



Centering Inclusivity in Invertebrate Fieldwork: An Argument for Modernizing Malacological Practices

Authors: Osborne, Teresa Rose, Abeyrathna, W. A. Nimanthi Upeshka, Shea, Elizabeth K., Martin, Kelly R., Li, Jingchun, et al.

Source: American Malacological Bulletin, 41(1) : 1-15

Published By: American Malacological Society

URL: <https://doi.org/10.4003/006.041.0109>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

SYMPOSIUM PAPER

Centering inclusivity in invertebrate fieldwork: An argument for modernizing malacological practices

Teresa Rose Osborne^{1,2}, W. A. Nimanthi Uppeksha Abeyrathna³, Elizabeth K. Shea⁴, Kelly R. Martin⁵, Jingchun Li^{5,6}, Kevin M. Kocot^{7,8}, and Elizabeth C. Davis-Berg⁹

¹Department of Biology, Villanova University, 800 Lancaster Ave, Villanova, Pennsylvania 19085, U.S.A.

²[current affiliation] Division of Fish and Wildlife, Department of Land and Natural Resources, P.O. Box 1397, Rota, Commonwealth of the Northern Mariana Islands 96951, U.S.A.

³Department of Biology, Clarkson University, 8 Clarkson Ave, Potsdam, New York 13676, U.S.A.

⁴Delaware Museum of Nature and Science, 4840 Kennett Pike, Wilmington, Delaware 19807, U.S.A.

⁵Museum of Natural History, University of Colorado Boulder, UCB 265, Boulder, Colorado 80309, U.S.A.

⁶Department of Ecology and Evolutionary Biology, University of Colorado Boulder, 1900 Pleasant St, Boulder, Colorado 80302, U.S.A.

⁷Department of Biological Sciences, University of Alabama, 500 Hackberry Lane, Tuscaloosa, Alabama 35487, U.S.A.

⁸Alabama Museum of Natural History, University of Alabama, 500 Hackberry Lane, Tuscaloosa, Alabama 35487, U.S.A.

⁹Department of Science and Mathematics, Columbia College Chicago, 600 S. Michigan Ave, Chicago, Illinois 60605, U.S.A.

Correspondence: (Teresa Rose Osborne), osborne.cnmi.dfw@gmail.com

Abstract: Fieldwork is an essential aspect of much research within malacology. However, not all fieldwork is inclusive to researchers with a diversity of needs and experiences. In this paper, we propose ways that malacological fieldwork can become more just, equitable, and inclusive for all scientists. We draw upon personal experiences, discussions at the Inclusive Fieldwork Panel at the American Malacological Society Annual Meeting in 2023, and insights from the literature. Rather than relying on “common sense” to guide field practices and avoid environmental hazards, we encourage senior malacologists to approach fieldwork as a teaching and learning experience for emerging young researchers. Conducting an inclusive field excursion requires substantial planning before fieldwork begins, including building comradery within a diverse field team, identifying and mitigating risk factors unique to each field season, and drafting day-to-day schedules that accommodate field team members’ individual and personal needs. Before entering the field, team members should be familiar with logistical requirements of fieldwork, emergency protocols, and procedures for responding to discriminatory actions that may occur in a field setting. Clear communication within the field team is critical for establishing interpersonal interaction norms and addressing mental health needs. Effective communication with members of the local community can be a tool for establishing human resource networks and de-escalating potential conflicts. Reflection on past field seasons is a key method for improving inclusivity, safety, and effectiveness for future fieldwork. Inclusive fieldwork practices not only advance researcher diversity within malacology but also increase the effectiveness of our field research by minimizing risks that distract from the science at hand. We hope that this paper encourages field malacologists to incorporate inclusive practices and provides resources for those seeking to expand their approach to fieldwork.

Key words: diversity, equity, field research, methods, safety

Fieldwork is an essential component of scientific training and development in biological, ecological, and paleontological molluscan research and a critical opportunity to welcome new malacologists into research practices and community (Hughes 2016, Fleischner *et al.* 2017, Peacock *et al.* 2018, Ramírez-Castañeda *et al.* 2022). Preparing for a field experience is complex. In addition to meeting scientific goals, researchers must also ensure that fieldwork is conducted ethically and is safe and inclusive for all participants. Once research moves off campus and out of the lab, the connection to formal workplace rules and guidance cannot be forgotten. Environmental knowledge and hazards are place-specific, and

what constitutes risk varies greatly according to the location of the field site, the size of the field team, and the background of the individual participants (Demery and Pipkin 2021, Amon *et al.* 2022, Lawrence and Dowey 2022, Lunden and Bombaci 2022, Ramirez-Castañeda *et al.* 2022, Zebracki and Greatrick 2022).

Currently, we are experiencing a cultural shift towards recognizing the historical marginalization of certain groups within the scientific and larger public communities. For example, funding bodies like the United States’ National Science Foundation and the Department of Energy require safety, inclusion, and equity planning in many grant proposals.

Unfortunately, malacological research is not immune from the legacies of sexism, racism, colonialism, or barriers to inclusion (Hughes 2018, Feig *et al.* 2019, Beltran *et al.* 2020, Monarrez *et al.* 2022, Vendetti 2022, Alexis-Martin 2023). The hurdles that exist for first-generation college students and other marginalized groups are slowly being acknowledged (Hughes 2018, Mao and Li 2018, Roksa *et al.* 2018), but negative experiences persist and can deter groups such as LGBT+, disabled, and other historically marginalized researchers from seeking out field experiences (McAnneny 2004, Alexis-Martin 2023, Primack *et al.* 2023).

In this paper, we encourage field biologists to adopt inclusivity as an essential context for fieldwork planning and execution, focusing on malacological field practices. This paper was inspired by the Inclusive Fieldwork Panel discussion at the 89th Annual Meeting of the American Malacological Society (AMS) in August 2023 (Fig. 1) and draws from that discussion, insights from the literature, and the authors' personal experiences (Table 1). We discuss and address how those who plan and participate in fieldwork (Table 2) can advocate for fieldwork practices that are grounded in justice, equity, diversity, and inclusion principles. We highlight specific challenges related to conducting safe, inclusive, and human-centered fieldwork (Fig. 2). In particular, we present suggestions intended to dismantle barriers to finding field-based resources and opportunities (justice), provide equal access to field-based opportunities (equity), transform the recognition and integration of individual differences into positive field experiences (diversity), and foster a sense of belonging in the field (inclusion). We see safety and financial accessibility as key facets of inclusivity, since real or perceived safety and financial concerns can dissuade malacologists from pursuing fieldwork.

THE MYTH OF “COMMON SENSE”

Seasoned malacologists can forget what they did not know during their first field experiences and assume that “common sense” can dictate appropriate conduct in the field. However, “common sense” is not common across all researchers; it is specific to gender, age, past experiences, and cultural background (O’Toole and Were 2008). “Common sense” in a field context is an example of the hidden curriculum for fieldwork-based research and experiential learning. In addition to data gathering, fieldwork is a teaching and learning experience. It is, therefore, crucial for principal investigators (PIs) to provide relevant guidance and for new team members to seek guidance to ensure they are well-prepared for the unique challenges of their particular projects (Cotton 2009).

Social norms are unwritten rules or expectations in a society or community, the “common sense” of human interactions. Failure to recognize and respect cultural differences and social norms can lead to misunderstandings, conflicts, and tensions. One of our authors recalled one of her first experiences doing fieldwork in a foreign country. This was far from her comfort zone, eliciting a huge cultural shock; she had to learn to drive on the “wrong” side of the road, use new field equipment without prior knowledge, conduct fieldwork alone most of the time, and navigate an unfamiliar reimbursement system. Specifically for international students, Dalby *et al.* (1996) give ten suggestions for adjusting to a new culture: avoid isolation, build friendships with locals, reflect on one’s feelings, seek to understand the local culture, maintain connections with one’s roots, keep in touch with people back home, ask questions, stay true to one’s values, be open to new experiences, and find the positives (Sarkodie-Mensah 1998). That said, it is not solely the responsibility of international



Figure 1. Inclusive Fieldwork Panel at the 2023 American Malacological Society annual meeting. Panelists from left to right: Beth Davis-Berg, Nimanthi Abeyrathna, and Kelly Martin. Moderator on the far right: Rose Osborne.

Table 1. Authors' relevant background, as it informs our perspectives on fieldwork.

Author	Relevant Background
Rose Osborne	T. R. O. was a postdoctoral scholar during manuscript preparation. As a PhD student and postdoc, she conducted international fieldwork in multiple tropical regions while based out of North American universities. During these experiences, she has been a field team member, served as an on-site team lead, and conducted solo fieldwork. As an undergraduate student, she participated in multiple field teams in temperate zones and engaged in a tropical study abroad program that included field excursions.
Nimanthi Abeyrathna	W. A. N. U. A. recently defended her PhD. She has conducted fieldwork in North America as well as in her motherland, Sri Lanka. During these fieldwork sessions, she has conducted solo fieldwork during graduate studies and as a part of large and small groups in undergraduate studies.
Liz Shea	E. K. S. is the Director of Collections and Curator of Mollusks at a natural history museum. Her fieldwork takes place mostly at sea, on board large research vessels, as a participant in a large group.
Kelly Martin	K. R. M. is a collections manager of invertebrate zoology. She conducts fieldwork both in terrestrial and freshwater environments in Western North America as well as in Ecuador.
Jingchun Li	J. L. is an Associate Professor who conducts fieldwork in marine ecosystems, ranging from estuaries to rocky intertidal zones and to subtidal reef habitats. She is a National Geographic Explorer and has led big and small group expeditions in tropical regions, as well as in Alaska.
Kevin Kocot	K. M. K. is an Associate Professor in the Department of Biological Sciences at the University of Alabama and the Curator of Invertebrate Zoology at the Alabama Museum of Natural History. He regularly conducts fieldwork at marine stations and on oceanographic vessels with students and collaborators from other institutions.
Beth Davis-Berg	E. C. D.-B. is a Professor of Biology and the Chair of the Science and Mathematics Department. She conducts fieldwork mostly at field stations in both terrestrial and aquatic environments in the Midwest and regularly supervises undergraduates in the field.

Table 2. The terminology used here to describe those who plan and participate in fieldwork.

Term	Possible Educational or Career Stage	Role in Fieldwork
Principal investigator or PI	Lab head, program manager	The research team leader, generally responsible for fieldwork planning and obtaining funding, does not always accompany their team in the field
Field team	Students, trainees, field technicians, early career researchers, faculty, collaborators	All those in the field, collectively
Team lead	Graduate student, postdoctoral researcher, senior field technician, faculty	In charge in the field, usually the person on the field team with the most experience in the field site or greatest seniority, may or may be the PI
Team member	Student, trainee, field technician, early career researcher, faculty, collaborator	Anyone in the field and associated with the field team

malacologists to adjust to their new cultural environments; field teams should be welcoming workplaces for all.

Emerging adulthood in a field context

Many malacologists participate in fieldwork for the first time during emerging adulthood (Tanner *et al.* 2016), a time of great social change that may influence personality development (Roberts *et al.* 2003). Research and educational experiences during emerging adulthood can influence diversity among upcoming generations of malacologists. For example, undergraduate research involvement and mentoring

experiences are critical to young women's development of a scientific identity and in encouraging their pursuit of STEM graduate education (Hernandez *et al.* 2023). Trainees on a field team may be unfamiliar with social norms of fieldwork or professional interactions, and guidance from senior colleagues can usher them into the research community. Senior malacologists have occasion to facilitate professional introductions for early career colleagues and model effective maintenance of professional relationships. Effective mentorship can also help build trainees' resilience in the face of fieldwork challenges (e.g., Dowtin and Levia 2018). Langen *et al.* (2022)

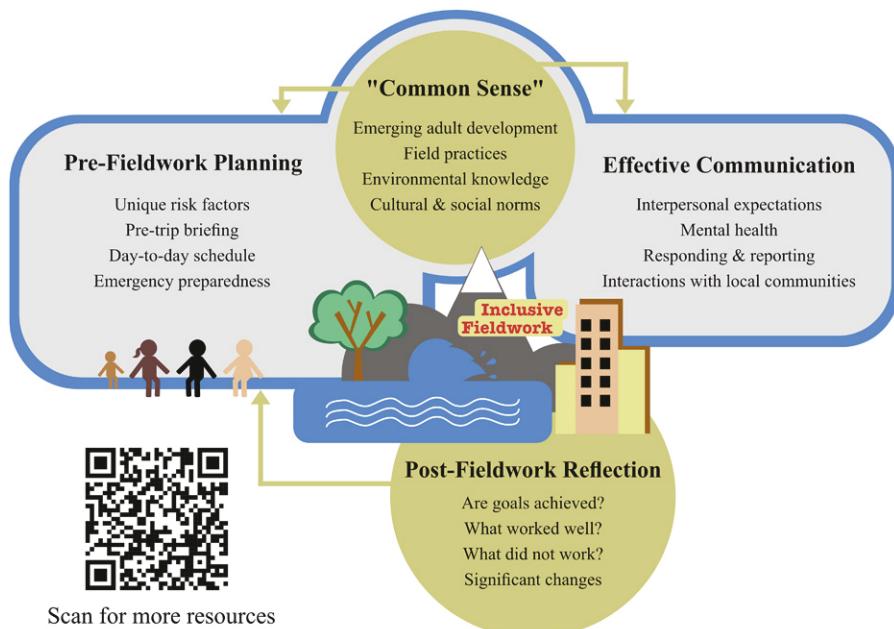


Figure 2. A conceptual framework describing key components for inclusive fieldwork planning and best practices. QR code links to “Inclusive Fieldwork Resources from the American Malacological Society” (American Malacological Society 2024).

offer advice for those looking to build a career as a field technician and supervisors of field technicians.

Below, we point out some areas in which the “common sense” fallacy often rears its head, which can be particularly impactful for emerging adults engaged in fieldwork.

Field practices

“Common sense” practices can be roughly grouped into the 3 C’s of fieldwork: clothing (and equipment), comportment, and context. Adapting the 3 C’s to the specific needs of each project is essential for the well-being and success of malacologists working in diverse fields. This adaptability ensures that field researchers can perform their tasks effectively and safely, regardless of the environmental conditions they may encounter. Audience members at the AMS panel seemed particularly surprised that student researchers and field course participants might be inclined to wear jeans in inappropriate field conditions, might not be prepared for hiking, or might be unaccustomed to sharing space during overnight trips with roommates.

Environmental factors, climate variations, and the nature of the research can necessitate specific adjustments in clothing and equipment. Do not assume that team members know what to wear during their first field excursion, whether in the context of a field course or a research experience. The AMS panelists suggested providing a “show and tell” of experienced malacologists’ field clothes, packing lists with well-defined items, and a few examples of common clothing items that are

appropriate in a field setting, such as leggings or old clothes that may be damaged without causing distress. Likewise, PIs may want to supply “don’t pack” lists in some circumstances. For example, a first-time participant on an oceanographic research cruise might be surprised to learn that open-toed shoes are typically not permitted. Clothing and gear often change between field projects. For example, one of the AMS panelists wore waders for the first time during their third field-based research project. It is, therefore, best to provide field assistance and safety training on necessary equipment, regardless of previous experience.

Field clothing and other gear can be expensive, imposing an accessibility barrier for students and malacologists who lack funds to purchase them. In such instances, we recommend that PIs loan field clothing, purchase new field clothes with grant money, and support trainees in applying for small grants such as the American Malacological Society’s Carricker Student Research Award, Conchologists of America’s Grants to Malacology, the *Unitas Malacologica* Student Research Award, and institutional funding. It is inappropriate to assume that everyone can purchase the required gear. Whenever possible, PIs should provide essentials like clothing and equipment to all students and field technicians, regardless of team members’ financial status, because admitting that required field items are not affordable can be extremely humiliating.

Comportment expectations encompass physical demands, professional interactions, and interpersonal relationships.

PIs should be clear about physical requirements for field activities; as one AMS panelist pointed out, fieldwork does not necessarily mean hiking. For example, if swimming or SCUBA certification is required, that should be stated. Communicating expectations for interpersonal comportment is discussed elsewhere in this paper.

Field sites, affiliated institutions, and research methodologies all contribute to the fieldwork context. All members of a research team should be briefed on relevant institutional policies, field protocols, and site infrastructure before they enter the field. We recommend that more experienced members of a field team accompany new team members during early collecting expeditions so that newcomers can learn by example and ask for help. Junior researchers, such as undergraduates who have spent months or years in a research group, may be well positioned to train new graduate students and postdoctoral scholars. In such instances, the authority of the junior researchers should be clearly stated and protected by the PI to preclude potential conflicts if more senior field team members do not welcome being trained by an undergraduate, for example.

Environmental knowledge and hazards

For a malacologist starting a new project in an unfamiliar environment, there is no place-specific “common sense” accrued, and prior experience may not always directly translate. One of the authors spent months in a Pacific Island rainforest, laying on the ground in search of tiny snails, only to be informed a few years later during a Neotropical field season that “everyone knows” not to sit on the ground for fear of venomous arthropods. Clearly, environmental hazards change from one tropical rainforest to another! Hazards can also change from one season to another within the same site. Field teams must identify safety concerns relevant to their field site and ensure that all team members arrive prepared to face them. Here, we provide an overview of some physical, biotic (e.g., animal, plant), and anthropogenic hazards to consider.

Physical hazards include exertion and exhaustion, inclement weather, and water hazards. Long-distance hiking and other strenuous physical activity can produce exhaustion, which may be exacerbated by heat-related illnesses like dehydration, salt depletion, and heat stroke. Cold and wet weather can lead to hypothermia and other cold-related illnesses. High winds, lightning, and flash floods may be dangers of severe weather in some areas. Malacologists working on boats and in or near bodies of water should consider team members’ swimming abilities, flotation devices, slippery surfaces, waves and currents, and standard boat and dive safety. As suggested during the AMS panel, malacologists with poor swimming skills or who prefer not to wear waders may need to wait on shore

and record data while others collect data or hire someone to dive for them.

Biotic hazards include large predators, venomous and poisonous organisms, and zoonotic diseases. Biotic hazards vary widely from one ecosystem to the next, and team members may be unfamiliar with relevant hazards, precautions, or signs of trouble unless they have been specifically briefed. For example, certain precautions can reduce the risk of interacting with large predators, such as wearing bear bells and not swimming in crocodilian habitats. When working in areas with venomous snakes, high rubber boots add an extra layer of protection from snake bites. It can be safer to simply trip and fall than to grab the nearest branch in areas with stinging arthropods, spiky plants, and plants that secrete skin irritants. Subtle behaviors, like rolling logs toward one’s body rather than away, can also lower the chances of surprising a venomous animal, such as a rattlesnake (if working in the Americas), when looking for snails. Zoonotic diseases, their vectors, prevention measures, and signs of disease may be unknown to field team members. Insecticides are a common defense against zoonotic diseases, but invertebrate researchers may hesitate to use them for fear of impacting study organisms. Tucked-in clothing, Tyvek suits, tick tape, vigorous showers, and daily full-body tick checks (with a mirror!) can reduce the risk of tick-borne diseases, and team members who may encounter ticks should be familiar with tick removal, tick-borne disease symptoms, and when to seek medical treatment. Mosquito netting, antimalarial medications, and other prophylactics may be appropriate in areas with mosquito-borne illnesses.

As discussed in the AMS panel, some of the authors have encountered signs of anthropogenic hazards, such as spent bullet casings of hunting rifles in their fieldwork areas. No snails are worth the risk of being mistaken for a deer during hunting season! Team members should wear high-visibility clothing as standard protocol, whether or not fieldwork is conducted in a remote setting, and especially for field sites that overlap known hunting areas. Similarly, consider not collecting during turkey hunting season. Humans engaging in illegal activities, including some hunting practices and cannabis farming, can become hostile or violent, making recognizing a cannabis cultivation site before a confrontation occurs a critical safety skill. Field protocols should also address the potential for racist, sexist, queerphobic, and ableist harassment directed towards team members and for encounters with law enforcement, such as police stops (e.g., Dowtin and Levia 2018). Official gear with an institutional logo, such as university-branded orange vests, are an important tool for preventing and de-escalating some human hazards. Fostering positive interactions with local communities are discussed further below.

PRE-FIELDWORK PLANNING

Inclusive fieldwork starts in the planning phase (Ramirez-Castaneda *et al.* 2022). Fieldwork encompasses a wide variety of activities, ranging from a single malacologist collecting shells on a college campus (*i.e.*, a simple, familiar, local, and quick experience) to organizing a multi-institutional, international expedition to Antarctica on Federal ships (*i.e.*, complex, unfamiliar, far away, and extended event). These two extreme examples highlight the vastly different levels of risk that may be encountered by malacologists. These examples also highlight how a researcher's identity influences their safety in a given field context; being stopped by campus security or police can be extremely dangerous for researchers who are racially profiled or undocumented. Preparation is crucial for ensuring the safety and well-being of field teams, yet it is often more focused on research questions than on planning for environmental conditions or personnel interactions. Transparent and collaborative pre-fieldwork planning that includes all members of a field team can teach trainees how to prepare for fieldwork as they take on more leadership roles.

Building a diverse & inclusive field team

Diversity in a field team brings both expertise and unique talents. It is important to consider social dynamics when forming field teams. When selecting new members for a field team, we suggest that PIs invite current team members to give input or participate in candidate interviews. This can help new members integrate easily into existing team dynamics. Once a new member has joined the field team, we recommend conducting formal introductions prior to the field season. It can be unpleasant to meet one's new coworkers for the first time on a research vessel that will remain at sea for several months! PIs should assign clear mentorship roles to all continuing field team members in welcoming and onboarding new team members. Onboarding can include protocols for data collection, data archiving, kitchen duties, and other field practices. Explicit within-team mentorship communicates to team members that mentoring is part of their valued job responsibilities, builds mentoring experience for future employment and educational opportunities, and ensures that new and existing team members develop one-on-one relationships. Pre-field social events, such as a game night, can also improve group cohesion. Morales *et al.* (2020) provide guidance for identifying and encouraging cultural diversity within a research team.

Understanding each team's unique risk factors

Evaluating each team's particular risk factors and preparing for possible emergencies allows field teams to focus on research rather than "putting out fires." Field researchers are some of the most vulnerable scientists in terms of safety

(Demery and Pipkin 2021). Some vulnerabilities impact everyone equally (*e.g.*, weather, potential for injury, malfunctioning equipment), but other vulnerabilities primarily impact those who do not conform to the stereotypical malacologist. This may include people who fall along a spectrum of experience, gender, race, religious practice, culture, or disability. In these cases, the added vulnerability and risks come from simply being oneself and being present. For example, women in ecology experience sexual harassment at a higher frequency than their male counterparts do, report lower levels of psychological safety in their workplace, and, along with LGBT+ ecologists as a group, are more likely to be concerned for their physical safety (Primack *et al.* 2023). Disabled ecologists are more frequently at the receiving end of insulting remarks than their non-disabled colleagues (Primack *et al.* 2023). Rapidly changing and highly variable restrictions on healthcare access for those who are pregnant or may become pregnant dramatically change the risk calculation for fieldwork for some (Zipp 2022). One of the AMS panelists recounted receiving inappropriate and intrusive questions when conducting fieldwork while pregnant, and another panelist described how, as a person of color, concerns about strangers' unknown intentions added anxiety to her fieldwork.

Planning inclusive field experiences means considering how each team member views and experiences the field site and their place in it. PIs should, therefore, start with open lines of communication about who may be at risk and why, recognizing that the reasons a person is at risk may not be obvious and may change depending on context. A team member may be vulnerable because they are viewed as different from the local community where fieldwork is being conducted (Demery and Pipkin 2021) or simply because they are the most junior or senior malacologist on the team.

In addition to the overarching planning considerations described by Ramirez-Castrneda *et al.* (2022), we note six factors that may be useful to consider when assessing a particular field team's needs and risk factors:

1. **Remoteness:** The ability to escape or be rescued from adverse conditions. The time required for emergency services to reach a field site or the distance and difficulty the field team experiences in reaching their site are good proxies for remoteness. The closer someone is to their home territory where access to resources is well established, the fewer hurdles there are to a successful field experience. That said, close-to-home field sites can also carry unique risks, such as encounters with law enforcement or hostile community members (Dowtin and Levia 2018).
2. **Familiarity:** How much experience a team member has in a particular environment. A person collecting shells in their backyard will know what to expect and how to escape or mitigate adverse conditions (*e.g.*, the neighbors'

dog, the likelihood of rain), but the same cannot be said for a completely new environment—even someone else's yard! Familiarity and remoteness are distinct; familiarity can increase as a malacologist repeatedly visits a field site, whereas remoteness is a function of infrastructure related to the site.

3. **Team size:** The number of people involved in a field excursion. Team size has a non-linear impact on safety and inclusivity. A single biologist in the field is particularly vulnerable in case of emergency. A team of two or a few can also present serious problems, especially if there is a significant difference in perceived or real power between team members. Large teams can result in individuals becoming overlooked or lost.
4. **Duration:** The length of the excursion. Fieldwork is physically, emotionally, and academically stressful, and the longer it continues, the more opportunities there are for problems to develop or fester.
5. **Identity:** Whether or not someone is otherized based on perceived or real identity markers. Harassment, sexual violence, and hate crimes are more likely to be directed at researchers with specific identities.
6. **Experience:** How often a team member has been in the field doing these or similar activities.

Mitigating risk is important for inclusive fieldwork. The six factors listed above can be combined to assess the overall riskiness of a proposed field season (Fig. 3) and highlight areas where mitigation measures may be most important. For example, three to five malacologists with a good working relationship spending the day collecting shells near their college or university campus would face fewer risks than a five- to ten-person team with a mix of experience levels spending a week at a well-established field station ("low" and "medium" risk scenarios, respectively, in Fig. 3). Within this five- to ten-person team, some team members are at greater risk than others—or at risk in different ways. Undergraduates on their first overnight experience away from family or support networks may feel homesick or lost in the field station social context, whereas undergraduates, post-baccalaureate assistants, or first-year graduate students with some previous fieldwork experience but unfamiliar with this site and belonging to minoritized racial, gender, religious, or other identities may be more likely to experience harassment or disparaging remarks ("novice" and "beginner" scenarios, respectively, in Fig. 4). For malacologists who have previously visited the field station, career stage may be a good proxy for familiarity and comfort with the field setting, though career stage can also correspond to increasing familial responsibilities that add stressors to longer field seasons ("moderate" and "extensive" scenarios, respectively, Fig. 4).

Particularly large or small field teams can be prone to greater risks. Field courses are one such example. Depending on class size, field courses come with all the risks associated with

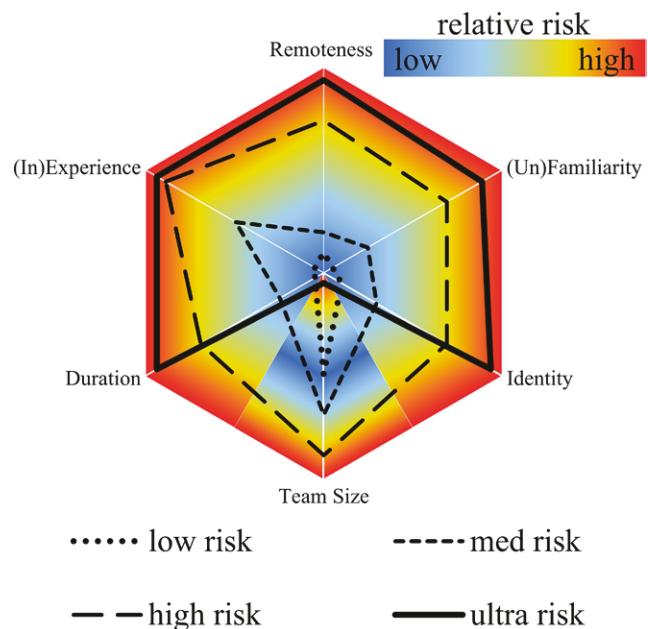


Figure 3. Assessment of field excursion risk level based on the remoteness of the field site, familiarity with the field site, researcher identity as it may relate to being otherized or make one a target for certain risks, team size, duration of field excursion, and team members' experience levels. See the main text for descriptions of factors represented by axes and four hypothetical field excursions represented in the figure. Axis values increase from 0 at the center of the graph to maximal at the outside edges. Except for team size, the risk increases as axis values increase; both very large and very small team sizes are risky. Note that team members' familiarity with the field site and experience levels are inversely correlated with risk. Our assessments of these axes are rough approximations and by no means universal; for example, some of the worst field situations can occur close to home, in familiar, nearby sites. "Med" = medium.

large field teams. In addition, although the instructor may be familiar with the field site, the students are not. The course may be students' first overnight field experience or the furthest they have been from emergency services, and students likely come from a variety of identity backgrounds ("high" risk scenario in Fig. 3). Long-term solo expeditions are especially vulnerable to physical, biotic, and human hazards because they lack a "buddy system" to assist in identifying environmental dangers, de-escalating conflicts, administering first aid, or coordinating with emergency services. Many of the AMS panelists knew of field researchers being hurt alone or in a small group and then navigating back to home base with an injury. Regular check-ins with off-site colleagues can mitigate but not eliminate these risks. We consider solo fieldwork by an inexperienced researcher in a remote, unfamiliar location where their identity may make them a target for harassment or violence to be the most risky fieldwork scenario ("ultra" risk scenario in Fig. 4).

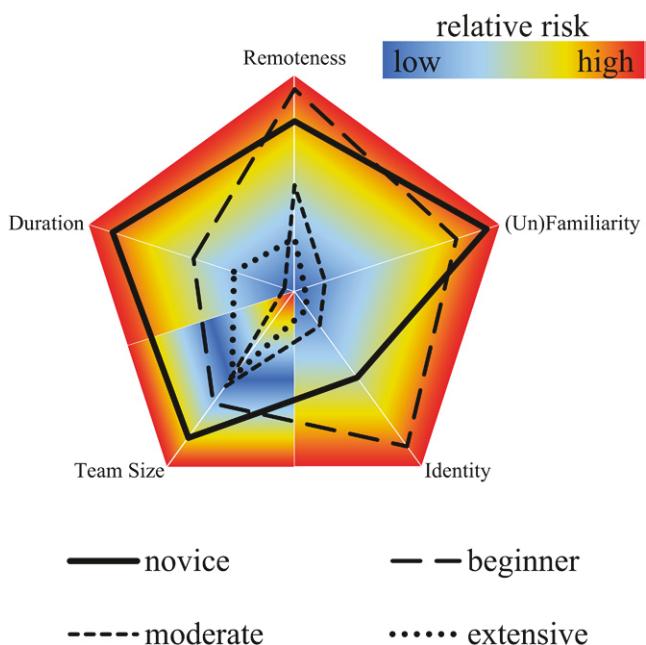


Figure 4. Assessment of a hypothetical field excursion described as “medium risk” in Fig. 3 from the perspectives of team members with different levels of experience (novice, beginner, moderate, extensive). For example, a novice (e.g., an undergraduate on their first overnight field experience) may be unfamiliar with the field site, feel lost in a large field team, and experience the remoteness and duration of the field excursion more acutely. See the main text for descriptions of factors represented by axes and hypothetical field team members represented in the figure. The legend for Fig. 3 describes other aspects of this figure.

Pre-trip briefing

Every field site, field team, and methodological approach presents unique needs and challenges. The following examples are primarily for those new to fieldwork or conducting fieldwork in a new environment. Some new field team members may have minimal previous experience with outdoor activities, particularly if they grew up in urban or suburban environments and/or if their STEM education to date has been confined to the classroom. Other first-timers may have grown up camping, boating, hiking, hunting, fishing, or farming and bring their own assumptions to fieldwork.

Pre-trip communication can help manage expectations in the field and minimize the surprise and embarrassment of being unprepared. For example, PIs may choose to share learning outcomes, provide handouts with a supply or packing list, travel information, or other important information, and hold briefings prior to the field season to address key components before the trip begins. Sunburns, vegetation scratches, animal bites, and other common environmental hazards can be mitigated by providing a packing list of necessary clothing, personal care items (including sufficient

prescription and over-the-counter medications), and how and when to wear certain attire. Depending on the location of the fieldwork, PIs should provide field teams with information regarding vaccine requirements for travel. It is also advisable to conduct a virtual field trip, for example, with GoPro™ footage, to familiarize new team members with the main sites and potential obstacles they may encounter, enabling them to find ways to mitigate any foreseeable challenges.

Field teams may consider adding travel insurance, MEDEVAC, or other additional insurance for remote work. PIs may want to provide a list of travel insurance companies, particularly if the fieldwork is abroad or out-of-network (e.g., out-of-state). Team members may be required to hold proper insurance for driving or operating vehicles as well. For certain fieldwork, it may be necessary for team members to complete special types of certification, such as SCUBA diving, boat licenses, or wilderness safety and first aid.

The flow of information during trip planning should be a two-way street; PIs should solicit information and required paperwork concerning team members’ relevant dietary requirements, medical needs, disability accommodations, sleeping requirements, religious practices, and cultural sensitivities to better assess team risk factors and avoid unnecessary conflicts in the field. Digital and print copies of relevant paperwork should be saved by both the field team and the home institution. We recommend that PIs collect insurance information, emergency contacts, known allergies, vaccination and medical histories, and other medical information for all field team members. Storing relevant medical information in sealed envelopes in case of emergency can balance obligations related to team members’ privacy and safety (Ramirez-Castaneda *et al.* 2022).

Team leads should work with team members to honor their unique needs. For example, if a team member’s religious beliefs prohibit the killing of animals, perhaps they can collect dead shells instead or collaborate with local museums to work on collections. Increasing the number of breaks in the workday and decreasing the amount of walking required can make fieldwork more accessible for those with limited physical endurance. Discussing individual needs prior to the start of the field season is especially important if additional funding needs to be secured to create accommodations.

Day-to-day scheduling

A clearly defined schedule should be available before the trip begins. Daily schedules should include regular rest breaks, mealtimes, challenging sections of the work, finish times, locations and times of available restrooms, and evening activities. Depending on the nature of the fieldwork, itineraries may be standard or vary from day to day. Morning or evening debriefs can keep the whole field team on the same page for the coming day’s activities. It is important to consider all team members’ needs when developing a

schedule. For example, a pre-planned housekeeping schedule that includes meal preparation, dishwashing, general cleanliness of common spaces, and laundry days can be helpful for those staying at one location. For day trips, start and end times may be dictated by childcare limitations. Given the unique risks of conducting fieldwork alone, scheduling should prioritize and enable team members to employ a “buddy system” in the field, and PIs should ensure that team members are comfortable with solo fieldwork before scheduling it. When possible, evening work should be clearly defined or made optional to accommodate varying needs.

“Biobreak” is a broad term that offers team members a discreet way to step away for a variety of self-care activities, including visiting the restroom, resting, nursing, eating or drinking, praying, or taking medications. When planning biobreaks, emphasis should be given to the various needs within the team (e.g., trans and non-binary team members, those who menstruate or squat to urinate, and/or those who may experience distress with voicing restroom needs; Becker 2016, Greene *et al.* 2019). Breaks may be longer or more frequent to accommodate religious needs or physical disabilities. Biobreak supply kits analogous to first aid kits can include rehydration sachets, hand sanitizer, wet wipes, toilet paper, menstrual supplies, small plastic bags, and coins or cash for pay-to-use toilets (Greene *et al.* 2019). It is wise to schedule physically demanding activities right before or after breaks to allow time for recovery and for folks to catch up if groups have become separated along a trail.

Planning regular rest days into field seasons can also improve field season success. Rest is critical to overall mental well-being (Sato *et al.* 2020). Days without scheduled research activities can give team members a chance to spend time away from one another, tend to personal matters, visit other parts of the field site, or ameliorate cabin fever through short excursions. If collecting days are lost to inclement weather, planned rest days may become valuable catch-up days. Conversely, bad weather can be reframed as unanticipated time off. Scheduling a longer field season than one thinks they may need can serve both as a hedge against bad weather and provide time for rest days. For extended field seasons, we recommend that team members bring a variety of leisure activity options. It is important to consider activities that can be conducted in the lodging location, do not involve alcohol, and do not require folks to stay out late into the night.

Emergency preparedness

The development of field safety plans helps to minimize the potential for emergencies and ensure that all team members know how to respond appropriately during a crisis. For example, in some cultures, a student may not be empowered to act on their own in response to an emergency but must wait for direction from a more senior member of the field team (Maldonado 2016). Similarly, less experienced team members

may be inclined to hide an injury to avoid embarrassment. There are many examples and templates of field safety plans available (e.g., supplementary material in Ramirez-Castaneda *et al.* 2022). Before arriving at a field site, all field team members should know what resources are available, who can help, what steps could be taken should a problem arise in the field, and what their role is in an emergency. Field safety plans should include information on local contacts and emergency services and evacuation plans in case of medical emergency or political instability (Ramirez-Castaneda *et al.* 2022). Each field team should also have off-site emergency contacts at home institutions. This could be an off-site PI, department chair, or administrator. Satellite phones, spot trackers, international phone plans, sharing planned collection locations with a colleague, and regularly scheduled check-ins can alert team leads to emergencies (Ramirez-Castaneda *et al.* 2022). Similar tools can be used to avoid emergencies when teams become lost. While sampling for new snail populations, an author and her team were turned around in dense vegetation, and access to a GPS with pre-programmed locations helped them navigate out of a precarious situation.

It is wise to practice emergency response protocols in advance. Team members should carry extra water, snacks, and a field first-aid kit to prevent or mitigate any *in situ* emergencies. Some of us have learned this lesson the hard way; an author was sampling terrestrial snails when she cut her leg on barbed wire, and a first aid kit was able to treat the wound until she could access medical attention and a tetanus booster.

Finally, inclusive emergency planning means that acquiring the necessary equipment, insurance, vaccines, and certifications is possible for everyone, regardless of financial standing (Chiarella and Vurro 2020, Matsuda 2023). PIs should provide resources on cost-effective ways of acquiring these necessities or provide financial support for these essential requirements.

EFFECTIVE COMMUNICATION

Effective communication is a cornerstone of successful fieldwork, especially as we work towards more inclusive practices, because it facilitates collaboration, understanding, and respect among team members and local communities where fieldwork is conducted. Even for those working alone in the field, there is usually an initial phase of communication beforehand (Fleischner *et al.* 2017). Whether it is organizing a large group or preparing for a solo trip, communication is required to obtain permits and gear, contact stakeholders and other interested parties, coordinate with administrators at home institutions and research stations, or recruit interested trainees. Inclusive fieldwork may require institutional advocacy, student outreach, and diversity training (Fleischner *et al.* 2017). Effective communication factors into successful fieldwork by meeting personal needs, defining interpersonal

expectations, preventing and resolving conflicts, addressing mental health challenges, responding appropriately to emergencies, and interacting with local communities (Haelewaters *et al.* 2021, Klein *et al.* 2022).

Interpersonal expectations

A key principle of inclusive fieldwork is that team members are people first and researchers second. It is impossible to maintain professionalism for every moment of a multi-day field excursion, and a new awareness of colleagues' personal sides may be positive or negative. Team members may have different needs or preferences around a variety of topics (e.g., sleep schedule, privacy, recreation, family contact, religious practice, substance use) that need to be accommodated and integrated into the field experience. That said, there are certain professional boundaries that should remain in place during field seasons. For example, faculty should refrain from disparaging colleagues or students in the presence of trainees. Boundaries relating to discrimination, harassment, and workplace safety are of particular importance, as issues around consent and sexual violence have emerged at multiple field sites (e.g., Clancy *et al.* 2014, Woolston 2022, Levy 2023). Setting expectations for appropriate conduct and acknowledging the limits of professionalism in the field ahead of time can reduce the risk of conflict.

Fieldwork also offers important career-building social experiences, particularly for students. For example, mentorship network interconnectedness and network size positively influence undergraduate women's science identity formation and likelihood of applying to STEM graduate programs (Hernandez *et al.* 2023). Field excursions are excellent opportunities to introduce trainees to a wide range of interconnected mentor figures, including PIs, collaborating faculty, postdocs, graduate students, and peer mentors.

Mental health

Fieldwork is a taxing experience, especially when students and faculty work closely for long hours in addition to sharing residential space and downtime. Anxieties can be heightened by tight data collection timelines, identity-related safety concerns, interpersonal conflicts, and living in an unfamiliar environment away from loved ones or support networks. We suggest that colleagues open up about problems they are experiencing. Doing so has two main benefits. First, coworkers are more likely to help address a problem if they are informed about it. For example, a coworker may act as a subtle chaperone for a colleague around someone who makes them uncomfortable. Second, emotional vulnerability invites others to reciprocate. Inviting others to share their mental health or other challenges gives one the opportunity to offer reassurance, emotional support, or pragmatic and collaborative solutions. Active listening can reduce emotional distress (Davis 1990).

While it is impossible to regulate another's emotions for them, field researchers should pay attention to whether their

team members feel overly anxious or unsafe. Severe anxiety or lack of safety should be taken seriously. Those who anticipate mental health challenges or unique safety needs should formulate a pre-trip plan with their PI. Pausing or even halting a field season may be appropriate to address severe emotional distress for some, though for others, feeling pressured to abandon a field season causes its own anguish. We recommend setting up a reporting system within the field team with multiple options for reporting and addressing concerns so that a mental health crisis can be managed.

Reporting options may include speaking with one's PI, a peer mentor, or another faculty member or administrator outside the field team. Options for addressing concerns could include modifying field goals or protocols, remote access to university mental health support systems, conflict mediation, relaxation activities, or more frequent check-ins so that field team members can work through stressors together.

Reporting and responding

Relationships (platonic, romantic, or sexual) can begin or end in the field, and PIs should be ready with guidelines about how these relationships may impact fieldwork. However, as reflected by audience questions during the AMS panel, many malacologists feel unprepared to address these situations. At a minimum, we recommend that teams discuss consent, relationships, and related policies prior to each field season. Everyone on the team should be familiar with Title IX and similar procedures within their home institution and affiliated institutions. For international fieldwork, the team should review policies and reporting for that country, since laws around sexual violence and other matters can vary by jurisdiction.

That said, institutional policies around consent and workplace relationships may be insufficient to address the needs of a small, isolated field team. Negative behaviors that occur in a fieldwork context often go unreported, and those who do report such behaviors are often unsatisfied with the outcome of reporting procedures (Primack *et al.* 2023). We therefore recommend that PIs and field teams develop their own protocols to supplement institutional policies, paying particular attention to power dynamics. Assigning multiple safety officers and sexual violence or harassment contacts within and outside the team increases the probability that problems will be addressed in a timely manner (Ramirez-Castaneda *et al.* 2022). Having multiple designated reporters expands the means of reporting and supplies provisions in case a designated reporter is involved in an incident. In the world of electronic forms, an anonymous form can be set up to supplement other reporting mechanisms. Unofficial reporting protocols should also include mechanisms for researchers to inform team leads of interpersonal problems in a judgment-free context.

Intoxicating substances similarly require rules and guidelines. Specific field stations, field sites, or field teams may

have or have had cultures or traditions of ritualized alcohol consumption. While some seasoned field scientists look back fondly on these rituals, more than one out of every five ecologists surveyed report being uncomfortable with alcohol in professional settings (Primack *et al.* 2023). Further, alcohol has played a role in alleged sexual violence at field sites (e.g., Jha 2021). PIs should make their teams aware of substance use practices and drug laws relevant to their field site.

For adult field team members, it is not appropriate for the PI to manage relationships or substance use unless they directly impact the team's ability to complete their work or constitute a serious breach of ethical or legal conduct. The goal is to help field malacologists feel comfortable discussing potential problems while maintaining appropriate professional boundaries.

Interactions with local communities

To be inclusive, fieldwork planning should involve collaboration with impacted communities and respect for local priorities and cultural customs. Field teams should develop procedures for interactions with government and other officials like police, as well as a plan for interacting with local community members. We recommend that team members wear official gear with their institutional logo, which can reduce the risk of some human hazards (Demery and Pipkin 2021, Matsuda 2023), and prepare for the types of questions that locals may ask. If most team members do not speak the local language, it is advisable to provide each person with a small pocket guide that contains common phrases for asking for help and describing what you are doing in the field. PIs may even require potential field researchers to have proof of some language skills (e.g., coursework, language learning app).

Positive relationships with the local community can be a resource in a number of ways, such as informing researchers about local hazards and assisting with data collection. A list of local collaborators and contacts can be useful as well. We recommend giving local collaborators full credit for their contributions to research and data collection and including them in planning the research agenda (Baker *et al.* 2019, Eichhorn *et al.*, 2020, Haelewater *et al.* 2021, Ramirez-Castaneda *et al.* 2022). These suggestions come from a growing body of literature on promoting equitable fieldwork, strengthening community engagement, and making science more inclusive (Klein *et al.* 2022, Ramirez-Castaneda *et al.* 2022).

It is best to prepare de-escalation strategies for possible conflict with the local community. Conflicts with local communities can happen in both domestic and international field contexts. Ensure that the field team has documentation, permits, and explanations ready and on their person in all local or common languages. It is recommended that each team member carries a waterproof copy, if not multiple copies, of collecting permits and insurance in case they are asked to present that information. An author and her team have

encountered locals and park rangers in the field while sampling for snails, and providing copies of their permits helped to de-escalate potential tensions. Another author has encountered local law enforcement when sampling and was glad to have paper documentation as well as phone numbers of local contacts. In areas where there may be human hazards, rather than arguing with someone threatening violence or carrying a weapon, simply apologize, leave, and then report the incident to the PI and other relevant authorities. For safety, field teams may also need to adopt inequitable dynamics when interacting with local communities. For example, where local cultural norms expect a male leader rather than a female one, it may be necessary for a male member of the field team to conduct interactions with local community members, even if the actual team lead is a woman. Even when field researchers do everything "by the book," they may still experience hostility from local community members; intervention from PIs and team leads in support of targeted team members can be a powerful tool in retaining researchers from marginalized backgrounds (Dowtin and Levia 2018).

POST-FIELDWORK REFLECTION

Fieldwork may end on the day the team arrives at their home country, state, or institution, but the journey is not completed. Post-fieldwork logistics and team debriefs should be addressed in a timely manner, as the longer one waits, the easier it is to lose track of details. As a PI or team lead, it is important to make sure that post-fieldwork logistics, such as importing and exporting specimens, depositing vouchers, and permit and grant reporting, are properly addressed. These logistical tasks can be important for maintaining and honoring local relationships with the field team and the natural world and for ensuring that local researchers have access to products of the field team's labor. It is, therefore, crucial to fulfill collector/researcher responsibilities to local communities and agencies and to practice the best stewardship of specimens to maximize their cultural and scientific value. In most cases, it is advised to deposit at least some specimens into local museums or other institutions near where specimens were collected. If any publications will be produced from the fieldwork, it is preferable to confirm authorship and project responsibilities early with all team members, including local collaborators. Authorship models like CRediT can increase authorship equity and diversity (Allen *et al.* 2019).

It is also essential to reflect on the fieldwork experience, evaluate each aspect of the trip, solicit feedback, and debrief the field team with the goal of increasing the inclusivity of future field excursions. Feedback from field team members can be solicited openly or anonymously. The feedback should, at minimum, address whether the fieldwork goals were met, what aspects of the fieldwork met team expectations, what aspects went as planned but did not work well, and what

unexpected events happened (positive or negative) and how they were addressed. Teams may also wish to compare anticipated risks to actual outcomes to identify areas of pre-fieldwork planning and in-the-field practices that were effective or could be improved. Post-fieldwork feedback can inform future field planning and, if done consistently, form an iterative process that continues to improve fieldwork practices.

CONCLUSIONS

Inclusivity and best practices in fieldwork are growing and important areas of research and discussion. Malacology is welcoming new researchers whose identities were poorly represented in our field in the past. As we work to conserve molluscan biodiversity, we must support diversity among malacologists as well. Malacology is increasingly interdisciplinary, and by valuing the inclusion of divergent experiences, perspectives, and backgrounds, we strengthen our collective intellectual contributions and real-world impacts. Inclusivity and diversity in malacology result in better outcomes, both immediately by leveraging individual strengths, and in the long-term by encouraging new generations of talent to pursue molluscan research.

Fieldwork is a key opportunity to advance justice, equity, diversity, and inclusion within malacology. An inclusive approach to fieldwork minimizes risks to individuals and the overall project. Inclusivity means acknowledging and accommodating differences rather than treating everyone the same regardless of identity and striving for equity of opportunity rather than equality. This change in framework runs counter to how many senior malacologists have been counseled and trained over the years. We encourage malacologists to demystify the “common sense” of fieldwork, create procedures to prevent and address issues, and recognize cultural and interpersonal differences by setting clear expectations in advance of fieldwork. Communication throughout a field excursion is essential; active listening and meaningful responses to team members’ concerns are powerful tools for collaboratively solving problems that arise in the field.

Though it can seem daunting at first, inclusive fieldwork is doable. There are a number of resources already available (e.g., tools listed in the AMS Inclusive Fieldwork Resources digital handout, American Malacological Society 2024). PIs may consider allocating funds for essential gear and accessibility tools in their next grant applications. Course-based undergraduate research experiences and providing previously collected datasets for analysis by those unable to participate in fieldwork directly open additional avenues for including more people in field-based malacological research. By taking incremental steps through the relatively uncharted territory of inclusive fieldwork practices, malacologists will become integrated into new ways of thinking and acting. Inclusivity

requires investment in time, care, and sometimes cash. These investments will pay dividends in research outcomes and researcher diversity. Field malacologists can be more effective, creative, passionate, and curious when more of their psychological, emotional, social, and safety needs are met.

PIs, field team members, and institutions have a duty to cooperatively strive for more inclusive fieldwork practices. The PI and associated institutions must safeguard the scientific goals of the project while supporting and protecting those hired to complete it. PIs should set norms for their field teams that are consistent with inclusive principles. Each field team member is responsible for identifying and communicating their individual needs, as well as practicing self-care strategies. Team members are also accountable for each other and for the scientific goals of the project. When fieldwork is being planned, most of the higher-level scientific objectives and goals have been articulated, arguments have been made, and grants have been written and received. It is the point at which science is put into action by people where it becomes more specific and consequently more personal. We hope that the malacological community will embrace the personal in our fieldwork practices and that our field will become more welcoming as a result.

ACKNOWLEDGMENTS

We thank the University of Alabama Department of Biological Sciences, Alabama Water Institute, Alabama Museum of Natural History, Geological Survey of Alabama, EnviroScience Inc., Visit Tuscaloosa, and Druid City Brewing Company for financial support and in-kind support of the 89th Annual AMS meeting. Additionally, we thank the AMS 2023 Annual Meeting Committee and the many volunteers who helped make the meeting a success, especially Carla Atkinson, Carmen Cobo, Meghan Yap-Chiongco, Nick Roberts, and AMS panel question wrangler Emily McLaughlin. The audience of the AMS Inclusive Fieldwork Panel in 2023 and their questions were instrumental to the idea formation for this manuscript, as were our conversations with Dr. Sarah Lemer, Dr. Derick D. Jones Jr., and numerous other colleagues. We thank an anonymous reviewer and Jann Vendetti for their helpful feedback. A previous version of this article was published in the *American Malacological Society Newsletter* (Osborne 2023).

AUTHOR CONTRIBUTIONS

All authors were involved in conceptualizing, writing, and editing the manuscript. T. R. O. was the lead author and provided project administration. W. A. N. U. A., E. C. D.-B., and K. R. M. were the AMS panelists, and T. R. O. was the panel moderator. K. M. K. was the AMS 2024 conference

organizer and acquired funding and logistical support for the panel. Figures were prepared by T. R. O., J. L., and E. K. S.

AMS JUSTICE, EQUITY, DIVERSITY, & INCLUSION STATEMENT

Members of the American Malacological Society spend their lives studying and appreciating the wonderful diversity of form, function, and ecological breadth of mollusks. We recognize that certain aspects of malacological research and collections have benefitted from historical associations with colonization and systems of oppression, such as slavery, and that societies, such as AMS, have not been equally accessible to all people. We acknowledge this history and commit to the future of our Society by finding and supporting the next generation of malacologists with this in mind as we look to advance our field through an inclusive lens. AMS welcomes all malacologists regardless of culture, ethnicity, race, sex, gender identity and expression, sexual orientation, nation of origin, age, languages spoken, veteran's status, religion, or disability. We expect our members to respect the diverse perspectives that come together at our meetings and take every opportunity to help the Society become more diverse, equitable, and inclusive through recruiting, supporting, and encouraging new people of all backgrounds.

POSITIONALITY STATEMENTS

T. R. O. worked at a Catholic North American university during manuscript preparation, located on the historical lands of the Nanticoke Lenni-Lenape Tribal Nation. She studies land snail evolution and conservation in Pacific Islands (e.g., the Commonwealth of the Northern Mariana Islands, the Republic of Palau) and ant locomotion ecology in Panama. She has often worked in primarily white (*i.e.*, European descent) research teams. T. R. O. was inspired to include a Positionality Statement by Baker *et al.* (2019) and Eichhorn *et al.* (2020).

W. A. N. U. A. is an Asian, straight, married woman who pursued her Ph.D. at Clarkson University in Potsdam, New York. She is a first-generation college student with fieldwork experience in Sri Lanka and the U.S.A. She studies the biogeography of invasive freshwater snails.

E. K. S. is a white, straight, married woman with two children who works at an independent non-profit museum. She studies cephalopod biodiversity in the northwest Atlantic as part of primarily white North American research teams.

K. R. M. works at the Museum of Natural History, University of Colorado Boulder. She studies land snail biodiversity and systematics.

J. L. works at the Museum of Natural History, University of Colorado Boulder. She is an immigrant, a woman of color,

and a mother of two. The Li lab studies the evolution of symbiosis and biodiversity of marine invertebrates.

K. M. K. works at The University of Alabama. He is a gay man and a first-generation college student. The Kocot lab studies the biodiversity and systematics of marine invertebrates, especially mollusks.

E. C. D.-B. is a white, cis-gendered, married mother of two who works at Columbia College Chicago, a private, urban, arts- and media-focused institution that serves a racially diverse student body with many students who identify as LGBTQIA+. She studies land snail biodiversity and the pedagogy of students learning in the undergraduate classroom.

LAND ACKNOWLEDGMENTS

The land acknowledgments from the institutions and/or locations of our various authors are listed below. We encourage reflection on the similarities between these acknowledgments and on the past of the land upon which one's own institution or field site rests.

Nanticoke Lenni-Lenape Tribal Nation (requested land acknowledgement previously available on their website)

"The Lenape People lived in harmony with one another upon this territory for thousands of years. During the colonial era and early federal period, many were removed west and north, but some also remain among the continuing historical tribal communities of the region: The Nanticoke Lenni-Lenape Tribal Nation, the Ramapough Lenape Nation, and the Powhatan Renape Nation, The Nanticoke of Millsboro Delaware, and the Lenape of Cheswold Delaware. We acknowledge the Lenni-Lenape as the original people of this land and their continuing relationship with their territory. In our acknowledgment of the continued presence of Lenape people in their homeland, we affirm the aspiration of the great Lenape Chief Tamanend that there be harmony between the Indigenous people of this land and the descendants of the immigrants to this land, 'as long as the rivers and creeks flow, and the sun, moon, and stars shine.'"

Villanova University

"We acknowledge that Villanova sits on the unceded land of the Lenni Lenape people. We acknowledge the Lenape community, their elders both past and present, as well as future generations. We acknowledge their spiritual, emotional, and physical connection to the land, their contributions, and struggles. They are an important part of our history, and we should honor them."

Clarkson University

"As the Staff, Faculty, and Students of the Clarkson Community, we're grateful for the opportunity to meet here,

and we thank all the generations of people who have taken care of this land before us. We acknowledge we are meeting on the traditional territory of the Akwesasne Mohawk and their ancestors. These lands and waterways connect to the vast traditional areas of the Haudenosaunee, Algonquin, Huron-Wendat, and Abenaki Peoples. We recognize and deeply appreciate their connection to this place.

These traditional territories were never wholly surrendered and were only claimed by competing French and British Crowns, and later New York State.

As we move towards healing past injustices, we must acknowledge the wrongs that have been done and work towards a unified path of co-existence and prosperity. We also recognize the contributions of the Akwesasne Mohawk, Haudenosaunee, and other Indigenous peoples have made, both in shaping and strengthening this community in particular, and other territories within the country as a whole.”

University of Colorado Boulder

“The University of Colorado Boulder, Colorado’s flagship university, honors and recognizes the many contributions of Indigenous peoples in our state. CU Boulder acknowledges that it is located on the traditional territories and ancestral homelands of the Cheyenne, Arapaho, Ute and many other Native American nations. Their forced removal from these territories has caused devastating and lasting impacts. While the University of Colorado Boulder can never undo or rectify the devastation wrought on Indigenous peoples, we commit to improving and enhancing engagement with Indigenous peoples and issues locally and globally.”

The University of Alabama

“We acknowledge that UA is situated upon the traditional homelands of the Choctaw and Creek tribal nations. We respect and honor the land itself and the people who have stewarded it throughout generations.”

Columbia College Chicago

“We collectively acknowledge that Columbia College Chicago occupies the stolen ancestral, traditional, and contemporary Lands of the Anishinaabeg—Three Fires Confederacy of the Ojibwe, Odawa, and Potawatomi, as well as the Miami, Menominee, Ho-Chunk, Illinois, Sac and Fox nations. Although the state of Illinois has no federally recognized tribal lands, we acknowledge, support, and advocate for the sovereignty of all Indian nations, for the historic Indigenous communities in Illinois, for Indigenous individuals and communities who live in the Chicagoland area, and for those who were forcibly removed from their Homelands. By offering this Land Acknowledgment, we reaffirm our College’s Diversity, Equity, and Inclusion Mission statement, affirm Indigenous sovereignty, and will hold Columbia College Chicago more accountable to the needs of American Indian and Indigenous peoples.”

LITERATURE CITED

Alexis-Martin, B. 2023. Ten steps to equity: Making fieldwork accessible. *Times Higher Education*. 15 Sept 2023 [accessed 17 May 2024]. <https://www.timeshighereducation.com/campus/ten-steps-equity-making-fieldwork-accessible>

Allen, L., A. O’Connell, and V. Kiermer. 2019. How can we ensure visibility and diversity in research contributions? How the Contributor Role Taxonomy (CRediT) is helping the shift from authorship to contributorship. *Learning Publishing* 32: 71–74.

American Malacological Society. 2024. Inclusive Fieldwork Resources from the American Malacological Society.pdf. *figshare*. 23 Jan 2024 [accessed 29 May 2024].

Amon, D. J., Z. Filander, L. Harris, and H. Horden-Davies. 2022. Safe working environments are key to improving inclusion in open-ocean, deep-ocean, and high-seas science. *Marine Policy* 137: 104947.

Baker, K., M. P. Eichhorn, and M. Griffiths. 2019. Decolonizing field ecology. *Biotropica* 51: 288–292.

Becker, R. 2016. Fighting the menstruation taboo in the field. *Nature*. DOI: 10.1038/nature.2016.19372

Beltran R. S., E. Marnocha, A. Race, D. A. Croll, G. H. Dayton, and E. S. Zavaleta. 2020. Field courses narrow demographic achievement gaps in ecology and evolutionary biology. *Ecology and Evolution* 10: 5184–5196.

Chiarella, D. and G. Vurro. 2020. Fieldwork and disability: An overview for an inclusive experience. *Geological Magazine* 157: 1933–1938.

Clancy K. B. H., R. G. Nelson, J. N. Rutherford, and K. Hinde. 2014. Survey of academic field experiences (SAFE): Trainees report harassment and assault. *PLoS ONE* 9: e102172.

Cotton, D. R. 2009. Field biology experiences of undergraduate students: The impact of novelty space. *Journal of Biological Education* 43: 169–174.

Dalby, S., S. Rubenstein, and E. H. Weir. 1996. *The International Student’s Guide to Going to College in America: How to Choose Colleges and Universities in the United States, How to Apply, How to Fit In*. Macmillian, New York, N.Y., U.S.A.

Davis, C. M. 1990. What is empathy, and can empathy be taught? *Physical Therapy* 70: 707–711.

Demery, A.-J. C. and M. A. Pipkin. 2021. Safe fieldwork strategies for at-risk individuals, their supervisors, and institutions. *Nature Ecology & Evolution* 5: 5–9.

Dowtin, A. L. and D. F. Levia. 2018. The power of persistence. *Science* 360: 1142.

Eichhorn, M. P., K. Baker, and M. Griffiths. 2020. Steps towards decolonising biogeography. *Frontiers of Biogeography* 12.1: e44795.

Feig, A. D., C. Atchison, A. Stokes, and B. Gilley. 2019. Achieving inclusive field-based education: Results and recommendations from an accessible geoscience field trip. *Journal of the Scholarship of Teaching and Learning* 19: 66–87.

Fleischner, T. L., R. E. Epinoza, G. A., Gerrish, H. W. Greene, R. W. Kimmerer, E. A. Lacey, S. Pace, J. K. Parrish, H. M. Swain, S. C. Trombulak, S. Weisberg, D. W. Winkler, and L. Zander. 2017. Teaching biology in the field: Importance, challenges, and solutions. *BioScience* 67: 558–567.

Greene, S., K. Ashley, E. Dunne, K. Edgar, S. Giles, and E. Hanson. 2019. *Toilet Stops in the Field: An Educational Primer and*

Recommended Best Practices for Field-Based Teaching. University of Birmingham, U.K.

Haelewaters, D., T. A. Hofmann, and A. L. Romero-Olivares. 2021. Ten simple rules for Global North researchers to stop perpetuating helicopter research in the Global South. *PLoS Computational Biology* **17**: e1009277.

Hernandez, P. R., M. S. Patterson, H. M. Nyanamba, A. S. Adams, R. T. Barnes, B. Bloodhart, M. S. Burt, M. Clinton, I. B. Pollack, and E. V. Fischer. 2023. Webs of science: Mentor networks influence women's integration into STEM fields. *Frontiers in Ecology and the Environment* **21**: 404–410.

Hughes, A. 2016. Exploring normative whiteness: Ensuring inclusive pedagogic practice in undergraduate fieldwork teaching and learning. *Journal of Geography in Higher Education* **40**: 460–477.

Hughes, B. E. 2018. Coming out in STEM: Factors affecting retention of sexual minority STEM students. *Sciences Advances* **4**: eaao6373.

Jha, N. 2021. Welcome to the jungle: The Smithsonian's #MeToo moment. *BuzzFeed News*. 9 Dec 2021. Available at: <https://www.buzzfeednews.com/article/nishitajha/smithsonian-tropical-research-institute-metoo>. 20 December 2023

Klein, S., J. S. Lee, S. Courtney, L. Morehead-Hillman, S. Lau, B. Lewis-Smith, D. Sarna-Wojcicki, and C. Woelfle-Hazard. 2022. Transforming restoration science: Multiple knowledges and community research cogeneration in the Klamath and Duwamish Rivers. *The American Naturalist* **200**: 156–167.

Langen, T. A., J. L. Beach, J. T. Boulerice, L. W. Halstom, A. R. Lamb, and A. M. Ross. 2022. How to be a professional ecological field technician or an effective supervisor of them. *The Bulletin of the Ecological Society of America* **103**: e01985.

Lawrence, A. and N. Dowey. 2022. Six simple steps towards making GEES fieldwork more accessible and inclusive. *Area* **54**: 52–59.

Levy A. 2023. Sexual harassment in science: Tackling abusers, protecting targets, changing cultures. *Nature Careers Podcast*. 20 July 2023 [accessed 5 May 2024].

Lunden, M. and S. Bombaci. 2022. Making outdoor field experiences more inclusive for the LGBTQ+ community. *Ecological Applications* **33**: e2771.

Maldonado, J. 2016. Considering culture in disaster practice. *Annals of Anthropological Practice* **40**: 52–60.

Matsuda, S. B. 2023. Centering transgender and gender non-conforming experience, access, & safety in ecological fieldwork. *Integrative and Comparative Biology* **63**: 86–97.

McAnneny, C. 2004. Learning support for disabled students undertaking fieldwork and related activities. *Disability Studies Quarterly* **24**: 3.

Monarrez, P. M., J. B. Zimmt, A. M. Clement, W. Gearty, J. J. Jacisin III, K. M. Jenkins, K. M. Kusnerik, A. W. Poust, S. V. Robson, J. A. Sclafani, K. T. Stilson, S. D. Tennakoon, and C. M. Thompson. 2022. Our past creates our present: A brief overview of racism and colonialism in Western paleontology. *Paleobiology* **48**: 173–185.

Morales, N., K. Bisbee O'Connell, S. McNulty, A. Berkowitz, G. Bowser, M. Giambellaro, and M. N. Miriti. 2020. Promoting inclusion in ecological field experiences: Examining and overcoming barriers to a professional rite of passage. *The Bulletin of the Ecological Society of America* **101**: e01742.

Osborne, T. R. 2023. Inclusive fieldwork: Some of your questions answered. *American Malacological Society Newsletter* **53**: 7–9.

O'Toole, P. and P. Were. 2008. Observing places: Using space and material culture in qualitative research. *Qualitative Research* **8**: 616–634.

Peacock, J., R. Mewis, and D. Rooney. 2018. The use of campus based field teaching to provide an authentic experience to all students. *Journal of Geography in Higher Education* **4**: 531–539.

Primack, R. B., T. K. Miller, C. Terry, E. Marin-Spiotta, P. H. Templer, A. A. Berhe, E. J. Diaz Vallejo, M. G. Hastings, V. J. Magley, A. Mattheis, B. B. Schneider, and R. T. Barnes. 2023. Historically excluded groups in ecology are undervalued and poorly treated. *Frontiers in Ecology and the Environment* **21**: 363–369.

Ramirez-Castaneda, V., E. P. Western, J. Frederick, S. Amini, D. R. Wait, A. S. Achmadi, N. Andayani, E. Arida, U. Arifin, M. A. Bernal, E. Bonaccorso, M. B. Sanguila, R. M. Brown, J. Che, F. P. Condori, D. Hartiningtias, A. E. Hiller, D. T. Iskandar, R. A. Jimenez, R. Khelifa, R. Marquez, J. G. Martinez-Fonseca, J. L. Parra, J. V. Penalba, L. Pinto-Garcia, O. H. Razafindratsima, S. R. Ron, S. Souza, J. Supriatna, R. C. K. Bowie, C. Cicero, J. A. McGuire, and R. D. Tarvin. 2022. A set of principles and practical suggestions for equitable fieldwork biology. *Proceedings of the National Academies of Science* **119**: e2122667119.

Roberts, B. W., R. W. Robins, K. H. Trzesniewski, and A. Caspi. 2003. Chapter 26: Personality Trait Development in Adulthood. In: J. T. Mortimer and M. J. Shanahan, eds., *Handbook of the Life Course*. Springer, Boston, Massachusetts. Pp. 579–595.

Roksa, J., D. F. Feldon, and M. Maher. 2018. First-generation students in pursuit of the PhD: Comparing socialization experiences and outcomes to continuing-generation peers. *The Journal of Higher Education* **89**: 728–752.

Sarkodie-Mensah, K. 1998. International students in the U.S.: Trends, cultural adjustments, and solutions for a better experience. *Journal of Education for Library and Information Science* **39**: 214–222.

Sato, K., S. Kuroda, and H. Owan. 2020. Mental health effects of long work hours, night and weekend work, and short rest periods. *Social Science & Medicine* **246**: 112774.

Tanner, J. L. and J. J. Arnett. 2016. Emerging adult clinical psychology. In: J. C. Norcross, G. R. VandenBos, D. K. Freedheim, and M. M. Domenech Rodriguez, eds., *APA handbook of clinical psychology: Roots and branches*. American Psychological Association. Pp. 127–138.

Vendetti, J. 2022. Gender representation in molluscan eponyms: Disparities and legacy. *American Malacological Bulletin* **39**: 1–13.

Woolston, C. 2022. Smithsonian island outpost reeling from sexual misconduct claims. *Nature Career News*. 14 Jan 2022 [accessed 5 May 2024].

Zebracki, M. and A. Greatrick. 2022. Inclusive LGBTQ+ fieldwork: Advancing spaces of belonging and safety. *Area* **54**: 551–557.

Zipp, K. 2022. Widening cracks in an already leaky pipeline. *Fisheries* **47**: 377–379.

Received: 14 June 2024; **Accepted:** 20 August 2024; **Final revisions received:** 23 November 2024; **Published:** 6 February 2025