

Risk Mitigation - GPS Field Safety

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Risks/Hazards associated with:

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Additional resources can be found through:

Caltech Environmental Health and Safety (<https://safety.caltech.edu/manuals>)

Student Wellness Services (<https://wellness.caltech.edu>)*

GPS Division Field Safety website (<https://www.gps.caltech.edu/academics/field-trips>)

*Leaders of field trips (class and research related) are encouraged to contact Student Wellness Services to seek advice from Dr. John Tsai (jytsai@caltech.edu) on who should be contacted to provide an assessment of health risks for the sites where they and/or their students/members of their research group or class will be working. Caltech Wellness Services will not conduct the risk assessment but will rather be a point of contact to someone expert in the area of the fieldwork. The professor will then need to either speak with that external authority or access a resource (e.g. website) that provides an official list of current concerns in the area of the site(s) selected.

This document put together by the GPS Field Safety Committee based on knowledge of best practices from prior experiences and discussions with individuals in the division. However, the GPS Field Safety Committee do not have training in Risk Management. All leaders and participants on field trips should to do their own research into the best practices for mitigation of risks associated with field activities.

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Physical Hazards Associated with Mode of Travel

| Risks | Associated Control Measures |
|---|--|
| Car travel | <ul style="list-style-type: none">• All drivers must have completed defensive driver training and obey traffic laws• Seatbelts must be worn by all participants inside moving vehicles• If personal vehicles are used, they should be up to date with scheduled maintenance• Regular scheduled breaks should be taken during long drives. |
| Off-maintained road requiring 4WD drive | <ul style="list-style-type: none">• 4WD training required by all drivers on class field trips. |
| Boat, kayak, canoe (etc.) travel | <ul style="list-style-type: none">• Ensure that personal flotation devices are available• Conduct specific safety briefing related to boat use |
| Chartered plane travel | <ul style="list-style-type: none">• Follow all safety protocols required by aviation company |
| ATV travel | <ul style="list-style-type: none">• Take appropriate safety training course to learn how to operate an ATV safely (https://atvsafety.org)• Always wear approved helmet and eye protection• Always wear long pants, long sleeves, gloves, and over-the-ankle boots• Only ride during daylight hours• Never ride on a 3-wheeled ATV• Never ride on paved surfaces or public roads• Do not ride alone |
| Horse or mule | <ul style="list-style-type: none">• Conduct specific safety training• Always wear a helmet and appropriate footwear• Do not ride alone |
| Snow mobile | <ul style="list-style-type: none">• Conduct specific safety training• Check weather forecast and trail conditions• Wear appropriate clothes and protective gear• Do not ride alone |

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Weather and Physical Hazards Associated with Destination of Travel

| Risks | Associated Control Measures |
|------------------------|---|
| Cold stress | <ul style="list-style-type: none"> • Provide all participants with a recommended gear list including waterproof clothing, boots, layers for insulation, extra dry clothes (socks) • Carry extra blankets or sleeping bags in vehicles for emergencies |
| Heat exposure | <ul style="list-style-type: none"> • Conduct Heat Illness Prevention training for the group • Establish a plan for assessing heat exposure and responding to heat illness • Acclimate to heat gradually • Carry sufficient water, drink plenty of liquids, and take breaks in shade • Carry shades or tarps if natural shade is unavailable • Maintain means of communication and continually monitor worksite conditions |
| Sunburn | <ul style="list-style-type: none"> • Wear long sleeved shirts, pants, and a hat. • Apply sunscreen with SPF of 30 or greater |
| Rain | <ul style="list-style-type: none"> • Provide all participants with a recommended gear list including waterproof clothing |
| Lightning | <ul style="list-style-type: none"> • Check weather forecast before participating in outdoor activities. • Seek shelter (e.g., closed vehicles) or go indoors, if possible • Get off elevated areas such as hills, mountain ridges, or peaks • Get out of and stay away from ponds, lakes, and other bodies of water • See more here: https://www.cdc.gov/disasters/lightning/safetytips.html |
| Flash flooding | <ul style="list-style-type: none"> • Be prepared to evacuate quickly • Avoid walking, swimming, or driving in flood waters • If you come upon flood waters, go another way and climb to higher ground • Check weather forecast before leaving on extended outdoor trips. Watch for signs of approaching storms. • Monitor for flash flood watches and warnings. https://www.weather.gov/snow |
| High fire danger | <ul style="list-style-type: none"> • Check current conditions in field area prior to starting field work (e.g., Cal Fire) • Develop evacuation plan in case of fire |
| Snow or icy conditions | <ul style="list-style-type: none"> • Provide all participants with a recommended gear list including footwear with good traction and insulation • Take short steps and walk at a slower pace to react quickly to changes in traction |
| Rugged terrain | <ul style="list-style-type: none"> • Provide all participants with a recommended gear list including footwear with ankle support and good traction. |

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|---|---|
| | <ul style="list-style-type: none">• Carry needed items in a well-balanced pack.• Use hiking poles if needed |
| High altitude | <ul style="list-style-type: none">• Allow for acclimatization by gaining elevation slowly• Keep hydrated• Eat high calorie/sugary snacks frequently• Consult with doctor prior to trip, if concerned. May prescribe Diamox to help you acclimatize |
| Other extreme weather (e.g., tornadoes, hurricanes) | <ul style="list-style-type: none">• Be aware of special weather concerns and monitor weather forecasts daily• Bring appropriate equipment to deal with severe weather |

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Endemic/Local Biological Hazards

| Risks | Associated Control Measures |
|---|---|
| Local diseases (e.g., Hanta virus, Valley Fever, West Nile, Lyme Disease, etc.) | <ul style="list-style-type: none">• Check with Caltech Wellness Services to seek advice on who should be contacted to provide an assessment of field site• Check with local health department on disease risks and preventative measures |
| Insects (e.g., mosquitoes, bees, chiggers, ants, ticks) | <ul style="list-style-type: none">• Do not disturb hives or nests• Wear long pants and long sleeves to reduce risk of being bitten or stung• Use repellents when appropriate• Bring EpiPen if participants have an allergy to specific insects |
| Animals (e.g., bats, bears, snakes) | <ul style="list-style-type: none">• Do not handle, provoke, or scare animals• Keep food stored in sealed containers (e.g., bear cannisters or boxes)• Wear a bell or other noisemaker when in bear territory |
| Poisonous plants (e.g. poison ivy, oak, or sumac) | <ul style="list-style-type: none">• Avoid contact with poisonous plants• Use pre-exposure lotion in areas where contact is likely• Wash clothes and skin with soap and water after exposure. |
| Impure water | <ul style="list-style-type: none">• Carry your own water or treat water using tablets, purifiers, or by boiling for more than 3 minutes |

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Cultural Hazards Associated with Destination of Travel

| Risks | Associated Control Measures |
|--|---|
| Elevated risk of robbery or assault | <ul style="list-style-type: none">• Be aware of your surroundings.• When possible, avoid being alone, especially after dark |
| Violence caused by political unrest or military conflict | <ul style="list-style-type: none">• Be aware of current travel advisories (https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories.html/) |
| Border checkpoints | <ul style="list-style-type: none">• Ensure that all participants have required documentation |
| Potential for encounters with discriminatory messages and symbols | <ul style="list-style-type: none">• Make participants aware during safety training• Develop plan to exit dangerous scenes |
| History of violence against racial minority groups or the LGBTQ+ community (e.g., sundown towns) | <ul style="list-style-type: none">• Make participants aware of cultural norms at field site during safety training• Always carry credentials (driver's licenses, institution identification, relevant permits)• Develop plan for bystander intervention• Develop plan to exit dangerous situations |
| Safety concerns or required attire/behavior for women | <ul style="list-style-type: none">• Abide local laws and customs |
| Hunting season | <ul style="list-style-type: none">• Wear appropriately colored safety clothing• Avoid animal-like behavior (e.g., hiding in bushes) |
| Entering private property | <ul style="list-style-type: none">• Avoid working alone, when possible• Carry Caltech identification• Carry a reliable means of communication and check in with campus contact regularly |

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Physical Hazards Associated with Planned Field Activities

| Risks | Associated Control Measures |
|---|---|
| Camping | <ul style="list-style-type: none"> • Ensure all participants have appropriate equipment • Leader must know how to operate camping stoves |
| Working at heights (>6' off ground level) | <ul style="list-style-type: none"> • Use guard rails, when possible • Provide proper PPE (e.g., helmets, harnesses, etc.) |
| Falling objects | <ul style="list-style-type: none"> • Provide proper PPE (e.g., helmets) |
| Breaking rocks (hammer or sledgehammer use) | <ul style="list-style-type: none"> • Provide proper safety training for equipment use • Wear proper PPE (safety glasses, gloves) • Participants should wear boots and long pants |
| Drilling through rock | <ul style="list-style-type: none"> • Provide proper safety training for equipment use • Wear proper PPE (hearing protection, safety glasses, gloves) • Participants should wear boots and long pants |
| Repetitive tasks | <ul style="list-style-type: none"> • Use proper form when doing tasks • Take frequent breaks |
| Strain from lifting, pushing, pulling | <ul style="list-style-type: none"> • Warm up and stretch before undertaking tasks • Use proper technique |
| Working in an awkward position | <ul style="list-style-type: none"> • Warm up and stretch before undertaking tasks • Take frequent breaks. |
| Cave/confined space exploration | <ul style="list-style-type: none"> • Never go into caves or confined spaces alone • Wear appropriate PPE (helmets) • Wear appropriate clothing to moderate body temperature • Carry extra light sources • Do not run or jump. Plan movements carefully. • Do not enter caves when rain predicted in area. |
| Use of machinery | <ul style="list-style-type: none"> • Provide proper safety training for equipment use • Wear proper PPE |
| Digging soil | <ul style="list-style-type: none"> • Wear proper PPE (e.g., respiratory masks, eye protection) • Check for soil borne diseases endemic to area |
| Dusty conditions | <ul style="list-style-type: none"> • Wear proper PPE (e.g., respiratory masks, eye protection) • Check for soil borne diseases endemic to area |
| Work at nighttime | <ul style="list-style-type: none"> • Never work alone |
| Scuba diving | <ul style="list-style-type: none"> • Provide appropriate training and follow safety protocols |
| Swimming | <ul style="list-style-type: none"> • All participants should know how to swim • Have life preservers and rescue equipment available |
| Hazardous materials or chemicals | <ul style="list-style-type: none"> • Consult the Caltech Safety for information on handling and transporting hazardous materials or chemical |
| Generation of hazardous wastes | <ul style="list-style-type: none"> • Consult the Caltech Safety for information on handling, transporting, and disposing hazardous waste • Plan for proper storage, labeling, and transportation of waste generated |

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Additional Considerations

| Risks | Associated Control Measures |
|---|---|
| International travel | <ul style="list-style-type: none">• Check the U.S. State Department travel site (https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories.html/) and CDC travel site (https://wwwnc.cdc.gov/travel/notices) for current travel alerts, advisories and important safety and security information for your destination.• If vaccinations or prophylaxis is recommended for your destination schedule a medical visit at least 6-8 weeks prior to your trip |
| Working alone | <ul style="list-style-type: none">• Notify division administration and faculty supervisor of your Field Safety Plan• Identify contacts for immediate or local assistance in the event of an emergency• Incorporate check-in times into your communication plan and Field Safety Plan |
| Visiting controlled sites (e.g., mines) | <ul style="list-style-type: none">• Contact operators of controlled site prior to work to understand potential hazards |
| Individuals with specific allergies | <ul style="list-style-type: none">• Be aware of specific allergies and bring medication (if appropriate; e.g., EpiPen) |