Formative Field Experiences
Bringing field and inquiry-based learning to first year students in biology

Abraham Borker
UCSC Department of Ecology and Evolutionary Biology
Why Field Experiences?

- Field courses narrow demographic achievement gaps, increase graduation rates and GPAs (Beltran et al. 2020)

- Engaging in science practices increases STEM motivation, identity and achievement (Starr et al. 2020)

- Inclusive, Equity-minded Field Courses can propel inclusion, persistence and excellence in Ecology, Evolutionary Biology and Conservation (Zavaleta et al. 2020, Race et al. 2021)
INCLUSION, IMMERSION, IN TEAMS, ITERATION, INQUIRY-LED

“The Five I’s”

Race, Beltran, Zavaleta 2021
INCLUSION, IMMERSION, IN TEAMS, ITERATION, INQUIRY-LED

Reduce experience gaps

Race, Beltran, Zavaleta 2021
INCLUSION, IMMERSION, IN TEAMS, ITERATION, INQUIRY-LED

Reduce experience gaps

Peer network, collaboration

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Makes gains visible

Race, Beltran, Zavaleta 2021
INCLUSION, IMMERSION, IN TEAMS, ITERATION, INQUIRY-LED

Reduce experience gaps

Peer network, collaboration

Makes gains visible

Builds self-concept as Scientists

Race, Beltran, Zavaleta 2021
What is 20F?

- 2cr, no pre-req
- Small class, no cost
- Natural History
- Training in experimental design
- Field Research Projects
How’s it going?
How’s it going?

“Every class was incredibly engaging with the material, because we were always the ones working with it and exploring the principles…”
How’s it going?

“Every class was incredibly engaging with the material, because we were always the ones working with it and exploring the principles…”

“There was never a class where we were taught a skill and then didn't have time to practice it, whether that was field journaling or rapid research”
How’s it going?

“Every class was incredibly engaging with the material, because we were always the ones working with it and exploring the principles…”

“There was never a class where we were taught a skill and then didn't have time to practice it, whether that was field journaling or rapid research”

“The rapid research projects were extremely helpful to my understanding of the scientific process. It was great that we had the chance to choose our own topics and that we worked in teams.”
Looking ahead?

Two ongoing research questions:

- **What’s the impact of overnight trips?** (Zavaleta, Beltran, Hernández)

- **What’s the impact of an early SCUBA experience on marine science paths?** (Kroeker, Flores)

**Goals:**

- Becoming a major requirement
- Measuring impact with IRAPS and on department metrics
- **Your ideas!**

**Challenges**

- Scaling is hard! (overnights, staff, transportation, equipment)
Check out our Poster on Inquiry-Based Field Teaching
Thank You!
Digging Deeper: Collaborative Efforts to Promote Equity in Field-Based Sciences

Erika Marín-Spiotta, University of Wisconsin-Madison
Blair Schneider, University of Kansas Geological Survey
Meredith Hastings, Brown University
Jessica Blois (she/her), University of California, Merced
Melissa Burt, Colorado State University
Allison Mattheis, California State University, Los Angeles
Billy Williams, American Geophysical Union

Christine Fabian Bell, University of Wisconsin-Madison
Kjir Hendrickson, Arizona State University
Hannah Horinek, Kansas Geological Survey
Julie Maertens, Colorado State University
Changing culture and climate at all levels, for everyone, by everyone

“Treat people better than data”
Changing culture and climate at all levels, for everyone, by everyone

ADVANCEGeo Partnership I
Empowering (geo)scientists to transform workplace climate

- Collect data
- Develop and deliver bystander intervention training with discipline-specific scenarios and that incorporate intersectionality
- Develop educational materials that identify harassment, bullying, and discrimination as research misconduct
Changing culture and climate at all levels, for everyone, by everyone

**ADVANCEGeo Partnership II**
Empowering transformations of STEMM workplace climate

- **Train-the-trainers** certification and capacity-building program
- **Workplace climate program** for academic departments and training programs
- Scaffolded online resources related to improving workplace climate
- Sustained national impact in partnership with professional associations.
ADVANCEGeo Partnership
Empowering (geo)scientists to transform workplace climate

ABOUT THE INITIATIVE
The ADVANCEGeo Workplace Climate Initiative aims to transform workplace climate by creating and sustaining a shared vision for thriving research and training environments.

WHAT IT INVOLVES
- Core workshops for your department led by trained facilitators
  - Session 1. Establishing shared visions and goals
  - Session 2. Empowering individuals to become active bystanders
  - Session 3. Developing effective codes of conduct
  - Session 4. Choose among:
    - Navigating implicit biases in evaluation activities
    - Preparing for safety in the field
  - Session 5. Sustaining shared vision and goals
- Support to develop department policies

LEARN MORE AND APPLY:
Learn More About ADVANCEGeo:
https://serc.carleton.edu/advancegeo/index.html
Contact Us:
advancegeo@awg.org
Community Engaged Arts
Field Research

Jack Chapman
Why “identity-based” field safety?

Fieldwork is **isolating**, usually placing new researchers in an **unfamiliar** environment and/or in contact with unfamiliar people.

**There is no ONE identity that is at risk.** There are identities that could be at **increased risk** due to implicit biases or prejudices, leading to **prejudice-driven conflict** (including harassment, assault, and murder).

Recognizing the importance of **intersectionality**
Which part of your identity do you most identify with for each statement?

All answers will remain anonymous

1. The part of my identity that I am most aware of on a daily basis is________.
2. The part of my identity that I am the least aware of on a daily basis is________.
3. The part of my identity that I believe is the most misunderstood by others is________.
4. The part of my identity that makes me feel discriminated against is________.
5. The part of my identity that gives me the most privilege is________.
Activity 3: Risks and Consequences (15 minutes)

For each vignette, identify and discuss:

1. What **types of risks** are these individuals facing?
2. What options do they have to prevent negative consequences?
3. What **protocols** could have been in place to prevent/mitigate these situations?
4. How could **you** (as a peer/colleague) support these individuals?
What risks do you think you or other team members might encounter in the field?

Reflect. Ask. Discuss.
## What is a Field Safety Plan?

<table>
<thead>
<tr>
<th>Site Information</th>
<th>Latitude: XX.XX (from GPS/Map)</th>
<th>Longitude: XX.XX (from GPS/Map)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Information:</td>
<td>Elevation, terrain, environment</td>
<td></td>
</tr>
<tr>
<td>Travel to Site:</td>
<td>How will participants get to site conditions.</td>
<td></td>
</tr>
<tr>
<td>Site Access:</td>
<td>Are there any particular restrictions or challenges to accessing site? Note any alternate routes or suggested parking areas; gate access codes, etc. Make special note if isolated or remote.</td>
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</tr>
<tr>
<td>Environmental Hazards:</td>
<td>Describe any dangerous wildlife, insects, endemic diseases, poisonous plants, etc. that participants may encounter. Note intended mitigation measures; discuss prior to trip.</td>
<td></td>
</tr>
<tr>
<td>Security:</td>
<td>High risk for harassment or violence? Note intended mitigation measures; discuss prior to trip. For international travel, check the U.S. State Department travel site for current travel alerts and look up the security rating for your destination via the Worldcue Trip Planner.</td>
<td></td>
</tr>
</tbody>
</table>
Inclusive field safety

An example from grasshopper fieldwork in the Colorado Rocky Mountains

By Monica M Sheffer, Postdoc @ UC Berkeley
E-Mail: monicasheffer.research@gmail.com
My background

- Field biologist since undergrad
- Fieldwork in Hawaii, Germany, France, Portugal, California, and Colorado
- Leader of a large field team in Colorado for the last two years
- Fieldwork has always been a joy for me – but for trainees, especially BIPOC trainees, the field can be intimidating and isolating. As team leader, I feel a great responsibility to make fieldwork joyful and productive for everyone
Adiverse team across many career stages

Professors, Postdoc, PhD Students, Masters students, post-Bacc students, Bachelors/Community College students, high school student, outreach with middle- and elementary schoolers
Primary risks at our field sites

• Lightning
• Moose
• Flat tires
• Altitude
• Exposure
Accommodation at the Mountain Research Station

• 9500 ft elevation (2900 m)
• Very basic cabins (with/without running water and kitchen)
• Community discussion around group living dynamics
• Excellent, thoughtful leadership: Kris Hess, Scott Taylor
Strategies for promoting inclusive field safety

• Full-team safety meeting
  • Main message: safety first, science second
    “Come home. Come home friends. Maybe get all of the work done.”

• Discuss physical risks as well as risks around identity- and gender-based harassment and violence

• One-on-ones with new members of the team

• Anonymous resource/access request form

• Provide laminated information pamphlets and permits to all team members
EGSA Field Safety Committee
About Us
Identified Issues

- Students are coming from a wide variety of backgrounds but there is a **false assumption of skill and knowledge for incoming students**. Ensuring proper training and field knowledge is left entirely to the student and PI.

- There is **no minimum field safety policy/education**, resulting in some labs prioritizing safety while others neglect it.

- Students are unfamiliar with campus field safety resources, services, rights, or support.

- Students are **systemically incentivized to work alone, quickly, and through unsafe conditions** sometimes with no safety nets.

- Students feel **disempowered to refuse unsafe fieldwork conditions**. **Lack of clear reporting/resolution structure** for students facing unsafe working conditions in the field.

- Students are **expected to lead field crews with no training** in supervising or handling emergency situations.

- **Field safety risks for historically marginalized groups** are often overlooked and underserved.
Potential Solutions

➢ Field safety policies, resources, and rights taught to students during orientation or in existing class(es).
  ○ Note: new classes or mandatory trainings may be burdensome on top of an already heavy class load for the program. If new classes or mandatory training were to be implemented, it could be in exchange for existing classes that are less urgent.

EGU safety course for hydrologists
Potential Solutions

➢ Reporting structures for students who do not feel supported by PI’s in their concerns for field safety. Empower students to refuse unsafe fieldwork conditions.
Potential Solutions

➢ More funding to support students in data collection to reduce rushed timelines and provide fieldwork assistants. Funding also to provide relevant trainings for students.
Potential Solutions

➢ Require students to have check-in protocols for fieldwork and utilize EH&S resources to plan their fieldwork.
➢ PIs be provided resources and support for developing field safety policies and plans for their groups.
Potential Solutions

➢ Implement diversity, equity, and inclusion initiatives to address specific risks faced by marginalized students.

➢ Conduct community agreement training to prevent and address incidents of harassment and assault. Establish clear protocols for intervention and reporting.
Reach out if you have any suggestions to help us in our goal of improving field safety on campus / in our graduate program.

clsnewell@ucdavis.edu

eplatzer@ucdavis.edu
Navigating gender at sea
Talia Evans (ncevans@ucsb.edu)
March 8, 2024
Cisgender focus in geoscience

<table>
<thead>
<tr>
<th>Discipline Composition</th>
<th>% Women</th>
<th>Ocean Sciences</th>
<th>Atmospheric Sciences</th>
<th>Planetary Sciences</th>
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<tr>
<td>Earth Sciences</td>
<td>30.3%</td>
<td>30.9%</td>
<td>23.9%</td>
<td>27.3%</td>
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<tr>
<td>% Women</td>
<td>n = 1902</td>
<td>n = 480</td>
<td>n = 355</td>
<td>n = 143</td>
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<td>Subdiscipline Composition</td>
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<tr>
<td>Geology</td>
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<td>38.0%</td>
<td>27.1%</td>
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<td>Biogeochemistry</td>
<td>36.6%</td>
<td>37.0%</td>
<td>22.5%</td>
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<tr>
<td>Geochemistry</td>
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<td>34.3%</td>
<td>27.3%</td>
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<tr>
<td>Glaciology</td>
<td>31.0%</td>
<td>21.3%</td>
<td>22.5%</td>
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<tr>
<td>Marine Geology</td>
<td>30.8%</td>
<td>12.5%</td>
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<tr>
<td>Geology</td>
<td>26.2%</td>
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<td>Geophysics</td>
<td>24.0%</td>
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<td>Geomorphology</td>
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<td>Paleo-oceanography</td>
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<td>Chemical Oceanography</td>
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<td>Biological Oceanography</td>
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<td>Physical Oceanography</td>
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<tr>
<td>Marine Biology</td>
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<td>Atmospheric Chemistry</td>
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<tr>
<td>Planetary Dynamics</td>
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Ranganathan et al. (2021)
Navigating Gender at Sea

Kay McMonigal\textsuperscript{1,2}, Natalya Evans\textsuperscript{3}, Dani Jones\textsuperscript{4}, Jay Brett\textsuperscript{5}, Reece C. James\textsuperscript{6}, Mar C. Arroyo\textsuperscript{7}, A-bel Y. Gong\textsuperscript{8}, Elizabeth C. Miller\textsuperscript{6}, Colette Kelly\textsuperscript{9}, Jule Middleton\textsuperscript{3}, Chris Spear\textsuperscript{10}, Wil Holmes, and Dakota Lane\textsuperscript{11}

\textsuperscript{1}Department of Marine, Earth, and Atmospheric Sciences, North Carolina State University, Raleigh, NC, USA, \textsuperscript{2}Now at College of Fisheries and Ocean Sciences, University of Alaska Fairbanks, Fairbanks, AK, USA, \textsuperscript{3}Marine Science Institute, University of California Santa Barbara, Santa Barbara, CA, USA, \textsuperscript{4}British Antarctic Survey, NERC, UKRI, Cambridge, UK, \textsuperscript{5}Johns Hopkins University Applied Physics Laboratory, Laurel, MD, USA, \textsuperscript{6}Department of Oceanography, University of Hawai‘i at Mānoa, Honolulu, HI, USA, \textsuperscript{7}Department of Ocean Sciences, University of California Santa Cruz, Santa Cruz, CA, USA, \textsuperscript{8}University of San Diego, San Diego, CA, USA, \textsuperscript{9}Woods Hole Oceanographic Institution, Woods Hole, MA, USA, \textsuperscript{10}University of Chicago, Chicago, IL, USA, \textsuperscript{11}Loyola University Chicago, Chicago, IL, USA

Key Points:
- Limited attention has been given to the challenges faced by transgender and gender diverse (TGD) scientists
- TGD people face harassment, gendered berthing, and other legal and physical barriers while working at sea
- Improvements to increase equity
Oceanographic fieldwork

- Use research vessels for days to three months
Ships for research

• Majority of research fleet operated through the UNOLS program
• Field work enables career advancement and collaboration
Harassment at sea

• Harassment can be common aboard these vessels
  • One study suggests that 46% of women experienced harassment while doing fieldwork
• For all types of fieldwork, 55% of queer geoscientists have felt unsafe
• Policies for safety at sea focus primarily on cisgender and often straight people

(Olcott & Downen, 2020; St. Clair et al. 2021)
Safety challenges – cruise preparation

- International cruises sometimes dock in countries that do not recognize X gender markers
- Cruise planning software often does not consider deviations from legal name and gender
- Rooms typically shared and assigned based on gender
Safety challenges – life at sea

• Frequent misgendering
  • Accidental and intentional
• Inability to choose cabinmates, typically assigned via binary gender
• Extended periods of binding, tucking, etc
• Insufficient reporting policies
# Suggestions for gender-related policy changes at the PI and institution level

<table>
<thead>
<tr>
<th><strong>DO</strong></th>
<th><strong>DON’T</strong></th>
<th><strong>TRY THIS</strong></th>
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</thead>
<tbody>
<tr>
<td>Ask for rooming preferences from all scientists travelling with you.</td>
<td>Assume you can pair people by gender based on their names, appearance, or gender markers on legal identification.</td>
<td>Ask pre-travel questions: ‘Rooms have 2 beds. What individuals or gender(s) do you prefer to share with?’</td>
</tr>
<tr>
<td>Check how ports handle X gender IDs, some countries will not allow entry.</td>
<td>Wait for the affected persons to ask about the port’s requirements.</td>
<td>Consider this issue in the cruise planning phase and communicate information to TGD persons.</td>
</tr>
<tr>
<td>Make anonymous feedback options for cases of harassment and misconduct.</td>
<td>Require individuals to communicate directly with captains, mar techs, or other authority figures.</td>
<td>Offer an online portal to report anonymously. Explain its use during safety training.</td>
</tr>
<tr>
<td>Consider additional single berthing options on new research vessels.</td>
<td>Assume everyone has equal privacy needs, or allocate single berths based solely on seniority.</td>
<td>Ask about accommodations, similar to asking about dietary needs.</td>
</tr>
</tbody>
</table>

Modified from McMonigal et al. (2023) Navigating Gender at Sea. AGU Advances. Accepted June 2023.
# Guidelines for respectful communication around gender

<table>
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<th><strong>DO</strong></th>
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<th><strong>TRY THIS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Refer to everyone the way they ask you to (e.g. names, pronouns, identities).</td>
<td>Require sharing of pronouns: may force people to misgender or out themselves (if not out at work).</td>
<td>Lead by example: Introduce yourself using the name you prefer and your pronouns.</td>
</tr>
<tr>
<td>Handle misgendering briefly, directly, and on your own.</td>
<td>Tell the misgendered person about the incident or expect them to handle it.</td>
<td>Where’s Jason? She went for lunch. They went for lunch? Right, yes, they did. Thanks!</td>
</tr>
<tr>
<td>Include respect for transgender people in safety training. Include indigenous genders (e.g. two-spirit).</td>
<td>Avoid the topic.</td>
<td>Assume questions around berths, bathrooms, and pronouns will arise. Prepare all authority figures aboard.</td>
</tr>
<tr>
<td>Publicly display DEI statements at institutes and onboard.</td>
<td>Assume that individuals in underrepresented groups know they are included and accepted.</td>
<td>Explicitly acknowledge TGD people in public EDI statements.</td>
</tr>
</tbody>
</table>

Modified from McMonigal et al. (2023) Navigating Gender at Sea. AGU Advances. Accepted June 2023.
Questions?
Wilderness Mental Health First Aid Workshops

Shannon Anderson
Field Safety Officer
Environmental Health and Safety, University of California, Santa Cruz
sander19@ucsc.edu
Why Talking about Mental Health is Important

Recent Statistics from Health Minds Study (2022 - 2023 Findings)

- 46% of College-aged Students have had a lifetime diagnosis of mental disorder
- 41% with positive screen for Depression (major and moderate)
- 36% with positive screen for Anxiety Disorder
- 14% with Suicidal Ideation (past year)
- Only 46% of students with positive depression or anxiety screens have had any mental health counseling/therapy
What The Workshop Is & Is Not

- **Intent and Goals**
  - To reduce stigma associated with Mental Health topics and gain confidence in talking openly about status and behaviors
  - To become more confident in addressing situations in the field that are Mental Health-related by:
    - Understanding basic information about nervous system physiology and why situations occur
    - Applying appropriate interventions and solution-based plans depending on patient status
    - Determining when someone can remain in the field vs being evacuated
  - To know the appropriate resources that are available on campus

- **What it is not**
  - Sexual Harassment and Assault Training
  - Psychotherapist Training
  - Medical First Aid Training
The conversation has shifted from “What’s wrong with you?” to “What happened to you?”

Experiencing acute trauma in the field and manifesting chronic trauma that’s been triggered in the field can look the SAME and is treated in the SAME way.

- Trauma exposure (or bringing the effects of current trauma with you) in the field is a "normal reaction to an abnormal situation”
- Past trauma triggered in the field is an “abnormal reaction to a seemingly safe situation”
Basic Brain Anatomy and Function
Review of Building Relationships

- Holding Space
  - Silently witnessing someone else’s experience
- Activating Mirror Neurons with calm, nonanxious presence
- Engage Active Listening
  - Demonstrate care and interest in someone by Naming feelings, values and Describing the situation from their perspective
Review of Grounding Techniques

- **Breathing**
  - Co-regulation/Companion
  - Square breathing
  - Trace fingers with each breath
  - Blowing out candles with each finger

- **Attention on something else**
  - Word games
  - Math puzzles
  - Recitation of poems
  - Music

- **Being aware of present moment**
  - 5-4-3-2-1 working with senses

- **Physical movement**
  - Walk
  - Stretch
  - Cold Water immersion
  - Scream and/or smash
  - Consensual touch

- **Tapping**
Gathering Resources for Support Plan: Engaging the Wizard Brain

- Now that Wizard Brain is more dominant, we can engage the person with solutions-based conversation
- We will need more information from the person to guide solution-making process
  - History of experiences
  - Teaching them about stress responses in the brain
  - Evacuation Decisions based on available resources
  - Connecting them with campus resources
Take-away Points

► This workshop was just an **introduction** to Mental Health topics encountered in the field

► We didn’t cover specific conditions explicitly
  
  ► Feedback from workshop evaluations recommended using more specific scenarios to practice skills

► My unique set of qualifications made it a natural resource to offer
  
  ► 20+ Peer Counseling; 20+ Wilderness experience including NPS Ranger in remote settings; Practice Mindfulness Meditation living in Buddhist monastery

► I’m interested in sharing and spreading this resource throughout the UC system...how to do that?
Pete Loschl, Facilities and Safety Operations Manager
Department of Fisheries, Wildlife, and Conservation Sciences
FIELDWORK SAFETY
FISHERIES, WILDLIFE, AND
CONSERVATION SCIENCES UNIT
FACILITIES AND SAFETY MANAGER

***New position in 2018

- Safety work ~ ½ duties
- Develop unit safety processes
- Duties - Compliance Management & support to PIs
- Serve on Department, College, and University Committees and Working Groups
- Small Boat Prog Instructor/Advisory roles
- POC for EHS, Occ Health, Facilities, Risk, Public Safety
PI ASSESSMENT PROCESS
PROGRAM SAFETY & COMPLIANCE

Two-page form & checklist of Items

- Completed by PI & Safety Manager
- Projects are listed
- Worker types are identified
- Discuss SciShield software for training and documentation
- Required training is reviewed/identified

- Lab Safety
- Motorpool Driver Authorization/Van Safety
- **Fieldwork Safety Planning requirement**
- Motorboat operator & Paddle Craft training
- ATV/Trailer Towing/Chainsaw use
- Additional/project-specific training?
- ***Documentation of training***
FIELDWORK SAFETY PLANNING

• EH&S Remote Fieldwork Safety Guide and Planning Template
  http://ehs.dev.acquia.cws.oregonstate.edu/sites/ehs.oregonstate.edu/files/pdf/remotefieldworksafetyguide.pdf
  • FWCS uses adapted template for unit work
• Remote = In terms of both distance and accessibility, any location more than approximately one hour’s travel time from receiving definitive treatment
• Formal plans are required for remote work, but strongly encouraged for all field work
• 42 safety plans for field studies have been submitted to me
• Field workers receive a copy of completed plans and all are asked to sign them to acknowledge understanding and participation
BIGHORN SHEEP STUDIES SOUTHERN CALIFORNIA

- Two field studies
- OSU and California Dept of Fish and Wildlife
- 15 fieldwork participants (all PIs and post-docs, grad students, state biologist, temp field technicians, and a volunteer)
- Following marked bighorn sheep using telemetry or established survey routes; collect fresh fecal samples
- Daily hikes into mountains working in teams of 2. Limited work alone.
- Return to truck each night to camp

Trilobite Wilderness Area
REMOTE FIELDWORK SAFETY PLAN - BIGHORN SHEEP STUDIES
(who, what, where, when, and how safely)

Principal and Co-PIs – Names & contact information
Location of Fieldwork (w/ distance to nearest town) – Barstow, Needles, Las Vegas
Nearest Hospital - Barstow; plus 4 more listed in plan Appendix
Fieldwork Description – Telemetry and survey routes on foot to locate sheep/pellets
Study period – January 30 to March 28, 2021
University Contact – not in field
Field-based project members – Names & contact information
Emergency contacts (in field area) – BLM field offices, Mojave Preserve,
City Hospitals, Local law enforcement

Hazard Identification – Series of check lists, questions, and text boxes:

Risk Assessment – user defined

Check-out/Check-in & Emergency Response Procedures
NO TIME FOR QUESTIONS
I’M SURELY OVER TIME!

HAPPY TO TALK MORE LATER😊