



## Information for Researchers at Denali

Denali National Park and Preserve

- encourages science, science education, citizen science, and traditional ecological knowledge
- shares research information about the park's resources
- uses research findings to protect park resources and sustain traditional ways of life



(a) 1961 Archaeological excavation  
(Photo credit: DENA Archives. 19.15)



(b) 2002 Using GPS to measure movement near the Denali Fault  
(Photo credit: National Park Service, photo by Lucy Tyrrell)

## Topics

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## About research at Denali

### What kind of research goes on at Denali?



More than 700 scientific and scholarly studies have taken place in the park since the early 1900's. In 2006, there are approximately 75 studies that are underway, ongoing, or recently completed. These projects are either conducted by Denali staff (see Current Projects 2005) and park cooperators (e.g., U.S. Geological Survey, Biological Resources Division, and the Alaska State Department of Fish and Game), as well as by investigators from other agencies, universities, and other institutions. Appropriate research gathers information while making minimal impacts to park resources. Researchers study everything imaginable from why glaciers surge, to the population dynamics of wolves and their prey, to the physiological effects of climbing Denali.

### How do I find out results of research in the park?



#### Website for Research Reports

Each year researchers at all national parks submit an Investigator's Annual Report (IAR) summarizing their findings. Anyone can go online to the National Park Service's Research Permit and Reporting System (RPRS) website and read IARs for Denali or any other park. You can search the website for IARs by park, investigator, year, or key words. Researchers also use this website to apply for a research and collecting permit. <http://science.nature.nps.gov/research>



#### Current Resource Projects 2006

This document provides a summary of resource projects that are being conducted at Denali in 2006 by its natural and cultural resource staff. It also shares findings from their activities in 2005. Printed copies are available on request beginning in early May. Current Resource Projects summaries from past years are available on request.



#### Science at Denali

This document provides an overview of park science, describes early science at Denali, gives examples of current or recent projects (inventory, monitoring, and research), and tells how science has been useful to management of Denali resources. Printed copies are available on request.



#### Resources Technical Library

Final reports (dissertations, publications, books, and articles) resulting from or associated with research and resource studies are housed in Denali's Resources Technical Library at Park Headquarters. This library also includes limited background material relating to natural and cultural resources of Denali and Alaska.

Arrangements can be made to use these materials by contacting the Research Administrator at (907) 683-6352. Library users can make use of a ProCite database to find volumes in the library. Searches can be made by author, title, year, or key words. Information linking the report to the research study is also available.

### How are records of research in the park kept?



Administrative files of scientific and resource studies in the park, 1900 – present, are arranged by study number in fireproof file cabinets in the resources building at Headquarters. These files contain research applications, proposals and study plans, permits, correspondence, and interim reports. A computer database is maintained about the research studies. The database can be searched by author, approximate start year, study number, or key words in the title. Contact the Research

Administrator at (907) 683-6352 for further information. Archived documents and collections are housed in the Denali National Park Museum or are loaned temporarily to other institutions. Contact Denali's Museum Coordinator at (907) 683-9607 or (907) 644-3615 for further information.

## What kind of research is needed by park managers at Denali?



### Wish-list of projects for the park

Here is a wish list of research projects compiled by Denali resources staff listed by general discipline.

### High-priority research that the park may support logistically

Underlined projects are high-priority research projects for which the park has funding and may be able to provide substantial monetary or logistics support.

For any asterisk-marked (\*) topic, there are already some or substantial data for the subject.

#### Physical Resources

Impacts of Off-Road Vehicles (ORV's), including snowmobiles, on soil compaction\*

Impacts of social trail development – erosion and runoff

Glacial history

Glacier change / climate change effects on glaciers\*

Surging glaciers\*

Climate trend modeling, with comparisons to regional and global trends\*

Paleontological inventory (timing relationships, locality studies, Cantwell formation bio-stratigraphy)\*

Detailed geological mapping\*

Tectonic and fault relationships, timing, and characteristics\*

Water quality improvements since the end of mining activities\*

Natural recovery of mined lands (plants, rivers)

Analyses of remotely sensed and related spatial data\*

Arctic haze, transport of industrial pollution, visibility change analysis\*

Effect of Coal-fired electric generation on air quality

Refinement of soil inventory in regions of plant range extensions\*

#### Biological Resources

Development of wildlife survey techniques

Development of improved species survey techniques

Development of animal tracking technology

Test of aerial transect wolf surveys

Development of bear survey techniques

Abundance and distribution of flora and fauna\*

Abundance, distribution and population dynamics (including survival) of Dall sheep\*

Meso-carnivores, including furbearers (wolverine to weasels)

Population dynamics of arctic ground squirrels

Abundance and distribution of snowshoe hare and willow ptarmigan

Distribution of beaver colonies and the effects on landscape change\*

Wood frog abundance, distribution, and trends\*

Fish species distribution\*

Salmon spawning stream distribution\*

Salmon stock trends

Terrestrial invertebrate inventory, distribution, trends

Insect (choose a species) inventory, distribution, trends

Monitoring techniques for wolf and bear prey species to help determine population dynamics\*

Migratory bird studies:

--species of conservation concern including Olive-sided Flycatcher, Rusty Blackbird, Blackpoll Warbler, and Arctic Warbler

--studies based on recommendations made by Boreal Partners in Flight,

Resident bird studies:

--identifying the factors that influence the abundance or distribution of species (choose one species or guild)

--abundance and distribution of White-winged Crossbill and Redpolls in relation to cone crops

Abundance, distribution, and population trends of Gyrfalcons\*

Abundance, distribution, and population trends of forest-nesting owls

Abundance, distribution, and population trends of shorebirds

Abundance and distribution of short-eared owls (one of the only raptors listed on the National Partners in Flight species of concern list)

Non-vascular plant inventory and guide\*

Studies and research utilizing the Denali museum collections\*

Effects of climate change

Effects of climate change on subsistence species

Carbon balance, mycorrhizal activity related to global warming

Aquatic invertebrate abundance and distribution, related to climate change

Plant species range expansion and invasion, due to climate change\*

Vegetation changes related to climate change\*

Changes in wetlands and wetland species in relation to climate change (including boreal wetland birds, e.g., grebes, scaup, and rusty blackbirds)

Changes in alpine areas and response of alpine-associated fauna in response to climate change (e.g, Dall sheep, arctic ground squirrel, hoary marmot, pika, and white-tailed ptarmigan)

Behavioral response of obligate hibernators (arctic ground squirrel and hoary marmot) to climate change

Behavioral response of pika to climate change

Anthropogenic change\*

Shorebird use along roads with different levels of development

Gull behavior near and away from rest stops

Density of songbird nest predators in campgrounds and in non-campground areas

Snowmachine effects on moose energetics

Exotic species removal and prevention\*

Effects of shallow gas exploration and development on park resources

Presence and level of persistent organic pollutants in migratory raptors (merlin, peregrine falcons) [in cooperation with USFWS]\*

Landscape level characterization studies

Phenology studies\*

Permafrost characterization and trends\*

Analysis of seasonal and long-term landscape change at a parkwide scale (infer change over large spatial scales using remotely sensed data and data from sites measured intensively)\*

**Cultural Resources**

Documentation of the scientific legacy of Denali National Park & Preserve\*

History of Kantishna Mining District\*

History of mountaineering on Mt. McKinley\*

Archaeological surveys\*

Aboriginal land use in the park\*

“Early man” studies, travel and hunting routes\*

Oral histories, collection of historical items (photos, journals, etc)\*

Cataloging Adolph Murie’s field notes and photographs

**Social Science**

Visitor experience and expectation studies – specific to user classes (climbers, cruisers, backcountry users, family, international visitors)\*

Changing patterns of use and visitor experiences

Road character impacts on visitor experiences

Perceptions of wilderness to backcountry users\*

Studies on what is the “Denali” experience

Climber experience studies

Studies of sport hunting in Preserve

Visitor impressions of park soundscapes

Attitudinal studies of park management

Visitor satisfaction of camping, lodging, and backcountry opportunities – changing patterns of visitation\*

Wildlife viewing expectations, patterns, and changes

Visitor demographic trends

Winter use interests and development opportunities

Trends in flightseeing and overflight activity, visitor expectations, etc.

Analysis of additional recreational opportunities

**Fire and Fuels Management**

Relationship of climate change on fire regime - fire occurrence, extent, and severity

Evaluate smoke transport models in Interior Alaska

Empirically test fire break effectiveness

Fire return intervals for the various biomes of Denali\*

Risk models for fire potential, incorporating values at risk, fuels, and fire behavior

Validation of fire danger weather indices and fire behavior models utilized in Alaska\*

Empirical testing of fuels treatment for developing improved treatments\*

Documentation of short and long-term effects of fire and suppression on subsistence resources and their habitats

Effects of repeated fires on biota

Effects of severity, moisture and seasonality of burns on successional pathways\*

Effects of increased fire frequency relating to warmer climates on vegetation and fuels composition\*

Effects of fire including burn severity on aquatic systems

**Integrative Work**

Relationship of climate with species distribution and abundance

Relationships among biological and physical components being monitored

Synthetic understanding of lake systems (climate, limnology, biology)

Effects of Off-Road Vehicles (ORV) on hunted species

Analyses (relationships) of data collected in soil and ecological inventory

New technologies for resource management

# Applying to conduct research or science education studies at Denali

## How do I apply to conduct a resource study at Denali?



Any scientist wanting to conduct research in any national park must fill out an application and submit a study plan or proposal. To expedite this process, the National Park Service has developed a website known as the Research Permit and Reporting System (RPRS). Scientists can file an application using the RPRS website

<http://science.nature.nps.gov/research> (preferred) or submit an application to the Research Administrator at Denali by email, hardcopy, or fax. The study plan can be uploaded onto the website

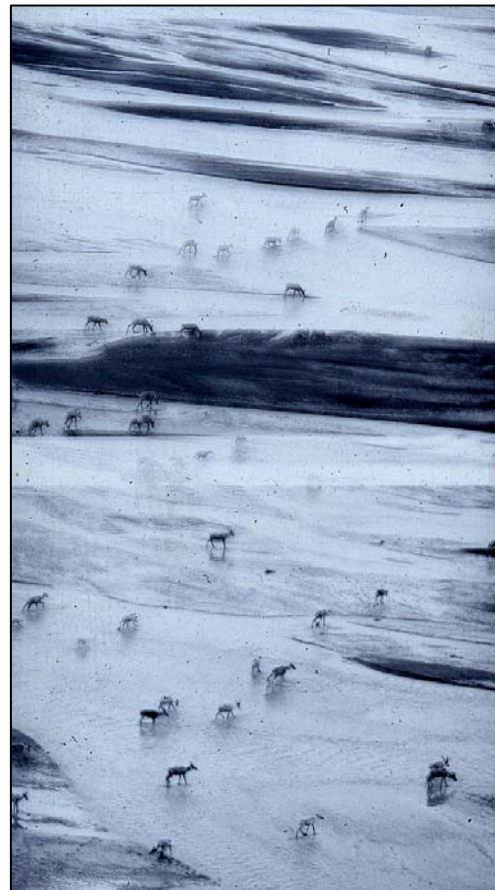
(preferred), or transmitted to the park by email, hardcopy, or fax. The proposed project will receive the quickest review if both the application and the proposal are filed on the website.

## What do I need to include in my study plan?

The study plan must describe the objectives and the rationale for working in Denali, and provide enough detail about the study locations and methods including logistics so Denali Park staff can adequately review the study plan for any administrative or compliance concerns, assess how the proposed project fits in with the overall science goals of the park, and set the conditions of the research permit, if approved and issued. Projects are evaluated for impacts, not scientific merit; however, project information will be valuable to the park if the science is sound. It is encouraged that potential researchers discuss their proposals and field sites with an appropriate Denali staff member and ask for current information that could enhance research studies.

Reviews of research projects will be more likely to be positive, with quick turn-around times, if researchers...

- Follow the guidelines for proposals given on the RPRS website
- Provide maps or coordinates indicating location(s) of proposed study
- Select study sites that avoid wildlife closures
- Provide clear description of methods for Denali
- Provide adequate justification for why the project should be conducted in Denali and not elsewhere
- Agree to ride the bus or hike to study sites OR provide adequate justification for why a permit for aircraft or road access is needed
- Ask in the study plan for an administrative backcountry permit for any backcountry overnight camping
- Obtain in advance special permits as required for work with sensitive species (state, federal permits)
- Have considered minimum tool and minimum requirements according to wilderness law for any proposed activities in wilderness
- Plan no permanent structures
- Limit or avoid digging and collecting
- Present idea(s) for educational component of project



### When do I need to apply?

Researchers should apply as early as possible to ensure the required paperwork is completed well before the intended start date. According to National Park Service regulations, all research in the park must operate under a valid research permit. Researchers must have approved permits signed by the Assistant Superintendent in order to conduct research in Denali.

Permit applications for most projects submitted two months in advance of the proposed starting date can be assured of being processed without delaying the project start date. However, if the research involves access by aircraft, wildlife capture, extensive collections or substantial disturbance, permanent structures, or other issues requiring detailed compliance, allowing more time is advised.



- **Submit your application/renewal by March 31 for the time period June 1 – September 15**
- OR
- **Submit your application/renewal at least two months in advance of your start date**

If you can not submit your application (with study plan) at least two months in advance of your proposed start date, we will do our best to process the materials quickly but we cannot guarantee that your proposed research can be reviewed in time to issue a research permit by the date you intended to begin. Again, discussing the project with park staff will increase odds of project approval, decrease time to project approval, and increase project success.

### Can I collect specimens at Denali?

Collecting permits may be granted for limited collecting of objects, whole organisms, or parts of organisms (e.g., leaves). Some animals may be collected and released after they have been measured or tagged. Specimens that are not destroyed remain the property of the National Park Service and are cataloged into Denali National Park and Preserve's museum collection. Arrangements must be made in advance in order for specimens to leave the park and be stored elsewhere.

Researchers follow "Curatorial Responsibilities for Researchers" related to any collections, including

- Describe proposed collections (size, number, etc.) in the application
- Obtain signature from the curator of home institution (fax signature to research administrator using application form) for any collections proposed to be loaned to another institution on a temporary or more permanent basis



## What are the obligations of researchers?

### Contacting the park with dates of research

Researchers with approved research and collecting permits should contact the research administrator or research liaison to confirm the dates they will be in the park.



### Safety

To make the research experience safe for researchers, others, and to ensure the protection of the park resources, researchers have obligations to complete appropriate Denali safety orientations at the park prior to field work. These safety orientations may include

- bear safety (for day hiking and overnight stays)
- park road safety (if issued road permit)
- backcountry Leave No Trace ethics (for backcountry camping)



### Investigator's Annual Report (IAR)

Each researcher reports results in an Investigator Annual Report (IAR) each year the permit is active. Anyone can access and read Investigator Annual Reports (IARs) for projects conducted in Denali and all national parks by going to the website <http://science.nature.nps.gov/research>. The website allows viewers to sort the Investigator Annual Reports by park, year, or investigator to find those IARs that would be of greatest interest.

### Publications or final report

In addition to yearly IARs, researchers supply the park with copies of any publications, dissertations, theses, or reports resulting from the research conducted at Denali.

### Educational component

Researchers also include an educational component in their projects to help share information with others.

There are unlimited options for the format or approach of the educational component. Examples include giving a program for a general park audience, developing a research-based curriculum for classroom or website use, providing text and photos for fact sheets, posters, or brochures, and creating other media.



### Collected specimens and loans

See separate document "Curatorial Responsibilities of Researchers."



## Resources available to researchers

### Collections at the Denali Museum



#### What is in the Denali Museum?

Denali National Park and Preserve's museum collection is an assemblage of objects, works of art, historic documents, and natural history specimens documenting the human and natural history of Denali. The collection includes biological voucher specimens for natural resource studies conducted within the park, and associated field records; early climbing gear; mining tools and equipment related to the Kantishna mining district; and archeological objects systematically recovered from within the park's boundaries, as well as the field records for them.

The museum collection includes over 6700 individual objects and 68 linear feet of archival material and collections. Natural history specimens number 5059 items, primarily plant specimens and mammal bone samples, bringing the total object count to 245,379.

#### Can researchers use the museum?

Due to a lack of suitable display space, most of the collection is maintained in a storage facility in the Headquarters area and is not on public display. However, access to the collection for research can be made by appointment, (907) 683-9607. Part of the collection and curation functions are in a facility where there is space to accommodate researchers when using the collection. During 2004, over 200 research requests for information and access were handled.

### Murie Science and Learning Center



The Murie Science and Learning Center (MSLC), located in the entrance area of the park, provides researchers who have approved research permits the following on a space-available basis:

- transient researcher office space, with access to phone and internet
- limited longer-term workspace for researchers-in-residence
- limited housing (one cabin) at Mile 231 through MSLC partner Denali Foundation

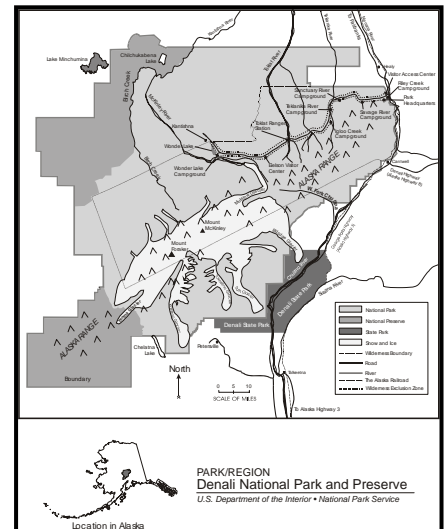
Access will be provided during normal hours of operation of the MSLC, and after hours by arrangement. Unfortunately at this time, there is not storage space available. In the future there may be funds available to assist researchers-in-residence. Ask about this possibility.

For further information about the MSLC, please contact the MSLC Education Coordinator at (907) 683-9531.

## Geographic Information Systems (GIS)

Denali's GIS includes several hundred layers or themes of information (hydrology, elevations, buildings, roads, etc.) that can be overlain by the computer to form composite maps. In addition to producing maps and other visual products, the associated databases can be queried in a variety of ways to analyze the features appearing in the maps. The system is managed on a central workstation and used by park staff on their desktop computers.

The park maintains the entire NPS GIS dataset for the state of Alaska locally (over 100gb of data and over 18,000 coverages). Many additional layers of information have been added. The dataset is kept current through updates that are conducted nightly over the internet.



Recent notable additions to the park's GIS dataset include

- a complete soils layer and associated database for the park based on 6 years of field data
- high-resolution (1 meter) satellite imagery of the park for the road corridor (data for the entire park will be collected over the next 2 to 3 years resulting in a map with far more accuracy than USGS Topo Quads)

Layers of the GIS are available to researchers or others by going to the website <http://science.nature.nps.gov/nrdata>. GIS layers filed there can be sorted by park unit, type of file, category or subject matter.

## Local housing

For researchers with approved permits, limited housing opportunities may be available at cabins, dorms, or tent camps within the park. Contact the Research Administrator at (907) 683-6352.



Researchers can request an administrative backcountry camping permit. This type of permit allows researchers to enter backcountry management units outside the backpacker quota (limit) for that unit.

Several local campgrounds, motels, and hotels are open year-round. Contact the Healy Chamber of Commerce (907) 683-4636, or visit the web at <http://www.denalichamber.com>.