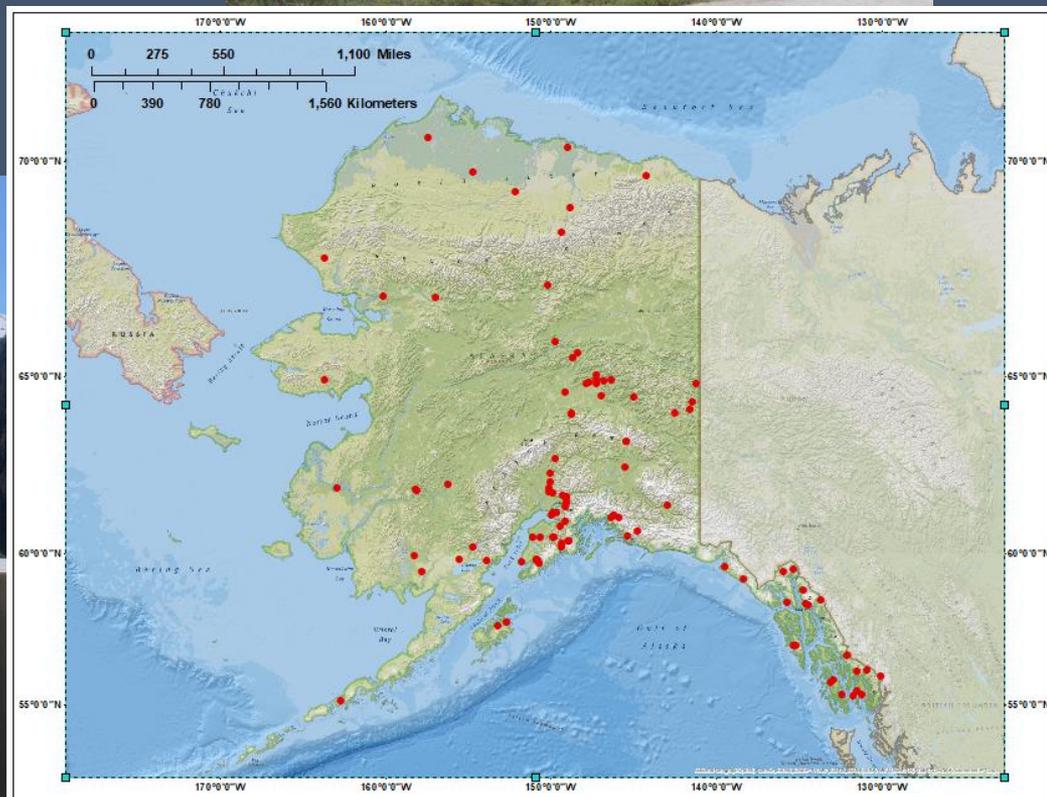


Overview of the 2019 Water Year in Alaska

Celine van Breukelen/Jeff Conaway
NWS Anchorage / USGS Alaska Science Center

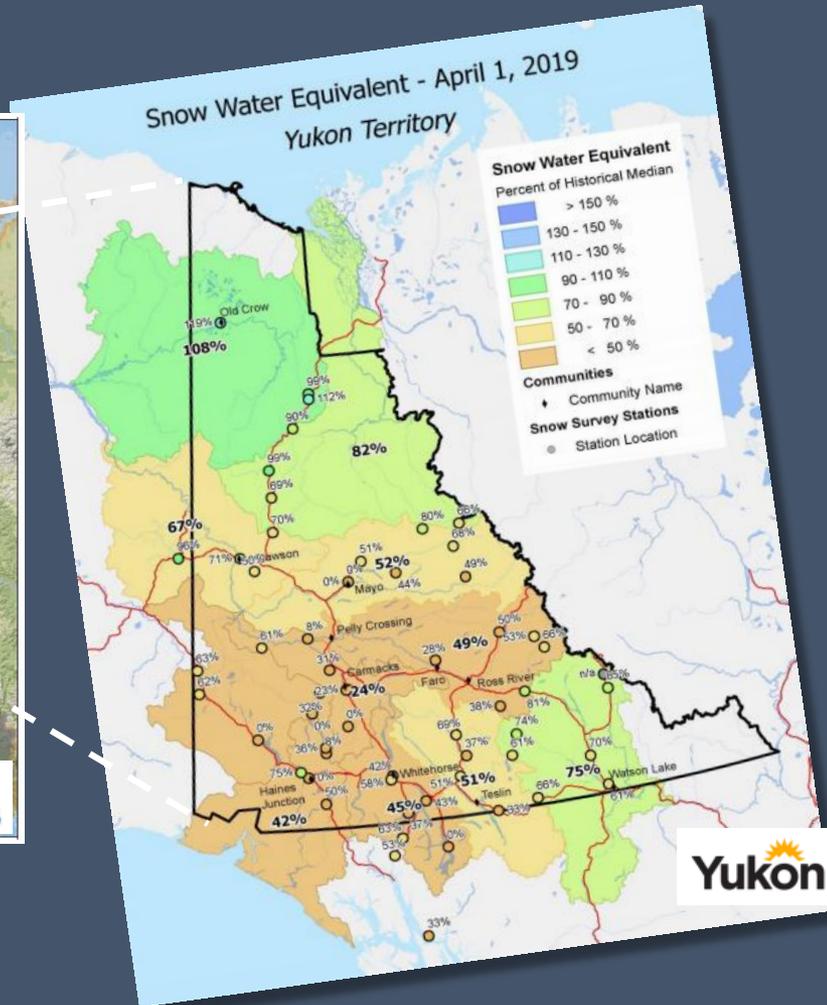
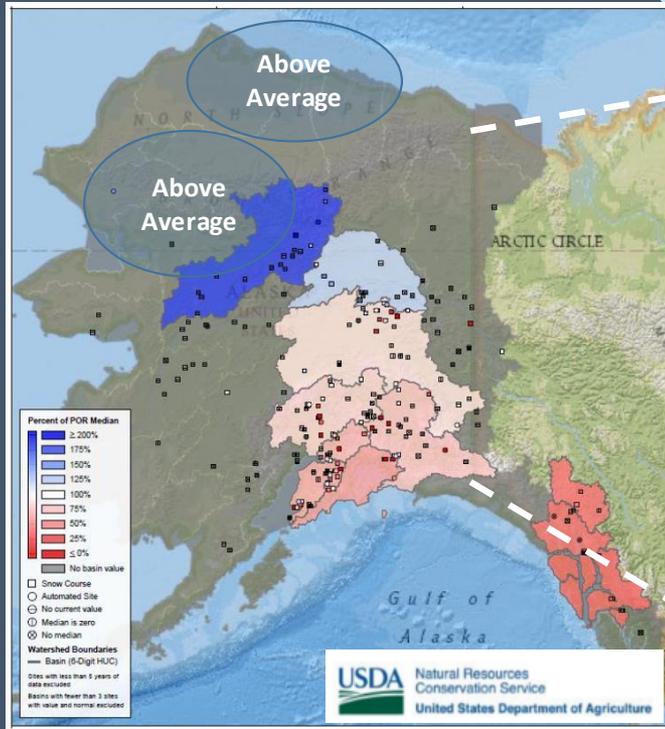


This July 2019 photo provided by Peter Westley shows carcasses of chum salmon lie along the shore of the Koyukuk River near Huslia. Alaska scientists and fisheries managers are investigating the deaths of salmon that may be tied to the state's unusually hot, dry summer. (Peter Westley, University of Alaska Fairbanks via AP)

Quick Overview

Alaska and Yukon Snowpack Conditions

May 1st 2019

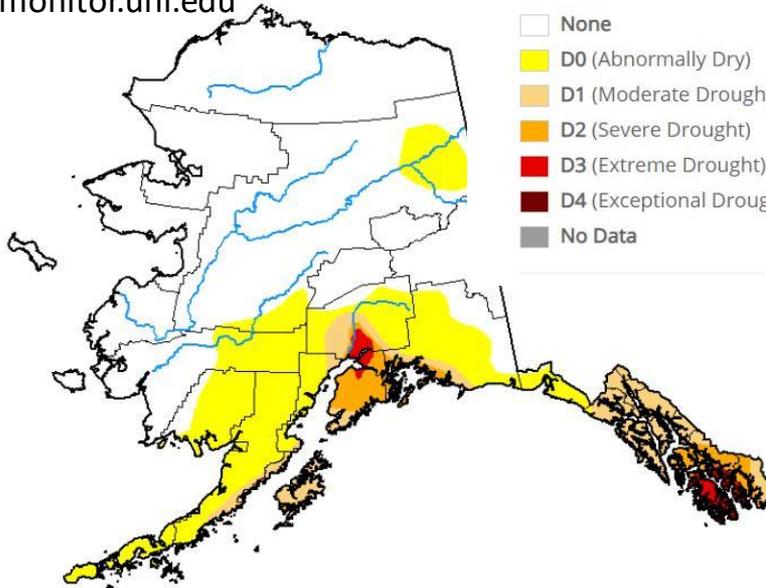


Summer 2019 = Hot and Dry, Mostly

droughtmonitor.unl.edu

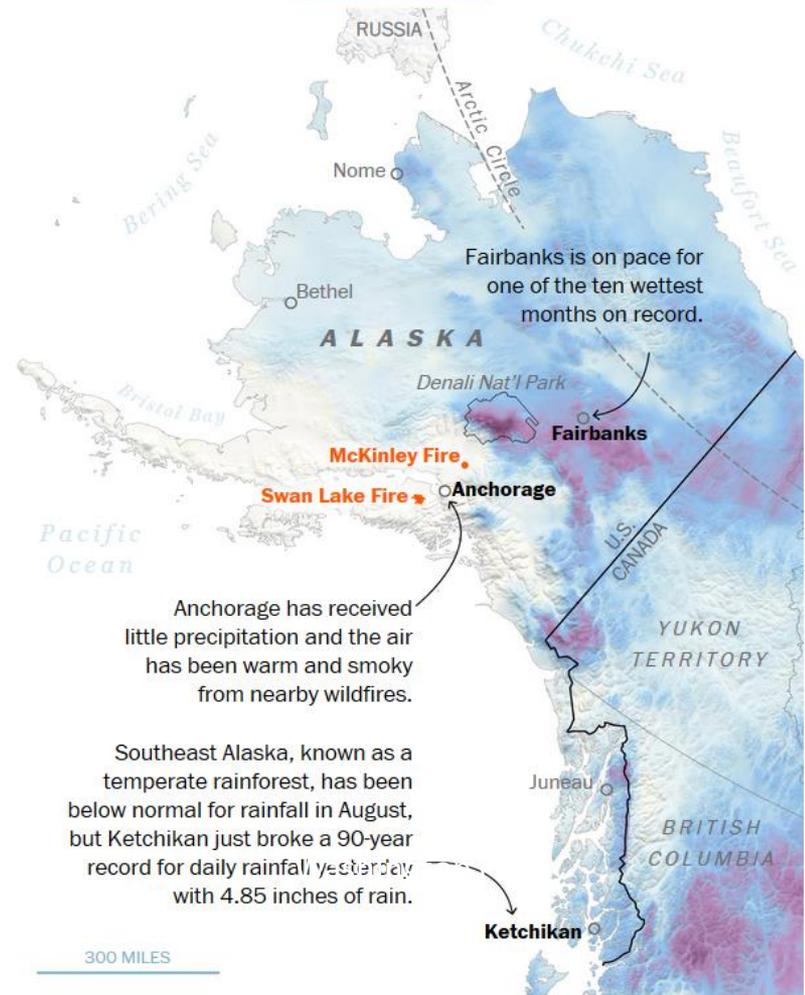
Intensity:

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data



14-day observed precipitation, Aug.20

Less than 1 inch 8 or more inches



Fairbanks is on pace for one of the ten wettest months on record.

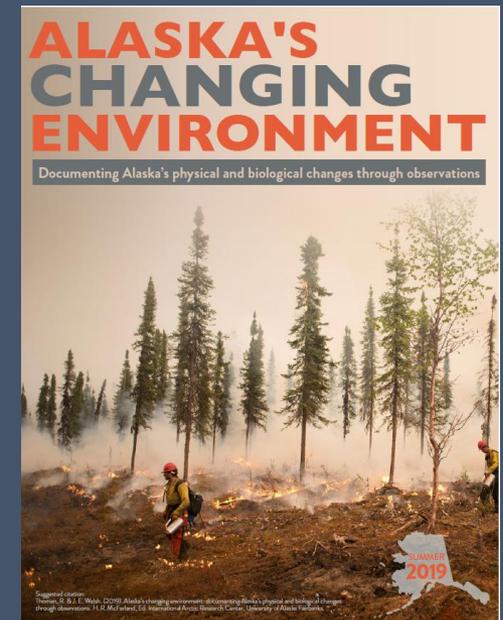
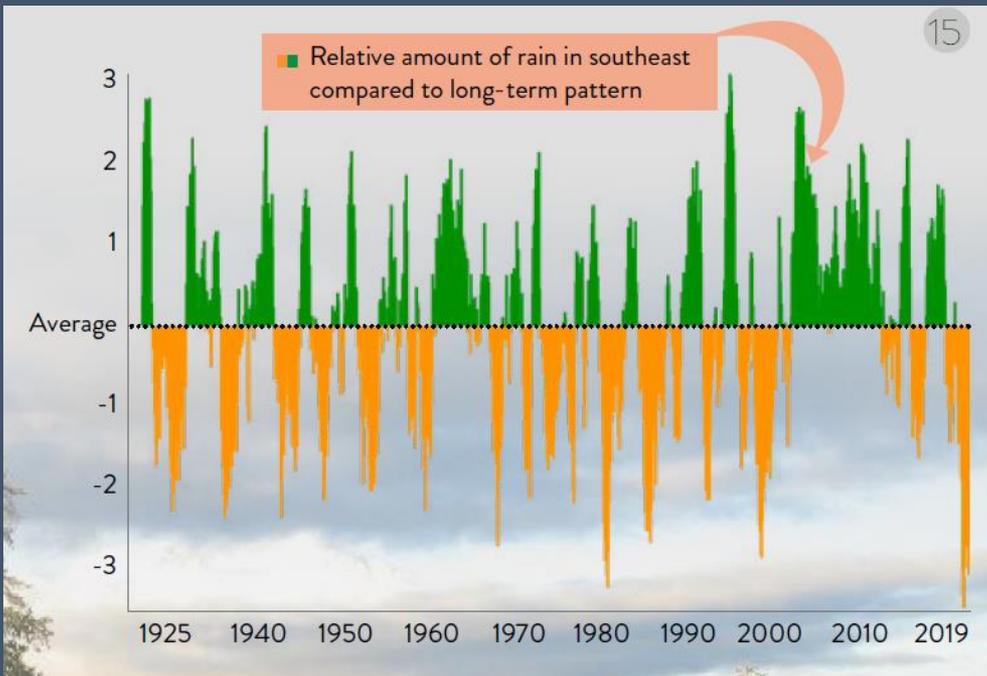
Anchorage has received little precipitation and the air has been warm and smoky from nearby wildfires.

Southeast Alaska, known as a temperate rainforest, has been below normal for rainfall in August, but Ketchikan just broke a 90-year record for daily rainfall yesterday with 4.85 inches of rain.

300 MILES

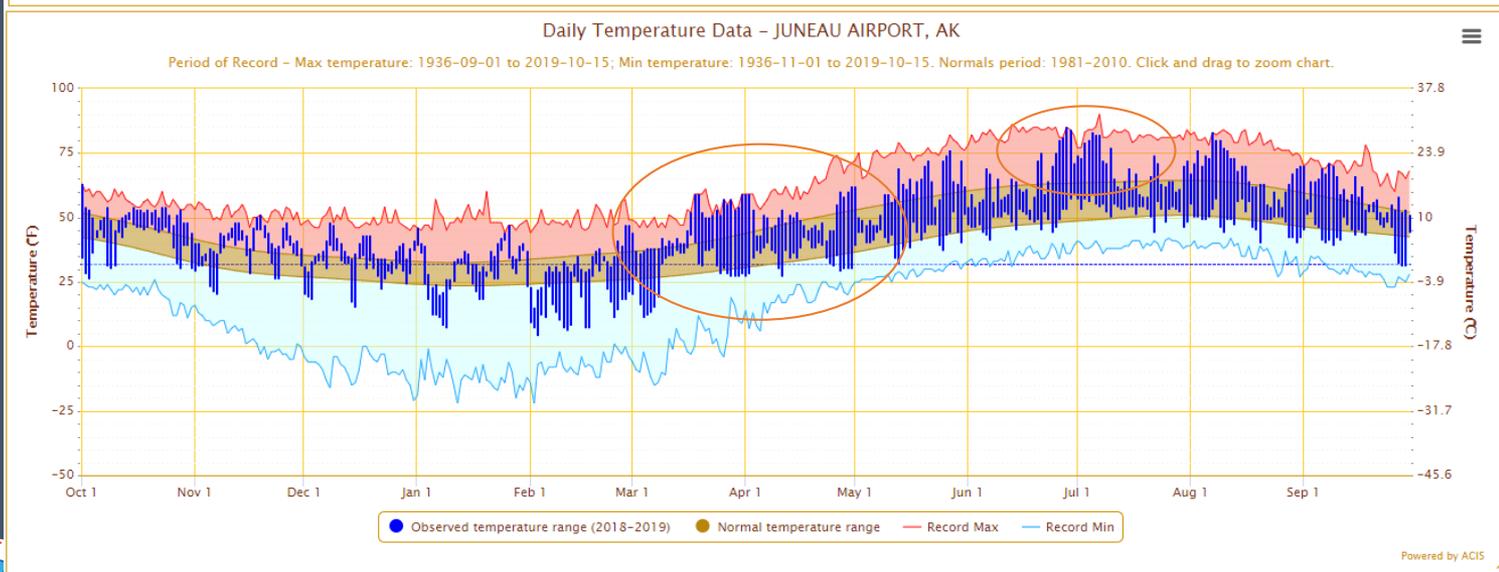
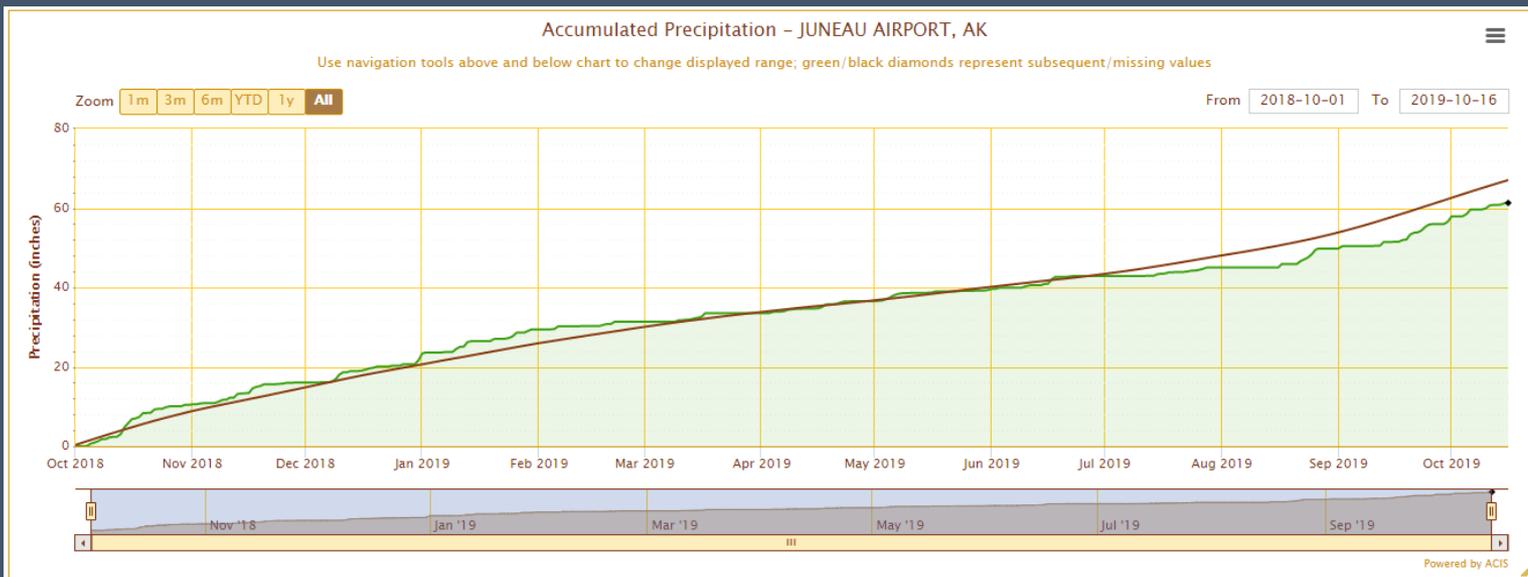
Southeast

Standardized Precipitation Index for Southeast



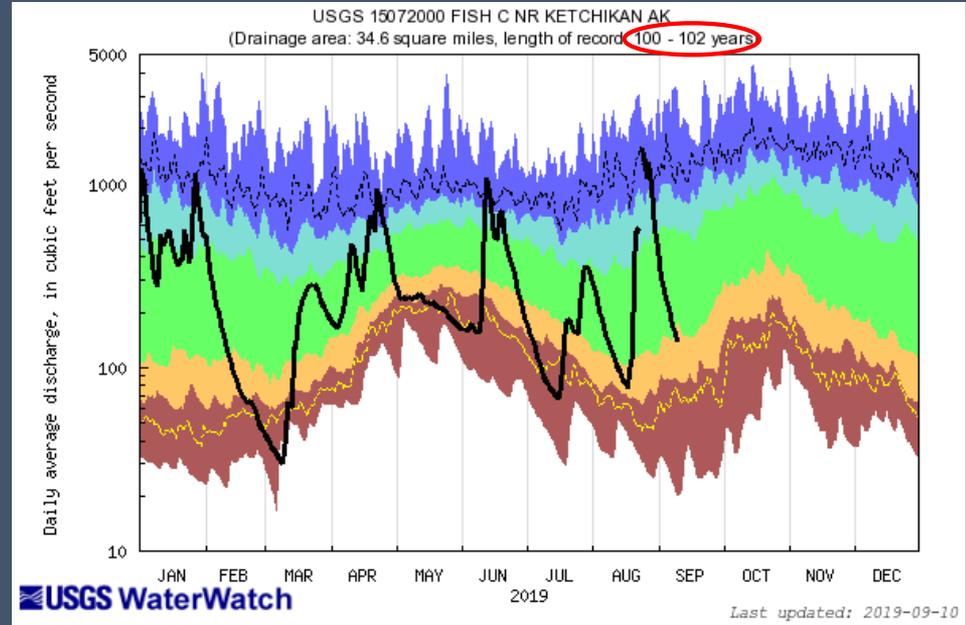
Thoman, R. & J. E. Walsh. (2019). Alaska's changing environment: documenting Alaska's physical and biological changes through observations. H. R. McFarland, Ed. International Arctic Research Center, University of Alaska Fairbanks.

Juneau



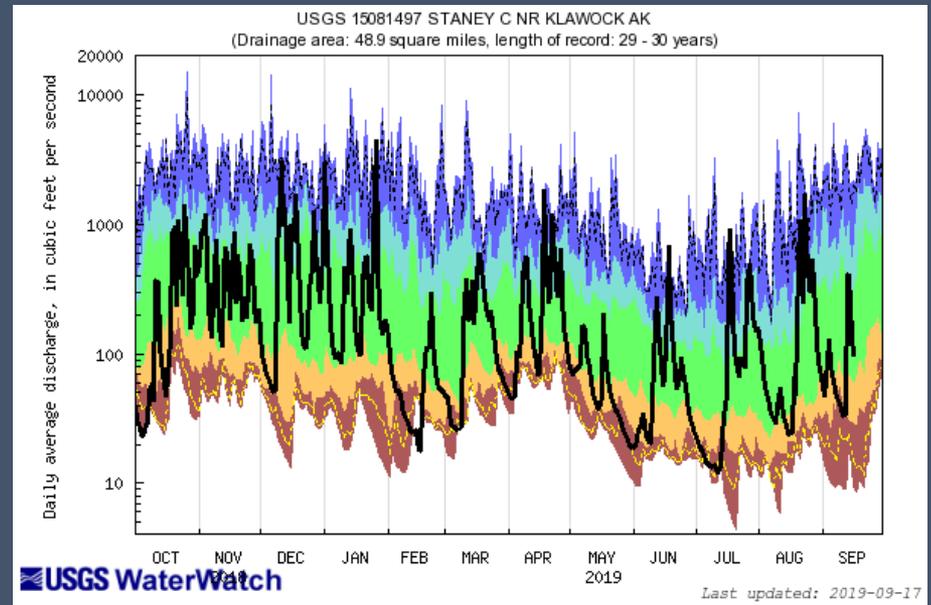
Fish Creek near Ketchikan

Extension - Percentile classes						
Less than normal	5	10-24	25-75	76-99	99	More than normal
Much below normal		Below normal	Normal	Above normal		Much above normal



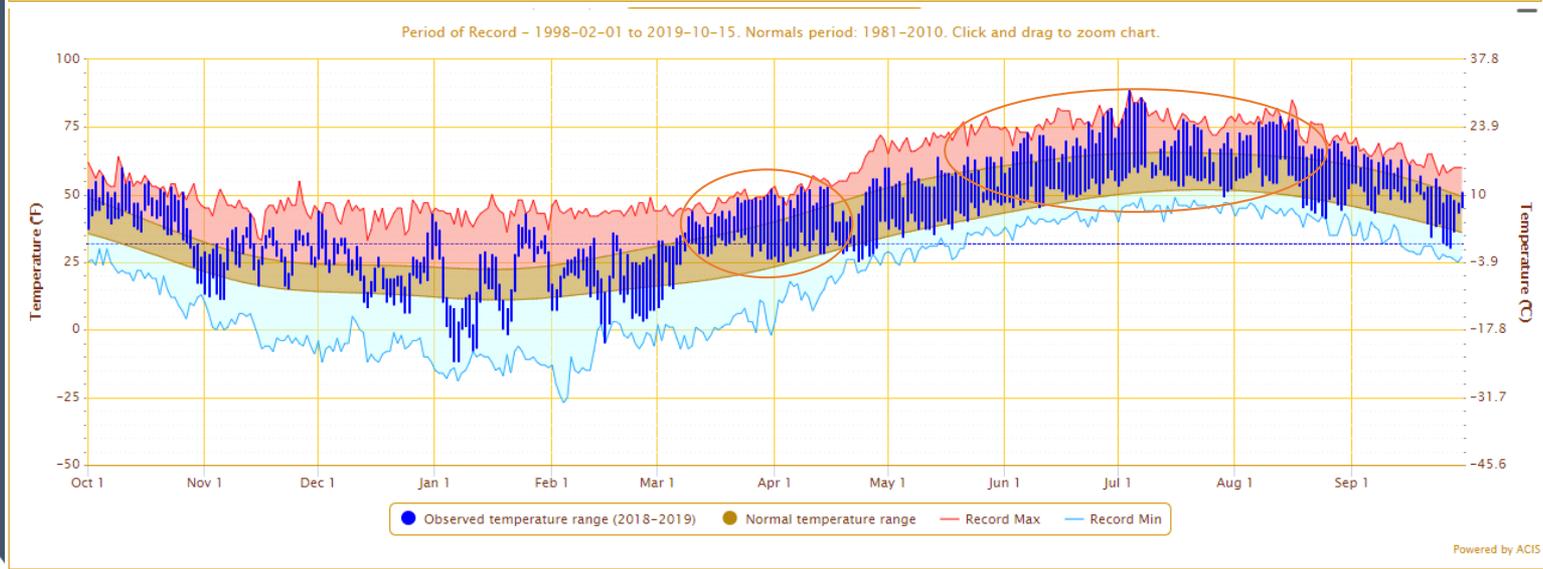
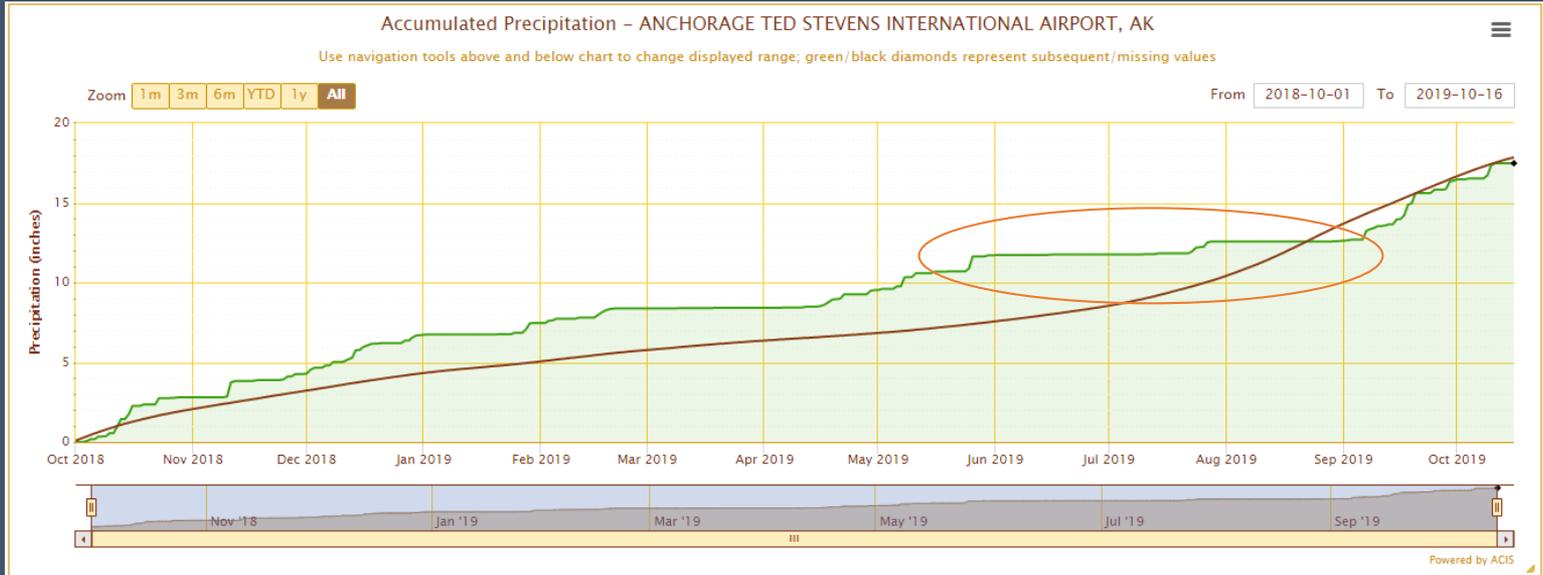
Staney Creek nr Klawock

Extension - Percentile classes						
-----	-----	-----	-----	-----	-----	
Percentile non-normality	5	10-24	25-75	75-93	95	100th percentile -highest
Water balance	Below normal	Normal	Above normal	Much above normal		Flake



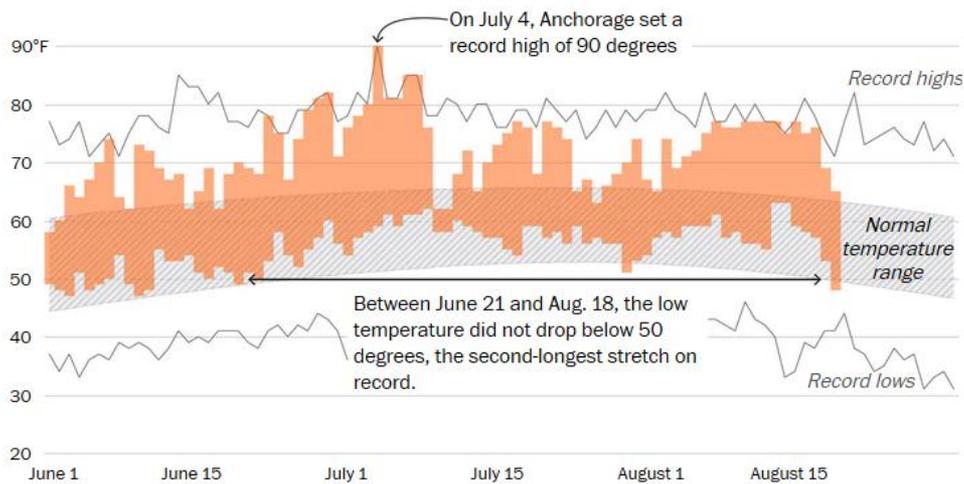
SouthCentral

Anchorage



Anchorage Climate Statistics

Daily temperatures in Anchorage



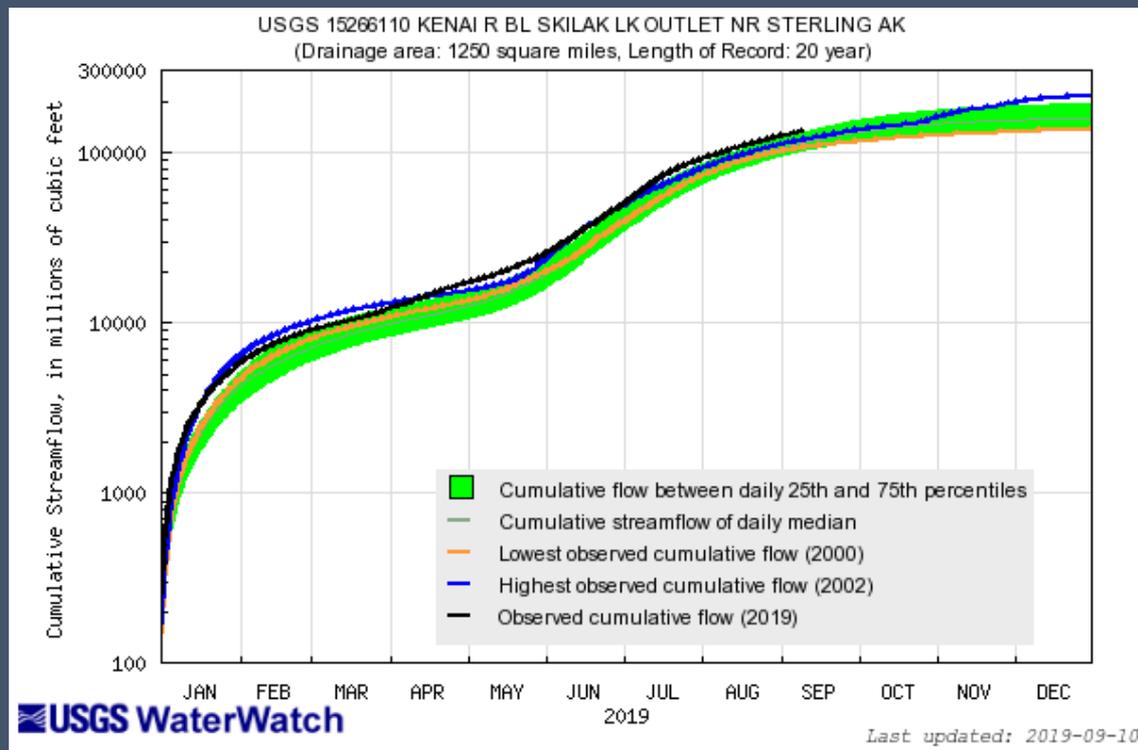
Warmest Day Ever (By Average Temperature)	74.5
Warmest Month (By Average Temperature)	65.3
Warmest High Temperature	90
Most 80 degree Days in a Year	8
Consecutive Days of Highs 80 degrees or more	6
Most 75 degree Days in a Year	31
Consecutive Days of Highs 75 degrees or more	12
Most 70 degree Days in a Year	49

NWS

Washington Post

Kenai River below Skilak

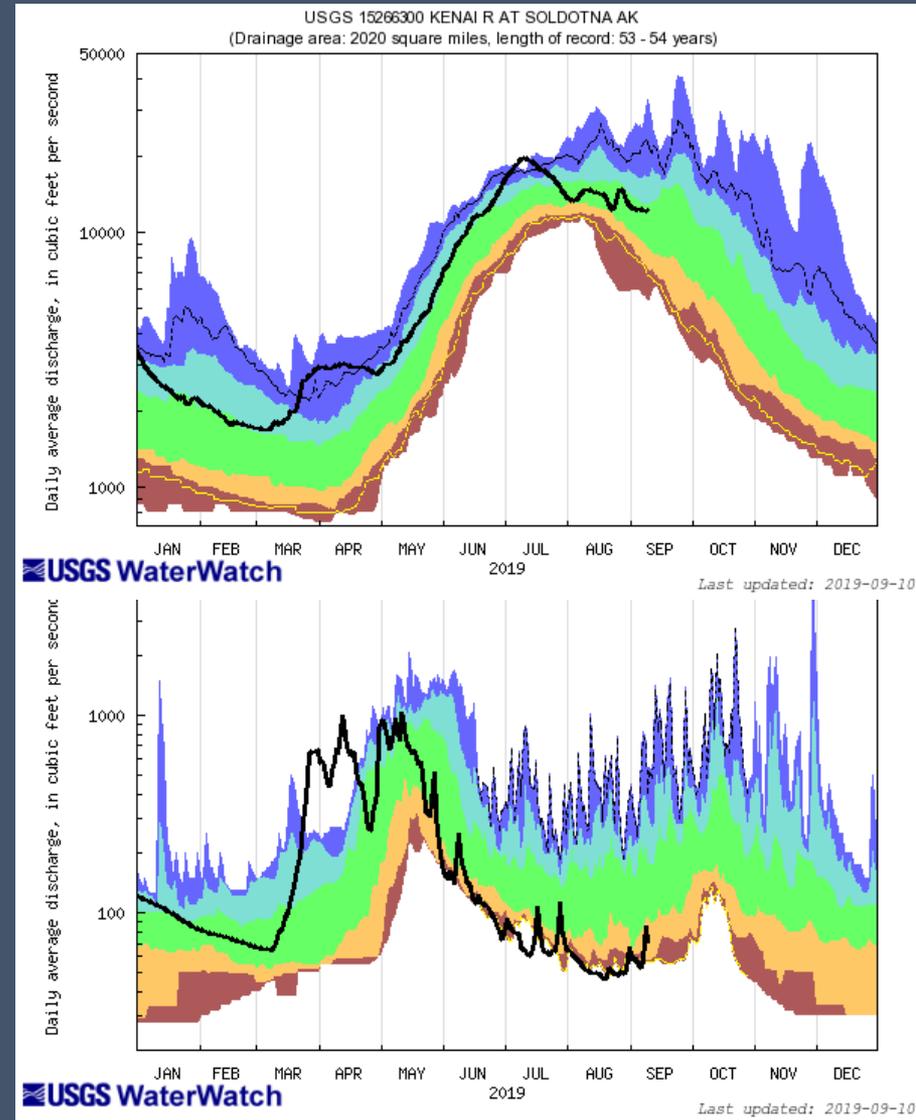
- 12 percent of basin is glaciated



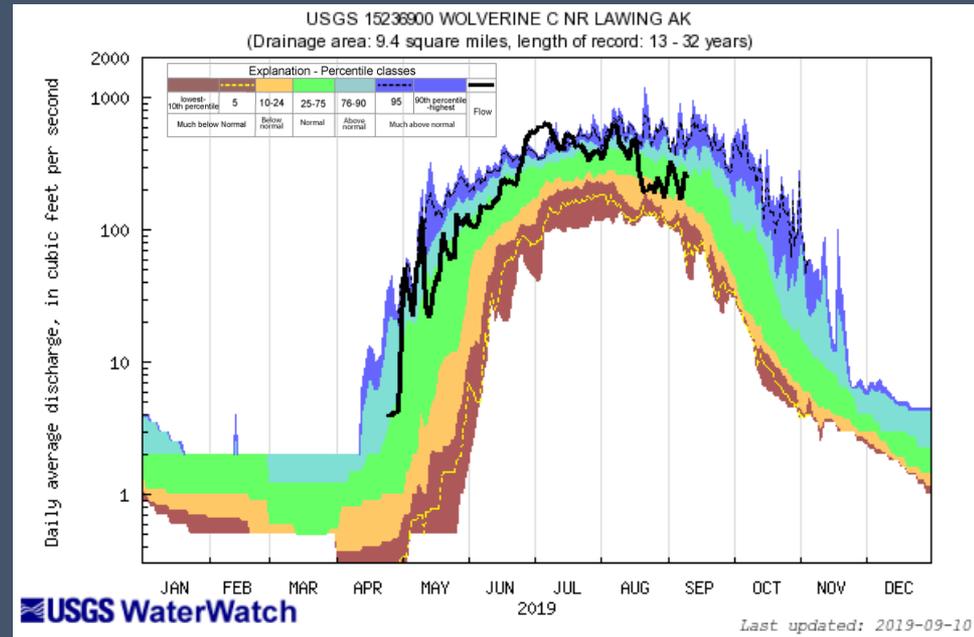
Kenai River at Soldotna – Record daily high flows mid June (12 percent glaciated)



Anchor River – Record daily low flows mid June

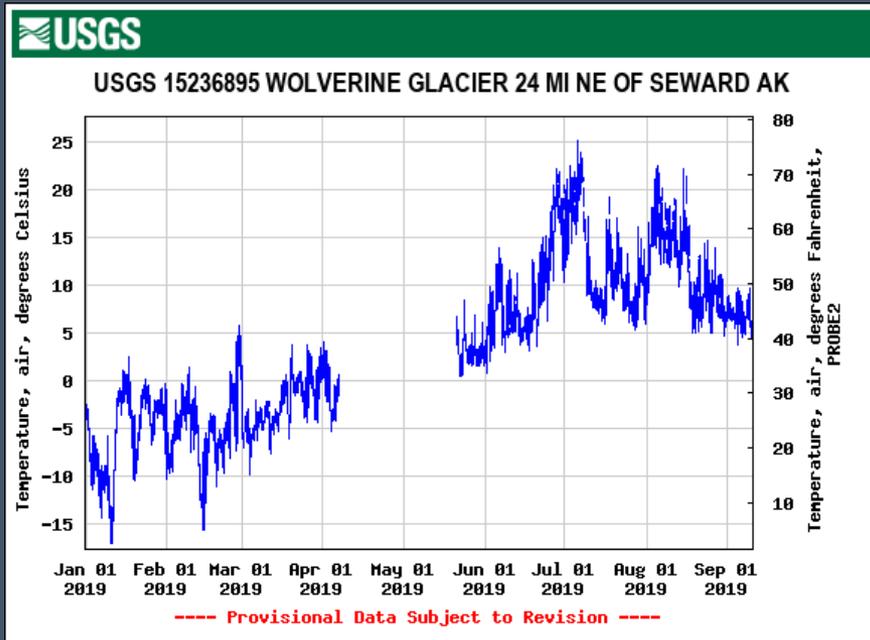


Wolverine Glacier

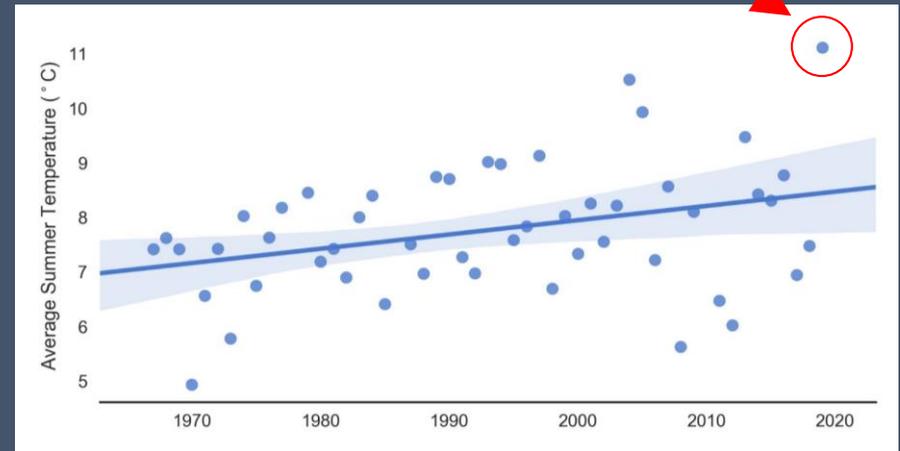


No precipitation
Basin-72 percent glaciated

Wolverine Glacier-50 years of air temp

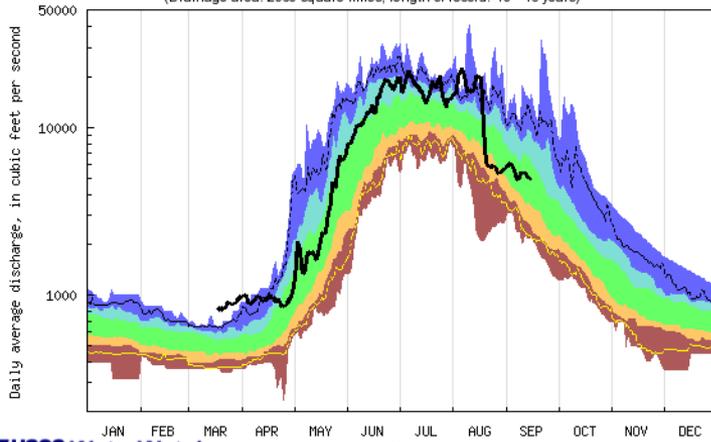


2019 warmest summer on record at Wolverine Glacier second warmest at Gulkana Glacier (2018 warmest)



12 meters of thinning near terminus in 2019

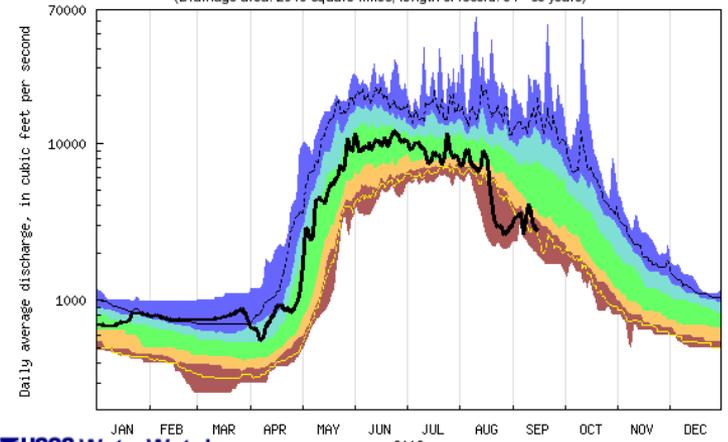
USGS 15284000 MATANUSKA R AT PALMER AK
(Drainage area: 2060 square miles, length of record: 43 - 46 years)



USGS WaterWatch

Last updated: 2019-09-16

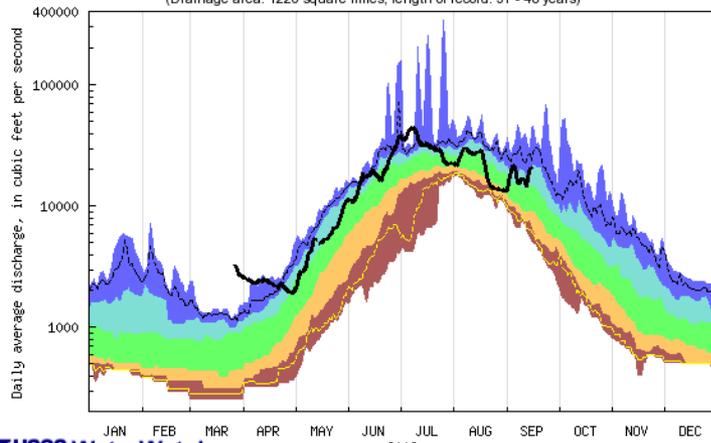
USGS 15292700 TALKEETNA R NR TALKEETNA AK
(Drainage area: 2010 square miles, length of record: 54 - 55 years)



USGS WaterWatch

Last updated: 2019-09-16

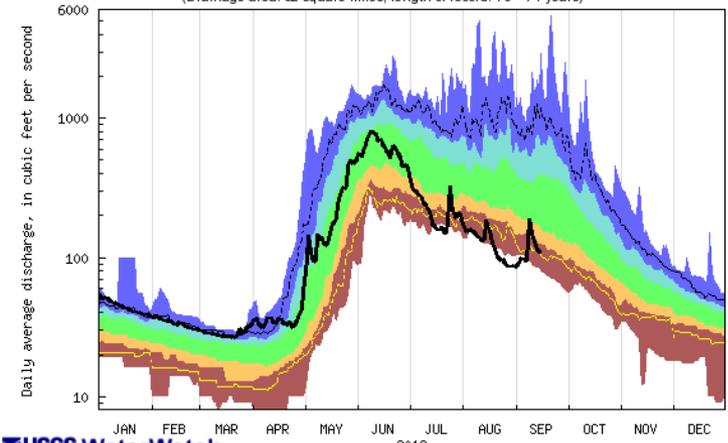
USGS 15281000 KNIK R NR PALMER AK
(Drainage area: 1220 square miles, length of record: 31 - 48 years)



USGS WaterWatch

Last updated: 2019-09-16

USGS 15290000 L SUSITNA R NR PALMER AK
(Drainage area: 62 square miles, length of record: 70 - 71 years)



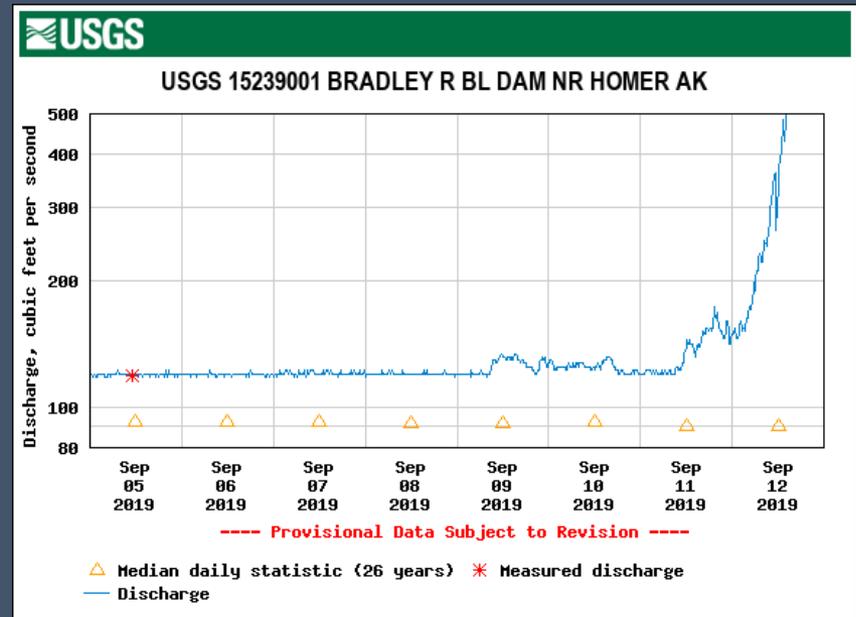
USGS WaterWatch

Last updated: 2019-09-16

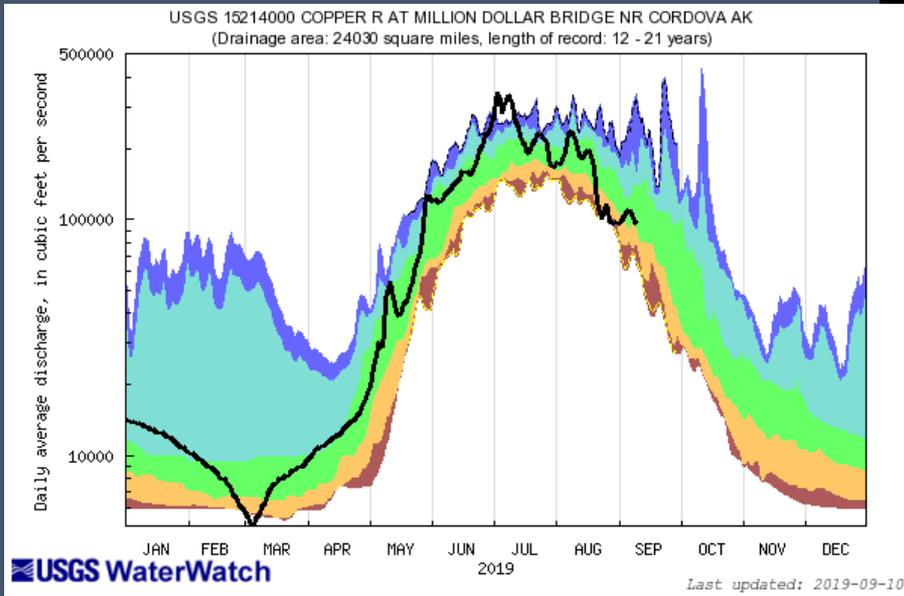
Bradley River Hydroelectric



Increased inflow and reduced power generation



Copper River

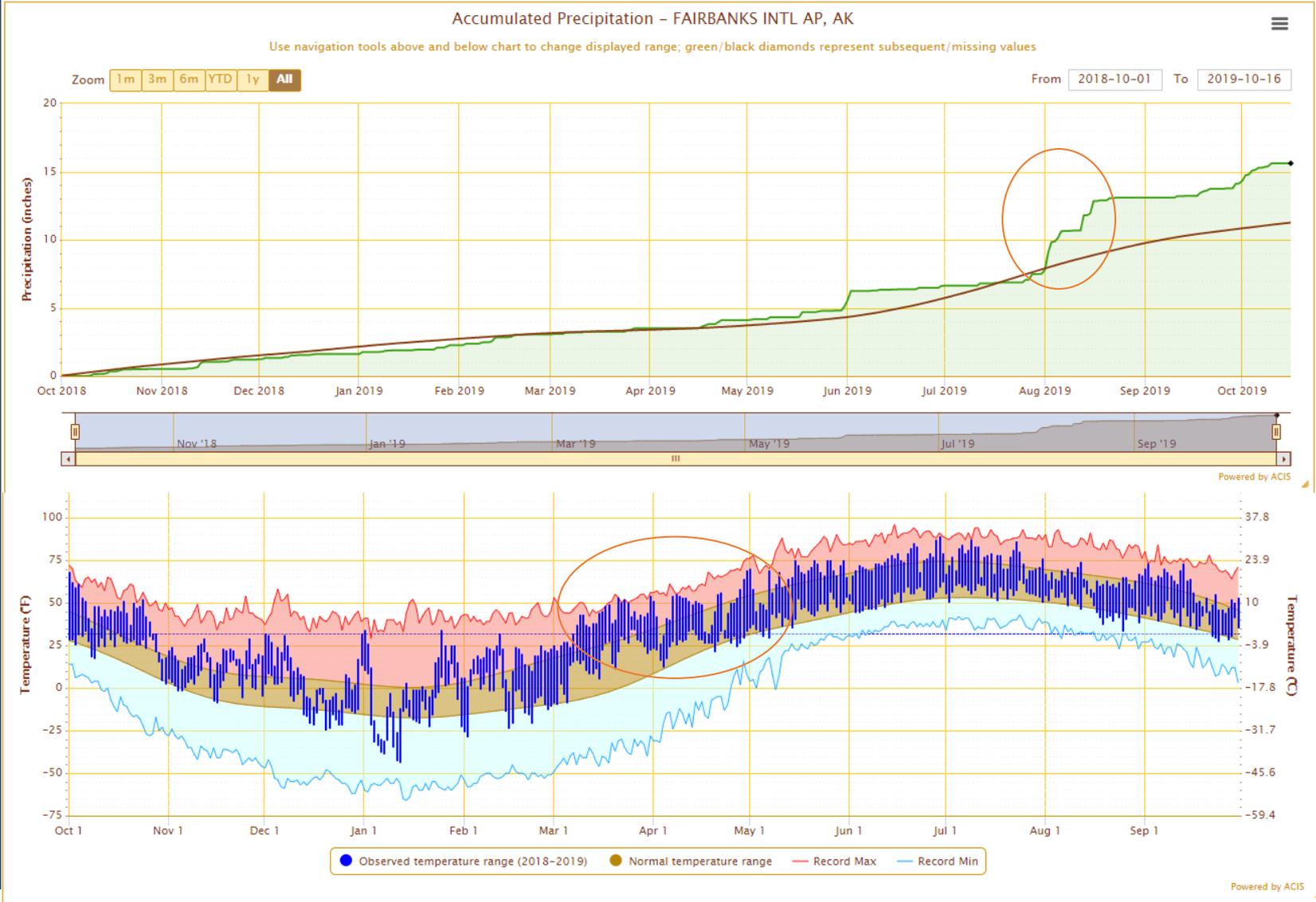


Interior

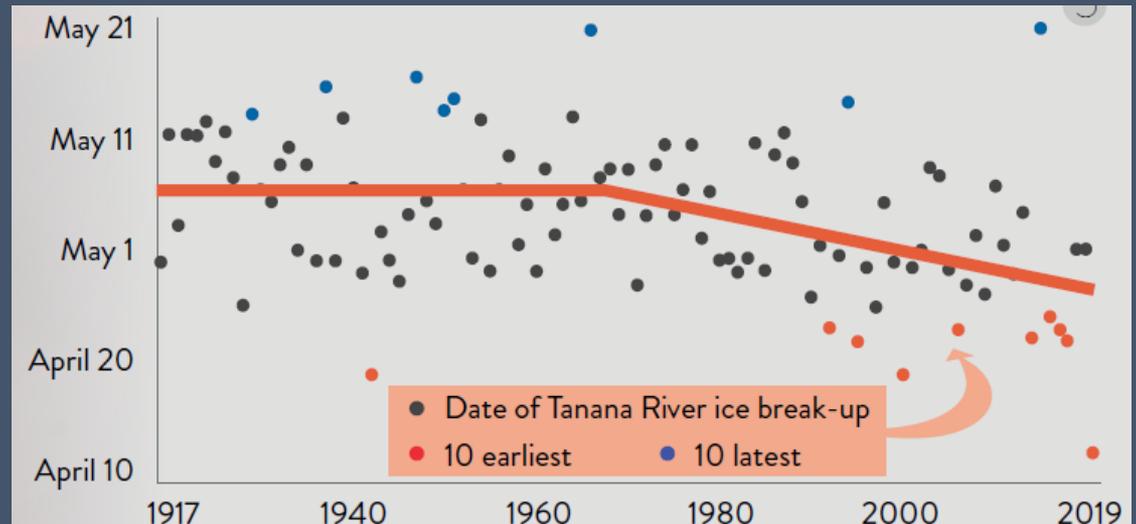
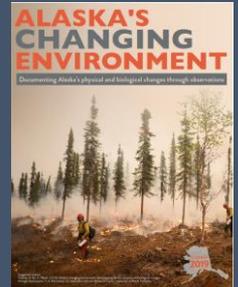
Interior Alaska



Fairbanks



Tanana River at Nenana



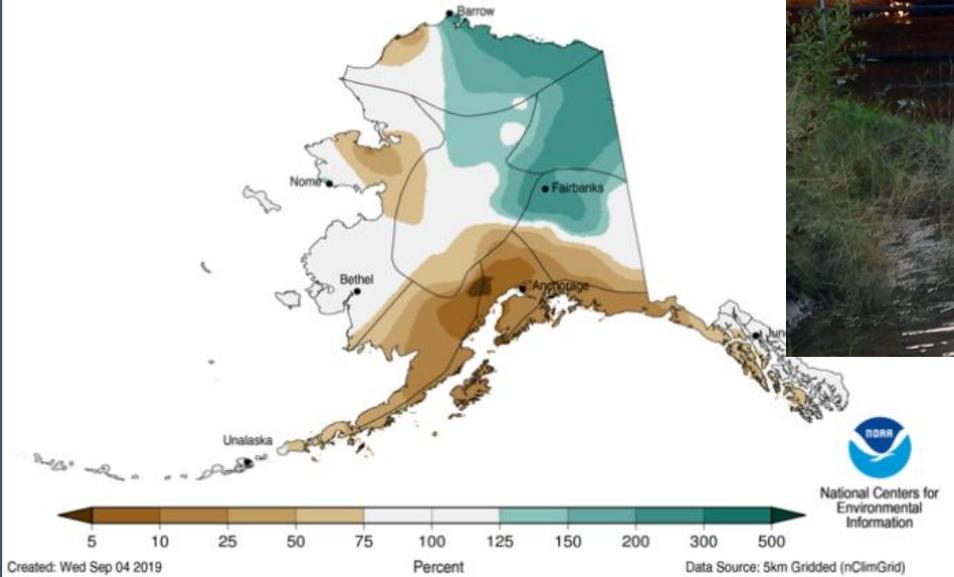
Fairbanks



Precipitation Percent of Average

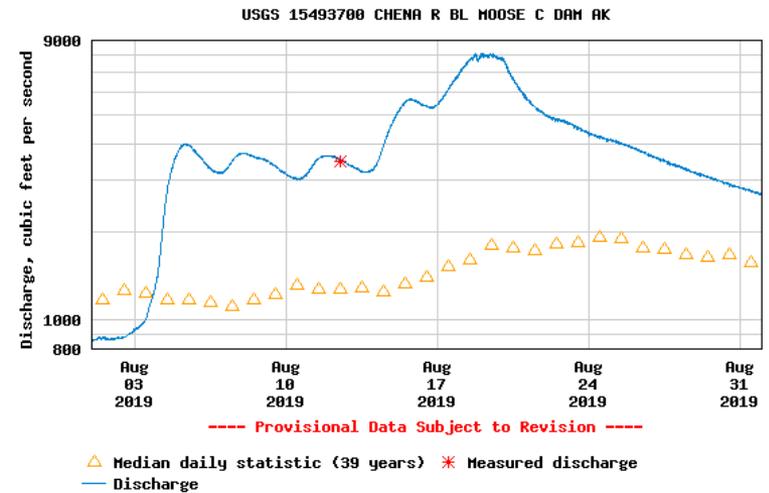
August 2019

Average Period: 1925-2000



Discharge, cubic feet per second

Most recent instantaneous value: 1840 09-11-2019 09:00 AKDT



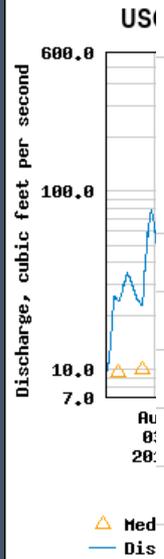
Interior Alaska



Summary of Recent Flood and High Flow Conditions

(2019-08-10 -- 2019-08-20)

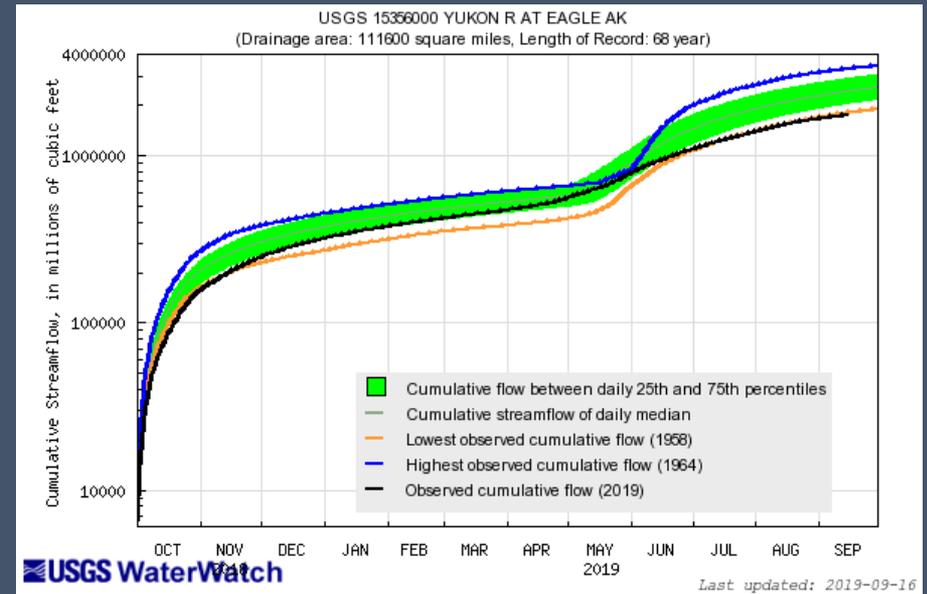
["--", no data; "<", less than all historical peaks]



USGS station number	USGS station name	Drain. area [mi ²]	NWS flood stage [ft]	No. of days above flood stage	NWS flood class	Highest peak from 2019-08-10 to 2019-08-20				Historical Peaks	
						Date	Stage [ft]	Stream flow (date) [ft ³ /s]	Rank	No. of years	Max. (year) [ft ³ /s]
15484000	SALCHA R NR SALCHAKET AK	2200	14	3	▲	2019-08-18	15.38	21700	24	67	97000 (1967)
15485500	TANANA R AT FAIRBANKS AK	--	24.5	2	▲	2019-08-19	24.66	84900	8	45	125000 (1967)
15493000	CHENA R NR TWO RIVERS AK	934	19.5	2	▲	2019-08-17	19.90	7510	27	52	20000 (1967)
15493700	CHENA R BL MOOSE C DAM AK	1460	24.5	3	▲	2019-08-19	25.19	8140	3	17	8340 (1995)
15515500	TANANA R AT NENANA AK	25560	12.5	4	▲	2019-08-19	12.89	105000	5	57	186000 (1967)
15908000	SAGAVANIRKTOK R NR PUMP STA 3 AK	1850	20	1	▲	2019-08-15	20.24	30600	5	35	48300 (2002)

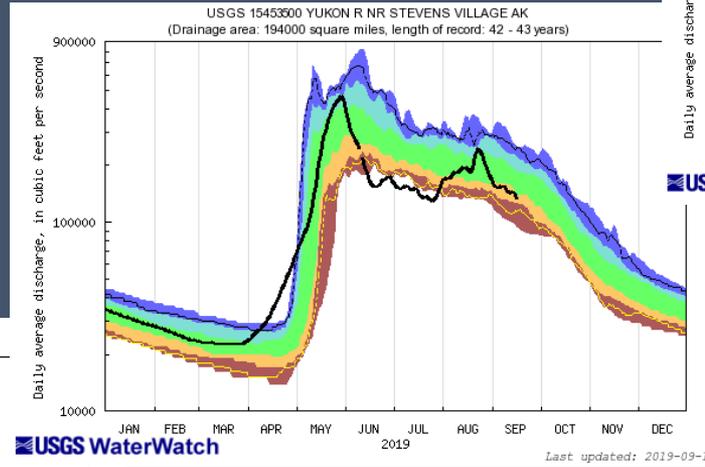
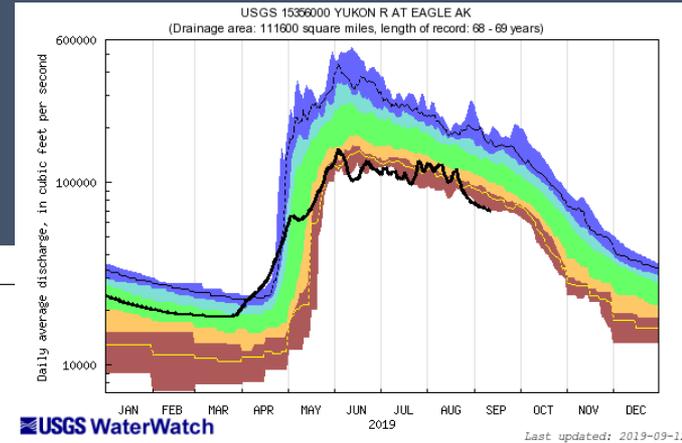


Interior Alaska-Yukon River at Eagle

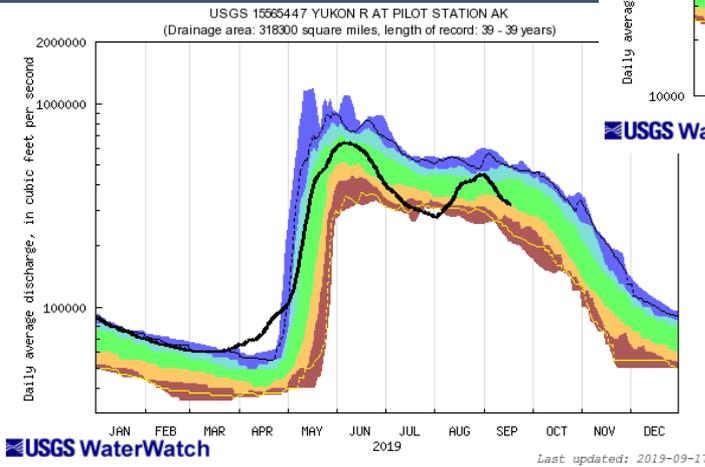


Yukon River

Eagle



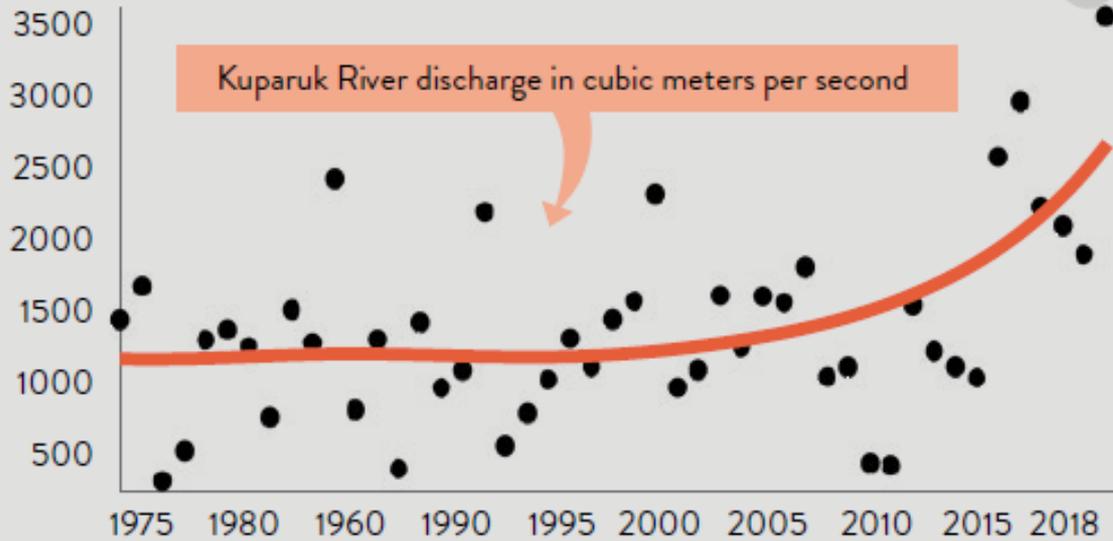
Stevens Village



Pilot Station

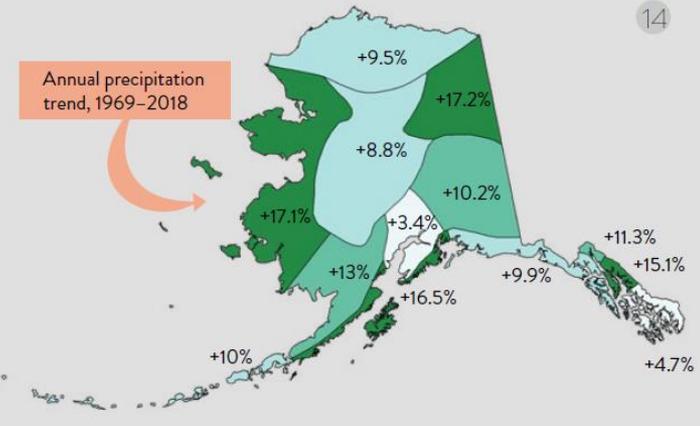
North Slope

North Slope



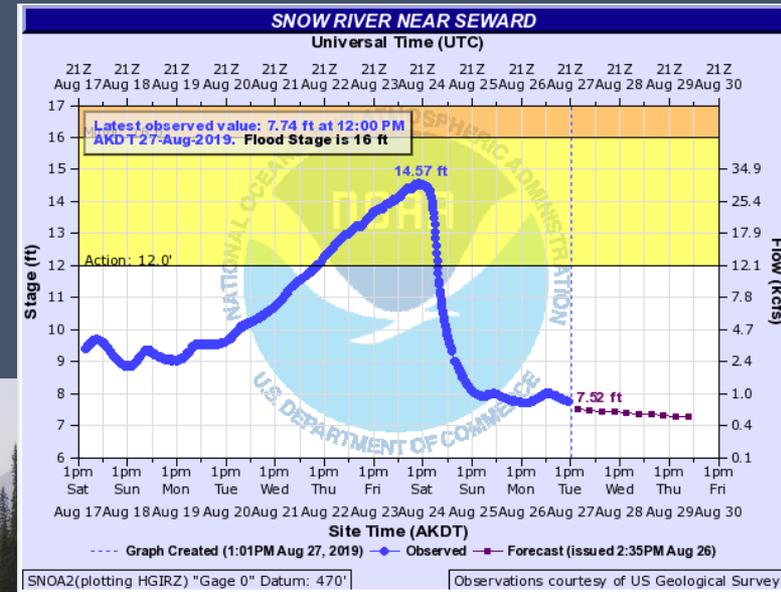
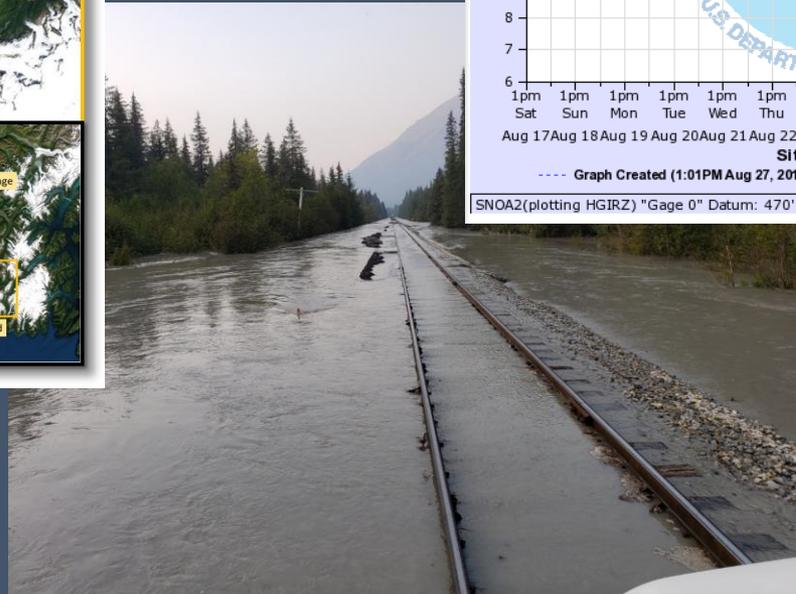
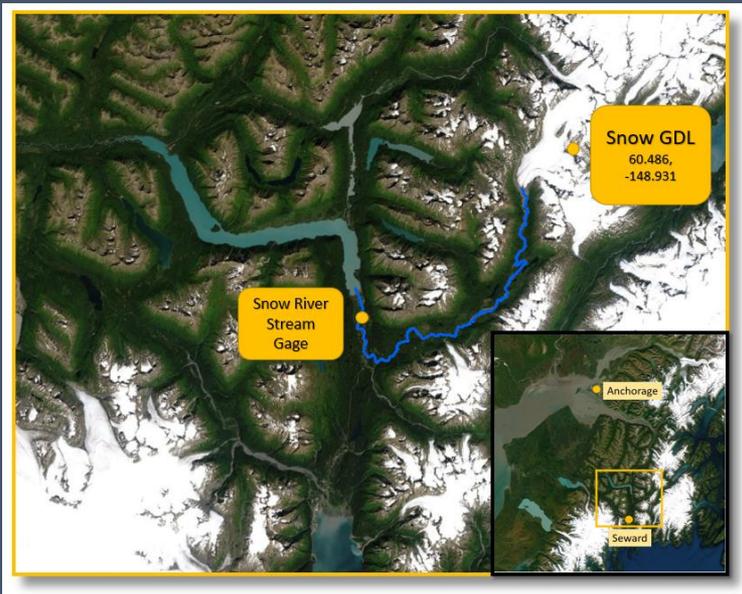
ANNUAL PRECIPITATION INCREASING

Over the past half century, annual precipitation has increased in all regions of the state. The best available estimates over the century time-scale suggest Alaska as a whole was relatively wet early in the 20th century, then drier from the 1940s–1990s, and wetter again recently.



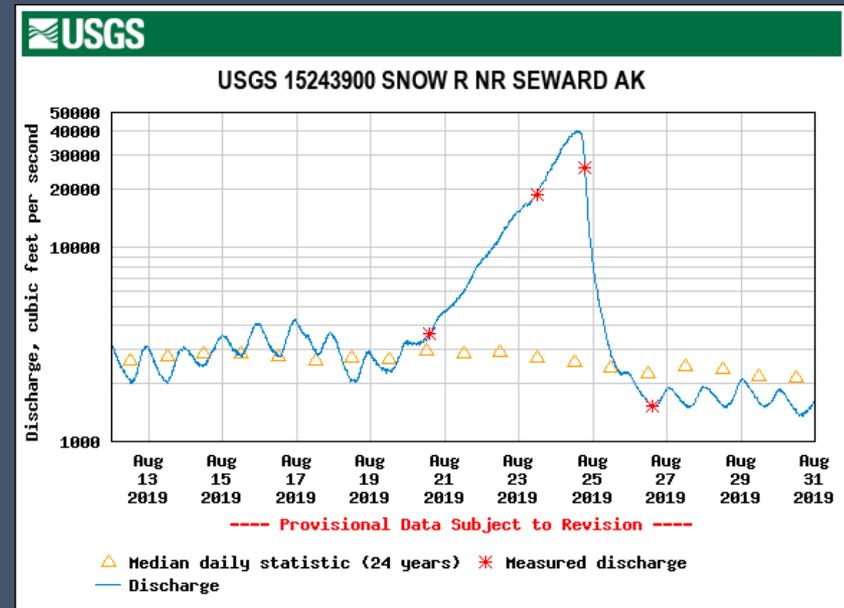
Impacts

Snow Glacier – Dammed Lake



Glacial Lake Outbursts

Copper, Taku, Kennicott, Valdez Glacier,
Mendenhall, Snow, Tazlina, and Kenai Rivers



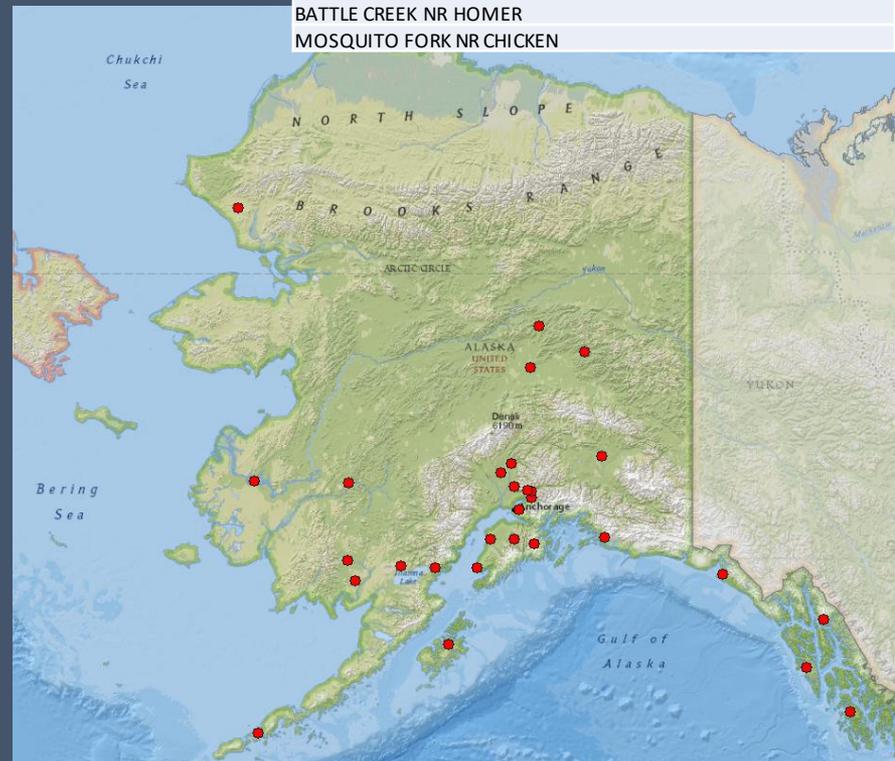
Second highest recorded peak discharge, no associated precipitation with peak

2019 Record Water Temperatures

Record Temps in 2018

HATCHERY CAT FOREST SVC RD 23 NR COFFMAN COVE AK
 GOVERNMENT C NR KETCHIKAN AK
 SAWMILL C NR SITKA AK
 OLD TOM CREEK NR KASAAN AK
 TAIYA RIVER NR SKAGWAY
 BATTLE CREEK NR HOMER
 MOSQUITO FORK NR CHICKEN

Station	2019 Max Water Temperature, °C	Date	Previous Max Water Temperature, °C	Date
15052000 LEMON CREEK NEAR JUNEAU	6.1	June 25, 2019	5.9	May 31, 2018
15081497 STANEY C NR KLAWOCK	24.8	July 4, 2019	24.2	July 27, 2018
15087700 INDIAN RAT SITKA AK	12.4	July 22, 2019	11.8	August 9, 2018
15129500 SITUK R NR YAKUTAT AK	20.4	July 5, 2019	19.1	July 18, 2016
15200280 GULKANA RAT SOURDOUGH AK	23.4	June 30, 2019	20.5	July 13, 2016
15215900 GLACIER R TRIB NR CORDOVA AK	11.2	July 6, 2019	10.9	July 19, 2016
15236900 WOLVERINE CREEK NEAR LAWING, AK	4.1	June 10, 2019	2.8	June 9, 2016
15239900 ANCHOR RIVER NEAR ANCHOR POINT, AK	22.8	July 8, 2019	18.2	July 26, 2018
15261000 COOPER CREEK NEAR COOPER LANDING, AK	16.2	August 13, 2019	15.3	August 5, 2015
15266300 KENAI RIVER AT SOLDOTNA, AK	18.2	July 10, 2019	16.9	August 7, 2015
15276000 SHIP CREEK NEAR ANCHORAGE, AK	15.6	July 7, 2019	15.1	August 4, 2015
15283700 MOOSE CREEK NEAR PALMER, AK	15.6	July 7, 2019	14.5	July 28, 2013
15290000 LITTLE SUSITNA RIVER NEAR PALMER, AK	16.2	July 7, 2019	14.6	August 4, 2015
15292700 TALKETNA RIVER NEAR TALKETNA, AK	15	July 6, 2019	14.5	June 15, 2019
15294005 WILLOW CREEK NEAR WILLOW, AK	19.9	July 8, 2019	17.2	August 6, 2015
15294080 KROTO CREEK NEAR TRAPPER CREEK AK	25	July 7, 2019	21.8	July 6, 2017
15295700 TERROR RIVER AT MOUTH NEAR KODIAK, AK	17	July 7, 2019	15	July 15, 2008
15297610 RUSSELL CREEK NEAR COLD BAY, AK	18.2	August 17, 2019	17.5	July 31, 2015
15300300 ILIAMNA RIVER NEAR PEDRO BAY, AK	16.1	August 16, 2019	14.7	August 2, 2014
15302000 NUYAKUK RIVER NEAR DILLINGHAM, AK	21	July 9, 2019	19.6	July 13, 2016
15302200 KOKTULI RIVER NEAR ILIAMNA, AK	19.8	July 7, 2019	17.2	July 26, 2013
15302812 KOKWOK R 22 MI AB NUSHAGAK R	22.8	July 6, 2019	19.3	July 23, 2017
15304010 CROOKED CREEK	16.1	July 7, 2019	13.2	June 16, 2017
15493000 CHENA RIVER NEAR TWO RIVERS	14.4	July 23, 2019	13.7	August 7, 2017
15515500 TANANA RIVER AT NEVANA	19.6	June 21, 2019	19.6	June 19, 2015
15519100 TOLOVANA R BL ROSEBUD C NR LIVENGOOD	16.5	July 24, 2019	16.3	June 21, 2015
15565447 YUKON RIVER AT PILOT STATION	21.6	July 15, 2019	19.7	July 15, 2016
15747000 WULIK RIVER	16.5	July 14, 2019	14.9	July 29, 2018
15803000 MEADE RIVER AT ATKASUK	20*not a record	July 9, 2019	20.5	July 23, 2015



Fish Die Offs

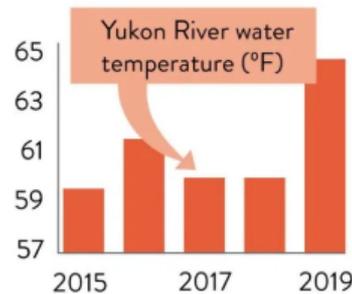
Heat and salmon die-offs

In June and July of 2019, thousands of salmon died as they migrated to their spawning grounds of western Alaska. Although the cause is not confirmed, the leading suspect is unusually warm water temperatures above the range that causes stress to adult salmon.

Warm water causes several problems: it contains less life-sustaining dissolved oxygen than cool water, greatly accelerates metabolism, resulting in faster burning of stored energy in the migrating fish, and promotes the growth of parasites and fungus that can weaken fish.

Surveys of the Koyukuk River (a major tributary of the Yukon River) confirmed thousands of dead summer Chum salmon, which most likely succumbed to the heat, as the river did contain sufficient levels of dissolved oxygen. [Peter Westley, College of Fisheries and Ocean Sciences]

Water temperatures, Yukon River, 2015–2019



Credit: Rick Thoman, Alaska Center for Climate Assessment and Policy.
Data source: DOI/USGS



Wildlife

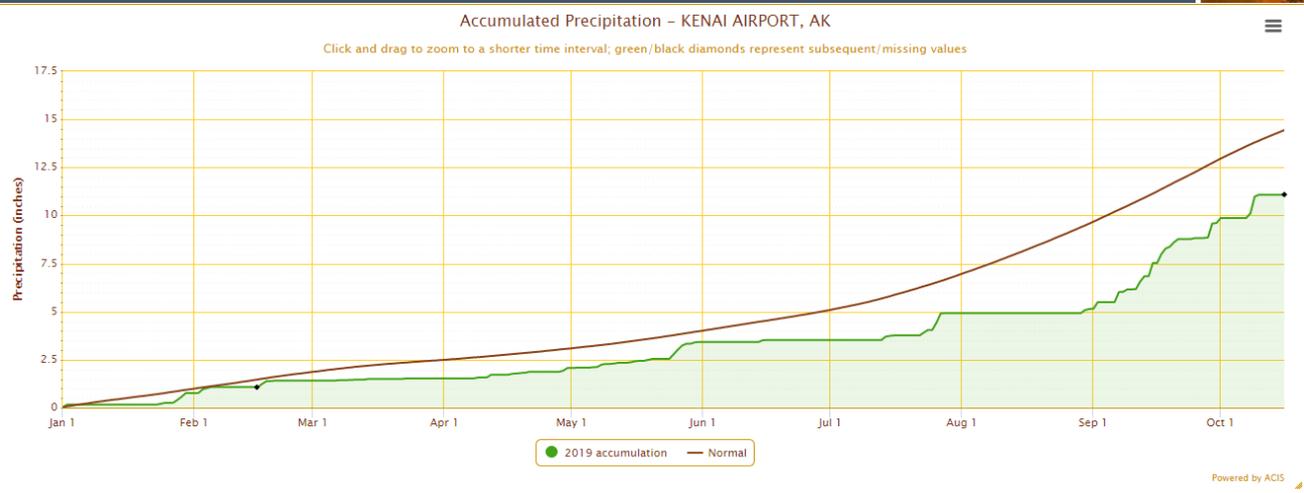
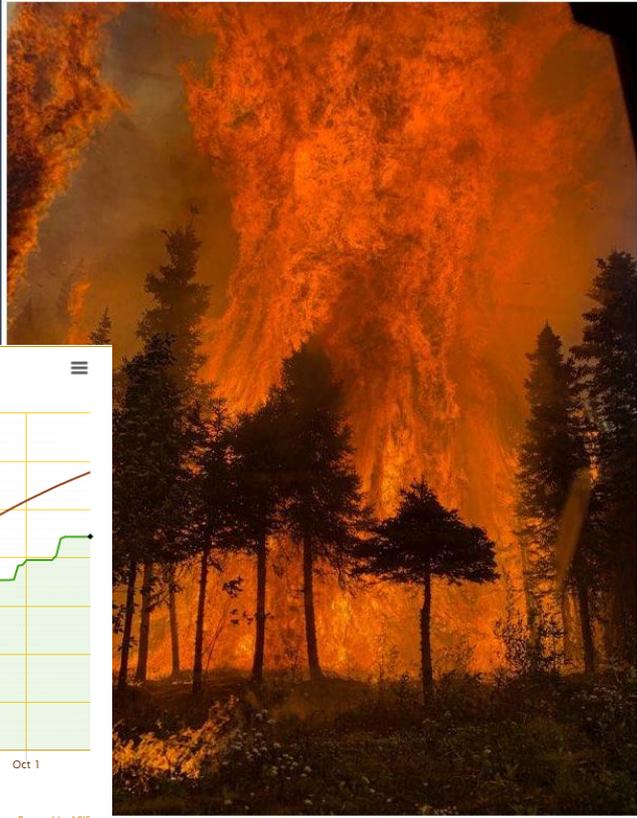
Alaska salmon deaths blamed on record high temperatures

Author: Dan Joling, Associated Press Updated: 1 hour ago Published: 1 hour ago



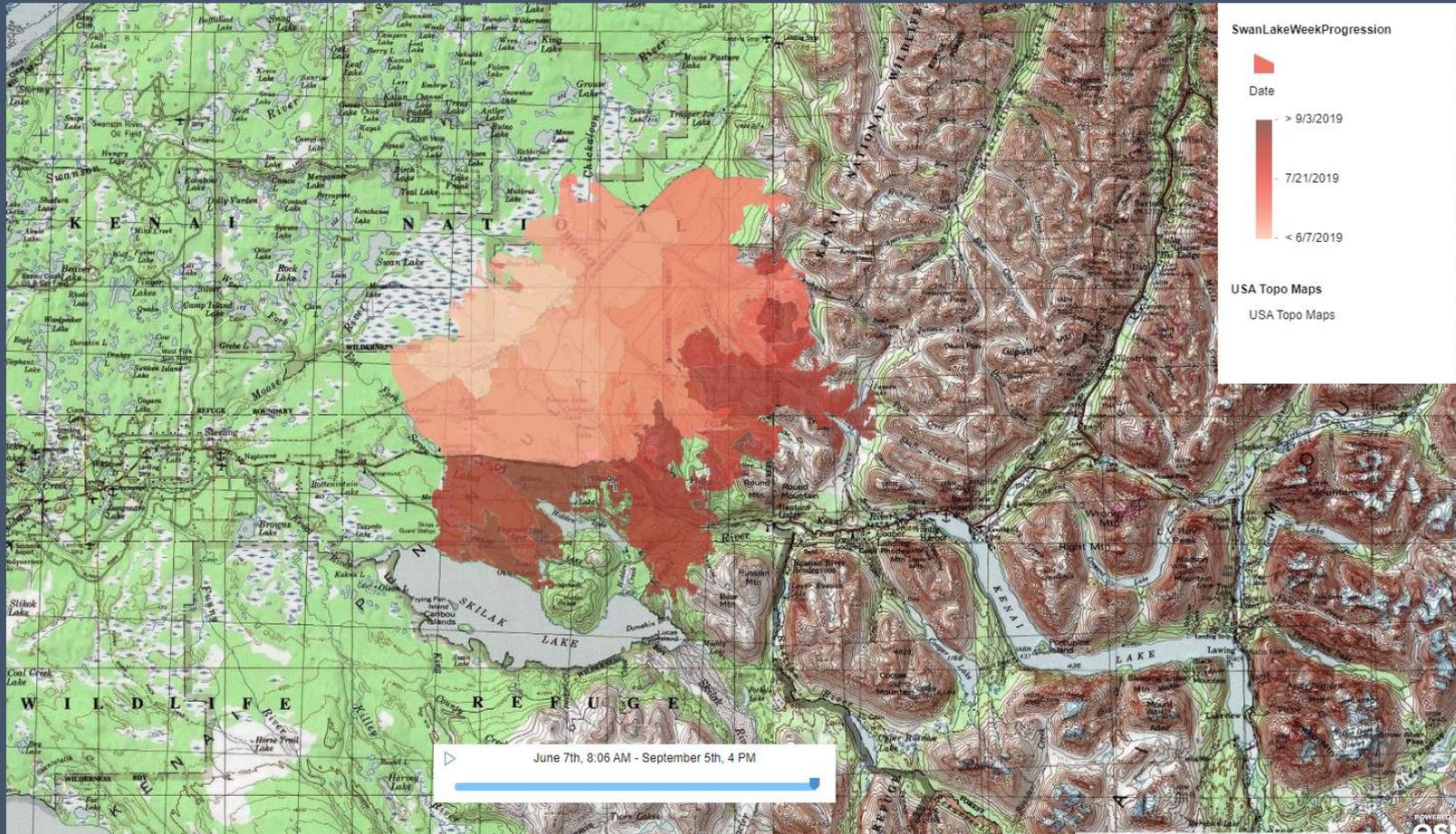
This July 2019 photo provided by Peter Westley shows carcasses of chum salmon lie along the shore of the Koyukuk River near Huslia. Alaska scientists and fisheries managers are investigating the deaths of salmon that may be tied to the state's unusually hot, dry summer. (Peter Westley, University of Alaska Fairbanks via AP)

Swan Lake Fire



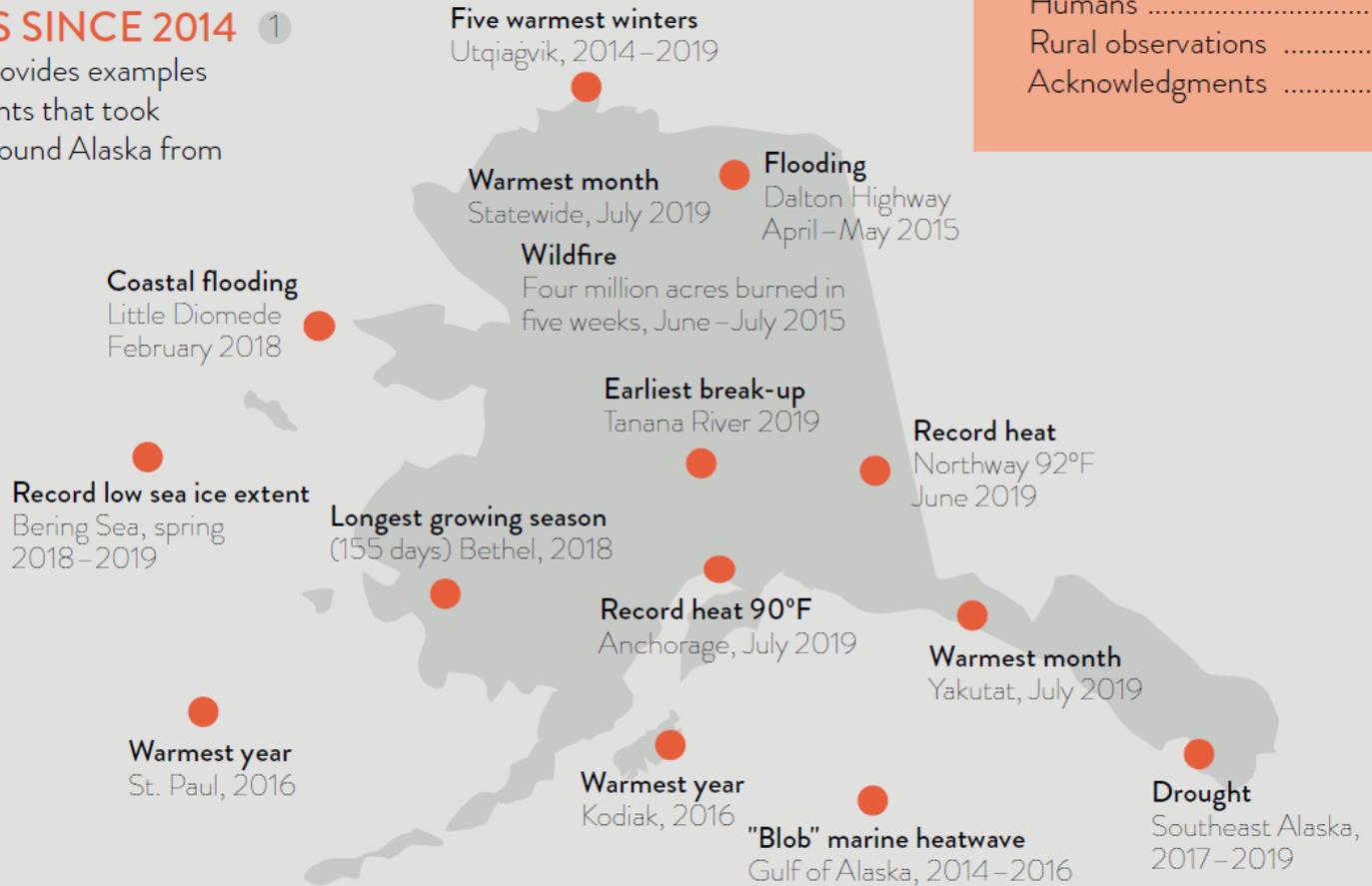
Swan Lake Fire

Burned
160,000
acres
between
June and
September



RECORDS SINCE 2014 ①

This graphic provides examples of notable events that took place in and around Alaska from 2014 to 2019.



Animals & fish	13
Humans	14
Rural observations	15
Acknowledgments	16



International Arctic
Research Center
University of Alaska Fairbanks



Alaska Center for Climate
Assessment and Policy

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Climate Outlook

3 Month Climate Outlook

