

Superintendent's Report

2015-2017

National Park Service
U.S. Department of the Interior

Denali National Park and Preserve, Alaska



Superintendent's Message

The past three years at Denali National Park and Preserve have been extremely busy and incredibly productive for the hardworking and dedicated rangers fulfilling the mission to preserve and protect the crown jewel of National Parks in Alaska. This report details and highlights many of the significant accomplishments from 2015-2017.



*Superintendent
Don Striker*

- Participating in scientific discoveries that include unearthing dinosaur bones inside the park for the first-time and identifying two new species of pollinators - one of which exists only in Denali;
- Hosting dignitaries such as President Barack Obama, Supreme Court Justice Sonya Sotomayer, Senator Lisa Murkowski and Interior Secretary Ryan Zinke;
- Welcoming Soldiers from Fort Wainwright for a 26-mile "Ruck March" along the park road;
- Changing the name of Mount McKinley to Denali, a decision supported by Alaskans who have wanted the change for more than 40 years.
- Entering a sister-park agreement with Otgontenger Mountain Specially Protected Area in Mongolia to increase information sharing and direct park-to-park contacts to address common issues related to resource management and protection.

- Celebrating the NPS Centennial in 2016;
- Hosting public events throughout 2017 to celebrate the park's 100th birthday;
- Welcoming record numbers of visitors in 2015/16/17;
- Unveiling a new day-use area at Riley Creek;
- Installing new sign at the entrance area;



Special Programs



Some of Denali's youngest visitors recite the Junior Ranger pledge at the Eielson Visitor Center during the park's annual road lottery.

Road Lottery and Military Appreciation Day

The 2015-2017 Road Lottery and Military Appreciation Day events hosted 15,236 visitors in 4,764 private vehicles on the park road. There were more than 34,400 applications which contributed to an average annual budget of \$107k for this cost recovery event. Approximately 90 staff members assisted in planning and executing the events each year with no notable incidents beyond temporary road closures for snowy weather. New informal interpretation stations at Teklanika, Wonder Lake, and Kantishna were a success in engaging visitors one-on-one while celebrating the NPS Centennial and park's 100th Birthday. Additionally, many visitors received thank you gifts for participating in Zero Landfill Initiative volunteer engagement events, and stickers of the newly designed Road Lottery logo. Road Lottery received a 4.8/5 rating each year in a recreation.gov survey of participants.

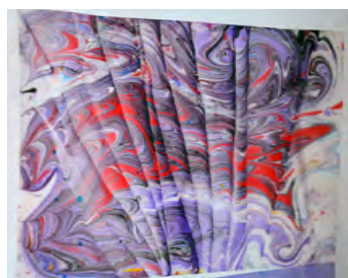
Military Appreciation Day was moved to the Saturday during Road Lottery to accommodate more participation from military guests. Every year, 400 invitations are given to our military point of contact, who then distributes these invitations to military bases in Alaska. We strive to continue to honor the hard work and sacrifices of our military by exploring easier ways to distribute invitations and finding opportunities to communicate other fee-free and family-friendly events.

Artist-in-Residence Program

Denali continues to use art as a means of outreach to

our visitors near and far. Offering hands-on activities at the Denali Visitor Center by visual artists, writers and composers gives visitors a way to create their own unique memories while exploring Denali. The range of activities included sketching, various writing/ poetry workshops, papercutting, cyanotype printing, wool felting, journal making and block cutting. Composers shared their experience and inspiration in the Karstens Theater with multimedia presentations, often giving visitors a musical treat or a sample of what may be included in their composition donation to the park.

Winter Artists in 2017 teamed up to provide an awesome outreach program with Tri Valley School, providing a two day book making workshop. Visual Artist, James Temte (Anchorage) taught the class a fun and messy marble painting technique for book covers. Temte also taught an artistic binding technique to put the books together. Writer Andrew Gottlieb (Irvine, CA) provided a poetry workshop, which the students could include in their books. Students and artists enjoyed their experience and this partnership idea may be encourage with future winter artists. In 2016, Denali launched a two year exploration, asking artists to consider digital submissions if possible. This allows art to be accessible on our website, and helps solve our lack of storage space problem. While some artists were able to submit literary works, photographs and short films, others donated physical pieces.



Students at Tri-Valley School in Healy receive art instruction from Denali Artist-in-Residence James Temte.



A bus travels the scenic Denali Park Road.

Commercial Services

The park's largest concessioner, Doyon/Aramark Joint-Venture was awarded a 10-year Category One concession contract in July 2016, providing a seamless transition as the park's exclusive provider of transportation services. Along with the suite of visitor services provided in the contract, it also included three Concession Facility Improvement Projects (CFIP) and construction of a recycling center. Construction projects include a food and beverage commissary, an automotive storage and receiving facility and an automated bus wash system. Construction on the recycling center began in the fall of 2017 and the remaining CFIPs are in the planning stage.

The Joint-Venture continued to be a solid environmental partner as an integral and responsive collaborator in the Denali Zero Landfill Initiative (ZLI). Since its inception in 2015, the Joint-Venture has embraced ZLI goals and sought multiple avenues to reduce waste streams from their operations. They have installed more recycling bins, developed a detailed waste and recycling data tracking system, piloted an off-site composting program, changed their back-of-house operations and food purchasing to minimize food waste, and redesigned tour snack packs to minimize waste.

The Joint-Venture also developed new partnerships to increase recycling opportunities and reduce transportation costs. Their tour drivers supported these efforts through zero landfill messaging -- providing ideas, and inviting guest participation in the sorting of their recyclables. Joint-Venture dedicated additional staff to messaging Zero Landfill Initiative goals and successes.

In addition to the Joint-Venture contract, division staff continued work on several concession prospectuses with regional and national concessions management staff. In 2016 and 2017, concession contracts were awarded for air taxi and scenic air tour services, dog sled tours and guided

hunting.

In the fall of 2016, NPS cancelled the solicitation to provide mountaineering guide services after significant feedback from businesses, guides, and the public about the process. The prospectus for mountaineering was reissued in September 2017 with an expected execution date of January 1, 2019.

In 2017, the Commercial Services program transitioned the Commercial Use Authorization (CUA) program from the Alaska Regional Office to the park. As part of the transition, the park converted from a cost-recovery to a market-price model, based on a percentage of gross receipts. In cooperation with the NPS Business Plan Internship Program, the Commercial Services program developed a Commercial Services Strategy (CSS) for Denali National Park in summer 2017. In preparing the final CSS, the interns analyzed visitor use data reported by the park and commercial operators between 2007 and 2016. They also obtained input from park staff and external stakeholders and worked with park management to develop "Necessary and Appropriate" criteria for evaluating commercial services in the park. Finally, the interns considered new services the park could offer and worked with park management to analyze and prioritize these services by impact and feasibility.

Planning and Compliance

The Planning and Compliance Team has been actively working to hone professional skills and keep in-step with emerging National Environmental Policy Act (NEPA) policies and guidance, which included implementing changes introduced in the revised 2015 NPS NEPA Handbook. The team seeks interdisciplinary collaboration with respect to compliance by providing excellent customer service to Denali park staff, revamping the monthly compliance meetings, and offering annual compliance training for park staff.

During the past three years, members of the team have played integral roles in the NPS and park's Centennial planning efforts, served on incident management teams both in and beyond Denali Park, and participated in numerous park planning efforts ranging from small local projects to interagency efforts. Denali planners have both participated in and been a part of launching the region-wide NEPA Academy, a new program aimed at training staff new to NEPA in developing the skills to author environmental documents. The team has hosted numerous open houses in the community and has reached out to the public through scoping opportunities and formal public comment periods. The team has supported the park's partnership goals by collaborating with state agencies, other federal agencies, commercial interests, and inholders.

Zero Landfill Initiative

In 2015, Denali embarked on the Zero-Landfill Initiative with Denali Education Center and Doyon/Aramark Joint Venture, and supported by National Parks Conservation Association and Subaru of America. The primary goals are to increase the amount of trash the park diverts from the landfill from 15 to 30 percent and engage other local stakeholders to create a culture of recycling and reducing waste. Student-led groups have formed at the three local schools to develop recycling programs and tackle what the students identify as important community waste issues that they want to highlight. This year-round, community partnership is working to reduce waste going to landfill through education, changing habits, increasing recycling rates, and reducing sources of waste coming into the borough.



Within the park, changes include increasing recycling opportunities for guests and employees; educating visitors about the initiative; and addressing food waste collection from visitors and employees through composting options. The Joint Venture began construction on a new recycling facility this fall and expect it to be operational in the summer of 2018.

In 2017, the Joint Venture unveiled a 100-percent recyclable and compostable snack box on their long tour route. The Joint Venture composted 6,275 pounds of food waste through their arrangement with Susitna Organics and sent 2,625 pounds of food wrappers (candy, chips) to the Terracycle recycling program. In 2017, the Joint Venture achieved a diversion rate of 23 percent and the park diverted 22 percent of what would have been municipal solid waste from going to the Denali Borough Landfill.



Local school children promote recycling efforts in Denali.



Soldiers from Fort Wainwright rest at the halfway point of their 26.2 mile Ruck March in 2017.

Denali Welcomes the U.S. Army

For the first-time ever, Denali hosted a “Ruck March” for Soldiers from Fort Wainwright in July 2017. The Soldiers with C Troop from the 5th Squadron, 1st Cavalry Regiment marched 26.2 miles along the Denali Park Road. They each carried backpacks or “rucks” weighing around 50 pounds. Troop commander Cpt. Brian Fiallo says it’s something they could be called upon to do while deployed, which makes training at home all the more important. Fiallo said the march allowed the leaders to assess the soldiers’ fitness levels and see where they need to focus their training down the road. The 1st Cavalry Regiment is part of the 1-25 Stryker Brigade Combat Team. There is a long tradition of shared service between our nation’s military and national parks. The original caretakers of the earliest parks, such as Yellowstone, were Soldiers. Since 1933, the National Park Service has cared for great battlefields of the Revolutionary and Civil Wars as parks and monuments. During World War II, several national parks, including Denali, served as training and testing centers, or recreation sites. Denali remains an important training ground for the U.S. Army Alaska Northern Warfare Training Center, which tests arctic equipment and skills. Military teams have made more than 16 climbing expeditions to the summit since 1980. Fort Wainwright’s 52nd Aviation Regiment delivers supplies to base camp in support of mountaineering operations. Military units assist with high altitude rescues and the Alaska Air National Guard assists with rescues in remote areas of the park. The Alaska District Veterinary Command helps care for the park’s canine rangers in exchange for cold-weather animal care experience with kennels staff.

Administrative Programs

The National Park Service completed the second year of the new electronic travel system in 2015. The park's travel coordinator ensured that all users received current information and training as needed. Denali purchased more I-plate vehicles and leased fewer GSA vehicles in 2015. With this transition, the park increased the number of fleet cards in the charge card program, which required updating guidance. The government charge card program reached a new level of complexity in April 2017. Starting in April, all charge card reconciliation occurred through the online system called Payment Net. All card holders – nearly all employees – attended a required training and then started using the system in April. With this change, card holders and approving officials no longer had to review and sign the hard copy statements. Card holders still had to attach receipts to the statements for filing. The Accounting Operations Center (AOC) conducted an internal controls audit at Denali in 2017. The AOC auditors focused on property, procurement, charge cards, employee check-outs, receipts and deposits, and accounts receivable. The audit resulted in minor recommendations for corrections. Administration staff are great at their jobs!

Budget

- FY15 base NPS funds allocation - \$13.6M
- FY16 base NPS funds allocation - \$14.3M
- FY17 base NPS funds allocation - \$14.6M

In fiscal year 2015, as requested by budget staff, the Denali Management Team (DMT) agreed to centralize funding of General Services Administration (GSA) leased vehicles in a maintenance account. Budget staff requested this change due to the complexities of the Financial and Business Management System that required the association of all charges with specific vehicles and issues with GSA reimbursements. DMT allocated funding off the top for vehicles.

In fiscal year 2016, Superintendent Don Striker initiated a budget process that based allocations on fixed salaries, fixed costs (centrally funded costs), core seasonals, and other direct costs (ODC). Program Managers covered the following expenses with the ODC allocation: travel, awards, supplies, cell phones, and other non-fixed costs. The Superintendent calculated ODC allocations by multiplying the fixed salaries amount by a percentage determined by division operations. For example, the maintenance division has a higher percentage to cover the supply costs for visitor facilities. The Denali Management Team used the same budget process for FY2017.

In FY17, other Alaska parks contributed funding for the Alaska Regional Communications Center through park shared costs.



Volunteers take part in Denali's Dandelion Demolition and National Trails Day.

Volunteer-in-Parks Program

Denali's volunteer program offers a variety of opportunities to those interested in donating their time. In 2016 and 2017, the park offered a centennial program for volunteers. The 100-hour Volunteer Challenge combined volunteering for the park with community volunteer work. By the end of the program in 2017, 74 people met the requirements and were recognized for their contributions.

The park offered annual volunteer opportunities such as National Trails Day, Dandelion Demolition, Need for Seed, and river clean up. In 2017, Volunteer Program Manager Kathleen Kelly facilitated the development of a volunteer opportunity for local non-federal seasonal employees to assist the park with managing visitors around wildlife in the Savage River day use area.

In 2016, the cooperative School-to-Work program between Denali National Park and Tri-Valley School in Healy won the National Hartzog award for a volunteer group. The park recognized the students and leaders during a Centennial celebration event in C-Camp. Two leaders – teacher Don Mirosh, and Park Carpenter Chip Barker – and two students attended the recognition ceremony in Washington D.C. In 2017, Denali volunteers Susan and Matthew Trucano won the Regional Hartzog award.

Volunteer Statistics

- 2015 – 483 VIPs volunteered 56,140 hours = \$1.3M (\$23.56/hour)
- 2016 – 1,061 VIPs volunteered 56,863 hours = \$1.3M (\$24.14/hour)
- 2017 – 772 VIPs volunteered 58,109 hours = \$1.4M (\$24.14/hour)

Administrative Programs

Human Resources

In 2016, all seasonal employees, volunteers, interns, contractors, and other people in non-paid positions had to have a Personal Identity Verification (PIV) card if they needed network access.

This directive completed the last phase of the implementation of two-factor authentication for those using network computers. The park continued to use the Local Hire policy approved in October 2012 by filling seasonal, term, and permanent positions. Stats: 97 hired in 2015; 91 hired in 2016; and 71 hired in 2017. A hiring freeze was implemented for all positions in January 2017. Applicants selected and approved with an enter-on-duty (EOD) date prior to January 21, 2017 were allowed to start work. Those with an EOD date of January 22 or after, required additional approval. The hiring freeze delayed seasonal hiring to the end of February 2017. Once the hiring freeze was lifted, parks still needed to request approval to fill GS-12 and higher positions unless the appointment was lateral transfer. As of November 2015, Denali's Human Resources (HR) office was fully staffed. In the three years covered by this narrative, the staff improved processes, decreased hiring delays due to processing, announced hundreds of positions, managed hundreds of background checks, organized files, and in general transformed the HR office into a highly functioning operation.

Concession Franchise Fees/Recreation Fee

After the FY14 sweep of Concession Franchise Fee (CFF) funding for the Grand Canyon leasehold surrender interest issue, the Washington (WASO) Concessions office started holding all CFF revenue and distributing funds to parks on a monthly basis. Each fiscal year the park had to complete a 3-year plan and a monthly spending plan. The WASO office also implemented a new process that facilitated the funding of all CFF projects shortly after October 1. Starting with the Servicewide Comprehensive Call (SCC) submission in FY17, the Regional Director became the approver of the park's Recreation Fee Comprehensive Plans (RFCP); previously the WASO fee office approved RFCP plans. Another change to the RFCP in 2017 was the requirement for revenue parks to spend 55% of retained revenue on deferred maintenance projects with a direct visitor connection. As an 80 percent fee park, Denali's retained revenue is 77.2% of all park revenue. WASO takes 3.5% off the top of the park's 80% revenue.

Information Technology

In 2015, the Office of Personnel Management experienced a major data breach of computer systems.

As a result, the Department of the Interior (DOI) implemented multiple security measures such as encryption for laptops and frequent updates for all computer systems. These security measures impacted the workload of the park's Information Technology (IT) staff significantly. Many more hours are now spent on routine computer maintenance tasks just to keep employees working. DOI applied an IT security measure in the Alaska Region only that directed web traffic through a Secure-Socket Layer (SSL). The SSL intercepted https:// websites, analyzed them, and then allowed access if this action resulted in no concerns. This extra security measure slowed down numerous websites and made some inaccessible on the network. Once again, our IT staff had to direct many hours to helping employees problem solve access issues and to get to websites required for their work.

In April 2016, the park experienced a catastrophic power failure that damaged servers, network equipment, the phone system, and battery backup units throughout the park. IT staff demonstrated heroic efforts to save data, install a new phone system, and get everyone back online. The power outage pushed Denali to the front of the line for the installation of the new Region based voice over internet protocol (VoIP) system. The new phone system requires users to enter seven digit internal phone numbers versus four digit extensions. Denali recycled 1.5 tons of IT equipment in 2016. In 2017, IT expanded the park's network storage capacity to keep up with ever growing demand. Denali now has 48TB of total storage space, and is currently using 30TB. Just four years ago the park was only using ~12TB of storage. The migration to Windows 10 began in 2017. IT staff responded to more than 1300, more than 1400, and more than 2600 IT requests in 2015, 2016, and 2017, respectively. In 2017, requests increased by 86%! Most of the increase was due to the frequent workstation security measures DOI implemented.

Procurement and Property

The National Park Service started using the Defense Logistics Agency (DLA) for all fuel orders in 2015. This transition had some bumps at the beginning, but then they smoothed out over the next couple of years. Denali completed all required property inventories in 2015, 2016 and 2017. The park began the process for a new key program in 2017.

Housing

The utilidor project in 2015 and 2016 converted all fuel sources to propane in the housing area for permanent employees.

Maintenance

The maintenance division's combined funding for fiscal years 2015-2017, including ONPS, quarters, reimbursable and project funds was approximately \$38.1 million. The breakdown by fiscal year is:

- FY15 \$11.1M
- FY16 \$11.6M
- FY17 \$15.4M

During peak season, the workforce of permanent, term and seasonal staff consisted of an average of 116 employees. The park road was plowed and opened to the public as far as the Mountain Vista Rest Area as part of the continuing trial period testing the viability of providing expanded winter recreational opportunities for park visitors for the second, third and fourth years of the trial period.

Projects over the past three years include:

- The replacement and upgrade to the underground utility systems at park headquarters and housing areas was completed. The project included laying new water, sewer, and propane lines in buried trenches mostly located under the headquarters road system, and installing new propane tanks near buildings while installing new meters at each building.
- A major accomplishment was dealing with a significant mud slide event at the Eagles Nest section on the western end of the Denali Park Road. A major slide crossed the road, closing it to all traffic. Park crews removed debris from the road and upslope area and reopened the road in less than a week.
- The special projects crew rehabilitated the office of the park's first superintendent and moved it to a new location in the historic district across the walkway from the headquarters building. A preservation grant funded the construction of custom furniture for the building that is representative of the rustic style of the period.
- Repaired and resurfaced 11.6 miles of the Park road, from the gate at headquarters to Savage Bridge.
- The Toklat Utility Infrastructure rehabilitation project started to replace the water distribution system, buried electrical lines and building service equipment, and the lower septic system to improve efficiency.
- Constructed timber-framed cook shelters at Savage, Sanctuary and Igloo campgrounds, providing visitors with better facilities.
- The special projects crew, in conjunction with the Tri-Valley School, was honored with the Herzog award for volunteers in parks. A tiny house was built for Lake Clark National Park and Preserve to alleviate the park's housing shortage and as a way to promote the School-to-Work program.
- The Hotel Power House was rehabilitated and renovated for energy efficiency. Aging boilers were replaced with modern, high-efficiency boilers. A new roof was installed and the building painted.
- Replaced tent roof cover and refinished the woodwork at the Toklat Contact Station.
- Demolished the old pump house at the Wonder Lake Campground.
- Replaced a deteriorated water distribution line and stabilized the water system intake at the Eielson Visitor Center.
- Designed and built the Riley Creek Day Use Area as well as associated trails, picnic shelters, and restroom facilities.
- Constructed two Federal Highway housing units at Toklat Road Camp.
- Built the Gorge Creek Trail near Eielson Visitor Center
- Installed a new bridge over Hotel Creek to mitigate perennial ice issues and completion of a thorough mapping of all DENA formal trails, including GIS data for all FMSS assets.
- Two Quinzee winter use huts were constructed and installed at Sanctuary and Igloo campgrounds.
- A custom display case was built for the MSLC to display fossils collected in the park.
- New water collection spring box was installed above the Eielson Visitor Center to provide fresh, safe, and plentiful water to the Visitor Center. Heat piping in the Eielson Visitor Center crawlspace was insulated for energy conservation and enhanced heating performance.
- A hatch access to the Eielson Visitor Center septic tank was excavated and constructed to aid the response time to septic system emergencies and for increased ease and effectiveness of septic tank pumping.
- A yurt and platform were erected for events at Friday Creek Road Camp.
- Four housing units in the front country were remodeled
- Awnings were installed at the Kennels grandstands to protect visitors from the elements.
- Completed realignment of the El Dorado Creek and Gorge Creek Trails, mitigated resource damage and ABA compliant work on the Mt. Healy Trail and trail repairs and improvements to the Triple Lakes Trail and the boardwalk on the McKinley Trail. The Trail Crew staff also worked with the planning division and Trails Interdisciplinary Team to develop a draft Trails Strategy.
- B-99 was converted into the park central files storage.
- Five buildings in the historic district were painted, rehabilitated and old cedar shake roofs were replaced with historically accurate materials and the superintendent's house was painted and extensive log repair was done.

Maintenance

- Fencing was built for a native gravesite at Birch Creek for future transport to the site.
- Planning and initial improvements were made to the kitchen at the volunteer camp. The School-to-Work Program began construction on four new buildings to replace aging tent frames.
- The foundation at the Wonder Lake Ranger Station was leveled for the first time in 17 years.
- Two new vault toilets were built at the north and south ends of Wonder Lake.
- A new Park entrance sign was designed, built and installed at the park entrance by park staff as part of the Centennial events.
- Staff constructed connector trails between the new Riley Creek picnic area, the Riley Creek campground and the McKinley Station Trail. Volunteer crews completed revegetation on the Gorge Creek Trail near the Eielson Visitor Center (EVC). Pavers to improve accessibility were installed at the entrance to the EVC
- Staff harvested tundra from new trail construction and utilized it in the headquarters area, as well as the Riley Creek Day Use Area.
- Planning efforts included informing a draft Trails Strategy to describe a 20-year vision for trail management at Denali, as well as initiating a Trail Plan for Kantishna and Wonder Lake.
- Two aging electrical generators were replaced with two Tier IV compliant generators for increased energy efficiency, decreased noise levels, and decreased air borne pollutants to improve visitor and resident experience.



2015 Highlights

Consolidating Visitor Services into Interpretation

The park consolidated work teams that actively communicate park messages, provide customer service and work in visitor services into the Interpretation Division. The Backcountry Information Center (BIC) staff moved into Interpretation from Visitor Resource Protection. Simultaneously, the Fee Management Program on the northside of the park moved from Commercial Services to Interpretation. This resulted in eliminating Visitor Use Assistant positions at the Denali Visitor Center and amending all frontline interpretation position descriptions to include fee collection duties.

The move streamlined supervision, training and mentoring staff within the Denali Visitor Center operation. It also allowed for a “ladder” of seasonal park ranger jobs to be established in the East District. The Denali Visitor Center staff developed a range of positions as a result of the consolidation from Youth Conservation Corps intern, to GS-4 Park Guides, GS-5 Park Ranger Interpreters and traditional GS-7 frontline Park Ranger Interpreter positions that existed prior to the merge of duties. This allowed local youth to obtain entry-level jobs that previously didn't exist. Incorporating the BIC and fee program into interpretation allowed for a focus on high quality messaging and communication skills, furthering opportunities for visitors to form personal connections with the park.

Dinosaur Exhibits Completed

The Murie Science and Learning Center unveiled new exhibits supporting the 2014 mural depicting Cretaceous Denali and its flora and fauna. The new digital exhibit allows visitors to select individual dinosaurs from the mural to learn more in-depth information about each. Physical panels discuss how national parks protect the current landscape as well as allowing visitors to learn more about the prehistoric landscape. The panels also highlight new paleontological discoveries in national parks. The mural, digital exhibits and panels help visitors understand the physical resources discovered in the park by connecting the 3-D tracks, dinosaur tracks, plant fossils and bird tracks to the significance of the paleontological resources Denali protects.

High School Internship from Denali Borough School

Interpretation hosted its first Denali Borough School District intern for the winter. The program allows a high school junior or senior to complete a professional internship during school hours for class credit. Intern Stony Yanuchi from the Tri-Valley High School



Local youth working at Denali Visitor Center include (from left to right) SCA Intern Emily Brease, Park Ranger Ana Brease, Park Ranger Maddi Owen, YCC intern Ashley Tench, Park Guide Stony Yanuchi, and YCC intern Riley Tench

conducted research on winter ecology, hosted a scoping meeting, wrote text and laid out graphics, photos and a map for a “Quest” brochure for winter visitors. Once the project was complete winter visitors could check out snowshoes and a brochure to take a self-guided walk on a trail to the Horseshoe Lake overlook. The quest posed questions to provoke reflection on the challenges and unique aspects of winter in Denali National Park. The park's winter visitation is expanding dramatically; hosting the internship to work on a winter activity was a perfect partnership for the park and school.

Instagram Launched

Denali finished collaboration with WASO to eliminate all ‘rogue’ Instagram accounts posing as the official park account, allowing the park to launch its presence on the social media platform in time for the NPS Centennial. Since creating its Instagram account, Denali has acquired more than 115,000 followers.

Community Outreach: Federal job application, internship and resume training

Three community training sessions were offered as a pilot outreach program during the winter. The training sessions provided background information on the types of NPS work at Denali, how to apply to national and local hire job announcements, internship opportunities for youth and how to build a federal resume.

The goal of each session was to continue to foster positive relationships with neighboring communities and help locals understand the complex federal hiring system. Sessions were held in schools and libraries in Anderson, Cantwell and Healy. Several attendees applied and were hired for seasonal jobs in Denali.

Interpretation



Ranger-led program at Denali Square

2016 Highlights

New partnerships for Interpretive Programming

In 2016, the park collaborated with Holland America Princess to renew a long standing agreement to put rangers on the rails five days a month. Additionally, the park established a new agreement to provide ranger programs on the Holland America campus. Typically, ranger programs do not take place outside the park, but this agreement strives to reach new audiences - those who may not choose to access the visitor center - through programs at Holland America's amphitheater. Rangers presented 106 programs on a variety of natural and cultural history topics that reached more than 2,100 people.

Facilitated Dialogue on Race/Recreation in Parks

As an outreach highlight of Denali's 100th birthday celebration, the park hosted free public screenings of "An American Ascent," an acclaimed 2015 film that sheds light on the complex relationship that minority populations often have with wild places. The documentary followed nine African-American climbers on an expedition on Denali. The public screenings were held at Joint Base Elmendorf-Richardson in Anchorage, the Sheldon Community Arts Hangar in Talkeetna, the Murie Science and Learning Center, the Morris Thompson Cultural and Visitor Center in Fairbanks and at Fort Wainwright in Fairbanks. After each screening, a facilitated dialogue program was available for visitors who wished to discuss the movie. Facilitated Dialogue is a new approach being used across the National Park Service to actively engage visitors in conversation and allow them to drive the content of the conversation. This series of programs was Denali's first concerted attempt to encourage park visitors, neighbors and stakeholders to actively direct conversations about a challenging and compelling topic.

Technology in the Wilderness Camp

In partnership with the National Oceanic and Atmospheric

Administration, park staff collaborated with Alaska Geographic to run two sessions (16 students total) of a new teen science camp in Denali.

Students explored various field sciences and helped locate survey monuments that haven't been mapped since the 1960's. Efforts to recruit underserved audiences using an open-enrollment application was only partially successful. In 2017, we offered open-enrollment sessions targeted at specific underserved audiences.

New Backcountry Information Center Safety Video

The backcountry permitting process was improved in 2016 with the release of the new "Denali Backcountry" video. Watching the five-part video series is a required to receive a backcountry permit. The video is available online, and provides visitors advanced preparation for a backpacking trip in Denali. The video highlights wildlife safety protocols, river crossing safety and provides a sense of what it means to backpack in the wilderness. The video also highlights the significance and personal meanings involved in wilderness exploration in Denali.

Sled Dog Demonstrations

In 2016, Kennels staff switched from using the summer sled with wheels to the dryland mushing cart used in fall training for Sled Dog Demonstrations. Switching to the cart mitigated safety concerns over the sled tipping, lack of braking power and steering challenges.

The mushing cart also provides an active visual for visitors about how dryland training actually happens in modern mushing. At the same time, the program flow was altered to increase the amount of time the dogs are active in the program and provide additional demonstration elements. In the past the dogs "ran home" to their houses after the audience departed.



Sled dog demonstration

Interpretation



Sled dog demonstration

Unharnessing the dogs and running them back to their house is now a dynamic, interpreted part of the program. These changes resulted in heightened visitor engagement throughout the program and established a better understanding of the dogs enthusiasm for running and their work.

Kennels Free-Run Pen

A fenced enclosure was installed adjacent to the dog yard in FY16. The purpose of the free-run pen is to let 2-4 dogs or puppies have a space large enough to run and play. The pen serves two essential purposes: exercise and socialization. Sled dogs are athletes and need a way to exert energy every day. Additionally, this space lets puppies run and play as they mature and need more space. Finally, the pen allows dogs to interact and socialize in a supervised setting. Denali National Park and Preserve strives to be the example of the highest level of dog care attainable; the free run pen helps the park meet this level of care.

Distance Learning

We greatly expanded this program's capacity by hiring a winter Education Technician to oversee the program. Thanks to these efforts, in winter of 2015 – 2016 the program nearly doubled its reach. We offered 188 programs and served 5,708 students. Denali's Distance Learning programs illuminate park science, with the top three focusing on sled dog adaptations, the geology of Denali and paleontology. We also added a "Find Your Park" program for 4th grade students.

2017 Highlights

Winter Visitor Center

Nearly 15,000 people visited Denali's Winter Visitor Center (the MSLC) during the winter of FY17. Of these, 10 percent came with a new tour company called Skylar Travel that caters exclusively to Mandarin-speaking visitors (other tour

companies brought visitors as well, but Skylar brought the most). Winter visitation has increased by nearly 300 percent since FY14.

New Kennels Films Released

Denali park kennels staff released a feature film "True Heart of Winter" in 2017. The film debuted at the park's 100th anniversary Winterfest celebration and is available for the public on the park's website. The film is an update to the prior "Winter Patrol" video. The video addresses the history and tradition of the Park Kennels, dog care and training as well as the drive and purpose of the park dogs working to protect the park's wilderness character. Two additional short films were released and installed in the Park Kennels exhibit room. Visitors can play the short films on demand to learn about mushing and climate change while visiting the Kennels in summer.

Pilot Partnership with Denali State Park

In 2017, Denali partnered with Denali State Park to provide interpretive services through an on-site NPS seasonal interpreter at the newly-opened K'esugi Ken campground and interpretive center. From Memorial Day through Labor Day the NPS ranger offered guided trail walks, roved the South Denali Viewpoint and Veterans Memorial wayside and offered evening campground programs on a variety of topics to highlight natural and cultural resources of the state and national parks. The partnership allowed for visitor opportunities to better understand Denali State Park resources, Denali National Park resources and the common ground / differences between the two.



Ranger-led programs are now offered at Denali State Park.

Interpretation

The interpreter-focused messages illustrate there is a “Denali for everyone”. Denali State Park draws many independent travelers and Alaskans. Denali established a five-year management goal to build better relationships with park neighbors; this pilot program provided a significant step forward in contacting Alaskans with key park messages.

Youth Programs offered in partnership with Alaska Geographic and Denali Education Center

In FY17 five different types of summer youth programs were offered: Denali Summer Science Academy, Denali Science School, Denali Discovery Camp and Denali Backcountry Adventures. To meet demand, the park hired a seasonal multi-day youth program instructor and utilized Backcountry Information Center staff to instruct camps. An Anchorage Youth Expedition was offered twice with five-day, science-themed backpacking programs for teens and young adults from the Anchorage area. Both sessions were targeted at underserved audiences and offered at no cost. Recruitment help was provided by Alaska Geographic’s Anchorage office, with one group made up of high school students and the other group comprised of first or second year college students.

Audience Centered Exhibits

Denali Interpretation explored audience centered exhibits at the Eielson and Denali Visitor Centers in summer 2017. At the DVC visitors were invited to share responses to the prompt “What Denali Means to Me” on paper birch leaves that were posted on a tree display. At the EVC rangers experimented with dialogic questions on a white board where visitors wrote and posted their thoughts and ideas, feeding into future visitor responses. Both exhibits are new ways for audiences to create and share their own park meanings beyond attending a traditional ranger program or reading passive exhibits.

Happy 100th Birthday!

Denali celebrated a century of protection and preservation and marked its 100th birthday on Feb. 26, 2017. Events included:

- Coffee with a Ranger – Informal, storytelling program to showcase the diversity of contributions park staff make to Denali and local communities, and highlight the unique lives of park rangers
- Human Hundred Challenge/Ranger-Choice programs – Commemorative challenge for visitors to get outside, get active, and log 100 miles of human-powered travel. The spirit of



Everyone loves cake!

Visitors to Denali had numerous opportunities to celebrate the park’s 100th birthday in 2017.

the challenge was to get people outside to experience Denali in new, fun, and active ways.

- Humans of Denali Social Media Campaign – Show a different perspective of Denali beyond the beautiful vistas and magnificent wildlife. Sharing stories of Denali’s staff, locals, and visitors provides a positive and unique way for Denali’s social media followers to relate.
- Summerfest – Live music and hands-on activities led by rangers from most of the divisions; volunteer event (Dandelion Demolition); information tables with giveaways by National Parks Association and Subaru to highlight the Zero-Landfill Initiative (ZLI); awards ceremony recognize ZLI Ambassadors; a Denali 101 Ranger-Led Hike; and cake.
 - Talkeetna Birthday Party! Party! – Celebration of Denali’s 100th and Walter Harper Talkeetna Ranger Station’s 20th birthdays. Events included a river clean-up, interactive activities, live music and cake!
 - Historic Film Series – Films featuring historic footage of the park, people and places.



Cyclic herbivores including snowshoe hare, red-backed vole and willow ptarmigan were all in the higher phases of their abundance cycles in 2017, providing ample food supplies for Golden Eagles, Gyrfalcons, Short-eared Owls, Northern Hawk Owls, Great-horned Owls, and Long-tailed Jaegers in Denali. This resulted in a boom in the number of these species, and Denali visitors were treated to frequent observations of all of these species. This Short-eared Owl nest, look closely for the owl looking back at you, was discovered by park scientists near Sable Pass.

Avian Ecology

The last three years (2015-2017) were exciting and productive for birds and bird studies in Denali. The capacity of Denali's Avian Ecology Program grew to include Laura Phillips (permanent ecologist), Emily Williams (term, avian ecologist), and Tucker Grigsby (seasonal biological technician), resulting in an increased ability to protect and conserve Denali's birds through research, science-based management and public outreach. Additionally, program lead Dr. Carol McIntyre was elected a Fellow of the American Ornithologists' Union in 2016 for her exceptional and sustained contributions to ornithology. Our team continued to collaborate with other Denali divisions and staff to address park-specific management needs, and other federal and state agencies, universities and non-governmental organizations on a wide variety of inventory, monitoring and research programs.

Over the past three years, long-term studies conducted as part of the NPS Central Alaska Monitoring Network's Vital Signs Program continued to expand our understanding of Denali's fauna and ecosystems. We found that while Golden Eagle reproductive success generally tracks prey abundance (hares and ptarmigan), it does so in a lagged fashion. This result provides further evidence that bottom-up (primary production) rather than top down (predation) forces are the dominant drivers in this system. In the companion paper that includes data from additional long-term studies in Denali, weather-driven change in primary productivity explains variation in the amplitude of two herbivore

population cycles in a boreal system. We detailed the effects of weather and primary productivity on cyclic vole and hare population dynamics in Denali. Together these two papers help us to better understand predator-prey dynamics and variation in the Denali ecosystem.

The Denali golden eagle monitoring program celebrated its 30th year in 2017, with 72 breeding pairs of eagles producing 84 fledgling, a new high for the study (thanks to an abundance of hares and ptarmigan). These collaborative studies provide new information for the management of migratory Golden Eagles in and from Alaska. Results from Denali's long-term golden eagle studies will be highlighted at the Draper Natural History Museum's new Monarchs of the Skies: the Golden Eagle in Greater Yellowstone and the American West exhibit, scheduled to open in June 2018. Long-term data on Gyrfalcon nesting success, collected simultaneously by the eagle program, is being contributed to a circumpolar effort of the Arctic Falcon Specialist Group to identify trends and status of Gyrfalcons through a new collaboration of the Conservation of Arctic Flora and Fauna (CAFF), the biodiversity group of the Arctic Council. Further, long-term data on willow ptarmigan, a primary prey species of Gyrfalcons, will assist a new international effort of CAFF's Circumpolar Biodiversity Monitoring Programme to identify the trends and status of ptarmigan populations across their circumpolar ranges.

With support from Alaska Geographic, the Denali Education Center and Camp Denali, NPS scientists and their collaborators including Scott Weidensaul and Dr. Iain Stenhouse, (Biodiversity Research Institute) launched the Critical Connections Program in 2015 to document the annual cycle movements of a suite of migratory passerine birds that nest in Denali. In 2015 and 2016, scientists deployed 137 tiny lightweight archival data-logger tags on migratory birds. In 2016 and 2017, we recaptured a sample of those individuals to retrieve the tags. This included recapturing the first geo-tagged Arctic Warblers, which nest in Denali and winter in SE Asia, in North America. The tiny tags will provide essential information about the movements of migratory passerine birds across their annual cycle, including trans-continental and trans-hemispheric migrations, and expand our capacity for collaborative management efforts. As part of the Critical Connections Program, we are also tagging American Robins in collaboration with TurdusNET, a program researching the life history strategies of Turdus thrushes across North and South America.

We also launched two new avian research projects in 2017. In response to concerns by local citizens, Avery Meeker under the guidance of his advisor Dr. John Marzluff, University of Washington, is studying the potential displacement of alpine nesting birds along the road.

Resource Management



Denali's Critical Connections Program exemplifies team work. Pictured here are members of the inaugural team from left to right, Jason Reppert (NPS biological technician), Carol McIntyre (NPS wildlife biologist), Jill Boelsma (Denali Education Center), Laura Phillips (NPS ecologist), Iain Stenhouse (Biodiversity Research Institute), Scott Weidensaul, and George Gress (The Nature Conservancy)

This study is also providing some of the first information on the nesting ecology of Whimbrel, Surfbirds, American Golden Plovers and Long-tailed Jaegers in Denali since the studies of Joseph Dixon in 1926 and 1932 and Adolph Murie in the mid-20th century. Another new collaborative study focusing on Gray Jay ecology is underway with Dr. Marzluff, Dr. Ryan Norris, University of Guelph, and Dr. Sandra Talbot, U.S. Geological Survey Science Center. In this collaborative study, scientists are exploring how Gray Jays, one of Denali's most common resident species, are responding to rapid changes in their environment. Science-based education and outreach is a critical component of Denali's avian ecology program. During the last three years, staff actively participated in many regional, national and international bird conservation and

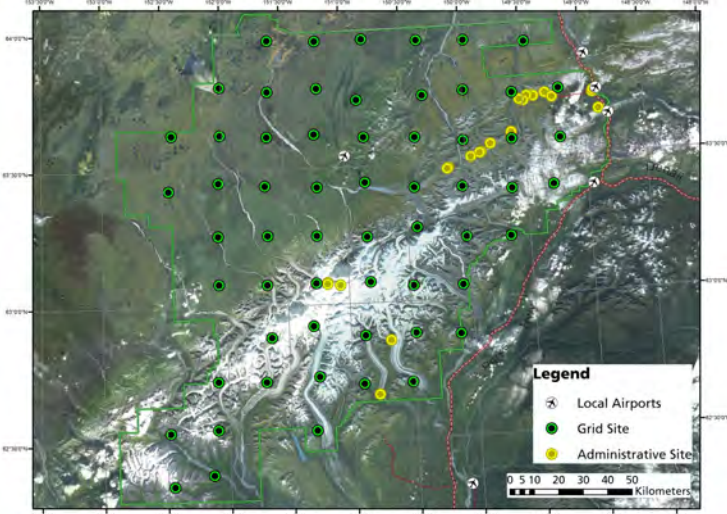
management groups including Boreal Partners in Flight, the Alaska Raptor Group, the Alaska Shorebird Group, the NPS Avian Avifauna Community of Practice program, The Wildlife Society, and the Raptor Research Foundation and in the Alaska Region's 2016 Centennial Science Symposium. We offered multiple public presentations, guided bird walks, and Alaska Geographic Field Seminars.

In 2017, we completed the Denali Avian Ecology Program's Science-education and Outreach Plan and Denali celebrated the revival of Denali Bird Day in conjunction with International Migratory Bird Day with guided bird walks and a bird trivia event. We have increased our science-based outreach efforts with a revamped web presence and the launch of an interactive, hands-on education program at TriValley School in Healy.



Researchers are studying the nesting ecology of many of Denali's alpine tundra nesting species, including American Golden Plovers.

Denali Acoustic Inventory, summer sites 2006 - 2015



More than 60 locations were sampled as part of Denali's Acoustic Inventory (2006-2015)

Acoustic Resource Management

"It's the great, big, broad land way up yonder,
It's the forests where silence has lease;
It's the beauty that thrills me with wonder,
It's the stillness that fills me with peace"

– from 'The Spell of the Yukon', Robert Service, 1916

One hundred years after poet Robert Service famously rejoiced in the natural soundscapes of the subarctic, Denali has made a significant contribution to understanding them. In 2015, staff completed a decade-long acoustic inventory which documents the natural acoustic environment over the entire extent of the park. To accomplish this, park staff collected sound pressure data on a randomly sampled 20x20 kilometer grid (along with a number of non-random, administratively-determined locations).

Denali's inventory project used technology and sampling protocols developed in part by the NPS Natural Sounds and Night Skies Division, and is the most scientifically rigorous in NPS history. The resulting baseline data will provide the park an unprecedented ability to monitor acoustic conditions through time. Such knowledge is critical to informing decision-making processes related to potential impacts. In addition, other parks and Federal lands throughout the country will also likely benefit from the inventory Denali has completed – the data set contains information related to many methodological, ecological, wilderness, and planning topics.

Botany

Program staff released a new public-facing website "An Ecological Atlas of Denali's Flora" that serves a large compendium of taxonomic, ecological, and geographic information about nearly 400 of Denali's plant species along

with descriptions, charts and graphs, and maps showing their distribution in the park. This is the culmination of two decades of work.

Staff also released the DenaliFlora app, which allows visitors to identify the common plant species in the Park Road corridor using an interactive random-access key with photographs and descriptions of these species.

In 2017, we upgraded the existing "Exploring Landcover Change Through Repeat Photography" website, making it more mobile-device friendly, and adding new features and many new photo-pairs from 2016 fieldwork.

Program staff received funding for large-scale analysis of patterns in woody plant dynamics across all NPS units in northern Alaska (including Denali) through a national Cooperative Landscape Conservation fund source competition. Work will begin in fiscal year 2018.

Program staff received funding for Murie Science and Learning Center research grant to compile and analyze historical/current photo pairs to classify changes in vegetation over time, and perform a statistical analysis of these image classifications for the same purpose. We initiated a collaboration with Dr. Jedediah Brodie, University of Montana, to pursue this project. Fieldwork in 2016 reproduced a series of historical photographs procured from archives all over the state of Alaska.

Staff completed the first comprehensive evaluation of the effects of Park Road dust suppressant on soils and vegetation adjacent to the road. This Natural Resource Technical Report series publication summarizes the results of monitoring work from 2005-2016.

Entomology

Denali has been collaborating with scientists at the University of Alaska Fairbanks (UAF) to examine arthropod communities along elevational gradients throughout park, with a special focus on forest, shrub and tundra habitats. Arthropods in the study include a variety of pollinators (bees, butterflies, and flower flies), as well as ground-dwelling arthropods (beetles, spiders, ants). The project is funded for five years, and 2016 was the pilot season to establish sites and develop protocols.

In 2017, a full crew including Denali's entomologist, two interns, an entomologist from UAF (Derek Sikes) and his graduate student, visited 15 plots between Mt. Healy and Kantishna every other week from mid-June and mid-August to collect arthropods in a variety of traps. Microclimate loggers were deployed for the same period of time at each plot to measure air and soil temperature. High numbers of snowshoe hares wreaked havoc with the traps at many sites, requiring several modifications in trap design!

The pollinator catch has been dominated by bumble bees, and we have documented 17 species in Denali. This includes one species, *Bombus kluanensis*, which is new to science

and known only from Denali and the Kluane region of the Yukon. The project has two more field seasons, and is sure to provide lots of novel information about arthropod diversity and distribution across habitats, temperature gradients, and elevations in the park.

Outreach has also been a project priority, and in 2017 we participated in numerous activities including: Summer Science Academy, Discovery Camp, bus driver trainings, interpretive training, Centennial celebrations, and an Alaska Geographic field seminar, co-taught by entomologists from Denali and UAF.

GIS: New Height for Denali

In June 2015, a GPS survey was conducted on the South Peak of Denali to determine a new elevation of the mountain's height. The most widely accepted height of Denali's south summit is often cited as 20,320 feet and was derived from a 1953 photogrammetric survey. More recently, data acquired over the area of the peak suggests a height of 20,237 feet. To address the difference in height, a survey party used modern GPS survey equipment and methods along with a better geoid model to gain an elevation measurement with a higher level of estimated accuracy.

The survey party consisted of four climber-researchers: one from the University of Alaska Fairbanks and three from CompassData (a subcontractor of Dewberry). The US Geological Survey (USGS) and the National Geodetic Survey (NGS) provided funding, while the University of Alaska Fairbanks (UAF) and the National Park Service provided in-kind support. Technical survey protocols were agreed upon by the partners before the survey commenced. Dewberry, NGS, and UAF will post-process the data separately and will compare results at the beginning of August. Once the partners agree to the results, additional information will be released.

Fire

There were 16 wildfires in Denali in 2015, which is the second highest number of discovered wildfire in recorded history (1946 – 2015). 2015 also recorded the second highest number of acres burned by fires that were discovered within or outside the Park/Preserve boundary that burned into the Park/Preserve. The 2015 fire season started off mid-May with indications of being a potentially extreme season with fire danger conditions very high throughout much of the Park/Preserve. Approximately 61,000 lightning strikes occurred statewide in a seven day period (June 19 – June 25). Eleven of the fires in Denali started during this time period. The largest fire of the season was the Carlson Lake fire (46,545 acres) that burned across and into previously burned areas. After the first week of July, and through the remainder of



GPS survey conducted in May 2015 on Denali's South Peak to update height of the mountain.

the fire season, regular precipitation events moderated fire growth. Two fires that merged, the Bear Creek fire, burned within five miles of the community of Kantishna. Unique to 2015 were the number and size of the fires near the Alaska Range. Wildfires are frequent in the lowland portions of Denali. While vegetation types near the Alaska Range support fire growth; wildfires are relatively rare in the uplands portions of northwest Denali. Four of the 16 fires were located in the uplands portions. Denali had four prescribed fires in 2015. Fuel (vegetation) management around structures was conducted in the developed and backcountry areas of Denali to create "defensible space" around structures. Creating a defensible space includes clearing all flammable vegetation within 30 feet and thinning vegetation that lies within 30 feet to 100 feet of the structure (cutting trees and other vegetation and removing lower tree branches). Defensible space reduces the risk of property damage in the event of a wildland fire and improves safety for visitors, residents, and firefighters.

The 2016 fire season in Alaska started early, with numerous human starts in April. The early spring was followed by a warm, but very wet summer in much of the interior Alaska, which resulted in relatively low number of acres burned for the year statewide. By the end of the season, a total of 573 fires were reported and 500,794 acres burned statewide for Alaska in 2016.

The lone wildfire in Denali was located just northeast of Kantishna, in the Glen Creek drainage. A decision to suppress the fire was made due to its proximity to private land and sensitive resources near the Glen Creek airstrip. The early season start date and the potential to incur undue risk to public and private resources through the course of the fire season contributed to the decision to suppress the wildfire. Denali had three prescribed fires in 2016. Fuel (vegetation) management around structures was conducted in the developed and



Castle Rock Fire on June 24, 2015

backcountry areas of Denali to create “defensible space”.

The 2017 fire season proved to be a relatively normal season, with hot and dry spells balanced with periodic rainfall that moderated fire activity in Alaska. The season began slowly with few fire starts in May due to lingering snowpack but steadily increased into June. The majority of the acres burned occurred in July with temperatures in excess of 90 degrees and strong winds in the eastern Interior of Alaska. End of season rains began in early August, slowing fire season to a halt. Though Alaska recorded one of highest number of lightning strikes in 2017, precipitation and high fuel moistures limited ignitions and fire growth. By the end of the season, a total of 362 fires were reported with 653,147 acres burned, falling below the ten year average of approximately 1.2 million acres but just above the median annual area burned. The single wildfire in Denali National Park and Preserve was located north of the confluence of the Muddy River and Birch Creek, west of Starr Lake. Despite the fire starting in the early season portion of the fire season due to the numerous natural barriers in the area the fire was managed for natural resources objective. The fire was monitored frequently due to the inholdings in the area to determine if suppression actions may be warranted through the duration of the wildfire. The wildfire received sporadic precipitation events in the days following discovery and was declared out on June 2. Denali had one wildfire and one prescribed fire in 2017. Fuel (vegetation) management around structures was conducted in the developed and backcountry areas of Denali to create a “defensible space” around the structures.

Fire Ecology

In 2015 and 2016 some fires in Alaska parks burned into recently burned areas, leading to the question of the longevity and effectiveness of recently burned areas effective fire breaks or fire-slowng conditions. Fire managers and

park staff were interested to know what burned and the potential impacts of the shortened fire return interval on the landscape. In 2016, the NPS Alaska Region Fire Ecology program partnered with the U.S. Geological Survey and U.S. Fish and Wildlife Service in a preliminary study to assess the: 1) extent and trends in repeat fire (reburn) in Alaska; 2) characteristics that allow older fires to act as fuel breaks for new wildfires; and 3) evaluate the impacts of shortened fire return intervals and reburns on vegetation succession and composition. The 2015 Carlson Lake fire in Denali burned into the 2000 Foraker fire (and other fires) and burned eight plots that had been established after the 2000 fire. In 2016, the team measured seven of the eight plots that burned in 2015 and 2000, as well as four plots that only burned in the 2000 fire. Preliminary data has been summarized in the Regional Fire Ecologist annual report for 2016.

Note: Prescribed fire is a fire ignited by management actions under predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement. Prior to a prescribed fire, a written, approved prescribed fire plan must exist and NEPA requirements must be met.

Geology

- Satellite imagery – In addition to satellite imagery of collected by various government and commercial platforms, Denali received wide swaths of imagery from 2014-2017. Examples include, but are not limited to: the road corridor, mainly to monitor geohazards; and formerly mined areas to assist with ongoing and future reclamation. Much of this imagery has sub-meter resolution.

- Aerial photography and associated products – While traditional systematic aerial photography began in Denali in 1953 and continued into the 2010s, advances in technology have allowed a new generation of geospatial products. For example, digital aerial photogrammetry, also known as Structure from Motion (SfM), now allows for the rapid

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collection of not only orthorectified (corrected for scale) photos, but a range of products that include digital surface models (DSMs - digital representation of the Earth's surface and all items upon it). Other important products include elevation difference maps (DSMs of the same area but different time subtracted from one another) that show changes in topography, such as landslides. Beginning in 2014 and continuing through 2017, a commercial vendor has provided imagery from their version of SfM called "Fodar". Fodar imagery of the East Fork Bridge and Polychrome areas was first collected in 2014 to analyze changes in the river and landslides. Fodar imagery was collected for the entire length of the road corridor in 2015, 2016, and 2017. The imagery swath was 400 m wide on each side of the road with a resolution of 12 cm for orthophotos and 25 cm for DSMs. In addition, a much larger area (4,500 km²) of the Denali Park Road was delivered in 2016. In 2017, a smaller area (2,500 km²) was repeated allowing the creation of difference maps over a large area. Products are available on the GIS (X) drive and the ArcGIS Theme Manager.

- Geohazards – Geologic hazards, or geohazards have always plagued humans and our infrastructure in Denali. However, increased visitation and the effects of climate change have caused the problem to worsen in recent years. For example, the park has a long history of landslides causing substantial disruptions to transportation, access restrictions for private inholders, and concerns for public safety. In October 2013, the 180-m-long, 33-m-wide Igloo Debris Slide blocked the park road near Mile 38. Blocks of permafrost-frozen, unconsolidated debris as thick as 5 m and the size of a small cabin slid on a slippery, unfrozen clay that acted as the failure plane. Upon further investigation staff determined that there were numerous precursors to the event. As a result, geology staff launched a new effort in 2014 to proactively assess the park road for geohazards and incrementally reduce risk.

Denali geology staff created a new Interagency Agreement with the USGS to create a digital map and database of the surficial geology and associated processes along the Park Road corridor. The agreement, first implemented in 2017 will extend through 2022. Prediction of geohazards is impossible without knowledge of the substrate (e.g. the slippery clay at Mile 38) and past and current geophysical processes. This project will assist in identification and characterization of active and potential mass wasting and other hazards to infrastructure. Because appropriate maps are nonexistent, this project will create a foundation for geohazard prediction along infrastructure corridors. Additionally, various geochronology techniques such as cosmogenic isotope dating will be used to determine the age of surficial deposits that cover much of the park. These ages are important for determining when and how often past



The Pretty Rocks debris slide is shown as an example of composite imagery created through digital aerial photogrammetry.

geohazards have occurred and the extent of past glaciations and their rate of their retreat. These dates will provide a framework for ecological succession studies and allow regional correlation with other parks and adjacent areas. Denali geology staff established a new CESU agreement with Colorado State University to use a combination of field mapping and measurements, remote surveys, and modeling to quantify the frequency, location, and ecologic impact of mass movements in the park. The agreement, first implemented in 2017 extends through 2020. Results of this study will address the effects of ongoing permafrost degradation and climate change on the type, magnitude, and frequency of mass movements. In particular, the proportion of active layer detachment landslides may indicate a link between permafrost thaw and frequency of slope failure. Identifying geomorphic and lithologic variables associated with areas of high mass movement frequency will inform hazards management in the park, throughout Alaska, and other high-latitude environments. Additionally, calculation of the volume of material mobilized by mass movements in permafrost environments will quantify lateral fluxes of sediment and potential delivery to rivers in the Toklat and other basins. Source areas of sediment within the Toklat basin will be investigated.

U.S. Army Corps of Engineers, FHWA, and DENA geologists and engineers conducted a geophysical investigation on four sections of the park road to ascertain the presence and extent of subsurface features (e.g. bedrock) and anomalies (e.g. permafrost) impacting roadway infrastructure.

Monitoring of the Pretty Rocks Debris Slide at Mile 45.4 of the park road demonstrates that movement has sped up through time. The road surface dropped up to four feet between September 2016 and April 2017; an average of six inches per month. As a result, FHWA and park staff created

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a plan to drill, install instrumentation, conduct slope stability analyses, and develop conceptual designs to reduce or possibly stop movement of the Pretty Rocks Debris Slide. To obtain adequate subsurface data for stability analyses, we intend to install five test borings - two on the roadway within the slump mass and three below the road. These test borings will allow us to learn more about the substrate and slump displacement. For example, we need to know the location and physical characteristics of unconsolidated material, bedrock, permafrost, and massive ice. The slope monitoring equipment will measure ground displacement, temperature, rainfall, and groundwater level. Once we have collected appropriate data from the slope monitoring equipment FHWA and NPS engineers and geologists will conduct slope stability analyses that will provide information required for conceptual plans to reduce the risk of the Pretty Rocks Debris Slide.

FHWA and park staff have monitored many other geohazards along the park road corridor. Ongoing monitoring at numerous sites has resulted in conceptual risk reduction designs.

- Paleontology – Interest in Denali paleontology continues to grow as more discoveries have been made. The earliest geologists to work in Denali, Alfred Brooks and Stephen Reid Capps, found numerous plant fossils in the early 1900s. Paleontology popularity surged when a UAF geology student found the first dinosaur track in 2005 while at summer field camp (which is supported by DENA). Since that time numerous park partners and DENA staff have found many thousands of tracks, the first bones in 2016, and some of the best dinosaur trackways in North America in 2017 (possibly the best). This research has resulted in many publications (Fiorillo, et al., 2014a, b, and c). Further publications are likely from an ongoing (2015-2020) agreement with the University of Alaska Museum of the North paleontologist Pat Druckenmiller. This CESU agreement has brought together an international team of paleontologists and funded graduate student research in DENA.

- Gravel Mining – Sporadically since the 1980s and regularly on even years beginning in 2004, DENA maintenance staff have mined gravel from the Toklat River immediately north of the causeway and bridges. A 2003 EA determined limits and monitoring requirements. Since that time, maintenance staff mined 22,200 cubic yards of gravel during each “scrape” and geology staff informed scrape locations. Therefore, one scrape occurred in 2016. Building on active adaptive management techniques developed by DENA staff, scrapes were modified to minimize environmental impacts based on what we’ve learned through time. In 2014, we began to utilize a new mining paradigm that mimicked a wide variety of natural braided



Close up image of an extremely well preserved meat-eating dinosaur footprint in Denali National Park, July 2016. This track clearly shows the fleshy pads of skin in each toe and claw impressions.

river processes.

This new paradigm had favorable mining yields and natural processes quickly reclaimed past mining scars. During this time, we funded a multiple-year employee’s graduate research that largely informs and explains our current practices. We expect to continue using this technique for the foreseeable future.

DENA geology staff and contractors have annually monitored the Toklat River’s response to gravel mining, with detailed efforts in odd years. Staff and contractors used traditional surveying techniques to monitor and analyze areas affected by mining from 2003-2011. In 2011 a contractor used terrestrial LiDAR for monitoring. In 2013 and 2015 staff used Real-time kinematic GPS surveys for cost savings. In 2017, we began to monitor and analyze the area with high resolution aerial imagery.

Park staff worked with a large, interdisciplinary team to develop a paleontology display at the Murie Science and Learning Center that includes a mural, an assortment of fossils, a digital display, websites, and printed interpretive information. Denali’s Cretaceous Mural includes all dinosaurs known to have inhabited the park, key plants, and the appropriate Cretaceous landscape. The mural was completed digitally by Karen Carr, a world-class muralist, then printed. Therefore, the mural can be updated as our knowledge of the Cretaceous ecosystem evolves. Many individuals from several divisions, academic institutions, and museums actively participated so that the mural was accurate to the best of current knowledge.

We complemented the mural with a custom-built display of many fossils, some of which were newly collected specifically for this purpose. For example the first dinosaur (theropod) track, a large hadrosaur track with many

integrated coniferous plant fossils, and another rock with numerous angiosperm fossils are all professionally displayed under protective glass. Visitors are able to touch other fossils, such as bird tracks and horsetail (equisetum). We worked closely with the Interpretive Division to develop outreach materials. We created digital (e.g. trace fossils and climate) and print displays to complement the mural, both onsite and for remote visitors. We created three-dimensional models of several fossils with a technique called Structure from Motion (SfM). SfM builds 3D models using two-dimensional photos and their orientation relative to each other. We photographed each fossil from multiple angles to capture all of their different surfaces, then stitched the photos together using algorithm-driven computer software.

Road Ecology

The Road Ecology Program (REP) continued its oversight of two major programs, the monitoring commitments of the Early Road Plowing Environmental Assessment (signed 2013) and the monitoring commitments of the Vehicle Management Plan Environmental Impact Study (signed 2012). 2015 was a watershed year in REP: the program ceased its use of fleet-based, near real time reporting, GPS units on vehicles due to random and systemic GPS network and data errors. These data errors led to a change in monitoring methods – we reallocated funds earmarked for GPS data subscriptions to hire Biological Science Technicians in order to generate more field observations. This created youth employment opportunities when the REP team grew from one term and three seasonal staff to one term with six seasonal staff.

In 2016, methods of data collection changed once more. This shift from traditional handheld GPS units (Trimble Juno) to iPads streamlined postprocessing procedures and increased responsiveness to within-season data requests by management. Today, all data is collected using iPad units and the NPS-developed Park Observer Application.

Most VMP indicators have regularly met standards (wildlife stops, viewscapes, hiker wait times, and rest stops). Meeting sheep gap standards continues to be the greatest scheduling challenge for NPS and the transportation concession's management. Nighttime traffic standards are typically met when there are no nighttime projects (e.g. 2016) but are challenged in years with more west district construction projects. (e.g. 2015 and 2014).

Staff continuity has improved. For the past two summers, the crew leader has been Taylor Bracher and we have had field technicians return also, Alaina Bankston and Anna Kirk. This continuity has improved efficiency and allowed the REP team to diversify and increase their contribution to other programs such as monitoring parking along

controlled section of road, wolf scat DNA collection, hare pellet collection, informal and formal trail counter data collection and monitoring, and assisting the Natural Sound Program with equipment installations and removals. Over the past three years, REP has taken on four YCC, three SCA Academy members, and approximately 20 VIPs. REP is committed to providing valuable entry-level scientific experience to a diverse range of youth.

Grizzly Bear Monitoring

- 2015 – Park staff began monitoring to document the ecology of grizzly bears and movements on the northeast portion of the park, especially outside the north park boundary where they may be subject to legal harvest and possible future intensive management efforts by the State of Alaska. An attempt was made in September 2015 to retrieve collars from this study area to download and analyze location data. Capture of bears for collar retrieval was hampered by poor weather conditions; six of 15 collars were collected. Remaining collars were retrieved in 2016.
- 2016 – Earlier radio telemetry efforts show that grizzly bears initially encountered in the park spend some portion of their lives outside the park boundary. These data were acquired from GPS radio collars that were deployed on bears in 2013 and released in 2015. Efforts to deploy additional collars in May 2016 were hampered by a lack of available bears and only four collars were deployed. The 2016 collars are Iridium based and send location data to a computer every 10 days. These four bears also split their time in and outside the park.
- 2017 – A capture effort planned to deploy additional Iridium collars in May 2017 was hampered by lack of aircraft so bear capture was conducted in September. Eleven bears were captured with 10 Iridium and one store-on-board collar deployed. Full analysis of the data will be completed after September 2019 when the last of the collars are programmed to release.

Bear Management

Between May 30 and September 18, 2015, there were 61 bear-human interactions documented. These interactions were classified as 49 encounters and four incidents. Of the four interactions classified as incidents this season, one occurred in the frontcountry and three occurred in the backcountry. In 2015, there were 12 frontcountry interactions reported. Of all the interactions, two were considered incidents. One was an incident in which the bear got food. A total of 50 interactions occurred in the backcountry; three were considered incidents. Of the three incidents, only one involved property damage. Both the number of reported backcountry interactions and backcountry incidents decreased slightly from 2014.

Over the course of the 2016 season, 126 Bear Human Incident Management System (BHIMS) reports were collected along with two reports regarding bear caused human injuries. Nine were rated to be merely observations, where the reporting party saw a bear at a distance but the bear never noticed them. 117 bear encounters were reported where minimally, a bear noticed a human and its behavior changed in accordance. Reported bear behavior and subsequent management ratings were markedly different between frontcountry and backcountry reports. There were fewer reports of bear /human interaction filed for frontcountry areas than for backcountry areas, 40 and 79 respectively. However, 55% (22) of frontcountry reports were rated as an incident versus 15% (12) of reported backcountry interactions. Similarly, frontcountry BHIMS reports indicate 68% of bears displaying varying degrees of habituated behavior (ie. Tolerant, conditioned, and rewarded) and backcountry BHIMS reported 42%. Five reports indicated that bears were actually provoked by humans. Four of the five encounters described in the aforementioned reports occurred on the park road by both visitors in private vehicles and concession employees driving buses.

Two major incidents occurred this season in which people were injured by bears. Both incidents involved people day hiking and grizzly bears. One incident occurred in the backcountry and one occurred on developed trails in the Savage River area. The human injury incident that occurred in the backcountry involved a lone hiker that surprised a grizzly sow with cubs and suffered a defensive attack. This incident was determined to be the result of natural bear behavior. The surrounding area was closed for a week and reopened without further incident. The other bear caused human injury incident involved a sub-adult male bear and many hikers in a developed area.

The injury incident occurred as the result of prior less severe incidents earlier in the season. In the other incidents, there was a clear progression from a curious sub-adult bear testing boundaries to a bear that was rewarded with human food by approaching people to a bear that almost attacked a person and was subsequently destroyed. At every progressive stage of this major incident the bear encountered visitors that reacted incorrectly to the bear and the situation, ultimately leading to the destruction of the bear.

A wide range of bear behaviors were reported when backcountry travelers encountered bears in 2017. A total of 71 reports were collected from backcountry users, including both overnight and day users. The majority of the bear behavior that was reported in 2017 (51%) fell into “natural” bear behavior classifications.



Grizzly bears

A slight rise in “intolerant” behavior was seen in 2017 at 24%. A fairly drastic decrease in surprise behavior occurred at 7%. However, habituated behaviors were reported at fairly high rates also. In 2017 37% of reports indicated “Tolerant” bear behavior and 7% indicated “Conditioned” bear behavior. Although fewer reports were collected from backcountry users, tolerant behavior rose slightly from 2016 to 2017. Much like 2016, 86% of reported interactions were classified as encounters. In 2017 a total of 31 reports were collected describing bear/human interactions in the front country. Relative to 2016, 2017 was a more benign year for frontcountry bear human interactions. Of the 31 total reports, 55% of frontcountry bear/human interactions were indicative of habituated types of bear behaviors. Conditioned bear behavior occurred 29% of the time in the frontcountry in 2017. More than 65% of front country reports were classified as encounters.

Moose Monitoring

In 2015, Denali received funding to monitor moose every third year from the Central Alaska Monitoring Network. These funds are then matched with park funds to conduct a moose survey on the north side of the park. Denali was scheduled to conduct this north side survey in Fall 2014. The survey area covers all areas within the park on the north side of the Alaska Range. Due to lack of adequate snow conditions, the survey was cancelled. Partial funding was made available to attempt a survey of the same area in the fall of 2015. Sufficient snow and reasonable weather conditions allowed us to conduct the survey between November 16 and 29 though the western-most units of the survey area were excluded.

Results are as follows:

- Total units sampled = 111 (out of 653)

Resource Management

- Total area sampled = 657 mi² (out of 3863 mi²)
 - Total moose counted = 524 (71 calves/167 bulls/286 cows)
 - Preliminary Population Estimate = 2,109 moose
 - Preliminary Calf:Bull:Cow ratio = 27:68:100
- In 2016, no moose survey work was conducted.
In 2017, moose surveys took place between Nov. 14-Dec. 1.
Data analysis has not yet been completed.

Caribou Monitoring

- 2015 – Fall composition survey results for the Denali Caribou Herd were 24 calves:47 bulls:100 cows based on 1,338 caribou classified in October 2015. The Denali Herd continues to exhibit slow growth as result of improved calf recruitment since 2004 (2004-2015 average = 22 calves:100 cows) and an increasing bull:cow ratio. The population estimate for fall 2015 of 2,780 caribou is up from about 1,800 caribou during 1998-99.

- 2016 – The Denali caribou herd size estimate is 2,660 caribou for September 2016. During the past three years, winter snowfalls have been below average and adult female survival over winter has been very high, averaging 98%. The adult sex ratio is 38 bulls:100 cows. Adult sex ratios declined from an average of 56:100 during 1984-1989 to a low of 29:100 during 1997-1998 as a result of increased mortality of males during severe winters in the late 1980s and early 1990s, as well as limited recruitment of male calves. Bull:cow ratios have shown an increasing, but variable, trend since that low point, but are well below those at the beginning of the study. Productivity of cows \geq 1 year old was estimated at 72% in mid-May 2016. Calf production has varied from 59% in 1990 to 92% in 1994 and is largely influenced by the number of yearling recruits, the highly variable productivity of 2-year-olds, and the proportion of older females in the herd. During October 2015-September 2016, an estimated annual mortality rate was only 5% for adult females, lower than the long-term study average of

11% (range of annual values = 2-23%). Females \geq 13 years old made up 10% of the population, declining from a recent peak of 22% in 2008.

- 2017 – Currently 100 radio-collared caribou, including 93 adult females and 7 adult males are being monitored. The preliminary herd size estimate for September 2017 is 2,960 caribou; that number will be adjusted and finalized based on results of the 2018 census. The Denali Herd appears to have increased at about 7% per year since the fall of 2013. During these 4 years, winter snowfalls have generally been light and adult female survival over winter has been very high, averaging 98%. Caribou numbers are higher than they have been since 1990.

Wolf Monitoring

- 2015 – A total of 17 wolf captures occurred in March and October. Eleven captures were of previously uncollared wolves, two captures were to replace aging collars and four captures were to replace accelerometer collars that were scheduled to drop in mid-October. These four wolves were re-collared with collars that will not drop off as they appeared to be stable members within the packs and in one case, a founding member of a new pack. There were nine collared wolf mortalities in 2015 with two human caused mortalities. A total of seven out of 10 packs denned, producing a total of 48 pups, an average of eight pups per pack in 2015. Bridget Borg, a Pathways Student Intern, earned her Doctorate in Biological Sciences in August 2015 with a dissertation entitled, “Effects of harvest on wolf social structure, population dynamics, and viewing opportunities in National Parks”. After completion of her Pathways Internship, Bridget was converted to a permanent Wildlife Biologist position in November 2015 and took over management of the wolf research project.

- 2016 – Ten wolf packs were monitored in the Denali study area and 68 aerial tracking flights were flown to record wolf pack locations, locate den sites, and obtain pack counts and estimates of pups produced. Information from these flights also documented wolves feeding at 11 moose carcasses, three caribou carcasses and two carcasses of unknown species. Nine wolves were captured and collared in 2016, including two recaptures of wolves previously collared. Eight collared wolves died in 2016; three from human causes mortalities and five from natural causes. Eight out of nine packs denned and one pack was suspected to have denned. We estimated that 29 pups were born to monitored packs and survived to the fall. In addition to addressing long-term monitoring objectives, in 2016 Denali continued collaboration on several wolf research projects. A multi-park project with Yellowstone, Grand Teton and Yukon-Charley is



Bull moose

investigating the impacts of harvest on wolf packs that primarily reside within National Parks or Preserves. Denali's part of this project has focused on obtaining detailed pack compositions data from genetic sampling and through photos. Additionally, we continued to collaborate with Dr. Laura Prugh and Master's student Kaija Klauder on a project investigating mesocarnivore-wolf interactions. We supported and promoted the development, deployment, and use of mobile application (Map of Life, <https://mol.org/>) that enables visitors to record wildlife sightings along the Denali Park Road. In 2016, over 200 citizen scientists downloaded and used the app to track wildlife sightings in Denali. A recent change in hunting regulations allowed for the taking of brown bears at bait stations, along with the lengthening of the wolf hunting season to May 31, exposed wolves that are attracted to bait stations to increased harvest pressure in the Stampede corridor within Game Management Unit 20C.

The National Park Service submitted an agenda change in 2016 to request that the Board of Game consider closing the wolf hunting season during the overlap with the bear baiting season. The proposal was approved by the Alaska Board of Game in March 2016 and beginning in 2017, the wolf hunting and trapping season now closes on April 15.

- 2017 – Ten wolf packs were monitored in the Denali study area. Eight new wolves were collared, including wolves from the East Fork, Grant Creek, Myrtle, Riley Creek, Bearpaw, Eagle Gorge, and John Hansen packs. Two wolves were recollared: a female in the McKinley Slough pack and a female in the Bearpaw pack. Four packs denned and produced 20 pups, an average of five pups per pack. Three collared wolves died in 2017, all of natural causes. In 2017, Denali's wolf program collaborated on several projects. At the March 2017 Board of Game Meeting, Denali National Park submitted a proposal to the Alaska State Board of Game to close areas adjacent to the park to wolf hunting and trapping, based on our research. We found that the probability for wolf sighting during the period a buffer was in place was twice that of the periods when the buffer was absent. The Board of Game rejected the proposal.

Dall Sheep Surveys

- 2015 – Park staff conducted a ground-based sheep survey June 8-9 on Mt. Margaret, Mt. Wright, Cathedral, Igloo, and a road survey from mile 15 to mile 66. A total of 152 total sheep were counted with an estimated 36.21 lambs per 100 ewes (ewe-like). The 2015 aerial survey included Primrose, Mt. Wright, west of Teklanika Canyon, Cathedral, Igloo and the East branch of the Toklat. We counted a total of 212 sheep in 23 bands, which included 104 ewe-like, 31 lambs, 72 unclassified rams, and five unclassified sheep.



Wolf

Lamb:ewe ratio was 29.8 lambs per 100 ewes or ewe-like.

- 2016 – Park staff conducted a ground based sheep survey on Mount Margaret, Igloo, Cathedral, and a road survey between mile 15 to 66 with a total of 41 sheep and an estimated 50 lambs per 100 ewes (ewe-like) sheep. The 2016 aerial distance sampling survey covered a large portion of the northern side of the Alaska Range, similar to the 2015 aerial distance sampling survey. During the 2016 aerial count, we counted a total of 79 sheep in 22 bands, which included 32 ewe-like, 10 lambs, 25 sub-curl rams, and 12 full-curl rams. Lamb:ewe ratio was 31.25 lambs per 100 ewes or ewe-like.
- 2017 – Park staff conducted a ground based sheep survey on June 8-9 on Mt. Margaret, Mt. Wright, Igloo, Cathedral, Sable/Tattler, with a road-based survey from mile 15 to 62. A total of 163 sheep were counted with an estimated 44 lamb per 100 ewe (ewe-like) sheep. The 2017 aerial distance sampling survey covered a large portion of the northern side of the Alaska Range, similar to the 2015 and 2017 aerial distance sampling survey. 2017 aerial distance sampling numbers are pending analysis.

Social Science

- 2015 – Visitation recorded this year: 560,757. The *Social Normative Study of Backcountry Visitors to Denali National Park and Preserve Natural Resource Report* was delivered to NPS by a team of researchers from Penn State. Davyd Betchkal, Denali's Soundscape ecologist, was an integral part of the study. He established sound stations and provided technical expertise in interpreting acoustic data. The aim of the study was to establish visitor norms (acceptability) of anthropogenic sounds in the backcountry during their visit. Acoustic data and survey data were matched by backcountry site, including: Base Camp, Triple Lakes Trail, and Wonder Lake. While the majority



Dall sheep

of backcountry visitors had a low tolerance for aircraft noise during their wilderness experience, mountaineers on Denali said hearing aircraft had a positive effect on their experience. The *State of the Backcountry* report led by Rob Burrows and Jessica Toubman in Resources division recorded informal trail trends in the backcountry, and visitor numbers on informal trails and frontcountry trails.

- 2016 – Visitation this year rose to 589,412; which is an increase of 5% from 2015, keeping with the overall climb in visitation over the years in Denali.

Southside airtaxi/scenic flight passenger counting improved with introduction of new counting protocol and a *Southside Scenic Flight Report* was completed and is available with other resource management reports.

The *Multi-level Values of Visitors and Backcountry Tracking Study* was completed in 2016. More than 700 surveys were completed with a response rate of 90%. Visitors were intercepted at the Backcountry Information Center, Train Depot, Denali Visitor Center, and Riley Creek Campground. Visitors were asked to describe values they hold of the park, and allot them on a map of the park. Spatial clustering of values were along the road at primary landmarks: Toklat, Eielson, Wonder Lake. Backcountry visitors distributed their values more broadly. All visitors targeted Denali as a key value source. Results found that individuals' cultural value orientations were primary drivers of preference and experience in the park.

The *Backcountry Visitor Experience Pilot* study, led by Rose Keller, social scientist, was completed in Sept. 2016. The pilot was conducted primarily know how to better capture overnight and day hikers in Denali, in order to record their backcountry experience and inform the encounter standards for the Backcountry Management Plan. Key among the pilot study findings was that use of social media to plan backcountry trips was correlated with a lower need for solitude in a wilderness experience.

This finding stimulated a deeper look into media use effects on visitor experience in the full scale study planned for 2017. The pilot study report will be compiled in 2018 together with the larger Backcountry Visitor Experience and Backcountry Indicators report.

The pilot study findings were presented at the NPS Alaska Centennial Symposium in October 2016; the material is available in the Symposium proceedings published by the NPS Alaska Region Office.

The *Map of Life* citizen science study was completed by Heather Fischer, PhD student from Univ. of Arizona.

The study tested visitor's knowledge of basic ecological knowledge and experience of Denali Park before and after using a citizen science wildlife-inventory tool, Map of Life, during their bus trip into Denali. Visitor knowledge did improve with use, and importantly, their level of connection with the park and its ecosystems was substantially deepened (self-reported).

Denali submitted the Biosphere Reserve Periodic Review Report to UNESCO and received approval for continued designation as a Biosphere, ensuring future participation in the Man and Biosphere (MAB) program.

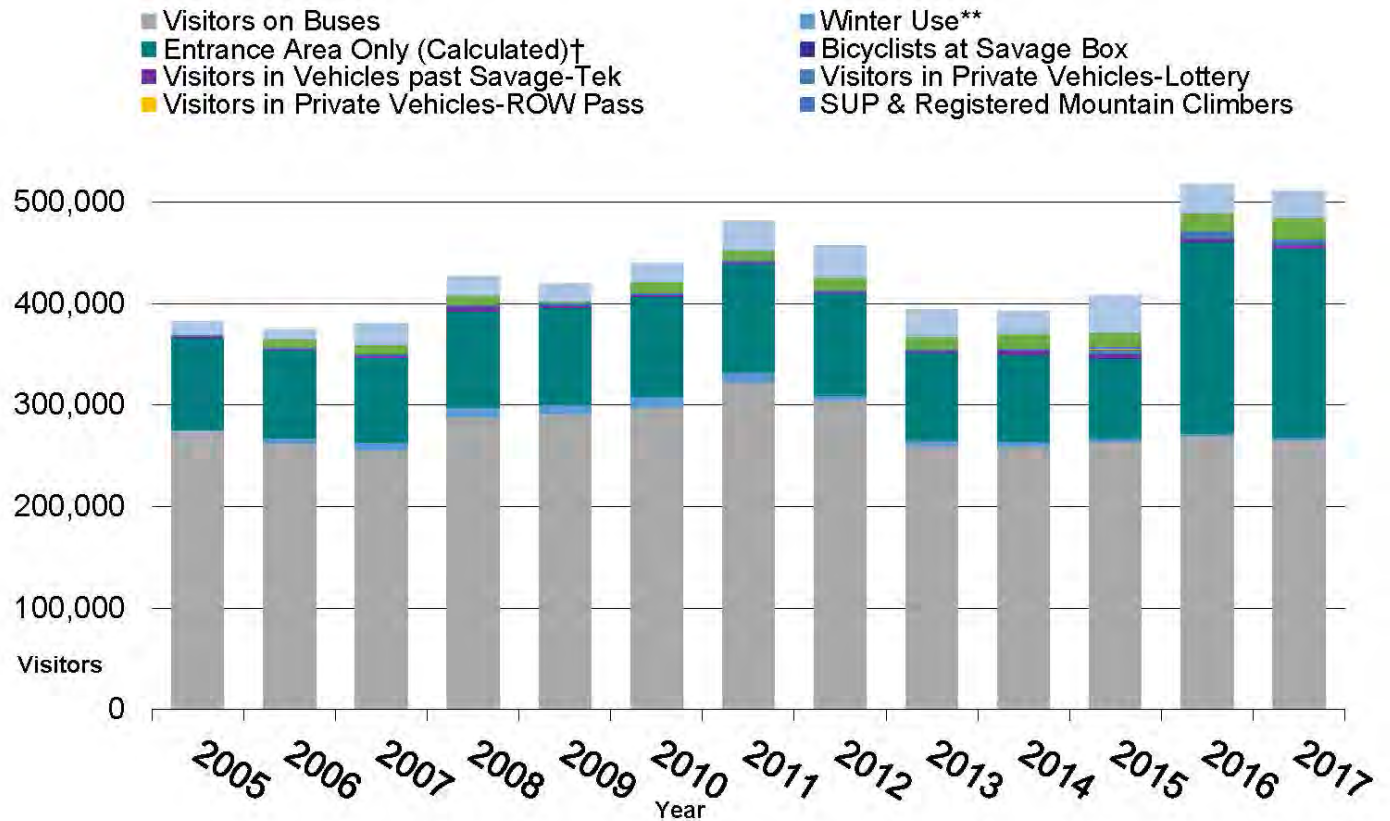
This report was the fulfillment of a long-delayed need of the UNESCO MAB program, which requires a periodic review of the Biosphere's functioning every 10 years. The first review submitted to UNESCO from the founding of Denali Biosphere was in 2013 and rejected. This was a second and full scale attempt to preserve Denali's Biosphere designation. The Denali Biosphere Reserve is a significant designation. In the Denali Foundation Statement, participation in UNESCO MAB is a special mandate of the Park, to follow UNESCO guiding principles of preservation of unique ecologies, and the recognition and support of high functioning, traditional, human-ecological systems.

- 2017 – Visitation this year totaled 642,809; a 9.4 % increase from 2016.

The *Winter Visitor Experience* interdisciplinary study launched in 2017 and continues into 2018. The road ecology program and winter visitor center staff cooperated with social science to administer visitor surveys and conduct roves of the park road. Results show that winter visitors are on average lower income, more independent and proportionally more diverse than Denali's summer visitors. 28% of winter visitors were Alaskan, and a total of 85% from the U.S. and Canada. Asian international visitors are increasing, but primarily visit from the lower 48 states (students in U.S. institutions on holiday). Other international visitors comprise 15% of visitation. 50% of visitors sampled did not know of the road access to Mountain Vista. 28% of visitors interviewed (post survey) stated they did not know the park was open. Visitors learned of the park/road opening on arrival or learned from

Visitor Statistics and Trends

2000-2017



tourist information sources upon arrival in Alaska. The *Backcountry Visitor Experience* survey launched in May 2017. The survey targeted overnight and day users of Denali's backcountry to assess their wilderness experience, perspectives on the quality of wilderness in Denali, and where they went during their backcountry trip. Each visitor sampled recorded impacts to the landscape they observed, encounters with other park visitors/rangers they had, and what they heard (anthropogenic sounds) during each day of their trip (or during their one day in the backcountry). Results will be released in 2018.

The *Frontcountry Visitor Acoustic Norms* study launched and completed in 2017; the partner to the backcountry acoustic norms study conducted in 2012. The study was led by Peter Newman and Lauren Abbott from Penn State through a CESU Cooperative Agreement. This survey targeted visitors in the front country sites of the DVC, Horseshoe Lake Trail, and Mount Healy Overlook Trail, and asked them to listen to soundclips (dose response method)

or record what anthropogenic sounds they hear.

Visitors then rated their acceptability of each sound, and tolerance for amount of each anthropogenic sounds / day; minutes/ hour. Results show that visitors generally tolerated propeller aircraft noise at three minutes per hour with slight annoyance.

The *Visitor Waste Behavior* study for the Zero Landfill Initiative was completed by a team from Penn State, and the Leave No Trace Center (Forrest Schwartz, Derrick Taff, and Ben Lawhon). Observations of visitor behavior around recycle and trash stations were coupled with surveys. Visitors reported their opinions of recycling and environmental stewardship and their perception of how they behaved (with waste) within the national park. Self-reported perceptions, coupled with observations of what surveyed visitors actually did with waste materials, will allow us to improve recycle station placement and messaging that aligns how visitors feel they recycle to facilitating actual recycle behavior.



Culture Camp participants excavate in a large structural ruin at a historic archaeology site in Talkeetna.

Archaeology

In FY15-FY17, the cultural resources archaeology program at Denali recorded 53 new sites, an 18.4% increase in the number of known sites, bringing the total number of known sites in Denali to 341. During Section 110 survey 2,669 acres were surveyed.

• Teklanika West Field School

In conjunction with the Murie Science and Learning Center and the University of Alaska Museum of the North, Denali offered a two week culture camp at the Teklanika West Site in 2015. The objective was to continue previous excavations at the site while introducing students to sub-arctic Alaska prehistory and archaeological field methods. The Teklanika West site has been used by people for 13,200 years and is one of the most important archaeological sites in Alaska. Thirteen students received training in archaeology ethics, field methods, and the cultural chronology of Interior Alaska.

• Talkeetna Culture Camp

Denali hosted a 13-day Archaeology Culture Camp at a historic archaeology site in Talkeetna in 2015. The site was owned by the Nagley family originally and contained the remains of several structures as well as pit features. The culture camp students focused excavation on the largest structural ruin (which was destroyed due to parking lot construction). Their findings indicate that the structure was a residence. The artifacts recovered from the site indicate the site was inhabited during the 1920s and 1930s and abandoned sometime around 1940.

• Birch Creek

In FY15, Denali staff traveled to the Birch Creek Site to assess the erosion rate and estimate future erosion concerns. The goal was to fulfill the park's obligations under the Native American Graves Protections and Repatriation Act (NAGPRA). In 2016, Denali staff traveled with Native Elders and a ground penetrating radar (GPR) specialist to the Birch Creek Site to relocate graves that may be threatened by erosion. Preliminary GPR results show at least 12 graves at the site (more than were previously thought to be at the site). The work was foundational for a culture camp where the graves will be rehabilitated. Rehabilitation of the graves is planned for 2018.

• Native Place Names Survey

The summer of 2016 marked the first field season of a three-year archaeology survey to identify and explore areas with known Native Alaskan place names. The survey investigates areas identified by Athabaskan community elders as historically important due to traditional use patterns, and ethno-historical research as factors indicating a high probability of cultural and archaeological sites. Three areas were surveyed; the upper the Herron River, glacial features near the upper Foraker River, and Lake Chilchukabena. In 2017 glacial features to the east of the Swift Fork of the Kuskokwim were surveyed. More than 1,500 acres were surveyed and eight newly identified archaeological sites were recorded. Of the newly recorded sites, six are historic-era and two are prehistoric; one of the historic-era sites is an isolated artifact and one of the prehistoric sites is an isolated lithic artifact.

Resource Management



Chuck Holmes, Jane Bryant, and Diane Gudgel-Holmes discuss native place names at Friday Creek Camp.

Also during the survey, moose and bison bones were found eroding out of a bluff face on the Bear Paw River. The site they were found at (MMk-088) was first recorded in 1987 as containing bison skulls and is one of only four locations known to contain bison bones in the park. Since 1987 dramatic fluvial and colluvial erosion has reshaped the project area; a rib bone (from a bison or moose) was found on a gravel bar downstream and likely eroded out of the site. This trend is likely to continue, particularly with widespread permafrost thaw in the area. Fossils from the Bearpaw site and other Pleistocene deposits found in DENA belong to extinct mammals like steppe bison and mammoth.

- Shellabarger Pass Archaeology Inventory

In 2016 and 2017, NPS archaeologists completed two field seasons of a four-year cultural resources inventory and assessment project in Shellabarger Pass, in the southwest corner of the park. Interesting natural features were recorded during the survey (in addition to the archaeological sites), including caves, a sulfur spring, and multiple ice patches. The crew conducted pedestrian survey and limited subsurface testing in areas with high potential for archaeological resources including limestone landforms and exposures on glacial moraines. Sites recorded consist of surface lithic scatters on exposed glacial moraines, one rock shelter site, and one historic era site. The rock shelter tested positive for cultural materials. The lithic scatters included

waste debris from stone tool manufacturing, a chert scraper, and a lanceolate point. The historic site consists of a small spice jar holding several wooden matches believed to date to the 1950s. A number of ice patches were examined in 2016 to evaluate the potential for preserved cultural materials eroding from melting snow patches; in 2017 these same ice patches were noted as having experienced dramatic melting from the previous year and were almost completely gone by the end of July. Though no cultural materials were identified during the 2016 examination of ice patches in Shellabarger Pass, the presence of prehistoric hunting sites and the likelihood that the pass served as a travel corridor make it an ideal candidate for further ice patch survey.

- Historic American Building Survey of the Historic Kantishna Roadhouse

In the spring of 2017, Denali consulted with the NPS Alaska Region Office to document the aging Kantishna Roadhouse building located near the end of the Denali Park Road. The goal was to obtain measurements to facilitate the production of Historic American Buildings Survey drawings that capture the existing condition of the structure. The Kantishna Roadhouse is considered eligible individually and as a contributing structure to the Old Eureka/Kantishna Historic District.

- Carlson Lake Cabin Fire

In 2015, the historic Carlson Lake Cabin was completely destroyed in a forest fire. The cabin was built by Hjalmar “Slim” Carlson between 1924 and 1949 and was used as a trapline cabin. The site was determined eligible for the National Register of Historic Places in 1995 as it was a physical representative of the subsistence lifeway and for its association with Slim Carlson.

- Denali Women’s History Series

The NPS Alaska Region Office, in cooperation with Denali National Park and volunteers Molly McKinley, Dianne Gudgel-Holmes, and Jane Bryant produced a series of fact sheets in 2015 about the lives and contributions of five women who are important to the history of Denali. These fact sheets were produced as part of the NPS Women’s History Initiative.

- Denali 100: Stories of the People

A cooperative agreement with StoryCorps was awarded in the summer of 2017 with the intention of capturing stories and memories from Denali’s 100th anniversary celebration during Labor Day weekend in 2017.

- Denali Oral History Project

Park Historian Erik Johnson and Cultural Resources Clerk

Resource Management



Erik Johnson (left) with Morton "Woody" Wood

Kiana Carlson conducted multiple oral history interviews in 2016 and 2017. The ongoing project collects stories and experiences of people who are associated with the Park. The interviews often contain valuable stories of the past and the documentation of important institutional knowledge.

• National Register of Historic Places

The process of nominating historic mining resources of the Kantishna Region to the National Register of Historic Places (NRHP) was restarted in 2015. The work continues a nomination process which began in 2008 when NPS employees drafted the Old Eureka/Kantishna Historic Mining District nomination form but never completed the nomination process. After consulting with historians at the NPS Alaska Region Office and the State Historic Preservation Office (SHPO), it was determined that the best approach at nominating the properties was through a NRHP Multiple Property Documentation Form (MPDF). The MPDF identifies themes, trends, and patterns of history that are shared by historic resources, and acts as a cover document for individual property nominations with a shared history. Because Kantishna contains private land and covers a large geographic area, a contiguous historic district designation approach was dropped in favor of the MPDF with individual nominations.

Between 2015 and 2017, park historian Erik Johnson drafted the Kantishna Historic Mining Resources of Denali National Park and Preserve, Alaska MPDF, as well as the individual nominations associated with it. The MPDF and

Historic Kantishna Roadhouse individual nomination were submitted to the SHPO in 2017. In addition, an individual nomination for the Fannie Quigley House is ready to be submitted to the SHPO and the Johnnie Busia Cabin nomination is near completion. After the SHPO returns the documents with their comments/revisions, they will be submitted to the Keeper of the NHRP for listing consideration.

• Distinguished Visitor

Navajo Nation Vice President Jonathan M. Nez, along with his family and staff, visited Denali in June 2017. He was in Alaska for another engagement and wanted to meet Kim Arthur -- a fellow Navajo/Diné who serves as Denali's museum specialist. While in the park, the group enjoyed a visit to the kennels, meeting with staff, a short drive on the park road and wildlife viewing.

• Charles Sheldon Makes Historically Significant Donation to Denali Museum Collection

Charlie Sheldon, grandson of Charles Sheldon, who fought to make the Denali area a national park presented a special gift to Denali National Park — his grandfather's rifle, a Jeffrey's Mannlicher bolt action .256 caliber rifle, assembled in 1899. It was the rifle Sheldon used during his time in the Denali region from 1906-1908, and during his hunting and collecting trips to Canada, other parts of the United States and Alaska. The firearm is scheduled to be displayed at the original superintendent's office behind headquarters.

• Original Superintendents Office Rehabilitation

In July of 2016, nearly 90 years after its initial construction, the park moved the original superintendent's office \ to the headquarters district. The building was originally used as an office by the park's first Superintendent, Harry Karstens. It later served as a museum and was moved to the north side of the park road and eventually became an employee housing unit. After the building was moved and rehabilitated in 2016, it began functioning as a meeting space.



Visitor and Resource Protection



2017 rescue of a climber who fell 60 feet into a crevasse on the Kahiltna Glacier. This photo shows ropes connected to rescuers and the injured climber after 12 hours of rescue operations.

Emergency Response Incidents

Denali averages 25 major search and rescue incidents annually throughout the park. Approximately half of these responses are on the West Buttress of Denali, the other half generally in the wilderness adjacent to the Park Road corridor. Due to the remote nature of most areas of the park, nearly all emergency response requires helicopter access to effect rescue. The park maintains an exclusive use helicopter contract based in Talkeetna during the climbing and hiking season in late spring into summer. Rangers and the park helicopter also regularly respond to other national park units in Alaska including Wrangell St Elias National Park and Preserve, Gates of the Arctic National Park and Preserve and Lake Clark National Park and Preserve. Notable rescues between 2015-17 include six short haul operations, several rescues of climbers who fell into crevasses on the Kahiltna Glacier and extended searches for overdue hikers on the north side of the Alaska Range. The park staffs two ambulances, one at Park Headquarters and another at Toklat, to respond to medical emergencies along the Park Road corridor. Between 2015-17 an average of 75 visitors required emergency medical care annually. Ten visitors succumbed to injuries or illness while visiting the park during this period ranging from traumatic falls to cardiac arrest. Park ambulances are dispatched to surrounding communities to assist Tri-Valley ambulance service. Law enforcement staff work closely with Alaska State Troopers, sharing resources and enforcing traffic and hunting regulations. Between 2015-17 park staff backed up Alaska State Troopers on calls that included DUI arrests, motor vehicle accidents, an active shooter and a stolen vehicle.

Program Updates

Denali is active with Sustainable Summits. In 2017, we launched an initiative to expand our human waste pack-out



Supreme Court Justice Sonya Sotomayor visited Denali in August 2016.

program on the mountain. We worked with independent climbers and commercial guide services to increase our inventory of Clean Mountain Cans. We were successful with more than 400 climbers packing out their human waste from their entire 3-week trip on the mountain. Rangers are serving in a range of roles, supporting regional and national programs and incorporating an Alaskan perspective on agency wide initiatives. Denali rangers are members of the NPS Serious Accident Investigation team, delving into lessons learned when employees are critically injured or die on the job.

Events and Dignitary Visits

Rangers assisted with Executive Branch visits to Denali and other parks in the region. These visits include President Barack Obama's visit to Kenai Fjords National Park in 2015, Supreme Court Justice Sonja Sotomayor visit to Denali in 2016 and Secretary of Interior Ryan Zinke's visit to Denali in 2017.

