

Department of  
**Ecology and Evolutionary Biology**  
Self-Study for 2023 External Review  
December 2022





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## 1. Executive Summary

The Department of Ecology and Evolutionary Biology (EEB) is a community of scholars dedicated to understanding the diversity, history, and interactions of life on Earth, benefitting both science and society through inclusive values that guide our research, education, and societal impacts. Since its inception in 2001, the EEB Department at U-M has maintained a high ranking among all EEB departments in the country. Since our last self-study in 2010, we have better integrated the strengths of the U-M Museum of Zoology and Herbarium, expanded and improved our teaching of undergraduates, increased the diversity of our faculty and graduate students, and strengthened many aspects of justice, equity, diversity, and inclusion in our Department's mission. In these last 12 years, we also have moved to a new building and turned over 60% of our faculty, priming the need for this extensive internal evaluation. An EEB community survey ranking the impact and urgency of the strategic goals described in this self-study identified the following top priorities:

1. **Increase funding for the EEB graduate program** to (a) provide graduate students with stipends that meet the cost of living in Ann Arbor every year and (b) realign the number of PhD students with the number of EEB faculty. We have increased faculty contributions to graduate student support well above our peer institutions and have restructured our PhD program to maximize impact of our current resources. Despite these changes, the target number of PhD students admitted each year has remained static at 12 despite a 40% increase in faculty from 2002 to 2022. There was a broad consensus that this is our most impactful and urgent goal.
2. **Increase transparency and equity in faculty teaching, service, and salary setting** to improve departmental climate. We will begin this internal work in Winter 2023.
3. **Increase the number of BIPOC faculty and students in EEB** to ensure we benefit from maximally diverse perspectives when investigating the natural world. We have made progress diversifying EEB along this and other axes of diversity, but more work is needed.
4. **Improve connections between the Research Museums Center and central campus** (particularly for students) to achieve collections-based teaching and research goals; this remains a pressing challenge despite prior efforts from the college and EEB to address it.
5. **Address space constraints in the Biological Sciences Building (BSB)** to ensure they do not inhibit growth of EEB research programs. The open-lab design of the BSB has increased space efficiency, yet we increasingly struggle to place personnel and equipment.
6. **Identify a title and promotion path for PhD-level collection managers** that reflects their contributions to museum functions as well as their contributions to research in EEB. Recent changes in U-M policy no longer allow us to offer 5% research scientist appointments to new hires and have caused great concern about promotion prospects for existing collection managers with these non-tenure-track research faculty titles.

Other goals ranked highly in terms of impact and urgency included formalizing departmental policies to promote collegiality; developing a process for defining future faculty searches in real-time; increasing support for disabled, transgender, and other marginalized members of EEB; and expanding undergraduate course offerings attractive to students majoring in biology, health, and society.

We believe that achieving these and other strategic goals described in the report will allow us to maintain our current top 10 standing in the field and support our path to becoming the leading EEB department in the country in terms of research impact, commitment to teaching, and advancement of justice, equity, diversity, and inclusion.



## 2. Introduction to EEB

### 2.1 Mission statement

The Department of Ecology and Evolutionary Biology, in collaboration with the University of Michigan Museum of Zoology and Herbarium, advances our understanding of the principles that govern the structure, function, and evolution of biological systems through innovative research, education, and community engagement. This work is critical for enabling knowledge-based decision making to address environmental and societal challenges, and we strive to conduct it in an environment that is diverse, equitable, inclusive, and respectful, enabling every person to do their best work. Our goal is to be a national leader for research, training, and education in ecology and evolutionary biology by using evolutionary, ecological, and organismal expertise to answer fundamental questions about the origin, history, and maintenance of biodiversity and ecological function at the level of molecules, organisms, populations, communities, and ecosystems.

To achieve this mission, we:

- conduct research that contributes uniquely to biosciences at the U-M through expertise in the origin, evolution, and ecology of diverse organisms in varied environments;
- provide individualized, culturally aware, mentorship in research for trainees ranging from undergraduate students to postdoctoral fellows in our laboratories and field sites;
- teach classes focused on many different levels of biological organization using evidence-based best practices, including active learning and learning goals aligned with equitable assessments;
- integrate computational and mathematical approaches into our educational and research programs, training students to develop and use quantitative methods in their work;
- build, safeguard, study, and share world-class biological collections comprising the diversity of life on Earth and reflecting its changes over time;
- engage with a global network of biodiversity repositories to foster understanding and teaching of the origin and maintenance of biodiversity and to inform its conservation;
- develop and participate in initiatives designed to increase the recruitment, retention, and belonging of minoritized scholars in biology, especially ecology and evolutionary biology;
- connect fundamental, “basic science” research with more applied work in the broader biological, health, and environmental sciences; and
- support professional development of all members of EEB to achieve their career goals.

### 2.2 Departmental Overview

The Department of Ecology and Evolutionary Biology (EEB) was founded in 2001 after reorganization of the biological sciences in the College of Literature, Science, and the Arts (LSA) at the University of Michigan (U-M). Administration of the Department of EEB, University of Michigan Herbarium (UMH), and the University of Michigan Museum of Zoology (UMMZ) was merged in 2011. The EEB department currently includes:

36<sup>1</sup> tenure-track Faculty (11 Assistant Professors, 4 Associate Professors, and 21 Professors)

14 non-tenure track Faculty

1 Associate Research Professor

7 Research Scientists (5 Assistant Res Sci, 1 Associate Res Sci, 1 Res Sci)

6 Lecturers (4 Lec IV, 1 Lec III, 1 Lec I)

37 Postdoctoral researchers (including 2 Michigan Fellows and 1 LSA Collegiate Fellow)

73 PhD students

13 Master's students

656 undergraduate majors

18 Museums staff members (5 admin, 13 collections-based, including 9 collection managers)

13 Program in Biology staff members

15 Research laboratory staff

6 Administrative staff

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<sup>1</sup> Two professors will retire in 2025, one of which has been on leave since Jan 2021 and is excluded from the rest of the report except where explicitly noted. The current LSA Collegiate Postdoctoral Fellow will become a tenure-track Assistant Professor in Fall 2024. Three Assistant Professors, one Associate Professor, and one Assistant Research Scientist are currently undergoing promotion review.



Ten tenure-track faculty members are active museum curators, including 7 in the Museum of Zoology and 3 in the Herbarium. Two others also have curatorial appointments in the Herbarium. Eight faculty are jointly appointed with either PitE (Program in the Environment), Complex Systems, Mathematics, MCDB (Molecular, Cellular, and Developmental Biology), Microbiology & Immunology (Medical School), the Residential College, or the U-M Biological Station. Michigan Fellows are part of a larger interdisciplinary program at U-M and conduct independent research and teach in EEB for two years. Our department is further strengthened by the engagement of 10 adjunct faculty from other U-M departments and 9 affiliated faculty members from other units at U-M and from other institutions.

EEB faculty play key leadership roles throughout the university, currently serving on advisory boards for the Rackham Graduate School, Rackham Mental Health and Wellbeing Committee, U-M Council for Disability Concerns, Museum of Natural History, Museum of Anthropological Archeology, LSA Undergraduate Program in Computing for Arts and Sciences, President's Postdoctoral Fellowship Program, Presidential Biosciences Initiative, Institute for Global Change Biology, Michigan Center for Infectious Disease Threats (MCIDT), and as directors of the Residential College, U-M Biological Station, and a new Michigan Pathogens Biorepository (M-PABI), which is integrated with the Museum of Zoology and was launched in 2021 with a \$2 million dollar investment from the Presidential Biosciences Initiative as part of the MCIDT. The MCIDT aims to predict and prevent future pandemics, and the M-PABI will leverage existing and future museum collections to understand the ecology and evolution of pathogens with zoonotic potential.

Together, we work in EEB facilities located in the Biological Sciences Building (BSB, central campus), the Research Museums Center (RMC, 5 miles from central campus), and the E.S. George Reserve (ESGR, 26 miles from central campus). Many members of EEB also work at the University of Michigan Biological Station in Pellston, MI (UMBS), Matthaei Botanical Gardens and Nichols Arboretum (MBGNA), and field sites around the world. We teach undergraduate students (major and non-majors) through the Program in Biology, which is jointly run by EEB and MCDB, and we partner with the University of Michigan Museum of Natural History (UMMNH, also located in the BSB) to communicate science to the public.

Since our departmental review in 2010, EEB has undergone significant changes, including:

- (a) recruitment of 21 new faculty, retirement of 10 faculty, and resignation of 5 faculty<sup>2</sup>,
- (b) relocation of offices, labs, and museum collections to the new BSB and renovated RMC,
- (c) administrative changes making the Museum of Zoology and Herbarium part of EEB, and
- (d) increasing gender, racial, and ethnic diversity of EEB faculty, students and staff.

These changes have created both challenges and opportunities for reinvention and invigoration of our research, teaching, and community engagement missions.

## 2.3 Self-study approach and process

Our self-study process started formally in January 2022, with EEB faculty meeting with a professional facilitator (Sarah Kurtz-McKinnon) 5 times over 4 months to discuss departmental strengths and opportunities in various areas. We also discussed EEB's mission statement and values in 2020 and strategies for future faculty hiring in both 2021 and fall 2022. One of our self-study meetings focused on justice, equity, diversity and inclusion (JEDI) and included people sharing their varied experiences in EEB. Administrative staff joined this faculty JEDI discussion, and a parallel JEDI session was run for graduate students, postdocs, and research lab staff. Simone Gamble, founder of [OAAARS](#), a BIPOC-run, social-justice focused consultancy, was hired to lead these discussions. Departmental leadership, including the department chair and chief administrator, met with the facilitator(s) before each event for goal setting and planning as well as after each event for synthesis and debriefing. Because of COVID-related safety concerns, all meetings were virtual and discussion was captured in real-time with online tools. Facilitator Kurtz-McKinnon also ran an in-person, strategic planning session for the EEB museums, organized in collaboration with the Associate Chair for Collections. These discussions, as well as smaller, committee-level discussions, provided the foundation for this document. Writing this document was also highly-collaborative, as evident in the acknowledgements.

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<sup>2</sup> Pejman Rohani returned to the University of Georgia in 2015, where he had been a faculty member from 2001-2009. Mercedes Pascal moved to the University of Chicago in 2016. Fernanda Valdovinos moved to UC Davis in 2020. In 2021, Nyeema Harris moved to Yale and Annette Ostling moved to U. Texas at Austin.

## 3. Research and Scholarship

### 3.1 Introduction

Members of EEB study the variety of life (biodiversity), how it came to be (evolution), and interactions among species and their physical environment (ecology). Many work at the intersections of these fields, often integrating tools and knowledge from other scientific disciplines. Field work, laboratory experiments, theory, and computational models are used to study fossils, museum specimens, living populations, and even digital organisms. Study systems include plants, birds, insects, mammals, fishes, amphibians, reptiles, mollusks, fungi, bacteria, and viruses. Ecological studies include terrestrial and aquatic habitats, with particular focus on soil ecology, marine ecology, tropical ecology, forest ecology, and agricultural ecosystems. Together, this work not only advances our understanding of core biological processes, but also provides the knowledge base needed to address pressing challenges for society including global climate change, emergence and spread of infectious diseases, sustainable agriculture, conservation biology, plastics pollution, invasive species, and the evolution of pesticide, herbicide, and antibiotic resistance.

### 3.2 Current State of Affairs

#### 3.2.1 Areas of study

##### **Biodiversity**

The twelve faculty curators in the EEB Museums share an interest in understanding the diversity of life as well as its origins and persistence. Their work also intersects with the other areas of interest in the department, especially evolutionary biology. In the Museum of Zoology, **Diarmaid Ó Foighil**, curator of mollusks, studies the evolution, systematics and biogeography of marine, terrestrial and freshwater mollusks. **Thomas Duda**, also a curator of mollusks, deciphers the evolutionary history and origins of adaptations in molluscs. Curator of insects **Lacey Knowles** studies speciation and the processes that initiate or contribute to population divergence over a wide range of temporal and spatial scales. **Daniel Rabosky**, curator of reptiles and amphibians, investigates the dynamics and drivers of biological diversity in time, in space, and across the tree of life, with particular expertise in Australian reptiles. **Alison Davis Rabosky**, also a curator of reptiles and amphibians, tests hypotheses about the ecological factors driving both the evolutionary stability and coevolution of traits. Curator of fishes **Hernán López-Fernández** examines the evolutionary processes that originate “mega-diverse” biotic assemblages and the role of ecology in shaping the evolution of freshwater fish diversity in tropical regions. Curator of birds **Benjamin Winger** studies speciation, biogeography, and movement ecology (migration and dispersal) in birds. Research Scientist **Fred Kraus** studies evolution, systematics, and biogeography of the Papuan herpetofauna.

In the Herbarium, curator of vascular plants **Christopher Dick** investigates the ecological and evolutionary processes that underlie the rich diversity of tree species in tropical forests. **Thais Vasconcelos**, also a curator of vascular plants, identifies patterns in flowering plant evolution by analyzing recurrent trait-environment correlations and investigates the historical factors leading to biogeographical patterns. Curator of fungi **Timothy James** studies the evolution of sex and reproductive traits of fungi and attempts to link these traits with phylogeny and population genetics. **Yin-Long Qiu** uses phylogenies, molecular evolution, and information about abiotic and biotic environments to understand the evolution of land plants. **Stephen Smith** develops and uses computational tools to investigate processes leading to novelty in the evolution of major lineages, identifying the molecular, genomic, and phenotypic signatures of these major evolutionary events.

Seven collection managers at the EEB Museums (5 of which have non-tenure track faculty appointments on the Research Scientist track<sup>3</sup>) also conduct independent research that adds to our strength in biodiversity sciences. In the Museum of Zoology, **Taehwan Lee** studies molecular systematics and evolution of invertebrates, especially mollusks. **Cody Thompson** studies patterns and processes of mammalian diversity, including impacts of hybridization on species boundaries. **Brett Benz** investigates the evolutionary processes and environmental factors that have shaped patterns of avian diversification and endemism in tropical ecosystems. **Randal Singer** studies the systematics, biogeography, and ecology of deep-sea fishes as well as biodiversity collection best practices. **Taro**

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<sup>3</sup>As of 2021, university policy prohibits hiring research scientists with appointments less than 50%, preventing us from offering this title to our most recently hired collection managers. Nonetheless, the two collection managers hired since this policy change both have PhDs and independent research interests. Recognizing the benefit that such work brings to the museums, department, college, and university, we have modified the collection manager duties for these individuals to include time for collections-based research.

**Eldredge** studies the evolution and ecology of rove beetles. In the Herbarium, **Brad Ruhfel** studies plant systematics, biogeography, and the flora of the Eastern United States, and **Alison Harrington** characterizes cryptic fungal biodiversity.

### **Ecology**

Eleven faculty members (10 tenure-track, 1 research scientist) have primary research interests in ecology, including five in population and/or community ecology (Vandermeer, Lehman, Umaña, Sanders, Arellano), three in ecosystems and/or global change biology (Kling, Classen, Allgeier), and three in microbial ecology (Schmidt, Deneff, Duhaime). Two faculty members (Vandermeer, King) are experts in theoretical ecology, and four other faculty (King, Duffy, Zaman, Speer), whose research is described in other sections, study disease ecology. **John Vandermeer** studies the coffee agroecosystem, using advances in complex systems to understand its biological, social, and political aspects. **John Lehman** studies limnology and food webs. **María Natalia Umaña** investigates how within-species processes determine the diversity and dynamics of current and future communities, focusing on tropical and temperate forests. **Nathan Sanders** works at the interface of community ecology, ecosystem ecology and macroecology, with a focus on how global change drivers and interspecific interactions influence the causes and consequences of biodiversity loss. Assistant Research Scientist **Gabriel Arellano** studies tropical forest ecology. **George Kling** studies aquatic ecology and biogeochemistry, including carbon and nutrient cycling, food-web interactions, aquatic landscapes, and microbial diversity in ecosystem function. **Aimée Classen** investigates how global changes impact terrestrial ecosystems at local, regional and global scales. **Jacob Allgeier** studies the mechanisms by which behavioral, population, and community dynamics mediate nutrient and energy pathways in tropical coastal ecosystems. **Thomas Schmidt** examines the physiology, ecology and evolution of microbes and the communities in which they thrive. **Vincent Deneff** studies fundamental concepts regarding the interrelation of evolution and ecology that enhance our understanding of the microbial contributions to ecosystem functioning. **Melissa Duhaime** investigates microbes (especially viruses) and how they influence the aquatic ecosystems that connect people, land, and wildlife.

### **Evolutionary Ecology**

Research at the interface between ecology and evolution has been perhaps the largest area of growth since our external review in 2010. We now have 11 faculty members (10 tenure-track, 1 research scientist) working in this area. Some of these individuals focus on how ecological systems evolve (King, Duffy, Weber, Howard), whereas others focus on how ecological interactions influence evolution (Dick, Badgley, Baucom, Speer, Hodel). Animal behavior and its interactions with ecology and evolution are included in this area (Tibbetts, Davis Rabosky, Green). **Aaron King** uses mathematical and computational methods to elucidate the ecology and evolution of infectious disease systems. **Meghan Duffy** examines the causes and consequences of symbioses in freshwater plankton, recognizing that host-symbiont interactions are dynamic. **Marjorie Weber** studies how ecological interactions impact phenotypic evolution and diversification across evolutionary scales. **Mia Howard** (Collegiate Fellow joining tenure-track faculty in 2024) investigates how plants protect their tissues from herbivores and how soil-dwelling microbes can support or thwart their efforts. **Catherine Badgley** uses the fossil record to study change over geologic time in ecological structure of mammalian faunas in relation to environmental gradients over continental regions. **Regina Baucom** integrates ecology, evolution, and genetics to understand how plants persist given strong, human-mediated selection. **Kelly Speer** studies interactions between hosts, parasites, and microorganisms to assess the response of complex wildlife communities to stressors like climate change, habitat loss, and novel disease emergence. Assistant Research Scientist **Richard Hodel** studies how species-specific phenotypic traits interact with the environment to influence the evolutionary processes driving spatial patterns of genetic variation. **Elizabeth Tibbetts** explores how communication systems and social behavior coevolve to shape the way animals look, think, and act. **D. André Green** studies the development of migration behavior in the monarch butterfly to understand how its developmental-genetic 'design' influences evolution of the migration strategy. Research interests of Dick and Davis Rabosky are described in the biodiversity section above.

### **Evolution**

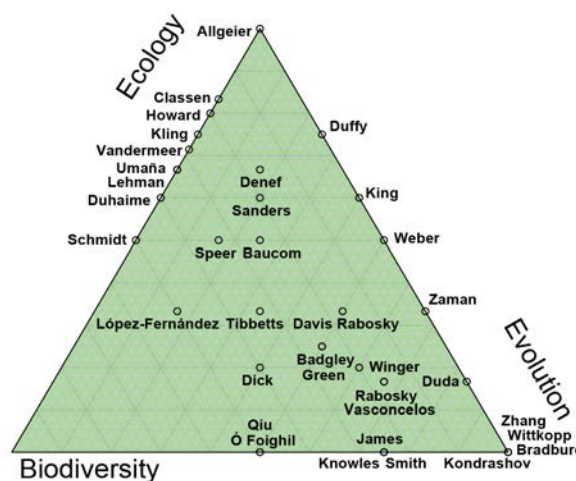
In addition to the 12 faculty curators described in the Biodiversity section, who incorporate evolutionary genetics, comparative genomics, biogeography, phylogeography, or phylogenetics into their work, six other faculty members (5 tenure-track, 1 research professor) also focus their research on evolutionary biology, most in evolutionary genetics and/or molecular evolution. **Jianzhi Zhang** investigates the roles of chance and necessity in evolution, addressing diverse topics in evolutionary genetics and genomics. **Alexey Kondrashov** works primarily on evolutionary theory and population genetics. **Patricia Wittkopp** studies genetic, molecular, and evolutionary processes underlying

phenotypic diversity with an emphasis on gene expression. **Gideon Bradburd** uses spatial models of population genetics to study population structure, local adaptation, and admixture. **Luis Zaman** uses a mixture of computational, mathematical, and microbial systems to answer fundamental questions about how evolution works. Associate Research Professor **Liliana Cortés Ortiz** studies the evolution and systematics of Neotropical primates, including hybrid zones. Knowles, Smith, Rabosky, and Bradburd all develop computational methods for studying evolutionary processes and macroevolution, making this an area of strength.

### Overall distribution

We present the faculty here in the broad categories of biodiversity, ecology, evolutionary ecology, and evolution, but these terms fail to fully capture our distribution within the shared conceptual research space that unites us. We therefore also asked each tenure-track faculty member to provide up to five terms that best describe their research program. Each of these responses was then categorized into a mixture of ecology, evolution, or biodiversity through a point allocation system based on keywords. Every response that included any derivative of the word ecology or evolution was allocated one point as such, while responses that referred to organismal expertise were each allocated one point as biodiversity. The relative contribution of each of these domains to individual research programs illustrates our conceptual strength, breadth, and integration across the department (Figure 1).

Our internal discussions identified the breadth of research topics, support for interdisciplinary work, museum collections, and combinations of empirical and theoretical approaches addressing both basic and applied sciences as strengths. Specific research areas recognized as strengths included Biodiversity, Evolutionary Genetics, Global Change Biology, Infectious Disease, Macroevolution, Plant Biology, and Tropical Biology. Organismal biology (particularly physiology) was recognized as an area for potential growth, consistent with our decision not to prioritize this area in our 2010 self-study. The co-location of all tenure-track faculty offices and primary lab spaces in the BSB, grouped by research themes into neighborhoods (described below in the facilities section) was also seen as a strength because of the opportunities it creates for interactions among groups, but the distance between the BSB and the RMC (where the museums' research collections are housed) was identified as a significant challenge.



**Figure 1. Summary of research interests for tenured and tenure-track faculty.** This ternary plot shows the approximate mixture of ecology, evolution, and biodiversity in each faculty member's work, indicated by last name. Faculty in the center of the plot integrate all three areas in their work.

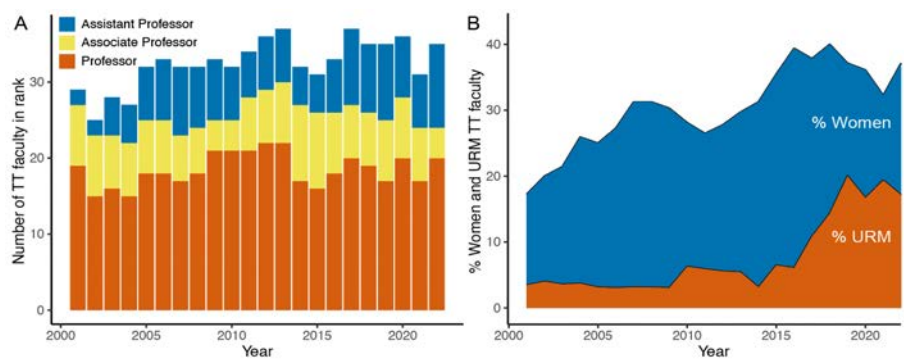
### 3.2.2 Faculty turnover, demographics, and diversity

Since our last review in 2010, the size of the tenure-track faculty in EEB has ranged from 31 to 37, with an average of 34 (Figure 2A). Of our 35 current faculty members, 20 (60%) have been hired during this time period. We also hired two other faculty members that have since moved to Yale and University of California Davis. These hires resulted from searches in Computational Biology, Evolution, Ecology, Fishes or Birds, Population or Community Ecology, Ecosystem Ecology, Theoretical Ecology, and one completely open search in any area of Ecology and/or Evolutionary biology. We have also hired faculty through the [Presidential Postdoctoral Fellowship Program](#), [LSA Collegiate Fellows program](#) (2 current faculty members +1 starting in 2024), Presidential Cluster hires in Microbial Ecology (2 hires), Biological Networks, and Sustainable Food Systems, searches for Directors of the U-M Biological Station and Michigan Pathogens Biorepository, and through person-specific searches jointly supported by the dual career office (5 hires). These 23 recruitments included 3 Professors, 1 Associate Professor, 4 Assistant Professors from other universities, and 15 new Assistant Professors, shifting our faculty distribution toward earlier career stages (Figure 2A).

The diversity of our faculty has also increased since 2010 (Figure 2B). Currently, 37% of the EEB faculty are women, including 30% of Professors, 25% of Associate Professors, and 55% of Assistant Professors. This overall percentage is up from 28% in 2010 and peaked at 40% in 2018-19. The percentage of EEB faculty classified by the university as



underrepresented minorities<sup>4</sup> (URM), currently 17%, has increased from 6% in 2010 and peaked at 20% in 2019-20. Further increasing the number of faculty that are members of underrepresented racial or ethnic groups continues to be a departmental goal, and we [modified our faculty search practices](#) to this end in 2016. These practices include making the job description for a search as broad as possible, requiring a DEI statement, actively working to ensure a diverse pool of applicants, and following best practices for minimizing unconscious bias when selecting candidates to interview and interviewing them. These efforts build on work of the EEB diversity committee beginning in the early 2000s, which included more deliberate searching outside of well-known universities, more broadly defined searches, more holistic application review, and participation in STRIDE training sessions discussing unconscious bias. Initially, these efforts focused on recruiting women, but have since shifted to focus on recruiting members of underrepresented racial and ethnic groups, especially BIPOC (black, indigenous, and people of color) faculty.



**Figure 2. Changes in EEB tenure-track (TT) faculty demographics.** (A) Number of Professors, Associate Professors, and Assistant Professors in EEB is shown annually from 2001 when the department was founded until 2022. (B) Percentages of women and individuals identified by U-M as underrepresented minorities (URM) among tenured and tenure-track faculty since 2010

Our long-term goal is to have the diversity of EEB faculty mirror the diversity of the US population, but our more modest current goal is for it to reflect the diversity of EEB PhDs awarded in the US. A recent analysis using data collected by the NSF and [published in this 2020 article](#) reported: "lower levels of representation among African Americans obtaining PhD's in EEB (1.8%) compared to non-EEB (5.1%) subfields of biology" and that "[t]he pattern of participation among underrepresented groups in EEB differs from the pattern in many other STEM fields. First, STEM fields with low representation of African Americans are generally fields with low representation of women (Leslie et al. 2015). Whereas African Americans have extremely low representation in EEB, women now outnumber men among PhD recipients and new tenure-track hires (Fox 2018; NSF, NCSES 2015). In 2014, women constituted 52.3% of PhDs awarded in EEB (NSF, NCSES 2015). Second, in addition to African Americans, Latinas/os (6.6%), Native Americans (0.2%), and Asians (3.7%) are all underrepresented among EEB PhD recipients relative to their presence in the U.S. population. The underrepresentation of Asians in EEB is particularly surprising given their relatively high rates of participation (12.6%) in non-EEB related subfields of biology." We would also like our faculty to reflect the diversity seen in U-M's undergraduate population, which will require an additional focus on groups such as people of Middle Eastern descent.

To assess progress toward these goals, we examined the demographic data from our most recent faculty search (2021-22), which was open to researchers studying any area of ecology or evolutionary biology. This search received 470 applications; 448 applicants provided gender information. Of this very large applicant pool (2-5x larger than prior searches in EEB), 43% of people choosing between the binary gender options offered by the university indicated that they were women. Of the 413 applicants that provided information about their race or ethnicity, 33% chose an option other than White. Specifically, 17 (4.1%) selected Hispanic or Latina/o, 1 (<1%) Black or African American, and 0 American Indian or Alaska Native, making up a combined 4.4% of the applicant pool. 54 (13.0%) self-reported that they were Asian, and 63 (15.2%) indicated that they were a member of more than 1 group; we were unable to obtain information about the specific groups individuals indicating more than 1 group selected.

Receiving only one application from a candidate identifying as Black or African American in our 2021-22 search was concerning given that we previously received five applications from Black or African American candidates in a pool half the size. To try to better understand the national applicant pool in EEB during 2021-22, our department chair reached out to department chairs at five peer institutions with faculty searches in EEB the same year. Only two shared their demographic data: a school in a large city not on a coast, which reported two applicants identifying as Black or African American, and a school located in California, which reported four such applicants. With these limited data, it

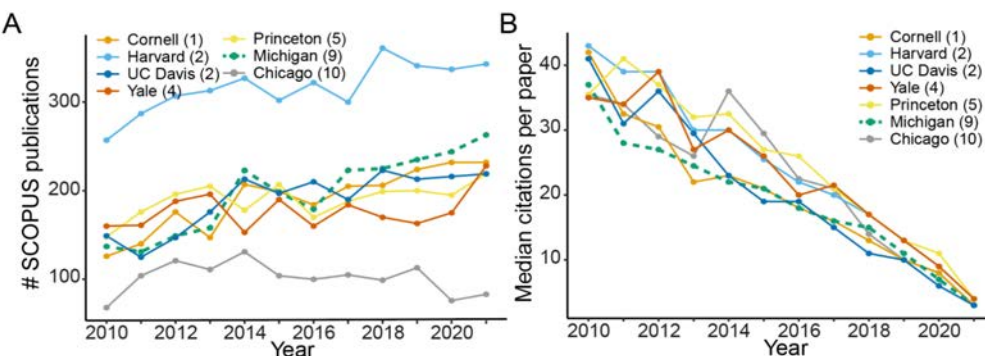
<sup>4</sup> The university defines URM as American Indian, Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, presumably based on self-reported data at the time of hire.

is difficult to determine if we struggled more than our peers to attract Black or African American applicants in this search. Regardless, continuing work to make EEB more attractive to, and supportive of, scholars of all identities remains a top priority.

### 3.2.3 Rankings, Publications, and Recognition

According to the US News and World Report (N&W), which [bases its rankings on surveys sent to academic officials](#), the U-M EEB department moved into the top 10 EEB programs in the country (out of 290 ranked in biology) in 2018 (#6) and stayed there in 2022 (#9). Notably, in 2022, EEB had the highest rank of any biological sciences department at the U-M. College Factual, which is less widely known but uses a [methodology based on more data-driven metrics](#), [ranked the U-M EEB department #13](#) out of 193 schools in their list of 2023 Best Ecology, Evolution & Systematics Biology Schools. In their list considering graduate programs in EEB, however, the same group [ranked U-M EEB #5](#).

Based on publication data available in SCOPUS, 2,365 papers were published with U-M EEB affiliations between 2010 and 2021. Looking at the number of papers published each year and comparing this metric to publications from other EEB departments ranked in the top 10 by N&W<sup>5</sup>, we found that our number of publications has increased since 2010 at a faster rate than other top EEB departments in the country (Figure 3A). The median number of citations per paper for U-M EEB is most similar to Cornell University (ranked #1), albeit lower



**Figure 3. Publication and citation records for U-M EEB and other top 10 EEB programs.** (A) Number of publications since 2010 included in the [SCOPUS](#) database with a University of Michigan EEB affiliation (dotted line) compared to those with institutional affiliations with EEB (or equivalent) departments at Cornell University, Harvard University, University of California Davis (UC Davis), Yale University, Princeton University, and the University of Chicago. Parenthetical number in figure legend is the US News and World Report rank in EEB for each institution. Note that the number of faculty members differs among departments. (B) The median number of citations per paper for publications included in (A).

than other top programs (Figure 3B). 248 (10.5%) of the 2365 papers published by members of U-M EEB were published in one of nine highly selective journals that publish work from all areas of biology<sup>6</sup>. 470 (20%) of these 2365 papers were published in one of 20 other top journals in EEB, enriched for leading journals run by scientific societies<sup>7</sup>. By comparison, these percentages range from 7% to 21% and 14% to 22%, respectively, for the other top EEB departments shown in Figure 3. At the level of individual researchers, publication number and impact (measured by citations) are often captured using the H-index. However, this metric is “biased against already marginalized groups and fail[s] to accurately capture the breadth of individuals’ meaningful scientific impacts” ([Davies et al. 2021](#)). Moreover, it varies widely among career stages and among scientific disciplines even within EEB. Despite these

<sup>5</sup> Stanford (#6), Duke (#7), University of Texas - Austin (#8), and Indiana University (#10) were excluded from this analysis of publications because their EEB faculty are embedded within a broader Biology department.

<sup>6</sup> PNAS (70), Proc Royal Society B (56), Nature Communications (29), Science (27), Current Biology (22), Nature (15), PLoS Biology (13), Science Advances (9), eLife (7), where (number) = publications from U-M EEB

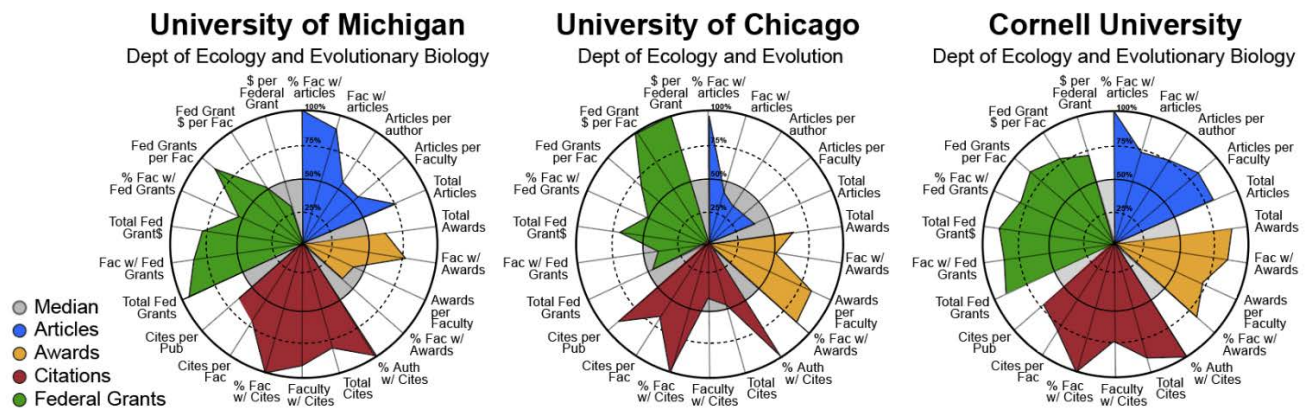
<sup>7</sup> Leading society journals (Evolution, American Naturalist, Ecology, Molecular Biology and Evolution, Systematic Biology, Animal Behaviour, Journal of Animal Ecology, mBio, Integrative and Comparative Biology, Behavioral Ecology, Genetics, and Evolution Letters) and some top non-society journals in the field (Molecular Ecology, Molecular Phylogenetics and Evolution, Ecology Letters, New Phytologist, Global Change Biology, Nature Ecology and Evolution, ISME Journal, and Trends in Ecology and Evolution) were included in this list. We recognize that there are also many other journals publishing outstanding work in EEB that are not included in this list.



major flaws, we recognize that the H-index remains a widely used tool for comparing groups and individuals in academia and provide these data in Appendix 1.

EEB faculty have received a number of the University's most prestigious research awards, including a Distinguished University Professorship, six Collegiate Professorships, a Michigan Biosciences Faculty Achievement Recognition, a Distinguished Faculty Achievement Award, two Faculty Recognition Awards, and four Henry Russel Awards. Externally, EEB faculty have received two Fulbright Scholar awards and a Guggenheim Fellowship, and been elected as AAAS fellows (x5), Ecological Society of America Fellows (x2), and Fellows of the American Academy of Microbiology (x2). Faculty have also received research focused awards from the Association for the Sciences of Limnology and Oceanography and the Society of Molecular Biology and Evolution. Three EEB faculty members (10% of all 30 at U-M) were identified by Clarivate as Highly Cited Researchers. Many EEB faculty have held leadership roles in scientific societies, with some serving as president or vice president of the American Society of Naturalists, Society of Systematic Biology, Society for Molecular Biology and Evolution, American Malacological Society and the American Society of Limnology and Oceanography. Assistant Professors have been recognized with an impressive number of early career research awards: four NSF CAREER awards (incl. one PECASE), two David and Lucile Packard Foundation Fellowships, a Alfred P. Sloan Fellowship, and young investigator awards from the American Society of Naturalists (x3), Ecological Society of America (x4), Society for the Study of Evolution, Society of Systematic Biologists (x2), American Society of Parasitology, Association for the Sciences of Limnology and Oceanography, International Biogeographical Society, and Mycology Society of America.

Despite these many accolades, an analysis by [Academic Analytics](#) suggests that U-M EEB faculty have received fewer major awards than other EEB departments with similar publication, citation, and funding records (Figure 4). To try to address this gap, we have recently established an *ad hoc* awards committee to help with nominations. This committee will also actively work to diversify the people nominated for awards, which is critical given the well-known and systemic biases affecting who is nominated and selected for awards in science (e.g., [Watson, 2021](#), [Nature Editorial, 2022](#)). We have already tried to make our departmental award nominations more equitable by increasing transparency and consultation, inviting individuals to self-identify for awards they think align well with their work, and choosing which person(s) to nominate in consultation with the most relevant departmental committee.



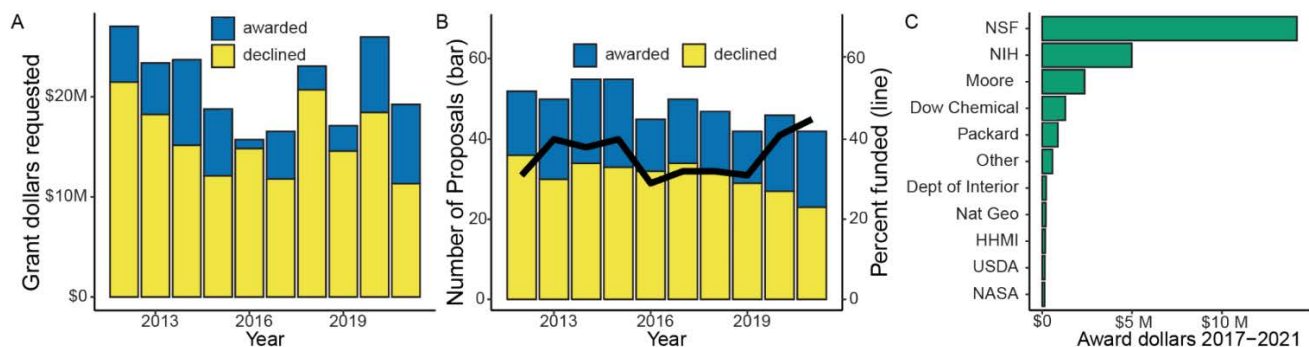
**Figure 4. Comparison of EEB to other top 10 departments.** Metrics related to publications (articles = blue, citations = red), recognition (awards = yellow), and funding (federal grants = green) between U-M (ranked #9), Chicago (ranked #10), and Cornell (ranked #1) as well as to a larger group of EEB departments at peer institutions, with median values from this group indicated with the gray inner circle. Dotted inner circles show 25th and 75th percentiles. Figures produced by Academic Analytics, <https://academicanalytics.com/contact/>, using their proprietary methods and database

Graduate students and postdocs in EEB also regularly receive internal and external research awards, including a ProQuest Distinguished Dissertation Award (1 in 2015), NSF Graduate Fellowships (26 since 2010), HHMI Gilliam and Janelia Fellowships (3 since 2010), Fulbright Awards (4 since 2010), Rackham Predoctoral Fellowships (20 since 2010), Graham Institute Dow Sustainability Fellowships (3 from 2010-2019), ITiMS Fellowship (1 in 2017), Michigan Sea Grant Graduate Student Fellowship (1 in 2022), NASA Earth and Space Science Fellow (1 in 2013), National Marine Fisheries Service-Sea Grant Joint Fellowship (1 in 2022). In the last year alone EEB graduate students have received 3 International Institute Research Awards, and awards from the AMNH Frank M. Chapman Memorial Fund (2), British Ornithologists Union, American Genetic Association, American Philosophical Society, Monarch Butterfly Fund, Rocky Mountain Biological Laboratory, SICB, and more. Many students and postdocs have also been recognized with awards for the best paper, best poster, or best talk at conferences, including the Storer and Stoye

awards from the American Society of Ichthyologists and Herpetologists and the Brina C. Kessel Award from the American Ornithological Society this year alone. Postdocs in EEB are currently supported by 1 NIH and 5 NSF fellowships.

### 3.2.4 Research Funding

As shown above in Figure 4, compared to the top ranked EEB department (Cornell), we have a similar number of total federal grants, but a smaller percentage of faculty who have received them. Compared to an EEB department ranked #10 (University of Chicago), we have more grants and more faculty with grants, but much lower federal grant dollars per grant and per faculty member (Figure 4), suggesting our faculty request and/or receive smaller awards. From 2012-2021, grant proposals submitted through EEB<sup>8</sup> requested an average of \$21,062,790/year, with an average of \$5,199,033 awarded. As shown in Figure 5A, these values varied quite a bit from year to year, with 2016 being the year with the fewest grant dollars requested and awarded. We note that this dip coincides with the departure of two well-funded Professors in 2015 and 2016. The number of proposals submitted through EEB also dropped in 2016 (Figure 5B) and has stayed at this lower level, even decreasing a bit further in 2021. However, from 2019-2021, the percentage of proposals submitted that were funded (awarded) has increased from 31% to 45% (Figure 5B). The National Science Foundation (NSF) is the largest source of external funding for members of EEB, followed by the National Institutes of Health (NIH), and then private foundations (e.g., Moore, Dow, Packard, National Geographic, HHMI) and other government agencies (e.g., Department of Interior, USDA, NASA, DOE) (Figure 5C).

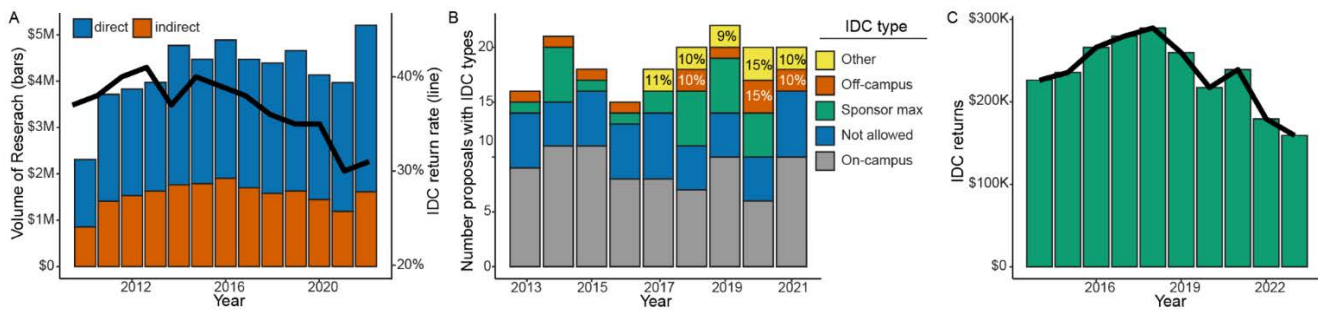


**Figure 5. Grant proposals and funding for U-M EEB.** (A) Total grant dollars requested (bar height), with proportions awarded (blue) and declined (yellow) from 2012-2021. (B) Number of proposals submitted (bar height), with proportions of awarded (blue) and declined (yellow) from 2012-2021. (C) Sources of extramural funding and total dollars awarded to EEB from 2017 to 2021.

External grant funding is essential to the success of EEB because it provides funds for equipment and supplies necessary to conduct research, salary and benefits for personnel performing that work (including graduate students, as described in the graduate program section below), and operating costs for the university, college, and department through indirect costs. These indirect costs (IDC) are the primary (and often only) source of funds for the departmental contribution to faculty start-up and retention packages. A portion of IDCs are returned to the department based on the funds spent from awards with IDCs two years after the expenditures. According to the U-M key performance indicator (KPI) database, EEB's total volume of research (VOR, direct + indirect) increased from FY11 to FY14 and has remained largely stable since (Figure 6A). However, the IDC proportion has declined in EEB from 40% to 30% since 2017 (Figure 6A). U-M's standard rate for on-campus research is 56%, but projects run off campus without U-M facilities can use a reduced off-campus IDC rate of 26%. In other cases, a grant sponsor does not allow IDC, sets its own maximum IDC, or uses another IDC rate less than the U-M on-campus rate. Looking at the number of proposals in EEB using each of these rates from 2013 to 2021 (Figure 6B), it seems the recent decrease in overall IDC rate for EEB resulted from an increase in proposals using the off-campus IDC (red) or other sponsored activity IDC rates (yellow). This reduced overall IDC rate, combined with reduced research expenditures in 2020 and 2021 due to the pandemic that lowered IDC returns in 2022 and 2023, resulted in a 45% drop in IDC returns to EEB from \$289,562 in 2018 to \$159,260 in 2023 (Figure 6C).

<sup>8</sup> Some EEB faculty with joint appointments have grant submissions handled by another department.





**Figure 6. Volume of Research (VOR) and Indirect Cost (IDC) rates and returns.** (A) For 2010 to 2022, the combined direct (blue) and indirect (red) research expenditures (VOR) are shown using data from the internal key performance indicators (KPI) database in the bar chart. The proportion of VOR attributable to IDC (also from KPI database) is shown with the line chart. (B) Usage of different categories of IDC rates charged to EEB grants from fiscal year 2013 to 2021. Percentages > 6% for “off-campus IDC” rates and “other IDC” rates are indicated. (C) Indirect costs returned (2014-2022) or projected to be returned (2023) to EEB.

### 3.3 Strategic goals

#### 3.3.1 Implement a process for defining future faculty searches when opportunities arise

The 2010 self-study identified evolutionary biology, evolutionary ecology, and large-scale ecology as priorities for hiring, with a stated desire to add faculty studying evolution of genotype-phenotype-environment relationships, speciation, experimental evolution, phylogenetic theory, evolutionary theory, evolutionary ecology, landscape ecology, and global change biology. We have achieved all but one of these goals (landscape ecology) and more, but we did not do so through the type of sequential, departmentally defined, searches anticipated at the time. Rather, faculty growth has come from taking advantage of a variety of hiring mechanisms, most of them unanticipated in 2010. As described in section 3.2.2, we hired 8 people through searches with a research area defined solely by the department, 4 through searches with the research area defined by multi-department cluster hire proposals written by subsets of the EEB faculty and selected by the U-M President, and 11 using hiring mechanisms where the department did not define a research area *a priori*. As shown in section 3.2.3, we have recruited stellar faculty through all these mechanisms. And yet, the decision to use these hiring mechanisms has been contentious at times and created conflict that negatively impacted our departmental climate.

Moving forward, we want to continue taking advantage of unanticipated hiring opportunities, but with a more deliberate and consultative process for doing so. For example, starting in 2020, we adopted a requirement for 75% or more of faculty to support pursuing an unanticipated hiring opportunity, such as a college, provost, or presidential initiative or request to jointly hire with another unit. More recently, we increased the threshold—from a simple majority to two-thirds—required for the full faculty to recommend a faculty offer to the EEB executive committee. We continue to require diversity statements in job applications (as we have since the 2016-2017 academic year) and to use a holistic, rubric-based evaluation process that helps us find the candidate that is the “best fit for us” on multiple axes (e.g., research, teaching, community) at the time of the search. As of May 2022, we have added chalk talks to our faculty interview visits to provide a more dynamic way for faculty as a group to discuss future research plans with candidates.

EEB faculty met in Jan 2021 and Oct 2022 to discuss plans for future faculty hiring. At both meetings, we discussed the pros and cons of trying to be a department that covers EEB as broadly as possible or one that builds strength in particular sub-disciplines. The consensus in both discussions was that either distribution would be acceptable as long as we were broad enough to cover our teaching needs and recruited faculty that strengthened our department in multiple ways. When we discussed specific research areas to prioritize in upcoming faculty searches, there was strong resistance to being too prescriptive given that (a) research shows broad searches attract more diverse candidate pools, (b) exciting areas of work in EEB change over time, and (c) departmental needs often shift in unexpected ways. Therefore, we changed our focus in these discussions from developing a list of current research priorities to defining a process that would be used to determine the focus of a faculty search in real time.

This process would define each search as broadly as possible as long as any candidate selected would be able to fill one or more current high priority teaching needs. If there are no high priority teaching needs at the time of the

search, the search would be defined as open to any area of ecology or evolutionary biology. We believe that this approach will maintain flexibility in the research profile of the department and ensure that we are able to recognize excellence in many different forms while also ensuring strong support for our undergraduate and graduate education programs. It requires, however, that we have a clear, consensus view of our highest priority courses for which the inability to consistently staff would cause us to narrow the scope of a faculty search. To create this list, we asked each faculty member to assess the essentiality of each course offered by EEB in the last 10 years and then asked them to report their ability and enthusiasm for teaching each course. Based on these responses, we identified three tiers of courses and how they will influence faculty hiring.

**Tier 1: Inability to staff one of these courses creates a high priority need that will narrow (if necessary) the focus of the next faculty search:** Introductory Biology: Ecology and Evolution (BIO 171, 550 students), Introductory Biology Lab (BIO 173, 1500 students), General Ecology (BIO 281, 100 students), Genetics (BIO 305, 350 students), Evolution (EEB 390, 100 students), Microbiology (BIO 207, 150 students), Animal Diversity (BIO 288, 40 students), Plant Biology (BIO 230, 25 students), EEB Capstone (EEB 410, 20 students), Ecosystem Ecology (EEB 476, 25 students), Population Genetics (EEB 490, 10 students), Population and Community Ecology (EEB 484, 35 students), and Principles of Evolution (EEB 516, 20 students). Most of these courses are requirements for one or more of our undergraduate majors or for our PhD program. Together, they define a minimal set of research expertise that we think must be maintained in EEB at all times.

**Tier 2: Inability to staff one of these courses will not narrow the job description, but will be used to prioritize candidates on the “long-short list” based on this priority teaching need:** Global Change (BIO 110, 100 students), Animal Behavior (BIO 130, 100 students), Biological Data Analysis (BIO 202, 40 students), Vertebrate Evolution and Diversity (BIO 252, 25 students), Ecology and Evolution of Infectious Disease (EEB 315, 40 students), Science Writing (EEB 525, 10 students), and our 400-level courses focused on specific taxonomic groups that enroll 25-50 students each: Microbial Ecology (EEB 446), Biology of Fungi (EEB 468), Ornithology (EEB 433), Woody Plants (EEB 436), Biology of Fishes (EEB 440), Amphibians and Reptiles (EEB 450), Biology of Mammals (EEB 451), Biology of Insects (EEB 442). These courses are not strictly required for any of our undergraduate majors, but we think that they are important components for any top educational program in Ecology and Evolutionary Biology.

**Tier 3: Inability to staff one of these courses will not be factored into hiring decisions:** The remaining courses offered by EEB faculty fall into this group. They include some very popular lower-level courses (e.g., Energy, Food and Environment, BIO 101, 180 students; Ecological Knowledge BIO 109, 120 students; Biology of Nutrition, BIO 105, 300 students) as well as many upper-level courses (typically 10-30 students each) that allow students to delve deeply into more focused areas of EEB. We are committed to maintaining a healthy mix of courses at both levels, but we also think that the topics of these courses can and should shift over time based on student and faculty interests.

Opportunities for suitable candidates to be appointed as museum curators will also be included in advertisements for all faculty searches. When we assessed our current capacity to cover these Tier 1 and Tier 2 courses, we concluded that we can generally do so at this time, though with little flexibility in some areas to cover leaves. Our discussion also identified a course that we have not recently been teaching, Animal Physiology (BIO 225), which used to be co-taught by EEB and MCDB faculty. We have thus decided to treat this course as a Tier 2 course, recognizing that hiring an EEB faculty member to teach it would strengthen our undergraduate teaching portfolio. A secondary benefit of prioritizing courses in these tiers is that it could help us increase equity in teaching assignments by requiring each EEB faculty member to regularly teach a course in tier 1 or tier 2.

### *3.3.2 Conduct market salary reviews for members of EEB*

Competitive salaries are critical for attracting and retaining all members of EEB, and we ask for the college's help and support comparing current salaries (ideally adjusted for cost of living) to other Big Ten schools and public peer institutions. For our existing faculty and staff, maintaining competitive salaries proactively is critical for retention. And for new hires, it is critical for recruitment. An area of particular concern right now is starting salaries for Assistant Professors. During recruitment last year, we learned that Assistant Professor salaries at Michigan State University for faculty in our field are ~10% higher than U-M, despite the cost of living being 13.4% lower in Lansing than Ann Arbor. In addition, a former EEB PhD student starting an Assistant Professor position at Purdue University this year was offered a salary only 8.6% lower than our most recent hires despite a 32% lower cost of living in West Lafayette, IN. University of Wisconsin and Indiana University, both Big Ten schools with strong EEB programs, have cost of living estimates more similar to (but slightly lower than) Ann Arbor, yet publicly available salary data indicates that



their Assistant Professors working in EEB have salaries \$3k - \$5k higher than at U-M. An additional source of faculty salary concern comes from mismatches among U-M units observed when salary setting for EEB faculty jointly appointed with other units. Benchmarking to industry will also be important given that we are increasingly competing with industry for candidates because of the strong quantitative and computational skills developed by many in EEB. Competitive salaries support our JEDI goals by ensuring that top candidates can accept our offers regardless of their socioeconomic backgrounds. Comparative salary data is also sorely needed for collections managers, especially those with PhDs, at other top biodiversity museums.



## 4. EEB Museums

### 4.1 Introduction

Although now administratively part of EEB, the U-M Museum of Zoology (UMMZ) and U-M Herbarium (UMH) have rich histories independent of the department. During 2022, the EEB Museums group held two self-study workshops, one dedicated to strategic visioning and one dedicated to Information Technology needs and strategy. A vision for the future emerged from these discussions that defined the EEB Museums as vibrant academic communities fully engaged with, and playing a leading role in, extending the scope and impact of biodiversity specimen-based research, education, and service. Over the next 10 years, our EEB Museums will reimagine how to make their extraordinary wealth of biodiversity research and teaching resources and capabilities more accessible to all the communities they serve, from our students and colleagues at the University of Michigan, to the broader research community, and to society in general.

The fundamental mission of natural history collections, and therefore the EEB museums, is to function as a research and service platform for biodiversity-oriented research and training in ecology, evolutionary biology, and conservation. In an era increasingly defined as the Anthropocene, during which unprecedented advances in biological knowledge and big data analytics run parallel with environmental change, biodiversity declines, and zoonotic pandemics, natural history collections are an outsized but insufficiently used tool for all manner of fundamental basic and applied biodiversity research. While biodiversity declines at alarming rates, much of that same diversity remains uncatalogued and unknown, making biodiversity discovery and basic taxonomic work an urgent and vastly incomplete task. Our ability to reconstruct ever larger and more accurate depictions of the evolutionary relationships and timing of species divergence has become an essential tool well beyond systematics and classification.

Collections-based research is key for delimiting evolutionary and conservation units, understanding the origin and maintenance of biological diversity, linking genetic and phenotypic variation, predicting functional properties of organisms, understanding the origin and consequences of ecological interactions, establishing conservation priorities, and predicting zoonotic pandemics. Century-old collections such as ours provide an irreplaceable tool in understanding and predicting how anthropogenic environmental changes are transforming ecosystems across the globe. *Extended Specimens* – those for which we have both physical specimen and its associated genetic, ecological, anatomical, physiological, and geographic data – engage researchers beyond traditional museum disciplines, and offer unique opportunities to gather, organize, study and share "big data" resources to address some of the defining questions of our time. We are also in a unique position, and have a unique responsibility, to educate, formally and informally, researchers, students and the general public on the uses and importance of collections in understanding biodiversity, the many ways in which human activities are affecting it, and what we may be able to do to preserve it. The EEB Museums aim to ensure that EEB, the University, and society at large benefit from our irreplaceable collections.

We are also excited that, for the first time in their history, the EEB Museums' biological collections are located in a single building with state-of-the-art facilities nearly unparalleled among its peers. They have a healthy community of faculty curators spanning multiple career stages and at least one Collection Manager for each collection. Together, the EEB Museums are an active, energized community eager to move into a new chapter of excellence in collection building, collections-based research, and training of the next generation of biodiversity scientists. The EEB Museums community is keenly aware of the historical legacy with which it has been entrusted, and it is deeply committed to ensuring the continued growth and expanded use of the world-class natural history collections that, for nearly 200 years, have helped define the University of Michigan as one of the world-leading institutions of higher education.

### 4.2 State of the EEB Museums

#### 4.2.1 Personnel

Currently, the University of Michigan Museum of Zoology (UMMZ) and the University of Michigan Herbarium (UMH) form a community driven by high motivation to innovate, lead, and develop integrated research themes, in which 10 active faculty curators, 9 collection managers (including 5 with research scientist appointments), 11 postdocs, 43 graduate students, and 46 undergraduate students are engaged in biodiversity research that builds from the many dimensions of data contained in natural history collections. Nine graduate students are supported each year as graduate student curatorial assistants (GSCAs), giving them a chance to acquire hands-on experience working with museum collections. 5 members from other departments and institutions, as well as retired curators and research scientists, also currently conduct research in the collections.



Since the last external review in 2010, new faculty curators have been hired in Amphibians and Reptiles (Rabosky; Davis Rabosky), Birds (Winger), Fishes (López-Fernández), and Vascular Plants (Vasconcelos). Only one division (Mammals) is currently without a faculty curator due to a retirement in 2021. A Director for the new Michigan Pathogen Biorepository (Speer) was recently hired that could fill this role (or another curatorial role) in the future. In addition, we have recently hired new collection managers in Mammals (Thompson), Fishes (Singer), Birds (Benz), Vascular Plants (Ruhfel), Fungi (Harrington), and Insects (Tucker; Eldredge). All newly hired collection managers hold PhDs. Together, these curatorial faculty and collection managers hired since 2010 have added expertise to the biodiversity, systematics, macroevolution, biogeography, and evolutionary ecology research programs in the department, as well as foci on Neotropical, North American, Southeast Asian, Australian, and oceanic biodiversity. Diversity of personnel within the EEB Museums has remained stable in some respects and has increased in others. For example, the percentage of women stayed constant at ~28%: female faculty curators increased from 2 to 4 (including Speer), but female collection managers decreased from 3 to 1. We have added two faculty curators from Latin America, a region strongly represented in the collections, but historically not part of the museum's personnel or leadership.

Daily operations of the EEB Museums have been enhanced by the creation of a dedicated Registrar position for the EEB Museums in 2016. The primary role of the Registrar is to advise and oversee the processes of collecting, accessioning, using and sharing our collections within and outside the university in accordance with biodiversity and safety regulations at the university, state, national and international levels. The current registrar, Ben Hess, has steadily developed a vast network of regulatory contacts at all levels and increased the profile of the EEB Museums, and indeed the University, as a center of procedural knowledge in the many dimensions of working with biodiversity from the field to the museums. As a result, our collections are increasingly managed at the highest level of compliance with biodiversity, health and safety, controlled substances, and other regulations. The EEB Museums are emerging as a national example of best practices in biodiversity collections.

#### 4.2.2 Administration

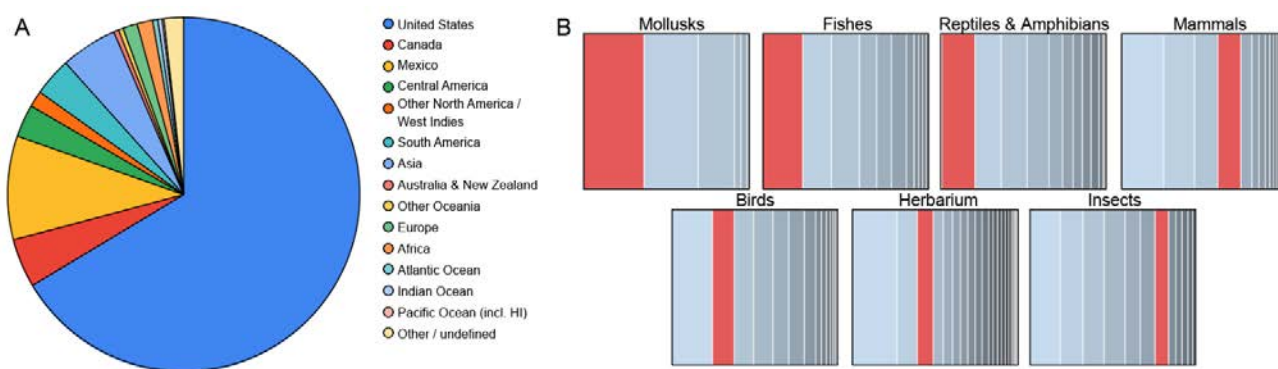
Since the merger of the Museum of Zoology, Herbarium, and EEB in 2011, leadership of the museums has transitioned from two directors (one for the Museum of Zoology and one for the Herbarium) to one Associate Chair for Collections appointed by the EEB Department Chair. In 2020, the Associate Chair for Collections established four formal committees within the museum to increase transparency and equity in museum decision making and policy development. The *Collections Operations Committee* oversees and manages the daily functioning of the collections and coordinates activities among the UMMZ, UMH, and other museums at the RMC. The *Education Committee* coordinates with the graduate and undergraduate offices in EEB and has standardized the role and selection of the GSCAs, awarded museum-based research and fieldwork grants to EEB graduate students, and developed standards for large undergraduate course visits to the collections (e.g., BIO173). The *Outreach Committee* is developing new initiatives to communicate the museums' activities to various audiences, such as through the Museums Newsletter, which has been sent electronically to hundreds of recipients in the Fall and Winter semesters since 2021 and are enhancing website and social media presences as well as developing fundraising strategies in coordination with the Advancement office. The *Digital Collections Committee* identifies critical needs in day-to-day collection management using the Specify database; they are working with LSA IT to develop short- and medium-term strategies to strengthen digital collections and develop a Biodiversity Informatics plan for the museums. These committees have improved coordination with the rest of EEB and created opportunities for broader participation of the Museums community in governance and new initiatives.

#### 4.2.3 Current strengths and priorities

##### **World-class historical and contemporary collections**

The EEB Museums collections are truly global in scope and date back at least one century, although some specimens date back to the foundation of the University of Michigan in 1817 or earlier. Geographic coverage is vastly dominated by the United States (Figure 7A) but encompasses global representation of biodiversity. Other areas of particular strength include North America, the Neotropics, Oceania, Asia, and among fishes and mollusks, the Atlantic and Indian Oceans. Collectively the collections exceed 17 million specimens, of which 15,533,928 are cataloged, including 8,045,832 digitized. Cataloged specimen records in all vertebrate collections are fully digitized and discoverable through each collection's webpage and through global aggregators, including iDigBio and the Global Biodiversity Information Facility (GBIF). The Insect and Mollusk collections have digitized approximately 10.5% and 44% of their ~4.5-5.0 million estimated specimens, respectively. The Herbarium's approximately 1.7 million specimens are about 64% digitized, including high-resolution digital imaging of their holdings. The U-M collections of Mollusks, Fishes, and Reptiles & Amphibians are the largest among Biodiversity Research Museums in the US (Figure 7B).

**Digital access to museum specimens:** Digitization of natural history specimens has been a priority over the last decade. We have received support for this and related collections-based research work through 11 sponsored and 14 internal awards over the last 5 years, totaling just over \$10 million across the UMMZ and UMH. The EEB Museums and Museum of Paleontology adopted the Specify Collections Management platform (<https://www.specifysoftware.org/>) through collaboration with LSA Technology Services (TS). Although technical informatics support for the digital collections has been limiting until recently, we are now developing a strategic plan in collaboration with Cathy Curley (LSA Chief Information Officer) and Amy Peters (Director of Research, Computing, and Infrastructure Services, LSA Technology Services), that articulates needs and goals of the EEB Museums for this critical part of museum infrastructure. Our increasing collaboration with LSA-TS led to hiring a second full-time programmer and searching for an informatics project manager for the RMC museums in late 2022. These new hires amount to an effective quadrupling of the number of people contributing to database and digitization efforts, which is much needed and will help increase the accessibility of our collections. In the mid-term, we aim to develop new software initiatives entirely within our museums, including digital extended specimen approaches across collections. Additionally, because the University of Michigan is a Founding Partner of the Specify Consortium, we are part of the Board of Members and the Science and Technology Advisory Committees for Specify. This vantage allows us to work collaboratively with the Consortium to improve digital collection management and develop digital Extended Specimen capabilities within the platform.



**Figure 7. Profiles of EEB collections and comparison to peer programs.** (A) Geographic origins of digitized specimens in the U-Museum of Zoology and Herbarium collections. (B) Relative size of U-M collections (red bar) and equivalent collections at other Universities with comparable museums and EEB Programs (i.e., Cornell University, Harvard University, University of California-San Diego, Yale University, Princeton University, Stanford University, Duke University, University of Texas at Austin, Indiana University, University of Chicago, University of Arizona, University of California-Santa Barbara, University of North Carolina, University of Wisconsin, University of California-Los Angeles, University of Florida, University of New Mexico, University of Kansas, Louisiana State University, University of California-Berkeley, and University of Washington).

**CT scanning and digital extended specimens:** With an increasing emphasis on developing an "Extended Specimen" approach to the museums (see below), the museums founded a new imaging facility dedicated to micro computed tomography ( $\mu$ CT) of biodiversity. Originally developed in 2019 as part of the NSF-funded oVert grant to CT Scan all genera of vertebrates, our scanning initiative led to the development of a U-M  $\mu$ CT Core facility in the Fall of 2022. The facility is currently a hub of research by faculty, postdocs, graduate and undergraduate students and is central to a number of NSF funded and pending research and digitization proposals, placing the museum among few with the capacity to lead in the use of this technology in biodiversity studies; between 2019 and 2022, we generated over 5,000 specimen scans of vertebrates and insects.  $\mu$ CT Scanning and associated digital specimen data are starting to open natural history collections for research and teaching in directions never before possible. This opportunity has diversified and expanded the use of specimens and anatomical studies in combination with genomic, ecological, and behavioral approaches to studying vertebrates, and more tentatively, insects and other invertebrates in the museums. Ongoing or proposed research includes skeletal reconstructions and development of new techniques to study soft tissues in vertebrates (diceCT scanning, in reptiles, fishes and mammals). These are at the core of ongoing studies of the evolution of mimicry and venom in coral snakes as well as macroevolution and comparative functional morphology in living and fossil fishes. The  $\mu$ CT facility is also central to new education and outreach initiatives funded by the U-M Center for Research on Learning and Teaching and U-M Museum of Natural History.

Pathogen collections and research: The Michigan Pathogen Biorepository (M-PABI) was founded in 2021 as part of the Michigan Center for Infectious Disease Threats (MCIDT), supported by the Presidential Biosciences Initiative. The MCIDT (led by Aubree Gordon, School of Public Health) gathers researchers and practitioners in the biological, epidemiological, and medical sciences with the goal of predicting and preventing future pandemics. The M-PABI, initially led by EEB Professor Tim James, will be directed by new EEB Assistant Professor Kelly Speer as of January 2023, with advice from an external advisory board of both internal and external leaders in pathogen biology (Appendix 2). The M-PABI will voucher potential pathogen hosts, develop protocols for biodiversity-wide pathogen screening, route samples towards experts in various pathogenic organisms, and help bridge biodiversity, epidemiological and clinical elements of zoonotic disease threats. Although administratively distinct from EEB, the M-PABI facilities will be housed at the RMC and work closely with the Museum of Zoology. Lab renovations for the M-PABI include expanded cryogenic storage capacity, a dedicated Biosafety Level 2 laboratory, and stand-alone ancient DNA and clean room facilities to screen pathogens from existing collections and to serve as a dedicated facility for working with degraded DNA. The M-PABI builds experience working with pathogen collections in the EEB museums developed through the Collection of Zoosporic Eufungi (CZEUM), managed by the U-M Herbarium and Curator of Fungi.

## 4.3 Strategic goals

### *4.3.1 Promote innovative growth in collections-based research at U-M and in global networks*

The future of natural history collections depends on our ability to leverage specimen data to solve the global biodiversity challenges facing our society. One way the EEB Museums addresses this challenge is through the interdisciplinary “Extended Specimen” approaches that have redefined natural history museums in the 21st century. Instead of the historical approach in which only physical vouchers were prioritized, newly accessioned specimens are now associated with a wealth of “extended phenotype” data on environmental associations, functional traits, behavior, genomes, microbiomes, prey interactions, parasites and pathogens, nutrient composition, and many others. Extended specimens continue growing even after field collections are concluded, thanks to new technologies like high-throughput sequencing and AI-driven phenotyping and data mining across broad spatial and temporal sampling scales. Partially emulating existing fieldwork and research fellowships for graduate students, we are developing a “Biodiversity Exploration” program to fundraise for and leverage museum endowed funds to support field exploration and publication of field and specimen-centered research. These activities will be performed ensuring participation of local stakeholders (e.g., students, indigenous groups, local collaborators) in expeditionary collections, research work, and publications funded by the museum. This initiative seeks to foster growth and broaden the relevance of the collections across museums personnel, EEB faculty, and other units. These approaches expand and extend the usability of collections into a digital realm of “big data”, enabling global analyses of biodiversity and its ecological and evolutionary responses to this unprecedented period of global change.

### *4.3.2 Create a Biodiversity Data Science and Informatics center in EEB Museums*

The EEB Museums have an opportunity to take a leading role in museum informatics among global biodiversity museums. To do so, we must prioritize our digitized data and specimen collections, recognizing their increasingly central role in museums-based biodiversity studies. Now that we have made significant headway in digitizing our collections, we are faced with the need to store, access, share, curate, and use these digital specimens and associated data. Support for museum informatics and museum data initiatives at all levels are a fundamental priority for the EEB Museums. We unanimously see expansion of our museum informatics and data science capabilities as essential to leveraging collections in the Extended Specimen framework that transforms the usability of our collections and makes them globally accessible and impactful. We envision a center based in the EEB Museums, but interdisciplinary by nature and in open collaboration with our existing partners at LSA Technology Services, other LSA Museums (e.g., Paleontology, Anthropology), and other administrative units (e.g., School of Information, Michigan Institute for Data Science (MIDAS), etc.). We will support this center through fundraising, hoping to hire a research data scientist(s) and museum informatics curator(s) who will develop new data initiatives.

### *4.3.3 Develop educational initiatives emphasizing natural history collections as essential tools for studying biodiversity and helping diversify career paths for EEB students*

Museum-based diversification of undergraduate and graduate training contributes to building the next generation of museum scientists, curators, and collection managers, which is a nationally identified priority for biological collections ([National Academy of Sciences, 2020](#)). Members of the EEB Museums have been engaging with the Associate Chair for Undergraduate Studies and EEB undergraduate affairs committee, as well as with the UMMNH and the UMBS,



to explore options for enhancing the biodiversity focus of our undergraduate majors and expanding graduate educational opportunities. We elaborate on these proposed initiatives in the corresponding sections below.

#### *4.3.4 Stabilize the mission and employment status of Collection Managers*

Until 2021, recently hired collection managers with a PhD had the option to apply to become Assistant Research Scientists with a 5% allocation of their time to pursue their own collections-based research goals. While modest in time allowance, this arrangement made these individuals non-tenure track faculty members, which helped us attract top talent to the EEB Museums and allowed the individuals hired to participate fully in the intellectual life of the U-M research community. This arrangement also provided a promotion path through Research Scientist ranks that validated and rewarded their contributions to the research mission of EEB and its museums. Recent policy changes from the University of Michigan Office of Research (UMOR) now require Research Scientists to have an appointment fraction of 50% or more, which is not compatible with the other responsibilities of our collection managers. This revised policy also states that all Assistant Research Scientists will be evaluated for promotion using the same standards, regardless of the appointment fraction. Understandably, these changes have created great uncertainty and stress regarding the research component and administrative status of our collection managers who currently hold Assistant Research Scientist appointments. They have also created two classes of collection managers, as we have hired new PhD-level collection managers unable to be appointed with this title. Currently, this is the single most detrimental issue for climate in the museums.

The previous conditions for Collection Managers constituted an innovative, potentially transformative approach to collection management in modern museums. Our collection managers are not only experts in their taxonomic group, but many are also at the forefront of current developments in museums-based digitization of specimens and historical data, Extended Specimen databasing approaches, data aggregation, and big-data initiatives at the helm of data-driven research based on collections. Ensuring our Collection Managers can continue to handle the day-to-day needs of the research collections while also pursuing innovative organismal and data-driven initiatives would place the University of Michigan among the leaders in collections-based research and data sharing innovation. EEB leadership has worked – and continues to work – with LSA and Academic Human Resources to try to find an alternative title for collection managers engaged in research that would better represent the breadth of the role and provide a clear promotion path. Unfortunately, this work has not yet been successful, and we think the best next step is a comprehensive review of similar roles with other titles at U-M and within similar museums across the country.

#### *4.3.5 Improve accessibility of RMC facilities for the U-M community, particularly students*

Accessible, inexpensive, and timely transportation between the RMC and central campus is essential for inclusive museum-based programs. Existing transportation options include privately-owned cars (which are not available to all and come with parking costs), an on-demand university biomedical research shuttle (that often has substantial wait times), and a university-paid but privately owned and operated taxi service (that has received multiple complaints of inappropriate or unsafe behavior by some drivers). These latter two modes of transportation are not ADA compliant. Surveys following a visit of Introductory Biology students showed that transportation is the key element discouraging undergraduate students from taking part in museum curatorial and research activities. Limited timely access to the collections prevents EEB students, postdocs, faculty, and the broader university community from taking advantage of the world-class collections at the RMC. Fulfilling our vision of a fully inclusive and welcoming EEB Museums community requires novel approaches to this problem that guarantee inclusive access to the collections. DEI initiatives aimed at increasing accessibility, inclusivity, and diversification of the museum-engaged community are negatively impacted by the transportation barriers created by the physical move to the RMC. This physical separation of the RMC has been identified by leadership of the EEB Museums, the Museum of Paleontology, and the Museum of Anthropological Archeology as the major structural barrier for all the museums to fully realize their potential in research, education, and outreach. This problem cannot be solved solely by EEB; we need help. We look forward to continuing to work with the College and other U-M units to find a more effective, lasting solution to this fundamental challenge.

#### *4.3.6 Address challenges resulting from the administrative merger of the Museums with EEB*

Prior to 2011, the UMMZ and UMH each had its own director. When these museums were administratively integrated with EEB following the last self-study, these two positions were replaced with a single Associate Chair of Collections, increasing this person's workload, decreasing their ability to directly communicate with the College, and reducing the museums' ability to autonomously plan hiring of faculty curators or control budgets. Although the museums have hired several new faculty curators since the last external review, these searches were not specifically targeted for faculty curators and there has not been a structural mechanism to ensure museum needs or initiatives are addressed

in a timely manner. This change has left the museum in a potentially vulnerable position when planning or executing strategic directions. With the future hiring strategy proposed in section 3.3.1, the ability to teach our taxonomically focused classes (which are typically taught by museum curators) will be given priority, helping to fill open curatorial positions in a more timely fashion. As also noted in that section, a statement indicating potential curatorial appointments for suitable candidates will also be added to future advertisements for EEB faculty positions. Finally, internal conversations are ongoing about how to best recognize the increased service workloads of faculty curators and collection managers created by the four new EEB Museums committees.

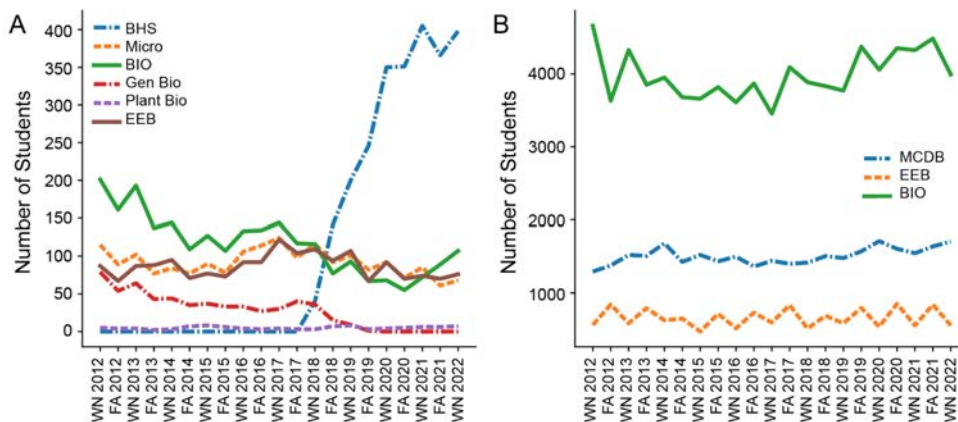


## 5. Undergraduate Programs

### 5.1. Introduction

Undergraduate education in EEB is managed by the interdepartmental Program in Biology (PiB) run jointly by EEB and its sister department, MCDB. The Associate Chair for Undergraduate Education in EEB and the EEB Department Chair determine teaching assignments for EEB faculty and work closely with the PiB director to ensure that courses are taught effectively and concerns from students and faculty are addressed. The PiB staff takes the lead on appointing graduate student instructors (GSIs) and undergraduate teaching assistants (UTAs), classroom scheduling, advising students and declaring majors, managing research honors theses, and handling student complaints and accusations of academic misconduct. The PiB oversees eight majors (Appendix 3), five of which EEB is either solely (\*) or jointly responsible for: (1) Biology, (2) Biology, Health, and Society (which replaced General Biology in 2018), (3) Ecology, Evolution, and Biodiversity\*, (4) Microbiology, and (5) Plant Biology. Currently, 656 undergraduate students have declared one of these five majors (Figure 8A). Courses taught by EEB faculty are coded as either BIO (mostly 100 and 200 level courses) or EEB and are often cross listed with other units.

EEB faculty offer high-quality teaching for the ~10,000 undergraduate students (majors and non-majors) who take EEB and BIO courses each year (Figure 8B), including being responsive to the varied career goals, interests, and backgrounds of this large and diverse student population. This commitment to excellence in teaching has been recognized by U-M with awards to tenure-track faculty including two Arthur F. Thurnau Professorships, four Henry Russel Awards, three John Dewey teaching awards, three Class of 1923 Memorial teaching awards, a



**Figure 8. Undergraduate enrollment in majors supported by EEB.** (A) Number of students with declared majors by semester in Biology, Health, and Society (BHS, started FA 2017), Microbiology (Micro), Biology (BIO), General Biology (Gen Bio, discontinued in FA 2017), Plant Biology (Plant Bio), and Ecology, Evolution, and Biodiversity (EEB). WN = winter semester, FA = fall semester. (B) Number of students enrolled in courses listed as BIO, EEB, and MCDB.

Provost Teaching Innovation Prize, an LSA Excellence in Teaching Award, and an Individual Award for Outstanding Contributions to Undergraduate Education. Scientific societies have also recognized EEB Faculty with a Meritorious Teaching Award in Herpetology and an International Society for Artificial Life Education and Outreach Award.

We are fortunate to work with a group of outstanding Lecturers in EEB, two of whom have been recognized with Collegiate lecturerships, and three of whom have received Individual Awards for Outstanding Contributions to Undergraduate Education. Our graduate students also do an excellent job teaching students in the classroom and mentoring undergraduates in research, with four receiving the Outstanding Graduate Student Instructor award since 2017 and multiple EEB postdocs and graduate students in EEB receiving Outstanding Mentor awards from the U-M Undergraduate Research Opportunities Program (UROP). To help convey to the EEB community the importance of high-quality teaching, the Program in Biology created an internal program that recognizes individuals receiving student evaluation scores for the question “Overall, the instructor was an effective teacher.” greater than 4.75 out of 5 for courses with fewer than 100 students enrolled and a  $\geq 75\%$  response rate or greater than 4.5 for courses with more than 100 students enrolled and a  $\geq 33\%$  response rate. In the last 4 years, 189 EEB lecturers, professors, and graduate student instructors were recognized for this achievement.

### 5.2. Current State of the Program

#### 5.2.1 Recent changes to majors

In Fall 2017, the “Ecology and Evolutionary Biology (EEB)” major was officially renamed “Ecology, Evolution, and Biodiversity (EEB)” to more explicitly convey its focus on the diversity of life. At the same time, the organic chemistry



and physics course prerequisites were reduced from 2 to 1 semester each. We saw a slight, but temporary, increase in the number of EEB majors following this change. A new student group, the Michigan Ecology and Evolutionary Biology Society (MEEBS), was also formed around that time to create a community for EEB-interested students from any major.

In Winter 2018, EEB and MCDB worked together to transform the “General Biology” major into a new “Biology, Health, and Society (BHS)” major. BHS was designed to include a wider variety of courses related specifically to how science interacts with society and health and to be much more flexible than other PiB majors. As with other PiB majors, prerequisites to BHS include the Introductory Biology course sequence (BIO 171, 172, and 173), 3 or more quantitative courses chosen from calculus, physics, statistics, and computer programming courses, and at least 1 semester of organic chemistry with lab. Students then take two of several 200-level “Gateway” courses (e.g., Microbiology, Introduction to Plant Biology), two “Health and Society” related courses, two “Core Biology” courses (e.g., Genetics, Ecology, Evolution), and at least one upper-level Biology elective course. An upper-level laboratory-based course is also required. The flexibility of this major has led to very rapid growth of both the major and the courses that serve the major. With this growth, there has been an increase in EEB’s role in the pre-health curriculum at UM. Importantly, this growth has come with little impact on the number of EEB majors and decreases in other PiB majors supported by EEB are much smaller than the growth of BHS (Figure 8A), indicating that BHS has attracted students otherwise unlikely to be affiliated with one of our majors.

Discussions are currently underway for three other changes to our undergraduate program:

1. **Quantitative Biology:** We are partnering with MCDB and the Department of Biophysics to develop a new “Quantitative Biology” major. We think the time is right for the introduction of this major because of the growing demand for quantitative and computational skills for careers in biology and related disciplines. Moreover, with demand from LSA students for computational classes now more than the courses offered by the College of Engineering can support, LSA has established a new interdisciplinary Program in Computing for Arts & Sciences (PCAS). The quantitative strengths and expansion of computational courses in the department along with the increased demand from students for quantitative and computational courses, make this the right time to develop this new major.
2. **Green Life Sciences:** We are collaborating with MCDB to reimagine the “Plant Biology” major as a new “Green Life Sciences” major that will more explicitly incorporate material relevant to biotechnology, conservation biology, sustainability, and climate change. We believe that the growing national interest in these topics will make this revised major more attractive to undergraduate students. In addition, we think that this change is timely because both EEB and MCDB have hired new faculty in the last year who are highly qualified to teach these classes (3 in EEB and 1 in MCDB, plus 2 senior faculty with offers now from MCDB).
3. **Museum studies in biodiversity:** Our courses focused on taxonomic groups have maintained consistently strong enrollment for many years but moving the research collections to RMC has greatly reduced the number of undergraduate students that can engage with these collections through research. Such experiences taught students about the role of museums in academia and society. We would thus like to increase support for students with strong interests in biodiversity science by providing more courses and a clearer training path in our undergraduate curriculum.

### 5.2.2 Curriculum

The EEB curriculum includes a wide range of course offerings with varied student experiences, including first year seminars, introductory courses, field courses (including at UMBS), biodiversity and specimen-based courses, lecture courses, and laboratory courses. Our largest courses required for our majors have drawn consistently high enrollments from 2012-2021 (Figure 9), with Introductory Biology: Ecology and Evolution (BIO 171) averaging >600 students each semester and the Introductory Biology Lab (BIO 173) averaging >740 students. Genetics (BIO 305) is the next largest course taught by an EEB faculty member (co-taught with someone from MCDB) and has a historical enrollment of >360 per semester, but >410 each of the last two Fall semesters. Other large enrollment courses required for majors taught by EEB faculty members include Microbiology (BIO 207, >140/semester) and Evolution (EEB 390, ~100/semester).

Although large enrollments can make active learning strategies difficult to implement, these courses are among our most progressive pedagogically. For example, BIO 171 instructors overhauled this large lecture course in Fall 2014, incorporating evidence-based best practices for advancing learning of students from diverse backgrounds, including active learning, peer learning, frequent low-stakes formative assessments, and clearly articulated learning goals. Analysis of exams given after these changes showed that questions became more focused on understanding and applying information and less on simple recall without any significant change in exam scores, signaling that students engaged more deeply with the material than they had before. This is a major achievement in the course that introduces more than 1000 students each year to ecology and evolutionary biology. Over the last 3 years, the BIO 173 instructional team has also reinvented this key introductory lab course in collaboration with the Center for Research on Learning and Teaching (CRLT) as part of the Foundational Course Initiative. Changes included updating lab experiments to make them more inquiry based. Working with the museums, up to 800 students are now taken to the RMC by bus where they are introduced to research and shown real-world examples of course themes (e.g., convergent evolution, speciation, mimicry, environmental change) at the UMMZ and UMH.

EEB offers the core Genetics (BIO 305), Ecology (BIO 281), and Evolution (EEB 390) courses required for multiple PiB majors. It also offers many courses focused on biodiversity (e.g., Woody Plants, Biology of Birds, Amphibians and Reptiles, Biology of Fungi, Animal Diversity, Biology of Fishes, Biology of Insects, among others). These courses include interactions with museum specimens or field experiences allowing students to see the organisms studied in the wild. EEB courses are also taught at the U-M Biological Station during the spring and summer terms that typically include intensive field experience and hands-on science experiments. To support recent changes in the quantitative course requirements for our majors (replacing specific calculus and physics courses with choices among math, physics, statistics, and programming courses), we have developed new programming courses in Python and R for data analysis, which are commonly used in biology (e.g., Biological Data Analysis and Programming, Introduction to Statistical Model Building in R).

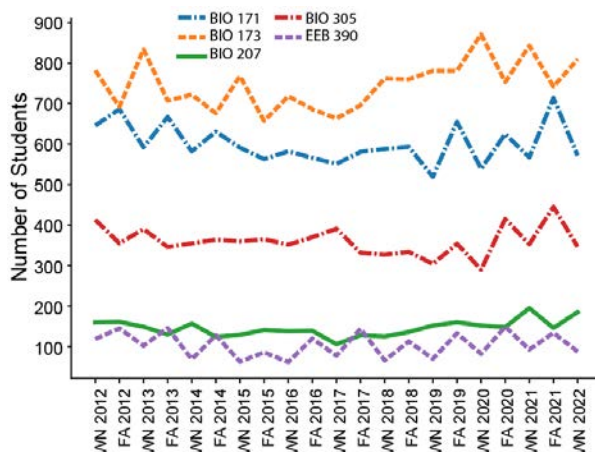
For non-majors, we offer a mix of large and small enrollment courses at the 100-level (e.g., Food, Energy, and Environmental Justice; Biology of Nutrition; Introduction to Global Change) and have recently begun offering more mini-courses (e.g., Evolutionary Impacts of Humans; Science, Reason, and Nonsense) that are gaining in popularity.

### 5.2.3 Advising and Mentoring Undergraduate Students

The Program in Biology provides undergraduate students with academic mentoring from three different sources: staff, faculty, and peers. Students often seek advising appointments with two goals in mind: career advice and course planning. Two full-time staff advisors in the PiB are the primary points of contact for student advising. Both are experts in the majors, their requirements, and course planning. They also supervise peer advisors, who are students in their junior or senior year who have majored in one of the PiB majors and meet with students to answer questions and offer advice. Advising meetings with faculty are therefore free to focus primarily on career development, advice, and planning. These conversations with faculty are helpful for many students, especially students interested in graduate school who may be unfamiliar with the expectations and application processes. On average, the PiB team holds ~1000 meetings with students in Fall, ~1000 meetings with students in Winter, and ~350 meetings with students in the Spring and Summer terms combined.

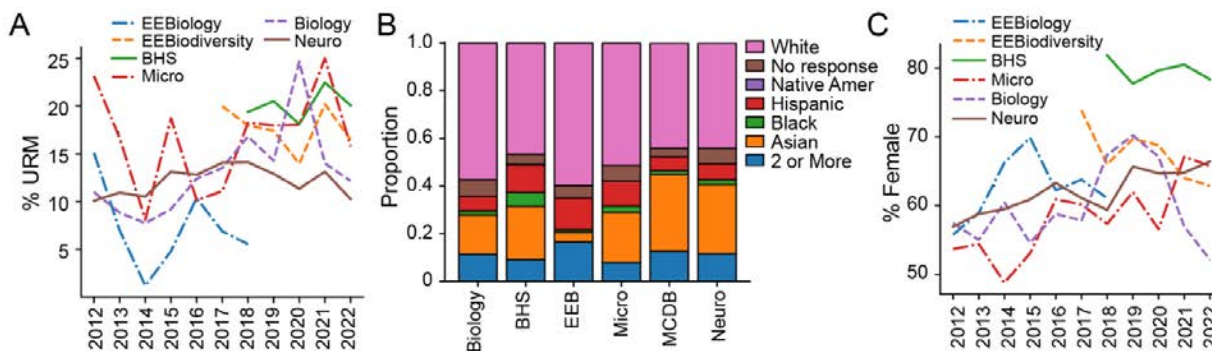
### 5.2.4 Undergraduate Student Demographics

EEB is committed to advancing diversity, equity, and inclusion (DEI) in its undergraduate program, including by working to increase the diversity of students enrolled in our courses; using teaching methods shown to reduce differences in performance among gender, racial, and ethnic groups; and presenting the work of diverse role models in our courses. For example, EEB graduate students recently developed slides highlighting the seminal work of scientists of color. In addition, as described above, some of our largest courses in EEB have recently been revised



**Figure 9. Enrollment trends for large courses required for majors supported by EEB.** Number of students per semester enrolled in BIO 171 Introductory Biology: Ecology and Evolution; BIO 173 Introductory Biology Laboratory; BIO 207 Microbiology; BIO 305 Genetics; and EEB 390 Evolution. WN = winter semester FA = fall semester.

to make them more effective for students from diverse backgrounds. Finally, enrollment in EEB-run or co-run majors in PiB shows a notable increase in the numbers of students from underrepresented racial and ethnic backgrounds during the last 5 years, with a particularly large increase in EEB majors when the name changed in 2017 (Figure 10A). Comparatively, the BHS and Microbiology majors are more diverse than the EEB and Biology majors (Figure 10B). All biology majors have consistently included more than 50% women (Figure 10C). We have recently increased support for transfer students by creating a [dedicated website](#) and introductory biology course specifically for transfer students (BIO 192) because they have disproportionately struggled in our introductory courses. This course is more diverse than our larger introductory courses, suggesting that supporting transfer students contributes to our goal of diversifying biologists.

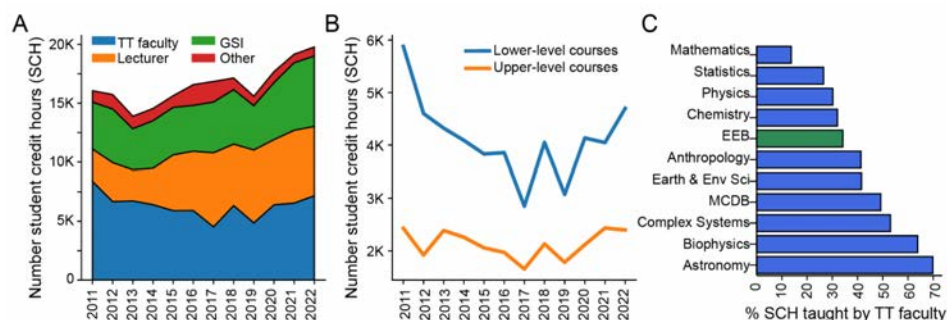


**Figure 10. Diversity of undergraduate students in Program in Biology majors run solely or jointly by EEB.** (A) Percentage of students classified by LSA as underrepresented minorities (URM) majoring in EEB, before (EEBiology) and after (EEBiodiversity) the EEB major changed names in 2017, as well as in the Biology, Health, and Society (BHS), Microbiology (Micro), and Biology majors run jointly by EEB and MCDB. For comparison, URM status is also shown for students majoring in Neuroscience (Neuro), which is jointly run by MCDB and Psychology. (B) Racial and ethnic identities reported by undergraduate students in each of these six majors. (C) Percentage of female students (as reported by LSA) in each of these six majors.

### 5.2.5 Who Teaches Undergraduates?

In 2022, EEB tenure-track faculty, lecturers, and graduate students taught a total of 19,781 undergraduate credit hours -- the highest in 10 years and up 26% from 2019 (Figure 11A). Approximately 36% of these credit hours are taught by tenure-track faculty. The remaining credit hours are taught by lecturers (30%) and graduate students (30%).

The proportion of credit hours taught by lecturers has increased since 2015, although the number of credit hours taught by tenure-track faculty has remained relatively stable over the last decade (Figure 11A). This increase in lecturer credit hours seems to reflect increased enrollments in the lower-level undergraduate courses, although tenure-track faculty members still teach the majority of their undergraduate credit hours in lower-level courses (Figure 11B). Overall, the percentage of credit hours taught by tenure-track faculty in EEB is similar to (slightly greater than) percentages taught in Statistics, Physics, and Chemistry but lower than in other natural science departments, including MCDB (Figure 11C).



**Figure 11. Student credit hours taught by members of EEB.** (A) Student credit hours (SCH) taught each semester by tenured or tenure-track (TT) faculty (blue), lecturers (orange), graduate student instructors (GSI, green) and others (visitors / postdocs, red). (B) Number of undergraduate student credit hours taught each semester by TT faculty members in courses listed at the 100-200 level (lower level, blue) and above (upper-level, orange). (C) Percentage of student credit hours in EEB taught by TT faculty compared to the same percentage for other LSA departments in the natural sciences.



### 5.2.7 Undergraduate Research

EEB encourages and supports undergraduate research experiences. Working on a research project outside of a class setting can have life-long impacts on students. In some cases, these experiences spark an interest in biological research as a career. For others, these research experiences provide important preparation for health-related careers, such as medicine, dentistry, pharmacy, veterinary medicine, and more. Faculty, postdocs, and graduate students in EEB often work with students through the U-M Undergraduate Research Opportunities Program (UROP), and all EEB-supported majors are encouraged to do independent research for credit or pay (including with work-study awards). For each of the last ten years, about 25 students from one of EEB's 5 majors enroll in an independent research course each semester (526 students since 2012). Over this same time period, 332 students have completed an honors thesis. However, these numbers capture only a fraction of the undergraduate students from U-M and other institutions who have gained research experience by working with EEB faculty, postdocs, and graduate students. Many of these other students are supported by grants and are not tracked centrally by the department. Nevertheless, CVs from EEB faculty show that most have trained tens to hundreds of undergraduate researchers during their careers.

### 5.2.8 Engagement with EEB Museums

Interactions with museum collections can also be a formative experience for undergraduate students, opening their eyes to biodiversity that they might not otherwise experience in their lifetimes. In some cases, specimens from museum collections are brought to central campus for use in undergraduate courses, but interactions with the research collections at RMC can be even more impactful. Since 2018, nearly 3,100 undergraduate students have visited the RMC through courses in EEB, Program in the Environment, School of Arts and Design, Architecture, Museums Studies, Medical School, and others. For example, 773 students from our large introductory biology lab course (BIO 173) visited in Fall 2021, and more than 160 of these students expressed an interest in doing undergraduate research with the collections after this visit, with interests distributed across all UMMZ Divisions, the UMH and the Museum of Paleontology. Currently, 46 undergraduate students conduct research in the EEB Museums, but this number has declined significantly since the museum collections were relocated from central campus to the RMC.

## 5.3. Strategic goals

### 5.3.1 Develop new courses that convey the role of EEB in Human Health and Epidemiology

The COVID-19 pandemic highlighted the importance of biological research to the general public in a way that is unique in our lifetimes. Whether it was understanding the ecological interactions that facilitated the movement of a coronavirus from an animal host to a human one, the use of disease ecology to predict the spread of the virus under different conditions, biogeographic tools revealing how the virus had moved through space, or evolutionary theory predicting how new variants of the virus should increase over time, core principles and methods from Ecology and Evolutionary Biology were essential. But the role of these fields is not always readily apparent to the pre-health students who seem to be driving the growth of majors collectively in the PiB: the number of students declaring one of the PiB majors has increased ~25% over the past ten years, but the number of EEB majors (~100) and the average number of students enrolled in our advanced courses has been relatively stable. EEB faculty have the expertise needed to teach courses that would greatly benefit students intending to join the medical and public health fields (and we had our first MD/PhD student complete their PhD in EEB in 2020), but have not prioritized teaching such courses. Moving forward, we aim to offer at least two such courses each semester and believe that doing so will help students from all of our majors gain a stronger appreciation for the far-reaching impacts of EEB.

### 5.3.2 Expand quantitative course offerings

The University, LSA, PiB, and EEB have recognized the increasing importance of quantitative skills for students going into a diversity of fields and careers. Many of our students have expressed the need for more courses that would develop and expand these abilities. We are therefore excited to partner with the Biophysics Department and MCDB to create a new interdepartmental quantitative biology major. This major will provide students with foundations in both Biology, through the standard introductory biology core courses, and quantitative skills, through math and computational courses. The major will have tracks that allow students to focus on either computational biology or quantitative biology. One of the current strengths in our department is the number of faculty who are capable of teaching and offering courses that can develop these quantitative skills. Over the last few years, we have expanded our course offerings in this area (e.g., BIO 202); however, more courses are needed to address the growing demand from the student population. Our graduate students also often request more course options in quantitative analysis,

and we have begun to address this need by incorporating more quantitative training into our required graduate ecology and evolution courses and offering a new data analysis course this year.

### 5.3.3 Develop new programmatic offerings in the Program in Biology

As described above, we are at various stages of planning for re-envisioning the plant biology major as Green Life Sciences with MCDB and designing a sub-plan for Program in Biology majors interested in biodiversity science.

*Green Life Sciences:* To raise interest in a Green Life Sciences major, we will first work with Introductory Biology instructors (BIO 171, 172, 173) to highlight the importance of plant biology. We will also develop a new 100-level course that illustrates why understanding plant biology is critical for addressing societal challenges. Currently, we offer a course in Practical Botany (BIO 102), whose enrollment has increased steadily from 54 students in 2017 to 90 students in 2021, suggesting that there is an audience for this type of course. We will add a field-based course in botany (e.g. at Nichols Arboretum or Matthaei Botanical Gardens) and consider reviving the Systematic Botany (EEB 459) course last taught in 2017. Students majoring in Ecology, Evolutionary, and Biodiversity are required to take such a field-based course, but the only current options for fulfilling this requirement are taking a summer course at the U-M Biological station or doing independent research, both of which pose logistical and/or financial challenges for some students. We therefore expect that such a course would immediately be in high demand among EEB majors. This year's Early Career Scientist Symposium will focus on Green Life Sciences, providing an opportunity to promote plant sciences and highlight research and resources for undergraduates.

*EEB Museum Studies:* To support undergraduate students with strong interests in biodiversity sciences, we will create a sub-plan for majors within the Program in Biology that includes the organismal courses already available as well as new field courses and courses that include science communication, collections-based research, and museum sciences. Students are now introduced to the museum and biodiversity collections in BIO 173, and a well-received "Biodiversity in Museums" course was offered in 2018. We hope to partner with the existing Museum Studies program, which offers a [minor for undergraduate students](#) but has had little coordination with our programs. We also envision partnering with the U-M Biological Station and the E.S. George Reserve for field-based collections and research, and the Museum of Natural History for science communication. Offering this sub-plan will help students identify a training plan for a career in biodiversity sciences.



## 6. Graduate program

### 6.1 Introduction

The goal of the Ecology and Evolutionary Biology graduate program is to train the next generation of biologists who study the origin of earth's biodiversity and the complex biotic and abiotic interactions that structure populations, communities, and ecosystems. Graduate training in EEB provides a rigorous, integrative academic experience that encourages the development and exploration of individual research goals. EEB attracts and trains a diverse student body made up of accomplished early career researchers who often also receive offers from other top 10 EEB programs.

To keep our program competitive for both students and faculty, we must address two major funding challenges resulting from a lack of growth in institutional support for our graduate program since the department started in 2001: (1) we need to increase PhD student stipends for departmental summer fellowships, and (2) we need to increase the number of PhD students that we can admit to the program each year. The first affects recruitment and retention of PhD students, and the second affects recruitment and retention of faculty — both of which are foundational for our graduate program. During years when our PhD students are supported in the summer by departmental fellowships, their annual stipends are \$5,000 less than the 2022 \$36,051 [MIT Living Wage](#) for Ann Arbor, adjusted for the health care costs; this shortfall is becoming worse with rising inflation. The inability to grow our PhD program concomitant with the increase in EEB faculty has also reached a critical point. We have already increased faculty contributions to student support such that we now require faculty to pay three or more times as much per student as faculty at most other EEB departments ranked in the top 10<sup>9</sup>. We have also changed our advancement to candidacy process to reduce tuition costs and used gift funds to cover gaps in our graduate funding. Below, we describe our graduate program in more detail and elaborate on these challenges, which must be addressed for the continued success of both our graduate students and faculty.

### 6.2 Current state of the program

#### 6.2.1 Graduate Program Structure, Size, Demographics, Time to Completion

Graduate training in EEB consists of three distinct programs: a PhD program, a Frontiers Master's program, and the EEB Master's program. The PhD and Frontiers Master's programs comprise the bulk of our enrollments and students within these programs are guaranteed funding for five and two years, respectively. Students within the EEB Master's program are not guaranteed funding and as a result this program is purposefully restricted in size.

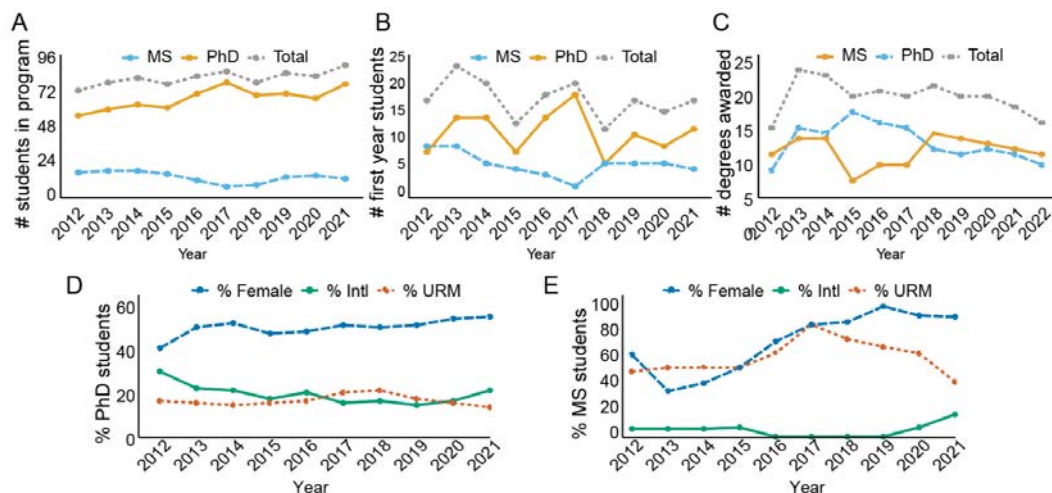
**Doctoral program:** Over the past five years, the PhD program has ranged from 63 and 73 students (Figure 12A) with an average of 11.4 new students enrolled each year (Figure 12B). Since 2012, our PhD student-to-faculty ratio has ranged from 1.4 to 2.3 (average 1.8), with the 2.3 in 2021-22 inflated by students staying in the program longer than usual because of the pandemic. This ratio is similar to our sister department MCDB (1.7:1), but MCDB labs are more likely than EEB labs to also have PhD students from medical school departments. It is lower than Chemistry (6.5:1) and Anthropology (3.1:1) at U-M as well as departments with EEB faculty at UC Berkeley (2.4), UC Davis (2.9), and University of Arizona (2.4), based on data gathered from their websites. Increasing PhD admissions in EEB is especially important right now given that 7 new Assistant Professors have been added to our faculty since 2019 and all are still building their labs to a steady state. With 35 current faculty members in EEB (up from 25 in 2005), admitting 12 students per year results in an average of one new PhD student joining each group every three years. Increasing our PhD student-to-faculty ratio to 2.5, similar to that of peer departments, would allow a faculty member to have, on average, a new PhD student join their group every other year, such that each faculty member could be working with 2-3 PhD students at a time. Research groups with multiple students at different career stages often function best for both students and faculty ([Crede and Borrego, 2012](#)).

Students in the PhD program have historically achieved candidacy in about two years, and on average the PhD program has awarded nine degrees per year (Figure 12C). For the program's last five-year cohort (2017-2020), the average time to degree completion was 5.7 years, with a slight increase to 5.96 in 2021, presumably due to the

<sup>9</sup> Based on data gathered earlier this year by David Queller (Washington University in St. Louis), Cornell, UC Davis, and UT Austin faculty pay only summer stipends (~\$25k total); Harvard, Yale, Princeton, Duke, and Indiana faculty are not required to pay for students, Stanford faculty are expected to support students in their 5th year, and University of Chicago faculty pay for students after their 1st (for international students) or 2nd (for domestic students) year. U-M EEB faculty provide tuition, stipend, and benefits for 2 academic terms and 2 summers, at a current cost of >\$75,000 per student, more than all of these schools except U. Chicago.



pandemic. It is too early to calculate a completion rate for the 2017-2020 group, but 79% of students that entered the PhD program between 2011 and 2015 completed their degree. Within this group, one cohort had a 50% completion rate, whereas the rest ranged from 82-93%. This overall completion rate increased from 66% for students entering our PhD program in 2006-2010. Interestingly, students in the 2011-2015 cohorts classified by Rackham as URM had a higher completion rate (95%) than students classified by Rackham as non-URM (83%).



**Figure 12. Trends in enrollment, degrees, and student demographics over the last 10 years.**

(A) Number of total graduate students, PhD students, and MS students, including Frontiers and non-Frontiers Master's programs. (B) Total number of first year EEB graduate students, PhD students and MS students. In 2017, acceptance rate was high, offers extended were normal. (C) Number of graduate degrees awarded overall and for PhD and MS programs. (D) Percentages of students that are female, international (Intl), and classified as underrepresented minorities (URM) using the federal definition of URM (i.e., domestic students identifying as Black, Native American, Hispanic, or Pacific Islander). (E) Same as D, but MS students.

The percentage of female graduate students in our PhD program has increased from 42 to 57% since 2010, similar to the gender distribution across Biology programs nationally (60%, NSF) (Figure 12D). An average of 17% of students within the program are from underrepresented racial/ethnic groups (Figure 12D), with approximately 38% of the program's students meeting at least one of the criteria for the Rackham Merit Fellowship<sup>10</sup>. Since 2012, 21.5% of our PhD students have been international students (Figure 12D).

**Frontiers Master's and EEB Master's programs:** Over the last ten years, the total enrollment in both Master's programs has ranged from 7-17 students (Figure 12A), with an average incoming cohort size of 5.7 students per year (Figure 12B). The majority of Master's students are in the Frontiers Master's program, which enrolls four students per year. Master's degrees within the department are conferred within 1.8-2.2 years, and over the last 10 years, 93% of our Master's students have completed their degree. The Frontiers Master's program was developed to increase the diversity of graduate students and workforce in ecology and evolutionary biology (see section 6.2.6), which is reflected in the demographics of the department's Master's students. On average, and across the last 10 years, 72% of Master's students have been female with 61% of students from an underrepresented racial/ethnic background and 5% international students (Figure 12E).

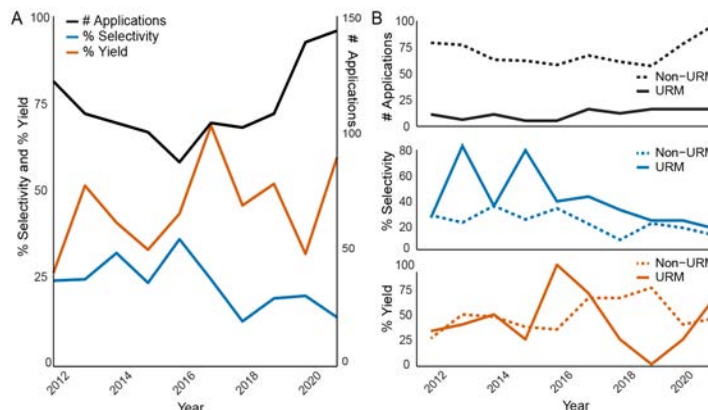
## 6.2.2 Admissions

**Doctoral Program:** Only students with a willing faculty advisor are admitted to the program. Faculty indicate their willingness to serve as advisors for potential students at the application stage, and then these applications are evaluated by the department admissions committee. The department uses a holistic admissions rubric that weighs the following categories evenly: academic preparation, research experience and potential, and motivation, persistence, commitment, and community. This rubric includes reminders of implicit bias and was redesigned in 2020 in light of disruptions that students may have faced as a result of the COVID-19 pandemic. We typically receive >100 applications per year (range: 88-145), and because our target enrollment has historically been 12 students/year, our admissions process is highly selective (Figure 13A). Based on an average acceptance rate of 45.7% for offers extended during the last 10 years, we typically make offers to about twice the number of students that we hope to enroll. A range of ~14-36% of students who apply have been offered admission annually (23% average from 2012-2021; Figure 13A). Over the last 10 years, we have received an average of 12 applications per year from students

<sup>10</sup> To be eligible for an RMF, students must come from an underrepresented educational, cultural, or geographic background; exhibit a sustained commitment to diversity; have experienced financial hardship as a result of family circumstances; be a first-generation US citizen; and/or be a first-generation four-year college student.

classified as URM (14% of the total, Figure 13B). In recent years, the EEB PhD program has made offers to a higher proportion of URM applicants than non-URM applicants (% selectivity); however, the percentage of students accepting our offers and matriculating (% yield) is similar for the two groups (44% and 49%, respectively; Figure 13B).

**Frontiers and EEB Master's programs:** The Frontiers Master's program is one of very few fully funded EEB Master's programs in the nation. Each year, we receive approximately 20 applications for this program. Due to funding constraints, we can have a cohort size of no more than four students per year. Consequently, we make no more than four offers at a time, which can make filling the cohort difficult depending on how many students matriculate, as 25% up to 100% of our initial offers have been accepted. The department admits ~1 student per year into the (unfunded) EEB master's program.



**Figure 13. PhD admissions metrics.** (A) Number of PhD applications, selectivity, and yield for the last 10 years. Selectivity is the percentage of students who applied that are admitted. Yield is the percentage of students admitted who matriculate. (B) Number of applications (top), selectivity (middle), and yield (bottom) are shown separately for students identified by Rackham as URM and non-URM.

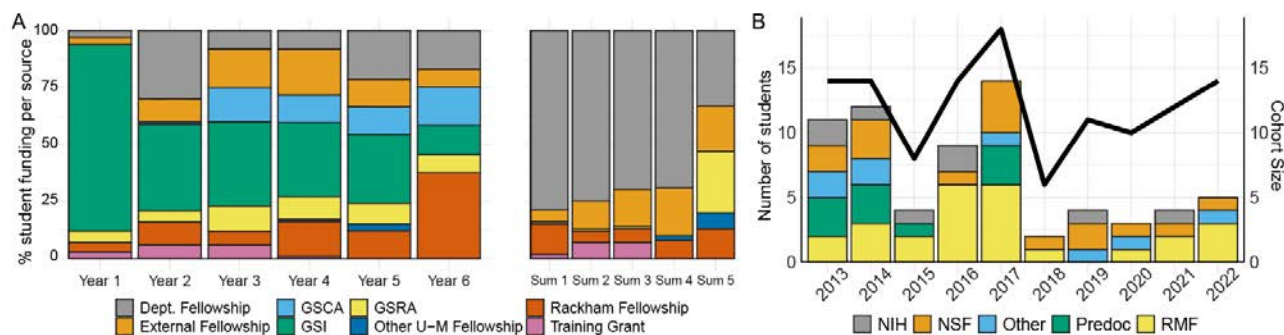
### 6.2.3 Graduate Student Funding

The majority of departmental funding for graduate education supports the PhD program. The department guarantees five years (including five summers) of funding for all admitted PhD students, although we (department and advisor) also find ways to support students who take more than five years to complete their PhD. Following Rackham's guidance, we also recently developed a formal plan for the department to fund students who need extended time to degree due to COVID-19. During the academic terms, stipend levels are set by the LSA graduate student assistantship stipend rates, which follow minimums established by the contract with the Graduate Employees Organization (GEO). Summer stipends for the three fellowship summers are set by the department at \$7,000 and do not increase annually. Previously, summer stipends fluctuated every year based on available department funds, but in Summer 2015 they were fixed at \$7,000 for stability. When faculty support students as Graduate Student Research Assistants (GSRAs) during the summer, the same stipend rate is charged as in Fall and Winter, providing an annual stipend (currently  $\$12,027 \times 3 = \$36,081$ ) that (because we also cover health care costs) meets the current cost of living metrics for a single person with no dependents (\$36,051) living in Ann Arbor. Per Graduate Employees' Organization (GEO) contract, the university provides [paid parental leave and child care subsidies](#). The Rackham Graduate school also offers [child care tuition grants and travel grants](#) for student-parents.

Since 2019, the standard funding package, shown in Appendix 4, has included six terms of teaching (GSI), two terms of departmental fellowship (Fellowship), two academic terms of research assistantships (GSRA, funded by the advisor), three summers of departmental fellowship (Fellowship), and two summers of research assistantships (GRSA, funded by the advisor). Thus, the department provides \$69,457 in fellowship support for each student following the standard funding package, and the advisor provides \$75,394. Departmental funds for fellowship terms come from a combination of LSA allocation (82%), Rackham support for graduate training (2%) and EEB endowments (16%). Prior to 2019, only one summer was covered by the advisor as a GSRA position. After advancement to candidacy, some students are supported by LSA-funded Graduate Student Curatorial Assistantships (GSCAs) which familiarizes them with museum collections, either in management, research, or both, at the Museum of Zoology (9 positions/year) or Herbarium (3 positions/year) in place of GSI positions or GSRAs when advisor funding isn't available. GSCA positions provide equivalent stipend and benefits to GSI and GSRA positions. The percentage of students funded by each of these mechanisms per year is shown in Figure 14.

EEB graduate students regularly receive prestigious NSF GRFPs and competitive appointments to NIH Training Grants on campus (Figure 14), as well as a number of less common external fellowships, including Fulbright and HHMI awards. When such a fellowship provides one or more years of funding, the department follows a long-standing substitution policy that external fellowships are not supplementary, but rather substitute first for department fellowships, second for advisor funded GSRA positions, and third for GSI or GSCA positions. We would like to change this policy and are currently searching for fiscally responsible ways of doing so without exacerbating other financial

challenges mentioned above. Once students have passed to candidacy, additional U-M sources of competitive fellowship funds become available, including fellowships from departmental endowments (Brower, Edwards, and Hubbs), Rackham One-Term Dissertation Fellowships, and Rackham Predoctoral Fellowships.



**Figure 14. Sources of PhD student funding.** (A) The percentage of students funded by different mechanisms per year, summarized across the 2012-2021 cohorts. Fall and Winter semesters are shown in the left panel whereas summers are shown in the right panel. (B) The number of students per incoming cohort with either external (NIH, NSF, Other) or internal (Rackham Predoc or RMF) fellowships of one year or longer. Cohort size is indicated by the black line. We expect that the fraction of students supported by fellowships in cohort years 2018 and after will increase since the Rackham Predoc is normally received in the fifth or sixth year. Additionally, students in the 2021 and 2022 cohorts may still be eligible to apply for GRFPs or Training Grants.

All students, both before and after candidacy, are also eligible to apply for EEB and EEB Museums research awards, which typically range from \$1,000-\$5,000 per year per student. Students write and receive feedback on a proposal requesting these funds, making this not only a financial support stream, but also a valuable training exercise in grant writing and the grant review process. Once awarded, funds are managed by the student, with support from a departmental staff member, and used to help cover the student's research expenses. Funds for this program come from the Rackham Block Grant program and departmental endowments and other gift accounts. Additional departmental awards include an annual conference travel award (\$400), research supply award (\$250), first paper award, competitive DEIJ and Most Outstanding Paper awards (\$500), and the UMMZ Donald W. Tinkle Scholarship (\$5,000). More awards are available from the [Rackham Graduate School](#) and other campus departments.

Students in the Frontiers Master's program are guaranteed funding for the two years of the program (four academic terms and two summers). Rackham provides a fellowship for both summers of \$8,000 (the initial summer consists only of July and August) and a fellowship for one academic term (at the GSRA stipend rate). Students serve as GSIs for the other three academic terms. Note that this stipend is higher (especially in the first year) than for PhD students provided summer support by departmental fellowship.

While students in the EEB MS program are not guaranteed funding, we have been able to assign GSI positions for all students in the program and have made efforts to provide summer funding, through GSI, GSCA, or GSRA positions when possible.

#### 6.2.4 Preliminary exam and advancement to candidacy

To earn their PhD in EEB, students must complete a two-step preliminary examination process at the end of years 1 and 2 as well as submit a dissertation, present their work, and pass an oral defense with their committee.

The requirements for Step 1 of the preliminary exam (Appendix 5) were modified in 2021 by making the literature synthesis paper ("EEB 730 paper") that was required prior to 2017 (and strongly encouraged from 2017-2021) part of the evaluation for advancement to candidacy. This change requires students to work with their primary or secondary advisor during their first year to lay the foundation for their Step 2 dissertation proposal. By creating this path for students to advance to candidacy before year 2, we were able to maintain the second-year departmental fellowship that students report is critical for preparing for the Step 2 exam while also addressing our financial challenges because tuition for candidates is \$19,332 per semester less than for pre-candidates.

The Step 2 portion of the current exam matches our advancement to candidacy exam prior to 2021 but was modified significantly in 2017 for the first time since the department was founded in 2001. These changes in 2017 were



motivated by concerns expressed by graduate students and some faculty about the unclear and variable exam expectations, an alignment with preliminary exam formats used at a majority of our peer institutions, and a disproportionately high exam failure rate for non-native English-speaking students. Most significantly, questions transitioned from covering virtually any area of ecology and evolutionary biology to being more focused on topics in ecology and evolution related to the student's proposal. The evaluation committee also changed from being assigned by the department to being chosen by the student, following the same composition requirements as a thesis committee. Finally, a single document was written for students and faculty describing the process and expectations in detail, increasing transparency and improving equity by reducing hidden curriculum.

In the five years prior to this change in 2017, 24% of students needed to retake at least one component of the exam. Since 2018, this percentage has decreased to 10% (approximately one retake/year). The first students experiencing this revised exam procedure are still in the program, so it is too soon to assess whether this change has had any negative impacts on students, such as a reduced number of publications during their PhD, lower degree completion rates, or longer time to degree. However, any such an assessment in the next few years will be challenging to interpret because of the overlapping impacts of the COVID-19 pandemic.

### *6.2.5 Graduate Student Outcomes*

Rackham conducts exit surveys for all PhD students on the number of publications and presentations upon graduation. For students who graduated between 2017 and 2021, there was an 85% response rate. Among those students, 95% had at least one first author or co-first author publication based on research conducted while a graduate student (compared to 90% across all LSA Natural Sciences) and 28% had more than three (39% across LSA Natural Sciences). All students reported having presented their work (including posters) at regional, national, or international conferences (95% across LSA Natural Sciences), with 80% of respondents having delivered more than three such presentations (64% across LSA Natural Sciences).

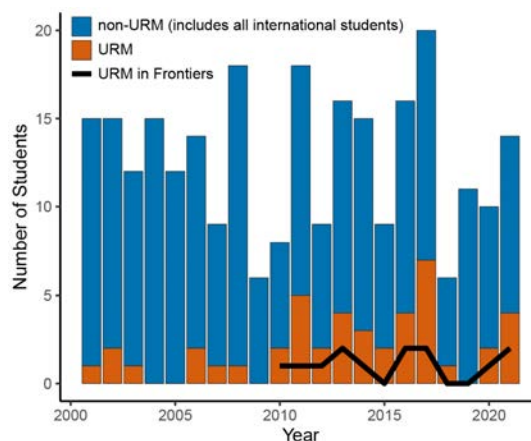
Graduate career outcome information is gathered annually through a combination of automated web scraping by the Rackham Graduate School and manual searching by EEB graduate program staff. These data are collected (when possible) for each student for ten years after graduation. For students who graduated between 2012 and 2021, one year after graduation, 71% were postdoctoral fellows, 5% held non-tenure track university positions, 2% were tenure track faculty, 2% were employed in business/industry, 6% held other employment, or were either unemployed or we do not have data. For students who graduated in the last 20 years, 51% were tenure track faculty ten years after graduation, 7% held non-tenure track positions, 7% were employed in business or industry, 5% were postdoctoral fellows, and 5% held other employment; we do not have data for the remaining 24%.

### *6.2.6 Frontiers Master's Program*

The Frontiers Master's program was developed in 2007 to increase the diversity of graduate students and the workforce in ecology and evolutionary biology. It began in 2008 and has served as a model to develop four similar Master's programs in LSA focused on increasing diversity in various STEM fields, as well as programs in Classical Studies, the Ross Business School, the College of Engineering, and the Taubman College of Architecture and Urban Planning. In 2011, the Rackham Graduate School received support from the National Science Foundation (NSF) to fund four Bridging to Doctorate programs at U-M, including Frontiers. Since NSF funding ended in 2015, the Frontiers Program continued to receive funding from Rackham, the College of Literature Science and Arts (LSA), and EEB. To date, the Frontiers program has hosted 15 cohorts, training 61 students (including 8 currently enrolled), with 51 students (96%) graduating.

By many measures, our program has excelled. Most (75%) of the students who completed the program chose to enter doctoral programs, and 10 of our first students are now postdoctoral fellows or have faculty positions (71% of those who already finished their PhD programs). Thus far, 16 (48%) of the 38 students from the Frontiers program continuing into PhD programs have joined our PhD program. Frontiers alumni continuing on to a PhD somewhere other than U-M have done so at Columbia, Harvard, Emory, Rice, Stanford, UCLA, UC Berkeley, Yale and ten other institutions. We are proud of the diversity of schools where our Frontiers students are enrolled because broadly training students for PhD programs best suited for them was the initial goal of our Frontiers program, and one of the reasons that NSF funded it from 2011-2015.

In 2019, Rackham and LSA required a new metric of success: “the proportion of students that successfully transition into a U-M doctoral program”. Rackham, LSA, EEB, and the three other departments with Master’s bridging programs signed a Memorandum of Understanding (MOU) to continue supporting these programs between 2020 and 2025 (i.e., last supported cohort 2023-2025). The MOU included a commitment to review the outcomes of the program and discuss the potential for continuing the program into the future. We adjusted our admissions process and programmatic activities to meet this new metric of success, and three out of four students from the 2020-2022 cohort accepted offers in our PhD program. In addition, three out of four students from the 2021-2023 cohort have exclusively applied to our PhD program this year. If these students join our PhD program as anticipated, we will have increased our internal retention rate from the historical 42% to 75%.



**Figure 15. Impact of Frontiers program on diversity of our PhD students.** The total number of URM (red) and non-URM (blue) students, as defined by Rackham, that join our PhD program each year. The number of URM students increased following the introduction of the Frontiers Master’s program beyond the number of URM students transferring from the Frontiers program (black line). All international students, regardless of race or ethnicity, are included in the non-URM group.

The Frontiers Master’s program has had both direct and indirect effects on increasing the diversity of our PhD student body. Since its inception, the Frontiers program has recruited 47 URM students in our department, 13 of whom transitioned to our PhD program. As seen in Figure 15, the number of URM students directly admitted to the PhD program also increased at this time. Frontiers students have actively participated in the life of our department and their voices have had a substantial impact on developing and implementing strategies aimed at improving the climate in EEB. Frontiers students and alumni have also had positive impacts in attracting and fostering student diversity in our department through their participation in various activities during the admissions process. Similarly, Frontiers alumni who have joined PhD programs in other institutions served as ambassadors, recommending our program to other URMs they interact with in their home institution. Additionally, some of our Frontiers alumni from the early cohorts are now Assistant Professors, university instructors, postdoctoral fellows, or other researchers, and we are excited to see that they are now recommending some of their own students to apply to the Frontiers program.

### 6.2.7 Graduate Student Organizations and Community

The department encourages graduate student community and involvement in departmental processes, primarily through supporting the Graduate Representatives of Ecology and Evolutionary Biology (GREEBs). GREEBs is a group of peer-elected graduate students who represent graduate student interests in the department by serving alongside faculty on many influential departmental committees, including the Executive, Admissions, Graduate Affairs, Diversity, and Social committees (among others). Faculty search committees also include graduate student representatives. Outside of the department, many EEB graduate students are involved in the university’s Graduate Employees Organization (GEO), which advocates for graduate student employment standards and quality of life across the university, including an elected GEO representative in GREEBs. Graduate students in GREEBs positions aid in organizing community events such as the annual department retreat, holiday gatherings, technical skills workshops, and our weekly Tuesday and Thursday seminars.

GREEBs, together with the department, operate a Big Sib/Little Sib peer-mentoring program that builds community among the graduate students, with an emphasis on integrating first-year Frontiers Masters, EEB Masters, and PhD students into the EEB department. The program historically pairs each first-year student with a more senior graduate student and provides funding for monthly coffee meetings with structured discussion prompts for the duration of the academic year to help ease first-year students into graduate school life. In the 2021-2022 academic year, the Big Sib/Little Sib program was restructured with support from the Rackham Faculty Allies Grant to form mentorship groups as opposed to mentor-mentee pairs. Each group consisted of 2-3 first-year students, as well as 2-3 graduate student mentors from different year cohorts. Such a structure not only allowed for mutual support among graduate student mentors but encouraged cross-cohort mentorship relationships to develop.

The department chair and associate chair for graduate studies meet at least once a year with all graduate students as a group. Other meetings are called as needed, including to discuss departmental decisions impacting graduate students. Graduate student opinions are also sought on various topics through student representatives on committees

and through anonymous surveys to ensure that each person has a chance to share their thoughts. These conversations, along with our recent departmental self-study meetings and follow-up discussions in the graduate affairs committee have revealed the following needs: (1) increased support for professional development and non-academic career paths, (2) enhanced mentoring quality and effectiveness, and (3) increased awareness of the intensified stressors that students are experiencing today. Some of the strategic goals below have been developed to meet these needs.

## 6.3 Strategic goals

### 6.3.1 *Our most pressing goal is to maintain adequate funding for graduate education*

EEB has seen no increase in support from LSA in the account used to support departmental fellowships (academic year and summer stipends) since 2002 despite a 40% increase in faculty during that time. To cope with this reality, we have made tough choices internally, including increased faculty contributions, shifting policies to reduce tuition costs, using gift funds, continuing the fellowship substitution policy, and reducing the number of fellowship terms provided to RMF students to try to balance the needs of our graduate students and faculty. But, as mentioned above, these changes have not been enough. As mentioned above, in years when students are supported in the summer by department fellowships, their annual salaries fall below cost of living expenses by \$5,000, leading to financial difficulty for students and decreasing our competitiveness with other top programs that have addressed this issue. Our current fellowship substitution policy might also be a deterrent for top students who earn independent fellowships because they are likely to receive a greater reduction in teaching at other universities. Further, the increased number of tenure track EEB faculty (Figure 2) without a similarly increased number of PhD students (Figure 12) can compromise the success of faculty research programs. We are especially concerned about the impact of current graduate enrollment constraints on Assistant Professors working to build their independent research programs. The department is thus at a critical juncture when it comes to graduate funding; we cannot support students at the appropriate level, nor can we adequately support the training and research needs of faculty. The fact that this crunch comes at a time when we are accelerating the diversification of our faculty makes it particularly pressing to address this issue promptly.

We are also concerned about how the \$75,394 per student that our current funding model requires from faculty could affect our ability to recruit and retain faculty. As noted in the introduction to this section, this is significantly more than 8 of the 9 other EEB departments ranked in the top 10 with us by News & World report. More broadly, the data provided to us by David Queller, a faculty member and graduate chair at Washington University in St. Louis, who collected this information, EEB departments at half of the 16 Big Ten and private universities for which data were collected do not require faculty to provide any funding for their graduate students. And when programs did require faculty contributions to support their students, the amount required was typically much less than we currently require. Because funding agencies rarely scale award size based on local funding requirements, U-M faculty spending these funds on graduate student support have less available for other research expenses and personnel than they would at another university with lower faculty costs of graduate students.

To help address the financial challenges associated with our graduate program, we are increasing fundraising around graduate education and developing a course to support and encourage students writing NSF Graduate Research Fellowship (GRFP) proposals. Our hope is that this course will increase the number of successful applications; however, increasing graduate fellowship success is not a broad solution and cannot address all of the financial challenges for students and faculty described above. If we are to remain one of the top EEB programs in the country, we will also need increased investment in graduate funding from LSA and Rackham.

### 6.3.2 *Strengthen professional development and job preparation opportunities for both academic and non-academic careers*

EEB 800, a required first-year seminar, focuses on developing professional skills for graduate school success. It includes workshops from the National Center for Faculty Development and Diversity, fosters social-emotional development, and improves communication skills critical for academic and non-academic settings. Beyond this professional skills course and EEB 525 (a course on writing and speaking in the sciences), we do not currently offer formal training for students exploring non-academic careers, nor do we regularly provide opportunities for students to meet industry representatives. To fill this gap we will highlight the many professional development workshops and seminars that the Rackham Graduate School offers, and likewise encourage students to take advantage of Rackham's new [internship program for PhD students](#) which funds an off-campus internship semester in partnership



with an industry or governmental organization. Further, we will host visits from industry or government representatives, providing students the opportunity to network with scientists working outside of academia.

Both academic and non-academic positions in museum-oriented career paths (e.g., faculty, curatorial, collection management, science communication, governmental research careers) are options for our students. To better support students interested in museum-centered career paths, we will also (1) enhance the graduate student curatorial assistant (GSCA) experience by explicitly identifying how curatorial management practices influence the use of collections; (2) teaching students about the advanced data science needs of museums; (3) proposing a biodiversity-focused option for the existing Graduate Certification Program in Museum Studies; (4) partnering with the UMMNH as a gateway for students to gain museums-based science communication, exhibit, and program development experience; and (5) leveraging the Rackham internship program to develop museum-focused student internship opportunities with state and federal agencies based in Ann Arbor (e.g., Michigan DNR, USGS, NOAA).

### 6.3.3 Develop faculty resources and best practices for mentoring

Students have reported unevenness in the quality of mentoring within the department through self-study discussions and other sources of feedback. We have addressed these concerns in a number of ways and will continue to do so by relying on initiatives from the Rackham Graduate School and enhancing departmental mentoring expectations. Rackham has recently developed a soon to be finalized statement of [Faculty Values, Privileges, and Responsibilities](#) and has announced that mentoring plans will now be required of each faculty-student pair. To further enhance student experiences within the department, we will develop a core set of expectations with regards to mentoring, encourage faculty to take part in formal mentor training in development by Rackham, and develop faculty-faculty peer mentoring conversations for support and ideas. While ~90% of faculty in the program report in an informal survey that they develop some form of mentoring plans with new students, we have recently made written mentoring plans a *de facto* expectation by making their development an assignment of each student-faculty pair during the EEB 800 seminar that students take in the Winter semester of their first year. The graduate affairs committee has also brainstormed ideas to build connections between students and faculty beyond their primary mentor including Friday morning breakfasts where 1st and 3rd year students give lightning talks, varying the location of Friday morning donuts and coffee across departmental neighborhoods, inviting faculty to give lightning talks during two sessions of EEB 800, and developing a journal club in which a faculty member leads discussion on a recent paper from their lab.

### 6.3.4 Increase support for students experiencing heightened stressors

The pandemic closures, recent political upheaval, and stress from anti-Black and anti-Asian violence have impacted both students' time to degree and mental health, in disparate ways among students. In recognition that today's students are managing typical graduate school stresses in a time of heightened concerns, the department has engaged in new opportunities designed to support students and plans to continue integrating new and creative types of structural support into the program. Because of these efforts, EEB was selected as the representative from the natural sciences division to pilot a new Rackham mental health advocacy program. Thus far, the resulting wellness committee has developed and deployed a minicourse designed to support second year students preparing for preliminary exams and for developing skills necessary for post-candidacy success. We further recommend that the department communicate prelim exam success rates (which are high) and track student experiences during their prelims to encourage a growth mindset during this stage of graduate training and to combat the perception that prelims are a winnowing step. We also recommend that the department work with the diversity committee to expand the little sibling program into a broader support network that will help foster a greater sense of belonging and provide peer resources for prelims. Finally, we recommend pursuing funding for a life coach program based on a successful trial program in 2022 (supported by Gilliam Foundation funds) that was helpful for the 5th and 6th year students that engaged with the opportunity.



## 7. Departmental Climate

### 7.1 Introduction

A supportive and welcoming departmental climate is essential for EEB to achieve its goals because climate affects the recruitment, retention, dedication, motivation, creativity, productivity, and mental health of all members of EEB. To better understand the challenges we face with departmental climate, especially those related to diversity, equity and inclusion, we brought in external facilitators with expertise in this area in February 2022 to lead discussion with faculty and administrative staff, as well as graduate students, postdocs, and research staff, in two independent sessions. These sessions gave people a chance to publicly, but anonymously, share their experiences in the department. The faculty discussion was especially challenging because it laid bare problematic experiences of people (especially women and people of color) in the department that some learned about for the first time and others learned about in greater detail than they had known before. A high-level summary of the questions and responses from both of these meetings was shared with the LSA DEI office along with a request for advice on how best to move forward. Their impression was that: *“the feedback seems to emphasize a need for more communication across the department, outside of disciplines, cohorts, and labs. There is also widespread concern about performative DEI values and what, if any action, is taking place to enact these values...Faculty, staff, and students also expressed concern about diversity being framed primarily as race-based without attention given to age, religion, or disabilities.”* The LSA DEI office then offered suggestions, including inviting them to lead an “Allies at Work” workshop tailored specifically to EEB, which we held on Dec 7, 2022. Their other recommendations are reflected in the strategic goals described below.

About one month after these internal, facilitated discussions, the U-M ADVANCE program used their standardized climate surveys to independently assess our departmental climate. These surveys were sent separately to faculty (tenure- and non-tenure-track combined), postdoctoral researchers, PhD students, MS students, and staff. In the next section, we summarize key findings from these surveys, providing the complete executive summary from ADVANCE in Appendix 6.

### 7.2 Current state of affairs

#### 7.2.1. Faculty

Of the 47 tenure-track faculty and non-tenure-track faculty (Research Scientists, including those who are also staff collection managers; Research Professors; and Lecturers) asked to complete the survey, 81% responded. Eighteen (47%) of the respondents were tenured faculty, six (16%) were untenured faculty on the tenure track, and fourteen (37%) were non-tenure-track faculty. Two-thirds identified as men and the rest identified as women. Four faculty (12%) identified as underrepresented minorities (URM) and nine (26%) identified as a person of color. Five (14%) identified as LGBTQIA+ and 9 (25%) identified as a person with a disability. Overall, 42% identified as coming from a lower-income background. The survey analysis from ADVANCE included tests for differences among all of these demographic groups except for faculty who are and are not on the tenure-track. Significant negative impacts of the COVID-19 pandemic were noted by all groups, although responses to most questions were not significantly different from the climate survey performed in 2019.

Over 60% of faculty reported overall satisfaction with their job and perceived autonomy, independence, and continual learning. They also generally perceived the departmental climate in EEB to be fairly tolerant and positive, especially in regard to respect and support. They were very satisfied with work-related resources provided by the department. Faculty reported greatest satisfaction with being valued as a mentor or advisor by their students, their office space, and the quality of U-M undergraduate students. They reported least satisfaction with their sense of being valued for their teaching by their colleagues and the time available for scholarly work. The most frequently reported common stressors were departmental politics, securing funding for research, and scholarly productivity. Approximately 50% of faculty reported that they thought departmental procedures and policies were fair, equitable, and transparent, and that criteria for tenure and promotion were clearly communicated. Importantly, nearly all EEB faculty agreed that a diverse faculty is important for the department’s continued academic excellence, and faculty responses demonstrated their substantial engagement with DEI-related work. However, open-ended questions revealed a range of beliefs and experiences regarding DEI in the department. Finally, the majority of faculty reported receiving formal and informal mentorship and being happy with the mentorship they received in the department. The perceived level of collegiality was mixed. International respondents and members of the LGBTQIA+ community reported feeling high levels of comfort and inclusion, whereas most women respondents reported a variety of concerns including condescending attitudes by some members of the department, having to work harder to be perceived as a legitimate scholar, and a sense that allocation of committee and teaching assignments were not fair and equitable.

This report was discussed first by the executive committee and then the full faculty. In both groups, concerns about the differing experiences of men and women in the department received the most attention. Other items noted as concerns were perceived inequities in teaching assignments, service workloads, unseen and uncompensated labor, and appreciation for contributions made to the department. The need for greater transparency in departmental functions and decision making also emerged as a theme. It was noted, however, that the survey did not advise respondents to reflect on their experiences over any specific time-frame in the department, making it difficult to know how impactful recent changes in departmental practices and policies have been. They also wished that some survey questions had included an option to express a lack of knowledge about how members of groups they do not belong to perceive the department. Comparing responses between tenure-track and non-tenure-track faculty would also have been helpful, especially given the recent policy changes affecting non-tenure-track research scientists that are also collection managers, as described in section 4. Addressing these limitations would have helped us interpret the results with more confidence.

### *7.2.2 Postdocs*

Thirteen (62%) of the 21 postdocs invited to complete the survey did so. Among respondents, six (46%) identified as women, with the rest identifying as men. Nearly half (46%) identified as international, and 39% identified as a person of color (defined as not identifying as White). Approximately 39% ( $n = 5$ ) reported being a person with a disability (broadly defined), and 46% identified as lower income. According to the ADVANCE summary, postdocs in EEB were quite satisfied with their experiences, opportunities, and relationship with their primary advisor. Respondents described an overall positive and tolerant climate and noted engagement as well as interest in DEI efforts, but some postdocs highlighted a lack of focus on or opportunities to engage in DEI efforts within the department. A minority of open-ended responses mentioned faculty's lack of engagement in DEI, whereas others praised the department's efforts to improve the climate. Postdocs felt most strongly that their advisor inspires them intellectually, treats their ideas with respect, serves as a role model, would support them in any career path they may choose, treats them as a colleague, and generally respects the opinions of others in the department. Respondents were split on whether their advisor talks with them about the conflicting demands between academia and having a family, with equal numbers agreeing and disagreeing.

Postdoctoral researchers were invited to meet with the department chair and associate chair for graduate studies to discuss the report, but only one person attended. We interpret this low attendance as a sign that postdocs feel less connected to the department than faculty, students, and staff. We are working to build a stronger community among postdocs by providing departmental support for postdoctoral lunches and other gatherings as well as being more intentional and explicit about inviting postdoctoral researchers to participate in departmental governance.

### *7.2.3 Graduate students*

The ADVANCE survey was sent to 85 students in the graduate program (70 PhD; 15 MS), with 48 and 6 PhD and MS students responding, respectively. While the PhD student response rate of 65% was over the required 51% threshold for the ADVANCE team to draw summary conclusions, the MS student response rate did not hit that threshold. Consequently, the findings described herein are specific to the PhD student experience. We are working to understand the low MS student response rate because capturing the entirety of the graduate student experience in surveys such as this is crucial.

PhD students reported both positive and negative aspects of the climate in the ADVANCE survey. 85-92% of students reported positive experiences with their major faculty advisor and lab, and more generally found the department to be both collegial and a place where they can thrive. The students also reported positive experiences with other students, postdocs, and staff within the department, and perceived a positive environment for LGBTQIA+ individuals. In open-ended responses, students reported general perceptions of a supportive, flexible, and friendly environment, and noted that the department encourages student input with clear evidence of ongoing efforts to further improve the climate. Some of the negative aspects included too few opportunities to interact with EEB faculty other than their primary advisor, the perception that the climate was less positively experienced by members of URM communities, and that some faculty and staff have a condescending attitude toward international students, students with disabilities, and those from a lower socioeconomic background. Over two-thirds of students reported that some faculty members had exhibited condescending attitudes toward women. In open-ended questions, students described experiences of discrimination and exclusion, such as graduate student cliques and a poor climate between faculty and graduate students, including bullying, and isolation. Of note, students who identified as persons of color or as international students reported a generally more positive view of the department and climate than respondents not in these groups.



Students of color reported a positive relationship with their major advisor, and international students reported that the environment was experienced as tolerant, respectful, and flexible.

All graduate students were invited to a meeting to discuss the report, and approximately 15 students attended along with the graduate chair and our two graduate program coordinators. During this meeting, students discussed components of the report that they found most surprising in small groups and presented summaries of the small group discussions to the whole group. Students commented on the amount of gender bias perceived by women faculty and expressed surprise that staff did not feel included in the department as well as disappointment that the climate survey gathered information on work-life boundary management for faculty but not students. Students also commented that they were surprised to learn of the overall high level of contentment students felt with their particular lab and that students identifying as a person of color, as well as international students, reported a better experience of the climate than suggested by the perception in the broader student community. Challenges students noted from the report were the general lack of collegiality felt by some and the difficulty students experienced with EEB research grant reimbursements, which require students to first purchase materials out of pocket and later file for reimbursement. Potential solutions to these challenges were discussed, and included promoting more opportunities for social interactions, developing accountability structures for problematic behaviors, and holding a mandatory town hall meeting every year that would involve inclusivity training.

#### *7.2.4. Administrative, research, and museums staff*

Twenty-eight (76%) of the 37 staff members invited to participate in the climate survey responded. The invited members included all employees with 100% staff appointments in EEB, including 16 Administrative Staff, 12 lab research staff (including those working in shared lab facilities and individual faculty labs), and 9 museum staff from the UMMZ and UMH. Collection managers who hold 5% Research Scientist and 95% Staff appointments were invited to participate in the survey as faculty members, as described above, but attended the follow-up discussions with both faculty and staff. Nineteen staff members attended a follow-up meeting to discuss the results of the survey and brainstorm ideas for addressing the concerns raised, including 9 administrative staff, 2 Program in Biology staff, 1 research lab staff, and 7 Museum staff members.

The survey identified several positive areas, including a supportive and respectful work environment, trust in the Chair and their direct supervisor, and an environment that supports their professional growth. However, discrimination, especially toward women in the department, and a lack of mentoring opportunities resulted in an overall lower climate score in 2022 than in 2019. During the discussion session, the staff chose to focus on communication challenges, work/life balance concerns, balancing autonomy with work expectations, and the disconnect between BSB and RMC teams. Using an impact/effort matrix, the team has prioritized 11 project ideas that will address these concerns focused on communication, transportation between RMC and BSB, a mentorship program, job descriptions, and boundary setting. The staff will be working together to assign ownership and action plans for these projects with a series of meetings to update and support one another. As a first step toward improving the connection between BSB and RMC, the team will alternate meeting locations between the two buildings.

#### *7.2.5 Community building events*

Because satisfaction with work is due in large part to experiencing a strong social community and making friends in the workplace, the department has been working toward rebuilding social interactions that were disrupted by the pandemic, including encouraging more between-lab interactions. For example, this year, we moved the departmental seminar to 3 pm to reduce conflicts with child-care responsibilities and created a social hour after it for the EEB community to interact with each other and the speaker. We also restored pre-pandemic graduate-student-led Friday morning donut and coffee hours and monthly Friday afternoon 'bioBev' social hours. Finally, the department has hosted activities including an iNaturalist competition, a virtual team trivia night, departmental volleyball games, a cider mill visit, photo competition, holiday party, and spring picnic.

### **7.3. Strategic goals**

#### *7.3.1 Increase transparency and equity in teaching, service, and salary setting*

One of the most common concerns raised by faculty (especially women faculty) was about inequitable teaching and service workloads. To address this concern, we will perform a data-driven equity review, following the recommendations and lessons learned by the [Faculty Workload and Rewards Project](#), funded by the National Science Foundation. This process starts with data collection (which we've already begun), data analysis, transparency (e.g., a workload dashboard), and a plan for change. Faculty have also voiced concern about a lack of transparency in

faculty salary setting, which connects to concerns about service and teaching equity because questions often arise about what “counts”. The long-standing merit review process in EEB has a promotions and merit committee review each faculty member’s accomplishments each year (as described on their CV and in an annual faculty report) and score them from 1-5 for teaching, research, and service. These ranks are then given to the department chair, who uses them to help determine merit raises. The department chair may also consider other factors, however, that the PMC might not be aware of, such as salary compression or inversion within the department. This process is outlined in a letter that informs each faculty member of their annual merit increase, but it does not include their scores from the PMC nor convey how their rankings or merit increase compared to others in the department. Following advice from a recent Big Ten Alliance workshop on faculty salary attended by our department chair, plans are in place to improve transparency in faculty salary setting this year.

### *7.3.2 Create policies and structures to develop and support a productive and collegial climate*

Last year, the EEB leadership team (department chair and associate chairs) participated in a workshop hosted by CRLT called “Creating Climates Resistant to Sexual Harassment”, which included a list describing [“What academic leaders can do now to begin to improve their unit climates”](#). The ADVANCE RISE committee also provides relevant [resources](#) for department chairs, including ways to interrupt behaviors that decrease inclusivity. Both of these and other resources will be used to develop policies that reinforce behaviors contributing to a positive departmental climate. For example, following a suggestion from one RISE workshop, the chair adopted a new process in Fall 2021 of opening the first faculty meeting of each semester with a review of behavioral expectations. The department has also established a code of conduct (Appendix 7) for the EEB department and all of its field stations and field sites. We plan to expand the examples of behaviors that promote inclusivity and a sense of belonging in this document. This work will build on the [conflict resolution guide](#) recently developed by our Associate Chair for Graduate Studies and the graduate affairs committee, which details different forms of conflict (including bullying) that arise within a department and provides a guide for identifying resources on campus for responding to different types of conflict. This document recognizes that conflict is inevitable in any workplace and must be addressed rather than suppressed. Having transparent policies in place for doing so can help make these challenging situations easier for all parties involved. As we develop new policies and practices, it will be critical to also develop an evaluation structure in parallel to assess their effectiveness. Finding ways to reward people for positive contributions to departmental climate will also be important.

### *7.3.3 Educate the EEB community about how gender bias shows up in academia*

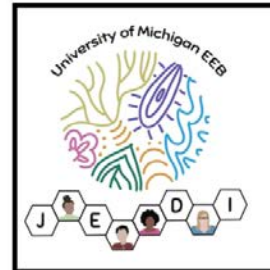
Concerns of gender-bias were deemed the most pressing to address, yet they were also reported to be enigmatic to some faculty who do not have this life experience. We are fortunate to have two co-authors of the 2018 [report by the National Academies of Science, Engineering, and Medicine](#) (NASEM) on the “causes, contours, and consequences of sexual harassment in higher education” on campus. These two faculty members (Lilia Cortina and Anna Kirkland) co-chaired a Working Group for Preventing Sexual Harassment in 2021 (of which our Graduate Coordinator was a member) that [produced recommendations](#) for the college of LSA. Both of these reports emphasize that damaging gender harassment (described in the NASEM report as verbal and nonverbal behaviors that “convey insulting, hostile, and degrading attitudes about members of one gender”) is much more common than more overt forms of sexual harassment (e.g., sexual coercion, physical assault). Indeed, it is this more subtle gender-bias that seems to be driving concerns in EEB. LSA has recently debuted a new mandatory training for faculty and staff called “Cultivating a Culture of Respect: Sexual Harassment and Misconduct Awareness” that should help clarify these issues. We will also disseminate the NASEM and LSA working group reports and hold a town hall to discuss this topic, as suggested by our graduate students.



## 8. Justice, equity, diversity, and inclusion (JEDI)<sup>11</sup>

### 8.1 Introduction

JEDI principles have been in the consciousness of EEB since before the department's creation. The first attempt to form a diversity committee was in 1974 when John Vandermeer petitioned the executive committee of the then Department of Biology. The petition was denied. When the department split, interim chair Deborah Goldberg established the Diversity Committee of the nascent EEB Department in 2002. From its conception, the department has engaged in efforts to strengthen and diversify the students trained through undergraduate and graduate programs as well as the next generation of academic leaders in EEB at the University of Michigan and other institutions.



The EEB Diversity Committee continues to lead on these issues, but we also now center this work in all departmental committees and decision making, as we hope is clear from the distribution of JEDI-related topics spread throughout this document. For example, in faculty hiring we strive for diverse applicant pools and consider each applicant's commitment to, and prior work advancing, justice, diversity, equity, and inclusion in our decision making. In the EEB Museums, we have broadened representation along multiple axes of diversity among curators, collection managers, and students (including hiring the first female curator in the U-M Herbarium's 100-year history). The EEB Museums have also prioritized making more equitable and inclusive spaces for historically marginalized communities in fieldwork, including through partnerships with indigenous groups local to their field sites. In our undergraduate program, we develop and promote resources that help instructors highlight diverse scientists in their courses and encourage the use of teaching techniques shown to reduce performance differences between students that are and are not members of marginalized groups. In our graduate programs, we strive to foster a sense of belonging and support for all students. Finally, when thinking about departmental climate, we are intentional about building community in a way that respects the variety of preferences, perspectives, and life experiences among members of EEB. Through these and other actions, we hope to become an EEB department that leads in both research and diversity, equity, and inclusion, fighting against the toxic falsehood that these are opposing goals.



Although we still have much work to do, our progress to date has come from the efforts of many people calling attention to problems, identifying possible solutions, and working to implement them. These activities require not only time and energy, but also often significant emotional labor, which has been generously given by many graduate students, postdocs, Michigan fellows, lecturers, research scientists, research professors, tenure-track faculty, and staff members. These efforts are too rarely recognized. In 2021, we created a new JEDI departmental award with a cash prize for graduate students and have since awarded it to 7 EEB graduate students who have done outstanding work advancing JEDI. Two current and one emeritus EEB faculty members have been recognized with the Sarah Goddard Power Award for "significant achievement in contributing to the betterment of current challenges faced by women" in academia. Three faculty members have been recognized with Imes and Moore Mentorship awards for making "exceptional contributions toward recruiting and mentoring graduate students in the sciences from disadvantaged and non-traditional backgrounds." Finally, a lecturer who teaches classes for EEB has been recognized with a Willie Hobbs Moore Aspire, Advance and Achieve Mentoring Award, and a former graduate student was honored with recognition from the U-M Council for Disability Concerns. Outreach activities, including to K-12 students and the public, are also critical elements of our JEDI work. Many members of EEB engage regularly in these activities with little to no recognition. One exception is an EEB faculty member who was recognized with a U-M President's Award for Public Impact for their work.

Four Lecturers, one Research Professor, and a former Michigan Fellow have also been leaders in JEDI work. The Research Professor is currently our Director of the Frontiers program and has trained many Frontiers students in her research group. The former Michigan Fellow led anti-racism reading groups and a graduate course, as described more below. One of our Lecturers has been a long-term member of the EEB Diversity Committee, playing a key role in much of its work for more than a decade. Another is an academic coach in the M-Sci academy, which is "designed to strengthen and diversify the cohort of students who will receive their degrees in science or mathematics from the

<sup>11</sup> The term DEI is used most often at U-M, but we prefer JEDI to explicitly capture the need for justice along with diversity, equity, and inclusion. Both terms are used in the document depending on context.



University of Michigan”; this program was co-founded by a former EEB department chair. A third lecturer teaches classes (and excels at doing so) for the Comprehensive Studies Program, which aims to support, advise, and retain “undergraduate students from diverse populations with outstanding potential for success at the University of Michigan.” Finally, the fourth lecturer is now using support from a grant received to increase inclusivity in our largest course and other courses that they teach.

## 8.2 Current state of affairs

### 8.2.1 Efforts to increase diversity of students in our graduate programs.

Through multiple initiatives, the department has worked to increase the diversity of our graduate (PhD and MS) student population. For example, members of EEB have participated in conferences such as SACNAS, the McNair Conference, Emerging Researchers National Conference, National Society of Black Engineers (NSBE), and the ESA Diversity Forum with the goal of increasing the diversity of applicants to our graduate programs. Beginning in 2016, the department has hosted [Fall Preview Events](#) annually that give prospective graduate students from educational, cultural or geographic backgrounds underrepresented in EEB a chance to learn about the admissions process, meet with prospective faculty mentors, and interact with current EEB students. EEB is one of a handful of departments in LSA that regularly participates in this program, and in 2022 we hosted eight students for the pre-application event. As early as 2008, we participated in a program supported by the National Center for Institutional Diversity (NCID) that invited undergraduate students from partner universities to visit Michigan and sent U-M students and faculty to visit their universities. For eligible students admitted to our PhD and MS programs each year, we submit nominations for [Rackham Merit Fellowships](#). Of all of our efforts, the Frontiers Master’s program has had the largest positive impact on the diversity of our PhD applicant pool (see section 6.2.6).

### 8.2.2 Increasing participation and representation for undergraduate students in science

Led by the EEB Diversity Committee, an NSF grant was awarded to support an undergraduate summer REU program for undergraduate students from minority-serving institutions. The program, [EDQUE<sup>2</sup>ST](#) (Enhancing Diversity, Quality, and Understanding of the Ecological/Evolutionary Sciences for Tomorrow), ran from 2010-2013 and helped to increase the diversity of undergraduates receiving training in EEB research labs at U-M. In 2019, the Diversity Committee was awarded a faculty development grant from the Center for Research on Learning and Teaching (CRLT) to develop the [‘Coloring Science’](#) program. This funding was used to pay two graduate students during the summer of 2020 to develop lecture slides highlighting scientists of color that could be used in undergraduate teaching in the biological sciences. These resources were distributed locally at U-M and contributed to a larger national program with similar goals, [Project Biodiversify](#), co-founded by a former U-M EEB undergraduate honors student and a faculty member who joined our faculty this year. That faculty member is also the lead PI on an NSF Engaged Student Learning Grant titled “Diversifying and Humanizing Scientist Role Models to Increase the Impact of Data Literacy Instruction on Student Interest and Retention in STEM”. Another EEB faculty member is a co-PI on an NSF grant effort to increase recruitment and retention of URMs with the U-M associated Earth Camp, a summer program serving high-school students and teachers (99% URM, >50% Black) from Detroit and nearby cities; 95% of Earth Camp alumni have gone on to college majoring in STEM. Other faculty members also work to offer research experiences to undergraduate students from diverse backgrounds in a variety of ways.

### 8.2.3 Graduate student-led activities

The EEB graduate student body has a long history of community outreach and social justice work in Ann Arbor and its surrounding communities. For example, our students (and postdocs) have developed educational activities in association with FEMMES, BioBlitz (beginning in 2010 with the BIO-Kids Program and continuing today at the D-Town Farm in Detroit), Science Olympiad, the U-M Museum of Natural History, and National DNA day. Students who conduct field research in other countries have made efforts to include local students in their projects (e.g., Pre-college Ocean Discovery and Science ([PODS](#)) program in the Bahamas, Ecodía (ecology day) in Chiapas Mexico). Graduate students have also played key roles in local JEDI work, including co-crafting [EEB’s land acknowledgments](#) statement with faculty and reading it before Tuesday Seminars in the 2018-2019 academic year. Graduate students were also heavily involved in shaping the department’s anti-racism work plan in 2020. Many EEB students have considerable interest in engaging with JEDI-related topics from an academic perspective and have done so in a well-attended reading group on decolonization in 2019 organized by former Michigan Fellow Shane DuBay. DuBay also ran the EEB 523: Critical Perspectives on Science course in 2021. In this course, graduate students proposed ideas for topics in EEB that faculty could propose to participate in the Provost’s Anti-Racism Faculty Hiring Initiative. Currently, graduate students are using a Rackham Allies grant to organize JEDI-related seminars.

### *8.2.4 Department-wide Initiatives*

The EEB Diversity Committee often holds department-wide discussions of JEDI issues at EEB annual retreats. In recent years, these activities have included a book discussion, activities designed to encourage department members to identify and reflect on the impacts of different social identities on individual and department dynamics, and broader discussions of EEB culture and climate. EEB also regularly hosts department-wide activities and seminars on DEI and wellness issues, such as the Change it Up! Workshop on bystander intervention (2017), Cuts: Responding to Student Climate Concerns (CRLT Players, 2018), Helping Students in Distress (CAPS, 2019), Wolverine Wellness Seminar (2019), RaceTalk Skills for Cross-racial Communication workshop (2020) and others, including most recently, a custom “Allies at Work” workshop led by the LSA DEI team open to all members of EEB. These readings, trainings, and life experiences, have led to new policies and practices in EEB, including a departmental Code of Conduct and an anonymous Drop Box for reporting climate concerns. More information about these and other JEDI activities is provided in Appendix 8.

### *8.2.5 Supporting JEDI in the Broader Ecological and Evolutionary Biology Sciences*

Our JEDI goals in EEB often extend beyond the department. For example, we hosted a NextProf Future Faculty Science Workshop from 2015 to 2022, organized by a dedicated EEB NextProf committee. NextProf is sponsored by the ADVANCE office in the College of LSA and is designed to encourage talented scientists and mathematicians with a demonstrated commitment to diversity to consider academia. It helps participants develop strategies to strengthen their ability to pursue an academic career. Since 2015, we have hosted 58 advanced senior PhD students and postdocs for our EEB NextProf event, and many of them are now pursuing careers in academia. Another example of more outward facing work can be found in our [2022 Early Career Scientists Symposium](#), which was organized by the Diversity Committee and other volunteers around the theme of Racial Justice and Anti-racist Research. This symposium was attended by members of EEB at U-M as well as people from many other universities. Eight rising early-career scholars identified as transforming the EEB discipline through anti-racist and justice-centered research that enlarges our understanding of the connections between EEB research and society presented their work. Although this was the first time in its 17 year history that our Early Career Scientists Symposium focused so explicitly on JEDI, this event itself (whose topic varies from year to year) provides a unique platform for senior graduate students, postdoctoral researchers, and assistant professors in their first 2 years of their faculty position to showcase their work. Speakers for this symposium have always been selected with gender, racial, and ethnic diversity in mind.

## **8.3. Strategic Goals**

### *8.3.1 Increase the number of BIPOC faculty in EEB*

Among the greatest challenges we face, both at the departmental and university level, is the lack of representation of BIPOC faculty and the extent to which our community in EEB is decoupled from the racial and socioeconomic demographics of southeastern Michigan. As a public institution charged with serving the students of our state, we are deeply concerned by declining enrollment of Black students at the University of Michigan, especially in light of the large regional Black population. This paucity carries through to EEB as well, at both the level of racial demographics in majors run by EEB (Figure 10 in section 5.2.4), as well as in our graduate student (Figure 12 in section 6.2.1) and postdoctoral populations. Our concerns in this area align well with overall U-M values, and the Diversity Committee would like to engage the department in conversation about more what we can do to help address these issues. This conversation will necessitate critical introspection about our past efforts and the extent to which they have been effective at different educational levels - whether through K-12 outreach, undergraduate, or graduate education at U-M. There is consensus that reaching our departmental JEDI goals will require our recruiting efforts to be more effective at all levels, from undergraduates to graduate students to faculty searches.

### *8.3.2 Increase support for disabled, transgender, and other marginalized members of EEB*

Our department – and the University of Michigan more generally - has failed to meet the needs of some marginalized communities that are not defined by race or ethnicity. For example, the transgender and disabled communities have not been fully integrated into traditional JEDI efforts. Disability is particularly challenging, due to the diverse and often confidential nature of the issues that individuals face. Even within the disability community, there is increasing awareness that invisible disability and neurodiversity have been comparatively neglected by traditional disability-related initiatives. Preliminary feedback from students in our program suggested that some form of "disability mentoring" could help address specific concerns that disabled students face, such as how to effectively self-advocate, when (and how) to disclose a disability, and how best to navigate professional and academic jobscares as a disabled

individual. The university Council for Disability Concerns (CFDC) is exploring a mentor-mentee pilot program along these lines, and we are engaging with this program in part to assess whether a similar model might work for EEB.

### 8.3.3 Clarify our department's vision and mission with respect to JEDI principles

The EEB Diversity Committee recognizes that full integration of JEDI principles with our departmental mission and culture requires that we meet numerous ongoing and emerging challenges associated with justice, diversity, equity, and inclusion. Our 2022 departmental Climate Survey provided us with multiple progress benchmarks and enabled us to self-assess the extent to which our actions during the past few years have had positive impacts on climate. It also identified several key areas for future improvement. Based on this feedback, it is clear that we must do a better job of consolidating our department's vision and mission with respect to JEDI principles, and we must do so with input from our graduate students and other EEB affiliates.



*Volunteers who coordinated and supported the BioBlitz in 2019.*



*2021 Feria de Ciencias!*



## 9. Research Space and Facilities

### 9.1 Introduction

Since our 2010 self-study, the research space and facilities used by members of EEB have changed dramatically. For the first time, all EEB faculty members have offices and lab space in the same building. Furthermore, this Biological Sciences Building (BSB), built in 2018 to replace our space in the Kraus Natural Sciences and Ruthven Museums buildings built in 1916 and 1928, respectively, contains modern research space including flexible, open lab spaces custom designed for the different types of work done in EEB. The BSB also has communal kitchens and lounge spaces, a dedicated plant-growth area, a small market (Darwin's Cafe), the public-facing Museum of Natural History (UMMNH), including a shared molecular lab-on-display used by members of EEB for research and science communication, as well as research labs for the MCDB department and Museum of Paleontology. Collections and collections staff for the University of Michigan Museum of Zoology (UMMZ) and the University of Michigan Herbarium (UMH) were relocated to a newly renovated Research Museums Center (RMC), located 5 miles from central campus. The building provides world-class facilities for collections-based research and outreach, but problems with current transportation options connecting the RMC to central campus have created new challenges, as described in section 3. EEB Lecturer offices are located in the Undergraduate Science Building, which is located next to the BSB. Other facilities include the E.S. George Reserve, which is a 25-minute drive from central campus in Pinckney, MI, and is managed by EEB with a director appointed by the EEB chair. This facility is home to multiple long-term ecological studies and also provides facilities for experimental work; however, some of these facilities are in dire need of extensive repairs. Although administratively separate from EEB, many members of our department also use the University of Michigan Biological Station in Pellston, MI (265 miles from campus) and the Matthaei Botanical Gardens (6 miles from campus) to conduct field work, both of which have, or are in the process of getting, more modern facilities.

### 9.2 Current state of affairs

#### 9.2.1 Biological Sciences Building (BSB)

EEB faculty are organized into 5 neighborhoods within the BSB: Biodiversity, Biogeochemistry, Field Biology, Molecular Biology and Microbiology (MB2), and Theory, each currently housing 3 to 10 faculty members. Within each neighborhood, faculty, students, and other researchers with common interests work together in shared spaces, often sharing knowledge, research equipment, and supplies. With the exception of the Biogeochemistry and Theory neighborhoods, which are located together, each neighborhood occupies a different floor or tower of the building. BSB has five floors in each of three towers connected by open walkways, and the EEB neighborhoods are clustered in the middle and west towers of BSB, on the 2nd, 3rd, and 4th floors. Each neighborhood also includes desk space for graduate students, postdocs, and full-time research lab staff. Lab space in each neighborhood is uniquely designed to support the type of research done in that neighborhood. For example, the MB2 lab space has high benches and equipment for molecular work and dark rooms for microscopy, whereas the theory neighborhood, which does computational work almost exclusively, is divided into desk spaces, whiteboards, and small group discussion areas.

Lab and office space for each group is intended to be flexible and assigned based on actual needs rather than history, seniority, amount of grant funds, or a strict multiple of people in a lab group (Appendix 9). Faculty offices within a neighborhood all run along the same wall, making interactions much easier than in the old buildings, and most faculty offices are located in the same neighborhood as their primary research laboratory space. Small-scale changes in research needs are generally handled collaboratively within each neighborhood, overseen by the designated neighborhood representative, with any conflicts or unresolvable challenges brought to the Associate Chair for Research Space and Facilities, who brings issues to the department chair if needed. This approach requires a climate of communal good-will and a consensus that there is no acquisition of space just to have space. EEB faculty recently agreed to conduct a space review every 3 years going forward, and the first review is currently underway.

The BSB contains two major shared facilities: the plant-growth facility and the biodiversity lab (BDL), which includes bench space, equipment, and supplies for molecular work. The plant-growth facility is located in the basement of BSB and contains 5 large and 10 small plant-growth rooms as well as 3 large and 17 small plant-growth chambers. The facility is managed collaboratively by EEB and MCDB faculty users, overseen by the Research Space Associate Chairs in EEB and MCDB. Currently 5-6 EEB faculty and their students routinely use the facility. The BDL is on the second floor of BSB and is managed by EEB, with day-to-day operations handled by a dedicated BDL manager. It is a general-purpose, multi-user facility that currently supports research activities of ~17 faculty and ~60 students, postdocs, and visiting scholars in EEB. The BDL is uniquely designed with a wall of windows facing a hallway

accessible by visitors of the Museum of Natural History (UMMNH) and microphones allowing museum guests to talk with researchers about their work. These facilities have been used for an EEB Public Engagement Program, in which graduate students were trained in science communication and then interacted with UMMNH guests.

### 9.2.2. Research Museums Center (RMC)

The RMC houses research collections for the UMMZ and UMH within EEB, as well as for the U-M Museums of Anthropology and Paleontology (associated with the Departments of Anthropology and Earth and Environmental Sciences, respectively). The RMC also contains administrative offices for faculty and staff, offices for emeritus faculty, offices for all UMMZ and UMH Collections Managers, and office cubicles for other researchers such as postdoctoral associates. The RMC does not contain dedicated offices for faculty curators (who have offices in BSB) other than the Associate Chair for Collections, but there are two office spaces available for shared faculty use as needed. Finally, the RMC houses dry and wet lab research areas for working with the collections, the museum's liquid nitrogen and pathogen cryogenic biorepository, a molecular lab currently being upgraded to Biosafety Level 2 with capabilities for working with degraded DNA, and a micro-CT scanning core facility. These facilities are further discussed in the EEB Museums (section 4).

### 9.2.3. The E.S. George Reserve (ESGR)

The ESGR is located ~30 miles (25 minutes) northwest of main campus on a 525-hectare fenced preserve. The University, and more recently EEB, has administered and maintained the Edwin S. George Reserve for the purposes of providing research and educational opportunities in the natural sciences and preserving the native flora and fauna since 1930. EEB provides a faculty director and a Facilities Associate Supervisor. The ESGR can house ~12 researchers, but most trips from campus are day visits. In 2021, there were over 400-day visits and 100 overnight stays. In addition, the EEB Frontiers Master's Program spends two weeks at the ESGR each summer. There are a number of long-term studies at the ESGR and approximately a dozen ongoing research projects. For example, studies of several turtle species began in 1953; since then, a team led by Justin Congdon has made 50,000 captures of more than 14,000 different turtles. The ESGR also hosts one of the 75 ForestGeo plots to monitor forest dynamics globally. Currently, there are two decommissioned research buildings, two unusable houses, and no WIFI or reliable cellular data service at the ESGR, which severely limits current opportunities. The director has discussed restoring one of the research facilities (the "Pond Lab") with LSA, but the estimated cost (\$500K or more) is currently prohibitive.

### 9.2.4 Collaborating and affiliated units

*Matthaei Botanical Gardens and Nichols Arboretum (MBGNA)*: The MBGNA is located ~6 miles northeast of main campus and is managed by a Director that reports to the College of LSA. The facility has opportunities for education and research for faculty and students, and several EEB faculty use their facilities, including field plots, lab space, and structures for rearing butterflies.

*U-M Biological Station (UMBS)*: UMBS is located in Pellston, MI, about 265 miles north of main campus. The station is an internationally recognized, fully self-contained research and teaching facility with a long history. It is managed by Director Aimee Classen, a faculty member in EEB, who reports to the College of LSA. EEB faculty and students do research and teach at UMBS, with recent efforts to increase EEB faculty teaching there. Excitingly, a \$10M investment was recently secured that will be used to renovate housing, teaching, and lab facilities at UMBS.

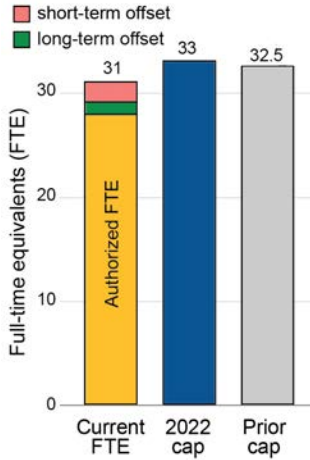
*U-M Museum of Natural History (UMMNH)*: Unlike the UMMZ and UMH, which focus on research collections, UMMNH is a public facing museum with exhibits covering aspects of biology ranging from DNA and molecular processes to mastodon fossils and macroevolution. The UMMNH brings families, school groups, and other visitors to the BSB, keeping the public impact of our work on display every day. Many graduate students and faculty in EEB have partnered with UMMNH for training in scientific communication and to develop museum exhibits or outreach activities. This work benefits not only the public, but also researchers by providing strong broader impacts for their work, which are required for competitive NSF proposals.

## 9.3 Strategic goals

### 9.3.1 Ensure space limitations within BSB do not inhibit growth of research programs in EEB.

Despite recent hires, we remain below the faculty "cap" raised from 32.5 to 33 in 2022 by LSA based on teaching contributions (Figure 16). Our current 31 FTE (full time equivalents) includes the three faculty hired last year as well as a faculty member on leave until retirement. It does not include the Pathogens Biorepository director starting in January 2023 (who is supported by the Presidential Biosciences Initiative, so should be as little as 0 FTE), nor the

LSA Collegiate Fellow starting as an Assistant Professor in Fall 2024, who should have short-term (0.25) and long-term (0.5) FTE offsets. Consequently, even including these individuals, we remain below our current FTE cap. Moreover, LSA indicated that they would increase the cap if the recent rise in undergraduate enrollments seen in courses taught by EEB faculty continued, and they have (see section 5). But changes in faculty cap size were not accompanied by increases in space available for faculty labs. While we are currently meeting the research space needs of our faculty and students, four 1.0 FTE faculty are not using any research space. We foresee space limitations



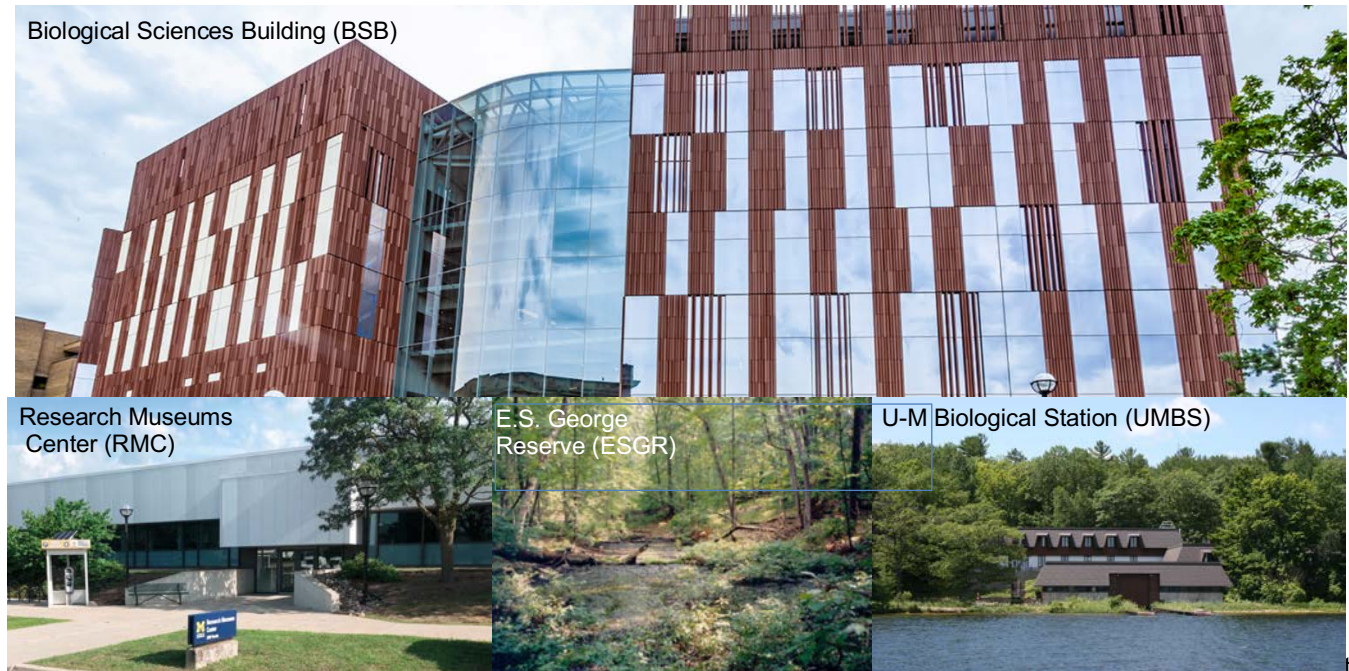
**Figure 16. Currently authorized FTE and 2022 faculty cap set by LSA.** This modified version of the graphic provided to EEB by LSA in 2022 shows our prior college-funded FTE cap of 32.5, the revised cap of 33, and our current 31 FTE count (with caveats noted in text). This current FTE count includes short-term (pink) and long-term (green) offsets. Short-term offsets = 3 years with reduced FTE cost for dual career hires or 0 to 6 years for others from appt start; Long-term offsets = 0 to 12 years with reduced FTE cost from appointment start. Total FTE, including offsets, is less than the number of EEB faculty because of joint appointments.

in the near future as recent hires expand their labs, faculty not using lab space are replaced with faculty that do, and our faculty expands to meet the growing teaching demand. We would thus like to start strategizing with LSA now to be prepared to meet these anticipated research and office space needs.

### 9.3.2 Partner with LSA facilities to find solutions for challenges with BSB built-in equipment

For a building only five years old, we have experienced a surprising number of equipment failures and design flaws that are having significant impacts on research programs in EEB. At least 5 research labs in EEB have experienced serious and sometimes catastrophic failures of

built-in equipment such as walk-in cold rooms, walk-in freezers, and environment-controlled rooms. In one case, an estimate of the damages to research of lost samples, lost research time, and setbacks in student dissertations is being filed with the University of Michigan for over \$1 million. Another smaller claim is also currently under consideration by risk management. In a third incident within the last year, an incubator rearing insects failed, disrupting long-term experiments. The manufacturer of these temperature-controlled rooms is unresponsive and has been dropped as a vendor by U-M, meaning that U-M is now responsible for retrofitting these installations. As of this writing, none of the failures have been retrofitted and fixed. We must move quickly toward having reliable infrastructure for our environmental rooms. We must also find a solution for a “fly room” designed to be temperature controlled and suitable for working with the CO<sub>2</sub> used to anesthetize fruit flies so that it can be safely used by multiple researchers at the same time with the door closed. Given these ongoing, major issues, we hope to partner with LSA and University facilities groups to find remedies for these issues soon.





## 10. Department Administration

### 10.1 Introduction

The EEB department (including the EEB Museums) is led by a department chair who works closely with the department's chief administrator, executive secretary, Associate Chair for Collections, Associate Chair for Undergraduate Studies, Associate Chair for Graduate Studies, Associate Chair for Research Space and Facilities, Program in Biology Director, E.S. George Reserve Director, and Frontiers Director. See Appendix 10 for faculty leadership organizational chart and responsibilities. The chair also works closely with the Executive Committee, which includes four faculty members elected by the full governing faculty and one graduate student, elected by their peers. Associate Chairs are also *ex-officio* members of the executive committee. Together, this group provides advice to the chair on all substantial departmental decisions, including voting on personnel issues such as faculty hiring, Lecturer promotions, and dry appointments. A list of current departmental committees is included in Appendix 10. Note that graduate students are included on nearly all departmental committees. The EEB department is supported by 23 staff members, including three teams of administrative staff divided among the EEB department office (6), the EEB museums (5), and the Program in Biology (13). The EEB Chief Administrator is responsible for supervising these staff and working closely with a series of central staff support teams managed outside of EEB, including Finance, Human Resources, Facilities, and Technology Services. An organizational chart for staff and descriptions of their individual responsibilities are provided in Appendix 11.

### 10.2 Current state of affairs

Over the past two years, the faculty leadership has been stable, but the staff administrative team has seen turnover in nearly every role. With the retirements of the long-time Chief Administrator, Nancy Smith (20 years), Communications Specialist, Gail Kuhnlein (16 years) and the resignation of the Executive Secretary and Graduate Coordinator to take on other roles at the university, EEB has been in a position to rebuild a fresh administrative staff team. The new Chief Administrator, Jennifer Wolff, joined in December 2021 and took the opportunity to promote two outstanding internal candidates, Nathan Sadowsky and Linda Garcia, to the roles of Graduate Coordinator and Executive Secretary, respectively. Additionally, we have hired terrific employees into the Administrative Senior Role, the Graduate Administrative Assistant, and the Communications Specialist roles. This turnover has enabled a fresh perspective on departmental operations and our future goals. In the time since the last self-study in 2010, the racial and ethnic diversity of staff members has also increased modestly from 9% to 12%.

### 10.3 Strategic goals

#### 10.3.1 Energize development and alumni relations

To generate additional resources that will help us achieve our goals, we will increase our focus on alumni relations and development. We will start with a benchmarking exercise within the college and then work to grow our communications, events, and engagement to support goals currently hindered by funding gaps. We aim to strengthen our alumni network, hoping to raise more support for our undergraduate and graduate students.

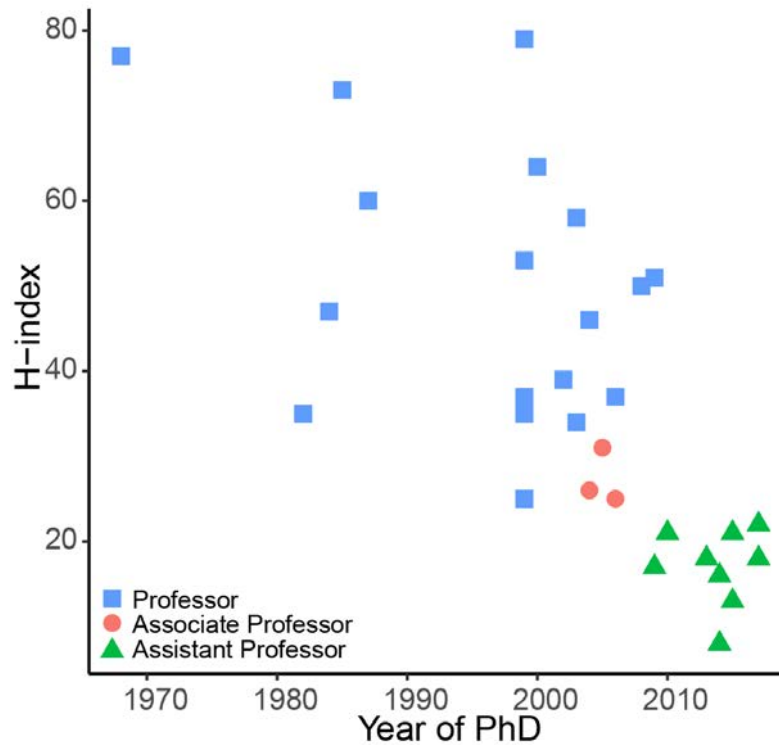
#### 10.3.2 Re-assessing and refining departmental committees

EEB has maintained a largely stable set of departmental committees since 2001. Some committees have involved more work and others less work over time. We have also identified a need for a departmental awards committee (which many of our fellow Natural Science departments have) to increase the consultation and transparency of nominee selection and to assist with nominations for both internal (U-M) and external (scientific society) awards. We have created such a committee on an ad-hoc basis for this year, and it seems to be working well. The Associate Chair for Collections has also recently created four new committees to support work in the EEB Museums. Identifying committees that can be combined or decommissioned is necessary to make space for these new priorities. Identifying the relative workloads of different committees will also be key for the equity review mentioned in the departmental climate section.

#### 10.3.3 Increasing staff operational efficiencies and service

The past 12 months have been focused on rebuilding the administrative team, and now that people are established in their new roles, we are excited to pivot toward creating and executing the next phase of operational goals. The team will put a heightened focus on service to our unit by being solution-minded and timely with our actions. As we continue to become experts in our roles and establish protocols for operations, we also plan to shift to a proactive mindset in order to address issues before they become problems. And, given the industry background of our new CA, we plan to develop a culture of continuous improvement by initiating training sessions and establishing annual goals for projects that improve efficiencies for our stakeholders.

## Appendix 1: H-index values for tenure-track EEB faculty



The H-index is shown for each tenured or tenure-track faculty member in EEB, compared to the year in which they earned their PhD. Blue squares represent professors, red circles represent associate professors, and green triangles represent assistant professors. H-indexes from Google Scholar were used for this plot, so do not include one assistant professor, one associate professor, and two professors who do not have scholar pages.

A person's H-index describes the number of papers that they have authored with at least the same number of citations. For example, an H-index of 10 means that the person has 10 papers that each have at least 10 citations. H-index scores thus tend to increase over the course of one's career. The average H-index differs among fields, including subfields within EEB, because the average number of publications and citations varies among fields.

## Appendix 2: M-PABI Advisory Board

Liliana Cortés Ortiz  
Research Associate Professor of Ecology and Evolutionary Biology (EEB)  
University of Michigan

Barbara Han  
Disease Ecologist  
Cary Institute of Ecosystem Studies

Aaron King  
Nelson G. Hairston Collegiate Professor of Ecology, Evolutionary Biology, and Complex Systems  
University of Michigan

Town Peterson  
Distinguished Professor and Senior Curator  
Kansas University Biodiversity Institute

Kendra Phelps  
Senior Scientist  
EcoHealth Alliance

Mary Grace Stobierski  
Manager, Emerging & Zoonotic Infectious Diseases, State Public Health Veterinarian  
Michigan Department of Health & Human Services

Cody Thompson  
Collection Manager, Division of Mammals and Assistant Research Scientist  
University of Michigan

Ben Winger  
Assistant Professor and Assistant Curator of Birds  
University of Michigan

Jon Zelner  
Assistant Professor of Epidemiology, School of Public Health  
University of Michigan

### *Ex officio*

Aubree Gordon, Director Michigan Center for Infectious Disease Threats  
Hernán López-Fernández, Associate Chair for Collections, EEB Museums  
Trisha Wittkopp, Chair of the Department of Ecology and Evolutionary Biology



## Appendix 3: Undergraduate majors supported by EEB

Program guides available at <https://lsa.umich.edu/biology/undergraduates/majors---minors.html>

### 1. Biology (managed jointly with MCDB) - 107 majors in Winter 2022

This major program develops an appreciation of the levels of organization of life, its diversity, and the processes by which life has achieved its present forms. The program is recommended for those who wish to study biology as part of a liberal education, to prepare for a teaching career in secondary schools, or to prepare for graduate study in biology or the health professions.

### 2. Biology, Health, and Society (BHS, managed jointly with MCDB) - 398 majors in Winter 2022

This major is recommended for students interested in a broad view of biology and the interactions between science and society, whether focused on health, education, or the environment. The major is appropriate for pre-health students, as well as those who wish to pursue professional school (e.g., law school) or other non-biology-specific career options where knowledge of the natural sciences would be beneficial. BHS also works well when paired with a (non-science) field of study in a dual major. It differs from other Biology majors in that it requires fewer credits, less laboratory work, and has more breadth.

### 3. Ecology, Evolution, & Biodiversity (EEB, managed solely by EEB) - 76 majors in Winter 2022

This major provides a comprehensive foundation in the biological sciences, places an emphasis on undergraduate research experience, and provides an integrated perspective on the origins and complex interactions of the earth's biodiversity and ecosystems. It focuses on numerous levels of biological organization over multiple time scales, including studies of genes and genomes, individual organisms, populations, communities and ecosystems. The major is highly suitable for students who wish to pursue career pathways in a wide variety of disciplines. These include graduate studies in the biological, public health and medical, dental, and veterinary professions, conservation and natural resource management, teaching at the K-12 level, positions in the local, state and federal governments, non-profit/non-governmental organizations, and private sector opportunities such as environmental consulting agencies.

### 4. Microbiology (managed jointly with MCDB) - 68 majors in Winter 2022

This major includes the study of viruses, algae, bacteria, protozoa, and fungi. Immunobiology is also included within the science of microbiology. A major in microbiology prepares students for graduate study in microbiology, biochemistry, agricultural science, and food science as well as for study in other areas of biology which emphasize cellular structures and their function. A bachelor's degree in microbiology may qualify students for entry-level positions in medical, industrial, or governmental laboratories. Students intending to go to graduate school should have at least two terms of research experience. These can appear as graded courses, UROP participation, or be independent of the graded curriculum.

### 5. Plant Biology (managed jointly with MCDB) - 7 majors in Winter 2022

This major provides undergraduates with training in those areas of science that are essential to an understanding of modern plant sciences. Like the Biology major, this major deals with all of the major levels of biological organization (molecular, cellular, organismal, ecological, and evolutionary), but differs from the Biology major by its greater emphasis on the biology of plants. This program is well suited for those who wish to study biology as part of a liberal education, or to prepare for a teaching career in secondary schools. It also provides excellent preparation for graduate study in basic and applied areas of the plant sciences and related fields, such as ecology, genetics, microbiology, and biochemistry.

**Minors are offered in (a) Biology and (b) Ecology, Evolution and Biodiversity**

## Appendix 4: Standard EEB PhD program funding package

	Fall Term	Winter Term	Spring/Summer Term	Total Cost
Year 1 (Precandidate)	GSI Tuition: \$26,321 Stipend: \$12,027 Dental and Health: \$1,325	GSI Tuition: \$26,321 Stipend: \$12,027 Dental and Health: \$1,365	Fellowship Stipend: \$7,000 Dental and Health: \$1,365	\$87,751
Year 2 (Candidate)	Dept. Fellowship Tuition: \$6,989 Stipend: \$12,472 Dental and Health: \$1,365	GSI Tuition: \$6,989 Stipend: \$12,472 Dental and Health: \$1,406	Fellowship Stipend: \$7,000 Dental and Health: \$1,365	\$50,099
Year 3 (Candidate)	GSI Tuition: \$7,338 Stipend: \$12,933 Dental and Health: \$1,406	GSI Tuition: \$7,338 Stipend: \$12,933 Dental and Health: \$1,448	Fellowship Stipend: \$7,000 Dental and Health: \$1,365	\$51,924
Year 4 (Candidate)	GSRA Tuition: \$7,705 Stipend: \$13,412 Dental and Health: \$1,448	GSRA Tuition: \$7,705 Stipend: \$13,412 Dental and Health: \$1,491	GSRA Stipend: \$13,412 Dental and Health: \$1,365	\$59,950
Year 5 (Candidate)	GSI Tuition: \$8,090 Stipend: \$13,908 Dental and Health: \$1,491	Dept. Fellowship Tuition: \$8,090 Stipend: \$13,908 Dental and Health: \$1,536	GSRA Stipend: \$13,908 Dental and Health: \$1,536	\$62,467

As described in section 6.2.3, funding for individual students deviates from this package when students are awarded internal or external fellowships or participate in NIH-funded training grants. As described in our [graduate student handbook](#):

Students cannot receive both a departmental fellowship and an external fellowship or traineeship at the same time. A student cannot receive fellowship/traineeship support and departmental summer support at the same time. External fellowship funding will be supplemented by the department to achieve the guaranteed stipend of at least the GSI rate, if necessary. External fellowships and traineeships are not supplementary, but substitute first, for departmentally-funded fellowships and second, for the GSRA.

Substitutions of support depend upon the term of the fellowship as follows:

- 1) 3-Year Fellowship: A 3 year fellowship would substitute for the year of departmental fellowship and, unless waived by the advisor, the year of GSRA support. This student would then teach a maximum of 4 terms, perhaps less if the advisor chooses to still support a student as a GSRA.
- 2) 2-Year Fellowship: A 2 year fellowship would substitute for the year of departmental fellowship and, unless waived by the advisor, the year of GSRA support.
- 3) 1-Year Fellowship: A 1 year fellowship would substitute for the departmental fellowship and the student would be expected to be supported by a GSRA for one year by their advisor.”

## Appendix 5: Requirements for doctoral program

Our PhD program requirements include (1) a two-step preliminary examination process administered by EEB faculty, (2) a dissertation conforming to the requirements of the U-M Rackham Graduate School, (3) a public seminar of the dissertation, and (4) an oral defense of the dissertation.

The first step of the preliminary examination process (Step 1) is completed at the end of the first year and meets the requirements set by the Rackham Graduate School to advance to candidacy. The current requirements for Step 1 include:

- At least 18 credits of in-residence, graduate-level coursework (400-level or above, including required courses and research credits);
- Satisfactory completion of EEB/MCBD 499, Responsible Conduct of Research and Scholarship Training also known as the “ethics course” [Fall or Winter]
- EEB 485 Population and Community Ecology (B- or better) [Fall];
- EEB 516 Principles of Evolution (B- or better) [Winter];
- Satisfactory completion of the 1 credit EEB 800 seminar course [Winter];
- 4 hours of “cognate” coursework outside of the field of specialization (B- or better) [optional, can be completed after advancing to candidacy, if preferred];
- Satisfactory completion of EEB 730 [Winter], including submission of a research or synthesis paper, with guidance from primary or secondary advisor

In Step 2, students form an exam committee consisting of their primary advisor(s), two other EEB faculty members (one of which is often the secondary advisor), and a “cognate” faculty member (i.e., a faculty member with at least a 50% appointment in another academic unit on campus). This committee evaluates the student on the following three components completed in the second year of the program: (1) a dissertation proposal, (2) a public seminar, and (3) an oral exam. After successfully completing both steps of the preliminary examination, the committee becomes the student’s dissertation committee, and members meet with the student twice a year (recently increased from once a year) until the defense. Dissertations and oral defenses follow procedures laid out by the Rackham Graduate School and the student’s dissertation committee.

This process is described more fully in our [Graduate Student Handbook](#), which also includes assessment rubrics for each step of our preliminary exam as well as other policies and information related to our graduate programs.



## Appendix 6: Climate Survey Results

### Ecology and Evolutionary Biology Climate Assessment Prepared by the ADVANCE Program (July 2022)

#### Executive Summary

At the request of the College of Literature, Science, and Arts (LSA) Dean's Office the U-M ADVANCE Program conducted a climate assessment in the Department of Ecology and Evolutionary Biology (EEB) during Winter 2022 as part of the department's external review process. The last ADVANCE climate assessment was in 2019. All faculty, staff, postdoctoral fellows, as well as master's and Ph.D. students, were surveyed online from March 3, 2022 to March 25, 2022. U-M ADVANCE researchers used quantitative and qualitative methods to analyze participant responses.

The following summary highlights major themes across faculty, staff, Ph.D. students, and postdoctoral fellows.<sup>1</sup> Response rates varied across groups, including 81% response rate for faculty (38 out of 47), 76% response rate for staff (28 out of 37), 69% for Ph.D. students (48 out of 70), 62% for postdoctoral fellows (13 out of 21), and 40% for master's students (6 out of 15).

#### Program and Job Satisfaction

The majority of staff were satisfied with their jobs and with their relationship with their supervisor. Similarly, the majority of postdoctoral fellows were satisfied with their current position, and perceived that their department training is preparing them well for their future career. In addition, over eighty percent of Ph.D. students were satisfied with their graduate program and most Ph.D. students perceived a positive relationship with their advisor. Further, doctoral students shared that their advisor inspires them intellectually, treats them as a colleague, advises them about getting their work published, and advocates for them.

Faculty were the least satisfied with their jobs out of the four surveyed groups, with 61% indicating that they were satisfied with their job. Most faculty felt valued as a mentor or advisor by their students. However, almost three-quarters had considered leaving U-M, with the most common reasons given as to find a more supportive work environment and increase their salary. Items reported as the most stressful for faculty included departmental politics, securing funding for research, and scholarly productivity.

#### Department Climate

Across surveyed groups, respondents indicated that their overall perception of EEB positive, with staff, Ph.D. students, faculty, and postdoctoral fellows describing a respectful and supportive environment. Non-homophobic was ranked as the highest on the *Tolerant Environment* scale across all surveyed groups. Additionally, in questions about the department environment for marginalized groups, most department members indicated that the environment is positive overall for LGBTQIA+ members. Across staff, faculty, and Ph.D. open-ended responses department members discussed the positive climate, including good interactions, supportive, friendly, and non-competitive environment, and friendly, communal and collaborative

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<sup>1</sup> Although the master's students were surveyed, they did not reach the minimum response rate of 51%, which is required for ADVANCE to write the report.

relationships. Additionally, some postdoctoral fellows commented on the department's determination to strengthen and improve DEI efforts and found this very encouraging.

Respondents perceived negative aspects of climate as well. Across all surveyed groups, non-sexist was ranked among the lowest on the *Tolerant Environment* scale, indicating that the department environment was consistently viewed as more sexist. This finding was supported in questions about the department environment for marginalized groups, as over half of faculty and over two-thirds of Ph.D. students perceived that department members have a condescending attitude toward women. In addition, women faculty were more likely to perceive a less diverse, less tolerant overall environment, were more likely to report bias or exclusion by colleagues within their department, and were more likely to agree that they have to work harder to be perceived as a legitimate scholar.

The general perceptions of the environment for specific members of the EEB community were reported. The environment for URM members of the EEB community was perceived more negatively across all respondents, with less than sixty percent of faculty and fewer than half (43%) of Ph.D. students reporting that the environment is one in which URM graduate students feel comfortable and included. In addition, at least one-quarter of Ph.D. students, faculty, and staff perceived that department members have condescending attitudes toward international people and lower-income people, and Ph.D. students and faculty additionally reported similar rates for people with disabilities.

While postdoctoral fellows and staff reported limited experiences of bias or exclusion, Ph.D. students and faculty reported higher levels. For Ph.D. students, the highest levels were from a faculty member (34%), and a student (30%) and whereas the highest levels for faculty were from a colleague (47%), followed by an administrator (32%), and a student (30%).

Within open-ended responses, staff also expressed frustration with how faculty treat staff and Ph.D. students. Staff also reported poor climate, including isolation, a lack of interactions among graduate students, and bullying. Further, some faculty noted a lack of community or collegiality. Postdoctoral fellows also commented that there is a lack of collegiality and cohesion in the department since the beginning of the pandemic, and some mentioned that this is affecting the experiences of postdoctoral fellows and leading to strained relationships.

Across several groups, responses about climate were closely tied to Diversity, Equity and Inclusion (DEI). Ph.D. students expressed several concerns with performative DEI, including a lack of action taken and resources given to ensure an inclusive environment, pushback towards progress, including pushback from faculty on enacting actual change toward a positive environment for students from underrepresented backgrounds, a lack of recruitment and retaining of students of color and students from underrepresented backgrounds. Faculty described difficult and often contentious discussions amongst fellow faculty related to climate or DEI concerns. Additionally, a few postdoctoral fellows mentioned that most faculty do not participate or engage in any of the DEI work that is happening in the department.

### **Departmental Leadership, Policies, Procedures, and Communication**

Most staff agreed that they have confidence in the chair's leadership, that the department conducts business in an ethical manner, and that they understand how their work contributes to the department's mission, vision, values, and goals. Most faculty agreed that their department would supported slowing or stopping the tenure clock for a faculty member's personal reasons, with close to two-thirds of faculty agreed that they are able to serve on departmental committees, and over half agreed that the criteria for tenure are clearly communicated in the



department. Across Ph.D. students and postdoctoral fellows, most respondents agreed that department staff are helpful, courteous, and respectful and that they find the interactions among graduate students/postdoctoral fellows to be collegial and supportive.

Across the department, survey respondents expressed several areas of concern related to communication and departmental policies and procedures. Less than half of faculty agreed that the department's procedures are transparent and open for discussion and that the procedures and allocation of committee assignments are fair and equitable. Almost half of staff perceive that they often feel that they do not know what is going on in the department and just over two-fifth of postdoctoral fellows agree that they do not know the responsibilities of the department staff. While one-third of Ph.D. students disagree that if they need help solving a problem, they know who to talk to within the department, Ph.D. student responses were more divided on several other issues related to departmental communication, such as perceiving the department is not effective at communicating new policies and initiatives.

Open-ended responses from faculty also describe that they would not change the current leadership and commitment to DEI. Within staff responses, some staff expressed concern with leadership; however, others expressed hope for the future with the recent administrative changes. In contrast, several Ph.D. students highlighted a sense of protection, resulting in a lack of accountability for faculty who treat graduate students poorly. In addition, several Ph.D. students expressed that graduate student concerns are not taken seriously, describing a lack of meaningful action based on their input, and referenced the power dynamics between faculty and students. Relatedly, Ph.D. students also described a lack of meaningful engagement with student concerns, such as poor conflict resolution avenues for reporting conflict.

### **Research Museum Centers**

The ADVANCE program included items about the Research Museums Centers (RMC). Half of faculty agreed that their RMC collections are valuable for their research/work, followed by staff, Ph.D. students, and only one-third of the postdoctoral fellows. Fewer respondents perceived a connection between the on-campus work and the work being done at RMC, with Ph.D. students having the highest responses (45%) followed by postdoctoral fellows (30%), faculty (20%) and staff (15%). Almost one-third of faculty (31%) agreed that the RMC collections add value to their teaching.

### **Diversity Equity & Inclusion (DEI) Experiences**

While almost all faculty, and most of Ph.D. students reported having a DEI-related conversation with a colleague/peer in their department, around one-quarter of staff and slightly less than half of postdoctoral fellows reported never having this experience. Furthermore, close to sixty percent of staff reported never attending at DEI-related event in their department, which was the lowest percentage across the groups surveyed.

### **Thriving**

Most postdoctoral fellows, staff, and Ph.D. students agreed that their department is a place where they can perform up to their full potential. Close to sixty percent of faculty agreed with this statement as well. Responses were more varied across survey groups about needing to work harder than their colleagues to be valued equally in their department, with around one-third of staff and faculty agreeing, followed by Ph.D. students, and postdoctoral fellows (10%).

### **Self-Determination, Boundary Management, & Learning**

Most staff and faculty agreed that they experience growth and learning on the job and perceived high levels of autonomy in their jobs. Over half of staff agreed that they respond to work related



communications during personal time away from work. Similarly, most faculty agreed that they bring work home and over two-thirds reported working during their vacations. Both faculty and staff have highly permeable work-life boundaries.

### **COVID-19 Pandemic**

All of the EEB respondents consistently rated the COVID-19 pandemic as having a negative impact on most aspects of scholarship, administrative duties, teaching and mentoring, as well as personal or psychosocial areas. All groups indicated that the department provided support throughout the COVID-19 pandemic, although the level of agreement ranged from three-quarters of post-docs, around two-thirds of faculty and staff, to just over half of Ph.D. students.

Within the EEB community, the main personal challenges due to the COVID-19 pandemic were the lack of personal interactions and anxiety across all surveyed groups. Both staff and faculty commented on changing childcare responsibilities as well as an increase in family demands. Staff also described the flexibility around remote work as something that helped mitigate COVID-19 challenges. Staff, faculty, and Ph.D. students additionally commented about the lack of social relationships, connections, and isolation during COVID-19. Finally, both faculty and Ph.D. students described challenging work delays and frustration with the cancellations or delays related to their research and travel.

## Appendix 7: EEB Code of Conduct

This Code of Conduct is shared within the department and posted at EEB field stations and field sites.

### **Expected Behavior**

- All visitors, staff, students, and faculty are to be treated with respect and consideration, valuing a diversity of views and opinions.
- Always be considerate, respectful, and collaborative.
- Alert UM personnel and/or call 911 if you notice a dangerous situation or someone in distress.

### **Unacceptable or Criminal Behavior is:**

- Physical or verbal abuse of any students, staff, faculty, or departmental or field station guests
- Assault, rape or other sexual violence; threatening or stalking anyone
- Harassment, intimidation or discrimination in any form
- Actions that create a hostile work environment and/or interfere, limit, or deprive an individual from participating in or benefitting fully from the education or research program and related activities, including:
  - Verbal comments or inquiries related to gender, sexual orientation, disability, physical appearance, body size, race, religion, economic status, or national origin, including
    - jokes based on any of these characteristics, and
    - use of slurs or lewd comments in conversation, even when not directed at a particular person.
- Verbal and nonverbal requests for sexual favors
- Repeated display of unwanted affection or attention towards another person (includes verbal, written and/or physical displays)
- Persistent, unwelcome requests for dates
- Unwelcome physical contact
  - Includes staring, touching, or invading an individual's personal space
- Blocking an individual's movement with your body or an object
- Inappropriate use of nudity and/or sexual images in the work environment or sharing such materials with co-workers and related activities
- Implicitly or explicitly making actions of a sexual nature a term or condition of a person's employment, academic standing, or participation in research programs and related activities

#### *Verbal/Written Behavior Examples:*

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>● Direct conversation</li> <li>● Indirect conversation</li> <li>● Texts, emails, instant messages</li> </ul> | <ul style="list-style-type: none"> <li>● Handwritten letters and notes</li> <li>● Comments made on social media or other online platforms</li> </ul> |
|---|--|

#### *Physical Behavior Examples:*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>● Inappropriate staring</li> <li>● Touching someone with your body or an object</li> </ul> | <ul style="list-style-type: none"> <li>● Stalking</li> <li>● Invading personal space</li> </ul> |
|---|---|

**Remember:** Harassment can occur between persons of the **same or different** genders, age groups, and positions/titles. Unacceptable behaviors are unacceptable **at all times** -- not just when classes, fieldwork, and other professional activities are in session.

**Practice self-awareness** in all interactions and stay committed to maintaining a positive learning and work environment for all persons in the department and at any field station.

The confidential resources provided below are places where you can get advice and support.

### ***EEB Contacts for Confidential Advice***

- Nathan Sadowsky Graduate Program Coordinator, (734) 615-7338, nsad@umich.edu
- Justin Hopper, Graduate Program Assistant, (734) 615-4917, jwhopper@umich.edu
- Jo Kurdziel, Collegiate Lecturer, (734) 763 3684, josephak@umich.edu

### ***UM Contacts for Confidential Advice***

- SAPAC – Sexual Assault Prevention and Awareness Center (for faculty, staff and students) (734) 936-3333 [www.umich.edu/~sapac/](http://www.umich.edu/~sapac/)
- FASAP – Faculty and Staff Assistance Program (for faculty and staff) (734) 936-8660 [www.umich.edu/~fasap/](http://www.umich.edu/~fasap/)
- CAPS – Counseling and Psychological Services (for students) (734) 764-8312 [www.umich.edu/~caps/](http://www.umich.edu/~caps/)
- Office of the Ombuds (for students) (734) 763-3545 [www.umich.edu/~ombuds/](http://www.umich.edu/~ombuds/)
- University Faculty Ombuds (for faculty) (734) 763-2707 [www.umich.edu/~facombud/](http://www.umich.edu/~facombud/)

### ***Important Links to University of Michigan Policies and Resources***

- UM Standard Practice Guide Policy on Sexual Harassment <https://spgdev.web.itd.umich.edu/policy/201.89-0>
- U-M Sexual Harassment and Gender Based Misconduct Resources <https://sexualmisconduct.umich.edu/>

### ***Individuals with Reporting Obligations (IRO)***

University administrators, supervisors and employees in certain designated positions (including resident advisers and human resources staff) are considered Individuals with Reporting Obligations (IROs) and are required to share information they have received about possible sexual or gender-based misconduct with the Title IX Coordinator in the Equity, Civil Rights and Title IX Office. Additional information about this and other reporting options can be found here: <https://ecrt.umich.edu/file-a-report/>

### ***Criminal Behavior***

In the case of sexual assault/violence or stalking, please report directly to the Ann Arbor Police Department:

Ann Arbor Police Department  
Ann Arbor Justice Center  
301 E. Huron St., Ann Arbor, MI 48104  
**Call 911 in an emergency situation**  
(734) 794-6920



## Appendix 8: Summary of recent departmental activities advancing JEDI

Section 8.2.4 briefly describes recent JEDI activities in EEB. Here, we provide a bit more information about some key activities from the last 7 years.

- A “[You Are Welcome Here](#)” campaign in 2015 to communicate an open and welcoming departmental climate for LGBTQ+ individuals. This campaign was reported to have positive impacts in our recent Climate Report, and we have received positive responses through the years from prospective students who noticed and felt welcomed by the campaign.
- In 2017-2018, the aforementioned [Land Acknowledgement statement](#) was approved by the department and (after initial resistance) by the college and university DEI officers. It was implemented in 2019. The EEB department website was reorganized to make the statement, and related departmental actions, more visible.
- Also in 2017, in response to harmful experiences and negative opinions about the departmental climate, especially for minoritized identities in the community, the Diversity Committee supported the development of a reporting system whereby unacceptable behaviors could be anonymously reported in an [EEB Climate Reporting Dropbox](#). The system includes options for a preferred response. When consent is given for sharing the report, we have discussed incidents submitted to the Drop Box and actions have been taken in response.
- An [EEB Code of Conduct](#) was drafted in 2017, later edited and approved by the department and updated in 2021. This code of conduct applies to the department and all of its field stations and field sites. The document outlines expected behaviors, unacceptable and criminal behaviors, and departmental and university-level resources for support and reporting.
- A [DEI Library](#) was set up in EEB in 2018, providing a permanent location to house books on a variety of topics at the intersection of race, class, and science, to better support students and increase opportunities for members of EEB to learn about DEI-related issues.
- In 2019, following a seminar visit by someone charged with sexual misconduct by multiple people, we developed a [seminar speaker policy](#) that gives the EEB community an opportunity to raise concerns about suggested seminar speakers before invitations are sent. This effort included conducting a graduate student survey on sexual harassment, a department-wide ‘Cookies and Conversation’ on the topic that helped shape the policy draft and led to buy in by a broad coalition of faculty, staff, and students. Together with the Executive Committee, the final policy was drafted and approved by EEB faculty, and included a reporting mechanism and evaluation committee composed of Diversity Committee and Executive Committee members to preempt invitation of speakers involved in sexual misconduct.
- A shared, anonymous google sheet seeking ideas from all faculty, staff, and students on how to promote diversity, equity and inclusion in the department (forming the EEB anti-racism work plan) was started in 2019. One of the first action items achieved was an annual [EEB JEDI Award](#) program to compensate and reward JEDI-related activities in the department. The award was initially sponsored by discretionary funds from the EEB department chair, and future funding has been secured through a Rackham Faculty Diversity Allies grant.
- In 2020, the EEB department chair established a new [weekly departmental newsletter](#) that includes a JEDI section and provides a way to regularly distribute information and JEDI-related resources to the entire EEB community. The diversity committee, department chair, graduate coordinator, and other members of the community have suggested information to include in this section.
- In Fall 2021, the department chair used this weekly newsletter as a forum to focus on inclusion by providing links to short videos from a LinkedIn Learning course called “[Confronting Bias: Thriving Across Our Differences](#)” each week. An anonymous survey was also circulated weekly asking about experiences that have made people feel more or less included in their current or prior workplaces. A summary of responses was then shared with the whole department.

## Appendix 9: Office and Lab Space Assignments and Priorities for EEB in the Biological Sciences Building

EEB allocates office and research space to faculty, researchers, and students according to the following guidelines and principles.

### **Office space priority of assignments:**

1. Tenure track faculty members with a primary appointment (i.e., tenure home) in EEB
2. Research track faculty members (Research Scientists and Research Faculty) with primary appointments in EEB and with an independent, active, funded research program.
3. Non-tenure-track assistant professors and U-M Collegiate Fellows or U-M Presidential Postdoctoral Fellows either with or without formal teaching responsibilities.
4. Shared office space for emeritus professors, visiting scholars, and senior laboratory personnel without their own grant funding.
5. Graduate students, research assistants, and other postdoctoral researchers.
6. Lecturers for EEB, all currently housed in the Undergraduate Science Building.

Office assignments for the first four categories above are determined by the EEB Chair, in consultation with the Chief Administrator, Associate Chair for Research Space and Facilities, and with the input of directors for other units in BSB (e.g., MCDB, UMMP) when needed. Office space for the fifth category is determined by the neighborhood representatives, in consultation with the Associate Chair if necessary. Lecturer offices (sixth category) are determined by the EEB Chair and Chief Administrator in conjunction with the director of the Program in Biology. Requests for office assignments that fall outside of the priorities described here are decided on a case-by-case basis by the EEB Chair in consultation with the Chief Administrator and Associate Chairs. The Associate Chair for Research Space and Facilities, EEB Chair, and EEB Chief Administrator work together with their counterparts in MCDB and UMMP to minimize unused office space in BSB.

**Research space assignments:** The overarching principle is that achieving the multiple benefits of shared laboratory space and equipment requires a climate of communal good-will and a consensus that there is no acquisition of space just to have space. The final responsibility and decision for all research space allocations resides with the Department Chair, who will consult with the College and the EEB Associate Chairs, Chief Administrator, and Executive Committee as needed.

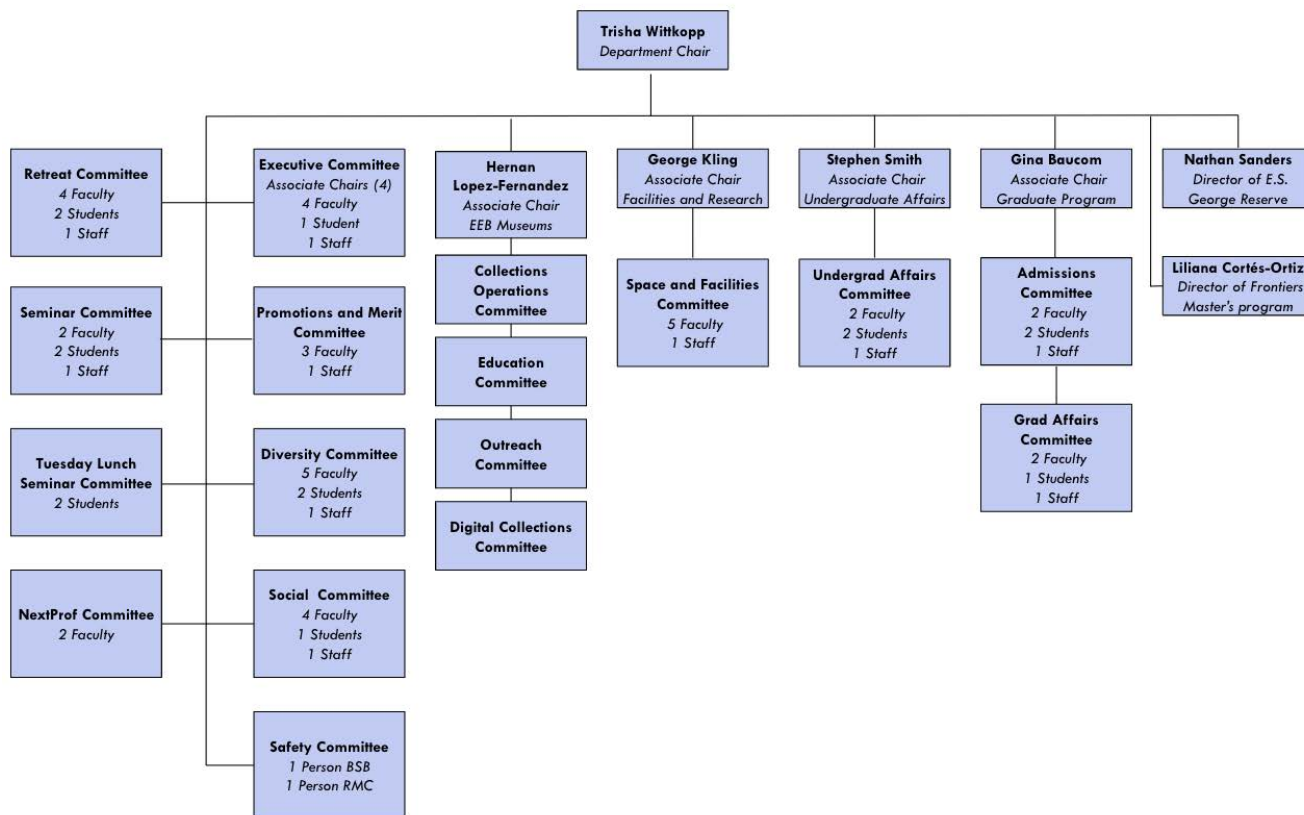
- A. Allocation of space is based on real needs, rather than history, seniority, amount of grant funds, or a strict multiple of people in a lab group. No one owns any space. The definition of “needs” varies considerably among research areas in EEB but may be related to number of people in the research group, space required for equipment, specialized facilities required, and may also vary considerably within a year for some researchers. Many faculty members’ research may span different types of neighborhoods (e.g., computational and wet lab, field biology and biogeochemistry, field biology and biodiversity wet lab) and thus space may be allocated across neighborhoods as appropriate.
- B. Strong efforts should be made to keep some laboratory space available as surge space, both for short-term needs by researchers and visitors, as well as to minimize disruptions associated with shifts in space allocation.
- C. Each neighborhood has a faculty representative, who is responsible for helping to resolve conflicts that may arise over space usage and for communicating with the department on emergent issues. This position is expected to rotate among faculty in the neighborhood, but decisions about how to allocate or shift this position lie within the neighborhood, although must be approved by the Associate Chair for Research Space and Facilities and/or Department Chair. If the neighborhood representative is unable to find a solution to a space or facility issue agreeable to all parties, it will be up to the Department Associate Chair for Research Space and Facilities and the Department Chair, in consultation with the Department Executive Committee and Chief Administrator, to resolve the situation.

- D. Ideally, each neighborhood will have a staff person who is responsible for the day-to-day management of space, compliance with safety policies, and shared equipment usage in the entire neighborhood.
- E. We believe that the most productive way to encourage a culture of communal good will around shared laboratory space and facilities is to ask residents of each local neighborhood to work out space allocation and equipment usage (including sharing costs of purchase, maintenance and repair) themselves rather than to have a set of highly specific rules at the department level. The approaches used may differ among EEB neighborhoods given that the groupings have quite different space usage patterns, work routines, and equipment usage.
- F. Faculty office space should be assigned as near as possible to the laboratory space (ideally on the same floor within the same tower; if not, at least on the same floor).
- G. In light of ever-evolving lab membership and research approaches, it is necessary to maintain continuity in lab knowledge, best lab practices for safety (e.g., EHS representatives), and consistent protocols about assignment and usage of space and facilities (e.g., referencing this document).
- H. Space assignments should be reviewed for equity every 3-5 years.



## Appendix 10: Faculty leadership roles and departmental committees

### DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY FACULTY LEADERSHIP TEAM AND DEPARTMENT COMMITTEES AY 2022



- **Department Chair:** presiding officer of EEB and its representative to LSA and other units within the University of Michigan. Responsible for academic and non-academic operations of EEB.
- **Associate Chair for Collections:** similar to a Museum Director but without the financial autonomy or direct reporting line to the college.
- **Associate Chair for Graduate Studies:** leads graduate admissions, graduate student orientation, and graduate affairs committee, which is responsible for graduate student programming, awards, and preliminary exams. Helps students and faculty navigate conflicts involving graduate students.
- **Frontiers Director:** leads the Frontiers Master's program, including admissions, summer course, and advising. Helps students identify appropriate mentors and supports them in many other ways.
- **Associate Chair for Undergraduate Studies:** develops plans for course assignments, leads undergraduate affairs committee, addresses concerns of undergraduate students, handles emerging issues and strategic planning for our undergraduate majors.
- **Associate Chair for Research Space and Facilities:** coordinates space usage within EEB and with MCDB and Paleontology, assists with new faculty startups, addresses emergent issues with research space (including office space) and facilities.
- **Director of the E.S. George Reserve:** oversees all operations at the ESGR, including managing staff, maintaining and improving facilities, working with potential donors, and developing new uses for the space that support our research, education, and outreach missions.

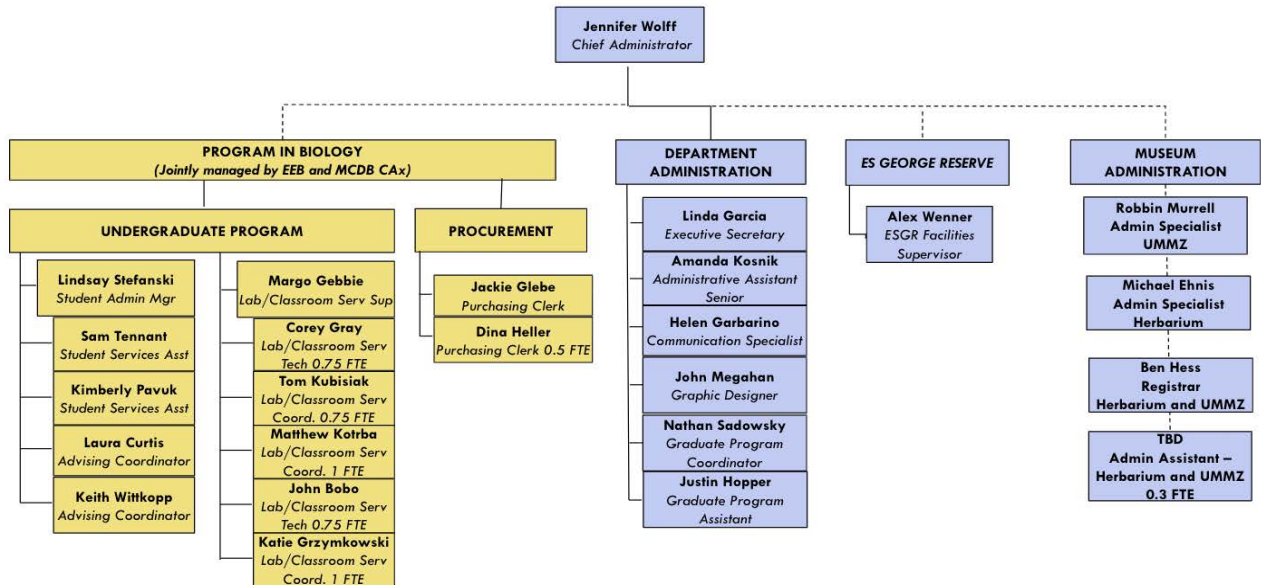
## Appendix 11: Staff roles and responsibilities

### DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY

#### ADMINISTRATIVE STAFF

AY 2022

- Ecology and Evolutionary Biology
- Program in Biology (Jointly managed with MCDB CA)



#### EEB Administrative Staff

- Chief Administrator - A leadership role responsible for supervising all department administrative staff, overseeing the unit's finances, and supporting the policies and mission of the unit under the guidance of the Department Chair.
- Executive Secretary - Supports faculty affairs (reviews, promotions, etc.), the department's secretarial needs (Faculty Meeting minutes, department calendar, etc.), and assists the Chair with day-to-day needs.
- Administrative Assistant - Coordinates department seminars and associated travel and hosting needs and manages the BSB Administrative Suite Front Desk and supply needs within the building.
- Communications Specialist - Manages all EEB news, websites, social media, newsletters, and donor and alumni engagement.
- Graduate Student Administrator (2) - Administrator for all matters pertaining to the PhD and master's programs including recruitment, student retention, policies, and finances.

EEB Museum Administrative Staff are jointly managed by the Associate Chair for Museums and the Chief Administrator and are located at the RMC.

- Administrative Specialist (2) - Both the Herbarium and Museum of Zoology each have someone in this role who is responsible for managing the finances and day to day operations of the museums.
- Registrar - Responsible for all compliance needs for specimen transactions and is the formal RMC Environmental Health and Safety officer for the museums.
- Communications and Media (2) - Contributes to writing and organizes museum newsletter, social media and websites, and edits museum publications as well as creates scientific illustrations for department and faculty use.

Program in Biology Staff are jointly managed by the EEB and MCDB Chief Administrators

- Program Manager - Supervises the four academic program staff and works under the direction of the Program in Biology Director to execute the strategic direction of the program.
- Student Services Assistant (2) - Handles the transactional needs of the program including GSI documentation, transfer and independent study credits, etc.
- Advising Coordinator (2) - Directly advises undergraduate students and manages a set of student Peer Advisors.
- Lab/Classroom Services Supervisor - Oversees the operations of classroom laboratories and the equipment and supply needs.
- Lab/Classroom Coordinator (3), Technician (2) - Works directly with faculty on lab setup for daily instruction.
- Procurement Clerk (1.5) - Handles all transactional purchasing needs for EEB and MCDB faculty, students and staff.