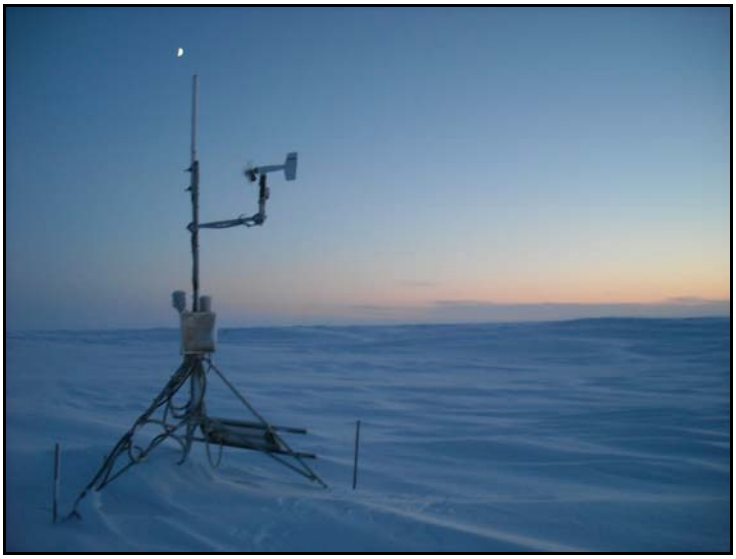
# North Slope, Alaska, Snow-Course and Lake Survey Data: January 2011



*Duck Island met station, photo by K. Hilton, January 2011.*

by

Jeff Derry, Kristie Hilton, Jeff Murray, and Michael Lilly

March 2011

Arctic Transportation Networks Project

Report GWS.TR.11.01

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by

Jeff Derry[1], Kristie Hilton[1], Jeff Murray[1], and Michael Lilly[1]

## A report on research sponsored by:

- U.S. Department of Energy
- National Energy Technology Laboratory
- Alaska Department of Natural Resources
- ConocoPhillips Alaska, Inc.
- Bureau of Land Management
- Geo-Watersheds Scientific

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[1]Geo-Watersheds Scientific, Fairbanks, AK

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Fairbanks, Alaska
March 2011

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# CONVERSION FACTORS, UNITS, WATER QUALITY UNITS, VERTICAL AND HORIZONTAL DATUM, ABBREVIATIONS AND SYMBOLS

## Conversion Factors

| Multiply | By | To obtain |
|---|---|---|
| | Length | |
| inch (in.) | 25.4 | millimeter (mm) |
| inch (in.) | 2.54 | centimeter (cm) |
| foot (ft) | 0.3048 | meter (m) |
| mile (mi) | 1.609 | kilometer (km) |
| | Area | |
| Acre | 43560 | square feet ($ft^2$) |
| Acre | 0.4047 | hectare (ha) |
| Square foot ($ft^2$) | $3.587X10^{-8}$ | square mile ($mi^2$) |
| square mile ($mi^2$) | 2.590 | square kilometer ($km^2$) |
| | Volume | |
| gallon (gal) | 3.785 | liter (l) |
| gallon (gal) | 3785 | milliliter (ml) |
| Cubic foot ($ft^3$) | 23.317 | liter (l) |
| Acre-ft | 1233 | cubic meter ($m^3$) |
| | Velocity and Discharge | |
| foot per day (ft/d) | 0.3048 | meter per day (m/d) |
| Square foot per day ($ft^2$/d ) | .0929 | square meter per day ($m^2$/d) |
| cubic foot per second ($ft^3$/s) | 0.02832 | cubic meter per second ($m^3$/sec) |
| | Hydraulic Conductivity | |
| foot per day (ft/d) | 0.3048 | meter per day (m/d) |
| foot per day (ft/d) | 0.00035 | centimeter per second (cm/sec) |
| meter per day (m/d) | 0.00115 | centimeter per second (cm/sec) |
| | Hydraulic Gradient | |
| foot per foot (ft/ft) | 5280 | foot per mile (ft/mi) |
| foot per mile (ft/mi) | 0.1894 | meter per kilometer (m/km) |
| | Pressure | |
| pound per square inch ($lb/in^2$ ) | 6.895 | kilopascal (kPa) |

**Units**

For the purposes of this report, both US Customary and Metric units were employed. Common regulations related to tundra travel and water use on the North Slope, Alaska, uses combinations of both US Customary and Metric units. The choice of "primary" units employed depended on common reporting standards for a particular property or parameter measured. Whenever possible, the approximate value in the "secondary" units was also provided in parentheses. Thus, for instance, snow depth was reported in inches (in) followed by the value in centimeters (cm) in parentheses.

**Physical and Chemical Water-Quality Units:**

Temperature:

Water and air temperature is given in degrees Celsius (°C) and in degrees Fahrenheit (°F). Degrees Celsius can be converted to degrees Fahrenheit by use of the following equation:

$$°F = 1.8(°C) + 32$$

Snow Water Equivalent (SWE):

Water content of a given column of snow is determined by knowing the depth of the snowpack and density.

$$SWE = d_s * \rho_s / p_w$$

where:

$d_s$ = snow depth

$\rho_s$ = snow density

$p_w$ = density of water.

Electrical Conductance (Actual Conductivity and Specific Conductance):

In this report conductivity of water is expressed as Actual Conductivity [AC] in microSiemens per centimeter (µS/cm). This unit is equivalent to micromhos per centimeter. Elsewhere, conductivity is commonly expressed as Specific Conductance at 25°C [SC25] in µS/cm which is temperature corrected. To convert AC to SC25 the following equation can be used:

**Error! Bookmark not defined.** $SC25 = \frac{AC}{1 + r(T - 25)}$

where:

SC25 = Specific Conductance at 25°C, in µS/cm
AC = Actual Conductivity, in µS/cm
*r* = temperature correction coefficient for the sample, in °C
T = temperature of the sample, in °C

Milligrams per liter (mg/l) or micrograms per liter (µg/l):
Milligrams per liter is a unit of measurement indicating the concentration of chemical constituents in solution as weight (milligrams) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter. For concentrations less than 7,000 mg/l, the numerical value is the same as for concentrations in parts per million (ppm).

Millivolt (mV):
A unit of electromotive force equal to one thousandth of a volt.

Vertical Datum:
"Sea level" in the following report refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929), a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called *Sea Level Datum of 1929*.

Horizontal Datum:
The horizontal datum for all locations in this report is the North American Datum of 1983 or North American Datum of 1927.

**Abbreviations, Acronyms, and Symbols**

| | |
|---|---|
| AC | Actual conductivity |
| ADOT&PF | Alaska Department of Transportation and Public Facilities |
| ADNR | Alaska Department of Natural Resources |
| ASTM | American Society for Testing and Materials |
| atm | Atmospheres |
| ATN | Arctic Transportation Networks |
| C | Celsius ($^{o}$C) |
| cm | Centimeters |
| DO | Dissolved oxygen |
| DVM | Digital voltage multi-meter |
| F | Fahrenheit ($^{o}$F) |
| ft | Feet |
| GWS | Geo-Watersheds Scientific |
| in | Inches |
| kg | Kilograms |
| $km^2$ | Square kilometers |
| kPa | Kilopascal |
| $lb/in^2$ | Pounds per square inch |
| m | Meters |
| mg/l | Milligrams per liter |
| µg/l | Micrograms per liter |
| $mi^2$ | Square miles |
| mm | Millimeters |
| µS/cm | Microsiemens per centimeter |
| mV | Millivolt |
| NGVD | National Geodetic Vertical Datum |
| NRCS | Natural Resources Conservation Service |
| NWIS | National Water Information System |
| ORP | Oxygen-reduction potential |
| ppm | Parts per million |
| QA | Quality assurance |
| QC | Quality control |
| Sag | Sagavanirktok River |
| SC25 | Specific conductance at 25°C |
| SWE | Snow water equivalent |
| UAF | University of Alaska Fairbanks |
| USACE | U.S. Army Corps of Engineers, Alaska District |
| USGS | U.S. Geological Survey |
| WERC | Water and Environmental Research Center |
| WWW | World Wide Web |
| YSI | Yellow Springs Instruments |

## PROJECT COOPERATORS

The Arctic Transportation Network project covers a large area of the North Slope and benefits from a number of positive partnerships, all contributing to the overall project objectives.

- U.S. Department of Energy, National Energy Technology Laboratory (NETL)
- ConocoPhillips Alaska, Inc. (CPA)
- Bureau of Land Management
- Alaska Department of Natural Resources
- North Slope Borough
- National Weather Service
- Geo-Watersheds Scientific
- University of Alaska-Fairbanks
- Idaho National Laboratory

## ACKNOWLEDGEMENTS

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# North Slope, Alaska, Snow-Course and Lake Survey Data: January 2011

## INTRODUCTION

Geo-Watersheds Scientific (GWS), University of Alaska Fairbanks (UAF), and Idaho National Laboratory (INL), together with project cooperators, initiated a study in October 2009 to collect field data for the development of management tools for various aspects of Arctic Transportation Networks (ATN). Some of the variables collected include data from meteorological and lake stations (such as snow depth, air and soil temperatures, unfrozen soil moisture, precipitation, wind and radiation data). Data are also collected at selected lakes and reservoirs. Lake data may include snow depth and density data, water-quality and water-level measurements and general observations of watershed conditions.

Snow depth is considered an important variable by regulatory agencies, since tundra travel operations (Alaska state lands) can only commence once data stations have a snow depth of 6 in (15 cm) in the coastal plain management areas, or 9 in (23 cm) in the foothills management areas. Soil temperatures are also used to manage tundra travel on Alaska state lands. The soil temperature must reach 23° F (-5°C) at a depth of 12 in (30 cm) (Bader, 2004) to meet tundra-travel management criteria. The intent of the soil temperature criteria is to ensure frozen soil strengths are adequate in terms of reaching maximum soil strength. The direct relationship of soil strength to the temperature criteria has not been defined, though this criteria is considered very conservative. Many meteorological factors determine when these conditions will be met. An established network of meteorological stations and increased manual snow measurements – both amount collected and number of sites visited – will improve the understanding of the timing and amount of snow and its spatial distribution and will assist in the development of predictive and management tools.

Ice thickness on lakes and reservoirs is another important measurement related to Arctic transportation networks. Adequate ice thickness must exist before safe travel over ungrounded ice (not frozen to bottom of lake or reservoir) can be conducted. In most cases, for lakes over 7

feet (2.1 m) deep, an end-of-season ice thickness of 7 ft (2.1 m) is assumed for the North Slope. This is a conservative seasonal ice thickness that is rarely measured, but has provided a safe management approach in lack of supporting data for seasonal ice thicknesses over the North Slope. Ice thickness data collected by the ATN project and others will be used to help develop better management approaches associated with water use and North Slope lakes and reservoirs.

## TRIP OBJECTIVES

The January field effort was primarily focused on replacing the SR-50 snow-depth sensors at three meteorological stations (Duck Island Met Station, F-Pad Met Station, and L9312 Met Station). However, snow-courses were also conducted, lake measurements were taken, and verification of other meteorological station operations were completed as time permitted. Snow sampling was performed at co-located ADNR and ATN project sampling sites. In addition to the standard snow-course measurements, additional measurement techniques were continued to address both the varying methods of measuring snow depth on the North Slope and the evaluation of current measurement standards.

A workplan was published prior to the January field campaign containing a site-by-site list of objectives (Murray et al. 2011). Project accomplishments include the following:

1. Kuparuk and Prudhoe Bay Operating Sites
    - Conducted snow courses at Duck Island, ANFO, 1J-Pad, and Betty Pingo.
    - Conducted additional snow measurements to test snow measurement approaches at 1J-Pad and Betty Pingo
    - Duck Island station maintenance- replaced SR-50a sensor
    - 2F-Pad station maintenance- replaced SR-50a sensor

2. Alpine
    - Conducted snow courses at L9312 on tundra and lake ice surface and additional snow measurements to test snow measurement approaches
    - Conducted snow courses at L9321, L9322, and L9323
    - L9312 station maintenance- replaced SR-50 sensor
    - Measured lake ice parameters at L9312
    - Measured water levels at L9312, L9321, L9322, and L9323

## PROCEDURES

ATN's standard snow course procedures include snow-depth measurements conducted in "L" shaped patterns on lake surfaces and/or tundra surfaces at predetermined locations according to ATN snow measurement methods (Derry et al. 2009). Snow-depth measurements were taken with a T-handle probe approximately every 3.3 ft (1 m) for 82 ft (25 m), then turning 90 degrees, and continuing for another 82 ft (25 m). Snow samples were also collected for density measurements with an Adirondack snow sampler. Five densities were collected at each location and averaged to establish a representative density. A number of sampling sites are co-located with ADNR snow and soil sampling sites to compare sampling methods. The ADNR method has been changed from the 2009/10 winter season, it now involves collecting 20 depth measurements along a transect spaced at 5 meter (16.4 ft) increments with a meter long ruler and 5 density measurements collected with a Federal Sampler. Previously (winter 2009/10), ADNR methods involved snow depth measurements along an 11 meter (36 ft) transect with depth samples measured every 0.5 meter (1.5 ft) totaling 20 depth values per transect. In addition, two snow densities were collected near each transect with a Federal Snow Sampler. (Derry et al. 2009). The intent of co-located sites is to provide data for ADNR and ATN project staff to compare measurement methods at representative sites.

In order to better address this comparison, ATN project members have also incorporated snow course measurements with a ruler similar to that used by ADNR. At various sites and times throughout the season, ATN will measure snow depths with both the T-handle probe and the ruler to compare the precision of each technique on both tundra and lake ice surfaces.

Two other measurement practices are being integrated into ATN's practices throughout this winter season. ATN recommends the "L-transect" method, which involves a 50 meter (164 ft) transect with a right angle at the halfway point. ADNR on the other hand, collects 20 snow depths along a transect spaced at 5-meter (16 ft) increments. To further test the validity of these methods, snow depths along a straight 100-m (328 ft) transect at established snow sampling sites are collected. Depths are taken every 0.5 m (1.6 ft) for 100 m, resulting in 200 depth values (n=200). This strategy is used to analyze the differences at a site by comparing the standard

procedure with a larger sample size to determine the optimum snow-depth sample size and spacing of the sampling to be collected in the field.

At lakes L9312, L9321, L9322, and L9323, holes were drilled through the ice with an electric drill with 5 cm (2 in) bit. Water depth (lake bottom to water surface), freeboard (water surface to top of ice), ice thickness (bottom of ice to top of ice), and snow depth (top of ice to top of snow, measured at the hole where snow was cleared to drill) were measured after the hole was drilled. Water depth was measured with a flexible tape fitted with a weight at the end. Freeboard and ice thickness was measured with a folding tape. Snow depth was measured with the same T-handle probe that is used for snow courses.

## SELECTED RESULTS

Snow-course measurements were conducted at eight different locations during the January trip (Table 1). Eleven sites have been chosen for this winter season, several of which are co-located with ADNR sites (see Figure 1). Snow data collected at the sampling sites visited can be found in Appendix A.

**Table 1. January snow sampling locations, locations in bold indicate site is co-located with ADNR snow and soil temperature sampling sites.**

| Station | Elevation Ft | North Latitude NAD 83 | West Longitude NAD 83 |
|---|---|---|---|
| **1J** | 82 | 70° 16.260’ | 149° 31.140’ |
| **ANFO 2** | 27 | 70° 14.447’ | 148° 10.760’ |
| L9312 – Lake Surface | 7 | 70° 20.008’ | 150° 57.083’ |
| L9312 – Tundra Surface | 7 | 70° 19.995’ | 150° 56.918’ |
| L9321 – Lake Surface | -11 | 70° 20.544’ | 150° 01.691’ |
| L9322 – Lake Surface | -5 | 70° 20.257’ | 150° 01.878’ |
| L9323 – Lake Surface | -3 | 70° 17.852’ | 150° 59.919’ |
| Betty Pingo | 34 | 70° 16.772’ | 148° 53.741' |

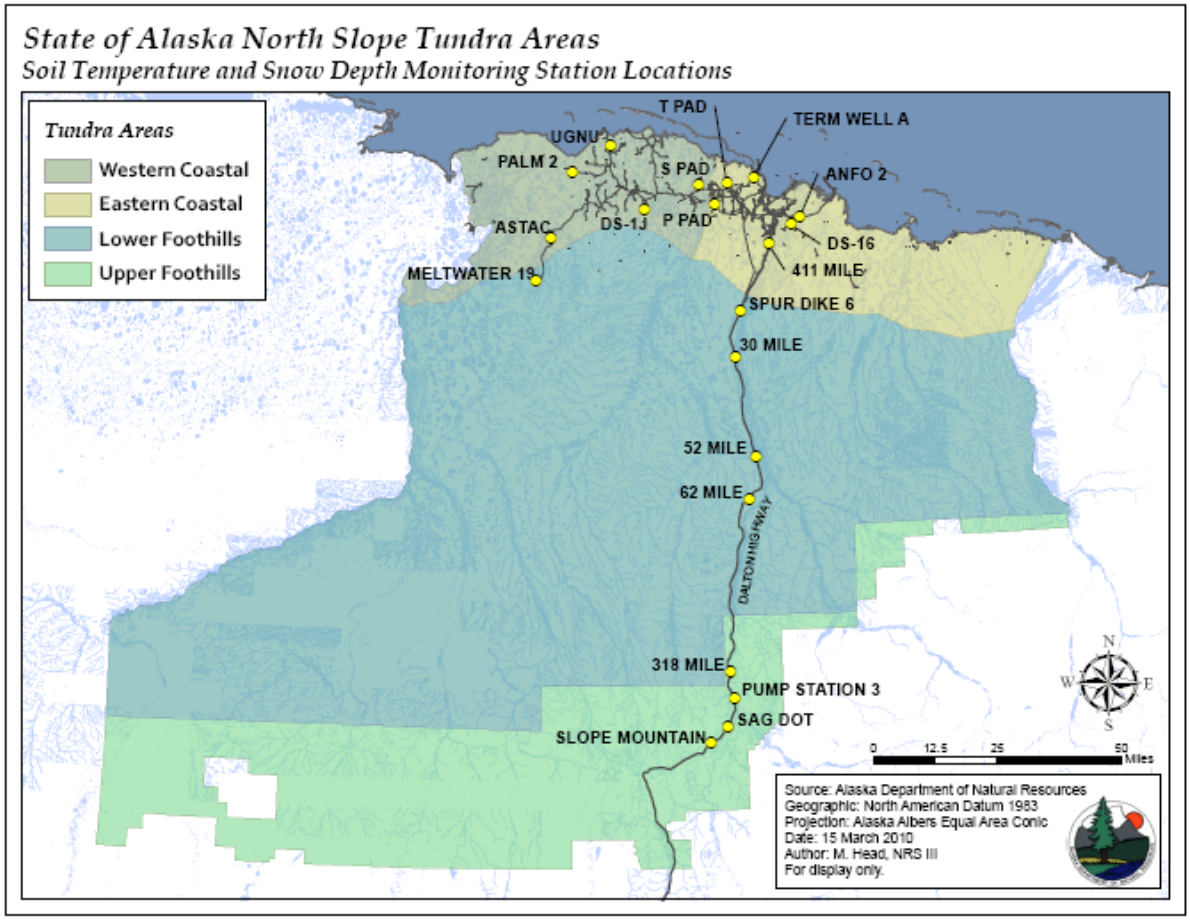


**Figure 1. Map of ADNR snow and soil temperature sampling sites (ADNR, 2010).**

The January field effort continued snow-data collection for comparative analysis between groups as well as method analysis for ATN and ADNR. The goal is to develop a technique for accurately, and precisely, measuring snow depth by both experienced and inexperienced personnel and to show the validity of both ATN and ADNR snow-data collection methods. Figure 2 shows the comparison snow depth data collected by two ATN personnel during three different visits to the Slope according to ATN snow-data collection methods (Derry et al., 2009). The measurements were taken with identical equipment at the same time and place within approximately 0.3 meters (1 ft) of each person sampling. For the figures shown in this section, lines were drawn at both 2 cm (0.79 in) more and 2 cm less than the equivalence line. While 2 cm has no regulatory significance, it has been chosen to signify an acceptable range of values for comparing snow-depth measurements. Any value that falls within this range should be considered a comparable measurement of the snow depth between the different groups and/or

methods. Figure 2 shows that the vast majority of depth measurements fell within the desired range for measurements made by two ATN project staff, using the same methods, at the same time. This comparison was designed that the only major differences between the two measurements are the two ATN staff. The snow surface and landscape surface are assumed to have similar variability within the 1.5 meter (5 ft) paths. All other sources of variance were removed to the fullest possible extent.

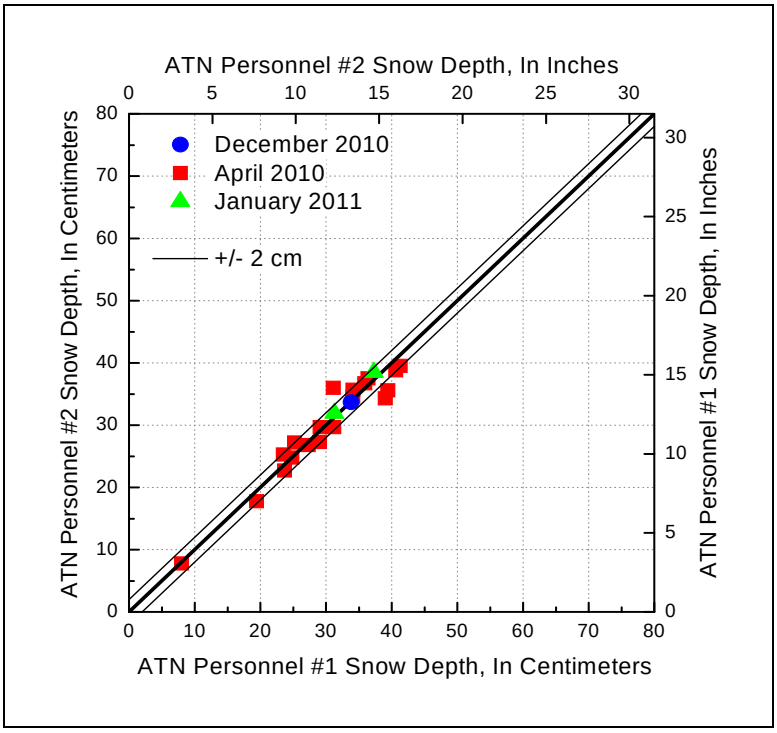


**Figure 2. Comparison of snow depths collected by ATN personnel. Snow depths collected according to ATN snow-course collection methods.**

To further this analysis to industry surveyor personnel (i.e. LCMF at Alpine and Lounsbury at Kuparuk), Figure 3 shows the average snow depth between ATN and industry personnel collected according to ATN collection methods over two winter seasons. Results are very similar to that of ATN personnel (Figure 2) with only 2-3 average snow course values being more than +/- 2 cm different. This plot includes data collected in December 2010 when two Lounsbury personnel received snow-course training for the first time. When comparing ATN and ADNR data at co-located sites (Figure 4), most of the co-located sites visited throughout the winter resulted in average snow depths that fell outside of the recommended +/- 2 cm range.

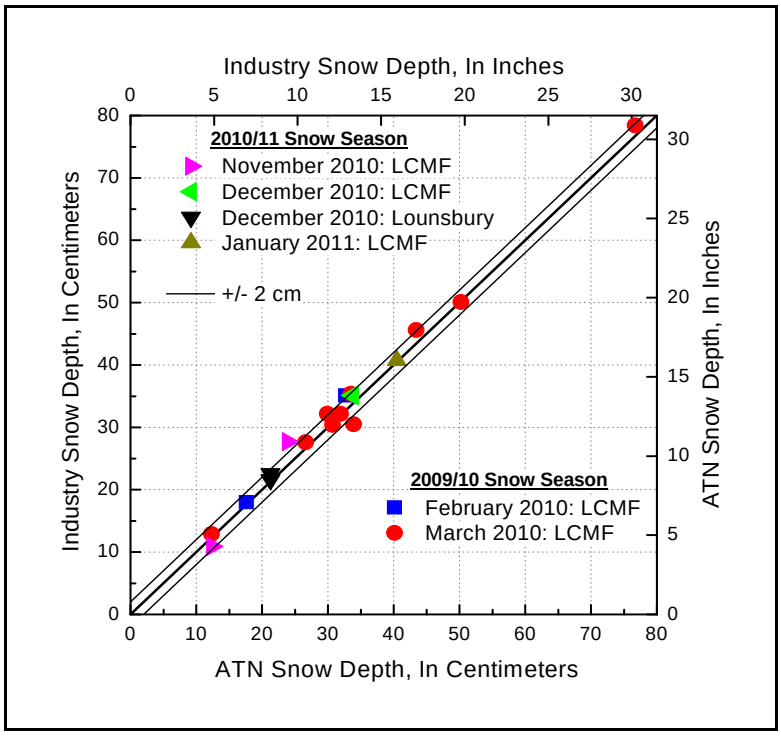


**Figure 3. Comparison of average snow depth collected by ATN personnel with that collected by industry. Snow depths collected according to ATN snow-course collection methods.**

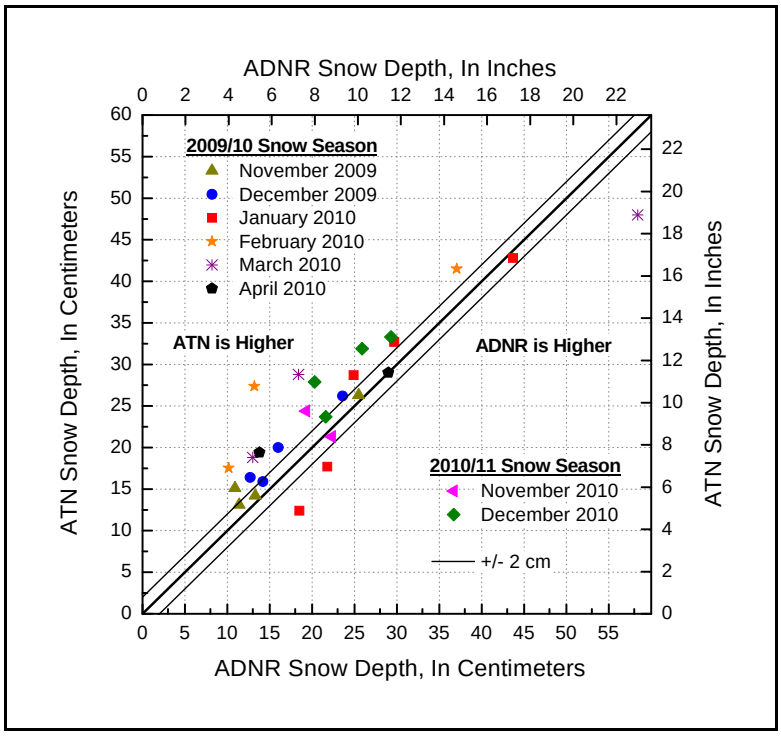


**Figure 4. Comparison of average snow depth between ATN and ADNR collected at co-located sampling sites. ATN data is collected according to ATN snow-course collection methods while ADNR methods are different between the two seasons.**

Several factors may influence the difference in observed depths including: different equipment used, difference in time of collection (up to a week apart), same general area, but not side by side, and different collection methods. The PROCEDURES section describes the difference in equipment and methods used by both groups to measure snow depth. The difference in the type of measurement rod used is being investigated by the ATN project. ATN uses a T-probe (commonly called a tile probe) and measures to the nearest 0.5 cm (0.2 in) while ADNR uses a steel ruler and measures to the nearest 2.54 cm (1 in) in 2009/10 winter 0.63 cm (0.25 in) in 2010/11 winter. Strong wind and snow events can greatly alter the snow distribution throughout the North Slope, so it should not be surprising if samples conducted on different days result in different depths. Figure 5 shows initial findings comparing the two different measurement devices. When collecting data for this comparison an attempt to collect snow depth at the exact same location was emphasized. It may be that the T-probes used by the ATN project (which is a sharp pointed rod) penetrates the tundra surface compared to the ADNR ruler which is flexible, and will bend if pushed too hard, and also has a flat area that cannot penetrate the tundra surface as easily.

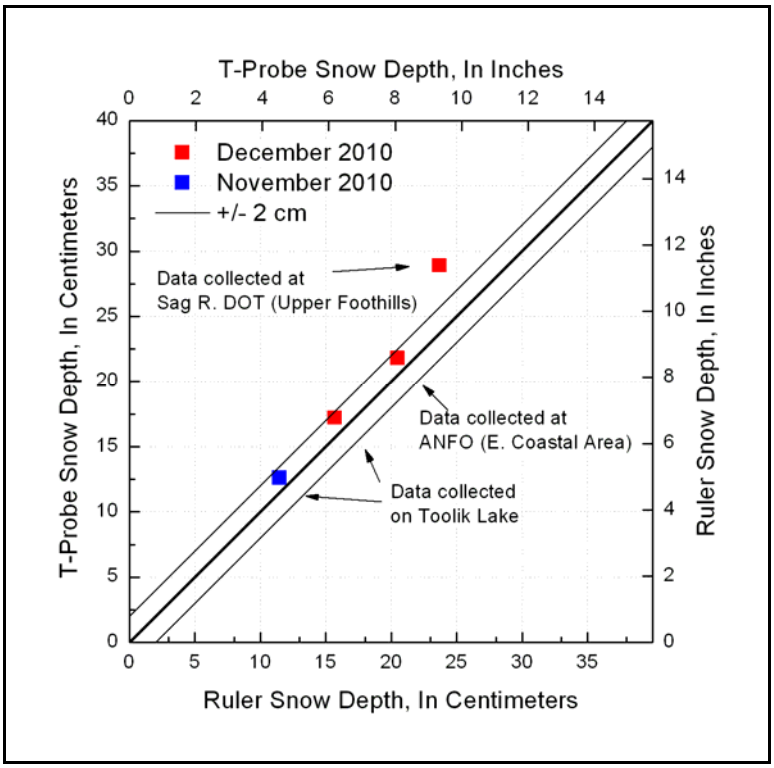


**Figure 5. Comparison of average snow depth collected by ATN personnel according to ATN snow course collection methods but using two different measurement devices; a T-probe which is the item used by ATN personnel, and a ruler similar to that used by ADNR personnel.**

In addition to snow sampling, water levels were measured at L9312 and compared to previous sampling dates (Figure 6). The water level of L9312 increased 0.02 ft from the first of December. Levels are 0.28 ft higher than January 2010, 0.37 ft higher than January 2009, and .0.17 ft higher compared to January 2008.

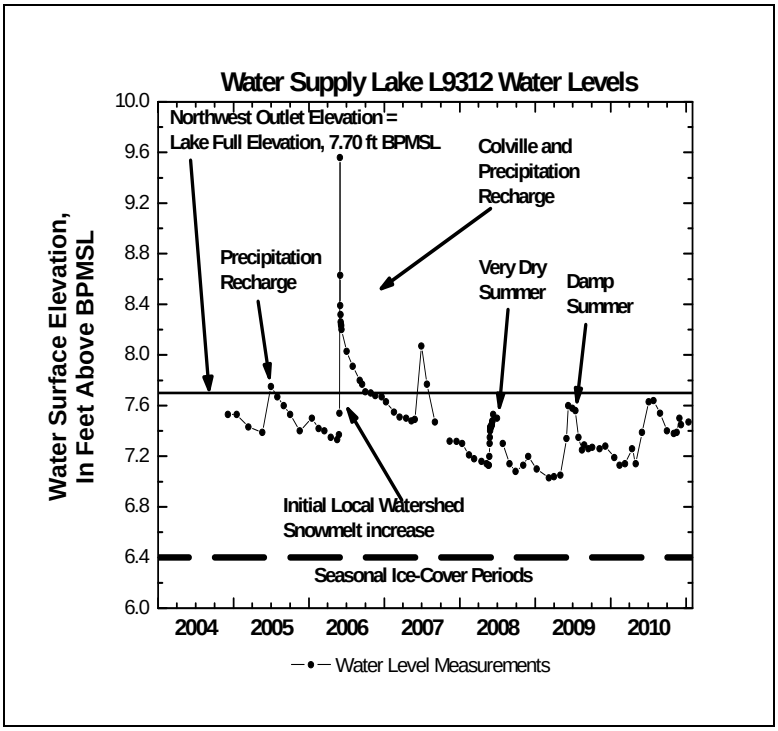


**Figure 6. Plot of water level at L9312 through January 13, 2011.**

## SUMMARY

During the January ATN trip, objectives focused on station maintenance at Duck Island, 2F-Pad, and L9312, where SR-50 sensors were replaced. Snow depth and density measurements occurred at multiple sites (including two ATN/ADNR co-located sites, ANFO and 1J-Pad), and lake/ ice depth measurements were taken along with a lake level survey at L9312, L9321, L9322, and L9323.

The collection of snow and lake information related to Arctic transportation networks will help the development of regulatory and user management tools, forecast modeling tools, and optimum field sampling methods. These tools will help manage increasing resource development and variation of natural conditions in extreme Arctic climates.

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# APPENDIX A. SNOW SURVEY FORMS

The following forms report the snow survey information obtained during field sampling.

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN Project** | Site Location/Lake ID: | **ANFO2** |
| Survey Purpose: | **Determine Snow Depth and SWE** | Date: 1/11/2011 | Time: 16:00 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Off road to the North. Near Duck Island gravel pit. Close to PVC pipe.. GWS stays to right (as looking at pipe) and DNR stays left. | | | | |
| Survey objective: | SWE and Tundra Travel (Co-located snow survey site with DNR sampling site) | | | Weather Observations | Cold, Dark, Breeze |
| Latitude: | N 70° 14.460' | Longitude: | W 148° 10.800' | Datum: | NAD 83 |
| Elevation: | 27 ft. | Elevation Datum: | NGVD29 | Reference Markers: | Black PVC pipe |
| Drainage Basin: | Sagavanirktok River | Slope Direction: | Flat | Vegetation Type: | Upland Tussock Tundra |
| Slope Angle: | Flat | Access Notes: | Truck | Other: | Hard surface layer ~2", consistent below |
| Snow Depth Probe Type: | | T-Handle Probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray, Kristie Hilton | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **1** | 36.0 | 24.5 | 26.0 | 22.0 | 16.5 |
| **2** | 34.0 | 26.0 | 24.0 | 21.0 | 21.5 |
| **3** | 29.0 | 27.5 | 24.0 | 26.0 | 26.0 |
| **4** | 32.0 | 28.5 | 19.0 | 23.0 | 25.0 |
| **5** | 32.0 | 24.0 | 27.0 | 20.0 | 24.5 |
| **6** | 37.0 | 22.0 | 20.0 | 29.0 | 26.0 |
| **7** | 35.0 | 26.0 | 22.0 | 28.0 | 34.0 |
| **8** | 30.0 | 24.0 | 19.0 | 22.5 | 31.5 |
| **9** | 26.5 | 26.0 | 20.0 | 23.0 | 37.0 |
| **10** | 27.0 | 24.0 | 21.0 | 26.0 | 41.0 |

(cm)

| | |
|---|---|
| Average snow depth = | **26.3** |
| Maximum snow depth = | 41.0 |
| Minimum snow depth = | 16.5 |
| Standard deviation = | 5.3 |

(inches)

| | |
|---|---|
| Average snow depth = | **10.4** |
| Maximum snow depth = | **16.1** |
| Minimum snow depth = | **6.5** |
| Standard deviation = | **2.1** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| N4 | 28 | 289.5 | 999.6 | 0.29 | |
| P4 | 24 | 243.6 | 856.8 | 0.28 | |
| P3 | 25 | 247.2 | 892.5 | 0.28 | |
| P5 | 26 | 254.8 | 928.2 | 0.27 | |
| P1 | 17 | 125.4 | 606.9 | 0.21 | |

| | | |
|---|---|---|
| Average Density = | **0.266** | |
| Average Snow Water Equivalent (SWE) = | **7.0** | cm H2O |
| Average Snow Water Equivalent = | **2.76** | inches H2O |
| Average Snow Water Equivalent = | **0.23** | feet H2O |

SWE = avg. snow depth*(density snow/density water)

Data entered by: Jeff Murray Date: 1/18/2011
Data QA/QC by: K. Hilton Date: 1/20/11

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN Project** | Site Location/Lake ID: | **ADNR J-Pad (JM)** |
| Survey Purpose: | **Determine Snow Depth and SWE** | Date: 1/12/2011 | Time: 9:30 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | East of road before 1J-Pad, near soil thermistors. GWS measures to right (as looking at bore tube from road) and DNR measures to left. | | | | |
| Survey objective: | Co-located snow survey site with DNR sampling site, tundra travel studies and management | | | Weather Observations | Dark, Cold, Calm |
| Latitude: | N 70° 16.260' | Longitude: | W 149° 31.140' | Datum: | NAD83 |
| Elevation: | 82 ft | Elevation Datum: | NGVD29 | Reference Markers: | Black PVC Pipe |
| Drainage Basin: | Unnamed stream east of Ugnuravik River | Slope Direction: | Flat | Vegetation Type: | Lowland Wet Sedge Tundra |
| Slope Angle: | Flat | Access Notes: | Truck | Other: | 2 solid layers, sintering at base |
| Snow Depth Probe Type: | | T-Handle Probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray, Kristie Hilton | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 35.0 | 34.0 | 41.0 | 49.0 | 39.0 |
| 2 | 32.5 | 32.0 | 45.0 | 45.0 | 37.0 |
| 3 | 32.0 | 32.5 | 57.0 | 39.0 | 36.0 |
| 4 | 33.0 | 40.0 | 44.0 | 41.0 | 31.0 |
| 5 | 31.5 | 44.0 | 42.0 | 32.0 | 34.0 |
| 6 | 33.0 | 39.0 | 54.0 | 42.0 | 35.0 |
| 7 | 41.0 | 41.0 | 58.5 | 45.0 | 37.0 |
| 8 | 29.0 | 38.0 | 53.0 | 40.0 | 29.0 |
| 9 | 31.0 | 30.0 | 50.0 | 43.0 | 31.0 |
| 10 | 31.0 | 25.0 | 44.0 | 39.0 | 29.0 |

| | (cm) |
|---|---|
| Average snow depth = | **38.5** |
| Maximum snow depth = | 58.5 |
| Minimum snow depth = | 25.0 |
| Standard deviation = | 7.6 |

| | (inches) |
|---|---|
| Average snow depth = | **15.2** |
| Maximum snow depth = | **23.0** |
| Minimum snow depth = | **9.8** |
| Standard deviation = | **3.0** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| F2 | 22 | 148.6 | 785.4 | 0.19 | |
| F1 | 32 | 273.6 | 1142.4 | 0.24 | |
| P4 | 32 | 306.3 | 1142.4 | 0.27 | |
| :)1 | 41 | 448.1 | 1463.7 | 0.31 | |
| P2 | 34 | 336.4 | 1213.8 | 0.28 | |

| | | |
|---|---|---|
| Average Density = | **0.256** | |
| Average Snow Water Equivalent (SWE) = | **9.9** | cm H2O |
| Average Snow Water Equivalent = | **3.88** | inches H2O |
| Average Snow Water Equivalent = | **0.32** | feet H2O |

SWE = avg. snow depth*(density snow/density water)

Data entered by: Kristie Hilton Date:1/19/2011
Data QA/QC by: Jeff Murray Date: 1/19/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

Project ID: **ATN Project** Site Location/Lake ID: **ADNR J-Pad (KH)**
Survey Purpose: **Determine Snow Depth and SWE** Date: 1/12/2011 Time: 9:45

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | East of road before 1J-Pad, near soil thermistors. GWS measures to right (as looking at bore tube from road) and DNR measures to left. | | | | |
| Survey objective: | Co-located snow survey site with DNR sampling site, tundra travel studies and management | | | Weather Observations | Dark, Cold, Calm |
| Latitude: | N 70° 16.260' | Longitude: | W 149° 31.140' | Datum: | NAD83 |
| Elevation: | 82 ft | Elevation Datum: | NGVD29 | Reference Markers: | Black PVC Pipe |
| Drainage Basin: | Unnamed stream east of Ugnuravik River | Slope Direction: | Flat | Vegetation Type: | Lowland Wet Sedge Tundra |
| Slope Angle: | Flat | Access Notes: | Truck | Other: | 2 solid layers, sintering at base |
| Snow Depth Probe Type: | | T-Handle Probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Kristie Hilton, Jeff Murray | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 33.0 | 32.0 | 44.0 | 41.0 | 38.0 |
| 2 | 33.0 | 29.0 | 55.0 | 44.0 | 37.5 |
| 3 | 32.0 | 39.0 | 45.0 | 38.5 | 33.0 |
| 4 | 29.0 | 43.0 | 43.0 | 38.0 | 28.0 |
| 5 | 29.0 | 39.0 | 44.5 | 37.0 | 33.0 |
| 6 | 17.0 | 40.0 | 48.0 | 43.0 | 35.0 |
| 7 | 28.0 | 26.5 | 58.5 | 46.0 | 33.5 |
| 8 | 30.0 | 31.0 | 53.0 | 39.5 | 27.5 |
| 9 | 33.0 | 26.0 | 50.0 | 41.0 | 30.5 |
| 10 | 24.5 | 40.5 | 51.0 | 38.0 | 34.0 |

(cm)
Average snow depth = **37.3**
Maximum snow depth = 58.5
Minimum snow depth = 17.0
Standard deviation = 8.5

(inches)
Average snow depth = **14.7**
Maximum snow depth = **23.0**
Minimum snow depth = **6.7**
Standard deviation = **3.3**

Data entered by: Kristie Hilton Date:1/19/2011
Data QA/QC by: Jeff Murray Date: 1/19/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN Project** | Site Location/Lake ID: | **Betty Pingo (JM)** |
| Survey Purpose: | **Determine Snow Depth and SWE** | Date: 1/12/2011 | Time: 10:30 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Near Wyoming gage. At staked snow site. Started east and then went north. Point of beginning is flagged rebar. | | | | |
| Survey objective: | SWE and tundra travel studies and management | | | Weather Observations. | Cold, Calm |
| Latitude: | N 70° 16.772' | Longitude: | W 148° 53.741' | Datum: | NAD83 |
| Elevation: | 34 ft. | Elevation Datum: | NVGD27 | Reference Markers: | Re-bar and lathe |
| Drainage Basin: | Kuparuk River | Slope Direction: | Flat | Vegetation Type: | Lowland Moist Sedge-Shrub Tundra |
| Slope Angle: | Flat | Access Notes: | Truck | Other: | Multiple layers, wind packed |
| Snow Depth Probe Type: | | T-Handle Probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray, Kristie Hilton | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **1** | 38.5 | 19.0 | 25.0 | 47.0 | 42.0 |
| **2** | 26.5 | 25.0 | 39.0 | 45.0 | 48.0 |
| **3** | 12.5 | 27.0 | 39.0 | 42.0 | 45.0 |
| **4** | 14.0 | 26.5 | 36.0 | 32.0 | 39.0 |
| **5** | 17.0 | 22.0 | 38.0 | 22.0 | 29.0 |
| **6** | 18.0 | 31.0 | 40.0 | 20.0 | 33.0 |
| **7** | 14.0 | 27.0 | 39.0 | 34.0 | 28.0 |
| **8** | 23.0 | 28.0 | 39.5 | 32.5 | 42.0 |
| **9** | 29.0 | 27.0 | 44.0 | 18.0 | 46.0 |
| **10** | 27.0 | 29.0 | 41.0 | 31.5 | 57.0 |

| | (cm) |
|---|---|
| Average snow depth = | **31.9** |
| Maximum snow depth = | 57.0 |
| Minimum snow depth = | 12.5 |
| Standard variation = | 10.2 |
| | (inches) |
| Average snow depth = | **12.6** |
| Maximum snow depth = | **22.4** |
| Minimum snow depth = | **4.9** |
| Standard variation = | **4.0** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| H1 | 17 | 95.3 | 606.9 | 0.16 | |
| H2 | 22 | 141.5 | 785.4 | 0.18 | |
| H4 | 29 | 214.8 | 1035.3 | 0.21 | |
| H5 | 31 | 286.7 | 1106.7 | 0.26 | |
| H3 | 32 | 282.8 | 1142.4 | 0.25 | |

| Judd (cm) | WY Gauge |
|---|---|
| 34 | 30.5" |
| 39 | |
| 39 | |
| 40 | |
| 40.5 | |

Average Density = **0.210**

Average Snow Water Equivalent (SWE) = **6.7** cm H2O

Average Snow Water Equivalent = **2.64** inches H2O

Average Snow Water Equivalent = **0.22** feet H2O

SWE = avg. snow depth*(density snow/density water)

Data entered by: Kristie Hilton Date: 1/19/2011

Data QA/QC by: Jeff Murray Date: 1/19/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

Project ID: **ATN Project** Site Location/Lake ID: **Betty Pingo (KH)**
Survey Purpose: **Determine Snow Depth and SWE** Date: 1/12/2011 Time: 10:30

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Near Wyoming gage. At staked snow site. Started east and then went north. Point of beginning is flagged rebar. | | | | |
| Survey objective: | SWE and tundra travel studies and management | | | Weather Observations. | Cold, Calm |
| Latitude: | N 70° 16.772' | Longitude: | W 148° 53.741' | Datum: | NAD83 |
| Elevation: | 34 ft. | Elevation Datum: | NVGD27 | Reference Markers: | Re-bar and lathe |
| Drainage Basin: | Kuparuk River | Slope Direction: | Flat | Vegetation Type: | Lowland Moist Sedge-Shrub Tundra |
| Slope Angle: | Flat | Access Notes: | Truck | Other: | Multiple layers, wind packed |
| Snow Depth Probe Type: | | T-Handle Probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Kristie Hilton, Jeff Murray | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **1** | 16.5 | 29.0 | 17.0 | 14.0 | 26.0 |
| **2** | 19.5 | 21.0 | 36.5 | 43.0 | 48.0 |
| **3** | 14.0 | 29.0 | 38.0 | 31.0 | 42.0 |
| **4** | 24.0 | 26.0 | 39.0 | 21.0 | 40.0 |
| **5** | 27.0 | 26.0 | 37.5 | 20.0 | 29.0 |
| **6** | 23.5 | 27.5 | 38.0 | 28.0 | 31.0 |
| **7** | 20.0 | 26.0 | 43.0 | 33.0 | 33.5 |
| **8** | 25.5 | 26.5 | 41.0 | 19.0 | 41.0 |
| **9** | 27.0 | 39.0 | 42.0 | 31.5 | 48.0 |
| **10** | 26.0 | 40.5 | 43.0 | 41.5 | 57.5 |

(cm)
Average snow depth = **31.3**
Maximum snow depth = 57.5
Minimum snow depth = 14.0
Standard variation = 9.9

(inches)
Average snow depth = **12.3**
Maximum snow depth = **22.6**
Minimum snow depth = **5.5**
Standard variation = **3.9**

Data entered by: Kristie Hilton Date: 1/19/2011
Data QA/QC by: Jeff Murray Date: 1/19/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN Project** | Site Location/Lake ID: | **Duck Island MET** |
| Survey Purpose: | **Determine Snow Depth and SWE** | Date: 1/11/2011 | Time: 15:30 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Near Duck Island Meteorlogical station. Staked snow course. Snow depths under SR50 sensor: 29 cm, 26 cm, 25 cm, 26.5 cm, 26 cm. Average=26.5 cm | | | | |
| Survey objective: | SWE and Tundra Travel (Co-located snow survey site with DNR sampling site) | | | Weather Observations | Cold, Breeze |
| Latitude: | N 70° 16.206' | Longitude: | W 147° 59.265' | Datum: | NAD 83 |
| Elevation: | 45 ft. | Elevation Datum: | NGVD29 | Reference Markers: | Black PVC Pipe |
| Drainage Basin: | Sagavanirktok River | Slope Direction: | Flat | Vegetation Type: | Upland Tussock Tundra |
| Slope Angle: | Flat | Access Notes: | Truck | Other: | Two layers, one thick homogenous, one ice |
| Snow Depth Probe Type: | | T-Handle Probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray, Kristie Hilton | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **1** | 19.0 | 18.0 | 21.0 | 57.0 | 21.5 |
| **2** | 22.0 | 18.0 | 20.0 | 49.0 | 17.0 |
| **3** | 21.0 | 24.0 | 23.0 | 35.0 | 19.0 |
| **4** | 21.0 | 21.0 | 25.5 | 27.0 | 41.0 |
| **5** | 22.0 | 30.0 | 26.0 | 25.0 | 45.0 |
| **6** | 22.0 | 24.0 | 20.0 | 21.0 | 35.0 |
| **7** | 19.5 | 24.0 | 34.0 | 17.0 | 41.0 |
| **8** | 17.5 | 26.0 | 30.0 | 15.0 | 47.0 |
| **9** | 17.0 | 23.0 | 41.0 | 20.0 | 51.0 |
| **10** | 16.5 | 22.0 | 51.0 | 21.0 | 51.5 |

| | (cm) |
|---|---|
| Average snow depth = | **27.5** |
| Maximum snow depth = | 57.0 |
| Minimum snow depth = | 15.0 |
| Standard deviation = | 11.2 |

| | (inches) |
|---|---|
| Average snow depth = | **10.8** |
| Maximum snow depth = | **22.4** |
| Minimum snow depth = | **5.9** |
| Standard deviation = | **4.4** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| 2L3 | 26 | 233.0 | 928.2 | 0.25 | |
| 2L1 | 19 | 192.2 | 678.3 | 0.28 | |
| 2L5 | 30 | 291.1 | 1071.0 | 0.27 | |
| 2L4 | 32 | 296.3 | 1142.4 | 0.26 | |
| 2L2 | 13 | 142.1 | 464.1 | 0.31 | |

Average Density = **0.280**

Average Snow Water Equivalent (SWE) = **7.7** cm H2O

Average Snow Water Equivalent = **3.03** inches H2O

Average Snow Water Equivalent = **0.25** feet H2O

SWE = avg. snow depth*(density snow/density water)

Data entered by: Kristie Hilton Date: 1/19/2011

Data QA/QC by: Jeff Murray Date: 1/19/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

Project ID: **ATN** Site Location/Lake ID: **L9312 - Lake Surface**
Survey Purpose: **Determine snow depth, SWE** Date: 1/13/2011 Time: 10:00

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | On lake surface ~150 yards east from L9312 pumphouse. | | | | |
| Survey objective: | Determine snow depth and density for application to lake recharge studies, and tundra travel management. | | | Weather Observations: | Cold, Clear, Breeze |
| Latitude: | N 70° 19.995' | Longitude: | W 150° 56.918' | Datum: | NAD 83 |
| Elevation: | 7 ft | Elevation Datum: | BPMSL | Reference Markers: | Lathe |
| Drainage Basin: | Colville Basin | Slope Direction: | Flat | Vegetation Type: | None, Ice surface |
| Slope Angle: | Flat | Access Notes: | Hagglund | Other: | Packed snow |
| Snow Depth Probe Type: | | T- probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray., Mike Rourick | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 22.5 | 12.5 | 18.5 | 20.5 | 12.0 |
| 2 | 23.0 | 10.5 | 19.5 | 22.0 | 20.0 |
| 3 | 23.5 | 10.5 | 21.5 | 23.0 | 23.5 |
| 4 | 23.0 | 14.0 | 24.0 | 14.0 | 10.0 |
| 5 | 21.5 | 15.5 | 22.0 | 6.5 | 11.5 |
| 6 | 21.5 | 16.0 | 20.5 | 15.0 | 15.0 |
| 7 | 21.0 | 14.0 | 20.0 | 20.0 | 20.0 |
| 8 | 15.0 | 13.0 | 19.0 | 13.5 | 21.0 |
| 9 | 14.0 | 13.5 | 18.0 | 8.5 | 12.5 |
| 10 | 13.0 | 15.0 | 18.0 | 8.0 | 12.0 |

(cm)
Average snow depth = **16.8**
Maximum snow depth = 24.0
Minimum snow depth = 6.5
Standard variation = 4.8

(inches)
Average snow depth = **6.6**
Maximum snow depth = **9.4**
Minimum snow depth = **2.6**
Standard variation = **1.9**

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| 2L3 | 24 | 315.7 | 856.8 | 0.37 | |
| F2 | 14 | 145.6 | 499.8 | 0.29 | |
| H2 | 16 | 193.9 | 571.2 | 0.34 | |
| 2L4 | 12 | 106.7 | 428.4 | 0.25 | |
| JM | 21 | 202.2 | 749.7 | 0.27 | |

Average Density = **0.304**
Average Snow Water Equivalent (SWE) = **5.1** cm H2O
Average Snow Water Equivalent = **2.01** inches H2O
Average Snow Water Equivalent = **0.17** feet H2O

SWE = avg. snow depth*(density snow/density water)

Data entered by: Jeff Murray Date: 1/13/2011
Data QA/QC by: Kristie Hilton Date: 1/20/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN** | Site Location/Lake ID: | **L9312 - Tundra-JM** |
| Survey Purpose: | **Determine snow depth, SWE** | Date: 1/13/2011 | Time: 9:00 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | On tundra on staked course, adjacent and north of L9312 weather station. SR50 depths 34, 30, 32, 31, and 31 cm | | | | |
| Survey objective: | Determine snow depth and density for application to lake recharge studies, and tundra travel management. | | | Weather Observations | Cold, Dark, Breeze |
| Latitude: | N 70° 19.995' | Longitude: | W 150° 56.918' | Datum: | NAD 83 |
| Elevation: | 7 ft | Elevation Datum: | BPMSL | Reference Markers: | Orange stakes |
| Drainage Basin: | Colville River | Slope Direction: | Flat | Vegetation Type: | Lowland Wet Sedge Tundra |
| Slope Angle: | Flat | Access Notes: | Hagglund | Other: | Hard surface layer, consistent throughout |
| Snow Depth Probe Type: | | T-probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray, Mike Rourick (LCMF) | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 17.0 | 61.0 | 25.0 | 19.0 | 45.0 |
| 2 | 19.0 | 54.0 | 47.0 | 20.0 | 34.0 |
| 3 | 18.0 | 65.0 | 49.0 | 25.0 | 40.5 |
| 4 | 24.0 | 58.0 | 47.0 | 45.0 | 39.0 |
| 5 | 34.5 | 59.0 | 48.0 | 62.0 | 36.0 |
| 6 | 48.0 | 49.0 | 23.0 | 61.0 | 46.0 |
| 7 | 39.5 | 38.0 | 24.0 | 60.0 | 37.0 |
| 8 | 50.5 | 42.0 | 21.0 | 64.0 | 45.0 |
| 9 | 49.0 | 25.0 | 20.0 | 58.0 | 43.0 |
| 10 | 67.5 | 19.0 | 18.0 | 46.0 | 39.0 |

| | (cm) |
|---|---|
| Average snow depth = | **40.5** |
| Maximum snow depth = | 67.5 |
| Minimum snow depth = | 17.0 |
| Standard variation = | 15.1 |

| | (inches) |
|---|---|
| Average snow depth = | **15.9** |
| Maximum snow depth = | **26.6** |
| Minimum snow depth = | **6.7** |
| Standard variation = | **6.0** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| P4 | 42 | 450.6 | 1499.4 | 0.30 | |
| 2L1 | 20 | 145.0 | 714.0 | 0.20 | |
| F1 | 22 | 191.7 | 785.4 | 0.24 | |
| H3 | 64 | 639.4 | 2284.8 | 0.28 | |
| 31P4 | 50 | 491.9 | 1785.0 | 0.28 | |

| | | |
|---|---|---|
| Average Density = | **0.261** | |
| Average Snow Water Equivalent (SWE) = | **10.5** | cm H2O |
| Average Snow Water Equivalent = | **4.15** | inches H2O |
| Average Snow Water Equivalent = | **0.35** | feet H2O |

SWE = avg. snow depth*(density snow/density water)

Data entered by: Jeff Derry Date: 1/18/2011
Data QA/QC by: K. Hilton Date: 1/20/2011

***Arctic Transportation Networks Project***

**Form F-012: Snow Survey Form**

Project ID: **ATN** Site Location/Lake ID: **L9312 - Tundra (LCMF)**

Survey Purpose: **Determine snow depth, SWE** Date: 1/18/2011 Time: 9:30

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | On tundra on staked course, adjacent and north of L9312 weather station. | | | | |
| Survey objective: | Determine snow depth and density for application to lake recharge studies, and tundra travel management. | | | Weather Observations: | Cold, Dark, Breeze |
| Latitude: | N 70° 19.995' | Longitude: | W 150° 56.918' | Datum: | NAD 83 |
| Elevation: | 7 ft | Elevation Datum: | BPMSL | Reference Markers: | Orange stakes |
| Drainage Basin: | Colville River | Slope Direction: | Flat | Vegetation Type: | Lowland Wet Sedge Tundra |
| Slope Angle: | Flat | Access Notes: | Hagglund | Other: | Hard surface slab. Consistent below |
| Snow Depth Probe Type: | | T-probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray, Mike Rourick (LCMF) | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 18.5 | 59.5 | 31.5 | 18.5 | 46.0 |
| 2 | 19.0 | 62.0 | 59.5 | 17.5 | 40.0 |
| 3 | 20.0 | 63.0 | 55.5 | 19.0 | 31.0 |
| 4 | 32.0 | 56.0 | 56.0 | 25.5 | 35.0 |
| 5 | 34.0 | 56.0 | 48.5 | 43.5 | 36.0 |
| 6 | 51.5 | 48.5 | 38.0 | 63.0 | 36.0 |
| 7 | 39.5 | 37.0 | 23.0 | 63.0 | 46.0 |
| 8 | 51.0 | 39.5 | 22.5 | 66.0 | 39.5 |
| 9 | 31.0 | 28.0 | 21.0 | 64.5 | 43.0 |
| 10 | 63.5 | 22.0 | 19.0 | 53.5 | 42.5 |

(cm)

Average snow depth = **40.7**

Maximum snow depth = 66.0

Minimum snow depth = 17.5

Standard variation = 15.3

(inches)

Average snow depth = **16.0**

Maximum snow depth = **26.0**

Minimum snow depth = **6.9**

Standard variation = **6.0**

Data entered by: Jeff Murray Date: 1/18/2011

Data QA/QC by: Kristie Hilton Date: 1/20/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN** | Site Location/Lake ID: | **L9321 - Lake Surface** |
| Survey Purpose: | **Determine snow depth, SWE** | Date: 1/13/2011 | Time: 11:45 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Middle of lake. Used GPS to locate as close to middle as possible. | | | | |
| Survey objective: | Determine snow depth and density for application to lake recharge studies, and tundra travel management. | | | Weather Observations: | Cold, Clear, Windy |
| Latitude: | N 70° 20.544' | Longitude: | W 150° 01.691' | Datum: | NAD 83 |
| Elevation: | -11 ft | Elevation Datum: | BPMSL | Reference Markers: | none |
| Drainage Basin: | Colville Basin | Slope Direction: | Flat | Vegetation Type: | None, Ice surface |
| Slope Angle: | Flat | Access Notes: | Hagglund | Other: | Packed snow |
| Snow Depth Probe Type: | | T- probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray., Mike Rourick (LCMF) | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 14.5 | 11.0 | 18.0 | 14.0 | 10.0 |
| 2 | 15.5 | 11.0 | 17.0 | 13.0 | 12.0 |
| 3 | 20.5 | 11.0 | 20.0 | 15.0 | 17.0 |
| 4 | 15.0 | 12.0 | 25.0 | 16.0 | 12.0 |
| 5 | 15.0 | 11.0 | 28.0 | 19.0 | 9.0 |
| 6 | 17.5 | 10.0 | 27.0 | 16.0 | 8.0 |
| 7 | 18.5 | 7.0 | 20.0 | 19.0 | 5.0 |
| 8 | 19.5 | 8.0 | 17.0 | 12.5 | 7.0 |
| 9 | 17.0 | 13.0 | 14.0 | 10.0 | 7.0 |
| 10 | 16.0 | 20.0 | 11.0 | 9.0 | 7.0 |

(cm)

| | |
|---|---|
| Average snow depth = | **14.4** |
| Maximum snow depth = | 28.0 |
| Minimum snow depth = | 5.0 |
| Standard variation = | 5.2 |

(inches)

| | |
|---|---|
| Average snow depth = | **5.6** |
| Maximum snow depth = | **11.0** |
| Minimum snow depth = | **2.0** |
| Standard variation = | **2.0** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| L92 | 19 | 232.6 | 678.3 | 0.34 | |
| L93 | 12 | 90.6 | 428.4 | 0.21 | |
| H4 | 12 | 121.3 | 428.4 | 0.28 | |
| P7 | 14 | 152.8 | 499.8 | 0.31 | |
| H5 | 8 | 77.6 | 285.6 | 0.27 | |

| | | |
|---|---|---|
| Average Density = | **0.283** | |
| Average Snow Water Equivalent (SWE) = | **4.1** | cm H2O |
| Average Snow Water Equivalent = | **1.60** | inches H2O |
| Average Snow Water Equivalent = | **0.13** | feet H2O |

SWE = avg. snow depth*(density snow/density water)

Data entered by: Jeff Murray Date: 1/13/2011
Data QA/QC by: Kristie Hilton Date: 1/20/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

Project ID: **ATN** Site Location/Lake ID: **L9322 - Lake Surface**
Survey Purpose: **Determine snow depth, SWE** Date: 1/13/2011 Time: 10:45

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Middle of lake. Used GPS to locate as close to middle as possible. | | | | |
| Survey objective: | Determine snow depth and density for application to lake recharge studies, and tundra travel management. | | | Weather Observations: | Cold, Clear, Breeze |
| Latitude: | N 70° 20.257' | Longitude: | W 150° 01.878' | Datum: | NAD 83 |
| Elevation: | -5 ft | Elevation Datum: | BPMSL | Reference Markers: | none |
| Drainage Basin: | Colville Basin | Slope Direction: | Flat | Vegetation Type: | None, Ice surface |
| Slope Angle: | Flat | Access Notes: | Hagglund | Other: | Packed snow |
| Snow Depth Probe Type: | | T- probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray., Mike Rourick (LCMF) | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 16.0 | 10.0 | 14.0 | 14.0 | 9.0 |
| 2 | 15.0 | 14.0 | 10.5 | 15.5 | 6.0 |
| 3 | 11.0 | 12.0 | 12.0 | 23.0 | 8.0 |
| 4 | 15.0 | 16.0 | 17.0 | 24.0 | 8.0 |
| 5 | 21.0 | 13.0 | 16.0 | 27.0 | 8.5 |
| 6 | 17.0 | 12.0 | 12.5 | 27.0 | 11.0 |
| 7 | 7.0 | 10.0 | 13.0 | 16.0 | 12.0 |
| 8 | 6.0 | 11.5 | 14.0 | 21.0 | 18.0 |
| 9 | 7.0 | 15.0 | 13.0 | 19.0 | 15.0 |
| 10 | 8.0 | 14.0 | 12.5 | 15.0 | 14.0 |

(cm)
Average snow depth = **13.9**
Maximum snow depth = 27.0
Minimum snow depth = 6.0
Standard variation = 4.9

(inches)
Average snow depth = **5.5**
Maximum snow depth = **10.6**
Minimum snow depth = **2.4**
Standard variation = **1.9**

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| P3 | 13 | 192.0 | 464.1 | 0.41 | |
| P2 | 8 | 76.1 | 285.6 | 0.27 | |
| 1 | 14 | 131.6 | 499.8 | 0.26 | |
| 2L5 | 8 | 72.9 | 285.6 | 0.26 | |
| P5 | 7 | 69.0 | 249.9 | 0.28 | |

Average Density = **0.295**
Average Snow Water Equivalent (SWE) = **4.1** cm H2O
Average Snow Water Equivalent = **1.62** inches H2O
Average Snow Water Equivalent = **0.13** feet H2O

SWE = avg. snow depth*(density snow/density water)

Data entered by: Jeff Murray Date: 1/18/2011
Data QA/QC by: Kristie Hilton Date: 1/20/2011

***Arctic Transportation Networks Project***
**Form F-012: Snow Survey Form**

| | | | |
|---|---|---|---|
| Project ID: | **ATN** | Site Location/Lake ID: | **L9323 - Lake Surface** |
| Survey Purpose: | **Determine snow depth, SWE** | Date: 1/13/2011 | Time: 12:15 |

| | | | | | |
|---|---|---|---|---|---|
| Location Description: | Middle of lake. Used GPS to locate as close to middle as possible. | | | | |
| Survey objective: | Determine snow depth and density for application to lake recharge studies, and tundra travel management. | | | Weather Observations: | Cold, Clear, Breeze |
| Latitude: | N 70° 17.852' | Longitude: | W 150° 59.919' | Datum: | NAD 83 |
| Elevation: | -3 ft | Elevation Datum: | BPMSL | Reference Markers: | Lathe |
| Drainage Basin: | Colville Basin | Slope Direction: | Flat | Vegetation Type: | None, Ice surface |
| Slope Angle: | Flat | Access Notes: | Hagglund | Other: | Packed snow |
| Snow Depth Probe Type: | | T- probe | | Snow-Survey Team Names: | |
| Snow Tube Type: | Adirondack Snow Tube | | | Jeff Murray., Mike Rourick (LCMF) | |

Snow Course Depths (cm)

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 15.0 | 18.5 | 27.0 | 13.0 | 14.0 |
| 2 | 14.0 | 17.0 | 24.0 | 9.0 | 11.0 |
| 3 | 17.0 | 16.0 | 17.0 | 5.0 | 18.0 |
| 4 | 21.0 | 17.5 | 14.5 | 10.0 | 14.5 |
| 5 | 21.5 | 20.0 | 14.0 | 13.0 | 14.0 |
| 6 | 22.0 | 24.0 | 10.0 | 9.0 | 14.0 |
| 7 | 19.0 | 25.0 | 11.0 | 11.0 | 9.5 |
| 8 | 17.0 | 22.0 | 13.0 | 10.0 | 11.0 |
| 9 | 17.5 | 25.0 | 15.0 | 11.0 | 11.0 |
| 10 | 13.0 | 23.5 | 17.0 | 11.0 | 8.0 |

| | (cm) |
|---|---|
| Average snow depth = | **15.5** |
| Maximum snow depth = | 27.0 |
| Minimum snow depth = | 5.0 |
| Standard variation = | 5.1 |

| | (inches) |
|---|---|
| Average snow depth = | **6.1** |
| Maximum snow depth = | **10.6** |
| Minimum snow depth = | **2.0** |
| Standard variation = | **2.0** |

Snow Sample Depths and Weights

| Bag # | Snow Depth (cm) | Weight (g) | Volume (cm^3) | Density (g/cm^3) | Organic Plug (cm) |
|---|---|---|---|---|---|
| L21 | 22 | 242.2 | 785.4 | 0.31 | |
| L22 | 11 | 104.6 | 392.7 | 0.27 | |
| L23 | 14 | 163.0 | 499.8 | 0.33 | |
| L20 | 10 | 103.9 | 357.0 | 0.29 | |
| L25 | 12 | 138.9 | 428.4 | 0.32 | |

Average Density = **0.303**

Average Snow Water Equivalent (SWE) = **4.7** cm H2O

Average Snow Water Equivalent = **1.85** inches H2O

Average Snow Water Equivalent = **0.15** feet H2O

SWE = avg. snow depth*(density snow/density water)

Data entered by: Jeff Murray Date: 1/18/2011

Data QA/QC by: Kristie Hilton Date: 1/20/2011

# APPENDIX B. ADNR SNOW DATA

The following tables report snow information measured by ADNR staff. ADNR snow measurement methods prior to 11/15/10 recorded snow depths to the nearest 1-inch increment. Snow depths were recorded to the nearest 0.25-inch. Depth measurements were taken with a construction-scale metal ruler at 20 locations spread out over an approximate 300 foot transect. Density measurements were taken with a Federal Sampler at 5 locations.

## Eastern Coastal Management Area

***UAF 411 Mile***

| Date | | | | | | | | | | | | | | | | | | | | | | average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 12/8/10 | depth (in) | 11.50 | 9.25 | 10.50 | 11.50 | 9.75 | 10.50 | 11.50 | 11.25 | 12.75 | 7.75 | 9.25 | 10.00 | 9.00 | 12.25 | 12.00 | 13.75 | 8.50 | 16.25 | 8.50 | 11.75 | | 10.88 | 27.62 |
| | density (g/cm^3) | 0.26 | 0.30 | 0.37 | 0.26 | 0.30 | | | | | | | | | | | | | | | | 0.30 | | |
| | SWE (in) | 3.44 | 5.05 | 7.01 | 1.71 | 3.69 | | | | | | | | | | | | | | | | | 4.18 | 10.62 |
| 12/15/10 | depth (in) | 14.00 | 11.50 | 10.00 | 17.50 | 16.70 | 13.50 | 9.00 | 12.00 | 9.50 | 12.50 | 7.00 | 11.75 | 11.00 | 15.50 | 12.50 | 16.00 | 12.75 | 14.00 | 13.75 | 9.00 | | 12.47 | 31.68 |
| | density (g/cm^3) | 0.26 | 0.30 | 0.34 | 0.29 | 0.24 | | | | | | | | | | | | | | | | 0.29 | | |
| | SWE (in) | 3.28 | 3.71 | 8.15 | 4.43 | 3.51 | | | | | | | | | | | | | | | | | 4.62 | 11.73 |
| 12/20/10 | depth (in) | 9.50 | 12.50 | 13.50 | 11.75 | 10.75 | 9.75 | 9.00 | 14.50 | 9.00 | 10.00 | 14.50 | 16.50 | 15.00 | 10.00 | 10.50 | 7.00 | 11.75 | 16.00 | 9.75 | 9.50 | | 11.54 | 29.31 |
| | density (g/cm^3) | 0.37 | 0.37 | 0.32 | 0.32 | 0.35 | | | | | | | | | | | | | | | | 0.35 | | |
| | SWE (in) | 5.20 | 4.60 | 4.38 | 4.45 | 5.25 | | | | | | | | | | | | | | | | | 4.78 | 12.13 |
| 12/27/10 | depth (in) | 11.00 | 12.50 | 13.50 | 16.00 | 18.00 | 17.75 | 11.50 | 10.25 | 12.50 | 11.25 | 15.00 | 11.25 | 11.75 | 13.75 | 17.00 | 11.25 | 18.00 | 14.75 | 16.00 | 12.50 | | 13.78 | 34.99 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 1/6/11 | depth (in) | 12.00 | 14.00 | 9.75 | 16.00 | 10.25 | 27.50 | 8.00 | 10.50 | 8.50 | 8.75 | 10.00 | 10.00 | 13.00 | 16.50 | 11.75 | 9.00 | 8.25 | 11.75 | 8.00 | 15.75 | | 11.96 | 30.38 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Eastern Coastal Management Area

***P Pad (N 70.282, W 148.912)***

| Date | | | | | | | | | | | | | | | | | | | | | | average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/1/10 | depth (in) | 7.00 | 7.00 | 7.00 | 15.00 | 6.00 | 6.00 | 6.00 | 5.00 | 5.00 | 11.00 | 6.00 | 7.00 | 6.00 | 10.00 | 9.00 | 9.00 | 9.00 | 7.00 | 10.00 | 7.00 | | 7.75 | 19.69 |
| | density (g/cm^3) | 0.11 | 0.14 | 0.17 | 0.13 | 0.20 | | | | | | | | | | | | | | | | 0.15 | | |
| | SWE (in) | 0.96 | 0.78 | 1.09 | 0.94 | 1.60 | | | | | | | | | | | | | | | | | 1.07 | 2.73 |
| 12/8/10 | depth (in) | 7.50 | 9.50 | 5.50 | 5.50 | 5.25 | 5.50 | 5.00 | 10.25 | 5.75 | 6.50 | 7.00 | 9.00 | 10.50 | 9.75 | 7.25 | 7.50 | 10.00 | 14.50 | 9.25 | 8.75 | | 7.99 | 20.29 |
| | density (g/cm^3) | 0.24 | 0.23 | 0.25 | 0.29 | 0.32 | | | | | | | | | | | | | | | | 0.27 | | |
| | SWE (in) | 1.37 | 1.82 | 1.57 | 1.99 | 2.88 | | | | | | | | | | | | | | | | | 1.92 | 4.89 |
| 12/15/10 | depth (in) | 10.00 | 9.00 | 17.50 | 6.50 | 10.50 | 5.50 | 4.00 | 14.00 | 7.00 | 11.25 | 5.75 | 18.00 | 6.00 | 15.50 | 6.75 | 7.50 | 7.00 | 14.00 | 18.00 | 12.50 | | 10.31 | 26.19 |
| | density (g/cm^3) | 0.26 | 0.27 | 0.22 | 0.26 | 0.32 | | | | | | | | | | | | | | | | 0.27 | | |
| | SWE (in) | 2.48 | 2.05 | 1.73 | 4.18 | 3.02 | | | | | | | | | | | | | | | | | 2.69 | 6.84 |
| 12/20/10 | depth (in) | 18.75 | 14.00 | 9.25 | 9.00 | 9.25 | 14.00 | 11.50 | 6.00 | 8.75 | 6.00 | 7.25 | 10.00 | 10.50 | 10.25 | 7.50 | 5.75 | 12.00 | 6.00 | 16.00 | 8.25 | | 10.00 | 25.40 |
| | density (g/cm^3) | 0.30 | 0.37 | 0.26 | 0.25 | 0.22 | | | | | | | | | | | | | | | | 0.28 | | |
| | SWE (in) | 2.44 | 5.60 | 2.93 | 2.59 | 1.78 | | | | | | | | | | | | | | | | | 3.07 | 7.79 |
| 12/27/10 | depth (in) | 5.75 | 15.25 | 10.75 | 6.25 | 5.50 | 8.50 | 5.75 | 20.00 | 9.25 | 7.50 | 7.50 | 10.00 | 15.75 | 12.75 | 10.75 | 6.75 | 11.50 | 16.75 | 10.50 | 18.00 | | 10.74 | 27.27 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Eastern Coastal Management Area

***T Pad (N 70.345, W 148.801)***

| Date | | | | | | | | | | | | | | | | | | | | | | average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/1/10 | depth (in) | 8.00 | 8.00 | 6.00 | 10.00 | 7.00 | 6.00 | 8.00 | 7.00 | 5.00 | 10.00 | 8.00 | 5.00 | 9.00 | 9.00 | 10.00 | 8.00 | 7.00 | 12.00 | 5.00 | 8.00 | | 7.80 | 19.81 |
| | density (g/cm^3) | 0.12 | 0.13 | 0.10 | 0.11 | 0.12 | | | | | | | | | | | | | | | | 0.12 | | |
| | SWE (in) | 0.91 | 0.79 | 0.68 | 0.74 | 0.75 | | | | | | | | | | | | | | | | | 0.77 | 1.96 |
| 11/29/10 | depth (in) | 6.50 | 15.50 | 9.50 | 11.50 | 11.25 | 9.00 | 12.50 | 14.50 | 12.75 | 9.00 | 12.75 | 11.00 | 9.00 | 11.00 | 13.25 | 12.00 | 13.00 | 6.20 | 9.00 | 10.00 | | 10.96 | 27.84 |
| | density (g/cm^3) | 0.29 | 0.19 | 0.15 | 0.17 | 0.15 | | | | | | | | | | | | | | | | 0.19 | | |
| | SWE (in) | 3.57 | 1.31 | 0.97 | 1.09 | 0.91 | | | | | | | | | | | | | | | | | 1.57 | 3.99 |
| 12/8/10 | depth (in) | 7.50 | 11.00 | 9.75 | 7.50 | 9.25 | 9.00 | 5.50 | 7.25 | 7.75 | 9.00 | 6.50 | 13.00 | 7.75 | 13.75 | 8.25 | 10.75 | 11.75 | 11.00 | 10.75 | 6.50 | | 9.18 | 23.30 |
| | density (g/cm^3) | 0.26 | 0.39 | 0.35 | 0.32 | 0.35 | | | | | | | | | | | | | | | | 0.33 | | |
| | SWE (in) | 2.33 | 6.86 | 3.96 | 2.91 | 3.52 | | | | | | | | | | | | | | | | | 3.92 | 9.95 |
| 12/15/10 | depth (in) | 19.00 | 8.75 | 11.50 | 5.50 | 6.50 | 13.00 | 11.00 | 6.25 | 7.50 | 9.75 | 8.00 | 6.00 | 7.75 | 11.25 | 12.50 | 6.75 | 10.75 | 12.75 | 9.50 | 9.25 | | 9.66 | 24.54 |
| | density (g/cm^3) | 0.34 | 0.19 | 0.26 | 0.18 | 0.30 | | | | | | | | | | | | | | | | 0.25 | | |
| | SWE (in) | 2.53 | 1.02 | 2.09 | 0.82 | 3.06 | | | | | | | | | | | | | | | | | 1.91 | 4.84 |
| 12/20/10 | depth (in) | 8.00 | 18.00 | 13.00 | 7.00 | 8.75 | 8.00 | 10.50 | 19.00 | 12.00 | 9.50 | 6.50 | 8.50 | 6.00 | 7.00 | 11.00 | 11.00 | 14.00 | 12.25 | 10.75 | 12.00 | | 10.64 | 27.02 |
| | density (g/cm^3) | 0.21 | 0.41 | 0.33 | 0.35 | 0.26 | | | | | | | | | | | | | | | | 0.31 | | |
| | SWE (in) | 1.17 | 5.27 | 4.06 | 2.70 | 2.00 | | | | | | | | | | | | | | | | | 3.04 | 7.73 |
| 12/27/10 | depth (in) | 8.00 | 8.75 | 9.00 | 8.00 | 6.00 | 15.50 | 15.75 | 10.75 | 10.50 | 7.00 | 6.25 | 6.25 | 14.75 | 11.25 | 7.75 | 11.00 | 14.50 | 10.75 | 11.00 | 8.50 | | 10.06 | 25.56 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Eastern Coastal Management Area

***Term Well A (N 70.363, W 148.569)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/10 | depth (in) | 4.00 | 4.00 | 5.00 | 5.00 | 3.00 | 6.00 | 7.00 | 6.00 | 5.00 | 4.00 | 6.00 | 4.00 | 6.00 | 6.00 | 6.00 | 5.00 | 6.00 | 4.00 | 4.00 | 5.00 | | 5.05 | 12.83 |
| | density (g/cm^3) | 0.21 | 0.19 | 0.12 | 0.22 | 0.10 | | | | | | | | | | | | | | | | 0.20 | | |
| | SWE (in) | 1.98 | 1.33 | 0.93 | 2.02 | 0.61 | | | | | | | | | | | | | | | | | 1.37 | 3.48 |
| 11/15/10 | depth (in) | 7.00 | 13.00 | 8.25 | 5.50 | 4.25 | 6.25 | 11.00 | 5.50 | 5.00 | 6.00 | 5.50 | 5.25 | 11.00 | 6.50 | 6.50 | 6.75 | 5.50 | 5.50 | 5.50 | 11.00 | | 7.04 | 17.88 |
| | density (g/cm^3) | 0.40 | 0.21 | 0.30 | 0.18 | 0.27 | | | | | | | | | | | | | | | | 0.30 | | |
| | SWE (in) | 2.38 | 1.24 | 1.94 | 0.87 | 2.58 | | | | | | | | | | | | | | | | | 1.80 | 4.58 |
| 11/29/10 | depth (in) | 13.00 | 8.00 | 11.00 | 13.50 | 13.00 | 5.75 | 9.75 | 10.50 | 13.25 | 6.75 | 5.50 | 9.50 | 14.75 | 10.00 | 6.00 | 10.00 | 9.00 | 11.00 | 11.50 | 7.25 | | 9.95 | 25.27 |
| | density (g/cm^3) | 0.22 | 0.16 | 0.29 | 0.30 | 0.22 | | | | | | | | | | | | | | | | 0.24 | | |
| | SWE (in) | 2.09 | 0.95 | 3.92 | 4.35 | 2.06 | | | | | | | | | | | | | | | | | 2.67 | 6.79 |

## Eastern Coastal Management Area

***DS 16 (N 70.222, W 148.256)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/10 | depth (in) | 9.00 | 9.00 | 9.00 | 9.00 | 10.00 | 9.00 | 9.00 | 9.00 | 8.00 | 9.00 | 8.00 | 9.00 | 10.00 | 10.00 | 9.00 | 12.00 | 11.00 | 12.00 | 11.00 | 11.00 | | 9.65 | 24.51 |
| | density (g/cm^3) | 0.17 | 0.15 | 0.18 | 0.15 | 0.14 | | | | | | | | | | | | | | | | 0.16 | | |
| | SWE (in) | 1.77 | 1.75 | 1.66 | 1.63 | 1.34 | | | | | | | | | | | | | | | | | 1.63 | 4.14 |
| 11/15/10 | depth (in) | 8.00 | 8.00 | 7.00 | 6.00 | 7.25 | 12.00 | 9.00 | 8.00 | 10.75 | 9.50 | 10.75 | 10.00 | 7.75 | 10.00 | 6.50 | 8.50 | 10.50 | 11.50 | 11.25 | 13.50 | | 9.29 | 23.59 |
| | density (g/cm^3) | 0.25 | 0.25 | 0.26 | 0.23 | 0.22 | | | | | | | | | | | | | | | | 0.24 | | |
| | SWE (in) | 1.48 | 2.28 | 1.91 | 1.40 | 1.29 | | | | | | | | | | | | | | | | | 1.67 | 4.25 |
| 11/29/10 | depth (in) | 15.00 | 13.00 | 14.75 | 15.50 | 16.00 | 13.75 | 12.75 | 11.00 | 15.75 | 13.00 | 13.50 | 13.25 | 14.00 | 17.00 | 11.00 | 13.00 | 16.50 | 21.00 | 9.75 | 10.50 | | 14.00 | 35.56 |
| | density (g/cm^3) | 0.26 | 0.28 | 0.28 | 0.25 | 0.23 | | | | | | | | | | | | | | | | 0.26 | | |
| | SWE (in) | 3.10 | 3.93 | 3.05 | 3.22 | 2.55 | | | | | | | | | | | | | | | | | 3.17 | 8.05 |
| 12/8/10 | depth (in) | 8.25 | 12.75 | 7.50 | 9.75 | 9.25 | 16.00 | 9.75 | 8.50 | 8.50 | 9.50 | 14.00 | 14.50 | 14.25 | 12.25 | 18.00 | 12.50 | 13.25 | 10.00 | 12.00 | 16.25 | | 11.84 | 30.07 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/15/10 | depth (in) | 8.75 | 16.50 | 15.00 | 13.50 | 10.00 | 18.00 | 15.00 | 11.00 | 8.75 | 9.75 | 16.50 | 13.75 | 13.75 | 13.75 | 20.25 | 12.75 | 11.75 | 10.50 | 13.00 | 16.00 | | 13.41 | 34.07 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/20/10 | depth (in) | 16.50 | 13.00 | 11.50 | 9.00 | 12.50 | 10.50 | 19.50 | 14.50 | 13.75 | 14.00 | 11.50 | 10.75 | 8.75 | 8.00 | 21.50 | 9.75 | 10.00 | 9.00 | 15.00 | 9.00 | | 12.40 | 31.50 |
| | density (g/cm^3) | 0.29 | 0.34 | 0.34 | 0.35 | 0.39 | | | | | | | | | | | | | | | | 0.34 | | |
| | SWE (in) | 2.62 | 2.56 | 5.44 | 4.03 | 8.55 | | | | | | | | | | | | | | | | | 4.64 | 11.79 |
| 12/27/10 | depth (in) | 10.00 | 10.00 | 17.50 | 10.75 | 12.00 | 9.75 | 19.75 | 8.50 | 9.25 | 10.75 | 13.25 | 14.00 | 14.00 | 14.50 | 13.50 | 12.00 | 11.50 | 10.50 | 14.00 | 17.75 | | 12.66 | 32.16 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Eastern Coastal Management Area

***ANFO Pad (N 70.241, W 148.180)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/1/10 | depth (in) | 10.00 | 8.00 | 9.00 | 10.00 | 9.00 | 7.00 | 8.00 | 9.00 | 8.00 | 9.00 | 9.00 | 8.00 | 7.00 | 8.00 | 9.00 | 7.00 | 9.00 | 7.00 | 8.00 | 8.00 | | 8.35 | 21.21 |
| | density (g/cm^3) | 0.18 | 0.12 | 0.20 | 0.16 | 0.19 | | | | | | | | | | | | | | | | | | |
| | SWE (in) | 1.17 | 1.08 | 1.86 | 1.50 | 1.74 | | | | | | | | | | | | | | | | | | |
| 11/15/10 | depth (in) | 7.00 | 5.50 | 5.50 | 8.00 | 8.00 | 5.00 | 7.00 | 9.00 | 9.00 | 11.25 | 10.00 | 6.75 | 9.75 | 9.50 | 5.25 | 9.00 | 7.00 | 5.00 | 4.25 | 10.25 | | 7.60 | 19.30 |
| | density (g/cm^3) | 0.27 | 0.73 | 0.12 | 0.20 | 0.21 | | | | | | | | | | | | | | | | 0.50 | | |
| | SWE (in) | 1.61 | 4.35 | 0.54 | 1.17 | 1.65 | | | | | | | | | | | | | | | | | 1.87 | 4.74 |
| 11/29/10 | depth (in) | 8.50 | 12.50 | 11.75 | 12.75 | 12.50 | 12.25 | 16.50 | 14.00 | 10.00 | 13.00 | 11.75 | 9.50 | 11.50 | 11.50 | 10.00 | 9.00 | 9.00 | 15.25 | 9.00 | 9.75 | | 11.50 | 29.21 |
| | density (g/cm^3) | 0.26 | 0.23 | 0.25 | 0.23 | 0.27 | | | | | | | | | | | | | | | | 0.25 | | |
| | SWE (in) | 2.69 | 2.36 | 3.03 | 1.79 | 2.89 | | | | | | | | | | | | | | | | | 2.55 | 6.48 |
| 12/8/10 | depth (in) | 6.00 | 6.25 | 8.00 | 8.50 | 8.00 | 9.00 | 7.75 | 13.75 | 9.25 | 12.00 | 11.00 | 8.00 | 10.00 | 6.00 | 7.00 | 7.00 | 8.75 | 6.50 | 6.75 | 10.50 | | 8.50 | 21.59 |
| | density (g/cm^3) | 0.27 | 0.35 | 0.28 | 0.31 | 0.29 | | | | | | | | | | | | | | | | 0.30 | | |
| | SWE (in) | 2.15 | 2.99 | 1.78 | 3.52 | 4.11 | | | | | | | | | | | | | | | | | 2.91 | 7.39 |
| 12/15/10 | depth (in) | 8.00 | 7.00 | 9.50 | 7.50 | 10.25 | 8.50 | 10.00 | 12.25 | 14.50 | 12.75 | 12.25 | 9.50 | 9.50 | 10.75 | 8.00 | 7.50 | 10.50 | 8.00 | 7.00 | 7.00 | | 9.51 | 24.16 |
| | density (g/cm^3) | 0.31 | 0.29 | 0.34 | 0.30 | 0.34 | | | | | | | | | | | | | | | | 0.31 | | |
| | SWE (in) | 3.28 | 2.49 | 3.54 | 2.51 | 3.58 | | | | | | | | | | | | | | | | | 3.08 | 7.82 |
| 12/27/10 | depth (in) | 10.00 | 7.25 | 9.75 | 10.50 | 13.00 | 9.00 | 8.00 | 11.00 | 8.00 | 10.50 | 10.50 | 9.00 | 10.50 | 6.75 | 8.00 | 10.00 | 6.75 | 6.00 | 7.25 | 12.25 | | 9.20 | 23.37 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Western Coastal Management Area

***DS-2L-ASTAC (N 70.235, W 150.452)***

| Date | | | | | | | | | | | | | | | | | | | | | | | average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/3/10 | depth (in) | 6.00 | 5.00 | 7.00 | 6.00 | 10.00 | 5.00 | 5.00 | 7.00 | 7.00 | 6.00 | 9.00 | 8.00 | 6.00 | 7.00 | 7.00 | 5.00 | 9.00 | 6.00 | 5.00 | 9.00 | | | 6.75 | 17.15 |
| | density (g/cm^3) | 0.08 | 0.22 | 0.14 | 0.17 | | | | | | | | | | | | | | | | | 0.15 | | | |
| | SWE (in) | 0.37 | 1.52 | 0.72 | 1.21 | | | | | | | | | | | | | | | | | | | 0.96 | 2.43 |
| 11/17/10 | depth (in) | 9.50 | 10.75 | 15.50 | 13.20 | 8.00 | 10.00 | 7.00 | 8.00 | 5.75 | 5.25 | 7.75 | 9.25 | 12.25 | 8.25 | 13.00 | 6.50 | 6.75 | 5.75 | 7.00 | 6.25 | | | 8.79 | 22.31 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 11/30/10 | depth (in) | 10.00 | 17.75 | 11.00 | 10.50 | 13.00 | 13.00 | 12.00 | 9.00 | 12.50 | 12.75 | 7.00 | 10.00 | 18.00 | 12.00 | 10.50 | 13.50 | 18.00 | 12.50 | 15.50 | 9.70 | | | 12.41 | 31.52 |
| | density (g/cm^3) | 0.19 | 0.33 | 0.33 | 0.30 | 0.33 | | | | | | | | | | | | | | | | 0.29 | | | |
| | SWE (in) | 1.98 | 6.19 | 5.74 | 4.95 | 4.61 | | | | | | | | | | | | | | | | | | 4.69 | 11.92 |
| 12/8/10 | depth (in) | 6.50 | 5.00 | 5.00 | 11.00 | 9.00 | 8.75 | 9.00 | 11.00 | 11.75 | 11.75 | 19.00 | 11.75 | 12.50 | 14.00 | 11.00 | 14.00 | 9.50 | 5.50 | 9.75 | 8.00 | | | 10.19 | 25.88 |
| | density (g/cm^3) | 0.27 | 0.30 | 0.34 | 0.34 | 0.32 | | | | | | | | | | | | | | | | 0.31 | | | |
| | SWE (in) | 2.67 | 2.65 | 4.47 | 4.23 | 3.66 | | | | | | | | | | | | | | | | | | 3.54 | 8.98 |
| 12/27/10 | depth (in) | 14.00 | 15.00 | 15.50 | 14.50 | 12.75 | 16.25 | 12.00 | 9.25 | 8.25 | 11.25 | 15.00 | 11.00 | 15.25 | 11.50 | 13.75 | 15.50 | 12.25 | 12.00 | 11.50 | 11.75 | | | 12.91 | 32.80 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Western Coastal Management Area

***Palm 2 (N 70.384, W 150.138)***

| Date | | | | | | | | | | | | | | | | | | | | | | | average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/3/10 | depth (in) | 5.00 | 7.00 | 7.00 | 7.00 | 7.00 | 8.00 | 5.00 | 8.00 | 10.00 | 7.00 | 5.00 | 6.00 | 8.00 | 8.00 | 7.00 | 9.00 | 4.00 | 7.00 | 5.00 | 7.00 | | | 6.85 | 17.40 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 11/30/10 | depth (in) | 10.00 | 14.75 | 11.00 | 14.00 | 13.50 | 12.50 | 10.50 | 18.00 | 12.50 | 13.00 | 12.25 | 19.00 | 16.00 | 17.50 | 11.25 | 15.50 | 17.50 | 12.00 | 10.00 | 11.50 | | | 13.61 | 34.58 |
| | density (g/cm^3) | 0.30 | 0.19 | 0.14 | 0.21 | 0.19 | | | | | | | | | | | | | | | | 0.21 | | | |
| | SWE (in) | 3.47 | 1.63 | 1.17 | 2.17 | 1.87 | | | | | | | | | | | | | | | | | | 2.06 | 5.23 |
| 12/8/10 | depth (in) | 8.50 | 10.00 | 12.00 | 22.00 | 12.00 | 12.00 | 11.75 | 12.75 | 8.75 | 5.50 | 9.50 | 10.00 | 6.25 | 9.00 | 12.00 | 16.00 | 12.00 | 12.50 | 7.75 | 10.00 | | | 11.01 | 27.97 |
| | density (g/cm^3) | 0.26 | 0.29 | 0.32 | 0.29 | 0.34 | | | | | | | | | | | | | | | | 0.30 | | | |
| | SWE (in) | 3.29 | 3.13 | 2.87 | 3.00 | 4.22 | | | | | | | | | | | | | | | | | | 3.30 | 8.39 |
| 12/12/10 | depth (in) | 11.50 | 12.25 | 16.25 | 19.25 | 16.00 | 11.50 | 11.50 | 13.50 | 12.00 | 9.50 | 11.00 | 7.75 | 11.50 | 8.00 | 12.00 | 13.50 | 15.50 | 11.25 | 10.00 | 9.00 | | | 12.14 | 30.83 |
| | density (g/cm^3) | 0.24 | 0.24 | 0.35 | 0.31 | 0.24 | | | | | | | | | | | | | | | | 0.27 | | | |
| | SWE (in) | 2.43 | 2.18 | 4.31 | 2.45 | 1.78 | | | | | | | | | | | | | | | | | | 2.63 | 6.68 |
| 12/27/10 | depth (in) | 10.25 | 9.00 | 13.00 | 12.25 | 19.50 | 20.50 | 14.75 | 13.50 | 11.00 | 13.25 | 6.50 | 10.00 | 14.00 | 13.50 | 14.75 | 13.25 | 19.75 | 19.00 | 14.00 | 16.75 | | | 13.93 | 35.37 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 1/5/11 | depth (in) | 9.00 | 12.00 | 10.25 | 9.75 | 14.75 | 20.50 | 16.75 | 11.00 | 7.50 | 10.00 | 9.25 | 11.75 | 14.00 | 12.75 | 12.75 | 8.75 | 20.25 | 13.00 | 12.00 | 8.00 | | | 12.20 | 30.99 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Western Coastal Management Area

***Ugnu (N 70.458, W 149.809)***

| Date | | | | | | | | | | | | | | | | | | | | | | | average | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/3/10 | depth (in) | 6.00 | 7.00 | 7.00 | 11.00 | 5.00 | 5.00 | 6.00 | 8.00 | 6.00 | 6.00 | 5.00 | 6.00 | 7.00 | 5.00 | 5.00 | 5.00 | 6.00 | 6.00 | 6.00 | 5.00 | | | 6.15 | 15.62 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 11/17/10 | depth (in) | 6.00 | 10.00 | 7.75 | 5.00 | 4.00 | 6.50 | 13.00 | 9.75 | 7.25 | 9.25 | 11.00 | 13.00 | 13.50 | 8.00 | 13.75 | 12.75 | 7.00 | 9.00 | 7.75 | 6.50 | | | 9.04 | 22.96 |
| | density (g/cm^3) | 0.32 | 0.32 | 0.33 | 0.31 | 0.27 | | | | | | | | | | | | | | | | 0.31 | | | |
| | SWE (in) | 2.32 | 3.03 | 2.40 | 1.78 | 2.07 | | | | | | | | | | | | | | | | | | 2.32 | 5.89 |
| 11/30/10 | depth (in) | 10.00 | 12.00 | 9.50 | 9.00 | 8.00 | 13.00 | 8.25 | 9.00 | 10.00 | 16.20 | 10.00 | 9.00 | 10.25 | 13.50 | 7.50 | 11.00 | 9.75 | 11.50 | 7.00 | 10.75 | | | 10.26 | 26.06 |
| | density (g/cm^3) | 0.19 | 0.29 | 0.18 | 0.25 | 0.24 | | | | | | | | | | | | | | | | 0.23 | | | |
| | SWE (in) | 1.38 | 4.14 | 1.30 | 1.79 | 1.48 | | | | | | | | | | | | | | | | | | 2.02 | 5.13 |
| 12/8/10 | depth (in) | 13.00 | 6.50 | 6.50 | 11.75 | 7.75 | 7.25 | 6.00 | 6.50 | 7.75 | 6.00 | 6.50 | 9.25 | 10.00 | 3.75 | 12.25 | 9.50 | 12.00 | 15.50 | 12.50 | 6.70 | | | 8.85 | 22.47 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/12/10 | depth (in) | 7.50 | 9.00 | 8.25 | 9.00 | 10.00 | 6.00 | 5.50 | 5.50 | 9.00 | 6.00 | 6.75 | 11.50 | 16.00 | 13.00 | 19.00 | 8.25 | 6.25 | 9.25 | 9.00 | 5.50 | | | 9.01 | 22.89 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/27/10 | depth (in) | 9.00 | 12.50 | 9.75 | 16.75 | 9.00 | 9.25 | 6.00 | 8.75 | 11.75 | 9.25 | 10.00 | 8.75 | 14.75 | 9.50 | 15.00 | 16.00 | 15.25 | 12.75 | 7.00 | 10.00 | | | 11.05 | 28.07 |
| | density (g/cm^3) | 0.36 | 0.34 | 0.37 | 0.44 | 0.41 | | | | | | | | | | | | | | | | 0.38 | | | |
| | SWE (in) | 4.81 | 4.23 | 4.66 | 7.55 | 6.14 | | | | | | | | | | | | | | | | | | 5.48 | 13.91 |

| Western Coastal Management Area | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***DS-1J*** | | | | | | | | | | | | | | | | | | | | | | | | average | |
| Date | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/30/2010 | depth (in) | 6.75 | 11.00 | 7.50 | 12.00 | 12.00 | 9.00 | 13.00 | 9.70 | 10.50 | 4.50 | 6.00 | 16.00 | 16.50 | 7.00 | 7.50 | 4.00 | 13.50 | 12.50 | 17.00 | 6.00 | | 10.10 | 25.65 |
| | density (g/cm^3) | 0.29 | 0.27 | 0.21 | 0.22 | 0.31 | | | | | | | | | | | | | | | | 0.26 | | |
| | SWE (in) | 3.42 | 2.31 | 2.62 | 1.51 | 4.06 | | | | | | | | | | | | | | | | | 2.79 | 7.07 |
| 12/8/2010 | depth (in) | 8.25 | 9.00 | 9.50 | 7.00 | 11.25 | 10.00 | 12.00 | 8.75 | 12.25 | 9.00 | 6.00 | 12.00 | 15.00 | 13.50 | 18.00 | 8.75 | 12.50 | 22.00 | 18.50 | 7.50 | | 11.54 | 29.31 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/12/2010 | depth (in) | 8.50 | 10.75 | 7.00 | 13.50 | 11.25 | 8.50 | 4.75 | 6.00 | 9.25 | 6.75 | 9.00 | 23.50 | 22.00 | 11.00 | 7.75 | 20.00 | 13.75 | 14.25 | 20.50 | 18.50 | | 12.33 | 31.31 |
| | density (g/cm^3) | 0.24 | 0.22 | 0.25 | 0.29 | 0.26 | | | | | | | | | | | | | | | | 0.25 | | |
| | SWE (in) | 1.07 | 1.08 | 1.90 | 1.29 | 2.67 | | | | | | | | | | | | | | | | | 1.60 | 4.07 |
| 12/21/2010 | depth (in) | 10.00 | 12.50 | 9.50 | 13.75 | 12.50 | 9.50 | 14.50 | 12.25 | 6.50 | 8.50 | 5.75 | 9.25 | 11.00 | 22.50 | 21.50 | 17.50 | 13.00 | 9.25 | 25.75 | 20.00 | | 13.25 | 33.66 |
| | density (g/cm^3) | 0.31 | 0.29 | 0.22 | 0.34 | 0.22 | | | | | | | | | | | | | | | | 0.28 | | |
| | SWE (in) | 1.87 | 4.69 | 1.17 | 5.07 | 1.77 | | | | | | | | | | | | | | | | | 2.91 | 7.40 |
| 12/27/2010 | depth (in) | 10.75 | 13.00 | 10.25 | 16.75 | 17.00 | 13.75 | 7.25 | 6.25 | 5.75 | 17.25 | 17.00 | 17.00 | 19.25 | 8.25 | 8.00 | 18.25 | 22.75 | 24.50 | 9.75 | 10.50 | | 13.66 | 34.70 |
| | density (g/cm^3) | 0.27 | 0.32 | 0.35 | 0.33 | 0.30 | | | | | | | | | | | | | | | | 0.31 | | |
| | SWE (in) | 1.40 | 4.84 | 4.19 | 3.42 | 3.65 | | | | | | | | | | | | | | | | | 3.50 | 8.89 |
| 1/5/2011 | depth (in) | 20.25 | 29.50 | 22.50 | 27.00 | 9.50 | 10.25 | 21.25 | 22.00 | 9.00 | 7.75 | 12.00 | 11.00 | 18.25 | 6.50 | 5.25 | 9.75 | 11.75 | 15.00 | 6.75 | 7.75 | | 14.15 | 35.94 |
| | density (g/cm^3) | 0.36 | 0.30 | 0.38 | 0.33 | 0.41 | | | | | | | | | | | | | | | | 0.36 | | |
| | SWE (in) | 2.72 | 3.29 | 4.90 | 4.42 | 7.08 | | | | | | | | | | | | | | | | | 4.48 | 11.38 |

| Western Coastal Management Area | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***S Pad (N 70.342, W 149.048)*** | | | | | | | | | | | | | | | | | | | | | | | | average | |
| Date | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 11/3/2010 | depth (in) | 10.00 | 8.00 | 6.00 | 8.00 | 5.00 | 4.00 | 5.00 | 3.00 | 5.00 | 4.00 | 3.00 | 5.00 | 4.00 | 5.00 | 12.00 | 6.00 | 5.00 | 7.00 | 5.00 | 6.00 | | 5.80 | 14.73 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 11/16/2010 | depth (in) | 5.75 | 7.00 | 5.50 | 5.50 | 4.50 | 6.00 | 5.00 | 6.00 | 5.00 | 5.00 | 5.00 | 6.00 | 5.00 | 5.75 | 4.75 | 11.25 | 6.75 | 7.00 | 12.00 | 11.00 | | 6.49 | 16.48 |
| | density (g/cm^3) | 0.18 | 0.19 | 0.29 | 0.25 | 0.30 | | | | | | | | | | | | | | | | 0.24 | | |
| | SWE (in) | 1.08 | 1.07 | 2.30 | 1.77 | 1.88 | | | | | | | | | | | | | | | | | 1.62 | 4.11 |
| 11/30/2010 | depth (in) | 6.50 | 7.50 | 10.25 | 16.00 | 8.00 | 11.50 | 8.50 | 18.50 | 9.50 | 7.75 | 6.00 | 15.00 | 10.00 | 5.50 | 7.75 | 14.50 | 6.50 | 4.50 | 8.25 | 6.00 | | 9.40 | 23.88 |
| | density (g/cm^3) | 0.25 | 0.23 | 0.26 | 0.30 | 0.29 | | | | | | | | | | | | | | | | 0.27 | | |
| | SWE (in) | 3.81 | 3.34 | 3.78 | 3.99 | 3.97 | | | | | | | | | | | | | | | | | 3.78 | 9.60 |
| 12/8/2010 | depth (in) | 7.75 | 6.50 | 8.00 | 7.75 | 7.25 | 7.00 | 6.25 | 10.50 | 8.50 | 7.75 | 5.25 | 8.25 | 7.50 | 5.00 | 15.00 | 17.00 | 6.00 | 6.00 | 8.75 | 6.75 | | 8.14 | 20.67 |
| | density (g/cm^3) | 0.20 | 0.38 | 0.32 | 0.32 | 0.32 | | | | | | | | | | | | | | | | 0.31 | | |
| | SWE (in) | 4.06 | 4.80 | 4.80 | 4.28 | 3.26 | | | | | | | | | | | | | | | | | 4.24 | 10.77 |
| 12/12/2010 | depth (in) | 5.75 | 6.75 | 8.00 | 9.00 | 9.25 | 4.75 | 4.50 | 9.25 | 6.50 | 8.25 | 5.50 | 8.00 | 8.00 | 5.75 | 18.00 | 16.00 | 7.50 | 5.00 | 9.50 | 9.50 | | 8.24 | 20.92 |
| | density (g/cm^3) | 0.25 | 0.25 | 0.31 | 0.25 | 0.28 | | | | | | | | | | | | | | | | 0.27 | | |
| | SWE (in) | 2.35 | 2.90 | 5.32 | 1.78 | 2.58 | | | | | | | | | | | | | | | | | 2.99 | 7.58 |
| 12/20/2010 | depth (in) | 8.50 | 8.00 | 8.25 | 5.00 | 15.00 | 10.75 | 16.50 | 4.00 | 6.50 | 7.00 | 4.75 | 5.25 | 5.25 | 15.00 | 9.75 | 11.00 | 14.50 | 9.50 | 7.00 | 6.00 | | 8.88 | 22.54 |
| | density (g/cm^3) | 0.20 | 0.38 | 0.30 | 0.31 | 0.39 | | | | | | | | | | | | | | | | 0.31 | | |
| | SWE (in) | 1.02 | 2.82 | 5.19 | 2.59 | 6.18 | | | | | | | | | | | | | | | | | 3.56 | 9.05 |
| 12/27/2010 | depth (in) | 10.00 | 7.50 | 8.00 | 7.50 | 10.75 | 7.25 | 8.50 | 12.00 | 5.75 | 10.75 | 7.00 | 9.00 | 8.00 | 6.75 | 23.00 | 18.25 | 16.50 | 7.75 | 8.25 | 9.00 | | 10.08 | 25.59 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Upper Foothills Management Area

***Slope Mountain (N 68.718, W 149.015)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/2/10 | depth (in) | 6.00 | 9.00 | 10.00 | 5.00 | 10.00 | 6.00 | 7.00 | 7.00 | 7.00 | 11.00 | 7.00 | 7.00 | 9.00 | 10.00 | 6.00 | 7.00 | 7.00 | 8.00 | 8.00 | 6.00 | | 7.65 | 19.43 |
| | density (g/cm^3) | 0.14 | 0.16 | 0.18 | 0.17 | 0.15 | | | | | | | | | | | | | | | | 0.16 | | |
| | SWE (in) | 0.74 | 1.23 | 1.00 | 1.18 | 0.98 | | | | | | | | | | | | | | | | | 1.03 | 2.61 |
| 11/18/10 | depth (in) | 15.00 | 8.75 | 16.75 | 13.00 | 13.00 | 12.00 | 14.50 | 10.00 | 8.50 | 17.75 | 10.00 | 11.50 | 19.00 | 9.50 | 14.00 | 6.50 | 10.50 | 9.00 | 8.50 | 12.50 | | 12.01 | 30.51 |
| | density (g/cm^3) | 0.21 | 0.18 | 0.26 | 0.25 | 0.13 | | | | | | | | | | | | | | | | 0.20 | | |
| | SWE (in) | 2.66 | 1.69 | 2.88 | 2.11 | 0.62 | | | | | | | | | | | | | | | | | 1.99 | 5.06 |
| 12/2/10 | depth (in) | 13.00 | 12.25 | 12.75 | 14.00 | 13.00 | 11.25 | 14.00 | 13.75 | 16.75 | 18.00 | 14.00 | 13.75 | 15.75 | 15.75 | 16.50 | 19.00 | 14.50 | 12.00 | 13.00 | 13.50 | | 14.33 | 36.39 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/28/10 | depth (in) | 10.25 | 12.25 | 11.25 | 11.00 | 14.75 | 9.75 | 15.25 | 11.50 | 19.50 | 17.75 | 14.75 | 9.25 | 13.75 | 13.25 | 11.50 | 14.50 | 13.50 | 15.25 | 16.00 | 12.00 | | 13.35 | 33.91 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Upper Foothills Management Area

***Sag River DOT (N 68.761, W 148.879)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/2/10 | depth (in) | 9.00 | 8.00 | 9.00 | 8.00 | 6.00 | 8.00 | 11.00 | 11.00 | 9.00 | 8.00 | 10.00 | 10.00 | 9.00 | 8.00 | 7.00 | 8.00 | 7.00 | 9.00 | 8.00 | 8.00 | | 8.55 | 21.72 |
| | density (g/cm^3) | 0.11 | 0.11 | 0.13 | 0.12 | 0.09 | | | | | | | | | | | | | | | | 0.11 | | |
| | SWE (in) | 0.95 | 0.96 | 0.96 | 0.81 | 0.74 | | | | | | | | | | | | | | | | | 0.88 | 2.24 |
| 11/18/10 | depth (in) | 7.50 | 11.50 | 8.50 | 7.50 | 7.00 | 8.00 | 5.50 | 5.00 | 5.50 | 7.50 | 6.75 | 6.00 | 10.50 | 8.75 | 7.00 | 7.00 | 8.00 | 6.75 | 3.75 | 3.50 | | 7.08 | 17.97 |
| | density (g/cm^3) | 0.24 | 0.17 | 0.16 | 0.19 | 0.10 | | | | | | | | | | | | | | | | 0.17 | | |
| | SWE (in) | 1.26 | 1.12 | 1.43 | 0.50 | | | | | | | | | | | | | | | | | | 1.08 | 2.74 |
| 12/2/10 | depth (in) | 11.00 | 11.75 | 9.25 | 8.75 | 9.00 | 12.00 | 11.00 | 11.50 | 10.75 | 7.00 | 7.00 | 10.50 | 12.50 | 6.00 | 11.00 | 10.50 | 15.50 | 9.00 | 7.00 | 9.75 | | 10.04 | 25.50 |
| | density (g/cm^3) | 0.19 | 0.18 | 0.18 | 0.17 | 0.14 | | | | | | | | | | | | | | | | 0.17 | | |
| | SWE (in) | 0.85 | 1.46 | 0.83 | 0.78 | 1.13 | | | | | | | | | | | | | | | | | 1.01 | 2.57 |
| 12/22/10 | depth (in) | 8.75 | 11.00 | 11.25 | 8.50 | 8.00 | 7.50 | 13.00 | 8.75 | 12.00 | 15.00 | 9.00 | 11.00 | 13.75 | 14.75 | 11.75 | 14.00 | 18.25 | 16.00 | 12.00 | 14.50 | | 11.94 | 30.32 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Upper Foothills Management Area

***Pump Station 3 (N 68.843, W 148.820)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/2/10 | depth (in) | 8.00 | 8.00 | 8.00 | 8.00 | 9.00 | 9.00 | 8.00 | 9.00 | 8.00 | 9.00 | 9.00 | 9.00 | 9.00 | 8.00 | 9.00 | 9.00 | 9.00 | 8.00 | 9.00 | 9.00 | | 8.60 | 21.84 |
| | density (g/cm^3) | 0.14 | 0.13 | 0.14 | 0.12 | 0.13 | | | | | | | | | | | | | | | | 0.13 | | |
| | SWE (in) | 1.17 | 1.00 | 1.08 | 0.91 | 1.08 | | | | | | | | | | | | | | | | | 1.05 | 2.66 |
| 11/18/10 | depth (in) | 10.50 | 6.75 | 10.25 | 7.00 | 6.50 | 10.00 | 8.50 | 6.50 | 8.00 | 7.50 | 10.50 | 8.50 | 8.00 | 8.00 | 7.00 | 7.75 | 6.50 | 6.50 | 9.50 | 10.25 | | 8.20 | 20.83 |
| | density (g/cm^3) | 0.15 | 0.14 | 0.19 | 0.13 | 0.15 | | | | | | | | | | | | | | | | 0.15 | | |
| | SWE (in) | 0.97 | 1.03 | 1.49 | 0.70 | 0.95 | | | | | | | | | | | | | | | | | 1.03 | 2.61 |
| 12/2/10 | depth (in) | 15.25 | 10.50 | 9.50 | 12.25 | 11.00 | 12.75 | 13.00 | 10.50 | 12.25 | 11.75 | 12.50 | 12.00 | 12.25 | 10.75 | 9.25 | 12.00 | 11.00 | 12.50 | 14.00 | 9.50 | | 11.73 | 29.78 |
| | density (g/cm^3) | 0.14 | 0.16 | 0.21 | 0.12 | 0.15 | | | | | | | | | | | | | | | | 0.16 | | |
| | SWE (in) | 1.54 | 1.33 | 3.11 | 1.35 | 1.68 | | | | | | | | | | | | | | | | | 1.80 | 4.57 |
| 12/28/10 | depth (in) | 11.50 | 12.00 | 12.00 | 11.25 | 14.25 | 13.00 | 13.50 | 12.75 | 11.75 | 13.25 | 14.00 | 11.25 | 15.00 | 10.50 | 15.00 | 12.00 | 13.25 | 12.25 | 12.75 | 14.00 | | 12.76 | 32.42 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 1/7/11 | depth (in) | 17.00 | 12.25 | 14.00 | 12.00 | 12.25 | 13.25 | 14.00 | 15.50 | 13.25 | 15.50 | 11.25 | 13.50 | 12.25 | 11.00 | 14.25 | 13.25 | 11.00 | 11.50 | 13.50 | 11.00 | | 13.08 | 33.21 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

## Upper Foothills Management Area

***318 Mile (N 68.922, W 148.850)***

| Date | | | | | | | | | | | | | | | | | | | | | | average g/cm^3 | average in | average cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11/2/10 | depth (in) | 9.00 | 9.00 | 8.00 | 9.00 | 8.00 | 8.00 | 8.00 | 9.00 | 8.00 | 10.00 | 8.00 | 8.00 | 7.00 | 7.00 | 10.00 | 8.00 | 10.00 | 8.00 | 8.00 | 8.00 | | 8.40 | 21.34 |
| | density (g/cm^3) | 0.10 | 0.09 | 0.10 | 0.11 | 0.11 | | | | | | | | | | | | | | | | 0.10 | | |
| | SWE (in) | 0.82 | 0.84 | 0.96 | 1.02 | 0.98 | | | | | | | | | | | | | | | | | 0.92 | 2.34 |
| 11/18/10 | depth (in) | 9.00 | 9.75 | 13.00 | 11.25 | 12.25 | 10.75 | 7.00 | 6.00 | 6.50 | 9.25 | 12.75 | 4.25 | 11.00 | 12.00 | 8.50 | 6.00 | 10.00 | 7.50 | 5.00 | 10.25 | | 9.10 | 23.11 |
| | density (g/cm^3) | 0.15 | 0.25 | 0.18 | 0.33 | 0.13 | | | | | | | | | | | | | | | | 0.21 | | |
| | SWE (in) | 1.78 | 2.67 | 1.24 | 3.43 | 1.37 | | | | | | | | | | | | | | | | | 2.10 | 5.33 |
| 12/2/10 | depth (in) | 14.50 | 13.75 | 17.00 | 11.50 | 13.25 | 15.00 | 11.50 | 11.50 | 16.00 | 15.75 | 11.50 | 12.50 | 14.00 | 8.75 | 15.00 | 12.25 | 16.00 | 17.50 | 9.50 | 8.50 | | 13.26 | 33.69 |
| | density (g/cm^3) | 0.14 | 0.20 | 0.25 | 0.15 | 0.19 | | | | | | | | | | | | | | | | 0.19 | | |
| | SWE (in) | 1.10 | 2.93 | 4.32 | 0.95 | 3.11 | | | | | | | | | | | | | | | | | 2.48 | 6.30 |
| 12/28/10 | depth (in) | 10.75 | 14.25 | 8.50 | 13.75 | 16.75 | 12.25 | 13.50 | 18.50 | 20.50 | 16.00 | 21.00 | 19.25 | 19.75 | 19.75 | 15.00 | 15.00 | 13.50 | 13.25 | 19.70 | 17.00 | | 15.90 | 40.38 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

| Lower Foothills Management Area | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***62 Mile (N 69.422, 148.659)*** | | | | | | | | | | | | | | | | | | | | | | | average | | |
| Date | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 10/21/10 | depth (in) | 7.00 | 10.00 | 10.00 | 9.00 | 9.00 | 10.00 | 9.00 | 10.00 | 12.00 | 12.00 | 11.00 | 12.00 | 10.00 | 9.00 | 12.00 | 8.00 | 8.00 | 12.00 | 6.00 | 10.00 | | 9.80 | 24.89 |
| | density (g/cm^3) | 0.17 | 0.13 | 0.16 | 0.14 | 0.12 | | | | | | | | | | | | | | | | 0.14 | | |
| | SWE (in) | 1.72 | 0.99 | 1.30 | 1.14 | 1.29 | | | | | | | | | | | | | | | | | 1.29 | 3.27 |
| 11/2/10 | depth (in) | 12.00 | 13.00 | 13.00 | 16.00 | 16.00 | 11.00 | 13.00 | 15.00 | 9.00 | 9.00 | 10.00 | 7.00 | 12.00 | 14.00 | 11.00 | 10.00 | 13.00 | 15.00 | 17.00 | 9.00 | | 12.25 | 31.12 |
| | density (g/cm^3) | 0.12 | 0.11 | 0.14 | 0.09 | 0.10 | | | | | | | | | | | | | | | | 0.11 | | |
| | SWE (in) | 2.01 | 1.67 | 1.29 | 1.06 | 1.03 | | | | | | | | | | | | | | | | | 1.41 | 3.58 |
| 12/2/10 | depth (in) | 11.00 | 11.00 | 9.25 | 10.50 | 7.50 | 13.00 | 12.00 | 10.25 | 9.00 | 12.75 | 14.00 | 12.00 | 14.50 | 9.00 | 12.00 | 13.50 | 12.50 | 13.00 | 10.50 | 12.75 | | 11.50 | 29.21 |
| | density (g/cm^3) | 0.22 | 0.16 | 0.26 | 0.30 | 0.20 | | | | | | | | | | | | | | | | 0.23 | | |
| | SWE (in) | 3.26 | 1.70 | 3.77 | 4.50 | 2.04 | | | | | | | | | | | | | | | | | 3.05 | 7.76 |
| 12/28/10 | depth (in) | 9.00 | 10.25 | 15.00 | 10.50 | 14.00 | 13.75 | 11.00 | 9.00 | 15.20 | 11.00 | 8.50 | 9.25 | 12.75 | 15.25 | 12.25 | 10.00 | 10.75 | 7.00 | 12.50 | 9.75 | | 11.34 | 28.79 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

| Lower Foothills Management Area | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***52 Mile (N 69.547, W 148.606)*** | | | | | | | | | | | | | | | | | | | | | | | average | | |
| Date | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 10/21/10 | depth (in) | 9.00 | 8.00 | 10.00 | 11.00 | 11.00 | 10.00 | 6.00 | 8.00 | 8.00 | 7.00 | 7.00 | 9.00 | 8.00 | 10.00 | 10.00 | 8.00 | 12.00 | 10.00 | 10.00 | 7.00 | | 8.95 | 22.73 |
| | density (g/cm^3) | 0.10 | 0.12 | 0.13 | 0.11 | 0.10 | | | | | | | | | | | | | | | | 0.11 | | |
| | SWE (in) | 0.85 | 0.93 | 1.13 | 0.87 | 0.89 | | | | | | | | | | | | | | | | | 0.94 | 2.38 |
| 11/18/10 | depth (in) | 8.50 | 8.00 | 5.00 | 12.00 | 9.00 | 11.50 | 10.75 | 3.25 | 4.50 | 9.00 | 11.00 | 12.50 | 10.00 | 6.00 | 9.50 | 15.25 | 8.25 | 11.00 | 6.75 | 10.70 | | 9.12 | 23.17 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/2/10 | depth (in) | 17.25 | 11.75 | 18.00 | 18.00 | 12.00 | 13.50 | 13.00 | 16.25 | 8.50 | 15.75 | 10.00 | 13.50 | 18.00 | 13.00 | 14.00 | 7.00 | 12.50 | 15.00 | 10.50 | 10.50 | | 13.40 | 34.04 |
| | density (g/cm^3) | 0.18 | 0.39 | 0.22 | 0.30 | 0.22 | | | | | | | | | | | | | | | | 0.26 | | |
| | SWE (in) | 1.93 | 3.52 | 3.21 | 3.28 | 1.67 | | | | | | | | | | | | | | | | | 2.72 | 6.91 |
| 12/28/10 | depth (in) | 14.50 | 10.75 | 10.75 | 17.25 | 11.50 | 14.00 | 12.75 | 13.75 | 16.00 | 15.75 | 13.75 | 17.75 | 18.00 | 14.50 | 21.50 | 15.00 | 11.50 | 11.50 | 17.00 | 17.25 | | 14.74 | 37.43 |
| | density (g/cm^3) | 0.19 | 0.24 | 0.26 | | | | | | | | | | | | | | | | | | 0.23 | | |
| | SWE (in) | 2.23 | 3.38 | 5.26 | | | | | | | | | | | | | | | | | | | 3.62 | 9.20 |
| 1/6/11 | depth (in) | 16.00 | 21.25 | 19.00 | 8.50 | 9.25 | 12.25 | 14.25 | 7.75 | 11.25 | 7.25 | 18.00 | 12.75 | 13.75 | 11.00 | 10.75 | 12.00 | 11.75 | 16.00 | 6.75 | 9.00 | | 12.43 | 31.56 |
| | density (g/cm^3) | 0.26 | 0.24 | 0.30 | 0.24 | 0.29 | | | | | | | | | | | | | | | | 0.27 | | |
| | SWE (in) | 4.64 | 2.80 | 4.00 | 2.16 | 4.12 | | | | | | | | | | | | | | | | | 3.54 | 9.00 |

| Lower Foothills Management Area | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Meltwater 19 (N 70.065, W 150.448)*** | | | | | | | | | | | | | | | | | | | | | | | average | | |
| Date | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 10/21/10 | depth (in) | 7.00 | 8.00 | 11.00 | 11.00 | 7.00 | 9.00 | 9.00 | 10.00 | 8.00 | 9.00 | 7.00 | 7.00 | 11.00 | 10.00 | 9.00 | 9.00 | 11.00 | 11.00 | 8.00 | 9.00 | | 9.05 | 22.99 |
| | density (g/cm^3) | 0.17 | 0.22 | 0.19 | 0.24 | 0.21 | | | | | | | | | | | | | | | | 0.21 | | |
| | SWE (in) | 1.12 | 2.06 | 1.53 | 2.04 | 1.90 | | | | | | | | | | | | | | | | | 1.73 | 4.39 |
| 11/1/10 | depth (in) | 8.00 | 8.00 | 12.00 | 9.00 | 6.00 | 8.00 | 4.00 | 4.00 | 6.00 | 9.00 | 8.00 | 6.00 | 5.00 | 8.00 | 12.00 | 6.00 | 3.00 | 6.00 | 14.00 | 5.00 | | 7.35 | 18.67 |
| | density (g/cm^3) | 0.18 | 0.21 | 0.25 | 0.17 | 0.22 | | | | | | | | | | | | | | | | 0.21 | | |
| | SWE (in) | 1.10 | 1.38 | 2.34 | 1.03 | 2.08 | | | | | | | | | | | | | | | | | 1.58 | 4.02 |
| 11/17/10 | depth (in) | 10.25 | 13.75 | 16.00 | 6.00 | 6.50 | 16.00 | 8.25 | 5.00 | 10.50 | 6.00 | 14.50 | 10.50 | 12.00 | 5.25 | 12.00 | 8.00 | 10.75 | 5.25 | 13.50 | 9.00 | | 9.95 | 25.27 |
| | density (g/cm^3) | 0.39 | 0.21 | 0.24 | 0.34 | 0.31 | | | | | | | | | | | | | | | | 0.30 | | |
| | SWE (in) | 4.36 | 0.78 | 1.08 | 2.39 | 2.62 | | | | | | | | | | | | | | | | | 2.25 | 5.71 |
| 11/30/10 | depth (in) | 14.25 | 17.50 | 6.00 | 11.00 | 15.00 | 9.00 | 19.75 | 4.00 | 7.75 | 14.00 | 7.75 | 15.50 | 13.50 | 11.50 | 13.00 | 15.00 | 12.00 | 11.50 | 14.50 | 13.00 | | 12.28 | 31.18 |
| | density (g/cm^3) | 0.19 | 0.26 | 0.23 | 0.21 | 0.21 | | | | | | | | | | | | | | | | 0.22 | | |
| | SWE (in) | 1.87 | 3.77 | 2.67 | 1.94 | 2.03 | | | | | | | | | | | | | | | | | 2.45 | 6.23 |

| Lower Foothills Management Area | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Spur Dike 6 - 20 Mile*** (N 69° 58.300' W 148° 42.324') | | | | | | | | | | | | | | | | | | | | | | | average | | |
| Date | | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 10/21/2010 | depth (in) | 6.00 | 3.00 | 4.00 | 5.00 | 6.00 | 2.00 | 4.00 | 3.00 | 2.00 | 2.00 | 3.00 | 3.00 | 5.00 | 4.00 | 4.00 | 3.00 | 5.00 | 6.00 | 3.00 | 3.00 | | 3.80 | 9.65 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/2/2010 | depth (in) | 5.25 | 9.00 | 10.50 | 8.25 | 10.50 | 9.00 | 10.00 | 7.25 | 13.00 | 9.25 | 8.75 | 9.00 | 12.00 | 10.00 | 9.75 | 11.50 | 8.50 | 9.50 | 8.25 | 9.00 | | 9.41 | 23.91 |
| | density (g/cm^3) | 0.26 | 0.25 | 0.24 | 0.28 | 0.29 | | | | | | | | | | | | | | | | 0.26 | | |
| | SWE (in) | 2.76 | 2.09 | 1.79 | 3.27 | 4.98 | | | | | | | | | | | | | | | | | 2.98 | 7.57 |
| 12/28/2010 | depth (in) | 9.50 | 11.50 | 11.50 | 12.00 | 11.75 | 10.00 | 9.75 | 10.75 | 10.00 | 10.75 | 10.50 | 11.50 | 16.00 | 19.00 | 11.00 | 11.00 | 8.50 | 15.00 | 11.75 | 10.00 | | 11.59 | 29.43 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |

| Lower Foothills Management Area | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***30 Mile*** (N 69° 50.204' W 148° 45.288') | | | | | | | | | | | | | | | | | | | | | | | average | |
| Date | | | | | | | | | | | | | | | | | | | | | | g/cm^3 | in | cm |
| 10/21/2010 | depth (in) | 2.00 | 3.00 | 4.00 | 1.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 3.00 | 1.00 | 4.00 | 2.00 | 1.00 | 1.00 | 4.00 | 3.00 | 1.00 | | 2.15 | 5.46 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 11/18/2010 | depth (in) | 5.00 | 4.00 | 4.00 | 4.50 | 9.00 | 4.50 | 7.25 | 5.25 | 3.75 | 4.25 | 5.75 | 8.00 | 3.25 | 6.75 | 3.25 | 4.75 | 2.50 | 2.00 | 4.50 | 9.75 | | 5.10 | 12.95 |
| | density (g/cm^3) | | | | | | | | | | | | | | | | | | | | | -- | | |
| | SWE (in) | | | | | | | | | | | | | | | | | | | | | | -- | -- |
| 12/2/2010 | depth (in) | 10.50 | 8.00 | 9.00 | 7.00 | 6.75 | 10.00 | 7.00 | 4.25 | 4.25 | 7.50 | 5.00 | 9.00 | 4.25 | 4.25 | 3.50 | 7.25 | 11.00 | 8.50 | 5.25 | 7.75 | | 7.00 | 17.78 |
| | density (g/cm^3) | 0.26 | 0.29 | 0.24 | 0.26 | 0.19 | | | | | | | | | | | | | | | | 0.25 | | |
| | SWE (in) | 2.83 | 2.92 | 2.47 | 2.56 | 1.94 | | | | | | | | | | | | | | | | | 2.55 | 6.47 |
| 12/28/2010 | depth (in) | 11.25 | 7.75 | 11.25 | 8.00 | 8.25 | 8.00 | 12.75 | 11.50 | 8.00 | 6.75 | 11.50 | 9.00 | 6.00 | 12.00 | 14.00 | 10.75 | 9.25 | 7.25 | 9.25 | 8.25 | | 9.54 | 24.23 |
| | density (g/cm^3) | 0.30 | 0.27 | 0.28 | 0.27 | 0.26 | | | | | | | | | | | | | | | | 0.28 | | |
| | SWE (in) | 4.02 | 3.27 | 3.40 | 2.69 | 3.33 | | | | | | | | | | | | | | | | | 3.34 | 8.49 |

# APPENDIX C. ADNR SNOW DATA SUMMARY

The following table reports a summary of snow information obtained by ADNR staff.

| | Oct 21-22 | | | Nov 1-5 | | | Nov 15-19 | | | Nov 29-Dec3 | | | Dec 6-10 | | | Dec 12-15 | | | Dec 20-24 | | | Dec 27-31 | | | Jan 3-7 | | | Jan 10-14 | | | Jan 24-29 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) | Depth (in) | Density (g/cm^3) | SWE (in) |
| **Eastern Coastal Area** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ANFO Pad | -- | -- | -- | 8.4 | -- | -- | 7.6 | 0.50 | 1.9 | 11.5 | 0.25 | 2.6 | 8.5 | 0.30 | 2.9 | 9.5 | 0.31 | 3.1 | -- | -- | -- | 9.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DS 16 | -- | -- | -- | 9.7 | 0.16 | 1.6 | 9.3 | 0.25 | 1.7 | 14.0 | 0.26 | 3.2 | 11.8 | -- | -- | 13.4 | -- | -- | 12.4 | 0.34 | 4.6 | 12.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| UAF 411 mi | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10.88 | 0.30 | 4.18 | 12.47 | 0.29 | 4.62 | 11.54 | 0.35 | 4.78 | 13.78 | -- | -- | 11.96 | -- | -- | -- | -- | -- | -- | -- | -- |
| Term Well A | -- | -- | -- | 5.1 | 0.20 | 1.4 | 7.0 | 0.30 | 1.8 | 10.0 | 0.24 | 2.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| P Pad | -- | -- | -- | 7.8 | 0.12 | 1.1 | -- | -- | -- | -- | -- | -- | 8.0 | 0.27 | 1.9 | 10.3 | 0.27 | 2.7 | 10.0 | 0.28 | 3.1 | 10.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| T Pad | -- | -- | -- | 7.8 | 0.13 | 0.8 | -- | -- | -- | 10.96 | 0.19 | 1.57 | 9.18 | 0.33 | 3.92 | 9.66 | 0.25 | 1.91 | 10.64 | 0.31 | 3.04 | 10.06 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area Averages | N/A | N/A | N/A | 7.7 | 0.15 | 1.2 | 8.0 | 0.35 | 1.8 | 11.6 | 0.24 | 2.5 | 9.7 | 0.30 | 3.2 | 11.1 | 0.28 | 3.1 | 11.1 | 0.32 | 3.9 | 11.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Western Coastal Area** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S Pad | -- | -- | -- | 5.8 | -- | -- | 6.5 | 0.18 | 1.6 | 9.4 | 0.27 | 3.8 | 8.1 | 0.31 | 4.2 | 8.2 | 0.27 | 3.0 | 8.9 | 0.31 | 3.6 | 10.1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| DS-1J | -- | -- | -- | -- | -- | -- | -- | -- | -- | 10.10 | 0.26 | 2.79 | 11.54 | -- | -- | 12.33 | 0.25 | 1.6 | 13.25 | 0.28 | 2.9 | 13.66 | 0.31 | 3.5 | 14.15 | 0.36 | 4.5 | -- | -- | -- | -- | -- | -- |
| UGNU Pad | -- | -- | -- | 6.2 | -- | -- | 9.0 | 0.32 | 2.3 | 10.3 | 0.23 | 2.0 | 8.9 | -- | -- | 9.0 | -- | -- | -- | -- | -- | 11.1 | 0.38 | 5.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Palm 2 | -- | -- | -- | 6.9 | -- | -- | -- | -- | -- | 13.61 | 0.21 | 2.06 | 11.01 | 0.30 | 3.30 | 12.14 | 0.27 | 2.63 | -- | -- | -- | 13.93 | -- | -- | 12.20 | -- | -- | -- | -- | -- | -- | -- | -- |
| DS-2L (ASTAC) | -- | -- | -- | 6.8 | 0.15 | 1.0 | 8.8 | -- | -- | 12.4 | 0.29 | 4.69 | 10.2 | 0.31 | 3.54 | -- | -- | -- | -- | -- | -- | 12.9 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area Averages | N/A | N/A | N/A | 6.4 | 0.15 | 1.0 | 8.1 | 0.25 | 2.0 | 11.2 | 0.25 | 3.1 | 9.9 | 0.31 | 3.7 | 10.4 | 0.26 | 2.4 | 11.1 | 0.30 | 3.2 | 12.3 | 0.35 | 4.5 | 13.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Lower Foothills Area** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SpurDike 6-20 Mi | 3.8 | -- | -- | -- | -- | -- | -- | -- | -- | 9.41 | 0.26 | 2.98 | -- | -- | -- | 10.71 | 0.28 | 3.41 | 10.71 | 0.28 | 3.41 | 11.59 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 30 Mile | 2.2 | -- | -- | -- | -- | -- | 5.1 | -- | -- | 7.0 | 0.25 | 2.55 | -- | -- | -- | 7.51 | -- | -- | 7.51 | -- | -- | 9.54 | 0.28 | 3.34 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 52 Mile | 9.0 | 0.11 | 0.9 | -- | -- | -- | 9.1 | -- | -- | 13.4 | 0.26 | 2.72 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14.74 | 0.23 | 3.62 | 12.43 | 0.27 | 3.54 | -- | -- | -- | -- | -- | -- |
| 62 Mile | 9.8 | 0.15 | 1.3 | 12.3 | 0.12 | 1.4 | -- | -- | -- | 11.50 | 0.23 | 3.05 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 11.34 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Meltwater 19 | 9.1 | 0.20 | 1.7 | 7.4 | 0.20 | 1.6 | 10.0 | 0.30 | 2.3 | 12.3 | 0.22 | 2.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area Averages | 6.8 | 0.15 | 1.3 | 9.8 | 0.16 | 1.5 | 8.1 | 0.30 | 2.3 | 10.7 | 0.24 | 2.8 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 11.80 | 0.25 | 3.48 | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Upper Foothills Area** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 318 Mile | -- | -- | -- | 8.4 | 0.09 | 0.9 | 9.1 | 0.20 | 2.1 | 13.3 | 0.19 | 2.5 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 15.90 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pump 3 | -- | -- | -- | 8.6 | 0.13 | 1.1 | 8.2 | 0.14 | 1.0 | 11.7 | 0.16 | 4.6 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 12.76 | -- | -- | 13.08 | -- | -- | -- | -- | -- | -- | -- | -- |
| Sag R. DOT | -- | -- | -- | 8.6 | 0.11 | 0.9 | 7.1 | 0.21 | 1.1 | 10.0 | 0.17 | 1.0 | -- | -- | -- | -- | -- | -- | 11.94 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Slope Mountain | -- | -- | -- | 7.7 | 0.99 | 1.0 | 12.0 | 0.19 | 2.0 | 14.3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13.35 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Area Averages | N/A | N/A | N/A | 8.3 | 0.33 | 1.0 | 9.1 | 0.19 | 1.6 | 12.3 | 0.17 | 2.7 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 14.00 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

# APPENDIX D. ELEVATION SURVEY FORMS

The following form reports the elevation survey information obtained during field sampling.

***Arctic Transportation Networks***

**Form F-011: Elevation Survey Form**

Project ID: **ATN Project** Site Location/Lake ID: L9312

Survey Purpose: **Water-Level Elevations** Date: 1/13/2011 Time: 14:30

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location: | Lake L9312, located southeast of Alpine pad, survey by pump house benchmarks | | | | | | | |
| Survey objective: | Determine FWS Elevation. | | | | | Weather Observations: | | |
| Instrument Type: | Leica NA720 | | Instrument ID: | 5482372 (GWS owned) | | | | |
| Rod Type: | Fiberglass | | Rod ID: | Crane Fiber Glass | | Cold, Clear, Slight breeze | | |
| Bench Mark Information: | | | | | | Survey Team Names | | |
| Name | Agency Responsible | Elevation (ft) | Latitude (dd-mm.mmm) | Longitude (ddd-mm.mmm) | | Jeff Murray, Mike Rourick (LCMF) | | |
| L9312"P" | CP | 11.73 | na | na | | | | |
| **Station** | **BS (ft)** | **HI (ft)** | **FS (ft)** | **Elevation (fasl)** | **Distance (ft)** | **Horizontal Angle** | **Vertical Angle** | **Remarks** |
| TBM "P" | 1.120 | 12.85 | | 11.73 | | | | Top of inlet pipe support |
| TBM "O" | | 12.850 | 1.390 | 11.46 | | | | Top of inlet pipe support. BM Elev=11.44' |
| 99-32-59 | | 12.850 | -1.700 | 14.55 | | | | Top of Pumphouse SE VSM. BM Elev = 14.53 |
| L9312 WL | | 12.850 | 5.380 | **7.47** | | | | |
| L9312 Ice | | 12.850 | 5.360 | 7.49 | | | | |
| Turn on L9312 Ice | | | | | | | | |
| L9312 Ice | 5.18 | 12.670 | | 7.49 | | | | |
| L9312 WL | | 12.670 | 5.20 | 7.47 | | | | **WL = 7.47** |
| 99-32-59 | | 12.670 | -1.890 | 14.56 | | | | |
| TBM"O" | | 12.670 | 1.200 | 11.47 | | | | |
| TBM"P" | | 12.670 | 0.940 | 11.73 | | | | close survey to 0.00' |
| | | | | | | | | |
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Abbreviations: backsight, BS; degrees, dd; feet, ft; feet above mean sea level, fasml; foresight, FS; height of instrument, HI; minutes, mm; seconds, ss; BP Mean Sea Level, BPMSL

# APPENDIX E. LAKE HYDROLOGICAL MEASUREMENTS

The following form reports physical measurements pertaining to lake ice obtained during field sampling.

## *Arctic Transportation Networks Project*

### FORM F-005: WATER-LEVEL MEASUREMENT FORM

Lake or Site ID: **L9312**

Local Number: Survey ID

| All measurements in feet, unless noted | Elevation (ft) | Latitude (dd-mm.mmm) | Longitude (dd-mm.mmm) |
|---|---|---|---|
| | 7.00 | N 70° 19.995' | W 150° 56.918' |

Vertical-Datum Corrections, reference survey notes in site folders

| Date | MP ID | MP Elevation (feet above BP Sea Level) | |
|---|---|---|---|
| 3/26/2004 | "P" | 11.61 | |
| 1/16/2006 | "P" | 11.73 | (BM elevation adjusted) |

ABBREVIATIONS

BOI, bottom of ice

Calib, used to calibrate PT

IS, ice surface
LB, lake bottom
LS, land surface
MP, measuring point
N/A, not available
WS, water surface

| Date | Time | Method | Snow Depth | Total Depth IS to LB | Estimated Error | Ice Thickness (IS to BOI) | Freeboard (IS to WS) | WS Elevation | IS Elevation |
|---|---|---|---|---|---|---|---|---|---|
| 11/16/10 | 12:45 | Tape/Levels | 0.41' | 10.83' | +/- 0.01' | 1.9' | 0.16' | 7.39' | 7.55' |
| 12/8/10 | 10:15 | Tape/Levels | 0.48' | 11.01 | +/- 0.01' | 1.85' | 0.11' | 7.45' | 7.56' |
| 1/13/11 | 14:15 | Tape/Levels | 0.61' | 10.52' | +/- 0.01' | 2.6' | .02' | 7.47 | 7.49' |
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**Collected Data Values**

Lake-Full Elevation = measured at staff gage or near vertical benchmark after lake outflow ceased following spring snowmelt
Freeboard (FB) = Height of ice level over water level in open hole
Ice Thickness (IT) = Measured distance between top and bottom of ice
Total Depth (TD) = Measured distance from water surface to lake bottom
Estimated Error = Field estimate of water level measurement error

**Calculated Values**

Ice Surface (IS) Elevation = Water Elevation + Freeboard
Ice Bottom (IB) Elevation = Ice Surface Elevation - Ice Thickness

## *Arctic Transportation Networks Project*

### FORM F-005: WATER-LEVEL MEASUREMENT FORM

Lake or Site ID: **L9321**

Local Number: Survey ID

| **All measurements in feet, unless noted** | Elevation (ft) | Latitude (dd-mm.mmm) | Longitude (dd-mm.mmm) |
|---|---|---|---|
| | -11.00 | N 70° 20.544' | W 150° 01.691' |

NAD83

ABBREVIATIONS

BOI, bottom of ice

Calib, used to calibrate PT

IS, ice surface

LB, lake bottom

LS, land surface

MP, measuring point

N/A, not available

WS, water surface

| Date | Time | Method | Snow Depth | Total Depth IS to LB | Estimated Error | Ice Thickness (IS to BOI) | Freeboard (IS to WS) | WS Elevation | IS Elevation |
|---|---|---|---|---|---|---|---|---|---|
| 01/13/11 | 11:30 | Tape | 0.45' | 10.0' | +/- 0.01' | 2.4' | -0.1 | | |
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**Collected Data Values**

Lake-Full Elevation = measured at staff gage or near vertical benchmark after lake outflow ceased following spring snowmelt

Freeboard (FB) = Height of ice level over water level in open hole

Ice Thickness (IT) = Measured distance between top and bottom of ice

Total Depth (TD) = Measured distance from water surface to lake bottom

Estimated Error = Field estimate of water level measurement error

**Calculated Values**

Ice Surface (IS) Elevation = Water Elevation + Freeboard

Ice Bottom (IB) Elevation = Ice Surface Elevation - Ice Thickness

## *Arctic Transportation Networks Project*

### FORM F-005: WATER-LEVEL MEASUREMENT FORM

Lake or Site ID: **L9322**

Local Number: Survey ID

**All measurements in feet, unless noted**

| | Elevation (ft) | Latitude (dd-mm.mmm) | Longitude (dd-mm.mmm) |
|---|---|---|---|
| NAD83 | -5.00 | N 70° 20.257' | W 150° 01.878' |

ABBREVIATIONS

BOI, bottom of ice

Calib, used to calibrate PT

IS, ice surface

LB, lake bottom

LS, land surface

MP, measuring point

N/A, not available

WS, water surface

| Date | Time | Method | Snow Depth | Total Depth IS to LB | Estimated Error | Ice Thickness (IS to BOI) | Freeboard (IS to WS) | WS Elevation | IS Elevation |
|---|---|---|---|---|---|---|---|---|---|
| 1/13/11 | 10:35 | Tape | 0.58' | 10.41' | +/- 0.01' | 2.9' | 0.01' | | |
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**Collected Data Values**

Lake-Full Elevation = measured at staff gage or near vertical benchmark after lake outflow ceased following spring snowmelt

Freeboard (FB) = Height of ice level over water level in open hole

Ice Thickness (IT) = Measured distance between top and bottom of ice

Total Depth (TD) = Measured distance from water surface to lake bottom

Estimated Error = Field estimate of water level measurement error

**Calculated Values**

Ice Surface (IS) Elevation = Water Elevation + Freeboard

Ice Bottom (IB) Elevation = Ice Surface Elevation - Ice Thickness

## *Arctic Transportation Networks Project*

### FORM F-005: WATER-LEVEL MEASUREMENT FORM

Lake or Site ID: **L9323**

Local Number: Survey ID

| **All measurements in feet, unless noted** | Elevation (ft) | Latitude (dd-mm.mmm) | Longitude (dd-mm.mmm) |
|---|---|---|---|
| | -3.00 | N 70° 17.852' | W 150° 59.919' |

NAD83

ABBREVIATIONS

BOI, bottom of ice

Calib, used to calibrate PT

IS, ice surface

LB, lake bottom

LS, land surface

MP, measuring point

N/A, not available

WS, water surface

| Date | Time | Method | Snow Depth | Total Depth IS to LB | Estimated Error | Ice Thickness (IS to BOI) | Freeboard (IS to WS) | WS Elevation | IS Elevation |
|---|---|---|---|---|---|---|---|---|---|
| 1/13/11 | 12:15 | Tape | 0.44' | 9.0' | +/- 0.01' | 2.5' | 0.0' | | |
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**Collected Data Values**

Lake-Full Elevation = measured at staff gage or near vertical benchmark after lake outflow ceased following spring snowmelt

Freeboard (FB) = Height of ice level over water level in open hole

Ice Thickness (IT) = Measured distance between top and bottom of ice

Total Depth (TD) = Measured distance from water surface to lake bottom

Estimated Error = Field estimate of water level measurement error

**Calculated Values**

Ice Surface (IS) Elevation = Water Elevation + Freeboard

Ice Bottom (IB) Elevation = Ice Surface Elevation - Ice Thickness