

# Kanuti National Wildlife Refuge Annual Report

Fairbanks, Alaska  
Calendar Year 2007



Prairie Bluet photo by John Hudson

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*Refuge Manager*

*Date*

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*Refuge Zone Supervisor*

*Date*

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*Regional Office Approval*

*Date*



## **Kanuti National Wildlife Refuge: The Year 2007 at a glance...**

In Calendar Year 2007 the Refuge said goodbye to Resource Planner Deborah Webb, said hello to new Fire Management Officer Chase Marshall and Rural Representative Kenneth Bergman, and more permanently welcomed back Park Ranger Kristin Reakoff and Maintenance Worker Doug Holton. It was a year that saw the often day-to-day grind of drafting the Refuge's revised Comprehensive Conservation Plan punctuated with projects addressing major resource and education issues. The Refuge's moose population garnered much of our attention, including browse and population surveys, hunter education and law enforcement for several hunts, and an interagency agreement to look at moose movements. "Friends of Alaska Refuges" volunteers continued to battle invasive weeds moving up the Dalton Highway that threaten waterways entering the Refuge. Several staff floated the Kanuti River from the Dalton Highway to educate both themselves and members of the regional directorate about some of the challenges faced by visitors attempting to access this remote Refuge. Staff and cooperators also helped host a science and cultural camp at the Henshaw Creek weir. Plans with National Park Service for building a shared bunkhouse and office/visitor in Bettles began in earnest. Finally, the Refuge's new logo, featuring a dragonfly and wetland (and *not* the usual charismatic megafauna or mountains' majesty!!), merely highlighted the understated function and beauty of this wild place.



The Refuge also initiated the process of filing for federal water rights in 2007.  
(Photo B. Raften)

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## Introduction

Kanuti National Wildlife Refuge (NWR; Fig. 1) straddles the Arctic Circle in north-central Alaska, encompassing an area slightly larger than Delaware. The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) set aside millions of acres of public land in Alaska, including 6,625 km<sup>2</sup> (or 1.637 million acres) for Kanuti NWR.

According to ANILCA, the Refuge was established for the following four purposes, which serve as guiding principles for refuge management:

1. To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, white-fronted geese and other waterfowl and migratory birds, moose, caribou (including participation in coordinated ecological studies and management of the Western Arctic Caribou Herd), and furbearers;
2. To fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
3. To provide, in a manner consistent with the purposes set forth in subparagraphs (1) and (2), the opportunity for continued subsistence uses by local residents; and
4. To provide, in a manner consistent with the purposes set forth in paragraph (1), water quality and necessary water quantity within the refuge.

Kanuti NWR is one of 16 refuges in Alaska and 545 nationwide. This network of refuges forms the National Wildlife Refuge System (System), which is administered by the U.S. Fish and Wildlife Service. The mission of the System is: *to preserve a national network of lands and waters for the conservation and management of the fish, wildlife, and plants of the United States for the benefit of present and future generations.* The vision for the System stresses the following principles: 1) wildlife comes first; 2) ecosystems, biodiversity, and wilderness are vital concepts in refuge management, 3) refuges must be healthy; and 4) growth of the System must be strategic.

The mission of Kanuti NWR is three-tiered, mindful of: 1) the Refuge purposes set forth in ANILCA, 2) the mission of the System, and 3) the following Kanuti NWR draft vision statement, developed by the staff:

*For the benefit of present and future generations and in partnership with others, stewards of Kanuti National Wildlife Refuge will conserve fish and wildlife populations and their habitats in their natural diversity, focusing on its natural unaltered character, biological integrity, and scientific value, as driven by biological and physical processes throughout time.*



## Highlights for 2007

- Refuge staff met with Water Resources Branch and Fisheries personnel to discuss initiating the process of filing for Kanuti's water rights. (Page 7)
- Wildlife Biologist (WB) Lisa Saperstein attended a USFWS Climate Change Forum in Anchorage where she presented a poster entitled "Managing fire on Kanuti National Wildlife Refuge to protect biodiversity under a warming climate scenario." (Page 11)
- WB Chris Harwood completed one Alaska Landbird Monitoring Survey, two full and two mini Breeding Bird Surveys, and one Inventory bird survey during June. (Page 14)
- The November moose survey resulted in the lowest population estimate recorded for the Refuge. (Page 19)
- An estimated 740 Chinook salmon and 44,425 chum salmon migrated through the Henshaw Creek weir. (Page 21)
- WB Saperstein conducted a moose browse survey in March with ADF&G biologists Tom Paragi and Tom Seaton. (Page 22)
- WB Saperstein and dragonfly expert John Hudson of Juneau searched for prairie bluet damselflies near Kanuti Lake as part of a challenge cost-share agreement. (Page 23)
- Refuge staff collaborated with Tanana Chiefs Conference staff and the Friends of Alaska Refuges in hosting a science camp at the Henshaw Creek weir. (Pages 24, 33, 57)
- Refuge staff conducted many public meetings addressing public comments on the draft revised Comprehensive Conservation Plan. Final edits and review were largely completed by year's end. (Page 26)
- The Refuge entered into \$35,000 cooperative agreement with Alaska Department of Fish & Game to radio-collar 60 moose in the upper Koyukuk area in 2008. (Page 28)
- Subsistence Coordinator Wennona Brown completed a 30-day detail in January as acting refuge manager at Hart Mountain NWR in Oregon. (Page 29)
- "Friends of Alaska Refuges" volunteers helped remove >3 tons of invasive weeds from the Dalton Highway between the Kanuti River and Jim River crossings. (Page 29)
- Allakaket resident Kenneth Bergman was hired through a contract with the Tribal Council to serve as the Refuge's "rural assistant." Bergman completed a waterfowl harvest survey of Allakaket and Alatna in the fall. (Page 31)
- New Fire Management Officer (FMO) Chase Marshall entered on duty in July. Marshall ended up attending the statewide Fire Review as well as hosting Region 7's

annual FMO meeting in Fairbanks. (Pages 38)

- Kristin Reakoff of Wiseman and Doug Holton of Bettles were rehired in March as permanent part-time interpretive park ranger (IPR) and seasonal maintenance worker, respectively, under the local hire program. (Page 38)
- Refuge Manager (RM) Mike Spindler authorized two bulls-only federal subsistence moose hunts for Unit 24B in March. Frigid temperatures largely discouraged hunters and no moose were taken during either hunt. (Page 46)
- RM Spindler, Deputy RM Joanna Fox, and IPR Reakoff floated the Kanuti River from the Dalton Highway to the Kanuti Lake administrative cabin in June. (Page 54)
- IPR Reakoff visited the Allakaket school in November to introduce Region 7's Migratory Bird Calendar contest to students and their teachers. (Page 59)
- USFWS and the National Park Service reviewed plans to build a new bunkhouse and a combined office/visitor contact station in Bettles, with dual construction possibly as early as summer 2008. (Page 64)



Chase Marshall filled the Fire Management Officer vacancy. (Photo M. Spindler)

# Climate

## Overview

The Refuge's climate is cold and continental, with slightly higher precipitation than other areas of interior Alaska. Low and high temperatures range between -56°C and 34° C (-69°, 93°F). Periodic flooding of the Koyukuk and Kanuti rivers is an important hydrological driver of the ecosystem. Temperatures and topography are quite conducive to extraordinary summer lightning activity, and consequently, an active wildfire regime. The nearest weather station to the Refuge is the National Weather Service Station at Bettles Field, three miles outside the Refuge's northern boundary; however climatic conditions on the Refuge often vary from those of Bettles, as well as throughout the Refuge itself.

## 2007 Climatological Highlights

Table 1. Monthly Temperature and Precipitation summaries (highs in red, lows in blue), Bettles Field, Alaska, 2007.

Month	Temperatures (°F)				Precipitation (inches)			
	Max.	Min.	Avg.	Depart.	Precip.	Depart.	Total Snowfall	Snow Pack (month's end)
January	33	-45	-4	+ 8	0.99	+0.15	15	<b>16</b>
February	26	<b>-48</b>	-10	- 2	<b>0.01</b>	<b>-0.60</b>	0	15
March	30	-45	-11	- 15	0.04	-0.31	1	15
April	56	1	33	+ 10	0.23	-0.15	3	0
May	75	20	47	+ 3	0.25	<b>-0.60</b>	trace	0
June	81	41	60	+ 2	2.01	+0.58	0	0
July	<b>84</b>	48	64	+ 4	<b>3.87</b>	<b>+1.77</b>	0	0
August	80	32	57	+ 4	1.97	-0.57	0	0
September	66	25	45	+ 4	1.59	-0.23	0	0
October	41	- 7	19	0	1.00	-0.08	13	5
November	37	-14	13	+ 14	0.85	-0.05	<b>18</b>	9
December	25	-43	-6	+ 6	0.76	-0.11	9	14
<b>Totals</b>					<b>13.57</b>	<b>-0.20</b>	<b>59</b>	

## Snow Markers

Snow came late and melted early on Kanuti during the winter of 2006 – 2007. Lack of sufficient snow necessary for tracking ( $\geq 10$  inches) prompted cancellation of moose surveys in November 2006. By the first snow survey in February, snow depths were similar to what was observed in 2006. The long-term average (1971-2000) snow depth for Bettles in early February is 27 inches, considerably higher than what has been observed on the refuge the last two years. Snow markers 1 and 2 are about 25 miles south of Bettles; the remainder are farther south and often have less snow than in Bettles. The deepest snow recorded on the Refuge in 2007 was 28 inches. There was no snow at any of the markers by the end of April 2007 (first time this has happened since markers were installed in 1998), compared to 27 inches persisting at some markers by 1 May 2006 and a long term average of 20 inches in Bettles for May 1. Snow density averaged 15.2% at marker 2 and 20.4% at marker 4 on April 2. For the last four years, we have intended

to move snow marker 6 at Taiholman Lake due to consistently windblown conditions; however, attempts to do so have been thwarted to date (persistent smoke from wildland fires prevented flights to the Refuge in the summers of 2004 and 2005, and time constraints prevented the move in 2006 and 2007).

Table 2. Aerial estimates of snow depth (inches) at snow markers (SM), 2007 and 2006. (We attempt to check markers at month's end from October –April.)

Date	SM1 Kaldoyeit	SM2 Minnekokut	SM3 Kanuti Chalatna	SM4 Nolitna	SM5 K. Kilolitna	SM6 Taiholman
2/01/07	19	18	17	21	21	4
2/28/07	19	28	16	21	20	3
4/02/07	16	27	15	17	17	7
4/27/07	0	0	0	0	0	0
11/06/07	10.5	17.5	11	12	10.5	3
11/29/07	10.5	17.5	14	11	10.5	0
2/10/06	19	18	24	24	21	8
3/03/06	20	18	30	28	26	5
3/28/06	21	34	28	25	23	2
5/01/06	13	27	19	14	13	0
12/08/06	10	11	10	14	14	4



Wildlife Biologist Harwood measures snow density at one of the snow marker courses in late winter. (Photo M. Spindler)

## Hydrology Review

### *National Weather Service Data*

Hydrological data for stretches of the upper Koyukuk River tend to be variable in completeness each year, depending on local observer participation. That said, breakup for the Koyukuk River was April 25 and May 5 for Wiseman and Bettles, respectively. The river was ice-free and capable of boat traffic on May 14 and 16 at Wiseman and Bettles, respectively. The first ice reported on the Koyukuk River at Bettles and Wiseman was September 23 and October 3, respectively. Boating near Bettles became impossible on October 5, was safe to walk on October 28, and safe for snowmachine traffic on November 23. The river was described as frozen with open channel at Wiseman on October 4. There were no available break-up or freeze-up data for Allakaket. (Data from NOAA/National Weather Service)

### *Local Refuge-specific Data*

Refuge Manager Spindler noted the following break-up conditions during aerial reconnaissance on April 16 and 19:

#### April 16

- Mud Lakes area looked "ready" for geese with <5% snow cover
- Lots of open water in shallow wetlands; Kanuti river flowing
- Near Allakaket there was 99% snow cover with few openings in river ice

#### April 19

- Near Allakaket about 80% snow cover and more numerous openings in river ice.
- Allakaket folks will not be able to access the Kanuti R. from the southeast trail this spring (hence, little to no access to bird hunting along the Kanuti)
- Above the Kilolitna R. confluence, at the usual trail crossing, the Kanuti River has 2-6 ft of water flowing on top of ice. Most of the river ice is still frozen to the sides and or bottom and has not yet started to move out, but there is deep water flowing on top of the ice.
- Near Allakaket good trails are still in place downriver to the mouth of the Kanuti River, and upriver to the wood cutting areas before the bluffs.
- There are numerous holes starting to open up in the Koyukuk R., so travel out of Allakaket will soon be limited. Bird hunting will probably be very local this year, or delayed until people can get out with boats.

### *Water Rights Process Planning*

Staff of the regional Water Resources Branch initiated the Refuge's water rights process in early October. Water Rights Coordinator Warren Keogh preceded Kanuti-specific meetings with a general water rights training to Refuge staff (i.e., Refuge Manager (RM) Spindler, Fire Management Officer Marshall, Wildlife Biologists Saperstein and Harwood, and Planner Webb) on October 1. On October 2, Refuge staff (same as above, but with addition of Deputy RM Fox) met with Hydrologists John Trawicki and Jasper Hardison to discuss threats to Kanuti's water resources and to determine gaging station locations. Fishery Biologists Randy Brown and Dave Daum of the Fairbanks fisheries office also attended. On October 4, Spindler, Hardison, Marshall, and Saperstein conducted an overflight of the Refuge to evaluate prospective gaging station sites.



Drying wetlands is a growing concern in interior Alaska but the causes may be many and additive. This drying lake (above) adorned the cover of our 2005 Annual Report and at that time (2004) was so deep as to require a raft to navigate. At that time, a robust, active beaver dam (yellow arrow below) spanned a channel (red box above, but best seen in close-up below) separating this lake from a larger water-filled lake. In 2005, a wildfire caused destabilization of the channel banks, causing the dam to collapse. Water then flowed into the nearby lake, the beaver colony disappeared, and the lake seemingly returned to a drier state of its past, as suggested by birch snags in the middle of the lake (white arrow above). This illustrates the dynamic nature Kanuti's hydrology, as affected by such drivers as fire and beavers.



### Wildland Fires Review

The “Kilolitna” fire was discovered by Refuge Manager Spindler on July 11 while conducting white-fronted goose surveys. Seven smoke jumpers responded within the hour and had the fire contained within two hours. The fire was declared out on July 13 and burned three acres, all on Doyon-owned land.



This ignition (above) on July 11 near the Kilolitna River was detected early by RM/P Spindler and was quickly put out (below) by smoke jumpers, with only 3 acres burned. (Photos D. Webb and M. Spindler).



## Natural and Cultural Resources

### Overview

The primary ecological drivers shaping the habitats and wildlife of Kanuti NWR are hydrology, fire, and climate. The mosaic of different vegetation types on the Refuge is the visible culmination of complex interactions among the drivers mentioned above, along with other factors such as topography, soils, permafrost, and flooding. Vegetation plays a role in determining the distribution of wildlife species, but the activities of herbivores such as moose, hares, insects, and beaver also can have a profound influence on vegetative patterns. One hundred twenty-eight species of birds, 37 species of mammal, and 15 species of fish are known to occur within the Refuge. Some of these are migratory and can only be found at certain times of the year. For example, of the 128 species of birds, only about 20 are year-round, permanent residents. Likewise, caribou, which occasionally number in the thousands in winter when the Western Arctic Caribou Herd migrates from northern calving grounds, are virtually absent from the Refuge during summer.



Kanuti Refuge was founded largely for its water resources and the wildlife supported by such. (J. Hudson photo)

## **Biological Planning**

### Climate Change Forum

The first FWS forum on climate change was held in Anchorage February 21-23; similar efforts will be held in other regions in the future. The goals of the forum were to:

1. Inform resource professionals about natural resources in Alaska that may be affected by climate change;
2. Strengthen communication and collaboration among FWS and U.S. Geological Survey (USGS) scientists and project leaders in Alaska;
3. Initiate a process to address the effects of climate change in Alaska in light of agency missions and statutory mandates; and
4. Provide the opportunity for FWS cross-programmatic collaboration to address climate change concerns.

The forum consisted of one day of technical reports with an evening poster session. This was followed by two days of internal break-out discussion sessions attended by FWS and USGS staff to brainstorm approaches for addressing climate change.

Wildlife Biologist Saperstein attended the forum and presented a poster entitled: “Managing fire on Kanuti National Wildlife Refuge to protect biodiversity under a warming climate scenario.” The poster summarized a modeling exercise conducted by Dr. Scott Rupp and Mark Olson of the University of Alaska Fairbanks that examined the effects of different fire management strategies under different climate scenarios. The introduction, results, and discussion from the poster are reproduced below.

### ***Managing Fire on Kanuti National Wildlife Refuge to Protect Biodiversity Under a Warming Climate Scenario***

#### *Introduction*

Researchers predict that climatic warming will increase fire frequency and lead to shifts in the composition and distribution of plant communities, further affecting fire occurrence and spread. Because fire is the major disturbance factor in interior Alaska, land managers will increasingly be required to make fire management decisions in order to achieve desired landscape level conditions as fire regimes change. Approximately 70% of the Kanuti National Wildlife Refuge (NWR) has burned since 1950, with about 60% having burned since 1990. In order to conserve biodiversity and support continued subsistence opportunities, refuge staff are interested in increasing fire suppression within an unburned 148,550-ha swath in the center of the refuge. The area contains much of the refuge’s remaining old-growth lichen habitat, important to caribou as winter range. Refuge staff changed fire management boundaries in 2006 to limit the area burned within this swath to only 5% per year. The new fire management option extended the boundary of a "Modified Management" suppression area to protect lichen-rich areas that were previously allowed to burn. The “Modified Management” option means that new fires will be initially attacked if ignited before July 10, so long as suppression resources are available. Using the Boreal ALFRESCO model, we estimated the potential landscape-level vegetation changes that might be seen on

Kanuti Refuge over time as a result of the increased fire suppression coupled with predicted climatic changes. We also modeled changes that might occur if further restrictions were applied using the "Full" suppression management option, under which all fires are initially attacked regardless of ignition date.

### *Results*

Predicted area burned for suppressed fires and weighting factors for different suppression types were calculated during the calibration phase. The non-linear regression, which modeled the natural historical area burned as a function of ALFRESCO climate inputs, produced an  $R^2 = 0.7169$ . ALFRESCO simulations suggested increases in the cumulative area burned in the full study area regardless of climate model or suppression option, although more area burned under the Hadley climate models than the PCM models. In general, all scenarios suggest the possibility of increased fire activity in the near future.

Within Kanuti NWR, simulated availability of caribou winter habitat varied with fire management option and climate model over time. All scenarios predicted low availability of winter habitat from 2020 to about 2050, influenced in part to the high percentage of the refuge currently in early seral stages. All scenarios showed an increase in winter habitat after 2050, with 13 - 18% more caribou habitat under the "new" suppression management option than the "old," and 27 - 38% more habitat under the "full" versus the "old" option, depending on climate model. By 2100, the PCM/B2 climate/emissions model showed the greatest amount of spruce stands older than 80 years.

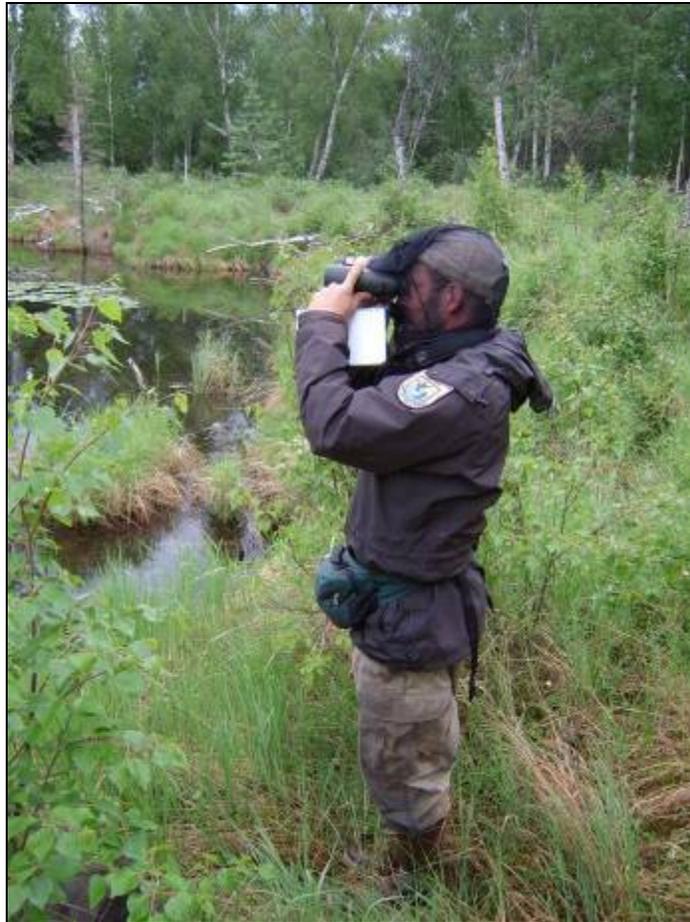
### *Discussion*

Refuge staff have interpreted the ANILCA mandate to conserve diversity to mean on a refuge-wide scale, rather than on an eco-regional, or similar level. Active management of wildland fire is seen as a key tool for maintaining diversity of different aged habitats and the wildlife species that use them. According to the model, increasing fire suppression on the refuge could produce noticeable increases in caribou winter range within 20 years. Such results would depend on the availability of suppression resources. During active fire years, villages, towns, and other areas of human habitation have higher priority for firefighting efforts than outlying areas. Given predictions of increasing fire activity in interior Alaska, suppressing fires on the refuge to manage habitat may not be a realistic option due to limited resources.

### Refuge Inventory and Monitoring Plan

A Region 7 (R7) refuge inventory and monitoring plan (I&MP) template was designed by a team of refuge biologists in 2006, presented to biologists at the regional biologist meeting in Homer in March 2006, and signed by R7's Chief of Refuges in 2007. The template was designed to facilitate completion of I&MPs in the region and to provide improved guidance on what to include in an I&MP given that the national I&MP policy is outdated and planned revisions have been delayed. Alaska Maritime NWR was slated to be the first refuge to complete an I&MP using the new template, but biologists there

encountered numerous problems and issues when trying to apply the template to a real refuge. The regional refuge biologist thought that it would be easier for a refuge that has already completed a biological review and a CCP revision to take on the I&MP task. Also, it was felt that it would be easier for a smaller refuge, with a less complex biological program than Alaska Maritime, to work through the template and, with assistance from regional office staff, modify the template as needed. In October, Kanuti agreed to move up the deadline of its I&M plan and provide feedback to help refine the existing template. A deadline has not yet been set for completion of the plan.



WB Harwood inventories wetlands along the Kanuti River for Rusty Blackbirds, a species whose precipitous continental decline had gone virtually unstudied until recently. (Photo L. Maloney)

#### Challenge Cost Share proposal

Wildlife Biologist Saperstein submitted (and was awarded in March 2008!!) a challenge cost-share proposal in December titled “Connecting the public and biologists with dragonflies: An exploration of biodiversity.” The introduction from the proposal, excerpted below, provides background information and goals of the project:

*Few insects capture the public’s imagination more than dragonflies. These beautiful insects represent an outstanding, but rarely utilized, opportunity for*

*connecting people with nature. As larvae and adults, dragonflies play an important role as both predator and prey in aquatic and terrestrial systems, making them ideal subjects for introducing the concept of ecological relationships. The goals of this project are to increase public awareness of dragonfly diversity, biology, and ecology and to expand upon the small body of information on dragonfly species diversity and distribution in Alaska. Dragonfly expert John Hudson and naturalist/photographer Bob Armstrong, co-authors of the book “Dragonflies of Alaska,” will be involved in both aspects of the project. A key educational component will be “Dragonfly Day,” a public event at Creamer’s Field in Fairbanks designed to introduce kids and adults to the identification and ecology of dragonflies. This event will include hands-on instruction on dragonfly collecting and identification techniques, displays about proper specimen handling and record keeping, children’s activities, exhibits of live dragonflies and other aquatic insects, and nature walks focusing on dragonflies and their habitats. An evening slide-show presentation will include a photo-introduction to the dragonflies of Alaska including information on life history, biology, biodiversity, ecology, and techniques for collecting and photographing dragonflies.*

*Dragonfly species distribution is poorly documented in Alaska, and even the most basic surveys result in large extensions of currently known species ranges. Agency biologists, as well as interested members of the public, can greatly increase our knowledge of dragonfly diversity in Alaska by collecting specimens in association with other activities. The second component of the project will include intensive training in dragonfly identification in Fairbanks that will include staff of Kanuti, Yukon Flats, and Arctic National Wildlife Refuges (NWR), and at Tetlin NWR, the Arctic Interagency Visitor Center (AIVC) in Coldfoot, and Koyukuk NWR, based in Galena. This portion of the project will also include public demonstrations and lectures in Tok, Coldfoot, and Galena. Dragonflies will be collected at and en route to all sites to increase our knowledge of their distribution and habitat use on public lands in interior Alaska.*

Partners for the project are: John Hudson, Bob Armstrong, University of Alaska Fairbanks Museum, Friends of Creamers Field, Alaska Department of Fish and Game, Fountainhead Development, and Alaska Bird Observatory. We also hope to have some Friends of Alaska Refuges volunteers help with the project. Total project cost was \$21,708, and we requested and were awarded \$10,800 from USFWS.

## **Inventory and Monitoring Surveys**

### *Project: Kanuti NWR Integrated Biological Inventory*

Two mini-grids (see Fig. 2) that had been surveyed for vegetation in 2006 were scheduled for bird surveys in 2007 (i.e., “South Fork” and “Jim River” mini-grids). The unexpected departure of Biological Technician (BT) Bridges in early June left the refuge without any field help. Volunteer Boyd’s emergency assistance allowed Wildlife Biologist (WB) Harwood to finish the Jim River plot; however, an attempt to survey the South Fork plot had to be aborted. It has been rescheduled for 2008.

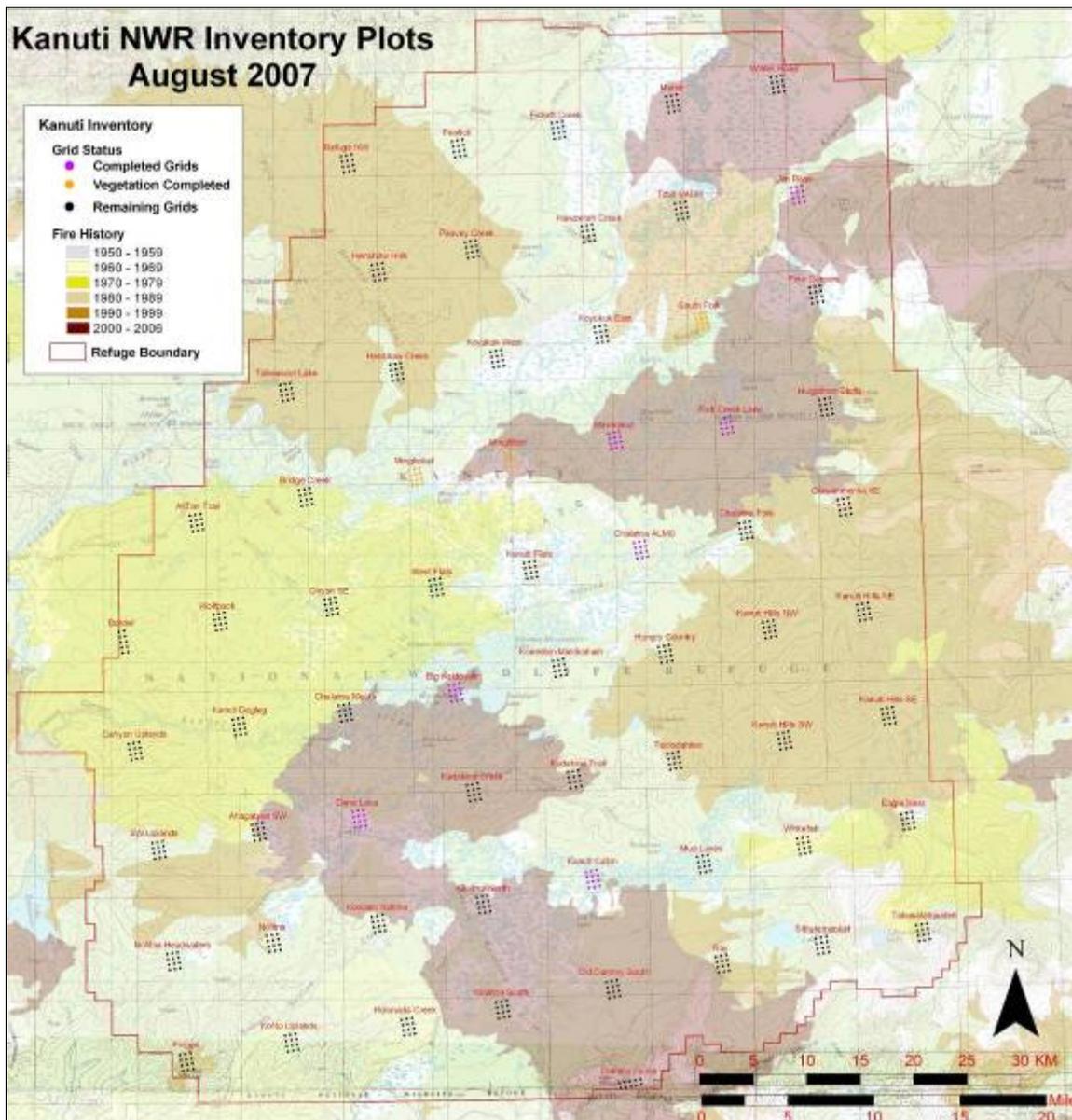


Figure 2. Location and status of inventory mini-grids by fire history as of August 2007.

BT Brown joined the Kanuti staff as an Emergency Hire to help WB Saperstein with vegetation work in July. They were able to survey two mini-grids, “MingMinn” and “Mingkoket,” and also finished vegetation surveys on the Dune Lake mini-grid, which could not be completed in 2005 due to fire. The MingMinn mini-grid had burned in 2004, but the Mingkoket mini-grid had not burned since before 1950. Unfortunately, the crew mistakenly re-surveyed one point on the Dune Lake mini-grid (point #8) and left point #6 unsurveyed. The protocol requires that at least 10 of the 12 points be surveyed (i.e., 2 points can be dropped if they fall in the middle of a lake or cannot be surveyed for other reasons), so Dune Lake will not be revisited to pick up the single missing point.

WB Harwood spent considerable effort in fall and early winter adapting the NPS

database to fit Kanuti Refuge's inventory data. Data are currently being entered and will be analyzed in 2008. Until then, reportable results from the inventory program are minimal.

*Project: Alaska Landbird Monitoring Survey (ALMS)*

Wildlife Biologist Harwood and Biological Technician Bridges conducted bird surveys of the Minnkokut ALMS plot June 2-3. This is the third time that Minnkokut has been surveyed (2003, 2005, 2007) and the second time since after the 20004 Clawanmenka fire. Again, habitat surveys of the points were also completed to document vegetational changes post-fire.



WB Harwood photodocuments the successional changes in habitat at the Minnkokut Lake ALMS grid, three years post-fire. Fireweed and paper birch saplings poke up through the abundant deadfall. (Photo B. Bridges)

Kanuti NWR is the only refuge to have regularly participated fully in ALMS (i.e., annually complete all plots assigned to them) since its inception in 2003. Based on land mass, refuges in Alaska have been targeted to complete 50% of the plots allotted statewide (other partners include National Park Service, Bureau of Land Management, etc.). Refuges in Alaska are currently meeting only 20% of their "responsibility" (i.e., program participation is voluntary) for the statewide program to succeed. If a regional refuge commitment is not met by 2010, then other agencies will drop out and cooperative monitoring program will fail. In December, Regional Refuge Biologist Eric Taylor polled the region's refuge supervisory and bird biologists to assess whether regular and complete participation in ALMS is a viable near-term goal for individual refuge programs. A determination of the future of ALMS was scheduled to be made in late

early March 2008. See the 2005 and 2006 Kanuti Annual Reports for more information on the history of ALMS.

*Project: Breeding Bird Surveys (BBS)*

Wildlife Biologist (WB) Harwood (observer) and Administrative Support Assistant Maloney (boat driver) conducted the annual Kanuti Lake and Kanuti Canyon BBSs on June 9 and 11, respectively. They recorded 619 individuals of 37 species on the former route, and 594 individuals of 43 species on the latter. Prior to the surveys, the crew spent three days 5-10 miles upriver of the cabin investigating wetlands for the occurrence of Rusty Blackbirds as a possible future project.

Additionally, WB Harwood and Volunteer Boyd conducted a quasi-BBS (38 points) by inflatable kayak along the lower South Fork Koyukuk River on June 23-24. This impromptu effort was implemented when a scheduled bird survey of the “South Fork” inventory plot had to be aborted. Harwood recorded 741 individuals of 45 species over two mornings. In addition to expected high detections for riparian songbirds like Alder Flycatcher and Northern Waterthrush, there were relatively high detections for Solitary Sandpiper and Red-tailed “Harlan’s” Hawk. This is ostensibly the first time refuge personnel have conducted a relatively rigorous bird survey of this area. We hope to further investigate the Solitary Sandpiper picture in coming years as a report of this survey garnered unexpected interest among some shorebird enthusiasts.



This Northern Hawk Owl settles into its birch snag nest near Kanuti Lake.  
(Photo by J. Hudson)

Project: Greater White-fronted Goose monitoring

During July 6-9, 2007, Refuge Manager/Pilot Spindler and Wildlife Biologist Harwood again conducted aerial surveys documenting numbers and distributions of primarily, molting Greater White-fronted Geese (white-fronts), and incidentally, Canada Geese. The crew surveyed 101 aerial line transects overlaying goose habitat on the Refuge, as well as nearby Lake Totatonten and the terminus of the Kanuti River. Totals of 380 white-fronts (280 adults and 100 young) and 314 Canada Geese (124 adults and 190 young) were observed (Table 3). Relatively good production was observed in both species.

At the request of Migratory Bird Management, the refuge also conducted an experimental breeding pair survey in the spring. Eleven transects along and south of the Kanuti River were surveyed on May 10, 17, and 24. Results from this survey are at best equivocal. While the results of the first white-front survey were expected (larger flocks, fewer pairs), a 75% increase in detections of white-fronts from the second to third survey was not. Because the percentage of paired birds is used as an index for correct timing of the survey, the varying percentages among the three surveys suggests that additional years are required to better account for intra- and interannual variation. Also, unlike Selawik NWR (which has substituted the breeding pair for the molt survey) and other sites to the north and west of Kanuti Refuge that largely represent the terminus of migration for white-fronts, Kanuti also likely represents a migration stopover to some segment of the observed population. To what extent the “resident” and “migratory” white-fronts comprise the birds observed during the three surveys is unknown. Also unknown is the percentage of breeding pairs within the larger flocks. While this pilot effort has shown that indeed paired geese can be detected on the Refuge (an initial uncertainty, given the differences in habitats between Kanuti and Selawik), the ambiguity in their ultimate breeding location raises the question as to whether a breeding pair survey is appropriate on Kanuti NWR.

Table 3. Goose and swan observations<sup>1</sup> by year during aerial goose surveys, Kanuti NWR, Alaska, 2001- 2007. [GWFG = Greater White-fronted Goose, CAGO = Canada Goose; ad = adults, yg = young]. Surveys were cancelled in 2004 and 2005 because of wildfires.

<b>Year</b>	<b>GWFG ad</b>	<b>GWFG yg</b>	<b>CAGO ad</b>	<b>CAGO yg</b>	<b>Swan ad</b>	<b>Swan yg</b>
2001	332	142	67	54	91	6
2002	117	50	101	128	103	14
2003	313	65	52	78	108	13
2006	332	71	108	95	219 <sup>2</sup>	37 <sup>2</sup>
2007	280	100	124	190	189 <sup>2</sup>	70 <sup>2</sup>

<sup>1</sup> Does not include observations made outside “official” study area or during resurveying efforts

<sup>2</sup> represents minimum counts



No geese were observed on Lake Todatonten during the molting goose survey. It is unclear if extremely shallow conditions (as suggested here by the abundant emergent vegetation) contributed to the absence of geese. (Photo C. Harwood)

*Project: Kanuti NWR Moose population survey*

An aerial moose survey conducted on Kanuti National Wildlife Refuge resulted in an estimated 588 moose on the Refuge, a significant decline from previous estimates. The 2007 estimated moose density of 0.22 moose per square mile was the lowest density since the first survey was conducted on the refuge in 1989. As in previous surveys, biologists found that moose tended to concentrate in 10- to 35-year old burns rather than in river corridors where moose are commonly found elsewhere. Large fires in 2004 and 2005 burned almost 25 percent of the Refuge and will hopefully produce more good moose habitat in the future. Most hunters access the Refuge by boat, but because much of the burned area is not adjacent to rivers, many of the moose are essentially unavailable to hunters.

The aerial survey was conducted from November 8 to 14, 2007, in cooperation with the Alaska Department of Fish and Game and National Park Service. To count moose in such a large area, the Refuge was divided into 508 rectangular survey units, each about 5.3 square miles in size. During the first step of the survey, the stratification, each of the survey units was quickly over flown by a Cessna 206 aircraft and observers categorized each unit as having high or low moose density based on the number of moose and moose tracks seen. For the Kanuti stratification, low density units were anticipated to contain three or fewer moose. The stratification resulted in 69 high-density and 439 low-density

units on the Refuge. All of the high-density units and a random selection of 81 low-density units were then thoroughly surveyed using a two-person tandem-seat aircraft such as a Super Cub, Husky, or Scout. It took about 40 minutes to survey a unit, and each aircraft team could survey about 8 to 10 units per day during the short November days. Four such teams were used during the Kanuti survey.

Observers counted 291 moose in the 150 units surveyed, classifying each moose as either a bull, cow, or calf. Bulls were further classified according to antler size. Yearlings have spike or forked antlers, large bulls have an antler spread over 50 inches, and medium bulls have intermediate-sized antlers. The Refuge-wide population estimate was statistically calculated based on the observed number of moose and the distribution of high and low density sample units on the refuge.

Population estimates on Kanuti have been plagued with high variability in the past, partly due to sample sizes (number of units surveyed) that were too small. The 2007 estimate was more precise than previous ones- as shown by error bars in Figure 3- partly due to the larger sample size (150 units surveyed versus 82 in 2005 and 103 in 2004) and possibly due to a more accurate stratification.

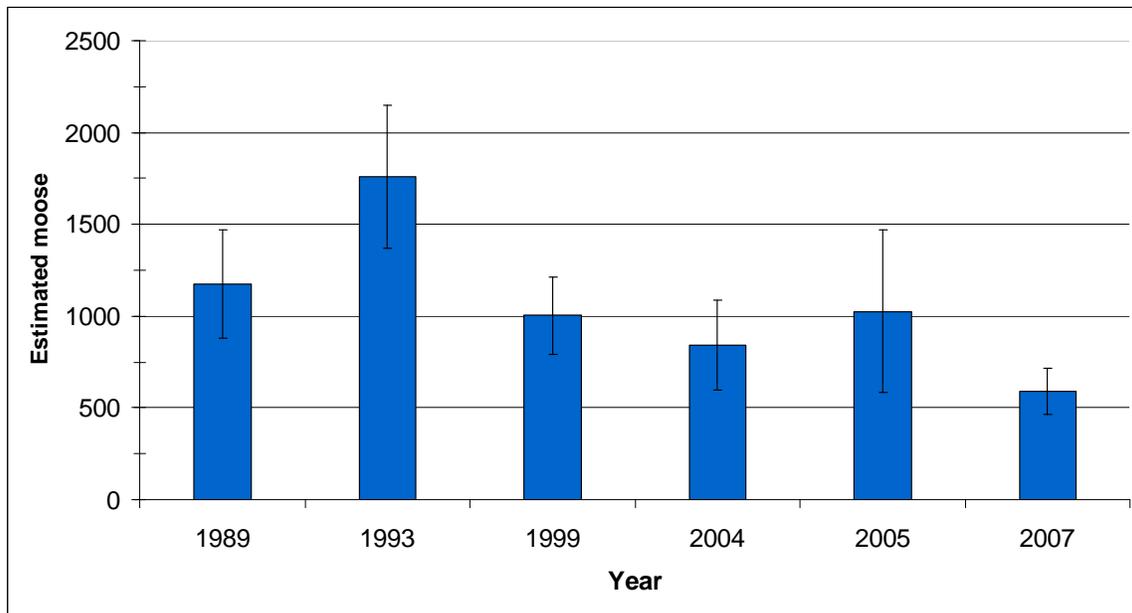


Figure 3. Moose population estimates on Kanuti National Wildlife Refuge, Alaska, 1989 – 2007. Error bars represent the 90% confidence interval; narrower bars indicate a higher level of precision.



Moose (two in center) were more regularly found in the burned areas during the November survey. (USFWS Photo)

Project: Aerial Wolf Survey

An aerial wolf survey was planned for March 2007 but was cancelled due to unfavorable conditions. A successful track survey depends on new or freshly windblown snow to cover old tracks, as well as good light conditions for seeing tracks. Pilot/tracker Harley McMahan, who had conducted surveys on the refuge in 2005 and 2006, was lined up to fly the survey again had conditions cooperated.

Project: Henshaw Creek fish weir (from Berkbigler 2008)

A resistance board weir was used to record escapement information from Chinook *Oncorhynchus tshawytscha* and chum salmon *O. keta* in Henshaw Creek. The weir operated from June 27 through August 6, with six days of flooding. An estimated 740 Chinook salmon and 44,425 chum salmon migrated through the weir. The most abundant non-salmon species was longnose sucker *Catostomus catostomus* ( $n = 5,039$ ), followed by whitefish (Coregoninae) ( $n = 218$ ), arctic grayling *Thymallus arcticus* ( $n = 136$ ) and northern pike *Esox lucius* ( $n = 23$ ). The estimated weekly sex composition for Chinook salmon ranged from 22% to 45% female fish. The estimated weekly sex composition for chum salmon ranged from 41% to 49% female fish. Chinook salmon and chum salmon escapement counts from this portion of the Koyukuk River drainage support fisheries management decisions during the Yukon River commercial and subsistence fishing seasons, provide post-season evaluation of various management practices, and assist in developing future run projections.



A technician counts passing fish at the Henshaw Creek weir (USFWS Photo)

## Research Studies and Investigations

### Project: Moose browse study and twinning survey

A survey of the use and availability of winter moose browse was conducted on the Refuge in late March, in cooperation with ADF&G biologists. Of the 64 plots (each about 5.3 mi<sup>2</sup> in size) visited by helicopter in GMU 24B (including 38 plots on Kanuti Refuge), browse was evident from the air in 38 plots (59%). No browse was seen in the remaining 26 plots as the helicopter traversed the plot from the southeast to northwest corner at low altitude. In plots containing browse, the helicopter landed and vegetation data were collected in randomly located 98 x 98 foot plots. Data collected included species and density of forage plants (willow, paper birch, aspen, and balsam poplar), biomass (weight) of new twigs produced, how much forage was removed by moose, and evidence of past browsing by moose. GMU 24B (including Kanuti Refuge) had the lowest levels of browse removal by moose compared to other areas surveyed in interior Alaska, suggesting that the available forage could likely support more moose in the area. The survey, however, was not designed to estimate how much overall forage was available throughout GMU 24B or on the refuge. Browse surveys are ideally coupled with spring twinning surveys (i.e., measure percentage of cows with twin calves), as twinning rates are an indication of nutritional status of moose. ADF&G attempted a twinning survey in GMU 24B in late May 2007 that included the refuge. Too few moose were located to calculate twinning rates.



Wildlife Biologist Saperstein measures moose browsing. (Photo M. Spindler)

*Project: Investigation of habitat characteristics of the prairie bluet damselfly*

WB Saperstein and dragonfly expert John Hudson of Juneau searched for prairie bluet damselflies at and near Kanuti Lake June 10-15 as part of a challenge cost-share agreement. One specimen of the damselfly was captured at Kanuti Lake in 2004, representing a new record for Alaska and a range extension of over 1,000 miles from its nearest known location. Additional prairie bluets were captured during the trip, and numerous other damselflies and dragonflies were identified.



Wildlife Biologist Saperstein searches for dragonflies. (Photo J. Hudson)

## **Cultural Resources**

### *Henshaw Creek Science Camp*

Elders Kitty and David David, long-time residents of Allakaket who are knowledgeable in traditional Native techniques, spent all week at the Henshaw Creek Science Camp in July. The Davids instructed the students in fish cutting and smoking, building a smoke rack without nails or ropes, making fish nets out of willows, and beading. Their Native traditional stories in the evenings were a big hit with the kids. (See also Environmental Education section, page 58)



Elder Kitty David (above) demonstrates the art of making fish nets out of willow peelings, while husband David constructs a fish-hanging rack without the use of nails or rope. (USFWS Photos)



# Management

## Overview

The management of Kanuti NWR is guided by a Comprehensive Conservation Plan. The original plan was developed in 1987; however, we are in the midst of revising it. The process of developing a vision statement, goals, objectives, and a range of alternatives for the revised plan helped us focus on future management priorities for the refuge. The plan tells the public that we aim for: high-quality land stewardship based on sound science; involving, coordinating, and cooperating with neighbors and stakeholders; and being responsive to local, regional, and national clientele. After release of the draft plan in May, the public meetings process, which lasted through early September, provided us with valuable feedback on what is important to the Alaskan public. The written comments provided Alaskan and other perspectives from the rest of the nation. Analysis of comments in general helped us improve the quality and clarity of the final document, currently scheduled to be published in 2008.

## Revision of the Kanuti NWR Comprehensive Conservation Plan (CCP)

*Draft plan preparation.* Refuge staff spent much of their time between January and April 2007 working on the public review draft of the plan. The draft plan was published in early May, with a public review period of May 15-September 15. The draft plan was over 400 pages long (with appendices). In May 2007, Assistant Planner Deborah Webb prepared a visually appealing and easy-to-read summary of the Kanuti CCP. Both the full plan and the summary were made available over the Internet and were available at public meetings.

*Outreach.* Every addressee (723) on a large regional mailing list was sent a post card inquiring whether a full plan, an electronic CD, or a plan summary was desired. Over 150 full printed plans, 250 electronic CDs, and 1400 summaries were distributed. Once the draft was available for public review, refuge staff shifted emphasis to conducting a series of public meetings.

Public meetings were held in Allakaket, Alatna, Bettles, Evansville, Coldfoot, and Fairbanks. Many refuge staff members attended most of the meetings. Chief of Planning Helen Clough attended the Allakaket meeting, and Planner Peter Wikoff attended a Fairbanks Chamber of Commerce meeting. Village meetings were fairly well attended, given the community sizes. Numerous oral comments were obtained at the public meetings. The Fairbanks public meeting held at the main Noel Wien Library was lightly attended. Also in Fairbanks, we conducted separate briefings for the environmental community (Wilderness Watch and Arctic Audubon), Kiwanis Club, Rotary Club, and for the Chamber of Commerce's Natural Resource Committee. This Committee decided that our presentation should be made to the Chamber's entire general membership, which ended up as our meeting with the greatest attendance (over 80 people). In addition to presenting the plan's issues and alternatives at public meetings, Refuge Manager Spindler was interviewed by reporter Dan Bross on public radio station KUAC, and by Daily

News-Miner reporter, Tim Mowry. The radio station aired a news piece, but the newspaper did not print a story.



Refuge Manager Spindler provides status updates on our CCP to Allakaket and Alatna residents (top) and the general membership of the Greater Fairbanks Chamber of Commerce, respectively. (Photos J. Fox [top] and C. Harwood)



*Response to written comments.* In October 2007 Refuge staff met with the Planning Team, including Regional Office and State of Alaska members, to review written and transcribed oral comments. Based on the preponderance of comments and concurring sentiments of Refuge staff, a decision was made to slightly modify our preferred

Alternative C to a new Alternative, dubbed “C1.” The new alternative increased the amount of minimal management in an area upstream of Henshaw Creek. Two small refuge blocks formerly in minimal and surrounded by checkerboard Native Corporation land near Bettles and Evansville were converted to moderate management. These changes resulted in a net addition of 17,700 acres of minimal, or a net change of about 1% additional minimal. The team also discussed approaches to some controversial issues regarding fire management (i.e., an old-growth spruce-lichen habitat protection zone) and access by off-road vehicles (i.e., a proposal from Allakaket that the Service consider allowing an all-weather trail route across a small block of federal refuge lands to access larger blocks of Native corporation lands near the Chalatna River).

*The final plan.* In November and December 2007, Refuge staff worked on responding to over 88 specific written comments and addressed many of these comments by making edits in a draft slated to become the final plan. Refuge staff reviewed the entire draft plan, making hundreds of minor edits. By year’s end, the staff was close to handing all materials back to the Regional Office Planning Team for inclusion in a final plan, to be published later in 2008. The Regional Team also took lead responsibility to prepare a letter of final written responses to the State of Alaska and other major commenters.

## **Fire Management**

### *Wildland-Urban Interface fuels reduction project in Evansville*

The Fairbanks Fire Management office continued funding the village Firewise/Wildland-Urban Interface fuels reduction project begun in 2006 in Bettles/Evansville. The project is to thin dense black spruce in and around the communities and is being done with the cooperation of the Evansville Tribal Council and the Bettles Volunteer Fire Department. Sufficient funding has allowed increasing targeted acreage to be thinned from 27 to 45 acres, in and around residences and public spaces within the community. Two successful prescribed pile burns (in October 2006 and June 2007, respectively), supervised by FWS, have been held to date to dispose of the accumulated slash. The project has achieved all interim goals and is on time and within budget and will continue until July 2008.

## **Intra- and Interagency Cooperation**

### *Cooperative moose work*

Following cancellation of fall moose surveys in 2006, four agencies (Kanuti NWR, Gates of the Arctic National Park and Preserve, Alaska Department of Fish and Game, and the Bureau of Land Management) pooled resources to fund a moose telemetry project in Game Management Units (GMUs) 24A and 24B. Most of the refuge lies in GMU 24B, with a little land along the eastern boundary falling in 24A. Moose have never been radio-collared in this area, and biologists were interested in learning more about moose movements within and between the GMUs. Collared cow moose would also make it easier to locate animals in spring for twinning surveys. The partners hoped to collar 60 moose in March 2007, but radio-collars were not available from the manufacturer by March. Collaring was delayed until March 2008, and Kanuti transferred \$35,000 to the Alaska Department of Fish and Game in a cooperative agreement to cover helicopter,

some fixed-wing airplane, and fuel costs for the collaring effort. The agreement will also pay for calving surveys in 2008.

### Refuge Details

Subsistence Coordinator Brown served 60-day and 30-day details as acting refuge manager at Yukon Flats and Hart Mountain NWRs, respectively. At Yukon Flats, she dealt with end-of-year budget cycle and year-end reports (RAPP, environmental compliance, real property), and provided guidance and oversight for reviewing the preliminary draft Doyon Land Exchange EIS and represented the refuge in the discussions to address deficiencies. At Hart Mountain, she was involved with finalizing the annual refuge work plan, preparing cost analyses for completing two ongoing and one new maintenance/construction projects, reviewing staffing needs, and reviewing existing data status and preparing a needs analysis for two ongoing, long-term refuge projects.

### Invasive Weed Pull on Dalton Highway

Six “Friends of Alaska National Wildlife Refuges” volunteers (Friends) assisted Bureau of Land Management (BLM) colleagues in pulling weeds along the Dalton Highway July 10-12. Approximately 2.5 tons of invasive, non-native plants, primarily white sweetclover (*Melilotus alba*), were removed during the effort. Later in the summer (August 24-26), an eight-person crew (five Friends and three BLM staff) collected an additional one ton of invasives, again primarily white sweetclover. Sobering lessons about the aggressiveness of these plants were learned during the return visit. In just one month’s time, some of the larger plants previously mowed or trimmed had vigorously resprouted and were even flowering, with a high potential for seed production. Other plants that had been earlier pulled or mowed just above the root crown were also resprouting and flowering and had become quite difficult to pull.

The Friends’ efforts primarily targeted weed removal from waterways in a 40-mile stretch between the Kanuti River and Jim River crossings. Additional control work from Milepost 116 to Coldfoot (Milepost 175) resulted in the removal of three other species of invasive weeds: yellow toadflax (*Linaria vulgaris*), oxeye daisy (*Leucanthemum vulgare*) and bird vetch (*Vicia cracca*). This is the second year in a row our Friends have assisted BLM in the weed pulls.

Invasive weeds have been gradually colonizing northward along the Dalton Highway. Waterways crossing the highway are seen as possible routes for dispersal of weeds to wild lands and waters outside the road corridor, including those of the Kanuti Refuge. At its nearest point, the Refuge lies just eight miles west of the Dalton Highway. There are at least six tributaries that cross the highway and later enter the Refuge. Since 1994 when unrestricted travel of the highway by the general public was allowed, there has been a gradual increase in recreational traffic along the highway. With increased traffic has come greater invasive weed infestation along the highway. Based on Alaska Department of Transportation and Public Facility’s annual average daily traffic counts 2005-06, an estimated 15,600 vehicles pass Dietrich Camp (Milepost 207) traveling north or south during the 100-days of summer between Memorial Day and Labor Day.

Given the uphill battle to manually and/or mechanically treat this infestation as it marches north, Friends members and Kanuti staff now believe a change in tactics is needed to control white sweetclover along the Dalton Highway. Two years of manual weed pulling has shown only a large-scale integrated approach, including the potential use of herbicides and other control methods, will stem the spread of this noxious weed. The Refuge will continue to work with partners along the highway corridor to prevent white sweetclover from entering the refuge.



"Friends of Alaska Refuges" volunteers employed both hand pulling and string trimmers to remove invasive white sweet clover along the Dalton Highway. (BLM Photo)

National Park Service orientation

WB Saperstein provided an overview of Kanuti Refuge for staff of Gates of the Arctic National Park and Preserve during their Bettles orientation on June 5. The orientation was attended by National Park Service staff based in Bettles and Fairbanks. The overview covered refuge habitats, wildlife, projects, and the CCP revision.



Wildlife Biologist Saperstein provides National Park Service with an overview of Kanuti Refuge during their annual spring orientation in Bettles. (NPS Photo)

## **Tribal Cooperation**

### Contracted Rural Representative

The Refuge lost its full-time Refuge Information Technician position in 2004, due to a resignation and a subsequent budget cut. In 2007 we negotiated a two-year contract for the Allakaket Tribal Council to hire and provide a part-time “Rural Representative.” The Allakaket Council selected Kenneth Bergman to serve as a liaison between the Refuge and the village. We have budgeted \$10,000 per year to obtain these contracted services. We believe contracting for these services is a “win-win” situation for all involved because it provides a local-hire job in the village and provides rural representation for the Refuge at a reduced cost to the taxpayer. The Rural Representative will mainly assist the Refuge by conducting subsistence harvest surveys, disseminating refuge and subsistence information to the village, and relaying feedback from the village to Refuge staff. Kenneth started working in September.



Rural Representative Kenneth Bergman, with wife Elsie, completed his first waterfowl harvest survey in late winter 2007. (Photo K. Reakoff)

### Subsistence waterfowl harvest survey

Kenneth Bergman, the contracted Rural Representative, conducted field sampling of waterfowl harvest in Allakaket and Alatna. Surveys were conducted representing three potential periods of harvest: spring, summer, and fall. While surveys are generally conducted by the end of June (spring harvest), at the end of August (summer harvest),

and after freeze-up (early October) once all migratory birds have departed (fall harvest), Kenneth's hiring date required that all three seasonal surveys be conducted in early winter. Future surveys will occur as scheduled per season. Survey results appear in Subsistence section (page 51).

Tribal assistance grant

Wildlife Biologist Saperstein reviewed and helped edit a tribal wildlife assistance grant entitled, "Management Strategies to Increase Subsistence Opportunities on Tribal Lands." The grant was to assist Allakaket in moose habitat management on Native corporation lands near the village and included a project to enhance moose habitat by crushing willows with a bulldozer. The Refuge has not yet heard if the \$120,146 project was funded.

Challenge Cost Share agreement

The Refuge received a \$3,000 challenge cost share grant for cooperative moose hunter education in Allakaket and Alatna. The agreement was to educate subsistence hunters about the importance of conserving cow moose during winter subsistence hunts. As the overall moose population declined in the last decade, and hunter success has diminished greatly, there has been increasing demand for harvest of cow moose. The Refuge and Tribe worked together in January through March to conduct meetings and school visits and to distribute educational leaflets describing the negative population impacts of cow moose harvest.



Former long-time Kanuti NWR employee, Johnson Moses, addresses prospective moose hunters during the March hunter education meeting in Allakaket. (USFWS Photo)

March bulls-only moose hunts

Refuge staff cooperated with the Allakaket Tribal Council to prepare for and implement two special bulls-only moose hunts in March. (See Section XX, Subsistence)

Henshaw Creek Science Camp

Refuge staff cooperated the Tanana Chiefs Conference (TCC), Allakaket Tribal Council, and Fairbanks Fish and Wildlife Field Office (Fisheries) to conduct the first ever Henshaw Creek Science Camp. (See Cultural Resources and Environmental Education sections as well)



Park Ranger Reakoff (R) assists USFWS Fisheries Technician Travis Varney (L), TCC Partners Fisheries Intern Lisa Kangas (middle L), and TCC Partners Fisheries Biologist Brandy Berkbigler in fish print activities at the Henshaw Creek Science Camp. (USFWS Photo)

**Permits**

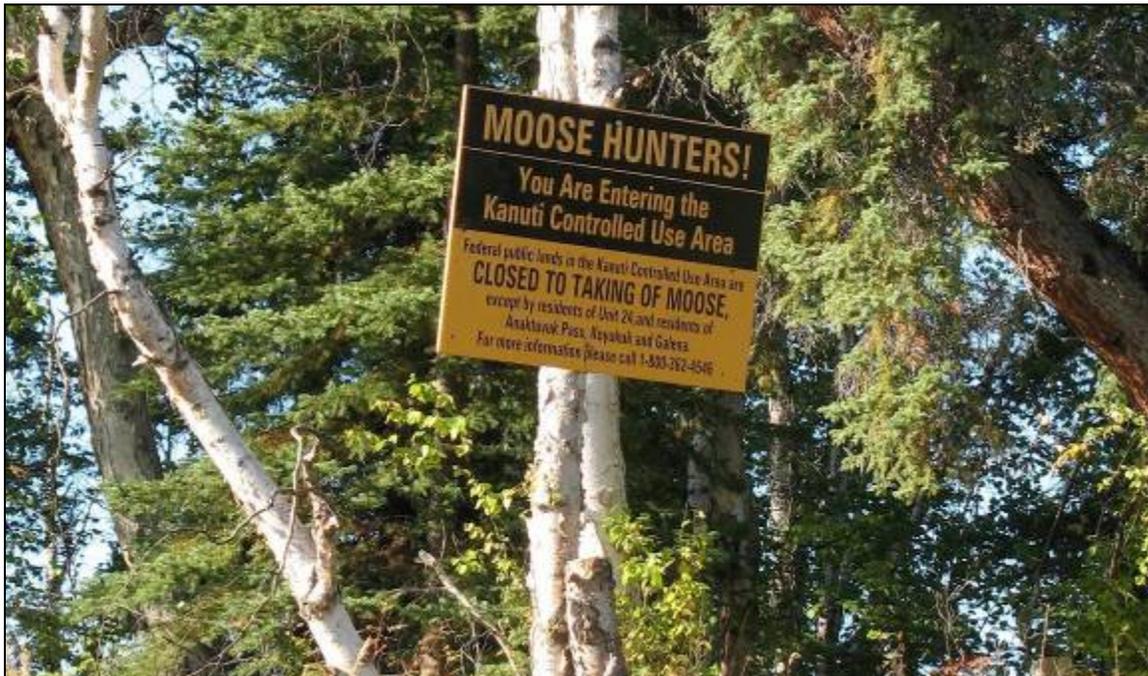
In 2007, two special use permits were issued to conduct commercial air taxi/transporter operations. The Refuge receives a limited number of special use permit requests for this activity for the following reasons: (1) the Kanuti Controlled Use Area occupies a large section of the refuge, and under State regulations this area is closed to the use of aircraft for hunting moose, including the transportation of moose hunters, their hunting gear, or parts of moose; and (2) moose densities within the refuge are low, and hence the refuge is not a popular destination for many moose hunters, who often comprise the bulk of air taxi/transporters' business volume.

Big game guide permits on the Kanuti Refuge, as well as on the other 15 National Wildlife Refuges in Alaska, are awarded through a competitive selection process. Permits for exclusive guide use areas are awarded for a five-year period with an option for one five-year extension contingent upon no violations and satisfactory performance. Areas are offered periodically as permits expire or as incumbents choose to discontinue their operations. Qualified Alaska big game guides may apply for up to three areas when they are publicly offered. In 2005, the Refuge offered its only exclusive guide use area, which encompasses the refuge in its entirety, for competition. The Refuge received only one application for the area. Early in 2006, a ranking panel consisting of Service employees evaluated the application in accordance with regional guidance, determined the applicant met the requirements identified in the Refuge prospectus, and recommended that he be considered for final selection as the big game guide in the area. After evaluating the application and talking with the applicant, Refuge Manager Spindler awarded the big game permit for the area to him. Because of the low moose densities and competition between local subsistence hunters and other hunters within the refuge, the guide is permitted to provide commercial grizzly bear, black bear and wolf hunts to no more than six clients annually through December 2011.

## **Public Access**

### *Kanuti Controlled Use Area*

In preparation for moose season, Refuge Manager Spindler and Deputy Refuge Manager Fox re-installed a sign marking the Kanuti Controlled Use Area boundary along the Kanuti River. The sign had been displaced by flood waters; the new location is hopefully above the highest flood levels.



This sign marks the Kanuti Controlled Use Area boundary along the Kanuti River.  
(Photo M. Spindler)

Sithylemenkat Lake Public Access Easement Check

Located in the southeast corner of the Refuge, picturesque Sithylemenkat Lake is the gateway into perhaps the most scenic and recreationally appealing area of the Refuge. A series of mountain ridges extending west of the lake and into the Refuge offers exceptional hiking opportunities, as well as excellent views into the heart of the Refuge. This large lake, although within Refuge borders, is surrounded by Native regional corporation lands. Section 17(b) of the Alaska Native Claims Settlement Act requires the Federal government to reserve easements for public access to refuge lands and waters from adjacent Native lands. Two trail easements and an associated campsite easement (Fig. 4) were reserved on the west side of the lake to allow the public to cross Native land to reach the Refuge for recreation, hunting, transportation and other uses. As these easements were never ground-truthed for suitability, Refuge Manager (RM) Spindler and Deputy RM Fox spent a day in late August checking the easements to verify access possibilities.

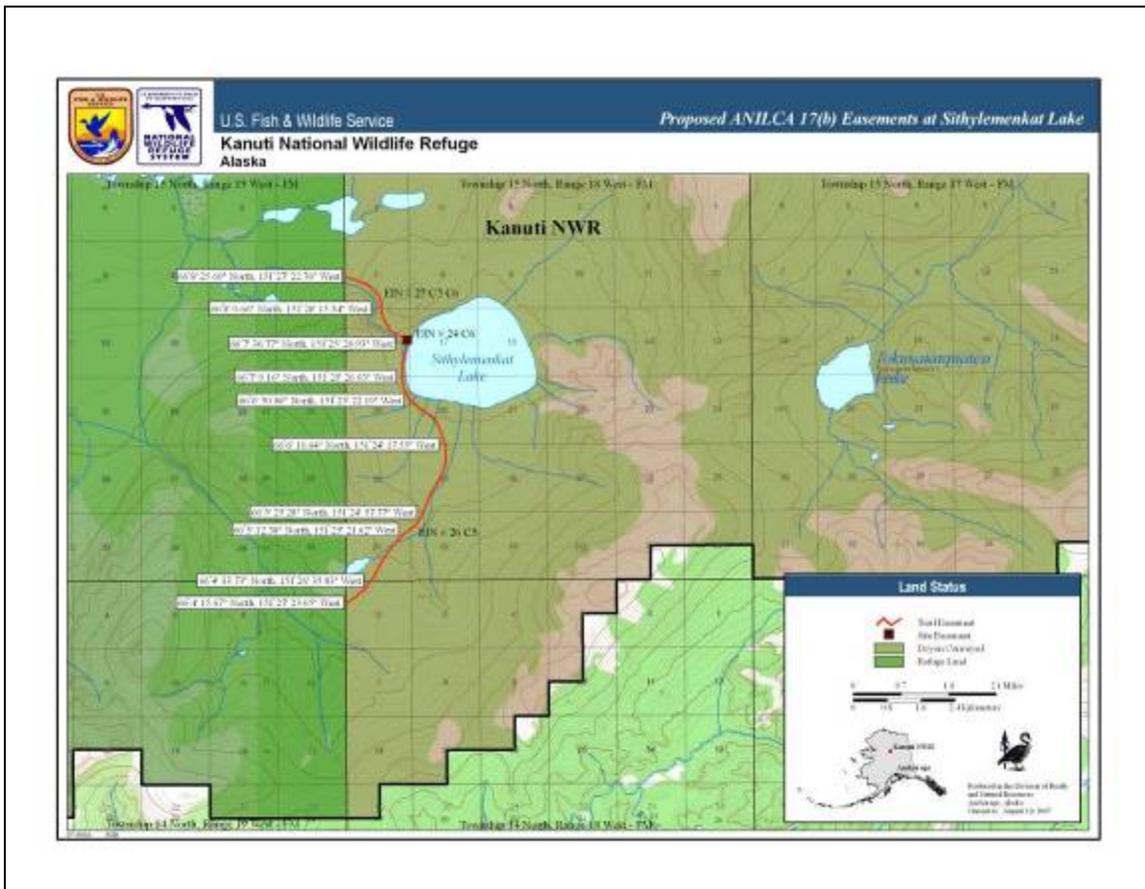


Figure 4. Legally recorded 17b easements near Sithylemenkat Lake.

From the air, some meadows appeared to offer good access but we later learned that not to be the case. For example, one trail easement crosses a large wet meadow for several miles before reaching the Refuge (such foot access would take more than a day and be

practical only in winter). The other trail easement generally follows a stream out of the lake. Along the stream banks and into the refuge the easement traverses dense patches of shrub vegetation interspersed with large tussocks, a very difficult walk. Between these segments, the easement parallels a small canyon where steep slopes covered with thick spruce, birch and alder are impenetrable. Unable to reach the Refuge via the reserved easement, we identified an alternate east-west route that allows easy hiking from the lake along an open alpine rocky slope and west into the refuge following a dry ridge.

Following the reconnaissance, Spindler and Fox prepared a report that described suitability of the recorded easements and an alternative route with easier access. The hope is to negotiate with the Native regional corporation to re-describe the northwest trail easement to include the ridge route from Sithylenkat Lake's north shore.



Refuge staff felt that this dry ridge, which is northwest of Sithylenkat Lake but south and west of the recorded easement (which is almost impassible), would be a more suitable easement option. (Photo M. Spindler)

## Administration

### Budget

Fiscal year 2006 saw a change in the organization of funding, making comparison with previous years problematic. Thus, 2006 and 2007 funding figures are given separately from the previous five years (Table 4).

	Year 2006	Year 2007
Refuge Operations (1261)	611,000	642,000
Maintenance (1262)	281,000	36,000
Visitor Services (1263)	399,000	403,000
Law Enforcement (1264)	4,000	4,000
CCP Planning (1265)	45,000	93,000
Subsistence (1332)	26,000	26,000
Fire	256,000	181,000
Construction (Bettles Bunkhouse)		<u>1,267,000</u>
<b>Total Funding</b>	<b><u>\$1,623,000</u></b>	<b><u>\$2,652,000</u></b>

Table 4. Funding for Kanuti NWR, Fiscal Years 2001-2005.

Year	Total Funding	Refuge Operations	Maintenance/ Construction	Fire	Subsistence	Challenge Cost Share
2001	\$ 845,000	\$769,000	\$ 18,000	\$20,000	\$26,000	\$12,000
2002	\$ 973,000	\$905,000	\$ 24,000	\$18,000	\$26,000	-----
2003	\$ 916,000	\$825,000	\$ 42,000	\$18,000	\$27,000	\$ 4,000
2004	\$1,044,000	\$876,000	\$103,000	\$19,000	\$27,000	\$19,000
2005	\$1,010,000	\$871,000	\$ 80,000	\$23,000	\$26,000	\$10,000



Wildlife Biologist Saperstein submitted (and was subsequently awarded) a Challenge Cost Share proposal to hold “Dragonfly Day” in summer 2008. (Photo J. Hudson)

## Personnel

### Staffing

Notable staff changes in 2007 included (see also Table 5):

- **Chase Marshall** filled the vacant fire management officer position representing the three Fairbanks-based refuges. Marshall has 17 seasons/years of experience in fire management with the Service. He was most recently a District Fire Management Officer in Region 6, where he oversaw all aspects of wildland fire management for the J. Clark Salyer NWR and Waterfowl Management District (WMD), J. Clark Salyer Complex, Upper Souris NWR, Audubon NWR complex, Lostwood NWR and WMD, Des Lacs NWR and WMD and the Crosby WMD.
- After a stint last summer as an emergency hire, Wiseman resident **Kristin Reakoff** was rehired as a local-hire, permanent part-time interpretive park ranger stationed at Coldfoot. She represents Arctic, Kanuti and Yukon Flats Refuges at the Arctic Interagency Visitor Center, and coordinates and conducts local, regional, and national outreach activities for Kanuti Refuge.
- Bettles resident **Doug Holton** was brought back as a local-hire, Term intermittent maintenance worker. His primary responsibilities were preparing the Bettles hangar for a major steel-girder retrofit project and acting as the Contracting Officer's Technical Representative in the field for the project. He also maintained facilities and equipment as needed.
- With Kanuti's Comprehensive Conservation Plan (CCP) well on its way, Assistant Planner **Deborah Webb** was re-assigned to the Regional Office (Anchorage) to begin assisting another refuge with its CCP.
- **Annie Parks** came aboard in April working as an Office Automation Clerk for the three Fairbanks-based Refuges.
- Biological Technician **Brandon Bridges** was originally hired through the Eco-Intern program, which collapsed after he had purchased his airplane ticket to Alaska. After the demise of Eco-Intern, Bridges was then brought on as an emergency-hire for 60 days, to be followed by a volunteer stint during which he would be reimbursed for subsistence expenses. After completion of all training and less than a week in the field, Bridges left to accept a permanent position in his home state.
- **Andy Brown** came on as an emergency-hire biological technician to assist with July fieldwork. The emergency hire was necessary because of the early departure of our scheduled technician (see above).



Departing staff member Deborah Webb (above) and departed staff member (August 2006) Curtis Knight were presented with photos from Kanuti Refuge at their respective (yet combined) going-away/thank-you party. (Photos M. Spindler)



Table 5. 2007 Kanuti NWR Staff (includes permanent, shared, seasonal, and emergency hire positions).

<b>Employee Name Title</b>	<b>Entered On Duty</b>	<b>Departed</b>
Mike Spindler Refuge Manager/Pilot	03/06/05	
Joanna Fox Deputy Refuge Manager	03/05/06	
Lisa Saperstein Wildlife Biologist (Lead)	09/27/98	
Chris Harwood Wildlife Biologist	03/10/03	
Deborah Webb Assistant Natural Resource Planner	04/10/06	10/27/07
Kristin Reakoff Interpretive Park Ranger <sup>1</sup>	03/18/07	
Doug Holton Maintenance Worker <sup>2</sup>	03/18/07	
Chase Marshall Fire Management Officer <sup>3</sup>	07/10/07	
Almeda Gaddis Administrative Officer <sup>3</sup>	10/26/97	
Lorna Young Administrative Support Assistant <sup>3</sup>	10/21/03	
Kimberly Robinson Administrative Support Assistant <sup>3</sup>	10/21/03	
Lou Maloney Administrative Support Assistant <sup>3</sup>	11/15/04	
Annie Parks Office Automation Clerk <sup>3</sup>	04/01/07	
Wenona Brown Subsistence Coordinator <sup>4</sup>	12/30/01	
Sam Patten Fire Management Specialist <sup>4</sup>	01/13/02	
Nancy Reagan Information Technology Specialist <sup>5</sup>	10/05/03	
Carlette Smith Information Technology Specialist <sup>5</sup>	10/05/03	03/02/07
Andy Brown Biological Technician	07/10/07	07/30/07
Brandon Bridges Biological Technician	05/15/07	06/05/07

<sup>1</sup> position is local-hire, permanent, part-time

<sup>2</sup> position is local-hire, term intermittent

<sup>3</sup> position hosted by Kanuti NWR, but shared with Arctic and Yukon Flats NWRs

<sup>4</sup> position hosted by Yukon Flats NWR, but shared with Arctic and Kanuti NWRs

<sup>5</sup> position hosted by Arctic NWR, but shared with Kanuti and Yukon Flats NWRs

## Volunteers

The work of the Refuge also greatly benefited from the significant efforts of these volunteers in 2007:

- Eight members of the “**Friends of Alaska National Wildlife Refuges**” collectively contributed 482 hours assisting in the BLM-sponsored weed pull along the Dalton Highway (see page 29).
- “Friends” member **Carla Stanley** donated considerable time serving as an instructor at the Henshaw Creek Science Camp (see pages 33, 57).



“Friends of Alaska Refuges” Group Education Chair, Carla Stanley, educates students about fish anatomy at the Henshaw Creek Science Camp, while former Kanuti manager Bob Schulz drives the boat during a white-fronted goose survey. (USFWS Photos)

- Former Kanuti Refuge Manager **Bob Schulz** (retired) was recruited by the Refuge to assist the Migratory Bird Management in conducting their fall staging Greater White-fronted Goose surveys along the Tanana River in Delta Junction.
- Former Kanuti employee **Curtis Knight** still managed to contribute to the Refuge with intermittent help making maps for the CCP.
- Regular Arctic NWR volunteer **Shari Boyd** did double duty in 2007 by also helping out at Kanuti. Shari came aboard in a pinch to help Wildlife Biologist Harwood continue his bird surveys in June.

- Visiting entomologist **John Hudson** was a cooperator on the Kanuti Lake prairie bluet Challenge Cost-Share project. He was paid for part of his time, but more of his time was spent as a volunteer for field work, specimen identification, and report writing.

- Interpretive Park Ranger **Joyce Potter's** responsibilities at the Arctic Interagency Visitor Center included: providing travel and recreation planning information to visitors; monitoring visitor use and collecting data; providing information about the natural and cultural resources of the Arctic; conducting sales and assisting with ANHA outlet inventory; and advising visitors about safety, fire prevention and proper use of public lands.



Volunteer Shari Boyd (L) paddles fully loaded down the Jim River, while entomologist John Hudson (R) demonstrates he has an affinity for dragonflies...and vice versa!!!  
(Photos C. Harwood and L. Saperstein)

#### Awards/Recognition

- Wildlife Biologist Saperstein received Star Awards for her efforts on the CCP final review draft, her work on fire ecology and management and on the prairie bluet damselfly project.

- Deputy Refuge Manager Fox received a STAR Award for her efforts to interview and select a highly qualified shared fire management officer for the Fairbanks-based refuges.

- Assistant Planner Webb received a STAR Award for compiling, designing and producing an excellent summary of the draft revised CCP for public distribution.

- Park Ranger Reakoff received a STAR award for creating boreal forest interpretive program designed to get visitors outdoors, where they can experience nature first-hand and develop a meaningful and lasting appreciation for arctic habitats and resources.

- Administrative Officer Gaddis received an award for securing additional clerical assistance for all three Fairbanks-based refuges.

- Administrative Support Assistant Maloney received awards for providing logistical and maintenance support associated with the Bettles hangar renovation project, and for providing motorboat-based logistical support during migratory bird surveys.

### Professional Development

All staff attended and completed all mandatory training for their respective positions. Supplemental training, workshops, and conferences for several staff members included:

- Subsistence Coordinator Brown: Refuge Compatibility Training
- Deputy Refuge Manager Fox: Project Leader Academy, Introductory Canoe Clinic, Alaska Committee for Noxious and Invasive Plants Management Workshop
- Wildlife Biologist Harwood: Bird monitoring/detectability symposium, Advanced GPS Applications, Pre-retirement seminar
- Maintenance Worker Holton: Contracting Officer's Technical Representative training; Hazardous Waste Operations and Emergency Response training
- Administrative Support Assistant Maloney: Employee Foundations, Bear/Firearms Safety Instructor training
- Fire Management Officer Marshall: ANILCA Seminar, Alaska Interagency Fall Fire Review, National Fuels Committee Conference
- Park Ranger Reakoff: Introductory Canoe Clinic, Interpretive Panels and Exhibits Workshop
- Wildlife Biologist Saperstein: Pre-retirement seminar
- Refuge Manager Spindler: Emergency Maneuver Pilot ("spin") training, Introductory Canoe Clinic
- Assistant Planner Webb: "Facilitating Work Groups and Public Meetings" training



Large swaths of fireweed were prevalent in 2007 as a result of the severe fire seasons of 2004-2005. (Photo C. Harwood)

# Public Use

## Overview

Pursuit of subsistence activities (e.g., hunting, fishing, trapping, berry picking) by local residents continues to be the primary public use of the Refuge. Given subsistence's prominence in the public use realm of the Refuge, considerable staff effort is expended in its behalf (e.g., moose and wolf surveys, law enforcement patrols, newsletters to village residents, village meetings, etc.). While the Refuge does not monitor use quantitatively, it is believed that non-subsistence usage is generally light; the Refuge's remoteness and general inaccessibility likely are major deterrents to recreational use by non-locals. Still, there is some sport hunting done every year by hunters flying in via their own aircraft or air taxi services, or by accessing the Refuge (e.g., jet boats, rafts, airboats) by rivers that intersect the Dalton Highway. Most, if not all, sport fishing, wildlife observation, and wildlife photography are likely done incidentally to sport hunting. The Refuge contributes one staff member to the recently erected Arctic Interagency Visitor Center (AIVC) in Coldfoot (260 mi/415 km north of Fairbanks) along the Dalton Highway. The AIVC is centrally located to inform public about not only Kanuti NWR, but also Yukon Flats and Arctic NWRs, Gates of the Arctic National Park and Preserve, and BLM-held lands such as the Dalton Highway Corridor and the National Petroleum Reserve Alaska. Considerable environmental education and interpretation is done in Fairbanks as well, in cooperation with such groups as the Alaska Department of Fish and Game, Alaska Public Lands Information Center, University of Alaska Fairbanks, and non-governmental organizations like the Alaska Bird Observatory, Arctic Audubon, and Friends of Creamer's Field.

Two sets of hunting regulations apply to the Refuge: 1) the general State harvest regulations and 2) federal subsistence regulations that only apply to federally qualified subsistence users on federal lands. Qualification as a federal subsistence user is based on residency in rural villages. In most cases, the State and federal regulations are the same, but there are exceptions where additional subsistence opportunity is necessary.

## Subsistence

### Subsistence Overview

Providing the opportunity for continued subsistence use by local residents is one of the ANILCA purposes of Kanuti Refuge. The Federal Subsistence Board, through its rulemaking process, addresses seasons, harvest limits, and determinations on customary and traditional use. The Federal Subsistence Board's jurisdiction includes hunting (excluding migratory birds), trapping, and fishing. The Federal Board established regional advisory councils to provide for meaningful public input to the rulemaking process. Kanuti Refuge is within the area represented by the Western Interior Federal Subsistence Regional Advisory Council (Western Interior RAC), and under State authority, the area represented by the Koyukuk River Fish and Game Advisory Committee (Koyukuk River AC).



This bull moose is just beginning to sprout antlers (Photo B. Whitehill)

#### Concerns/Issues

##### *1) Low moose numbers*

The most frequently expressed concern of village residents throughout interior Alaska continues to be the low moose population and high number of wolves. Local residents continue to ask for predator control (intensive management) on both State and federal lands. They also have asked for wolf surveys on the Refuge and predator/prey relationship studies.

##### *2) Fuel costs*

High gasoline prices in the villages continued to limit hunting, fishing, and trapping opportunities for subsistence.

##### *3) Poor salmon runs*

Area residents continued to note concerns about the decline in fish size. Relatedly, they also expressed concern about the use of larger mesh size (i.e., tends to select for larger fish) by salmon fishers elsewhere.

##### *4) Global warming affecting resources*

Some residents have expressed concern that warming trends are affecting game, particularly moose, movements (i.e., making game less accessible to hunt) and are possibly causing a decline in whitefish.

### Big Game Harvest and Hunting Regulations (Subsistence)

The State harvest system (via green mail-in cards) typically under-reports subsistence harvest. Most of the harvest on the Refuge is by subsistence users living in area villages. In 2007, a five-day March moose bulls-only season and an extended fall hunting season from September 26 - October 1 were available for federally qualified subsistence hunters. The Refuge contracted with the local license vendor in Allakaket to issue federal fall and March moose permits and collect harvest reports for these seasons. Thirty-five federal permits were issued in Allakaket/Alatna for the extended season, September 26 - October 1 on Kanuti Refuge. A total of 13 moose was harvested in the fall hunt, all during the State general hunt September 1-25. According to the license vendor, no moose hunting activity occurred in Alatna and Allakaket during the State's December 1-10 general hunt.

Special regulations are currently in effect on the Refuge regarding moose hunting. The State Board of Game established the Kanuti Controlled Use Area in 1981. In the Controlled Use Area, aircraft access for moose hunting is prohibited. In 1992, the Federal Subsistence Board restricted moose hunting on federal lands within the Kanuti Controlled Use Area to residents of Game Management Unit 24, Anaktuvuk Pass, Galena, or Koyukuk.

Under the discretionary authority granted by the Federal Subsistence Board (FSB) in 2005, Refuge Manager (RM) Spindler, in conjunction with the Gates of the Arctic National Park/Preserve Superintendent and the Central Field Office Manager of BLM, closed the 2007 fall cow moose season, consistent with State and other federal managers' actions. Because of low moose harvest in the fall and lack of caribou through the winter, RM Spindler opened the discretionary March 1-5 season in 2007. Extremely cold temperatures, persistent throughout the Interior in March, largely discouraged and/or hampered hunting during the week of the hunt; no hunters were successful. This precipitated an official request from Allakaket to extend the hunt. The Federal Subsistence Board granted an additional hunt March 20-24. Thirty-three hunters (from all villages) attended the mandatory pre-hunt meetings, with 27 issued permits; no moose were taken. Five hunters did not return permit reports or answer follow-up phone calls. Only 10 hunters actually hunted during either or both of the hunts, with their efforts ranging from 1-10 days (average days hunted per hunter who went to the field = 3.8; average days hunted per permittee = 1.6). The frequency of occurrence of the hunting effort was: 1 day hunted - 2 hunters; 2 days hunted - 1 hunter; 3 days hunted - 3 hunters; 5 days hunted - 3 hunters; and 10 days hunted - 1 hunter.

In 2007, the Western Interior Regional Advisory Council took action on four statewide and three regional proposals that would affect hunting in the Kanuti Refuge. The statewide proposals and actions are listed below:

- **Proposal 1** -- remove "claws" from the Federal definition of fur; also sales of handicraft articles made from claws, bones, teeth, sinew, or skulls of black and brown bears be allowed for sale only between federally qualified subsistence users statewide. Council opposed; FSB rejected.
- **Proposal 2** -- change the regulatory wording in 50 CFR 100.25(h) from "calendar" year to "regulatory" year. Council supported; FSB adopted.

- **Proposal 3** – request sale of raw, untanned hides and capes of goat, sheep, caribou or moose (untanned hides do not meet the federal definition of handicrafts). Council supported; FSB adopted with modification to include tanned hides and add deer, elk, and muskox.
- **Proposal 4** – allow sale of antlers or horns of goat, sheep, deer, elk, caribou, moose, or muskox. Council supported; FSB adopted with modification to address only horns and antlers from animals harvested under Federal subsistence regulations and modified language to clarify intent of language regarding removal of horns or antlers from the skull.

The three regional proposals and actions are listed below:

- **Proposal 34** – change the sheep season from August 20 – September 30 to August 10 – September 20 for Unit 24A, except within Gates of the Arctic National Park and Preserve. Council opposed; FSB rejected.
- **Proposal 55** – require federally qualified subsistence hunters to use a bow and arrow to hunt sheep in Dalton Highway Corridor Management Area during period of time when State has archery-only hunt. Council opposed; FSB rejected.
- **Proposal 58** – require federally qualified subsistence hunters to use a bow and arrow to hunt moose in Dalton Highway Corridor Management Area during period of time when State has archery-only hunt. Council opposed; FSB rejected.

#### Fishing Harvest and Regulations (Subsistence)

Data for the 2007 fishing season are not yet available. In 2006, Alatna residents harvested an estimated 14 Chinook, 110 summer chum, 0 fall chum, and 0 coho salmon. Allakaket residents harvested an estimated 5,611 salmon, with the following breakdown: 23 Chinook, 5,170 summer chum, 393 fall chum, and 25 Coho. Bettles and Evansville residents had no reported salmon harvest (W. H. Busher, Commercial Fishery Management Biologist, ADF&G, Fairbanks, personal communication). In 2006, Alatna residents also had an estimated harvest of 20 blackfish (W. H. Busher, Commercial Fishery Management Biologist, ADF&G, Fairbanks, personal communication).



Allakaket elder Kitty David demonstrates her traditional skills like cutting and hanging salmon strips. (USFWS Photo)

Estimated harvest of fish other than salmon in Koyukuk River villages for 2004 - 2006 is presented in Table 6. No data were reported for Evansville.

Table 6. Non-salmon fish species harvested by the Koyukuk River villages, 2004-06.

Village	Whitefish *	Pike *	Sheefish *	Grayling **	Burbot **	Suckers **	Arctic Char**	Total
<b>2004<sup>1</sup></b>								
Allakaket	580	461	545	20	7	12	0	1625
Alatna	0	0	0	0	0	0	0	0
Bettles	0	0	45	4	0	0	12	61
<b>2005<sup>2</sup></b>								
Allakaket	2340	619	480	174	208	572	1	4394
Alatna	100	8	0	20	0	6	0	134
Bettles	0	0	6	6	0	0	4	16
<b>2006<sup>3</sup></b>								
Allakaket	7,318	480	875	23	1	0	10	8,707
Alatna	160	40	76	0	0	0	0	276
Bettles	0	4	0	23	0	0	3	30

<sup>1</sup>Data from Busher et al., 2008 \*Expanded to estimate village harvest

<sup>2</sup>Data from Busher et al., 2007 \*\*Reported subsistence harvest (not expanded)

<sup>3</sup>Data from W. H. Busher, commercial fishery management biologist, ADF&G, Fairbanks, personal communication.

By regulation, subsistence salmon fishing is open in the Koyukuk River drainage 24 hours per day/7 days per week. Fisheries biologists described the 2007 Chinook salmon fishing season about a day late in timing, and below average in run strength. The Chinook salmon fish passage was about 125,000, about 24% below the 2006 run estimate. The summer chum run was estimated at 1.7 million fish, slightly above the historical average. The fall chum run was exceptionally late, with estimated season total of about 1.0 million fish. Most subsistence fishermen were anticipated to have met their immediate family harvest goals in 2007, but many stated that their harvests were not sufficient to share with extended family like they normally would. Middle and upper river district fishermen reported difficulties in catching Chinook during the 2007 season.

The Federal Subsistence Board (FSB) deferred action on the four Yukon River proposals submitted for the 2007 fishing season; therefore, the Western Interior RAC did not have the opportunity to review and vote on them at their fall fisheries meeting. The FSB deferred action until next year to allow the Yukon River Drainage Fisheries Association Fish Size Working Group to address the issues raised by the proposals.

The Western Interior RAC submitted a proposal in 2007 for the 2008 season that would allow drift net fishing in Yukon River Districts 4B and 4C throughout the fishing window, rather than be restricted to the last 18 hours of the window. The Western Interior RAC also took no action on proposals submitted by the Eastern Interior RAC that would restrict gill nets to 7.5-inch mesh size, and restrict nets to 35-mesh depth. At its December 11-13, 2007 meeting, the FSB approved expanding the drift net fishing window for District 4B and 4C as proposed by the Western Interior RAC, but did not approve the fish mesh net size and depth restrictions as proposed by Eastern Interior RAC.

#### Waterfowl Harvest and Hunting Regulations (Subsistence)

In 1997, the Migratory Bird Treaties with Canada and Mexico were amended to officially recognize and legally sanction Alaska's traditional spring/summer subsistence waterfowl harvest. Under the amendment terms, the Alaska Migratory Bird Co-Management Council (AMBCC) was formed, which includes representatives from the Alaska Native community, the Alaska Department of Fish and Game, and the U.S. Fish and Wildlife Service acting as equal partners. Subsistence Coordinator Brown serves on both the AMBCC's Communication Outreach Committee and the Harvest Survey Technical Committee. Also under the terms of the amendment was the requirement to regularly monitor subsistence waterfowl harvest through village harvest surveys. To that end, the Refuge entered into an agreement with village of Allakaket that provides a local resident to conduct regular waterfowl harvest surveys.

### Waterfowl Subsistence Survey

Beginning in late October and through December, Rural Representative Kenneth Bergman conducted waterfowl harvest surveys in Allakaket and Alatna. Bergman was able to contact 48 households in Allakaket, 12 of which reported harvest in the spring and 5 reported harvest in the fall (Table 7). There was no reported harvest in the summer period. Participation in the survey in Allakaket was reportedly excellent. Four of seven occupied houses in Alatna participated in the survey. Like 2006, there was no reported harvest from Alatna. No surveys were done in Evansville and Bettles in 2007, based on the lack of reported harvest there in 2006.

Table 7. Reported waterfowl harvest survey for **Allakaket** in 2006 and 2007.

<b>Season</b>	<b>Bird Species</b>	<b>2006<sup>1</sup></b>	<b>2007<sup>2</sup></b>
Spring (April 1-June 30)	Greater White-fronted Goose	32	37
	Snow Goose	1	0
	“Lesser” Canada Goose	77	25
	American Wigeon	39	30
	Mallard	16	38
	Northern Shoveler	2	12
	Northern Pintail	33	32
	Green-winged Teal	0	9
	Canvasback	0	17
	Unidentified Scaup	0	13
	Surf Scoter	2	5
	Long-tailed Duck	10	24
<b>Spring (April 1-June 30) Total</b>		<b>212</b>	<b>242</b>
Summer (July 1-Aug 31)	Canada Goose	1	0
	Northern Pintail	1	0
	Sandhill Crane	9	0
<b>Summer (July 1-Aug 31) Total</b>		<b>11</b>	<b>0</b>
Fall (Sept 1-Oct 31)	“Lesser” Canada Goose	1	10
	American Wigeon	0	1
	Mallard	2	7
	Northern Pintail	1	2
	Canvasback	0	5
	Unidentified Scaup	0	6
	Unidentified Merganser	0	1
<b>Fall (Sept 1-Oct 31) Total</b>		<b>4</b>	<b>32</b>
<b>Grand Total</b>		<b>227</b>	<b>274</b>

<sup>1</sup> There was no reported harvest from Alatna, Bettles, or Evansville in 2006.

<sup>2</sup> There was no reported harvest from Alatna in 2007. Bettles and Evansville were not surveyed in 2007, given the lack of reported harvest in 2006.

## **Arctic Interagency Visitor Center (AIVC)**

### Overview

Open May 26 through September 8, the Arctic Interagency Visitor Center (AIVC) hosted over 9,439 visits in 2007. Overall visitation in 2007 (independent and guided visitors combined) increased 13% from 2006. Independent visitors increased 16%, while guided visitors increased 6%. Educational group visits were also up by 55%, a significant increase over last year. Interestingly, visitor center staff recorded 13% fewer visitors as starting trips in Gates of the Arctic National Park and Preserve but recorded a 14% increase in visitors going to Arctic National Wildlife Refuge. Since opening the new facility in 2003, overall visitation at the AIVC has continued to increase annually.

### Visitor Survey

A visitor survey was conducted during the 2007 season, which marked the fifth year the new facility has been in operation. The Dalton Highway Visitor Survey, coordinated by BLM and analyzed by the University of Idaho, gave the facility an 86% GPRA (Government Performance and Results Act) satisfaction measure. Valuable recreation information was obtained from the survey. Visitors indicated that sightseeing (77%), birdwatching/wildlife viewing (32%), hiking/walking (26%), camping (25%), and education/interpretation (23%) were the primary activities/reasons for visiting the area.

### Trail Dedication

A ceremony was held to dedicate two walking trails at the visitor center to the late Ron Dettmers of Helenville, Wisconsin, who volunteered during the summer of 2006. The trail dedication was attended by visitor center staff and local residents, and included a commemorative plaque being permanently placed at the trailheads in Ron's memory. Ron's son, John Dettmers, also attended the ceremony on behalf of Ron's family. Ron was a retired math professor who loved life and enjoyed sharing his colorful personality with thousands of visitors. He will be truly missed. He was an avid outdoorsman, enjoying his time off from the visitor center picking gallons of blueberries on the trails now dedicated to him.

### Dalton Highway Invasive Weed Pull

For the second year in a row, AIVC staff worked closely with volunteers from the "Friends of Alaska Refuges" group and BLM staff on two occasions to assist in pulling invasive weeds along the Dalton Highway corridor (see Intra- and Interagency Cooperation section, page 29). Visitor center staff helped the weed pullers with logistics, and by answering questions. Park Ranger Reakoff coordinated the volunteers' use of Kanuti Refuge's cabin at Marion Creek. She and her husband, Jack Reakoff, a long-time resident of Wiseman, also hosted the volunteers in their home and provided a tour of Wiseman.

## Wildlife-dependent Recreation and Education



Casual hiking is largely limited to the upland areas in the southeast quarter of the Refuge. Lowland areas (tussock meadows, bogs, fens, etc.) can be quite challenging.  
(Photo J. Fox)

### Sport Hunting

#### *Harvest*

Estimating big game sport harvest (moose, caribou, and bear) on the Refuge is difficult because of the remote nature of the hunts. Hunters are required to submit mail-in harvest report cards for moose and caribou to Alaska Department of Fish and Game (ADF&G)

within 15 days of fulfilling a bag limit or within 15 days following the close of the season. The hunter harvest reports do not accurately represent the Refuge because many of the ADF&G reporting units intersect the Refuge boundary making it impossible to determine if the animal was actually taken on the Refuge. These harvest data are not yet available for 2007. The most timely harvest information is from reports of air taxi operators who are required to obtain a special use permit to operate on the Refuge. In 2007, two permitted air taxi operators reported transporting four clients who harvested a total of two moose in the Refuge.

### Sport Fishing

The Refuge does not have a mechanism in place to monitor subsistence or sport fishing activity on the Refuge. Much of the sport fishing is likely associated with fall hunting trips, but people occasionally visit the Refuge solely to fish. Northern pike and arctic grayling are probably the two most sought-after species for sport fishermen.



Deputy Refuge Manager Fox fishes for grayling during the Kanuti River float trip. (Photo M. Spindler)

### Wildlife Observation and Photography

The Refuge does not have a facility where visitors can check in or out of the Refuge. Therefore, tracking actual numbers of recreational visitors is difficult. Records of trips to Kanuti Refuge do not pinpoint locations or provide details on use patterns. Visitor numbers are so small that no systematic effort has been made to quantify them. It is assumed that most wildlife viewing and photography occurs incidentally when those already on Refuge lands are hunting, fishing, or floating rivers.

### *Kanuti River Float Trip*

On June 3-10, Refuge Manager (RM) Spindler, Deputy RM Fox, and Park Ranger Reakoff hosted a float of the Kanuti River for regional office leadership, including Deputy Regional Director Gary Edwards and Refuge Supervisor Mike Boylan. Veteran paddlers DRM Barry Whitehill (Yukon Flats NWR), Supervisory Ecologist Dave Payer (Arctic NWR), and Wildlife Biologist Tim Craig (BLM) assisted the novice crew members in navigating the Kanuti River's very challenging boulder fields.

The purpose of the trip was to introduce several "uninitiated" Refuge staff and regional office staff to the practicalities of accessing Kanuti NWR from the Dalton Highway. The Kanuti River flows through numerous rapids and boulder fields (up to Class III) as it traverses about 30 miles of hilly and mountainous terrain. At the east end of the Kanuti Flats, the Kanuti River becomes a slow meandering Class I stream until reaching the lower canyon about 20 miles above the confluence with the Koyukuk River. About half of the rough 30-mile stretch is on Refuge lands, the other half is on BLM lands. Each year Refuge staff receive several inquiries from the public about floating the Kanuti River. This trip was mainly intended to provide key Refuge staff with sufficient field experience so they could credibly and accurately answer questions from the public. Secondary objectives were to: a) look for evidence or impacts of other public use (e.g., fishing, hunting, trapping, floating, camping), b) gather opportunistic biological information such as wildlife observations and presence of invasive weeds, and c) improve coordination with BLM regarding the lands between the Dalton Highway and Kanuti Refuge. The crew used three different types of watercraft for the trip: a 12-ft raft, an inflatable canoe, and several inflatable kayaks. Variable rafting conditions, including low water levels, introduced additional challenges to the trip's success.

The Kanuti is a highly changeable river—starting out gently, then traversing rugged sections, and ending up in benign slack waters in the heart of Kanuti Flats. It is a demanding trip requiring good river skills, quality equipment, and thorough preparation. The rewards of such a trip are great, however, as one can literally spend an entire week in expansive wild lands without seeing another person. Such experiences are hard to find even in designated wilderness areas.

A more detailed account of the trip, including a photo documentary with daily journal annotations, can be found in the Refuge files. Photos illustrating different characteristics of the river follow.



Upriver of the Refuge border, DRM Fox (front) and Supv. Ecologist Payer navigate Class II rapids, while RM Spindler (below) completes passage through the Class III boulder field (Photos T. Craig and J. Fox)





RM Spindler & DRM Fox (top) encounter the abundant slack water stretches as one leaves the hillier sections, while DRM Whitehill (Yukon Flats NWR) traverses one of the abundant obstacles found in the backwater lakes and sloughs connected to the Kanuti River (Photos D. Payer, Arctic NWR)



## Environmental Interpretation

To date, all environmental interpretation activities have occurred at the Arctic Interagency Visitor Center. They include the following programs.

### *Boreal Forest Walking Tours*

In 2007, for the first time at the Arctic Interagency Visitor Center (AIVC), outdoor interpretation became available to the public. Park Ranger Reakoff developed an outdoor walking tour program to provide AIVC visitors with a chance to experience the outdoors with an interpretive experience. The program provides guided tours through the visitor center trails and includes a talk about the mysteries of the boreal forest.

### *Discovery Boxes*

Park Ranger (PR) Reakoff completed the Discovery Box Program, which was initiated years prior by former PR Jody DeMeyere. Discovery boxes were a real hit this year! They contain educational items and activities for families to borrow and use while traveling the Dalton Highway. Reakoff hopes to create more discovery boxes in the near future and add to the variety of activities they include.

### *Binocular and Field Guide Program*

This year Park Ranger Reakoff developed the “Binocular and Field Guide Program,” which provides visitors with binoculars and field guides to borrow during their time in the area. The goal of the program is to help visitors see and learn more about their experiences in Interior Alaska, as well as assist visitors in enjoying a closer view of the wildlife. Visitors participating in the program also receive information on wildlife viewing tips and leave-no-trace ethics and are encouraged to get outside and enjoy the beauty of the wilderness they are visiting.

### *Just for Kids*

Kids visiting the Arctic Interagency Visitor Center this summer were excited to try out the new exhibit featuring animal tracks. Park Ranger Reakoff created the hands-on exhibit, which includes life-sized animal and bird feet, several trays of local river sand, and information about identifying animal tracks. Kids can practice creating tracks and then identifying the tracks from field books. A “just-for-fun” set of river rocks is also included in the exhibit, which kids greatly enjoyed. Reakoff plans to enhance the use of the exhibit in 2008 summer by adding a children’s table acquired at year’s end.

## Environmental Education

### *Henshaw Creek Science Camp*

Interpretive Park Ranger Reakoff and Refuge Manager Spindler cooperated with Tanana Chiefs Conference fish biologist, Brandy Berkbigler, and “Friends of Alaska National Wildlife Refuges” Group Education Chair and former science teacher, Carla Stanley, in hosting a science camp on July 23-27 at the Henshaw Creek Weir, where annual runs of chum salmon are counted near their spawning grounds. The event was attended by five junior high school- and high school-aged youths from local villages near the refuge,

providing them an exceptional hands-on, field-based opportunity to get excited about science and natural resource management. Lessons focused on fish identification and anatomy, stream ecology, aquatic insects, stream physics and chemistry, and habitat conservation, and included fun activities like fish printing and traditional Native beading. Due to the success of the science camp this first year, plans to conduct and even expand it next summer are already underway. (see also Cultural Resources Section, pages 24-25 )



Park Ranger Reakoff (top) assists a student with making bird track casts, while another student shows off her fish print shirt. (USFWS Photos)

### *Migratory Bird Calendar Contest*

This year Kanuti staff celebrated the Refuge's first ever participation in Region 7's Migratory Bird Calendar Contest. On November 19, Park Ranger Reakoff hosted a celebration event for students at the Allakaket School. Reakoff and students spent the day talking about migratory birds and creating poster entries for the contest. Similar celebrations for Wiseman and Coldfoot home-school students, who are also eligible to participate in the contest, are planned for January of 2008.



An Allakaket youngster participates in the Migratory Bird Calendar contest.  
(Photo K. Reakoff)

### *Creamers Field 5<sup>th</sup> Grade Bird Watch*

Refuge Manager Spindler and Assistant Planner Webb assisted Creamer's Field State Waterfowl Refuge (Fairbanks) staff with the annual 5<sup>th</sup> Grade Bird Watch on April 26 and 25, respectively.

### *Film Festival*

Arctic, Kanuti, and Yukon Flats NWRs joined with the National Park Service, Alaska Public Lands Information Center, Fairbanks Arts Association, Fairbanks North Star Borough Parks and Recreation, University of Alaska Student Activities' Office, and the student chapter of The Wildlife Society to host the fourth annual "Far North Conservation Film Festival" on November 4, 2007. The film festival is a cornerstone of National Wildlife Refuge Week activities for the Fairbanks-based refuges. Attendees enjoyed 12 outstanding films about conservation and sustainability of wildlife, wild places, and cultures around the world.

### *Outdoor Days*

Wildlife Biologist Saperstein helped staff the FWS telemetry station at Outdoor Days.

The two-day event provides 6<sup>th</sup> grade students hands-on lessons and games in biology, geology, archaeology, recreation, and natural resource management. At the telemetry station, students learn about the types of radio-telemetry and their uses and try their hands at tracking a radio-collar hidden in the woods.

### General Outreach

#### *Alaska Geographic Logo*

With the creation of a Kanuti-specific design for the Alaska Geographic's (formerly Alaska Natural History Association) "Discover Alaska Collection," the Refuge has hit the big time! This collection highlights Alaska's refuges, parks, forests, heritage sites, etc. Kanuti is the ninth refuge in the series to be highlighted. Our dragonfly design is unique in that it is the first logo to depict an invertebrate. The design is available as a pin, magnet, hat, and t-shirt (so far) through Alaska Geographic outlets, such as the one at the Arctic Interagency Visitor Center.



Our new Alaska Geographic-sponsored dragonfly logo has been a big hit with staff and public alike.

#### **Law Enforcement**

In 2007 law enforcement (LE) activities increased markedly on Kanuti. The main reason was that we needed to provide a significant deterrent to cow moose harvest during a March 1-5 bulls-only subsistence moose hunt. Additionally, this 5-day hunt had to be extended for another five-day period, March 20-24, due to extreme cold weather experienced March 1-5. (See more detailed report in Subsistence section, page 46).

During the March 1-5 hunt, RM Spindler was assisted in conducting a snowmobile trail

patrol by FWS Special Agent-In-Charge Kim Speckman and BLM Enforcement Ranger Mimi Thomas. Also during this hunt Special Agent David Rippetto (FWS), and Refuge Officers (RO) Don Carlson (Arctic NWR) and Mike Hinkes (Yukon Flats NWR) conducted aerial patrols. During the March 20-24 hunt, Spindler was assisted by RO Heather Knudsen (Arctic NWR). Again, ROs Carlson and Hinkes provided aerial patrols during the second hunt.

Since this was a federal-only hunt, we needed to mark the boundaries between federal lands and Native corporation lands along the main snowmobile trails radiating out from the villages of Allakaket/Alatna and Bettles/Evansville. We contracted with Steven Bergman, through the Allakaket Tribal Council, to mark sites where trails entered refuge lands with “blue goose” boundary signs. Steven did an excellent job despite extreme cold (-50°F) experienced the week before the hunt when most of the marking took place.

Although permits were issued to 33 hunters, the March bull-only hunts had limited participation, with only 10 taking to the field. Hunters were challenged by extremely cold weather both weeks of the hunt. Also hunters using showshoes in thick brush had a tough time keeping silent in the cold when trying to approach moose close enough to identify bulls when they lack antlers. Moose readily fled when they heard the snowshoes scraping through the brush in the extreme cold.



Helping with March subsistence moose hunt patrols were Kim Speckman, Special Agent-In-Charge, Fairbanks (left) and Mimi Thomas, BLM Enforcement Ranger. Thomas is standing beside one of over 30 refuge boundary signs placed along the main trails to identify refuge lands. (Photos M. Spindler)



Refuge Manager Spindler, with Refuge Officer (RO) Heather Knudsen (Arctic NWR) at right, used both snowmachine and airplane to assist in LE patrols during the March moose hunt. Pilot/RO Mike Hinkes (Yukon Flats NWR) also assisted with aerial patrols. (USFWS photos)

During the September general moose hunt, Spindler and Knudsen conducted two aerial patrols, September 7-10 and 17-21. They contacted three parties of local subsistence hunters and five parties of non-local hunters. These three local parties did not report any encounters or conflicts with non-local hunters. However, success of local hunters was low in September 2007, perhaps due to early season mild temperatures, low water levels, and low moose density. As a result, some controversy developed surrounding the Refuge's LE efforts in 2007. Subsequent meetings and phone calls turned up accusations of the refuge plane "flying low and scaring moose away from hunters." In fact, Spindler and Knudsen made it a point to maintain an altitude of at least 1,500-2,000 feet above ground level and use binoculars to see if boats or camps had moose. They descended to look more closely only if dead moose were seen.

The main focus of the September patrols was to determine the veracity of reports of airboats leaving State navigable waters to enter Refuge lands, as well as reports of illegal guides or outfitters using airplanes in a way that caused conflicts between subsistence hunters and non-local hunters. No airboats were seen in 2007. Six parties of non-local hunters were checked: three parties flew in and out, and three parties floated in and flew out. One of the fly-in parties based a Super Cub airplane on the Dalton Highway and shuttled people to the Kilolitna and the Kanuti rivers (see photo next page). The Kanuti Refuge plane used in the fall patrols was a float-equipped Scout. The 2007 increase in wheel-based fly-in hunting challenged our ability to access camps and contact hunters. Fortunately, Coldfoot-based Park Ranger/Pilot Pete Christian (NPS) provided assistance with his wheel-equipped Husky aircraft. Christian landed at camps along the Dalton Highway, Kanuti River, and Kilolitna River to interview hunters for Kanuti Refuge.

An additional large party of jetboat-based hunters was seen on Bonanza Creek, but Refuge staff were not able to land near their camp. Of the non-local hunters contacted, none reported encountering any local subsistence hunters. The use areas of the two groups are generally segregated because of the Kanuti Controlled Use Area (KCUA; see page 46 for description). Furthermore, shallow water in upper reaches of rivers outside the KCUA boundary usually limits travel of local propeller-equipped boats.



For the first time in several years, moose hunters using wheel-equipped aircraft began accessing the Kanuti and Kilolitna rivers just outside of the Controlled Use Area boundary. This Super Cub was camped on the farthest downriver gravel bar along the Kanuti River. The same aircraft landed at about 10 locations along the Kilolitna River, from the Refuge boundary north to the Controlled Use Area boundary (below).

## Facilities and Equipment

### **Bettles Bunkhouse (existing)**

Other than routine maintenance, the Bettles bunkhouse received some safety and energy upgrades, including new smoke detectors, GFCI circuit breakers, and compact fluorescent lighting.

### **Bettles Shop**

Two windows on the north side of the shop were replaced with energy-efficient “Alaska” windows. The originals were damaged by extreme heat from the 2004 fire that consumed the adjacent office/bunkhouse.

### **Bettles Bunkhouse and Office (Proposed New)**

Refuge staff attended several meetings held jointly between the National Park Service (NPS) and FWS to discuss the design of a new bunkhouse and new combined office/visitor contact station in Bettles. It was decided in 2006 that FWS would take the lead on design and construction of the bunkhouse and NPS would take the lead for the office-visitor contact station. In August 2007, NPS and FWS leaderships decided that for economy and efficiency, both projects could be lumped into a single design and construction contract. FWS transferred its \$1 million appropriation to the NPS via a cooperative agreement so that both contracts could be administered by a single office on an identical schedule. Both buildings are slated to replace the facility that burned in January 2004. The final meeting (October 22) was with the architectural firm to review the 100% final drawings in preparation of construction contract bidding. Plans were to issue bid opportunities in late December 2007 or early January 2008, with hopes for construction in summer 2008.



Architect's rendering of proposed office-visitor center in Bettles.

### **Kanuti Lake Administrative Cabin**

Maintenance Worker Holton and Administrative Support Assistant Maloney spent a week at Kanuti Lake Cabin in June replacing insulation under the floor. Holton spent a second week in July completing the insulation job, repairing and replacing rain gutters, and building a shed for firewood.



The encroaching shoreline and shallower depths of Kanuti Lake make summer floatplane access to the administrative cabin (top center at treeline) increasingly tricky.

(Photo D. Webb )

### **Airplane/Airplane Support & Facilities**

RM/Pilot Spindler flew a total of 227 hours in fiscal year 2007, including 189 hours in the Refuge's Scout, and 38 hours in other aircraft, including Cessna 206 and Piper Super Cub. In 2007 Kanuti most frequently borrowed a C206 from other stations to support CCP meetings, other village meetings, and VIP visits.

### *Bettles Hangar*

The Bettles hangar was originally designed to accept a snow load of 40 lb/ft<sup>2</sup>, but in some years, snow loads in Bettles can be much greater. In heavy snow years, Refuge staff had to arrange for the snow to be shoveled off the hangar roof at great expense and with some safety risk. Late in FY2006, contracts were awarded to Reid Middleton (design) and Paug-vik Development Corp, (construction) to make structural steel improvements to the

Bettles hangar. The project included adding supplemental purlins to the roof structure and strengthening of the main arches with thicker steel welded to the gussets and vertical risers. These improvements increased snow load capacity to 95 lb/ft<sup>2</sup>. Paug-Vik shipped the steel to Bettles via the winter road in March 2007 and began work in April. Maintenance Worker (MW) Holton was assigned as the Service's contract representative to monitor the construction project. The project was completed before the busy field season for FWS and NPS. The cost of these contracts was \$488,946.

Along with structural steel upgrades, Paug-Vik installed an efficient 185,000-BTU, oil-fired, forced-air furnace. Due to cost, the Bettles hangar is not continuously heated. Rather, it is only occasionally heated when major aircraft-related projects are based in Bettles. We encountered problems when trying to heat the hangar from stone cold using the older, existing, "Clean Burn" waste oil furnace; this did not perform well from a cold start. With the new furnace, the normal procedure will be to warm up the building initially by burning heating oil in the new furnace (89% efficiency), then once the hangar is warm, switch to burning waste oil in the "Clean Burn" furnace (60% efficiency). Free waste oil from aircraft oil changes and from the City power plant can be burned in the waste oil heater.



New structural steel purlins were welded in place at the Bettles hangar to increase its snow load capacity. A new high-efficiency forced-air furnace was also added.  
(Photo D. Holton)

## Other Items of Interest

### VIP Visits

Deputy Regional Director Gary Edwards and Refuge Supervisor Mike Boylan made their first trips to the Refuge memorable ones by joining the Kanuti River float trip in June (see pages 54-56).



Deputy Regional Director Gary Edwards (top) and Refuge Supervisor Mike Boylan checked out the heart of the Refuge during a June float of the Kanuti River. (Photos by B. Whitehill (top) and M. Spindler)



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