kayce. 4th year Ph.D. student. Systematics and phylogeography of chipmunk lice.

McLean, Bryan. 3rd year Ph.D. student. Systematics and phylogeography of ground squirrels.

Sawyer, Yadeeh. Received Ph.D. Linkage corridors along the North Pacific Coast.

Rearick, Jolene. 8th year Ph.D. Phylogeography and molecular evolution of freeze tolerance in *Lithobates sylvaticus*.

Jessica Weber. 4th year Ph.D student. Hypoxia tolerance and adaptive responses in Caviomorph rodents.

Grad Student workers

3. Marie Westover
4. Jocie Colella
5. Bryan McLean
6. Dianna Krejsa

C. Undergraduate Student Workers and Volunteers

Undergraduate Workers

1. Lena Bolling
2. Lindsey Frederick
3. Richard Apocada
4. Stephanie Mladinich
5. Ellie Johnson
6. Amber Trujillo
7. Schuyler Liphardt
8. Amber McArdle
9. Kimberly Wong

Undergraduate Volunteers

1. Alexander Hendrickson
2. Amber West
3. Michael Smith
4. Omega Delgado (student volunteer through Master Naturalist Program)
5. Mercedes Metzgar
6. Cheyanne Corona
7. Kendall Lovely

High School Volunteers – 186 hours

1. Irving Flores (Amy Biehl HS)
2. 12 students from Amy Biehl HS that have volunteered three times.

Other Volunteers – 50 hours

1. Teresa Skiba (non-student volunteer through Master Naturalist Program)
2. Adrienne Warner (non-student volunteer through Master Naturalist Program)
3. Mark Bundy (non-student volunteer through Master Naturalist Program)
4. Omega Delgado (student volunteer through Master Naturalist Program)

Total volunteer hours: 412
14. MUSEUM ASSOCIATES

A. Curatorial Associates

James H. Brown, UNM Department of Biology
Jerry W. Dragoo, UNM Department of Biology
William Gannon, UNM Research Ethics
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 Medillin, 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

1. DIVISION HIGHLIGHTS

In 2014, the Natural Heritage New Mexico Division continued to develop conservation biology-related research projects, technological applications, and education and outreach programs with 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 embarked on a collaborative project with the NM Department of Game and Fish (NMDGF) to revise the State Wildlife Action Plan (SWAP) using MSB specimen data in combination with external observation data. 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 additional data and provide quality control on target sensitive species to build tools for dissemination of that information via the web. Lastly, we engaged the UNM Libraries, updating our website and developing a joint project on web hosting and data archiving.

The Ecology Group (Estepan 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) by adding a new module on for the Rio Grande and Pecos Rivers. We also continued our work on the playas module and conducted field-training workshops. 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 delivered the final Middle Rio Grande Conservation Action Plan to the Middle Rio Grande Conservancy District that was the outcome of MSB-sponsored science and managers workshops. We initiated a project with the BLM to evaluate ecological restoration projects in the context of projected climate change scenarios. 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 (Kristine Johnson, lead; Jackie Smith, Senior Zoology Tech) 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 2014, we collaborated with the University of Nevada Reno to use 27 years of NHNM data to model population trends for the Lesser Prairie-chicken. We provided the results to the USFWS for its status review of this threatened grouse species of southeastern New Mexico. In cooperation with Animas Biological Studies, Durango, CO, we completed the second year of a nest-scale habitat modeling study of pinyon-juniper birds of conservation concern at the BLM Farmington, NM Resource Area. We created a monitoring program for Pinyon Jays for NMDGF. We continued work on a three-year habitat analysis 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 model the distribution of the rare Tharps's bluestar (*Amsonia tharpii*). 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

Collection Growth (specimens catalogued)	Loans (outgoing)	Loans (incoming)	Visitors	Information Requests Personally Respond to	Publications Citing MSB Specimens
20,512 new records, 32,431 updated records	NA	NA	14,026 visitors to web site	126 Custom 283,287 Downloads	UNKNOWN (all downloads carry a citation)

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 2014 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 20,512 observations to the database and updated another 32,431.

Through our one-of-a-kind program to database Section 10 and section 6 reports from USFWS, we were able to add over 1,000 new observations to our database on federally listed species. 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). As an outcome of our database activities, we completed 126 formal information requests and provided 283,287 publications and data downloads via our website.

6. AWARDS, GRANTS, AND CONTRACTS

NHNM AWARDS:

\$139,414. NM Military Affairs Dept. Banner #0480B6. Endangered and threatened species surveys. **Paul Arbetan**, PI. 10/12-06/15. \$41,153 (F&A \$6,859).

\$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).

\$296,080. Center for Excellence for Hazardous Materials Management. Banner #0480AJ. Dunes Sagebrush Lizard habitat map and model. **Kristine Johnson**, PI. 07/12-12/14. \$100,020 (F&A \$9,093).

\$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).

\$50,000. BLM. Banner #0480GU. Pinyon-juniper birds 2014. **Kristine Johnson**, PI. 06/14-09/17. \$35,492 (F&A \$5,286).

\$85,000. Dept. of Defense. Banner #0480FG. Grassland/shrubland bird surveys at Holloman AFB 2014-15. **Kristine Johnson**, PI. 04/14-04/16. \$29,165 (F&A \$6,556).

\$55,000. Dept. of Defense. Banner #0480FF. Management and monitoring of Lake Holloman Wetlands Complex Area 2014-15. **Kristine Johnson**, PI. 04/14-04/16. \$61,554 (F&A \$5,186).

\$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).

\$110,000. Dept. of Defense. Banner #0480GZ. Holloman AFB wetlands vegetation assessment. **Kristine Johnson**, PI. 07/14-04/16. \$4,791 (F&A \$1,077).

\$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).

\$11,250. NM Energy, Minerals & Natural Resources Dept. Banner #0480HG. Rare plant rankings 2014. **Rayo McCollough**, PI. 10/14-12/15. \$2,111 (F&A \$352).

\$13,000. U.S. Forest Service. Banner #0480GD. Cibola sensitive species data exchange. **Rayo McCollough**, PI. 5/14-12/15. \$4,598 (F&A \$0).

\$5,000. U.S. Forest Service. Banner #0480GG. NRM data importation. **Rayo McCollough**, PI. 6/14-5/19. \$3,837 (F&A \$349).

\$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).

\$39,822. BOR. Banner #0480C3. Albuquerque overbank project (AOP). **Esteban Muldavin**, PI. 04/13-10/14. \$26,288 (F&A \$3,915).

\$14,080. INTERA Inc. Banner #0480DC. Intera Cliff-Gila reconnaissance vegetation survey. **Esteban Muldavin**, PI. 10/13-06/14. \$14,33 (F&A \$237).

\$20,000. Middle Rio Grande Conservancy District. Banner #0480DL. Middle Rio Grande Conservancy action plan. **Esteban Muldavin**, PI. 10/13-9/14. \$19,611 (F&A \$3,269).

\$35,000. NPS. Banner #04808X. Assess impacts of Las Conchas fire and suppression activities on park vegetation. **Esteban Muldavin**, PI. 03/12-3/15. \$4,568 (F&A \$680).

\$29,200. NPS. Banner #0480CN. Monitoring sensitive vegetation after the Loop Fire. **Esteban Muldavin**, PI. 08/13-04/14. \$16,222 (F&A \$2,416).

\$69,492. NPS. Banner #0480G2. Vegetation map for White Sands National Monument – Phase II. **Esteban Muldavin**, PI. 05/14-11/15. \$16,110 (F&A \$2,399).

\$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).

\$70,000. NPS. Banner #0480H9. Bandelier Nat'l Monument – climate tipping point: managing rapid vegetation change in a natural-cultural wilderness landscape. **Esteban Muldavin**, PI. 09/14-09/16. \$0 (F&A \$0).

\$3,402. NatureServe. Banner #0480BQ. Madrean Archipelago REA. **Esteban Muldavin**, PI. 02/13-09/14. \$2701 (F&A \$912).

\$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).

\$189,690. NM Environment Dept. Banner #04809Z. Rapid assessment of wetlands in the Gila watershed. **Esteban Muldavin**, PI. 06/12-10/15. \$24,220 (F&A \$2,202).

\$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).

\$16,469. U.S. Forest Service. Banner #0480GA. RNA database. **Esteban Muldavin**, PI. 05/14-09/16. \$3,080 (F&A \$280).

\$75,000. U.S. Geological Survey. Banner #0480HE. Regional-scale analysis of vegetation types of the northern Chihuahuan Desert. **Esteban Muldavin**, PI. 10/14-09/15. \$1,432 (F&A \$484).

PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

B. Journal Articles

Munson, S., E. H. Muldavin, J. Belnap, D.C. Peters, D.C. J. Anderson, M. H. Reiser, K. Gallo, A. Melgoza-Castillo, J. E. Herrick, and T. A. Christiansen. 2013. Regional signatures of plant response to drought and elevated temperature across a desert ecosystem. *Ecology* 94: 2030-2041.

C. Web-Based

D. Technical Reports

Johnson, K., L. Wickersham, J. Smith, G. Sadoti, T. Neville, J. Wickersham, and C. Finley. 2014. Habitat use at multiple scales by pinyon-juniper birds on Department of Defense lands III: Landscape, territory/colony, and nest scale. Natural Heritage New Mexico Publication 14-GTR-381. Biology Department, University of New Mexico.

Milford, E., E. Muldavin, and Y. Chauvin. 2014. Santa Fe River riparian vegetation monitoring. Natural Heritage New Mexico Pub. No.14-GTR-383. Natural Heritage New Mexico, University of New Mexico, Albuquerque, NM.

Petersen, N., K. Johnson, and J. Smith. 2014. Pinyon Jay monitoring program for New Mexico. Natural Heritage New Mexico Publication No. GTR-14-382. Biology Department, University of New Mexico.

Sivinski, R., T. Neville, E. Muldavin, and H. Hulse. 2144. Status survey for Tharp's blue-star in the Carlsbad, New Mexico area. Final Report to the Bureau of Land Management. Natural Heritage New Mexico Report – 14-GTR-384.

E. Theses/Dissertations Completed

F. Work In Progress

Muldavin, E., E. Milford, N. Umbreit, and Y. Chauvin. (in review). Long-term outcomes of a natural-processes approach to riparian restoration in a large regulated river: the Rio Grande Albuquerque Overbank Project after 16 years. In review for Restoration Ecology.

Muldavin, E.H., D. Moore, and S. Collins. (in prep.) Extreme environmental conditions and post-fire vegetation response in a Chihuahuan Desert grassland. In-prep for Ecological Applications.

Muldavin, E., Y. Chauvin, T. Neville, and P. Neville. 201x. Vegetation Classification and Map Report, Guadalupe Mountains National Park. Natural Resource Technical Report NPS/CHDN/NRTR–200X/00X, National Park Service, Fort Collins, CO.

Johnson, K., J. Smith, and G. Sadoti. Pinyon Jay nest-scale habitat use in pinyon-juniper woodlands. Manuscript in preparation.

Johnson, K., G. Sadoti, and J. Smith. Declining pinyon tree condition and Pinyon Jay colony movement. Manuscript in revision.

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

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/Plenary Talks and/or Seminars

B. Contributed Talks/Posters

Johnson, K. and J. Smith. Pinyon Jay population status and threats. Talk presented at New Mexico Ornithological Society Annual Meeting. Albuquerque, NM, April 2014.

Johnson, K., L. Wickersham, J. Smith, G. Sadoti, T. Neville, and J. Wickersham. Nest-scale habitat use by pinyon-juniper birds on Department of Defense Lands. Talk presented at American Ornithologists' Union Annual Meeting. Estes Park, CO, September 2014.

Sadoti, G., T. Albright, K. Johnson, M. East, and R. McCollough. Weather, land-use change, and space in multi-season occupancy models: the threatened Lesser Prairie-Chicken in eastern New Mexico, 1985-2011. Poster presented at Ecological Society of America Annual Meeting. Sacramento, CA, August 2014.

Sadoti, G., K. Johnson, T. Albright, M. East, and R. McCollough. 2014. Long-term declines in a Lesser Prairie-chicken population: effects of heterogeneity. Talk presented at Western Section of The Wildlife Society Annual Meeting. Reno, NV, January 2014.

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

- E. Muldavin: Biodiversity without Boundaries, NatureServe Network annual meeting. New Orleans, LA.
E. Muldavin: Ecological Society of America Panel on Vegetation Classification Workshop, 2014 Baltimore MD.

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

E. Service as Officer of Professional Society/Organization

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

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity

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

- E. Milford. New Mexico Rapid Assessment Methodology. EPA tribal workshop, Isleta Pueblo, Nov. 2013.
R. McCollough and M. East. Ranking rare plant species. Rare Plant Technical Council.
E. Milford and E. Muldavin: NM RAM applications, New Mexico Wetlands Roundtable 2013.

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

- E. Muldavin: 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

- K. Johnson: Southwestern Naturalist
E. Muldavin: Journal of Vegetation Science

E. Hosting Professional Colloquia and Groups

Middle Rio Grande Conservation Action Plan Workshop Playa Science Workshop, MSB, University of New Mexico, June 2014.

10. SERVICE

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

- E. Milford New Mexico Rapid Assessment Training Workshop, Santa Fe, NM, June 2014.

B. Public Service

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

12. DONATIONS AND GIFTS RECEIVED

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

C. Undergraduate Student Workers and Volunteers

Amy Adams
Kimberly Allen
Maren Geisler
Natalia Moore
Casey Myers
Brett Reynolds

14. MUSEUM ASSOCIATES

None

DIVISION OF PARASITES

Metric Descriptions

Specimens Accessioned	Loans (outgoing)	Loans (incoming)	Visitors	Information Requests	Publications Citing MSB Specimens
Parasites 700 Hosts 151	2	6	3	15	8

1. DIVISION HIGHLIGHTS

Our division is now up to 20,506 catalogued parasite specimens: Platyhelminthes 8,659, Nematoda 7,451, Acanthocephala 292, Nematomorpha 122, Arthropoda 2,505 and 15,594 catalogued host specimens

Through efforts of Collections Manager for Division of Fishes, Alexandra Snyder, who obtained a FEMA grant, the division obtained ledges for the slide collection shelving

Continuation of NSF and NIH grant work

Expeditions to Kenya (Loker), Argentina (Brant, Gendron)

Snail collections for digenetic trematodes (Brant, Gendron)

Included Division of Parasites webpage

Of the Rausch Helminth Collection (RHC):

2. COURSES USING THE COLLECTIONS

3. COURSES TAUGHT BY MSB PERSONNEL

Eric S. Loker

Spring

Biology 402 – Parasites and Hosts – 2 students

Biology 490 – Biology of Infectious Organisms (split with Bruce Hofkin) – 95 students

Biology 400 – Honors Thesis – 1 student

Biology 502- Parasites and Hosts – 4 students

Biology 490 –Biology of Infectious Organisms (with Bruce Hofkin) – 4 students

Biology 699 – Dissertation - 3 students

Fall

Biology 402 – Parasites and Hosts –1 student

Biology 419 –Biology of Disease Vectors – 39 students
 Biology 502- Parasites and Hosts – 8 students
 Biology 519 – Biology of Disease Vectors – 3 students
 Biology 551 – Research Problems –2 students fall
 Biology 699 – Dissertation - 3 students

Sara V. Brant

Undergraduate

Biology 400 - Senior Honors Thesis - 1 student Spring

Graduate

Biology 551 - Research Problems - 1 student Spring

Graduate Student laboratory teaching:

Laitemitt, M. – Parasitology Lab 20 students - Spring

Devkota, R. - BIOL 201 Cell and Molecular Function - Spring/Fall

Buddenborg, S.

Spring 2014 Biology of Infectious Organisms BIOL 4-- ~100 students

Fall 2014 Invertebrate Biology BIOL 371L ~16 students

4. COLLECTION MANAGEMENT ACTIVITIES

1. Rausch Collection Progress Summary:

		Number Complete:						
	Total Est. Nalgene jars/slide boxes	Data Capture Only	Number of Lots	% Complete	Data Capture and Object Tracking	Number of Lots	% Complete	Total Number Lots Handled
Wet Collection- 2007 Accn	100 jars	31 jars	1395 vials	31%				1395
Wet- New 2012 Accn	50 jars				50 jars	1676 vials	95%	1676
Wet Collection – Total	150 jars	84 jars	3071 vials	56%	50 jars	1676 vials	30%	3071
Slide Collection	400+ slide boxes				304 boxes	19,293 slides	75%	19,293

Rausch Wet Collection:

Data capture and object tracking of 50 large Nalgene jar equivalents= 1676 vials; 95% of 2012 new accession; 30% of entire collection is completed and ready to move to new wet collection space for cataloging. All data for these samples has been archived in the MSB Para Dropbox.

Data capture has been completed on 84 of the 150 Nalgene jar equivalents = over 50% of the collection. Total number of vials handled so far: 3071 out of estimated 5,500.

Rausch Slide Collection:

Slide box data capture, conservation assessment, object tracking completed:
=129 boxes, 9,016 slides

Rausch Records in Arctos Database:

MSB Hosts records entered: 4731 records loaded to Arctos, up to record 30,000 out of original 42,000.

MSB Para records: 2127 parasite records corresponding to above
Additional 4,000 Rausch records transcribed, to host number 34,000.

Rausch Media:

Rausch Host-Parasites card file scanned and loaded to Arctos; initial tagging of specimens to card will start in 2015

Total number of Rausch records tagged to ledger and card file media: 121 tags

2. Continued development of the Arctos Database for hosts and parasites

3. Designed and implemented shelf organization and barcoding for the wet collection room 125 Alcohol collection for Arthropods and Parasites and slide room for Parasites; Continued prepping alcohol and slide specimens across the collection to move to RM 125 and slide room

4. Integrating schistosomes from Schistosome Diversity Project, about 75% catalogued for the helminths.

5. We conducted 10 tours through the division – about 6 were from classes/groups within UNM, the rest were from the Albuquerque area.

6. Other than specimens from paper submissions, local people and projects that generate specimens for the Division include the Schistosome Diversity Project - NSF; Nematomorph Diversity Project - NSF; Beringia Coevolution Project - NSF; the ongoing RHC.

5. AWARDS, GRANTS, AND CONTRACTS

Awarded:

1. 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

2. Cook JA (PI) REU for 2 students from grant NSF-DEB 1057383 Integration and Curation of the Robert and Virginia Rausch Helminthological Collection- A Resource for Science and Society in the MSB Division of Parasitology \$12,000

Ongoing:

1. 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).

2. E. S. Loker (PI) NIH/NCR *COBRE: Center for Evolutionary and Theoretical Immunology*. 9/30/2003 – 5/31/2015 \$1.4M (annual direct cost)

3. E. S. Loker (PI) NIH/NIAID 1R01AI101438-01 Snail-Related Studies of Transmission and Control of Schistosomiasis in Kenya 04/01/2012 – 05/30/2017 \$250,000 (annual direct cost)

4. Cook JA (PI) NSF-DEB 1057383 1/1/11-12/32/14 Integration and Curation of the Robert and Virginia Rausch Helminthological Collection- A Resource for Science and Society in the MSB Division of Parasitology, \$489,490

6. PEER REVIEWED PUBLICATIONS BY MSB PERSONNEL (bolded); * indicates publication with specimens from more than one division

Journal Articles that used or deposited specimens

***Galen SC, Witt, CC.** 2014. Diverse avian malaria and other haemosporidian parasites in Andean house wrens: evidence for regional co-diversification by host switching. *Journal of Avian Biology* 45:1-13. doi: 10.1111/jav.00375

Devkota R, **Brant SV**, Thapa A, **Loker ES.** 2014. Sharing schistosomes: the elephant schistosome *Bivitellobilharzia nairi* also infects the greater one-horned rhinoceros (*Rhinoceros unicornis*) in Chitwan National Park, Nepal. *Journal of Helminthology* 88: 32-40.

Kraus, T.J., **Brant, S.V.**, Adema, C.M. 2014. Characterization of trematode cercariae from *Physa acuta* in the Middle Rio Grande. *Comparative Parasitology* 81: 105-109.

Devkota R, Brant SV, Thapa A, **Loker ES.** 2014. Two avian schistosome cercariae from Nepal, including a *Marcrobilharzia*-like species from *Indoplanorbis exustus*. *Parasitology International* 63: 374-380

Pinto HA, **Brant SV**, de Melo AL. 2014. *Physa marmorata* (Mollusca: Physidae) as a natural intermediate host of *Trichobilharzia* (Trematoda: Schistosomatidae), a potential causative agent of avian cercarial dermatitis in Brazil. *Acta Tropica* 138:38-43

*Ubelaker JE, Bretton S. Griffin, Genevieve M. Konicke, **Duszynski DW** and Harrison RL. 2014. Helminth Parasites from the Kit Fox, *Vulpes macrotis* (Carnivora: Canidae), from New Mexico. *Comparative Parasitology* 81(1):100-104. doi: [10.1654/4657.1](https://doi.org/10.1654/4657.1)

*Ubelaker, JE, Griffin, BS, Mendoza, KM, **Duszynski, DW**, & Harrison, RL. (2014). Distributional records of helminths of the swift fox (*Vulpes velox*) from New Mexico. *The Southwestern Naturalist*, 59(1), 129-132.

*Haukisalmi V, Hardman LM, **Hoberg EP, Henttonen H.** 2014. Phylogenetic relationships and taxonomic revision of *Paranoplocephala* Luhe, 1910 *sensu lato* (Cestoda, Cyclophyllidea, Anoplocephalidae). *ZooTaxa* 3873:4, 371–415 DOI: <http://dx.doi.org/10.11646/zootaxa.3873.4.3>

Journal Articles - other

Adema, CM and **Loker, ES.** 2014. Digenean-gastropod host associations inform on aspects of specific immunity in snails. *Developmental and Comparative Immunology* 48: 275-283.

Mutuku, MW, Dweni, CK, Mwangi, M, Kinuthia, JM, Mwangi, IN, Maina, GM, Agola, LE, Zhang, S-M, Maranga, R, **Loker, ES**, and Mkoji, GM. 2014. Field-derived *Schistosoma mansoni* and *Biomphalaria*

pfeifferi in Kenya: a compatible association characterized by lack of strong local adaptation, and presence of some snails able to persistently produce cercariae for over a year *Parasites & Vectors* 2014, **7**:533 (26 November 2014)

Agola, EL, Mburu, DM, Magoma, GN, Mungai, BN, Kihara, JH, Mwangi, IN, Maina, GM, Kinuthia, JM, Mutuku, MW, **Loker, ES**, Mkoji, GM, Steinauer, ML. 2014. No apparent reduction in schistosome burden or genetic diversity following four years of school-based mass drug administration in Mwea, Central Kenya, a heavy transmission area. *PLoS Negl Trop Dis* 8(10): e3221. doi:10.1371/journal.pntd.0003221

Gardner, SL., Jimenez-Ruiz FA, **Campbell ML. 2013.** *Pritchardia boliviensis* n. gen., n. sp. (Anoplocephalidae: Linstowinae), a Tapeworm from Opossums (Didelphidae) in the Yungas and Lowlands of Bolivia and Atlantic Forest of Paraguay. Occasional Papers, Texas Tech University Museum, No. 319, pp. 1-13. NOTE – THIS PAPER IS 2013, BUT HAD BEEN OVERLOOKED IN 2013 ANNUAL REPORT.

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

Dissertations/Theses Based on MSB Specimens/Data

Tabitha Rossman - Senior Thesis project book for Documentary Photography: University Research Collections in New Mexico “*The Collection*”. Advisor Dr. Jennifer Fry, New Mexico State University. 2014. – this was completed for all divisions except DGR.

Reports Based on MSB Specimens/Data

none

7. ACTIVITIES IN LEARNED SOCIETIES

1. Invited/Plenary Talks and Seminars

Loker, ES. Plenary speaker. Achieving Transmission Control of Schistosomiasis: Is There a Role for Biological Enemies of Snails or Schistosomes? British Society for Parasitology, Cambridge, England, 6-9 April 2014.

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

E. T. Gendron*^, **E. S. Loker**, N. Davis¹, **S. V. Brant**. ORAL: Comparative Phylogeography and Population Genetics of a Globally Distributed Parasite and Host: *Trichobilharzia querquedulae* and *Physa acuta*. Southwestern Association of Parasitologists, Lake Texoma OK 10-12 April 2014

M. L. Campbell*, **G. Jarrell**, **S. V. Brant**, and **E. S. Loker**. ORAL: A Legacy for the Future: The Robert L. and Virginia R. Rausch Helminthological Collection. Southwestern Association of Parasitologists, Lake Texoma OK 10-12 April 2014

K. Keller*^, **E. Gendron^**, N. Davis, **S. V. Brant**. POSTER: Morphological and molecular analysis of ten trematode individuals from New Zealand scaup (*Aythya novaeseelandiae*). Southwestern Association of Parasitologists, Lake Texoma OK 10-12 April 2014

M. L. Campbell, G. Jarrell, R. Barber*^, and K. Chavez^. POSTER: Specimen Object Tracking in the ARCTOS Collections Database. Southwestern Association of Parasitologists, Lake Texoma OK 10-12 April 2014

Brant, SV*, Gendron E^, Davis N, Loker ES. (2014). ORAL: How did we get so many species of *Trichobilharzia*, a globally distributed genus? American Society of Parasitologists, New Orleans Louisiana, 23-27 July 2014.

Campbell ML*, Jarrell GH, Brant SV, Cook JA, Hoberg EP, Loker ES. ORAL: A Legacy for the Future: The Rausch Helminthological Collection. Presented at the annual meeting of the American Society of Parasitologists, New Orleans, LA, July 24-27, 2014.

Gendron, ET*^, Loker ES, Tkach V, Davis N, **Brant SV.** (2014). ORAL: The role of host movements and ecology on the evolution and distribution of *Trichobilharzia* species. American Society of Parasitologists, New Orleans Louisiana, 23-27 July 2014.

Rios S*^, **Brant SV,** Tkach VV. (2014). ORAL: Diversity and distribution of avian schistosomatids in North Dakota. American Society of Parasitologists, New Orleans Louisiana, 23-27 July 2014.

Martina Laidemitt^, Martin W. Mutuku¹, Sarah Buddenborg^, Lijun Li^, Si Ming Zhang, Gerald M. Mkoji¹ and Eric S. Loker*. ORAL: Achieving Transmission Control of Schistosomiasis: Is There a Role for Biological Enemies of Snails or Schistosomes? British Society for Parasitology, Cambridge, England, 6-9 April 2014.

Laidemitt, M. R. *^, Mutuku, M.W. , Dweni, C.K. , Zhang, S.-M. , Mkoji, G.M. and Loker, E.S. ORAL: Interspecific interactions between schistosomes and other trematodes in field-collected snails in Kenya: ecology, immunology, or both? North American Comparative Immunology Workshop, Albuquerque, 31 May – 3 June 2014.

L. Lu*^, S. Zhang, E.T. Gendron^, M. Mutuku, C. Dweni, G.M. Mkoji, E.S. Loker. ORAL: STUDIES OF THE NEMATODE *DAUBAYLIA POTOMACA*, INCLUDING ITS INFECTIVITY TO SCHISTOSOME-TRANSMITTING SNAILS AND EFFECTS ON *SCHISTOSOMA MANSONI* IN *BIOMPHALARIA GLABRATA*. American Society of Parasitologists Meeting, 2014, New Orleans, Louisiana, 24-27 July, 2014.

M.R. Laidemitt*^, M.W. Mutuku, G.M. Mkoji, E.S. Loker. AMPHISTOMES AS NATURAL ENEMIES OF LARVAL SCHISTOSOMES IN KENYA. American Society of Parasitologists Meeting, 2014, New Orleans, Louisiana, 24-27 July, 2014.

Laidemitt, M.R.^, Mutuku, M.W. , Dweni, C.K. , Mkoji, G.M. and Loker, E.S*. ORAL: Surprising interactions between schistosomes and amphistomes in Kenyan *Biomphalaria pfeifferi*: amphistome dependence on and dominance of schistosome infections, with some implications for schistosome control. 13th International Congress of Parasitology, Mexico City, 10-15 August, 2014.

Laidemitt, M.R.^, Mutuku, M.W. , Dweni, C.K., Mkoji, G.M. and Loker, E.S^. Surprising interactions between schistosomes and amphistomes in Kenyan *Biomphalaria pfeifferi*: amphistome dependence on and dominance of schistosome infections, with some implications for schistosome control. American Society for Tropical Medicine and Hygiene, New Orleans, 2-6 November 2014.

Buddenborg S^{*}, Mkoji G, **Loker ES**. "RNA-seq analysis of field-derived *Biomphalaria pfeifferi* naturally infected with *Schistosoma mansoni* from western Kenya" North American Comparative Immunology (NACI) poster presentation

Buddenborg, S.K.^{*}, M. Misra, S. Zhang, G. Mkoji, **E.S. Loker**. RNA-SEQ ANALYSIS OF FIELD-DERIVED *BIOMPHALARIA PFEIFFERI* INFECTED WITH *SCHISTOSOMA MANSONI* FROM WESTERN KENYA. American Society of Parasitologists Meeting, 2014, New Orleans, Louisiana, 24-27 July, 2014.

3. Attendance at Professional Meetings

Loker, E.S.

American Society of Parasitologists, New Orleans, Louisiana, July
North American Comparative Immunology (NACI)
National IDeA Symposium Biomedical Research Excellence (NISBRE) Washington, D.C
American Society for Tropical Medicine and Hygiene, New Orleans, 2-6 Nov 2014.
13th International Congress of Parasitology, Mexico City, 10-15 Aug 2014.
British Society for Parasitology, Cambridge, England, 6-9 April 2014.

Brant, S.V.

Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.
American Society of Parasitologists, New Orleans, Louisiana, July

Gendron, E.T.

Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.
American Society of Parasitologists, New Orleans, Louisiana, July.

Laidemitt, M.R.

American Society of Parasitologists, New Orleans, Louisiana, July
American Society for Tropical Medicine and Hygiene, New Orleans, 2-6 November 2014.

Buddenborg, S.

North American Comparative Immunology (NACI)
National IDeA Symposium Biomedical Research Excellence (NISBRE) Washington, D.C
American Society of Parasitologists, New Orleans, Louisiana, July

Lu, L.

American Society of Parasitologists Meeting, New Orleans, Louisiana, July

Campbell, ML

American Society of Parasitologists, New Orleans, Louisiana, July
Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

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

Loker, E.S. Journal of Helminthology

5. Service as Officer of Professional Society/Organization

Loker, E.S.

As immediate past president, member of Council, American Society for Parasitologists

Brant, S.V.

President for the Southwestern Association of Parasitologists

Member of the Membership Committee for American Society of Parasitologists

8. OTHER PROFESSIONAL ACTIVITIES

1. Presentation to General Audience in a Scholarly Capacity

Brant, S.V.; Gendron, E.T.; Hanelt B.

Parasites in New Mexico Presentation to the Bosque Club afterschool program for Coronado Elementary School, Albuquerque, New Mexico. November.

Gendron, E.T. November 2014 - Preparation of educational modules for the transmission and treatment of human helminth disease in the Peruvian Amazon – she created educational podcasts and did 'on-site' education

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

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

Loker, E.S.

Member, advisory review panel for Senegal aquaculture project, gates foundation, Senegal, 26-30 March 2014

Member, schistosomiasis consortium for operational research and evaluation (score), funded by Bill and Melinda Gates foundation, meeting, MAY, Athens, GA.

Reviewer for World Health Organization document “guidelines for laboratory and field testing efficacy of molluscicides for schistosomiasis control”

Internal advisory committee, north campus BRAIN COBRE program

Informal advisor, Dr. Vojo Deretic, COBRE application organization

Pibbs advisory board and retreat, 3 October 2014

Service on NIH study section for review of INBRE programs as part of the NIH IDEA program, November, 2014

Brant, S.V.

2011 - present: Scientific voting member of UNM IACUC committee

UNM Dept. of Biology: Research Day Undergraduate Poster Judge

4. Journal Referee

About 18 papers for about 8 different journals

Public Service

- Jefferson Middle School Honors Science Classes, November
- Bosque Club, Coronado Elementary After School Program, November

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

Gendron, E. T. American Society of Parasitologists Marc Dresden Travel Award \$500

10. DONATIONS AND GIFTS RECEIVED

- Received the library collection of Dr. and Mrs. Rausch, from Mrs. Rausch
- Received the Leitz research scope of Dr. and Mrs. Rausch, from Mrs. Rausch
- Helminth slides and field ledger of Larry Schultz, via Dr. Eric Hoberg USNPC
- Arctic seabird helminth ethanol collection of Dr. Doug Causey, University of Alaska-Anchorage

11. 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
Mariel Campbell, Program Specialist Arctos for Division of Parasites Jan-Aug 2014

Graduate students

Ms. Erika T. Gendron (GA for Division of Parasites)
Mr. Ramesh Devkota
Ms. Martina Laidemitt
Ms. Sarah Buddenborg
Ms. Lujin Lu

Undergraduate Student Workers and Volunteers

Rausch REU students in collection in 2014-2015

Ryan Lee Barber (Rausch and CIIBA collections, field work, meeting presentations)
Kelly Chavez (Rausch slide and wet collections)
Elias Alejandro Salazar (Rausch slide and wet collections)
Kristin Meyer (cataloged BCP *Arostrilepis* to MSB Para)
Alexander Hendrickson (Rausch mammals, slides)
Niccolette Ochoa (Rausch wet collection)
Brooke Thurston (Rausch wet collection)
Lizon Cenac (Rausch skins, linking skins to MSB Host and Para records in database)
Laurel Cenac (Rausch skins, linking skins to MSB Host and Para records in database)

High School RAHSS Students:

Hannah C. Qualls (field work, lab parasite prep in MSB Para)

Volunteers:

James Will Brunt (field work, Sevilleta curation)

Meghan Bentz (Sevilleta curation)

12. MUSEUM ASSOCIATES**Curatorial Associates****Research Associates**