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2015 Annual Report

Joseph A. Cook

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Museum of Southwestern Biology 2015 Annual Report



Joseph A. Cook, Director
9 June 2016

The University of New Mexico's Museum of Southwestern Biology

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

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

	2011	2012	2013	2014	2015	5-YEAR AVERAGE
1. Collection growth (Specimens Cataloged)	64,598	25,446	34,772	103,947	129,245	71,602
2. Loans Out	185	99	145	241	176	169
3. Professional Visitors to the Collections	504	307	344	248	945	470
4. Collection Database Web Site Hits	160,880	396,362	**	233,079	585,913	275,247
6. Outside Publications Citing MSB Specimens	134	76	167	147	189	143
7. Peer-Reviewed Publications by Staff	52	77	54	104	80	73
8. Graduate Students	42	42	42	41	27	39
9. Graduate Theses/Dissertations Completed	3*	9	7	11	11	7
10. Undergraduate Students	75	76	66	63	57	67
11. Grants/Contracts in Force	78	76	61	61	82	75
12. Grants In Force Total Costs	\$10,132,206	\$8,850,955	\$8,388,469	\$8,489,493	\$2,662,014	\$7,644,627
13. Estimated F&A return	398,059	\$528,950	\$410,871	\$436,680	379,129	\$ 430,738

* 1 UNM, 2 outside, NR – not reported

MSB has a long history of leading UNM in training students. Many of our students fill jobs with natural resource agencies, the private sector, or in academia in the state and elsewhere. We also lead in mentoring international students, especially those from Latin America, with many returning to leadership positions in their respective countries. MSB-affiliated undergraduate and graduate students have taken leadership positions in biology in the US. Many graduate students work in collections-related activities during their graduate tenure at UNM. Our unit regularly leads the Biology Department in the number of students receiving doctorate or master's degrees.

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

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

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

DIVISION OF AMPHIBIANS AND REPTILES

1. DIVISION HIGHLIGHTS

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

2. TABLE OF COLLECTION USE

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

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

²Direct Website access represents access to our Division's webpages.

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

3. COURSES USING THE COLLECTIONS

BIOL 204, Animal Form and Function, spring and fall semesters, 338 students

BIOL 386, General Vertebrate Zoology, spring and fall semesters, 93 students

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty/Collection Managers

Poe, S.

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

BIOL 699 Dissertation
 BIOL 488L Herpetology

Fall BIOL 499 Undergraduate Problems
 BIOL 551 Research Problems
 BIOL 599 Master's Thesis
 BIOL 699 Dissertation

Snell, H.L.

<i>BIOL course number</i>	<i>Title</i>	<i>Number of Students</i>
386L	General Vertebrate Zoology	23
386L	General Vertebrate Zoology	25
402	T: Conservation Biology	11
402	T: Herpetology Collection Res	5
499	Undergraduate Problems	1
502	T: Herpetology Collection Res	1
379	Conservation Biology	40
402	T: Conservation Biology Sem	15
402	T: Herpetology Collections Res	5
502	T: Herpetology Collections Res	1

5. COLLECTION MANAGEMENT

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

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

Every year scientists and members of the general public continue to request information on specimens or general aspects of herpetology from our division via telephone, email and directly in person. In 2015, we handled over 170 of these requests and hosted several research visitors in the collection Our outreach activities, in addition to

general tours of the collection, included a variety of presentations or consultations. We presented on amphibians and reptiles at Valle de Oro National Wildlife Refuge as well as to the City of Albuquerque and Bernalillo County Open Space Division program. In addition, we were involved in judging scientific posters both at UNM and Albuquerque Public Schools, and coordinated or gave invited lectures at UNM.

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

6. AWARDS, GRANTS, AND CONTRACTS

\$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.

\$50,000. Identification and evaluation of threats of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico **Mason J Ryan, Howard L. Snell** and **J.T. Giermakowski**. New Mexico Department of Game and Fish. Mar 2015-Dec 2015.

\$15,960. Status of the Barking Frog (*Craugastor augusti*) in New Mexico. **Mason J Ryan, Ian M Latella, Howard L. Snell** and **J.T. Giermakowski**. New Mexico Department of Game and Fish. Mar 2015-Dec 2015.

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

7. PUBLICATIONS

B. Journal Articles

Agha, M., M. O. Murphey, J. E. Lovich, J. R. Ennen, C. R. Oldham, K. Meyer, C. Bjurlin, M. Austin, S. Madrak, **C. Loughran**, L. Tennant, and S. J. Price. 2015. The effect of research activities and winter precipitation on defensive voiding behavior of Agassiz's desert tortoises (*Gopherus agassizii*). *Wildlife Research* 41:641-649.

Arias, E, G Chaves, A García-Rodríguez & **MJ Ryan**. 2015. Notes on predation of *Rhaebo haematiticus* (Anura: Bufonidae) by *Leptodeira septentrionalis* (Serpentes: Dipsadidae) in the Caribbean slope of Costa Rica. *Mesoamerican Herpetology*, 2:563-566.

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* 46:23-25.

Köhler JJ, S Poe, **MJ Ryan** & G Köhler. 2015. *Anolis marsupialis* Taylor 1956, a valid species from southern Pacific Costa Rica (Reptilia, Squamata, Dactyloidae). *Zootaxa* 3915:111-122.

Latella, I.M. and **H.L. Snell**. 2015. Geographic Distribution: *Crotalus viridis* (Prairie Rattlesnake). *Herpetological Review*. 46 (1): 62.

- Loughran, C. L.,** D. D. Beck, and R. E. Weaver. 2015. Use of communal shedding sites by the Northern Pacific rattlesnake (*Crotalus oreganus oreganus*) in central Washington State. *Northwestern Naturalist* 96:156-160.
- Lovich, J. E., J. R. Ennen, C. B. Yackulic, K. Meyer-Wilkins, M. Agha, **C. Loughran,** C. Bjurlin, M. Austin, and S. Madrak. 2015. Not putting all their eggs in one basket: bet-hedging despite extraordinary annual reproductive output of desert tortoises. *Biological Journal of the Linnean Society* 115:399-410
- Poe, S, IM Latella,** F Ayala-Varela, C Yañez-Miranda, O Torres-Carvajal. 2015. 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* 103:639–650.
- Poe, S, S Scarpetta, EW Schaad.** 2015. A new species of *Anolis* (Squamata: Iguanidae) from Panama. *Amphibian and Reptile Conservation* 9 (general section):1-13.
- Ryan MJ, IM Latella, JT Giermakowski, H Snell, S Poe,** RE Pangle, N Gehres, WT Pockman & NG McDowell. 2015. Too dry for lizards: short-term rainfall influence on lizard microhabitat use in an experimental rainfall manipulation within a piñon-juniper woodland. *Functional Ecology*, doi: 10.1111/1365-2435.12595.
- Ryan MJ, IM Latella,** A García-Rodríguez & C Gilman. 2015. Notes on the breeding habits of seven snake species in southwest Costa Rica. *Herpetological Notes*, 8:669-671.
- Ryan MJ,** NJ Scott, JA Cook, B Willink, G Chaves, F Bolaños, A García-Rodríguez, IM Latella & SE Koerner. 2015. Too wet for frogs: changes in a tropical leaf litter frog community coincide with La Niña. *Ecosphere*, 6(1):4.
- Scarpetta, S, LN Gray,** A Nieto-Montes de Oca, MR Castañeda, A Herrel, JB Losos, R Luna-Reyes, NJ Lang, **S Poe.** 2015. Morphology and ecology of the Mexican cave anole *Anolis alvarezdeltoroi*. *Mesoamerican Herpetology* 2:261-270.

D. Technical Reports

- Ryan MJ, IM Latella, TJ Giermakowski & H Snell.** Patterns of occupancy and distribution of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico. New Mexico Department of Game & Fish, Final Report, 58 pp.
- Ryan, MJ.** Arizona Toad (*Anaxyrus microscaphus*) comments to U.S. Fish & Wildlife Service. Endangered and Threatened Wildlife and Plants; 90-Day Findings Petitions, 31 August 2016.
- Ryan MJ, IM Latella, TJ Giermakowski & H Snell.** Patterns of occupancy and distribution of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico. New Mexico Department of Game & Fish, Interim Report, 17 pp.
- IM Latella, MJ Ryan, TJ Giermakowski & H Snell.** Distribution and status of *Craugastor augusti* in New Mexico. New Mexico Department of Game & Fish, Final Report. 38 pp.
- IM Latella, MJ Ryan, TJ Giermakowski & H Snell.** Distribution and status of *Craugastor augusti* in New Mexico. New Mexico Department of Game & Fish, Interim Report. 8 pp.

Abarca, JG & **MJ Ryan**. In search of missing frogs in Costa Rica: rediscovery of critically endangered species in a time of extinction. The Rufford Foundation. Final Report. 9 pp.

E. Theses/Dissertations Completed

Ryan, M.J. 2015. Too wet for frogs, too dry for lizards: role of changing precipitation on tropical frogs and arid lizards.

F. Work In Progress

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

Ryan, MJ, G Chaves, C Barrio-Amorós, F Bolaños, IM Latella, S Poe, R Lovich, K Lovich. A herpetofaunal checklist of the Paso de la Danta Biological Corridor of south-central Pacific coast of Costa Rica. Target: Checklist

Ryan, MJ, H Snell, IM Latella, TJ Giermakowski. The amphibians and reptiles of the Sevilleta National Wildlife Refuge and Long-term Ecological Research Station. Target: Checklist

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

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

Poe S, A Nieto-Montes de Oca, K de Queiroz, J Velasco, B Truett, LN Grey, MJ Ryan, G Köhler, F Ayala-Varela & IM Latella. A phylogenetic, biogeographic, and taxonomic study of all extant species of *Anolis* (Squamata; Iguanidae). Systematic Biology.

Chaves G, **MJ Ryan**, F Bolaños, M Cruz, G Köhler & **S Poe**. Two new species of semiaquatic *Anolis (Norops* clade) from Costa Rica. Zootaxa.

G. Publications/Reports Based on MSB Specimens/Data

Alroy, J. 2015. Current extinction rates of reptiles and amphibians. Proceedings of the National Academy of Sciences 112:13003-13008.

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 46:23-25.

Barker, B. S., J. A. Rodriguez-Robles, and J. A. Cook. 2015. Climate as a driver of tropical insular diversity: comparative phylogeography of two ecologically distinctive frogs in Puerto Rico. Ecography 38:769-781.

Burbrink, F. T., and E. A. Myers. 2015. Both traits and phylogenetic history influence community structure in snakes over steep environmental gradients. Ecography 38:1036-1048.

Campbell-Staton, S. C. 2015. Phylogeographic History and Temperature-Mediated Evolution of the Green Anole, *Anolis carolinensis*. Harvard University, Cambridge, MA, USA.

Dittmer, D. E., J. B. Johnson, and T. J. Hibbitts. 2015. Sexual Dimorphism and Patch Size Variation in Three Lizard Species Suggests Potential for Sexual Confusion. Copeia 103:310-321.

Latella, I.M. and **H.L. Snell.** 2015. Geographic Distribution: *Crotalus viridis* (Prairie Rattlesnake). Herpetological Review. 46 (1): 62.

- Latella, I.M., MJ Ryan, JT Giermakowski & H Snell.** Distribution and status of *Craugastor augusti* in New Mexico. New Mexico Department of Game & Fish, Final Report. 38 pp.
- Micheletti, S. J., and A. Storfer. 2015. A test of the central-marginal hypothesis using population genetics and ecological niche modelling in an endemic salamander (*Ambystoma barbouri*). *Molecular Ecology* 24:967-979.
- Poe, S, IM Latella,** F Ayala-Varela, C Yañez-Miranda, O Torres-Carvajal. 2015. 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* 103:639–650.
- Poe, S, S Scarpetta, EW Schaad.** 2015. A new species of *Anolis* (Squamata: Iguanidae) from Panama. *Amphibian and Reptile Conservation* 9 (general section):1-13.
- Reyes Puig, C. D. P. 2015. Un método integrativo para evaluar el estado de conservación de las especies y su aplicación a los reptiles del Ecuador. Pontificia Universidad Católica del Ecuador, Quito, Ecuador.
- Ryan MJ, IM Latella, JT Giermakowski & HL Snell.** Patterns of occupancy and distribution of the Arizona Toad (*Anaxyrus microscaphus*) in New Mexico. New Mexico Department of Game & Fish, Final Report, 58 pp.
- Schild, D. R., D. C. Card, R. H. Adams, T. Jezkova, J. Reyes-Velasco, F. N. Proctor, C. L. Spencer, H. W. Herrmann, S. P. Mackessy, and T. A. Castoe. 2015. Incipient speciation with biased gene flow between two lineages of the Western Diamondback Rattlesnake (*Crotalus atrox*). *Molecular Phylogenetics and Evolution* 83:213-223.
- Stratman, T. S. M. 2015. Finding the Needle and the Haystack: New Insights into Locating Bog Turtles (*Glyptemys mühlenbergii*) and their Habitat in the Southeastern United States. Clemson University, Clemson, NC, USA.
- Wright, A. N., M. W. Schwartz, R. J. Hijmans, and H. Bradley Shaffer. 2015. Advances in climate models from CMIP3 to CMIP5 do not change predictions of future habitat suitability for California reptiles and amphibians. *Climatic Change* 134:579-591.

8. ACTIVITIES IN LEARNED SOCIETIES

B. Contributed Talks/Posters (*presenter)

- Giermakowski, J.T.*** EM Nowak, MJ Johnson, JA Holmes, JR Hatten. Future landscape suitability and actionable management for several species of reptiles in Arizona and New Mexico. Arizona/New Mexico chapters of The Wildlife Society, Las Cruces, NM. February.
- Loughran, C.L.***, D. D. Beck, M. Linn, D. Lewis and R. E. Weaver. Innate recognition of chemical cues by neonate Northern Pacific Rattlesnakes (*Crotalus oreganus oreganus*). Joint Meeting of Ichthyologists & Herpetologists, Reno, NV. July 15-19, 2015.
- Ryan MJ*, IM Latella & JT Giermakowski.** The decline of another southwestern anuran species? Recent population trends of the Arizona Toad in west-central New Mexico. Joint Annual Meeting of the AZ and NM Chapters of The Wildlife Society, Las Cruces, NM.
- Ryan MJ*.** A novel amphibian fungal skin parasite in New Mexico: a new concern and monitoring recommendations. Chiricahua Leopard Frog Annual Meeting, NM.

C. Attendance at Professional Meetings

- J.T. Giermakowski**
Arizona/New Mexico chapters of The Wildlife Society, Las Cruces, NM. February.

13th Biennial Conference of Science & Management on the Colorado Plateau & Southwest Region, Flagstaff, AZ. October.

C.L. Loughran

Joint Meeting of Ichthyologists & Herpetologists, Reno, NV, July.

M.J. Ryan

Arizona/New Mexico chapters of The Wildlife Society, Las Cruces, NM. February.

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

S. Poe. Associate Editor. Phyllomedusa.

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

E. Service as Officer of Professional Society/Organization

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

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

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity

J.T. Giermakowski

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.

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

H.L. Snell.

Member of IUCN SSC Iguana Specialist Group 2013-2016.

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

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

J.T. Giermakowski.

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

Member of Collections Committee for the American Society of Ichthyologists and Herpetologists.

Member of New Mexico Department of Game & Fish Species Recovery Board.

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

D. Journal Referee

S. Poe. Phyllomedusa (Associate Editor)

M.J. Ryan. Biotropica, Herpetological Review (5), Herpetological Conservation and Biology (2), Integrative Zoology, Journal of Herpetology, Journal of Natural History, Zoology, United States Geological Service Publication

10. SERVICE

B. Public Service

J.T. Giermakowski

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

M.J. Ryan

Conservation

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

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

Educational & Science Outreach

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

H.L. Snell

Work with Whitfield Wildlife Conservation Area, Belen, NM

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

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

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

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

C.L. Loughran

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

Graduate Resource Allocation Committee, University of New Mexico Biology Department. 2015.

"Validation of Quantitative Magnetic Resonance (QMR) imaging to measure body condition in reptiles" \$400

Sevilleta Graduate Student Summer Fellowship, Sevilleta National Wildlife Refuge. 2015. "How do seasonal shifts in resource quality and abundance affect capital energy stores for arid-adapted reptiles in the Chihuahuan Desert?" \$4000

12. DONATIONS AND GIFTS RECEIVED

Donation of 2015 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)
Loughran, C.L. Graduate Assistant (Fall)

B. Graduate students

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

C. Undergraduate Student Workers and Volunteers

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

14. MUSEUM ASSOCIATES

A. Curatorial Associates

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

B. Research Associates

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

DIVISION OF ARTHROPODS

DIVISION HIGHLIGHTS COLLECTION USE

COURSES USING THE COLLECTIONS

TERM	COURSE TITLE	STUDENTS
Spring & Fall	BIOL 203L Evol/Ecol lab	24
Spring	BIOL 419 Discovering Arthropods	16
Spring	BIOL 406 Discovering Arthropods Lab	16
Summer	BIOL 203L Evol/Ecol Lab	36

COURSES TAUGHT BY MSB PERSONNEL

INSTRUCTOR	TERM	COURSE	TITLE	STUDENTS
Kelly Miller	Spring	Biol 419	Discovering Arthropods	16
Rachael Mallis	Spring	Biol 406	Discovering Arthropods Lab	16
Rachael Mallis	Summer	Biol 203L	Evolution/Ecology Lab	36

COLLECTION MANAGEMENT ACTIVITIES

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

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

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

7,500 specimens from the National Park Service White Sands arthropod inventory project were entered into the Arthropod dry collection database, and 9,169 bee specimens from PhD Candidate Karen Wright were entered into the dry collection database.

A large collection (approximately 10,000) of tropical scarab beetles were donated to the Division of Arthropods collection by the family of the late Mark Rowland. Miller, Lightfoot, Mallis and Gustafson transferred that donated collection to the MSB.

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

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

AWARDS, GRANTS, AND CONTRACTS

NSF Emerging Frontiers Grant #EF-1207371, (N. Cobb, PI: **K.B. Miller**, Co-PI). Digitization TCN: Collaborative Research: Southwest Collections of Arthropods Network (SCAN): A Model for Collections Digitization to Promote Taxonomic and Ecological Research (\$366,333), 2012-2015.

PEER REVIEWED PUBLICATIONS BY MSB STAFF

Journal Articles

Gustafson, G.T. and **K.B. Miller**. 2015. The New World whirligig beetles of the genus *Dineutus* Macleay, 1825 (Coleoptera, Gyrinidae, Gyrininae, Dineutini). *ZooKeys*, 476: 1-135.

Homziak, N., Hopkins, H., and K.B. Miller. 2015. Revision of the genus *Heteranassa* Smith, 1899 (Lepidoptera, Erebidae, Omopterini). *ZooKeys*, 527: 31-49.

Leister, M. and **K. Miller**. 2015. Description of a new tracheline spider, *Trachelas mombachensis* sp. n., in the *T. bispinosus* species group from the Mombacho Volcano in Nicaragua (Araneae: Trachelidae). *Zootaxa*, 3936(4): 141-146.

Lightfoot, D.C. 2015. Planing and implementing landscape-scale arthropod inventory and monitoring projects. Pages 60-77. In: Huenneke, L.F., van Riper, C., and K.A.Hayes-Gilpin, editors. 2015. The Colorado Plateau VI. Science and management at the landscape scale. The University of Arizona Press, Tucson, AZ.

McElrath, T.C., Robertson, J.A., Thomas, M.C., Osborne, J., **Miller, K.B.**, McHugh, J.V., and M.F. Whiting. 2015. A molecular phylogenetic study of Cucujidae s.l. (Coleoptera: Cucujoidea). *Systematic Entomology*, DOI: 10.1111/syen.12133: 1-14.

Meyer III, W.M., J.A. Eble, K. Franklin, R.B. McManus, **S.L. Brantley**, J. Henkel, P.E. Marek, W.E. Hall, C.A. Olson, R McInroy, E.M. Bernal Loaiza, R.C. Brusca, and W. Moore. 2015. Ground-dwelling arthropod communities of a sky island mountain range in southeastern Arizona, USA: obtaining a baseline for assessing the effects of climate change. *PLoSOne* 10(9): e0135210, doi 10.1371/journal.pone.0135210.

Miller, K.B. and A.E.Z. Short. 2015. *Belladessus* Miller and Short (Coleoptera: Dytiscidae: Hydroporinae: Bidessini), New Genus for Two New Species from Northern South America: Parthenogenetic Diving Beetles? *The Coleopterists Bulletin*. 69(3): 498-503.

Miller, K.B. and Q.D. Wheeler. 2015. *Zimpherus nancae* Miller and Wheeler (Coleoptera: Dytiscidae: Hydroporinae: Bidessini), New Genus and New Species from Venezuela. The Coleopterists Bulletin. 69(3): 507-511.

Robertson, J.A., Slipinski, A., Moulton, M., Shockley, F.W., Giorgi, A., **Lord, N.P.**, McKenna, D.D., Tomaszewska, W., Forrester, J., **Miller, K.B.**, Whiting, M.F., and J.V. McHugh. 2015. Phylogeny and classification of Cucujoidea and the recognition of a new superfamily Coccinelloidea (Coleoptera: Cucujiformia). *Systematic Entomology*, DOI: 10.1111/syen.12138 1-34.

Wright, K.W., K.L. Vanderbilt, D.W. Inouye, C.D. Bertelsen, T.M. Crimmins. 2015. Turnover and reliability of flower communities in extreme environments: Insights from long-term data sets. *Journal of Arid Environments*. 115: 27-34.

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

Johnson, P.J. 2015. A new species of *Drapetes* Megerle (Coleoptera: Elateridae) with taxonomic summaries and a key to the species of northern North America. *Insecta Mundi* No. 0445: 1-13. Paratype in MSB, catalog no. 32881.

Dissertations/Theses Based on MSB Specimens/Data

Medrano, M. F. 2015. A morphological phylogenetic analysis and taxonomic revision of the millipede family Atopetholidae (Chamberlin)(Diplopoda: Spirobolida) with descriptions of new species and the conservation status of *Comanchelus chihuanus* (Chamberlin 1947)(Diplopoda: Spirobolida: Atopetholidae), a species of concern. The University of New Mexico. Doctoral Dissertation.

Reports Based on MSB Specimens/Data

ACTIVITIES IN LEARNED SOCIETIES

Invited/Plenary Talks and Seminars

Brantley, S.L.

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

Wright, K.W.

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

Contributed Talks and Posters

Alfaro, R.E.

Courtship in *Tengella perfuga* Dahl: Strumming, stroking stilting. Oral presentation. American Arachnological Society, June.

Brantley, S.L.

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

Near yet far: four families of spiders in adjacent conifer forest sites in northern New Mexico. Oral presentation. American Arachnology Society, June.

Richins, A., D.C. Lightfoot and S. Newsome

Examining grasshopper herbivory and foraging strategies in a diverse grasshopper community from central New Mexico. Poster presentation, Entomological Society of America, November.

Wright, K.W.

Phylogeny of *Melissodes* (Hymenoptera: Apidae). Oral presentation. Entomological Society of America, November.

Attendance at Professional Meetings

Alfaro, R.E.

American Arachnological Society Annual Meeting, Mitchell, South Dakota, June.

Brantley, S.L.

American Arachnological Society Annual Meeting, Mitchell, South Dakota, June.

Richins, A.

Entomological Society of America Annual Meeting, Minneapolis, Minnesota, November.

Wright, K.W.

Entomological Society of America Annual Meeting, Minneapolis, Minnesota, November.

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

Service as Editor or on Editorial Board of a Journal

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

Service as Officer of Professional Society/Organization

OTHER PROFESSIONAL ACTIVITIES

Presentation to General Audience in a Scholarly Capacity

Brantley, S.L.

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

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

Lightfoot, D.C.

Television interview and story on insect response to a summer with considerable rainfall in New Mexico, KOB Channel 4 news, Albuquerque, August.

Wright, K.W.

Native Bees of New Mexico. Invited guest lecturer. Native Plant Society of New Mexico, Santa Fe Chapter. April.

PUBLIC SERVICE

Alfaro, R.E.

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

Brantley, S.L.

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

Lightfoot, D.C.

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

Wright, K.W.

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

ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.

Alfaro, R.E.

Alvin R. and Caroline G. Grove Summer Research Scholarship (\$2000), April

DONATIONS AND GIFTS RECEIVED

Henry Hesperheide, 9 buprestid beetles, including 6 *Brachys* from the southwestern US.
Mark Ward, 63 pyralid and crambid moths from the Valles Caldera National Park.
Karen Wright, 150 chrysomelid beetles from her bee traps, 9150 bee specimens.
Mark Rowland, approximately 10,000 scarab beetles.
Paul Opler, 448 butterflies of New Mexico.

Robert Parmenter, 160 moths from Valles Caldera Preserve.
Eric Metzler, 2 complete Malaise traps for capturing flying insects.

CURRENT STAFF

Faculty and Staff

Miller, K.B., Curator, Associate Professor
Brantley, S.L., Senior Collection Manager, Research Associate Professor
Lightfoot, D.C., Senior Collection Manager, Research Associate Professor

Graduate students

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

Undergraduate Student Workers and Volunteers

Katie Klonis
Allyson Richins

MUSEUM ASSOCIATES

Research Associates

Ana Davidson,
Eric Metzler, Ohio State University, retired
Robert Parmenter, Valles Caldera National Park
Ernie Valdez, USGS
Mark Ward, entomologist, Valles Caldera National Park

DIVISION OF BIRDS

Highlights & Major events in 2015

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

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

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

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

Peru expeditions commenced in January with Jonathan Schmitt, Libby Beckman and Matt Baumann heading to two high-altitude sites in the Central Andes. Witt, Johnson, and Blair Wolf joined Jonathan at a high elevation site to study the community of six hummingbird species. We were accompanied by a team of videographers who were filming a special on hummingbirds for the PBS series *Nature*. Ashley Smiley and Andrea Chavez joined Johnson after this Lima expedition and headed south to Lake Titicaca to sample high elevation species there. Johnson left after this leg of the expedition to be with Bob Dickerman after he had a stroke. Chavez and Smiley stayed and sampled birds of Arequipa with Peruvian collaborator Mauricio Ugarte-Lewis. Field work in Peru continued in July with Jonathan Schmitt, Chauncey Gadek and Matt Segura sampling low elevation sites along the coast of southern Peru to complement the high elevation sampling of Smiley, Chavez and Johnson in March/April.

New Mexico field work consisted of continuing to sample breeding populations of Yellow-rumped warblers and other species in the Manzano and Sangre de Cristo Mountains, winter birds of the southern Sangre de Cristos, an attempt at collecting nesting Yellow Warblers in the Rio Grande valley, and continued collecting in San Juan County by Greg Schmitt, including unprecedented series from the New Mexico portion of the Navajo Nation. Major curation progress was made by **publishing over 8100 specimen records from Peru onto our open-access database Arctos**. Local cataloging slowed because of a short-term switch back to cataloging directly into Arctos, which had the undesired effect of slowing data entry to glacial speeds. By the end of the year, we switched back to our system of entering data onto spreadsheets before proofing and bulk-loading to Arctos.

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



MSB students and staff surround Bob Dickerman to review the Australia accession, January, 2015.

By the Numbers: MSB's metrics of productivity for the Bird Division, 2015:

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

RESEARCH IMPACTS OF THE MSB BIRD DIVISION

Publications by personnel affiliated with the MSB Bird Division. (13 total)

These publications have MSB as part of the authors' affiliations. They include theses & dissertations.

- Baumann, Matthew J; Beckman, Elizabeth J; Bautista, Emil; Witt, Christopher C. 2015. Long-distance dispersal of a sedentary Andean flycatcher species with a small geographic range, *Ochthoeca piurae* (Aves: Tyrannidae). *Check List* 11(6) 1795
- Beckman, Elizabeth J; Witt, Christopher C. 2015. Phylogeny and biogeography of the New World siskins and goldfinches: Rapid, recent diversification in the Central Andes. *Molecular Phylogenetics and Evolution* 87:28-45
- Benham, Phred M; Cuervo, Andrés M; McGuire, Jimmy A; Witt, Christopher C. 2015. Biogeography of the Andean metaltail hummingbirds: contrasting evolutionary histories of tree line and habitat-generalist clades. *Journal of Biogeography* 42(4) 763-777
- Braun, Clait E; Williams III, Sartor O. 2015. History of Sage-Grouse (*Centrocercus* spp.) In New Mexico. *The Southwestern Naturalist* 60(42403) 207-212.
- Carriker, CR; Mermier, CM; McLain, TA; Johnson, KE; Beltz, NM; Vaughan, RA; McCormick, JJ; Cole, NH; Witt, CC; Gibson, AL. 2015. Effect of Acute Dietary Nitrate Consumption on Oxygen Consumption During Submaximal Exercise in Hypobaric Hypoxia. *International journal of sport nutrition and exercise metabolism*.
- Dickerman, Robert W. 2015. Common Nighthawks in New Mexico. *New Mexico Ornithological Society Bulletin* 43(3) 25-.
- Galen, Spencer C; Natarajan, Chandrasekhar; Moriyama, Hideaki; Weber, Roy E; Fago, Angela; Benham, Phred M; Chavez, Andrea N; Cheviron, Zachary A; Storz, Jay F; Witt, Christopher C. 2015. Contribution of a mutational hot spot to hemoglobin adaptation in high-altitude Andean house wrens. *Proceedings of the National Academy of Sciences* 112(45) 13958-13963.
- Hosner, Peter A; Andersen, Michael J; Robbins, Mark B; Urbay-Tello, Abraham; Cueto-Aparicio, Luis; Verde-Guerra, Karen; Sánchez-González, Luis A; Navarro-Sigüenza, Adolfo G; Boyd, Roger L; Núñez, Jano. 2015. Avifaunal surveys of the upper Apurímac River Valley, Ayacucho and Cuzco Departments, Peru: New distributional records and biogeographic, taxonomic, and conservation implications. *The Wilson Journal of Ornithology* 127(4) 563-581
- Hubbard, John P. 2015. "Prairie" Merlin captures a Eurasian Collared-dove in northern New Mexico. *New Mexico Ornithological Society Bulletin* 43(1) 42376.

- Johnson, Andrew B. 2015. Obituary-Robert W. Dickerman. *New Mexico Ornithological Society Bulletin* 43(2) 22-24.
- Opazo, Juan C; Hoffmann, Federico G; Natarajan, Chandrasekhar; Witt, Christopher C; Berenbrink, Michael; Storz, Jay F. 2015. Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. *Molecular Biology and Evolution* 32(4) 871-887
- Schmitt, Carl Jonathan. 2015. Pre-industrial melanism: The origin, maintenance, and genetic basis of an urban melanic morph of the Vermilion flycatcher. MS Thesis. University of New Mexico, Albuquerque, NM, USA.
- Wright, Natalie. 2015. The effects of ecology and evolution on avian flight morphology. Ph.D. Dissertation. University of New Mexico, Albuquerque, NM, USA.

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

- Abrahamson, Bethany L. 2015. Tracking changes in natural history collections utilization: A case study at the Museum of Southwestern Biology at the University of New Mexico. *Collection Forum* 29(42371) 42390.
- Adams, Rachael V. 2015. Landscape genetics of a North American songbird, the black-capped chickadee (*Poecile atricapillus*). Doctoral dissertation. University of Lethbridge, Alberta, Canada.
- Adams, RV; Burg, TM. 2015. Influence of ecological and geological features on rangewide patterns of genetic structure in a widespread passerine. *Heredity* 114(2) 143-154.
- Baumann, Matthew J; Beckman, Elizabeth J; Bautista, Emil; Witt, Christopher C. 2015. Long-distance dispersal of a sedentary Andean flycatcher species with a small geographic range, *Ochthoeca piurae* (Aves: Tyrannidae). *Check List* 11(6) 1795.
- Beckman, Elizabeth J; Witt, Christopher C. 2015. Phylogeny and biogeography of the New World siskins and goldfinches: Rapid, recent diversification in the Central Andes. *Molecular Phylogenetics and Evolution* 87:28-45.
- Benham, Phred M; Cuervo, Andrés M; McGuire, Jimmy A; Witt, Christopher C. 2015. Biogeography of the Andean metaltail hummingbirds: contrasting evolutionary histories of tree line and habitat-generalist clades. *Journal of Biogeography* 42(4) 763-777.
- Bothwell, Emma; Montgomerie, Robert; Lougheed, Stephen C; Martin, Paul R. 2015. Closely related species of birds differ more in body size when their ranges overlap—in warm, but not cool, climates. *Evolution* 69(7) 1701-1712.
- Dickerman, Robert W. 2015. Common Nighthawks in New Mexico. *New Mexico Ornithological Society Bulletin* 43(3) 25-.
- Friggens, Megan M; Finch, Deborah M. 2015. Implications of Climate Change for Bird Conservation in the Southwestern US under Three Alternative Futures. *PLoS One* 10(12) e0144089.
- Friggens, Megan M; Finch, Deborah M. 2015. Implications of climate change for bird conservation in the southwestern US. Special Publication of the United States Forest Service.
- Galen, Spencer C; Natarajan, Chandrasekhar; Moriyama, Hideaki; Weber, Roy E; Fago, Angela; Benham, Phred M; Chavez, Andrea N; Cheviron, Zachary A; Storz, Jay F; Witt, Christopher C. 2015. Contribution of a mutational hot spot to hemoglobin adaptation in high-altitude Andean house wrens. *Proceedings of the National Academy of Sciences, USA* 112(45) 13958-13963.
- Logan CJ, Palmstrom C. (2015) Is there a field proxy for brain size in great-tailed grackles (*Quiscalus mexicanus*)? *PeerJ PrePrints* 3:e791v1.
- Opazo, Juan C; Hoffmann, Federico G; Natarajan, Chandrasekhar; Witt, Christopher C; Berenbrink, Michael; Storz, Jay F. 2015. Gene turnover in the avian globin gene families and evolutionary changes in hemoglobin isoform expression. *Molecular Biology and Evolution* 32(4) 871-887.
- Salinas, Irene; Miller, Robert D; . 2015. Comparative Phylogeny of the Mucosa-Associated Lymphoid Tissue. In *Mucosal Immunology*. Page 145- . Academic Press
- Schmitt, Carl Jonathan. 2015. Pre-industrial melanism: The origin, maintenance, and genetic basis of an urban melanic morph of the Vermilion flycatcher. MS Thesis. University of New Mexico, Albuquerque, NM, USA.
- Winger, Benjamin M; Bates, John M. 2015. The tempo of trait divergence in geographic isolation: Avian speciation across the Marañón Valley of Peru. *Evolution* 69(3) 772-787.

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

Wright, Natalie. 2015. The effects of ecology and evolution on avian flight morphology. Ph.D. Dissertation. University of New Mexico, Albuquerque, NM, USA.

TEACHING IMPACTS OF THE MSB BIRD DIVISION

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

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

2015	Fall	486L	Ornithology	Witt, C.	22
2015	Spring	300	Evolution	Witt, C.	37
2015	Spring	402/502	Avian Sci Specimen Prep	Johnson, A. B.	6
2015	Fall	203	Ecology and Evolution	Andersen, M. J.	197(total for two sections)
2015	Spring	400	Senior Honors Thesis	Witt, C.	1
2015	Spring	551	Research Problems	Witt, C.	1
2015	Spring	599	Masters Thesis	Witt, C.	2
2015	Spring	699	Dissertation	Witt, C.	3
2015	Fall	400	Senior Honors Thesis	Witt, C.	1
2015	Fall	551	Research Problems	Witt, C.	1
2015	Fall	599	Masters Thesis	Witt, C.	1
2015	Fall	699	Dissertation	Witt, C.	1
2015	Fall/Spring	386	GVZ	Rotating faculty	72

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

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

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

Wright, Natalie. 2015. The effects of ecology and evolution on avian flight morphology. Ph.D. Dissertation. University of New Mexico, Albuquerque, NM, USA.

Schmitt, Carl Jonathan. 2015. Pre-industrial melanism: The origin, maintenance, and genetic basis of an urban melanic morph of the Vermilion flycatcher. MS Thesis. University of New Mexico, Albuquerque, NM, USA.

Adams, Rachael V. 2015. Landscape genetics of a North American songbird, the black-capped chickadee (*Poecile atricapillus*). Doctoral dissertation. University of Lethbridge, Alberta, Canada.

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

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

FUNDING AND PERSONNEL

Grants and contracts in force.

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

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

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.

2015-2018: Collaborative Research: Causes of parallel molecular evolution: insights from protein engineering; P.I. (UNL): J. F. Storz; P.I. (UNM): C.C. Witt. \$37,247 (UNM portion).

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

Donors who gave to MSB Bird Division in 2015:

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

CURRENT STAFF

See webpage. <http://msb.unm.edu/divisions/birds/people/index.html>

MUSEUM ASSOCIATES

See webpage. <http://msb.unm.edu/divisions/birds/people/index.html>

DIVISION OF GENOMIC RESOURCES

1. DIVISION HIGHLIGHTS.

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

Collection Growth.

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

Collection Usage.

1. The DGR collection issued 76 loans of frozen tissues from 1736 specimens from the Mammal, Bird, Fish, Herp, and Parasite Divisions in 2015.
2. Publications in 2015 related to DGR loans: >70.

Training in specimen based research and curation.

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

- a. 6 UNM students worked in DGR in 2015
 - i. 2 graduate students
 - ii. 2 paid undergraduates
 - iii. 2 post-baccalaureate students
- b. 10 Students mentored by DGR Collection Manager:
 - i. 1 volunteer undergraduate
 - ii. 5 undergraduate interns
 - iii. 2 undergraduate students conducting independent study projects
 - iv. 2 high school student interns

Of these,

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

Publications citing MSB DGR specimens.

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

MSB Arctos database and collection accessibility.

- B. **Arctos database and collection accessibility.** The Arctos database is a cutting-edge relational database that continues to provide an invaluable resource for biodiversity and environmental questions for researchers, educators, public health workers, and natural resource managers worldwide. Arctos is web-accessible and greatly enhances the visibility of the MSB. See MSB Mammal summary of Arctos usage.
- C. Since the MSB DGR interface was discontinued in 2014, the DGR collection records are now accessed directly from the Arctos interface for the respective divisions. The tissue collections for the Divisions of Mammals and Birds are fully online; MSB Fish and MSB Herps are in the process of upload.

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

Collection	Queries	Specimen Records
DGR Mammals	898	81,844
MSB Mammals	39,649	17,293,086
DGR Birds	1070	17700
MSB Birds	9942	877780
MSB Fish (tissues)	357	353297
MSB Herps (tissues)	509	48962
TOTAL	52,425	18,672,669

2. COLLECTION USE

Collection Growth (samples archived)	Loans (number of specimens)	Visitors	Information Requests Personally Responded to	Publications Citing MSB DGR Specimens
~ 26,245 Mamm and Bird Vials representing ~13,000 specimens	MSB Mamm 56 (1320)* MSB Bird 12 (53)** MSB Fish 1 (61) MSB Herp 2 (35) MSB Para 5 (267) Total Loans: 76 (1736)	75 (DGR)	>500***	70+

* Mamm/DGR Mamm combined tissue loans (number of specimens)
 ** Birds/DGR Birds combined tissue loans (number of specimens)
 *** Mammals/Birds/DGR/Fish/Herp/Para

Collection Usage:

MSB DGR issued 17,299 NK numbers in 2015 for collection of new specimens. The Division issued 76 loans of 1736 specimens to researchers in 7 countries: Argentina, Canada, China, Brazil, Denmark, Spain, and multiple institutions across the United States. Specimens were cited in over 70 publications.

3. COURSES USING THE COLLECTION**UNM Classes receiving loans of DGR material for educational purposes**

BIOL 599 – Master’s Thesis. Spring	(3 students, 3 tissue loans)
BIOL 599 – Masters Thesis. Fall	(3 students, 8 tissue loans)
BIOL 699 – Dissertation. Spring	(3 students, 7 tissue loans)
BIOL 699 – Dissertation. Fall	(3 students, 5 tissue loans)

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

UNM Art and Ecology
MSST Museum Studies Class Group (1 instructor, 12 students)
UNM Prep Program (1 instructor, 13 students)

Visiting researchers: Institutions or Departments.

University of Illinois
Veteran’s Administration Cooperative Studies Program
Natural History Museum, Arequipa, Peru
USGS
University of Arizona
Angelo State Natural History Collections

K-12 schools and educational group.

See MSB Mammal/MSB Bird Divisional Reports.

Other Visitors:

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

4. COURSES TAUGHT BY DGR PERSONNEL

Collection Manager/Faculty Student Mentoring:

Mariel L. Campbell/Joseph Cook:

Undergraduates

Lizon Cenac, Rausch REU intern in mammalogy, parasitology; *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution.*; BCP Flea Independent Study

Laurel Cenac, Rausch REU intern in mammalogy, parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution.*; BCP Flea Independent Study

Niccolette Ochoa, Rausch and CIIBA REU intern in parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution.*; UNM Prep Program Panama and *Soboliphyme* inventory

Brooke Thurston, Rausch and CIIBA REU intern in mammalogy, parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution.*; Canada Yellowknife Field Parasitology expedition

Elias Alejandro Salazar, Rausch REU intern in parasitology, *Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution.*

Katelyn Clifton, CIIBA REU intern in parasitology

Elisa Gagliano, volunteer in parasitology, genomic resources

High School

Victoria Crosby (Amy Biehl), CIIBA RAHSS intern in parasitology

Samuel Nasci (Homeschool, CNM), CIIBA RAHSS intern in parasitology

5. COLLECTION MANAGEMENT

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

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

Current projects generating specimens for DGR

Incorporation of other collections (USGS, NMMNHS)

CIIBA – NSF (JA Cook)

High Latitude Contact Zones - Andrew Hope, JA Cook – Alaska (USGS, NPS)

Mexican wolf reintroduction – USFWS (JL Dunnum)

Panama Hantavirus – ICIDR NIH (JA Cook)

Bighorn Sheep Reintroduction Program – NMGF

Black bear /elk predation project – NMDGF

Mammalogy and Tropical Biology classes (JA Cook)

Troy Best collections

Ladder Ranch and Greater Gila Ecoregion Project - (UNM, GPSA) A Jones, JA Cook)

Peruvian Bird Survey –Chris Witt (NSF)

The majority of staff time was spent:

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

6. AWARDS, GRANTS, AND CONTRACTS

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

7. PUBLICATIONS

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

A. Books, Book Chapters, Edited Volumes

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

B. Journal Articles

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

C. Web-Based

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

D. Technical Reports

Annual Report, Division of Genomic Resources, Museum of Southwestern Biology

E. Theses/Dissertations Completed

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

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

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

H. Theses/Dissertations

See MSB Mammal/MSB Bird/MSB Parasite/MSB Fish/MSB Herp divisional reports

8. ACTIVITIES IN LEARNED SOCIETIES

B. Attendance at Professional Meetings (see also other Divisional reports)

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

Mariel L. Campbell, Gordon Jarrell, Chris Jordan, Dusty L. McDonald, Joseph A. Cook; Eric P. Hoberg. *Integrating Across Collections: Parasite/Host Relationships in the Arctos Collections Database*. Presented at the Annual Meeting of the Society for the Preservation of Natural History Collections, Gainesville, FL, May 17-23, 2015.

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentations to General Audience in a Scholarly Capacity Campbell, Mariel L

Sara V. Brant and Mariel L. Campbell, Bernalillo Co. Open Space --Bachechi Center Naturalists Series. Public Presentation Series. *Revealing the Lives of Parasites Among us in the Rio Grande Bosque*.

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

Campbell, Mariel L.

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

9. SERVICE

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

B. Public Service General

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

Campbell, Mariel L.

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

10. DONATIONS AND GIFTS RECEIVED

11. CURRENT STAFF

Faculty/Staff

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

Graduate students

Cook, J.A.

(Reported in Mammal Division report)

Grad Student Research Assistant DGR

1. Jocelyn P. Colella (Spring 2015)
2. Dianna Krejsa (Fall 2015)

Undergraduate Student Workers and Volunteers

1. Matthew P. Segura (Spring, Fall 2015)
2. Chauncey Gadeck (Spring 2015)
3. Elisa Gagliano (Fall 2015)

DIVISION OF FISHES

1. DIVISION HIGHLIGHTS

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

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

2. TABLE OF COLLECTION USE

Collection Growth	Loans Out	Professional Visitors	Collection Web Activity	Publications by MSB Staff	Publications using MSB specimens/data
48,865 specimens	21	39	1,570	19	3
UNM Courses taught by MSB staff	Graduate Students mentored	Graduate Students' Theses/Dissertation	Undergraduate Students employed	Grants and contracts in force	
4	4	2	5	16	

3. UNM COURSES USING THE COLLECTIONS

TERM	COURSE	TITLE	STUDENTS
Spring 2015	BIOL487	Ichthyology	20
Spring 2015	BIOL386	General Vertebrate Zoology	20
Fall 2015	BIOL 386	General Vertebrate Zoology	24
Spring 2015	BIOL 204	Plant and Animal Form and Function	55
Fall 2015	BIOL 204	Plant and Animal Form and Function	55

4. UNM COURSES TAUGHT BY MSB STAFF

INSTRUCTOR	TERM	COURSE	TITLE	STUDENTS
T.F. Turner	Spring 2015	BIOL 487	Ichthyology	20
T.F. Turner	Spring & Fall	BIOL 599	Master's Thesis	3
T.F. Turner	Spring & Fall	BIOL 699	Dissertation	1
T.F. Turner	Spring & Fall	BIOL 402/502	Ecology and Evolution of Fishes	10
T.F. Turner	Fall 2015	BIOL 386	General Vertebrate Zoology	24

5. COLLECTION MANAGEMENT

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

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

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

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

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

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

Rio Grande Silvery Minnow Genetics Assessment and Monitoring. US Bureau of Reclamation. M.J. Osborne PI. 6 Jan 2015 to 30 Nov 2016. Total: \$318,000

Development of eDNA detection methodology for Jemez Mountains and Sacramento Mountain Salamanders. The Nature Conservancy. M.J. Osborne PI. 1 June 2015 to 30 Nov 2016. Total: \$11,965

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

Lower Colorado River Multi-Species Conservation Program- Genetic and Demographic Studies to Guide Conservation Management of Bonytail in Off-Channel Habitats. US Bureau of Reclamation. M.J. Osborne PI, 10 Apr 2014 to 31 Jan 2016 Total: \$270,000

Assessment of Genetic Variation and Population Structure in Economically Important Fishes of Commonwealth of Northern Mariana Islands (CNMI). E.W. Carson PI. 1 Oct 2014 to 30 Sep 2015. Total: \$115,910

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

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. E.W. Carson PI. 1 Jul 2014 to 31 May 2015. Total: \$3,000

Assessment of MTDNA and Nuclear DNA Introgression in Pecos Pupfish in New Mexico. E.W. Carson PI. 1 Nov 2014 to 30 Jun 2015. Total: \$17,702

Genetic contribution of four sucker species to larval drift in experimental and control streams of the Gunnison River basin in Colorado. E.W. Carson PI. 17 Nov 2014 to 30 Jun 2015. Total: \$19,650 F&A: \$2,948.

Local-to-landscape-scale distribution of genetic variation in catostomid suckers of Colorado, with emphasis on genetic contribution to larval drift in streams of the Gunnison River Basin. E.W. Carson PI. Megan J. Osborne, Thomas F. Turner, and Michael R. Schwemm. 1 Oct 2015 to 30 Jun 2018. Total: \$96,467 F&A \$12,583

Next-Generation Genetic Resource Management in Gila Trout, Phase I. T.F. Turner PI. 1 Dec 2013 to 31 Dec 2015. Total: \$28,514

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

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

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

*Seismic Mitigation for Museum of Southwestern Biology Fluid Preserved Collections. Federal Emergency Management Agency (FEMA), NM Dept. Homeland Security. A.M. Snyder PI. 25 Jul 2014 to 25 Jul 2016. Total: \$90,081

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. 1 Aug 2012 to 31 Jul 2015. Total: \$140,350

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

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

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. Monographs of the Western North American Naturalist 8:1-25.

B. Journal Articles

- 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. *Western North American Naturalist* 75:200-208.
- Carson, E. W., C. Padraza-Lara, M. de L. Lozano-Vilano, G. A. Rodríguez-Almaráz, I. Banda-Villanueva, L. A. Sepúlveda-Hernández, L. Vela-Valladares, A. Cantú-Garza, and M. De la Maza-Benignos. 2015. The rediscovery and precarious status of Chihuahuan Dwarf Crayfish *Cambarellus chihuahuae*. *Occasional Papers of the Museum of Southwestern Biology* 12:1-7.
- Carson, E. W., R. R. Beasley, K. L. Jones, S. L. Lance, M. de L. Lozano-Vilano, L. Vela-Valladares, I. Banda-Villanueva, T. F. Turner, and M. De la Maza-Benignos. 2015. Erratum to: Development of polymorphic microsatellite markers for the microendemic pupfishes *Cyprinodon julimes* and *C. pachycephalus*. *Conservation Genetics Resources* 7:773-775. DOI 10.1007/s12686-015-0468-9.
- Hoagstrom, Christopher W. and T.F. Turner. 2015. Recruitment ecology of pelagic-broadcast spawning minnows: paradigms from the ocean advance science and conservation of an imperiled freshwater fauna. *Fish and Fisheries* 16 (2):282-299.
- Pilger, T.J., K.B. Gido, D.L. Propst, J.E. Whitney, and T.F. Turner. 2015. Comparative conservation genetics of protected endemic fishes in an arid-land riverscape. *Conservation Genetics* DOI 10.1007/s10592-015-0707-3.
- Whitney, J.E., K.B. Gido, T.J. Pilger, D.L. Propst, and T.F. Turner. 2015. Consecutive wildfires affect stream biota in cold- and warmwater dryland river networks. *Freshwater Science* DOI 10.1089/683391.
- 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. *Copeia* 103:125-131.
- Bertrand, K. N., J. A. VanDeHey, T. J. Pilger, E. A. Felts and T. F. Turner. 2015. Genetic structure of a disjunct peripheral population of Mountain Sucker *Pantosteus jordani* in the black Hills, South Dakota, USA. *Conservation Genetics*. DOI: 10.1007/s10592-016-0820-y
- Whitney, J. E., K. B. Gido, T. J. Pilger, D. L. Propst and T. F. Turner. 2015. Biotic responses to consecutive wildfires in a warmwater dryland river network. *Freshwater Science* 34:1510-1526. DOI: 10.1086/683391.
- Whitney, J. E., K. B. Gido, T. J. Pilger, D. L. Propst and T. F. Turner. 2015. Metapopulation analysis indicates that native and nonnative fishes respond differently to wildlife in a desert stream. *Ecology of Freshwater Fish*. DOI: 10.1111/eff.12217.
- Osborne, M.J., Diver, T.A., Hoagstrom, C.W. and Turner, T.F. (2015) Biogeography of 'Cyprinella lutrensis': intensive sampling from the Pecos River 'melting pot' reveals a dynamic history and phylogenetic complexity. *Biological Journal of the Linnean Society*, Available Online Early, DOI: 10.1111/bij.12664.
- Perkin, J.S., K.B. Gido, A.R. Cooper, T.F. Turner, M.J. Osborne, E.R. Mayes, B. Kevin. 2015. Fragmentation and dewatering transform Great Plains stream fish communities *Ecological Monographs* 85(1):73-92.
- Turner, T.F. M.J. Osborne, M.V. McPhee, C.G. Kruse. 2015. High and dry: intermittent watersheds provide a test case for genetic response of desert fishes to climate change. *Conservation Genetics* 16 (2):399-410.

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

Marsh, P.C, T.E. Dowling, B.R. Kesner, T.F. Turner, 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. *Copeia* 103 (1):141-156

Turner, T.F., T.J. Krabbenhoft, M.L. Collyer, C.A. Krabbenhoft, M.S. Edwards, Z.D. Sharp. 2015. Retrospective stable isotope analysis reveals ecosystem responses to river regulation over the last century. *Ecology* 96(12):3213-3226.

Perkin, J.S., Gido, K.B., Cooper, A.R., Turner, T.F., Osborne, M.J., Johnson, E.R. and K.B. Mayes. 2015. Fragmentation and dewatering transform Great Plains stream fish communities. *Ecological Monographs*, 85:73–92.

C. Technical Reports

Dudley, R.K., and S.P. Platania. 2015. Summary of the Rio Grande Silvery Minnow population monitoring program results (February 2015 to December 2015). 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. 2015. Rio Grande Silvery Minnow population monitoring program results from February to December 2014. Report to the Middle Rio Grande Endangered Species Collaborative Program and the US Bureau of Reclamation, Albuquerque, NM. 185 pp.

Dudley, R.K., and S.P. Platania. 2015. Monitoring of the Rio Grande Silvery Minnow reproductive effort during 2015 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. 37 pp.

Farrington M. A., R. K. Dudley, J. L. Kennedy, S. P. Platania and G. C. White. 2015. San Juan River 2014 Colorado Pikeminnow and Razorback Sucker larval fish survey. Research report submitted to San Juan River Basin Implementation Recovery Program. 64 pp.

Farrington M. A. and S. P. Platania. 2015. A life history of Roundnose Minnow, *Dionda episcopa*, in the Middle Pecos River Valley. Research report submitted to the New Mexico Department of Game and Fish share with wildlife project. 26 pp.

Snyder, A.M. and T.F. Turner. 2015. Curation of the 2014 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. 2015. Final Report: 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.

Turner, T. F., T. J. Pilger, and D. L. Propst. 2015 Effects of the Whitewater-Baldy Complex Fire on Warm-water Fishes in the Gila River Basin, New Mexico. Project Work Order # 14-055. Annual Report to NMDGF, Santa Fe. 10 pp.

Turner, T. F., T. J. Pilger, and D. L. Propst. 2015 Effects of the Whitewater-Baldy Complex Fire on Warm-water Fishes in the Gila River Basin, New Mexico. Project Work Order # 14-055. Final Report to NMDGF, Santa Fe. 31 pp.

Osborne, M.J., T. J. Pilger and T. F. Turner. 2015. Genetic monitoring of the Rio Grande Silvery Minnow: Genetic status of wild and captive stocks in 2015. Annual report FY 2015 US Bureau of Reclamation-UC-AAO Albuquerque, New Mexico. 34 pp

Osborne, M.J. and T. F. Turner. 2015. 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.

Osborne, M.J. and T.F. Turner. 2015. Genetic Studies to Guide Conservation and Management of Bonytail Chub. Report to the Lower Colorado Multispecies Conservation Program. 23 pp.

Osborne, M.J. 2015. Relationship of genetic diversity metrics to abundance in two Canadian River fishes. New Mexico Department of Game and Fish. Share with Wildlife Program. 22 pp.

Kegerries, R. B. Albrecht, R. Rogers, E. Gilbert, W.H. Brandenburg, A.L. Barkalow, S. P. Platania, M. McKinstry, B. Healy, J. Stolberg, E. O. Smith, C. Nelson, and H. Mohn. 2015. Razorback Sucker *Xyrauchen texanus* research and monitoring in the Colorado River inflow area of Lake Mead and the lower Grand Canyon, Arizona and Nevada. Final report prepared by BIO-WEST, Inc., for U.S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City, Utah.

D. Theses/Dissertations Completed:

Farrington M. A. A life history of Roundnose Minnow, *Dionda episcopa*, in the Middle Pecos River Valley. Thesis submitted to the University of New Mexico. 29 pp.

Pilger, T. J. 2015. Conservation genetics at the interface of theory and application. Doctorate of Philosophy Biology, The University of New Mexico Albuquerque, New Mexico, May, 2015. Advisor T. F. Turner, Committee Members, K.B. Gido, V. Katju, D. L. Propst

E. Work In Progress. NONE TO REPORT

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

Collyer, M.L., M.E. Hall, M.D. Smith, and C.W. Hoagstrom. 2015. Habitat-morphotype associations of Pecos Pupfish (*Cyprinodon pecosensis*) in isolated habitat complexes. *Copeia* 103(1):181-199

Kwan, L., M. Fris, F.H. Rodd, L. Rowe, L. Tuhela, and T.M. Panhuis. 2015. An examination of the variation in maternal placentae across the genus *Poeciliopsis* (Poeciliidae). *Jrnl. Morphology* 276:1-13

Hopkins, A.R. and A. Kodric-Brown. 2015. Life history of *Gambusia nobilis* (Pecos Gambusia) from Bitter Lake National Wildlife Refuge. *Enviro. Biol. of Fishes* 98 (7):1833-1844.

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. *Monographs of the Western North American Naturalist* 8(1):1-25.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited Talks/Plenary NONE TO REPORT

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

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

Colorado River inflow area of Lake Mead and the lower Grand Canyon, Arizona and Nevada. Grand Canyon. Glen Canyon Dam Adaptive Management Program. Phoenix AZ, April 2015.

Carson, E. W., I. Banda-Villanueva, M. L. Lozano-Vilano, G. A. Rodríguez-Almaráz, L. Sepúlveda, A. Cantú, C. Pedraza-Lara, and M. De la Maza-Benignos. Development of a conservation program for the co-endemic Carbonera Pupfish, Largemouth Shiner, and Chihuahuan Dwarf Crayfish. 47th annual meeting of the Desert Fishes Council, Death Valley, California. 18-22 November 2015.

Dudley, R.K., S.P. Platania, and G.C. White. Rio Grande Silvery Minnow population monitoring (1993–2014). Science Subcommittee, Middle Rio Grande Endangered Species Collaborative Program, US Bureau of Reclamation, Albuquerque, NM. 21 April 2015.

Schwemm, M. R., T. F. Turner, K. Thompson, **E. W. Carson**. Genetic contribution of native and introduced catostomids to larval drift in experimental and control streams of the Gunnison River basin in Colorado. 47th annual meeting of the Desert Fishes Council, Death Valley, California. 18-22 November 2015.

Pilger, T.J., K.B. Gido, D.L. Propst, J.E. Whitney and T.F. Turner. Demography and Genetic Diversity are Correlated in a Desert River Fish Metacommunity. Annual Joint Meeting of Ichthyologists and Herpetologists. Reno, Nevada, 15-19 July 2015.

Pilger, T.J., K.B. Gido, D.L. Propst, J.E. Whitney and T.F. Turner. Wildfire effects on genetic diversity and recolonization of longfin dace, *Agosia chrysogaster*. Desert Fishes Council annual meeting. Death Valley, California, 18-22 November 2015.

Osborne, M.J. Perkin, J.S., Gido, K.B., Turner, T.F. Comparative riverscape genetics reveals reservoirs of genetic diversity for conservation and restoration of Great Plains fishes. Joint Meeting of American Society Ichthyologists and Herpetologists, Reno, Nevada 15-19 July 2015.

Turner, T.F., Osborne, M.J., Propst, D.L. and W.D. Wilson. Drought and wildfire compromise genetic diversity and recovery in Gila trout. Joint Meeting of American Society Ichthyologists and Herpetologists, Reno, Nevada. 15-19 July 2015.

Osborne, M.J., Sanchez, A.V. and Turner, T.F. Reproductive success of Bonytail in off-channel habitats. Desert Fishes Council Annual Meeting Death Valley, CA. 18-22 Nov. 2015.

Osborne, M.J., Sanchez, A.V. and Turner, T.F. Reproductive success of Bonytail in off-channel habitats. Colorado River Aquatic Biologist Annual Meeting. Laughlin Nevada. 6 – 8 Jan 2015

Reese, R.A. Food web Gila River Fishes. Desert Fishes Council Annual Meeting Death Valley, CA. 18 - 22 Nov 2015.

Sanchez, A. V., Gilbert, E. and Osborne, M.J. Relationship of genetic diversity metrics to density in two imperiled Canadian River fishes, Arkansas River Shiner and Plains Minnow. Desert Fishes Council Annual Meeting Death Valley, CA. 18-22 Nov 2015.

Turner, T. F. , Osborne, M.J., Pilger, T.J., Propst D.L., Brooks, J.E. and Wilson, W.D. Drought and wildfire compromise genetic diversity and recovery in Gila Trout. Desert Fishes Council Annual Meeting Death Valley, CA. 18-22 Nov 2015.

C. Attendance at Professional Meetings

W. H. Brandenburg

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

E.W. Carson

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

R.K. Dudley

- Science Subcommittee, Middle Rio Grande Endangered Species Collaborative Program, US Bureau of Reclamation, Albuquerque, NM. 21 April 2015.
- Fish Population Monitoring Workshop, Middle Rio Grande Endangered Species Collaborative Program, Isleta Resort and Casino, Albuquerque, NM. 8–10 December 2015.

M.A. Farrington

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

M.J. Osborne

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

T.J. Pilger

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

D.L. Propst

- Desert Fishes Council, 47th Annual Meeting, Death Valley CA. 18-22 Nov 2015.

R.A. Reese

- Desert Fishes Council, 47th Annual Meeting, Death Valley CA. 18-22 Nov 2015.

S.T. Ross

- San Juan River Recovery Implementation Program, Biology Committee Workshop on Environmental Flows in the San Juan River. U.S. Forest Service Office, Albuquerque, NM. 12-13 February 2015.
- San Juan River Recovery Implementation Program, Biology Committee Meeting, Durango, CO, 19-20 February, 2015.
- San Juan River Recovery Implementation Program, Biology, Public, and Coordination Committee meetings. U.S. Forest Service Office, Durango, CO. 12-14 May 2015.
- 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno, NV. 15-19 July 2015
- Desert Fishes Council, 47th Annual Meeting, Death Valley, CA. 18-22 November, 2015.

A.M. Snyder

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

T. F. Turner

- Colorado River Aquatic Biologists (CRAB) Meeting, Laughlin NV. 6-7 Jan 2015

- 95th annual meeting of the American Society of Ichthyologists and Herpetologists, Reno NV. 12-15 July 2015
- Desert Fishes Council, 47th Annual Meeting, Death Valley CA. 18-22 Nov 2015

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

T.F Turner

- Contributing Editor – Aquatic Biology, since 2008

E. Service as Officer of Professional Society/Organization

E.W. Carson

- Conservation Committee for Cuatro Ciénegas, Desert Fishes Council. 2002 to present
- Committee for review of Desert Fishes Council Conservation Award applications. January 2015-present.

S.T. Ross

- Member, Long Range Planning and Policy Committee, American Society of Ichthyologists and Herpetologists, 2007-2015.
- 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.
- Vice Chair, UNM Institutional Animal Care and Use Committee

T. F. Turner

- Board of Governors, American Society of Ichthyologists and Herpetologists, 2013-2018
- Chair, Stoye Award Committee, American Society of Ichthyologists and Herpetologists
- Guest editor, *Oecologia*
- Contributing editor, *Aquatic Biology*

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentation to General Audience in a Scholarly Capacity

R.K. Dudley

- Native fishes of New Mexico. *Ichthyology (BIOL 487L)*, T.F. Turner, University of New Mexico, Albuquerque, NM. 16 March 2015.

S. T. Ross

- Guest lecture in *Ichthyology, Biogeography of North American Freshwater Fishes*. March 18, 2015.

S.P. Platania

- The Middle Rio Grande and its fishes-100 years ago. *Naturalist Series Fall Edition*. Bernalillo County Open Space, Bachechi Open Space, Albuquerque NM. 15 August 2015.

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

R.K. Dudley

- Dudley, R.K., S.P. Platania, and G.C. White. Rio Grande Silvery Minnow population monitoring (1993–2015). *Fish Population Monitoring Workshop, Middle Rio Grande Endangered Species Collaborative Program, Isleta Resort and Casino, Albuquerque, NM*. 8 December 2015.

C. Scholarly Service as a Member of a Local/State/Regional/Nat'l Committee, Panel

R.K. Dudley

- Member of Technical Subgroup, Rio Grande Silvery Minnow (*Hybognathus amarus*) Recovery Team, US Fish and Wildlife Service.

M.A. Farrington

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

- Member, Desert Fishes Council Planning Committee for 2016 annual meeting.

M.J. Osborne

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

D.L. Propst

- Chair, Desert Fishes Council Planning Committee for 2016 annual meeting.

S.T. Ross

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

A.M. Snyder

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

T.F. Turner

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

D. Journal Referee

E. W. Carson

- Aquatic Biology (1), Biological Journal of the Linnean Society (1), Conservation Genetics (1), and Current Biology (1)

M.J. Osborne

- Aquaculture Research (1) Transactions American Fisheries Society (1) Journal of Biogeography (1) PLOS One (1)

T.J. Pilger

- Journal of North American Fisheries Management (1)

T.F. Turner

- Oecologia (1), Canadian J Fisheries and Aquatic Sciences (2), Ecology of Freshwater Fishes (2), Evolutionary Applications (1), Aquatic Biology (2)

E. Hosting Professional Colloquia and Groups NONE TO REPORT

10. SERVICE

A. Symposia, Workshops, Conferences etc. Sponsored, Organized, Held, etc. NONE TO REPORT

B. Public Service

R.A. Reese: Mentorship

- Albuquerque Institute of Math and Sciences, *San Juan River Fishes and Contaminants*.
- UNM Center for Stable Isotope, assisted three student projects by running freeze drier equipment

A.M. Snyder: Lectures, Tours, and Public Engagement

- Silverton Middle School, Albuquerque
- UNM Global Education Office, Andrea Valenzuela Staff
- Jefferson Middle School, Albuquerque, Suzan Dunnum, Faculty
- Montessori Rio Grande Charter School, Albuquerque Grades 1 to 3, Moss Templeton, Faculty
- UNM MSB Open House for Research Day 4:30pm to 6:00pm
- UNM Recruitment Undergraduate and Graduate Student Tour, Christopher Witt, Faculty
- UNM Museum Studies Tour, Loa Traxler, Faculty
- Sandia Preparatory School, Grade 11, Charles Buxbaum, Faculty
- UNM Honors College Seminar *People and Animals UHON302-016*

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

E.W. Carson

- 2015 George Miksch Sutton Award in Conservation Research: Carson, E. W., A. H. Hanna, G. P. Garrett, and J. R. Gold. *Conservation genetics of cyprinid fishes in the upper Nueces River basin in Central Texas*. *Southwestern Naturalist* 59:1-8. Presented at the 62nd annual meeting of the Southwestern Association of Naturalists at San Diego State University, April 2015, in San Diego, California.

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

13. CURRENT STAFF

A. Faculty/Staff

Evan W. Carson, Research Assistant Professor

Nathan R. Franssen, Postdoctoral Researcher

Megan J. Osborne, Research Assistant Professor

Tyler J. Pilger, Post-doctoral Research Fellow

Steven P. Platania, Associate Curator of Fishes

David L. Propst, Curatorial Associate and UNM Adjunct Professor of Biology

Stephen T. Ross, Curator Emeritus and UNM Adjunct Professor of Biology

Alexandra M. Snyder, Collections Manager

Maribel Solis, Staff Curatorial Assistant

Kendra Brunet Lecomte, Staff Curatorial Assistant

Thomas F. Turner, Curator of Fishes, UNM Professor of Biology, and UNM Associate Dean for Research

B. Graduate students

Museum Research Assistants-Graduate Student TA

Rosalee A. Reese Spring and Fall 2015

MSB Fishes Graduate Students, UNM Biology

Adam L. Barkalow, M.Sc. student

Michael A. Farrington, M.Sc. candidate

Rosalee A. Reese, M.Sc. candidate

David Camak, Ph.D. student

C. Undergraduate Student Employees, Lab and Museum

Kendra Brunet Lecomte, A&S Biology

Holly L Hayes, A&S Psychology

Shiloh Langwell, A&S Art

Larissa E. Garcia, UNM School of Business

Sarah Hogland, A&S Biology

Alyssa Sanchez, A&S Biology

14. MUSEUM ASSOCIATES

B. Research Associates

W. Howard Brandenburg, American Southwest Ichthyological Research, Albuquerque

Stephani Clark Barkalow, M.S. American Southwest Ichthyological Research, Albuquerque

James E. Brooks, US Fish and Wildlife Service, Albuquerque (Ret.)

Brooks M. Burr, Ph.D. Southern Illinois University, Carbondale

John M. Caldwell, M.S. New Mexico Dept. Game and Fish, Santa Fe

Michael Collyer, Ph.D. Western Kentucky University, Bowling Green

Thomas E. Dowling, Ph.D. Wayne State University, Detroit

Robert K. Dudley, Ph.D. American Southwest Ichthyological Research, Albuquerque

Michael A. Farrington, M.S. American Southwest Ichthyological Researchers, Albuquerque

Keith B. Gido, Ph.D. Kansas State University, Manhattan KS

Eliza I. Gilbert, M.S. American Southwest Ichthyological research, Albuquerque

Jennifer L. Kennedy, American Southwest Ichthyological Research, Albuquerque

Astrid Kodric-Brown, Ph.D. Emeritus, University of New Mexico, Albuquerque

Richard L. Mayden, Ph.D. St. Louis University, St. Louis MO

Andrew Monie, M.S. New Mexico Dept. Game and Fish, Santa Fe

Kirk A. Patten, M.S. and J.D. New Mexico Dept. Game and Fish, Santa Fe

Norman Mercado Silva, Ph.D. El Colegio de la Frontera Sur, Unidad Chetumal & Univ. de la costa Sur, Univ. de Guadalajara

HERBARIUM

1. DIVISION HIGHLIGHTS

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

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

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

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

2. TABLE OF COLLECTION USE

Collection Growth (specimens catalogued & entered in collection)	Loans	Visitors	Information Requests Personally Responded to	Publications Citing MSB Specimens
2231	10	224	140	6

3. COURSES USING THE COLLECTIONS

| Fall 2015: Biol. 463-Flora of New Mexico-9 students (8 undergrads, 1 graduate student).

| Summer 2015: Water Resources 573-12 students (12 graduates students)

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty

Lowrey, T.K..

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

Graduate Student problems:

Spring 2015. Biol 551 Research Problems.

Spring 2015. Biol 699. Dissertation

Fall 2015: Biol 599. Masters Thesis

Fall 2015: Biol 599. Dissertation

B. Graduate Students/ Research Associates

Bixby, R.J.

Courses taught:

Summer 2015: WR 573 (Water Field Methods) (12 students)

Spring, Summer, Fall 2015: BIOL 551- Research Problems (2 students)

Guest lectures:

BIOL 495 (Limnology): “Bacterioplankton”, undergraduate and graduate, Spring 2015

BIOL 496 (Limnology lab): Algae lab, Spring 2015

5. COLLECTION MANAGEMENT

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

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

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

6. AWARDS, GRANTS, AND CONTRACTS

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

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

Bureau of Reclamation, “Hydrological and biological monitoring of bendway weirs in the Middle Rio Grande”, 2015-2020, Bixby, lead P.I. (with M. Stone, A. Gregory, and A. Burdett), \$323,434

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. 2015. Rivers of Costa Rica. In: M. Kappelle (ed.) *Costa Rican Ecosystems*. The University of Chicago Press, Chicago, Illinois

Journal Articles

Bixby, R.J., S.D. Cooper, R.E. Gresswell, L.E. Brown, C.N. Dahm, and K.A. Dwire. 2015. Fire effects on aquatic ecosystems: an assessment of the current state of the science. *Freshwater Science* 34: 1340-1350.

Jewson, D.H. and **R.J. Bixby**. 2015. Abundance and size change in *Hannaea baicalensis* in Lake Baikal. *European Journal of Phycology* 45:354-364.

Cerrato, J.M., J. M. Blake, C. Hirani, A.L. Clark, A.-M. Ali, K. Artyushkova, E. Peterson, and **R.J. Bixby**. In review. Wildfires and water quality: Effect of metals associated with wood ash. Submitted to *Environmental Science: Processes and Impacts*.

B. Curriculum Development

Sultany, M. and **R.J. Bixby**. In review. Welcome to the Nanoscale: Using Diatoms to Study Water Quality. Submitted to *The Science Teacher*.

C. Technical Reports

Tonne, P. Bosque Ecosystem Monitoring Program – BEMP Vegetation Report.

By Herbarium Associates:

Muldavin, E., **R. Sivinski**, M. East, Y. Chauvin, and M. Horner. 2015. Brack's Hardwall Cactus Distribution, Habitat, and Status Survey 2015. Natural Heritage New Mexico, Museum of Southwestern Biology and Department of Biology University of New Mexico, Albuquerque. Prepared for Bureau of Land Management.

Roth, D. and **R.C. Sivinski**. 2015. Survey for Rare Gypsophilic Plants in the Ojito ACEC, Sandoval County, New Mexico. Prepared for Bureau of Land Management.

Sivinski, R.C. 2015. Biological Survey of Thornton Ranch Open Space, Santa Fe County, New Mexico. Prepared for Santa Fe County, Land Use Division.

F. Work In Progress

Bixby, R.J., M.B. Edlund, and N. Soninkhishig. In prep. An Asian biodiversity hotspot: *Hannaea* (Bacillariophyceae) in the Baikal Rift Zone. To be submitted to *Phycologia* (summer 2016).

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

Ph.D. Advisement:

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

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

Becky Bixby:

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

Committee member for doctoral students:

John M. Roesgen, Ph.D., Department of Biology, University of New Mexico, 2013-present
Virginia Thompson, M.S., Department of Biology, University of New Mexico, 2010-present

M.S. Advisement:

Committee Member:

Becky Bixby:

Advisor:

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

Ryan Kelly, Master in Water Resources, 2013-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)

- 1) Alexander, Patrick J., Michael D. Windham, James B. Beck, Ihsan A. Al-Shehbaz, Loreen Allphin, and C. Donovan Bailey. 2015. Weaving a Tangled Web: Divergent and Reticulate Speciation in *Boechera fendleri* sensu lato (Brassicaceae; Boechereae). *Systematic Botany* (2015), 40(2): pp. 572-596.
- 2) Collins, L.T. and G. Yatskievych. 2015. *Orobanche arizonica* sp. nov. and nomenclatural changes in *Orobanche cooperi* (Orobanchaceae). *Phytoneuron* 2015-48: 1–19.
- 3) McGrath, James, Max Licher, William R. Norris, and Glenn Rink. 2015. A Review of *Carex* in New Mexico: Initial Findings. *The New Mexico Botanist* No. 63.
- 4) Prather, L. Alan, and Jessie A. Kieth. 2003. *Monarda humilis* (Lamiaceae), a new combination for a species from New Mexico, and a key to the species of section *Cheilyctis*. UNM Loan returned in 2015.
- 5) Rink Glenn, and Max Licher. 2015. Cyperaceae. Sedge Family. Part 1: Family Description, Key to the Genera, and *Carex* L. September 2015. *Canotia*, Volume 11. Arizona State University.

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/Plenary Talks and/or Seminars

B. Contributed Talks/Posters

Bixby, R.J., S. Johnson, and L. Ashkenas. 2015. Effects of forest harvest methods of diatom communities in headwater streams. North American Diatom Symposium. Beaver Island, MI.

Clark, A.L. and **R.J. Bixby**. 2015. Fire impacts on diatom population growth: a microcosm study. North American Diatom Symposium. Beaver Island, MI.

Ramírez, A., C.M. Pringle, G. E. Small, **R.J. Bixby**, J.H. Duff, M. Ardón, A.P. Jackman, M. Snyder, C. Ganong, P.F. Gutiérrez-Fonseca and F.J. Triska. 2015. Insights from a 25+ year dataset in lowland Costa Rica: Effects of hydrologic connectivity from the mountains to the sea on stream ecosystems of an inland protected area. Ecological Society of America, Baltimore, MD.

Cerrato, J.M., A.L. Clark, N. Correa, A.-M. Ali, J. Blake, and **R. Bixby**. 2015. Effect of metals associated with ash produced from wildfires on water quality. American Geophysical Union, San Francisco, CA.

C. Attendance at Professional Meetings

Bixby, R.J.

Society for Freshwater Science, Milwaukee, WI, May 2015

North American Diatom Symposium, Beaver Island MI September 2015

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

Bixby, Guest editor and co-lead, “Fire impacts on freshwater ecosystems” special issue, *Freshwater Science* (16 accepted manuscripts), published December 2015

D. Service as Officer of Professional Society/Organization

Bixby: R.J.

Co-Chair, Public Information and Publicity Committee, Society for Freshwater Science, 2013-present

Research Associate, New Mexico Museum of Natural History and Science, 2014-present.

Lowrey, T.K.

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

Sivinski, R.C. Regional reviewer for the south-central region of the Flora of North America. Flora of North America Project. A flora is a comprehensive, systematic account of the plant species of a given area — in this case, North America north of Mexico.

9. OTHER PROFESSIONAL ACTIVITIES

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

Bixby, participated in MSB Brown bag talk for Darwin Day, Feb 2015

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

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

Master Naturalists Program – Bernalillo County, New Mexico:

Tonne, Phil, and Karen Wetherill. Bosque Buzz: Pollinators and Plants: Living Relationships that Color the Landscape at Bachechi Open Space. September 12. Presented to the public and the master naturalists program.

Sivinski, R.C. Grass Identification Workshop, Native Plant Society of NM, with K. Allred, August 3-5, 2015.

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

Bixby, R.J.

Science Consultant, Energy in the Bosque curriculum development, supplementing Bosque Education Guide, Fall 2015

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

UNM representative (appointed), Consortium of Universities for the Advancement of Hydrologic Sciences, Inc. (CUAHSI), 2013-present

Science-Cyberinfrastructure liaison, Bioalgal energy group, NM EPSCoR “Energize New Mexico” grant, 2013-present

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

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

Member, American Society of Limnology and Oceanography

Member, Ecological Society of America

Member, International Society for Diatom Research

Member, New Mexico Academy of Science

Member, Organization for Tropical Studies

Member, Phycological Society of America

Member, Society for Freshwater Science

Lowrey, T.K.

Founding Member, New Mexico Rare Plant Technical Council

Member, Native Plant Society of New Mexico

California Botanical Society, 2008-present.

American Society of Plant Taxonomists, 1975-present.

Sivinski, R.

Member, New Mexico Rare Plant Technical Council

Member, Native Plant Society of New Mexico.

Regional Reviewer for the Flora of North America Project.

Tonne, P.C.

Founding Member, New Mexico Rare Plant Technical Council.

Member, Native Plant Society of New Mexico

D. Journal Referee

Bixby, R.J.

NSF (Biological Oceanography Program)-1

Algal Research-1

Lowrey, T.K.

Systematic Botany-1

Phytotaxa – 1

American Journal of Botany-1

Phytoneuron-1

10. SERVICE

B. Public Service

Lowrey, T.K.

National Science Foundation – Systematics Panelist

Institute of Museum and Library Services - Panelist

Lowrey, T.K., Phil Tonne, and Bob Sivinski:

Plant Identification for the general public in the UNM Herbarium.

Tonne, P., Joy Avritt, and Bob Sivinski. Rare plant conservation and restoration efforts in New Mexico. Current focus is on the conservation botany of the Todsens' Pennyroyal (*Hedeoma todsenii*).

C. University and Departmental Committees

Lowrey, T.K.

Committee on Governance, Co-chair.
Provost's Committee on Academic Success
Committee on Academic Assessment
Graduate Policy Committee

Curator, UNM Herbarium, Museum of Southwestern Biology

Bixby, R.J.

Program committee (appointed), Water Resources Program

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

Alex Clark (undergraduate), Department of Biology Microbiology Award (\$1000)

12. DONATIONS AND GIFTS RECEIVED

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

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

A. Faculty/Staff

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

C. Undergraduate Student Workers and Volunteers

Robinson, Kyle. Work-study Employee. Spring/Fall 2015.
Alex Clark, Student and employee for Bixby, Senior (Fall and Spring 2015)

14. MUSEUM ASSOCIATES

A. Curatorial Associates

Sivinski, R., Former New Mexico State Botanist – Forestry Division EMNRD

B. Research Associates

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

DIVISION OF MAMMALS

1. DIVISION HIGHLIGHTS.

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

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

a. Specimen growth through fieldwork

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

b. Specimen growth through donation

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

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

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

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

- F. **Publications utilizing MSB DOM specimens or data.** The DOM collection continues to be utilized heavily in a wide range of disciplines and is the basis for a large number of peer-reviewed publications and agency reports. Tracking all publications that utilize our specimens is difficult, as not all authors are careful to acknowledge use of DOM specimens, so number reported is an underestimate.

During 2015 DOM specimens were cited or specimen data was utilized in at least **69** papers published in **51** journals and **3** books:

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

G. Theses/Dissertations.

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

H. **Arctos database and collection accessibility.** The Arctos database is a cutting-edge relational database that continues to provide an invaluable resource for researchers, educators, public health workers, and natural resource managers worldwide. Arctos is web-accessible and greatly enhances the visibility of the MSB.

- a. Web visits to Arctos db tracked via Google analytics = 115,955 visits
- b. 7,641 visitors referred to our site were from GenBank.
- c. From 200 countries

d. Queries containing records from DOM, DGR Mammals, or DOM observations:

Collection	Queries	Specimen Records
DGR Mammals	898	81,844
MSB Mamm Obs	124	288
DOM	39,649	17,293,086
TOTAL	40,671	17,375,218

- I. Integration and Geo-referencing of USGS collection** – This collection is now completely catalogued, installed, and geo-referenced.
- J. Denver Museum case acquisition** – The MSB received a donation of 149 Lane style museum cases (about \$150,000 value). Of these 2/3 went to the DOM and 1/3 to Birds. These have allowed us to double stack the entire collection space and replace old upright cabinets that were holding Perissodactyla and Artiodactyla collections.
- K. New Mexico Museum of Natural History and Science collection** – Official transfer of the 6000 mammal voucher specimens in their collection was begun. The tissue collection was previously transferred.

2. COLLECTION USE

Collection Growth (specimens catalogued)	Loans (outgoing)	Loans (incoming)	Visitors	Information Requests Personally Responded to	Publications Citing MSB DOM Specimens
14,364*	35(652) / 59(1,653)**	3	570***	>500****	69

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

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

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

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

4. COURSES USING THE COLLECTIONS

UNM Classes receiving loans of material for educational purposes (14 classes serving 1,009 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 499/599 – Trop Biol-Darien Panama	(15 students)
BIOL 386L – General Vertebrate Zoology. Fall	(30 students)
BIOL 386L – General Vertebrate Zoology. Spring	(40 students)
NTSC 262L – Spring	(32 students)

NTSC 262L – Fall	(28 students)
MSST 507	(12 students)
BIOL 599 – Masters Thesis. Spring	(4 students, 1 loan)
BIOL 599 – Masters Thesis. Fall	(4 students, 9 loan)
BIOL 699 – Dissertation. Spring	(4 students, 7 loans)
BIOL 699 – Dissertation. Fall	(4 students, 3 loans)

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

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

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

Jefferson Middle school	(65 students, 5 teachers)
Montessori on the Rio Grande	(10 students, 3 teachers)
Sandia Prep	(12 students, 1 teachers)
Amy Biehl High School	(11 students, 1 teacher)
Albuquerque Academy	(12 students, 1 teacher)
Monte Vista Elementary	(1 student)
Estancia High School	(7 students, 1 teacher)
Silverton Middle school, Colorado	(7 students, 1 teacher)

Visiting researchers: 61 from 17 institutions or departments

UNM Dept of Anthro/Contract Archaeology	(10)
UNM Dept of Biology	(10)
University of Nebraska-Kearney	(2)
University of Nebraska-Omaha	(1)
Eastern New Mexico University	(1)
Texas Tech University	(4)
National University of Mongolia	(1)
USGS	(6)
Northern Arizona University	(1)
Florida State University	(2)
Seattle Central College	(2)
University of North Texas	(1)
Coastal Carolina	(1)
Yavapai College	(1)
New Mexico Museum of Natural History/Science	(1)

New Mexico State University	(1)
UNM Maxwell Museum	(1)
Other	(15)

Other visitors: 181

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

4. COURSES TAUGHT BY MSB PERSONNEL

A. Faculty/Collection Managers

Cook, J. A.

Spring:

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

Fall

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

Dunnum, J.L.

Biol 502-037 – Mammal Scientific Preparation, Spring 2015

Student Mentoring

Undergraduates

Bell, K.C.

1. Schuyler Liphardt, Distributions and diversity of Mongolian *Ochotona*. Biology undergraduate laboratory volunteer.

Colella, J.

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

Greiman, S.

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

High School Students

Dunnum, J./A. Raniszewski

1. Caroline Pierotti (Albuquerque High)
2. Irving Flores (Amy Biehl)
3. Serina Altamirano (Amy Biehl)

5. COLLECTION MANAGEMENT

The DOM received 100 new accessions of material (>12,000 specimens) and added approximately 14,364 specimens to its catalogue during 2015.

The DOM added new specimens to its catalogue during 2015 and now contains 282,206 cataloged specimens.

The collection is the 2rd largest collection in the Western Hemisphere and in the top 3 worldwide. New accessions of mammalian material amounted to >12,000 specimens.

Current projects generating specimens for DOM

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

The majority of staff time was spent:

- Development of the Arctos database.
- Reorganizing and relabeling of dry collections.
- Training student technicians in museum work.
- Preparation, cataloging and installation of museum specimens.

- Data entry for the incoming accessions.
- Filling information requests.
- Processing loan material.
- Assisting with UNM courses utilizing MSB specimens and facilities.
- Outreach to K-12 schools.

6. AWARDS, GRANTS, AND CONTRACTS

Bell, K. C.

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

Carrion, C.

Colella, J.

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

Cook, J.A.

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

Jackson, D.

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

Dunnum, J. L.

1. F15AP01070. Improved archiving of Mexican Wolf Specimens. USFWS. (2015-2016) - \$10,000
2. USGS Specimen Georeferencing (7/1/14-3/31/15). Co-PI. \$49,980. USGS
3. F11AP00643. Improved archiving of Mexican Wolf Specimens in the MSB. USFWS. (2014-2015) - \$10,000

Frederick, L.

1. Joseph Gaudin Research Scholarship UNM - \$1000

Krejsa, D.

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

McLean, Bryan

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

7. PUBLICATIONS

A. Books, Book Chapters, Edited Volumes

Dunnum, J.L.

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'Elía, Pp. 690-726. The University of Chicago Press, Chicago, IL.

B. Journal Articles

Abrahamson, B.L.

1. Abrahamson, Bethany L. "Tracking changes in natural history collections utilization: A case study at the Museum of Southwestern Biology at the University of New Mexico." *In* *Collection Forum*, vol. 29, no. 1-2, pp. 1-21.

Bell, K.C.

1. **Bell, K.C.**, D. Matek, J.R. Demboski, J.A. Cook. 2015. Expanded host range of sucking lice and pinworms in western North American chipmunks (genus *Tamias*). *Comparative Parasitology* 82: 312-321.

Cook, J. A.

1. Weckworth, B. V., N. G. Dawson, S. L. Talbot, and J. A. Cook. 2015. Genetic distinctiveness of Alexander Archipelago wolves (*Canis lupus ligoni*): reply to Cronin et al. (2015). *Journal of Heredity* 106(4): 412-414.
2. Hope, A., Waltari, E., Malaney, J., Payer, D., Cook, J. A., and Talbot, S. L. 2015. Arctic biodiversity: increasing richness accompanies shrinking refugia for a cold-associated tundra fauna. *Ecosphere* 6(9):159. <http://dx.doi.org/10.1890/ES15-00104.1>.
3. Bell, K. C., D. Matek, J. R. Demboski, J. A. Cook. 2015. Expanded host and distribution of sucking lice and pinworms in western North American chipmunks. *Comparative Parasitology* 82(2): 312-321.
4. Barker, B. S., J. Rodríguez-Robles, J. A. Cook. 2015. Climate as a driver of tropical insular diversity: comparative phylogeography of two ecologically distinctive frogs in Puerto Rico. *Ecography* 38: 769–781
5. Kohli, B. A., V. B. Fedorov, E. C. Waltari, and J. A. Cook. 2015. Phylogeography of a Holarctic rodent (*Clethrionomys rutilus*): Testing high-latitude biogeographic hypotheses and the dynamics of range shifts. *Journal of Biogeography* 42:377-389.
6. Ryan, M. J., N. J. Scott, J. A. Cook, B. Willink, G. Chaves, F. Bolaños, A. García-Rodríguez, I., M. Latella, and S. E. Koerner. 2015. Too wet for frogs: changes in a leaf litter community coincide with La Niña. *Ecosphere* 6(1):4. <http://dx.doi.org/10.1890/ES14-00352.1>

McLean, B.

1. McLean, B.S. et al. (2015) Natural history collections-based research: progress, promise, and best practices. *Journal of Mammalogy* online access. doi:dx.doi.org/10.1093/jmammal/gyv178

Weber, J.

1. Chung, O., Jin, S., Cho, Y.S., Lim, J., Kim, H., Jho, S., Kim, H., Jun, J., Lee, H., Chon, A., Ko, J., Edwards, J.S., Weber, J.A., Han, K., O'Brien, S.J., Manica, A., Bhak, J., Paek, W.K. The first whole genome and transcriptome of the cinereous vulture reveals adaptation in the gastric and immune defense systems and possible convergent evolution between the Old and New World vultures. *Genome Biology* 16(1):11 (2015).
2. Tyler, C.R., Weber, J.A., Labrecque, M., Hessinger, J.M., Edwards, J.S., Allan, A.M.. ChIP-Seq analysis of the adult male mouse brain after developmental exposure to arsenic. *Data in Brief* 5:248-54 (2015).
3. Ogasawara, Y., Torrez-Martinez, N., Aragon, A.D., Yackley, B.J., Weber, J.A., Sundararajan, A., Ramaraj, T., Edwards, J.S., Melançon, C.E. High-Quality Draft Genome Sequence of the Actinobacterium *Kibdelosporangium* sp. MJ126-NF4, Producer of the Type II Polyketide Azicemicins, Using Illumina and PacBio Technologies. *Genome Announcements* 3, e00114-15 (2015).

C. Web-Based

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

D. Technical Reports

Annual Report, Division of Genomic Resources, Museum of Southwestern Biology

Annual Report, Division of Mammals, Museum of Southwestern Biology

Annual Director's Report, Museum of Southwestern Biology

Annual (4) NSF reports

E. Theses/Dissertations Completed

Abrahamson, Bethany L. Master's degree, Museum Science.

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

Bell, K.C.

1. McLean, B.S., **K.C. Bell**, J.L. Dunnun, B. Abrahamson, J.P. Colella, E.R. Deardorff, J. Weber, A.K. Jones, F. Salazar-Miralles, J.A. Cook. Natural history collections-based research: progress, promise, and best practices. In press, *Journal of Mammalogy*.
2. Hope, A.G., J.L. Malaney, **K.C. Bell**, F. Salazar-Miralles, A.S. Chavez, B.R. Barber, J.A. Cook. Revision of the widespread red squirrels (genus *Tamiasciurus*) highlights the complexity of speciation within North American forests. In press, *Molecular Phylogenetics and Evolution*.
3. Cook, J.A., Lacey, E.A., Ickert-Bond, S.M., Hoberg, E.P., Galbreath, K.E., **Bell, K.C.**, Greiman, S.E., McLean, B.S., Edwards, S. From museum cases to the classroom: emerging opportunities for specimen-based education. in press at Archives of the Zoological Museum of Moscow State University.

Dunnun, J.

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

- McLean, B.S., K.C. Bell, J.L. Dunnum, B. Abrahamson, J.P. Colella, E.R. Deardorff, J. Weber, A.K. Jones, F. Salazar-Miralles, J.A. Cook. Natural history collections-based research: progress, promise, and best practices. In press, *Journal of Mammalogy*.

Colella, J.

- McLean, B.S., K.C. Bell, J.L. Dunnum, B. Abrahamson, **J.P. Colella**, E.R. Deardorff, J. Weber, A.K. Jones, F. Salazar-Miralles, J.A. Cook. Natural history collections-based research: progress, promise, and best practices. In press, *Journal of Mammalogy*.
- Cook JA, McLean BS, Jackson DJ, **Colella JP**, Greiman SE, Tkach VV, Jung TS, Dunnum JL. First record of the Eurasian Least Shrew (*Sorex minutissimus*) and associated helminths from Canada: new light on northern Pleistocene refugia. in review at *Canadian Journal of Zoology*

Cook, J.A.

- Cook, J.A., B.S. McLean, D.J. Jackson, J.P. Colella, S. E. Greiman, V.V. Tkach, T.S. Jung, J.L. Dunnum. 2016. First Record of the Holarctic Least Shrew (*Sorex minutissimus*) and Associated Helminths from Canada: New Light on Northern Pleistocene Refugia. *Canadian Journal of Zoology*.
- Hope, A. G., J. Malaney. K. C. Bell, F. Salazar-Miralles, A. Chavez, and J. A. Cook. 2016. Revision of widespread red squirrels (genus *Tamiasciurus*) highlights complexity of speciation within North American forests. *Molecular Phylogenetics and Evolution*. In Press.
- Bell, K.C., K. Calhoun, E. P. Hoberg, J. R. Demboski, J. A. Cook. 2016. Disparate drivers for deep host association and shallow geographic differentiation of genetic diversity for a widespread pinworm, *Rauschtineria eutamii*. *Biological Journal of the Linnean Society*.
- Kang, Hae Ji, Se Hun Gu, Joseph A. Cook, and Richard Yanagihara. 2016. Dahonggou Creek Virus, a Divergent Lineage of Hantavirus Harbored by the Long-tailed Mole (*Scaptonyx fuscicaudus*). *Tropical Medicine and Health*
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Jackson, D.

- McLean, B.S, D.J Jackson, and J.A. Cook. Rapid divergence and gene flow at high latitudes shape the history of Holarctic ground squirrels (*Uroditellus*). In revision, *Molecular Phylogenetics and Evolution*.
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Dunnum. First Record of the Eurasian Least Shrew (*Sorex minutissimus*) and Associated Helminths from Canada: New Light on Northern Pleistocene Refugia. Accepted, Canadian Journal of Zoology.

McLean, B.

1. McLean, B.S., K.C. Bell, J.L. Dunnum, B. Abrahamson, J.P. Colella, E.R. Deardorff, J. Weber, A.K. Jones, F. Salazar-Miralles, J.A. Cook. Natural history collections-based research: progress, promise, and best practices. In press, *Journal of Mammalogy*.
2. McLean, B.S. *Urocitellus parryii*. in review at *Mammalian Species*.
3. Cook, J.A., Lacey, E.A., Ickert-Bond, S.M., Hoberg, E.P., Galbreath, K.E., Bell, K.C., Greiman, S.E., McLean, B.S., Edwards, S. From museum cases to the classroom: emerging opportunities for specimen-based education. in press at *Archives of the Zoological Museum of Moscow State University*.
4. McLean, B.S., Jackson, D.J. and Cook, J.A. Rapid divergence and gene flow at high latitudes shape the history of Holarctic ground squirrels (*Urocitellus*). in review at *Molecular Phylogenetics and Evolution*
5. Cook JA, McLean BS, Jackson DJ, Colella JP, Greiman SE, Tkach VV, Jung TS, Dunnum JL. First record of the Eurasian Least Shrew (*Sorex minutissimus*) and associated helminths from Canada: new light on northern Pleistocene refugia. in review at *Canadian Journal of Zoology*

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

1. Aguiar, Ludmilla MS, Enrico Bernard, Vivian Ribeiro, Ricardo B. Machado, and Gareth Jones. "Should I stay or should I go? Climate change effects on the future of Neotropical savannah bats". *Global Ecology and Conservation* 5:22-33 (2015) 2016.
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Theses/Dissertations

1. Choi, Kenneth D. "Exploration of the Range Overlap Between *Cynomys leucurus* and *Cynomys ludovicianus*." Senior Honors thesis, Andrews University (2015).
2. Dini, Patricia. "Variabilidad genética de hantavirus causantes de síndrome pulmonar en Uruguay." MS Thesis, Facultad de Ciencias, Universidad de la Republica, Montevideo, Uruguay.
3. Kattan, K., H. Gustavo, and Alan Giraldo-López. "Estructura interna del área de distribución geográfica: el caso de la Guagua loba (*Dinomys branickii* Peters 1843)." PhD diss., Universidad del Valle, Cali, Colombia, 2014 (2015).
4. Keith, Megan S. "Phylogenetic relationships, divergence and radiation within the subfamily Neotominae (Rodentia: Cricetidae)." PhD diss., Texas Tech University, 2015.
5. Krasnec, Katina. "A novel family of major histocompatibility complex class I genes in marsupials and monotremes." Ph.D dissertation, University of New Mexico (2015).
6. Stegner, Mary Allison. "Spatial and Temporal Variation in Mammalian Diversity of the Colorado Plateau (USA)." PhD dissertation, University of California-Berkeley (2015).

8. ACTIVITIES IN LEARNED SOCIETIES

A. Invited/ Plenary talks

Cook, J.A.

1. Invited Presenter, Scientific Collections and Emerging Infectious Diseases. SciColl Workshop, Smithsonian, Washington, DC (cited in PNAS article 2016).
2. "Genomic Archives: Critical Infrastructure for Emerging Pathogen Detection". Veterans Administration, Cooperative Studies Program Clinical Research Pharmacy Coordinating Center, Albuquerque, 17 Nov. 2015
3. J.L. Dunnun and J.A. Cook. Emerging Pathogens and the Role of Natural History Archives: The Hantavirus Example. Invited Talk: AEON Workshop. University of New Mexico. 19 February 2015.

Dunnun, J.L.

4. Dunnun, J.L. Connecting NH collection data. Invited talk - ASM/IDigBio Collections Digitization and Imaging Workshop. American Society of Mammalogists meeting. Jacksonville, FL. 12 June 2015.
5. J.L. Dunnun and J.A. Cook. Emerging Pathogens and the Role of Natural History Archives: The Hantavirus Example. Invited Talk: AEON Workshop. University of New Mexico. 19 February 2015.

B. Contributed Talks/Posters

Bell, K.C.

1. Bell, K., K. Calhoun, E. Hoberg, J. Demboski, J. Cook. June 2015. Comparative parasitology: diversification of two pinworms across a widespread North American clade of rodents. Evolution, Guarujá, Brazil.

Carrion, C.

Colella, J

1. Colella, J., Yang, T., Ratan, A., Schuster, S., Talbot, S., Lindqvist, C., & Cook, J. Poster: Genomic analysis of hybridization in ermine (*Mustela erminea*). Gordon Research Conference: Ecological and Evolutionary Genomics. Biddeford, ME. 12-17 August 2015.
2. Colella, Jocelyn. "Mitogenomic phylogenetics of ermine (*Mustela erminea*) a model system for investigating the impacts of historical isolation to guide management" The Wildlife Society – Alaska Chapter of the Wildlife Society and the Northern Furbearer Conference. Juneau, AK. 14 April 2015.
 - Awarded "Best Student Presentation"

Cook, J.A.

1. Gu, S. H., H. J. Kang, L. N. Yashina, S. N. Bennett, J. A. Cook, R. Yanagihara 2015. Highly Divergent Molecular Variants of Shrew-borne Hantaviruses: Possible Ancestral Lineage in Eurasia. Asian Pacific Congress in Medical Virology, Taipei.
2. Yanagihara, R., J. L. Dunnun, J. A. Cook. 2015. Mining archival tissue collections from shrews, moles and bats to gain insights into the spatial-temporal distribution and genetic diversity of hantaviruses. European Mammal Congress. August.
3. Campbell, M. L., J. L. Dunnun, and J. A. Cook. 2015. Museum-based Bio-repositories and Biodiversity Databases in Infectious Disease Discovery and Epidemiology: An Example from the Division of Genomic Resources, Museum of Southwestern Biology. International Society of Biological Repositories. Phoenix, AZ, May.
4. Bell, K., K. Calhoun, E. Hoberg, J. Demboski, J. Cook. June 2015. Comparative parasitology: diversification of two pinworms across a widespread North American clade of rodents. Evolution, Guarujá, Brazil.
5. SPNHC
6. Dianna M. Krejsa, José A. Francés, Joseph A. Cook. Phylogeography and population genetics of North American wolverine (*Gulo gulo*). Poster, 2015 American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).
7. Jackson, D., JA Cook. "Phylogeography of the meadow vole (*Microtus pennsylvanicus*), American Society of Mammalogists (ASM) Annual Meeting, Jacksonville, FL, June 2015
8. McLean, B.S., Jackson, D.J. and Cook, J.A. Diversity, distribution and conservation of Holarctic ground squirrels: new phylogenetic insights. **American Society of Mammalogists 95th Annual Meeting, oral pres. (June 2015).**
9. Colella, J., Yang, T., Ratan, A., Schuster, S., Talbot, S., Lindqvist, C., & Cook, J. Poster: Genomic analysis of hybridization in Mustelids (*Mustela erminea* and *Martes* sp.). Gordon Research Conference: Ecological and Evolutionary Genomics. Biddeford, ME. 12-17 August 2015.
10. Runck, A. M. Matocq, J. A. Cook. 2015. Repeatability of patterns of hybridization after post-glacial contact of *Myodes rutilus* and *M. gapperi*. International Biogeography Society, meeting, Bayreuth, Germany. January.
11. Johnson, E.J., Colella, J.P. & Cook, J.A. 2015. Geometric Morphometric analysis of marten (*Martes* spp.) in northwestern North America: A closer look at insular morphology and evolution in meso-carnivores. University of New Mexico's Biology Department Research Day, Undergraduate Research Poster. Albuquerque, NM.

Dunnun, J.L.

1. Campbell, M.L., J.L. Dunnun, and J.A. Cook. 2015. The Role of Museum-Based Biorepositories and Biodiversity Databases in Infectious Disease Discovery and Epidemiology: An Example from the

Division of Genomic Resources, Museum of Southwestern Biology. International Society for Biological and Environmental Repositories (ISBER) meeting. Phoenix, AZ. 5-9 May.

2. Yanagihara, R., J. L. Dunnun, J. A. Cook. 2015. Mining archival tissue collections from shrews, moles and bats to gain insights into the spatial-temporal distribution and genetic diversity of hantaviruses. European Mammal Congress. August.

Frederick, L.

1. Frederick, Lindsey and Jocelyn Colella. March 27 2015. Poster: Stoat (*Mustela erminea*) phylogeography across Southeast Alaska: a genomic and geomorphometric approach. Castetter Hall, UNM Research Day. Albuquerque, NM.

Jackson, D.

1. American Society of Mammalogists (ASM) Annual Meeting, "Phylogeography of the meadow vole (*Microtus pennsylvanicus*), Jacksonville, FL, June 2015

Jones, Amanda K.

Kredja, D.

1. Dianna M. Krejsa, José A. Francés, Joseph A. Cook. Phylogeography and population genetics of North American wolverine (*Gulo gulo*). Poster, 2015 American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

McLean, B.

1. **McLean, B.S., Jackson, D.J. and Cook, J.A. Diversity, distribution and conservation of Holarctic ground squirrels: new phylogenetic insights. American Society of Mammalogists 95th Annual Meeting, oral pres. (June 2015).**

C. Attendance at Professional Meetings

Bell, K.C.

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

Carrion, C.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

Cook, J.A.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

Colella, J.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

Dunnun, J.L.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

Jackson, D.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

Jones, A.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

Kresja, D.

American Society of Mammalogists conference, Jacksonville, FL (15 June 2015).

McLean, B.

American Society of Mammalogists 95th Annual Meeting, (June 2015).

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

Cook, J.A.

2013-2015 - Review Editor, *Frontiers in Phylogenetics, Phylogenomics, and Systematics*

E. Service as Officer of Professional Society/Organization

Cook, J.A.

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

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

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

9. OTHER PROFESSIONAL ACTIVITIES

A. Presentations to General Audience in a Scholarly Capacity

Seminars

Cook, J.A.

1. Bernalillo Co. Open Space --Bachechi Center Naturalists Series. Public Presentation Series (MSB-organized 8 presentations) and DOM presented 2. "An Introduction to the Museum of Southwestern Biology Spring Series on Natural History along the Rio Grande."
2. "Natural History Collections and Their New Roles in Citizen Science". Bernalillo County Open Spaces Collaborative, March 7, 2015.
3. Public Presentation, "Building Research Infrastructure for Mongolia" American Center for Mongolian Studies and US Ambassador, American Culture and Information Center, Ulaanbaatar, Mongolia September 1, 2015
4. UNM STEM Workshop Presentation

Dunnum, J.

1. Bernalillo Co. Open Space --Bachechi Center Naturalists Series. Public Presentation Series. *Mammals of the Middle Rio Grande Valley*.

Workshops

Cook, J.A.

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

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

Bell, Kayce

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

Cook, J.A.

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

Dunnum, J.L.

1. Systematic Collections Committee, American Society of Mammalogists
2. Oliver Pearson Award committee, American Society of Mammalogists
3. Arctos database advisory committee
4. NEON Scientific Research Collections Technical Working Group, 2013-present.

D. Journal Referee**Bell, K**

BMC Evolutionary Biology (1)

Cook, J.A.

Canadian Field-Naturalist

Mammalian Species

Molecular Phylogenetics and Evolution

Conservation Biology; Proceedings of the National Academy of Sciences

Northwestern Naturalist

Journal of Biogeography

J. Mammalogy

Dunnum, J.L.

Journal of Zoo and Wildlife Medicine (1)

Ecosphere (1)

Vector-borne Zoonotic Diseases (1)

E. Hosting Professional Colleagues and Groups

We hosted 61 visiting academics and professionals from 17 institutions or departments and they primarily visited collections that we curate for research purposes.

Cook hosted the following individuals:

Dr. Eric Hoberg, USDA National Parasite Lab
Nyamsuren Batsaikhan, National University of Mongolia
Gana Wingard, Denver Museum of Natural History

10. SERVICE

B. Public Service

General

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

Colella, J

1. Presentation at Adobe Acres Elementary school on NM mammals.

Cook, J. A.

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

Dunnum, J. L.

1. Divisional tours and presentations – provided educational tours and information for 570 visitors (61 visiting researchers from 17 institutions, 138 students and 16 teachers from 8 K-12 schools, 13 UNM classes (165 students and 10 instructors), 181 other visitors).
2. Tour and presentation on NM mammals and mammalian adaptations for Bernalillo County Master Naturalists program.
3. Presentation on mammalian adaptations to Jefferson Middle School gifted science classes.
4. Jefferson Middle School science fair judge
5. Volunteer coach for Duke City Soccer Organization. U16 girls.
6. Board member – Albuquerque High School band.
7. Contributed specimens and text for NMMNHS exhibit "Cabinet of curiosities".
8. Prepared exhibit material on mammalian conservation for Laguna Pueblo Jr. Ranger Expo.

Jackson, D.

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

Krejsa, D.

1. Jefferson Middle School Science Fair Judge 1/23/2015

C. University and Departmental Committees

Cook, J.A.

1. Chair, MSB Executive Council*
2. Curator, Division of Genomic Resources, Museum of Southwestern Biology
3. Curator, Division of Mammals, Museum of Southwestern Biology
4. Chair, Annual Faculty Evaluation Committee*

5. Chair, Graduate committees -13 students
6. Graduate committee – 11 other students
7. College of Arts and Sciences, Deans and Directors Council
8. UNM Museum Studies Exec Council
9. UNM Museum Council—Chair*

Dunnum, J.L

1. MSB Space Committee

12. DONATIONS AND GIFTS RECEIVED

Virginia Rausch \$4000

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

13. CURRENT STAFF

A. Faculty/Staff

Joseph A. Cook, Curator

J.L. Dunnum, Collection Manager

M.A. Bogan, Emeritus Curator

J.S. Findley, Emeritus Curator

Stephen O. MacDonald, Curator II (retired)

Adrienne Raniszewski, Curatorial Assistant

B. Graduate students

Bell, Kayce. 5th year Ph.D. student. Systematics and phylogeography of chipmunk lice.

McLean, Bryan. 4th year Ph.D. student. Systematics and phylogeography of ground squirrels.

Rearick, Jolene. 9th year Ph.D. Phylogeography and molecular evolution of freeze tolerance in *Lithobates sylvaticus*.

Jessica Weber. 5th year Ph.D student. Hypoxia tolerance and adaptive responses in Caviomorph rodents.

Colella, Jocie. 3rd year Ph.D student. Patterns of phylogeography, hybridization and diversity of mustelids (*Mustela ermine* and *Martes* spp.) across northwestern North America.

Liphardt, Schuyler. 1st year Master's student. Hantavirus evolution.

Jones, Amanda. 2nd year Master's student. Mammals of the Gila River ecosystem.

Jackson, Donovan. 1st year Master's student. Phylogeography of the meadow vole *Microtus pennsylvanicus*.

Krejsa, Diana. 2nd year Master's student. Phylogeography and population genetics of North American wolverine (*Gulo gulo luscus*).

Grad Student workers

3. Schuyler Liphardt
4. Dianna Krejsa

C. Undergraduate Student Workers and Volunteers

Undergraduate Workers (10 total)

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

Volunteers (37 total and 719 volunteer hours)

Undergraduate Volunteers – (9)

1. Anna Kebler
2. Cindy Smoak
3. Miguel Medina
4. Milena Carvalho
5. Shannen Lopez
6. Shannon O'Brien
7. Steven Guerin
8. Veronica Koomson-Maiden
9. Victoria Bowler

High School Volunteers – (16)

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

Other Volunteers – (12)

- Anita Bruce (homeschool mom)
- Kaylen Jones (recent UNM grad)
- Lance Robinson (Mandy's Farm)
- Lindsey Frederick (recent UNM grad)
- Mo Hobbs
- Susan Stark
- Josh Stark
- Adrienne Warner (Master Naturalist intern)
- Bruce Lambert (Master Naturalist intern)
- Lisa Hada (Master Naturalist intern)
- Teresa Skiba (Master Naturalist intern)
- Jan Henfling (Master Naturalist intern)

14. MUSEUM ASSOCIATES

A. Curatorial Associates

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

B. Research Associates

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

Sandy Talbot, Molecular Ecology Lab- USGS Anchorage, AK
Fernando Torres Perez, Vina del Mar, Chile
Ernie Valdez, USGS-UNM, Tijeras, NM
Alasdair Veitch, Department of Renewable Resources, Norman Wells, NWT, Canada
Jack Whitman, Ketchum, ID
Don E. Wilson, Smithsonian (retired), Washington, DC
Nyamsuren Batsaikhan, National University of Mongolia, Ulaan Baatar

Natural Heritage New Mexico Division

1. DIVISION HIGHLIGHTS

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

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

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

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

The Zoology Group conducts field research and modeling of the habitats of animal species of conservation concern in New Mexico. We provide habitat management recommendations and create management plans for animals of conservation concern and their habitats. In 2015, we cooperated with Animas Biological Studies, Durango, CO, to begin a landscape-scale habitat model for piñon-juniper birds of conservation concern at the Bureau of Land Management Farmington, NM Resource Area. We continued work on a four-year habitat

modelling project for the dunes sagebrush lizard, a sensitive species of southeastern New Mexico. We completed a habitat use study of grassland and shrubland birds at Holloman Air Force Base (HAFB), surveyed HAFB shrublands for raptors, and continued a long-term monitoring project of wetland invertebrates and birds at the HAFB Wetlands.

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

2. TABLE OF COLLECTION USE

Collection Growth (specimens catalogued)	Loans (outgoing)	Loans (incoming)	Visitors	Information Requests Personally Respond to	Publications Citing MSB Specimens
10,545 new records, 7,184 updated records	NA	NA	5,081 visitors to web site	124 Custom	Unknown but 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 2015 the Conservation Data Management Group worked on several initiatives to add to our conservation information. Under the supervision of our assistant data manager, three student employees added over 10,000 observation records for rare and endangered species at over 7,000 locations across New Mexico. We finalized a data exchange protocol with BLM for sensitive species data. We now have data exchange protocols with all the major land management and wildlife agencies.

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

6. AWARDS, GRANTS, AND CONTRACTS

NHNM AWARDS:

\$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. \$1,433 (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

ESA Vegetation Classification Panel (Franklin, S., P. Comer, J. Evens, E. Ezcurra, D. Faber-Langendoen, J. Franklin, M. Jennings, C. Josse, C. Lea, O. Loucks, E. Muldavin, R. Peet, S. Ponomarenko, D. Roberts, A. Solomeshch, T. Keeler-Wolf, J. Van Kley, A. Weakley, A. McKerrow, M. Burke, and C. Spurrier). 2015. How a national vegetation classification can help ecological research and management. *Frontiers in Ecology and the Environment* 13: 185–186. <http://dx.doi.org/10.1890/15.WB.006>

C. Web-Based

D. Technical Reports

Johnson, K., L. Wickersham, J. Smith, Petersen, N., and J. Wickersham. 2015. Nest-scale habitat use by Pinyon Jay and Gray Vireo in the BLM Farmington Resource Area 2013-2014. Natural Heritage New Mexico Publication #15-GTR-386. Biology Department, Museum of Southwestern Biology, University of New Mexico, Albuquerque, NM.

Johnson, K., M. Horner, E. Muldavin, P. Neville, T. Neville, and J. Smith. 2015. Dunes sagebrush lizard habitat map and models, New Mexico. Natural Heritage New Mexico. Publ. No. 15-GTR--384.

Muldavin, E., E. Milford, N. Umbreit, and Y. Chauvin. 2015. 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. Final Report to the Bureau of Reclamation, Albuquerque NM.

F. Work In Progress

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 preparation.

Sadoti, G., T. Albright, and K. Johnson. Applying dynamic species distribution modeling to lek-mating species. In review, Journal of Biogeography.

Sadoti, G., K. Johnson, and T. Albright. Modelling environmental and survey influences on lek attendance using long-term lek survey information. In press, Ibis.

Sadoti, G., K. Johnson, J. Smith, and N. Petersen. Vegetation gradients predict seasonal avian richness and abundance in a Chihuahuan Desert grassland. In review, Journal of Arid Environments.

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

8. ACTIVITIES IN LEARNED SOCIETIES

B. Contributed Talks/Posters

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

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

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

E. Service as Officer of Professional Society/Organization

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

9. OTHER PROFESSIONAL ACTIVITIES

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

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

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

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

K. Johnson: NM Prairie Dog Working Group, New Mexico Burrowing Owl Working group.

E. Muldavin, R. McCollough, New Mexico Rare Plant Technical Council.

R. McCollough: Jemez Mountains salamander recovery team; Dune Sagebrush Lizard GIS Group.

D. Journal Referee

E. Muldavin: Journal of Vegetation Science

10. SERVICE

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

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

B. Public Service

13. CURRENT STAFF

A. Faculty/Staff

Paul Arbetan, Research Assistant Professor

Lisa Arnold, GIS Analyst

Yvonne Chauvin, Sr. Research Tech/Life Sciences

Mitchell East, Data Analyst

Kristine Johnson, Research Associate Professor

Rebecca Keeshen, Unit Administrator I

Rayo McCollough, Database Administrator

Elizabeth Milford, Research Scientist III

Esteban Muldavin, Research Associate Professor

Teri Neville, GIS Analyst

Nathan Petersen, Field Research Tech/Life Sciences

Jacqueline Smith, Sr. Research Tech/Life Sciences

Hannah Varani, Sr. Field Research Tech

B. Graduate students

Hannah Varani (M.S.)

Jack Triepke (Ph.D.)

C. Undergraduate Student Workers and Volunteers

Amy Adams

Zach Andres

Kimberly Allen

Natalia Moore

Casey Myers

Brett Reynolds

DIVISION OF PARASITES

METRIC DESCRIPTIONS

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

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

2. Loans Out: 8 (369 specimens)

3. Professional visits to the collection: 3

4. Collection Database Web Site hits: MSB Parasites UNM webpage had 1,506 views.

Arctos Database: number of queries 3,149 for 1,246,268 records for Parasites and number of queries 6,392 for Hosts for 1,172,609 records.

5. Outside Publications citing MSB specimens: 14 (637 specimens)

6. Peer-Reviewed Publications by Staff: 7

7. UNM courses using the collections: 2

8. Graduate Students: 3

9. Graduate Theses/dissertations completed: 1

10. Undergraduate students: 5

11: Grants/contracts in Force: 5

1. DIVISION HIGHLIGHTS

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

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

Acquisition of Olympus Research Compound Microscope with image capture capabilities

Continuation of NSF and NIH grant work

Expeditions to Kenya (Loker, Laidemitt), California (Gendron), Colorado (Brant)

Snail collections for digenetic trematodes (Brant, Gendron)

<http://www.dailylobo.com/article/2015/01/2015-1-15-parasite-museum>

2. COURSES USING THE COLLECTIONS

TERM	COURSE	TITLE	STUDENTS
Fall 2015	BIO482/582	Parasitology	15
Summer	STEM	Field Parasitology and Museum Curation	3

3. COURSES TAUGHT BY MSB PERSONNEL

ERIC S. LOKER

Graduate

Biology 502- Parasites and Hosts – Spring and Fall – 4 students Spring; 4 students Fall

Biology 551 – Research Problems – Spring and Fall – 1 student each semester

Biology 699- Dissertation – Spring and Fall – 4 students each semester

Undergraduate

Biology 402 – Parasites and Hosts – Fall – 1 student

Biology 419 – Concepts in Parasitology (split with Bruce Hofkin) – Spring – 37 students

SARA V. BRANT

Undergraduate

Biology 400 - Senior Honors Thesis - 1 student Spring

Summer STEM course: Field Parasitology and museum curation

Graduate

Biology 551 - Research Problems - 1 student Spring/Fall

Graduate Student laboratory teaching:

NONE

COLLECTION MANAGEMENT ACTIVITIES

Continued development of the Arctos Database for hosts and parasites

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

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

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

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

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

1 May 2015 12:00-13:30 Webinar - After Disasters: Salvage and Recovery in Small and Mid-sized Museums and Libraries

Other than specimens from paper submissions, UNM researchers and projects that generate specimens for the Division include:

Schistosome Diversity Project (Brant and Loker) - NSF;
Nematomorph Diversity Project (Hanelt) - NSF;
Beringia Coevolution Project (Cook) - NSF;
Epidemiology of schistosomiasis in Kenya (Loker) – NIH;
The ongoing cataloguing/integration of the Rauch Helminthological Collection.

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

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

AWARDS, GRANTS, AND CONTRACTS

Awarded:

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

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

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

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

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

PEER REVIEWED PUBLICATIONS BY MSB PERSONNEL (BOLDED)

Journal Articles

Horak P, Libor M, Lichtenbergova L, Skala V, Soldanova M, **Brant SV**. 2015. Avian schistosomes and outbreaks of cercarial dermatitis. *Clinical Microbiology Reviews* 28: 165-190.

Narayanan J, Mull BJ, **Brant SV**, **Loker ES**, Collinson J, Secor WE, Hill VR. 2015. Real-time PCR and Sequencing Assays for Rapid Detection and Identification of Avian Schistosomes in Environmental Samples. *Applied and Environmental Microbiology* 81(12):4207-15. doi: 10.1128/AEM.00750-15.

Karen L. Sweazea*, Anna Simperova, Tiffany Juan, Alice Gadau, **Sara V. Brant**, Pierre Deviche, Catherine Jarrett. 2015. Pathophysiological responses to a schistosome infection in a wild population of mourning doves (*Zenaida macroura*). *Zoology* 118: 386-393 [doi:10.1016/j.zool.2015.07.001](https://doi.org/10.1016/j.zool.2015.07.001)

Devkota R, Brant SV, Loker ES. 2015. The *Schistosoma indicum* species group in Nepal: presence of a new lineage of schistosome and use of the *Indoplanorbis exustus* species complex of snail hosts. *International Journal for Parasitology* 45: 857-870 DOI: 10.1016/j.ijpara.2015.07.008

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

Flores V, **Brant SV, Loker ES.** (2015). Avian schistosomes from the South American endemic gastropod genus *Chilina* (Pulmonata: Chiliniidae), with a brief review of South American schistosomes species. *Journal of Parasitology* 101: 565-576.

Loker, E.S. and Hofkin, B.V. 2015. *Parasitology: a conceptual approach*. Garland Press. 550p.

Zhang, S-M, Buddenborg, S.K., Adema, C.M., Sullivan J.T., and **Loker, E.S.** 2015. Altered gene expression in the schistosome-transmitting snail *Biomphalaria glabrata* following exposure to niclosamide, the active ingredient in the widely used molluscicide Bayluscide. *PLoS Negl Trop Dis* 9(10):e0004131. [doi:10.1371/journal.pntd.0004131](https://doi.org/10.1371/journal.pntd.0004131).

PUBLICATIONS USING/donating MSB data/specimens

Smith MM, Ramey AM. 2015. Prevalence and genetic diversity of haematozoa in South American waterfowl and evidence for intercontinental redistribution of parasites by migratory birds. *International Journal for Parasitology: Parasites and Wildlife* 4:22-28.

Aldhoun J, Horne EC. 2015. Schistosomes in South African Penguins. *Parasitology Research* 114: 237-246, **DOI:** 10.1007/s00436-014-4185-1.

Gustafson KD, Bolek MG. 2015. Tradeoff Between Establishing an Infection and Killing the Host: Response of Snails (*Physa acuta*) to a Gradient of Trematode (*Halipegus eccentricus*) Exposures. *Journal of Parasitology* 101: 104-107.

Pratap Kafle, Manigandan Lejeune, Guilherme G. Verocai, Eric P. Hoberg, and Susan J. Kutz. 2015. Morphological and morphometric differentiation of dorsal-spined first stage larvae of lungworms (Nematoda: Protostrongylidae) infecting muskoxen (*Ovibos moschatus*) in the central Canadian Arctic. *International Journal for Parasitology: Parasites and Wildlife* 4(3): 283–290. [10.1016/j.ijppaw.2015.05.003](https://doi.org/10.1016/j.ijppaw.2015.05.003)

Sean A Locke, Fatima S Al-Nasiri, Monica Caffara, Fabiana Drago, Martin Kalbe, Angela Rose Lapierre, J Daniel McLaughlin, Pin Nie, Robin M Overstreet, Geza T R Souza, Ricardo M Takemoto, David J Marcogliese. 2015. Diversity, specificity and speciation in larval Diplostomidae (Platyhelminthes: Digenea) in the eyes of freshwater fish, as revealed by DNA barcodes. *International Journal for Parasitology*. 45(13):841-55. [doi: 10.1016/j.ijpara.2015.07.001](https://doi.org/10.1016/j.ijpara.2015.07.001).

Makarikov, A.A., Nims, T.N., Galbreath, K.E., Hoberg, E.P. 2015. *Hymenolepis folkertsi* n. sp. (Eucestoda: Hymenolepididae) in the oldfield mouse *Peromyscus polionotus* from the southeastern Nearctic with comments on tapeworm faunal diversity among deer mice. *Folia Parasitologica*. 114(6):2107-2117.

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

Vhora MS1, Bolek MG. 2015. Temporal occurrence and community structure of helminth parasites in southern leopard frogs, *Rana sphenoccephala*, from north central Oklahoma. *Parasitology Research* 14(3):1197-206. doi: 10.1007/s00436-014-4303-0

John E. Ubelaker, Bretton S. Griffin, Genevieve M. Konicke, Nora Abdullah, Aya Mouhaffel, Donald Duszynski, and Robert L. Harrison. 2015. Metazoan Endoparasites of the Gray Fox, *Urocyon cinereoargenteus* from New Mexico. *Manter: Journal of Parasite Biodiversity Occasional Papers* 1.

John E. Ubelaker, Nora Abdullah, Aya Mouhaffel, Rashmi Ananadampillair, Caitlyn Emigh, Scott L. Gardner. 2015. Natural infections of tetrathyridia of species in deer mice, from New Mexico. *The Southwestern Naturalist* 59(3):404-406.

Hanelt B, Schmidh-Rhaesa A, Bolek M. 2015. Cryptic speciation of a hairworm parasite revealed by molecular data and crowdsourcing of specimen collections. *Molecular Phylogenetics and Evolution* 82: 211-218. doi: 10.1016/j.ympev.2014.09.010

Dissertations/Theses Based on MSB Specimens/Data

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

ACTIVITIES IN LEARNED SOCIETIES

1. Invited/Plenary Talks and Seminars

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

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

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

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

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

Brant SV, Loker ES*. 2015. Schistosome Diversity: An Update. 2nd International, 9th National Iranian Congress of Parasitology, Guilan, Iran 20-22 May.

Brant SV*, Loker ES. 2015. Cercarial dermatitis and the diversity of the genus *Trichobilharzia*. 2nd International, 9th National Iranian Congress of Parasitology, Guilan, Iran 20-22 May.

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

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

Brant SV*, Ebbs, ET^, Loker ES, Viozzi,^ Flores V. (2015). ORAL: *Trichobilharzia* in the New World: Argentinian species offer a first glimpse of species diversity across hosts and the American continents. American Society of Parasitologists, Omaha, Nebraska, 25-2 June 2015.

Brant SV, Ebbs, ET^, Loker ES, Viozzi,^ Flores V*. (2015). ORAL: *Trichobilharzia* in the New World: Argentinian species offer a first glimpse of species diversity across hosts and the American continents. VII Congreso Argentino de Parasitologica, San Carlos de Bariloche, Argentina, 1-5 November 2015.

Ebbs, ET*^, Loker ES, Brant SV. (2015). ORAL: Invasion genetics of the globally invasive snail, *Physella acuta* (Draparnaud 1805) and its potential as an intermediate host to larval trematodes. American Society of Parasitologists, Omaha, Nebraska, 25-2 June 2015.

Ebbs, ET*^, Loker ES, Brant SV. (2015). ORAL: Invasion genetics of the globally invasive snail, *Physella acuta* (Draparnaud 1805) and its potential as an intermediate host to larval trematodes. Southwestern Association of Parasitologists 16-18 April 2015

Laidemitt, M.R*^., M.W. Mutuku, G.M. Mkoji, and E.S. Loker. ORAL: Exploiting biotic diversity to control human disease: schistosomes and competing trematode larvae in Kenyan freshwater habitats. Fancy Gap Immuno-parasitology Workshop, 2015

Brooke Thurston*^, Niccolette Ochoa^, Ryan L. Barber^, Elias A. Salazar^, Lizon Cenac^, Laurel Cenac^, Mariel L. Campbell. POSTER: Parasites and Hosts in the Robert L. and Virginia R. Rausch Collection: Taxonomic and Geographic Distribution. Southwestern Association of Parasitologists, Lake Texoma, OK, April 2015.

Mariel L. Campbell*, Gordon Jarrell, Chris Jordan, Dusty L. McDonald, Joseph A. Cook; Eric P. Hoberg. Integrating Across Collections: Parasite/Host Relationships in the Arctos Collections Database. Society for the Preservation of Natural History Collections, Gainesville, FL, May 17-23, 2015.

3. Attendance at Professional Meetings

Loker, E.S.

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

Brant, S.V.

- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.
- American Society of Parasitologists, Omaha, Nebraska, June.
- 2nd International and 9th National Congress of Parasitology, 20-22 May 2015, Guilan University of Medical Sciences, Iran

Campbell, M.

- Society for the Preservation of Natural History Collections, Gainesville, FL, May 17-23, 2015
- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

Gendron, E.T.

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

Laidemitt, M.R.

- Fancy Gap Immuno-Parasitology Workshop 2015

Thurston, B (REU undergraduate).

- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

Ochoa, N. (REU undergraduate).

- Southwestern Association of Parasitologists, Lake Texoma, Oklahoma, April.

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

Loker, E. S. Guest Editor, PLoS Neglected Tropical Diseases, June 2015.

Loker, E. S. Editorial Board, Journal of Helminthology

5. Service as Officer of Professional Society/Organization

Brant, S.V.

2015-2020 Council Member-at-Large of the American Society of Parasitologists

2015-2020 Chair of the Membership Committee for American Society of Parasitologists

OTHER PROFESSIONAL ACTIVITIES

1. Presentation to General Audience in a Scholarly Capacity

Brant, S.V.

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

Ebbs (Gendron), E.

Jan. 2015 - Cafe Scientifique, Around the Science World in 80 minutes - presenter

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

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

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

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

4. Journal Referee

Loker, E.S.

Approximately one dozen in 2015

Brant, S.V.

Journal of Parasitology, Parasite International, Parasitology Research, Journal of Helminthology

Public Service

- Jefferson Middle School Honors Science Classes tour, Sara Brant
- New Mexico Museum of Natural History “Out of the Cabinet” contribution of *Riberoria* life cycle. Sara Brant
- Bernalillo County Open Space Naturalist Series Fall Edition: 21 Nov Revealing the lives of the parasites among us in the Rio Grande Bosque. Sara Brant
- Interview with 8th grader Lily Ramsay, at Francis Howell Middle School Missouri, about museums and parasitology. 40 minute conversation. Sara Brant
- Cafe Scientifique, Around the Science World in 80 minutes – Erika Ebbs (Gendron)

ADVANCED STUDY, HONORS, AWARDS, FELLOWSHIPS, ETC.

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

CURRENT STAFF

Faculty and Staff

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

Graduate students

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

Undergraduate Student Workers and Volunteers

Emily Sarvis

Brooke Thurston

Niccolette Ochoa

MUSEUM ASSOCIATES

Curatorial Associates

Research Associates