



Performing
Environmentally
Sensitive Field Research
in Yellowstone National Park

A Guide for Research Scientists

Since its inception, Yellowstone National Park has attracted scientists interested in conducting research. We are proud to host more than 200 research studies each year. Each day specialists conduct studies on everything from insects to paleontology, and from microbes to elk.

Research permits are required to conduct research or collect specimens in National Park Service areas. Scientists must submit an application, study proposal, and peer reviews for permit consideration. To learn more about park research, or to obtain a research permit, please contact Yellowstone's Research Permit Office at 307.344.2234. You may also visit our website at www.nps.gov/yell/technical/researchpermits.

A scientific research permit allows scientists to do things that the average visitor is prohibited from doing in a national park. With special permissions, come special responsibilities.

Yellowstone is managed as a Wilderness Area. Respectful, low-impact research is essential to its preservation. The information in this pamphlet represents best field practices and techniques, and was contributed and compiled by permitted researchers, Montana State University's Thermal Biology Institute, and Yellowstone National Park staff. Our objective is to promote new ways of carrying out research activities while minimizing traces left by scientists in the field. This brochure also includes tips for staying safe while conducting research activities in the park.



CONDUCTING RESEARCH:

Best Field Practices

Be prepared. Excessive trips between your car and your study site can create unwanted social trails. Make sure you have all necessary field gear before heading to your study site.

Take care to not trample plants or soils at your work site. Some researchers use wooden planks or tarps to lessen impacts to the site.

Leave what you find. Do not collect any items unless your research permit authorizes you to do so.

Respect others by collecting samples in a manner not obvious to visitors. If you do encounter visitors, take the time to explain what you are doing.

Use of mechanized/motorized equipment is prohibited, without permission from the park's Wilderness Committee. **Do not leave equipment** in the field overnight, or for extended periods of time without explicit permission from the Research Permit Office.

Do not approach or harass wildlife. If you cause an animal to change its behavior you are too close.

Pack out what you pack in. When leaving your field site, be sure to check the area for garbage.



Thermal Area Safety

Never work alone, or in areas you are unfamiliar with. Ask for help from a knowledgeable colleague or request park assistance.

Thermal areas can have unpredictably high levels of dangerous gases. Exposure to such gases may be greater on wind-free days. Researchers should consider using gas monitors.

Always carry a first aid kit equipped for treating thermal or chemical burns.

To avoid ruining clothing, do not kneel or sit in acidic thermal areas.

Always wear sturdy closed-toed boots in thermal areas. Gaiters may offer some protection from thermal burns if you accidentally break through a thin-crust area.

Always wear personal protective equipment such as safety glasses and heat-resistant gloves.

To avoid standing on the edge of a thermal pool, or to sample beyond your reach, use an extendable fishing pole or other specialized sampling equipment.





pure Geothermal and Research

Thermal areas in Yellowstone are as dangerous as they are beautiful. At least 18 people have died and many have been severely injured as a result of thermal burns. It is critical that you **make personal safety your first priority** when working in thermal areas.

Thermal Area Safety Practices



Best Field Practices in Thermal Areas

Avoid cross-contamination! Sterilize all equipment, including pH and temperature meters, between thermal features.

When use of chemicals in the field is necessary, it is good to measure chemicals and place in sampling vials prior to transport. Dispose of all chemicals properly outside of the park. **NEVER** release any chemicals into thermal pools, outflow channels, or any watershed.

Use planks or boards when working in mucky geothermal areas. In areas where excessive walking or standing has occurred, use a whiskbroom to brush out any footprints.

Do not leave glass slides, test tubes, or dataloggers in the field unless explicitly permitted. All equipment deployed must be retrieved.

When sampling from microbial mats, collect small amounts, such as straw-sized cores. Spread out sample locations across features so sampling does not harm mats and is not visibly obvious.

Personal safety and preservation of park resources always take priority over your research. It is important to **plan ahead and be prepared** for emergencies.

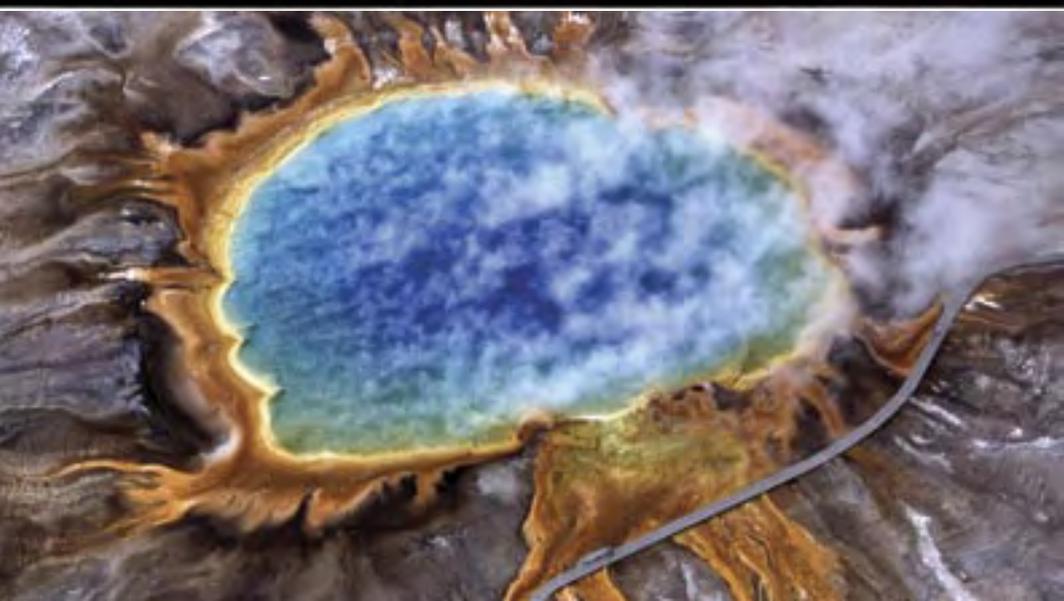
It is a condition of every research permit to notify area rangers before starting work and to **leave a Dashboard Display pass** in your car. This will aid park staff in the event you are reported overdue.

Do not disturb wildlife in an effort to reach your study site. At a minimum, 100 yards must be maintained from bears and 25 yards from all other wildlife. Bison, moose and elk can be especially dangerous during breeding and calving seasons. You should schedule extra time to conduct research due to the presence of wildlife.

Be prepared for environmental conditions that could cause exposure, hypothermia, or dehydration. Always carry a first aid kit, plenty of water, extra clothing, raingear, an emergency blanket, and sunscreen. In Yellowstone, weather conditions can change very rapidly.

Working in winter poses additional hazards. Cold weather, snowmobile operation, poor driving conditions, avalanches, and thin ice are all concerns. The Research Permit Office can recommend winter safety-related training for you and your staff.

Remember the -25°F cutoff! Yellowstone National Park prohibits all staff and researchers from working outdoors when temperatures are at or below -25°F.



Bear Safety

Bears are wonderful animals...at a distance. Close encounters with bears in Yellowstone have resulted in death and injury to both humans and bears.



REDUCE THE RISK OF CLOSE ENCOUNTERS

NEVER enter closed Bear Management Areas.

Stay on trails whenever possible.

Do not hike at night or alone. Groups of three or more are recommended.

Make noise! Talk, sing, or clap your hands to let a bear know of your presence.

Avoid carcasses. Report dead animals found along trails or near campsites to the local rangers.

Regardless of distance, **NEVER** approach a bear.



MOST COMMON CAUSES OF ATTACKS

Not making sufficient noise.

Approaching or surprising a bear, especially at close range.

Startling a female bear with cubs.

Getting close to a carcass or other food source.

Hiking off trail or at night.



KNOW THE SIGNS OF BEARS — Tracks, Claw marks, Profile

Grizzly Bear



Black Bear





BEAR PEPPER SPRAY

In addition to appropriate bear safety techniques, **bear pepper spray** has been shown to be a good last line of defense and has been effective in most reported cases of its use. It must be quickly accessible, not in your pack, and should not be applied to people, tents, or other equipment as a repellent. Before using your bear spray, read the instructions that accompany it.

For more information about preventing bear interactions, please consult a bear safety brochure, and consider purchasing a safety video for you and your research staff. You may also contact the Research Permit Office about annual bear safety trainings.



Backcountry Camping

Camping in Yellowstone's backcountry requires a backcountry permit and use of a designated campsite. To obtain a permit, you will be required to go through an orientation each year.

For more information please contact the Central Backcountry Office at 307.344.2160.

To help minimize impacts to Yellowstone please follow **Leave No Trace** principles:

1. Plan ahead and prepare
2. Travel and camp on durable surfaces
3. Dispose of waste properly
4. Leave what you find
5. Minimize campfire impacts
6. Respect wildlife
7. Be considerate of other visitors

For more information about Leave No Trace principles visit www.lnt.org or call 1.800.332.4100.

This brochure was produced as a collaborative effort between Montana State University's Thermal Biology Institute and Yellowstone National Park. Our organizations share a common goal to preserve park resources, encourage safe field practices, and promote scientific discovery.

For additional information about the Thermal Biology Institute and ongoing thermal biology research, visit the TBI website at www.tbi.montana.edu or contact us at 406.994.7039.



For additional copies of this brochure or for more information about park research, contact the Research Permit Office at 307.344.2234. Or visit our website at www.nps.gov/yell/technical/researchpermits.