III. BROADER IMPACTS (Example 1)

Funding of this project will enable [X NUMBER] laboratories to coordinate our extensive outreach efforts. We will focus our outreach efforts at three different levels, (i) high school students, especially underrepresented minority students, (ii) undergraduate students, and (iii) graduate students and postdocs.

(i) High school summer internship program for underrepresented students. In a recent nationwide student data collection, the U.S. Department of Education found that high schools with high underrepresented student enrollment (75% or above) offered science courses at a lower rate than the overall population of high schools. In an effort to provide real research experience, resulting in an increased enrollment in [REDACTED FIELD] and other STEM fields by underrepresented students, PIs [REDACTED] will establish a paid summer internship (from 5 to 8 weeks) for high school students. During their time in the lab, students will not only gain **real research experience**, but will also receive guidance in college applications and funding opportunities. At the end of the summer, all students will participate in a multi-institutional **in-person/virtual symposium** where each student will have the opportunity to present a lightning talk and explain their role in the project. This symposium will be tied to the project annual meeting to facilitate networking among students and the project PIs. All participating students will also complete a pre- and post-experiment survey using the 14 Likert-style questions from the peer-reviewed, validated, and published "science identity" section of the Children's Motivation Towards Science survey. Importantly, participating labs have extensive experience in mentoring high school students. Notably, funds from PI [REDACTED] CAREER award helped provide similar paid summer internships (2/year) for local [REDACTED] students from failing inner-city high schools to work in the [REDACTED] Laboratory (20[XX] through 20[XX]); each of these students is currently attending or has graduated from a 4-year university, and [X NUMBER] are currently enrolled in doctoral (MD or PhD) programs.

(ii) Undergraduate students. One of the most effective ways to attract and retain students in STEM is to provide real research experiences. Our research experiences for undergraduates (REU) program provides a perfect platform to recruit diverse and talented students, and increases the numbers of women, underrepresented minorities, and persons with disabilities in research. The [REDACTED] Center ([REDACTED] home institution) has a long-established and successful REU program; students participate in an intensive, well-managed summer program (supported by NSF [REDACTED]), exposing them to advanced research in [REDACTED] science. Since 20[XX], >[XXX] students, many of whom are from rural communities, have participated in the program, with a [XX]% minority and/or disability representation. Since funds added by individual NSF awards allow greater participation, here we request funds to cover two undergraduate students a year, in years 2–4, to participate in the established [REDACTED] Center REU program, hosted by the [REDACTED] Lab. Each member of the PI team will select one undergraduate from their home institution to participate, for a total of [X] students over the course of the grant.

(iii) Graduate students and postdocs. One of the biggest strengths of this collaborative project is the multidisciplinary component, including groups working in [REDACTED], insects, [REDACTED], and data analysis, as well as teams working in different types of [REDACTED]. This project will fund [X NUMBER] graduate students and [X NUMBER] postdocs. Here we propose to create an exchange network, where all the involved scientists will be able to visit the other institutions and learn about the different organisms and [REDACTED] types. This experience will provide the participants with a holistic view of the project, broaden the horizons of mentees by allowing them to discover other aspects of the non-coding [REDACTED] world and/or other model species, and allow them to experience a wide variety of ways of working and institutions. In a final note, the **PIs** involved will also establish a collaborative network that will allow them to (i) include each other's expertise in their teaching curriculum and (ii) share their individual research with each of the other's institutions. All PIs will present their findings at international conferences and meet in person for an annual project meeting. The project meeting will include PIs, students, and postdocs involved in the project and will be hosted by a different participating institution each year.

BROADER IMPACTS (Example 2)

This research, education and outreach program brings together a highly interdisciplinary perspective and set of resources designed for tackling complex ecological problems. Furthermore, **the proposed program places itself in a broader, transdisciplinary context of science education and sociology through direct collaboration with academics who are leaders in those fields, fostering meaningful transdisciplinary synthesis**. It will create new analytical tools that can be applied to complex systems and data science problems in other fields, train undergraduate and graduate students and post-doctoral scholars, and reach out to younger learners and the public. The research components will utilize public datasets, and draw connections between short- and long-term studies, demonstrating pathways to broader use of archival data, increasing the impact of public investments in research. The proposed work will particularly respond to these targeted areas:

Enhanced infrastructure for research and education. Although community acceptance for incorporating open scientific approaches into research is increasing in recent years, in many cases this incorporation remains perfunctory or superficial. My goal, with the proposed work, is to provide a framework for downstream use of the tools and curriculum I build, so that my research and teaching can meaningfully be used as a starting point for other scientists and educators. My commitment to 'radical openness' of data, intermediate data products, analysis code and curriculum not only will ensure reproducibility of the present work, but will provide future scientists with both clear entry points, and a model for building their own open work with this communal resource.

Broaden dissemination to enhance scientific and technological understanding. I am a vocal proponent of open science approaches with specific interests in diversifying accessibility [REDACTED SOURCES]. Through this work, I will demonstrate the use of open analytical workflows (i.e. reproducible coding, open data, open note-booking) to mainstream academic biologists, but also perform specific outreach on diversifying access within open science itself (i.e. developing materials that are both 'open access' and compatible with regulations surrounding digital products as outlined in the Americans with Disabilities Act, for example, including captions/transcripts and ensuring materials produced are screen-reader compatible; [REDACTED SOURCES]). These approaches allow biologists to more effectively connect with data scientists, engineers, and sociologists, fostering future cross-disciplinary collaborations. The podcast will allow findings, and broader scientific perspectives, to be disseminated to a wide public audience.

Undergraduate and graduate education. In addition to 2 graduate students, this project will train 1-2 undergraduate students in years 2-5 of the project. The curriculum developed will be made available so that in addition to directly reaching graduate students enrolled in the new course (likely ~10 per year), material from the class as well as the podcast can be used in classrooms from the high school through graduate level, reaching many more students.

*Broaden participation of under-represented groups***.** The podcast and curriculum materials will help reach students and interested people across a broad audience. Furthermore, the podcast will preferentially recruit interviewees from marginalized and historically excluded groups, helping to provide a pool of visible role models to listeners while providing a platform for sharing and promoting their work to interviewees, an important facet to improving retention of marginalized people in the sciences [REDACTED SOURCES]. I have a strong history of recruiting students from historically excluded groups, from diverse economic backgrounds, and from the LGBTQ+ community (through outreach, teaching, recruitment through the [REDACTED] program, and more locally through [REDACTED]'s Summer Undergraduate Research Experience program) and will continue to seek out and actively encourage applicants from the widest possible pool of backgrounds, and will continue to incorporate a transparent, supportive lab culture to foster retention of students once they enroll.