

[Project name]

Standard Operating Procedures

Considerations and Procedures for Safe Hiking

PURPOSE

The purpose of this SOP is to provide project staff with tips, techniques and procedures that can be applied when hiking in the field and to increase hiking safety awareness.

SCOPE

Accidents during hiking activities are the cause of most of the injuries reported by PCSU project staff and include twisted ankles, twisted knees, wrist injuries, a variety of strained muscles, and bruises-lacerations-broken bones to a variety of body parts resulting from falls. Since field staff require hiking to access their worksites, with the many differing terrain, vegetation types, and weather conditions hiking cannot be taken for granted and each project staff must maintain constant alert to the variety of hazards in their hiking environment.

ROLES AND RESPONSIBILITIES [Project needs to tailor the Roles/Responsibilities based on their staffing level]

Project Manager (PM) is responsible for the overall program safety.

Project Safety Officer (PSO) is responsible for ensuring the field staff is in compliance with this SOP, investigate the project's hiking and hiking related injuries to determine the root causes, make recommendations to eliminate a repeat of the same accident or be pro-active to mitigate serious injuries due to hiking accidents.

Field Supervisors (FS) are responsible for the safety of their field crews and must ensure their staff read and understand the procedures and tips in this SOP and review this SOP semi-annually as a refresher to maintain a culture of hiking safety awareness.

Field staff is responsible for adopting and maintaining a high level of hiking safety awareness by adapting the appropriate procedures and using the information as needed.

PROCEDURES

Project field staff works primarily in remote, rugged, and wilderness areas and mostly where there are no established or maintained trails. Hiking often requires traversing rugged terrain just to access a work site and occurs off of established trails, across uneven and precipitous terrain, through dense pristine native rainforest, mixed shrub land, open grassland, bogs, steep valleys, barren lava fields, high elevation to low elevation, where non-native vegetation dominates, and coastal areas. These procedures provide information to help maximize hiking safety in these work environments.

Planning and Preparation for the Fieldwork

When a field assignment is made, project staff is aware of their work assignments, what work equipment is needed to accomplish the task, how long they will be in the field, and what they need to bring in addition to the tools, equipment and supplies; new staff should consult with experienced staff

prior to their first trip to each location; conversely, experienced staff should share their knowledge on how to prepare to the new staff. Below is a list of considerations to help prepare you for safe hiking experience when in the field.

Being Fit

- Being in good physical shape helps prevent fatigue
- Fatigue will result in a slowing of reflexes, inattention, and making poor judgment calls, not good when needing to concentrate on hiking safely
- A person suffering from fatigue may fall behind the group and try to catch up and become a high risk for a hiking accident
- Get a good night's rest; don't start the work day tired!

Your Boots

Your footwear may be the most important equipment you have. The appropriate footwear for PCSU fieldwork ranges from tabis for coastal shores, streams, to rubber boots for extremely muddy conditions at base camps or bogs, to boots with all leather uppers as required for helicopter work, to leather boots with spikes for wet areas requiring good ankle support, to combination leather synthetics for most hiking applications, etc.; there is no one or maybe two types of footwear that will adequately perform in all the conditions.

Outside of the required all leather boot for helicopter work and specialized footwear for working in water, hiking boots should be comfortable, sturdy, and able to support the ankles, provide stability and slip resistance with the soles being tough enough to protect the bottom of your feet from being bruised on sharp objects. The best boot provides all the above while fitting properly.

Ill-fitting boots are actually unsuitable for hiking because they

- Create severe blistering
- Become exceedingly painful to wear
- Create fatigue
- Become so uncomfortable that the field worker becomes a high risk for an accident

Suggestions for finding the best boots:

- Must comply well with the shape of your feet with a bit more room at the toe than you are used to
- Heel of boot should "lock" your heel so as to not allow your heel to "piston" up and down
- Should hold your foot firmly and not allow it to twist or tip over
- Feet should feel good as soon as you put it on
- Traction is important so ensure it has sturdy treads a bit deeper than the average running shoe
- Ankle support is important but has more to do with a proper fit than high ankles
 - Unless you have weak ankles, will frequently carry heavy (>35#) weights, or hike in extreme weather consider high ankle support
 - Higher ankles may be needed to prevent cinders or sand from getting in
- Get the lightest comfortable and properly fitted boot as a pound on the foot is equivalent to carrying 7 pounds on you back

- Socks are important as the quality of the boot
 - Never cotton for hiking as they get wet from perspiration and cause blisters
 - Best to have a combination of thin moisture wicking polyester or polypropylene liner topped with an outer pair of synthetics for comfort and cushioning
 - Some hiking socks are thick cushioning with moisture wicking qualities
 - Get the proper size sock that does not bunch up at the toe and pull high and tight when wearing
 - Buy your socks first and have them on when purchasing on your boot
- Best time to try on the different boots is in the evening when your feet are swollen
- Your boot will probably be at least a half size larger than your normal shoes
- Testing the boot for a good fit
 - Lace up firmly and walk briskly
 - If there are stairs available, walk up and down several times
 - Press the soles with your thumb, if it presses in, it's probably too soft
 - Twist the boot, if it twists easily, it may not provide good ankle support
- Break-in your boots with several short hikes slowly lengthening the distance
 - Don't break-in your boot on a work trip
 - If you need to return the boot for another one, it must be in resalable condition

Your Pack

- A well fitted pack will significantly reduce your fatigue factor
 - Fits your torso well
 - Excellent suspension system
 - Well padded and ergonomically designed shoulder strap
 - Chest compression strap available
 - Padded waist belt fitting comfortably over the hips
 - Compression straps around the pack to keep your load secured and centered
 - Available side pockets for accessory gear such as radios/cell phones, water bottles
 - Built-in rain fly that will securely cover the pack
- Does it have enough volume for the essentials and still be comfortable?
- Once you pack the required items, is the weight comfortable to carry to and from the worksite without causing fatigued (or knee pains) while hiking?
- Are there items that can be removed to reduce the fatigue factor during the hike to the worksite?

Essentials and Personal Items that You Put in Your Pack, You Wear, or You May Use

- Food and snacks for the day
- Enough water to keep hydrated for the day
- First Aid kit, if the crew has a kit, this can be taken out
- Survival kit with pocket knife, fire starter (such as matches in waterproof container), space or emergency blanket, whistle, signal mirror, small waterproof flashlight or headlamp or strobe light, 25-ft of nylon cord
- Raingear lightweight but sturdy
- Bright colored clothing or vest

- Radio or Cell phone (if others in the crew have these items and we always stick together, do we all need it?)
- GPS (one per crew is sufficient)
- Map (only as needed)
- Head gear such as hardhat with chinstrap
- Eye protection depending on the work and hiking environment including dark glasses, safety glasses, goggles
- Sunscreen, lip balm, insect repellent
- Clothing that is appropriate for the hiking and working conditions
 - Shirt
 - SPF 30+ long sleeve light colored for sunny or high altitude work
 - Wear in layers if necessary
 - Avoid wearing cotton tee-shirts next to the skin as it does not dry quickly and may cause a person to chill faster under certain conditions or become hot and clammy in humid conditions
 - Select moisture wicking synthetics to maintain body temperature
 - Trousers
 - SPF 30+ sturdy, long enough to extend below the ankles when wearing hiking boots
 - Somewhat loose, not tight
 - Socks, synthetic moisture wicking, avoid cotton
- Appropriate footwear for the type of terrain
- Gaiters to provide additional protection to the lower leg from hidden branches, thorny plants
- Gloves to wear while hiking that is adequate for terrain and vegetation
 - Flexible leather or leather-like palms
 - Synthetic uppers to “breathe”
- Trekking poles, pair

Knowledge of the Area with the Potential Hazards to Safe Hiking

- Cliff or steep-walled valleys with potential for rock falls or prone to flash flooding (hard hat)
- Stream crossings prone to flash floods (proper footwear, trekking poles for balance)
- Rain or fog to prevent working or hiking safely (rain gear)
- Overhead vegetation such as old snags (hard hat, eye protection)
- Ground level ranging from overgrowth and hard to see to open rocky or crumbly (appropriate footwear, gaiters, trekking poles)
- Lightning, occurs in Hawaii and avoid being in the area (weather forecast)
- Thorny plants such as kiawe, lantana, blackberries, thimbleberry, etc. (gloves, gaiters, long sleeve shirt, eye protection, first aid kit)
- Poisonous plants (depending on an individual’s allergies) or sap such as xmasberry, mango (long sleeve shirt, gloves, personal medication)
- Insects such as fireants, centipedes, venomous spiders, mosquitoes, yellow jackets or wasps (appropriate footwear, trousers, gaiters, long sleeve shirt, hat, goggles, personal medication)
- Heat exhaustion or stroke on hot days or lee-side of mountains (moisture wicking clothing, water, hat)
- Hypothermia at higher elevations (long sleeve shirt, trousers, hat, layering under outer clothing, hat)
- Giardia or Leptospirosis from any stream or open water source (don’t drink the water)

- Altitude sickness at higher elevations (inform your Field Supervisor if you are susceptible to altitude sickness before being assigned to work at high elevations)
- Acrophobia on precipitous drops, steep slopes, knife-like ridges (let Field Supervisor know before you are assigned to these field conditions)
- Dehydration from lack of drinking water (thirst is not a good indicator for needing water, drink at regular intervals to prevent getting thirsty)

Duty Day

- Field Supervisor and Field Staff must be aware of their duty day
- Plans for the work day must take into account the hike to the worksite, the amount of work for the day, and the hike back at towards the end of the day
- Planning the next day's work should ensure adequate time to rest so that the Field Staff will not fatigue easily on subsequent work days

Basic Stretching Tips

Stretching prior to hiking in the morning may prevent an injury [\[projects may research what type of stretches best works for their crew\]](#)

- Hold each of the stretches for at least thirty seconds
- Do not abruptly go into a stretch, but ease into it
- Do not bounce, which can tear muscles
- Breathe steadily and deeply during the stretch
- Do not hold a conversation with someone else while stretching
- Instead hold a conversation with your body and listen to what it is saying
 - Where are the tight and stiff spots
 - What needs to be loosened up
- You want to feel a slight burn in the muscles while stretching
- Do not make it painful.

General considerations

- VISUALLY PLAN at least three steps ahead while hiking
- DO NOT HIKE ALONE unless you are required to
 - Make sure you have a written plan as to where you are going (compliance with Fieldwork SOP)
 - Leave a map of the area with the plan indicating your parking area, landing LZ, trail to work area
 - Have a radio or cell phone (if no coverage, PLB is required)
 - Have an established call in time with someone
 - When you return from the field, close out your written plan by making a last check-in call
- Be sure other workers in vicinity know where you are
- If poor weather sets in, allow extra time to return to base camp or the vehicles
- Be aware of your surroundings at all times (ground level, overhead, and to both sides)
- Always be on guard against injury from falling trees, snags, limbs, rolling logs, or rocks
- Stay together as a group, NEVER allow a staff to be by themselves whether rushing ahead or lagging behind
 - Have a leader who is aware of the pace of the slowest person

- Have a sweep that keeps everyone ahead of her/him
- Always leave the worksite with enough time to return to the base camp, or to the vehicles with travel time to return to the project baseyard
- Muddy spots may be deeper than what it appears to be
- Select each stepping spot carefully and do not shift body weight until you are sure the spot is solid
- Eye protection is minimally required in areas with thick vegetation and in dusty environments
- Never run blindly if a rolling rock, log, or tree is heard
 - Try to determine the direction of fall
 - Then move out of the path
- Plants on the side may have thorns or sharp edges as you reach to grab onto something to maintain your balance
- Be extra cautious when returning from the field as you will probably be fatigued

Hiking Techniques [Examples: projects to use their examples with potential hazards](#)

Field Supervisor should do a daily safety briefing at the start of the workday and should include prevention of slips and falls; Field Staff should ensure they have the appropriate clothing and footwear, and required PPE. The day's work plan should include the safest route to the worksite not necessarily the shortest.

Entering New Areas

- Plan ahead and if the area allows
 - Recon for possible routes
 - Select safest route
- Clear path wide enough for hiking through with gear and equipment
- Remove hazards from above head level to ground
- Eliminate snagging obstacles
- Remove all branches that can whip back

Crossing Streams

- Wear the appropriate footwear such as boots, spiked tabs (those designed for wading)
 - DO NOT jump from rock to rock
 - Always ensure your footing is firm and safe
 - Use trekking poles to provide balance
- Do not cross if the stream appears to be flooding or attempt to cross a deep running stream, look for a spot where the stream widens out and is shallow

Traversing Mature Stream Valleys

- Wear appropriate hiking footwear dictated by the level of undergrowth, mosses, ferns
- Avoid standing on large rounded boulders
- Pay attention to the weather towards the headwalls of the valley
- Clear path with brush knives or machetes based on Hand Tool SOP
- Avoid leaving "punji" stakes along path that may be quickly hidden by fast growing vegetation

- Avoid walking on logs unless they have been tested for secure footing

Crossing Muddy or Boggy Areas

- Make sure boot laces are tight as the suction may hold the boot in the mud as you lift your leg
- If crossing a bog is required, minimize impacts as much as possible

Ascending Steep Slopes

- Avoid climbing straight up the slope as this expends a lot of energy very quickly
- When contouring up a steep slope
 - Avoid leaning too far towards the slope as this tends to loosen footing
 - Use a somewhat erect but slightly forward leaning posture that provides more secure footing and better balance
- Avoid dislodging rocks or debris; call out “ROCK” if you do dislodge a rock
- Make sure your handhold is secure and not a loose rock or dead/rotted tree trunk/branch
- Keep your interval with the co-workers ahead and behind you
- DO NOT be directly under the person above you
- When carrying a heavy pack, do not stand straight up as you may lose your center of gravity and pitch backwards
- If you begin the slip or trip
 - Lean into the slope and initially try to grab something to help arrest fall
 - Do not lean out away from the slope as this may result in a head-over-heels tumble
 - If you continue to slip down the slope, turn onto your back as quickly as you can so you can see where you are going
 - Spread eagle to create as much friction with the ground to slow and stop your descent

Descending Steep Slopes

- Contour down slowly; not straight down
- Downhill slopes tend to be “slippery”
 - Keep most of your weight on your heels
 - Shorten your stride
 - Keep knees bent
 - Lean slightly backward
 - Best use of trekking poles to reduce impact on the knees
- Keep a reasonable interval between co-workers
- Ensure handholds are secure and not a loose or dead tree trunk or branch
- Avoid dislodging rocks especially if a co-worker is below your location
- Pay attention to your balance when carrying a heavy pack
 - Make sure the waist belt and chest strap are tight
 - Do not lean forward or to the makai side so as to lose your center of gravity
 - Ensure your pack will not snag on vegetation or an overhang
- If you do slip and begin to fall
 - Fall on your back so you can see where you are going
 - Spread eagle to create friction to slow and eventually stop your descent

Traversing Narrow Ridges or Cliff Edges

- NEVER take your eye off the trail just ahead of you as you hike

- If you need to look at something off the trail, stop first
- Let the staff on both sides know that you are stopping
- Keep a reasonable interval between co-workers if vegetation obscures your vision
- If you feel you are going to lose your balance
 - Buckle your knees to get low
 - Plant your butt on the trail immediately
 - Bend your elbows and keep your arms apart to stabilize yourself

Hiking in Open Disturbed Thick Non-Native Grass

- Maintain a pace based on the ability to clearly see the ground you are stepping on
- If you cannot see the ground be aware of potential hidden hazards and slow your pace
 - Holes, drainage channels, old 4WD treads
 - Obstacles such as stumps, fallen trees/branches, hidden fence, rocks

Hiking in High Elevation Shrub Land

- If areas with well developed soil or cinder
 - Walk between shrubs carefully
 - Be careful of uneven ground
- Terrain has exposed lava rock rocks and outcrops
 - When stepping over shrubs, make sure rock is solid

Hiking Uphill in Sandy Soils or Cinders

- Lean slightly forward
- Turn feet outward
- Shorten stride
- Use as much of the inside of the foot as possible
- Have those behind you use your steps
 - To lessen impacts on the area
 - Reduces their fatigue factor

Traversing Rocky Slopes

- Footing is especially treacherous due to loose rocks and steepness
- Have one hand free, preferably on the uphill side, for protection against falls or obstructions
- If carrying tools, make sure it's on the makai side
- Always remember that the rocks underfoot can shift
- Another ideal condition for using trekking poles if you're not carrying a tool

Pushing Through Thick Brush

- Wear appropriate PPE to prevent eye injury and head injury
- Safety goggles with secure strap to prevent eye injury
- Hard hat with secure chinstrap to prevent scalp from being lacerated or punctured
- Be aware of the risk of an ear injury due to branches, canes, foreign objects entering the ear canal
 - Punctured ear drum
 - Scratched ear canal
 - Embedded splinter
 - Loss of hearing could result

- It is not feasible to wear ear protection while hiking due to reducing the ability to hear co-workers
- Wide strap from goggles may be used to cover part of the ears to prevent injury
- Gloves with adequate flexibility with leather (or synthetic leather) for palms and fingers
 - To grab and push, bend branches, canes away from your intended path
 - Ensure that they will not spring back at you
- Best to avoid really thick vegetation where possible

Hiking Through Thick Vegetation or Thick Undergrowth

- Be aware that your vision is obscured from hazards
 - Tree trunks, broken branches, snags
 - Holes of varying size, hidden drop offs
 - Rocks that may be loose or firmly in the ground, sharply pointed, crumbly when stepped on
 - Slippery mud surface, mud holes up to the knees
- Slow down and exaggerate steps in areas of exposed roots to keep from catching your foot
- Lift your knees high so your feet will clear obscured obstacles
- Be extra cautious when using brush knives or machetes (refer to appropriate SOP)
- Clear hazards from above head level to the ground
- Remove snagging obstacles such as vines
- When cutting through dense growth near ground level
 - Be aware of low snags/branches at eye level when you stand up straight
 - Wear goggles with secure strap to prevent the goggles from being dislodged
- Wear gloves while using a machete (based on Hand Tool or Machete SOP's PPE)

Further Hints on How to Fall

- Know how to fall to avoid hard impacts
- Keep flexible with knees slightly bent
 - This helps your legs act as a shock absorber
- If you feel yourself slipping, pick a landing spot
 - Stop and survey steep areas for possible good landing spots should you fall
- Avoid sticking your arms out to break a fall
 - This may result in a wrist or arm injury
 - Try to keep your arms slightly bent in front of your head during the fall
- "Curse your fall"
 - This means shout out an exclamation as you fall
 - This ensures you exhale as you land which in turn releases air from your lungs
 - This can help minimize damage to your internal organs

Use of Emergency Whistle

The whistle code is a method of communication when no radio comm is available when the other fieldworkers are hiking back to the vehicle or base camp and are too far away to hear you. Use these codes as follows:

- ONE whistle blast = STOP! Wherever you are and wait
- TWO whistle blasts = STOP! Then come towards whoever blew the whistle

- THREE whistle blasts = STOP! Then come QUICKLY towards whoever blew the whistle as there may be an emergency at hand

TREKKING POLES [this section provides information regarding trekking poles and projects may utilize in their SOP]

Trekking poles (textured handles, rigid, strong, hardened carbide steel tips) are not the same as ski poles (flexible shafts) and are also called hiking poles. They offer a number of proven practical advantages.

- Great for taking pressure off the knees when going downhill and even on level ground
- Using two trekking poles allow the upper body muscles to “take over” some of the cushioning task of the quadriceps and other muscles that support the knees
- Using trekking poles allow muscles of the upper body to “help out” the legs during ascents due to the “push off” effect, and helps to correct the posture with a more elevated head and better lung expansion
- Use of two poles provides two additional points of contact with the ground enhancing stability, balance, and footing
 - Allow hikers to brace themselves on their poles to remain upright instead falling after stumbling
- Attach collapsed poles to your pack when not in use – tip pointed down!
- When in use, keep a safe distance between the persons in front and back
- Make crossing streams, loose rocks and slippery surfaces easier and safer
- Help you establish a walking rhythm
- Can be used to push back overhanging vegetation from the trail and probe soggy ground for holes or deep spots
- When selecting from the different types available
 - Get collapsible types that go down to about 24-inches (Z-style collapse to 12-inches)
 - It should be lightweight with less than 12oz per pole
 - Grips available in cork, foam, rubber at ergonomically neutral angle
 - Shock absorbing types are available although slightly heavier
 - Aluminum shaft is sturdy, carbon fiber is lighter and more expensive
 - Ensure they have a “basket” to limit the depth to which the pole tip can penetrate the ground
 - Standard steel tips may be changed out for rubber tips
 - Twist-and-lock mechanism has been known to slip when heavy weight is applied
 - Probably as a result of being dirty; maintain per instructions
 - Lever locking clamps are sturdier but still requires maintenance

Trekking poles are most helpful to those with weak or damaged knees or ankles, particularly when going downhill, because the poles absorb some of the impact the body would normally sustain. According to a 1999 study in *The Journal of Sports Medicine*, trekking poles can reduce compressive force on the knees by up to 25%. This translates into literally tons of weight that your knees will not have to support during the course of a hike.

Note that using trekking poles will not decrease overall energy expenditure since you'll be using your arms more than you would when walking without poles. They do, however, help distribute your energy usage in a way that can help your hiking endurance.

Also note that trekking poles cannot be used in certain hiking environments such as uluhe, when using machetes or other hand tools while hiking (they can be strapped on the pack), and where vegetation will be thick enough to prevent them from being moved forward without snagging. While in use, staff must keep their intervals so as to not accidentally hit the other person or their pole.

REVIEWS AND UPDATES

The SOP may be updated at any time during the year. Minimally, the SOP should be reviewed annually by those whose work is covered by the SOP. Program Manager and Program Safety Officer must concur and approve the updated versions. An electronic copy of updated versions with new signatures will be sent to the Principal Investigator for his review, approval/signature.

SIGNATURES

Project Manager/Date

Project Safety Officer/Date

Principal Investigator/Date