

Vertebrate Division of the Biodiversity Research Collections



Strategic Plan 2022-2027

Proposed by 2021 Vertebrate Collections Committee:
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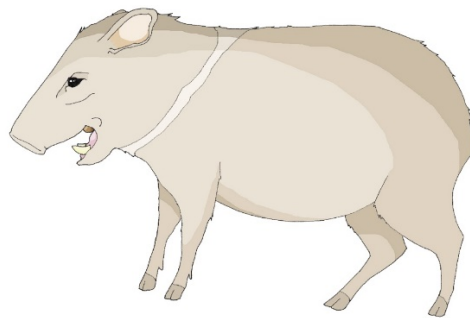


STRATEGIC PLAN

Vertebrate Division of the Biodiversity Research Collections
Department of Ecology and Evolutionary Biology
University of Connecticut
Summer 2022

TABLE OF CONTENTS

I.	EXECUTIVE SUMMARY.....	1
II.	OVERVIEW	1
A.	HISTORY	1
B.	MISSION	3
C.	VISION	3
III.	ORGANIZATION.....	3
A.	UNIVERSITY POSITION.....	3
B.	STAKEHOLDERS (key stakeholders are underlined)	4
IV.	STRATEGIES, GOALS, and OBJECTIVES	5
A.	STRATEGIES.....	5
B.	GOALS and OBJECTIVES	5
V.	ENVIRONMENTAL SCAN	7
VI.	SUSTAINABILITY	7
A.	INTERNAL: MAINTAINING STRENGTHS AND ADDRESSING WEAKNESSES	7
B.	EXTERNAL: CAPITALIZING ON OPPORTUNITIES AND MINIMIZING THREATS.....	8
VII.	ACKNOWLEDGMENTS.....	8



I. EXECUTIVE SUMMARY

Biodiversity collections are an important resource for understanding past changes to natural resources and in projecting, mitigating, and adapting to future changes. Collection specimens provide data for teaching and research on biodiversity, biogeography, invasive species, climate change, ecotoxicology, and extinct and endangered species. Because vertebrates draw a level of interest from policy makers and the public disproportionate to their representation in the biosphere, vertebrate biodiversity collections are especially important public resources and research repositories.

As we look to the future, the UConnBRC Vertebrate Division embraces three core priorities that coincide with the broader philosophy of the University of Connecticut: (1) scientific innovation, discovery, and creativity; (2) transformative teaching experiences for students; and (3) broad engagement with the public. Our major emphases over the next five years are:

- Increasing the visibility and accessibility of high-quality data associated with all four collections in the Vertebrate Division of the BRC. This will simultaneously increase the use of our vertebrate specimens in novel research projects at UConn and beyond.
- Engaging with students of all levels across the UConn community to provide unique learning experiences involving authentic research and student training in all facets of vertebrate specimen preparation, preservation, and utilization.
- Designing and creating engaging, informative displays in public areas of the Biophysics building on the UConn campus, where the BRC is located, encouraging visitors to more readily engage with our vertebrate collections.
- Continuing to cultivate and disseminate our reputation as an invaluable resource for students, faculty, and the public through our activities related to education, fellowship, leadership, and service.

This strategic plan includes a roadmap for evaluating progress by identifying concrete steps to achieve success, measures for quantifying outputs, and outcomes we expect to generate as a result of our activities. The predominant obstacle that impedes our pursuit of these goals is staffing inadequacy. In contrast to other divisions in the BRC, the Vertebrate Division does not have a full-time collections manager.

II. OVERVIEW

A. HISTORY

The University of Connecticut's (UConn) vertebrate collections in the Biodiversity Research Collections (BRC) embody a long history of scholarly engagement with natural history. UConnBRC includes vertebrate specimens collected by Grinnell in 19th century, Bingham and Sage in the early 20th century, and notable biologists of the latter half of the 20th century including mammalogist Ralph Wetzel. Our collections are focused on the fauna of our region,

offering opportunities to investigate biotic patterns arising from gradients in climate, human land use, and a mosaic of landforms; furthermore, the region has also been subjected to, and continues to undergo, pronounced natural and anthropogenic changes in time.

The UConnBRC **bird** collection comprises more than 10,000 specimens with an emphasis on the avifauna of Connecticut and the northeastern region of the USA. Most of our specimens are preserved as round study skins, though we also have some taxidermy specimens. The collection includes approximately 1,000 bird skeletons, over 1,000 fluid preserved birds, an egg collection of more than 2,000 eggs in 1,440 sets, and one of the few known feather collections in the world (from the work of Alan Brush). The collection began with the donation of study skins, (dated between 1875 to 1925) from the private collections of J. H. Sage and W. E. Treat. Our collection of study skins holds more Connecticut specimens than any other natural history collection in the world.

The UConnBRC **fish** collection contains an estimated 10,000 specimens of more than 700 species, predominantly preserved in ethanol. Most specimens are from Connecticut, and provided the taxonomic and distributional data presented in widely-used statewide guides to freshwater and marine fishes. The fish collection includes good representation of the fish families of the world, but the strength of this collection is as a repository for specimens documenting taxonomic and distributional data presented in 2 major works, "*The Freshwater Fishes of Connecticut*" by Walter Whitworth and "*The Saltwater Fishes of Connecticut*" by Keith Stewart Thomson. These surveys involved collection of fishes from thousands of temporary and permanent bodies of water within the state, as well as along the entire coast. The freshwater data are especially important because two intensive, specimen-based surveys were conducted that now provide an historical record of the state's fauna. The majority of the specimens are preserved in ethanol, but we also have a small series of mounted skeletons.

The UConnBRC collection of **herpetofauna** comprises over 5,000 ethanol-preserved specimens of reptiles and amphibians from around the globe, with Connecticut and the northeastern US particularly well represented. In addition to local species, there are frogs from South Korea and the Middle East, lizards from Puerto Rico and South Africa, snakes from Paraguay, and salamanders from the southeastern USA.

The UConnBRC **mammal** collection comprises more than 12,000 specimens. Taxonomic coverage of the New England mammal fauna is deep and comprehensive, and detailed field notes accompany many of these specimens. Another significant component of this collection is material collected in expeditions to Paraguay and other South American locales. The diversity and size of this collection is primarily creditable to the late [Ralph Wetzel](#). The collection grew as a consequence of Dr. Wetzel's NSF-supported program on the mammals of Paraguay. One particularly exciting and notable result of this project was the "rediscovery" of the Chacoan peccary (*Catagonus wagneri*), once thought by US-based scientists to be extinct. Wetzel later extended his collections to several other South American countries. As a result, our collection includes many South American ungulates, marsupials, canids, and rodents. We believe that this collection ranks among the top 5 in the world with respect to South American cats (many of the

species included in our collection are now considered to be endangered or threatened), and among the top 10 collections in its coverage of South American mammals. The collection also includes moderate representation of mammals from outside North and South America, most notably from Lebanon, Iraq, Turkistan, England, and Germany (reflecting the interests of previous students).

B. MISSION

The Vertebrate Division of the BRC at UConn is a rich resource of specimens and data dedicated to research, teaching, and outreach. Its holdings are curated to the highest standards for use by the research community; formal and informal instruction using our collections helps prepare the next generation of herpetologists, ichthyologists, mammologists, and ornithologists; it contributes biodiversity data to worldwide digitization efforts; and it inspires and empowers the people of UConn, Connecticut, and the whole world to experience, value, and conserve the wonders of nature.

C. VISION

The Vertebrate Division of the BRC will develop and implement innovative modes of undergraduate instruction in natural history collections, will engage the university community in communicating about the value of vertebrate life, and will become available as a resource for scholarly research in vertebrate specimens throughout all of our collections.

III. ORGANIZATION

Vertebrate Collections Strategic Planning Partners:

Vertebrate Collections Manager, Dr. Erin Kuprewicz

Director of Vertebrate Collections and Curator of Fishes, Dr. Eric Schultz

Curator of Birds, Dr. Margaret Rubega

Curator of Herpetofauna, Dr. Elizabeth Jockusch

Curator of Mammals, Dr. Michael Willig

These partners were recruited to the Vertebrate Collections Strategic Planning Committee because of their high level of involvement in the vertebrate collections, as well as to reflect the fundamental values of our organization: education, collegiality, and diversity.

A. UNIVERSITY POSITION

The vertebrate collections are part of the integrated Biodiversity Research Collections (BRC) within the Department of Ecology and Evolutionary Biology (EEB) in the College of Liberal Arts and Sciences (CLAS) at the University of Connecticut (UConn). The BRC is broadly divided into vertebrates (birds, fishes, herpetofauna, and mammals), plants (herbarium and paleobotany),

and invertebrates (arthropods, parasites, and a small number of mollusks). Each division has its own Collections Manager and Director. There are also faculty Curators for each discipline within the divisions (*e.g.*, birds, fishes, paleobotany), and the entire facility is overseen by a faculty Director. This integration promotes cross-discipline collaboration, assistance, and collegiality.

The vertebrate collection is multifaceted, containing specimens from four taxonomic disciplines: (1) birds (10,813 specimens), (2) fishes (about 8,500 specimens), (3) herpetofauna (about 6,900 specimens), and (4) mammals (12,725 specimens). Most bird and mammal specimens are skeletal and/or skin preparations (“dry” collections) whereas most fish and all herpetofauna are preserved in ethanol (“wet” or “spirit” collections) (**Table 1**).

Discipline	Skeletal	Skin	EtOH	Other
Birds	X	X	X	Nests, eggs, feathers
Fishes	X	---	X	
Herpetofauna	---	---	X	Some turtle shells
Mammals	X	X	X	

Table 1. Types of specimen preparations within each of the four disciplines in the vertebrate collections. “X” indicates the presence of a preparation type, “---” indicates the absence of a preparation type.

The vertebrate collections have one part-time staff member (the Collections Manager), who is supervised by the Director of Vertebrate Collections (faculty position within EEB).

B. STAKEHOLDERS (key stakeholders are underlined)

1. Vertebrate Collections staff: collections manager, curators, undergraduate employees, summertime graduate student employees
2. Director of the Biodiversity Research Collections
3. Members of the Vertebrate Collections Strategic Planning Committee
4. Curators and collections managers of the other Biodiversity Research Collections divisions
5. Students in the following classes: (1) EEB 5500, Introduction to Natural History Collections course, (2) EEB 3254, Mammalogy (3) EEB 3265/EEB 5265, Herpetology, (4) EEB 4200, Biology of Fishes, (5) EEB 4260, Ornithology, (6) EEB 2214, Biology of the Vertebrates, (7) BIOL 1102, Foundations of Biology, and (8) BIOL 1108, Principles of Biology II
6. Dean of the College of Liberal Arts and Sciences
7. University faculty who use the vertebrate collections for research, teaching, and/or to deposit specimens
8. Regional herpetologists, ichthyologists, ornithologists, and mammalogists

9. Graduate and undergraduate students who conduct research/independent study in the vertebrate collections
10. Head of the Department of Ecology and Evolutionary Biology
11. Volunteers in the vertebrate collections
12. UConn faculty and students who attend tours of the BRC for coursework
13. Public school students/community members (usually through tours and/or Skype-a-Scientist), and the Natural Resources Conservation Academy (NRCA) in the Institute of the Environment (IoE)
14. Collaborators in the Connecticut State Museum of Natural History (CSMNH) in IoE
15. Connecticut Department of Energy and Environmental Protection (DEEP)
16. United States Fish and Wildlife Service (USFWS)
17. Online data repositories: VertNet, GBIF, iDigBio, Specify, Arctos
18. Global users of data we post online
19. Land trusts and regional nonprofits (*e.g.*, White Memorial Conservation Center)
20. People of the State of Connecticut
21. Other collections with whom we have exchange/loan/gift relationships
22. National Science Foundation (NSF) and other funding sources

IV. STRATEGIES, GOALS, and OBJECTIVES

A. STRATEGIES

The UConn Vertebrate Collections furnish user-friendly access to data, specimens, and expertise documenting historical and present biodiversity of Connecticut and provide exemplary experiential learning in a welcoming environment that catalyzes inquiry, collaboration, and exploration.

B. GOALS and OBJECTIVES

- Provide accessible, high-quality data and images to enable and facilitate specimen-based research. Ongoing.
- Make bird data available online in Arctos. 2023 (partially available in system now, but not publicly available).
- Transfer mammal data to Arctos. 2023.
- Create an Arctos database for herps. 2023.
- Create an Arctos database for fishes. 2023.
- Develop a collecting/accession strategy for each collection. 2023.
- Develop criteria for allocating remaining “expansion space” to future accessions
- Develop and implement an organized, efficient strategy for compiling a list of publications each year that have used data and specimens from UConn BRC vertebrate collections. Ongoing.
- Design and implement engaging, experiential learning opportunities that attract students from across the UConn community while inspiring them to apply new skills to graduate study or

careers in collections management, biodiversity research, museum studies, etc. Ongoing (e.g., Skinning Club).

- Update and revise content for the Introduction to Natural History Collections course (EEB 5500), using developments in the field and student reviews as a guide. Ongoing.
- Explore expanding the Introduction to Natural History Collections course to a full semester offering. 2023.
- Enhance course marketing efforts within the department (EEB) and college (CLAS) as well as across campus. Ongoing.
- Implement a tiered apprenticeship program in natural history collections management for undergraduates. Ongoing/2027.
- Track post-graduation activities of students (graduate and undergraduate) who have worked in the UConnBRC vertebrate collections. Ongoing.
- Create visually interesting, educational displays to engage students and visitors to the Biology Physics Building lobby by showcasing natural history research. Ongoing.
- Redesign display case in main lobby and create sustainable plan to redesign biannually. 2023.
- Collaborate with other BRC collections on designing a smaller, frequently changing lobby display to offer students “small bites” of information about natural history as they are waiting for class (e.g., digital display via BRC TV). Ongoing/2023.
- Cultivate the reputation of the BRC as a welcoming, collaborative, intellectually stimulating resource that serves students, faculty, and community; within UConn and in the broader international natural history collections community. Ongoing.
- Review web pages of UConnBRC vertebrate collections to ensure they meet University standards and are consistent in design with other BRC collection websites. Ongoing.
- Increase volunteer roster & recruiting. 2023.
- Host weekly coffee for department faculty, staff, and grad students. Ongoing.
- Increase visibility across campus by interacting with student groups such as the UConn chapters of the American Fisheries Society and the Wildlife Society, the Forestry and Wildlife Club, the Birding Club, etc.; the State Archaeologist Dr. Sarah P. Sportman. Ongoing/2023.
- Invite regional governmental and nonprofit stakeholders to visit the UConn BRC for tours (CT DEEP, Joshua’s Trust, Connecticut Botanical Society, Master Naturalists, Archaeological Society of Connecticut, etc.). 2023.
- Activate social media accounts (Twitter, Instagram, Facebook). In progress/2022.
- Design and print promotional brochures for admissions/alumni offices and to include in loan packages, donor mailings, events, etc. 2022.

V. ENVIRONMENTAL SCAN

	INTERNAL	EXTERNAL
POSITIVE	<p>--STRENGTHS--</p> <ul style="list-style-type: none"> We have the most complete collection of CT vertebrates anywhere EEB department is collegial, productive, and supportive EEB strongly values organismal biology and museum collections Tours for all intro bio students (as well as other classes) Unique collections (feathers, eggs, nests) Job security/low turnover 	<p>--OPPORTUNITIES--</p> <ul style="list-style-type: none"> Local groups would be happy to collaborate on collecting salvage, student projects New president, provost, college dean, department head--> chance to cultivate powerful allies Opportunities available to diversify & expand funding sources Database publication increases our visibility and potential for scholarly impact
NEGATIVE	<p>--WEAKNESSES--</p> <ul style="list-style-type: none"> Herpetofauna and fish collections have been underutilized for research Dry collections curatorial issues need to be resolved Collections manager is less than half-time Small budget Have not been successful or recently active in seeking external funding Disaster plan not updated in 5+ years Not well known across campus 	<p>--THREATS--</p> <ul style="list-style-type: none"> Globally, support for collections has been eroding Pandemic-related spending freeze; uncertainty of funding in next fiscal year De-icer, ongoing HVAC issues Accidents have potential to damage specimens or lead to personal injury Uncertainties around Nagoya Protocols may impact our ability to acquire international specimens and/or participate in international transactions (loans/gifts/etc.)

VI. SUSTAINABILITY

A. INTERNAL: MAINTAINING STRENGTHS AND ADDRESSING WEAKNESSES

The BRC collectively has a small but dedicated, enthusiastic, and resourceful cohort of managers. Two managers of the three preserved collections are full-time, but the vertebrate collections now are managed by Dr. Kuprewicz on a part-time basis. This ends a period in which only a 20% staff line was allocated to vertebrate collections management and even this was vacant for years.

The vertebrate collections are increasing visibility and availability to various stakeholders. New activities are engaging more students, and the EEB 5500 course is offered at higher frequency.

Skinning Club continues to gain popularity in the undergraduate community and has been essential in clearing some of our frozen specimen backlog, as well as training new cohorts of undergrads in vertebrate preparation, curation, and management techniques (which they otherwise do not receive in any classes offered at UConn). The collections occasionally host special events, such as the celebration of Dr. Ralph Wetzel's career, to showcase our research and community value.

B. EXTERNAL: CAPITALIZING ON OPPORTUNITIES AND MINIMIZING THREATS

The Biodiversity Research Collections facility was designed as part of the UConn 2000 initiative and purpose-built to minimize (but not eliminate) potential threats to the collections. In the past several years we have struggled with pollutants (de-icer in the wintertime) and ongoing HVAC issues. At the same time, our disaster plan has not been revised in at least five years. Now that we have consciously identified risks to the collections, we have the opportunity to thoughtfully and comprehensively update this critical document and create a path forward that will help protect our collections for future generations.

Continued efforts to garner external support are essential. As described above, the Vertebrate Collections have identified ways of increasing stakeholder engagement, but the resources that can be brought to bear on initiatives are quite limited. The collections will have a secure home and a *raison d'être* only if they have a vital role in education and research.

The Covid-19 pandemic has already had major impacts on the Biodiversity Research Collections. Its potential financial impacts have thrown existing threats and weaknesses into sharp relief. Without a strong social media presence we are unable to broadly connect with stakeholders. As we look ahead, we can strengthen our existing connections with students and cross-disciplinary faculty and forge new relationships with incoming administrators, land trusts, and local botanists. Cultivating a complex network through education and service will help us capitalize on available opportunities to collaborate with Connecticut nonprofits, achieve our goals of raising our profile (internally at UConn and externally in the international collections community) and establishing a welcoming reputation, and may help to insulate us from the most severe financial repercussions to come.

VII. ACKNOWLEDGMENTS

This strategic plan was modified from one prepared for the Conn Herbarium, which was initially drafted by Sarah Taylor as part of coursework for Strategic Planning for Herbaria, a course provided by the Society of Herbarium Curators and iDigBio in Spring 2020. Instructors Austin Mast (FSU) and David Jennings (iDigBio) provided clear guidance, excellent resources, and abundant assistance. Course participants Matthew Becker (Museum of Natural History and Planetarium, Providence, RI), Herrick Brown (USCH), Christina Campbell (DBN), Tim Flynn

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