Field Safety Manual

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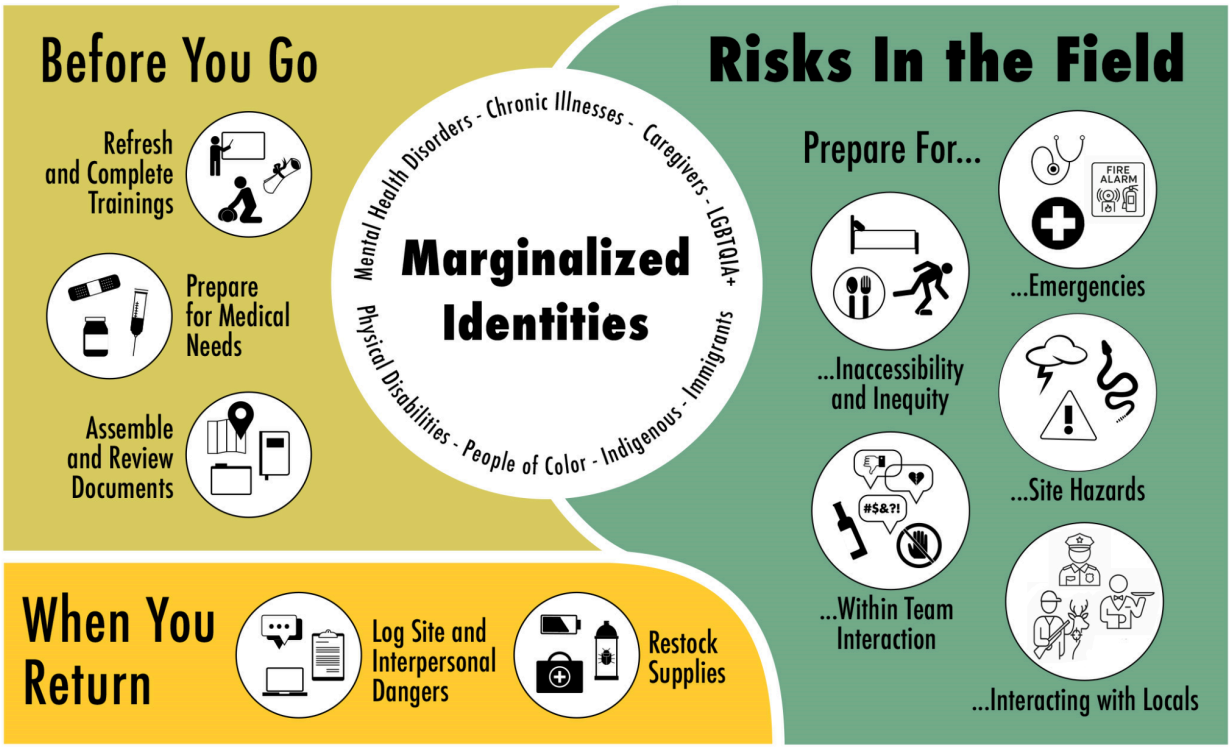

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Introduction

Field work is required for some research projects and is often exciting, as it allows researchers to travel, be outside, and observe their study systems in nature. However, field research also involves a certain amount of risk. Potentially harsh conditions, unfamiliar locations, interpersonal conflicts with research team members, and contact with unfamiliar landowners or property managers can lead to situations in which the health and safety of researchers may be jeopardized. The purpose of this document is three-fold: first, to highlight actions and resources to increase safety by minimizing potential risks; second, to outline appropriate responses should adverse events occur; and third, to identify inequities in field research and solutions to improve access for researchers of all identities.

The risks associated with field work are not equal for everyone (Demery and Pipkin 2020) and pose a barrier to equitable participation in field research. Some scientists may experience increased risks due to their race, ethnicity, nationality, first language, sexual orientation, disability, gender identity, or religion. Black, Hispanic, Latinx, and Indigenous scientists often report feeling threatened and unwelcome when conducting research in the field and frequently face increased risk from local law enforcement (Demery and Pipkin 2020, Chaudhury and Colla 2020). Scientists that identify within the LGBTQIA+ community may also encounter unwelcoming or dangerous environments at home or abroad (Booms 2019), especially when field work occurs in countries where certain sexual orientations or gender identities are illegal (Ragen 2017, Pickrell 2020, Olcott and Downen 2020, Viglione 2020, Coon et al. 2023). Sexual harassment during field work is more commonly reported by women than men and by early-career researchers than senior researchers (Clancy et al. 2014). Additionally, people with disabilities are one of the largest minoritized groups, with roughly one in four people identifying as living with a disability (CDC 2018). People with disabilities share many of the aforementioned heightened risks with other minority groups, and may require additional accommodations to reduce risk and create equitable access to participating in field research (Hall et al. 2002, Thurston et al. 2017, Chiarella and Vurro 2020).

The best way to reduce and mitigate potential risks during field work, as well as to provide equitable access to field research opportunities, is to ensure all research participants have received proper training as it relates to both science and field work, as well as fostering awareness and leadership within research teams. Supervisors need to work with research leaders and team members to prepare for safe field work by understanding and addressing inequities and mitigating foreseeable risks as well as actively allocating resources towards making fieldwork more equitable for underrepresented groups. All research team members should be involved in planning

and training and all team members should be aware that safety is as important as data collection during fieldwork.

Supervisors should work in tandem with research teams to develop field plans and strategies to mitigate risks and increase access (Demery and Pipkin 2020). Supervisors should be aware that their own identity and experiences with field work may limit their ability to assess the extent of risk or access for any member of their team, but especially for minoritized team members. Additionally, because of societal inequities and variation in abilities among team members, some team members may require more resources than other team members to fully participate in field work; supervisors should remember achieving ***equity*** among team members is unlikely to arise when resources are merely distributed ***equally*** between team members.

Within this document we designate certain responsibilities to either 'research supervisors', 'team leaders', or 'team members'. Research supervisors are generally the Principal Investigators (PIs) of a project, and will typically be a faculty member; research supervisors may or may not be in the field during all portions of field data collection. Team leaders are those individuals who are the designated leader during field work and may be at any career or training stage including post-docs, graduate students, undergraduates, or field technicians. The team leader is generally responsible for explaining field safety procedures and dealing with issues that arise in the field. 'Team members' are field researchers who work under the guidance of the team leader, regardless of career or training stage. The actual composition of field teams will vary depending on the project and specifics of the field work, but supervisors should designate these positions prior to beginning any field research.

Contents

We have organized this manual into seven core topics. The first three sections discuss field safety and accommodations for people involved in field research: (1) *cultivating productive and inclusive research teams*; (2) *communication with the public & land managers*; and (3) *bringing children into the field*. The next three sections deal with mitigating risk and increasing access to the places we conduct field research: (4) *understanding field site risks*; (5) *transporting field teams safely*; and (6) *planning for medical emergencies*. The final section, (7) *returning from a field trip,* outlines actions to take after the field team is safely home. Within each section, we first outline important considerations for minoritized scientists and for health and disability, and then provide action items structured for either "before you go" to the field or while "in the field". It is important to note that depending on the project and location, some of the considerations we outline in this document may be important to read and consider as far ahead as 6-12 months "before you go".

1. Cultivating Productive and Inclusive Research Teams

It is never recommended to be out in the field alone because researchers are typically safer when working within a team (however, all the safety guidelines in this document are applicable no matter the size of the field team). Most field work is conducted in teams that work together on equipment operation, data collection, language translation, or just to make field work more enjoyable. However, team members can also be a source of conflict and risk. Field research is physically and mentally demanding and these stressors can strain team relationships and be challenging to mental health (John and Khan 2018). Thus, effective field teams must work together to create professional and supportive relationships.

1.1 Considerations for Minoritized Scientists

Field work, especially multi-day trips, can be an opportunity for research teams to bond. Unlike in typical academic settings, team members may have more free time for casual socializing during mealtimes and in the mornings or evenings before and after the workday. This opportunity for socializing can be beneficial to creating team unity. However, these experiences can also be exclusionary and uncomfortable for some (Pickrell 2020). Women and researchers with minority identities in the biological sciences, including race, ethnicity, sexual orientation, disability, gender identity, religion or first language, all report feeling uncomfortable, excluded, and sometimes unsafe in field teams where they are the only member of a minority group (Demery and Pipkin 2020, Pickrell 2020, Viglione 2020). This is particularly true when field teams manifest a “get-it-done-at-all-cost” culture that prioritizes physical intensity and ‘machismo’ (Nelson et al. 2017, Pickrell 2020). Women and early career team members are significantly more likely to report that they have been targets of harassment or sexual assault than male researchers or supervisors during field research (Clancy et al. 2014).

1.2 Considerations for Health and Disability

Providing every team member with access to basic accommodations (food, lodging, and services that satisfy their needs and allow them to work effectively) improves each team member’s ability to participate in field work. Unfortunately, there is often a trade-off between a team member having to disclose personal health information with their ability to access accommodations and resources (Schumer 2019, JAN 2020). Team members can decide whether to disclose medical information to their supervisor or other team members, but it is not legal or appropriate for supervisors to pressure individuals to disclose health information. Many individuals may feel unsafe disclosing personal health information because of past discrimination or harassment from their colleagues and supervisors. To remedy this, supervisors should provide basic accommodations for all team members. This removes the burden on an individual researcher to request some

accommodations and reduces pressure and barriers that prevent qualified researchers from participating fully in field work. Additionally, supervisors must take care to maintain open, transparent, and professional communication and relationships with all team members to potentially increase comfort of team members and facilitate them disclosing important health information.

Sometimes, basic accommodations will not be enough support to make field research accessible to everyone. In these events, team members may need to disclose health information to access accommodations they are legally entitled to. At Pitt, undergraduate and graduate students may disclose their health conditions to the Disability Resources and Services office, which will advocate for any required accommodations that allow a team member to participate in field research. Pitt staff and faculty may disclose their health conditions to the Human Resources Department when requesting accommodations. If institutional resources are not available or cannot meet the needs of the researcher self-advocacy is always an option (e.g., https://askjan.org/). Supervisors and team leaders should make sure their team members are aware of these resources.

1.3 Before You Go

Research supervisors should provide team leaders and team members with the appropriate training and resources to foster positive field work experiences. Training should cover mediating interpersonal conflicts, recognizing harassment, empowering team members to protect their own personal safety, employing bystander intervention strategies when witnessing conflict, and ensuring team members are aware of available reporting mechanisms in the event of risky or inappropriate actions taken by other team members.

1.3.1 Promote leadership and develop field team codes of conduct

Field research team leaders and members must be equipped to work together under challenging and stressful situations. Supervisors should meet with teams before fieldwork begins to discuss team members' roles and responsibilities, day-to-day schedules, and provide team members the opportunity to discuss any of their safety concerns with particular emphasis on their mental and physical health concerns. Supervisors must facilitate open and transparent communication in these conversations to ensure team members feel comfortable disclosing information they deem important. Being able to brainstorm possible accommodations with a supervisor or team lead who is knowledgeable about the site and the work, and cultivating an open and transparent environment where that conversation can take place is important. Additionally, field teams sometimes consist of team members that are colleagues or have previously worked together in some regard. Supervisors should keep this in mind and facilitate

open conversation and narratives for team members to discuss any prior incidents or disclose relevant information before going into the field. Supervisors should work with team leaders and team members to develop 'ground rules' or codes of conduct that all team members agree to abide by during the trip. These should cover general safety expectations, definitions of harassment, how team members will communicate and resolve conflict together, and general behavior guidelines while in the field. Ground rules set expectations for all team members, build team member buy-in to what types of behavior are unacceptable, and provide a pathway for team members to report and flag situations that make them feel uncomfortable or unsafe (Nelson et al. 2017). Team leaders should bring written copies of the group's ground rules to the field to mediate conflicts when issues arise, and have plans for addressing violations of these rules.

1.3.2 Cultivate an inclusive environment where all team members belong

Supervisors should be thoughtful about the culture they cultivate with their research teams and consider whether team culture may exclude some team members or negatively impact team member participation and performance (Nelson et al. 2017). To make field work equitable for all, casual conversations should never include jokes about minoritized groups or social pressure to participate in group activities. Demeaning language of any kind, no matter how it is used, can create an uncomfortable environment for team members. Supervisors should clearly state to all team members that researchers have the right to choose how they spend their free time. Team members who are pressured to assimilate into the dominant group culture can quickly become emotionally and mentally tired. This ultimately leads to less energy to devote to their field tasks, which may lead to poor job performance and more pressure from the group.

1.3.3 Provide appropriate trainings

All team members should be aware of their rights to an inclusive and safe work and learning environment and their responsibilities for promoting an inclusive and safe work and learning environment for their colleagues. Supervisors at Pitt should consider organizing trainings through the Office for Equity, Diversity, and Inclusion for team leaders and members that cover preventing and responding to sexual harassment, building inclusive workspaces for people of all identities, and providing accommodations to researchers with disabilities. Supervisors may consider involving their research teams in exercises where they can practice mediating interpersonal conflicts in the field (Appendix 1). However, it is important to also recognize that training itself can be triggering for some and providing ways for individuals to undergo training outside of a group setting, or in a trauma-informed manner can be important. The CONVERGE Natural Hazards Center at UC Boulder provides some online trainings related to disasters that may be of interest to field workers.

1.3.4 Establish a strict no tolerance policy for harassment

In the field, a team member may have a limited support network and may be more likely to disclose information about harassment directly to the supervisor or another team member than to on-campus support services. Any disclosure of this nature should be taken seriously. Supervisors and team leaders should act on all harassment disclosures and validate the experiences of team members disclosing harassment. Actions may involve private discussions with the individual accused of harassment (but consider carefully when this is safe to do and when it might result in additional harm via retaliation by the accused against actual or suspected reportants), discussions with the field team, removal of individuals who are participating in harassment, or reporting of harassment to the department chair or to Pitt's Office for Equity, Diversity, and Inclusion, which houses the Civil Rights and Title IX Division that works to prevent all forms of harassment. When field teams see that codes of conduct and rules about harassment are enforced by supervisors and team leaders, team members report that their field work experiences are more positive, inclusive, and equitable (Nelson et al. 2017).

1.3.5 Understand institutional policies and procedures for preventing and reporting harassment

Supervisors should ensure that all research team members are aware of Title IX policies and procedures for preventing and responding to reports of discrimination, bias, and sexual harassment. All team members should know how to file an official harassment report with the Office for Equity, Diversity, and Inclusion. Team members should be aware of the Student Code of Conduct and how to report violations. Supervisors and team leaders should familiarize themselves with campus resources for caring for team members who are victims of sexual assault. If researchers are working at field stations not affiliated with their home institution these field stations' managers may also have official reporting protocols and requirements; however, these reporting protocols are in addition to, and not in lieu of, reporting mechanisms at the home institution.

Research team members should also be aware that at Pitt, faculty, staff, and some graduate students are 'mandatory reporters' for Title IX sexual harassment claims. Supervisors should know how to refer team members to counseling services and other supportive resources. Graduate students who are also Teaching or Research Assistants also have mandatory reporting obligations when supervising undergraduates.

1.3.6 Explicitly acknowledge power structure in field teams, and empower team members to advocate for themselves

Field teams generally are structured with hierarchical roles and responsibilities, where team leaders and supervisors have greater power to make decisions and determine tasks for team members. This power structure leads to power differentials among field

teams that may make team members feel less empowered to request things they need during field work or, even more damaging, less likely to report harassment or other dangerous behaviors by team leaders or supervisors (Nelson et al. 2017). When creating codes of conduct, supervisors and team leaders should acknowledge their positions of power within the group and make it clear that they are also held to the same professional standards as all team members. Supervisors should provide the name and contact information of *their supervisors*, who team leaders and members could contact if they wanted to discuss interpersonal problems or report harassment. At Pitt, this might be another faculty member in the department, the department chair, the field station director, or staff at Pitt's Office of Equity, Diversity, and Inclusion. Generally, team members that feel there are clear rules and accountability for *all* field crew members are more likely to feel included in field teams and safe during field work (Nelson et al. 2017).

1.3.7 Make a daily communication plan

All team members should know how to contact each other in the field. If the field site has reliable cell phone service, team members should all have each other's cell phone numbers. If cell phone service is not reliable, a team member does not have access to a cell phone, or field work is in a very remote location, supervisors should consider providing additional means of communication, such as two-way radios or satellite phones for all team members (see Section 4.3.1), and establishing a common geographical meeting location and agreed upon end of day meeting time should all communication mechanisms fail. It is a good idea to establish a protocol for action if someone fails to appear at the agreed upon time and location. It is a good idea for all team members (including team leaders and supervisors) to have emergency contact information for all other team members accessible at all times as well.

1.3.8 Provide basic accommodations to reduce stress and conflict

When field team members' basic needs are not met, stress and conflict are more likely to arise. Supervisors should cultivate a lab culture that makes it safe for everyone to request basic accommodations without further justification or fear of reprisal. Before leaving for field work, supervisors and team leaders should provide information about the living accommodations (e.g., heating/cooling available, access to electricity), food options (e.g., options for individuals with dietary restrictions), and access to private space, wifi, restrooms, water, and refrigerators at all field sites. Team leaders should schedule regular water breaks, meals, and bathroom breaks or routinely encourage team members to take breaks as needed (Greene et al. 2020). Similarly, team leads should prepare team members for the types of bathroom facilities (e.g., gendered vs. gender neutral) that will (or will not) be available at the field site.

If field teams will need to hike or use specialized vehicles (like ATVs, boats, or snowmobiles) to get to or between field sites, team members should understand what types of terrain they will be covering, the distances between research locations if teams will be moving from site to site, and the estimated physical exertion required. Walk at a speed that allows the group to stay together and remember to encourage stops for hydration. When possible, supervisors should provide vehicular transport, which will make the research more accessible for individuals with health and mobility concerns, as well as increase the ability for team members who are injured or at risk to more quickly get out of the field to safety.

Another cause of stress for team members lies in the often-overlooked, day-to-day monetary expenses of performing field research (e.g., cost of gas for vehicles, mileage on team members' personal vehicles, small supplies such as batteries or notebooks, etc.), especially if these expenses fall to team members in a non-supervisor or junior team member role. In no other field of scientific research is it expected for team members to bear the costs of performing research (i.e., laboratory scientists do not buy reagents with their own bank accounts). Because of the power dynamic that exists between supervisors and junior team members, junior team members may feel that they cannot ask their supervisors to cover or reimburse these costs. Therefore, it should be the responsibility of the PI, supervisor, and/or team leader to be upfront about how the day-to-day costs of field research are to be handled. This may mean that team members are expected to pay for these costs with reimbursement to follow, the team members are given a designated payment card for such charges (e.g., a gas card that is associated with the field vehicle), or purchases are to be made solely by the supervisor/team lead. Finally, although this may present a barrier to performing field research, if there are not funds budgeted for these day-to-day costs, the team leader must consider if it is possible to perform the field research at all.

A good night's sleep is also a basic accommodation that research teams should discuss for overnight field work trips. Sleep quality and quantity are important determinants of an individual's health and a disruption of sleep can increase the severity or frequency of symptoms of some medical conditions, leading to increased medical risk for some researchers. Additionally, insufficient sleep can exacerbate mental exhaustion and result in or contribute to poor mental health conditions of team members. Team leaders and supervisors should make sure that sleep disturbances are minimized for all team members by discussing sleeping 'ground rules' with team members. Ground rules might include designating a no-noise zone around the sleeping accommodations, 'quiet hours' for all team members, and outline activities, such as showering, cooking, or socializing, that may be disruptive to sleeping team members. If a researcher with health concerns and/or disabilities requests a change in sleeping location to reduce sleep disturbances

(farthest room from the socializing area, or a private room if available), the team lead and supervisor should accommodate this request. Team leaders should foster an environment which allows team members to feel comfortable requesting a private room when available.

1.3.9 Get rid of 15-hour field days

While there may be times that long, exhausting, field days are necessary, these types of days should not be the norm. If field work requires long sampling periods or round-the-clock data collection, supervisors and team leaders should develop a shift schedule for team members. When field teams get tired and worn out, interpersonal conflicts and the risk of declining mental health become more likely. All team members benefit from breaks in the field, but some team members with health conditions may require extended pacing of a trip, such as including scheduled “off” days to recuperate; team leaders should accommodate these needs, which will likely enhance all team members' performance and productivity. Supervisors should design research protocols and make field timelines that include built in breaks so no one has to ask for one or take one when other members are not.

1.3.10 Think carefully about the impact of alcohol

The decision to bring and/or drink alcoholic beverages deserves careful thought and should be discussed as part of an initial “ground rules” discussion with field team members. While field research and alcohol consumption may go hand-in-hand for many, it also can be a source of stress or danger for others (Viglione 2020, Pickrell 2020). Some team members may be unable to drink or choose not to drink for medical, religious, or other personal reasons; team members should never be expected to justify their choices concerning alcohol consumption. Ensuring nonalcoholic beverage options are available and erasing social pressure to drink alcohol are essential steps towards equitable team socializing.

Groups typically drink alcohol at night, sometimes very late into the evening. While casual drinking can promote team bonding, it also can also get out of control and put team members at risk. At a minimum, team members that are drinking can be noisy and cause disturbances to team members that are trying to sleep. If some team members are socializing late into the night, team leaders should address the group if they are becoming too loud or disruptive, especially if they are breaking any agreed ground rules. More concerning, is that inebriated team members may pose a risk to injuring themselves or others. Additionally, even casual drinking can lead to unwanted interactions among team members and alcohol is often used to facilitate sexual assault (RAINN 2021). Bringing alcohol into the field comes with inherent and potentially serious risks that should be considered before going into the field.

1.3.11 Accommodate nursing parents

Supervisors and research leads can accommodate new parents during field expeditions. Nursing parents need regularly scheduled breaks and private places to nurse or pump milk throughout the day. Supervisors should discuss with nursing parents their scheduling needs and privacy accommodations. Nursing parents should be supported in advocating for the time and space they need to comfortably participate in field research. If refrigeration is available at a field site, lactating parents may choose to store their breast milk or prepared formula for later use and supervisors should accommodate their request by providing access to a clean refrigerated space. For nursing parents - it is possible to do remote, multi-day field work while lactating (Shortall 2015, Scovanner 2017, Glenn 2020)!

1.4 In The Field

1.4.1 Communicate with team members

If team members are not all working at the same location throughout the day, then team leaders should make sure everyone knows the following information for all team members: 1) the location and daily plan for each team member; 2) the approximate times team member(s) will arrive at and depart from their location; and 3) how to contact each team member while in the field. All team members should know how to contact their supervisor, field station manager (if applicable), and team leader while in the field.

1.4.2 Resolve conflicts calmly

The physical demands of field work and the amount of time spent together can heighten tension and stress and can lead to more intense interpersonal interactions than in office or lab environments (Kintisch 2014). Supervisors and team leaders should address within-team conflicts or concerns. Team members can avoid conflicts by avoiding gossiping about coworkers. If conversations become tense or confrontational, researchers should take a break to calm down and collect their thoughts before coming back together to discuss a solution. Team members should listen to each other empathetically, identify the source of the conflict, and communicate effectively to find resolutions (Skiba 2020). It helps if team members are able to listen, find common ground, and respectfully engage with colleagues.

1.4.3 Don’t be a bystander

Team members working together in close-knit settings may witness harmful or dangerous incidents or situations before team leaders or supervisors are aware. Oftentimes those not actively involved may remain idle or ignore a situation, but intervening during these times is important to prevent further harm. Situations may

include witnessing harassment or mental health challenges. For example, some team members may be the target of verbal harassment or microaggressions during field work by other team members, leaders, or supervisors. How the field team responds to that harassment is critical to providing support and safety to the impacted team member. Team members may also witness behavioral or mood changes in other team members that may be experiencing mental distress or crisis. Field work and the many associated facets and challenges can be mentally and emotionally draining on field teams. Being cognizant of fellow team members' mental wellness is important to keep in mind in order to intervene and seek help before escalation and further harm.

Research supervisors and team leaders should prepare team members to intervene, support team members, and report transgressions if another team member is subject to prejudicial language or harassment or is in distress or showing signs of crisis. Developing codes of conduct (see Section 1.3.1) and practicing bystander intervention during safety trainings (see Section 1.3.3) can create safer field work experiences for team members (Nelson et al. 2017). Team members may employ skills learned in previous bystander training workshops or The 5 D's of Bystander Intervention: Be *Direct* and speak up about the incident or situation, create a *Distraction* to de-escalate the situation, *Delegate* and get help from someone else, *Document* the incident, and finally, check in with team member who was experiencing the situation if your response is *Delayed*.

1.4.4 Use a mediator to resolve serious conflicts

Serious conflicts that put a team member at immediate risk of harm should be dealt with immediately. However, when time and safety allow, team members in serious conflict should consider recruiting a third-party mediator. The mediator--who could be a team leader, supervisor, a human resources representative, an ombudsperson, or another person unaffiliated with the research team who has had training in cultural competency--should identify whether biases or cross-cultural communication or language barriers could have led to the misunderstanding, as well as if additional assistance from outside experts is necessary. Team leaders and supervisors should ensure conflict resolution talks take place as soon as is safe and possible. If supervisors or team leaders avoid assessing and resolving the conflict, they are putting their team at increased risk.

1.4.5 Remove dangerous team members immediately

If conflict or emotions escalate to threats or acts of physical or emotional violence, supervisors, team leaders, or team members must act immediately. If team members feel uncomfortable or unsafe because of conflict, they should tell a supervisor or team leader immediately. If a team leader or supervisor are not currently present at the site or

the team leader or supervisor are the aggressors, team members should take action to protect themselves and other team members. If an aggressive team member physically assaults another team member, cannot calm down, or is unable to follow instructions from a supervisor, team leader, or mediator they should be removed from the field site as soon as possible. Team leaders and supervisors should be aware of which professionals they can call on at their field site for help in these situations (but if this includes law enforcements, see section 2.1).

1.4.6 Be supportive and transparent when responding to sexual harassment

If supervisors and team leaders are mandatory Title IX reporters, they should remind team members of their reporting status to preserve the team member's privacy and agency to decide what to disclose and with whom. For supervisors and team leaders who are not mandatory reporters, they should follow the lead of the team member on whether they would like to report the incident. If a team member reports harassment, the person the victim initially reports to should listen without judgment and should not question the team member or 'investigate' the situation. The respondent's response following a disclosure is critical to making the team member feel safe and empowering them to move forward, both in the field and in advocating for equitable treatment (Ullman and Peter-Hagene 2014, BARCC). Respondents should work with team members in navigating what support the team member requires, which includes helping them leave, staying with them so they feel safe, and navigating the reporting process. If it is not possible to remove team members from the field immediately (i.e., in very remote field settings), respondents should offer to stay near the team member to prevent further harassment and increase their peace of mind.

Supervisors should be aware that the negative impacts of harassment may extend beyond the individuals directly involved in the incident. If other team members have experienced harassment or assault in the past, a disclosure of harassment by a colleague or mentee may be a trigger for that team member or supervisor. Supervisors should encourage all team members to debrief on the incident and seek external support to process their experience. Failure to address these situations appropriately will lead to negative downstream impacts on all team members.

2. Communicating With the Public & Land Managers

Even when field work is in remote locations, interactions with people outside of your research team are likely. Depending on the field site, researchers may need to work with the land managers of the site or researchers may encounter other researchers, recreational users of the site--including hikers, boaters, fishermen, bird watchers, hunters, or plant collectors--or local community members. Researchers should always

be prepared to effectively and respectfully communicate why they are conducting research, provide documentation of their authority to be at the site, and be aware of and prepared for the possibility of negative encounters. Team members with privilege (e.g., speakers of the local language, individuals who may be perceived as less foreign) should use that privilege to make encounters safer for all members of the team.

The goal of this section is to reduce the risk of negative encounters while in the field through planning, equipping researchers with the proper tools to de-escalate or disengage safely from negative encounters, and outlining mechanisms for reporting and addressing negative interactions after they occur.

2.1 Considerations for Minoritized Scientists

Supervisors and team leaders should know the variation in risks their team members may experience during field work. Supervisors should be aware that their own personal experiences, which are shaped by their personal identities, may not enable them to identify risks for team members whose identities differ from their own. Team members with minoritized identities can experience housing and food service discrimination or refused service, sexual harassment and assault, hate symbols and hate crimes, or verbal abuse, which all threaten their physical and mental safety. Additionally, just because some team members have previously had positive public interactions at a field location, this does not mean that all team members will find the same social or cultural acceptance at the site. Therefore, supervisors should consider the social and cultural context of research sites for a diversity of research scientist identities, and actively think about how some identities may be at increased risk in some situations.

There is disparity in violent and dangerous interactions with law enforcement in the United States. Black, Indigenous, and Latino Americans are significantly more likely to be killed by police officers than white Americans (Edwards et al. 2019). The vast majority of Black Ameriians (84%) say they are treated less fairly than white Americans in dealing with the police, while nearly two-thirds of Black adults and one-third of Hispanic and Asian adults report that they have been in situations where people acted suspicious of them because of their race (Desilver et al. 2020). Non-US citizens may also be treated differently. This means that interactions with law enforcement can be dangerous for some team members and that utilizing law enforcement as emergency contacts may not be viable for all situations. Additional emergency contacts may include other research team members, a research supervisor, or a local land manager or owner with whom the researcher has an established relationship (see also section 2.2.3).

When a field team includes non-US citizens and/or fieldwork is taking place internationally, supervisors should work with team leaders and team members to

address immigration related concerns ahead of fieldwork. The ACLU has good resources for learning about a person's rights in this regard.

2.2 Before You Go

Supervisors can minimize the possibility of negative encounters with people outside the research team through two pathways: gathering information about the field site and the people who are likely to be encountered there and providing training opportunities to prepare team leaders and members for risky encounters.

2.2.1 Gather information about the field site

All team members should understand the cultural and societal context of the field site and the surrounding community. If the field location is new to a team, supervisors should reach out to other researchers who have worked at the site to gather such information. If team members are working at field stations or field sites run by research organizations, they should talk with field station managers to discuss risk mitigation strategies, sexual harassment policies, and codes of conduct as well as any locations or known individuals that pose extra danger. There are locations and situations where hiring a local guide may be required by law or needed to ensure the safety of the field team. It is also important to know and respect the expectations of local Indigenous communities regarding how research is conducted and how results are to be shared.

If supervisors do not have contacts for other researchers who have used the site, they should visit the field site before conducting field work. During this visit, supervisors should establish connections with property owners, land managers, state officials, or business owners to introduce themselves, their research, and the research team. Because local communities may have different levels of acceptance for researchers whose identities differ from the dominant identity, supervisors should be thoughtful when scouting potential field locations and consider how other team members may be welcomed or whether they may be at heightened risk. If visiting a field site before starting work is not possible, then supervisors may decide that they will not begin field work until they are able to gather more information about the site or ensure that supervisors are present when starting research at a new and unknown field site to connect with site managers and local community members, and assess site safety.

Supervisors and team members can learn how to best serve and work with Indigenous communities in different ways. One powerful way, and a step in the right direction to recognize and honor American Indians and Indigenous communities abroad, is by creating and sharing land use acknowledgements when disseminating your research. Here, for example, is a land acknowledgement for the University of Pittsburgh, and

information about land acknowledgements, provided by the Office of Sustainability. If researchers would like help to learn more about American Indians and Indigenous Land Use in the greater Pittsburgh Area or would like help in drafting their own land acknowledgement, they can contact the local Council of Three Rivers American Indian Center. For researchers working outside of Southwestern Pennsylvania, the following websites may be useful resources: https://native-land.ca and https://nativegov.org/resources/.

2.2.2 Prioritize field work sites that are safe for everyone

Unfortunately, there are certain field site locations that are embedded within a larger community setting that will be hostile to some team members, regardless of a supervisor's thoughtful intent and pre-planning. This represents a real and insurmountable barrier for some field biologists and imposes inequity in our profession. Supervisors and team leaders should prioritize field research at locations that are safe for *all* researchers or that have infrastructure and facilities that are equipped to foster safety, support researchers, and minimize risk. Prioritizing research at field stations that have dedicated, full-time facilities, staff, and a culture of equity and inclusion may be one of the best ways to promote equity in access to and safety at field sites for all researchers.

2.2.3 Train and prepare team for communicating with the public

Supervisors should work with team leaders and members to develop strategies and practices to employ when they encounter non-team members while out in the field. Supervisors and team members should seek relevant training opportunities that increase personal safety (such as self-defense training), increase the safety of colleagues (such as bystander intervention training), or that build awareness of local customs and cultures (such as cultural history courses about field site locations). When these trainings are not available, supervisors can lead their own training using example scenarios of situations that may be encountered at the field site (Appendix 1). Team members should prepare and learn how to communicate for themselves and advocate or intervene for a team member. While typical science communication training workshops prepare researchers to discuss their work with other researchers or an *interested and engaged* general audience, researchers should also be prepared to explain their research to a wider and potentially more skeptical audience.

Supervisors and team members should have a plan for researchers to follow should interactions with the public become negative or unsafe and a way to document negative community interactions (Appendix 2), which will assist in preparing and planning for future field work at that site. Supervisors may also consider sharing this incident log with other researchers or supervisors at their institution who conduct research at that field

site to increase accessibility to information about risks to researchers outside of the immediate research group.

Researchers should be encouraged to leave a field site if they feel unsafe and researchers should have multiple emergency contact options. Supervisors should be aware that for some team members, 911 or local law enforcement may not be a viable emergency contact, emphasizing the importance of having multiple emergency contacts. Additional emergency contacts may include other research team members, a research supervisor, or a local land manager or owner with whom the researcher has an established relationship.

2.2.3 Acquire research permits and permission

Field work should never be conducted on a property without permission from the owner of the property and discussions with the individuals who are in charge of the day-to-day management of the site. Supervisors should determine what agencies or organizations manage or own the site and what documentation is needed to conduct research at that site with their specified organism(s) of study. Cooperation and communication with multiple agencies or organizations may be necessary to complete official permitting documents. Permits to conduct research and for the collection and exportation of samples can differ based on the state or country in which you are working, who owns and manages the site, what type of organism the team is studying, and whether the field sampling is observation, experimental, or requires removal of materials or organisms from the site. Because obtaining the necessary permits can be a complex and lengthy process (up to years!), supervisors should budget ample time prior to the field season to complete this task.

Depending on the owner of the potential field site property, it may not be clear who to contact to obtain permission for field work. While most state and federal agencies will have information about permitting on their website, smaller municipalities or private landowners, like land trusts, may not have explicit permitting instructions on their websites or obvious staff to contact for permitting information. If a research team is working near a research field station, supervisors may reach out to the field station’s manager to ask about permitting information for other properties in the area. Supervisors may also try contacting researchers who may have previously worked at a specific site or site managers who manage other sites owned by the same organization or agency. Supervisors should always verify permitting information with the land manager of the site.

2.2.4. Learn all site rules, regulations, and protocols

Once supervisors have acquired permits for field work, they should familiarize themselves with the specific rules and protocols that the land manager or owner requires of permit holders and inform field team leaders and members about relevant rules. Protocols can vary depending on the land manager, ranging from annual reporting on field activities to daily notifications of when the researcher enters and exits the property. Additionally, supervisors should inquire who to contact to report problems--such as vandalism or illegal activities like trash dumping, plant harvesting, logging, or out-of-season hunting--and applicable codes of conduct.

2.3 In The Field

2.3.1 Be prepared to provide credentials and permits

While in the field, team members may want to visually distinguish themselves as members of a research team by wearing clothing and field gear that signal institutional or organizational affiliations. Supervisors can assist with this by providing lab or departmental gear like hats, t-shirts, jackets, vests, or field bags with institutional logos or colors. Likewise, some researchers may opt to carry field gear such as binoculars and hiking backpacks that can also signal “field research”.

Similarly, team members should always be prepared to provide ‘credentials’ or documents of affiliation, including student identification cards, business cards with the supervisor’s name and contact information, or letters from the supervisor on organizational letterhead. For researchers working in international field sites, carrying passports and/or visa documentation may be required or prudent. Researchers should always have multiple copies of all appropriate / possible research permits or other paperwork in their field bags and vehicles. When team members are not driving vehicles that have visible institutional affiliations, researchers should also have stickers or magnets to place on the exterior of their field vehicle. Team members may also place official letters on institutional letterhead or business cards on the interior of the vehicle dashboard.

Team members should use their situational awareness to judge whether providing credentials will escalate a conflict, or whether another action, such as leaving the field site, is more prudent.

2.3.2 Don’t be a bystander

Some team members may be the target of harassment during field work by someone outside the field crew. Team leaders and team members must intervene immediately by actively and visibly supporting the harassed team member by employing strategies

learned in team trainings (see Section 1.3.3) or in bystander training (see Section 1.4.3).

2.3.3 Leave unsafe field sites immediately

Interactions can turn negative or unsafe at any point. If a team member finds themselves in a situation that they feel is unsafe or will become unsafe for any reason, they should be empowered to leave the field site at their own discretion. If this occurs, team members should contact their emergency contacts as soon as possible.

3. Bringing Children into the Field

Many field researchers--especially those early in their training and career--are juggling the responsibilities of caring for children. Researchers who bring children into the field overwhelmingly report that that the experience is positive--both for the researcher and the children--but that challenges are common (Lynn et al., 2018). Supervisors and research leads can help team members balance field work safety and familial obligations by supporting and accommodating researchers with dependent children.

3.1 Considerations for Minoritized Scientists

Childcare responsibilities disproportionately affect female researchers relative to male researchers; male researchers are significantly more likely than female researchers to leave children at home with the other parent while conducting field work. Female researchers are significantly more likely to bring or hire an additional person on field trips to care for children (McGuire et al. 2012; Lynn et al. 2018).

Socio-economic inequalities exist in field research as well. Researchers who come from more privileged socioeconomic backgrounds will have more resources to subsidize costs of childcare in the field (paying for travel and accommodations for children and extra caretakers) or may be more able to draw upon free labor of grandparents or other family members (Lynn et al. 2018). Because many granting agencies will not allow research funds to be spent on family care during field work, these represent out-of-pocket expenses that more privileged researchers are more likely to afford.

3.2 Before You Go

3.2.1 Be supportive

Support from supervisors and colleagues can significantly impact the ability of researchers to fulfill field research and childcare responsibilities. Supportive supervisors and colleagues can alleviate stress on these individuals and increase their productivity. Many early-career scientists--especially women--report that they delay starting a family because of perceptions that conducting field research and having families are incompatible (Lynn et al. 2018). Researchers that do have young children may not even consider asking to bring their children with them; supervisors that feel they can accommodate families during field work may bolster the research productivity of their trainees by suggesting that they are open to accommodating families.

3.2.2 Discuss accommodations

If a researcher opts to bring their children into the field, they likely will need additional accommodations. These accommodations may include extra space to carry kid gear or

to accommodate additional people that may join to help with childcare responsibilities. Likewise, children will need safe spaces at field sites that are away from dangerous equipment, environmental conditions, or chemicals commonly encountered in research. Supervisors and researchers should explicitly talk about how to cover additional expenses, especially because many granting agencies will not allow grant funding to cover costs of childcare at field locations. Accommodating supervisors that can creatively leverage resources to facilitate childcare during fieldwork can greatly increase equity for field researchers with children.

3.2.3 Consider conducting research at field stations

Field stations with family-friendly policies can be a boon to field researchers with dependent children. Infrastructure at field stations can provide safe environments for children and their caretakers to stay while parents are physically “in the field” conducting research.

3.3 In The Field

3.3.1 Be flexible & adjust expectations

Fieldwork with kids will likely be more difficult and require a more flexible schedule to accommodate parent and child’s needs. Meeting research goals may take longer with children present than without children, and so researchers should either plan for more time in the field or adjust expectations for how much research can be accomplished within a given time period. However, supervisors and research leads who accommodate parental flexibility will ultimately gain, not lose, in research productivity; if parents lack accommodations and are ultimately forced to stay home to provide childcare, they will get zero field research done.

4. Understanding Field Site Risks

Field work entails both biotic risks (from animals, plants, and microorganisms) as well as abiotic risks (such as the weather and the study site terrain). Supervisors and team leaders should identify potential risks in a given field location ahead of time and make plans to mitigate them. When possible, supervisors should visit field sites and consult with local officials to determine the site-specific risks prior to sending field teams to collect data. If pre-assessment of risks are not possible, supervisors should make sure that they, or another equally-experienced field team member, joins field teams for the first time working in a new location. Many of these risks can be ameliorated with proper planning and training, including field safety courses, well-stocked first-aid kits, emergency plans, and protective equipment.

It is the supervisor's responsibility to establish that team leaders and team members understand that their safety is a top priority during field work. Supervisors need to set clear rules and expectations that prioritize safety over data collection, and team leaders and team members should have authority to determine when field site risks are too high and they need to stop work and leave the site. Field team members are responsible for reviewing all safety materials provided and completing any required training. Team members should follow all safety protocols and report identified hazards to the team leader/supervisor.

4.1 Considerations for Health and Disability

Appropriate field clothing and personal gear can be expensive and may not be affordable for all team members. While cheaper clothing--like blue jeans, cotton t-shirts and socks--or shoes like sneakers are suitable for some field sites or for single-day field work trips, cotton clothing does not dry quickly, can be very uncomfortable when wet, can cause rashes and skin abrasions, and can be dangerous when temperatures are cool. Sometimes, pricey specialty clothing and shoes are necessary for safe fieldwork because inexpensive alternatives may be too uncomfortable or may put the researcher at greater risk of injury.

A variety of health conditions may interact more severely with certain environmental risks in the field. By adequately preparing team members for the types of conditions they will encounter during field research, supervisors can allow team members to assess their own safety and decide if they should disclose personal health information to reduce risks. Here are some general considerations supervisors and team leaders may need to account for when assessing risks:

- The altitude of a field site may ameliorate or exacerbate pre-existing health conditions or certain types of medications may make a team member more susceptible to sunburn.
- Team members with allergies may be at greater risk from stinging insects that can cause anaphylaxis or from plants producing copious amounts of pollen.
- Team members with asthma may be at greater risk when working outside when air quality is poor.
- Team members with lower visual or auditory acuity may be less likely to quickly respond to dangerous animals, like venomous snakes or approaching large mammals.
- Team members with mobility-related disabilities are at higher risk of injury when traversing uneven terrain, or during natural disasters like flash floods.
- Some insect-borne diseases carry greater risk for pregnant women and/or their developing baby. Mosquito-vectored illnesses like Zika virus, Chikungunya virus, Yellow Fever, Dengue Fever, Bunyamwera, malaria, and Japanese encephalitis, tick-borne illnesses like lyme disease, babesiosis, tick-borne encephalitis, relapsing fever, rocky-mountain spotted fever, and fly-borne illnesses like Chagas disease and Leishmaniasis have all been associated with adverse pregnancy outcomes (Bodie-Willams and Knowles et al. 2016, O'Kelly and Lambert 2020).
- Heat exposure poses extra risks to some team members. Team members who need to wear compression socks for a variety of health reasons, those who wear chest binders to ameliorate gender dysphoria, and persons taking certain medications are at increased risk of heat exhaustion and heatstroke.

4.2 Before You Go

4.2.1 Make access to necessary field gear equitable

Supervisors should provide necessary field safety clothing and equipment (Appendix 3) to all team members. In some instances, this might include providing the right types of durable hiking boots, waders, or quick-dry pants or shirts that some team members may not have the resources to afford on their own. When feasible, this gear could also have organizational logos to increase safety for researchers in the field (see 2.3.1). In other instances, supervisors may need to provide the whole team with additional field gear including work gloves, safety blaze-orange vests, waders, snake chaps, life jackets, face masks, insect head nets, or helmets. Team leaders should inspect reusable gear for wear and tear and replace items that are ripped, degraded, or no longer safe for use. Team leaders should maintain a checklist of the necessary field gear and equipment to make sure everything is packed for the trip.

4.2.2 Safely store hazardous chemicals

Common chemicals used in field work include gasoline, ethanol, formalin, compressed gasses, and radioisotopes. Team leaders should label storage containers and safely store hazardous supplies, especially those that are toxic, flammable, or combustible. Supervisors may need to apply for special approval for transporting these chemicals. When handling field chemicals, team members should wear personal protective equipment and be trained in correct and safe usage. Supervisors should contact their university's Environmental Health and Safety department (for Pitt: safety@ehs.pitt.edu) for training, best practices, and approval regarding transporting, working with, and disposing of hazardous materials.

4.2.3 Handle biological materials and sharps appropriately

Field work that involves animals often requires members of the field team to come in contact with biological materials (e.g., blood, tissue, fecal matter, etc.), which has the potential for close contact with pathogens. All team members must complete University required training (Bloodborne pathogen training), and receive appropriate, hands-on training from the team leader / supervisor demonstrating proper techniques for safe handling of biological materials. Team members should bring an abundant supply of the appropriate personal protective equipment with them in the field.

Another known hazard for field teams involves the use of sharps (e.g., knives, scalpels, razors, needles, glassware, capillary tubes), and the risks associated with pathogen exposure from a sharps-related injury. All field team members should be trained in the safe and proper usage of any sharps. All sharps must be disposed of in an approved sharps container to prevent potential exposure. Any sharps-related injury should be medically treated, documented, and reported to Pitt Environmental Health and Safety.

4.2.4 Know how to operate dangerous field equipment

Some field equipment can cause significant injuries if team members are not trained on how to safely use them. Common dangerous field equipment includes chainsaws, firearms, and power tools. Supervisors should provide proper training and access to personal protective equipment to team leaders and members using this equipment. If firearms are necessary for research, supervisors should check local and state rules pertaining to firearm permitting, use, and safety. For fieldwork in Pennsylvania, supervisors can see the Pennsylvania State Police rules and regulations for carrying firearms.

4.2.5 Avoid dangerous animals and plants

Animals and plants that are big and small can transmit parasites, toxins, or venom. Team leaders and members should know how to avoid dangerous animals, how to

behave if they get too close to a dangerous animal, and what to do if the animal charges or attacks. Team members should never approach large mammals, especially females with their young. Team leaders and members should also know how to identify poisonous or noxious plants, which can cause blisters and rashes that can range from minor irritations to painful and disfiguring conditions. Before a team enters a field site the team leader should make sure team members are aware of the dangerous animals present and know how to respond to them if they are encountered.

4.2.6 Prevent insect-borne disease

Supervisors can minimize team member exposure to insect-borne diseases by providing team members protective equipment and insecticide, and training team members on preventative measures that can reduce insect encounters or disease transmission. Pregnant team members should be aware of the potential insect-borne diseases prevalent at a field site, especially of those diseases that may be more dangerous to pregnant researchers. Standard protective equipment may include mosquito nets (for sleeping), head nets, coveralls, or permethrin-treated clothing. Common insecticides include insect repellents containing DEET or permethrin (for clothing only!) and picaridin (safe for skin). Supervisors should provide researchers with information on the common types of biting insect and insect-borne diseases at their field site, including what risks are present, how to identify symptoms of these diseases, and where to receive treatment. Supervisors should encourage researchers to use preventive measures while in the field or after their return, including both treatment of symptoms and testing for diseases. For example, the Pennsylvania Tick Research Lab offers free testing of attached ticks for tick-borne diseases.

4.2.7 Prepare for the entire range of possible climate conditions

One of the most dangerous factors in the field is the weather. When field teams are unprepared for all possible climate conditions, they put themselves at extreme risk. Extreme hot or cold temperatures can be life threatening. Wet feet get blisters that can prevent team members from walking; wet bodies are susceptible to hypothermia, even in mild temperatures. High humidity increases the risk of heat stroke even when temperatures are not extremely high, because sweat evaporates less. Supervisors should make sure that team leaders and members are aware of the range of climate conditions they will experience during a field trip so they can pack accordingly to keep themselves comfortable no matter how hot, cold, or wet the field site may get.

For field sites with cell phone service or internet access, team leaders and members should have reliable weather forecast websites and apps on their cell phones or computers. For field sites without internet or cell phone service, team members should have a shortwave radio. Sudden rain storms can disrupt communications or cause

floods or landslides that can disrupt travel, so team members need to be able to track changing weather conditions to keep themselves safe.

Team leaders should also be aware that air quality could also dictate when it is safe for field crews to work. Forest fires can create toxic smoke that can travel hundreds of miles away from the actual fire; air pollution from human combustion of fossil fuels in and outside of cities can make air quality so poor that it is unsafe to be outside. When possible, team leaders should check current air quality forecasts each day.

4.2.8 Prepare for terrain obstacles

Terrain obstacles such as fast-flowing water, rocky terrain, and ravines can prevent access to field sites, cause harm to researchers, or make navigation more challenging. Supervisors should provide information to team members about navigation of terrain obstacles, including empowering researchers to decide to leave research activities unfinished when these obstacles preclude their safe completion.

4.2.9 Prepare for natural disasters

Depending on the field site and season for field work, field teams need to be equipped to respond to natural disasters like fires, flash floods, landslides, or avalanches. Navigation, by foot or by vehicle, can become dangerous when visibility becomes poor owing to fog, smoke, haze, hard rain, or snow. Flash floods and landslides can make roads or trails impassable, trapping vehicles or team members traveling on foot. For remote field sites with high natural disaster risks, supervisors need to coordinate evacuation plans with field team leaders and members. Team leaders should consider the mobility of team members when creating evacuation plans to make sure that all team members can get out of field sites quickly and safely. Supervisors may need to delay field work or avoid field sites that have such a high risk of natural disaster that some team members with limited mobility cannot safely navigate.

5. Transporting Field Teams Safely

The use of motor vehicles, including cars, trucks, and watercraft, can be a dangerous aspect of field research. It is important that team members complete proper training and preparation before driving or boating for field research. This is particularly important if field teams are traveling to new locations, to areas with limited cellular reception, or to areas with unpaved roads. Driving and boating in remote and unfamiliar locations requires advanced planning to identify hazards and mitigate risks before leaving, and during fieldwork, to ensure everyone is safe in the field.

5.1 Considerations for Minoritized Scientists

Because of societal inequities, team leaders and team members should be aware that the presence of local law enforcement to help with a vehicle accident or broken vehicle may pose increased risks for certain team members (see Section 2.1). Team leaders should talk with team members before calling local law enforcement for help and involve team members in decision-making about how the team will interact with the police in the event of a vehicle accident.

5.2 Considerations for Health and Disability

Some vehicles are less safe or less accessible for people with limited mobility. Supervisors can select vehicles with some basic accommodations (see below) to make vehicles more accessible, but supervisors should never make assumptions about the needs of a team member who has disclosed that they have limited mobility and instead consult with that team member to understand all necessary extra accommodations. These accommodations may include selecting vehicles that are not too low to the ground, ones that can be appropriately outfitted with assistive devices, such as hand control or pedal extensions, or one that has large enough storage capacity to accommodate assistive devices that a team member may need in the field.

5.3 Before You Go

5.3.1 Know the ‘ins and outs’ of the field site

Supervisors and team leaders should know exactly what route(s) the field team will use to get to their field site and what road conditions the team will likely experience. If possible, team leaders should visit field sites to check road conditions and to determine where they can park vehicles safely and alternative exit routes in case the main travel route becomes impassable owing to flooding, mudslides, landslides, or other adverse conditions. If the field team will be traveling off-road, team leaders should ask park rangers or other officials about typical road conditions to ensure that the field vehicles meet clearance and horsepower requirements. Immediately prior to trip departure, the

team leader should check transportation alerts for recent road closures or other hazards. For field work in Pennsylvania, the Pennsylvania Department of Transportation maintains an online map of current road conditions and travel information. Additionally, researchers who are working in areas with spotty cell service or unmarked roads should also download an off-line version of the study area on Google Maps for reference when service may not be available. Having a paper map as a backup is always a good idea, in case cell phone batteries die or a phone gets lost. Researchers should also know ahead of time who to contact for help in the event that a field vehicle breaks down. Keeping this information inside the vehicle (e.g., in the glove compartment) is a good idea.

5.3.2 Determine the appropriate vehicle

Before leaving for the field, supervisors should work with team leaders to determine the types of vehicles the field team will need to get to the field site. Team members may need cars, motor boats, paddle boats, ATVs, a truck with a trailer, or snowmobiles, which all may require different types of insurance, driver's licenses, and training. Regardless of the type of vehicle, the team leader should ensure that all possible safety devices (e.g., seatbelts, life vests, etc.) are functional and being used appropriately by the team.If field teams will be driving off-road or in areas with poorly maintained roads, they should have (and be trained to use) a vehicle with high-clearance, 4x4 or all-wheel drive, and a recovery kit with a winch, tow rope or cable, and a traction mat. Researchers' personal vehicles are often inappropriate for field research. Even when they can be safely used, it is important to discuss ahead of time the liability implications in case of an accident, as well as how the researcher who is providing a personal vehicle to the project will be reimbursed (e.g., via reimbursement for gas or provision of mileage reimbursement).

Supervisors can increase vehicle accessibility for all researchers by selecting vehicles that have the widest range of accommodations. For example, high clearance vehicles should either have a drop-down step or team leaders should bring a small, collapsible step stool to facilitate easy entry and exit from the vehicle. When selecting ATVs or other off-road vehicles, supervisors should make sure these have seat belts and that properly-fitting helmets and balance supports are provided that do not require a lot of physical exertion to remain in the vehicle.

5.3.3 Ensure multiple team members can operate each vehicle

Supervisors should make sure that a minimum of two team members have driver's licenses, authorization, and experience operating the types of vehicles used during field work (e.g., manual vs. automatic transmission). A field team with a single driver may get stuck if the only team member who can drive the vehicle is incapacitated. If team

members report dangerous driving by other team members this should be taken seriously by team leaders and supervisors and remedied quickly.

Boating

Supervisors should ensure that multiple team members have proper licenses, insurance, and safety certifications before allowing field teams to operate boats during research. Pennsylvania offers an online boating safety course that meets licensing requirements. Supervisors may consider having at least one team member complete a lifeguard training course depending on the field conditions and time team members will spend on the water.

Supervisors should also confirm that all team members have received boat safety training and can swim. Team leaders should check that every team member has correctly-fitted life jackets in the boat, that all team members know where life jackets are stored, and that all life jackets are easily accessible.

ATVs and Snowmobiles

Supervisors should ensure that multiple team members have proper helmets, licenses, insurance and training for driving ATVs or snowmobiles used during fieldwork. The Pennsylvania Department of Conservation and Natural Resources offers an online ATV safety course and an online snowmobile safety course that meets Pennsylvania safety certificate requirements.

5.3.4 Renting vehicles

Supervisors at Pitt can rent vehicles through Concur. Typically, team members must be over 21 to drive a vehicle rented through the University. All designated team member drivers must present their driver's license to the rental agency staff to be listed as an official driver of a rental vehicle.

5.3.5 Make sure you have proper insurance coverage

Pitt supervisors who rent vehicles through the University should decline additional vendor-provided insurance for domestic rentals. The University of Pittsburgh provides full liability and physical damage insurance for accidents and losses in the United States, Canada, and Puerto Rico. Team leaders should make sure that all rental vehicles have a copy of Pitt's Financial Responsibility Insurance Identification Card and 'What to do in case of a motor vehicle accident' in the vehicle. If supervisors are renting vehicles for international fieldwork, they can purchase additional insurance through the rental agency.

It is important to know that personal vehicles are not covered by Pitt's insurance policy. Team members who drive their own vehicles must carry their own liability and damage insurance and are responsible for deductibles. If team members drive their own personal vehicles, they should have a copy of their insurance in the vehicle at all times.

5.3.6 Inspect all vehicles before leaving for field work

Supervisors or team leaders should inspect all vehicles, both rental and personal, before heading out to the field. Field vehicles should have current state-required inspection and recent oil change that will not expire during the fieldwork travel dates. Field vehicles should also be stocked with appropriate safety equipment (Appendix 3). Supervisors should make sure someone checks field safety equipment at least once a year to replace any items that have expired. If field teams will be in very remote areas with limited access to car mechanical stores, supervisors should make sure field teams have extra supplies like vehicle fuel and oil, windshield wiper fluid, and extra safety equipment to last the duration of the trip.

5.4 In The Field

5.4.1 Check vehicle and road conditions each day

Each day before getting into field vehicles, team leaders should go over the list of safety equipment (Appendix 3) and replace any missing supplies.

Cars and Trucks

Team leaders should make sure that vehicle's oil level, tire air pressure, and windshield wiper fluid are full, that there are no vehicle warning lights on the dashboard, and that all headlights and taillights are properly functioning. If possible, team leaders should check local weather and road conditions to make sure driving to and home from your field site will be possible that day. Team members should carry their drivers license on them, observe all local traffic laws, and make sure everyone in the vehicle is wearing a seatbelt.

Boats

All team members should wear a life vest while using watercraft. All boats should have a paddle and tow-rope on board. When loading boats each day, team leaders should check that sufficient fuel is on board and make sure that the total boat load--including people and field equipment--does not exceed the safety weight limit. Team leaders should check weather conditions for the day and not leave port if adverse conditions like fog or storms could prevent a field teams return to port are expected during the day.

5.4.2 Park vehicle safely at field site

Many field sites do not have designated parking areas for vehicles and field teams may need to park vehicles off the roadside. Team members should make sure that they are parked as far off the road as possible. If parking along a road, field teams should try to park vehicles at wide points in the road with good visibility in both directions, so that cars traveling in the road are not suddenly surprised by parked field vehicles. Field teams should respect 'Private Property' and 'No Trespassing' signs by never parking vehicles in areas where property rights are not clear. Field teams should be aware of their surroundings and if they feel uncomfortable parking a vehicle at a research site, they should leave the site.

Team leaders should make sure that parked vehicles are identifiable as part of the research institution (See Section 2.3.1)

5.4.3 Prevent theft and vandalism by removing valuables from vehicle

Supervisors should check with local officials about risks of vehicle vandalism and theft at new field sites. If field teams will be working far from their parked vehicles, they should lock vehicles and remove all items from the vehicle. Team leaders should make sure that valuable items like cell phones, cameras, instruments, laptops, or other electronics are not visible, and ideally not left inside a field vehicle. If bags or backpacks are left in the vehicle, they should be hidden underneath seats or in vehicle trunks.

5.4.4 Stay calm if you have an accident

If a team member driving a university-rented vehicle is in a car accident, they should follow instructions from the 'What to do in case of a motor vehicle accident'. ***If there is an injury, have someone call 911 immediately.***

If the vehicle can still be driven, the team member should move the vehicle out of the path of traffic. All team members should get out of the vehicle and stand a safe distance from the road, and the team leader should turn on the vehicle's emergency lights.

If the accident involves another person, the team leader should call the local police, or if the accident occurred near or on campus, the university police (412-624-2121). The team leader should collect contact information and details from the other person, including their name and phone number. If the accident involved another vehicle, the team leader should also request the other person's license plate number, insurer, and insurance number. The team leader should take photographs of any damage to any vehicle, if possible, and if there are other witnesses not involved in the accident, request their names and phone numbers as well. Team leaders should not assume responsibility for an accident and call the supervisor as soon as possible to provide all

the necessary information. Supervisors should report the accident to the University and the rental agency immediately.

5.4.5 Stay calm if your vehicle gets stuck

Field vehicles can get stuck in mud, snow, ice, or sand, but luckily a well-prepared field team with a well-stocked field vehicle can likely get their vehicle unstuck from many situations. Do not drive through floodwater; wait until water recedes or follow an alternative (non-flooded) route. If a vehicle becomes trapped by floodwater, and the water is not moving, leave the vehicle and head for higher ground if possible.

In the event a vehicle gets stuck, all team members should exit the vehicle and stand a safe distance from the vehicle. No one should stand or sit downhill from a stuck vehicle. Team leaders should direct team members to help use tow equipment, winches, shovels, sand, track mats, or other equipment to unstick the vehicle.

If the field team is unable to move the vehicle, then the team leader will need to call for help. If the team is working on public lands or a field station, the team leader may be able to call the local ranger station or field station manager for help. If the team is close enough to a town, the team leader may be able to call a tow truck. In the event the field team gets stuck in an area with no cell service, the team leader should use a roadside emergency flare to seek assistance.

6. Preparing for Medical Emergencies

Like any type of research, there are inherent medical risks while conducting field research. Supervisors should ensure that in the event of a medical emergency while in the field, team members are equipped to respond to the emergency quickly and calmly.

6.1 Considerations for Minoritized Scientists

Racial and ethnic disparities in healthcare are common, and may be more likely in rural healthcare facilities. For example when comparing white, Black, and Hispanic patients at emergency medical departments, Black and Hispanic patients are less likely to be given high-urgency scores for admittance, are more likely to experience longer wait times, are less likely to be admitted to the hospital, and are more likely to die in the emergency medical department or hospital (Zhang et al. 2020). Transgender and nonbinary scientists can also experience difficulties or lack of care when interacting with new and unfamiliar healthcare providers. Therefore, it may be important to have colleagues accompany minoritized scientists at medical facilities, and to advocate when minoritized scientists are not receiving requested medical care.

6.2 Considerations for Health and Disability

A team member should decide what medical information they are comfortable disclosing with supervisors and team leaders. Team members are encouraged to disclose any medical information about allergies or health conditions that may require emergency treatment while in the field. While team members are not obligated to disclose personal medical information, telling a supervisor, team leader, or another field member about prescription medications, like EpiPens, asthma inhalers, or seizure medication, and/or medication allergies increases the team member's safety in the event of a medical emergency. Team members may feel more comfortable designating a 'field buddy'--who may be a peer or supervisor--who is aware of the location and use of emergency or rescue medications, location of medical ID bracelets or tags, and can communicate with emergency first responders in the event of an emergency.

6.3 Before You Go

6.3.1 Complete appropriate medical trainings

If team leaders and team members will be conducting field research in remote field locations, supervisors may consider providing Wilderness First Aid or Wilderness First Responder training for their team members. These courses typically are multi-day courses that cover the basics of emergency first aid in the field, such as heat or cold related exposure emergencies, bone injuries, serious allergic reactions, and hypothermia. Supervisors can search for in-person classes at www.wildmed.com or

online courses at (https://schoolfa.teachable.com/p/wilderness-first-aid-certication-course1; https://www.base-medical.com/home)

6.3.2 Write a field safety plan that outlines possible risks

Supervisors should write a field safety plan (Appendix 4) that lists anticipated risks at the field site, establishes mitigation plans to reduce those risks, and outlines what to do in case of an injury. At a minimum, field safety plans should include standard operating procedures and location and phone number of the nearest emergency medical facility. Supervisors will likely want to make more detailed plans if field research will be in very remote locations or foreign countries. Supervisors should review safety plans with team leaders and team members prior to the start of field work so team members can anticipate and prepare for all known risks. Team leaders should carry multiple copies of the plan with them during the trip. Making an electronic version of a daily field safety log form (e.g., using JotForm or Google Forms) accessible by QR code that can be easily submitted via email to supervisors after each field day is a good way to operationalize such a plan.

6.3.3 Assemble a well-stocked First Aid Kit

Supervisors should have a well-stocked first aid kit for field work (Appendix 5). The extent of the first aid items should depend on how far the field site is from medical facilities, how many days the field team will be out in the field, and the specific medical needs of field team members. All first-aid kits should contain a short list of action items to follow in the advent of a medical emergency (Appendix 6). This document ***should not*** be considered a substitute for first aid training for team members.

6.3.4 Ensure proper medical coverage

For international field work, supervisors should make sure all team members have adequate medical coverage in the event of a medical emergency. Pitt supervisors should pre-register the field work trip with Pitt Global Operations Support (https://globaloperations.pitt.edu/trip-registration/). This program offers comprehensive health and security coverage to Pitt faculty, staff, and students traveling abroad on University business and on University programs and activities. For more information, see https://globaloperations.pitt.edu/traveling-abroad/insurance-coverage. *Note: This program only provides insurance for Pitt-affiliated students, staff, and faculty. If supervisors have team members from other institutions, they will likely need to verify additional medical coverage from the members' home institution.*

6.3.5 Get necessary immunizations

Supervisors should make sure team members are aware of recommended vaccinations for domestic and international travel. Supervisors can find a list of recommended vaccinations for international travel through the Center for Disease Control (https://www.cdc.gov/vaccines/index.html). At Pitt, student team members may be able to get some vaccinations at Student Health (https://www.studentaffairs.pitt.edu/shs/immunization/vaccines/) and staff team members can contact Pitt's MyHealth@Work for employee vaccination coverage. It may not always be possible for team leaders to cover the cost of team members' travel vaccinations, but when it is allowable by the funding source this should be standard practice.

6.3.6 Provide General Liability insurance

Some land owners or property managers may require documentation of General Liability Insurance. At Pitt, supervisors can request a Certificate of Insurance from Pitt, which can take up to 10 days to receive, here: https://www.risk.pitt.edu/insurance/certificate-insurance.

6.3.7 Be a responsible 'field buddy' when a colleague discloses personal health information

If a team member chooses to disclose private health information, the designated 'field buddy' should ask the team member how they can help, details about specific tasks where the team member may need assistance, and all necessary information needed to complete those tasks. If a field buddy feels they are unable to support their team member safely, they should let the team member know. Field buddies should never disclose private medical information without the team member's permission. In the event a team member needs assistance, field buddies should follow the lead of the team member because they know their own personal needs the best. In the event of a medical emergency and the team member is unable to advocate for themselves, field buddies can then share necessary private health information of the team member with first responders.

6.4 In The Field

6.4.1 Stay calm and follow emergency plans if a team member is unconscious or has a life threatening injury

In case of injury to you or a team member, remain calm. Team leaders should coordinate the team's response. If an injured team member is unconscious or the injury is life threatening, the team leader should have someone call 911 immediately. The dispatcher can work with the field team to stabilize the team member and to determine

how to get the injured team member the quickest medical care. If field teams are in remote locations that do not have cell phone service, team leaders will need to rely on the first aid training (see Section 6.3.1) to stabilize the injured team member and then follow the field safety plan (see Section 6.3.2) to efficiently and safely evacuate the injured team member. Team leaders and members can refer to the medical emergency procedures in the first aid kit (Appendix 6) to guide them through the most important steps in a medical emergency.

6.4.2 Administer first aid to non-life threatening injuries

If the injured team member is responsive and does not have a life-threatening medical emergency, team leaders should refer to their first aid training (see Section 6.3.1), wilderness medical guides, and the medical emergency procedures (Appendix 6) packed into the first aid kit. After the injured team member's injuries are stabilized, the field team can discuss whether the team member needs to seek further medical attention and how to transport the team member to a medical facility.

7. Returning From a Field Trip

Upon returning from a field trip, supervisors should meet with team leaders and members to discuss the experience. These discussions should go beyond asking about the success in collecting data or establishing experiments; supervisors should debrief with the field team to celebrate their accomplishments, and discuss unsafe or risky interactions or injuries that occurred during the trip. The purpose of these discussions is for supervisors and team members to assess whether or how the trip was unsafe, discuss how the team handled the risk, how the team could better prepare for similar risks in the future, and address any additional questions, comments, or concerns.

7.1 Check in with supervisors about negative or risky interactions within field teams or with the public

During this discussion the supervisor should ask about any interpersonal team issues that arose during the field work or any negative or positive encounters with the public. Team leaders and members should debrief on the details of the interaction, how the team responded, whether the team was prepared for the interaction, and how the team could prepare for a similar interaction in the future. Supervisors may refer team leaders or team members to counseling services or mental health providers after negative interpersonal interactions. Pitt students may use Pitt's Counseling Center to find services while faculty and staff may reach out to the Office of Human Resources.
If you require immediate support, you can access free help 24/7 from these resources:

- Resolve Crisis line: 1-888-796-8226
- Text Crisis Line: Text HOME to 741741
- Sexual Assault support: 1-800-656-4673
- Suicide and Crisis Lifeline: Dial 988 from any phone, anywhere, any time

7.2 Report negative or unsafe encounters

Supervisors should work with team members to file an incident report for negative interpersonal interactions or interactions with the public (Appendix 2). Pitt supervisors may also refer team leaders or members to the Pitt Office of Equity, Diversity, and Inclusion to report a 'bias incident' if a team member experienced harassment or prejudice. If the field team was working at a field station or field site owned/managed by another institution, supervisors should work with team leaders and team members to report the incident to the field station or site managers.

7.3 Report medical incidents or injuries

Team leaders should report to the supervisor if any injuries, minor or major, occurred during the field trip. Supervisors may need to file University or departmental incident

reports or may consider making maps of dangerous areas of the field site for future field trips. If a Pitt employee sustained an injury during the field trip, they may be eligible for worker's compensation to cover any medical expenses. Supervisors should review the incident with the team leader and members and discuss the reasons the injury occurred, how the team responded to the injury, and what (if any) safety protocols should be updated to avoid similar injuries in the future.

7.4 Check in with site land owners or managers

Supervisors should communicate with site managers and owners to maintain strong working relationships and increase opportunity for future research and engagement. Team leaders or supervisors should complete all required reporting on the research activities that took place at the site. For example, some agencies require a final report of the number and type of samples collected or any research products that have come from the work. It is not uncommon for land owners to delay or deny a new permit until a researcher has submitted all required reporting. Even if a formal permit report is not required, researchers should communicate with land managers after field work is finished, or in some cases throughout a long field season, to keep them informed on how the research project is going or any problems the researchers have encountered.

7.5 Restock spent supplies

Supervisors should designate the team leader or a team member to restock any supplies used from the field safety kit (Appendix 3) and the first aid kit (Appendix 5).

7.6 Return rental vehicles and report any damage

Before returning the rental vehicle, make sure to remove all field equipment from the vehicle. If the field team was involved in an accident during the rental, the supervisor should have already alerted the rental company about the accident (see 5.4.4). However, whoever returns the vehicle should bring copies of any accident reports, photographs of the damage, contact and insurance information of any other people involved in the accident to the rental office.

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University of Pittsburgh Resources

Diversity and Inclusion Certificate Program (DICP) - The University of Pittsburgh offers the DICP, with courses on dealing with microaggressions, workplace bullying, and creating accommodating and inclusive environments, among other topics.
https://www.diversity.pitt.edu/education/diversity-and-inclusion-certificate-program

Global Competence Certificate Program (GCCP) - The Office of Human Resources offers the GCCP, which provides faculty and staff the opportunity to build awareness and understanding of diverse cultures, while learning about University policies and resources that support our strategic goal of embracing the world.
https://www.hr.pitt.edu/current-employees/learning-development/fsdp/global

Disability Resources and Services - This office manages accommodations for students and employees with disabilities.
https://www.diversity.pitt.edu/disability-access/disability-resources-and-services

Gender Inclusive Language - University of Pittsburgh provides resources and examples regarding gender diverse language on our campus.
https://www.gsws.pitt.edu/resources/faculty-resources/gender-inclusive-non-sexist-language-guidelines-and-resources

Motor Vehicle Safety Resources -

- Vehicles for field work can be rented through Panther Express (https://pext.pitt.edu/airfare-hotels-car-rentals/). When driving a rented vehicle for research purposes, a University of Pittsburgh Financial Responsibility Identification Card should always be on board , as should a copy of the University's information on "What to do in case of a motor vehicle accident" .
- The Pennsylvania Department of Natural Resources has ATV (https://www.dcnr.pa.gov/Recreation/WhatToDo/ATVRiding/SafetyTrainingandReportingAccidents/Pages/default.aspx) and Snowmobile (https://www.dcnr.pa.gov/Recreation/WhatToDo/Snowmobiling/SafetyTrainingandReportingAccidents/Pages/default.aspx) safety information and training available.

Boating Safety Resources - Follow this link to learn about the state of Pennsylvania's Boating License & Boat Safety Course (https://www.boat-ed.com/pennsylvania/). A Lifeguard Safety Course is also available from the American Red Cross of Western Pennsylvania (https://www.redcross.org/local/pennsylvania/western-pennsylvania/take-a-class)

Resources for Dealing with Harassment and Misconduct

The University of Pittsburgh's Title IX Policies and Procedures can be found at https://www.diversity.pitt.edu/civil-rights-title-ix/policies-procedures-and-practices. The University of Pittsburgh Student Code of Conduct can be found at https://www.studentaffairs.pitt.edu/wp-content/uploads/2022/12/Student-Code-of-Conduct-Published_11.18.22.pdf.. Information on how to make a report of harassment can be found at https://www.diversity.pitt.edu/civil-rights-title-ix/how-make-report. The University of Pittsburgh's Policy CS 20 on Sexual Misconduct can be found at https://www.policy.pitt.edu/cs-20-sexual-misconduct-formerly-06-05-01. Information on caring for victims of sexual assault can be found at https://www.studentaffairs.pitt.edu/shs/share/.

Medical Resources

Information on how to disclose a disability and about disability resources at the University of Pittsburgh can be found at https://www.diversity.pitt.edu/disability-access/disability-resources-and-services and at https://www.hr.pitt.edu.

Appendices

Appendix 1: Training scenarios for managing interpersonal conflicts

Appendix 2: Field Safety Incident Log

Appendix 3: List of recommended safety equipment to bring in a field vehicle

Appendix 4: Field Safety Plan

Appendix 5: List of first aid kit essentials

Appendix 6: What to do in a medical emergency

Appendix 7: Example field researcher signage

Appendix 8: Voices from the field

Appendix 1: Training Scenarios for managing interpersonal conflicts

This document describes potential interpersonal conflicts that could arise between field team members during field work. We encourage research supervisors to use these examples as training exercises with field teams to prepare team members for navigating interpersonal conflicts. These are fictional scenarios and do not represent any particular persons, places, or institutions. Some of these scenarios include instances of discrimination, sexual assault, or other examples that field team members may have personally experienced. Prior to leading team discussion on these topics, supervisors should alert team members to the scope of the scenarios and acquire consent from all team members before using these scenarios in role-playing exercises.

These scenarios are intentionally challenging and are intended to build collegiality among team members and encourage team members to work together and understand each other. We provide a list of 'considerations' for field teams as they search for potential resolutions to these various kinds of interpersonal conflicts.

Scenario 1: You are a team leader and you notice two team members are arguing over the proper use of field equipment. The argument escalates and Team Member #1 states that they are more knowledgeable about the equipment because they have many family members who are established field researchers and they do not have a mental disability. You interrupt the researchers and provide them the equipment protocol to resolve the argument on how to operate the equipment. What is your next course of action?

Considerations:

- Is this type of interaction discussed in your team's code of conduct?
- Was Team Member #1's comment discriminatory? If yes, why? If no, why not?
- Do you have a private conversation with each team member separately, or a conversation with both team members together? What is important to communicate to each team member in those conversations?
- Should someone report this incident? If no, why not? If yes, who should report and to whom should they report to? Who should decide who reports this incident?
- Does Team Member #2's identity and background affect your response? Why or why not? If you do not know the details of Team Member #2's identity or background, does that matter?

Scenario 2: You, a team member, notice that your colleague, Team Member #1, always completes secretarial field tasks like sample labeling and recording data. Although Team Member #1 said at the initial team meeting that they wanted to learn specific skills while in the field, they always agree to complete the same secretarial tasks each day.

One morning, you suggest that team members should rotate task assignments so everyone gets a chance to participate in all field tasks. The team leader overrules your suggestion, stating that this is the most efficient way to collect data because Team Member #1 will slow the team down in any other task. What is your course of action?
Considerations:

- Does this decision reflect previously discussed rules and responsibilities for all field team members?
- Does the team leader's decision reinforce a "get-it-done-at-all-costs" field culture? What are the pros and cons of this philosophy?
- How does the power dynamic between you, a team member, and the team leader affect this situation?
- There could be alternative explanations as to why the team lead believes Team Member #1 would be inefficient at completing these tasks (lack of training, lack of experience, racism, sexism, etc.). How would your response change depending on the team leaders' reason?

Scenario 3: It is the tenth day in the field of a two-week field data collection trip that is far away from your home institution. Your team has lost time to adverse weather and malfunctioning equipment and so the team leader is trying to make up lost research time by extending the working day and taking fewer and shorter breaks. You, a team member, notice that you and your crew are ignoring many field safety protocols, which is putting everyone at elevated risk. You have a close relationship with the team leader, but you are feeling unsafe and exhausted. What do you do?
Considerations:

- Did your team discuss field work priorities and how you would handle unavoidable data collection set-backs?
- Is it unreasonable for a team member to request more or longer breaks?
- How do you navigate making decisions about setting priorities, modifying protocols, or reducing the study size in the event of delays?

Scenario 4A: You are a field team member working at a site five hours from your institution. When you and the team arrive and begin unpacking equipment, a neighboring landowner stops you and asks what you are doing. Team Member #1, who is a person of color, provides the team's permits and explains the research to the landowner. The landowner begins aggressively questioning the researcher. What is your course of action?
Considerations:

- How do you respond immediately to de-escalate the landowner's aggression?
- Once the landowner has departed, what do you say to Team Member #1? How do you ensure that Team Member #1 feels safe and supported?

- How does the team respond in the longer term? Do you continue using this research site? How do you record this interaction? Who needs to be alerted about the interaction?

Scenario 4B: The landowner finally leaves but Team Member #1 feels unsafe staying at the field site. Team Member #2 says that everything is now fine, that they feel safe because the landowner has left. Team Member #2 does not want to leave and pressures the team to continue with original field work plans citing their long drive and losing a whole day of research.

Considerations:

- Did your team discuss what would happen in the event that some team members want to leave while others want to stay? Who makes the final decision about this?
- Is forcing Team Member #1 to decide whether they will remain at the site to participate in research but feel unsafe, or to return home and miss out on field but feel safe an equitable solution?
- If the team decides to split up, does this decision reinforce a "get-it-done-at-all-costs" field culture? What are the pros and cons of this philosophy?
- What is the team leader's responsibility here? Should someone have a discussion with Team Member #2 about their comments? What should that discussion entail?

Scenario 5A: You are part of a field team that is conducting remote field work and staying multiple nights at a small field station. On the third day, multiple team members are talking about how 'wasted' they are going to get that night. Team Member #1, who identifies as a woman, does not join in on the discussions about the party and is unusually quiet. Later that evening, Team Member #2, who identifies as a man, continually grabs Team Member #1 by the arm, pressures her to drink with the group, and calls her a 'killjoy'. The next morning, Team Member #1 is very obviously upset and not speaking to anyone.

Considerations:

- Are there any 'ground rules' about alcohol consumption during the field work?
- Were there actions that could have been taken before the party to prevent what happened? Who should have acted?
- After the party, what actions should be taken? Who should act?
- Did Team Member #2 violate Title IX or other sexual harassment policies at your institution? If yes, what are the policies and guidelines for reporting?

Scenario 5B: As Team Member #1's closest friend on the team, you approach her and ask how you can help. In a private discussion, Team Member #1 reveals that Team Member #2 sexually assaulted her on a previous field trip. What would you do?
Considerations:

- How do you support Team Member #1 during the remainder of the trip?
- Whose decision is it to report Team Member #2's previous or most recent actions?

Scenario 5C: As the team leader (who was sleeping in a different cabin during the party), you approach Team Member #1 and ask if she wants to talk. You are a mandatory reporter for your institution, and you remind Team Member #1 of your responsibilities as a mandatory reporter. In this discussion, Team Member #1 reveals that Team Member #2 sexually assaulted her on a previous field trip. What would you do?
Considerations:

- Did Team Member #2 violate Title IX or other sexual harassment policies at your institution? If yes, what are the policies and guidelines for reporting?
- How do you provide for Team Member #1's safety for the remainder of the time you are in the remote location?

Appendix 2: Field Safety Incident Log

This log can be used to document risky incidents that occur during fieldwork and should be managed by the research supervisor. Risky incidents may include interpersonal interactions within field teams, interactions with non-field team people at the research site, or other dangers encountered during the field trip. We provide an "Incident Log Cover Page" for quickly summarizing reports and an "Incident Cover Report Form" for gathering details about each incident. Supervisors may want to separate incident reports about interpersonal conflicts, to maintain privacy of those involved, or create separate Incident Logs for each field site or field season.

Incident Log Cover Sheet

Date	Name of researcher filling out report	Location of incident	Danger or threatening behavior?	Report number

Incident Log Reporting Form **Report #_____**

Team information		
Person(s) claiming incident:		
Project Name:	PI:	Staff:
Team Member Names:		

About the Incident		
Research site location:	Date:	Time:
Did the incident cause any harm? Yes / No Were you concerned for your safety? Yes / No	What was affected: (Tick all that apply) ❏ People ❏ Property ❏ Environment ❏ Other:	
If there were witnesses or mediators please include names and contact information (if available) here:	If you checked People above, please answer: Who was affected by or put at risk by the incident? (Tick all that apply) ❏ Staff ❏ Student ❏ Public/visitor ❏ Land owner ❏ Contractor ❏ Other:	

Describe the incident in detail
Please provide information about relevant events leading up to the incident, what strategies or approaches were used to remedy the problem, and what follow-up actions need to occur.

Signature of person preparing the incident log Date

Appendix 3: List of recommended safety equipment to bring in a field vehicle

Papers and Permits

- ❏ Pitt Insurance Card and information card on what to do in case of an accident
- ❏ Copies of drivers' licenses, certifications, or driver authorization forms (if applicable)
- ❏ Vehicle decals (even better with QR code that links to information about the researcher/project!)
- ❏ Multiple copies of research permits and/or letters on University letterhead from department chair or faculty supervisor explaining research
- ❏ Paper maps, saved images from Google Earth, directions, GPS coordinates of sites and field lodging
- ❏ Vehicle repair manual

Vehicle Repair & Tow Equipment (***Make sure you are trained in how to use this equipment!***)

- ❏ Jumper cables
- ❏ Car battery charger
- ❏ Spare tire (check to make sure it is inflated, useable)
- ❏ Roadside emergency flares
- ❏ Tire changing supplies:
    - ❏ Tire gauge
    - ❏ Car jack
    - ❏ Tire iron
- ❏ Towing supplies for getting unstuck from mud or snow (don't forget instructions):
    - ❏ Rope
    - ❏ Winch
    - ❏ recovery tracks (MAXTRAX or similar)
    - ❏ snow chains
    - ❏ shovel
    - ❏ road salt, sand, or kitty litter (the non-clumping kind!).

Communication Equipment

- ❏ Charged cell phone, charger and connection cables
- ❏ Satellite phone and/or emergency beacon if traveling to an area with poor cellular service
- ❏ Shortwave-NOAA weather radio
- ❏ Waterproof bag for storing all electronic equipment

First Aid & Safety Equipment (see also Appendix 5)

- ❏ Flashlights, headlamps, and LED lanterns
- ❏ Basic toolkit containing:

        - ❏ Pliers
        - ❏ Screwdrivers
        - ❏ Hex wrenches,
        - ❏ Vice clamps
        - ❏ Hammer
        - ❏ Duct tape
        - ❏ Super glue
        - ❏ Bungee cords
        - ❏ Zip ties
        - ❏ Large plastic bags
    - ❏ Personal protective equipment:
        - ❏ Nitrile gloves
        - ❏ Safety glasses
        - ❏ Reflective vests
        - ❏ Whistles
        - ❏ High visibility ribbon roll/flagging tape
    - ❏ Fire extinguisher or bucket of sand (for work in dry vegetation with any type of ignition source/spark)
    - ❏ Space blanket, sleeping bag, and/or extra dry clothing
    - ❏ Extra first aid kit
    - ❏ Sunglasses and sunscreen
    - ❏ Pocket knife

For VERY remote field trips

- ❏ Spare fuel
- ❏ Car oil
- ❏ Lots of extra water and water treatment kits
- ❏ Windshield washer fluid
- ❏ Hatchet or hand saw
- ❏ Spare batteries for communication devices (e.g., phone, satellite phone)

Boat Safety Equipment

- ❏ Spare oars or paddles
- ❏ Spare life vests
- ❏ Visual signaling devices (light flares, smoke, strobe lights, white flags)
- ❏ Sound signaling device (horn, whistle, etc.)
- ❏ Bailing bucket
- ❏ Anchor and line
- ❏ VHF radio

Appendix 4: Field Safety Plan

This template can be used by Supervisors, team leaders, and team members to create a safety plan for all field work trips. This should serve as a guide for field teams to think about potential environmental hazards, have contact information clearly in one place, and information on medical facilities in the event of a medical emergency. Supervisors should review this plan with team leaders and members before field work begins, and team members should have copies of the plan during field work. We have emulated several forms we found online while creating this plan and we are grateful. Making an electronic version of this form (e.g., using JotForm or Google Forms) accessible by QR code that can be easily submitted via email to supervisors after each field day is a good way to operationalize such a plan.

Research team			
Project title			
Supervisor *(Name, phone number)*			
Team Leader *(Name, phone number)*			
Field Team Members *(Names, phone numbers)*			
Travel Date(s)			
Planned activities *List proposed activities briefly*			
Is anyone working alone? *Yes/No? Names*		**Frequency of check ins?** *Daily Other?*	
Communication plan			
Contact information while in field *(Provide information on how each team member can be contacted in the field [cell phone number, satellite phone number, CB radio or walkie talkie channel, etc.)* *If cell coverage is unreliable in parts of the field site, provide information on where best service can be found*			

Daily Communication Plan *(How frequently will team members check in with one another? Who is responsible for checking in? What is the protocol if a team member cannot be reached?)*	

Research site information			
Field site geographic location *Name of location, geographic coordinates.* **Link to online map**			
Is the field site new?	Yes / No	**If no, names of previous investigators**	
Specific site information *Elevation, terrain, environment, lakes, rivers or forests*			
Access to Shelter/Drinking water	☐ Plumbed water available ☐ Bottled water provided ☐ Cabins /Labs ☐ Tents ☐ Vehicle with A/C		
Nearby facilities *Name, distance, hours of operation* *If not, where is the nearest service area?*	☐ Restrooms ☐ Gas ☐Firewood ☐ Store ☐ Other:		
Travel and access *List typical access roads and alternate routes*			
Environmental risk factors *Describe any environmental conditions (terrain, plants, animals, disease vectors) that create a risk.* *Briefly discuss safety measures plans.* *List any specialized dangerous safety equipment (e.g., bear spray, rifle…)*			
Human interaction risk factors *List any potential risk factors from the locals or criminal groups and briefly discuss management plans.*			

Weather risk assessment and management plan *Identified weather risks: Extreme cold, extreme heat, lightening, flooding* *What are the conditions under which field activities at the site should be canceled?* *Briefly discuss safety measures to reduce risk and emergency plan in case of an emergency*	
Emergency services and contact information	
Field site contact *Name, address and landline phone number of local institutions,* *Name of campsite, cabins, dorms* *Address, location and phone numbers*	
University Contact and other persons not participating in field team *Name of department chair, personnel manager, number, email of other department administration on campus, or other lab members*	
Nearest emergency medical services or hospital *Contact information for nearest emergency medical services. List the local full telephone number (not just 911) and provide an address. Attach a map of route from field site to medical facility.*	
Evacuation plan *List the identified evacuation plan in case of an emergency (driving, splitting up team…)*	
Field researcher(s) information	
Physical demands *List physical demands required for this trip (hiking, climbing, wading, high altitudes, other)*	
First aid training *List team members trained in first aid and CPR.* *Location of first aid kit, or who is carrying it. Brief description of any special components.*	

Immunizations or prophylactics *List required immunizations/prophylaxis needed.*	
Medications *List any regularly taken medication that might need to be given in an emergency: EpiPens, insulin, nitroglycerine pills, allergy shots, asthma inhalers, etc.* *List how they are carried and stored: refrigerated or room temperature*	
Equipment, Activities, Permits	
Fieldwork transportation *What vehicles will be used during fieldwork operations? watercraft, car, ATV.*	
Research activities *Detail the goal of field operations*	
Research hazards *Describe the potential research-associated hazards and hazardous materials*	
Research Tools *Brief description of tools or equipment that will be used to access research sites or conduct research activities. Including sharps, power tools, heavy machinery, specialty equipment, firearms*	
Personal Protective Equipment **Required—***Boots, safety glasses, hardhats, snake gaiters, reflective vests, etc.* **Recommended—***Waders, gloves, long pants, mosquito net (sleeping), etc.*	

Permits *Do you have the required permits for working at the site, collecting specimens, or shipping specimens across political boundaries?* *Is the contact information of the permit issuer(s) on the permit? If not, provide contact information here.*	
Affiliation Documents *Do all team members have documents (letters on institutional letterhead, business cards, magnet decals for vehicles) to carry with them that would demonstrate their institutional affiliation and authority?*	

Campus Contacts

University of Pittsburgh Police Department:
Off-Campus Emergency: 412-624-2121
Non-Emergency: 412-624-4040

MyHealth@Work - Employee Health
3708 Fifth Ave
Medical Arts Bldg, Ste 505
Pittsburgh, PA 15213
412-647-4949

UPMC Presbyterian Emergency Dept
200 Lothrop St
Pittsburgh, PA 15213
412-647-3333 (hospital)
412-647-2121 (emergency)

Environmental Health & Safety (EH&S):
University of Pittsburgh
Phone: 412-624-9505

Student injuries
Student Health Services
Nordenberg Hall
119 University Place
www.studentaffairs.pitt.edu/shs/

Report injuries:
Call EH&S at 412-624-9505
Submit report https://www.ehs.pitt.edu/sites/default/files/docs/Report-IncidentForm.pdf

<u>Supervisor and Team Leader Signature</u>: *I prepared this Field Safety Plan and reviewed its contents with all team members.*

Name (printed)	Signature	Date

<u>Field Team Members</u>: *I read and discussed this Field Safety Plan with my Supervisor and Team Leader, I understand the outlined risks associated with this field work, and I understand the process for mitigating risks as outlined in this plan.*

Name (printed)	Signature	Date

Appendix 5: List of first aid kit essentials

General Supplies: Single use or consumable items that need replacing after each use

Hygiene & Antiseptics

- ❏ Alcohol wipes/antiseptic towelettes
- ❏ Iodine
- ❏ Nitrile gloves
- ❏ Hand sanitizer

Bandages & wound coverings

- ❏ Adhesive tape
- ❏ Adhesive bandages (bandaids) - multiple sizes
- ❏ Sterile gauze bandages
- ❏ Roller bandages
- ❏ Absorbent compress
- ❏ QuikClot bandage
- ❏ Moleskin tape
- ❏ Sterile wound closure strips

Medication and ointment

- ❏ Antibiotic ointment
- ❏ Oral antihistamines (Benadryl, Zirtec, Claritin)
- ❏ Topical anti-itch lotions (hydrocortisones, Calamine)
- ❏ Oral pain relievers (NSAIDs: Ibuprofen, acetaminophen, Naproxen sodium, or aspirin products)
- ❏ Anti-diarrheal medicine - Diamode, Imodium, or any other Loperamide product
- ❏ Antacids like pepto-bismol or Maalox
- ❏ Eye wash
- ❏ Ammonia inhalant ampoules

Other

- ❏ Oral rehydration salts
- ❏ Instant cold packs
- ❏ Instant heat packs
- ❏ CPR mask
- ❏ Duct tape
- ❏ Superglue

General Supplies: Reusable (replace after wear)

- ❏ Waterproof carrying case for first aid kit, ideally unzips and lays flat
- ❏ Wilderness field medicine guide such as:
  - ❏ https://www.wildmedcenter.com/print-wilderness-medicine-handbook.html
  - ❏ https://www.elsevier.com/books/field-guide-to-wilderness-medicine/auerbach/978-0-323-59755-5
  - ❏ https://www.redcross.org/store/wilderness-and-remote-first-aid-emergency-reference-guide-and-pocket-guide-rev-9-14/656237.html?cgid=wilderness-first-aid#start=1&cgid=wilderness-first-aid
  - ❏ https://store.nols.edu/products/wilderness-medicine-pocket-guide
- ❏ First aid scissors and EMS shears
- ❏ Miscellaneous forceps and fine point tweezers
- ❏ Pencil + Paper for vitals and symptoms notes, Rite in the Rain or similar notebook preferred
- ❏ Irrigation syringe
- ❏ SAM splint
- ❏ ACE bandages
- ❏ Tick-twisters
- ❏ Thermometer
- ❏ Hand mirror

Prescription or training needed

- ❏ Epi-Pen
- ❏ Tourniquet

Note: This is a basic list and not intended to be comprehensive. Depending on the nature of fieldwork, supervisors may supplement this basic field kit with more specific supplies to fit their needs. Supervisors may include considering the field site's proximity to fires, hunters, and length of trip.

Additional First Aid Kits Lists:

- National Outdoor Leadership School (NOLS) 27 Considerations for a Wilderness First Aid Kit
- Berkeley Field Safety First Aid Kit
- Boston University First Aid Resources in the Field
- REI First Aid Kit Checklist

Appendix 6: What to do in a medical emergency

Field teams should store copies of this document in first aid kits for referral in the event of a medical emergency. If in a group, uninjured parties should divide responsibilities. If you are alone, follow steps 1-6 to stabilize the patient(s).

1. ***Call 9-1-1 immediately***. Use your GPS unit or phone to provide location coordinates to the dispatcher. If you are out of cell phone service, your first priority is to stabilize the injured team member.

2. If an injured team member is conscious, ***obtain consent to provide first aid*** and include them in any treatment or evacuation decisions.

3. If you suspect a spinal injury and there is no imminent danger (fire, flood, landslide), ***do not move the patient*** and keep them as still as possible.

4. Follow the ABCDEs:
    a. Check to make sure ***Airways are clear***
    b. Check for ***Breathing*** by listening or holding a mirror.
    c. Check ***Circulation*** by feeling for pulse at neck or wrist
    d. ***Disability decision*** - if you can't rule out a spine injury, keep them still
    e. ***Expose injuries*** for treatment and apply pressure to active bleeding.

5. ***Perform CPR immediately*** if team member is unconscious and has no circulation

6. ***Stop active bleeding immediately*** by applying pressure and elevating the injured area, if possible. ***Do not remove an object that has impaled a team member.*** This could cause more severe bleeding; instead, wrap the wound and object so that it is secure and does not move. If you removed the object, don't put it back in.

7. Look, listen, feel, smell, and ask for ***signs of more subtle injuries***, including bleeding, fluids, skin discoloration, or limb hardness, tenderness, or numbness.

8. ***Check and record vitals*** by using a watch or phone to time heart rate and breathing.

9. Take notes on the team member's ***medical history and account of what happened***, including allergies, medications, and relevant medical history. Record the injured team members' responsiveness to questions, signs of disorientation, and skin color and temperature.

10. ***Refer to the field medicine guide*** for specific treatment advice. Record all treatments given and team member's response to treatments.

11. Once the injured team member is stabilized, you can make decisions on how to get the team member the fastest emergency medical services. If you are able to reach a 911 dispatcher, they can guide your decisions. If you cannot call 911, you will need to work with the field team to either get a medevac team for the injured team member OR carry the injured team member to a road that is accessible to an emergency medical vehicle.

Appendix 7: Example Field Researcher Signage

A7.1 A sign that could be put on the dash of your field research vehicle while you are off sampling.

Hello, from your local wildlife scientists at the University of Pittsburgh and Pymatuning Lab of Ecology!

This vehicle is being operated to perform field research covered by all necessary permits and landowner permissions.

All immediate, on-site questions can be answered by **Dr. Brandon Hoenig (724-561-5563)**, the primary field researcher operating this vehicle.

If you would like to speak with the supervisor of this research, **Dr. Corinne Richards-Zawacki**, the director of the Pymatuning Lab of Ecology can be reached by e-mail at cori.zawacki@pitt.edu.

If you would like to speak with the on-site, assistant director of the Pymatuning Lab of Ecology, **Chris Davis** can be reached at chris.davis@pitt.edu.

Appendix 8: Voices from the field

The content of this Appendix builds upon a section of the following paper, which was published by University of Pittsburgh faculty, staff, and students after writing the initial version of this field safety manual.

Rudzki, E. N., Kuebbing, S. E., Clark D. R., Gharaibeh, B., Janecka, M. J., Kramp, R., Kohl, K. D., Mastalski, T., Ohmer, M. E. B., Turcotte, M. M., and Richards-Zawacki, C. L. 2022. A guide for developing a field research safety manual that explicitly considers risks for marginalized identities in the sciences. *Methods in Ecology and Evolution* 13, 2318-2330.

Writing a field safety manual that explicitly considers the multitude of ways that institutional policies and academic and social norms can exclude and increase risk for researchers is hard. Especially if you are at an institution with low diversity or your own personal privileges protect you from experiencing exceptional barriers or increased risk because of your identity. We found the following essays,surveys, interviews and publications to be extremely helpful resources as we learned about the various risks and barriers faced by researchers with marginalized identities conducting field research.

A. Personal narratives from field researchers

- Mothers in the Field (MacDonald & Sullivan, 2008).
- 'We Thought You Would Be White': Race and Gender in Fieldwork (Henderson, 2009).
- Being queer in the jungle: The unique challenges of LGBTQ scientists working in the field (Ragen, 2017).
- I Am One of You: A Gay wildlife biologist's perspective on our profession (Booms, 2019).
- Challenges of fieldwork for LGBTQ+ scientists (Atchison, 2021).
- What happens when a field biologist becomes disabled? (Mendelson III, 2022).
- My first expedition as a man (Matsuda, 2018)
- Trans researchers are struggling to stay in science. That has to change (Matsuda, 2015)
- A wellness framework for fieldwork (Nordseth, 2023)
- Additional considerations for trans individuals doing fieldwork (Matsuda, 2023)

B. Surveys and Interviews of field researchers

- Fieldwork and disabled students: discourses of exclusion and inclusion (Hall et al., 2004).
- Survey of academic field experiences (SAFE): Trainees report harassment and assault (Clancy et al., 2014).

- Impact of inclusive field trips (Gilley et al., 2015).
- Signaling safety: characterizing fieldwork experiences and their implications for career trajectories (Nelson et al., 2017).
- Family in the field: expectations of a field based research career affect research family planning decisions (Lynn et al., 2018).
- Racism and harassment are common in field research—scientists are speaking up (Viglione, 2020).
- Scientists push against barriers to diversity in the field sciences (Pickrell, 2020).
- Black birding is about hope. (Hou, 2020).

C. Essays and best practices recommendations

- Volunteer Field Technicians are bad for wildlife ecology (Fournier & Bond, 2015).
- Mental health in the field (John & Khan, 2018).
- Making geoscience fieldwork inclusive and accessible for students with disabilities (Stokes et al., 2019).
- Toilet stops in the field: an educational primer and recommended best practices for field-based teaching (Greene et al., 2020).
- Barriers to fieldwork in undergraduate geosciences degrees (Giles et al., 2020).
- Promoting inclusion in ecological field experiences: examining and overcoming barriers to a professional rite of passage (Morales et al., 2020).
- Fieldwork and disability: an overview for an inclusive experience (Chiarella & Vurro, 2020).
- Elevate, do not assimilate, to revolutionize the experience of scientists who are Black, Indigenous and people of colour (Halsey et al., 2020).
- Ten steps to protect BIPOC scholars in the field (Anadu et al., 2020).
- Safe fieldwork strategies for at-risk individuals, their supervisors and institutions (Demery & Pipkin, 2021).
- Cultivating inclusive instructional and research environments in ecology and evolutionary science (Emery et al., 2021).
- Anti-racist interventions to transform ecology, evolution and conservation biology departments (Cronin et al., 2021).
- You are welcome here: A practical guide to diversity, equity and inclusion for undergraduates embarking on an ecological research experience (McGill et al., 2021).
- Ecology and evolutionary biology must elevate BIPOC scholars (Massey et al., 2021).
- Next steps in dismantling discrimination: Lessons from ecology and conservation science (Chaudhury & Colla, 2021).
- Tips for transitioning to fieldwork: Preparing for your first expedition (Matsuda 2016).
- Transgender researchers want to make an impact (Kwok 2019).