Weather and Climate

Lake Clark - Winter 2014 - 2015 Weather Summary

Chigmit Mountains/NPS

Port Alsworth weather

It was a warm, dry and low-snow winter in Port Alsworth. The average temperature for December was 33.4 °F compared to a normal of 19.4 °F. It was the 3rd warmest December since records began in 1960. 0.68 inches of precipitation fell in December— well below normal. Only 2.5 inches of snow fell, compared to the December average of 18 inches.

Similar weather conditions continued into January when the average temperature was 25.2 °F, which is 9.7 °F warmer than the average temperature for this month. Only 1.5 inches of snow fell, compared to the January average of 14.9 inches.

February saw no snowfall and only a trace of rain over two separate days. The average temperature in February was 29.4 °F compared to an average temperature of 18.6 °F. This month was the 6th warmest ranking February since 1960. The average snowfall for this month is usually just over 12 inches.

Daily temperature for winter 2014 - 2015 are shown compared to record temperatures and average conditions in Figure 1. A similar graph showing daily accumulation of precipitation is shown in Figure 2. Monthly temperature and precipitation summaries—including average snow depth or range—can be found in Tables 1 and 2.

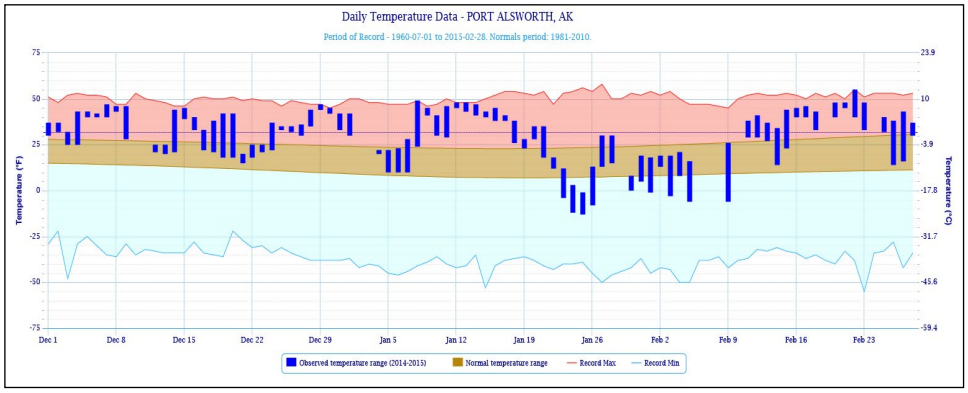

Figure 1. Winter 2014 -2015 daily temperatures at Port Alsworth (Farm Lodge). Record maximum (red), record minimum (blue), normal (brown) temperatures, and 2014 observed range (blue bars) are shown for Port Alsworth.

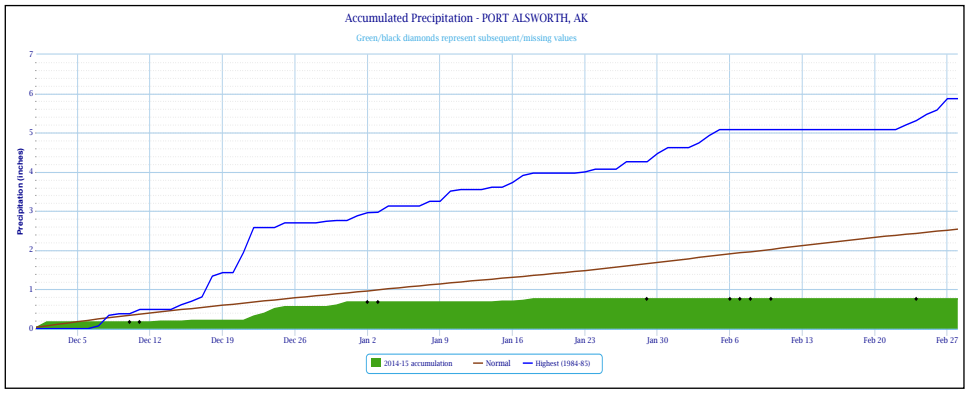

Figure 2. Winter 2014 - 2015 precipitation at Port Alsworth (green).

Table 1. Temperature summary for Port Alsworth (Farm Lodge) for winter 2014 - 2015 and 30-year average (climate normal).

Winter 2014-15	Average monthly temp (°F)	30-year average 1981-2010 climate normal (°F)	Departure from normal (°F)	Monthly high (°F / date)	Monthly low (°F / date)
December	33.4	19.4	+14.0	47 / Dec 7 & 29	15 / Dec 21
January	25.2	15.5	+19.7	49 / Jan 8	-13 / Jan 25
February	29.4	18.6	+10.8	55 / Feb 22	-6 / Feb 5 & 9

Winter season temperature departure from Normal: Warmer than normal—by +11.5 °F

Table 2. Precipitation summary for Port Alsworth (Farm Lodge) for winter 2014 - 2015 and 30-year average (climate normal).

Winter 2014-15	Total monthly precipitation (inches)	30-year average 1981-2010 climate normal precipitation (inches)	Departure from normal (inches)	Total monthly snowfall (inches)	30-year average 1981-2010 climate normal snowfall (inches)
December	0.68	0.91	-0.23	2.5	18.0
January	0.08	0.81	-0.73	1.5	14.9
February	0.00	0.82	-0.82	0.0	12.1

Winter season precipitation departure from Normal: Drier than normal—approximately -1.78 inches (30% of Normal)

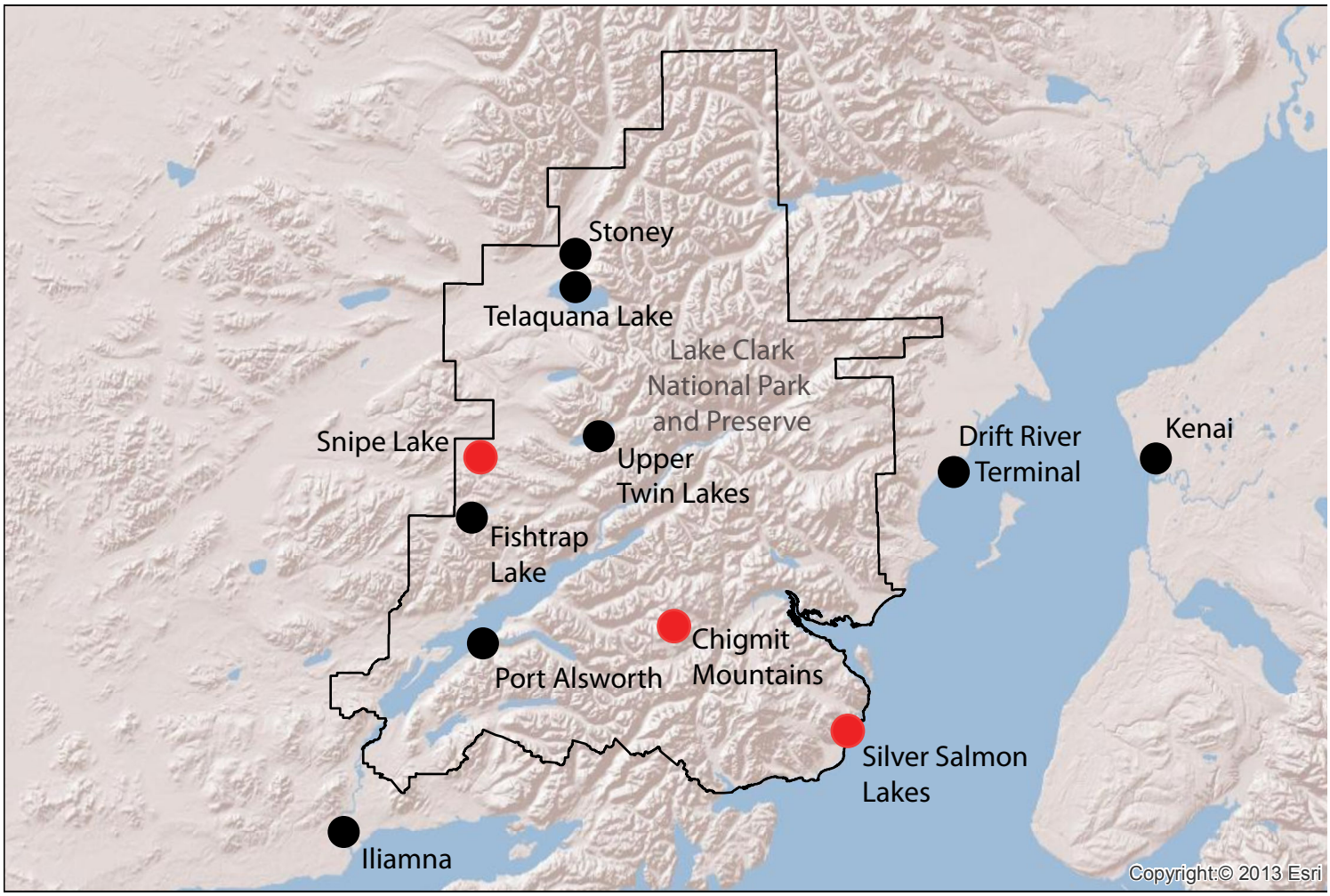

Figure 3. Selected climate stations in or near Lake Clark National Park and Preserve. Stations operated by the Southwest Alaska Network are shown in red and stations operated by other organizations are shown in black.

Table 3. Summary of weather statistics from selected climate stations in or near Lake Clark National Park and Preserve. Asterisk (*) indicates stations operated by the Southwest Alaska Network. All data are preliminary and subject to review. Data that are not available or suspect are indicated with "n/a". Iliamna Airport and Telaquana are the only stations capable of measuring both liquid and solid precipitation (rain and snow).

Site	Elev. (feet)	Ave. temperature (°F)			Ave. snow depth/range (inches)			Wind max (mph)
		Dec	Jan	Feb	Dec	Jan	Feb	
Chigmit Mtns*	4658	19.5	16.2	20.0	13 to 25	19 to 28	21 to 24	n/a
Drift River	53	34.4	27.9	29.0	n/a	n/a	n/a	12.1
Iliamna Airport	183	32.8	23.0	26.2	n/a	n/a	n/a	n/a
Silver Salmon*	23	34.5	30.1	30.9	0 to 11	0 to 4	0 to 7	49.7
Snipe Lake*	2315	28.5	19.3	24.0	0 to 3	0 to 5	0 to 5	80.5
Telaquana	1250	23.1	12.2	17.1	7	6	5	n/a

Climate monitoring updates

The Southwest Alaska Network operates three climate stations in Lake Clark National Park and Preserve (Figure 3).

• This summer we will add additional wind sensors at the Chigmit Mountain RAWS. Heavy rime ice has twice snapped the 6 m (~20 ft) mast that supports our existing wind sensors (Figure 4). To address this we will add an additional RM Young Alpine wind sensor at 3 m (~10 ft) height. We anticipate that this sensor will sturdier and sustain the rime ice that develops on them each winter. The sensors will operate at both the 6 and 3 m height for one year to allow for scaling of historic data to 3 m wind speed.

• We will also add additional soil sensors to the Snipe Lake and hopefully to the Stoney RAWS this summer. Soil temperature will be measured in profile (Figure 5) at 5, 10, 20 and 50 cm beneath the surface or, if at less than 50 cm, in the first surface of the active layer. Additionally Decagon MPS-6 matric potential and temperature sensors will be installed at 10 and 50 cm depth for determining plant water availability and developing soil moisture release models.

Why measure soil moisture?

Soil water content in the surface layer of the earth is a critical hydrological parameter affecting land-atmosphere processes. The estimation of soil moisture is important for hydrological modeling at all spatial scales. In practice, the measurement of soil moisture at global scales requires application of satellite remote sensing. The low-end of the microwave spectrum is well suited for passive sensing of water content in the surface layer of the soil. To this end, NASA launched the SMAP (Soil Moisture Active Passive) satellite on January 31, 2015.

We propose to help validate SMAP at two core validation areas, located on the west side of Lake Clark National Park and Preserve. This region is located in a climatically sensitive region oriented between the Pacific Ocean and increasingly ice free Bering Sea at a latitude of high meridonal amplitude. As a result, winter precipitation frequently transitions between rain and snow across the study area, and thus snowpack and active layer depth are likely to be sensitive to small changes in mean annual temperature.

Figure 4. Climate monitoring station in the Chigmit Mountains. The mast with 20-ft wind sensors is broken and laying on the ground.

Figure 5. Soil pit profile near Snipe Lake.

Port Alsworth fall temperature trend

The average winter temperature for 2014 – 2015 was 29.4 °F, the 4th warmest winter on record (1960-2015) and 11.5 °F warmer than the 1981-2010 climate normal period.

We calculate the average winter temperature by simply taking the average of December, January, and February monthly temperatures. Note that some months may have days with missing data. Historically, average winter temperatures show great variability with a range between 0.4 °F in 1969 and 32.9 °F in 1977.

If years with <5 missing days are analyzed, there has been an overall increase in winter temperatures of 1.8 °F per decade over the period of record based on a simple linear regression (Figure 6). The 10-year moving average shows the warmest periods in the late 1980s and early 1990s.

Connecting further

• Interesting new paper published: Evidence for a wavier jet stream in response to a rapid Arctic warming

• Read climate monitoring reports and other documents from the Southwest Alaska Network

• See a map of projected temperature and precipitation changes for Lake Clark National Park and Preserve

• Check the National Weather Service point weather forecast for Port Alsworth

• Find climate-related information from the Alaska Climate Research Center

• Explore NOAA's Climate.gov

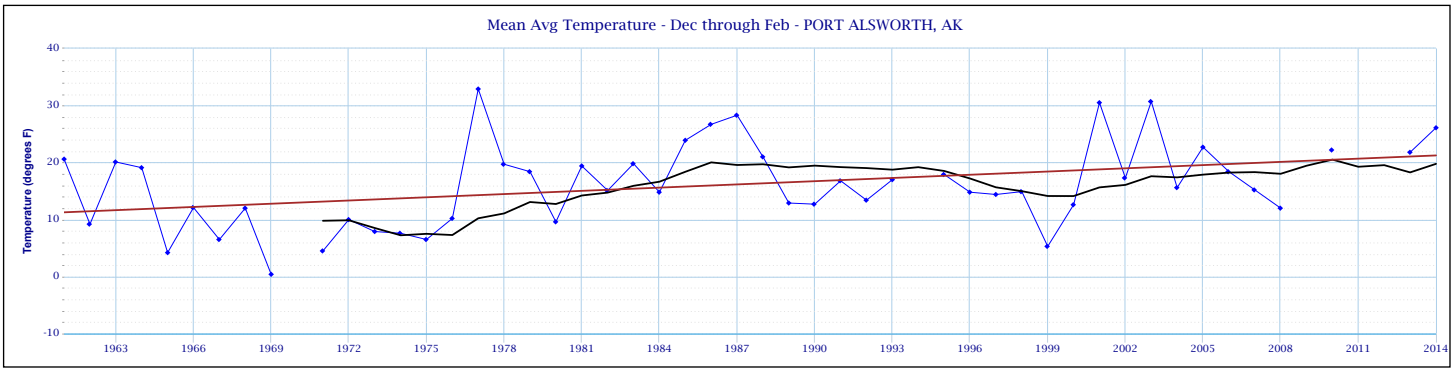

Figure 6. Average winter (December, January, February) temperatures at Port Alsworth (Farm Lodge) between 1960-2015. The black line is a 10-year moving average. The brown line is a simple linear regression.

More information

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Snipe Lake-Bonanza Hills/NPS