



Climate Station Maintenance in the Central Alaska Inventory and Monitoring Network

2016 Summary

Natural Resource Data Series NPS/CAKN/NRDS—2017/1085



ON THE COVER

Tana Knob weather station, Wrangell-St. Elias National Park and Preserve.
Photograph by: Pam Sousanes

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Abstract

The mission of the Central Alaska Network Inventory and Monitoring Program (CAKN) is to collect, compile and synthesize scientific information about the central network of parks in order to manage park resources "unimpaired for the enjoyment of future generations". The Inventory and Monitoring (I&M) Program is a major component of the National Park Service's (NPS) strategy to improve park management through greater reliance on scientific information.

The objective of the climate monitoring program is to monitor and record weather conditions at representative locations in order to identify long and short-term trends, provide reliable climate data to other researchers, and to participate in larger scale climate monitoring and modeling efforts beyond park boundaries. Thirteen remote automated I&M weather stations (RAWS) have been installed in CAKN parks since 2003. There are additional weather and climate stations in the parks run by state and federal agencies with specific objectives and missions. It is in the best interest of the CAKN program to cooperate with these other entities on maintenance site visits. During the 2016 field season maintenance site visits were conducted at a total of twenty-two sites, including thirteen I&M RAWS, four Snotel (snow telemetry) stations in coordination with Natural Resource Conservation Service (NRCS) staff, and five fire RAWS station. This report summarizes all work for the 2016 field season and includes current sensor metadata.

Acknowledgments

A successful field season would not have been possible without support from staff in Fairbanks (Maggie MacCluskie, Trey Simmons, administrative staff), McCarthy (Stephens Harper), Gulkana (Carolyn Venner), and Eagle. Additional support was provided by pilots (Andy Hermansky, Curtis Cebulski, Ruston Boucher, John Carney) and aviation staff (Denali Dispatch, Scott Sample).

List of Acronyms

Ah	Amp hour
AKDST	Alaska Daylight Savings Time
AKRO	Alaska Regional Office
AMD	Aviation Management Directorate
AS350	A-star 350 Helicopter
AT-RH	Air Temperature- Relative Humidity
C185	Cessna 185 airplane
C206	Cessna 206 airplane
CAKN	Central Alaska Network
CS	Campbell Scientific
DENA	Denali National Park and Preserve
DLP	Data Logger Program
FTS	Forest Technology Systems
GOES	Geostationary Operational Environmental Satellite
GPS	Global Positioning System
I&M	Inventory and Monitoring
LED	Light-Emitting Diode
NESDIS ID	National Environmental Satellite, Data, and Information Service Identifier
NIFC	National Interagency Fire Center
NRCS	Natural Resource Conservation Service
NPS	National Park Service
RAWS	Remote Automated Weather Station
RG-TB	Rain Gage - Tipping Bucket
SD	Snow Depth
SDI	Serial Digital Interface
SR	Solar Radiation
ST	Soil Temperature
W	Watt
WFMI	Wildland Fire Management Information
WRCC	Western Regional Climate Center
WRST	Wrangell-St. Elias National Park and Preserve
WS-WD	Wind Speed - Wind Direction
YUCH	Yukon-Charley Rivers National Park and Preserve

Climate Station Locations

For the 2016 field season, the Central Alaska Network (CAKN) continued its climate monitoring program by visiting stations in Denali National Park and Preserve (DENA), Yukon-Charley Rivers National Preserve (YUCH), and Wrangell – St. Elias National Park and Preserve (WRST) (Figure 1). Thirteen CAKN climate stations were maintained (Table 1) along with NPS support at four NRCS snow and soil sites, five fire RAWS stations, and one NOAA Climate Reference Network station. Annual maintenance includes downloading data, updating software and programming, replacing sensors, and troubleshooting problems. Maintenance is critical in order to provide continuous, high-quality meteorological data.

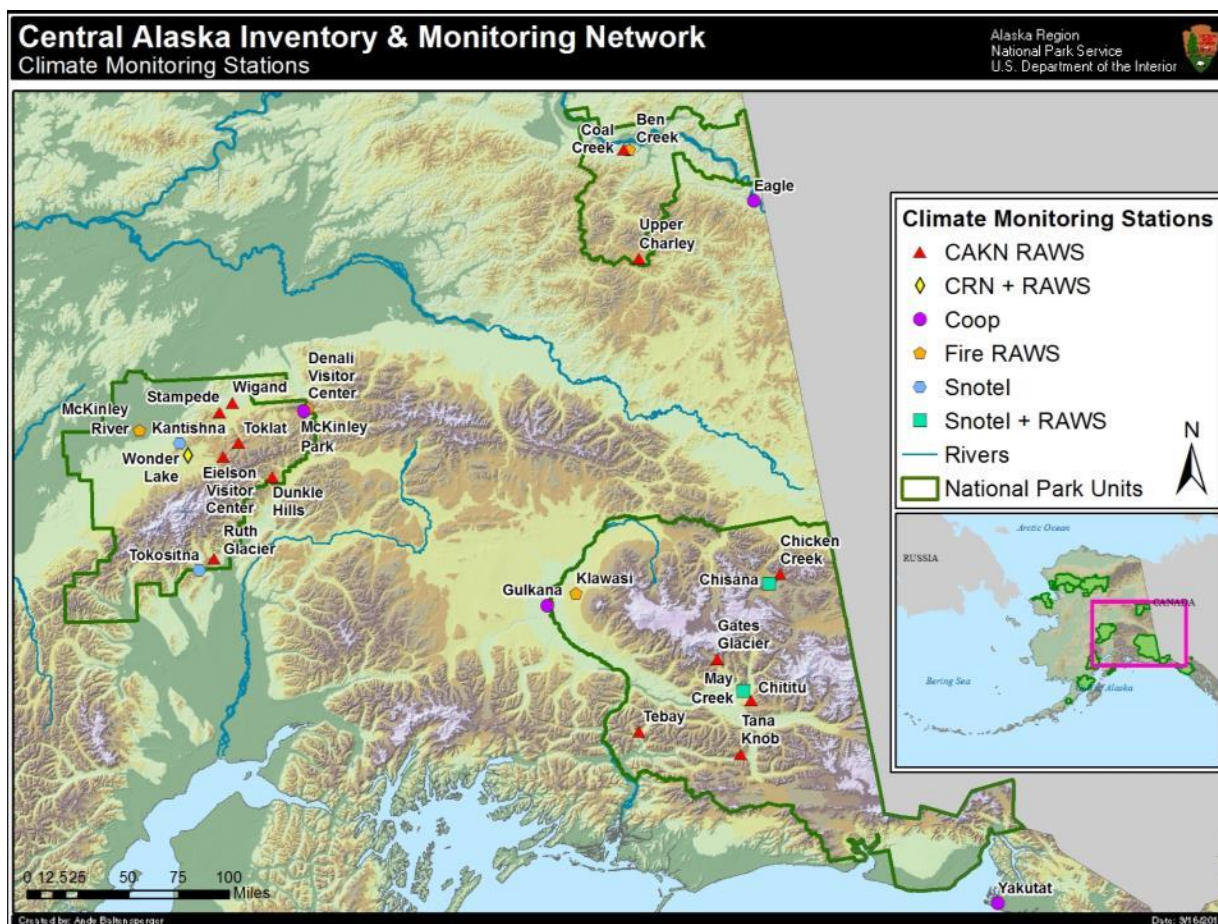


Figure 1. Map showing locations of CAKN climate stations.

Table 1. Locations of CAKN sites operated and maintained in 2016 field season.

Station Name	Latitude	Longitude	Elevation (m)	Park
Chititu	61.274	-142.621	1385	WRST
Chicken Creek	62.124	-141.847	1597	WRST
Tana Knob	60.908	-142.901	1140	WRST
Gates Glacier	61.603	-143.013	1237	WRST
Tebay	61.181	-144.342	573	WRST
Chisana SNOTEL/RAWS	62.072	-142.065	1012	WRST
May Creek SNOTEL/RAWS	61.348	-142.694	503	WRST
Upper Charley	64.517	-143.202	1114	YUCH
Coal Creek	65.314	-143.132	292	YUCH
Toklat	63.524	-150.043	890	DENA
Eielson Visitor Center	63.431	-150.309	1202	DENA
Wigand	63.814	-150.109	1716	DENA
Ruth Glacier	62.710	-150.540	1006	DENA
Stampede	63.747	-150.328	549	DENA
Dunkle Hills	63.268	-149.539	808	DENA
Wonder Lake fire RAWS	63.490	-150.871	2038	DENA
Kantishna SNOTEL	63.540	-150.990	472	DENA
Tokositna SNOTEL	62.629	-150.775	259	DENA

Climate Station Maintenance Summaries

This section describes the maintenance details of twenty climate stations in the Central Alaska Network organized by park. See Appendix A for detailed logistics for each of the parks and Appendix B for detailed information on station metadata.

Denali National Park and Preserve

This section includes all of the stations that were maintained in DENA in 2016. The sites include: Dunkle Hills, Eielson Visitor Center, Ruth Glacier, Stampede, Toklat, Wigand, Tokositna Snotel, and Kantishna Snotel.

Dunkle Hills

Date: August 11, 2016

Time of visit: 1100-1300

Personnel: Pam Sousanes, Ken Hill

Mode of transport: A-star helicopter – Temsco (NPS Western Area Fire) – N-6015S

Purpose of trip: Annual Maintenance

Weather: 51°F, cloudy

Sensors replaced:

AT (109 added)

AT-RH

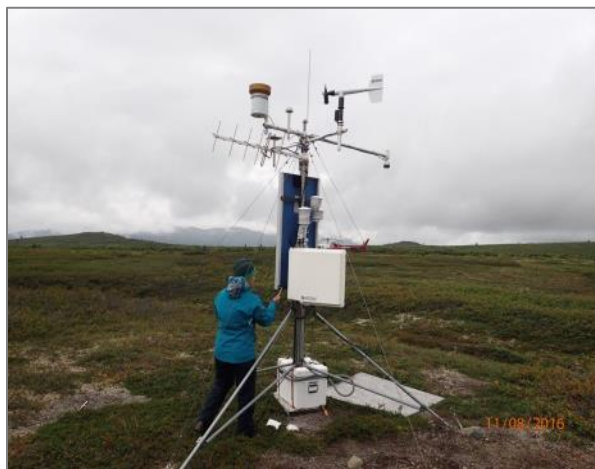


Figure 2. Dunkle Hills station August 11, 2016.

Narrative: The site was accessed by helicopter from DENA park headquarters. The site was in good condition. All data were downloaded from the datalogger. The air temperature-relative humidity (AT-RH) HMP45 sensor was replaced for routine calibration. A new 109 model air temperature (AT) sensor was added as the primary air temperature measurement. A new program (*Dunkle2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 104 inches. The cumulative rainfall measurement was reset to its pre-visit value of 8.49

inches. The first soil temperature (ST) sensor was undamaged, but was exposed on the surface upon arrival at the station. The sensor was reinstalled to its designated depth of -10 cm. The south tripod leg is slightly bent and will need to be replaced sometime in the future. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. Photos were taken from the eight cardinal directions both towards and away from the station. *During the next field visit the nearby snow marker should be repainted.*

Eielson Visitor Center

Date: September 8, 2016

Time of visit: 1730-1930

Personnel: Pam Sousanes, Clinton Farmwald (DENA)

Mode of transport: DENA Park Road

Purpose of trip: Annual Maintenance

Weather: Mostly cloudy, 42°F

Sensors Replaced:

AT (109 added)

AT-RH

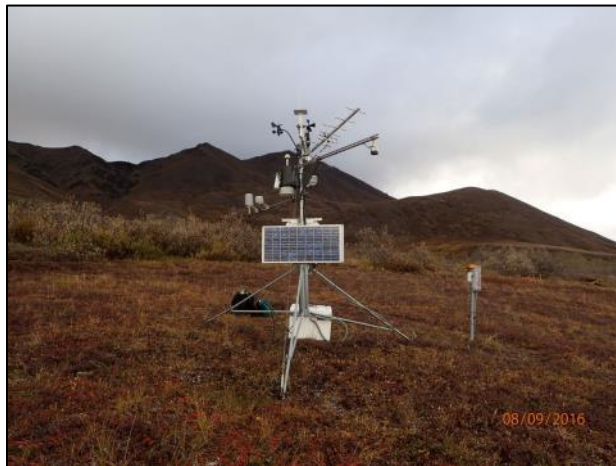


Figure 3. Eielson visitor center station September 8, 2016.

Narrative: The site was accessed from the DENA park road. The site was in good condition. All data were downloaded from the datalogger. The HMP45 AT-RH sensor was replaced for routine calibration. A new 109 model AT sensor was added as the primary air temperature measurement. A new program (*Eielson2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 87.1 inches. The cumulative rainfall measurement was reset to its pre-visit value of 30.47 inches. The rain gage was checked for level, re-taped, and cleaned. The enclosure box is deteriorating with black mold and shedding fiberglass. The solar panel was reinforced with cable ties; it was a little loose on the crossbar. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. Photos were taken from the eight cardinal directions both towards and away from the station.

Ruth Glacier

Date: June 23, 2016

Time of visit: 1630

Personnel: Pam Sousanes, Trey Simmons

Mode of transport: A-star helicopter – Temsco – 570AE – Tighe Daugherty

Purpose of trip: Annual Maintenance

Weather: Mostly cloudy, light winds

Sensors replaced:

AT (107 added)

AT-RH

SR



Figure 4. Ruth Glacier station June 23, 2016.

Narrative: The DENA mountain rescue A-star helicopter from Talkeetna was used to access the site. The site looked good upon arrival. All data were downloaded from the datalogger. The AT-RH and solar radiation (SR) sensors were replaced for routine calibration. A 107 model AT sensor was added as the primary air temperature measurement. The 109 model sensors were not yet available. *Next year, the 107 sensor should be swapped with a 109 sensor and the program should be updated.* A new program (*Ruth2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 69.1 inches. The cumulative rainfall measurement was reset to its pre-visit value of 2.13 inches. The electric fence was in good condition and maintained as needed. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. High precision GPS coordinates were taken with a Trimble unit. Photos were taken from the eight cardinal directions both towards and away from the station.

Stampede

Date: August 11, 2016

Time of visit: 1500-1600

Personnel: Ken Hill, Pam Sousanes

Mode of transport: A-star helicopter – Temsco (NPS Western Area Fire) – N-6015S

Purpose of trip: Annual Maintenance

Weather: 66° F, calm

Sensors replaced:

AT (109 added)

AT-RH

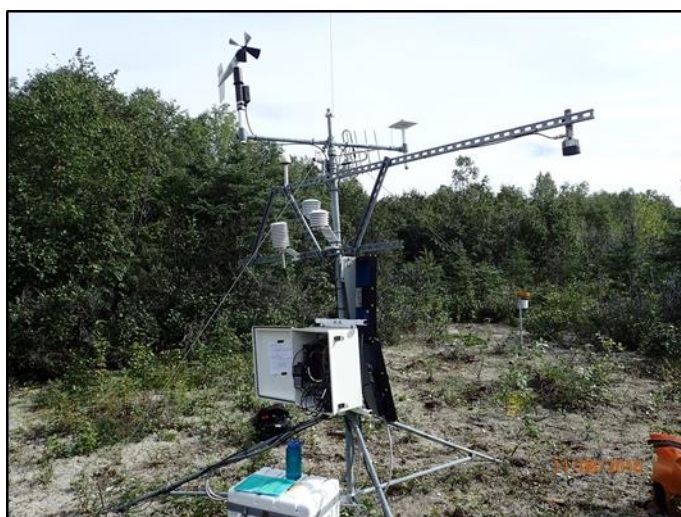


Figure 5. Stampede station August 11, 2016.

Narrative: An A-star helicopter was used to access the site from DENA park headquarters after maintenance at the Wigand station. The site looked good upon arrival. All data were downloaded from the datalogger. The AT-RH sensor was replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*Stampede2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 83 inches. The cumulative rainfall measurement was reset to its pre-visit value of 13.23 inches. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. The brush near the station was removed, but vegetation is beginning to encroach on the area surrounding the station. Consider a major clearing or and/or moving the station towards the airstrip at some point in the future. The radiation shield for the AT-RH shield was cleaned, but is beginning to fade. Consider replacing the radiation shield at a future visit. Photos were taken from the eight cardinal directions both towards and away from the station.

Toklat

Date: September 9, 2016

Time of visit: 0900-1200

Personnel: Pam Sousanes

Mode of transport: DENA Park Road

Purpose of trip: Annual Maintenance

Weather: 50°F, 5-10 mph, mostly sunny

Sensors Replaced:

AT (109 added)

AT-RH

SR

RG-TB

CR1000 datalogger

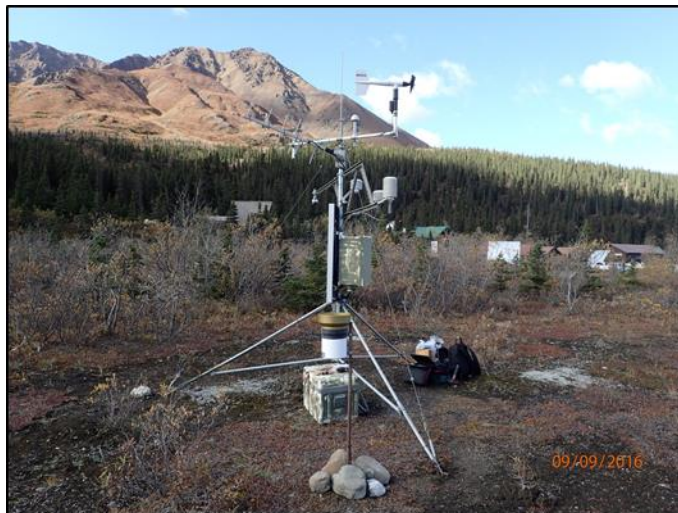


Figure 6. Toklat station September 9, 2016.

Narrative: The site was accessed from the DENA park road. The site was in good condition. All data were downloaded from the datalogger. The AT-RH and SR sensors were replaced for routine calibration. A new 109 model AT sensor was added as the primary air temperature measurement. The rain gage tipping bucket (RG-TB) was swapped because the calibration screws were inadvertently adjusted. The cable for the new gage was shorter, thus the sensor was moved three feet to the north and mounted at the same height. The lithium battery in the datalogger was reading less than 2.9 volts, so the datalogger was swapped. A new program (*Toklat2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 81.9 inches. The cumulative rainfall measurement was reset to its pre-visit value of 19.82 inches. The desiccant packets were replaced in the enclosure. The solar panel cables were shortened because they were six feet longer than necessary. All bolts and guy wires were tightened. Photos were taken from the eight cardinal directions both towards and away from the station.

Wigand

Date: August 11, 2016

Time of visit: 1300-1500

Personnel: Ken Hill, Pam Sousanes

Mode of transport: A-star helicopter – Temsco (NPS Western Area Fire) – N-6015S

Purpose of trip: Maintenance

Weather: 60°F, 5-10 mph, partly cloudy

Sensors replaced:

AT (109 added)

AT-RH

WS-WD

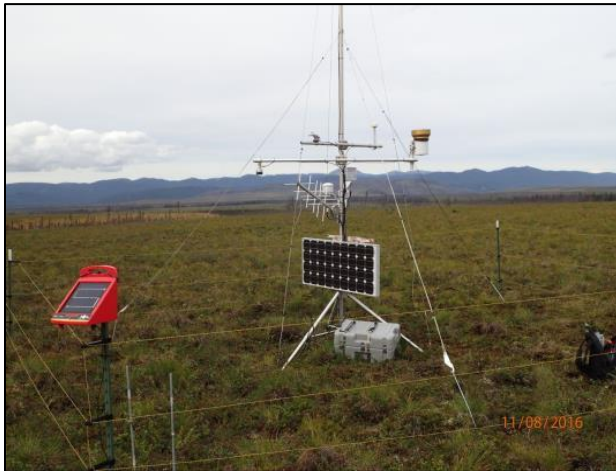


Figure 7. Wigand station August 11, 2016.

Narrative: An A-star helicopter was used to access the site from DENA park headquarters. The site looked good upon arrival. All data were downloaded from the datalogger. The AT-RH and WS-WD sensors were replaced for routine calibration. Note that the wind sensor at Wigand has a 30' cable length. The mast was lowered by first disconnecting the guy wires and loosening the soil temperature cables. By lifting the enclosure, the mast can be lifted and then lowered. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*Wigand2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 77.4 inches. The cumulative rainfall measurement was reset to its pre-visit value of 14.59 inches. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. The rain gage was cleaned and re-taped. Tundra anchors were left at the site, but were not installed during the field visit. The electric fence was damaged on arrival and repaired as needed: the polywire and charger were replaced and the fence posts were straightened. Photos were taken from the eight cardinal directions both towards and away from the station.

Denali Fire RAWS

DENA fire staff (Keith Mitchell) completed annual maintenance at all fire RAWS in summer 2016. More information is available on the Wildfire Management Information system (WFMI).

- Denali Visitor Center 6/9/2016: Replaced AT-RH and RG-TB. Tripod needs to be leveled.
- McKinley River 6/8/2016: Some bear damage upon arrival. RH sensor, SR sensor, RG-TB out of level. Replaced AT-RH and RG-TB; 7/16/2016: repaired electric fence and solar panel. Replaced SR sensor.
- Wonder Lake 6/15/2016: replaced AT-RH, RG-TB, reset rain gage.

Snotel Sites

- Tokositna Snotel: Daniel Fisher and Tony DeMarco from the Natural Resources Conservation Service completed the annual maintenance on the Tokositna Snotel site on June 22. The site was accessed by helicopter from Talkeetna. The precipitation gage was flushed and 10 gallons of fresh antifreeze liquid was added for the winter. The electric fence was repaired. The sensors were tested and the site was working great on departure. The helicopter landing zone was cleared.
- Kantishna Snotel: Daniel Fisher (NRCS) drove the Denali park road on June 22 and completed the maintenance at the Kantishna Snotel. The precipitation gage was flushed and 10 gallons of fresh antifreeze liquid were added for the winter.

Wonder Lake USCRN (AK Denali 27N)

July 16, 2016. Brent French from the NOAA Climate Reference Station Network (USCRN) maintained the station according to CRN standards. A DENA road permit was arranged in advance by Pam Sousanes. CRN staff stayed at Friday Creek camp; September 9, 2016. Pam Sousanes replaced a fuse in the methanol fuel cell as requested by CRN staff.

Wrangell – St. Elias

Stations maintained in WRST include Chicken Creek, Chititu, Gates Glacier, Tana Knob, Tebay, Chisana RAWS and Snotel, and May Creek RAWS and Snotel. CAKN staff used McCarthy as a base for helicopter operations and stayed at the McCarthy B&B.

Chicken Creek

Date: June 29, 2016

Time of visit: 1040-1230

Personnel: Ken Hill, Pam Sousanes, Leigh Welling

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 45°F, light winds, rain showers

Sensors replaced:

AT (109 added)

AT-RH

SR

WS-WD

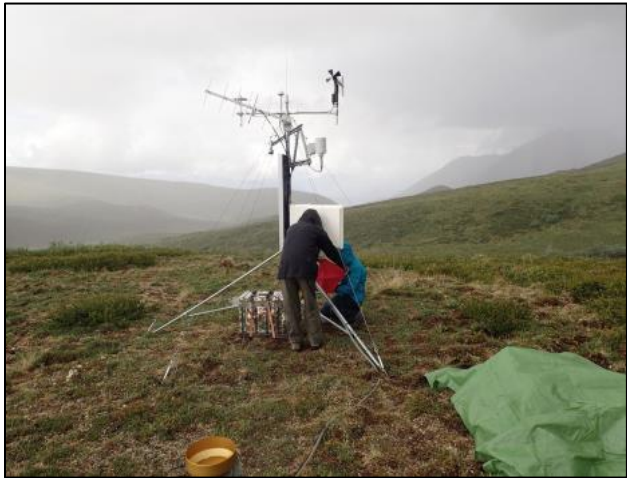


Figure 8. Chicken Creek station June 29, 2016.

Narrative: An A-star helicopter was used to access the site from McCarthy. The rain gage had been knocked off its post and was lying horizontally on the ground on arrival. The sensor was remounted and leveled. All data were downloaded from the datalogger. The AT-RH, SR, and WS-WD sensors were replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*Chicken2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 85.5 inches. The cumulative rainfall measurement was reset to its pre-visit value of 2.22 inches. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. High precision GPS coordinates

were obtained with a Trimble unit. Photos were taken from the eight cardinal directions both towards and away from the station.

Chititu

Date: June 30, 2016

Time of visit: 0900-1030

Personnel: Ken Hill, Pam Sousanes

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 46°F, light winds

Sensors replaced:

AT (109 added)

AT-RH

SR

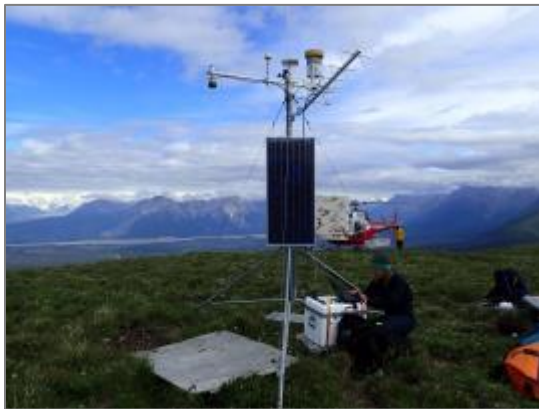


Figure 9. Chititu station June 30, 2016.

Narrative: An A-star helicopter was used to access the site from McCarthy. All data were downloaded from the datalogger. The AT-RH, SR, and WS-WD sensors were replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*Chititu2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 92.7 inches. The cumulative rainfall measurement was reset to its pre-visit value of 2.40 inches. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. High precision GPS coordinates were obtained with a Trimble unit. Photos were taken from the eight cardinal directions both towards and away from the station.

Gates Glacier

Date: June 29, 2016

Time of visit: 1430-1600

Personnel: Ken Hill, Pam Sousanes, Leigh Welling

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 46°F, light winds

Sensors replaced:

AT (109 added)

AT-RH



Figure 10. Gates Glacier station June 29, 2016.

Narrative: An A-star helicopter was used to access the site from McCarthy. All data were downloaded from the datalogger. The AT-RH sensor was replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*GatesGl2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 103 inches. The cumulative rainfall measurement was reset to its pre-visit value of 6.36 inches. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. High precision GPS coordinates were obtained with a Trimble unit. The SD memory card in the phenology camera was swapped and all images were downloaded to the field laptop. The TCP/IP settings on Pam's field laptop were reconfigured in order to connect to the phenology camera. Camera settings were changed and verified according to the Arctic Network terrestrial landscape patterns and dynamics vital sign protocol. Photos were taken from the eight cardinal directions both towards and away from the station.

May Creek and Chisana Snotel

Date: June 2016

Personnel: Tony DeMarco (NRCS), Lynn Ellis (NPS Pilot)

Mode of transport: NPS plane and pilot from Gulkana

Purpose of trip: Annual maintenance

Sensors replaced: as needed by NRCS

Narrative: Tony DeMarco from the Natural Resources Conservation Service completed the annual maintenance at May Creek and Chisana Snotel sites in June 2016. The precipitation gages were flushed and 10 gallons of fresh antifreeze liquid added for the winter. The electric fences were repaired. The sensors were tested and the sites were working great on departure.

Chisana Fire RAWS

Date: June 29, 2016

Time of visit: 1130

Personnel: Ken Hill, Pam Sousanes, Leigh Welling

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 66°F, mostly sunny

Sensors replaced:

AT-RH

RG-TB



Figure 11. Chisana Fire RAWS June 30, 2016.

Narrative: The AT-RH and RG-TB sensors were replaced for routine maintenance. The RG-TB was reset to 0.00 inches. Data was downloaded from the site. All bolts and guy wires were tightened. A spruce tree on the NW side of the station was removed. *The solar radiation mount is missing and a new one should be added at the next site visit.* Photos were taken from the eight cardinal directions both towards and away from the station.

May Creek Fire RAWS

Date: June 30, 2016

Time of visit: 1130

Personnel: Ken Hill, Pam Sousanes

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 66°F, mostly sunny

Sensors replaced:

AT-RH

RG-TB



Figure 12. May Creek Fire RAWS June 30, 2016.

Narrative: The AT-RH and RG-TB sensors were replaced for routine maintenance. The RG-TB was tested and reset. Data was downloaded from the site. All bolts and guy wires were tightened. Some brush was cleared around the station. Photos were taken from the eight cardinal directions both towards and away from the station.

Tana Knob

Date: June 28, 2016

Time of visit: 1250

Personnel: Ken Hill, Pam Sousanes

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 58°F, 8-12 mph

Sensors replaced:

AT (109 added)

AT-RH

RG-TB

SR

WS-WD



Figure 13. Tana Knob station June 20, 2016. Some cables (left) and the electric fence (middle) were damaged upon arrival. The station was functioning properly after completion of the field visit (right).

Narrative: An A-star helicopter was used to access the site from McCarthy. The site was not transmitting upon arrival. The station had been damaged by a bear. The GPS, RG-TB, and SR cables were damaged. All data were downloaded from the datalogger. The AT-RH, and WS-WD sensors were replaced for routine calibration. The damaged RG-TB and SR sensors were replaced. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*Tana2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 102.2 inches. The cumulative rainfall measurement was reset to its pre-visit value of 0.20 inches. The electric fence was damaged by snow and/or bears. The fence posts were straightened and the fence components were repaired and replaced as needed. The desiccant packets were replaced in the enclosure. All bolts and guy wires were tightened. High precision GPS coordinates were obtained with a Trimble unit. Photos were taken from the eight cardinal directions both towards and away from the station. *There have been occasional resets of the rainfall variable, possibly related to power cycling issues. These problems have not yet been resolved.*

Tebay

Date: June 28, 2016

Time of visit: 1530-1745

Personnel: Ken Hill, Pam Sousanes

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 63°F, 5-10 mph, sunny

Sensors replaced:

AT (109 added)

AT-RH



Figure 14. Tebay station June 28, 2016. The crossarms had been sheared off by snow loading. The guy wires were removed and all sensors were re-leveled during the field visit.

Narrative: An A-star helicopter was used to access the site from McCarthy. The site had been damaged, presumably by excessive snow loading on the guy wires. All sensors were working, but the two cross arms had been sheared off the mast. The rainfall, solar radiation, snow depth, and wind measurements were all affected because the sensors were severely out of level. All data were downloaded from the datalogger. The AT-RH sensor was replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. The guy wires were removed and the cross arms were remounted. All sensors were re-leveled and the YAGI antenna was realigned. A new program (*Tebay2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor

height was measured and entered into the program as 88.2 inches. The cumulative rainfall measurement was reset to its pre-visit value of 0.33 inches. The electric fence was damaged by snow and/or bears. The fence posts were straightened and the charger was replaced. The desiccant packets were replaced in the enclosure. Photos were taken from the eight cardinal directions both towards and away from the station.

Strelna (Chitina) Fire RAWS

Date: June 30, 2016

Time of visit: 1500-1630

Personnel: Pam Sousanes, Patrick Knavel

Mode of transport: GOV- McCarthy Road

Purpose of trip: Maintenance

Weather: 56°F, partly cloudy, light rain

Sensors replaced:

AT-RH

SR

RG-TB



Figure 15. Strelna (Chitina) Fire RAWS June 30, 2016.

Narrative: The AT-RH, SR, and RG-TB sensors were replaced for routine maintenance. The RG-TB was tested and reset. All bolts and guy wires were tightened. Parking for this site is next to the Strelna fire station; do not park along the road adjacent to the RAWS station (private property). Photos were taken from the eight cardinal directions both towards and away from the station.

Yukon-Charley Rivers

This next section includes maintenance done on sites in YUCH, which includes the Upper Charley and Coal Creek stations.

Coal Creek

Date: July 6, 2016

Time of visit: 1700-1830

Personnel: Ken Hill, Dave Swanson

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 63°F, 5-10 mph, sunny

Sensors replaced:

AT (109 added)

AT-RH



Figure 16. Coal Creek station July 6, 2016.

Narrative: An A-star helicopter was used to access the site from Coal Creek. All data were downloaded from the datalogger. The AT-RH sensor was replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. A new program (*CoalCreek2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 72 inches. The cumulative rainfall measurement was reset to its pre-visit value of 3.77 inches. Dave Swanson completed soil and vegetation descriptions at the site. A short presentation of the CAKN climate program was presented to Alaska teachers present at Coal Creek for a workshop. All bolts and guy wires were tightened. The desiccant packets were replaced in the enclosure. Photos were taken from the eight cardinal directions both towards and away from the station.

YUCH Snow Markers

Date: July 6, 2016

Personnel: Ken Hill, Dave Swanson

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: rain

Copper Creek: Plumbed the snow marker. The crossbars were repainted. The distance from the ground surface to the middle of the first black cross bar is 8 inches.

Cathedral Creek, Step Mountain, and Crescent Creek snow markers were maintained in 2015.

Three Fingers snow marker was not maintained in 2015 or 2016.

Upper Charley

Date: July 6, 2016

Time of visit: 1230-1430

Personnel: Ken Hill, Dave Swanson

Mode of transport: A-star helicopter – Temsco (NPS Eastern Area Fire) – N57954 – Boucher

Purpose of trip: Maintenance

Weather: 56°F, showers

Sensors replaced:

AT (109 added)

AT-RH

SR



Figure 17. Upper Charley station July 6, 2016. The lid of the tipping bucket was on the ground upon arrival at the site (left).

Narrative: An A-star helicopter was used to access the site from Coal Creek. The lid of the rain gage was on the ground upon arrival at the site. All data were downloaded from the datalogger. The AT-RH and SR sensors were replaced for routine calibration. A 109 model AT sensor was added as the primary air temperature measurement. The rain gage lid was put back on the sensor and re-taped. A

new program (*UpperCharley2016.CR1*) was sent to the datalogger. The snow depth (SD) sensor height was measured and entered into the program as 79.4 inches. The cumulative rainfall measurement was reset to its pre-visit value of 0.07 inches. Dave Swanson completed soil and vegetation descriptions at the site. All bolts and guy wires were tightened. The desiccant packets were replaced in the enclosure. High precision GPS coordinates were obtained with a Trimble unit. The SD memory card in the phenology camera was swapped and all images were downloaded to the field laptop. Camera settings were changed and verified according to the Arctic Network terrestrial landscape patterns and dynamics vital sign protocol. Photos were taken from the eight cardinal directions both towards and away from the station.

Appendix A: Logistics Summary 2016

DENA Logistics

August 11, 2016: Dunkle Hills, Wigand, and Stampede. Pam Sousanes and Ken Hill accessed these stations by helicopter from Denali Park headquarters with the Temsco A-star western area fire helicopter N6015S under pilot John Carney.

June 22-23, 2016: Tokositna Snotel and Ruth Glacier. Pam Sousanes met Daniel Fisher and Tony DeMarco (NRCS) along with Trey Simmons (CAKN aquatic ecologist) in Talkeetna. Sites were accessed with the DENA rescue A-star helicopter N570AE under pilot Tighe Daugherty (relief pilot). The helicopter was on contract from Temsco for mountain operations in Denali.

September 8, 2016: DENA park road. Pam Sousanes completed maintenance at Toklat and Eielson Visitor Center. On September 9, Sousanes visited the Wonder Lake CRN site.

WRST Logistics

June 28-30, 2016: Pam Sousanes and Ken Hill drove from Fairbanks to McCarthy on June 27. The A-star helicopter N57954 with pilot Ruston Boucher arrived June 28. Fuel was purchased at the Fireweed airstrip on the west side of the Kennicott River (contact: Lori Rowland). The helicopter was also staged at the Fireweed airstrip. Chicken Creek, Chititu, Gates Glacier, Tana Knob, and Tebay were accessed by helicopter 7/9-7/10. The helicopter was shared with Trey Simmons (CAKN aquatic ecologist). Leigh Welling, the chief scientist for the Alaska Region participated in both climate and aquatics field work. Pat Edwards (NPS fire detail) was the designated helicopter manager. All staff stayed at the McCarthy B&B (contact: John Adams). The Strelina RAWS was maintained on June 30 on the trip back to Fairbanks

June 2016: The Snotel sites at May Creek and Chisana were accessed from Gulkana with NPS pilot Lynn Ellis. Tony DeMarco (NRCS Palmer) completed the maintenance at the Snotel sites.

YUCH Logistics

July 5-7, 2016: Ken Hill flew to Coal Creek on an Everts air charter caravan. The caravan was scheduled to pick up the CAKN vegetation crew in Coal Creek. Hill and Swanson (who was already at Coal Creek for a teacher training workshop) maintained the Upper Charley site on July 6. Temsco helicopter N57954 (NPS eastern area fire helicopter; pilot Ruston Boucher) was used to access the site. The helicopter was shared with Trey Simmons, who completed field work on YUCH streams. The Copper Creek Snotel was also maintained on July 6. Later that evening, the Coal Creek station was maintained and a short presentation of the CAKN climate program was completed for Alaska school teachers attending a workshop in Coal Creek. Fuel was available at the NPS tank at Coal Creek. Pat Edwards (NPS fire detail) was the designated helicopter manager. All staff stayed at park housing in Coal Creek. Ken Hill and Trey Simmons returned to Fairbanks on the NPS fleet Cessna-206 on July 7.

Appendix B: CAKN I&M Station Specifications

Table 2. Sensor Specifications.

Measurements	Model/Manufacturer/Item#	Purchased from:
Air Temperature 1	109 Temperature Probe (primary beginning summer 2016)	Campbell Scientific
Air Temperature 2	Resistance Temperature Detector (RTD) Thermistor. Custom build.	Therm-X
Air Temperature 3/Relative Humidity	HMP-45C Temperature and Relative Humidity Probe	Campbell Scientific
Wind Speed and direction	RM Young 05103	Campbell Scientific
Precipitation (summer rainfall)	Texas Electronics TE525WS Rain Gage	Campbell Scientific
Solar Radiation (incoming)	LI-COR LI200X	Campbell Scientific
Snow Depth	SR50A sonic ranging sensor	Campbell Scientific
Soil Temperature	107 Temperature Probe (3)	Campbell Scientific

Table 3. Datalogger Specifications.

Datalogger	Purchased from:
CR1000-XT Measurement and Control System	Campbell Scientific

Table 4. Satellite Communication Specifications

Satellite Communication	Model/Item #	Purchased From:
GOES Satellite transmitter	TX312/TX320 High data rate GOES Transmitter	Campbell Scientific
GPS Antenna	GPS Antenna 3.3 V 17992	Campbell Scientific
GPS Cable	Antenna Cable 18017	Campbell Scientific
GOES Antenna	GOES 11 dBi YAGI RHCP Antenna 25316	Campbell Scientific
Coaxial Cable	Antenna Cable RG8 COAXNTN	Campbell Scientific

5. Power Specifications

Power	Model	Purchased form:
Batteries	Concorde Sun Extender PV 1040 T 12 Volt 100 Amp hour (2)	ABS Alaskan
Solar Panel	60-75 watt	Varies depending on prices
Battery Box	Pelican Hardigg Single Lid Case	AllCases
Charging Regulator	CH100/200 12V Charging Regulator	Campbell Scientific

Table 6. Hardware Specifications

Station Hardware - Item	Type/Model	Purchased from:
Tripod	CM110 10 ft. stainless-steel tripod w/grounding kit	Campbell Scientific
Guy Kit	Guy Kit for Tripod 19239	Campbell Scientific
Crossarm – 4 ft.	CM204 Sensor crossarm with mounting hardware – 4ft	Campbell Scientific
Crossarm – 6 ft.	CM206 Sensor crossarm with mounting hardware – 6ft	Campbell Scientific
Enclosure with (2) 1.5” diameter holes and mounting hardware for tripod	Weather Resistant 16” x 18” enclosure ENC 16/18 – DC - MM	Campbell Scientific

Table 7. Electric Fence Specifications

Electric Fence Parts	Type/Model	Purchased from:
Metal fence posts	6 ft. T-Posts	Various local vendors
T-Post Insulators	5-inch extender insulators	
Poly wire	200 ft. Polywire	Various local vendors
Solar fence charger	10 mile low impedance fence charger – various models	Various local vendors

Appendix C: ARCN I&M Components by Station

Chicken Creek

Station Name	Item	Model	Start Date
Chicken Creek	Antenna	25316 YAGI	8/21/2004
Chicken Creek	AT	109	7/6/2016
Chicken Creek	AT-RH	HMP45	7/6/2016
Chicken Creek	Battery	100 AH (x2)	8/21/2004
Chicken Creek	Crossarm	3/4"	8/21/2004
Chicken Creek	Datalogger	CR1000	6/19/2013
Chicken Creek	DLP	Chicken2016	7/6/2016
Chicken Creek	Enclosure	ENC 16/18	8/21/2004
Chicken Creek	GPS	17992 GPS	7/3/2014
Chicken Creek	RG-TB	TE525	8/21/2004
Chicken Creek	SD	SR50a	6/19/2013
Chicken Creek	Solar Panel	75 W	8/21/2004
Chicken Creek	SR	Li200x	7/3/2014
Chicken Creek	ST1	107	7/2/2010
Chicken Creek	ST2	107	7/2/2010
Chicken Creek	ST3	107	7/2/2010
Chicken Creek	Tripod	CM106	8/21/2004
Chicken Creek	TX312	NESDIS ID 39603396	5/25/2006
Chicken Creek	WSWD	5103	7/6/2016

Chititu

Station Name	Item	Model	Start Date
Chititu	Antenna	25316 YAGI	8/20/2004
Chititu	AT	109	6/30/2016
Chititu	AT-RH	HMP45	6/30/2016
Chititu	Battery	100 AH (x2)	8/20/2004
Chititu	Crossarm	3/4"	8/20/2004
Chititu	Crossarm	3/4"	8/20/2004
Chititu	Datalogger	CR1000	6/26/2012
Chititu	DLP	Chititu2016	6/30/2016
Chititu	Enclosure	ENC 16/18	8/20/2004
Chititu	GPS	17992 GPS	6/21/2013
Chititu	RG-TB	TE525	8/20/2004
Chititu	SD	SR50a	6/21/2013
Chititu	Solar Panel	75 W	8/20/2004
Chititu	SR	Li200x	6/30/2016
Chititu	ST1	107	8/20/2004
Chititu	ST2	107	8/20/2004
Chititu	ST3	107	6/25/2011
Chititu	Tripod	CM106	8/20/2004
Chititu	TX312	NESDIS ID 396020E0	6/21/2013
Chititu	WSWD	5103	7/10/2015

Coal Creek

Station Name	Item	Model	Start Date
Coal Creek	Antenna	25316 YAGI	9/16/2004
Coal Creek	AT	109	7/6/2016
Coal Creek	AT-RH	HMP45	7/6/2016
Coal Creek	Battery	100 AH (x2)	9/16/2004
Coal Creek	Crossarm	3/4"	9/16/2004
Coal Creek	Crossarm	3/4"	9/16/2004
Coal Creek	Datalogger	CR1000	7/24/2013
Coal Creek	DLP	CoalCreek2016	7/6/2016
Coal Creek	Enclosure	ENC 16/18	9/16/2004
Coal Creek	GPS	17992 GPS	9/8/2012
Coal Creek	RG-TB	TE525	9/16/2004
Coal Creek	SD	SR50a	7/24/2013
Coal Creek	Solar Panel	75 W	9/16/2004
Coal Creek	SR	Li200x	8/7/2015
Coal Creek	ST1	107	9/16/2004
Coal Creek	ST2	107	9/16/2004
Coal Creek	ST3	107	9/16/2004
Coal Creek	Tripod	CM106	9/16/2004
Coal Creek	TX312	NESDIS ID 39605670	9/8/2012
Coal Creek	WSWD	5103	5/22/2014

Dunkle Hills

Station Name	Item	Model	Start Date
Dunkle Hills	Antenna	25316 YAGI	8/1/2002
Dunkle Hills	AT	109	8/11/2016
Dunkle Hills	AT-RH	HMP-45	8/11/2016
Dunkle Hills	Battery	100 AH (x2)	8/1/2002
Dunkle Hills	3/4"	CM204	8/1/2002
Dunkle Hills	3/4"	CM206	8/1/2002
Dunkle Hills	Datalogger	CR1000	5/26/2015
Dunkle Hills	DLP	Dunkle2016	8/11/2016
Dunkle Hills	Enclosure	ENC 16/18	9/19/2011
Dunkle Hills	GPS	17992 GPS	8/1/2002
Dunkle Hills	RG-TB	TE525	8/1/2002
Dunkle Hills	SD	SR50a	8/22/2014
Dunkle Hills	Solar Panel	75 W	8/1/2002
Dunkle Hills	SR	Li200x	8/14/2013
Dunkle Hills	ST1	107	8/14/2013
Dunkle Hills	ST2	107	8/14/2013
Dunkle Hills	ST3	107	8/14/2013
Dunkle Hills	Tripod	CM106	8/1/2002
Dunkle Hills	TX312	NESDIS ID 3960B582	9/17/2009
Dunkle Hills	WSWD	5103	8/22/2014

Eielson Visitor Center

Station Name	Item	Model	Start Date
Eielson	Antenna	25316 YAGI	6/4/2005
Eielson	AT	109	9/8/2016
Eielson	AT-RH	HMP45	9/8/2016
Eielson	Battery	100 AH (x2)	6/4/2005
Eielson	Crossarm	3/4"	6/4/2005
Eielson	Datalogger	CR1000	5/28/2014
Eielson	DLP	Eielson2016	9/8/2016
Eielson	Enclosure	ENC 16/18	6/4/2005
Eielson	GPS	17992 GPS	6/4/2005
Eielson	RG-TB	TE525	6/4/2005
Eielson	SD	SR50a	5/28/2014
Eielson	Solar Panel	75 W	6/4/2005
Eielson	SR	Li200x	8/20/2015
Eielson	Tripod	CM106	6/4/2005
Eielson	TX312	NESDIS ID 39604506	9/17/2009
Eielson	WSWD	5103	5/28/2014

Gates Glacier

Station Name	Item	Model	Start Date
Gates Glacier	Antenna	25316 YAGI	7/6/2005
Gates Glacier	AT	109	6/29/2016
Gates Glacier	AT-RH	HMP45	6/29/2016
Gates Glacier	Battery	100 AH (x2)	7/6/2005
Gates Glacier	Camera	CC5MPX	6/21/2013
Gates Glacier	Camera Battery/Solar Panel	12 Volt – 100 AH / 10 W panel	7/9/2015
Gates Glacier	Crossarm	3/4"	7/6/2005
Gates Glacier	Crossarm	CM206	7/6/2005
Gates Glacier	Datalogger	CR1000	6/21/2013
Gates Glacier	DLP	GatesGI2016	6/29/2016
Gates Glacier	Enclosure	ENC 16/18	7/6/2005
Gates Glacier	GPS	17992 GPS	7/6/2005
Gates Glacier	RG-TB	TE525	7/6/2005
Gates Glacier	SD	SR50	6/21/2013
Gates Glacier	Solar Panel	75 W	7/6/2005
Gates Glacier	SR	Li200x	6/21/2013
Gates Glacier	ST1	107	7/6/2005
Gates Glacier	ST2	107	7/6/2005
Gates Glacier	ST3	107	7/6/2005
Gates Glacier	Tripod	CM106	6/21/2013
Gates Glacier	TX312	NESDIS ID 39608018	6/30/2010
Gates Glacier	WSWD	5103	7/9/2015

Ruth Glacier

Station Name	Item	Model	Start Date
Ruth Glacier	Antenna	25316 YAGI	9/6/2008
Ruth Glacier	AT	107	6/23/2016
Ruth Glacier	AT-RH	HMP45	6/23/2016
Ruth Glacier	Battery	100 AH (x2)	9/6/2008
Ruth Glacier	Battery Cable	Power Cable	6/13/2012
Ruth Glacier	Charging Regulator	CH-100	6/13/2012
Ruth Glacier	Datalogger	CR1000	6/24/2014
Ruth Glacier	DLP	Ruth2016	6/23/2016
Ruth Glacier	Enclosure	ENC 16/18	9/6/2008
Ruth Glacier	GPS	17992 GPS	9/6/2008
Ruth Glacier	RG-TB	TE525	9/6/2008
Ruth Glacier	SD	SR50a	6/24/2014
Ruth Glacier	Solar Panel	75 W	9/6/2008
Ruth Glacier	SR	Li200x	6/23/2016
Ruth Glacier	ST1	107	9/6/2008
Ruth Glacier	ST2	107	9/6/2008
Ruth Glacier	ST3	107	6/24/2014
Ruth Glacier	Tripod	FTS RAWS Lunar Lander	9/6/2008
Ruth Glacier	TX312	NESDIS ID 396063EA	6/13/2012
Ruth Glacier	TX312 Cable	Coaxial Cable	6/13/2012
Ruth Glacier	WSWD	5103	6/24/2014

Stampede

Station Name	Item	Model	Start Date
Stampede	Antenna	25316 YAGI	8/1/2002
Stampede	AT	109	8/11/2016
Stampede	AT-RH	HMP-45	8/11/2016
Stampede	Battery	100 AH (x2)	2003
Stampede	Crossarm	3/4"	8/1/2002
Stampede	Datalogger	CR1000	9/16/2014
Stampede	DLP	Stampede2016	8/11/2016
Stampede	Enclosure	ENC 16/18	5/18/2011
Stampede	GPS	17992 GPS	8/1/2002
Stampede	RG-TB	TE525	8/1/2002
Stampede	SD	SR50a	9/16/2014
Stampede	Solar Panel	75 W	8/1/2002
Stampede	SR	Li200x	8/13/2015
Stampede	ST1	107	8/1/2002
Stampede	ST2	107	8/1/2002
Stampede	ST3	107	8/1/2002
Stampede	Tripod	CM106	9/1/2002
Stampede	TX312	NESDIS ID 3960A6F4	9/17/2009
Stampede	WSWD	5103	8/13/2015

Tana Knob

Station Name	Item	Model	Start Date
Tana Knob	Antenna	25316 YAGI	7/5/2005
Tana Knob	AT	109	6/28/2016
Tana Knob	AT-RH	HMP45	6/28/2016
Tana Knob	Battery	100 AH (x2)	7/5/2005
Tana Knob	Crossarm	CM204	7/5/2005
Tana Knob	Crossarm	CM206	7/5/2005
Tana Knob	Datalogger	CR1000	7/2/2014
Tana Knob	DLP	Tana2016	6/28/2016
Tana Knob	Enclosure	ENC 16/18	7/5/2005
Tana Knob	GPS	17992 GPS	7/5/2005
Tana Knob	RG-TB	TE525	6/28/2016
Tana Knob	SD	SR50	6/20/2013
Tana Knob	Solar Panel	75 W	7/5/2005
Tana Knob	SR	Li200x	6/28/2016
Tana Knob	ST1	107	7/5/2005
Tana Knob	ST2	107	7/5/2005
Tana Knob	ST3	107	7/5/2005
Tana Knob	Tripod	CM106	6/27/2012
Tana Knob	TX312	NESDIS ID 3960709C	7/1/2010
Tana Knob	WSWD	5103	6/28/2016

Tebay

Station Name	Item	Model	Start Date
Tebay	Antenna	25316 YAGI	7/8/2005
Tebay	AT	109	6/28/2016
Tebay	AT-RH	HMP45	6/28/2016
Tebay	Battery	100 AH (x2)	7/8/2005
Tebay	Crossarm	CM204	7/8/2005
Tebay	Crossarm	CM206	7/8/2005
Tebay	Datalogger	CR1000	6/20/2013
Tebay	DLP	Tebay2016	6/28/2016
Tebay	Enclosure	ENC 16/18	7/8/2005
Tebay	GPS	17992 GPS	7/8/2005
Tebay	RG-TB	TE525	7/8/2005
Tebay	SD	SR50a	6/20/2013
Tebay	Solar Panel	75 W	7/8/2005
Tebay	SR	Li200x	7/10/2015
Tebay	ST1	107	6/30/2010
Tebay	ST2	107	6/30/2010
Tebay	ST3	107	6/30/2010
Tebay	Tripod	CM106	7/3/2014
Tebay	TX312	NESDIS ID 3960936E	9/17/2008
Tebay	WSWD	5103	7/10/2015

Toklat

Station Name	Item	Model	Start Date
Toklat	Antenna	25316 YAGI	6/16/2005
Toklat	AT	109	9/9/2016
Toklat	AT-RH	HMP45	9/9/2016
Toklat	Battery	100 AH (x2)	6/16/2005
Toklat	Crossarm	3/4"	6/16/2005
Toklat	Datalogger	CR1000	9/9/2016
Toklat	DLP	Toklat2016	9/9/2016
Toklat	Enclosure	ENC 16/18	6/16/2005
Toklat	GPS	17992 GPS	5/28/2014
Toklat	RG-TB	TE525	9/9/2016
Toklat	SD	SR50a	5/28/2014
Toklat	Solar Panel	75 W	6/16/2005
Toklat	SR	Li200x	9/9/2016
Toklat	ST1	107	6/16/2005
Toklat	ST2	107	6/16/2005
Toklat	ST3	107	6/16/2005
Toklat	Tripod	CM106	6/16/2005
Toklat	TX312	NESDIS ID 396063EA	5/28/2014
Toklat	WSWD	5103	5/28/2014

Upper Charley

Station Name	Item	Model	Start Date
Upper Charley	Antenna	25316 YAGI	8/3/2005
Upper Charley	AT	109	7/6/2016
Upper Charley	AT-RH	HMP45	7/6/2016
Upper Charley	Battery	100 AH (x2)	8/3/2005
Upper Charley	Camera	CC5MPX	7/23/2013
Upper Charley	Camera Battery/Solar Panel	12 Volt – 100 AH / 10 W panel	8/6/2015
Upper Charley	Crossarm	3/4"	8/3/2005
Upper Charley	Crossarm	CM206	8/3/2005
Upper Charley	Datalogger	CR1000	9/7/2012
Upper Charley	DLP	UpperCharley2016	7/6/2016
Upper Charley	Enclosure	ENC 16/18	8/3/2005
Upper Charley	GPS	17992 GPS	9/8/2012
Upper Charley	RG-TB	TE525	8/3/2005
Upper Charley	SD	SR50a	9/7/2012
Upper Charley	Solar Panel	75 W	8/3/2005
Upper Charley	SR	Li200x	7/23/2013
Upper Charley	ST1	107	7/23/2013
Upper Charley	ST2	107	7/23/2013
Upper Charley	ST3	107	7/23/2013
Upper Charley	Tripod	CM206	8/3/2005
Upper Charley	TX312	NESDIS ID 3960D064	9/8/2012
Upper Charley	WSWD	5103	5/23/2014

Wigand

Station Name	Item	Model	Start Date
Wigand	Antenna	25316 YAGI	8/3/2005
Wigand	AT	109	8/11/2016
Wigand	AT-RH	HMP45	8/11/2016
Wigand	Battery	100 AH (x2)	8/13/2013
Wigand	Camera	CC5MPX	7/23/2013
Wigand	Crossarm	3/4"	8/13/2013
Wigand	Crossarm	CM206	8/13/2013
Wigand	Datalogger	CR1000	8/13/2013
Wigand	DLP	UpperCharley2016	8/11/2016
Wigand	Enclosure	ENC 16/18	8/13/2013
Wigand	GPS	17992 GPS	8/13/2013
Wigand	RG-TB	TE525	8/13/2013
Wigand	SD	SR50a	8/13/2013
Wigand	Solar Panel	75 W	8/13/2013
Wigand	SR	Li200x	8/13/2015
Wigand	ST	107	8/13/2013
Wigand	ST	107	8/13/2013
Wigand	ST	107	8/13/2013
Wigand	Tripod	CM206	8/13/2013
Wigand	TX312	NESDIS ID 3960D064	8/13/2013
Wigand	WS/WD	5103 (30" cable)	8/11/2016

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 184/136256, 190/136256, 191/136256, February 2017

National Park Service
U.S. Department of the Interior



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