SUPERINTENDENT'S ANNUAL REPORT

DENALI NATIONAL PARK AND PRESERVE

FY2007

EXECUTIVE SUMMARY

Denali 90th Anniversary Celebration

Park staff created a logo that was used in publications, souvenirs, and made into a pin that was worn by park employees on uniforms. Staff also developed a lecture series of seven speakers who presented throughout the summer to explore various facets of what *is* Denali. This lecture series was funded through the Alaska Natural History Association (ANHA) direct support funds and coordinated with help through the Alaska Natural History Institutes. Approximately 656 people attended the evening programs that were held at the Denali Visitor Center and were followed by a book signing. Park staff also developed a 90th anniversary book list to highlight the many books written about this park through the years.

Eielson Visitor Center Development

The final 100% construction documents for the Eielson Visitor Center exhibit package were completed during the fall of 2006. The exhibit package went out to bid in June 2007, and the hiring of Color-Ad, Inc, exhibit fabricator from Manassas, Virginia, was accomplished in July of 2007. Installation of exhibits is scheduled for the last two weeks in May of 2008. Using Denali's direct support funds from the Alaska Natural History Association, the Association worked with the park to conduct an international competition for an original fabric artwork that will enhance the interior of the building. The desired piece would capture the spirit of the wilderness through light, landscape, flora, fauna, wildness, and/or culture of the far north. After reviewing proposals, the selection committee awarded the project to artist Ree Nancarrow of Denali Park.

Cantwell Off-Road Vehicle Management

On September 18, 2007, the Finding of No Significant Impact (FONSI) was signed for the selected action that was evaluated in the "Denali National Park and Preserve Cantwell Subsistence Off-Road Vehicle Management Environmental Assessment." The selected action (a modified Alternative 3) allows the Cantwell Traditional Use Area to remain open to use of off-road vehicles by NPS qualified subsistence users for all subsistence purposes on specified NPS-managed trails and routes.

South Denali Implementation Plan

The Superintendent and other park staff worked to garner support for funding the South Denali Implementation Plan, more specifically the proposed development within Denali State Park. This development will provide increased recreational opportunities in the southern part of Denali National Park. There were regular site visits with dignitaries, including Governor Sarah Palin and James King, the new Director of the state's Division of Parks and Recreation.

Resource Stewardship Strategy

Denali was selected as a pilot park in the Alaska Region to develop a Resource Stewardship Strategy (RSS) which replaces the Resource Management Plan as the principal program document for resource management. The multidisciplinary team consisted of natural and cultural resource co-leads, writers/editors, and staff members representing facilities management, resource protection, and interpretation. Through the RSS process staff identified indicators of resource condition, established target values for each indicator, assessed current indicator values, analyzed

the difference between current conditions and the desired conditions, and developed "Comprehensive Strategies" to achieve or maintain desired conditions. This document will guide resource management for the next 20 years.

Backcountry Operations Plan

The division took the lead in developing and writing a Backcountry Operations Guide, ORV Standard Operating Procedure and Job Hazard Analysis. Preparation of these three critical safety plans were mandated by WASO following fatalities in other NPS units.

Military Appreciation Day

The park offered the opportunity for up to 400 active members of the military and their families to drive the Denali Park Road on Tuesday, September 18 as part of a "Military Appreciation Day" to recognize and thank these individuals for their contributions to the nation. The authorization letters for road permits were distributed to military personnel stationed in Alaska through their internal channels. Approximately 250 permits were issued to vehicles for the day. Camping and road lottery fees were waived for active members of the military. The park concessioner, Doyon/ARAMARK Joint Venture and the Denali and Mount McKinley Princess Lodges remained open for the special event, offering special rates and packages for members of the military, active and retired, and with their families.

Rangers on the Train

This season the park partnered with Princess Tours to put rangers on the special twice-weekly direct train from Whittier to the park. Rangers boarded near Hurricane and rode the train to the park, providing short interpretive programs in each train car in addition to providing informal interpretation to visitors. The program allowed park staff to help set the stage for the impending park visit and allowed rangers to interact with a Princess passengers they might not otherwise contact.

The Kantishna Experience

2,500 visitors took advantage of this new 12-hour program delivered as part of a bus trip into the park. The program, developed as a joint project by the Concessions and Interpretation Divisions, consisted of a bus trip over the entire length of the 92-mile Denali Park Road to Kantishna. While in Kantishna the visitors had a tour of the Quigley house where legendary pioneer and long time Kantishna miner Fanny Quigley lived out her final years. This program generated $40,000 in funding for NPS interpretation, enabling additional interpretive services on the west end of the park.

SUPERINTENDENT'S OFFICE

Management Team Accomplishments

The park began a public scoping process in April to gather input on proposed new fees for sled dog demonstrations and backcountry permits. The proposed fee for a sled dog demonstration is $10/adult, which could be implemented beginning in 2009. The proposed fee for a backcountry permit is $15 per permit, which would allow the park to partially recover the costs of operating the Backcountry Information Center and backcountry patrols. The backcountry permit fee could be implemented in 2008. The new fees are being proposed because the current level of funding for park operations has not kept up with the cost of inflation. The monies generated from these fees would provide the supplemental funding needed to maintain the current level of operations. If the FY08 budget is significantly increased, implementation of the fees will be deferred.

In June 2006 the U.S. Department of Labor ruled that the Service Contract Act (SCA) applied to the principal concession contract at Denali National Park and Preserve, directing the NPS to implement this requirement within 30 days. This was the first time the SCA had been applied to a NPS concession contract. The Act requires certain federal contractors to pay service employees in various jobs no less than the wage rates and fringe benefits found prevailing in the locality (statewide, in Alaska), or the rates (including prospective increases) contained in a collective bargaining agreement. The prevailing wage rate is determined by the U.S. Department of Labor.

The effect at Denali and for those employed by Doyon/ARAMARK Joint Venture was that about 140 employees working in bus cleaning and maintenance, food service, retail sales and other positions saw a significant increase in wages in 2007, retroactive to July 23, 2006.

About 120 bus drivers are members of Denali National Park Professional Drivers Association/General Teamsters Local and are covered by a collective bargaining agreement. They did not receive a wage increase in 2007 under the SCA, as the act provides for prevailing area wages only to those employees not already covered by a collective bargaining agreement. The drivers, represented by the Teamsters, contend that the Service Contract Act application should have had the effect of raising driver wages. The collective bargaining agreement between the concessionaire and the union contains a no-strike clause, but there were persistent rumors throughout the summer of union activities that would impact the park's bus operations. Nothing materialized, and the union and concessionaire are planning additional talks. The current agreement with the concessionaire expires in February 2008.

The park is working with the Alaska Railroad on legislation seeking a land exchange to site a train turn-around. The current draft of the legislation would authorize the Secretary to complete an acre for acre exchange with the railroad. The proposed location of the turn-around is approximately four miles south of the Denali Park depot and, though undeveloped, is currently determined to be unsuitable for wilderness designation. The turn-around would provide more options for visitor access to the park and give the railroad more flexibility in arrival/departure times.

Wallace and Jerilyn Cole approached the park with concerns that currently the language in ANILCA does not allow them to pass their business, Camp Denali and the North Face Lodge, down to their immediate descendants. The Coles are working with Senator Steven's office to develop language that would allow them to do this. The Coles also feel that they were promised

historic rights when they purchased the North Face Lodge, even though ANILCA did not provide for this due to the date of the purchase. They are hoping to address this issue at the same time.

Staffing Changes
Jo Anne Blankenship, who had previously worked for the office in a seasonal position, was hired in late 2006 to fill one of the permanent Superintendent's secretary positions. She began her new position in February 2007, after finishing law school. Meg Ciccciarella resigned from the other Superintendent's secretary position in July, and Theresa Hubbell from Thousand Oaks, California was hired in September 2007 as the division's administrative assistant. Charlotte Pulliam, a senior at Tuskegee University, joined the staff for the summer as a seasonal office assistant. In that position she provided assistance to the Public Affairs Officer and the Planning Division on a variety of projects from mid-May to mid-August.

Artist-in-Residence Program
Four artists using very different mediums were selected for this year's Artist-in-Residence program. The artists were Janice Kasper from Swansville, Maine; Sheila and David King of Fort Myers, Florida and Margo Klass from Fairbanks, Alaska. They were selected from forty-eight applicants by a seven-person panel comprised of artists, art supporters and National Park Service staff.

Janice Kasper is a painter who uses oil paints to provide poignant and whimsical portraits of wildlife and their environments. Her work reflects her passion for habitat conservation, but she also strives to provide fun and introspective images for her viewers. While in Denali she hopes to explore the ideal of Alaskan wilderness as it compares to her own ideas of wilderness in Maine.

Sheila King has been making baskets for over thirty years, and has taught basketry for twenty years. She draws inspiration for her intricate baskets from natural shapes and colors. She looks forward to exploring native Alaska basketry techniques and the materials of the interior Alaska region.

David King is a wildlife and natural landscape artist who works with watercolors. Retirement from a dental practice now affords him the time to explore areas and paint scenery and wildlife throughout the summer months. He looks forward to returning to Alaska this summer to further capture the beauty of Denali.

Margo Klass is a student of aesthetic space who creatively uses light to produce sculptural boxes. She studied Northern Renaissance artists for their use of spaces receding into the distance, and she has been influenced by the interior spaces and exterior landscapes of Japanese temples. During her residence in the park she will use sketching, watercolors, and photography to observe and absorb the monumentality of Denali.

This was the sixth year of the Artist-in-Residence program at Denali National Park and Preserve. Fifteen artists, including ten from Alaska, have participated in previous summers. This year the Alaska Natural History Association assumed the role of managing the program in the park.

VIP Visits
This was a year of international visitors. The season began in April with a visit from the Honorable Mark Minton, U.S. Ambassador to Mongolia. He spent a day in the park and was

hosted for a tour and luncheon at the Usibelli Coal Mine in Healy. In late May the park hosted a contingent from New Zealand consisting of Chris Carter, Minister of Conservation, Housing, and Ethnic Affairs; Rob Taylor, the Consul-General from Los Angeles; Sir Geoffrey Palmer, a previous Prime Minister, their partners, and aides. Other summer season visitors included a group of ten from the Japanese Diet House of Representatives and thirteen members of the Norwegian Parliament's Committee on Energy and the Environment.

Several political dignitaries also came to the park, including Chief Justice of the Supreme Court John Roberts, Department of Interior officials Todd Willens and Hans Neidigg, Dr. Kevin Geiss of the Executive Office of Science and Technology Policy, Kevin Kennedy, a legislative assistant for Representative Young; Jerry Hood, Representative Young's District Director in Anchorage, and Judge Richard Paez of the Ninth Circuit Court of Appeals. Other guests included John Rice, President of the Americas for Unilever; Rick Lemon, the Director of the U.S. Fish and Wildlife Service's National Conservation Training Center (NCTC); James King, the new Director of the Alaska Department of Parks and Recreation; Tom Wolfe, the NPS' legislative office chief; Richard Myers, the new Regional Solicitor for Alaska, and Shelby Alexander and her family. Shelby is a 10-year old from Homer, Alaska who won a state-wide program promoting a healthy lifestyle that was sponsored in part by the NPS Rivers, Trails & Conservation Assistance Program based in Anchorage. Shelby, her mom, and grandmother traveled to the park via plane and train and stayed in the historic Superintendent's house for two nights. They were treated to a bus trip into the park and participated in a Discovery Hike and other interpretive programs. Shelby came away from her experience with her Junior Ranger badge!

Commercial Filming Permits
Twenty permits were issued this summer, a number that continues to increase each year. The permits were for mostly small groups consisting of two – five people. Most of the projects were for a week or less, but two of the two-person film crews were in the park for three- four weeks. National Geographic Television & Film were on site for four separate periods to film seasonal footage for a documentary on moose.

Whereas most of the focus was on wildlife filming, two projects highlighted buildings. The Oregon Public Broadcasting shot footage of the park while filming for a documentary on Great Lodges of the National Parks (which would feature Camp Denali), and a crew from Japan filmed the interior and exterior of the Denali Visitor Center because of its sustainable features.

CONCESSIONS DIVISION

Service Contract Act
The division staff successfully implemented the Service Contract Act (SCA) resulting in final payment of all back-wages on September 15, 2007. They negotiated and executed contract amendment language to provide for franchise fees to offset the impact of the SCA wage payment on the concessionaire.

Concessionaire Maintenance
Concessions staff identified a maintenance backlog in concessionaire managed assets resulting in 14 maintenance projects totaling $468,000 funded from the concessionaire's maintenance reserve account. An additional $100,000 of deferred maintenance projects were completed through the concessionaire's operating budget, which included the remodeling of the Morino Grill and upgrades to concessioner dorms and other facilities.

A new Dispatch/Interpretive Resource Center building was constructed for $370,000. The project funding came through the Concession Facilities Improvement Program. A fire fuels reduction project was initiated on the concessioner land assignment to provide better fire protection for these structures.

Other Division Accomplishments
Four new contracts for air taxi operations and three new contracts for guided hiking in Kantishna were implemented. All new operating plans plans incorporate the desired management conditions articulated in the backcountry management plan. Two new contracts for guided sport hunting were awarded. The division reviewed and approved twelve Commercial Use Authorizations for new commercial operators in 2007. There are 53 operators providing commercial activities through CUAs in the park.

Efficiency issues within the transportation services were addressed by optimizing the shuttle schedule to provide alternative activities, providing an opportunity for tour operators to book on the shuttle in block spaces. The division continued to support efforts of the road study by conducting a weekly analysis of VTS ridership and traffic activity on the park road.

CENTER FOR RESOURCES, SCIENCE, AND LEARNING

Interpretation

Visitor Centers and Contact Stations

Denali Visitor Center

This was the second full season for the Denali Visitor Center, which was open May 15 – September 20, 2007. Approximately 144,462 visitors came to talk with rangers, visit the displays, attend a ranger auditorium program and/or view the park film. The award-winning film *Heartbeats of Denali* received upwards of 75-100 visitors per showing during peak operating hours. For many visitors the film is a highlight of their stay, and they buy the retail copy offered by the Alaska Natural History Association to take home to family and friends. An audio description for the sight impaired is being prepared, and should be available in the spring of 2008.

Toklat River Contact Station

The "Tent" was opened for visitors May 26 – September 18, 2007. Total visitation for the season was 198,172 which averaged about 1600 persons per day. The contact station was staffed by a combination of Student Conservation Association Interns and NPS interpreters. Hours of operation were 9 a.m. to 7 p.m. The Alaska Natural History Association continued to provide retail presence at the contact station.

Talkeetna Ranger Station

Though not a visitor center per se, the Talkeetna Ranger Station is a major draw to visitors exploring downtown Talkeetna especially now that the new film "Climbing Mount McKinley" is available for viewing. The ranger station concurrently serves as the venue for the ranger program offered by interpretive staff nightly throughout the summer season. Approximately 32,710 visitors stopped by the station in 2007.

Murie Science and Learning Center

The MSLC exhibit area saw many improvements and summer season visitation increased to a new high of 15,874 (an increase from 14,594 in 2006). Some of the enhancements to the visitor experience include:

- Creation of an exhibit area on the recent dinosaur trace-fossil discoveries. A new cabinet showcasing the very first dinosaur track found in Denali was locally built and is accompanied by a science conference poster and other related items.
- The wildland fire display was reopened in the summer months and the continuous film loop of a 'burn-over' remains one of the most popular exhibits.
- Several copies of the NPS glossy fact sheets are now displayed in binders in the lobby. For copies of these fact sheets visitors are now sent to the MSLC website for downloading their own copies.
- Improved skull collect display with new fleece mats.
- Lobby displays were shifted to increase the exhibit space.
- Entrance alcove is now unlocked in the evening to provide visitors access to the brochure rack and "Park News" bulletin board after business hours.

Savage Checkstation
The Savage Checkstation ran smoothly with five staff, who board all buses traveling west into the park to collect statistics and say hello to visitors. This year all rangers provided a short introductory greeting that spoke to the significance of the park and helped to set the stage for the upcoming journey into Denali. This greeting was very well received by both visitors and drivers.

Interpretive Programming, including partnership programs

East District Highlights

East district was able to offer a full range of programs for a variety of audience types and needs. The scheduling of interpreters from week to week was streamlined this year and a tracking system put in place to assure that each interpreter presented each of their programs frequently enough to develop a comfortable mastery of their topic and techniques. All three east district coaches were required to develop the full range of programs as well, giving them a working knowledge of the logistics of each program to assist in performing effective audits, and assuring the operation more flexibility in case of an interpreter was unable to meet scheduled commitments.

Ranger Auditorium Program
The NPS partnered with Princess Tours to offer an auditorium program at the Denali Visitor Center that was open to all visitors. The formal program took the place of a lobby program offered at the Princess Lodge in past years. The DVC proved a much better venue and the program was attended by approximately 7,325 visitors.

Sled Dog Demonstrations
Interpretive staff continued to work closely with kennels staff to offer sled dog demonstrations, a perennial favorite. Offering one program during the spring and fall shoulder seasons, the schedule grew to three programs daily June through August. With programs at 10 a.m., 2 p.m. and 4 p.m. the programs drew an average of 126, 123, and 130 visitors per program respectively, up significantly from past years. Interpretive rangers also worked as dog handlers throughout the season allowing kennels staff the opportunity to present interpretive programs to visitors. This helped to extend the length of time the demonstrations could be offered, allow 5,627 more visitors to "go to the dogs" than did in 2006. Total program visitation was 42,046.

West District Highlights

Kantishna Experience
Through a new partnership program, the division was able to increase its reach and address interpretive needs in the historic mining district Kantishna. The Kantishna Experience (KE) was cooperative effort between Doyon-ARAMARK Joint Venture and the park. A knowledgeable driver would ferry passengers from the park entrance to Wonder Lake, where the bus was joined by a park ranger who would offer guided tour to Kantishna, culminating in a visit to the house of long-time historic resident, Fannie Quigley. Program funding provided the salary and support costs for two experienced GS-7 interpretive rangers. When not working with KE groups, the rangers could provide daily campground programs and interpretive roves in the Wonder Lake and Kantishna areas. The KE received a total of 2494 visitors June 8 – September 2, 2007.

Supporting the Kantishna Experience was an interdivisional task, requiring the assistance of West District B&U. The interpreters lived in two cabins at DollyMollyVille that had been rehabbed with new carpet, linoleum, and kitchen cabinets with double basin sinks. Grey water tanks were also replaced. B&U also set up and maintained portable toilets at the Kantishna Airstrip for use by the tour participants. Funding for an emergency hire WG-5 was provided to help support the additional workload.

Additional Programming
Other interpretive programs offered in the west district included, Discovery hikes, structured interpretive roves at the Teklanika Rest Area, evening programs at Teklanika Campground and impromptu porch talks at the Toklat River Contact Station.

South District Highlights

Mt. McKinley: Climbing North America's Icy Crown
This new 17-minute film about mountaineering on Mt. McKinley was produced by Farrallon Media, using existing footage from National Geographic. The film gives park visitors an understanding of what it takes to climb North American's highest point and the resource protection activities managed by the National Park Service. The film is shown at the Talkeetna Ranger Station. Because it was designed to answer visitors' most common questions about climbing, it has become one of the main interpretive events at the ranger station and was viewed by 7,050 visitors in its first season.

Museum Programs and Evening Talks
From Memorial Day through Labor Day, daily interpretive programs were offered through the Talkeetna Ranger Station. Mountaineering history and glacier talks were given each day at the local museum around a model of Mt. McKinley, reaching 4297 visitors. In the evenings, 845 visitors learned about animals' survival strategies for winter in Denali and medicinal uses of plants.

Informal Interpretation
Staff made 1258 informal contacts with visitors who stopped at the ranger station to learn about Denali and Mount McKinley.

Winter Operations

Winter Visitor Center
The 06/07 winter was the third season of having a winter visitor center at Denali. As the large Denali Visitor Center goes cold in the winter, winter operations take place at the Murie Science and Learning Center, which is open seven days a week from 9 a.m. to 4 p.m., except for holidays. Visitors could talk with a ranger, peruse the displays, get a backcountry permit and view the park film, as well as the variety of other films available.

Winter Ranger-led Hikes
From mid-February to mid-April, visitor center staff offered weekend snowshoe hikes using various entrance area trails. For some of the 44 hike participants, it was their first time on snowshoes.

Non-Personal Services

Wildlife Bulletin Boards
Specially designed wildlife safety bulletin boards were posted throughout the park at campgrounds, bus stops, food storage lockers – wherever appropriate. These signs professionalized the posting of wildlife safety message and should aid in the removal of many small signs aimed at sharing wildlife safety messages. Park staff also produced the full complement of summer bulletin boards throughout the park to help visitors keep informed on important information.

Accessibility Handout
To meet the needs of visitors with accessibility issues, the park information specialist created a new accessibility handout outlining the range of services available to such visitors. This is also posted on the web. The park also acquired two wheelchairs for visitors to check out from the DVC. They have proved useful in helping mobility challenged visitors enjoy the DVC exhibits more comfortably.

Education Programs

Alaska Lake Ice and Snow Observatory Network Project
Two classes of Tri-Valley School/Denali Borough School District fourth and fifth graders trekked the 1.5 miles to Horseshoe Lake as part of the citizen science project: Alaska Lake Ice and Snow Observatory Network (ALISON). Through this program, students record lake ice and snow measurements in order to provide data that may help detect changes in the ice and snow levels throughout the state. The Horseshoe Lake site is one of sixteen sites across the state that makes up the ALISON network initiated by Dr. Martin Jeffries of University of Alaska Fairbanks (UAF). Students portrayed their data through graphs displayed at Winterfest. MSLC funds provided bus transportation from the school to the park, a necessary link that allowed the program to continue. FY2006 was the fifth year the NPS, Denali Borough School District, and UAF have partnered on ALISON. Thirty-six students benefited from this field work.

Denali Days
Education specialists collaborated to reach 540 students through both north and south side districts. Elementary schools were reached in Cantwell, Healy, Anderson, Nenana, Nikolai, McGrath, Tanana, Talkeetna, Trapper Creek, and Willow across five school districts (including one homeschool group). The Denali Days curriculum explores current research being done in the park and how curiosity leads scientists and students into a greater understanding of the world. This academic year's specific theme focused on current physical science research being conducted in the park on weather and glaciers. Programs include an in-class component, an onsite park visit (where possible) or a visit to Denali State Park.

This year McGrath School requested additional time for more classes to benefit from these lessons. Unique to 2007 Denali Days, the park education specialist was able to overnight in Nikolai and provides an evening program. Another new element was NPS initiated funding that provided bus transportation for two Nenana classes to visit the park. Nenana students were very enthusiastic to see tundra, and the clear running water of the early-season Savage River, neither of which they see in their immediate environment. Denali National Park concessioner Doyon/ARAMARK Joint Venture provided buses and drivers for the in-park portion of Denali Days.

School visits to Talkeetna Ranger Station

Responding to special requests from groups and teachers, park staff offered special programming to over 208 students who visited the Talkeetna Ranger Station. Programming provided included special programs on mountaineering and glaciers, as well as programs given at the local museum. Students traveled from schools in Palmer and Wasilla. Participants were in elementary grades through high school.

National Junior Ranger Day
National Junior Ranger Day, April 28, 2007, was celebrated both on site at the MSLC and off site at the Denali Borough School District Health Fair at Tri-Valley School. Thirty-one children participated in activities ranging from scavenger hunts to science experiments. Each Junior Ranger received a badge, patch, certificate, and personal recognition with a Ranger.

E-field Trips
The park teamed with distance learning integrators to offer two virtual field trips to 18,150 students across 47 states. Educators work E-field Trips into their lesson planning in multiple ways. For some, they are an introduction to a unit of study. For others, E-field Trips are an extension activity. Several years ago Denali education specialists created two programs. *Mammals of Denali: Amazing Animals of Adaptation* has become a model program Distance Learning Integrators showcase to prospective park clients and to introduce teachers to their website. *Climbing Denali: The Highest Challenge* offers elementary and middle school teachers a connection to parks, teamwork, physical challenges, physiology, geology and goal setting. Students take the E-field Trip on-line at their classes' convenience. New this year, we received direct comments from teachers, highlighting the various learning styles and content areas e-fieldtrips benefits. One teacher wrote: "I use efieldtrips.org to provide opportunities for students to view real-world applications of the concepts we are learning in our …science classes."

Terrific Tuesdays
In Talkeetna, park staff offered programs to local children on every Tuesday over the course of seven weeks during the summer. These offerings included river and plant walks, with a total of 55 participants. Youth in the program also had the opportunity to videoconference with participants in Glacier Bay National Park and Preserve in order to share more about their respective parks and communities.

Education Group Special Requests
Throughout the year, teachers requested special programming for their students through the MSLC which the education staff seeks to facilitate. Over 500 students (elementary through college) received programmatic support during their classroom or school visit to Denali. Some teachers' requests were answered by directing them to existing Interpretive programs available to the public, providing resources, or assisting with logistics.

Facilitated Independent Learning Opportunities

Denali Discovery Pack Program
The Denali Discovery Pack program features durable backpacks families can check out at no cost during their visit to Denali. Inside the backpack are 22 lessons in the Activity Guide, organized by tundra or taiga habitats. A total of 422 packs were checked out to families, serving 684 children!

This noticeable increase from the previous five years is due in the most part to the assignment of two DVC staff as dedicated liaisons to the education specialist, streamlining restocking and program management. Discovery Packs were initially funded through a Parks as Classroom grant.

Junior Ranger Program
More than 3000 children became Denali Junior Rangers this year. Denali National Park and Preserve's Junior Ranger program consists of two free activity guides aimed at ages 4-8 and 9-14. Future rangers work through the activity guides at their own pace and attend a ranger program. Once they have completed the work, candidates present their books to a ranger and earn an official Junior Ranger badge. In response to coordination with Doyon/ARAMARK Joint Venture interpretive staff, the park education specialist revamped examples, graphics and select content to meet the needs of potential junior rangers who ride the Denali Natural History Tour.

Denali Visitor Center Scavenger Hunt
To help families explore the new Denali Visitor Center, two self-paced scavenger hunts were developed for children ages 4-8 and 9-14. These ages mirror the Junior Ranger Activity Guides. The scavenger hunt allows families to explore the exhibits and make connections for kids. The Denali Visitor Center staff has an answer key that indicates where to go to find an answer in case the child (or parent) gets stumped. Feedback from parents, kids, and teachers has been very positive.

ARAMARK Interns
The division hosted several interns who were part of the ARAMARK hospitality internship program. During their day-long visit, interns spent time at the desk of the Denali Visitor Center and participated in several interpretive programs. They also spent time with program managers to learn about Denali's interpretive operations.

Evaluation

Interpretive Coaching Program
With three east district coaches and an interpretive specialist, we were able to complete 68 evaluations of east district interpretive programs. Nearly every interpreter had each program they presented evaluated at least once during the season. This is something we have never been able to accomplish before, which gave us a very clear idea of what's going on in the field and ideas for changes for future training. We were also able to audit and offer constructive feedback for south district programs, the new Kantishna Experience, and the Experience Denali program and Science Series programs offered by Alaska Natural History Institutes staff at the MSLC (for a total of fifteen additional evaluations) yielding valuable insights into what our partner organizations are doing, ways that we may be able to help each other excel, needs for training, and ideas for further evaluations. All West District staff received at minimum two audits per program.

Community Outreach

Earth Day
During the Earth Day 2007 festivities, over 175 attendees gathered to explore the theme *Healthy People, Healthy Planet*. Park staff, twelve volunteers, and a number of local businesses, non-profit groups, and agencies joined together to offer participants the chance to learn more about topics such as climate change, forest health, invasive weeds, and dealing with natural disasters. Youth participated in National Junior Ranger Day activities. Park Concessioner Doyon-ARAMARK Joint Venture generously coordinated recycling for the event.

Teacher to Teacher Workshop
In August, the park education specialists presented sessions at the Teacher to Teacher Workshop in Anchorage. Over 144 educators from 17 states attended the workshop, with 26 teachers joining park staff to learn about bringing Denali to their classrooms through the *Science of Denali's Sled Dogs* and *Denali: A Living Classroom* curricula. This workshop was generated in partnership with the Department of Education and the national parks of Alaska.

Project Wild/Project Learning Tree Facilitator Training
Denali National Park and Preserve was the first pick location for two state organizations to host their long awaited facilitator training of each the Project Wild/Alaska Department of Fish and Game and the Project Learning Tree/Alaska Division of Forestry programs. Twelve leaders in science education attended, participants from around the state representing various state and organizations/agencies that serve the public. The course was based at the MSLC field camp, and included three NPS education specialists and a Chief of Interpretation. CRSL staff provided a field component. Beyond the clear contribution of training a dozen Alaskan educators in these national curricula, the experience was a bridge building event that demystified education missions of various groups, and initiated opportunities for agencies to work together on common goals.

Radio Shows
The park education specialist in Talkeetna hosted two "Nuggets" radio shows relating to Denali on the local community radio station.

Winterfest
Interpretive staff led the park in the coordination and execution of Winterfest, held the last weekend of February. This year's planning efforts saw greater participation on the part of all park divisions make the weekend happen. The Denali Borough also chose to hire a community organizer and there was greater participation by the Tri-Valley School/Denali Borough School District. Minus 20 degree temperatures were not enough to keep away participants, who showed up in heavy gear to do snow carving, attend resource talks and storytelling, go for guided walks, learn tracks, roast marshmallows, etc. Winterfest 2007 served as a kick-off event for the park's 90^{th} anniversary celebration, with cake for all!

Denali Borough School District Science Fair
Over sixty science fair projects were submitted to the annual DBSD's Science Fair. The fair coordinator and district staff appreciate the park's commitment to science learning and real-world application of the park's mission. This year's *Park Achievement Award* honored research studying local river invertebrates. Other science fair projects complemented the MSLC purpose, and two were displayed at the MSLC through springtime; Wood frogs and river turbidity of local rivers. In addition to the park award and NPS education staff involvement, the MSLC was invited to provide a judge for the event and donate a prize. With guidance from the science fair coordinator, the MSLC created an award in a under recognized area – the award was for the best example of *Understanding Your Local Environment*.

Intergenerational Family Week
Working with the Denali Education Center, Denali education staff presented a family seminar to grandparents, parents and children their first day of a week long adventure learning about the sub arctic. Twenty-two participants began their week at Denali with a seminar on *Denali as*

Home/Families of Denali, a program that introduced grandparents to various species of the park through presentations by their grandchildren and the park education specialist.

Special Projects

Denali Visitor Center Exhibits

Though the facility opened to the public in July, 2005, work continued refining, completing and repairing exhibits. Through an ANHA Cooperative Agreement Ron Senungetuk, a Native artist from Homer was hired to coordinate the design and fabrication of four carvings to encircle the topographical model in Denali Visitor Center's lobby. The other three participating Alaska Native artists are Lena Amason from Kodiak, Wayne Price from Haines, and Kathleen Carlo from Fairbanks. This project will be completed in the spring of 2008, and will enable Denali National Park to provide greater accessibility, enhanced esthetic, education and cultural appeal to the visiting public.

Reports/Planning

Service wide Interpretive Report

Denali has a tremendously complicated interpretive program and to try to meet the reporting needs of the Service wide Interpretive Report without a systematic approach would be a truly daunting task. However, over the past five years park staff has developed and refined a workbook of spreadsheets that, in 2007, allowed us to create the report for 2007 more efficiently and accurately than ever. See the attached for a subsidiary report created from the report showing the change in attendance at interpretive programs from last fiscal year.

Denali Education Plan

Work continued on the Denali Education Plan. This long-range document is being created to help shape the major direction of the Denali interpretation/education program over the next 15 – 20 years. The plan went through several drafts and was reviewed by a range of stakeholders, including park staff, community members, concessioners, and partners. The final plan is scheduled to be published and distributed in spring 2008.

National Research Learning Center Strategic Plan

All seventeen Research Learning Centers have been validating national vision, mission, and goals as well as assembling a Logic Model and work plan. A draft of this plan is expected to be ready in mid-FY08.

South Denali Interpretive Plan

Park staffs were involved in the scoping meetings for the South Denali interpretive plan which seeks to present a unified thematic front to visitors experiencing all facets of state or federal land in the Southern portion of Denali's range. As plans for the South Denali Visitor Center move closer to reality it is expected the exchange of interpretive ideas and resources will increase between the National Park Service, Alaska State Parks and other stakeholders.

Staff Development Highlights

National and Regional Initiatives

Interpretive Staff at DENA are involved in several national and regional initiatives that forward the mission of the NPS. These include:

- NPS Regional Alaska Education Specialist Conference Call Group

- Servicewide NPS Educators Roundtable
- National Research Learning Center Advisory Group
- NPS Interpretive and Education Evaluation Advisory Group (and Pilot Evaluation Sub-Committee)
- National Association for Interpretation membership
- George Wright Society membership

Seasonal Training
Division leadership provided two sessions of two-week long interpretive training to the staff of the East, West and South Districts. This is time well-spent as it is the frontline staff members who will facilitate that vital link between the interests of the visitor and the meanings of the resource.

Staffing highlights
MSLC Education Coordinator
For ten months the Chief of Interpretation continued to provide oversight for this MSLC Education Coordinator position to continue its momentum. In mid-June the position was officially filled with a full-time coordinator lured to the MSLC by the vast wilderness, strong community, and wonderful meal cooked at a potluck during her interview process. Christie Anastasia, comes to the program with seven years of research learning center experience developing the Pacific Coast Science and Learning Center based in Point Reyes. She takes the reins of the MSLC with a national perspective, great ideas and the desire to grow the program.

Interpretive Specialist/Personal Services
With the return of the Interpretive Specialist for non-personal services, the division was able to shift the energies of Marisa James into focus on these development areas for seasonal staff:
- planning and implementing seasonal interpretive training and associated training materials for all districts, as well as inter-organizational training involving park concessioners and other partners involved in visitor contact positions;
- planning the master schedule of east district interpretive programming for the summer and creating the bi-weekly schedules for the east district seasonal interpreters;
- scheduling regular evaluations of interpretive programs primarily for the east district, but also including west and south districts, Joint Venture, and MSLC programs offered by ANHA employees;
- coordinating ongoing interpretive training throughout the summer;
- coordinating the collection and reporting of interpretive and education program statistics.

Park VIP Coordinator
The West District supervisor continues to serve as the park-wide VIP coordinator. Through funding provided by the Regional VIP program, staff were able to attend the national volunteer coordinators symposium in San Francisco, California, in March of 2006. The number of VIP hours increased by almost 2,000 for a total of 41,290. Volunteerism continues to play an important role in Denali's operations. Essential functions such as visitor center staffing, emergency medical response, invasive plant control, trail construction, campground hosting, mountaineering patrols and construction projects were carried out by park volunteers.

Cultural Resources

Denali's Historic Resources and National Register

Denali staff continued to research which sites are eligible for listing on the National Register of Historic Places but have shifted their evaluations from mining sites to the numerous trapping cabins in the park.

To date, only two historic resources are listed on the National Register: the Headquarters Historic District and the Patrol Cabins of Mt. McKinley. Historical sources of information (correspondence, archival material, oral history, photography, and architectural information) are collected and evaluated to develop Determinations of Eligibility to the National Register. Draft nominations include the Kantishna Mining District, Caribou Creek (part of Kantishna District), McKinley Park Station, and the Stampede Mine Historic District. Work continued in 2007 on these drafts that are now in the stage of gathering documentation to support the nominations (generating maps and diagrams and reproducing photographs). As an outgrowth of this National Register work, information is being compiled about mining in the Kantishna Hills for the park website.

A Determination of Eligibility was prepared for the 4 Pre-Mission 66 housing units in the headquarters residential area (also referred to as the Doty houses after Architect Cecil Doty, who designed the houses). Park staff concluded that the houses are significant and are eligible to be listed on the National Register of Historic Places, based on distinctive architecture and the association to Cecil Doty, a prominent NPS architect who designed many of the Mission 66 Visitor Centers.

Historical Research and Oral History

Cultural resource staff continued to participate in planning for interpretive exhibits, interpretive trails, and new facilities including Eielson Visitor Center. Staff continued to produce educational programs interpreting park history for staff and visitors, acquire and accession historic photos, and conduct oral history interviews with park "elders", i.e., park staff, former employees, local residents, and others to document conditions and experiences in the park. In recognition of the 90th year of the park, Jane Bryant produced a photographic program entitled *McKinley Country*, showing what was happening in the 1917 era in the area that became Mt. McKinley National Park.

Current and recent work included the following projects:

- Planning for interpretive information and panels about prehistoric use of the Teklanika area.

- Historic photographs from Denali's Museum Collection were identified and updated descriptions were entered in the Rediscovery database. To enhance Denali's collection of historic photographs, cultural staff continued to seek out historic park-related photographs and accession any donated private historic photograph collections.

- Alaska Regional Support Office Historian Frank Norris worked on the research for and writing of *Crown Jewel of the North: An Administrative History of Denali National Park*

and Preserve, Volume 2 (1981 to present and selected thematic chapters) during 2007 and Jane Bryant worked on the collection, selection and preparation of photographs for the illustration of Volume 2. This second volume of the administrative history is expected to be published in 2008.

- Jane Bryant worked with local park elder, William Nancarrow, to facilitate the transfer of three of his personally-produced 16-mm films to a digital format so that the films will be usable with today's technology. William Nancarrow has donated the films to the University of Alaska Film Archive for preservation and copies to Denali National Park and Preserve. Jane Bryant conducted and recorded Mr. Nancarrow's narration for all three films, each approximately thirty minutes in length. The films show a wide spectrum of park wildlife and various activities in Mt. McKinley National Park in the early 1950s, including dog mushing and travel by snow jeep.

Archeology

Brian Wygal, park archeologist, fielded a crew of six to conduct pedestrian surveys of several areas in the park. A total of 4100 acres were surveyed during the 2007 field season. The crew located 11 new sites in the Bull River area and 5 in the northern Teklanika drainage. The carbon date range on these sites was 12380 – 12700 cal. BP. Condition assessments were performed on 17 existing sites. The survey for areas identified as having a high potential of having archeology sites will continue over the next two summers.

Museum Collection

Jane Lakeman completed her first year as Museum Curator and many organizational changes have taken place. Compressed shelving was installed in the secure collections room and all cataloged and yet to be cataloged objects, specimens, and archives are securely stored. The primary tasks of the Museum Curator are caring for the park's museum collection, updating the museum database, and providing customer service to park staff and the public. To this end the following projects were completed in 2007:

- Housekeeping Plan updated and put into practice.
- Backlog Cataloging: 5550 objects/specimens added to the museum database including herbarium specimens, Natural History Observation Records, and photographic prints and negatives.
- New Cataloging: 603 photographic prints and negatives added to the museum database.
- The Museum Collections welcomed 97 visitors and provided tours.
- Jane Lakeman responded to 117 Museum Collections Research Requests including 65 requests from within the park and 52 requests from outside the park.

Murie Science and Learning Center

The Murie Science and Learning Center (MSLC) is a collaborative effort between Denali National Park and Preserve, seven other Alaska national parks, and several park partners to promote scientific research to aid park managers and provide science-based education programs and information to students, educational institutions, and the visiting public. This is the fourth season of operation for the center.

Partners

Although based in the park, Denali is only one of the eight national parks with sub-arctic or arctic ecosystems that the MSLC represents. Partner parks are Cape Krusenstern National Monument, Noatak National Preserve, Kobuk Valley National Park, Wrangell-St. Elias National Park and Preserve, Yukon-Charley Rivers National Preserve, Bering Land Bridge National Preserve, and Gates of the Arctic National Park and Preserve. The area covered by these parks is more than 50 percent of the lands administered by the National Park Service nationwide.

Other partners include:

- Alaska Natural History Institutes (manages and promotes the Murie Science and Learning Center programs and facility with the National Park Service—provides management assistance for the MSLC facility; experiential education programs; arts programs; services for visiting education and researcher groups; and funding for field camp housing facilities, exhibits, research grants, NPS education programs, and arts programs)
- Denali Education Center (provides educational programs and housing for researchers, as available, and assists with the Discover Denali Research Fellowship Program)
- Doyon-ARAMARK Joint Venture (park concessioner who operates the MSLC Dining Hall jointly with their employee dining room)
- Denali Borough School District (provides technical support and equipment to the center and partners on several education programs and in the development of the Wireless Cloud Network)

Facilities, Services, and Programming

The MSLC main facility provides a classroom, exhibit area and office space for staff and visiting researchers. The MSLC Dining Hall (next door) is shared with the park concessioner. The MSLC field camp is now located within the park by the Teklanika River (Mile 29) and consists of four tent cabins and a yurt. Services provided by the MSLC and partners are the following: providing space for both educational programs and events, and office space and resources for visiting researchers; internet access and data transmission capabilities; wireless network capabilities along the first 35 miles of the park road; video-conferencing; and food service. In 2006, the MSLC programming included citizen science programs; curriculum-based education programs for K-12 grades; school-to-work experiential learning programs; multi-day accredited field seminars and teacher trainings; youth camps; and research fellowship grants.

Programs

ALISON Project. Through out the 2006-07 winters, students from Denali Borough School District hiked to Horseshoe Lake twice monthly to measure and record lake ice and snow data. The Horseshoe Lake site is one of 16 sites across the state that make up the Alaska Lake Ice and Snow Observatory Network (ALISON), a project under the direction of Dr. Martin Jeffries at the Geophysical Institute, University of Alaska Fairbanks. Tri-Valley teacher Dorothy DeBlauw and students working with NPS Education Specialist Kristen Friesen were only turned back on occasion by temperatures colder than -10ºF and extremely icy trail conditions. Through this citizen science program students provide data that may help detect changes in the ice and snow levels throughout the state over time.

Denali Backcountry Adventures. This week-long learning camp for high school students was developed in partnership with the Denali Education Center, with the support of the Denali Borough School District. The program develops participants' outdoor and leadership skills while they conduct impact monitoring activities in the Denali backcountry. Information collected is entered by participants into the current park database. Indicators selected for monitoring in the park's new Backcountry Management Plan are: soundscape qualities, visitor observations and contacts, wildlife observations, and backcountry impacts. Backcountry Adventure group size is limited to six participants and two instructors. Areas for exploration and monitoring are identified by park managers. The group spends three nights in Denali's backcountry. In 2006, the MSLC will offer two sessions: July 17 – 21 for students in grades 9 and 10 and August 13 – 18 for students in grades 11 and 12.

Denali Discovery Camp. This was the sixth season for this five-day camp (June 19 – 23) that seeks to offer quality outdoor experiences to local youths in grades one through eight. Developed in partnership with the Denali Education Center, the camp curriculum engages participants in hands-on activities as they learn about sub-arctic ecology, the national park mission, preservation and protection of park resources. Many park resource staff members meet with groups of campers in the field to talk about ongoing research projects. Depending on their ages, participants spend one to three nights in the park.

Denali-Susitna Exploration Camp. This camp combines an outdoor-based science curriculum with cutting edge technology for the benefit of local students. Offered in partnership with Kigluait Educational Adventures and the Upper-Susitna Soil and Water Conservation district, the goal of the camp is to share the unique natural environment and ongoing research of Denali National Park and Preserve with the middle-school- age youth who live in communities south of Denali, including Trapper Creek, Sunshine, Talkeetna, and Willow. This year's activities (July 31 to August 4) were based out of the Sunshine Creek area and participants will help to develop interpretive information about the area's natural history. Campers used GPS units, compasses, video-teleconference technology, and mapping software to explore their environs and create publications.

Alaska Summer Research Academy. Taking place July 9 - 20, the Alaska Summer Research Academy (ASRA) will offer two programs in Denali for students grades 8-12 who are interested in working with university faculty and industry professionals. "All Shook Up in Denali: Earthquakes Module" will explore seismic activity. The "Photography Module**"** will include photo documentation of dinosaur tracks in the park. ASRA is sponsored by the University of Alaska Fairbanks in partnership with the National Park Service, the MSLC and other partners. For more information visit: www.uaf.edu/asra.

Field Seminars and Teacher Training

Field Seminars. The MSLC offered 15 field seminars in the 2007 season. The seminars are active learning experiences that cover a range of topics including geology, wildflowers, birds, large mammals, Dall sheep, edible & medicinal plants, wolves, bears, and field journaling. Most courses are based out of the MSLC field camp, located within the park near the Teklanika River at Mile 29 on the park road. Many park research staff members serve as leads and content experts for the seminars. All field seminars are available for optional university credit through the University of Alaska - Anchorage.

Teacher Training. The MSLC offered four teacher trainings in June and July. These three- to four-day programs will investigate using i-movie, science writing, paleontology, and wolf ecology. All teacher trainings include one to three credits through the University of Alaska - Anchorage or the University of Alaska - Southeast.

Special Programming

Discover Denali. Developed to provide a meaningful park experience for Royal-Celebrity Tours passengers, this program is offered twice weekly May – September in partnership with the Denali Education Center. The program consists of a lecture in the MSLC classroom, a skins-and-skulls hands-on session, interpretive walk through an area significant in early park history, and a ranger-introduced viewing of the new park film. Participants receive photo postcards of the historic photographs that Denali Education Center instructors use as teaching tools. A portion of the proceeds support the Discover Denali Research Fellowship Program.

Experience Denali Excursion. This MSLC program, offered five days a week, helps visitors explore wildlife and wildlife research in Denali through small-group outdoor-based activities with MSLC science instructors. Participants learn about different habitats as they travel out the park road by bus to the Savage River area, where they take a short walk and participate in hands-on activities.

Education Internship

2007 was the third year of the Murie Science and Learning Center offering the summer education internship. These 14-week internships expose students to all facets of education programming and provide field experience in areas of experiential education as well as research and park management.

Research Grants

Discover Denali Research Fellowship Program

Discover Denali Research Fellowships for 2007 (made possibly by the Denali Education Center through the Murie Science and Learning Center) have been awarded to the following researchers (listed alphabetically), conditional on their applying for a research and collecting permit as with any research project:

- Roseann Densmore, USGS Alaska Science Center
  Monitoring the success of the Caribou Creek restoration project
- Michael Loso, Alaska Pacific University
  Trajectory and fate of human waste on the Kahiltna Glacier
- Robert Newman, University of North Dakota
  Population biology of the wood frog in Denali National Park
- David Sunderlin, Lafayette College, Easton, Pennsylvania
  The floral ecosystem in the lower Cantwell Formation of Denali National Park and Preserve: evolutionary, paleoecological, and paleoclimatic implications
- Martin Wilmking, Greifswald University, Germany
  A shrubby future for Denali? – Investigation on the effect of recent warming on alpine shrubs in Denali National Park and Preserve

This is the second year of the Discover Denali Research Fellowship Program, made possible through proceeds of the Discover Denali program offered in partnership with the Denali Education Center. Recipients are awarded grants up to $5,000 for research that will assist park managers make decisions about critical resource issues.

Murie Science and Learning Center – Research Awards

Financial support for research projects, which is provided by the Murie Science and Learning Center through Alaska Natural History Institute funding, is awarded in 2007 to the following researchers, conditional on their applying for a research and collecting permit:

- Chris Arp, USGS, Alaska Science Center
  Using beaver colonies as a model for ecosystem disturbance and recovery in Denali
- Jason Dortch, University of Cincinnati
  Terrestrial cosmodating of the Wonder Lake moraines, McKinley River Basin: in pursuit of understanding the nature of glaciation and climate change in the Denali National Park
- Alexander Milner, Institute of Arctic Biology, UAF
  Hydroecology of upwelling zones in a glacierized catchment

Natural Resources

Central Alaska Network Inventory and Monitoring (I&M)

The Central Alaska Network (CAKN) includes three national parks that encompass 21.7 million acres of land: Denali National Park and Preserve, Wrangell-St. Elias National Park and Preserve, and Yukon-Charley Rivers National Preserve.

The 2007 field season is the second year of program implementation after four years of planning and development.

Vital Signs Monitoring

The focus of the network until 2008 is bringing eleven of the 378 Vital Signs into full operation. This includes collecting field data, analyzing and reporting on the data to parks and the public. As part of bringing the program into full operation, the network produced full protocols for the eleven initial Vital Signs (Climate, Air Quality, Snowpack, Vegetation, Water Quality, Macroinvertebrates, Passerines, Peregrine Falcons, Golden Eagles, Moose, and Wolves). After protocols are given scientific peer-review, they are revised as necessary before final approval from the Alaska Region Monitoring Coordinator. Currently, four Vital Signs protocols (Air Quality, Climate, Snow Pack, and Vegetation) have been given final approval. The remaining seven are in various stages of scientific review.

Interactive kiosks have been installed in four locations: the Murie Science and Learning Center (Denali), the visitor centers for Yukon-Charley Rivers Visitor Center (Eagle) and Wrangell-St. Elias (Copper Center), and the Fairbanks Public Lands Information Center. These kiosks encourage visitors to learn about the Vital Signs Monitoring Program, to view maps and graphs of the Biological Inventory data, and to see how parks utilize the I&M data for management purposes.

Recent Activities and Support

- "Near real-time" data from climate stations. Climate data from Denali, Wrangell-St. Elias and Yukon-Charley Rivers climate stations are transmitted hourly (hence "near real time") via satellite to the website http://www.wrcc.dri.edu/NPS.html. The website provides on-line tools for data summaries and data analysis.

- Vegetation monitoring underway. During 2007, vegetation monitoring was conducted in all three network parks. In Denali, two crews of technicians conducted ten day excursions to collect vegetation data across the park landscape. Seven sites were sampled in Denali in summer 2007.

- Interactive computer kiosks help educate park visitors about I&M data. The interactive computer kiosk program (see Vital Signs Monitoring above) has been updated. Park visitors can now view data on bird monitoring projects conducted throughout the network. Visitors may view maps of where the birds were observed, see pictures of characteristic habitats for each species, and view photos and hear audio-clips of each species.

- Investigating remote sensing for constructing vegetation maps. CAKN staff completed an analysis of three remote techniques to evaluate their usefulness in making large (regional) vegetation maps from plot data and in detecting changes in vegetation. The three techniques were unsupervised satellite image classification, supervised image classification, and photo-interpretation. The question was—can local-scale plot data collected according to the CAKN vegetation monitoring protocol be used to produce regional-scale maps of landscape change in Denali? Map accuracy is low for a map with nine classes of vegetation, but increases to ~80 percent when similar vegetation types with similar spectral characteristics are aggregated into a 6-class map. Classifications from remote techniques are reliable for detecting large changes in spectral characteristics only. For example, the invasion of spruce trees (conversion of Low Shrub–Tussock Scrub into Spruce Woodland) could not be detected reliably because of the similarity in spectral characteristics between the vegetation types.

- Shallow lake monitoring at Denali. In 2006, researchers implemented the shallow lake monitoring protocol at 30 lakes in Denali. In 2007, 28 of those lakes were re-visited. Limnologists collected data on all the variables as outlined in the protocol except for vegetation. Researchers observed that 27 lakes showed a significant drawdown from 2006 (on average 16 cm lower than last year). This difference was explained by low winter snow pack and early melt. The data were visually corroborated with observations of newly exposed mud flats on many of the lakes in the Minchumina basin. The one lake that had a rise in water level was the third lake in a string of lakes. This lake experienced a 28 cm increase in water level and is within the 2005 Highpower burn. The increased water level may be explained by increased run-off from the upland areas where hydrophobic soils frequently occur following fire. Researchers were pleased to find that lake level monitoring techniques could be verified visually and that virtually all lakes showed similar trends. This provided confidence that the techniques are viable for monitoring water level in shallow lakes.

- Small mammal monitoring reveals new understanding of population dynamics. For the 16th year, in summer 2007 researchers monitored the abundance of small mammals in the Rock Creek watershed.

Denali's Resource Stewardship Strategy

In 2001, the National Park Service instituted a new program document for resource management. Instead of having a Resource Management Plan, each park will develop a Resource Stewardship Strategy (RSS), a 15- to 20-year program planning document that serves as a bridge between the desired conditions as articulated in the park's General Management Plan and the implementation actions taken to protect park resources and values. The RSS will replace Denali's Resource Management Plan (1998). Existing specific park program plans (e.g., Subsistence Management Plan, Museum Management Plan, and Bear Management Plan) will continue to provide the details for day-to-day operations, but may need to be modified by the direction provided in the RSS.

A team was formed at Denali (primarily resource staff) to complete Denali's RSS by the end of September 2007. A draft document has been completed and is under review.

The park GMP specifies desired conditions for most of Denali's fundamental and "other" resources and values. Desired conditions are a qualitative description of the integrity and character for a set of resources and values, including visitor experiences that the NPS has committed to achieve and maintain. Some of these desired conditions are articulated for the entire park and preserve; others apply only to specific management zones (also called "management areas" in some Denali plans). The RSS focuses on providing park managers with recommended comprehensive strategies to guide the National Park Service (NPS) in achieving and maintaining the desired conditions for the park's cultural and natural resources.

When most of the Denali GMP was crafted, articulating desired conditions was not an explicit objective of the planning process. As a result, although the desired conditions are present in the text they must be extracted and, in some cases, interpreted with reference to statutes. Desired park conditions fall into these categories:

1. ***Wildlife populations, wildlife habitat, and the processes and components of the park's natural ecosystem***
2. ***Wilderness character, wilderness resource values, and wilderness recreational opportunities***
3. ***Scenic and geologic values of Mount McKinley and surrounding mountain landscape***
4. ***Visitor enjoyment and inspiration from observing wildlife in its natural habitat and other natural features***
5. ***Historic, archaeological, and ethnographic resources***
6. ***Paleontological resources***
7. ***Air quality***
8. ***Subsistence resources and opportunities***

Indicators were selected so they can be used to evaluate resource conditions and to determine whether management actions are effective at protecting park values. *Standards* for some indicators are different for different park zones.

Research *strategies* were developed to (1) learn more about resources for which insufficient knowledge is available to select indicators for them, (2) measure resource indicators to make sure desired conditions are being achieved, and (3) carry out additional mandates about park resources. In January and February 2007, six informational meetings were held (two in Anchorage, one in Talkeetna, one in Denali, two in Fairbanks) to share what is going on, and to gather suggestions from researchers and other subject matter experts about Denali resources.

Denali Park Road Capacity Study

In 2006, Denali began a multidisciplinary study designed to optimize visitor experience along the park road while protecting wildlife. Since 1972, traffic on the park road has been limited mostly to buses, and since 1986, a use limit of 10,512 vehicle trips annually has been in effect. Faced with increasing visitation and pressure to defend or change the limits to road traffic, park managers have designed a study to develop a greater understanding of the impacts of traffic volume and traffic patterns on the physical, biological, and social environment of the park.

Wildlife movement

A GPS telemetry study of grizzly bears and Dall sheep is intended to detect impacts of traffic on animal movements near the road. Researchers captured twenty grizzly bears within the road corridor in the spring of 2006 and outfitted them with GPS collars for the season. The collars were programmed to calculate the position of the bears once every hour all summer, then fall off the bears automatically on September 20, 2006. Researchers captured 20 Dall sheep in March 2007 to follow their movements in the same way. Collars were programmed to fall off in September 2007.

The movements of sixteen bears in 2006 yielded a total of 45,370 locations (see Fig. 1). Three bears were censored from the analyses because they either did not have any locations within three km of the park road or were cubs whose behavior was autocorrelated with the mother's. The actual locations of the bears were assumed to be no more than about nine meters (nine yards) away from the point reported by the GPS data.

These sixteen grizzly bears crossed the park road 466 times between May and September 2006 (Table 1). The number of crossings varied significantly among bears and ranged from zero to 144 crossings. Differences among bears were primarily due to the position of a bear's home range relative to the park road. The fewest crossings for all bears occurred in September.

Researchers considered a bear inactive when movement rates were less than eleven meters in one hour. The highest probability of being inactive was during early morning hours. The height of inactivity (10 percent) occurred between 3:00 and 4:00 a.m. On average, bears were inactive about 15 percent (range 10 to 28 percent) of the time across the entire season.

Park staff installed traffic counters at intervals along the park road to record vehicle numbers to determine whether variation in the amount of traffic on segments of the park road affected bear behavior. Average daily traffic was 282 vehicles from Savage to Mile 28; 222 vehicles from Mile 28 to the Teklanika gate; 218 vehicles from the Teklanika gate to Toklat; 189 vehicles from Toklat to Grassy Pass; and 107 vehicles from Grassy to Wonder Lake. While study bears utilized habitats along the entire length of the park road, proximity to various road sections by a bear seemed to depend on home range location and not on what section of road a bear was near. There was no great variation among bears in distance to road by segment. Researchers then compared the

distances of locations of inactive bears from the park road to random points along road segments. Researchers found significant differences in the distance to the road of resting bear locations relative to random points for only five bears. In four of these cases, bears were resting closer to the road than would be expected.

During the summer of 2006, the average number of vehicles on the Park Road peaked at 11am with over 17 vehicles per hour logged at traffic counters along the road.

GPS collared bears generally crossed the road most frequently between 8:00 and 10:00 a.m. and at 10:00 p.m. The low number of road crossings between midnight and 4:00 a.m. corresponds to the period during which collared bears were found to be most inactive.

In March 2007, researchers captured twenty Dall sheep within one mile of the park road between the Teklanika and Toklat Rivers and fitted them with GPS collars. Data was retrieved from seventeen collars in September 2007, yielding over 60,000 hourly locations.

Visitor survey

Researchers examining the expectations and quality of experiences of Denali Park Road vehicle users completed the first of two phases of the study in 2006. Researchers conducted qualitative interviews with over 120 Denali Park visitors. Visitors were classified by user group—those who utilized (1) shuttle buses, (2) tour buses, (3) buses from lodges in Kantishna, and (4) their own recreational vehicle (RV) to access the park (Teklanika campers). Visitors were asked to identify and describe issues important to their experience on the Denali Park road.

Interviewers asked visitors questions about the quality of their experience on the park road, impacts to their experience, the number of vehicles on the road, and the management of vehicles using the road. Results from these interviews suggest a wide variety of potential indicators for the quality of a visitor's experience. These variables include the number of vehicles seen, number of encounters with other vehicles, frequency/duration of wildlife stops, distance of wildlife from the road, dust generated by vehicle traffic, number of visitors at rest stops, the condition and maintenance of buses, behavior/actions of other visitors while on buses, number/type of facilities along the road, vehicle congestion, and the quality of educational information provided by bus drivers. Results also provide insights into *how* these variables affect visitor experiences and into potential differences among user groups. For example, seeing moving buses diminished the sense of "being in the wilderness" for some visitors, but seeing stopped buses positively affected the experience by indicating areas where wildlife might be viewed.

In 2007, researchers conducted the second phase of the study—gathering data that will help set standards for indicators selected from results of the first phase. Written quantitative surveys were completed by 695 park visitors who travelled the park road. Park managers will eventually use the resulting indicators and standards to evaluate and manage vehicle traffic by monitoring indicator variables and using a computer simulation model to estimate maximum acceptable vehicle use levels.

Traffic constraints

A study of logistical and physical constraints on traffic is examining vehicle behavior and determining factors that constrain traffic flow on the park road. In 2006, park staff, with assistance from Joint Venture, installed 130 GPS units on vehicles that use the park road on a

regular basis. GPS units were installed on all JV tour, shuttle, and camper buses. Approximately forty NPS vehicles also had GPS units installed, including heavy equipment, road crew vehicles, and vehicles driving the park road on a regular basis. Park staff set up three base stations to remotely download vehicle data at the Denali Visitor Center, C-Camp, and Toklat. Remote downloads of vehicle GPS data worked very well once all the equipment was in place.

In 2007, bus drivers on twenty buses used LCD touch screen panels to record information about the location of stops made along the road for wildlife sightings, passenger pick-up and drop-off, and road maintenance. The information was automatically downloaded to base stations along with the vehicle's GPS location data.

Traffic patterns on the Denali Park Road are affected by locations of wildlife sightings, numbers and behavior of buses on the road each day, weather, and road maintenance. To account for the effects of these various factors on traffic flow, researchers will use GPS and wildlife sighting data collected from vehicles driving the park road in 2006/2007 to create a traffic model capable of simulating location and vehicle-specific driving behaviors. Researchers can use the model to vary bus schedule scenarios, wildlife encounter probabilities, and other road logistic rules to quantify and visually analyze travel times, predicted bunching, and following distances of buses and of other vehicles along the road. The results can be used to predict and better study traffic related impacts on visitor experience and wildlife behavior.

Simulation experiment. During the winter 2006/2007, researchers developed a simulation experiment to evaluate model rules about driver behavior (travel time, stop time) especially in relation to wildlife stops. Using the rules, the model can predict changes in total travel and stop time related to traffic congestion on the park road. Researcher modeled the park road from the Wilderness Access Center to Stony Overlook west of the Toklat River. "Wildlife sightings" near the road at six hypothetical but predetermined locations during early morning, mid-morning, and afternoon were added to the model at one hour intervals over a nine-hour period. These locations and time periods for encounters were based on actual observations over a single day in 2006. The stop and speed characteristics for all bus routes – Visitor/Camper Shuttle Buses, Denali Natural History Tours (DNHT), and Tundra Wilderness Tours (TWT) – were considered identical for this experiment. In 2006, 76 buses departed daily from the Wilderness Access Center. This bus schedule was used as a 'control' for other management strategies that were tested. One of these strategies included varying the stop times at wildlife encounters to average either five or fifteen minutes.

The change in average stop times for wildlife viewing resulted in responses in total travel and stop times. Five minute viewing times decreased the number of unintended stops made by all buses by seven percent and decreased the overall travel time by over an hour on average.

Data collected in 2007 along with a comparative analysis of 2006 data will be used to fine-tune the traffic models for each type of bus routes (DNHT, TWT, Shuttle).

Ultimately, a comprehensive model of park road traffic will be developed to predict the effects of changes in traffic volume and timing on visitor experience and wildlife movements. If the model and an environmental impact statement suggest that an increase in traffic volume is feasible, an experimental increase in road traffic, timed to produce the greatest value in understanding impacts, will be undertaken as part of a Before-After-Control-Impact (BACI) study. The goal of the road

study is to provide park managers with a tool to make the most well-informed decisions about the future of traffic on the park road.

International Polar Year (IPY) Activities at Denali

The International Polar Year 2007 – 2009 is a huge, exciting scientific campaign focusing on the polar regions – both the Arctic and Antarctic regions. The official IPY launch date was March 1, 2007. For the next two years, scientists from around the world will focus their efforts on understanding the role of the polar ecosystems on global climate systems. The 9th International Conference on Permafrost (ICOP) will take place in Fairbanks on June 29 – July 3, 2008.

Current programs and research at Denali will contribute to this effort. The park will host an ICOP field trip July 4, 5 and 6, 2008 which will include stops at areas of geologic, glacial and permafrost interest, inside and outside of the park. The vital signs monitoring program (Central Alaska Network), and data from long-term studies will be highly supportive of Alaska efforts. Denali's contributions will include some of the longest running climate and biological monitoring records in the region. It is anticipated that Denali resource staff will work with UAF scientists on IPY projects related to climate change, permafrost, glaciers, vegetation changes, and wildlife. One example is Martin Jeffries, University of Alaska Fairbanks, who continues measurements of lake ice and snow at Horseshoe Lake as part of the Alaska Lake Ice and Snow Observatory Network (ALISON). He has enlisted the help of Tri-Valley students and teaches, as well as NPS and Murie Science and Learning Center staff.

Effects of Climate Change

Denali's natural resources are responding to climate change. Some of these changes are easily visible and others are more subtle:

- **Wildfire Size and Duration.** Fire statistics over the last five years show an increase in fire size and duration. The Moose Lake Fire in 2002 (see photo at right) was the largest single fire on record for Denali (117,920 acres) and the Highpower Creek Fire (2005) lasted 81 days – well beyond the average of 24 days. There has not yet been an increase in the average numbers of fires per year, but lightning activity levels have increased. There were a record number of lightning strikes in June 2005 in Interior Alaska. 2005 was the second largest fire season on record – 4 million acres burned with widespread smoke in June and July.

- **Shrinking Glaciers.** Denali glaciers continue to show negative balance and steady thinning.

- **Warming of permafrost.** Permafrost temperature profiles measured in boreholes near Healy show consistent warming since 1991. The borehole temperatures are very close to 0°C. At the point when borehole temperatures reach 0°C, there is the potential for significant landscape change.

- **Snow free days and length of growing season.** Weather observations have been recorded at Denali for 83 years (since 1925). In recent years, the number of snow free days has increased and the growing season has lengthened. Average warming over the past century has been 0.5°F.

- **Vegetation and landscape change.** Over a 30-year period, based on visual comparison of aerial photography (1976, 2005), spruce has expanded its range across the landscape, open water areas are smaller, "pond-drying" is common, and woody vegetation has invaded open wetland sites.

- **Shifts in Bird Distribution.**
    - Trumpeter Swans increased in numbers; their distribution enlarged to include higher elevation lakes (2005 survey)
    - Orange-crowned Warblers, Golden-crowned Sparrows, and Lincoln's Sparrows are much more common in Denali than they were 75 years ago (based on bird surveys in 2001 to 2005).

Plants/Vegetation

Long-term Vegetation Monitoring

Field work continued in 2007 for the vegetation component of the long-term monitoring of park resources, including landscape monitoring of vegetation and white spruce cone production.

Landscape-scale vegetation monitoring project

The goal of this project is to detect changes in the fundamental properties of the vegetation cover of the park over long intervals of time. The design for this landscape-scale work is a systematic grid of sites at 20-km intervals laid out over the park landscape. For vegetation monitoring, parameters measured at these mini-grid sites include species composition and structure, abundance, tree density, tree size, tree vigor, and evidence of pathogens. The vegetation field crew also measures soil characteristics and landscape variables in these plots. The vegetation protocol for the Central Alaska Network vegetation monitoring has received a full peer-review, and the official implementation phase of the program began in 2006.

In 2007, two vegetation crews completed sampling of the following mini-grids: Moose Creek, Fish Creek, Nika Ridge, Gorge Creek, Panorama, Summit, and Bull River. Sampling involved installing new plots and measuring vegetation in these seven mini-grid study areas, scattered across the northern part of the Park from Polychrome Glacier area to Broad Pass to the Stampede Corridor.

Monitoring white spruce growth and reproductive effort

The vegetation crew continues to monitor the permanent plots installed in 1992 within the Rock Creek drainage near park Headquarters—observing the growth and cone and seed production of selected white spruce trees. Spruce cone production has been quite variable among years during this study, with especially high productivity observed in the years 1998, 2000, and 2002.

The spruce sample population produced virtually no cones in 2006, which is not surprising considering 2004 and 2005 were two consecutive years of sizable cone production that depleted the trees' reserves. On average, the trees in the forested sites have produced more cones per tree than did trees in the treeline plots over the course of this study, but in 2004 and 2005 there were more cones per tree in the higher elevation treeline sites. In general, trees at treeline are considerably smaller than the spruce trees in the low elevation forested site.

Repeat photography

The repeat photography project is part of vegetation monitoring in the Central Alaska Network. Approximately 2,500 slides of Denali taken in 1976 have been scanned and metadata on each picture recorded in an Access database. A number of repeat photographs (a subset of the entire aerial photos of park landscapes taken in the mid-1970's) were taken in 2005 to document qualitative changes in Denali's landscape. The original photographs were taken were taken by Frank Dean, long time researcher in Denali, to prepare the first vegetation map of the park. Dean's early photos are a treasure trove of ecological information about the park at an earlier time and what changes are evident on the landscape over a thirty year span of time.

The CAKN is working on ways to objectively quantify the vegetation change. While there was no repeat photography taken in 2006 or 2007, additional repeat photography will be done in the future.

Removal of Exotic (Non-native) Plants

Several individuals and groups helped Wendy Mahovlic and "the exotic plant management team" remove hundreds of pounds of non-native plants from the Denali Park Road corridor, the Entrance Area of the park, and the Parks Highway near the park entrance. Counting the native seed collection volunteering (see next section), sixty-eight volunteers worked 1351 hours.

- **Non-native plants with greatest biomass removed**
  Here's the 2006 roster of non-native plants removed in/ near the park (more than 50 lbs):
  * Dandelion (*Taraxacum officinale)*: 756 lbs
  * White Sweet Clover (*Melilotus alba*): 173 lbs
    (Miles 239 to 227 Parks Hwy; Miles 0 – 3 Park Road)
  * Hawk's-Beard (*Crepis tectorum*): 350 lbs
    (Sewage lagoon; Miles 0 – 3 Park Road)
  * Mustard (*Erysimum cheiranthoides*): 70 lbs
    (Toklat area; Miles 41 and 43.4 Park Road)
- **Other non-native species of plants**
  Six additional non-native species other than dandelions were removed in 2006:
  * *Vicia cracca* (bird vetch): 5 lbs. (Miles 1 – 3 of Park Road)
  * *Lupinus polyphyllus* (bigleaf lupine): 3 lbs. (Mile 7 pull-out)
  * *Trifolium repens*, *T. pretense* (red and white clover): 20 lbs. (Miles 0 – 3 Park Road)
  * *Leucanthemum vulgare* (oxeye daisy): a few plants (Nenana Canyon, near bus barn)
  * *Tripleurospermum perforata* (scentless false mayweed): a few plants (Railroad Depot)
  * *Linaria vulgaris* (yellow toadflax): several plants (Railroad Depot)

In 2007, for the ninth consecutive year, volunteers will be enlisted to pull dandelions and other non-native plants in the park.

Revegetation of Construction/Disturbed Sites

Seed collections

In anticipation of the need for native seeds to revegetate areas after development and construction, resource staff, thirteen volunteers, and the Denali trails crew again conducted a "Need for Seed" collection in 2006. Approximately 328 person-hours were spent collecting thirty pounds of uncleaned seeds in mid-August 2006.

Collections were made in the East (near the park entrance) and West (at Toklat, Eielson, and Kantishna) of early successional species. These species are ones that will grow well on any newly-graded and bare soil sites being created by construction. The species include Eskimo potato (*Hedysarum* spp.), Oxytropis (*Oxytropis campestris*), Arnica (*Arnica* spp), and native grasses (*Elymus* spp).

Once the seeds are collected, they are cleaned (removing seeds from pods or leafy sheaths and removing plant stalks and stems). Seed collections will continue in 2007 for revegetation of present and future construction projects.

Revegetation
The big revegetation projects for the 2007 season are the revegetation of areas around the new Eielson Visitor Center and in the Toklat area, using vegetation mats and seeding in the fall. The best time for harvesting and transplanting mats is when the mats are almost dormant (so little damage occurs to plants) when more plant energy is directed at root production (in spring and fall) than in leaf and fruit production (summer). Seeding in the fall mimics the natural dispersal of seeds at a time when the seeds won't germinate but will overwinter on site and be ready to germinate the following spring.

Off-Road Vehicle (ORV) Impacts

In 2005, park staff used GPS to map nearly 45 linear km of tracks made by ORVs in the park. Staff recorded information about thirteen trail attributes for each section of trail, including trail type (main active, secondary inactive, etc.), trail width, number of parallel paths along the trail segment, degree of vegetation stripping on the trail, depth of trail compared to adjacent areas, muddiness, and depth of damage to soil below the organic mat.

In 2006 and continuing in 2007, park staff members are incorporating the field data about the impacts of ORVs into the Environmental Assessment (as part of the NEPA process) being written to develop alternatives for managing ORV use for subsistence activities in the Cantwell Traditional Use area of Denali.

Monitoring Dust Palliatives on the Park Road

To reduce road dust created by vehicular traffic, park maintenance crews apply an aqueous solution of calcium chloride ($CaCl_2$) to the surface of the park road. The application reduces dust and the need for replacing the fine materials constantly lost from the road as dust. However, adding this compound also has the potential for adversely affecting ecosystems adjacent to the road. NPS developed a monitoring plan to assess and monitor the possible effects on soil, water, and vegetation of applying calcium chloride as a dust palliative on the park road.

On August 23–24, 2005, park staff buried thirty lysimeters (instruments designed to sample water from within the topsoil). At Mile 15.2, 18.6, 22.2, 23.4, 26.9, 28.9, 31.2, 41.5, 49.1, 58.4, 60.4, 64.5, 71.3, 79.8, 88.4—one lysimeter was buried near the road, and one about ten meters away. Water samples are being taken annually from lysimeters and nearby water bodies to test for chloride ions. The data from 2005 and 2006 (preliminary results) show that beyond Mile 31.2 there is little to no chloride in the water bodies. Two sites on east end had high levels of chloride (180 ppm) adjacent to the road. The lysimeters were sampled again in fall 2007.

Wildland Fire

Monitoring Wildland Fires

Denali National Park and Preserve has 3,359,449 acres (out of a total of 6+ million) that are covered by burnable vegetation. Eighty-nine percent of the burnable vegetation acres (2,983,460 acres) lies within "limited fire management options". These options allow fire to play its natural role in the ecosystem. Although some wildland fires are suppressed because they threaten natural or cultural values, the emphasis of the fire management program at Denali is on actively monitoring wildland fires while they burn and on protecting individual isolated structures in the fire's path. Six wildland fires and three prescribed fires occurred in Denali in 2007.

Fire monitoring includes observing a fire from aircraft, digitally photographing and mapping its progress, and keeping an updated narrative of the fire's status and behavior. Current and forecasted weather over the fire area is also monitored to ensure that the fire will continue to burn only where allowed. Protecting isolated structures that lie in the fire's path is generally accomplished by setting up a water pump and sprinkler system on or around the structure as most structures tend to be located adjacent to water sources.

Creating Defensible Space Around Structures

History has shown the devastating effects when wildland fire combines with a buildup of vegetation around structures. Hazardous fuels around structures in the developed and backcountry areas of Denali National Park and Preserve have or are being reduced to create a "defensible space" around the structures. Much of the built environment in Denali was constructed during the 1920s and 1930s. Structures were often built close to the forest edge or the forest has since grown back into the areas disturbed during construction.

Creating a defensible space includes clearing all flammable vegetation within 30', and thinning the vegetation that lies within 30' to 100' of the structure (cutting some trees, other vegetation; removing lower branches of trees). The defensible space reduces the risk of property damage in the event of a wildland fire and improves safety for visitors, residents, and firefighters. Once all the defensible spaces have been created, a maintenance and educational program will continue the benefits of this program. Firewise is the name given to the creation of defensible space by thinning, limbing, or clearing space around structures. Throughout the project, Denali employees receive project updates and other fire information.

- **Developed areas**. In 2007, defensible space totaling ~ .5 acres was improved at park headquarters, trimming branches to varying heights from the ground to give a natural appearance.

- **Cultural resource sites**. In 2007, debris accumulated from past hazard fuels projects were burned at the Lower East Fork and Lower Toklat Patrol Cabins and at the Stampede Mine. This completed the cycle for the initial treatment of the sites and they will enter and maintenance cycle.

Videography Landcover Reclassification and Moose Browse Utilization

The purposes of this study are to reclassify the "burn" portions of the Landcover Classification, test the use of videography as a method for landcover reclassification, validate predictive fire models used by fire managers, validate successional patterns compared to burn severity, and

identify fire effects on the level of moose browse observed under varying burn severity levels and age of burn. Understanding the natural variability related to fire is also necessary in order to identify potential abnormal effects associated with long-term climate change or management activities.

The current fire fuels map for Denali is based on LANDSAT imagery compiled from scenes over several years. Approximately 12.9 percent of the park, which is prone to natural ignitions, is classified as "burn" on the current map or has burned since the Landcover Classification map was made. The analysis and imagery used to develop the landcover classes are unable to detect other classes of vegetation for up to fifteen years after a fire. In the short term, these "burn" areas need to be reclassified into another Landcover classification other than "burn" to update maps so fire managers can predict fire behavior with some confidence. In the long term, fire managers would like to combine data about vegetation recovery after fires to model plant succession after a fire on a landscape scale, then apply this information to create maps.

Post-fire plant succession depends on the site's fire severity, climate, surviving flora and seed sources, proximity to early successional colonizing seed sources, and the substrate (rock, soil). Fire severity is the degree of ecological change (setback) due to fire. In general, the greater the fire severity, the further the plant succession is reduced to its earlier stages and the longer recovery will take to its pre-fire condition.

Fire is a major disturbance of boreal forests in Denali and interior Alaska, but how the age and fire severity of fires affects the density and distribution of moose on a landscape scale is poorly understood. Moose play a major role in the dynamics of boreal forest ecosystems and are an important resource for subsistence users. In much of the natural fire-prone portion of Denali, if the fire severity encourages shrub development, then browsing by moose (moose browse utilization) may increase. Extremely high fire severity may delay shrubs development and extremely low fire severity may induce little change in species composition and structure.

In 2005, field crews ground-truthed areas in the northwestern (most fire-prone) portion of the park that were flown with videography equipment in 2004. The field crews sampled vegetation in 46 plots established along the two 100-km transects, recording whether browsing by moose was low, moderate, or high. Transects were chosen to span burned areas ranging from 3-to 50 years ago. Data from this portion of the study will (1) provide ground-verified data to reclassify the "burn" landcover classification to a vegetated class and (2) establish baseline information on the extent of shrubs (browse) utilized by moose for areas where fire age and satellite-derived (Normalized Burn Ratio) burn severity are known.

In 2007, the Fire Management staff resampled fifty-three selected plots that were installed and sampled in 2002 as part of the Satellite Burn Severity Project. Analysis for this project is in progress and continued in 2007.

Fire Education

Murie Science and Learning Center Science Series. In 2007 MSLC staff offered short presentations with activities in the MSLC classroom that educated visitors of current science topics in Denali. A typical presentation included an introduction to the mission of the MSLC, introduction to research in our National Parks, a broad overview of the subject matter and natural history, a focused look at current research on the topic and explanations of how this work assisted

park mangers. The programs were free to the public on a first come, first serve basis. After working with Western Area Fire Management and the Regional Fire Communication and Education Specialist, MSLC staff presented "Feel the Burn: Wildland Fires And Management in Denali**."** A total of 195 visitors attended the fire program throughout the 2007 summer season.

Denali Discovery Camp. As part of the annual Denali Discovery Camp in June 2007, the Fire Management staff participated in short hikes and taught several students about the wildland fire triangle, fire behavior, firefighter tools, and the range of work a firefighter does.

Firewise Workshops. Fire managers create defensible space around park structures and encourage communities to do the same. Firewise workshops teach community members how to reduce the combustible material around their homes in order to reduce the wildland fire risk. Workshops also focus on "Why" create defensible space by teaching residents about the fire environment they live in. In 2007, workshops took place at Panguinge Creek and the Denali Education Center. One workshop at the Denali Education Center was specifically designed for the non-governmental organization and the other was hosted by the Center for the community.

Alaska Interagency Wildland Fire Key Messages. Wildland fire management agencies and organizations share common goals—to enhance personal safety and reduce loss of life while preserving and enhancing the health of forests and wetlands. To communicate clearly and consistently across all agencies and disciplines, the Interagency Wildland Fire Prevention, Education, and Awareness Committee developed key messages about wildland fire during the winter of 2006/7. Morgan Miller is chair of this committee.

Wildlife

Keep Wildlife Wild

Denali National Park and Preserve resource staff continue to educate people with the basic message: "Keep wildlife wild - do not approach or feed wildlife". Anecdotal observations continue to indicate that the program is successful. Fewer reports of human-wildlife conflict due to food conditioning have been reported each year the program has been in effect. The program includes bookmarks, buttons, brochures, and signs bearing a universal symbol "Do not feed the animals" with text explaining why this is important. In 2007, staff again distributed these materials around the park. Signs appear on trash cans, picnic tables, and toilet stall doors.

The message has also become part of every interpretive program. The "Keep Wildlife Wild" program serves as a model for other parks. Wildlife staff encourage everyone working at the park to take every opportunity to discourage the feeding and subsequent habituation of wildlife.

Bears

Grizzly bear monitoring

This long-term study on the north side of the Alaska Range focuses on a sample of grizzly bears between the Muldrow Glacier and the Herron River. Radio-collared females are located from den emergence to the end of September to locate and follow the mortality of the sows and their cubs.

Bear capture was conducted on May 24 and 25, 2007. Collars were replaced on six female grizzly bears. Three new three-year-old females were captured and collared. Captures were conducted from a helicopter with fixed wing support. There are thirteen collared bears in the study, all female. The oldest study bear is nineteen years old.

At den emergence, two sows each had two spring cubs. By the end of September one cub could not be accounted for and was presumed dead. One sow had a single two year old that could not be accounted for at the season's end.

Plans for 2008 are to replace radio collars where necessary, increase the sample size by collaring some new bears or locating those with failed collars, and investigate mortalities/dropped collars.

On the south side of the Alaska Range, the park is cooperating with the Alaska Department of Fish and Game to estimate population numbers for both black and grizzly bears. The study was conducted in 2000, 2001, and 2003. A final report on this study has not yet been received. Preliminary results indicate that for the entire study area, the density for brown bears is approximately 28 bears/1000 km^2. This density is slightly higher than that documented on the north side. Density for black bears is predicted to be about 80 bears/ 1000 km^2.

Bear Management

Bear problems at Denali escalated in the 1970's and 1980's. By 1982, Denali had the highest rate of backcountry bear incidents of any U.S. national park with a significant grizzly population and high backcountry use. Bears were getting food from backpackers and poorly-handled garbage, causing property damage, and injuring people. Between 1946 and 1983, forty-eight bears were relocated or destroyed in the park. Denali's Bear Management Plan (BMP) was developed to address bear problems and reduce bear-human conflicts.

By educating staff and visitors about bears and providing bear-resistant storage for food and trash, the park has dramatically reduced conflicts with bears and other wildlife. In 1984, Bear Resistant Food Containers became mandatory for backcountry users. By 1985, incidents with bears in the backcountry had dropped nearly 90%. The last problem with a food-conditioned bear in one of the Denali campgrounds was in 1994. Since 1983, only four bears have been destroyed, one sent to a wildlife park, and two relocated by the National Park Service.

The success of the Bear Management Plan is largely dependent on the cooperation of all NPS employees. Within the BMP, it states that all employees are responsible for reporting or correcting possible bear problems as they develop. Supervisors and liaisons are responsible for ensuring that their staff or crews get bear safety training and are aware of Denali's policy regarding bears and other wildlife. Information and some equipment can also be provided for bear-proofing camps and worksites.

Between May 7, 2007 and September 19, 2007, 142 bear-human interactions were documented. These were classified as eight observations, 122 encounters, eleven incidents, and one control action. The total of 142 BIMS this year marks a 23.2% decrease from the previous year's total of 185. Of those interactions rated as encounters, 41 occurred in frontcountry areas and 81 occurred in the backcountry. There were eleven interactions classified as incidents this season, with five incidents occurring in frontcountry areas and six in backcountry settings. This is about the same as last year's number of recorded incidents. Backcountry and frontcountry incidents involved property damage and close approaches to people.

There was only a single control action in 2007 compared with 17 in 2006. This one control action involved a young grizzly bear that was hazed out of Wonder Lake campground.

Road Wildlife Study

This study relies on those bus drivers who volunteer to help monitor wildlife along the park road and continued in 2007 and become part of the larger road capacity study. Drivers record the numbers of bears, moose, sheep, caribou, and wolves they see on their trips (westbound only). These numbers are summarized and compared to previous years to detect substantial changes. So far, differences in numbers from year-to-year are within the range expected due to natural variation.

Laura Phillips, the ecologist hired to work on many aspects of the road study, has begun some preliminary analysis of several recent years of data collected by bus drivers but not yet analyzed. She is restricting the analysis to observations made after the Savage check station at Mile 15 on the park road, so some numbers such as the number of moose observations may be different from previous years.

Based on the groups of wildlife observed per bus trip from 1999 through 2006, a visitor taking one bus trip into the park could expect (based only on averages) to see three groups of caribou, two groups of grizzlies, and one or two groups of Dall sheep. Based on bus driver observation data from 1999 – 2006, a visitor taking ten trips into the park would be expected to see a moose on three out of ten trips, and a wolf on two out of ten trips.

In summary, beyond the Savage River, the odds (based on averages over the last eight years) of seeing the five large mammals are: caribou (92%), grizzly bear (82%), Dall sheep (81%), moose (35%), and wolf (19%).

Wolves

Denali National Park and Preserve's wolves have been studied by researchers since 1939. Population estimates were not very accurate until 1986, when a large-scale wolf research project was initiated by David Mech and others. This project provided basic information necessary for effective wolf management. While the intensive research program was concluded in 1993, research and monitoring efforts have continued.

The current study consists of maintaining two to three radio-collared wolves in each known pack inhabiting the park north of the Alaska Range. Radio collared wolves are located every two weeks, with additional locations during late September-early October to determine fall pack sizes and to count pups, and locations during March and April to determine late winter pack sizes.

Telemetry locations acquired over two biological years (a biological year runs May 1 – April 30) are used to determine the area of each pack territory. Areas of the combined pack territories and pack counts are used to estimate abundance and density of wolves. In addition, monitoring data have been used to determine wolf movements, mortality factors, behavior, and population dynamics.

As of April 1, 2007, thirty wolves in sixteen packs in Denali wore conventional, VHF radio collars that are located from antennae-equipped airplane. Another nine wolves carried GPS collars that determine the animal's location once per day, store the data, and upload it through the ARGOS satellite system.

In April 2007, there were approximately 83 wolves in the sixteen packs being monitored by park biologists. The estimated density of wolves in Denali (about 4.8 wolves per 1000 square kilometers) was significantly lower than the 2006 estimate (6.7 wolves per 1000 square kilometers), probably because more wolves dispersed from their packs during the previous year. Track observations and sightings in spring 2007 indicated that many wolves were traveling alone. High densities of snowshoe hares during the winter of 2006-2007 probably contributed to the ability of dispersing wolves to live alone before pairing up or joining a pack.

Caribou

The National Park Service has supported intensive caribou research at Denali since 1983. Since 1986, this research program has consistently applied the same methodology to census the population annually and to estimate calf production, calf recruitment, adult female survival, and herd composition. This Denali study is the longest and most consistent caribou census anywhere in North America. Despite the general acceptance of the importance of age on productivity and survival, the Denali's age-structured sample is the only one of its kind ever attempted in a wildlife population and it has been maintained for 20 years. Since 1986, a sample of approximately fifty radiocollared females has been maintained, providing an annual assessment of population vital rates faithful to the herd's age structure.

Much has been learned about the interactions between predation and weather and the dynamics of the Denali caribou herd. When this study began, the caribou population was increasing at about 7% per year through a period of relatively mild winters in the mid-1980s. Winter survival of caribou cows was high (96% per year) and about 50% of the calves were recruited into the herd. With the onset of a period of severe winters in 1988, caribou numbers reached a plateau of about 3,200 in fall 1989, then declined and dropped to about 2,300 caribou by fall 1992. During the period of decline, adult cow winter survival dropped (85%) and calf recruitment dropped to a mere 5% (i.e., 95% of calves did not make it to adulthood). Since1992, winter snowfall has been moderate and the caribou herd has declined slowly at about 2% annually. Adult cow survival has been comparable to the mid-1980s, but calf recruitment has continued to be relatively low.

With a decline in calf recruitment since 1990, and the female age structure heavily weighted towards older females who would be lost over a few years, it was expected that another period of decline would exist for the herd, particularly that the poorest adult female survival recorded in this study occurred in winter 2002-03 coincident with the lowest snowfall on record for the park.

However, calf recruitment has been somewhat improved in recent years and the herd has shown some slight growth. Although the female age structure of the herd is still somewhat weighted to older females, compared to that at the beginning of the study, the situation has improved and we expect the herd to maintain its numbers, particularly if the increase in calf recruitment continues. Caribou capture operations were conducted in March 2007, and researchers placed or replaced radiocollars on 28 cows. In addition, 45 bull caribou were radio-collared in September 2007, initiating a four-year effort to learn more about the movements and survival of the male component of the Denali herd.

Herd size. The tentative estimate of herd size was 2,150 caribou in the Denali Herd in late September 2006. Herd size has increased during 2005-2006 primarily as a result of increased calf recruitment. During the last three years, calf:cow ratios and estimated calf numbers have averaged about twice what was observed in 1998-2003. Trends for the herd size over the next few years will depend largely on whether the increases in calf recruitment continue.

Adult Sex Ratios. In September 2006, the adult sex ratio recorded was 39 bulls:100 cows. Bull numbers declined from an average of 56:100 during 1984-1989 to a low of 29:100 during 1997-1998 (increased mortality of males during severe winters). It has averaged 37:100 over the last four years.

Calf Production and Survival. The natality rate (how many ≥ 1 year old in mid-May have calves) was 70%, based on observations of 63 radiocollared cows in the age-structured sample in May 2006. Natality rates have averaged 78% over the twenty years of the study. The lower rate in 2006 was largely due to the high number of yearlings and two-year-olds in the population recruited in 2004 and 2005. These age-classes accounted for thirteen of the nineteen non-pregnant females in the radioed sample. Productivity of two-year-olds was high (four of twelve radiocollared individuals produced calves). Between early June 2006 and late September, the calf:cow ratio had declined from 38:100 to 21:100, indicating 29% survival of the 2006 calf cohort. Approximately thirteen female calves were recruited per 100 older females.

Adult Female Survival. During October 2005 – September 2006, two radiocollared caribou from the age-structured sample died, for an annual mortality rate of 3.2%. Interestingly, these mortalities all occurred during the summer. Thus summer survival was comparable to the long-term average of 96.4%, while overwinter survival was higher than the average (91.1%).

Female Age Structure. As with last year, changes in the female age structure in 2006 were largely due to recruitment of a relatively large number of individuals from the cohort that entered the age structure as yearlings in 2005. The proportion of old cows (≥ 13 years old) in the population differed little from the last few years. Although the proportion of old cows in the herd has declined markedly since 2001-2002, it is still nearly double that of 1987-1989 when calf recruitment was high and the herd was growing at about 8% per year.

Small Mammal Monitoring

Voles (*Microtus* spp. and *Clethrionomys* sp.) are not highly visible in the boreal forest, yet their collective biomass is a larger proportion of the animal community than that of grizzly bears. Within Denali's ecosystems, voles consume seeds, fungi and invertebrates, and provide a key prey source for raptors, and carnivorous mammals. Voles play another important ecological role by having the ability to influence species above and below them in the food chain.

Since 1992 vole populations have been monitored in the park and will continue to be monitored as part of the Central Alaska Network "Vital Signs" Monitoring Program. From these data and other studies we know that populations of voles vary across the landscape and over years. Data from Denali suggest that annual fluctuations in small mammal populations are strongly related to abiotic factors like weather and timing of snowfall. Additionally, the relative abundance of small mammal species is directly related to local composition of plant species. Thus, any park-wide changes in weather or plant species composition will likely affect small mammal distribution and

patterns of abundance. By monitoring populations of voles, we may detect effects of human-induced change (like global warming).

The 2007 field season of small mammal sampling in Rock Creek added a sixteenth year to the data series begun in 1992. Sampling occurred at the trapping grids in the Rock Creek drainage—four study plots include two forested areas and two areas along Rock Creek. Sherman live traps were deployed on the plots for a four-day period. Traps were baited with sunflower seeds and bedding, and checked three times per day. Captured individuals were identified by sex and species, reproductive status was determined, and net weight was calculated. Unmarked individuals were implanted with passive integrated transponder (PIT) tags approximately the size of a grain of rice and released. Every individual can then be identified with a "reader" for capture/recapture estimates of population size.

In 2005, small mammal abundance was the highest ever observed in Rock Creek, but in 2006 population sizes dropped to more "typical" levels. Eighty percent of the variation in small mammal abundance could be explained by a population model that incorporates date of spring onset, and the amount of spring and summer moisture (or lack of moisture), along with an interaction of spring onset and summer moisture (dryness). As far as is known, this study is the first of its kind to explain (model) so much of the variation in small mammal abundance.

Small Mammal Inventory

At this time all 25 species of *small* mammals (100 percent of those expected to occur in Denali) have been documented (observed in the park and specimens collected). Denali's three most common species (based on inventory collections) are northern red-backed voles, tundra voles, and the cinereus shrews.

Birds

Monitoring abundance and distribution of passerines. Biologists from the National Park Service and the Alaska Bird Observatory conducted ten-minute point transect surveys in Denali National Park and Preserve, Alaska, as part of the Central Alaska Network's Vital Signs monitoring program. The protocol for this project was peer-reviewed in 2005 and the project is in full-implementation. This was the second year of the three-year sampling rotation for this project.

All sampling occurred from June 1 – 26, 2007 between the hours of 3:00 a.m. – 9:00 a.m. No days were lost to inclement weather and all but one of the minigrids required two days to sample all accessible points. All birds detected (seen or heard) at each sampling point were recorded during a 10-minute sampling period in one of four time intervals (0 to 3 min, >3 $\leq$5 min, >5 $\leq$8 min, and >8 $\leq$10 min) and one of 13 distance intervals (10-m intervals up to 100 m, 25-m intervals to 150 m, and >150-m). The survey crew sampled 187 points on eight minigrids in 2007.

The survey crew detected 1,941 birds in 2007, including 55 to 396 birds per minigrid and 3.9 to 16.5 birds per survey point. The fewest birds (55) were detected on Gorge Creek minigrid and the most were detected on Sanctuary Flats minigrid (396). Fifty-eight species were detected on minigrids (47 species during the 10-minute counts and eleven species on the minigrids but not during the ten-minute counts). Species richness ranged from 14 to 23 species per minigrid and 2.6 to 7.6 species per point; the most species were detected on Sanctuary Flats minigrid.

White-crowned sparrow, fox sparrow, American tree sparrow, and savannah sparrow were detected on all grids, and comprised approximately 63.5% of all detections. White-crowned sparrow was the most commonly detected species, comprising 29% of all detections and occurring at 81% of all points. Wilson's warbler and orange-crowned warbler comprised 14.4% of all detections. Somewhat surprising was the absence of Lapland longpurs; a single Lapland longspur was observed on the Moose Creek Cabin North minigrid while the crew was returning to camp. Also of interest were the 35 detections of whimbrels on three minigrids: Reindeer Hill, Moose Creek Cabin North, and Sanctuary Flats. Whimbrels were detected at 15.5% of all points in 2007. Also, 26 Arctic warblers were detected on the Divide Mountain minigrid.

Point transect surveys will continue in June 2008; approximately 200 to 250 points will be sampled.

Breeding Bird Survey (BBS): The North American Breeding Bird Survey (BBS) is a large-scale survey of North American birds. Approximately 3,700 BBS routes are located in the U.S. and Canada and about 2,900 routes are surveyed annually. The BBS has accumulated over thirty years of data on the abundance, distribution, and population trends of more than 400 species. These data are useful for determining if changes of a species in certain states are related to a continental decline or merely represent population shifts within their breeding range. At Denali, park staff conduct two standardized Breeding Bird Survey (BBS) routes along the park road—the Savage BBS and the Toklat BBS. Each route contains fifty sampling points located 0.50 miles apart. At each point, the surveyor conducts a three-minute count and records all birds detected within 0.25 miles.

The Savage BBS route was completed on June 14, 2007. All fifty points were surveyed in 2007. Twenty-nine species and 895 individuals were detected in 2007. White-crowned sparrow (n=136) and American tree sparrow (n=122) were the most commonly detected species along the Savage BBS route. Two new species were detected on the Savage River BBS route in 2007, herring gull and downy woodpecker.

The Toklat BBS route was completed on June 15, 2007. All fifty points were surveyed in 2007. Thirty-eight species and 6808 individuals were detected in 2006. Wilson's warbler (n=101) and White-crowned sparrow (n=84) were the most commonly detected species along the Toklat BBS route.

National Park Service biologists will complete the two BBS routes in Denali in June 2008. Results from the Denali BBS routes are available at:
www.pwrc.usgs.gov/bbs/retrieval/summary/stateform.cfm

Reproductive success of Golden Eagles and Gyrfalcons: As part of the National Park Service's Central Alaska Network Vital Signs Monitoring Program, National Park Service (NPS) biologists monitored the occupancy of nesting territories and reproductive success of Golden Eagles and Gyrfalcons in the northeast region of Denali National Park and Preserve (Denali) in 2007. This marked the 21st consecutive year of this study. NPS biologists collected data using two standardized aerial surveys conducted from a Robinson R-44 helicopter, and additional ground observations and foot surveys. The occupancy survey was conducted in late April, additional foot surveys from May through July, and the productivity survey in mid-July 2007. NPS biologists

also visited a sample of occupied golden eagle nesting territories in early July to collect shed feathers for ongoing DNA analyses.

It was a banner year for golden eagles in Denali in 2007; 77 of the 83 territories that were monitored were occupied (93 percent occupancy rate) and rates of laying (71 percent), nest success (84 percent), and production of fledglings (n = 76; fledglings per occupied territory = 0.99; mean brood size = 1.65) were among the highest recorded in study's history. NPS biologists attributed the high eagle reproductive success to high numbers of snowshoe hare in the study area.

Gyrfalcon reproductive success in Denali was lower than most years despite apparently high numbers of willow ptarmigan in the study area. NPS biologists monitored twelve gyrfalcon nesting territories in 2007, and occupancy (60%), success rate (50%), and production of fledglings (n = 12) were lower than most years.

Proposed activities for 2008 include (1) continuation of golden eagle and gyrfalcon monitoring in the historic study area in Denali, (2) continuation of genetic studies of golden eagles in Denali, and (3) continued public education and outreach efforts.

NPS biologists are providing data on Denali's golden eagles to assist the US Fish and Wildlife Service, Division on Migratory Bird Management with a NEPA document analyzing the potential impacts from the proposed regulation to permit take of bald and golden eagles under the Bald and Golden Eagle Protection Act. Additionally, Denali biologists are working with Dr. James Nichols and Dr. Julian Martin from the USGS, Patuxent Wildlife Research Center, Dr. Joel Schmutz, USGS, Alaska Science Center, and Dr. Maggie MacCluskie, CAKN, on a "*Structured Decision Making, Ecological Thresholds and the Establishment of Management Trigger Points*" project to provide Denali's managers with methods and information to protect Golden Eagle nesting territories during the breeding season.

Developing indices of trends in willow ptarmigan and snowshoe hare: Indices of population size of snowshoe hare and willow ptarmigan on a broad scale are obtained by recording the number of each species observed during routine field activities. These data allow National Park Service biologists to track broad-scale abundance trends of both species over time. The abundance of snowshoe hare and willow ptarmigan was higher in 2007 than in the past 20 years.

Christmas Bird Count: The National Audubon Society organizes the Christmas Bird Count (CBC) and each year more than 50,000 observers participate each year in this all-day census of early-winter bird populations. The results of their efforts are compiled into the longest running database in ornithology, representing over a century of unbroken data on trends of early-winter bird populations across the Americas. The primary objective of the Christmas Bird Count is to monitor the status and distribution of bird populations across the Western Hemisphere. When data with Christmas Bird Counts and other surveys such as the Breeding Bird Survey are combined, scientists begin to see a clearer picture of how the continent's bird populations have changed in time and space over the past hundred years.

Local naturalist Nan Eagleson organizes and compiles the results of the Denali CBC which has been conducted every year since 1992. The 2007 Denali CBC was held on December 29.
To learn more about the Christmas Bird Count, visit: www.audubon.org/bird/cbc/

Wood Frog Surveys

The wood frog is the only amphibian that occurs (or is expected to occur) in Denali National Park and Preserve. Information on the presence and habitat associations of the wood frog continues to be collected concurrently with many of the ongoing bird and vegetation projects.

Dr. Grant Hokit (Carroll College, Montana) conducted extensive surveys for wood frogs (2004) from Grassy Pass to the south end of Wonder Lake. He looked for frogs in all still-water sites inside randomly-located 1-km circular plots. By describing habitat information and recording where they found frogs, they learned what features are positively or negatively correlated with use by wood frogs. Wood frogs were observed at 106 sites (48%), breeding activity (the presence of eggs and/or larvae) was observed at 98 sites (45%), and adults and/or juveniles were observed at seventeen sites (8%).

Breeding activity occurred more frequently than expected at larger sites that were not isolated from other sites characterized by: 1) maximum water depth between 1 to 2 meters, 2) no connection to moving water, 3) 51-75% of the site less than 50 cm deep, 4) 76-100% of the riparian zone covered with woody vegetation, 5) from one quarter to three-quarters (26 to 75%) of the site covered with emergent vegetation, 6) alder or spruce present in the riparian zone, and 7) no sign of beaver activity. Sites with signs of beaver activity were negatively associated with frog breeding activity. No breeding activity was observed at bog sites dominated by sphagnum mats. Breeding activity of wood frogs was *not* associated with elevation or distance to boreal forest.

In 2007, Robert Newman of the University of North Dakota conducted a study of the population biology of wood frogs as one of the Discover Denali Research Fellows. Dr. Newman and one assistant surveyed ponds in the area between Eielson Visitor Center and Wonder Lake in early summer, identifying frog breeding sites and collecting samples for genetic analysis.

Physical Resources

Parkwide Climate Monitoring

Climate monitoring continues at established locations around the park. These data are especially useful for weather forecasting related to fires and detecting ecological trends. There are a total of seventeen climate stations distributed throughout the park. Most of these stations record air temperature, relative humidity, wind speed and direction, solar radiation, precipitation, and soil temperatures. From these stations, resource staff gain a park-wide perspective on the physical factors affecting Denali's ecosystems and can provide timely information on snow and weather conditions to park managers, the National Weather Service (NWS), researchers, and the public.

Climate monitoring at Denali is part of the vital signs monitoring of the Central Alaska Network (CAKN), which also includes Wrangell – St. Elias National Park and Preserve and Yukon-Charley Rivers National Preserve. The main objective of the climate portion of the CAKN program is to monitor and record weather conditions at representative locations in order to quantify one of the drivers in Alaskan ecosystems (climate), identify long and short-term trends, provide reliable climate data to other researchers, and to participate in larger scale climate monitoring and modeling efforts.

In 2007, all of the sites were visited for annual maintenance. The sensors on the station were swapped and calibrated and the data were downloaded. The comprehensive annual climate monitoring report will be available on the web in the spring of 2008.

Most of the stations are automated and send hourly data via satellite. Data summaries and data analysis tools are available at http://www.wrcc.dri.edu/NPS. See examples of the data summaries available below:

Weather Station on Mt. McKinley

Denali Park staff, the International Arctic Research Center (IARC), and the Japanese Alpine Club have continued to work jointly planning the transmission of data from a weather station on Mt. McKinley. One objective of the project is to make near-summit weather information available in "real time" to the hundreds of climbers who attempt the summit each year, as well as to park rangers, who must plan and perform search-and-rescue operations in the vicinity of the South Summit. Researchers also find the data useful for their studies of the high-elevation environment.

It is extremely difficult and time consuming to engineer a station that will withstand the harsh weather at 19,000 feet, especially when the team can get there only once a year. The 2007 expedition took place in June. The weather station is transmitting temperature and air pressure but no wind speed because they were unable to save the tripod that had busted off of the rock last year. They think that heavy icing and strong wind pulled the tripod over so far that the cables broke. When they found it, it was leaning with only one leg attached. They did their best to remedy the situation and attach the new sensors to the rocks. The old data logger has been sent to Climatec in Japan so any data can be downloaded and sent over to reconstruct what happened.

Weather Monitoring at Park Headquarters

For more than 80 years, weather information has been collected at park headquarters. Long-term weather (climate) datasets provide valuable information for detecting and predicting changes or trends in both temperature and precipitation, both factors that play a critical role in the ecology of Denali.

Below are **summaries of the 2006 climate data** for temperature and precipitation collected at Park Headquarters and compared with averages from the long-term database. Weather summaries are done by the calendar year, so for reporting purposes, summaries of the preceding year will be presented.

Temperature

- maximum temperature 77°F on July 21 and 29
- minimum temperature -38°F on January 27, 28, and 29
- mean annual air temperature 26.8°F which is cooler than the historical average of 27.2°F

Temperature Notes for 2006

Mean annual temperature	26.8° F
Departure from normal	-0.4° F
Highest temperature	77° F on July 21 and 29
Lowest temperature	-38° F on Jan 27, 28 and 29
New record highs/lows	1/1

# Highs above 80° F	0 days
# Lows below -40° F	0 days

Precipitation

Precipitation Notes for 2006

Total Precipitation	16.0 inches
Departure from Normal	+0.93 inches
Max. 24 hr precipitation	1.16 inches on June 26
Total Snowfall	57.8 inches from July 1 – June 30
Departure from normal	-22.7 inches
Maximum 24 hr snowfall	6.6 inches on January 22

2006 Records for Denali Park headquarters

June 5: 22° F minimum temperature (previous record 23° F in 1933)
June 26: 1.16 inches of rain (previous record 1.14 inches in 1937)
October 10: 0.78 inches of rain, not snow (previous record 0.41 in 1989)
October 10: 57° F maximum temperature (previous record 53° F in 1979)

Weather Notes for 2006:

- Most of January's snow fell on January 22 (6.6 inches)
- Temperatures came up above normal ~February 6 and stayed there for 2 weeks
- May was warmer than normal mostly due to the temperature spike the last week of May
- The "snow off" date for headquarters was May 11 (about normal)
- Unlike the previous two summers, 2006 was cooler and wetter, or more like normal
- The largest rainfall in 24 hours on June 26 (1.16 inches) was also a record for this date
- A large rain event occurred July 12-14 (total of 2.08 inches of rain)
- There were 18 days in August with measurable rainfall including every day Aug 17-24
- October's precipitation fell mostly as rain (snowfall was 2.9 inches; normal total is 12.7)
- On October 31st there was only 1 inch of snow on the ground
- It was the third coldest November on record (after 1932 and 1963)
- November was cold
- It finally started to snow in December for a normal monthly total
- It snowed for 10 days straight starting on December 19 (4 inches on Christmas Eve)

Snow Surveys

In the winter of 2006-2007, park staff conducted snow surveys in Denali during the survey window (last four days of each month) during the winter season. Thirteen snow courses and aerial snow markers were surveyed throughout the season. The following narrative describes the 2006 – 2007 season:

In January while Southeast Alaska was getting hit with record snowfall, the Central Yukon and Tanana Valleys were 50 – 69 % of normal. The first measurable snow that stuck around was on October 21, 2006 on the north side of Denali, and October 24 south of the Alaska Range. On the south side the early season measurements were less than 50% of normal for the snow markers in the eastern part of the Susitna Valley. The high elevation sites were closer to normal, which leads one to believe that some of the early season precipitation was falling as rain rather than snow at

lower elevations. On the north side very little snow fell in the early season and the snowpack, as of February 1, was between 50 and 60% of normal.

On March 1 the south side sites were 64% of normal with the least amount of snow at the lower elevations. The north side sites continued to be 50-60% of normal. There was little change in the snowpack during the month March. Temperatures were well below normal and the skies were mostly clear for the entire month. North side sites remained virtually unchanged, but the southside sites picked up some of the moisture from the storms centered over the Gulf of Alaska; on April 1 they were 80% of normal.

The snowpack in Interior Alaska melted quickly in April with persistent warm temperatures. There was no measurable snow at any of the north side sites on May 1, only upper elevation sites in interior Alaska had any snow remaining. Surprisingly, there was very little snow at the south side snow markers for this survey. This is very unusual. At Tokositna Valley this was the first time in 28 years that there was not measurable snow at the marker on May 1. The upper elevation sites still had snow but it was about 50 to 60% of normal for this time of year.

Snowpack Characterization

This project provides snow depth and density information to park managers who are faced with the decision to open or close areas of the park and preserve to snowmobile use based on the current snow conditions. This study focuses on measuring the snowpack characteristics that will allow adequate support of snowmobile travel without causing adverse impacts to vegetation and soils. Snow depth and density were monitored at several fixed survey sites throughout the winter season (December 2006 through May 2007).

The snowpack was slow to develop for the 2006-2007 season. Very little snow fell in October and November to create any kind of base to protect vegetation. The last 10 days of December brought snow, and by the second week of January there was adequate snow cover on the south side except for the area between the West Fork of Chulitna River and Windy Creek at the north end of Broad Pass. After additional snowfall between January 12 and 17, the use of snowmobiles for traditional activities in all the 1980 additions to Denali National Park and Preserve opened for snowmachine use, including the areas on the north side of the range. Generally the snowpack on the north side deteriorates first, closing the area in mid-April, while south of the range the snowpack remains deep enough until May 1. Depending on the spring conditions the south side may remain open until mid May.

Air Quality Monitoring

Long-term monitoring of air quality continued at the stations near Park Headquarters and Trapper Creek. 2007 marked the 28th year of uninterrupted air quality monitoring in the park through national monitoring networks. While Denali has some of the cleanest air measured in the United States, small amounts of industrial and agricultural contaminants from other continents make their way into the park each year in a recurring seasonal pattern. The peak concentrations of international contaminants are generally measured in the late winter and spring. During summer, naturally-occurring wildfire smoke is usually the primary contributor to air quality degradation. There was very little wildfire smoke in the park in 2007, compared to recent years.

Toxic Airborne Contaminant Assessment

Although Denali seems an unlikely place to find Persistent Organic Pollutants (POPs) and other toxic airborne contaminants, these pollutants are a growing concern throughout the Arctic and Subarctic. In 2004, the NPS Western Airborne Contaminants Assessment Project (WACAP) sampled fish, lake sediments, lake water, snow, lichens, willows, and spruce trees at Wonder Lake and McLeod Lake as part of a multi-park assessment of contaminants in park ecosystems. Subsistence hunters also donated samples from moose harvested near the park. Spring snow sampling occurred at the two Denali study lakes from 2003 to 2005. Chemical analyses of all samples in all parks were completed in January 2007, and the final comprehensive project report is scheduled to be released in 2008.

Visibility Web Camera

Park staff and air quality monitoring contractors installed a web camera at Eielson Visitor Center in July 2004 to document summer visibility conditions in the park. The Denali camera is part of a nationwide network of visibility webcams operated by the NPS Air Resources Division. During summer, the camera takes a picture once every 15 minutes, and the image is transmitted to the web via satellite. Current ozone and weather data from the air quality monitoring station near park headquarters are also displayed on the webcam home page and updated hourly. All images are archived throughout the summer for a long-term visual record of visibility, one of the air quality related values (AQRVs) protected under the Clean Air Act. During construction of the new Eielson Visitor Center, the web camera has been temporarily relocated to the Wonder Lake area.

Monitoring Landslide at Mile 45

At Mile 45 on the park road, survey stations were established in 1993 to monitor the rate of movement of the surface area of a mass movement (landslide)—a classic rotational slump with a headwall scarp, subsiding basins, pressure ridges and fractures, and flow features. The apex of the headwall scarp is within 35 horizontal feet of the park road, and park management and Federal Highways personnel are concerned about the threat that this movement poses to the road.

Both horizontal and vertical movement has been monitored since 1993 by eleven (near-annual) surveys. Approximately 60 stations have been established over the entire period. Some have been lost due to surface fracturing or squeeze-out, and animal damage, and new ones are added almost every year. In this most recent survey effort (September 2006), 34 stations were resurveyed or established, and 28 of those were used for calculating the horizontal (downslope) movement.

Stations in Zone 1 (above the road) are primarily drill casings in what is considered relatively stable (non-moving) ground. Surveys here began in 2002, and show little or no movement in the five years of monitoring. Zone 2 stations (below the road but above the slump scarp) show a slight increase in average movement (0.3 to 0.6 ft), demonstrating some moderate adjustment of the slope in the 14 years of monitoring. Zone 3 stations (below scarp and in upper basin) and zone 4 stations (lower basin below scarp) show punctuated, but slightly decreasing movement over the fourteen year survey period.

Much of the survey movement, especially in zone 1, is not downslope, but instead represents a "wobble" within a few tenths of a foot around each survey station. In zones 3 and 4, there is moderate downslope migration, which can mostly be correlated to the average annual precipitation. The average movement for zone 3 and 4 stations increased by several magnitudes in the 2004-2005 survey year (2.5 and 3.5 ft respectively), but show a decrease in movement for the 2005-2006 survey year (1.6 and 2.1 respectively). This spike is likely a response to a slightly

higher precipitation period (16.64 inches as opposed to an average of about 15 inches) during 2005, and it would be expected that future movement in these zones will slow further, unless another rise in precipitation occurs.

Although the 2007 data has not been analyzed, no increase in downslope movement (or other movement that is threatening to the park road) can be detected by the most recent survey, or history of surveys. Although the downslope migration of the slump continues, the rates of movement, and their spatial situation, suggests no immediate threats to the park road for the medium term (five to possibly ten years). Of course, all bets are off if there is a period of exceptionally high precipitation.

Paleontological Survey of the Lower Cantwell Formation

It has been well known for many years that the Cantwell Formation was formed in the right age and partly under the correct terrestrial conditions for dinosaur fossil preservation. The first dinosaur fossil material (footprint) was found only two years ago in Igloo Canyon within 200 feet of the park road although some geologic mapping and other geo-investigative work had occurred in the Cantwell Formation prior to 2005. This first footprint found was of a theropod, a carnivorous dinosaur that walked upright and probably weighed around 200 pounds. Although the footprints and skeletal remains of theropods have been found on the North Slope of Alaska, among other dinosaur types, this was the first evidence of dinosaurs in the interior of Alaska.

Since that park find, the NPS and other researchers have stepped up the search and geologic mapping effort in the Igloo Creek and tributaries just north of the park road, and on buttress ridges on the north side of Double Mountain. The park road courses right through Cantwell Formation rocks in Igloo Canyon.

At the close of the 2006 field season, field parties had located dozens of additional dinosaur footprints including hadrosaurs (duck billed dinosaurs) and four sizes of theropods, bird tracks, numerous plant fossils or imprints, and other paleo-biotic features. Some of the rock strata have numerous tracks on the same horizon or surface, and researchers have come to call these sites "Cretaceous dance floors." These finds have provided insight into the paleoecology (plants, plant-eaters, animal eaters) of the Late Cretaceous (65 to 145 million years ago).

In the 2007 field season, three major research efforts took place on the Lower Cantwell. The primary project work, led by Dr. Tony Fiorillo (Dallas Museum of Natural History), involved roughly two weeks of field time and assistance from two other researchers, Dr. Steve Hasiotis (University of Oklahoma), and Dr. Yoshi Kobayashi (Hokkaido University, Japan). This team of three worked in three locations in the park as follows:

Double Mountain – Efforts for 2007 were concentrated on the North and Northeast buttress ridges. Trace fossil finds in this location in previous field efforts included small theropod footprints, avian tracks, and other unknown smaller creature track impressions. In the 2007 investigation, Dr. Hasiotis identified the possibility of several insect tracks or trackways, as well as potential fin traces of perhaps several types of fish. These features and sites were photo documented, some features were latex molded, and some trace fossil (rock) samples were taken for further analysis.

Cabin Peak – Several days of field effort at Cabin Peak revealed similar floodplain-fluvial system materials here as in the Tattler Creek vicinity. Trace fossil material identified here included both theropod and hadrosaur footprints.

Tattler Creek – Similar to previous years, the Fiorillo team investigated known as well as new found trace fossil sites. Additional theropod and hadrosaur footprints were cataloged and molded.

Two independent research efforts on the Cantwell (McCarthy & Tomsich, & Sunderlin) which were closely related to the NPS Cantwell project were carefully coordinated to maximize field data collection with a minimum of overlap of effort & area coverage. These projects involving the understanding of the paleoecology of the Cantwell (McCarthy & Tomsich), and a paleofloristic evaluation of the Cantwell (Sunderlin), will fortify the NPS-Dallas Museum coordinated effort.

Field Class for Geologic Mapping

The University of Alaska Fairbanks under the direction of Rainer Newberry conducted its Field Geology class in the park from June 23 to July 2, 2007. Class objectives are: (1) to teach advanced undergraduate geology students how to use field geologic information in creating a geologic map and cross section and (2) to better understand the well-exposed, but geologically complex region that sits between two major strands of the Denali fault system.

The class based out of several campsites at the Teklanika Campground. Each day, twelve University of Alaska geology students (assisted by four UAF faculty members and a graduate Teaching Assistant) conducted field traverses for geologic mapping in four 3-person teams. Each group maps a different but overlapping ten square km area. The objective by 2011 is to complete a detailed geologic map in the vicinity of the Park Road between Teklanika Campground and the Toklat River, by conducting the field class at Denali in alternate (odd) years. The field class was also held in 2003 and 2005. One field team discovered the dinosaur footprint near Igloo Creek in 2005.

The group may augment their geologic observations with non-invasive geophysical techniques (including magnetics, electromagnetics, and gravity) to better define geologic structures and rock types in areas of sedimentary cover.

Mining Issues

Based on a court decision made in the fall of 2005, the owner of several hard-rock unpatented* claims, known as the Comstock claims (on Upper Eldorado Creek in Kantishna), was allowed to re-open an adit (horizontal shaft) for mineral sampling purposes (to assess the potential of the mine to produce minerals) to evaluate the value of the property. In the summer of 2006, the adit was opened, and both the NPS and the claimant accomplished the required sampling. With this information in hand, the court may now decide to allow additional sampling (by subsurface drilling) or decide that the information is adequate to render a decision on validity of the claim.

In the 2007 field season, the Comstock claimant and the NPS have agreed on a buy-out, acquisition was made, and the Comstock claims are now null and void, and back into federal ownership. Additionally, 10 unpatented placer claims (US vs. 191.7 Acres) returned to full NPS ownership in September of 2007, when an appeal deadline was not met by the claimant.

*There are “patented” mining claims” (privately owned surface and mineral estates) and “unpatented” mining claims (federally held and managed surface and privately held mineral estates).

Reclamation of Disturbed Areas

Denali National Park has been continually working on cleaning up abandoned mining sites in Kantishna since mining activities ended in 1985. A number of abandoned barrels along Crooked Creek were identified for characterization and removal by a hazmat contractor this summer. Crooked Creek, a tributary of the Toklat River, is approximately 23 miles northeast of Kantishna. In early August, resource management staff and contractors from North Wind, Inc. assessed the site and remaining mining waste, finding a total of thirty-seven 55-gallon fuel drums and a variety of 30-gallon drums and smaller fuel containers - some engulfed in beaver ponds and the surrounding wetlands. The barrels were hauled to Kantishna by helicopter in six sling loads. Overland transport then continued to salvage yards and landfills.

Centennial Challenge

Condition monitoring and restoration planning was accomplished on eight different mining properties this 2007 field season. Initial or new restoration plans will be developed for seven of those properties (Slate Creek, Upper Caribou, Moose Creek, Spruce Creek, Red Top, and Glen Creek) in response to possible Centennial Challenge funding. The project proposals involve all facets of mining claim clean-up and restoration including equipment & debris removal, hazardous material mitigation, upland floodplain reconstruction and revegetation, and stream and riparian restoration.

Geoscience Education & Outreach

Over thirty different opportunities occurred in 2007 to provide geoscience outreach. Three geoscience courses were offered in the MSLC teacher training of field seminar series, as well as over 20 presentations to visitors, staff, educational groups, and professional societies, five programs were offered at local and out of state schools, eight pamphlets or guidebooks were prepared for professional or public consumption, and three professional papers (one oral delivery) for conferences or society meetings.

Soundscape Inventory and Monitoring Program

A soundscape research program has been underway at Denali National Park and Preserve since 2001. Natural and human-generated sounds have been inventoried at numerous locations around the park including along the Park Road, south of Broad Pass near Cantwell, at the Stampede Airstrip, in the Ruth Amphitheater, at Base Camp on the Kahiltna Glacier, on the Pika Glacier, and at the toe of the Tokositna Glacier. From the 7000+ hours of digital recordings and sound levels that have been documented in the park's three acoustical zones (alpine, sub-alpine, and scrub/forest), we can calculate for each audible sound the percent time and the number of times per day that it is audible. We then use the sound level data to compare the levels of human-made sounds to the natural ambient levels.

The second sampling season of a newly revised systematic (random) sampling plan was implemented in 2007. Five automated sound monitoring stations were deployed and rotated to occupy 10 locations in Denali National Park & Preserve. These included two winter season sites, six LTEM grid points, and two locations of interest in support of the Backcountry Management Plan. Over the next ten years, stations will be placed at six new locations each year that will be randomly selected from a coarse grid of 60 points spread evenly throughout the park.

From the sound data processed thus far from 23 locations in Denali, wind is the most common natural sound and aircraft overflights are the most common human-generated sound. At some

locations wind can be heard all day long. At locations with brush or trees, birds can also be heard nearly all day long during the spring breeding season. At locations near common flightseeing routes, it is common to hear thirty overflights per day. At glacier landing strips, it is common to hear more than 100 overflights per day. At locations away from common flightseeing routes, the number of overflights heard per day rarely exceeds ten. At every site sampled, there are usually around five commercial jets heard per day.

The data collected with the sound stations can be used to characterize the soundscape. The data show that physical sounds dominated the soundscape on the Muldrow Glacier, in contrast to Foggy Pass, where biological sounds were more abundant. Wind and rock avalanches made up most of the physical sounds on Muldrow, and bird calls were nearly continuous at Foggy Pass.

Water Resource Management Plan Development

The park's existing Resource Management Plan (1998) calls for the development of a Water Resources Management Plan to protect and preserve the high quality of surface and ground water resources and to correct current water quality degradation problems. Planning and development efforts within and adjacent to Denali National Park and Preserve have been occurring at an accelerated pace for the past five years. The potential for large projects to impact resources continues to exist (e.g., North Access and South Side development). As a result of development pressures, a comprehensive Water Resources Management Plan planning process was initiated in 2004 and completed in 2006.

A comprehensive review of Denali's water resources was completed in 2005, entitled *Water Resources Information and Overview Report*. This report outlines the foundation documents pertaining to water resources, historical and current events affecting water resources, summarizes completed studies and water resource investigations, and outlines water resource management issues that will be addressed during 2006 in the *Water Resources Stewardship Report,* which will act as the park's guidance for water resources management. The planning report will identify Denali's significant unprotected water resources and protection measures for them. The *Water Resources Stewardship Report* was developed with professional analysis and public involvement. It provides an adequate conceptual framework to address the identified issues in a realistic manner for the next 10 years. The stewardship report defines the parks fundamental water resources, identifies our water resource goals, and provides strategies for achieving the water resource goals. There are three water resource goals which address water quality, functional morphology, and navigability of park streams and rivers.

Permafrost Monitoring

The Central Alaska Inventory and Monitoring Network staff are developing a comprehensive permafrost monitoring program. Two permafrost monitoring pilot projects have already gathered information to understand the relation of permafrost trends to climate trends. One project uses air and satellite photo interpretation to identify the general rates and nature of landscape change due to permafrost changes in the park. A second quantitative study initiated in 1991 has made annual measurements of borehole temperatures in developing thermokarst near the park.

In 2006, a third aspect of permafrost monitoring was initiated through a partnership with Ted Schuur of the University of Florida. His project, *Development of Monitoring Techniques to Detect Change in Carbon Cycling in Relation to Thermokarst in National Parks and Preserve,* will provide critical elements to the design of a comprehensive permafrost monitoring program.

Recommendations from this work will be combined with those from complementary remote sensing interpretation and borehole monitoring pilot studies to design the formal monitoring protocol.

Shuur's project centers on the same borehole site outside the park in Healy where permafrost thawing and thermokarst have been observed to occur over the past several decades. This natural experiment will be used to develop monitoring techniques for changes in vegetation and ecosystem C cycling that are a result of thermokarst. The research outcomes of this project will be to: (1) quantitatively determine current plant species composition, growth, and biomass patterns, (2) provide an historical reconstruction of disturbance as a result of thermokarst, and (3) detect the contribution of old carbon to ecosystem carbon cycling. These three measurement approaches can be applied on a widespread scale to analyze change in northern ecosystems. The study will guide monitoring of Carbon cycle processes that can be affected by permafrost thawing and thermokarst. The draft monitoring protocols will be developed in coordination with Dr. Schuur during 2007.

Wonder Lake Water Quality and Limnology Study

In 2006, the U.S. Geological Survey (USGS) began a three-year comprehensive water quality and limnology study of Wonder Lake and other selected lakes in the northwest portion of Denali.

The objectives of this intensive water-quality study are to (1) determine the present limnology and water quality characteristics of Wonder Lake, (2) determine whether or not there have been human impacts to the water quality of Wonder Lake, (3) utilize hydrodynamic and water quality models to determine 'threshold' levels of nutrients of other water quality constituents that would severely impact the water quality of Wonder Lake, (4) choose a number of other 'index' or 'benchmark' lakes in Denali for water quality sampling to provide a better overview of the park's lacustrine systems, and (5) as an outreach effort, partner with the Murie Science and Learning Center to involve students and the general public with the science of this project.

Field sampling trips to Wonder Lake were conducted on April 23, June 20, July 25, and September 7. During the April trip, researchers collected water and snow from one site. During the other trips they conducted full limnological analyses (depth stratified water sampling and measurements and plankton tows).

All water chemistry analyses have been completed; results for the snow and plankton samples are pending. Wonder Lake was stratified (see figure) and relatively similar in temperature, dissolved oxygen, pH, conductivity, and chlorophyll during all open-water field trips, so these data provided little information about seasonal lake mixing regimes, but do provide a solid baseline of water quality for comparison to future work with other lakes. Water chemical composition of Wonder Lake also varied little among dates and by depth, indicating seasonally consistent source-water contributions and relatively low biological productivity.

A comparison of Wonder Lake water chemistry to many small lakes sampled by Amy Larsen (CAKN) in 2006 suggests that Wonder Lake has very different water characteristics (high alkalinity, sulfate, and dissolved solids (particularly Ca^{2+} and Si), and low dissolved organic carbon). These results are likely unsurprising given that Wonder Lake is very large and deep and positioned at a mountain toe-slope in glacial outwash material. Most of the lakes sampled by CAKN are kettle, thermokarst, and floodplain lakes located in organic soils of the northwest portion of the park.

Historic Photos of Glaciers

In 2007, there may be the opportunity to re-visit additional historic photo sites, including many taken by Bradford Washburn in the 1950's. During 2004, over 200 historical photos of park glaciers were obtained. These are ground-based images made in the early 1900's by survey and research expeditions to the Denali area, including Cathcart, Capps, Washburn, Post, and others. Many of these sites were "reoccupied" to repeat the images using modern digital cameras. New photo stations were established at locations lacking historical coverage. The photo-comparisons of the glaciers are often dramatic, showing significant changes in the ice extents – including over 700 vertical feet of ice loss on a glacier in the Teklanika valley.

The GIS data and photographic media will be available to researchers, park management, park natural resource and interpretive staff, park visitors, educators, and the general public through the accompanying website.

Muldrow Glacier Monitoring

Denali staff members have monitored ice elevations and flow rates of the Muldrow Glacier since 1992. The Muldrow last surged in 1956-57 extending its terminus some 2.5 miles (four kilometers). Surges may occur at fifty-year intervals; thus, another surge is anticipated within a few years of 2007. Monitoring efforts in the last few years have described the quiescent glacier between surges so that the data can be compared to information collected during and after the next surge. To detect flow rate changes that might signal the start of a surge, ice surface flow rate is measured from movement of survey markers on various points of the Muldrow Glacier and its two largest tributary glaciers (Traleika and Brooks). A survey in April 2006 indicated no glaciers in Denali are currently surging. High resolution elevation data was acquired late in 2006 (LIDAR) which will be compared with a detailed topographic map made by Bradford Washburn in the 1970's. The difference in glacial volume and ice distribution will help us understand the glacier fluctuations and dynamics.

Long-term Glacier Monitoring

Long term glacier monitoring sites were installed on the Traleika and Kahiltna Glaciers in 1991 to monitor their long-term mass balance changes and flow. These glaciers were selected to compare glaciers on the north (Traleika) and south (Kahlitna) sides of the Alaska Range (dryer and wetter climates, respectively). The measuring sites for both glaciers are located at approximately 6000' (1830 m). The Kahiltna Glacier flows ~660 feet (200 meters) per year, while the Traleika Glacier moves ~165 feet (50 m) per year. The Traleika glacier has lost approximately 13 feet (4 m) of water-equivalent (if the change in ice/snow were water) in 11 years of monitoring (a negative mass balance), while the Kahiltna has gained ~7 feet (2 m) of water-equivalent. Interestingly, although the Tralieka Glacier is experiencing negative mass balance, it has thickened 82 feet (25 m) in the past 11 years (the measurement station has risen by that amount), illustrating the complexity of glacier flow.

Monitoring on the Southeast Fork of the Kahiltna Glacier began in 2004 and is being continued in 2007 and beyond. Movement rates, winter accumulation, and summer ablation rates will be determined. Magnets are also placed in outhouse holes for determination of their movement rates. Preliminary measurements indicate that the ice under the main "Base Camp" is 300-400 meters thick and is moving approximately 0.60 meters/day. The thickest measured ice in the park is in the Ruth Gorge. Near the center of the glacier the thickness based on seismic measurements is 3805

feet (1150 meters). From the summit of Mt. Dickey (9545 feet) to the bottom of the ice-filled valley is almost 9000 feet. The ice moves 3.1 feet per day (0.95 meters per day) in the center of the glacier, with much less movement near the glacier margins.

Shallow Lakes Monitoring

In 2006, the Central Alaska Inventory and Monitoring Network (CAKN) began a shallow lake monitoring program in Denali. In the three CAKN parks, there are more than 25,000 shallow lakes and ponds distributed across the landscape. Not only are shallow lake systems abundant, they are an excellent choice for monitoring changing conditions because they are more easily tracked, they are easy to sample, they have distinct boundaries (as compared to other wetland ecosystems), and they provide relatively easy opportunities for field experiments. Shallow lakes are a major wetland feature in northwestern Denali and many of them are relatively free of direct human modification. Vital signs to be monitored in shallow lake ecosystems include water quality, water quantity (e.g., are lake levels falling?), vegetation, and macroinvertebrates. These vital signs were chosen because they represent important physical, chemical and biological elements of healthy wetland ecosystems.

Seismic Monitoring

Researchers at the Geophysical Institute at the University of Alaska Fairbanks have maintained seismic monitoring stations within Denali at Wickersham Dome, Thorofare Mountain, and Mt. Healy for over thirty years. An upgrade of sites to allow for digital multi-signal transmission and the installation of a new site on Double Mountain occurred in 2003. Real-time earthquake data and maps showing recent seismic activity are available through the Alaska Earthquake Information Center. The new equipment allows for much more precise location of earthquakes, recording ground movement in all three directions.

In September 2006, a new seismometer was installed at Castle Rocks (after an Environmental Assessment identified some mitigation measures) in order to better characterize activity on the western portion of the Denali Fault and the "Kantishna Swarm" of earthquakes (a cluster near Kantishna). The Kantishna Swarm is of interest to researchers working on the geologic evolution of the Alaska Range and the apparent seismic gap that occurs between the eastern and western portion of the Alaska Range (all of Denali).

Social Sciences

Visitor-related Projects

Two ongoing projects monitor visitation to Denali National Park and Preserve. One of these projects also focuses on park use by park staff.

- **Monthly public use report:** This project documents visits to the park including Talkeetna Ranger Station, mountaineering, aircraft landings, railroad passengers, park road traffic, bus passengers, and backcountry users, for both recreational and non-recreational purposes. According to this report, recreational visitors to the park were 415,935 in 2006, compared to 403,520 in 2005 and 404,234 in 2004. However, there have been some glitches in the program that formulates the representative numbers for Denali and reexamination of the formulas and input method is forecast for some time in 2007.

- **Road traffic monitoring:** Because the road corridor is a human feature within a pristine natural area, monitoring the direct and indirect effects of park road use on the natural resources is critical. Vehicle use of the park road by both visitors and park staff is being documented. The only traffic counter maintained in 2006 to assist with the Monthly Public Use Report is the one in the entrance area across from the road to the post office. In 2006, approximately 111,425 vehicles entered the park on July 4 compared to 17 on December 25. Vehicle trips are also counted at the Savage Check Station during summer months.

Research Support

Geographic Information System

A Geographic Information System (GIS) is a computer-based database system for storing, analyzing, and displaying spatial information. Anything that can be depicted on a map can be incorporated into a GIS. The Denali National Park and Preserve GIS is used by all functions in the park for preparing maps for planning purposes, public displays, and analysis of park resources. Engineering drawings for construction, mining site rehabilitation, and design work are also produced by the 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 an unlimited 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. Efforts are on-going to make the technology and/or products more useful and available. Applications such as Google Earth have brought GIS technology to anyone with an internet connection.

One notable addition to the park's GIS dataset involves an on-going project to collect high-resolution (1 meter) satellite imagery of the park. The project was started in 2005 and to date the portion encompassing the road corridor and south to the Alaska Range has been collected. In 2005 several areas of the existing imagery were re-collected due to smoke in the earlier images. It is anticipated that the entire park will be collected as clear images become available resulting in a base map far more accurate than the existing USGS topographic quads.

The park maintains a copy of the entire NPS GIS dataset for the state of Alaska locally (over 400gb of data and over 18,000 coverages). Many additional layers of information have been added. In 2007 the dataset was kept current through updates that were conducted nightly over the internet. Major infrastructure layers were updated to reflect changes as a result of work accomplished in the summer season.

GPS (Global Positioning System) has become a valuable tool for park managers in all disciplines. As receivers have become smaller, cheaper, and more precise, the number of units in use in the park has grown dramatically. The tool has become a common addition to backpacks along with the first aid kit and map. The latest high-end handheld GPS collects positions as accurate as 8 inches. The park glaciologist uses Survey-Grade GPS to measure movements of glaciers within 0.1 meter. Biologists use GPS to document sample site and observation locations within 2 to 5 meters. The backcountry staff uses small, recreation-grade GPSs to document patrol routes,

campsite locations and for search and rescue. The Maintenance Division uses GPS to document infrastructure such as culvert locations and for laying out construction projects. In the future this tool will increasingly be useful for precisely locating park infrastructure and documenting management activities.

Research Administration

As of October 1, 2007, 765 study numbers have been assigned to scientific and scholarly studies (some continuing and some have taken place in the park over the years). Each year there are approximately 50-75 studies that are ongoing or recently completed. These projects are either conducted by Denali staff (described at length in this document) and park cooperators (e.g., U.S. Geological Survey, Biological Resources Division, and the Alaska State Department of Fish and Game), or by other investigators (e.g., from other agencies and institutions). Appropriate research gathers information while making minimal impacts to park resources. Scientific research on arctic and subarctic ecosystems has been integral to the understanding, management, and protection of resources at Denali National Park and Preserve since the early 1900's.

Any scientist wanting to conduct research must submit a study proposal and fill out an application. To expedite this process, the National Park Service developed a Research Permit and Reporting System (RPRS). Beginning in 2001, scientists file an application using the RPRS website (http://science.nature.nps.gov/research). Denali Park staff review the application and study plan for any administrative, scientific, 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. Collecting permits may be granted for limited collecting of objects, whole organisms, or parts of organisms (e.g., leaves). Some samples may be destroyed while being analyzed. Some animals may be collected and released after they have been measured or tagged.

Each researcher reports his/her results in an Investigator Annual Report (IAR). Anyone can access and read the Investigator Annual Reports for projects conducted in Denali and all national parks by going to the website http://science.nature.nps.gov/research. Beginning in 2002, each researcher at Denali is expected to include an educational component to their project, in addition to filing an IAR.

Study files about each research project are kept in fireproof file cabinets in the resources building. Reports, dissertations, and publications resulting from scientific studies become part of Denali's resources technical library. Computer databases are maintained about the research studies and the library volumes. Archived documents and collections are housed in the Denali National Park Museum or are loaned temporarily to other institutions.

Fact Sheets about Denali Research and Resources

Several color fact sheets about Denali resources and research are available now in hard copy or on the web. Fact sheets on additional topics will be developed in future years.

- Central Alaska Network: Inventory & Monitoring Program
- Climate Change
- Dinosaur Track Found in Denali
- An Integrated Study of Park Road Capacity – Spring/Summer 2006, Summer 2007 (two sheets)

- Large Mammals…How many are there? [2007 Update]
- Permafrost Landscapes
- Resource Stewardship Strategy
- Rivers and Streams (4-pages)
- Soil Survey and Ecological Classification
- Soundscapes
- Moose Surveys
- Wildland Risk and Response: Why are you cutting those trees?

Subsistence

Staff Changes

Amy Craver, formerly of U.S. Fish and Wildlife Service (FWS) / Office of Subsistence Management in Anchorage, began her Subsistence Manager position at Denali on February 5, 2007. Amy grew up in Talkeetna, where her family has long been engaged in homesteading and a subsistence lifestyle. She holds degrees in anthropology (BA from Evergreen State College, MA from Indiana University) and is currently completing her Ph.D. dissertation. Amy worked as a social scientist at FWS and as a liaison regarding subsistence harvest with other federal and state bureaus and native organizations. As Denali's Subsistence Manager, Amy's communication skills, knowledge of subsistence in Alaska and background in social science research will be a significant enhancement to Denali's subsistence program. In addition, her work throughout the state will aid her contributions to the regional subsistence team.

Traditional Subsistence Access Review for the Cantwell Area

On September 18, 2007, National Park Service (NPS) Alaska Regional Director Marcia Blaszak signed a Finding of No Significant Impact (FONSI) for the selected action that was evaluated in the "Denali National Park and Preserve Cantwell Subsistence Off-Road Vehicle Management Environmental Assessment."

In July 2005, the NPS published the final "Cantwell Subsistence Traditionally Employed Off-Road Vehicle Determination" which opened the entire 32,159 acre Cantwell traditional off-road vehicle (ORV) use area (TUA) to the use of ORVs for subsistence purposes by NPS qualified subsistence users. With input from the State of Alaska, the Denali Subsistence Resources Commission, and other members of the public, the NPS developed four alternatives to manage subsistence related ORV use in the Cantwell TUA.

The selected action (a modified Alternative 3) allows the Cantwell TUA to remain open to use of ORVs by NPS qualified subsistence users for all subsistence purposes on specified NPS-managed trails and routes. The analysis of the selected alternative suggests that moose harvest levels in the Cantwell TUA will remain the same or increase slightly above current levels.

Traditional Moosehide Boat Project

With support from the Murie Science Learning Center, Alaska Natural History Association, Denali Borough School District, and the Cantwell Village Council, the National Park Service is coordinating the construction of a traditional moosehide boat with Nick and Verdrisia Dennis.

Moose Harvest in GMU 16B

Again in 2007, ADF&G closed the general moose hunting season in GMU 16B, in which the upper Yentna River area of Denali National Preserve is located. This was done because of declining moose populations in the area. The only moose hunting allowed in GMU 16B under state regulations was a Tier II subsistence hunt, limited to 100 permits in the TM565 hunt area that adjoins the Preserve (down from 120 permits in 2006). Many local, rural residents who are eligible to hunt in the Preserve under federal subsistence regulations do not get Tier II permits, so their only option for moose hunting is within the Preserve. Because this subsistence hunt is the only way that many local residents can legally hunt for moose, NPS was concerned that a greater than usual number of people would enter the Preserve to hunt. A complete survey of the Preserve in late November 2005 found only 44 moose in the area (11 of which were harvestable bulls), so even a modest increase in hunting success could significantly affect the Preserve's moose numbers. By contrast, previous moose surveys in the area between 1984 and 1996 had indicated a population of about 200 moose in the Preserve.

At present, local rural residents in GMU 16B can hunt for moose for subsistence use without obtaining any permit, other than a state hunting license and harvest tag. For hunts where federal registration permits are required for subsistence harvest, there are strict reporting requirements that deny permits in subsequent years to hunters who do not report their hunting effort and success promptly. This greatly facilitates the gathering of quality harvest data where registration permits are required (as they are in the Cantwell area). In the Preserve area, the NPS does not know the levels of harvest from the moose population. To alleviate concerns about over-harvest, NPS is submitting a proposal to reinstate a Federal subsistence permit hunt in GMU 16B. A permit system would help to ensure that only qualified residents are allowed subsistence hunting privileges, and to ensure that subsistence harvest took precedence over sport or Tier II harvest if it became necessary to restrict moose harvest in the preserve.

MAINTENANCE DIVISION

Staff and Budget

Juan Gomez from Big South Fork River and Recreation Area was hired to fill the B/U Foreman vacancy created when George Keers retired, and Denise Taylor was hired to fill a vacant Administrative Support Assistant position. Other vacancies were also filled, including Arnie Porter as a maintenance mechanic and a B/U Seasonal laborer. Chief of Maintenance Dutch Scholten directed the implementation of the new water system start up and designed strategies for the next year's operations. George Keers hired Nathan McCombs, who is the lead operator. Dutch served as the Alaska Region representative for the Service-wide Maintenance Advisory Committee, and represented Denali National Park and Preserve maintenance needs at the annual MAG meeting.

Annual fiscal spending plans were developed for the ninety-five accounts totaling $9 million dollars for the division.

The ongoing bio-diesel testing program was concluded, and staff successfully removed the remaining 7,000 gallons of oxidized fuel which will be used as boiler fuel at Chena Hot Springs.

Facility Management

Nancy Pearson, the park's Facility Management Specialist, coordinated Park Asset Management Plan (PAMP) Meetings and performed many hours of QA/QC (Quality Assurance /Quality Control) of FMSS data in preparation for the PAMP. The final data clean-up is ongoing. All of the FY07 implementation of FMSS and Asset Management Reform goals were achieved by September 1, 2007.

Engineering and Special Projects

The park's architect, Mary Tidlow, under the direction of the park's lead engineer, Joe Durrenberger, continued as the park coordinator for the line item replacement of the Eielson Visitor Center, a $9 million visitor center in the heart of the park. Her duties included reviewing the hydroelectric installation and building design and the LEED documentation as it pertained to architecture. The building will open in June 2008. The LEED certification process is underway, with the goal of a Platinum rating, the highest ever achieved in the Service.

Mary also prepared and executed the architectural design drawings for the Rock House and did preliminary architectural designs for the rehab of Building 22 as part of the ongoing rehabilitation of the park historic and non-historic buildings. The work on the Ranger Cache was completed, and the Rock House residence is scheduled to be done in spring 2008.

Staff coordinated the Cultural Landscape Report for the Headquarters District, and assisted in completing the Environmental Assessment and Fonsi for the Headquarters Area Plan, a master plan specific to the headquarters area that tiers off the 1996 Entrance Area Development Concept Plan.

Another successful year was completed with the School to Work program. This year the cabins' design was modified so that they would be ADA accessible. A handicapped accessible pad detail was also designed. A student engineer program was developed with the Tri-Valley High School.

Repair/Rehab Work

The removal and replacement of the auto shop roof was completed with minimal disruption of auto shop operations. The fleet services crew coordinated their work schedules with the contractor, cleared service bays as needed, and meet their needs for access to the shop. The work had to be modified in order to correct weld deficiencies that created a safety issue with the auto shop overhead crane. This project required WASO approval as the project was over $500,000. The new roof great improved the insulation and heat efficiency of the building.

Work continues to remove and clean up old underground storage tanks, and excavate and remediate contaminated soils associated with the tanks.

Work continues on plans for the Emergency Services Building. New site alternatives had to be developed when the preferred site was found to have unsuitable soils. Interagency Agreements with Federal Highways to conduct geotechnical investigation for new site were written in order to ensure it was an acceptable site. These IAA's enabled the park to make the decision on the site in a timely fashion and saved the government approximately $30,000 by using FHWA instead of a private company.

Planning for the Front Country Wastewater Treatment Project (replacement of the current lagoon) is underway. The project coordinator wrote the scope of work for schematic design, including defining the range of alternatives to include low tech, low energy alternatives to a higher tech, higher energy package wastewater treatment plant alternative. She also worked with FHWA to conduct additional soils investigation to determine which discharge alternatives would be feasible before completing the scope of services for the schematic design. The Government saved approximately $20,000 by using FHWA instead a private firm. The environmental assessment will go out for public comment in 2008, and the project is funded for construction in 2010.

Environmental Management Program

The engineering evaluation/cost analysis for the Banjo and Stampede Mines was completed. Park management decided not to pursue using these sites as visitor use destinations due to the high levels of contamination present.

Another round of RegenOX was applied to the remaining contaminated sites of Moose, Taybo, and Bueno. The sites were re-sampled to determine effectiveness and almost all were at ADEC cleanup levels after the second application of the REgenOX.

West District B&U

West District B&U provided support for the Artists-in-Residence and visiting dignitaries using the East Fork Cabin. They worked with Roads & Trails to build a gravel pad by the

existing garbage dumpster at Toklat in order to set up the recycling trailer next to the dumpster. This consolidated the solid waste collection sites and made it more convenient for dropping off recyclables. They also provided support for the Military Appreciation Day in mid-September. Additional projects completed include the following:

Stabilize Unsafe Walking Surfaces at Polychrome Rest Stop
This FLREA project was funded for $34,900 to level the deck and replace hand railings, decking and steps as needed at Polychrome Rest stop. The project was started in early May. Besides leveling the deck, the front steps, hand railings and guard railing top plates were replaced. In addition, the entire facility was painted. Other than the deck, this facility had not been painted since it was built in the late 1980's.

Replace Operational Obsolete Single Wall Fuel Storage & Dispensing System at Wonder Lake
This Environmental Management Project was funded for $99,700 to replace the operational obsolete gravity fed single wall fuel dispensing tanks at DollyMolly Ville and install a Fuel Master fuel monitoring system for tracking fuel use.

Several sites were considered for the new fuel system including the existing site at DollyMolly Ville, Friday Creek Camp and the "loop road" adjacent to the Kantishna Airstrip. The gravel parking area next to the Kantishna Airstrip Park AV gas tank was selected as the new site for the Wonder Lake fuel dispensing system. An existing parking area was expanded to accommodate the fueling system and also still provide parking space for five-six vehicles. The installation of the 2,000 gallon unleaded and 3,000 gallon diesel fuel tanks, tank mounted fuel transfer pumps, fuel dispensers and associated tank components was 95% completed by September 1. This system includes a solar-powered fuel dispensing system to prevent spills and improve efficiency. The vendor supplying the Fuel Master system could not provide the system components and arrange to install them before October 1, after the West District was closed for the season. That work will have to be completed next June.

An add-on to the original project included moving the Park AV gas tank 100' from the airstrip to the bench above the airstrip next to the new vehicle fuel dispensing tanks. This was done to get the tank out of an overflow ice area that inundated the tank during the 2006 – 2007 winter seasons.

The existing method of fueling aircraft involves using a hand pump located at the tank to pump fuel to the aircraft located 75' – 100' away. In 2008 we will install an electric pump that will allow pilots to be at the aircraft holding the dispensing nozzle during fueling making it much safer and easier to fuel aircraft.

Upgrade Toklat Rest Area – This CFF project was funded for $59,300 in FY06 to resolve the Contact Station weather port condensation problem, install a solar powered lighting system for the Toklat restrooms and build a boardwalk and guard railings along the Toklat River at the Toklat River Rest Area. The condensation issues and solar powered lighting system have been installed, but the boardwalk and other improvements have

been postponed. High ventilation fans were installed in the weather port in FY06 that reduced condensation to manageable levels but did not totally eliminate interior condensation. Remaining work, including the installation of solar panels, lighting controls and interior and exterior lights was completed in FY07.

Recycling

The West District recycling effort continues to be expanded, and an additional 750 pounds of cardboard, paper, aluminum cans, plastic bottles and glass were recycled.

Roads

The road design standards were finalized. These will be used in the repair of all future road projects. A major rainstorm on July 9 produced mudslides at Mile 50, 50.5 and 52. A total of 2388 cubic yards of mud and material were cleared from the slides and transported to Toklat.

Approximately 150 linear feet of sheet pile at the Toklat Rest Stop collapsed due to by heavy rains and flooding during the week of August 5. Crews excavated adjacent material, re-stood the sheet pile, attached tiebacks and dead men, and then hauled and placed 1092 cubic yards of drain rock fill at the site. The heavy flooding also required the repair of the river access ramps at the rest stop.

The crews plowed snow three of the four road lottery days and provided operational support for the lottery and the military appreciation day.

A total of twenty critical failing culverts in Kantishna, Wonder Lake area and near Mile 57 mile were replaced, including:

- three large culverts in the major drainages at Mile 50 and 50.5, including the construction of bypass roads the installation of bypass culverts.
- Nine culverts on the Wonder Lake section of road
- eight culverts on Kantishna section of road.

An additional twenty-eight culverts were replaced on the gravel section of the road east of Sable Pass. Work included excavation, processing and hauling bedding gravels, road surfacing gravels and application of dust suppressant at each replacement site. The East District crew worked a one week night shift in the West District replacing culverts on the west side of Sable Pass.

The East District crew processed, hauled and spread 228 cubic yards of road surfacing gravels on the Teklanika River Campground access roads and all camp sites. The gravel provided enhanced site drainage, and improved visitor access to all sites and comfort stations. The work also included brushing of all camp sites and local trails.

The staff is replacing road and information signs so that they met the NPS UniGuide sign standards. One project replaced the “Denali Park Road” signs along the Parks highway, including new” NO HUNTING” signs, per Alaska DOT breakaway standards. The trails

staff met with numerous park staff during the development of 230 trails-related signs and developed a template for trailhead information panels to meet these new standards.

A major project in the Igloo Canyon was completed, repairing sub-grade failures, replacing all worn undersized and failing culverts and resurfacing three miles of park road. Two failing undersized culverts at Hogan Creek were replaced with one arch box culvert, which greatly improved winter ice flow under the road and providing previously non-existent passage for fish.

The group assisted with the effort to remove old ATCO trailers from the park. The green trailer (former hotel water filtering trailer) was re-locat4ed from the water intake site to bottom of hill for surplus.

In preparation for the 2008 FHWA road re-alignment project at Mile 4 and 4.5, crews removed all usable nesting vegetation. They later hauled 44 ½ cords of firewood to Healy, McKinley Village and Cantwell community centers from this project. Staff is coordinating with the FHWA survey crew by providing permits, maps, and needed survey supplies. This project to re-locate the road is being undertaken as the continually slipping hillside at that location is a year-round maintenance issue. project and Sanctuary Hill projects.

Fleet Services

This working group accomplished 418 scheduled vehicle repairs during 2007. In June a STF position was vacated by Jeff Wysong. An emergency hire was secured to cover the immediate work need. The group did well on the OSHA shop inspections, with only some repeat findings. The fleet services group purchased and tracked inventories on 49,700 gallons of unleaded, and 49,250 gallons of diesel fuels.

They finalized the purchase of a new 4 cubic yard loader to replace a 22 year old Cat 966C, using ERF funding at a combined two-year amount of $213,000. Delivery is anticipated in September 2007. They also finalized the purchase and took delivery of a new 26,000 GVWR flatbed truck equipped with a Stellar Hooklift system. This new truck cab-chassis system is the first primary platform for several fleet efficiencies in the future; allowing us to exchange entire trucks for hooklift equipped truck bodies, taking advantage of the new truck's roll-on / roll-off capabilities to exchange them.

Recycling and sustainable practices is an integral part of the fleet services group's function. In 2007 the park used 110 gallons of bio-based oils, ten recapped commercial tires, and recycled 8,500 pounds of scrap steel. They also lawfully disposed of 272 pounds of hazardous waste, and identified and handled potentially hazardous materials, diverting 2,050 pounds into non-hazardous disposal avenues.

The park received nation-wide recognition for environmental stewardship in GSA's Quarterly Newsletter regarding the use of hybrid vehicles in an arctic environment.

The division participated in a nation-wide NPS fleet work group, as one of two individuals representing park level fleet expertise, in order to help develop the FMSS fleet module. The roll-out for the active module in FMSS is planned for January 2008 for the "big 14" parks. Denali will begin using this completed module at that time.

Bill Friesen, the Auto Shop Foreman, was nominated by the Regional Fleet Manager to join and participate in the nation-wide NPS Fleet Investment Review Board.

Trails

The 2007 Trails crew consisted of one permanent, two term, eighteen seasonal, three YCC, 36 youth and twenty volunteer workers. For nine weeks there were 51 trail workers working daily. During their season they restored over 8,000 square feet of impacted landscape by replanting salvaged tundra mats and seeding, constructed 9,000 feet of trail during the Triple Lakes Trail Reconstruction, completed the footbridge crossing Hines Creek, and did a trail reroute and trail reconstruction above the Polychrome Rest Area involving almost 3,000 feet of trail. The Triple Lakes Trail is a high priority project, as it will provide a link between headquarters and the trailhead on the Nenana River. The work is approximately 60% complete.

The crew helped support other divisions by providing staff for search efforts for missing and injured hikers in Denali and Wrangell-St. Elias and for fire crews responding to fires outside of Alaska.

PLANNING DIVISION

Planning Division projects during 2007 included implementing the 2006 *Backcountry Management Plan* and the 2006 *South Denali Implementation Plan*, completing the *Cantwell Subsistence Off-Road Vehicle Management Environmental Assessment* and the *Park Headquarters Area Plan*, and continued work on the transportation plan for the park entrance area. Planning Division staff finalized the consolidated general management plan, worked with the State of Alaska, local communities and the public on Scenic Byway planning, and completed environmental compliance for various projects throughout the park. The division also assisted other work teams in the park with a variety of planning projects.

Backcountry Management Plan Implementation

The Planning Division completed the *Final Backcountry Management Plan and General Management Plan Amendment* in 2006 and began implementation in 2007. Planning staff worked with the Office of the Solicitor and NPS staff in Washington, DC to establish the Aircraft Overflights Advisory Council, a Federal Advisory Committee Act chartered group, to provide advice and recommendations on mitigation of impacts from aircraft overflights at Denali National Park and Preserve. Staff recommended membership from a broad range of interests, including air taxi operators, commercial aviation, local landowners, State of Alaska, Federal Aviation Administration, climbers and other park users, and the environmental community. All of the park's nominees were approved by the Secretary of the Interior.

Planners obtained funding to implement the first round of visitor experience and resource condition monitoring required by the backcountry management plan, with work expected to begin early in fiscal year 2008.

South Denali Implementation

Implementation of the South Denali plan continued in partnership with the Matanuska-Susitna Borough and State of Alaska. Complimentary agency projects and a variety of non-federal fund sources were used to provide tangible improvements to trail heads, parking areas, and trail systems that were approved in the 2006 *Record of Decision*. Significant progress was made to obtain a dedicated trail easement for the Chulitna Bluff and Rabiduex trail system.

Funding was secured and work began on the *Denali State Park Master Interpretive Plan*, which will guide design of visitor facilities and provide a template for interpretive and educational programs in the state park and the South Denali region.

Cantwell Subsistence Off-Road Vehicle Management

The planning division played a major role in completing the *Cantwell Subsistence Off-Road Vehicle Management Environmental Assessment* (EA). Planners evaluated four alternatives to assure subsistence ORV use in the Traditional Use Area is proactively managed to minimize adverse impacts to the resources and values for which the park was established while also providing reasonable access for subsistence purposes. Along with

the 2005 Determination, this action amends the *General Management Plan* for Denali. The EA was published in May 2007 and a FONSI was signed in September 2007.

General Management Plan Consolidation

The division compiled a consolidated *General Management Plan* (GMP), which contains the complete GMP guidance for Denali drawn from the 1986 *General Management Plan*, 1997 *Entrance Area and Road Corridor Development Concept Plan*, 1997 *South Side Denali Development Concept Plan*, and the 2006 *Backcountry Management Plan*. Land ownership data referenced in the Land Protection Plan were updated. The document is intended to be an easy-to-use reference for park managers and interested members of the public. The document is substantively complete, with printing scheduled for early in fiscal year 2008.

North Access Proposals and Wolf Townships

The planning division continued to track and respond to proposals related to a new northern access route to Denali and land use in the Wolf Townships. Specifically, the division coordinated responses to information requests, attended meetings, and articulated the park's position regarding the state's Stampede Road extension project, and separately the legislative proposal for establishing a Stampede State Recreation Area. The state Department of Transportation and Public Facilities halted the road extension project this year. The proposal for the recreation area was introduced to both the state House and Senate late in the state legislative session but was not heard in committee in either house. It is expected to be reintroduced in the 2008 legislative session.

Compliance Program Management

In addition to the Cantwell ORV EA, an EA and Finding of No Significant Impact (FONSI) was completed for the Rehabilitation of Mile 4.0 and Mile 4.5 of the Park Road. An EA for the Installation of Two Plate Boundary Observatory Sites in Denali National Park has been through public review and a FONSI is being prepared. An EA for a new Park Headquarters Area Plan was completed and distributed for public review. Reviews at the environmental assessment level were continuing for: Replacement of Five Cabins for Subsistence Uses; Gravel Extraction at Kantishna; Improve Safety Between 80-84 Mile of the Park Road; Increase Gravel Extraction at the Mile 70 Pit; Temporary Telecommunications Installations in Wilderness; New Structures in the Concessioner Land Assignment; Kantishna Area Trails; a New Talkeetna Ranger Station Parking Lot; and Improve Wastewater Treatment Facilities in the Park Entrance Area.

Thirty-six projects were tracked at the categorical exclusion level of National Environmental Policy Act compliance, including projects dealing with park road rehabilitation; historic structure rehabilitation; MSLC field activities; permafrost, glaciation, global warming, earthquake and climate research; stream invertebrates and beaver research; moose, caribou and wood frog research; eagle and passerine research; dinosaur and paleo-environment research; moss inventories; reclamation; Met Stations on Mount McKinley; physiology of climbers; trail rehabilitation; drilling

for project geophysical data; SST installations; Off Road Vehicle (ORV) use closures; contaminated soil removal and remediation; and hazardous drum removal.

Denali used the Planning and Environment Public Comment (PEPC) system for public comments on environmental assessments as well as for internal use to describe and evaluate cat ex level projects.

Parks Byway Community Partnership

Planning staff participated in the initial stages of a scenic byway program that will plan for the visitor experience along the Parks Highway from MP 131 – MP 247. This planning effort led by the State of Alaska will include two boroughs, state and national park lands, and multiple communities that are connected by a ribbon of road and a desire to offer a quality visitor experience while highlighting and conserving community values.

Community Transportation Planning

Following up on the recommendations from the Needs Assessment and Feasibility Study for a Community Transportation System, park planners collaborated with the Denali Borough and the Greater Healy/Denali Chamber of Commerce to begin implementation of the system. NPS staff wrote a technical assistance application to the Community Transportation Association of America asking for help in creating a local transit organization and a business plan. The application was submitted by the Chamber of Commerce with support from the Borough, the assistance was awarded, and park planners and collaborators hosted a fact-finding trip by CTAA field staff in August. Follow-up work sessions are tentatively scheduled for October and November 2007.

Environmental Management System

The planning division provided the lead coordination role for the park's Environmental Management System for the 2007 fiscal year. The EMS committee led the chemical inventory process for the park, established a detailed monitoring framework for NPS traffic on the park road, provided guidance for the park's Centennial Challenge strategic plan, and described environmental goals, objectives, and targets for the next three years.

Navigability

Planning staff met with BLM, U.S. Fish and Wildlife Service, and State officials during 2007 about State navigability assertions on five park waters: Birch Creek and the Kantishna, Muddy and Bearpaw Rivers and Deep Creek. The Recordable Disclaimer of Interest process was used. Staff collected evidence, including sequences of air photography, old newspaper stories, and diary entries, from agency and first-person sources, related to historical use and the susceptibility of commercial use on these rivers and shared that evidence with BLM and the State. The State filed final documents during the summer and park staff responded that the State lacked evidence for any of the asserted interconnected sloughs along the Kantishna River. The investigation and process continues, but the State has apparently dropped its assertion of Bearpaw River navigability upstream of Diamond based in part on evidence presented by planning staff.

Other Planning Projects

The planning division assisted the research and resource management division in producing a Resource Stewardship Strategy for Denali. The division provided the initial sections of the document describing the park's purpose and significance, identifying the fundamental and other resources and values of the park, and identifying desired conditions for those resources and values by management zone. The division also led the development of the social science components of the plan and facilitated several meetings with both the general public as well as with independent researchers who work in the park.

Planning staff began internal scoping work for an Environmental Impact Statement on traffic capacity on the park road that is expected to be announced in the Federal Register in early 2008. Initial work focused on defining the project and obtaining funding for the next two years.

As part of several projects, the Planning Division compiled a database of visitor statistics from a variety of sources which will provide a useful reference for internal use.

Planning staff provided content oversight of the Visitor Survey Project draft and final reports, helping to assure that report data were presented in meaningful ways. Planners also provided critiques of the draft Denali Education Plan to insure its consistency in actions and themes with general management plan documents.

Staff provided wetlands maps used in the Mile 4 FHWA project and the Headquarters Master Plan.

Planning staff spent time reviewing and making suggestions for improvements to the Phase III Alaska Region regulations package and to Volume II of the draft official Administrative History of Denali National Park and Preserve.

The division continued throughout 2007 to be a part of the Alaska Region team putting together the ANILCA Section 1110(b) Access Guide. Staff worked to make clear in the document what the agency authorities are and what the process is for evaluating Right-of-Way requests. Staff worked to categorize and respond to the public comment through the PEPC system, and worked to set up a Wetlands Bank to be used for 1110(b) project compensation.

Planning staff worked throughout 2007 to incorporate the Park Road Design Guidelines into planning for Federal Highways Administration (FHWA) design for projects at Mile 4, Mile 4.5, Mile 52, and Mile 80-84. This plan provides a quantitative representation of the qualitative road management concepts given to the public in the 1986 *General Management Plan* and 1997 *Entrance Area and Road Corridor Development Concept Plan* so that FHWA design engineers, park staff, and the public are clear on the types of modifications and improvements that would continue or enhance the rustic character of the park road versus those actions or proposals that would adversely affect park road character.

Staff tracked legislation introduced in Congress in 2007 to authorize a land exchange between the Alaska Railroad and the park for the purpose of constructing a turnaround 'Y' on park lands. This authorization was expected to result in an environmental assessment for public evaluation of the site selected and would include an addition of acreage to the Denali Wilderness.

Planning staff worked with the Eielson Visitor Center (EVC) architects and engineers and consultants to minimize the impacts from the proposed hydro plant that would supply electrical power for the EVC. Staff discussed the project with the Corps of Engineers and applied for and received the necessary 404 permit.

Planning staff conducted field work on the 17b (public access) easement that the National Park Service is responsible for managing across AHTNA Native Corporation lands west of Cantwell. Staff provided updated information to park management for continuing discussions with AHTNA and BLM.

The division updated and expanded the planning section of the park website to create a user-friendly resource through which the public can access all of the park's active plans, environmental documents, and studies.

Staff assisted with multiple congressional staff and Department of Interior officials site visits to Denali. Staff coordinated VIP visits to project sites, assisted with special events such as Military Appreciation Day, and offered expertise in coordinating a combined agency/community training session on Green Infrastructure.

RESOURCE AND VISITOR PROTECTION

The division took the lead in developing and writing a Backcountry Operations Guide, Off-Road Vehicle Standard Operating Procedure, and Job Hazard Analysis. Preparation of these three critical safety plans were mandated by WASO following fatalities in other NPS units.

The growth and evolution of the Denali CommCenter as a regional dispatch office continued. A third permanent full-time position was added under a 4-year Term appointment. The NPS, including Denali, signed onto a State-wide agreement under which the park can utilize the new State-wide radio system – the Alaska Land Mobile Radio (ALMR) system. Equipment needed to bring the system online was purchased for the CommCenter. When activated, direct radio communication with the CommCenter will be available to NPS users across the Alaska who are on or near the road system. Flight following services provided to other units in the state using Automated Flight Following technology nearly doubled from the previous year.

Wreckage from the 2006 fatal crash of a DeHavilland Beaver Mystic Pass was removed by a private company under a Special Use Permit.

South District

Administration

There were a number of significant organizational changes to the south district staff this year. As a result of a work-related shoulder injury, long time Lead Mountaineering Ranger Roger Robinson was moved into a six-month non-supervisory PSTF position and removed from law enforcement duties. Recruitment for a new lead ranger will take place early in FY 08. PSTF mountaineering ranger Gordy Kito transferred; this position will be lapsed indefinitely and replaced by a 5th seasonal mountaineering ranger position. Mountaineering staff going forward will consist of a GS-12 district ranger, GS-11 lead position, three PSTF and five seasonal mountaineering rangers.

The duties of the Lead VUA position was restructured and changed into a Supervisory VUA position reporting directly to the South District Ranger; this eliminated a layer of supervision and aligned grade with duties. Missy Smothers, the Lead VUA, completed an interdivisional, six week detail to the Denali Visitor Center and served as Planning Section Chief on the annual Road Lottery event. The seasonal VUA staff was restructured. Instead of hiring two full-time seasonal positions, three part time positions were filled. This improved visitor service and employee satisfaction with only a negligible increase in personnel costs.

Visitation to the Talkeetna Ranger Station increased by 9% over the previous year to 29,902.

Law Enforcement

Illegal commercial activities were the primary focus of south district law enforcement efforts. Illegal guiding, principally by foreign guide services, remains a large problem. A number of advertised guided trips to McKinley were identified by ranger personnel during the winter months before the climbing season, principally through multiple hours of searching for such

operations on the internet. As a result of the investigations, the park denied climbing permits (registrations) to over one hundred different climbers who were being sold illegal services. A German group, known to be guiding illegally, was allowed to actually fly into base camp, where rangers contacted them and turned around their expedition. Two German-speaking rangers from other parks were brought in to assist on this sting operation. Advance briefings to the US Attorney's Office gained their support for such operations and authorizations to prosecute.

A local Talkeetna pilot, employed by an air taxi operator, was known to be conducting illegal glacier landing flight instruction in the park. This individual was warned by letter in 2005 to cease such activities, but did not. An undercover operation, approved by the US Attorney's Office, was initiated. A ranger/pilot from Gates of the Arctic National Park and Preserve was engaged to sign up for one of the classes. The ranger paid for the class and then attended the three day instructional session, which included multiple landings on glaciers within the park. Park staff subsequently sought and received a search warrant for the suspect's residence in Talkeetna. An NPS special agent with technical expertise in seizing computer evidence was brought in from Denver to assist with the warrant execution. Prosecution is pending.

Search and Rescue (SAR)
Seventeen major search and rescue operations were conducted by district staff during the year. Three incidents resulted in visitor fatalities; five visitors died climbing in the range in 2007.

Mt. Wake - Kellogg
On April 23, a two-person team was climbing the Northeast Ridge of Mt. Wake (9,100 feet) in the Ruth Gorge of Denali National Park and Preserve. The pair turned around in the afternoon and began to descend the same route. While on rappel, one of the climbers came off the end of the rope and fatally fell over 1,300 feet. The partner descended the rest of the route and sought help from another climbing party in the Ruth Gorge that had a satellite phone. The NPS was notified later that evening. The victim's body was recovered by fixed wing aircraft on the 24th and flown to Talkeetna.

CCAO1
On May 6, the basecamp manager reported to the NPS staff that a climber had taken a crevasse fall at the bottom of Heartbreak Hill (7,000 ft.) and needed assistance. Three rangers were dispatched down glacier to the reported location and found one injured climber who had already been extracted from the crevasse. Injuries included a possible fractured upper and lower left arm, pain in right ankle, as well as possible broken ribs. Rangers stabilized the injured patient and escorted the climbers back to Basecamp.

Cascade Climbers
Two members of a climbing team departed from the 14,200-foot camp in the morning of May 16 for a summit attempt via the Upper Rib route, with a planned descent via the West Buttress. On May 17 the two were observed by several guides as well as a ranger patrol at the 17,200-foot high camp to be traversing along the top of the Messner Couloir, which is not a route normally taken, to a point high above the trail leading to Denali Pass.

The team was spotted traversing at an elevation of approximately 18,900-feet, but shortly thereafter the team had fallen down the slope, stopping at the 17,000 foot level. A hasty team was dispatched to the site and discovered one climber deceased, while the other was alive but critically injured. The injured climber was treated for immediate life-threatening injuries and transported to the ranger tent at 17,200-feet. Inclement weather prevented any helicopter extraction, and the patient's injuries ruled out a technical lowering to the 14,200-foot camp. The climber was treated throughout the night but ultimately succumbed to injuries and died the morning of May 18. Both victims were air-lifted from the 17,200-foot camp via the Lama helicopter on May 19.

Mount Barrille

Two climbers were killed in a fall caused by an avalanche while attempting the Japanese Couloir route on Mount Barrille in the Alaska Range. The accident was not witnessed, but likely occurred sometime on the evening of May 16 or the morning of May 17. The remains of the two climbers were spotted on May 19 in wet avalanche debris at the base of Mt. Barrille by rangers aboard the Lama helicopter; later than evening, the bodies were recovered and flown back to Talkeetna.

TIA

On May 22, a client on a guided expedition contacted NPS staff at the 14,200-foot camp exhibiting signs and symptoms of a possible Transient Ischemic Attack (TIA). The climber received medical care until weather permitted an evacuation by the NPS Lama helicopter.

Santis

An unresponsive member of an independent expedition was brought to the 14,200-foot NPS camp for evaluation on May 25. Ranger and volunteer staff determined that the sick climber was suffering from severe High Altitude Pulmonary Edema (HAPE) and High Altitude Cerebral Edema (HACE). The individual was treated and quickly evacuated from the 14,200-foot camp by the NPS contract Lama helicopter.

B&V

On May 25, a member of a two-person climbing team fell into a crevasse at the 7,500-foot level of the Kahiltna Glacier. The fall was held by a combination of his companion, rope drag, and a snow bridge approximately 60 feet down in the crevasse. The climber on top of the glacier secured the rope and after determining that the fallen partner was relatively uninjured, dragged out the partner's sled and pack. The climber in the crevasse was unable to extricate himself, nor could the partner haul him out on his own. The team used their satellite phone to request assistance. A team of three (one ranger and twp VIP's) was transported to the scene by the Lama helicopter and extricated the climber from the crevasse. Both team members were then flown to basecamp where it was determined that the fallen climber be flown down to Talkeetna to receive further medical attention for some cuts received about his head and face when his sled hit him.

Fred the Knee

On May 30, a guided client injured his knee while descending below the fixed lines after doing a carry to 16,200 feet on the West Buttress of Denali. The following day, the client was assessed by a VIP ranger physician at the 14,200-foot camp. The determination was made to evacuate the injured climber from 14,200 feet to the 7,200-foot basecamp via the Lama helicopter where he was released. He then returned to Talkeetna via his air service to seek medical follow-up at home.

Snow-blind

Led by his partner, a climber sought ranger assistance at the medical tent at 14,200-feet as he was completely blind in both eyes due to snow blindness. The snow blindness took longer than normal to heal up due to the severity of the injury, and ranger and medical staff at the camp decided it safer to evacuate the climber than risk an accident on the descent due to impaired vision. However, due to the prolonged period of bad weather, he eventually healed up enough to descend safely with his partner.

Kidney Stone

The NPS was notified of a climber at the 7,800 foot camp unable to walk because of severe abdominal pain on June 6. Staff on scene diagnosed the climber's illness as a probable kidney stone. The patient remained non-ambulatory following treatment and was air-evacuated from the mountain by the Lama helicopter.

Jake the Lung

On June 6, a guided client presented to the 14,200-foot camp complaining of difficulty breathing and was subsequently diagnosed with high altitude pulmonary edema. Ranger and medical volunteers at the camp treated the climber with oxygen and albuterol, though the patient's condition did not significantly improve. An air evacuation took place at the earliest opportunity, which due to weather considerations was not until the morning of the June 8.

Ski Patrol

A climber reported to NPS staff at the 14,200 foot camp on June 13 that they had injured their knee while alpine skiing above camp. After two days of rest, the patient was unable to bear weight on the injury. On June 17, the patient was air evacuated from the mountain via the Lama helicopter.

AAI-Lederer

A guided client presented to the 14,200-foot medical tent with unexplained Brady-cardial episodes and accompanying shortness of breath. These continued even at rest and on oxygen. Patrol medics in consultation with the park's sponsoring physician recommended that the patient not descend under their own power and instead be flown off. The evacuation occurred two days later owing to poor flying weather.

AMS-Arnette

On June 27, a guide was escorting a client down to the 14,200-foot camp from the 17,200-foot high camp. In the vicinity of Washburn's Thumb (app. 16,900'), the client

experienced a sudden onset of abdominal pain followed by a period of vomiting and bowel movements. The guide contacted the 14,200-foot ranger camp via radio to inform them what was occurring, but stated that they did not require any assistance at the time. Radio contact was maintained throughout the day and the guide and client ultimately arrived into the camp that evening without assistance. After a physical examination and consultation with the park's sponsoring physician at Alaska Regional Hospital, it was determined that the client had a possible bowel obstruction. The climber was emergency evacuated via the Lama helicopter to Talkeetna, and ground transported to the Mat-Su Regional Hospital for definitive medical care.

TZT Knee
On June 28, a climber experienced a small fall while descending the fixed lines of the West Buttress. The climber's right knee was injured during the fall and subsequently was unable to support any weight. The team requested National Park Service assistance to descend to the camp at 14,200 feet. Two rangers and a patrol volunteer evacuated the injured party to the ranger camp by rescue litter. The next morning, the patient was flown out by Lama helicopter to the 7,200-foot basecamp and transferred to a fixed wing aircraft to Talkeetna.

MT- Staheli
On June 29, a client on a guided expedition collapsed below Denali Pass at the 18,000-foot level of Mount McKinley. The patient was treated on the spot for HACE symptoms and short-roped down to the 17,200-foot camp for further medical evaluation by ranger staff. Upon improvement, it was determined that the patient could descend under their own power with short-rope assistance. The patient was advised to descend immediately and to be re-evaluated ranger and volunteer medical staff at the 14,200-foot camp. Showing no additional signs or symptoms besides the event, the client descended with their guide to 7,200-foot base camp and flew out by fixed wing aircraft to Talkeetna.

Kobayashi
A climber incapacitated by snow blindness and pulmonary edema was evacuated from the West Buttress high camp to the 14,200-foot ranger camp via a roped lowering operation on June 30. Two days later the weather allowed for the Lama helicopter to evacuate the sick climber to Talkeetna, where the patient was transferred to a fixed wing air ambulance for further hospital care.

RMI Douthitt
Also on June 30, a client exhibited seizures on the first day of a guided West Buttress expedition. Later that evening, the climber was airlifted from the 7,100-foot level of the Kahiltna Glacier by an Air National Guard helicopter for transport to Providence Hospital in Anchorage.

RMI-Ziegler
On July 4, a lead guide on a commercial expedition descended with a sick client from high camp to the 14,200-foot ranger camp for medical assistance; the client was complaining of a shortness of breath, a general lack of energy, and lower left intercostal

chest pain. The patient had a previous cardiac history, so after initial medical treatment to stabilize the condition, the Lama helicopter was placed on standby for an emergency medical evacuation. Weather deteriorated and did not improve sufficiently until July 9, at which time the Lama evacuated the patient to the Kahiltna basecamp where the climber was released from NPS care following a physical examination by a park medic. The patient flew out to Talkeetna, and subsequently sought consultation with a cardiologist.

Training

In early April, the Talkeetna Ranger station hosted a Wilderness First Responder and Emergency Medical Technician refresher. Buck Tilton, Wilderness Medical Institute, and Dr. Jennifer Dow, South District Physician Sponsor, provided the instruction. A variety of different topics were covered including trauma management, treatment of altitude sickness and frostbite care. At the conclusion of the course Tilton offered an open enrollment American Heart Association CPR class that was attended by different employees of Denali National Park and Preserve air taxi concessionaires.

In mid March, the entire mountaineering staff attended a technical rescue seminar in the Chugach Mountains. Mike Gibbs and Mark Miller of Rigging for Rescue instructed this year's seminar. This advanced rescue seminar included approximately eighty hours of classroom instruction and field exercises. Topics covered included technical snow, rock and ice lowering, roped glacier travel, crevasse rescue, patient care and highline construction and operation. This year's course was also attended by four members of the Alaska Air National Guard 212th Rescue Squadron.

Helicopter shorthaul training this year included real-life training with simulated rescue scenarios in the Tokositna Mountains. "Victim" rangers were shorthauled into a rescue site; rescue personnel then practiced evacuating them as would be required during a real event.

High Altitude Contract Helicopter

The 2007 South District helicopter contract started with the arrival of the Lama helicopter (SA-315B) on April 18. Evergreen Helicopters provided the helicopter and crew for the contract. The contract was extend by a week this year to August 7. The regional Radio Shop paid for the extension to complete radio repeater site work in Wrangell St. Elias National Park and Preserve (WRST).

The helicopter executed two rescues this year using the shorthaul technique. One of these was conducted in the Kennecott Mine area of WRST where an uninjured hiker had become stranded in a dangerous and precarious position on a cliff. In a similar operation and circumstance high on Mount Healy, another female hiker was shorthauled from a stranded position above a cliff face.

The helicopter slung the 14,200-foot ranger camp to it location at the being of the season. It took 13 load weighting around 500 pounds and removed the 14,200-foot camp at the end of the season. It took 14 loads to relocate the camp. The average weight of a load was

450 pounds. The camp was placed on the upper airstrip on the south east fork of the Kahiltna for air taxi removal.

The helicopter was available for 106 days during the 2007 season at a cost of $4,013.75 per day. Flight rate was $650 per hour dry. The daily availability was charged off as follows: major SAR accounts (27 days), base ONPS helicopter account (58.43 days), PMIS project camp insert/extract (4.3 days), Radio Shop extension (16 days), and research/other (.27 days).

Total flight time for the high altitude helicopter was 130.3 hours broken out as follows: SAR (36.1), PMIS project camp insert/extract (18.3), Radio Shop (61.8), base ONPS helicopter account (8.6), and research/other (5.5).

Without the usual support of military helicopter to take supplies in and out at the beginning and end of the season, a PMIS project account was used to fund these essential operations. The 18.3 hours required to accomplish this included placing 10 sling loads at 14,200-foot camp, installing/removal of the Mount Crosson repeater, and slinging 14 loads from 14,200-foot camp back to Base Camp.

Military Aviation Support

Military helicopters flew a total of 21 hours in support of NPS operation in the south district, three on a SAR mission and eighteen in support of camp insert and removal.

A Pavehawk helicopter from the 210th in Anchorage was used for one rescue operation. The helicopter picked up a patient from the 7,800-foot level on the West Buttress, flying directly from its Anchorage base to the rescue site and back to Anchorage. The response time for the helicopter to the patient's location was 3.5 hours. Army Blackhawk helicopters were used to assist with one patrol transfer onto the mountain. John Leonard had three Marines on this patrol and they requested assistance from the Blackhawk. The Blackhawk helicopter placed the three marines on the mountain to start the patrol. They returned at the end of the season to remove gear from the mountain. The Chinook helicopters were not available for rescue or camp placement or removal due to their pending deployment to the war in Iraq.

Vendor fixed wing aircraft flew a total of 54.56 hours of flight time in support of mountaineering operations, project, and SAR missions in the South District. No use of vendor helicopters occurred. Fixed wing flight hours were used in search and rescue (11.09), Patrol moves (18.40), and Base Camp support (25.70). Total cost for these flight hours was $43,421.

The Lower South East fork airstrip was not useable by the air taxi operators after July1. Crevasses opened on the top of the airstrip and three to four large humps formed in the middle section of the runway. Before the last plane landed on the lower airstrip planes were landing and taking off on the lower half of the airstrip. All of the concessionaires decided to use the upper airstrip in the South east fork of the Kahiltna glacier. This airstrip is approximately ½ mile up the glacier from the lower airstrip.

Denali Pro Award
The Denali Pro Pin is an award that recognizes climber(s) for exemplary performance in expedition behavior, risk assessment, and minimum impact while climbing Denali. Pigeon Mountain Industries and the National Park Service recognized Heidi Kloos and Robert Durnell as being the joint recipients of the 2007 Denali Pro Pin Award for their selfless assistance to other climbers in need.

While climbing on Mt. McKinley as guides for Mountain Trip, a NPS concession, Heidi Kloos and Robert Durnell were at the 17,200-foot camp on the May 17 when they witnessed two climbers from another expedition suffer a 2,000 foot fall. They immediately volunteered to assist a National Park Service patrol with the rescue of these two climbers. They both were assigned to the hasty team dispatched to evaluate the situation, and upon arrival at the accident site discovered a catastrophic scene where two members of the 'Cascade Climbers' expedition lay entangled in a climbing rope with their personal effects strewn all about. One of the two climbers had perished in the fall, and the other was in serious condition with a compromised airway and active bleeding. Kloos and Durnell were instrumental in assisting the NPS mountaineering ranger in providing immediate emergency medical treatment and preparing the victim for evacuation back to the 17,200-foot camp. After the evacuation was underway they both stayed behind at the accident site, unbidden, to collect and consolidate as many personal effects that could be found from the surrounding area, and to mark the gear and deceased climber with wands. This was a very unpleasant but vital task since the majority of the gear would have been buried by the snow that was falling and being blown by the 30 mph winds that were present. Upon completion of this task they returned to the 17,200-foot camp where they took upon themselves the chore of providing sustenance for all the rescue personnel and hot water bottles for the surviving victim throughout the night. Unfortunately, the climber died the following morning without ever regaining consciousness, but the hard work put forth by Kloos and Durnell ensured that everything possible was done to save the severely injured climber. Their selfless efforts to render aid to fellow climbers illustrate the highest quality of character that the Denali Pro Pin seeks to recognize.

2007 New Climbs and Notable Ascents
The most activity in the range this season occurred off of the Ruth Glacier. Beginning early in the season a Japanese threesome climbed a trio of hard new routes. Fumitaka Ichimura, Yusuke Sato, and Yamada Tatsuro spent 24 days on the Ruth in April and made five attempts on unclimbed lines, three of them successful: Mt Bradley, SE Face; Mt Johnson, N Face; and Mt Church, N Face. Also in April Gareth Hughes and Vivian Scott made a first ascent on the East Face of Mt. Dan Beard, 10,260-feet. The two climbed the route along the right side of the face in 24 hours. New route activity in the Ruth resumed again in June. Cedar Wright and Renan Ozturk climbed five rock routes in the 5.10 to 5.12 range along the east side of the gorge. The longest lines were on the West face of the Eyetooth (a direct variation to the last ten pitches of the Ogler route) and a route to the left of the major dihedral. They also added two quality routes on the Stump

within 100 feet of Gold Finger. These are some of the most accessible rock routes in the Alaska Range, being only one-half hour from a base camp in the gorge where climbers can land if conditions allow. Finally, Alaskan locals Jay Rowe and Peter Haeussler climbed a moderate route on the Southeast Buttress of the Sugar Tooth. From Espresso Gap they climbed 21 pitches to the summit.

Elsewhere in the range the activity was more sparse but no less impressive. On March 10, Masatoshi Kuriaki completed his quest to get to the summit of Foraker during a calendar winter. This year he climbed the South East Ridge. (He had succeeded on this route and the Sultana missing the spring equinox buy a few days in previous years). Also on the Foraker massif, Peter Doucette, Ben Gilmore, and Freddie Wilkinson climbed a steep new route up the 4,000-foot South Face of the Fin, a 13,300-foot sub-peak on the remote southwest side of Mt. Foraker. This route is included here due to its remote nature, as it was not a completed route to a summit.

Over on Mount Hunter, Britons Jon Bracey and Andy Houseman made the second ascent of the French Route on the North Buttress of Mt. Hunter on May 8, twenty-three years after the first ascent. The pair climbed the route and then descended via the West ridge to base camp in four days.

On Mount McKinley, 76 year-old Michio Kumamoto became the oldest person to reach the summit**.** On the technical climbing scene Colin Haley and Mark Westman climbed the Denali Diamond in under 2 days*,* from the bergschrund to the summit. This stunning route ascends the steep wall left of the Cassin Ridge and has now had five ascents. A group of highly motivated skiers were active on the upper mountain in June. Good conditions allowed ski descents of most of the popular lines. Then they also set out for new ground making a probable first descent of the couloir on the Black Tower on the North summit, which is extremely obvious from the 17,200-foot high camp.

Climbing Statistics

Average trip length: 16.8 days
Average trip length for groups that reached the summit: 17.6 days
Busiest day on the summit: June 12 – 77 summits
Summit breakdown by month: 379 in June; 177 in May; 15 in July
Average age: 37
Women climbers: 12%
Days with a summit: 32

International Makeup:
USA – 729
United Kingdom: 64
Canada: 50
Germany: 39

Most American climbers came from:
Alaska – 118

Colorado: 115
Washington: 94
California: 83

North District

Personnel

Karen Fortier was assigned to the North District to supervise both the kennels and backcountry operations. During much of the summer season Bob Sloop and Scott Pariseau were at the Federal Law Enforcement Training Center and in field-training assignments. Amy Scudder was hired as a GS-5 STEP and assigned to HQ area patrol. Matt Smith was assigned to the backcountry office as a commissioned ranger. Jess Toubman was assigned as the lead employee in the backcountry office. Morgan Strong and Michael Eckenfels were recruited as Volunteers-In-Parks and were assigned to the west side of the park to make up for a lack of ranger coverage and to assist with EMS operations. Phyllis Hassinger returned as the Wonder Lake Campground host and Ron and Beth Shugan served as the Teklanika Campground hosts. Volunteers in the North District contributed over 3000 hours to the NPS this year.

Training

Michael O'Connor and Jaime Smith attended the Advanced Resource Protection training in California in October. Bob Sloop and Scott Pariseau attended a seminar on ANILCA in November. Several employees attended an avalanche rescue scenario sponsored by the AMRG in December. A CPR refresher was held in the park in February. Michael O'Connor, Dan Fangen-Gritis and Jeff Caulfield attended and completed short haul rescue training with South District Staff in April. Several staff attended a regional wildlife aversive conditioning workshop held in the park in April. Several staff attended the wildland fire refresher in May. Karen Fortier attended the Air Force Search and Rescue Planning Course in Anchorage in June. Jaime Smith and Richard Moore represented the park during an anti-terrorism seminar sponsored by the US Attorney's Office in Fairbanks in September. Richard Moore attended ICS-400 training in September. Most law enforcement staff attended the law enforcement in-service refresher in Anchorage in either February or May.

Outreach

Richard Moore, Karen Fortier, Michael O'Connor, the kennels staff and Matt Smith each presented a program or activity during Winterfest in February. Richard Moore provided training to seasonal Interpretation employees on park rules and regulations in May, and to South District Visitor Use Assistants in June. Various law enforcement staff attended and presented at all concessionaire employee orientations throughout the spring and early summer. Jeff Caulfield met with all Kantishna lodge managers in September and April and facilitated Kantishna guide orientation in May. Jaime Smith attended approximately fifteen driver safety meetings throughout the summer representing the NPS. Richard Moore represented the region as Deputy IC on the Western Incident Management Team and helped facilitate an avian flu response tabletop exercise in Anchorage in May. Jaime Smith, Jeff Caulfield and Richard Moore conducted an undercover investigation into illegal commercial services in the South District in May. Dan Fangen-Gritis taught

several firearms courses to both commissioned and non-commissioned NPS employees in both Anchorage and in the park throughout early summer. Michael O'Connor put on two SAR training sessions for park employees and volunteers throughout the summer. Richard Moore, Jess Toubman, Cory Lane, Evan Olson along with employees from other divisions responded to Wrangell-St. Elias NP for a missing person search in September.

Significant Incidents

- Two day hikers became lost in the Triple Lakes area in June requiring a large response; they were successfully found within hours.

- A twelve-year-old student on a MSLC-sponsored hiking trip in the Kantishna Hills fell and injured his back in June; evacuated to Fairbanks by air taxi.

- A woman hiking off trail on Mt. Healy became trapped by terrain and was rescued via short haul in July.

- A 21-year-old Russian national committed suicide at the Riley Creek railroad trestle in July.

- A park SCA volunteer fell and was injured in the Toklat area in July and was evacuated by military helicopter.

- A twenty-four-year-old woman fell down the stairs of a concessionaire bus at Wonder Lake and was seriously injured in August; she was evacuated to Fairbanks by a commercial air ambulance.

- A twenty-year old man became lost and then trapped by terrain near the headwaters of the Teklinika River in the Alaska Range in August, requiring a large response by both park and Air National Guard resources to locate and rescue him. He was hoisted aboard an Air Force helicopter and transferred to a park ambulance.

- A moose was found to have been poached by a local resident in the park near the north boundary in September; the case is proceeding.

- Local guides with clients were found guiding in the park in September; the case is proceeding.

Patrols and workload

Rangers responded to a total of 25 medical calls in the North District, ranging from ambulance responses and patient transport to basic first aid for both medical problems and trauma. Additionally, eight visitors were rescued by helicopter or by ground in the North District after becoming lost, injured or trapped in the backcountry.

Rangers on patrol responded to or initiated 531 calls for service ranging from responding to visitor complaints or concerns to criminal investigations to accidents to visitor assists.

The Backcountry Information Center served over 10,100 visitors in our efforts to educate the visitor on proper and safe backcountry use and travel. The staff issued 1587 backcountry permits for a total of 7,434 backcountry user nights. In addition to snowmobile patrols in the winter and ATV patrols during the late summer and early fall rangers and staff conducted twenty-seven long-range wilderness patrols during the summer.

Wilderness Management

The protection of wildlife from illegal hunting and the prevention of illegal ORV use continued to be a major emphasis of the ranger division this year. The primary operational focus was on the known problem areas of the southwest preserve, Cantwell, and Stampede/north boundary. An exploratory trip into the northwest preserve was made for the first time in 15 years to regain an understanding of the issues in that area. This motorized raft patrol started at the Lake Minchumina airstrip and then followed the Muddy River downstream to the Kantishna River and downstream to the north park boundary.

The ability to regularly place law enforcement staff into many of these areas on the ground was limited because of the reduced number of staff available this year. Two law enforcement rangers were away from the park for required training. It was only possible to initiate one to two law enforcement field patrols per week to make contacts with hunters. However, several other actions were taken to compensate for this shortfall. All of the field time of the Backcountry Information Desk staff was redirected toward areas with hunting and ORV issues during August and September. Several patrols were done by staff members such as the Chief Ranger and Wilderness Program Manager who are not routinely in the field.

A major effort was made to encourage the State of Alaska wildlife enforcement staff to work in and around the park area. For example, several contacts with hunting camps in the southwest preserve were made by the state wildlife trooper at a time when we did not have sufficient staff to cover the area. The park conducted two very effective patrols with wildlife troopers in the Stampede area, both of which resulted in the detection of hunting violations in the park.

The ranger staff continued to make maximum use of their field time by fully documenting observations such as airstrips, hunting camps, access routes, and ORV incursions. This work will provide an information base for educating new employees and making future operations more effective. The park aircraft were used to their full advantage for the first time in several years. The park pilot's rapidly expanding understanding of park geography and issues, along with a sufficient flying budget, helped to provide an effective presence in many areas even when ground staff were not available.

The preventative information on the park website about hunting and ORV regulations as well as the location of the park boundary was expanded and publicized along with the initiation of a wildlife protection reward program for the park through the Alaska Fish

and Wildlife Safeguard program. Despite some of the limitation on field operations, two new hunting violations and a major ORV incursion were detected. A conviction for a poaching incident discovered in the fall of 2006 was also obtained after a trial in the US District Court in Fairbanks. Overall, the reestablishment of a wildlife protection program at the park has continued to improve as the ranger staff has become more familiar with the area and the financial support for the program has increased.

The park Wilderness Program Coordinator assisted in this effort by contributing to the development of an action plan for wildlife protection efforts for the season as well as setting up procedures and training staff on technologies such as GPS to help gather field information in a manner that could be incorporated into long term databases and the park's GIS system. He also helped organized a training session for the division on both general park and hunting specific regulations to help orient new staff members to the unique regulatory environment of Alaska.

The Wilderness Program Coordinator worked on several projects related to the implementation of the new backcountry management plan such as meeting with guided hike providers in Kantishna, developing a research project to inventory and monitor social trail and campsite development, writing a new backcountry hiking guide, coordinating the development of a new Trails Illustrated map for the park that reflects the revised backcountry units, and developing funding proposals for other plan implementation items. He also provided many compliance reviews for other operational activities and research projects and worked closely with the Resource Management division to coordinate activities between the two work groups. He wrote a resource protection component with an emphasis on preventing illegal wildlife harvest and ORV incursions was developed for the new Resource Stewardship Strategy. He continued to participate in wilderness management issues on both a regional and national level as the Alaska park representative on a regional wilderness science committee and on the NPS National Wilderness Steering Committee.

Kennels

Personnel

Assistant Kennel Manager Carmen Adamyk (four-year term STF) was hired and began work in October 2006. This position replaced one summer seasonal position at the kennels. The kennel manager assumed full supervisory duties of the Backcountry Desk Operation. Two SCA's were employed at the kennels instead of the one typically used.

Training

Kennel manger attended a five day Search and Rescue Planning course in Anchorage in June. ATV safety training for three staff. Avalanche Safety Awareness training for three staff. EMT Refresher for kennel manager completed.

Accomplishments

41,720 visitors attended sled dog demonstrations. An additional 6,200 visitors came to the kennels outside of demonstration times. The teams traveled approximately 1200 miles while on winter patrol. 257 visitors were contacted, supplies carried to all but three back-

country cabins, firewood hauled. Teams assisted Jared Withers (Soundscape Management Technician) on a five day backcountry trip to access north boundary stations in March. Kennels staff provided special curriculum based programs to sixteen school groups from throughout the state and country at the kennels. Work was completed on the curriculum for the sled dog distance education class. This project was a joint effort with the park's Education Specialist. Focus points are science, wilderness, and teamwork.

3,463 volunteer hours were contributed at the kennels. This amount was divided between two winter VIP's (1200), two summer SCA's (1180 hours), and approximately 60 dog walkers (1,083 hours).

ADMINISTRATION DIVISION

It was another busy year for the Information Technology staff as they worked to install cables and other communications gateways into facilities that will be opening up in 2008, such as the new Eielson Visitor Center, and upgraded and rehabilitated existing network equipment in headquarters buildings that were being rehabilitated or reconfigured for a different work group. Getting the VoIP (voice over satellite) phone system at Toklat was a priority, as the only voice communication currently available to the remote seasonal work camp employees is via satellite phone (the old radiophone system is no longer being supported by the local phone company). Several attempts were made to get the system functional on a continual basis, but additional work needs to be done in the 2008 season to make it effective. The second year of the Wireless Backbone Project with the University of Montana was completed, and a satellite communication system was set up for the Wonder Lake Ranger Station. Denali is rapidly entering into the 21st Century!

The Administration Division completed a major organization of the park's administrative/budget staff. The division took over the park-wide mail function, which was being done by the dispatchers from the Comm Center, and the Central Files position, which was previously in the Superintendent's Office. Three new GS-06/07 budget tech positions were created to position the park to have better checks over PMIS and better parkwide tracking of the budget.

A new requirement to have an on-line Individual Development Plan for each permanent and term employee by early in the year was facilitated by training provided by the human resources staff. Two sessions of supervisory training were provided by a private contractor, retired NPS employee Bill Wade, to improve employee moral and enhance relationships between employees and supervisors through workshops designed to improve communications.

Parkwide Operations Involvement
The Chief of Administration and the Human Resources Specialist helped coordinate the first year of an Internship Program with Joint Venture to show students majoring in the Hospitality field the NPS side of business and the relationship between NPS and their concessessioners. Seventeen interns did job shadows with park staff over a two week period. The Administration division hosted one intern for three days.

Budget and Finance
The division successfully closed out the park's budget of $22M, consisting of twenty fund sources and 368 account numbers while the park budget analyst was out on sick leave.

FY2007 Human Resources Report

Promotion From	New Grade/Position	Incumbent	Comments
GS-5 ADMIN ASS'T	GS-6 BUDGET TECH	FIELDING, M	
GS-4 ADMIN ASS'T	GS-5 ADMIN ASS'T	LASELL, L	
GS-5 BUDGET TECH	GS-6 BUDGET TECH	SAUVEY	
GS-5 BUDGET TECH	GS-6 BUDGET TECH	DEMERS, N	
GS-11 CULTURAL RES MGT SPEC	GS-12 HISTORIAN	KAIN	
GS-6 FORESTRY TECH	GS-7 SUPV FORESTRY TECH	REYNAR	
GS-7 SUPV FORESTRY TECH	GS-9 ASS'T FMO	WEDDLE	
GS-6 LEAD PARK DISPATCHER	GS-7 SUPV PARK DISPATECHER	FIELDING, S	
GS-7 FACILIT MAGT SPEC	GS-9 FACILITY MGT SPEC	PEARSON, N	

Vacancies Created	Office	Vice	
GS-6 SECRETARY	SUPT	CICCIARELLA	
WS-9 MAINT MECHANIC SUPV	MAINT	KEERS	
WG-9 MAINT MECHANIC	MAINT	SCHMOKER, D	
GS-6 BUDGET TECH	MAINT	MILLIKEN	
GS-5 ADMIN ASS'T	MAINT	SAUVEY	
GS-5 ADMIN ASS'T	RES	KAPALKA	
GS-5 ADMIN ASS'T	MAINT	JENKINS	vacant
GS-5 ADMIN ASS'T	MAINT	VANTREASE	vacant
WG-7 MAINT WORKER	MAINT	DEMERS, R	
GS-6 HR ASS'T	ADMIN	POLLOCK	
GS-11 CONCESSIONS MGT SPEC	CONC	WYSONG, M	vacant
WG-8 HEAVY MOBILE EQUIP MEC	MAINT	WYSONG, J	vacant

Vacancies Filled	Office	Incumbent	
GS-5 ADMIN ASS'T	SUPT	HUBBELL	
GS-5 SECRETARY	SUPT	BLANKENSHIP	
WS-9 MAINT MECHANIC SUPV	MAINT	GOMEZ	
WG-7 MAINT WORKER	MAINT	NEWTON	term
WG-9 MAINT MECHANIC	MAINT	PORTER	
GS-5 BUDGET TECH	MAINT	SAUVEY, P	
GS-4 ADMIN ASS'T	MAINT	TAYLOR, D	
GS-11 EDUCATION CO-OR	INTERP	ANASTASIA	
GS-5 ADMIN ASS'T	INTERP	RAY	
GS-11 ANTHROPOLOGIST	RES	CRAVER	
GS-6 FIRE PROGRAM ASS'T	RES	NANCARROW	
GS-5 PARK DISPATCHER	RANG	HAMEL	term
GS-5 ADMIN ASS'T	RES	JONES	
GS-11 WILDLIFE BIOLOGIST	RES	OWEN, P	
GS-6 SUPV VISITOR USE ASS'T	RANG	SMOTHERS	term
GS-7 BIOLOGICAL SCIENCE TECH	RES	MAHOVLIC	term
GS-7 PARK RANGER	RANG	ADAMYK	term
WG-7 MAINT WORKER	MAINT	SHOREY	term