



CLIMATE CHANGE IN THE MACKENZIE MOUNTAINS



PLANNING CHECKLIST

PLANNING CHECKLIST

IMMEDIATELY

- Make sure you understand and agree to Earthwatch's **Terms and Conditions** and the **Participant Code of Conduct**.
- If you plan to purchase additional travel insurance, note that some policies require purchase at the time your expedition is booked.

6 MONTHS PRIOR TO EXPEDITION

- Log in at earthwatch.org to complete your participant forms.
- If traveling internationally, make sure your passport is current and, if necessary, obtain a visa for your destination country.
- Bring your level of fitness up to the standards required (see the Project Conditions section).

90 DAYS PRIOR TO EXPEDITION

- Pay any outstanding balance for your expedition.
- Book travel arrangements (see the Travel Planning section for details).
- Make sure you have all the necessary vaccinations for your project site.

60 DAYS PRIOR TO EXPEDITION

- Review the packing list to make sure you have all the clothing, personal supplies, and equipment needed.

30 DAYS PRIOR TO EXPEDITION

- Leave the Earthwatch 24-hour helpline number with a parent, relative, or friend.
- Leave copies of your photo ID and flight reservation number with a parent, relative, or friend.

READ THIS EXPEDITION BRIEFING THOROUGHLY. It provides the most accurate information available at the time of your Earthwatch scientist's project planning, and will likely answer any questions you have about the project. However, please also keep in mind that research requires improvisation, and you may need to be flexible. Research plans evolve in response to new findings, as well as to unpredictable factors such as weather, equipment failure, and travel challenges. To enjoy your expedition to the fullest, remember to expect the unexpected, be tolerant of repetitive tasks, and try to find humor in difficult situations. If there are any major changes in the research plan or field logistics, Earthwatch will make every effort to keep you well informed before you go into the field.

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NOTE FROM THE PI

DEAR EARTHWATCHER

Welcome to the *Climate Change in the Mackenzie Mountains* expedition, a multidisciplinary research effort initiated in 1999. Since its inception, Earthwatch teams have helped establish eight long-term environmental monitoring stations, four International Polar Year study plots, and three Global Treeline Range Expansion Experiment sites in the Mackenzie Mountains study area. The results from these efforts will be used to meet the long-term objective of quantifying environmental responses associated with climate change in the region. Our efforts are directed at benchmarking current conditions in order to evaluate predicted future changes.

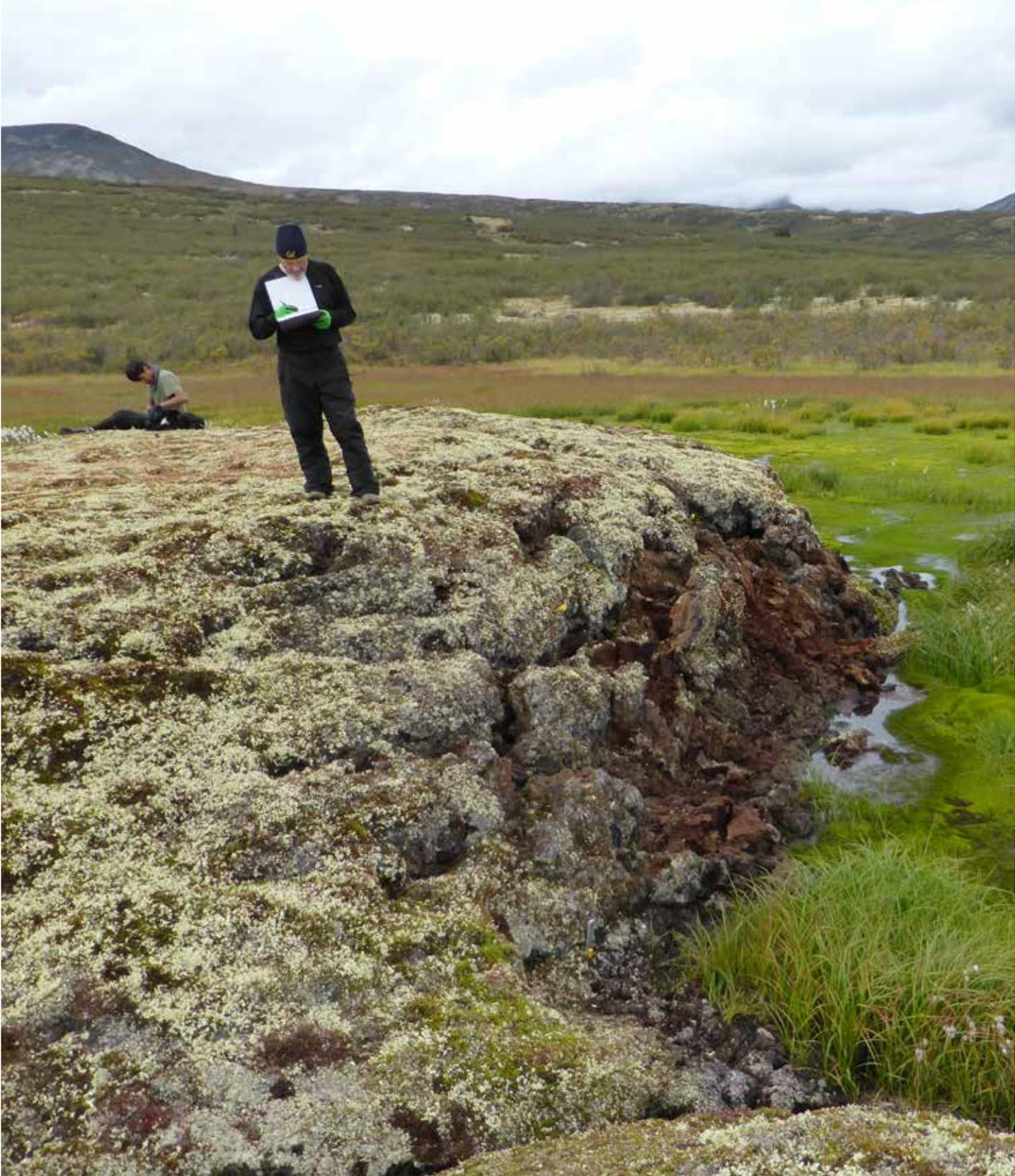
This project is one that requires a high investment of time in the field, something that I relish. The studies are labor-intensive and Earthwatch teams provide the people-power that makes it possible to collect large amounts of data in relatively small windows of time. Team members are provided with the necessary training, and either I or the Earthwatch field team leader will be with them at all times. The outside work can be physically demanding, but participants have to be able to deal with the weather that comes with this environment. The mountains are well known for their changeable weather, but team members rise to the challenge, reach into their daypacks and bring out another layer, gloves, or rain gear as required. Regardless of the conditions, we do our work and put up with the good, the bad, and the ugly weather, knowing that Dechen la' Lodge will offer comfort, food, and shelter at the end of the day.

Between the long days of data collection, we make time for team members to walk near the lodge to check out sunsets, stars, birds, and flowers. Day-off activities can include hikes up local viewpoints, across tundra streams, or along the Canol Heritage Trail. I strive for a balance between science and providing opportunities for team members to immerse themselves in this unique environment.

It is my pleasure to work with Earthwatch participants, and their contributions so far have significantly and positively affected this research project. I also treasure the interactions, the camaraderie, and the opportunity to learn from the dedicated people who selflessly contribute to this project.

Yours Sincerely,
Steven Mamet





THE RESEARCH

CLIMATE CHANGE IN THE MACKENZIE MOUNTAINS



THE STORY

At the Arctic's edge we can measure the evidence of global warming. As a result of recent warming, polar sea ice is shrinking, glaciers are retreating, the winter snowpack is becoming less extensive and is melting earlier, and permafrost is degrading (ACIA, 2004; IPCC, 2013). Biological evidence of warming is also mounting. For example, growth of trees at the treeline (beyond which trees do not grow) has been enhanced, plant community types are shifting, and northern ecosystem characteristics are changing (Bonan et al., 1992, Chapin III et al., 2005, Harsch et al., 2009). Residents of northern regions rely on these ecosystems, and as a consequence they are also being affected. Over the next few decades, the effects of global warming are expected to be greatest at high latitudes. Estimates of the amount of warming go as high as 6°C in the mean annual temperature, and at Churchill on Hudson Bay in Canada there has been a warming of approximately 2°C in annual air temperatures since record keeping began in the 1880s.

Permafrost (where the ground temperature remains below 0°C for more than a year) underlies 24% of the surface of the Earth, including vast areas of Russia, Canada, China, and Alaska. An estimated 50% of the world's terrestrial carbon stores are locked up in permafrost (Tarnocai et al., 2009). Northern circumpolar peatlands, mineral soils, and deltas have 1,672 gigatonnes of organic carbon and >67 gigatonnes of nitrogen (Voigt et al., 2017), and 88% of this area is affected by permafrost. Permafrost in the northern hemisphere is warming, and the zone of permafrost is predicted to shift northward. As the permafrost thaws, its vast stores of organic matter begin to decompose, producing carbon dioxide, methane, and nitrous oxide—three strong greenhouse gases. The release of these greenhouse gases into the atmosphere will amplify the current warming effect in a positive feedback loop (ACIA, 2004; IPCC, 2013).





RESEARCH AIMS

Our main research goal has been to establish an environmental monitoring program to collect baseline quantitative data on climate-related changes in northern ecosystems. Earthwatch participants make it possible to obtain large numbers of samples over a short time period and are vital to the success of the monitoring program.

The Mackenzie Mountains research sites have been under study since the 1970s, with year-round monitoring beginning in 1990. Over the period of record keeping, it is apparent that interannual variations can be great. Long-term studies of these highly variable systems are the most valid approach, enabling researchers to place short-term ecosystem-modifying events into their proper context.

The more than 20-year record from the Mackenzie Mountains confirms an increase of approximately 1.3°C in mean annual permafrost temperature. This coincides with an increase in treeline tree growth. The treeline is a zone of ecological stress where minor changes in the environment can have significant ecological impacts. For example, warmer growing seasons can lead to a greater number of viable tree seeds produced and higher germination success, thus allowing the treeline to migrate further into the tundra.

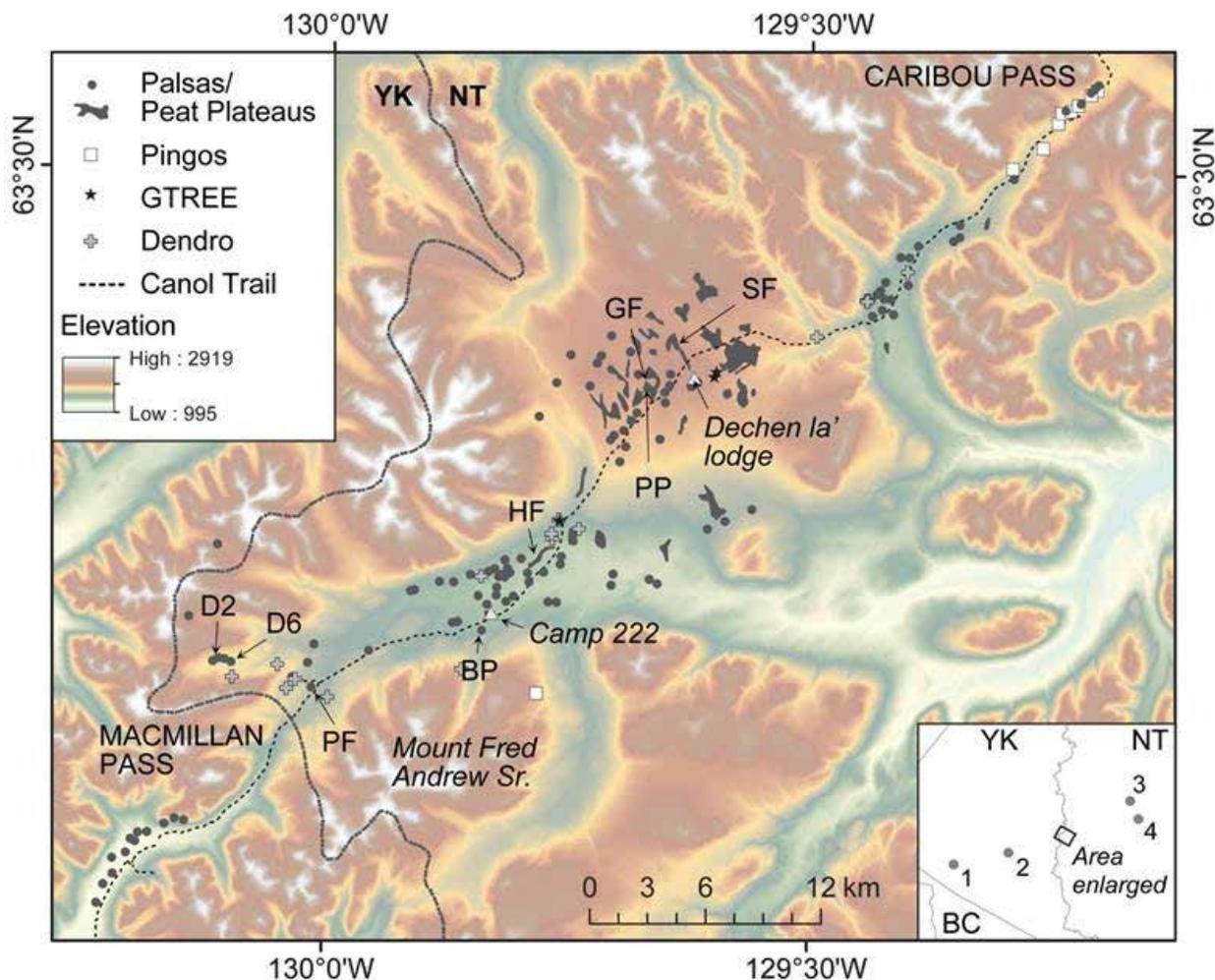
Only long-term studies have the time frame to capture these unpredictable events. With each additional year of data comes a greater understanding of these systems and how they function. This study can provide evidence of these early-warning signs of global environmental change driven by climate change.

HOW YOU WILL HELP

You will assist in both field and lab research. The amount of time you will spend at each site will vary, but you should expect to spend about 60% of your time at the research sites and the remainder working indoors. Most of the sites require 30 minutes to three hours of travel time in a four-wheel-drive vehicle, though some are within walking distance from camp. You may help set up and monitor equipment and collect data on features of the permafrost and soil; the occurrence of vascular plants, lichens, and mosses; plant phenology (the timing of seasonal events such as flowering, first leaves, etc.); annual growth rings of trees; seed germination success in the field; and the numbers of mammals and birds. You will be taught methods of identifying animals and plants, although some identification experience would be helpful. The equipment you will be operating will be relatively easy to use, including a dissecting microscope, frost probe, permafrost corer, tree borer, plant press, and GPS.

DAILY LIFE IN THE FIELD

PLANS FOR YOUR TEAM



DAILY LIFE IN THE FIELD

You will be given lectures on general topics such as climate change, the evolution of permafrost landforms, plant community succession, and disturbance regimes. Talks and presentations on topics specifically related to the study area could include the formation and status of local permafrost landforms, the ecology of wildlife species, disturbance ecology, the significance of the project to the community, and climate change monitoring in general. Depending on the particular tasks that you will be performing, you will also be given practical talks on plant species identification, community structure, sampling techniques, and monitoring and census techniques. You will also learn about the concepts behind tree boring and dendrochronology (dating by analysis of the pattern of tree growth rings), and the use of various kinds of equipment.

Steven Mamet and his capable field staff participate in the fieldwork and provide theoretical and practical training for every component of the study. Questions are encouraged, and objectives and tasks are reviewed on a daily basis during briefings. Some basic knowledge of biology, geography, and ecology is helpful but not required. Computer skills would be beneficial, but training can be provided on word processor and spreadsheet programs. Most important is a strong interest in natural history. Individual tasks will be matched with the interests and skills of participants whenever possible.



ITINERARY & DAILY SCHEDULE

ITINERARY

Weather and research needs can lead to changes in the daily schedule. We appreciate your cooperation and understanding.

DAY 1

You will board the charter flight in Whitehorse to take you to the research site. After your arrival, there will be an introduction and orientation with time for participants to recover from travel. A meeting will be conducted to outline the objectives and methods of the team and guidelines for safety, and to provide a preliminary schedule.

DAY 2

There will be demonstrations of equipment and training. If this is completed in the morning, the team will conduct measurements on a research site in the afternoon.

DAYS 3-10

Each day will begin with a briefing to outline the day's activities. At least half of each day will be spent at the research sites collecting data. Given the travel times involved to reach the sites, the team may picnic in the field. Depending on the tasks, there might be an evening trip to catch the sunset or other excursions. There will normally be an evening briefing to review the day's activities, followed by a lecture or lab or data entry work. There will be a recreational day toward the middle of the expedition; the exact day will depend on weather and activities. Recreational day activities can include those noted at the end of this section.

On the last evening there will be a wrap-up seminar with an overview of the data, comments, recommendations, and discussion about the significance of your contributions to the overall project.

DAY 11

You will board the charter flight to take you back to Whitehorse.

DAILY SCHEDULE

7:15 a.m.	Morning briefing, review of assignment progress, new assignment outlined
7:30 a.m.	Breakfast, lunch prep, and cleanup
8:15 a.m.	Prepare for daily field program
8:45 a.m.	Depart for field
12:00 p.m.	Lunch
1:00 p.m.	Depart for field if lunch was at a different location
2:30 p.m.	Return from field, begin laboratory work, data entry, etc.
6:00 p.m.	Dinner and cleanup
7:00 p.m.	Data entry, lectures, specimen processing, optional recreational activities
9:00 p.m.	Relax, read, socialize, go to bed, etc.

RECREATION TIME: Usually on the fifth or sixth day of the expedition the team will have a recreational day. Dechen la' Lodge is a base for ecotourism, and those staying at the facility are provided with an opportunity for activity in the beautiful alpine tundra and hilly areas around the camp. Normally activities take the form of day hikes to different sites that are accessible directly from the lodge or from the four-wheel drive road. Note that the last few days of the expedition will probably be spent at the more primitive facility, Camp 222, closer to where the landing strip is located.



ACCOMMODATIONS AND FOOD

ABOUT YOUR HOME IN THE FIELD



Dechen la' (www.dechenla.ca/lodge_facilities.php) is the only lodge in the vast northern wilderness between the Selwyn and Mackenzie ranges, which lie between the Yukon and Northwest Territories. Its name comes from an aboriginal word meaning "the land at the end of the sticks." This was a special place to both the Kaska and Sahtu aboriginal people, the traditional land stewards of the area. In more recent times, this area was identified by a group of eminent scientists, under the auspices of a United Nations program, as a place of unique and outstanding natural heritage. They called this place the Mackenzie Mountain Barrens, in reference to its lack of trees.

The lodge is situated on lake-dotted tundra near the westernmost end of the Canol Road Heritage Trail, and serves as a staging area for hikers and backcountry sojourners. The Canol (Canadian Oil) Heritage Trail is a 231-mile (372-kilometer) route that begins across the Mackenzie River from the Northwest Territories town of Norman Wells. From there, it winds through the Mackenzie Mountains to Macmillan Pass on the Yukon border.

SLEEPING

Dechen la' Lodge has a series of cabins on either side of the main lodge building, which includes the dining, kitchen, and communal lounge areas. Each cabin has two single beds, a wood stove, and storage areas. Large windows on the front of each cabin look out over the picturesque Mackenzie Mountain Barrens. Couples can be accommodated with advance notice.

BATHROOMS

There are three freestanding pit toilets (separate from the cabins) with pump-out tanks. Water is limited, but hot showers are available on demand. A wood sauna can even be arranged, given sufficient advance notice.

ELECTRICITY

Electricity (North American standard, 110 volts) is provided by solar cells and a gas-powered generator, which is run on demand. Power is available in the main lodge building approximately two to three hours daily, usually before and after dinner.



PERSONAL COMMUNICATIONS

There may be limited Internet service at Dechen la' when the generator is running, and no Internet at Camp 222. There is no cell phone reception in the area.

FACILITIES AND AMENITIES

Water must be trucked from a local source to the lodge, so depending on the current supply; laundry opportunities (aided by a good old-fashioned wringer washer) could be limited or unavailable. Bedding and towels will be provided. The scientist provides a couple of laptop computers for data entry and word processing. Participants wishing to share photos by burning CDs or DVDs should bring along blank discs or external memory devices (4GB minimum). You are also encouraged to bring your own laptops. If you use a digital camera, remember to bring spare batteries, chargers, and interface cables to upload photos to laptops for sharing.

You will be able to access stores in Whitehorse before and after the expedition, but while in the field there will not be any stores, restaurants, cash machines, etc. Dechen la' Lodge sells t-shirts for approximately CAD\$15. Wine and beer may occasionally be available for purchase; otherwise you will have to bring alcohol for personal consumption from Whitehorse.

DISTANCE TO THE FIELD SITE

Travel time from the main lodge to the westernmost research sites is about three hours, depending on road conditions. Access to the sites is first by a four-wheel-drive vehicle and then by foot. Walking can be trying on one trail, which is dominated by dense, tall shrubs, while others offer challenges due to deep standing water; however, no sites are more than 30 minutes from the trailhead.

PLEASE NOTE: The team will stay several nights at the facilities at Camp 222, about 9.5 miles (15 kilometers) from the western study sites and 10 miles (16 kilometers) from the main lodge buildings. It can take an hour to travel from Camp 222 to the furthest study sites and an hour and a half to take a four-wheel-drive vehicle to the main lodge. The more rustic Camp 222 is equipped with bunk beds with bedding provided, and sleeps up to four in a room. There is no running water (as at the main lodge) or heat (though the kitchen area can be heated by a wood stove), and there is a dry toilet (with a spectacular view, thus aptly named "The View").

FOOD AND WATER

Cooks prepare all meals and participants prepare their own lunches from food provided. Participants, scientists, and staff eat together. Offers to assist in cleanup are never refused.

The following are examples of foods you may find in the field. Variety depends on availability. We appreciate your flexibility.

TYPICAL MEALS

BREAKFAST	Eggs, bacon, toast, porridge, pancakes, French toast, sausages, fresh or preserved fruit
LUNCH	Sandwiches, cookies, fruit
DINNER	Meatloaf, spaghetti, roast beef, turkey, lasagna, stew, fish, potatoes, pork chops, pizza, chicken, salads, Jell-O, cake, pie, fresh fruit
SNACKS	Leftovers, fruit, cookies, hot chocolate
BEVERAGES	Juice, milk, coffee, tea, hot chocolate, water, (if you want alcoholic beverages at the lodge, you should purchase them in Whitehorse, however there may be a limited supply of boxed wine available during dinner)
WATER	Due to the remoteness of the site, water at the lodge is trucked from a nearby mountain stream.

SPECIAL DIETARY REQUIREMENTS

Please alert Earthwatch to any special dietary requirements (e.g., diabetes, lactose intolerance, nut or other food allergies, vegetarian or vegan diets) as soon as possible, and note them in the space provided on your volunteer forms.

Accommodating special diets is not guaranteed and can be very difficult due to availability of food, location of field sites, and other local conditions.

PROJECT CONDITIONS

THE FIELD ENVIRONMENT



Weather in the Mackenzie Mountains is unpredictable; winds can shift from calm to strong, rain can turn to snow, and 20°C (68°F) can drop to -5°C (23°F) very quickly. At this time of year, there could be nighttime frosts, and even with daytime temperatures of 10 to 15°C (50 to 60°F), the wind can give a “feels like” temperature close to 0°C (32°F).

GENERAL CONDITIONS

The following are averages. Please check weather resources for your team dates for more accurate weather predictions. Projects have experienced unseasonable weather at all times of year.

HUMIDITY: 20%–100%

TEMPERATURE RANGE: 23°–77° F (-5°–25° C)

ALTITUDE: 1100 m to 1700 m above sea level

RAINFALL: 0 to 20 mm per month

ESSENTIAL ELIGIBILITY REQUIREMENTS:

All participants must be able to:

- Follow verbal and/or visual instructions independently or with the assistance of a companion.
- Wear all protective equipment recommended or required by industry standards. Please pay close attention to the Expedition Packing Checklist at the end of this briefing.
- Enjoy being outdoors all day in all types of weather and in the potential presence of wild animals and insects.
- Tolerate cold weather.
- Carry personal daily supplies, such as lunch, water, and some small field equipment, of up to 9 kg (20 lbs.).
- Get low enough to undertake ground-level activities such as soil sampling, permafrost coring, frost probing, and vegetation sampling, for up to two hours per day.
- Hike for up to two hours per day on flat to undulating terrain (alert project staff about any injuries or discomfort such as blisters, bruising, difficulty breathing, etc. as soon as it occurs).
- Travel seated with seatbelt on in a four-wheel-drive vehicle over unpaved roads, which can sometimes be bumpy, for up to five hours a day (this can be uncomfortable for individuals with back problems).



POTENTIAL HAZARDS

CLIMATE CHANGE IN THE MACKENZIE MOUNTAINS

HAZARD TYPE	ASSOCIATED RISKS AND PRECAUTIONS
Transportation	Travel is along the Canol Heritage Trail, an abandoned gravel roadbed, navigable by four-by-four vehicle. Dechen la' Lodge has a number of four-by-four vehicles, one of which can carry the entire team. All drivers hold licenses required by the Canadian government, and vehicles meet provincial safety standards, with the addition of radios.
Hiking	Walking and hiking along the unmarked trails to the research sites varies from firm footing to unstable with tall shrubs to open hard or soft ground. Trail sections can also be very wet, with holes deeper than the tops of rubber boots. Grizzly bears occupy the area, but are not known to threaten groups of people.
Terrain	All participants will be walking in the field and there is risk of strains, sprains, and breaks due to falls. The terrain can be slippery. Participants must wear rubber boots due to sections of wetlands at several sites, and should be aware that tall shrubs can restrict movement at some sites.
Animals	The Mackenzie Mountains region is a wilderness area with lots of wildlife. Grizzly bears and other large mammals can be seen but have never been a problem. Grizzlies are hunted in the area and are very reclusive. The scientist and project staff (NOT participants) will carry deterrents. Participants should travel in groups to avoid the possibility of a dangerous animal encounter.
Insects	Mosquito and blackfly populations can be a nuisance in the summertime. There is no evidence of West Nile virus in the region. Participants should take precautions to prevent mosquito bites by using insect repellent and wearing long sleeves or bug jackets or head nets while in the field. Black flies bite and inject an anticoagulant and are generally very irritating. If you suspect you might have an allergic reaction to their bites, be sure to bring an antihistamine.
Climate/ Weather	The sun can be quite intense. Even on an overcast day, you are at risk for sunburn. You should bring good-quality sunblock. You will also want to have lip, sun, and wind block. The environment is dry year round, so be sure to drink plenty of water to avoid dehydration.
Distance from Medical Care	The nearest hospital is 420 kilometers (280 miles) away from the project site, and it may take up to 3 hours to arrange air transport and reach the hospital. If you have a chronic condition which could require immediate medical care (e.g., heart conditions, kidney problems, severe asthma, etc.), or if you are pregnant, please discuss your participation on this expedition with your physician.
Disease	Traveler's diarrhea affects many international travelers. Please see the U.S. Centers for Disease Control and Prevention (cdc.gov) or the World Health Organization (who.int/) websites for more information on this condition and how to avoid it.



HEALTH & SAFETY

CLIMATE CHANGE IN THE MACKENZIE MOUNTAINS



EMERGENCIES IN THE FIELD

Project staff members are not medical professionals.

Staff will provide guidance in an emergency. A number of first aid kits are maintained at the lodge and in their vehicles. All medical emergencies will be evacuated directly to the nearest hospital. If severe, a helicopter can be used to transport the injured person. In the event of a dangerous encounter with a grizzly bear, the animal will be deterred using standard procedures and the team will leave the area immediately.

For emergency assistance in the field, please contact Earthwatch's 24-hour emergency hotline number on the last page of this briefing. Earthwatch is available to assist you 24 hours a day, 7 days a week; someone is always on call to respond to messages that come into our live answering service.

IMMUNIZATIONS & TRAVEL VACCINATIONS

Please be sure your routine immunizations are up-to-date (for example: diphtheria, pertussis, tetanus, polio, measles, mumps, rubella and varicella) and you have the appropriate vaccinations for your travel destination. Medical decisions are the responsibility of each volunteer and his or her doctor, and the following are recommendations only. Visit [cdc.gov](https://www.cdc.gov) or [who.int](https://www.who.int) for guidance on immunizations.

If traveling from countries or region where yellow fever is endemic, you must have a certificate of vaccination.



TRAVEL TIPS

SUGGESTIONS FOR THE ROAD



YOUR DESTINATION

LANGUAGE: The two official languages of Canada are English and French, although the degree of fluency in each varies depending on the province. Yukon and Northwest Territories are primarily English speaking.

TIME ZONE: Mountain Time Zone: MST/UTC -7 [-6 Daylight Savings Time, in summer].

CULTURAL CONSIDERATIONS: You will probably meet First Nations citizens (aboriginal people of Canada) either at the Dechen la' Lodge or in hunting parties. Pay respectful attention to what they have to say and heed any advice closely about their customs.

LOCAL CURRENCY: Canadian dollar (CAD)

COUNTRY AND PROJECT ENTRY REQUIREMENTS

Entry visa requirements differ by country of origin, layover, and destination, and do change unexpectedly. For this reason, please confirm your visa requirements at the time of booking and, again, 90 days prior to travel. Please apply early for your visa (we recommend starting 6 months prior to the start of your expedition). Refunds will not be made for volunteers cancelling due to not obtaining their visa in time to meet the team at the rendezvous. You can find up to date visa requirements via the following site:

www.travisa.com

NOTE: Canada has recently changed its entry requirements and citizens from several countries are now required to apply for an eTA prior to travel. Please check the Canadian government's website prior to traveling <http://www.cic.gc.ca/english/visit/visas-all.asp>

As of the printing of this expedition briefing, US citizens and permanent residents are not required to obtain a visa, but are required to show a passport/green card.

If a visa is required, participants should apply for a TOURIST visa. Please note that obtaining a visa can take weeks or even months. We strongly recommend using a visa agency, which can both expedite and simplify the process.

Generally, passports must be valid for at least six months from the date of entry and a return ticket is required.

CONTACT INFORMATION

You may be required to list the following contact information on your visa application and immigration form, or if your luggage does not make it to baggage claim at your destination:

Norman Barichello
Box 10461
Whitehorse, YT, Y1A 7A1 Canada
+1 (867) 667-2639



EXPEDITION PACKING LIST

WHAT TO BRING

EXPEDITION PACKING CHECKLIST

GENERAL

- This expedition briefing
- Your travel plans, rendezvous details, and Earthwatch's emergency contact information
- Photocopies of your passport, flight itinerary, and credit cards in case the originals are lost or stolen; the copies should be packed separately from the original documents
- Passport and/or visa (if necessary)
- Certification of vaccination (if necessary)
- Documentation for travel by minors (if necessary)

CLOTHING/FOOTWEAR FOR FIELDWORK

- Rubber boots (comfortable to walk in and the taller the better – at least knee height)
- Hiking boots or sturdy walking shoes (cross-trainers will do)
- Rain jacket with a hood and rain pants
- Windbreaker and pants if you don't want to use rain gear for this purpose
- Three or four different layers of clothing to adapt to the temperature range
- Warm layers of clothing (e.g., lightweight jacket or fleece for cool climate)
- Warm socks (wool are best, avoid cotton)
- Hat with wide brim for sun protection
- Beanie for warmth on cooler days
- Work gloves (neoprene can be good in cold or wet weather, and mittens or insulated gloves can come in handy during cold weather in any season)

CLOTHING/FOOTWEAR FOR LEISURE

- Clothing to wear indoors
- Footwear (e.g., sneakers/trainers or slippers) for use indoors
- One set of clothing to keep clean for end of expedition

FIELD SUPPLIES

- Daypack (30 L or larger is sufficient) to keep your personal items together and dry
- One one-liter water bottle

- Sunglasses
- Sunscreen lotion with SPF 30 or higher

BEDDING AND BATHING

NOTE: all bedding, as well as a bath towel, is provided at the lodge.

PERSONAL SUPPLIES

- Personal toiletries (biodegradable soaps and shampoos are encouraged)
- Antibacterial wipes or lotion (good for cleaning hands while in the field)
- Personal first aid kit (e.g., anti-diarrhea pills, antibiotics, antiseptic, itch-relief, pain reliever, bandages, blister covers, etc.) and medications
- Spending money (approximately CAD\$50)

OPTIONAL ITEMS

- Earplugs for light sleepers
- Headlamp or flashlight with extra batteries and extra bulb
- Insect repellent
- Calamine lotion and/or antihistamines if you suspect you will react to insect bites
- Pencil, pen, notebook for note taking during lectures
- Whistle
- Binoculars
- Camera, memory card(s), extra camera battery
- Hardware for sharing digital photographs at the end of the expedition
- Dry bag or plastic sealable bags (e.g. Ziploc) to protect equipment like cameras from dust, humidity, and water or to put dirty clothes in
- Books, games, journal, art supplies, etc. for free time

NOTE: Do not bring more luggage than you can carry and handle on your own. If traveling by air and checking your luggage, we advise you to pack an extra set of field clothing and personal essentials in your carry-on bag in case your luggage is lost or delayed.



PROJECT STAFF

YOUR RESOURCES IN THE FIELD



NOTE: The specific staff scheduled to run your team is subject to change.

STEVE MAMET, PH.D. (Alberta) is currently a Research Associate at the University of Saskatchewan in Saskatoon. Steve studies ecological change in marginal environments, specializing in the expansion of treeline in a number of subarctic and alpine environments in northern Canada. He has worked with Earthwatch projects in Churchill since 2003 and the Mackenzie Mountains since 2006. Steve will be leading the Mackenzie Mountains team.



LEEANN FISHBACK, PH.D. (Western) is an environmental geochemist focusing on freshwater lake and pond water chemistry in arctic and subarctic regions. She lives in Churchill, Manitoba full time as a northern field research scientist. Her passion for the north has grown over the past 20 years, and she enjoys living in the remote areas of the country. LeeAnn has been the Scientific Coordinator at CNSC for the last twelve years. She is also an adjunct professor in the Department of Geography at the University of Winnipeg in Manitoba, where she teaches and supervises students. LeeAnn will not be present in the field for this team.



GEOFF KERSHAW has a Masters Degree in Environmental Studies from Dalhousie University and a Bachelor of Science from the University of Alberta. He is currently a PhD student at Wilfrid-Laurier University studying the impacts of changing hydrology on permafrost. He has partnered with a variety of universities, non-profits, primary schools, and First Nations in support of local environmental management and research. Geoff is from Alberta and spends his summers in the NWT.



RECOMMENDED READING

YOUR RESOURCES AT HOME

RESOURCES

ARTICLES

- Huntington, H., G. Weller, E. Bush, T.V. Callaghan, V. Kattsov, and M. Nuttall. "Chapter 1: An Introduction to the Arctic Climate Impact Assessment." In Arris, L. (ed.), Arctic Climate Impact Assessment: Scientific Report, 2-19, (2004). Fairbanks: ACIA Secretariat and Cooperative Institute for Arctic Research. Available at:
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BOOKS

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- Sturtevant, W.C. (ed.) Handbook of North American Indians. Volume 6: Subarctic and Volume 7: Arctic. Washington, D.C.: Smithsonian Institution, 1981.
- McGhee, R. Ancient People of the Arctic. Vancouver: UBC Press, 1996.
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PROJECT-RELATED WEBSITES

- Steve Mamet: <http://www.stevenmamet.com/>
- Dechen la' Lodge: www.dechenla.ca
- This project's Facebook page: <https://www.facebook.com/arcticledge>
- Climate science information: www.realclimate.org

EARTHWATCH SOCIAL MEDIA

- FACEBOOK: [facebook.com/Earthwatch](https://www.facebook.com/Earthwatch)
- TWITTER: twitter.com/earthwatch_org
- INSTAGRAM: [instagram.com/earthwatch](https://www.instagram.com/earthwatch)
- BLOG: blog.earthwatch.org/
- YOUTUBE: [youtube.com/earthwatchinstitute](https://www.youtube.com/earthwatchinstitute)



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YOUR RESOURCES AT HOME

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EMERGENCY NUMBERS

AROUND-THE-CLOCK SUPPORT



MESSAGE FROM EARTHWATCH

DEAR EARTHWATCHER,

Thank you for joining this expedition! We greatly appreciate your decision to contribute to hands-on environmental science and conservation. It is volunteers like you who fuel our mission and inspire our work.

While at Earthwatch, I've had the opportunity to field on a few expeditions, most recently in Kenya with one of my daughters. Each expedition has touched me deeply, and made me proud to be able to roll up my sleeves alongside my fellow volunteers and contribute to such meaningful work.

As an Earthwatch volunteer, you have the opportunity to create positive change. And while you're out in the field working toward that change, we are committed to caring for your safety. Although risk is an inherent part of the environments in which we work, we've been providing volunteer field experiences with careful risk management and diligent planning for nearly 45 years. You're in good hands.

If you have questions as you prepare for your expedition, we encourage you to contact your Earthwatch office. Thank you for your support, and enjoy your expedition!

Sincerely,



Scott Kania
President and CEO, Earthwatch





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