

Temperature in the LBD Cooperative Effort Area

2014 – 2018 WEEKLY AVERAGE AND DAILY MAXIMUM DATA COMPILATION

Stream Temperature Program Objectives

- Complement existing stream temperature monitoring efforts;
- Provide the LBD operations subcommittee with timely data to make informed decisions about releases of environmental water;
- Provide stream temperature data to evaluate effectiveness of environmental water releases;
- Identify critical stream reaches for water temperature;
- Assess compliance with Colorado's stream temperature standards;
- Monitor and assess impacts of restoration efforts performed by LBD

Temperature Standard Overview

Chronic Standard

- Maximum Weekly Average
- 7-day moving average
- CS-I
 - 17.0 (Jun – Sep)
 - 9.0 (Oct – May)
- CS-II
 - 18.3 (Apr – Oct)
 - 9.0 (Nov – Mar)

Acute Standard

- Daily Maximum
- Highest 2-hr average in 24-hrs
- CS-I
 - 21.7 (Jun – Sep)
 - 13.0 (Oct – May)
- CS-II
 - 24.3 (Apr – Oct)
 - 13 (Nov – Mar)

All temperature standards in °C

Assessment Period – Previous 5-years

Changes to 2018 Program

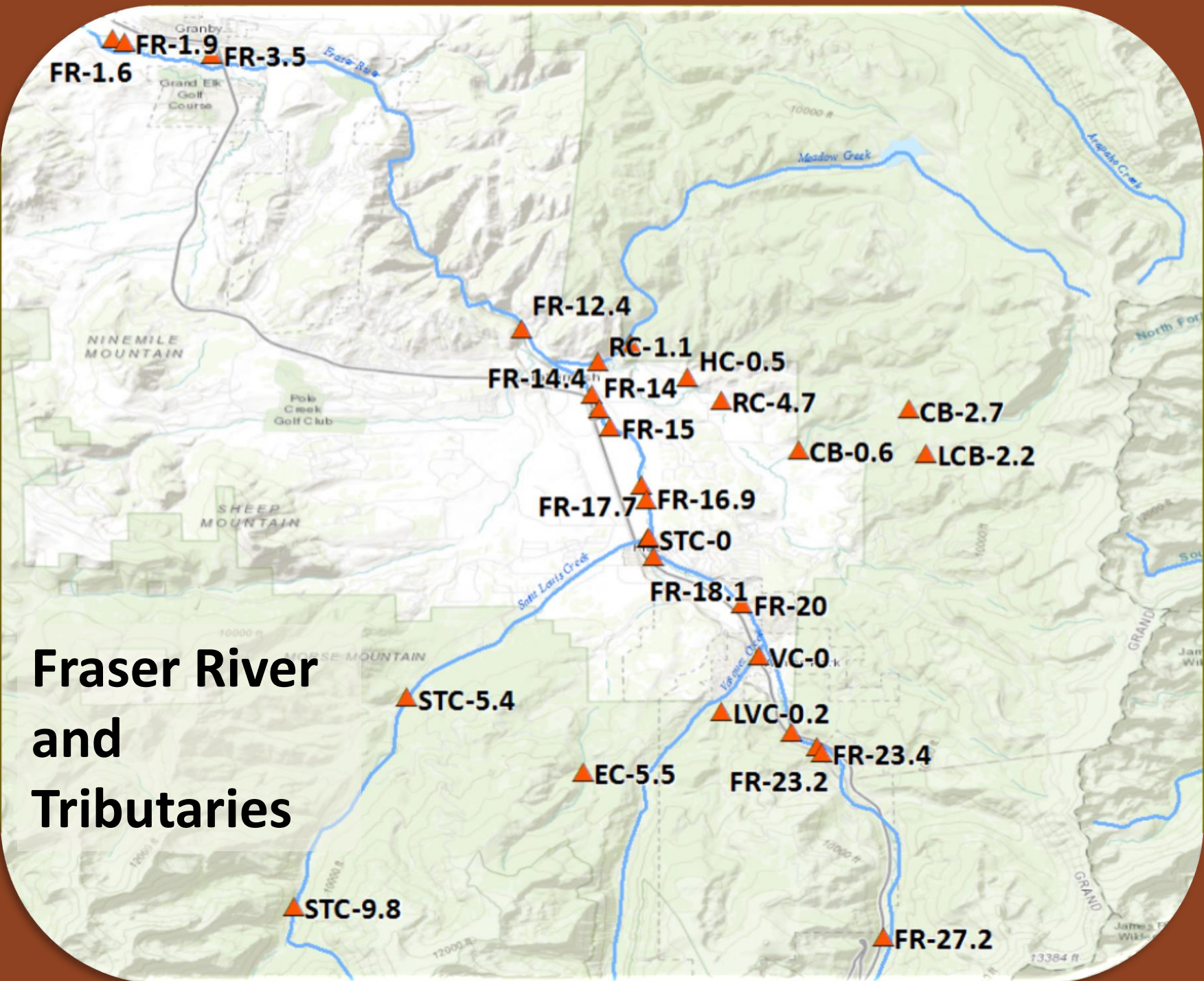
New sites:

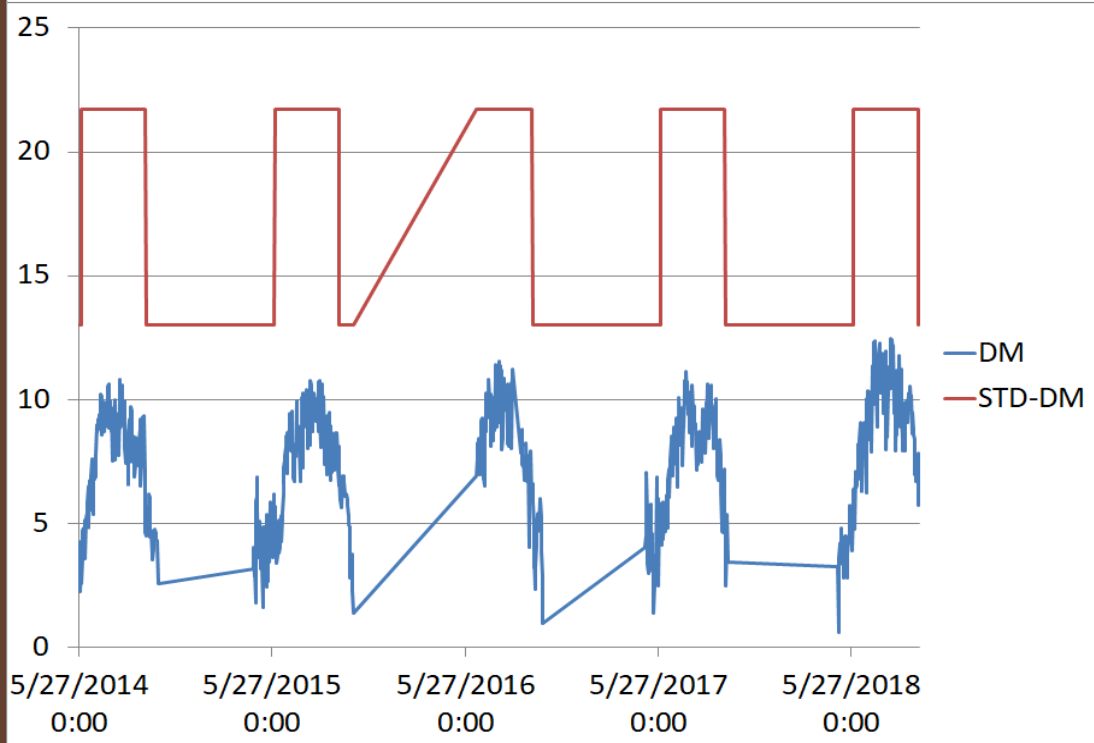
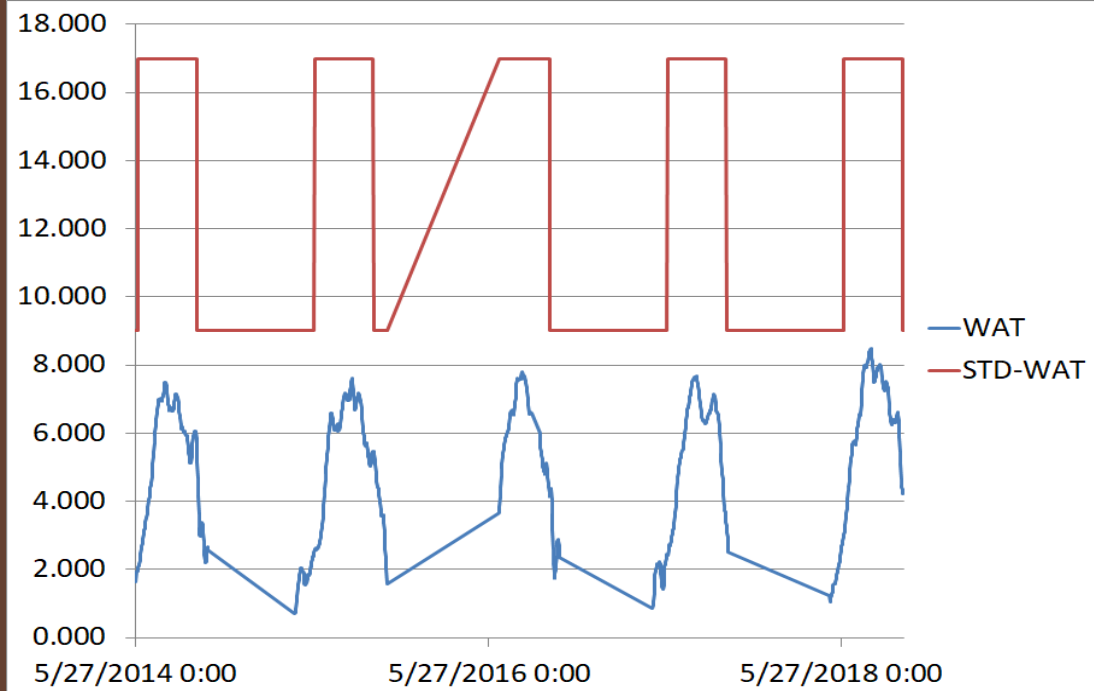
- STC-5.4 (Saint Louis Creek near Fraser Experimental Forest)
- WC-2.3 (Willow Creek above Bunte Highline Ditch)
- WC-0.5 (Willow Creek near confluence of Colorado River)
- WF-5.5 (Williams Fork upstream of the reservoir)

Frequency:

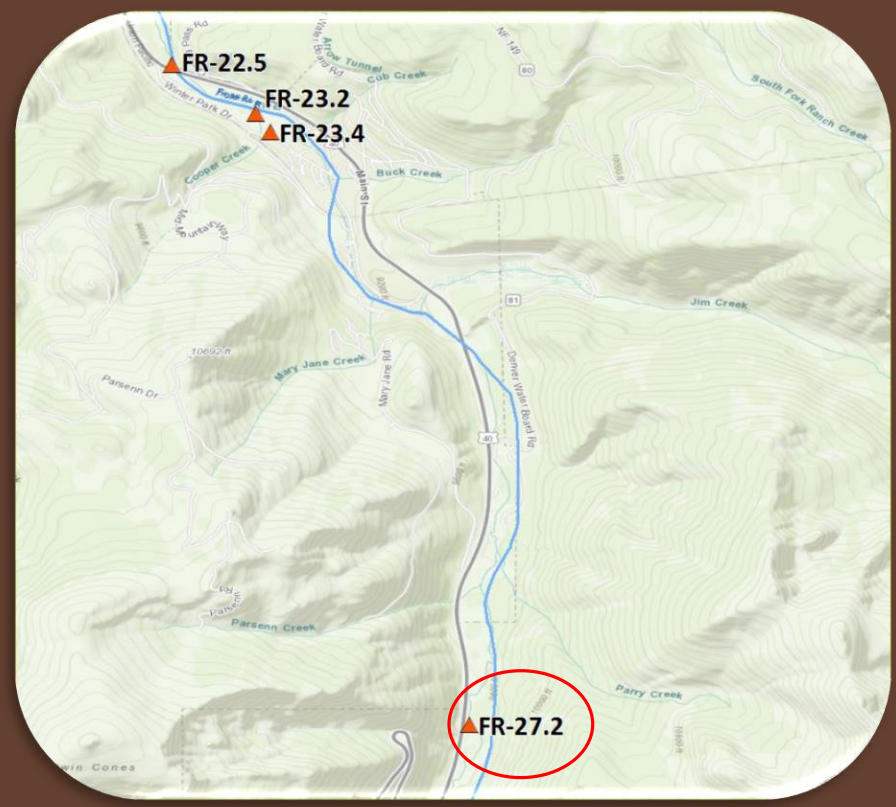
In 2018, four sites were monitored on a weekly basis to inform the Operations Subcommittee

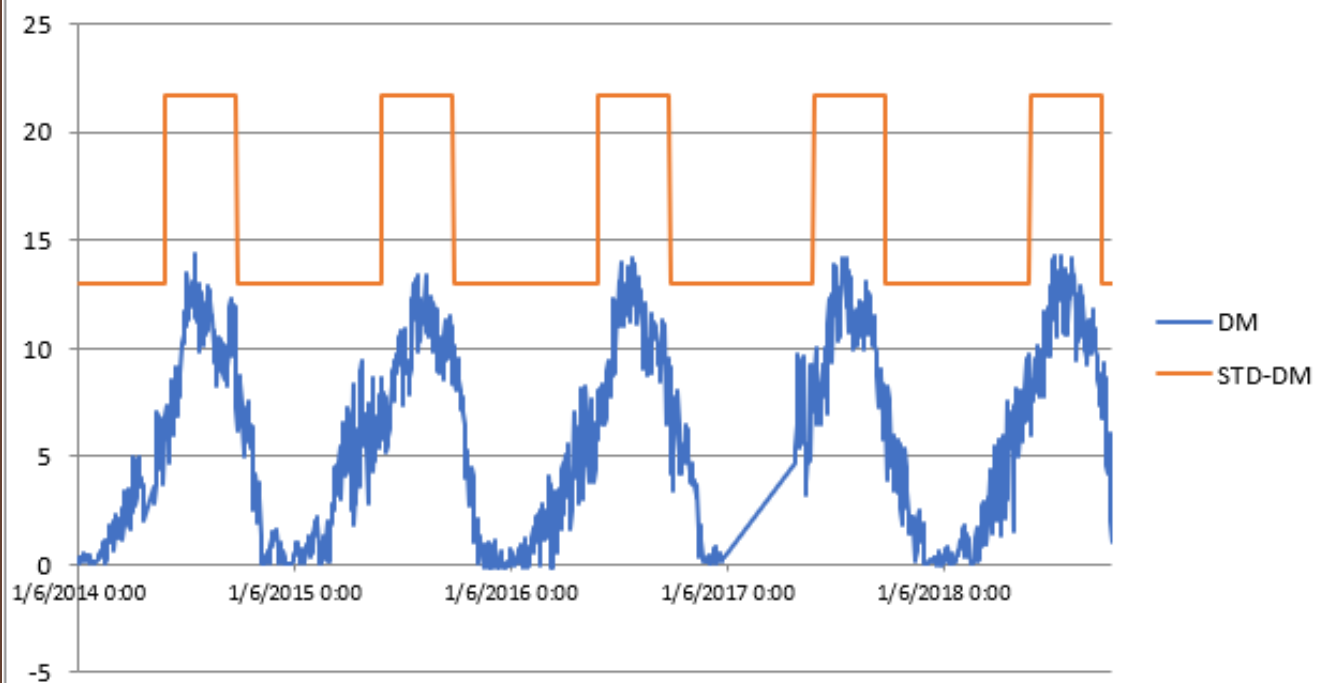
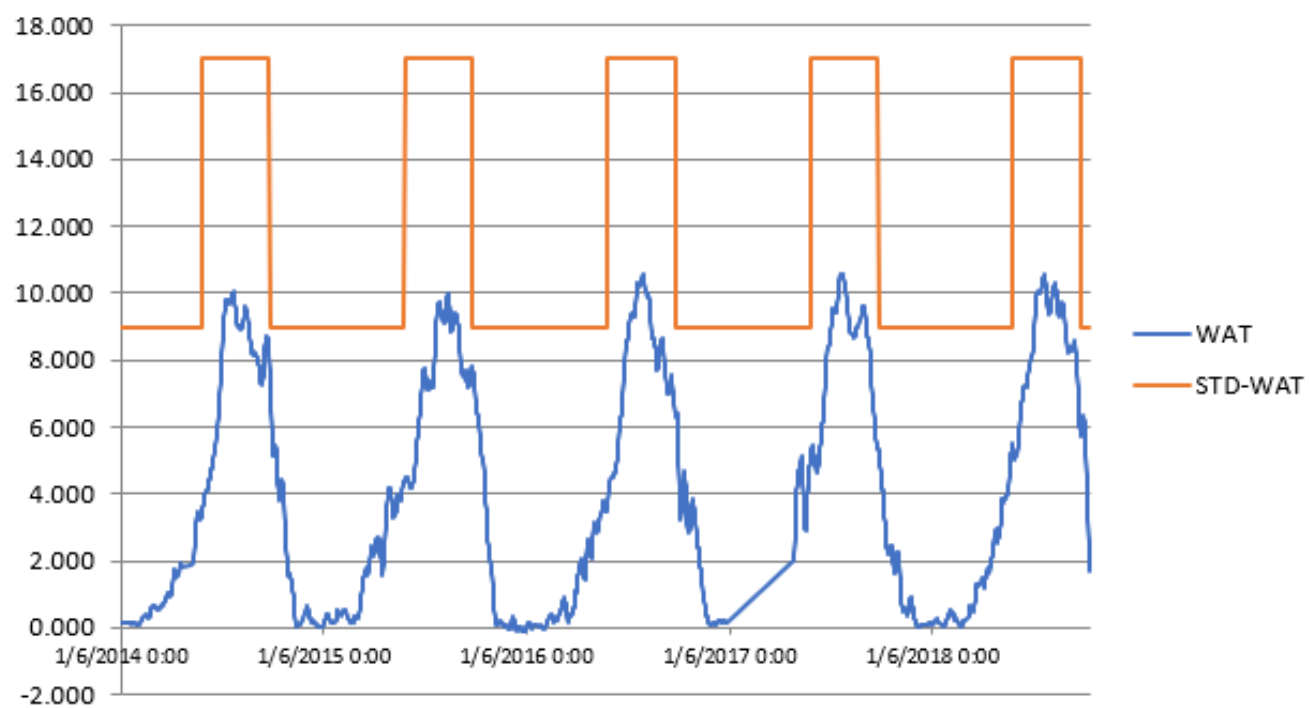
- STC-0 (Saint Louis Creek at confluence of Fraser River)
- FR-3.5 (Fraser River at Hwy 40 in Granby)
- CR-22.1 (Colorado River upstream of Hot Sulphur Water Treatment Plant)
 - Real time sensor provided by Northern
- CR-16.7 (Colorado River upstream of confluence with Williams Fork)
 - Real time sensor provided by Northern



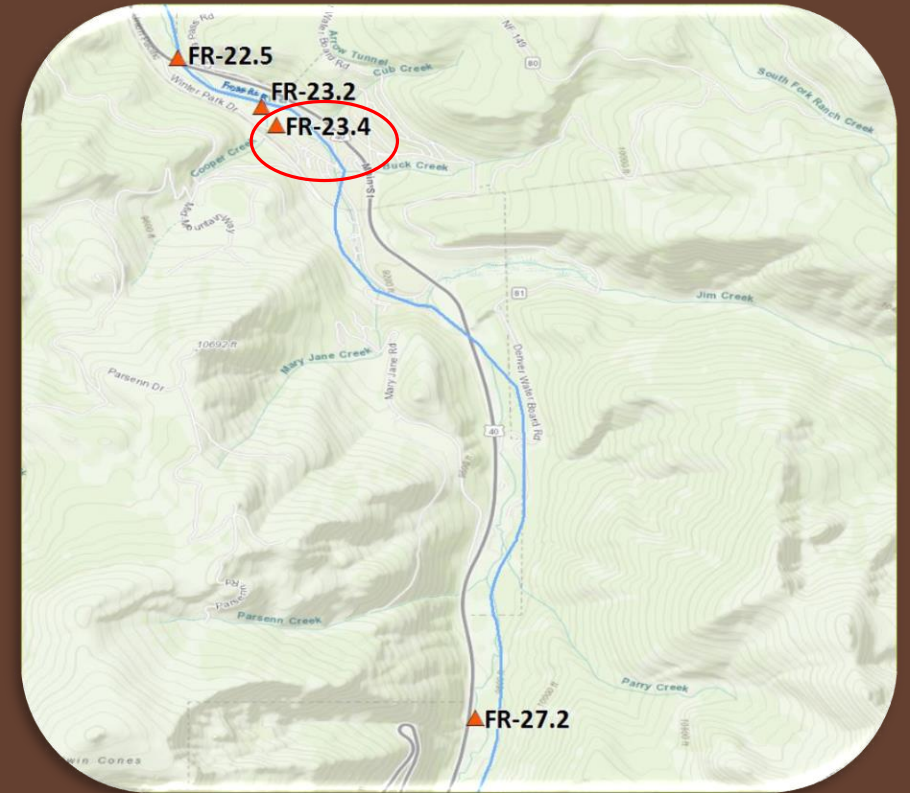


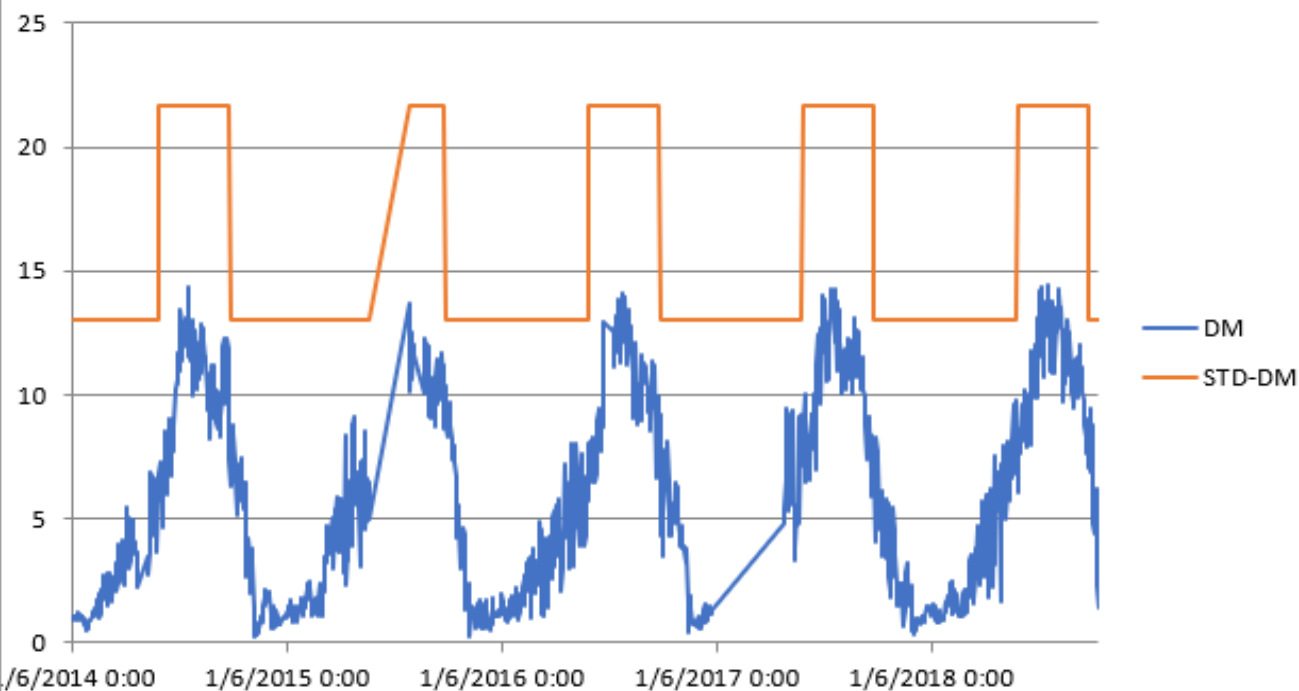
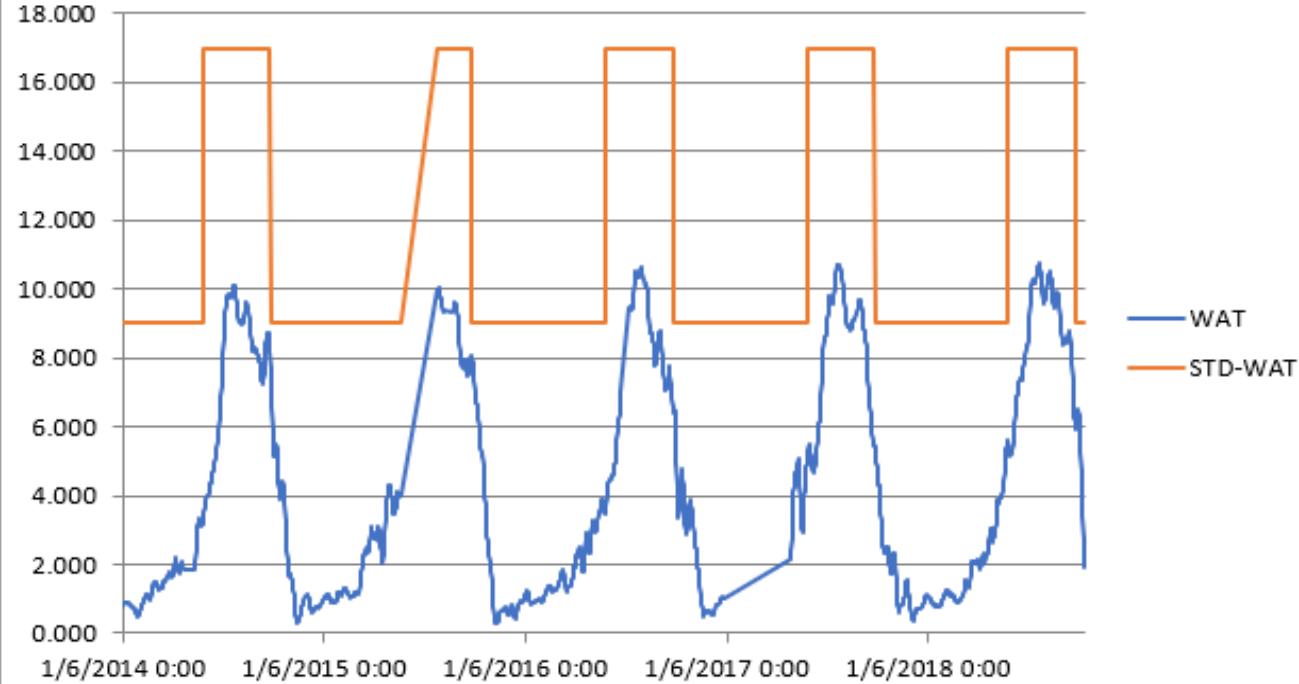
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FR-Upper
FR-27.2



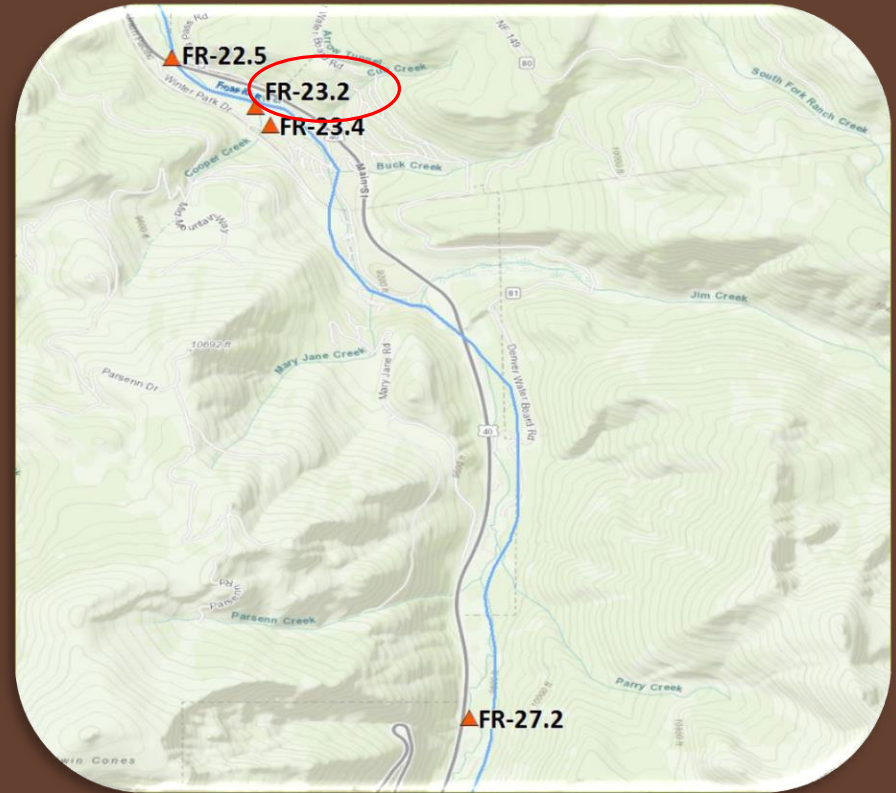


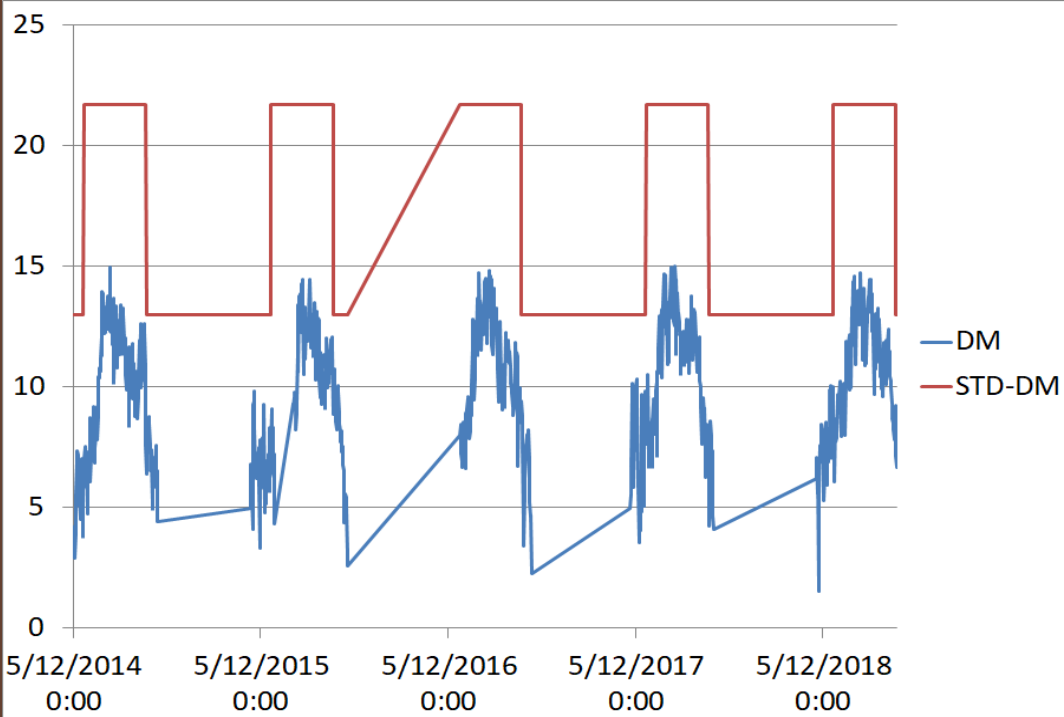
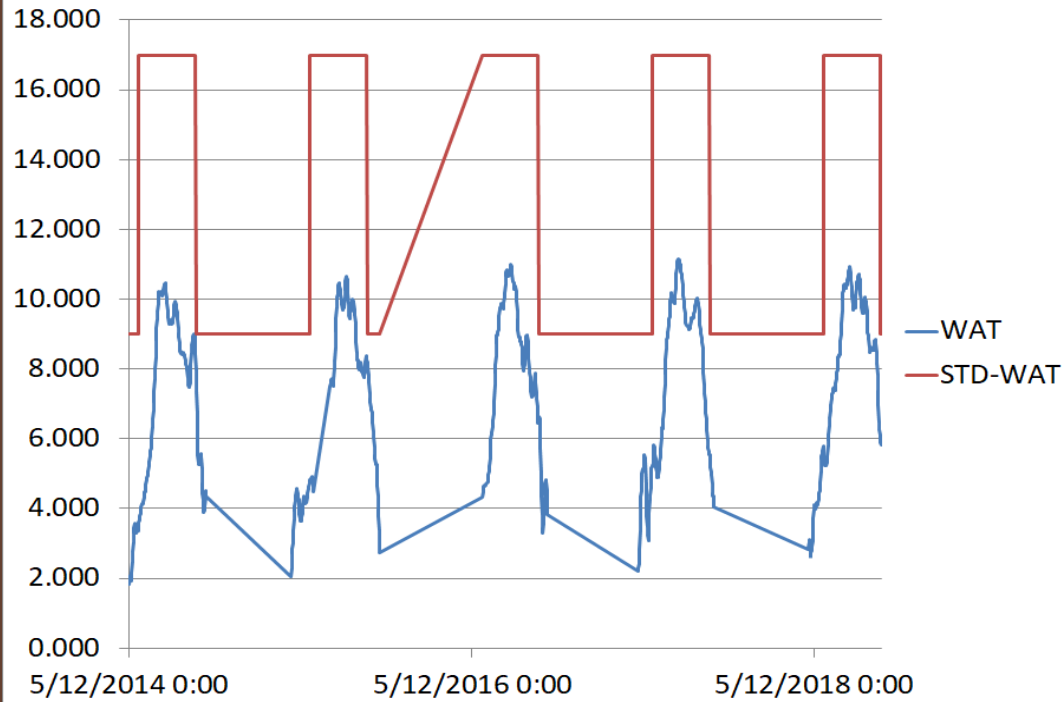
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FR-23.4





CSI
FR-blwWPSD
FR-23.2

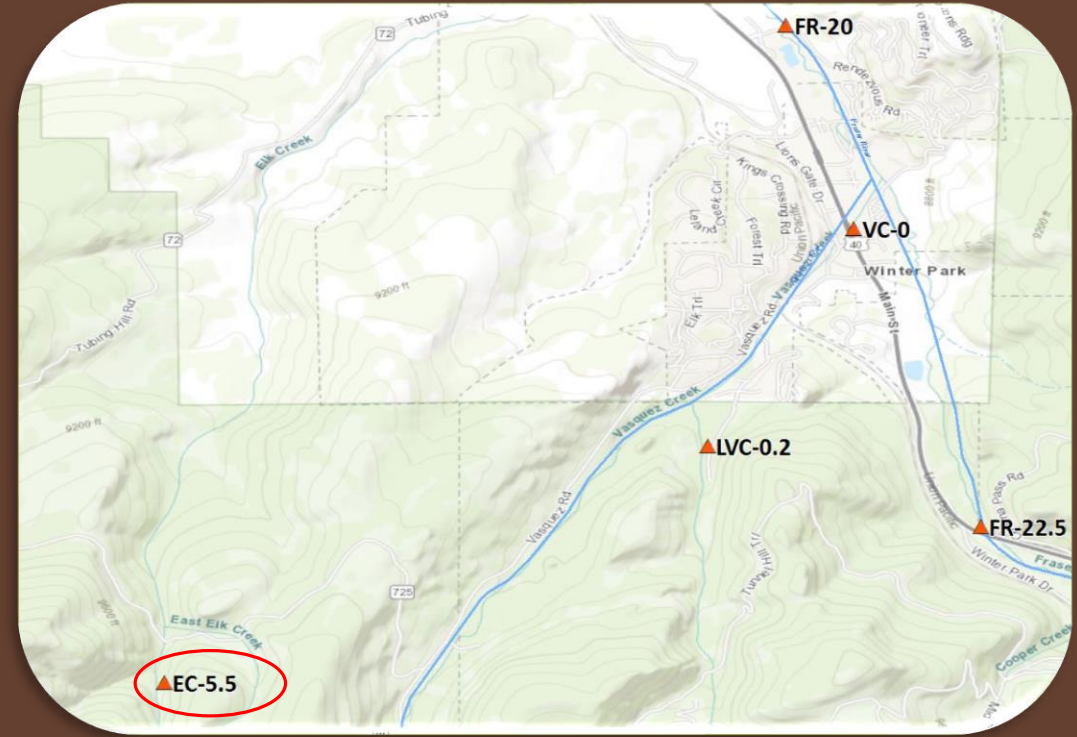
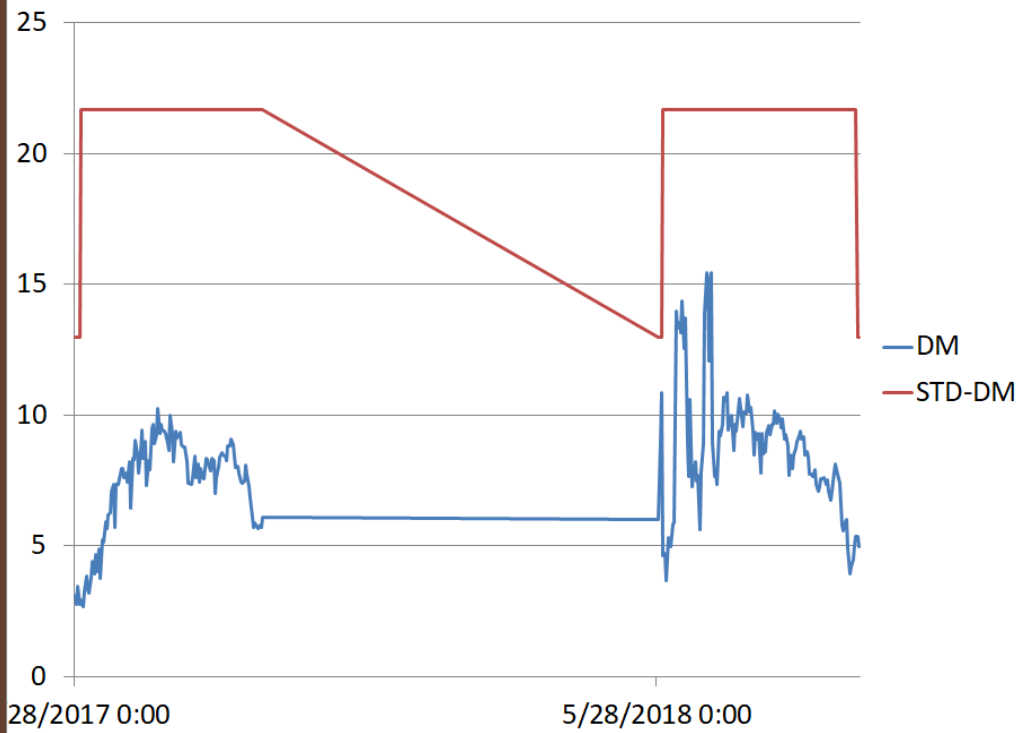
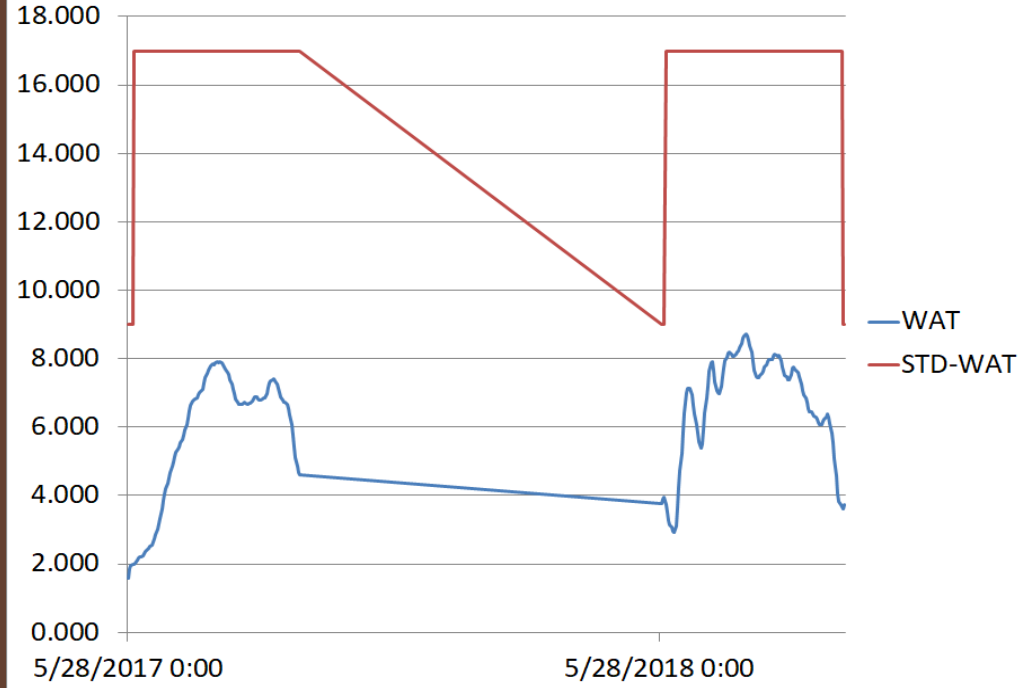




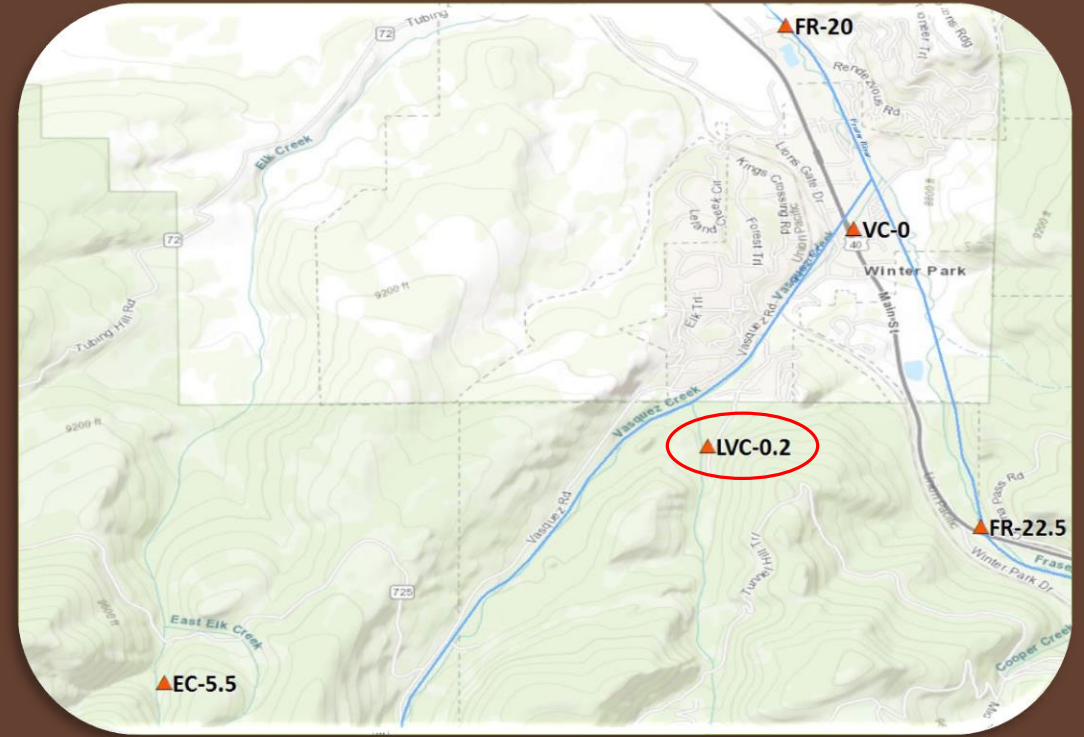
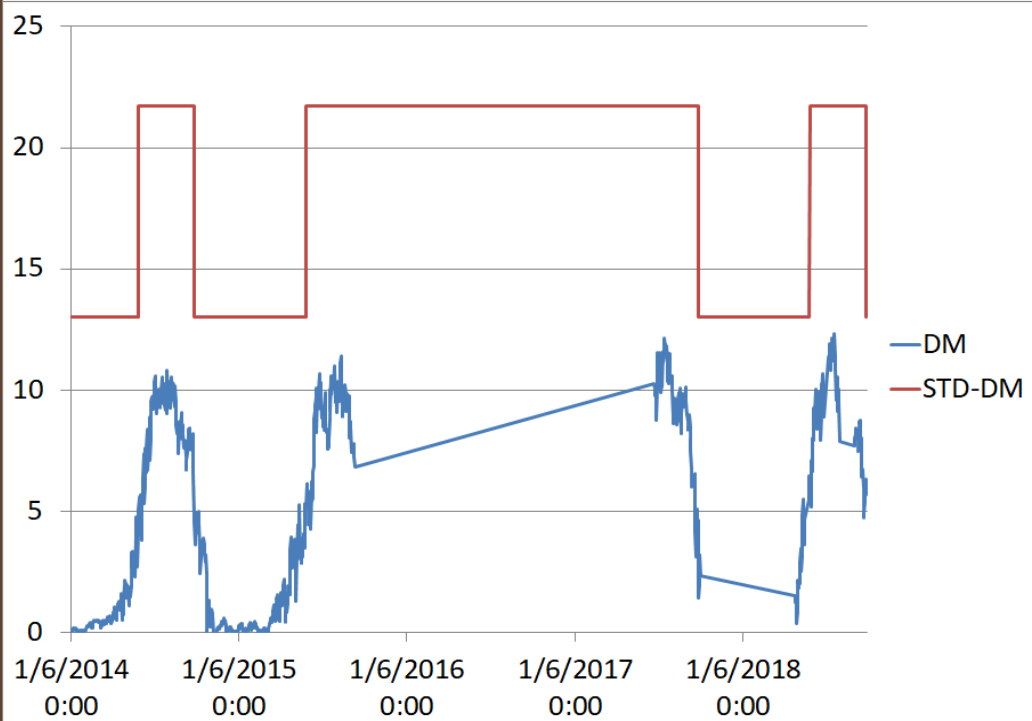
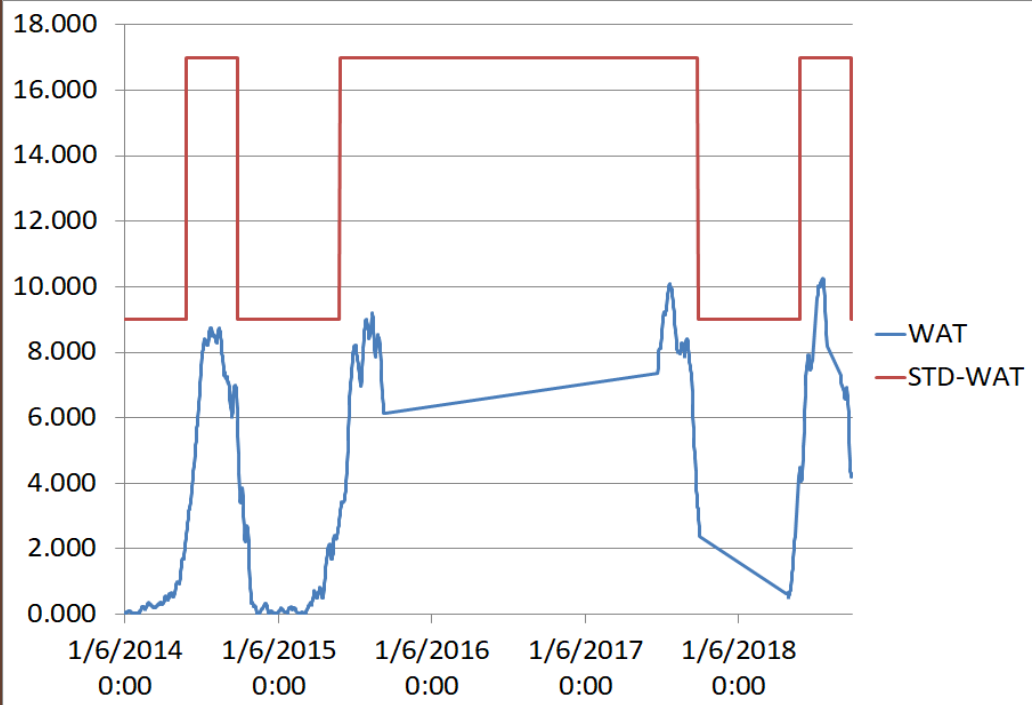
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FR-blwWP
FR-22.5

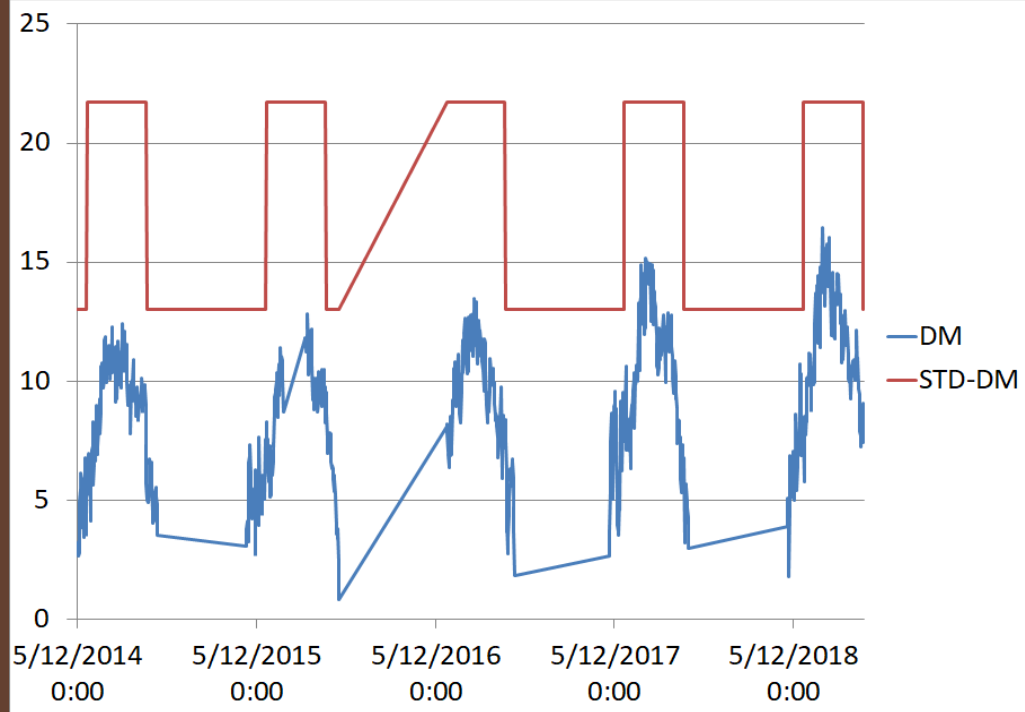
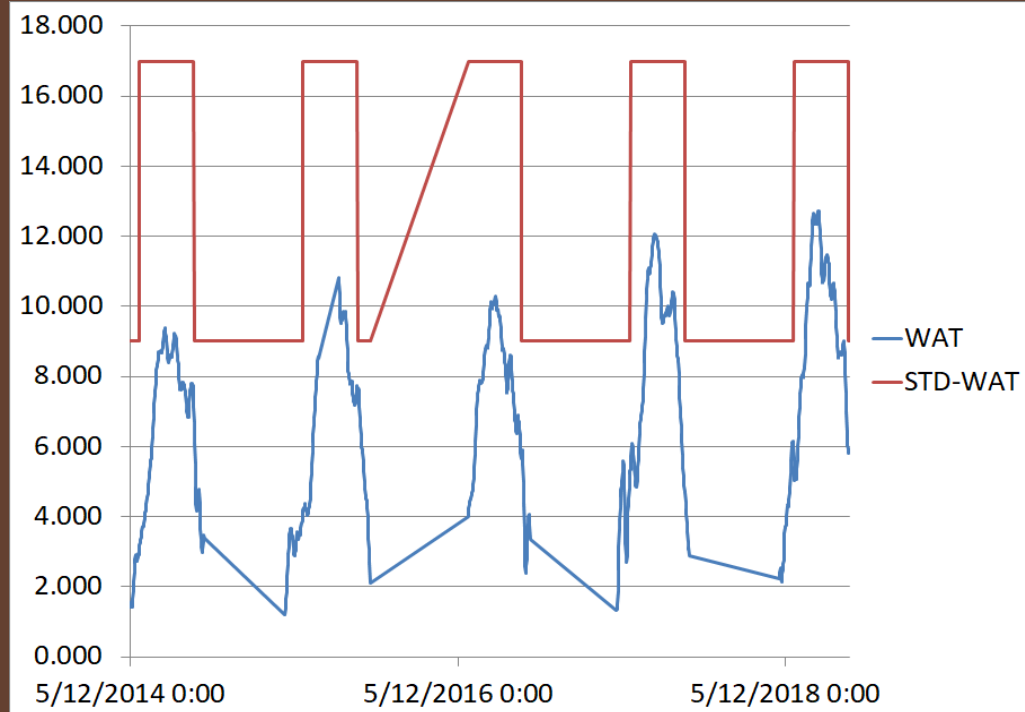


CSI Elk-blwDWB EC-5.5

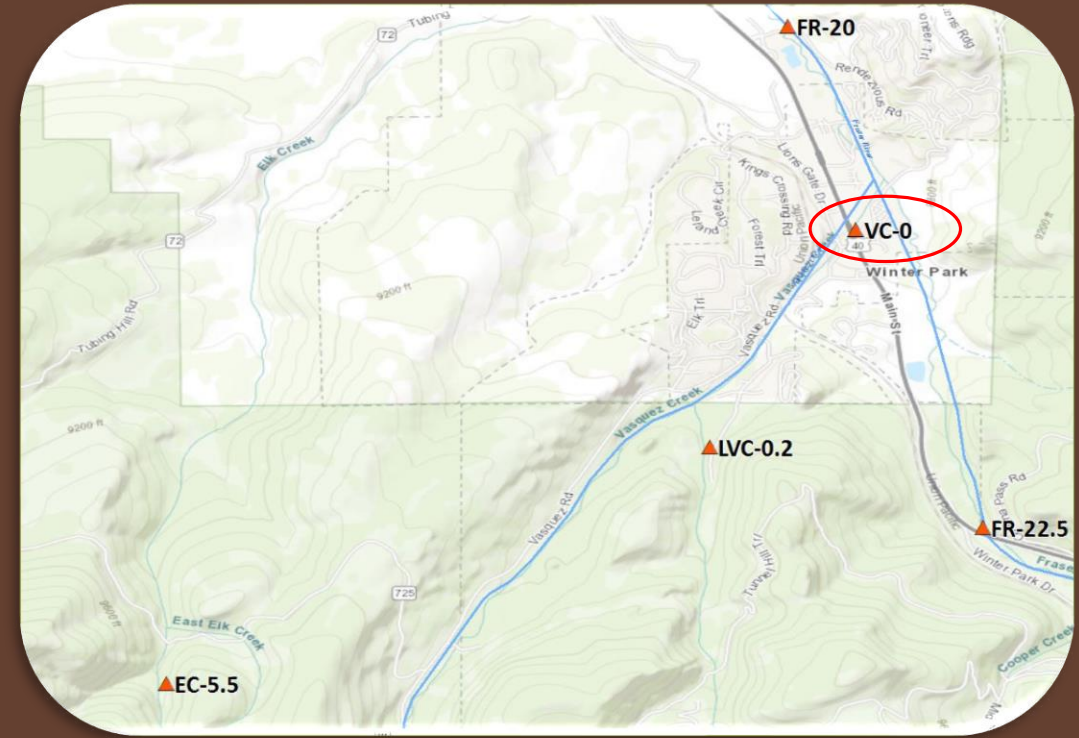


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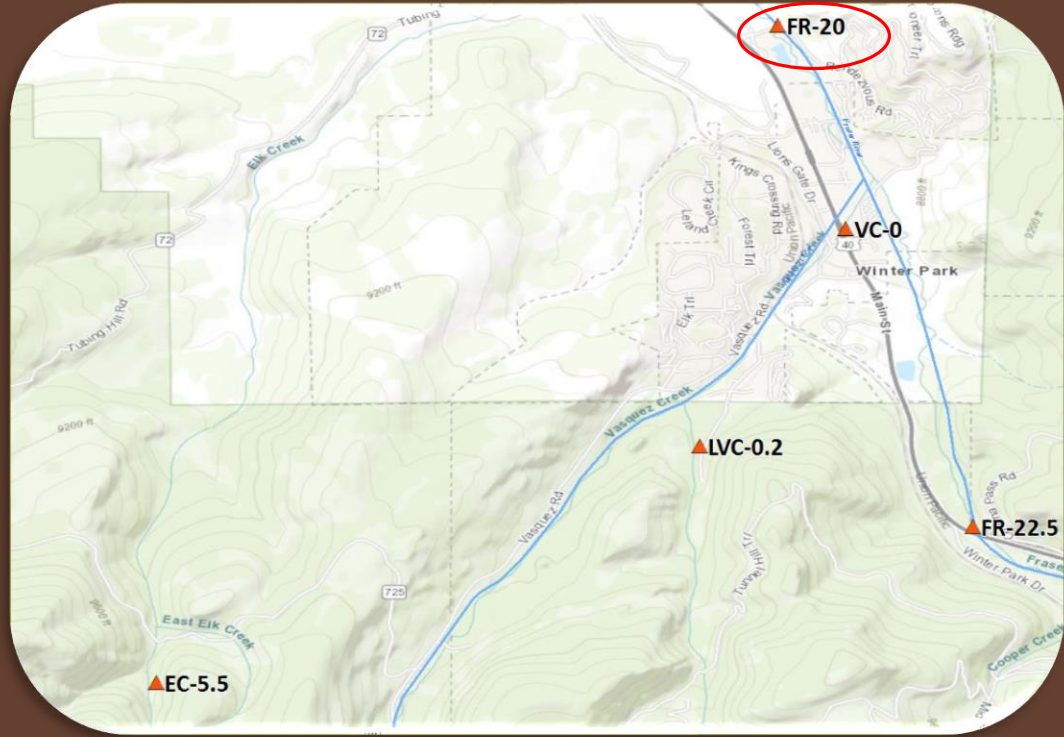
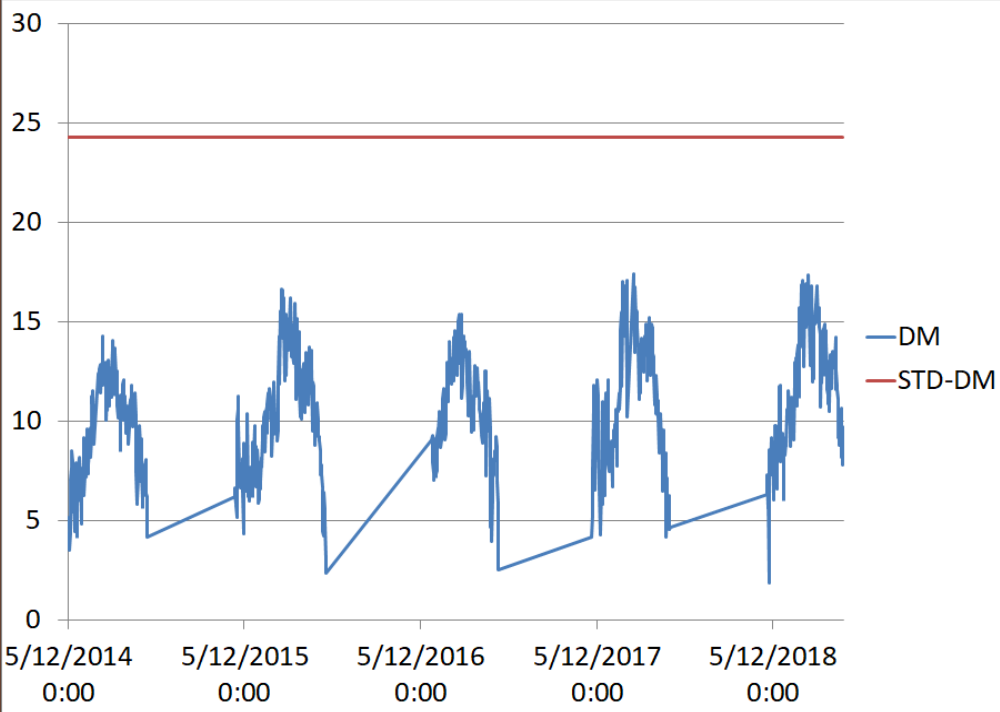
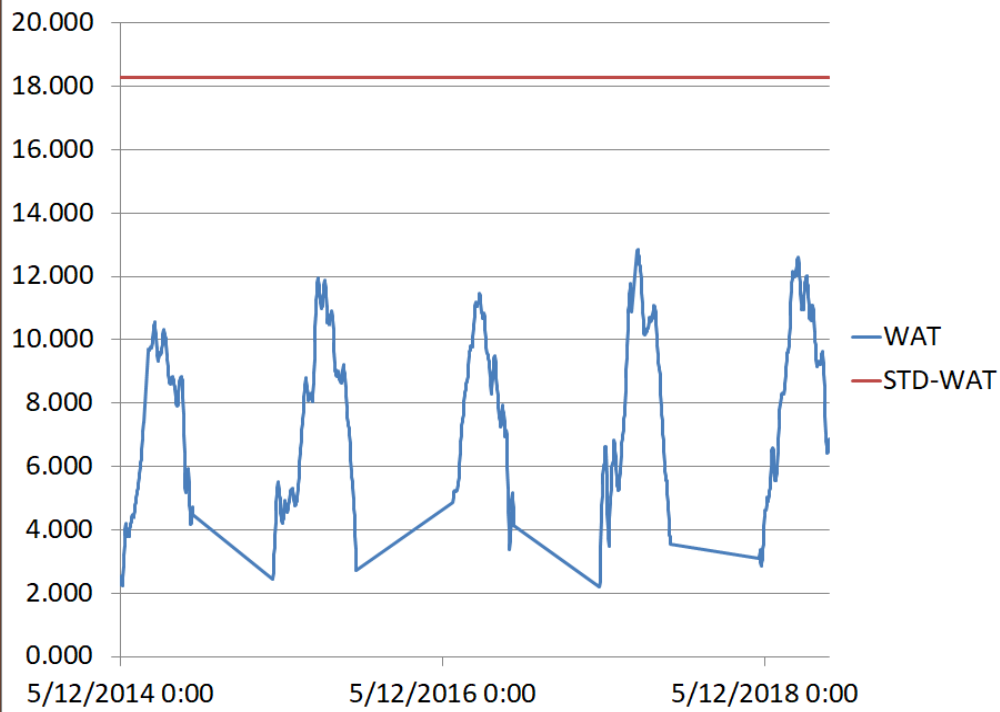




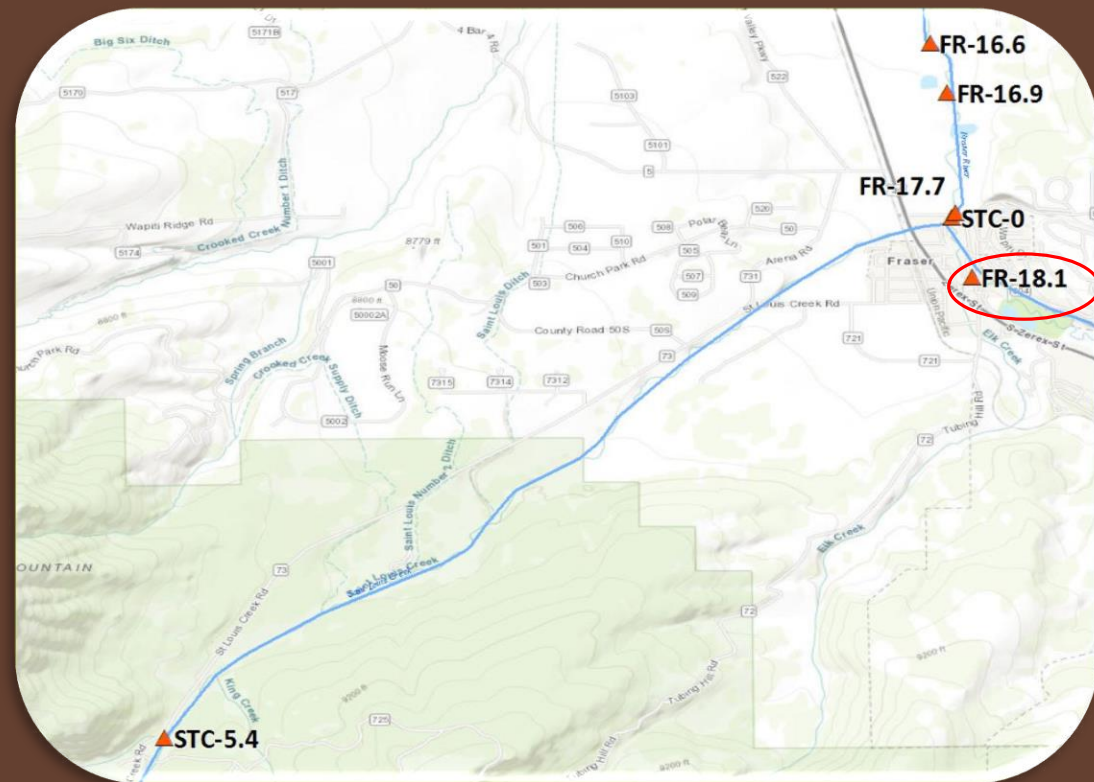
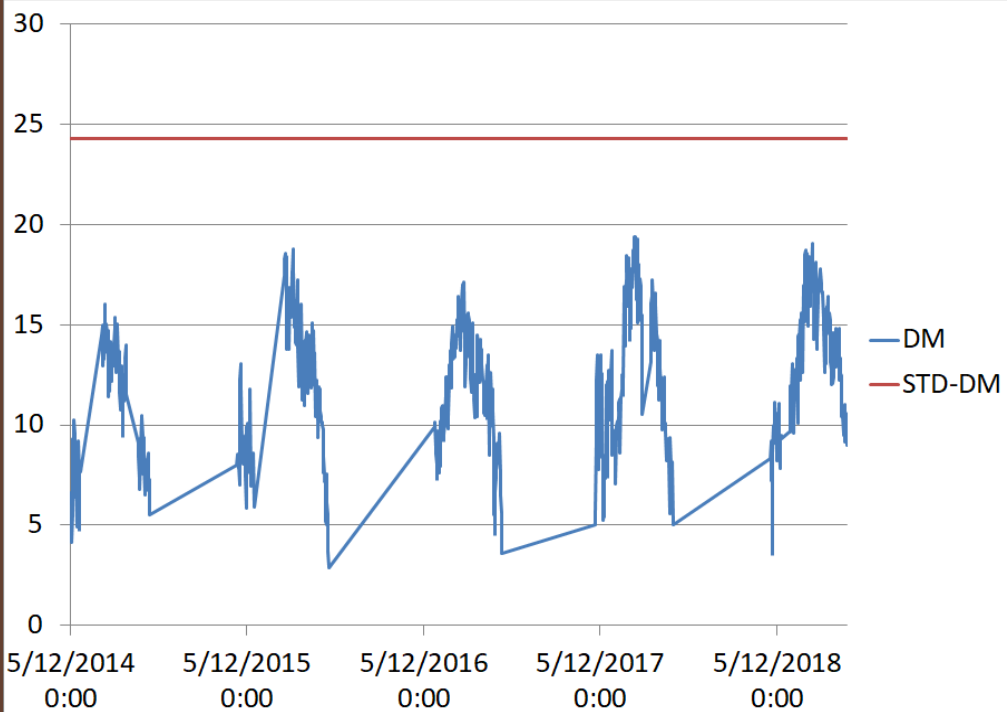
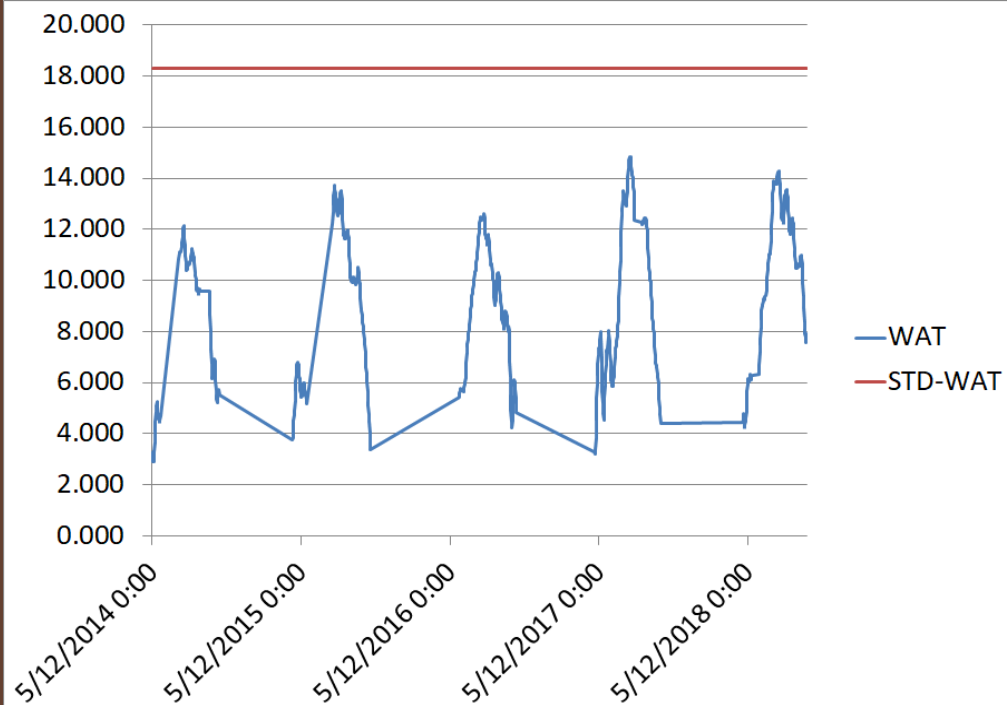
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VC-WP
VC-0

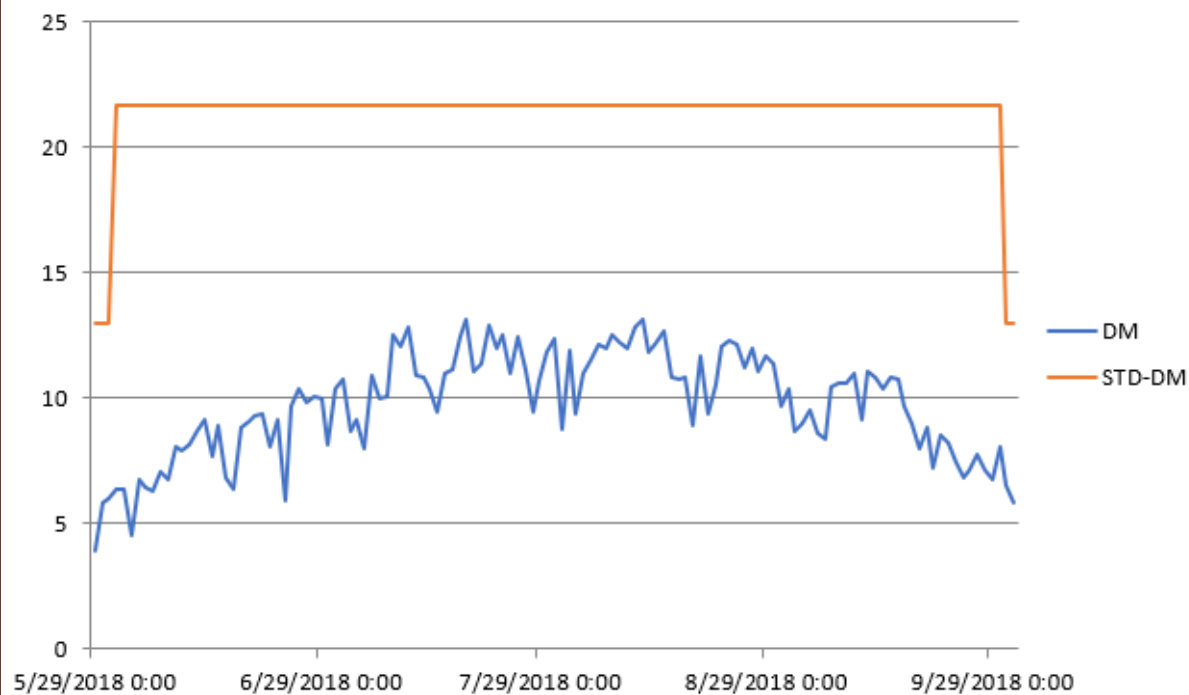
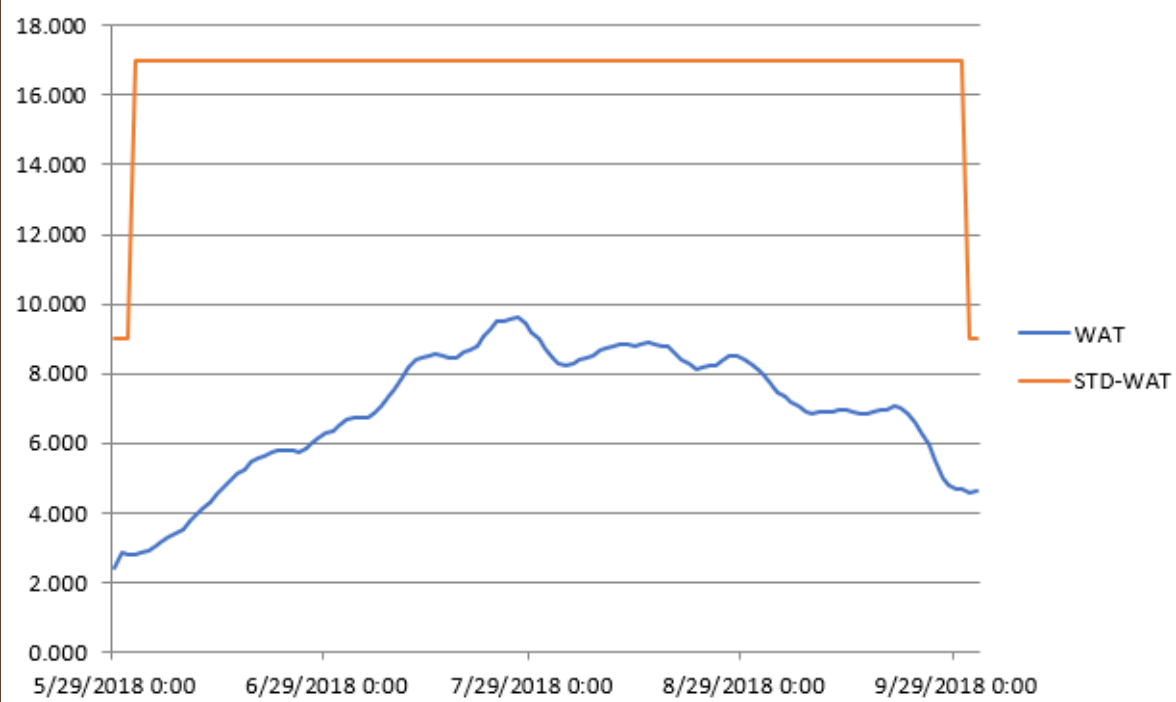


CSII FR-Rendezvous FR-20

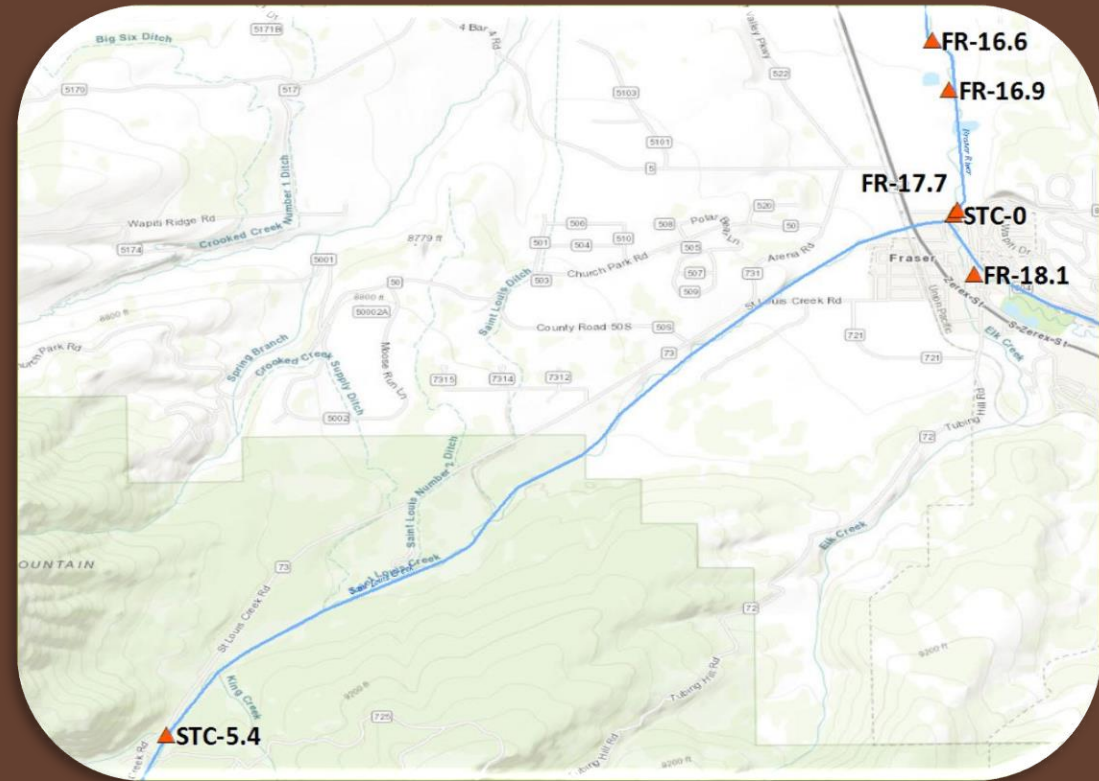


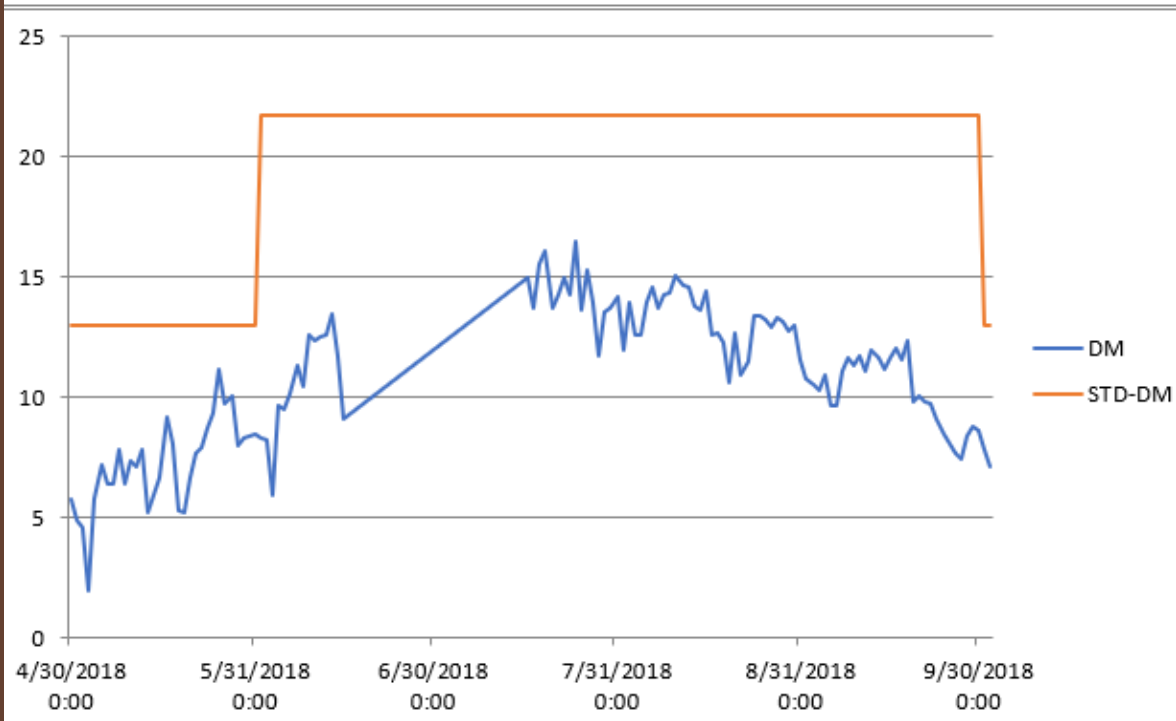
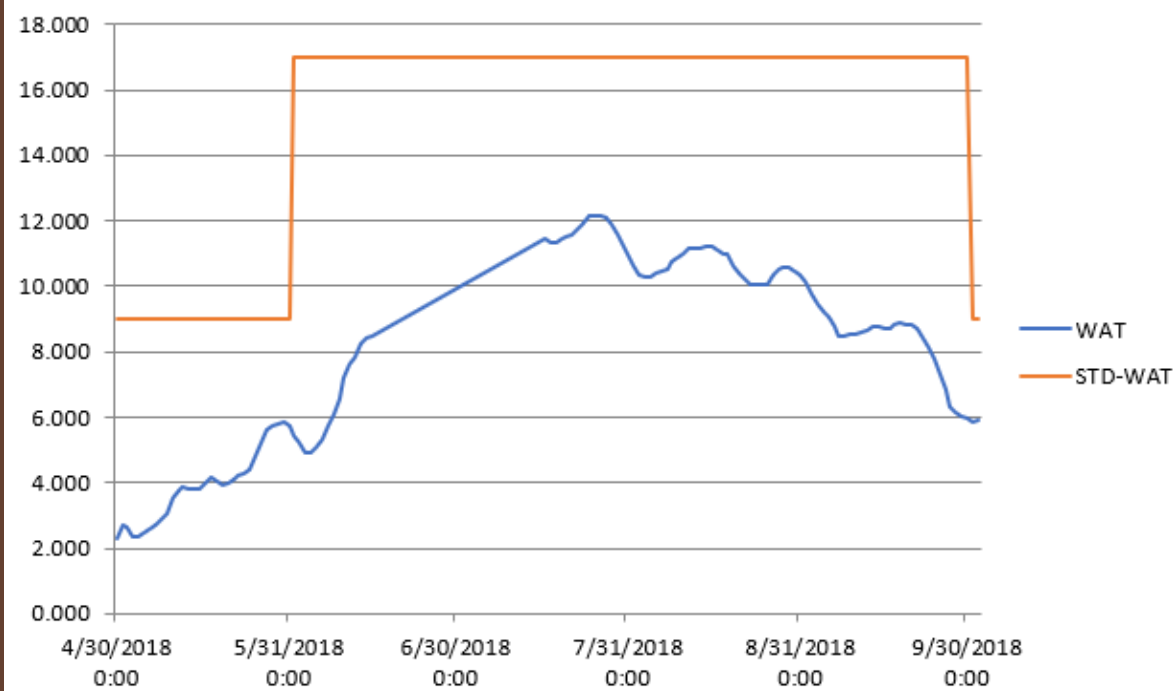
CSII FR-CR804 FR-18.1



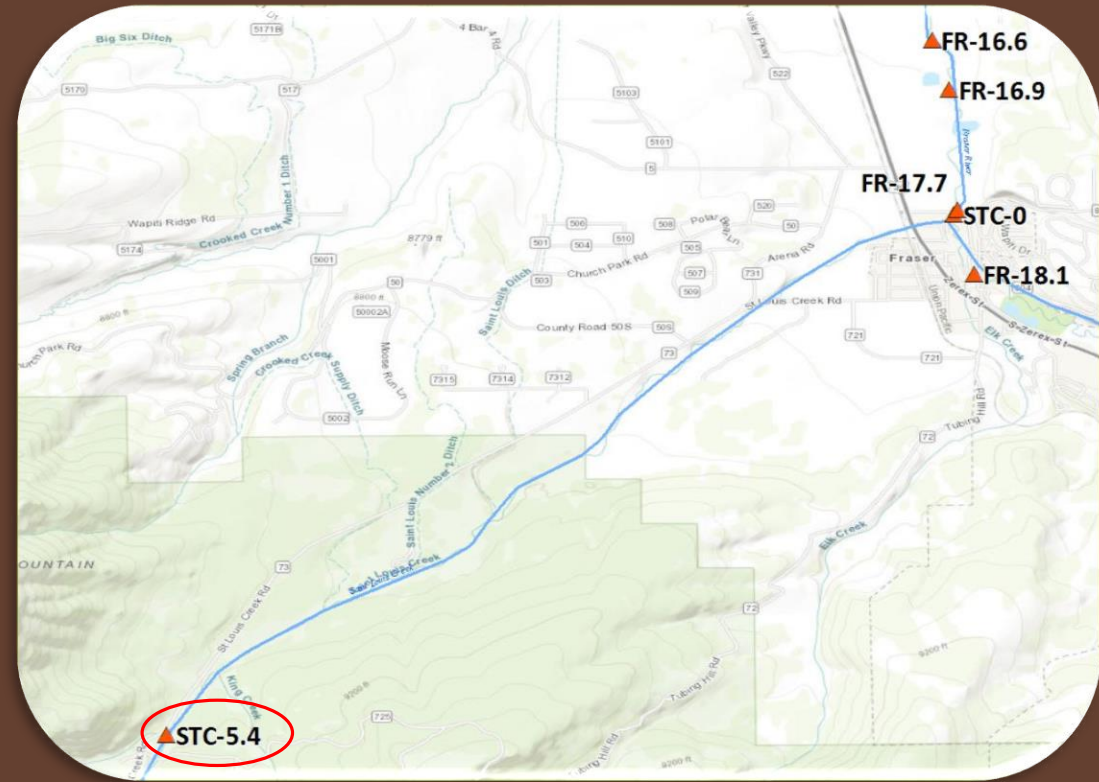


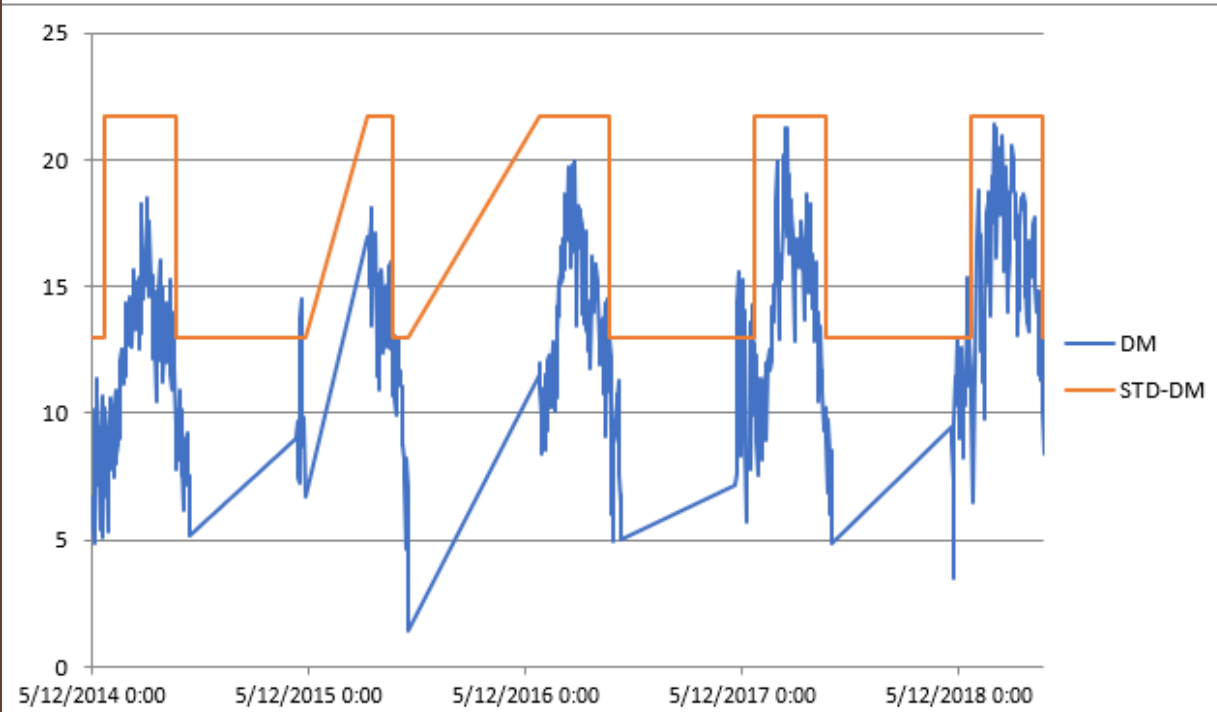
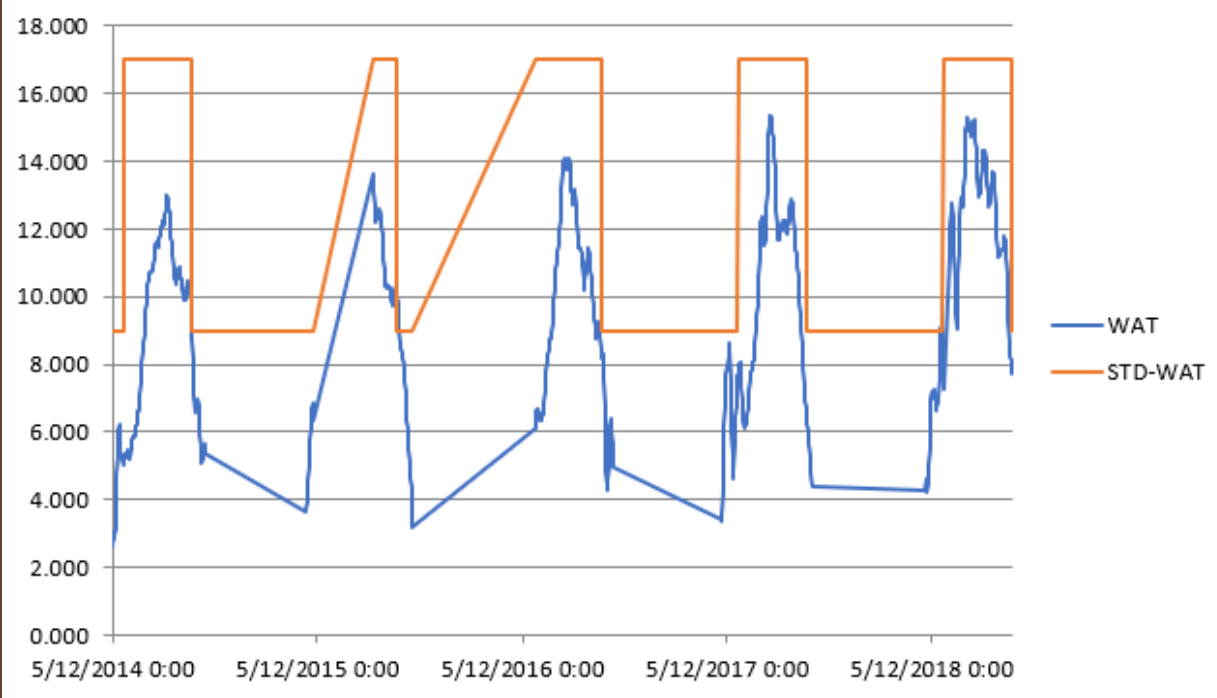
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 STC-blwDWB
 STC-9.8



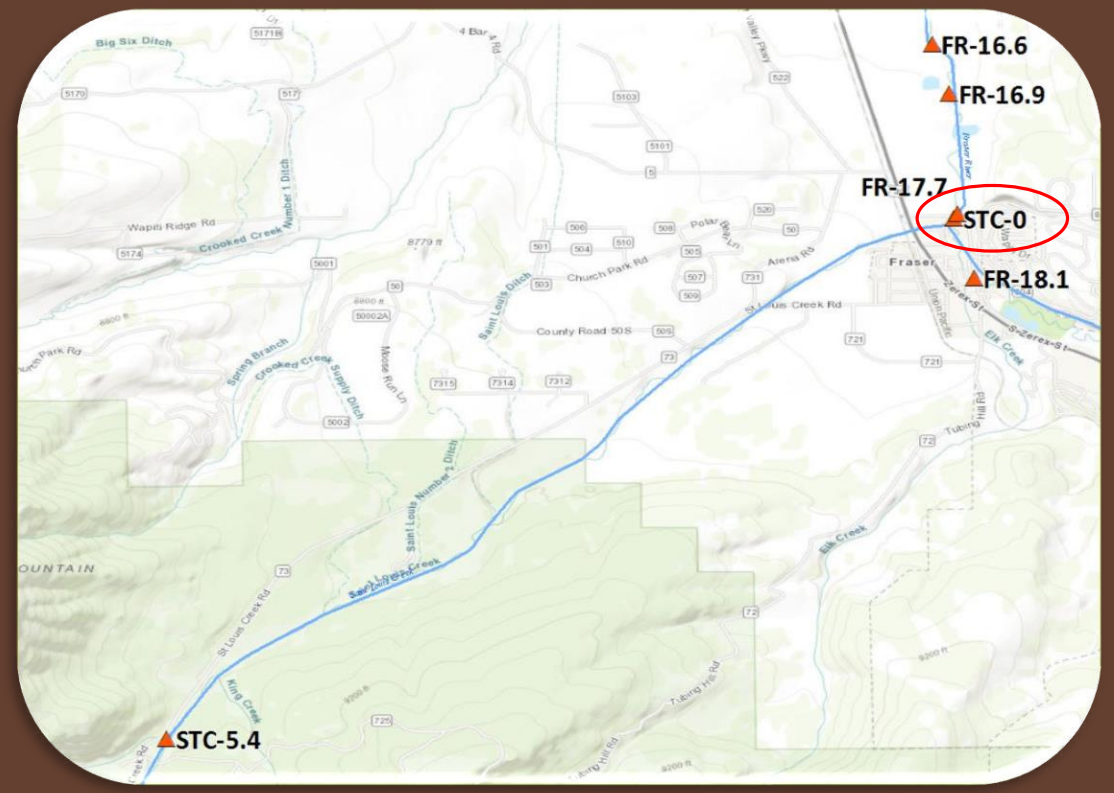


CSI
STC-Mid
STC-5.4

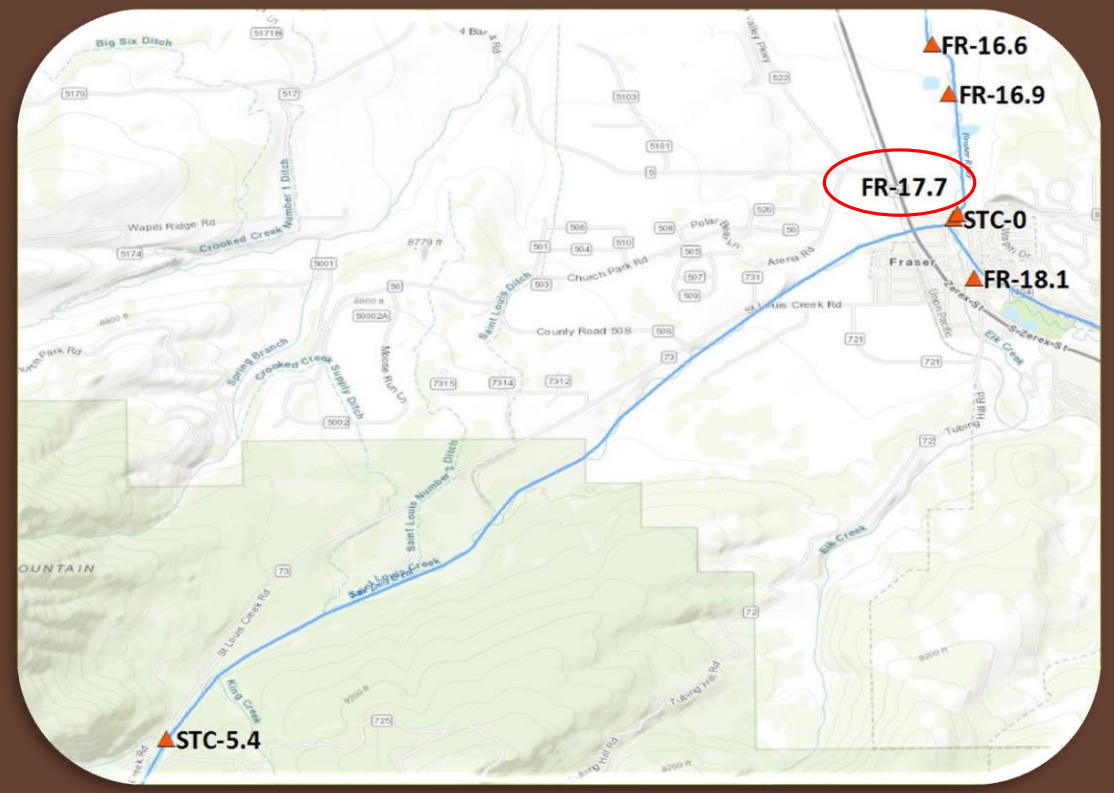
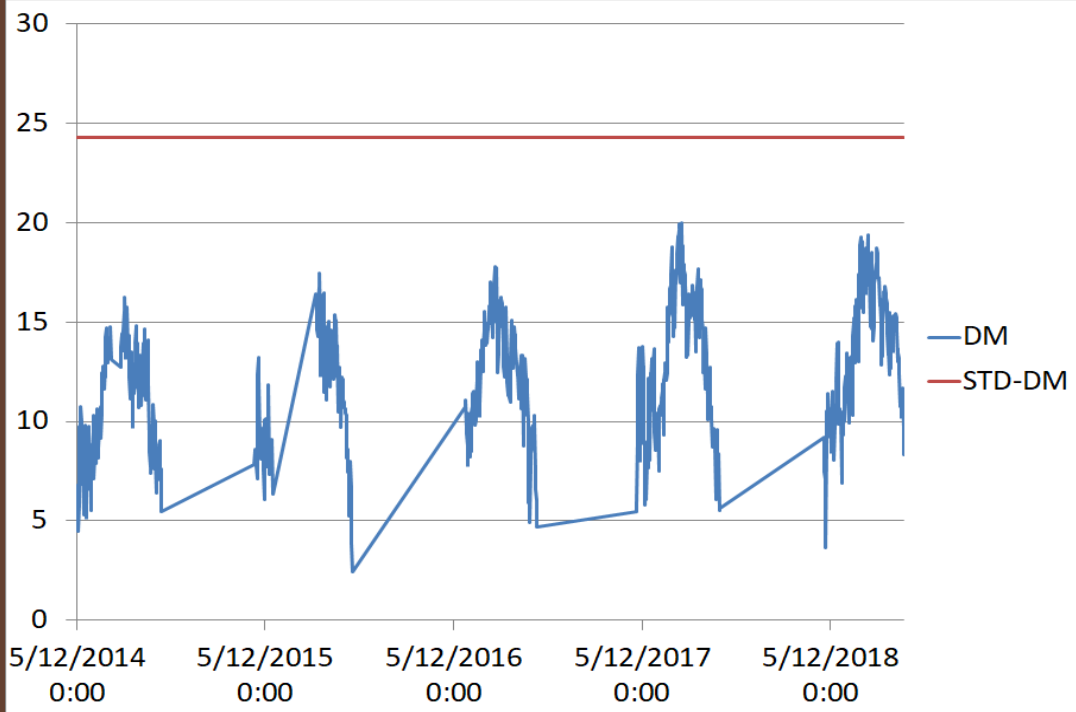
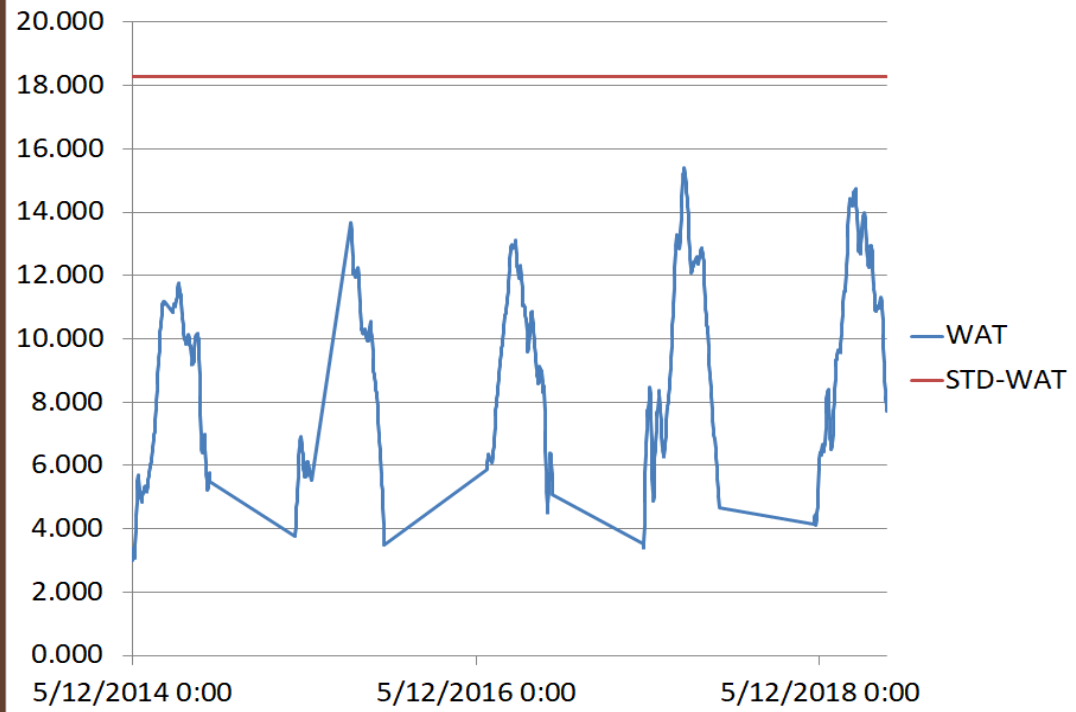


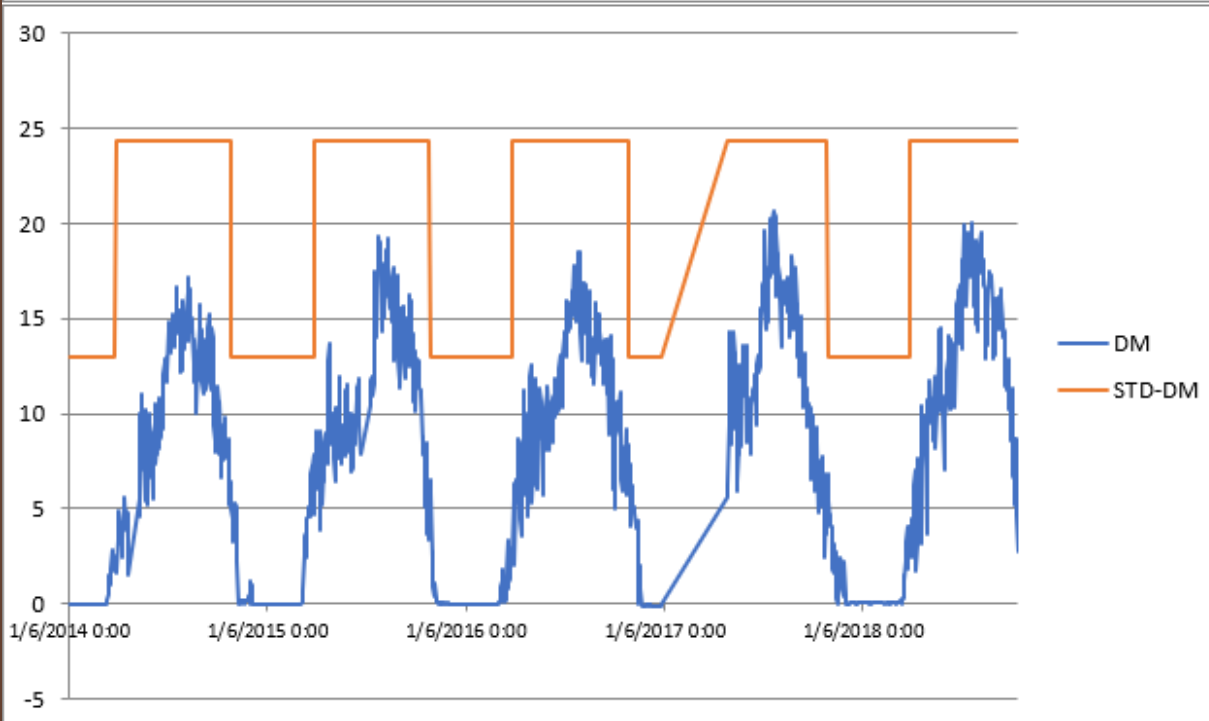
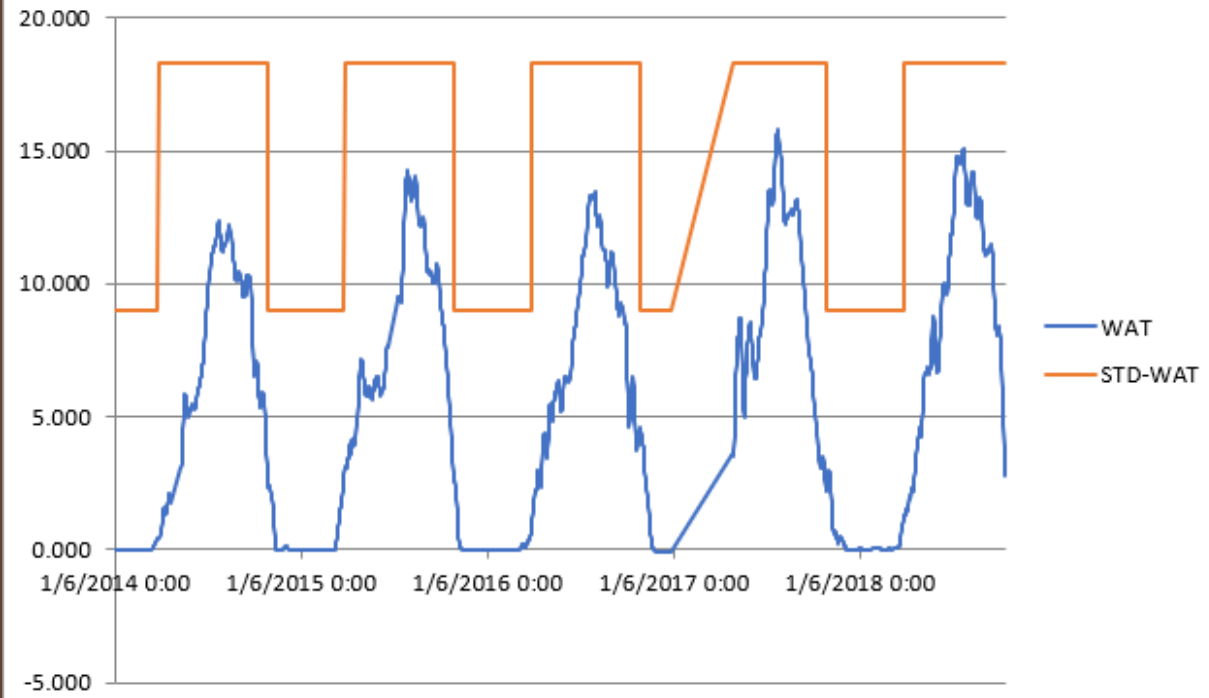


CSI
ST-LC
STC-0

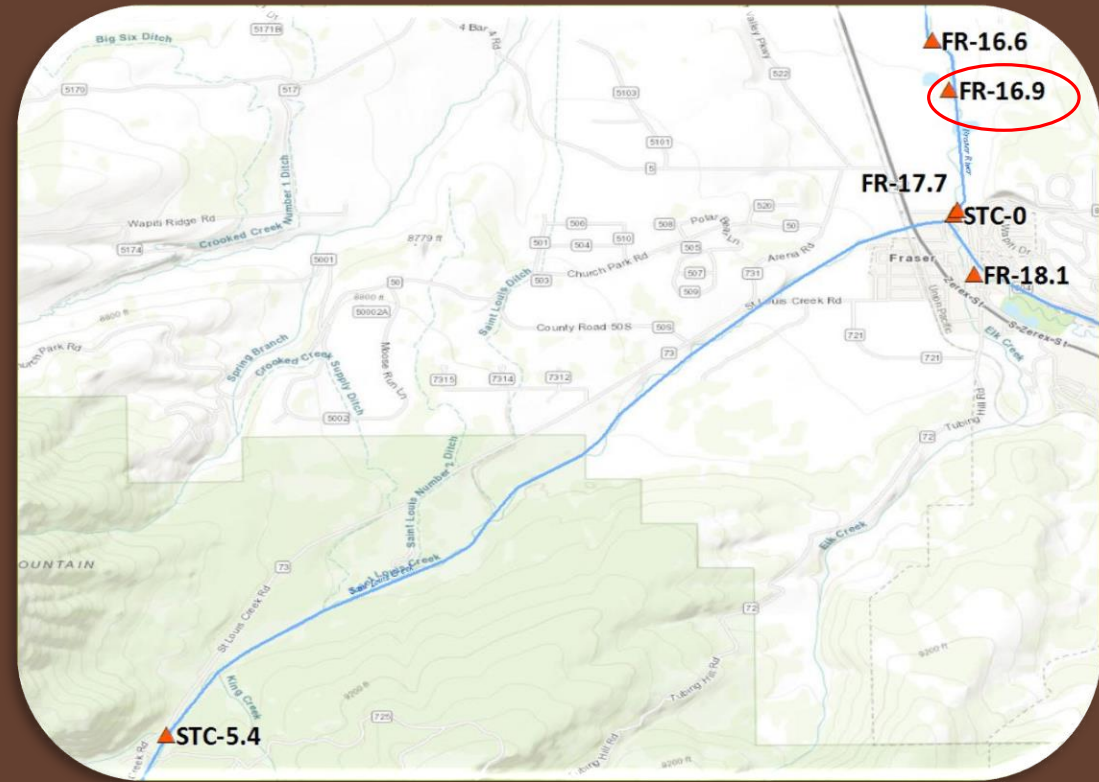


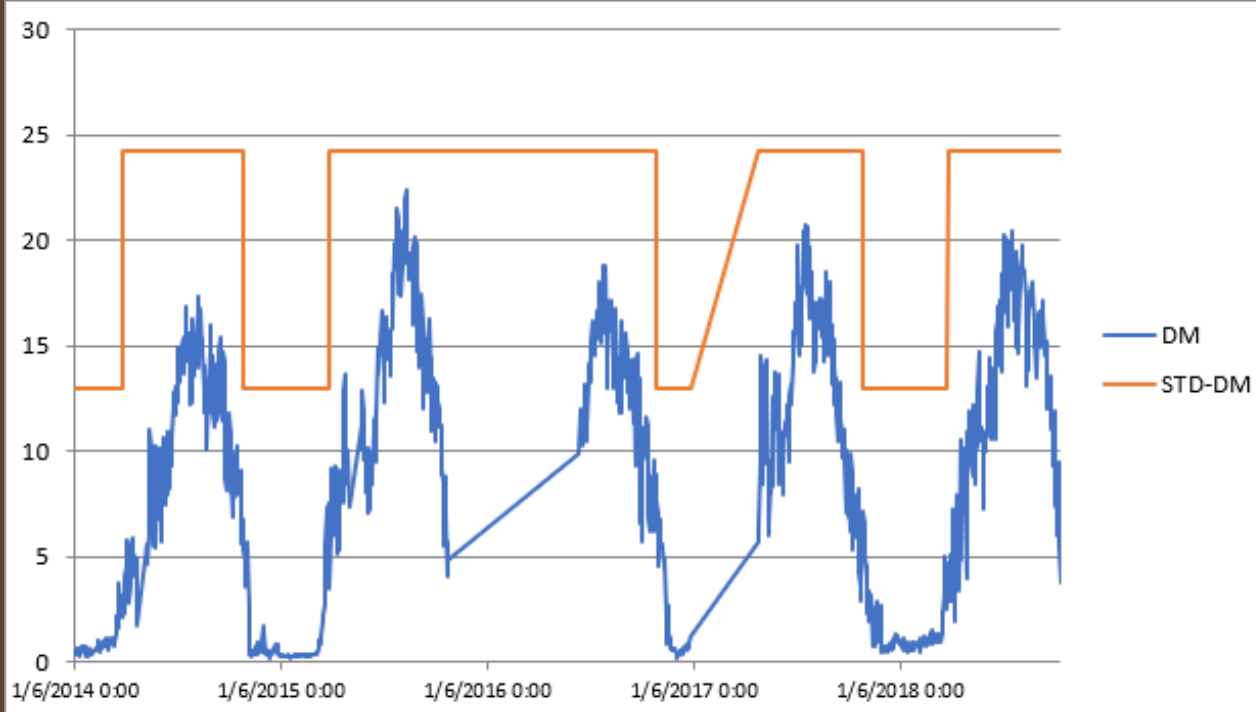
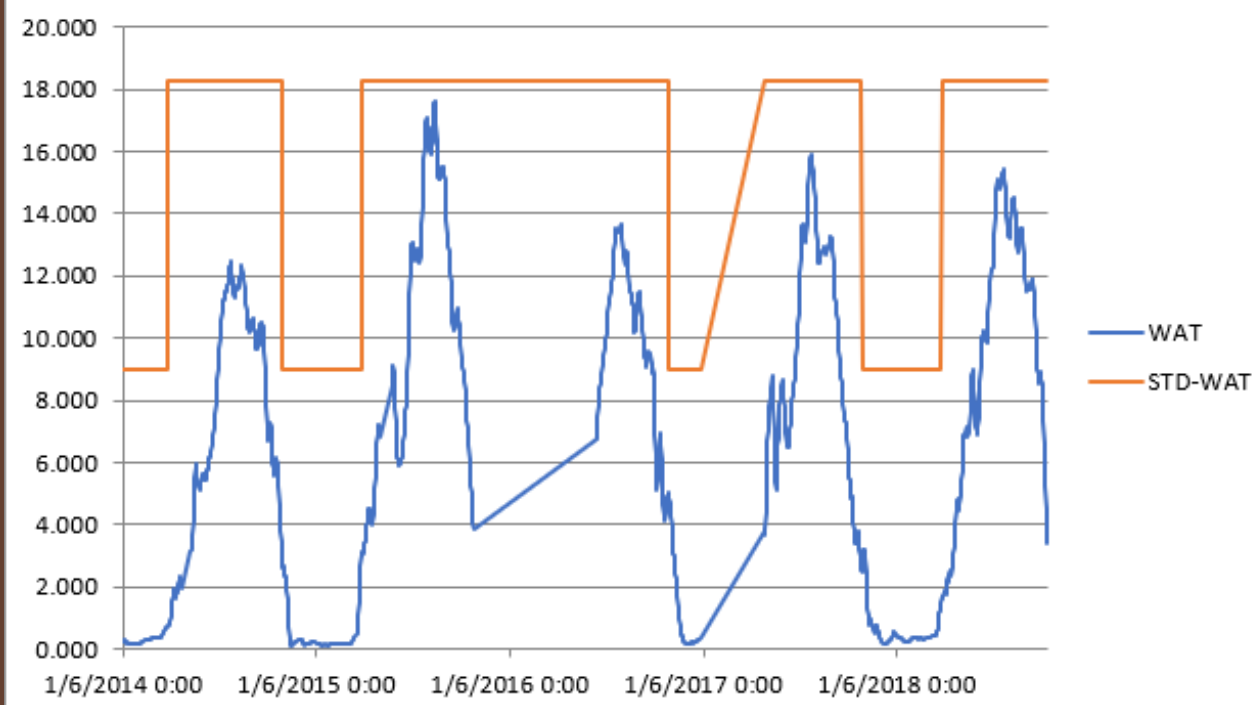
CSII FR-blwCR8HD FR-17.7



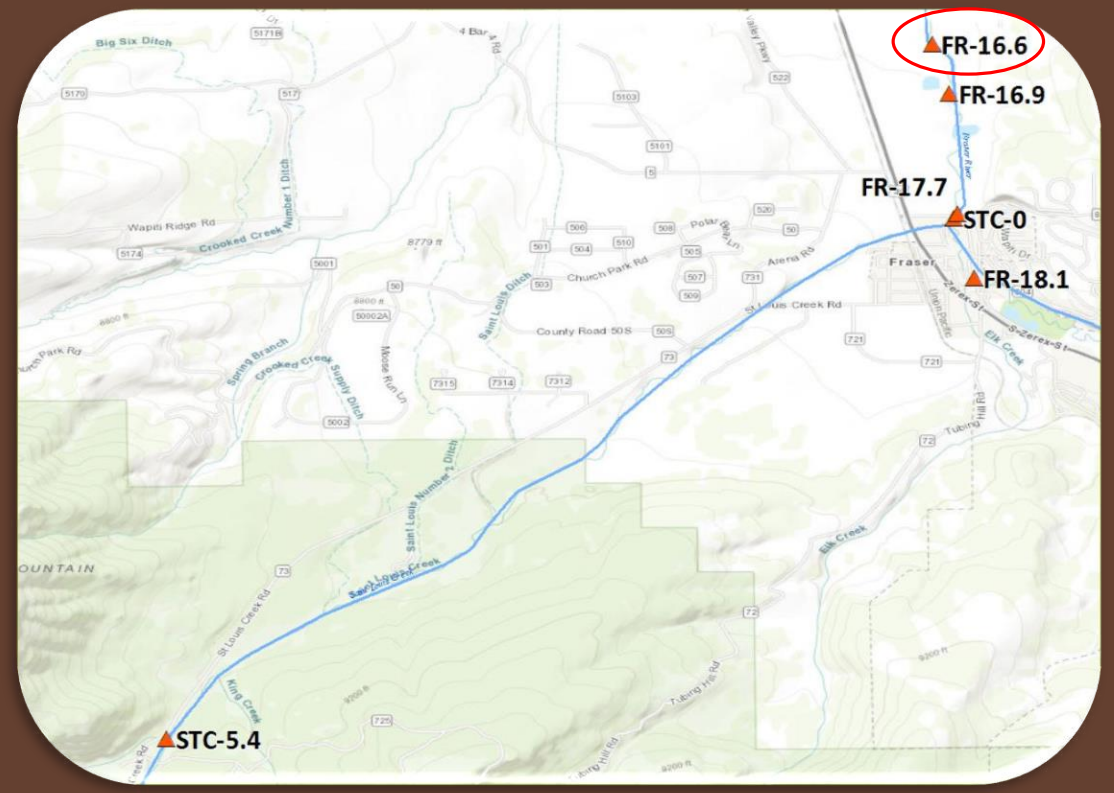


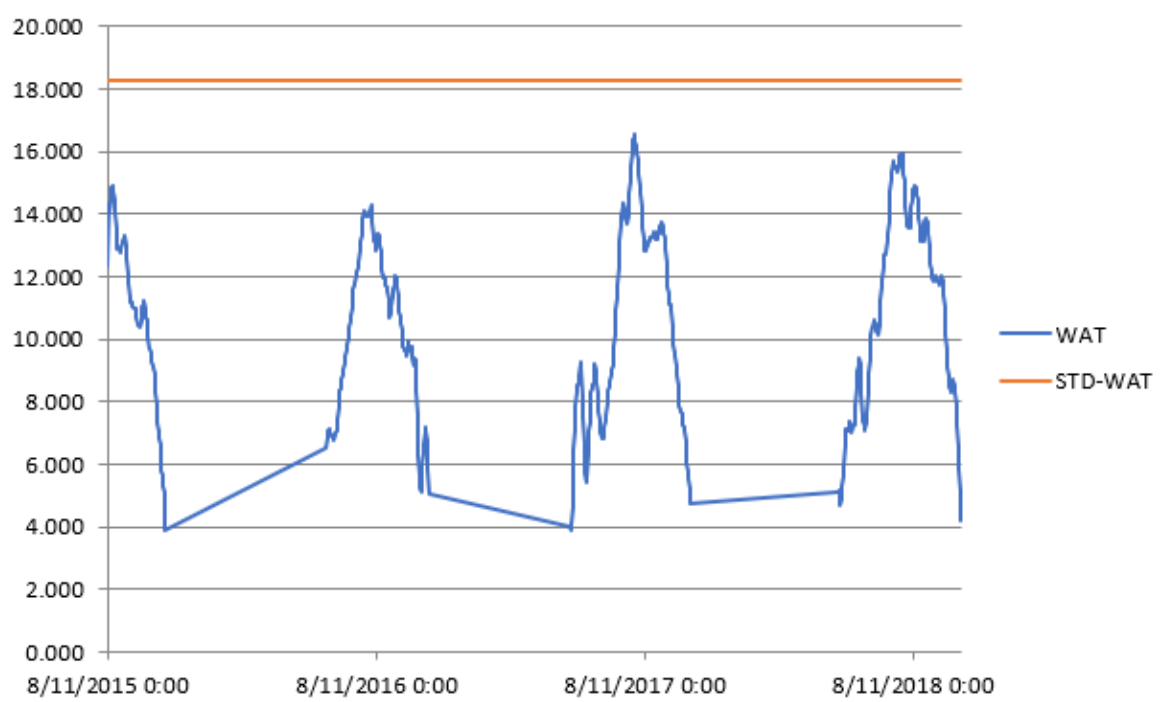
CSII
 FR-abvFSD
 FR-16.9



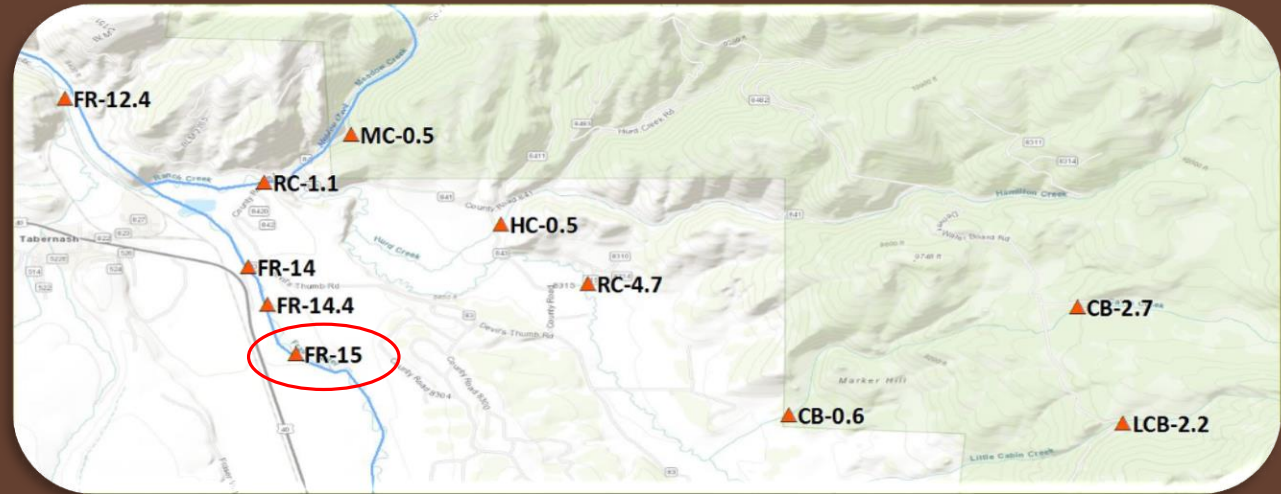


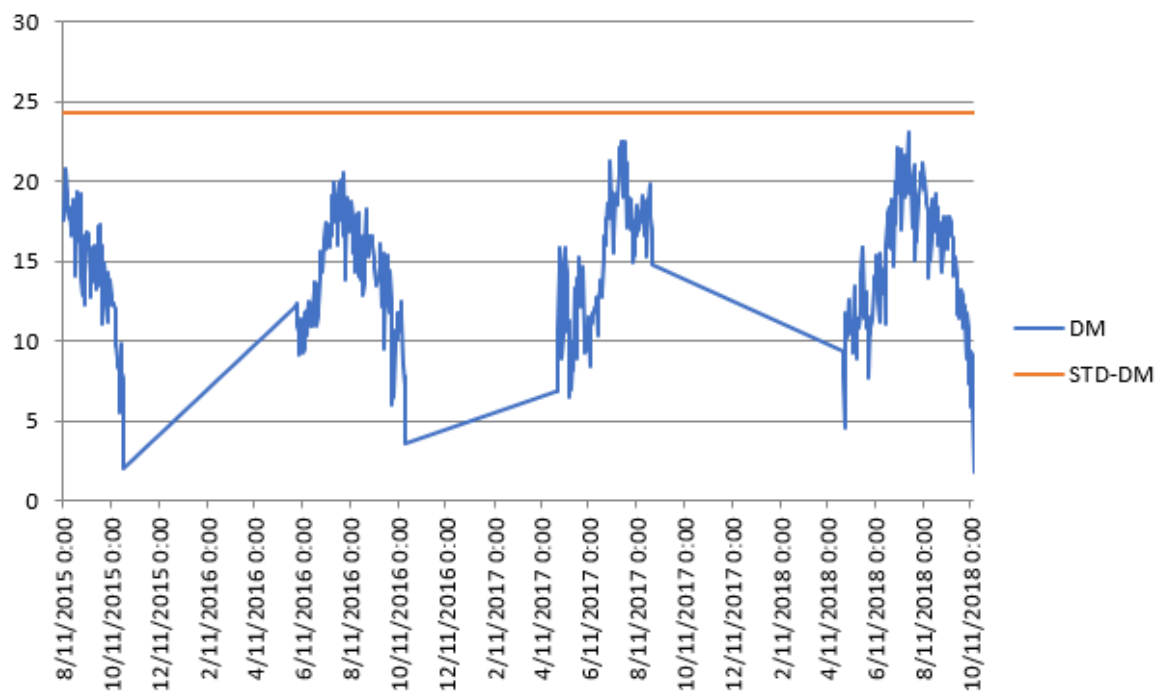
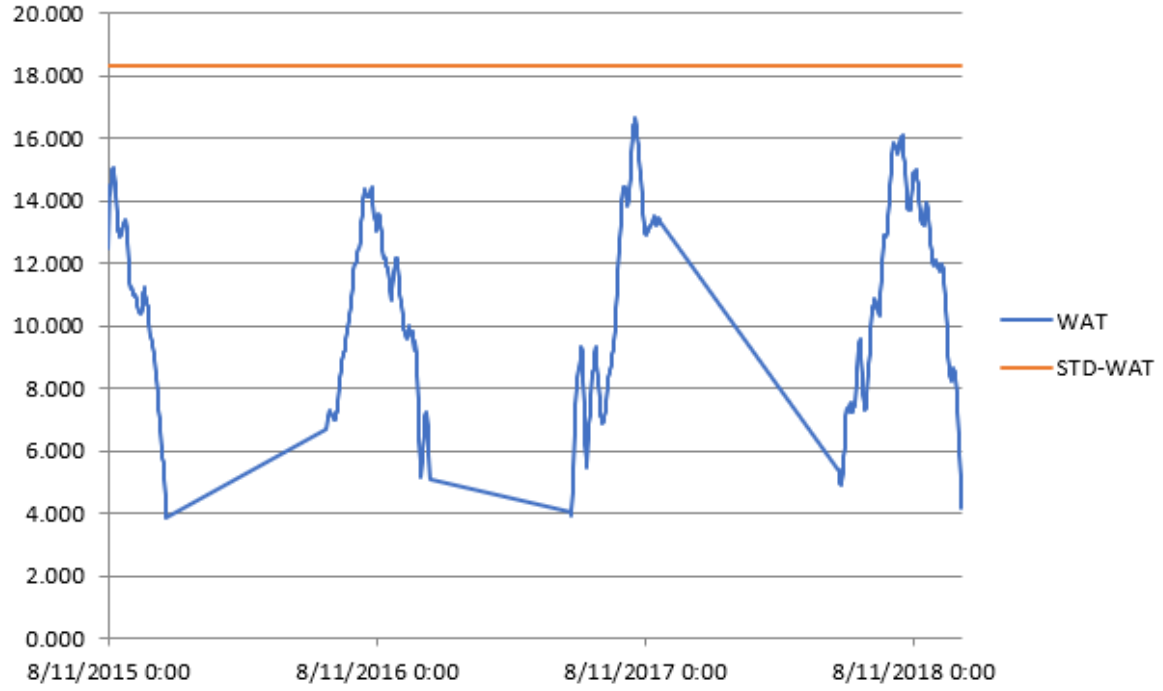
CSII
 FR-blwFSD
 FR-16.6



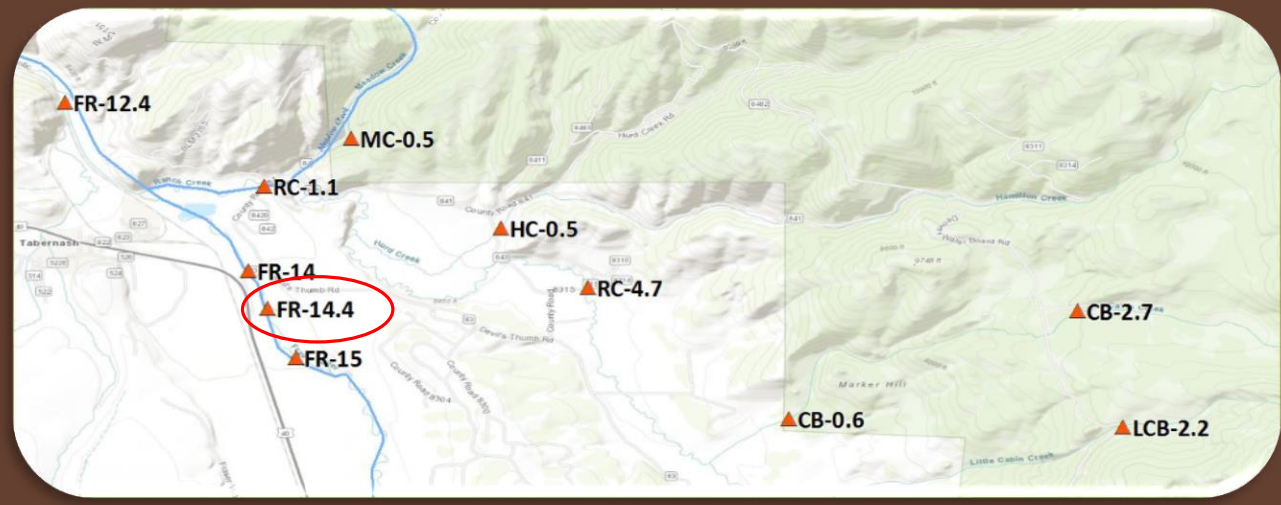


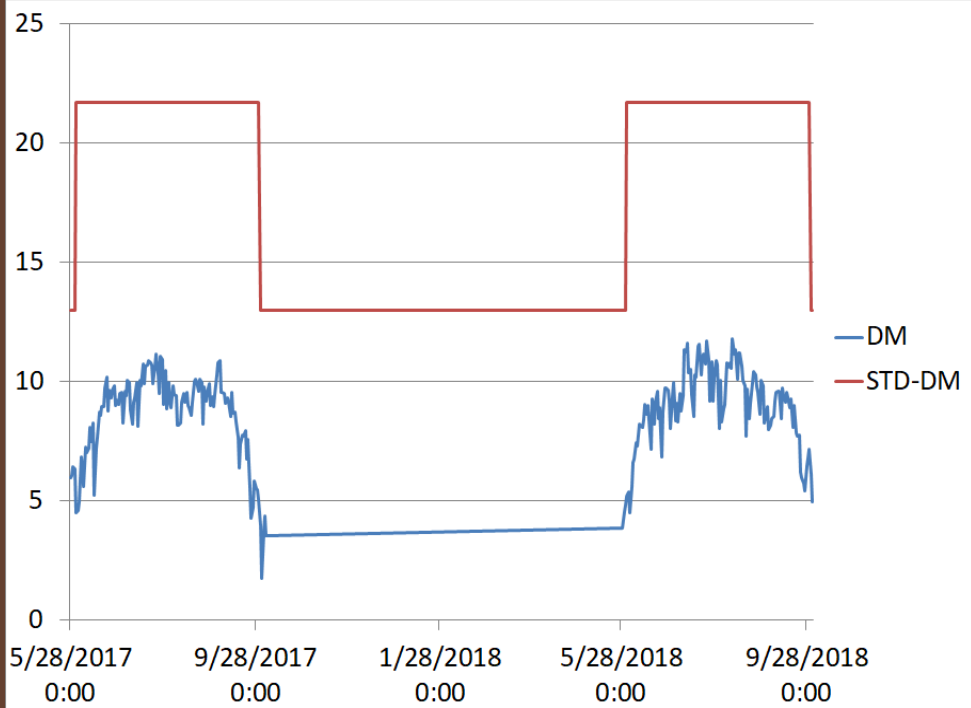
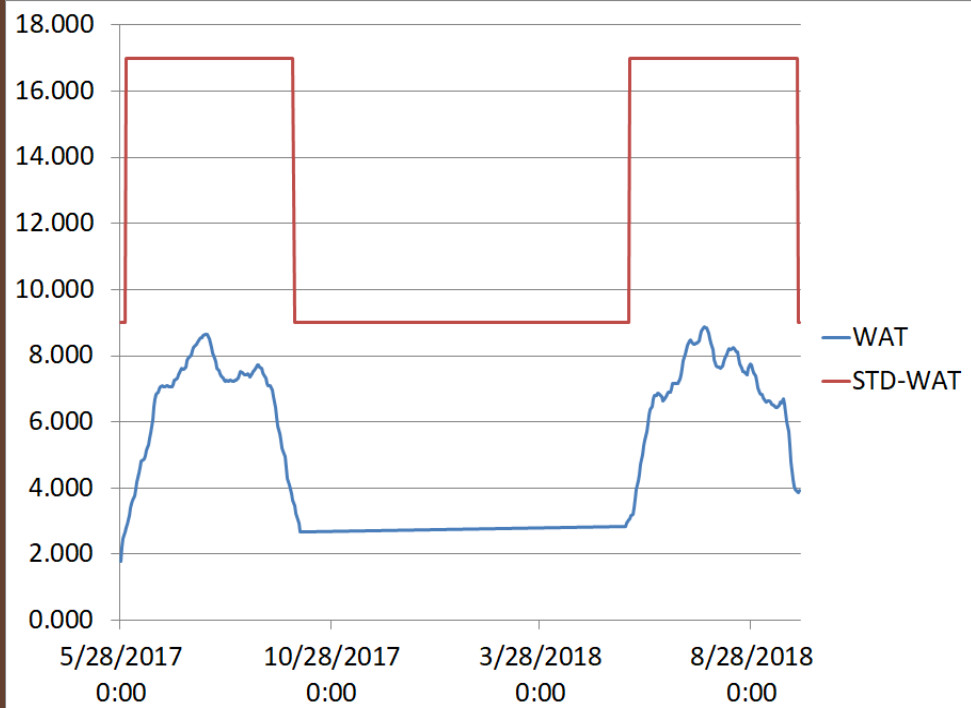
CSII
FR-SpProjU
FR-15



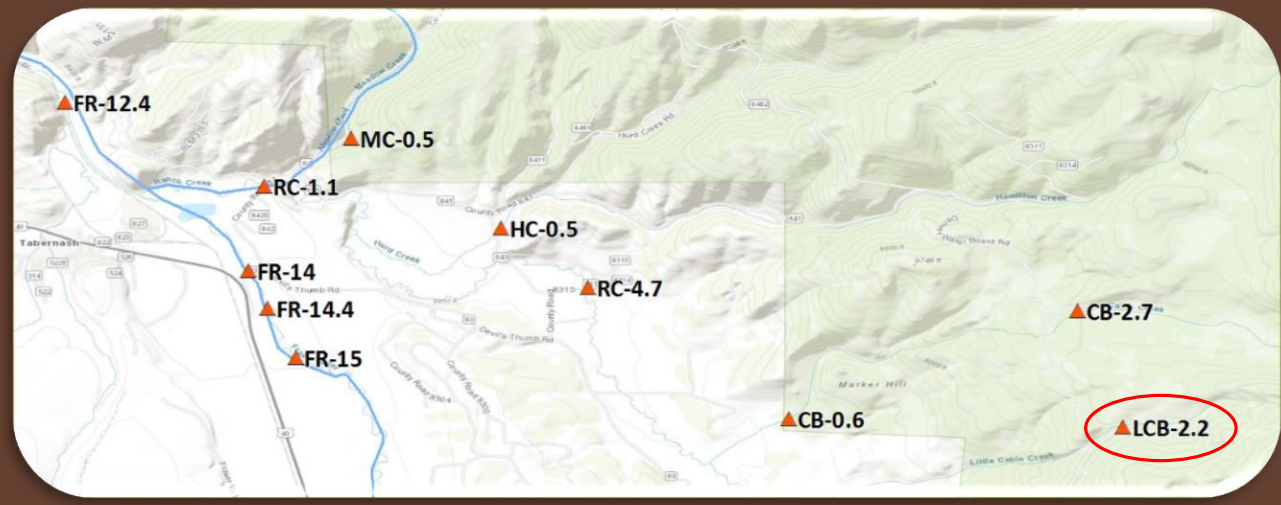


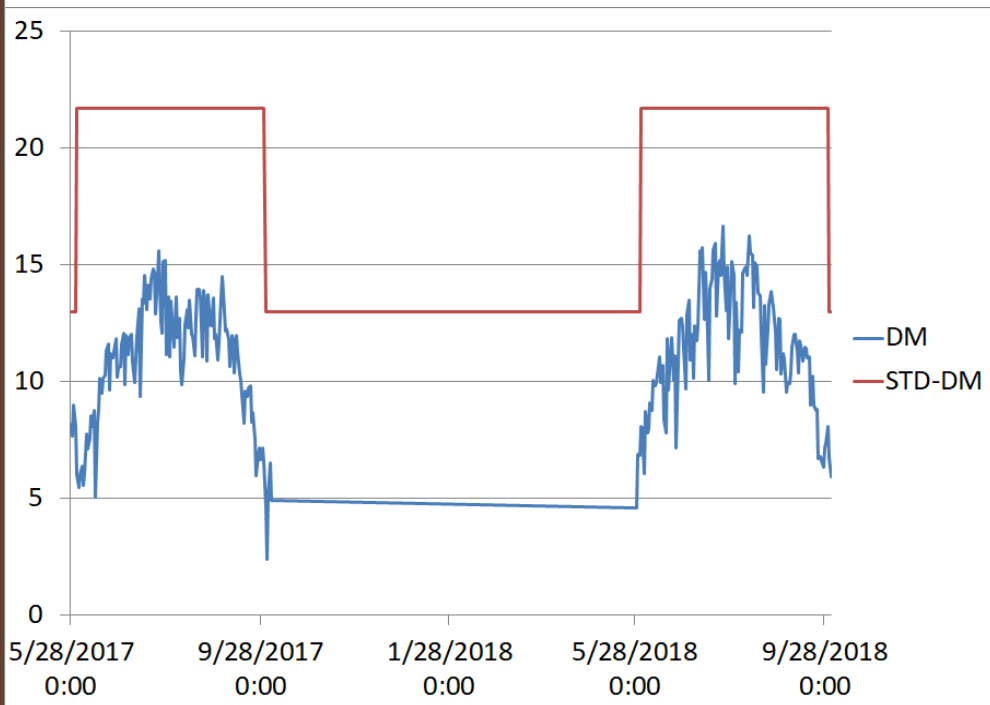
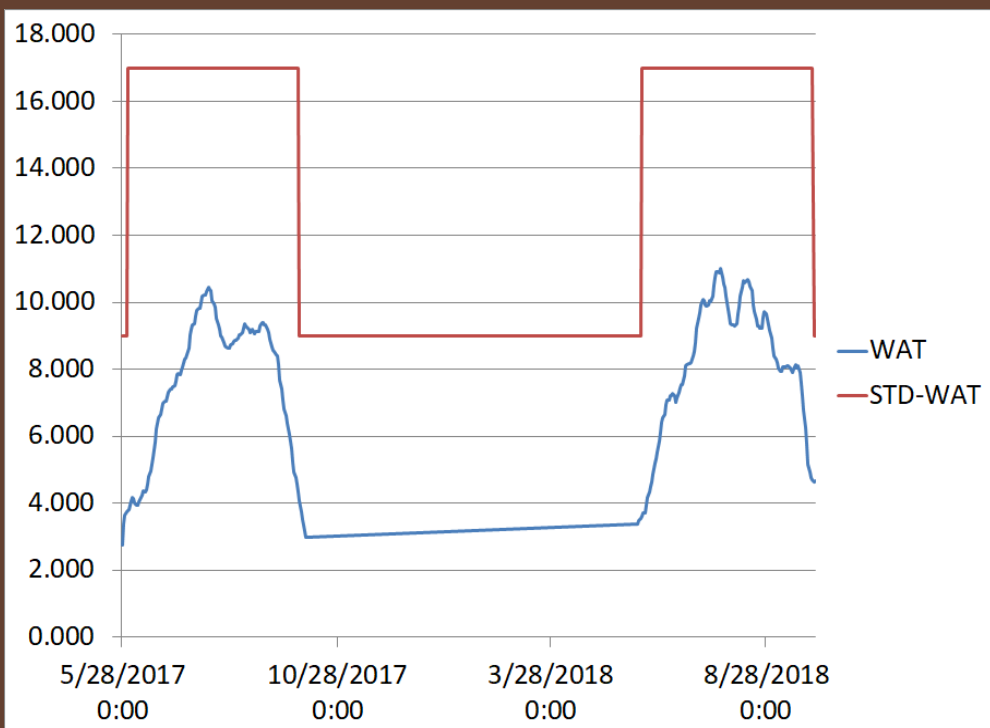
CSII
FR-SpProjD
FR-14.4



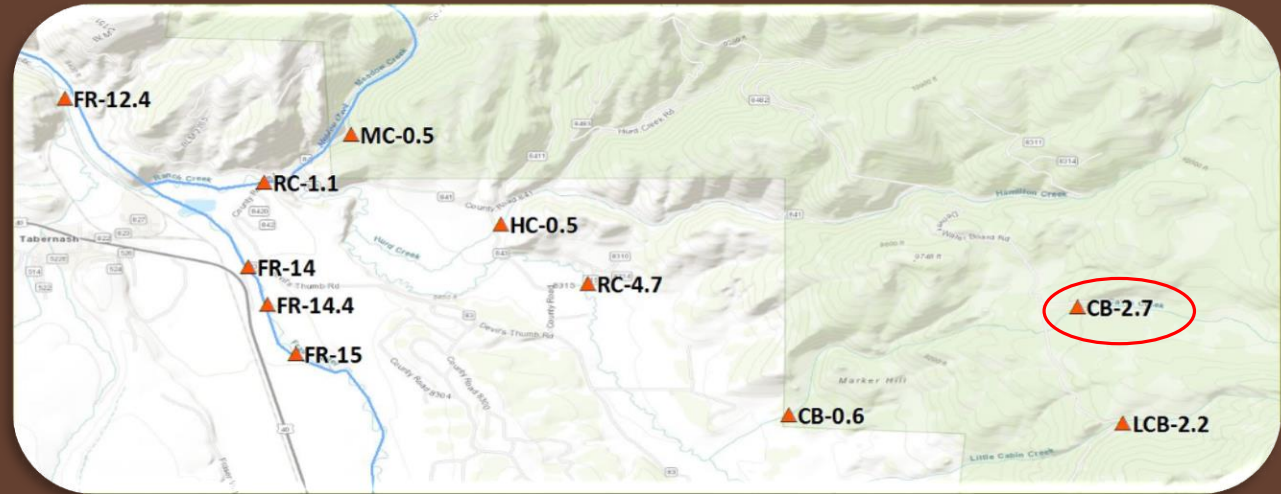


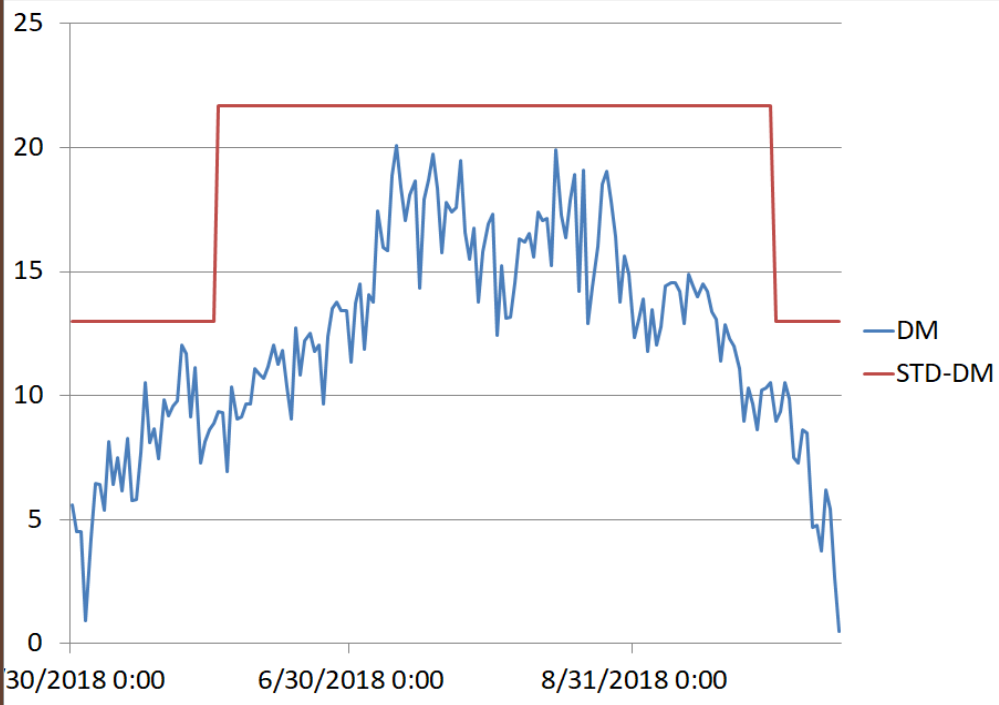
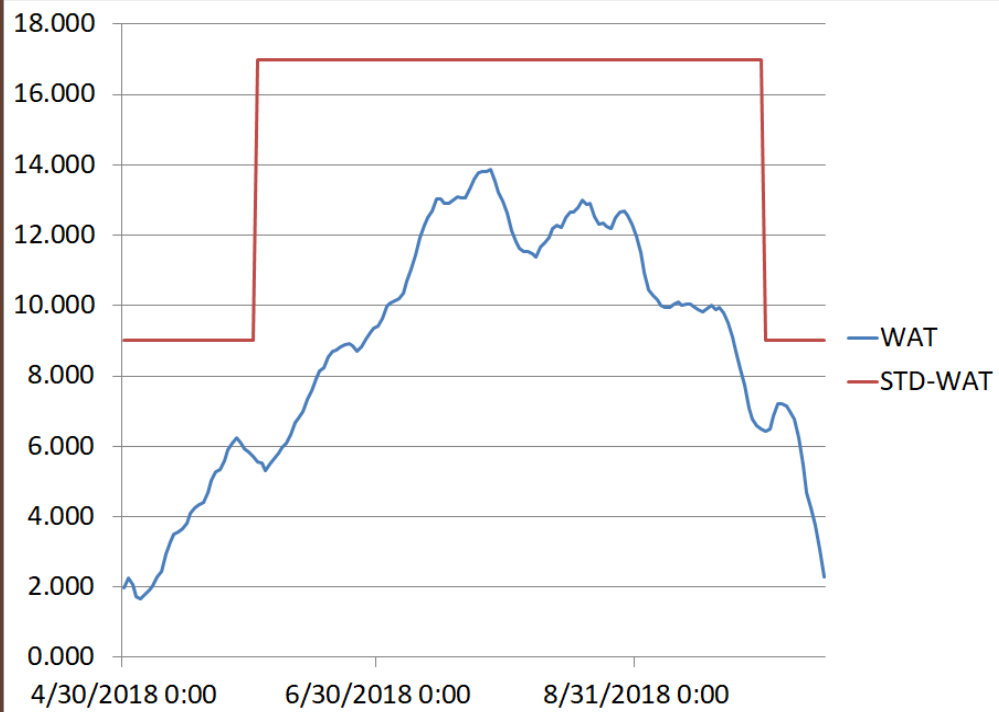
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 LCAB-blwDWB
 LCB-2.2



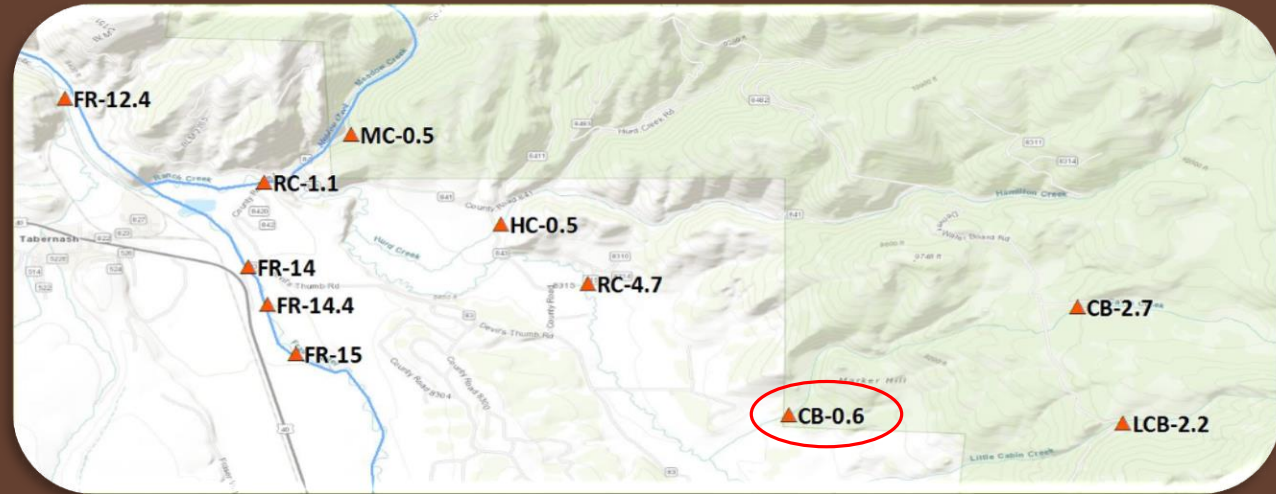


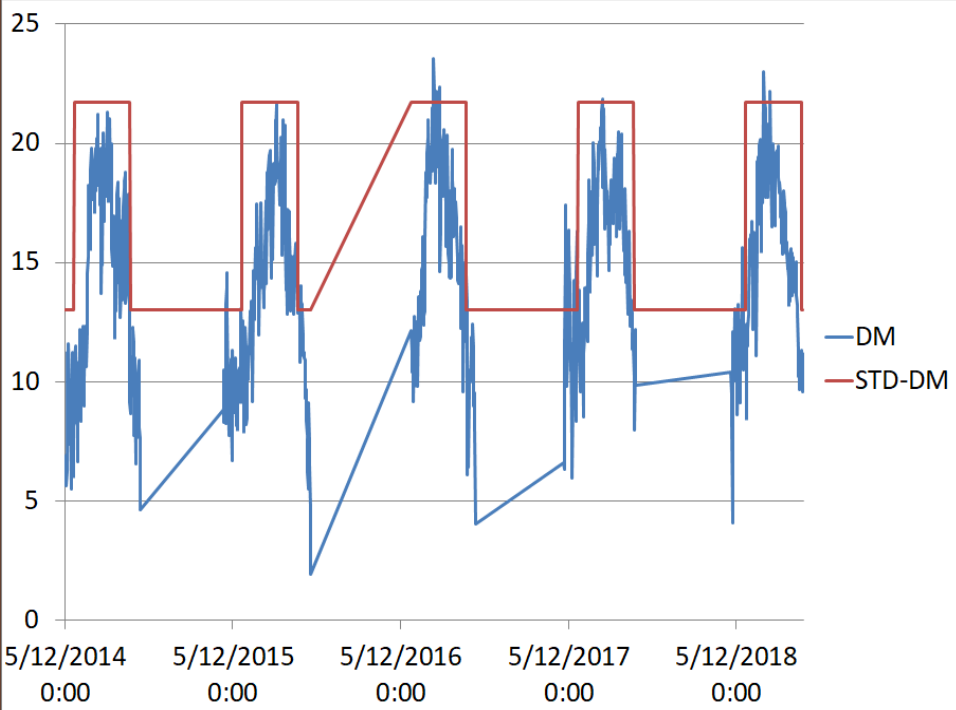
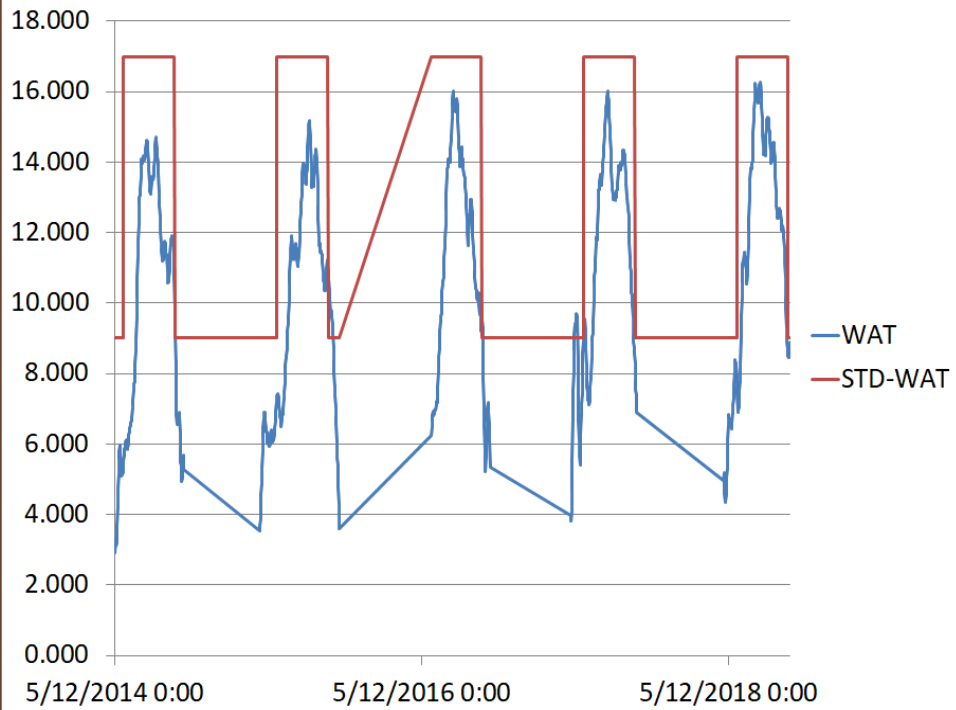
CSI
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 CB-2.7



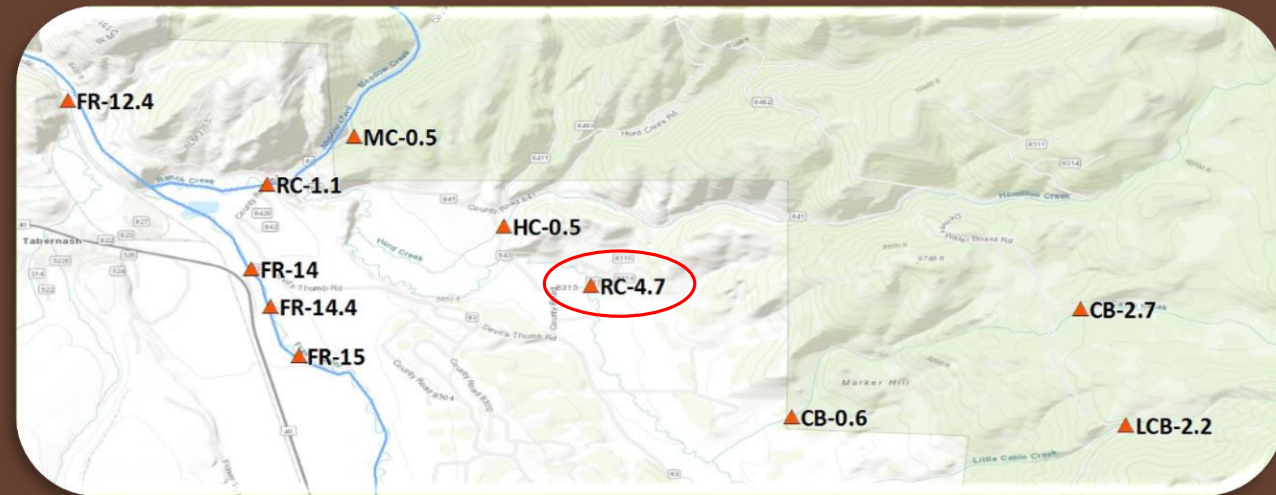


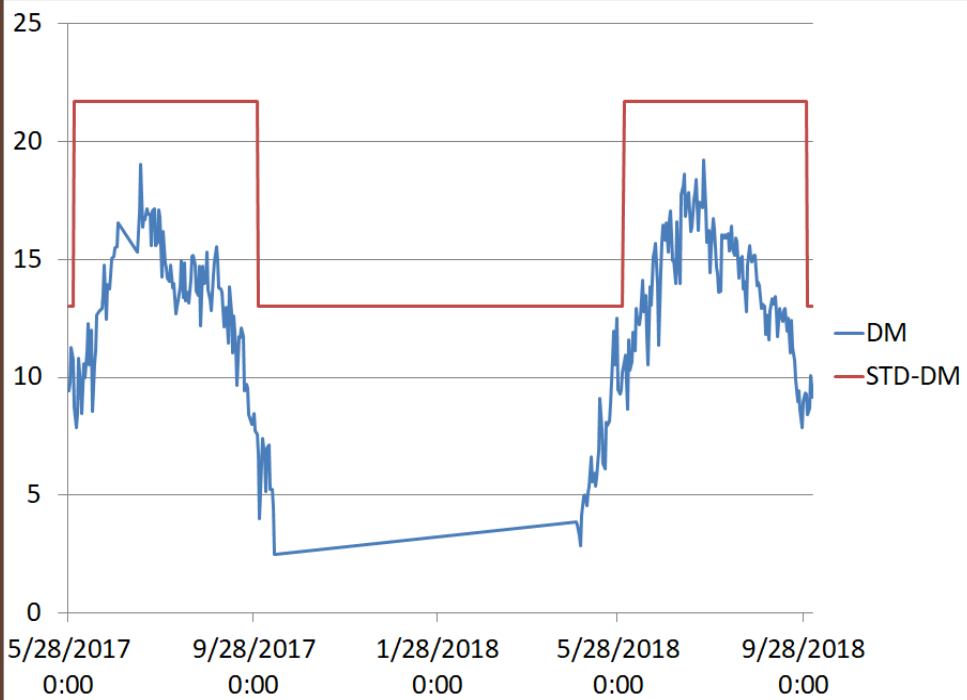
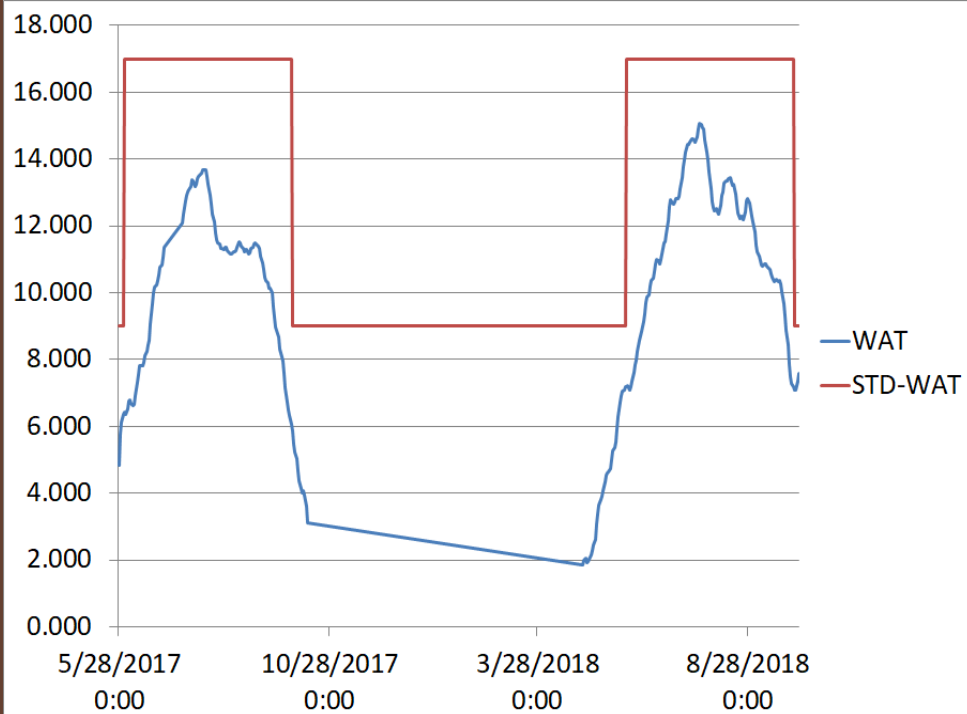
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 CAB-abvChan
 CB-0.6



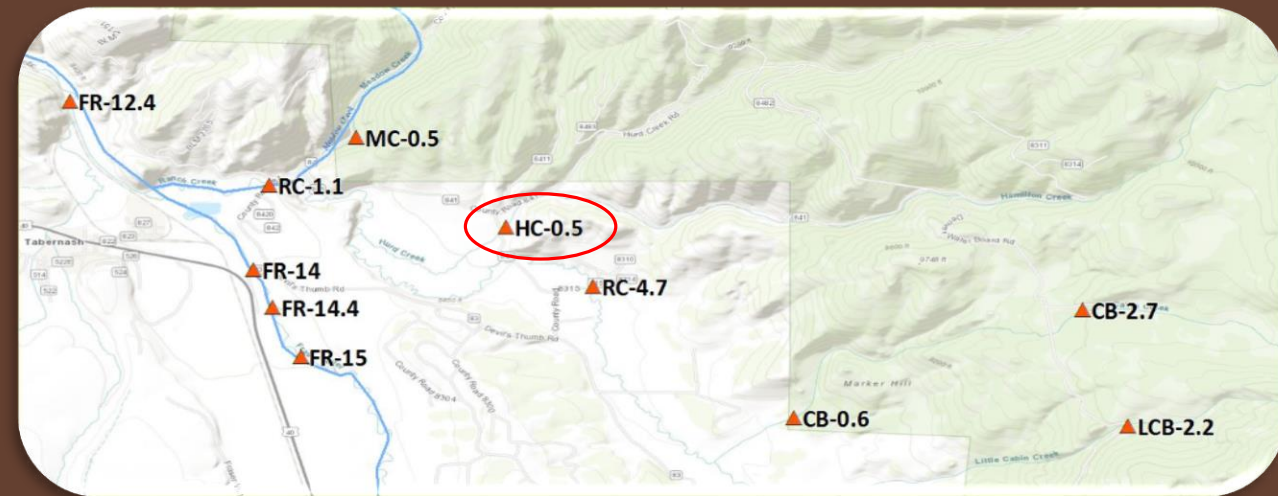


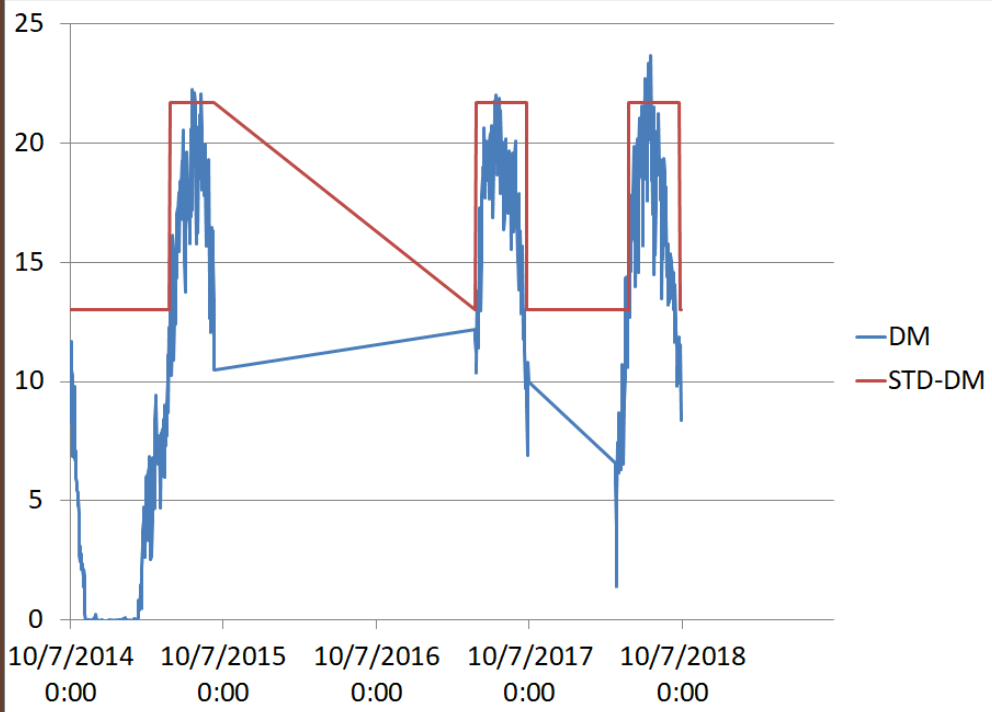
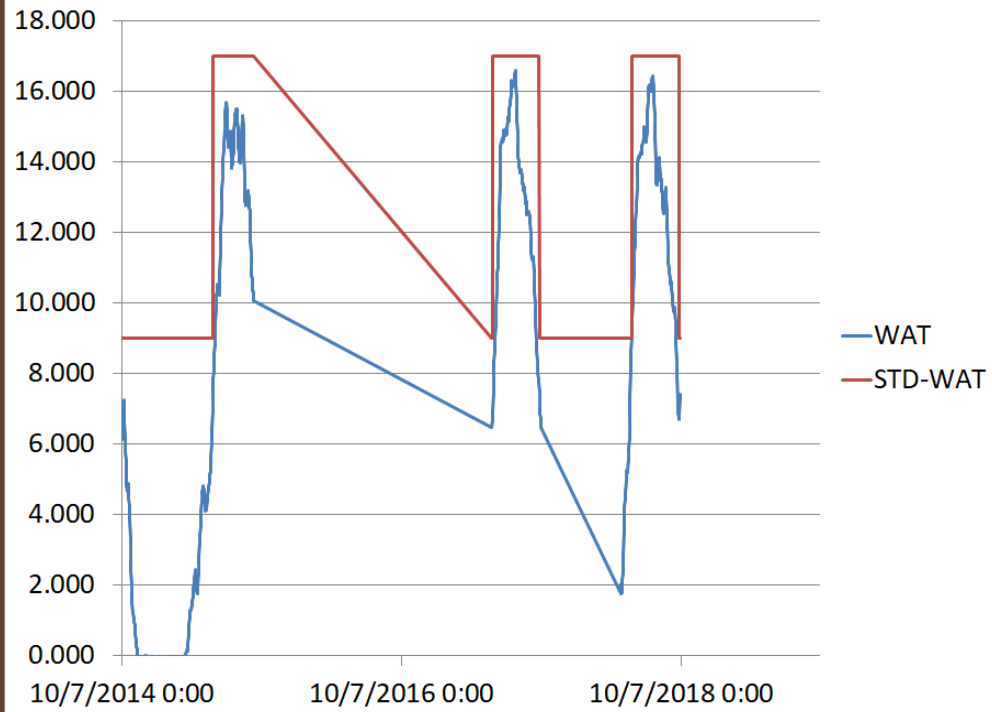
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RC-blwCR8315
RC-4.7



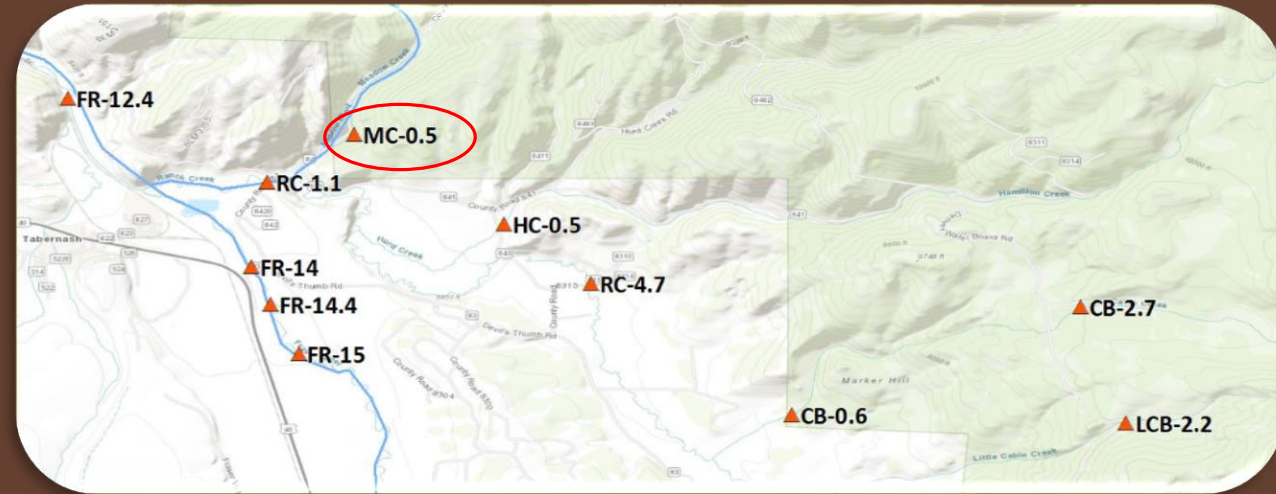


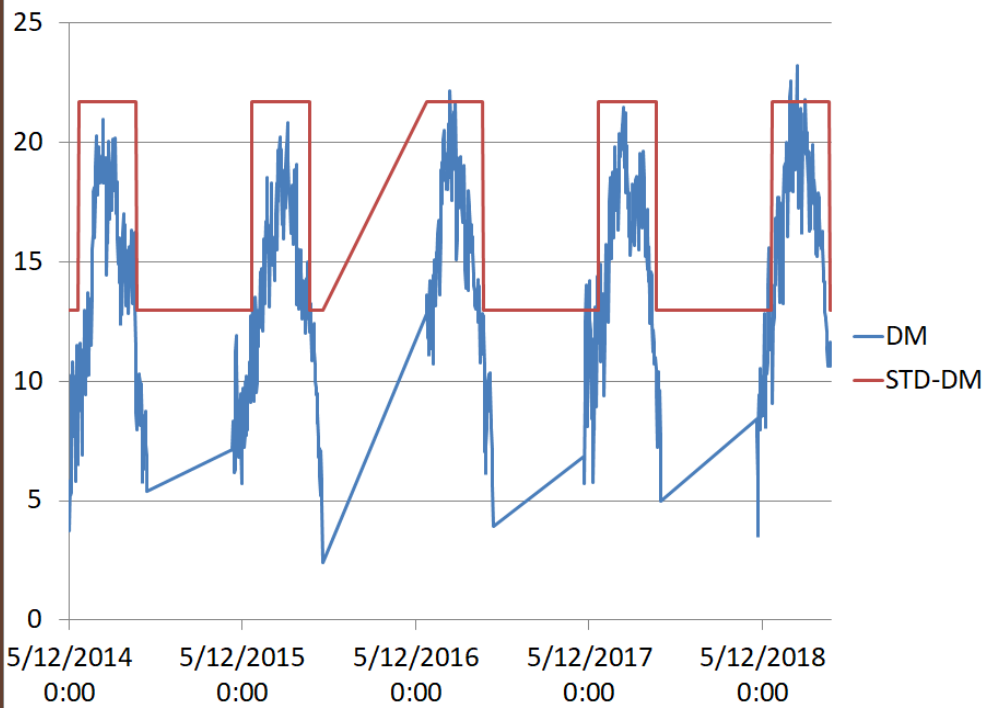
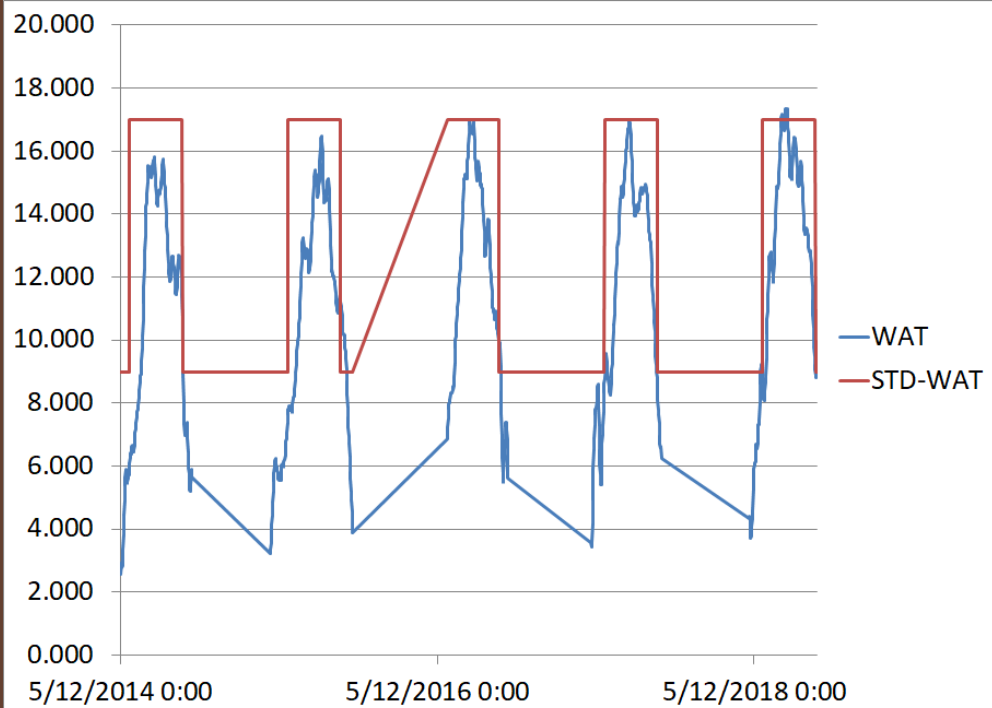
CSI
HRD-atCR843
HC-0.5



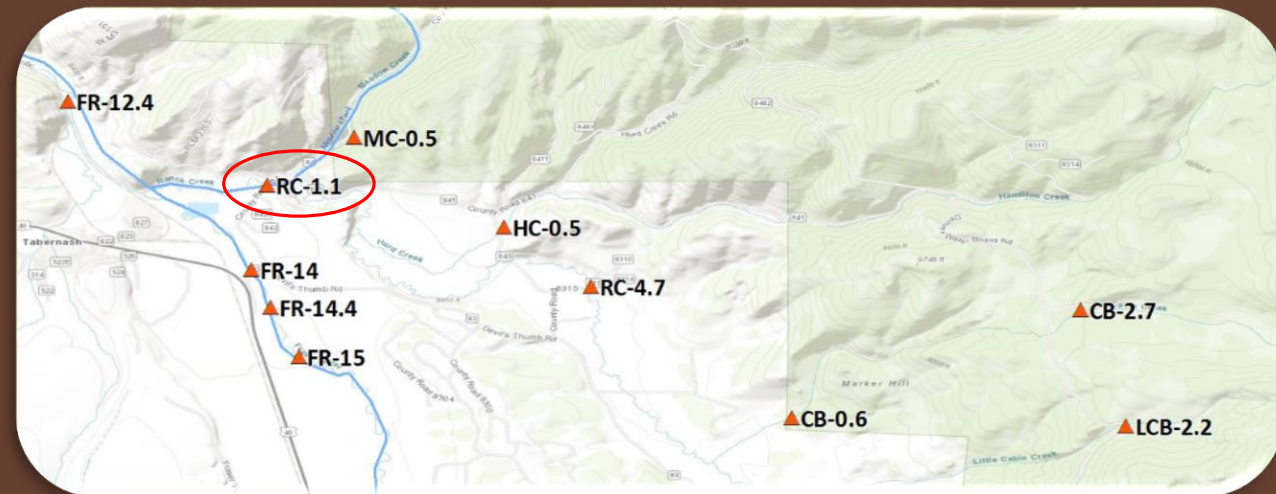


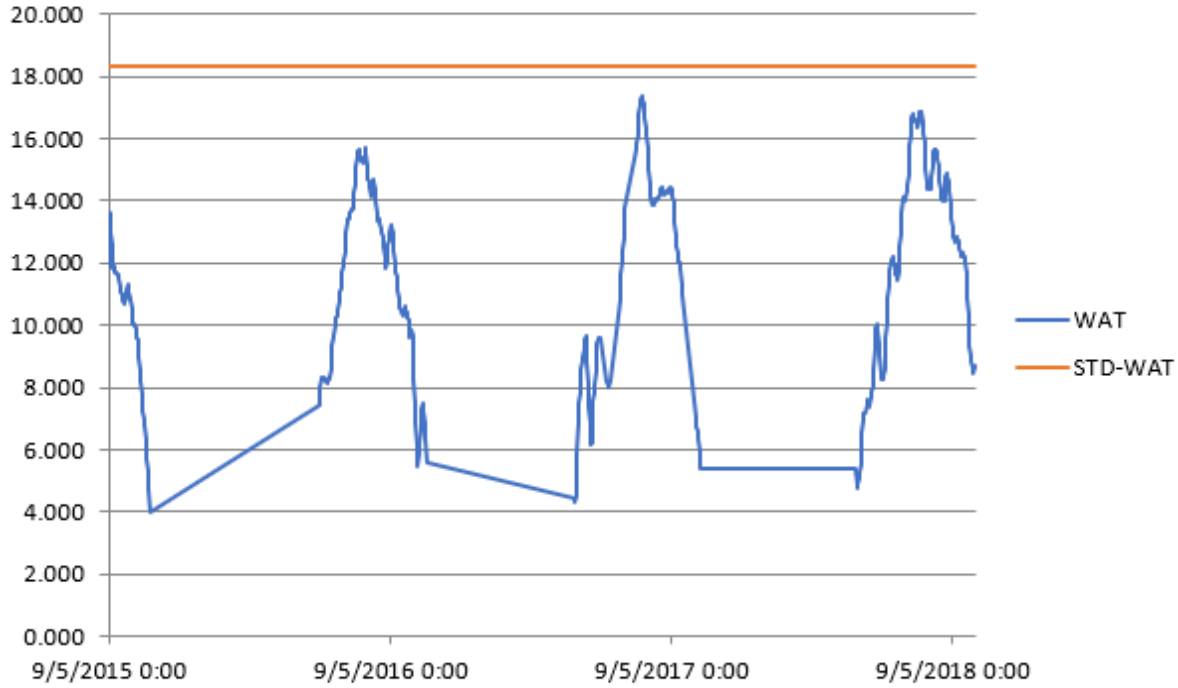
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MC-0.5



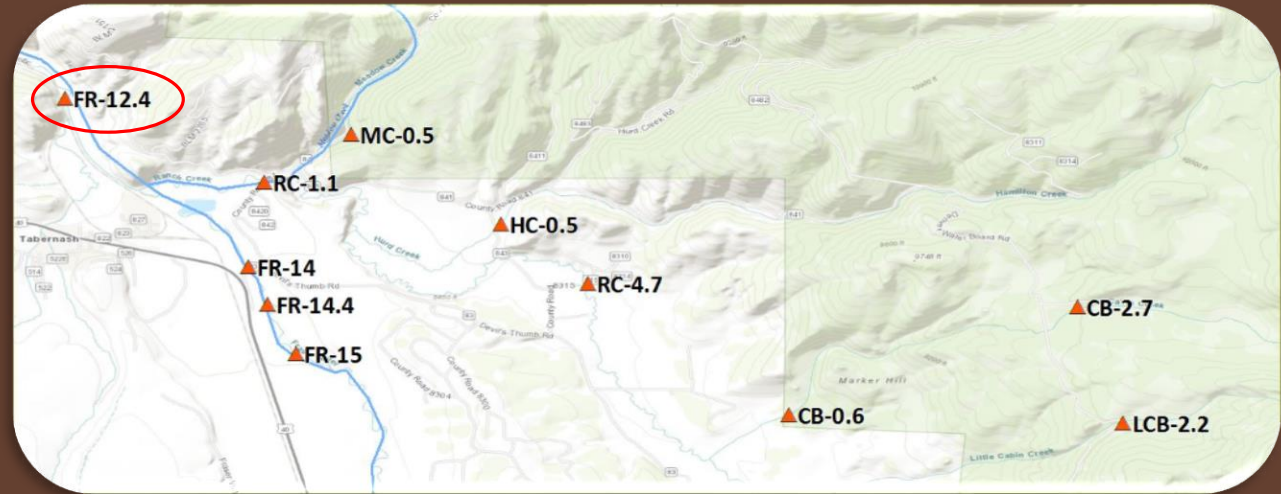


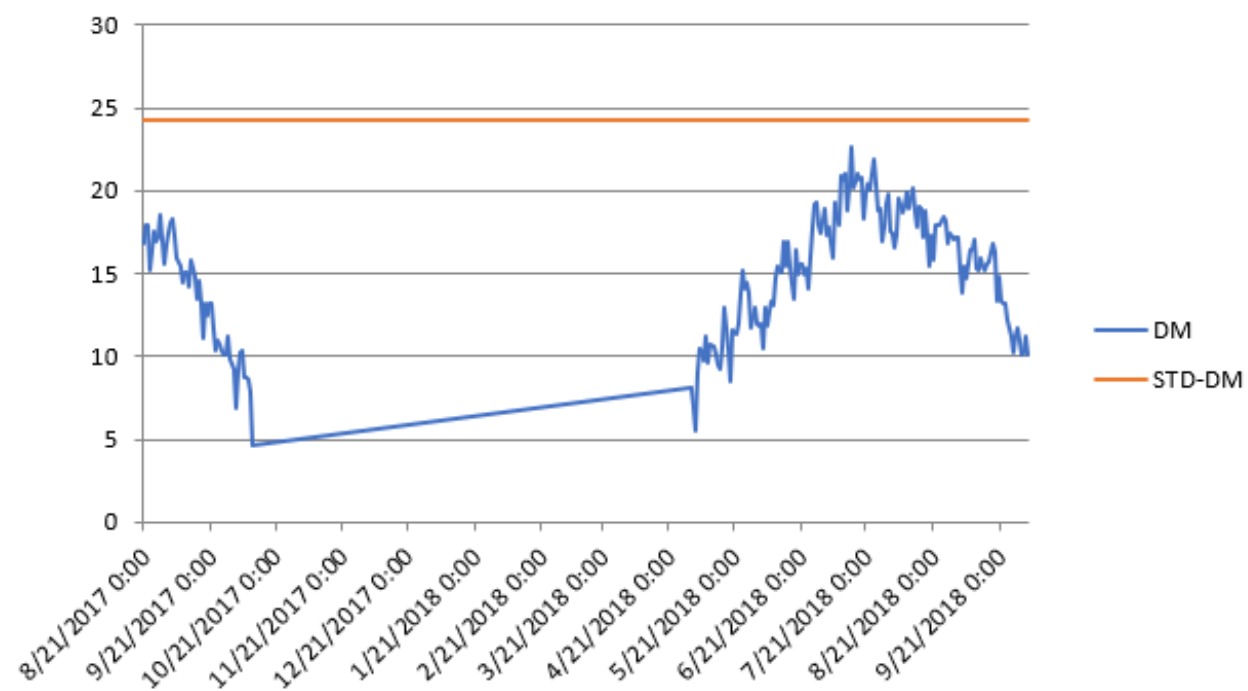
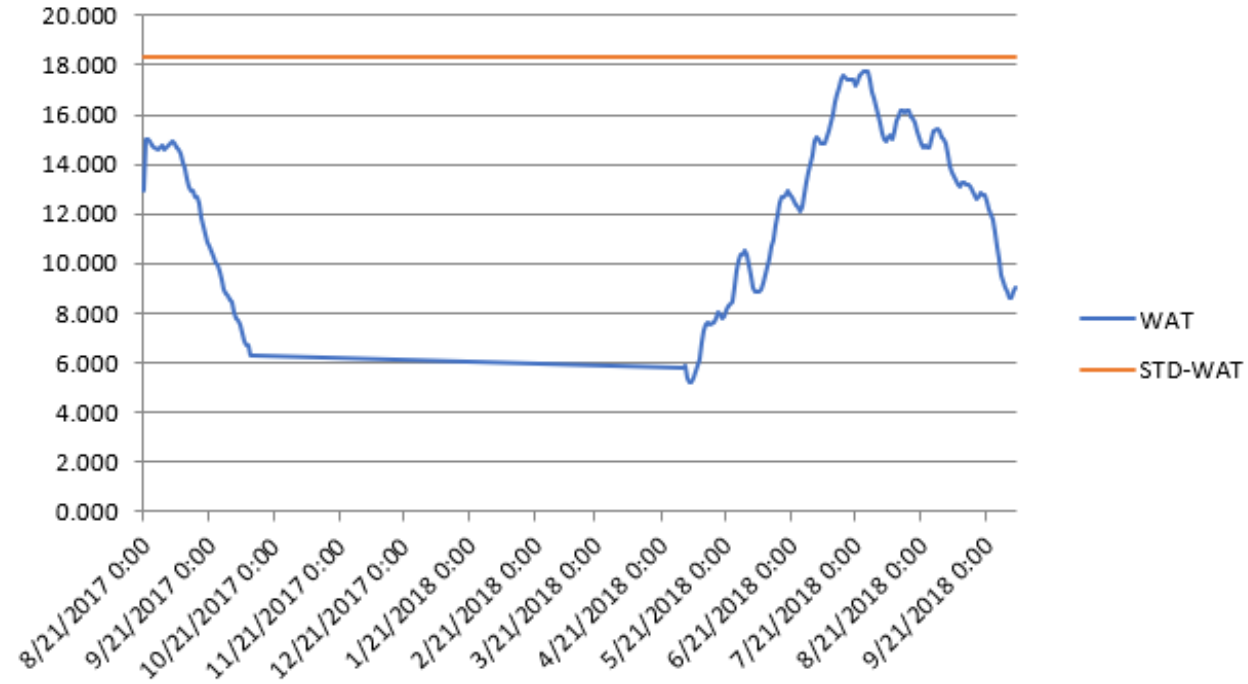
CSI
RC-blwMC
RC-1.1



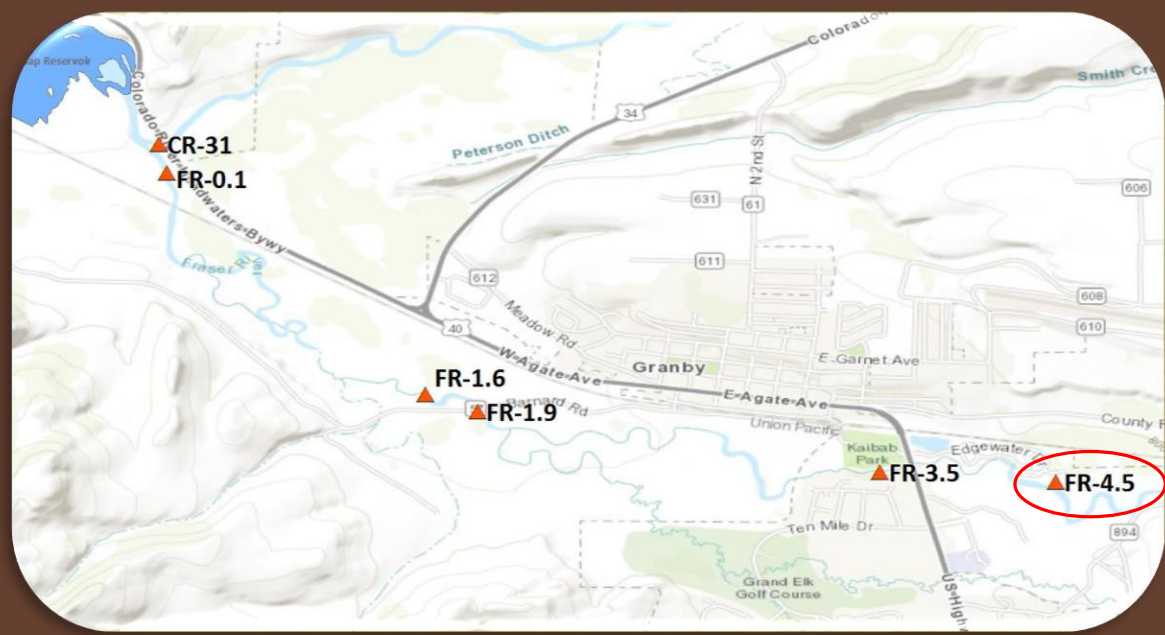


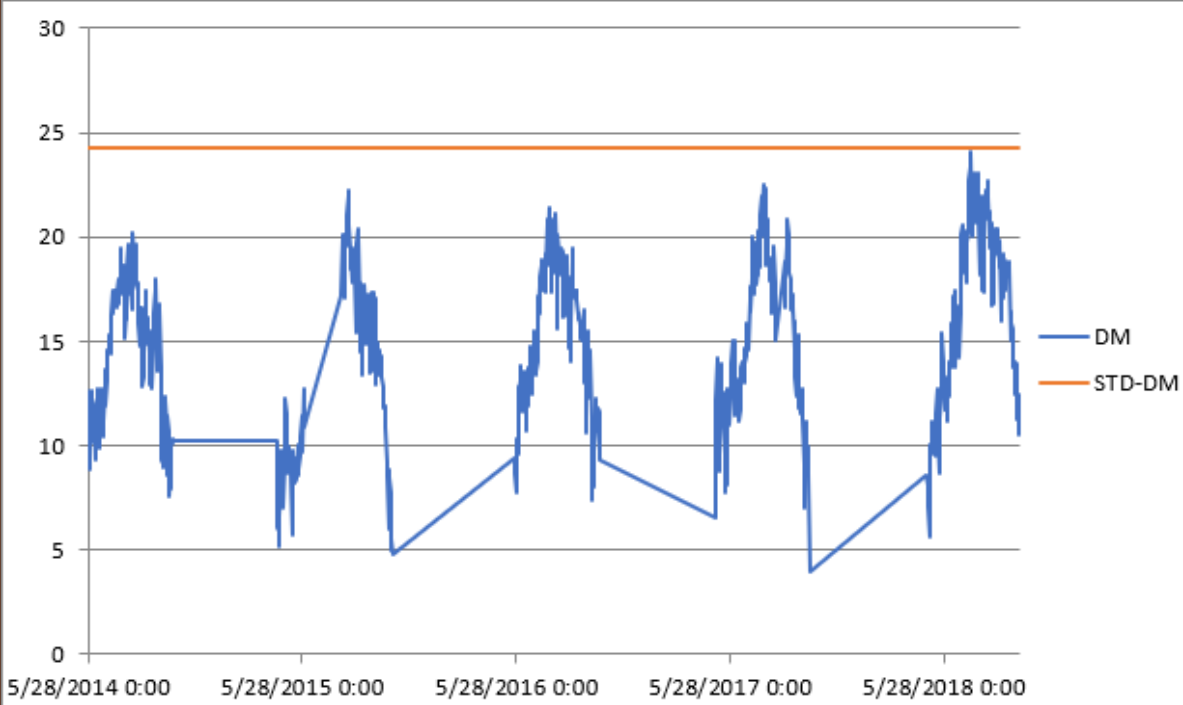
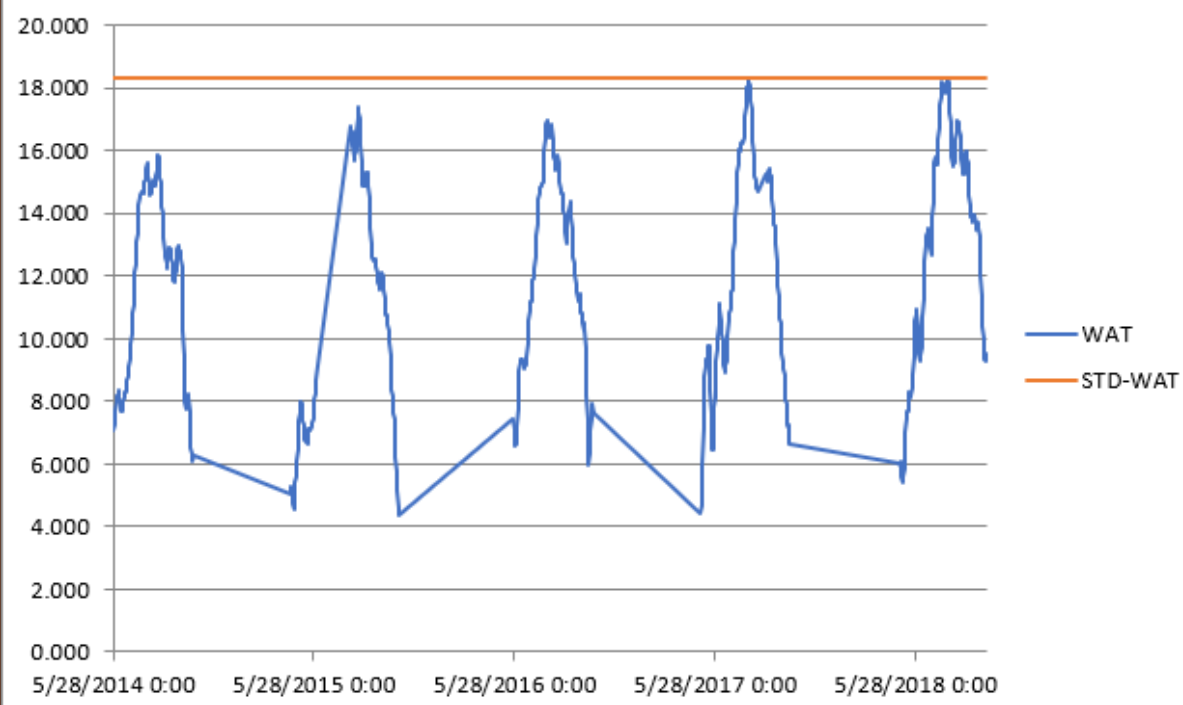
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 FR-12.4



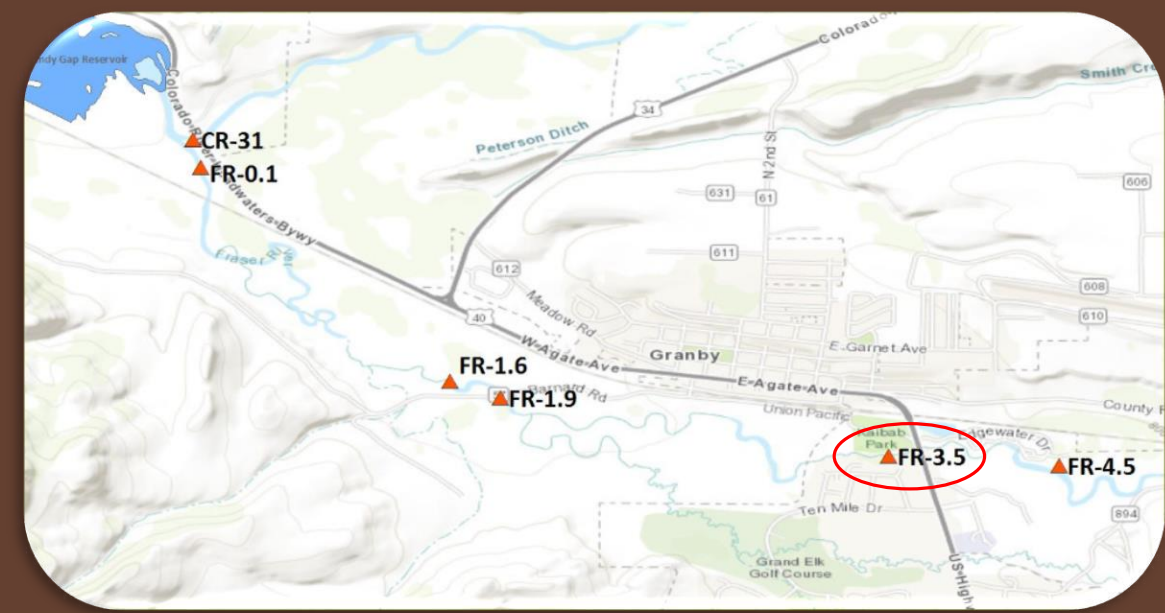


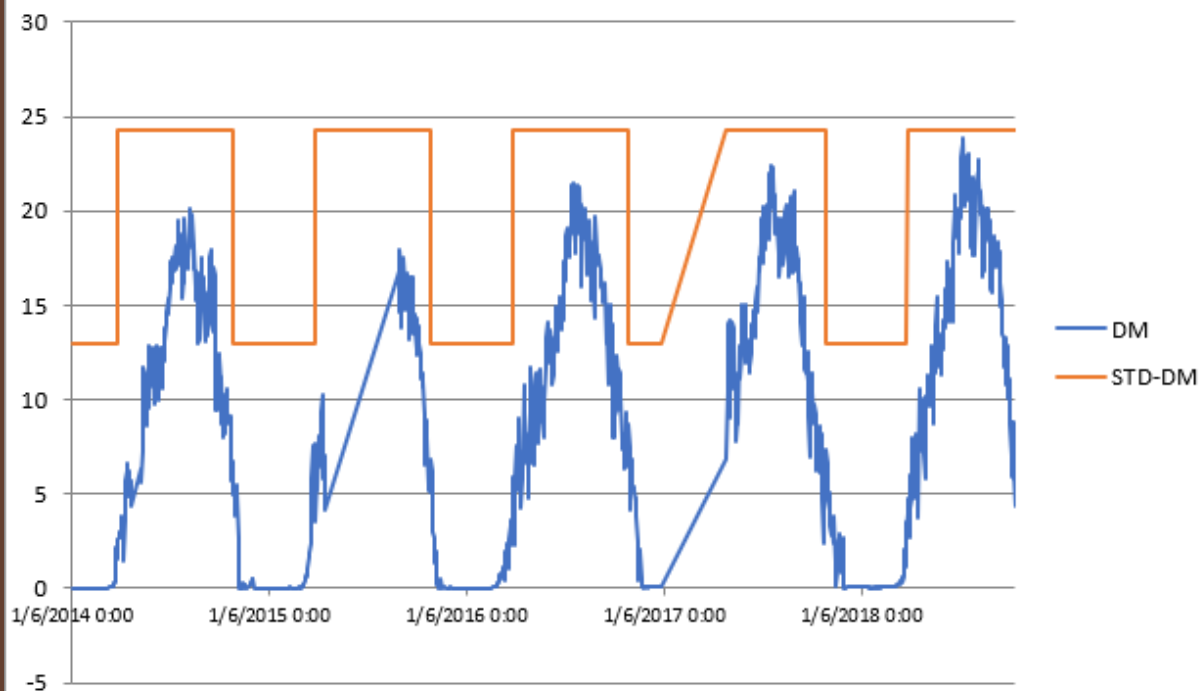
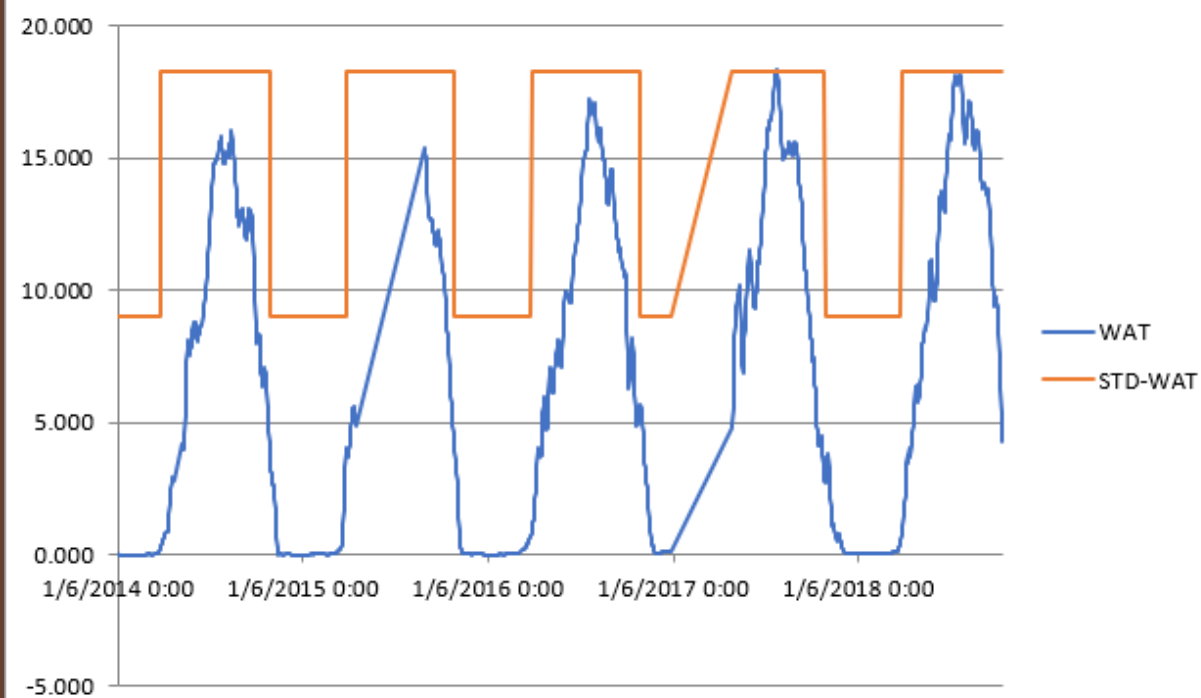
CSII
FR-blwFrCan
FR-4.5



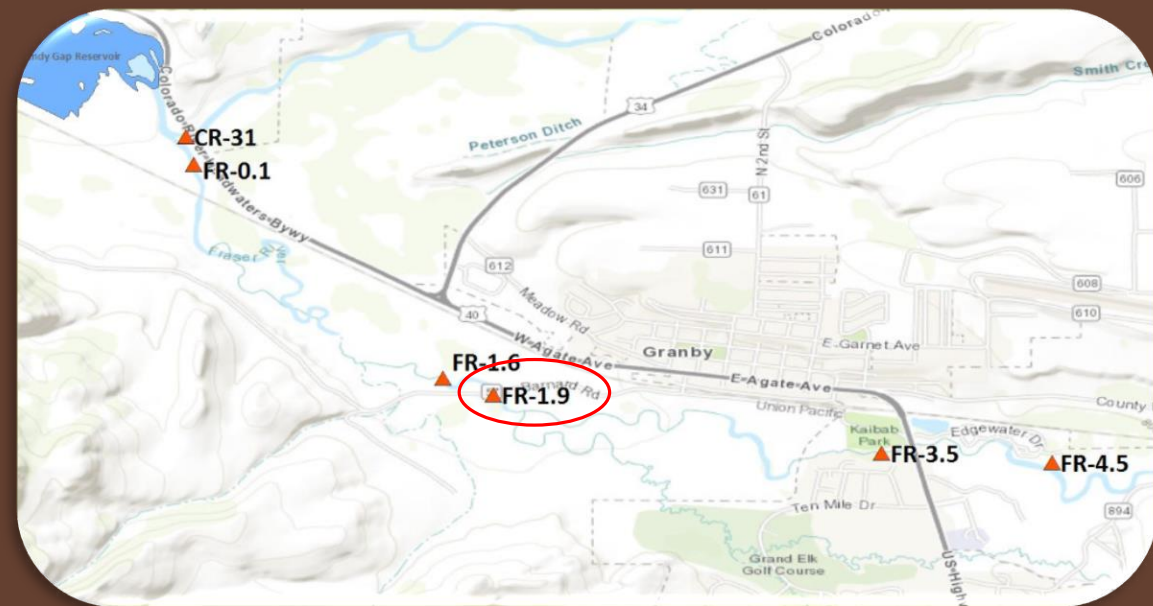


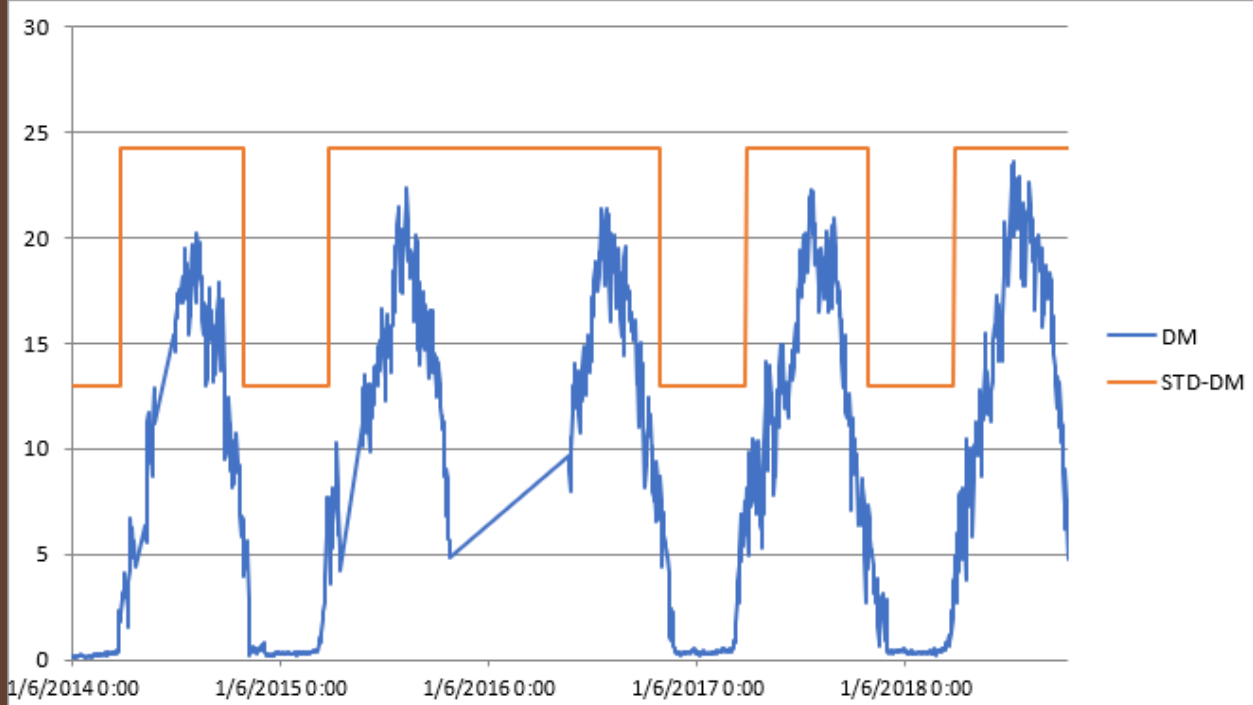
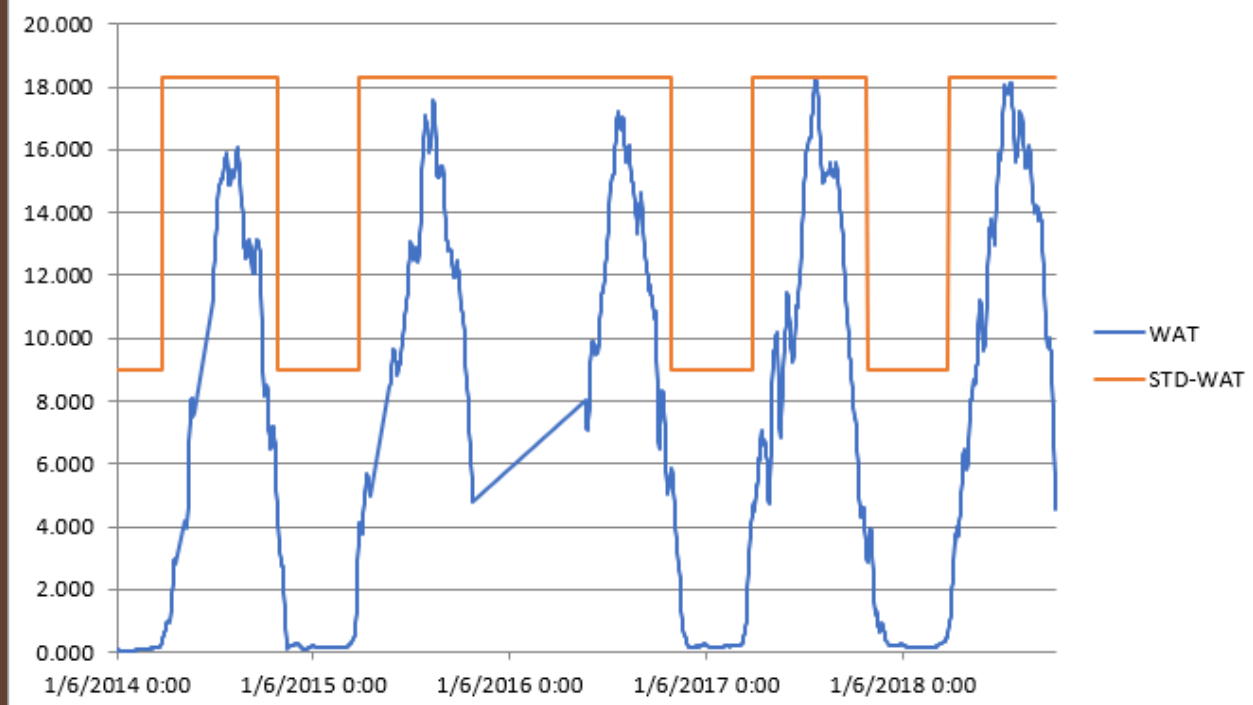
CSII
FR-HWY40GR
FR-3.5



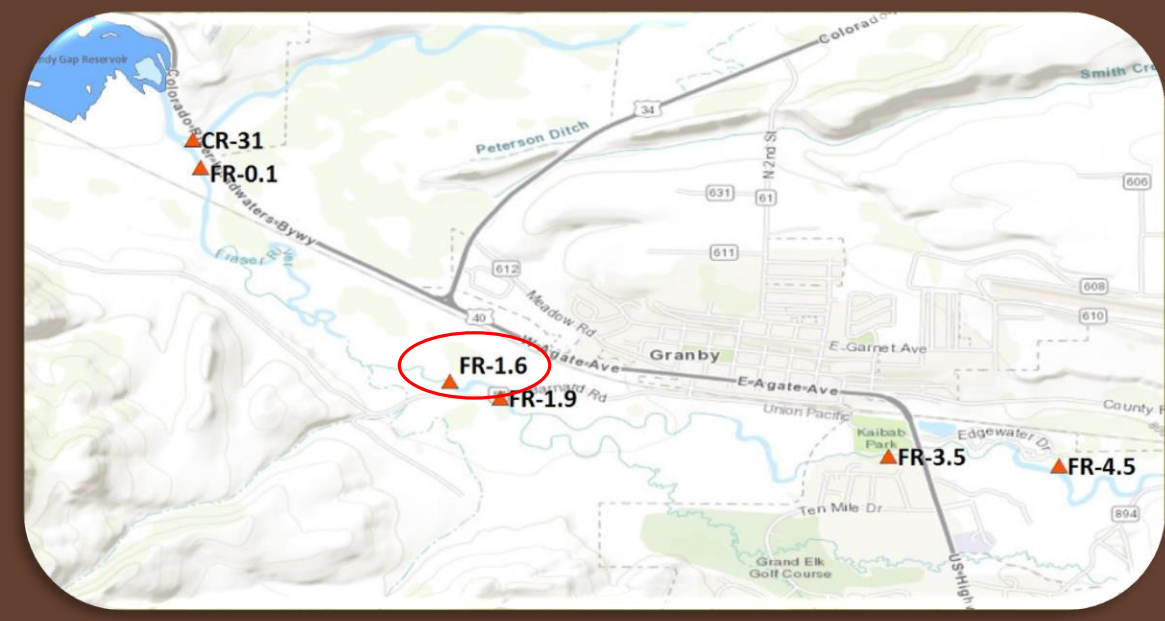


CSII
FR-abvGSD
FR-1.9

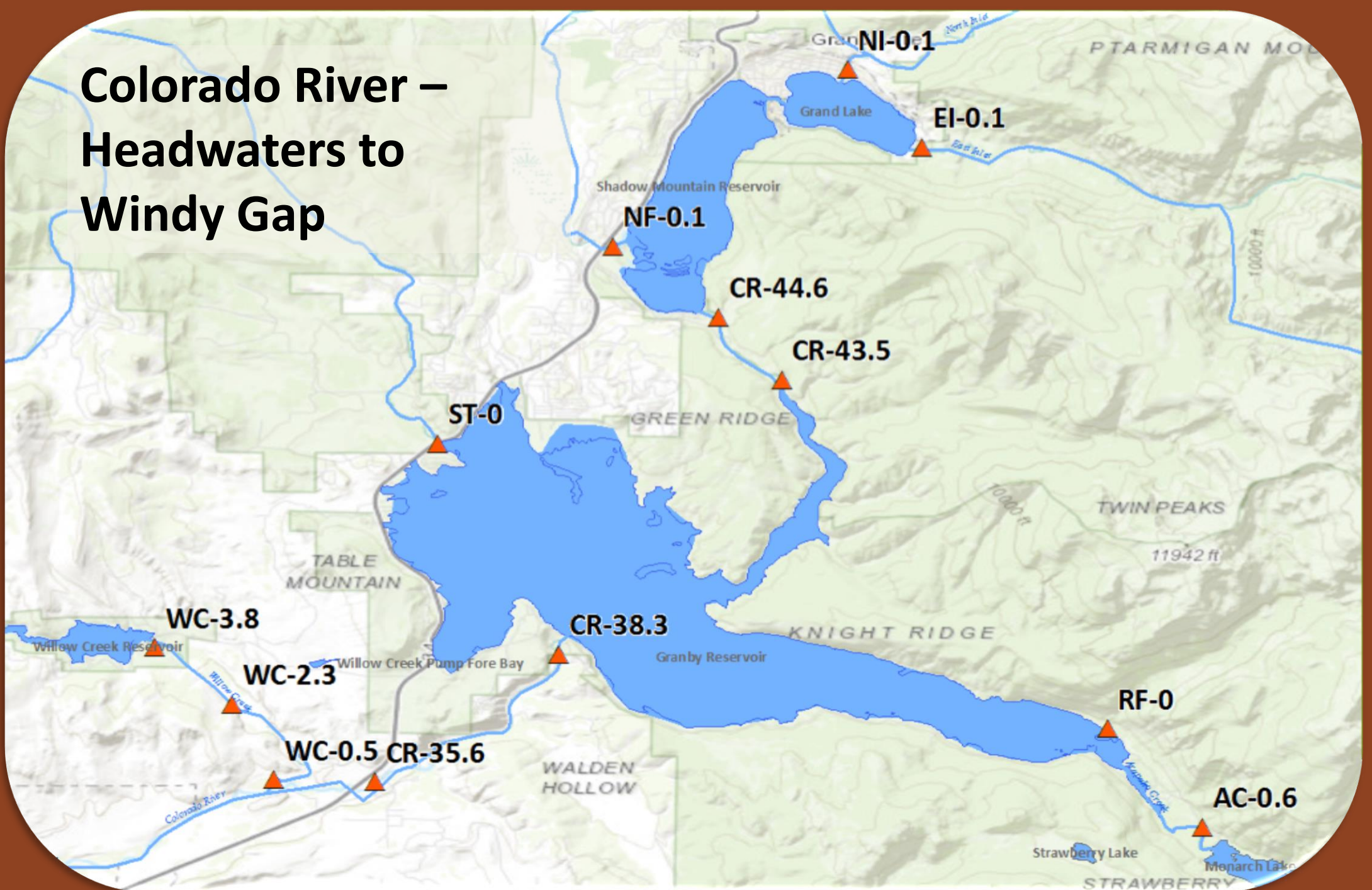




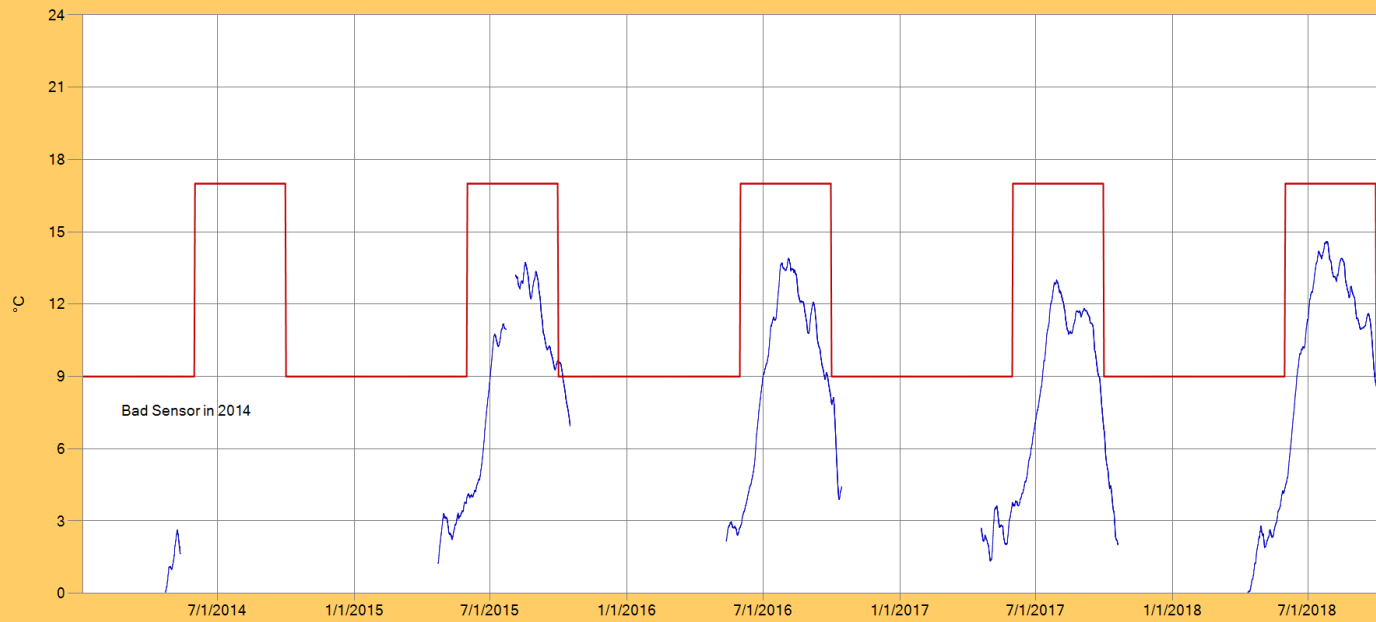
CSII
FR-blwGSD
FR-1.6



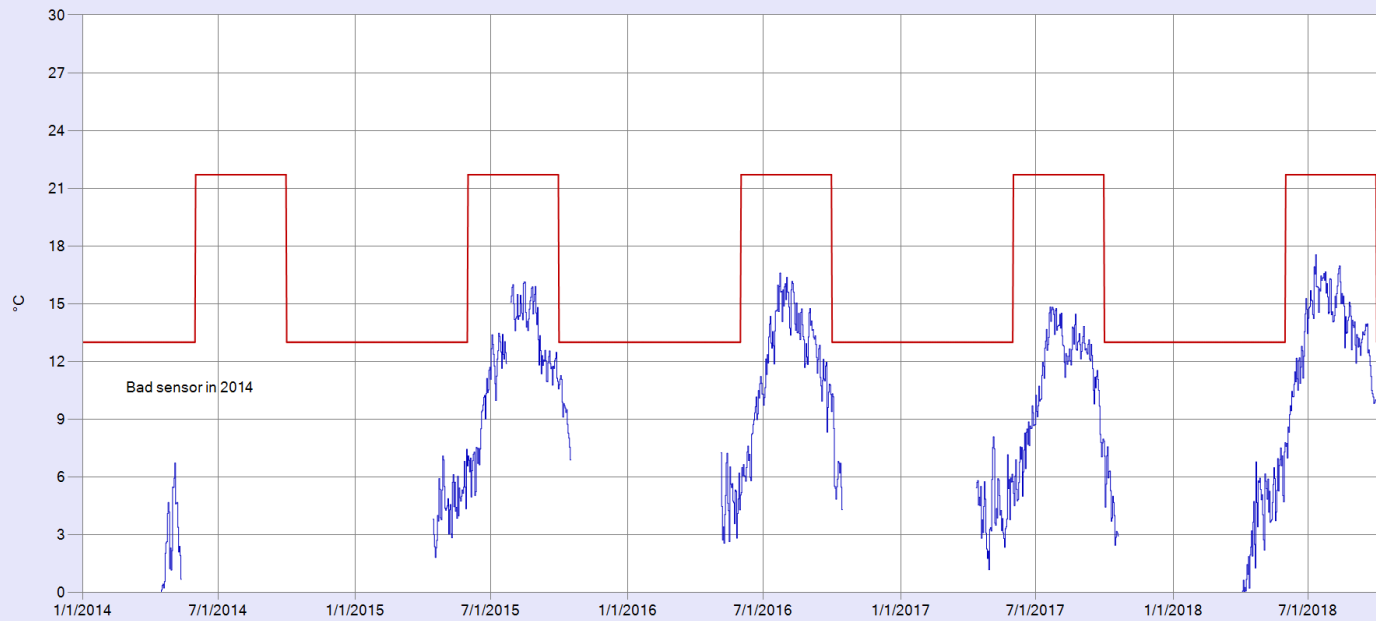
Colorado River – Headwaters to Windy Gap



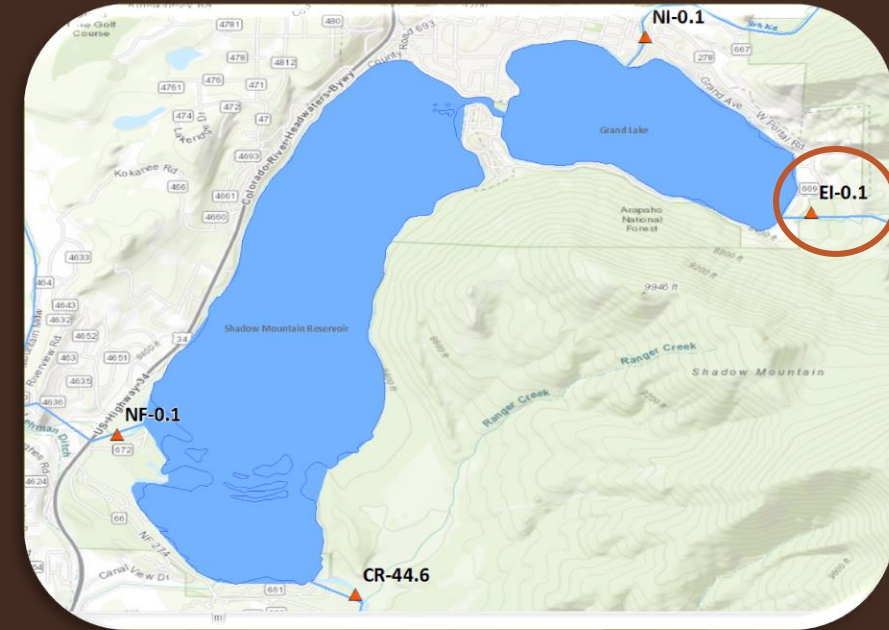
EI-GLU (EI-0.1) - Weekly Average Temperature



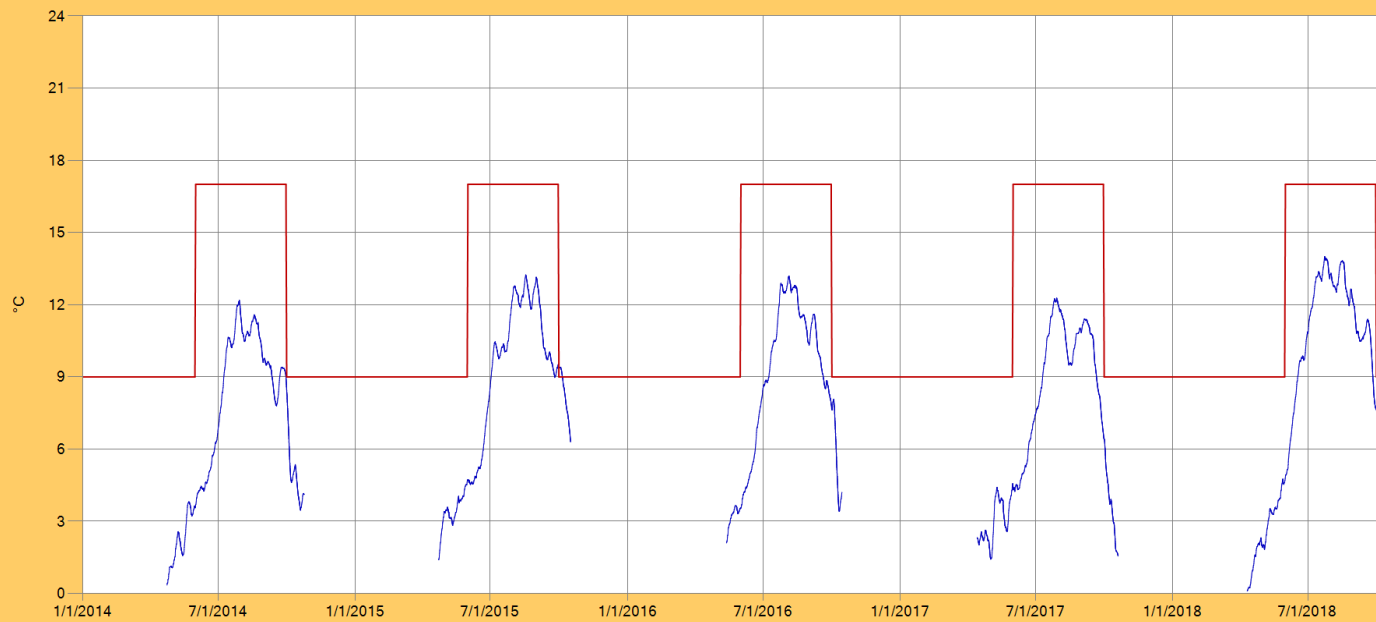
EI-GLU (EI-0.1) - Maximum Daily Temperature



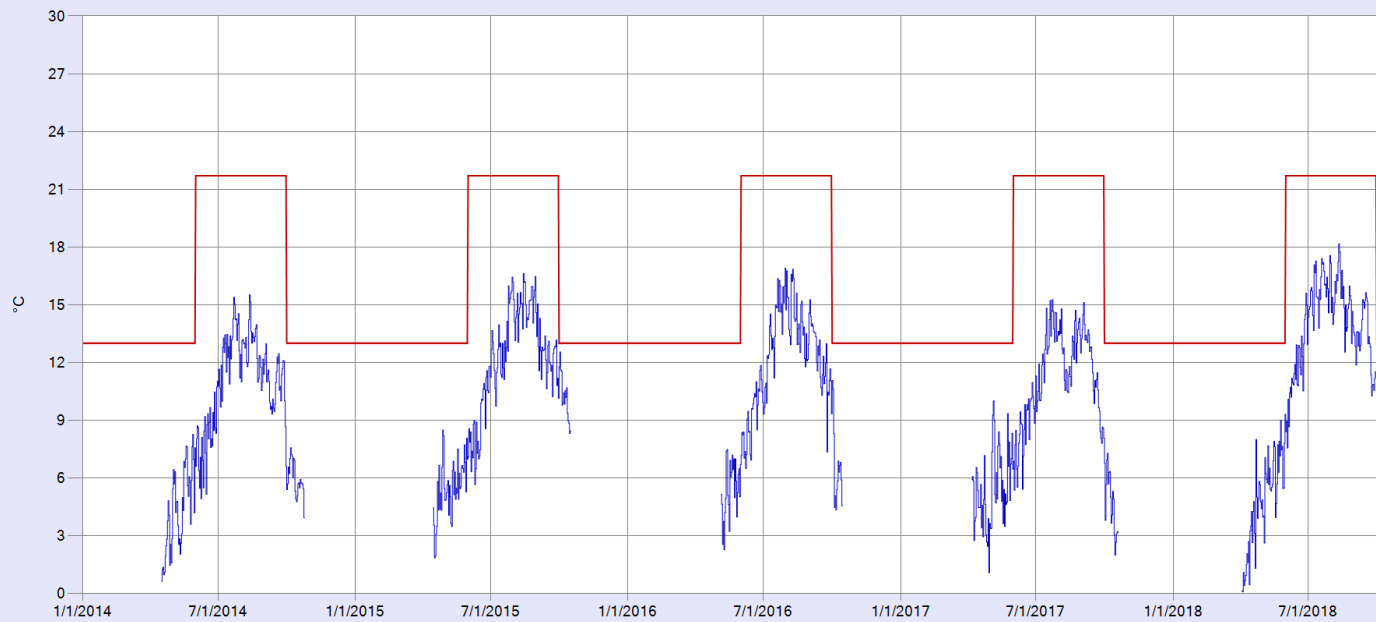
East Inlet - CSI



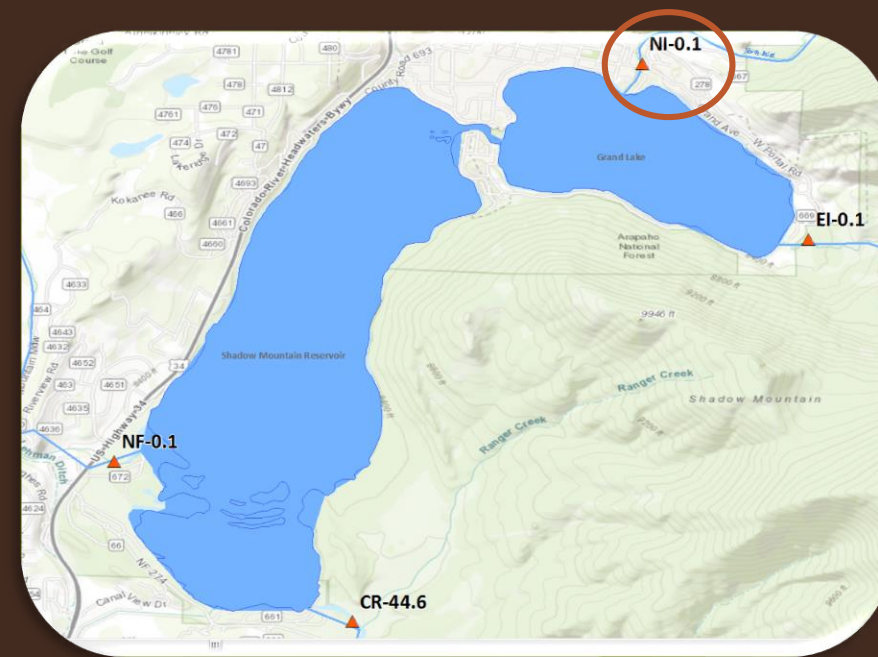
NI-GLU (NI-0.1) - Weekly Average Temperature



NI-GLU (NI-0.1) - Maximum Daily Temperature



North Inlet - CSI



CR-SMU (NF-0.1) - Weekly Average Temperature



CR-SMU (NF-0.1) - Maximum Daily Temperature



North Fork Colorado - CSI



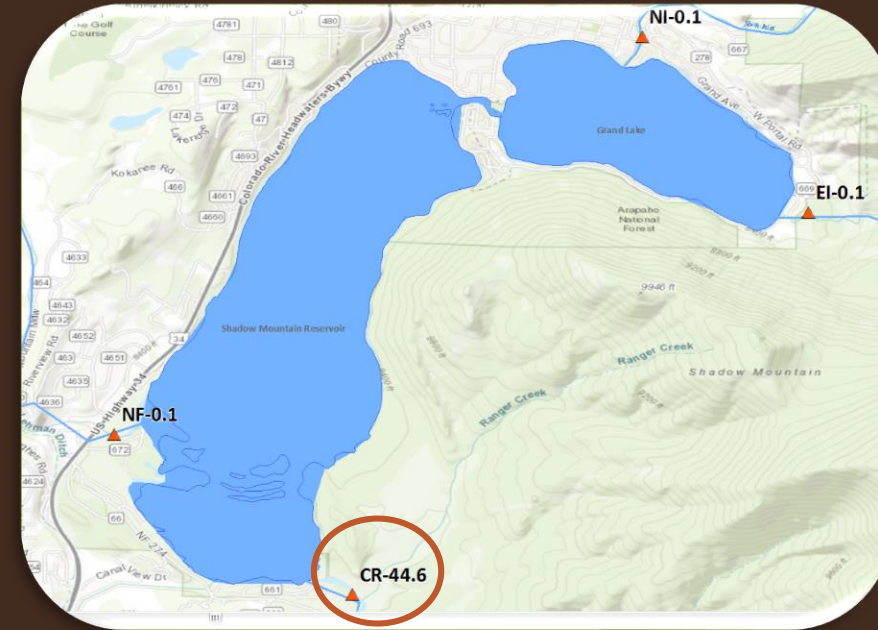
CR-SMD2 (CR-44.6) - Weekly Average Temperature



CR-SMD2 (CR-44.6) - Maximum Daily Temperature



Colorado downstream Shadow Mountain - CSI



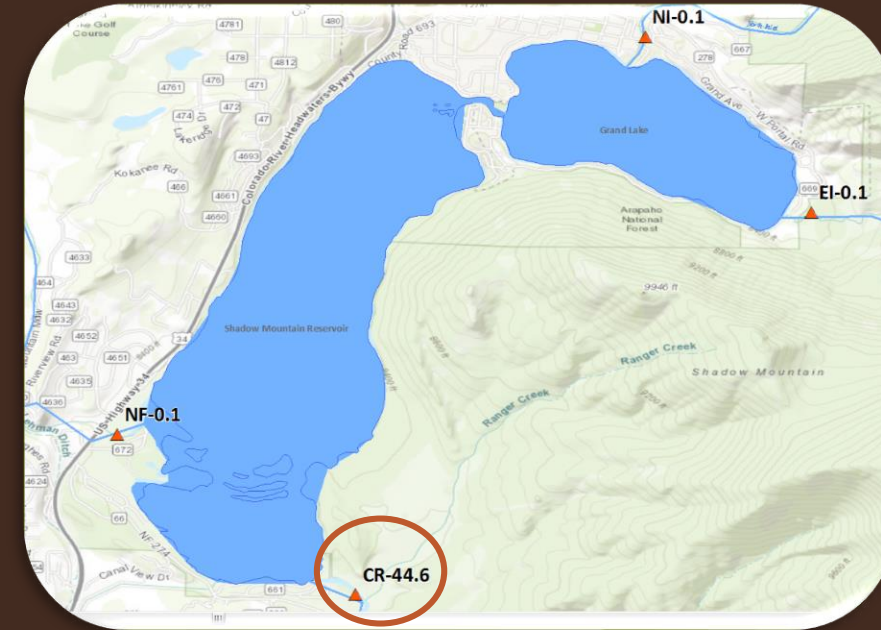
CR-SMD2 (CR-44.6) - Weekly Average Temperature



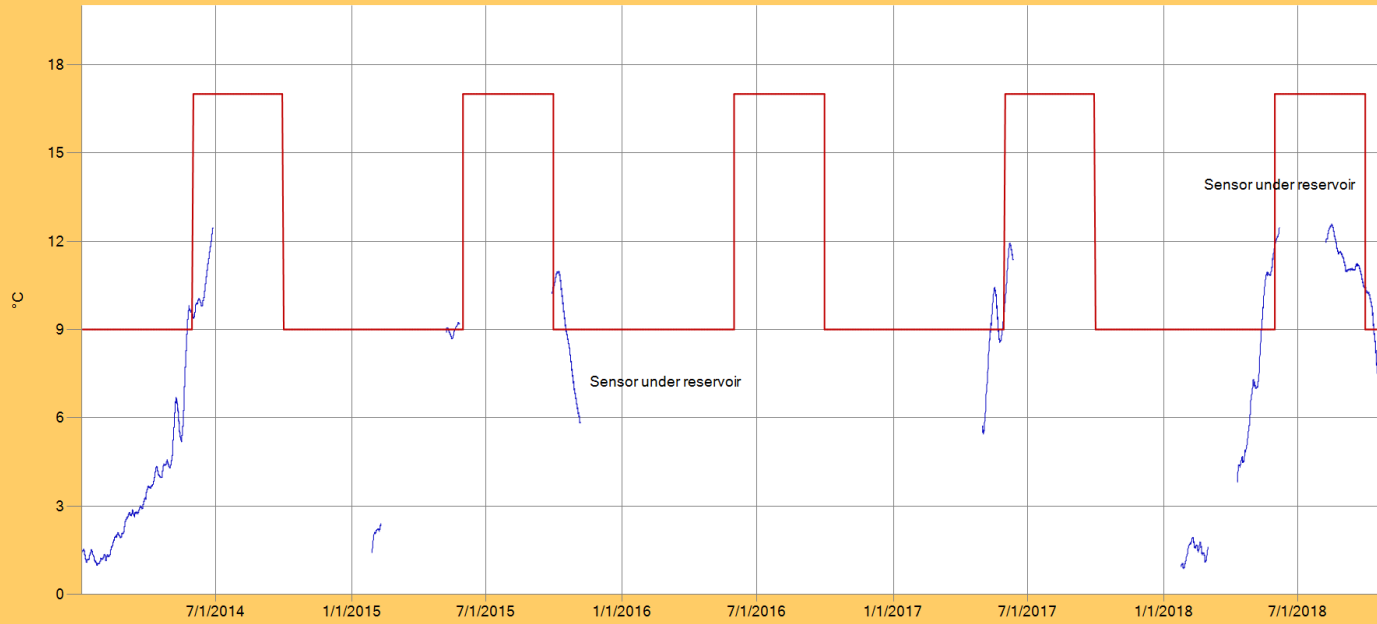
CR-SMD2 (CR-44.6) - Maximum Daily Temperature



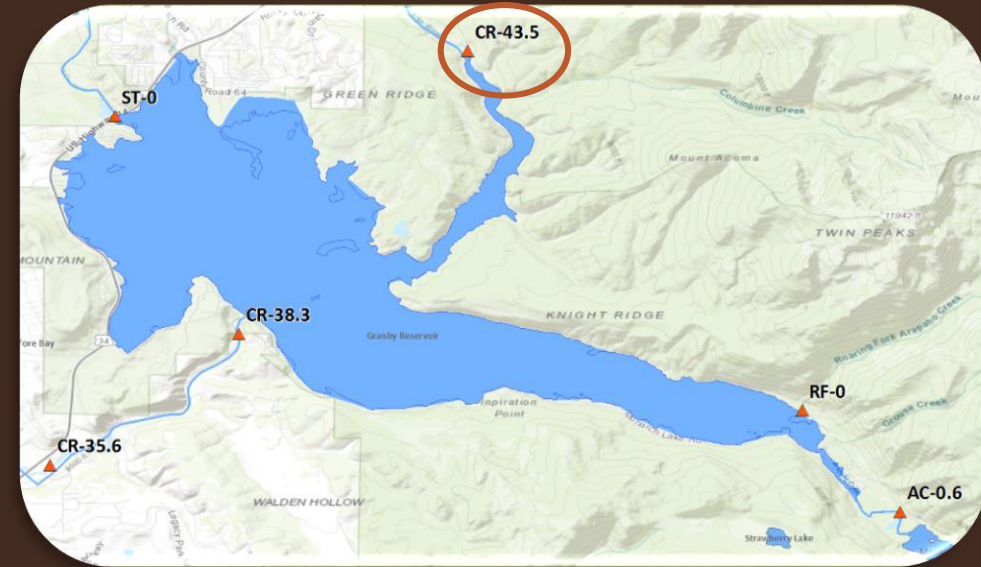
Colorado downstream Shadow Mountain - CSI



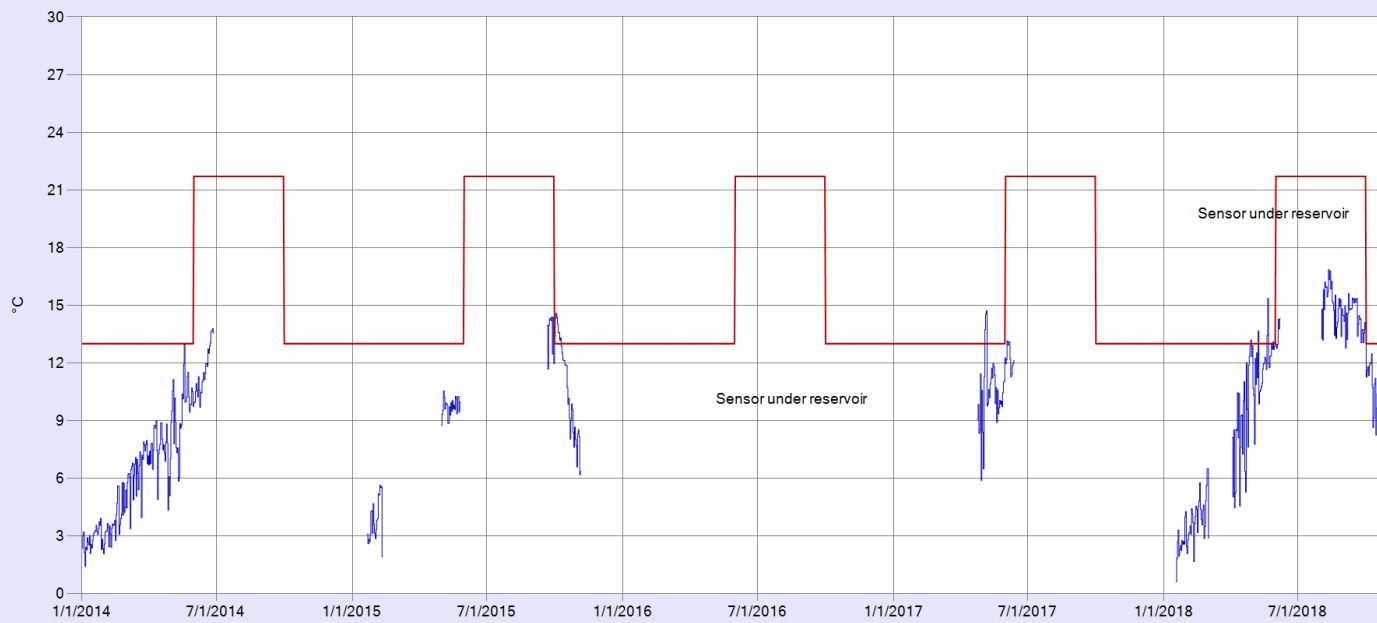
CR-GRU (CR-43.5) - Weekly Average Temperature



Colorado upstream Granby Reservoir - CSI



CR-GRU (CR-43.5) - Maximum Daily Temperature



RF-GRU (RF-0.0) - Weekly Average Temperature



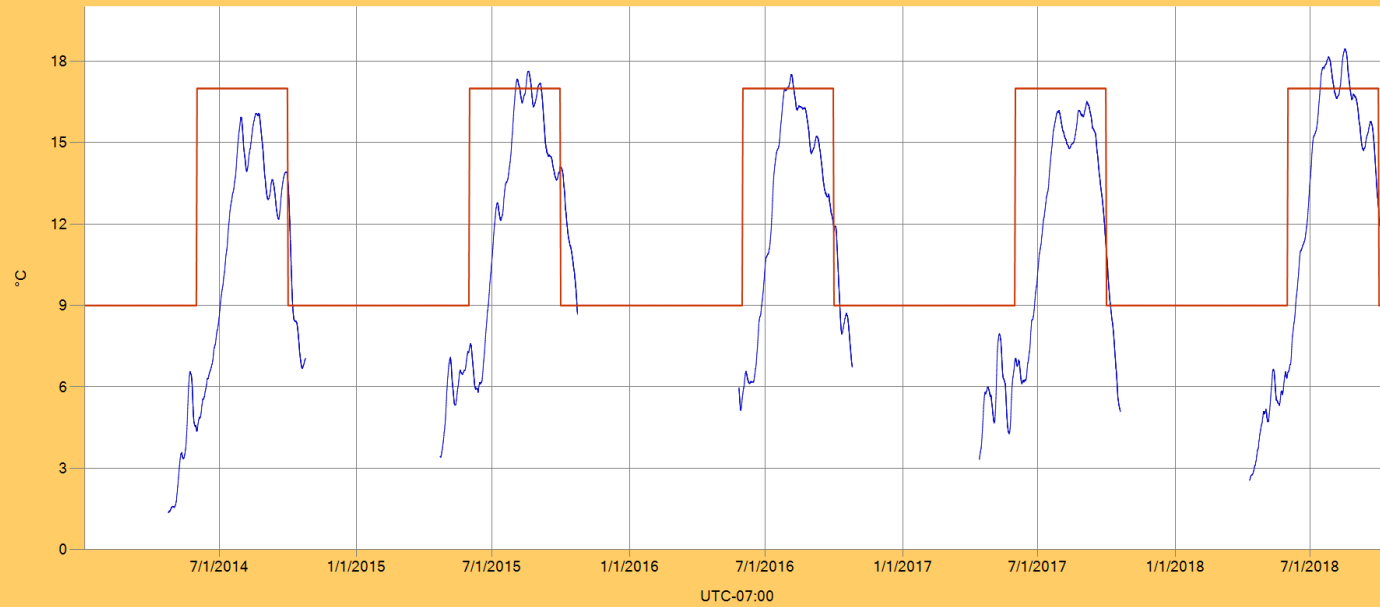
RF-GRU (RF-0.0) - Maximum Daily Temperature



Roaring Fork - CSI



AC-GRU (AC-0.6) - Weekly Average Temperature



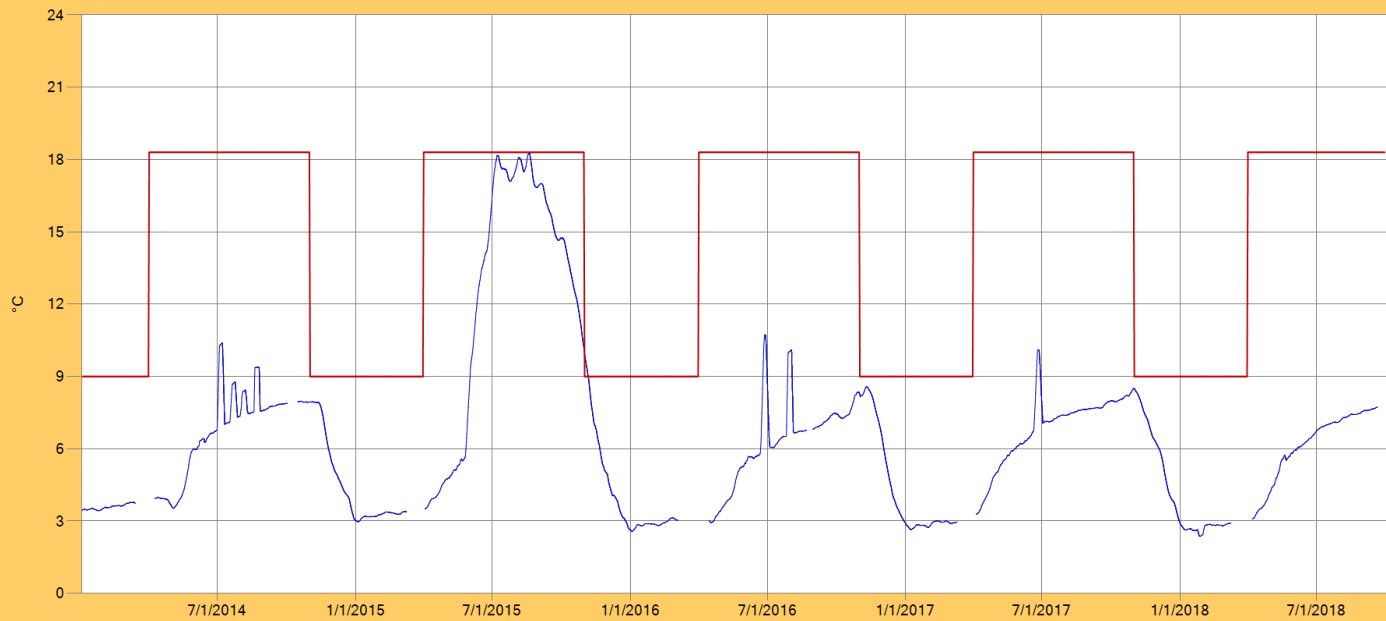
AC-GRU (AC-0.6) - Maximum Daily Temperature



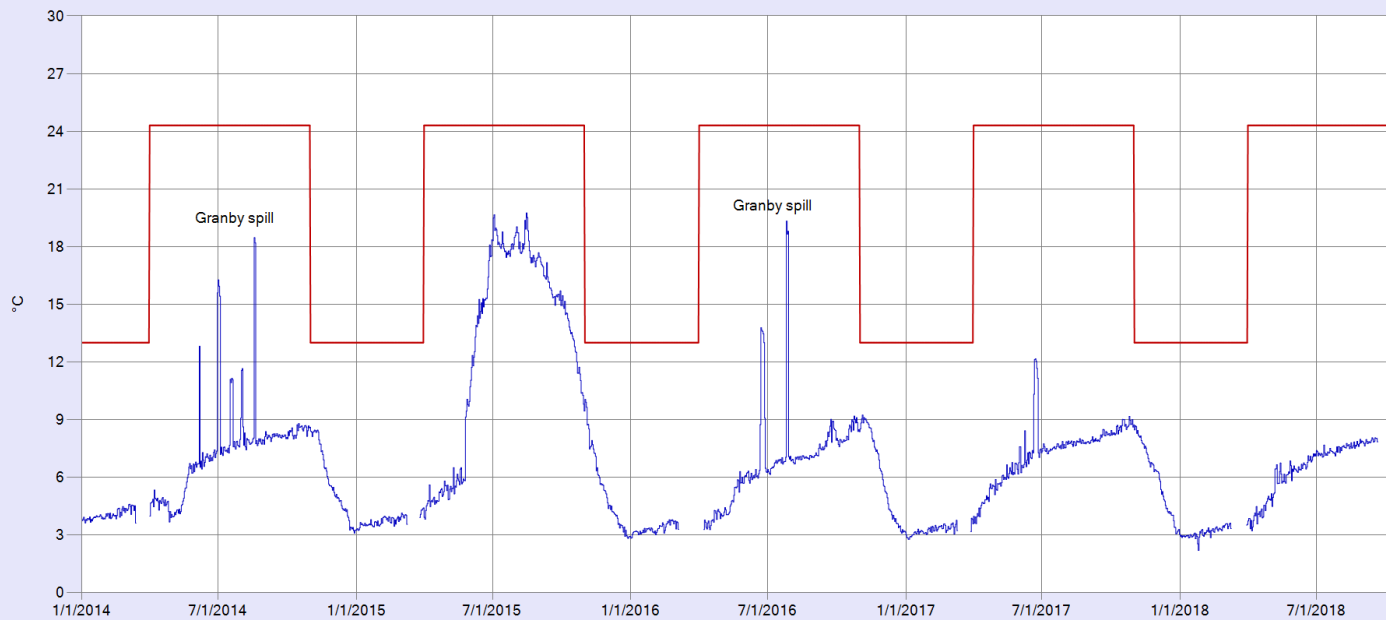
Arapaho Creek - CSI



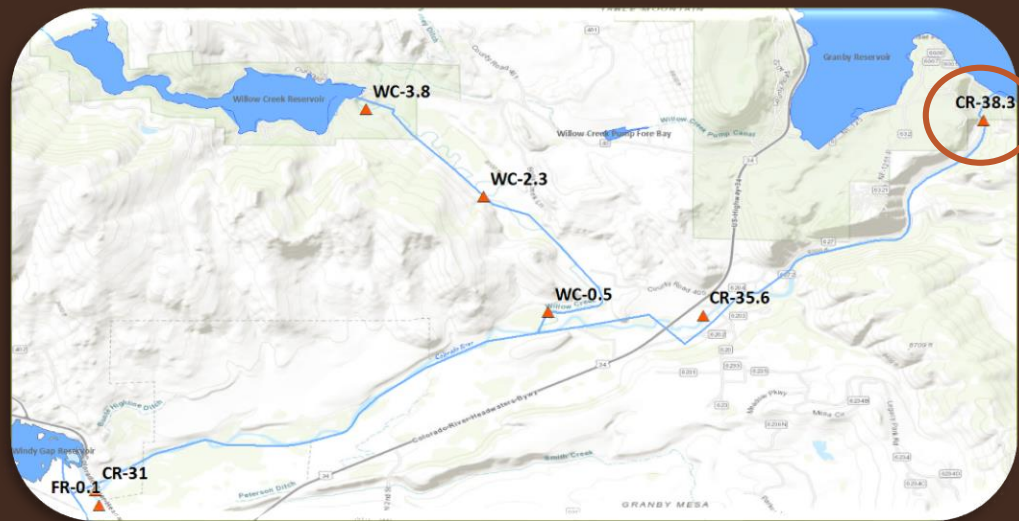
CR-GRD (CR- 38.3) - Weekly Average Temperature



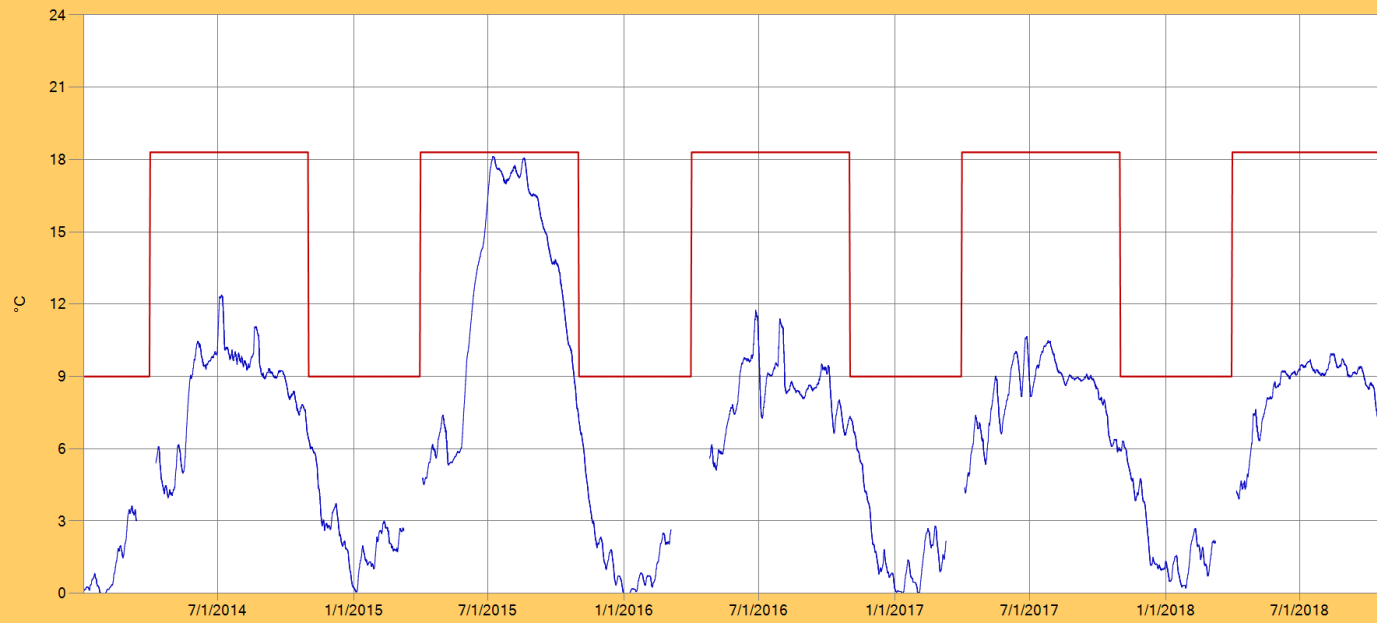
CR-GRD (CR-38.3) - Maximum Daily Temperature



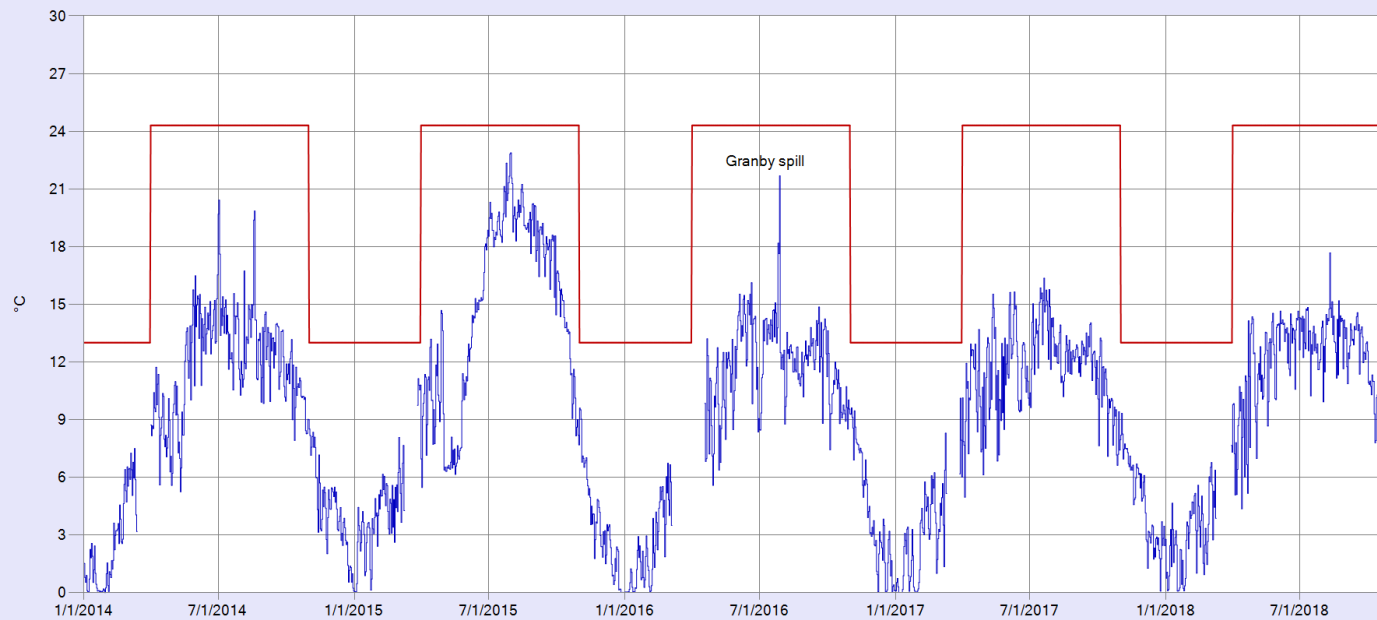
Colorado River downstream of Granby Reservoir- CSII



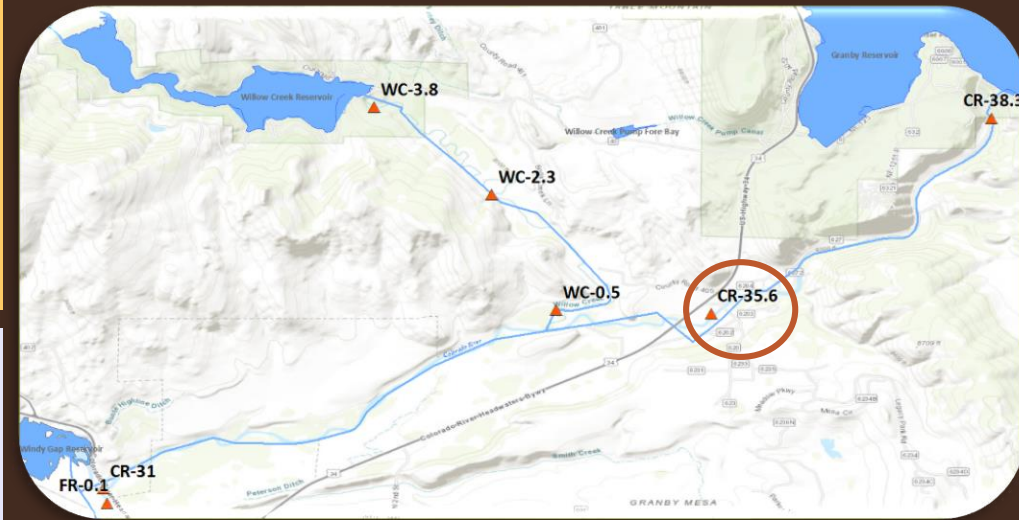
CR-YGAGE (CR-35.6) - Weekly Average Temperature



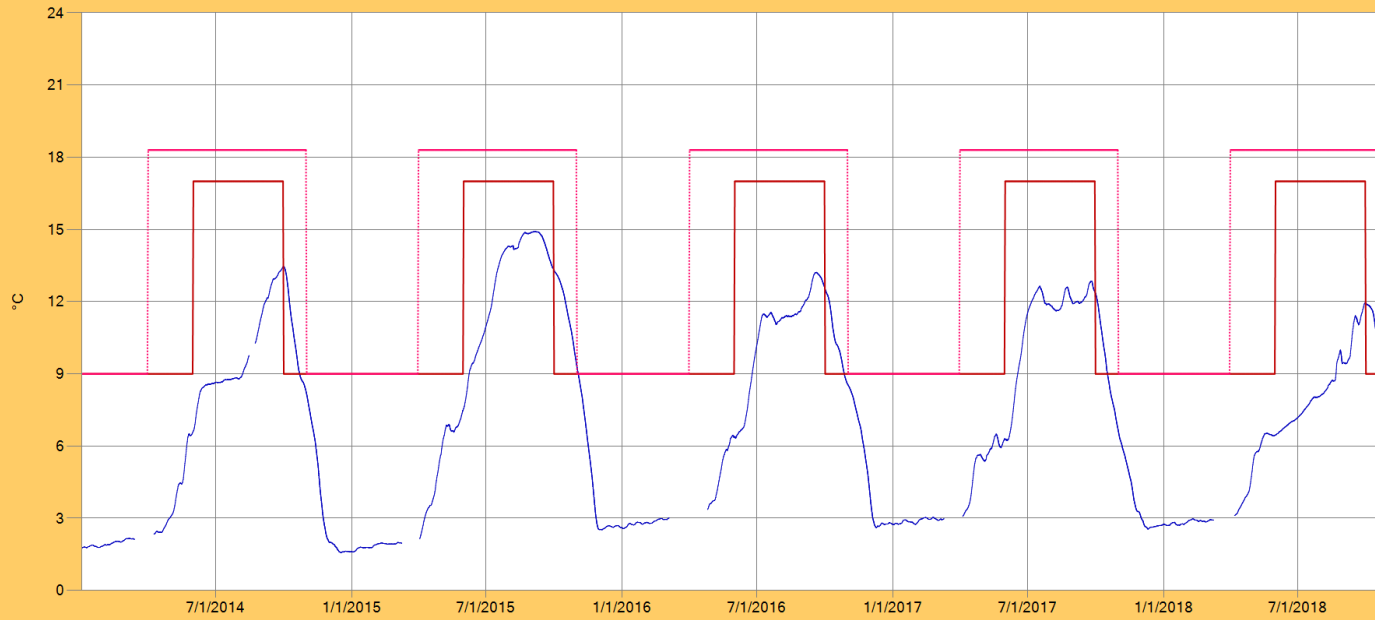
CR-YGAGE (CR-35.6) - Maximum Daily Temperature



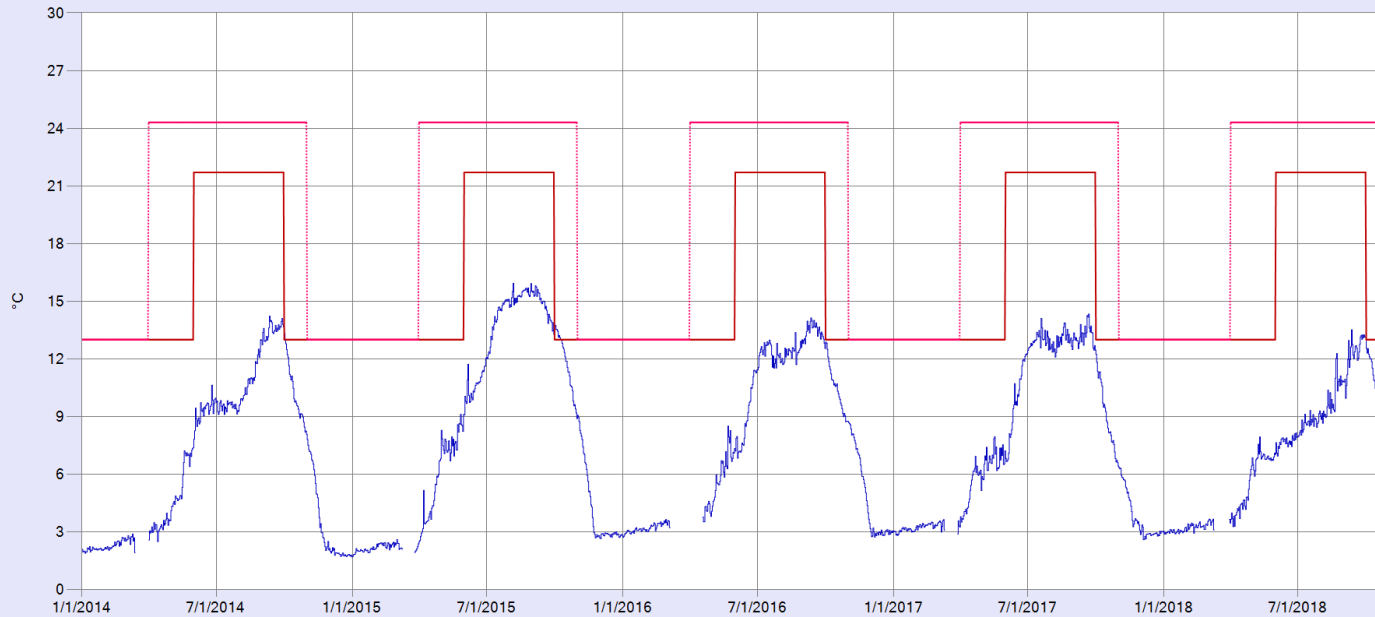
Colorado River at Y-Gage - CSII



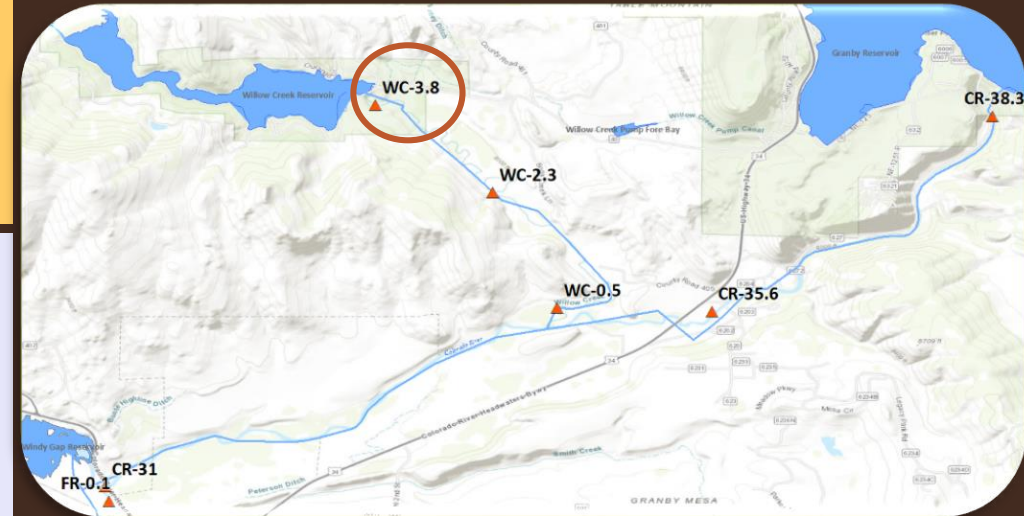
WC-WCRD (WC-3.8) - Weekly Average Temperature



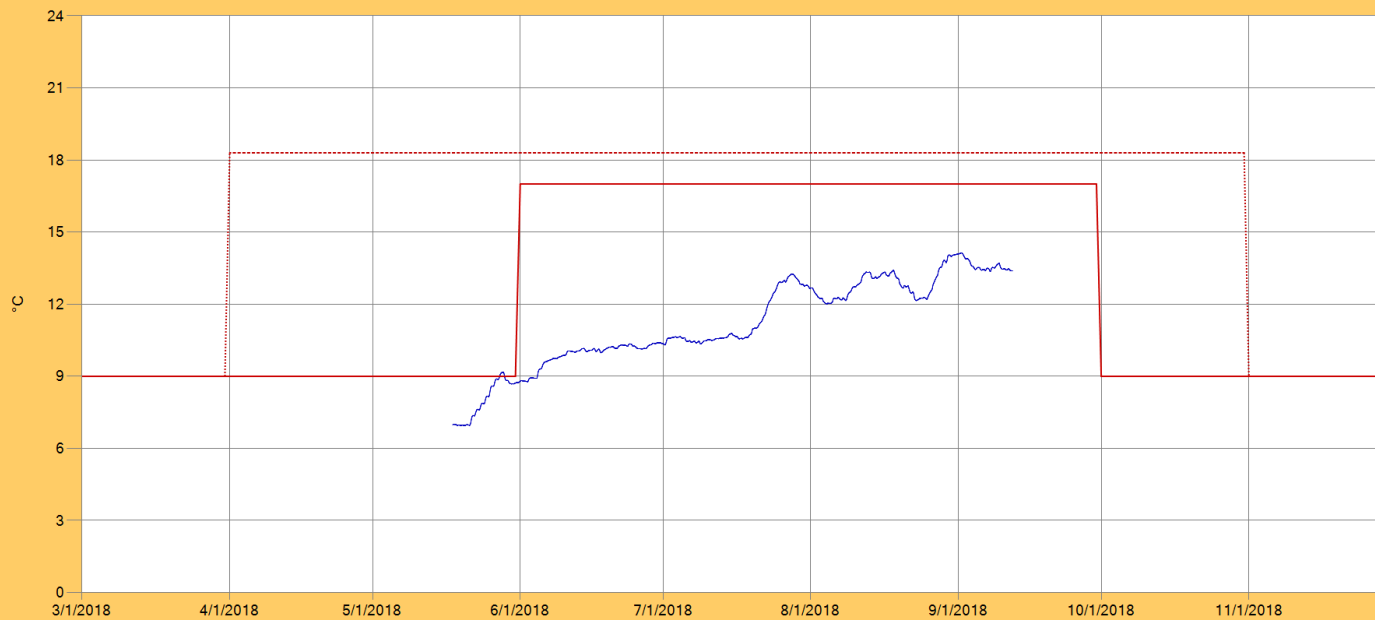
WC-WCRD (WC-3.8) - Maximum Daily Temperature



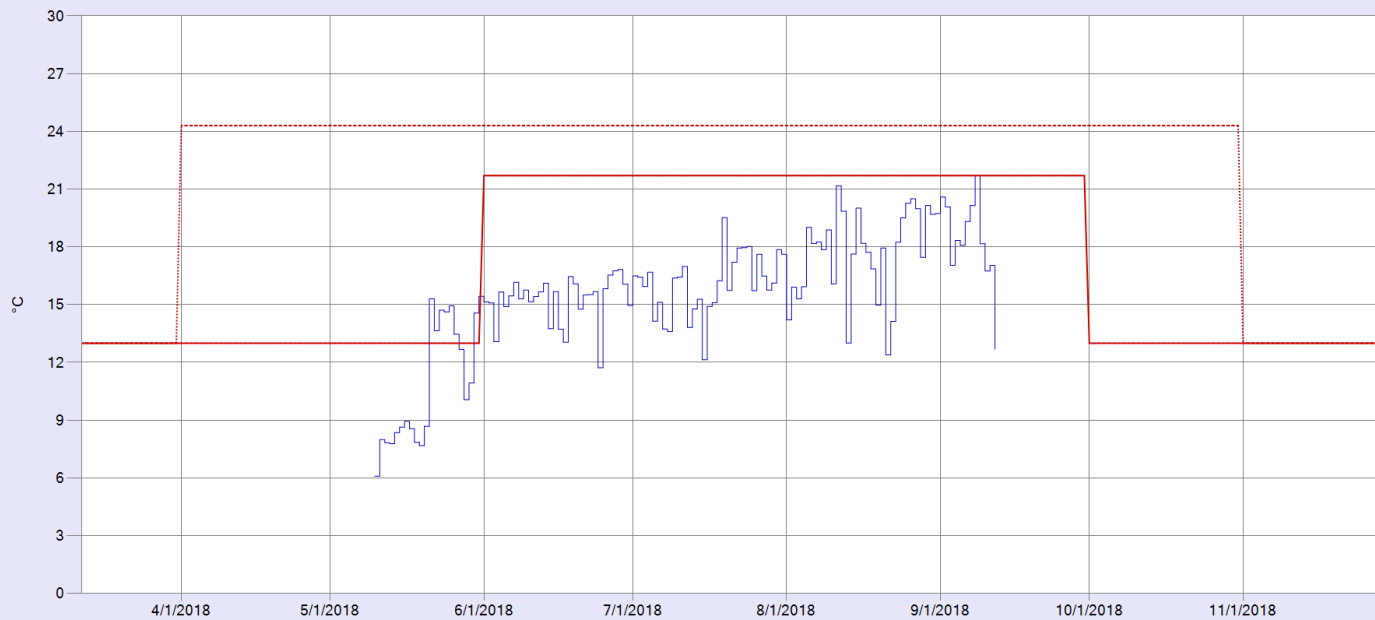
Willow Creek downstream of Reservoir – CSI WQCD Proposed CS-II



WC-abvBHD (WC-2.3) - Weekly Average Temperature



WC-abvBHD (WC-2.3) - Maximum Daily Temperature



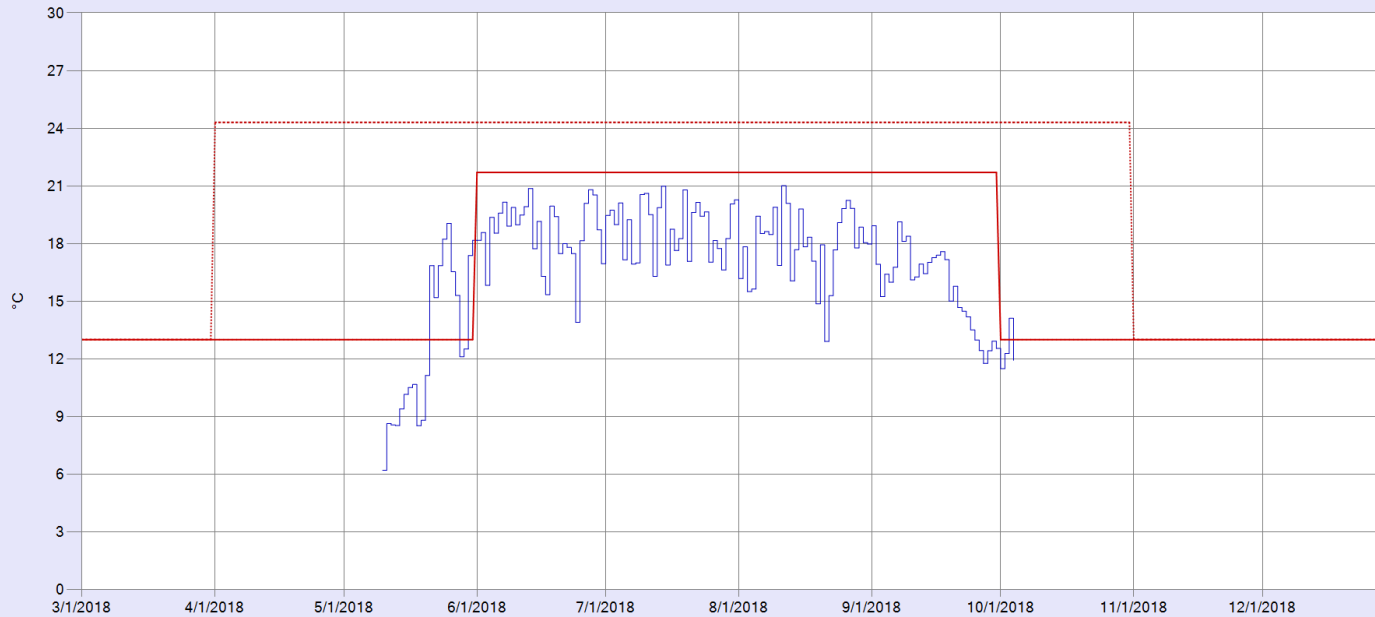
Willow Creek upstream Bunte Highline – CSI WQCD Proposed CS-II



WC-abvCOR (WC-0.5) - Weekly Average Temperature



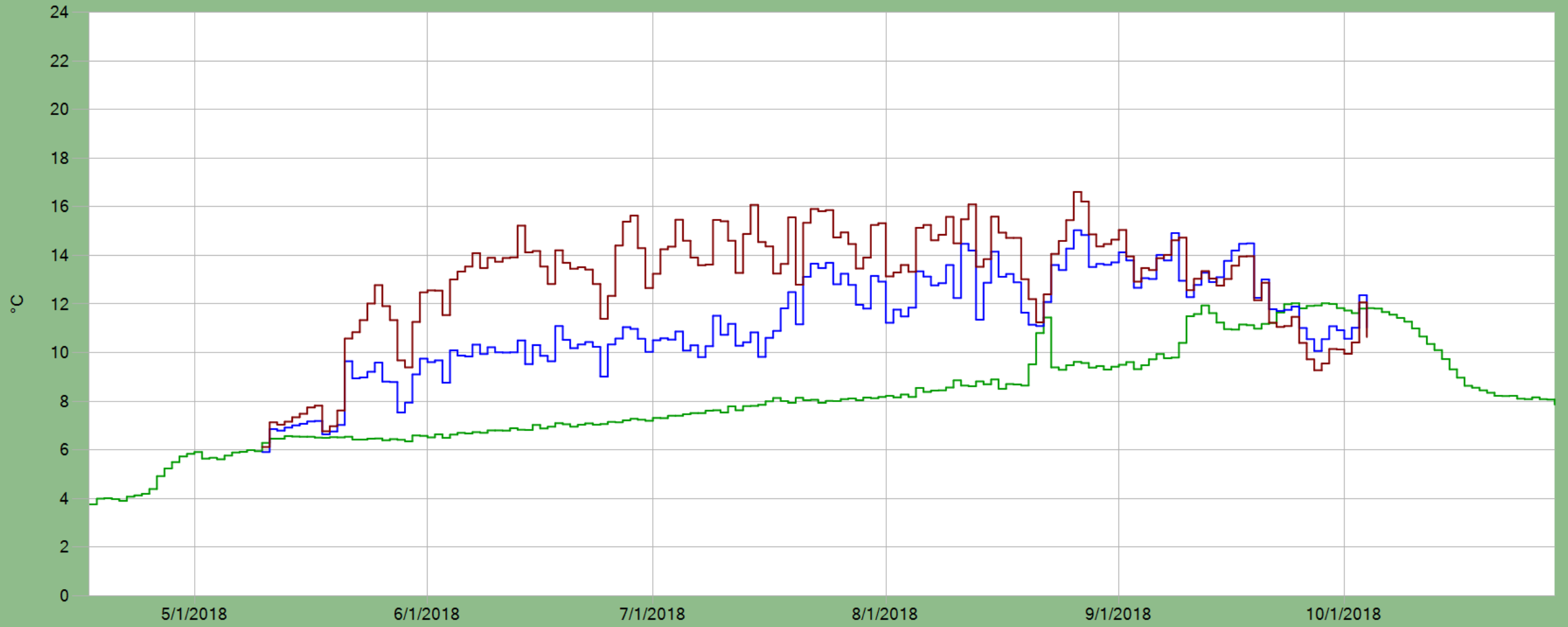
WC-abvCOR (WC-0.5) - Maximum Daily Temperature



Willow Creek upstream Colorado River – CSI WQCD Proposed CS-II

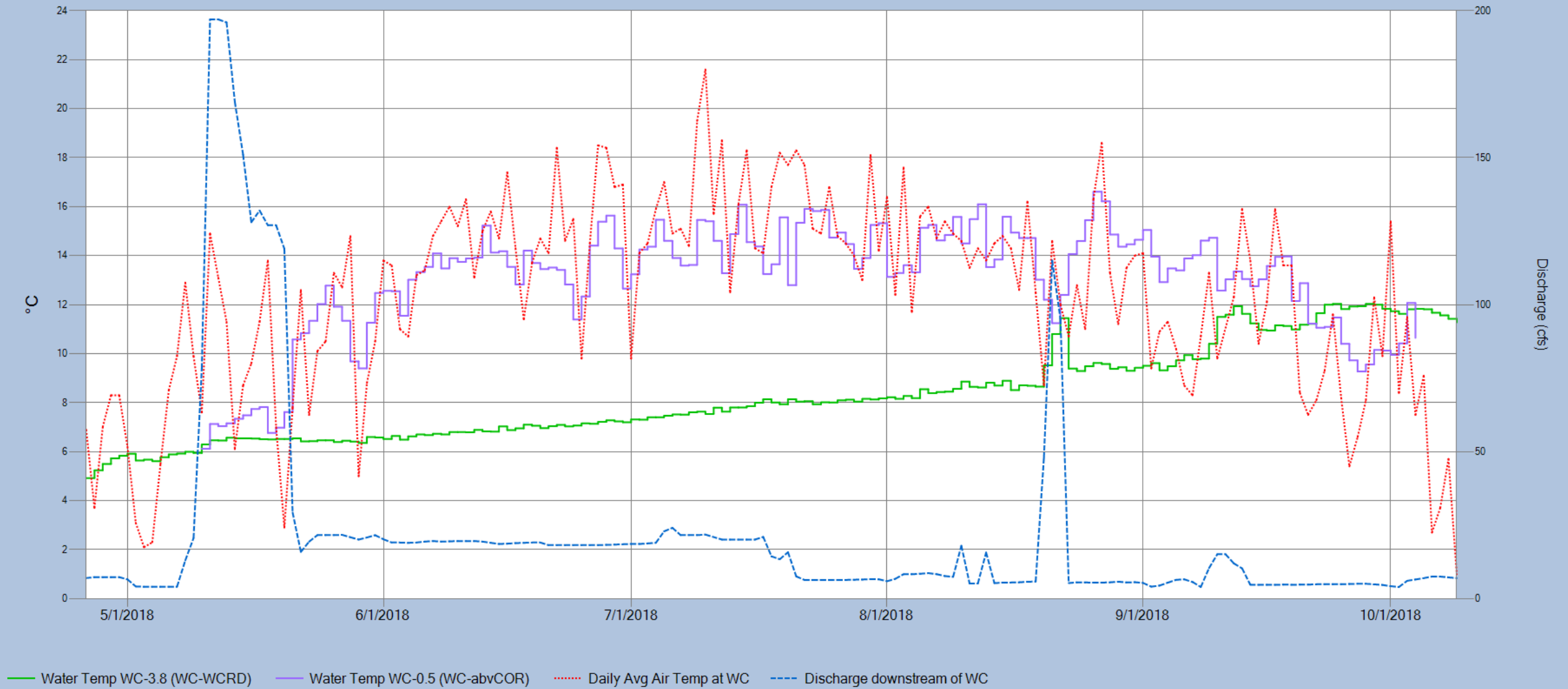


Willow Creek Daily Average Temperature Downstream of Willow Creek Reservoir 2018

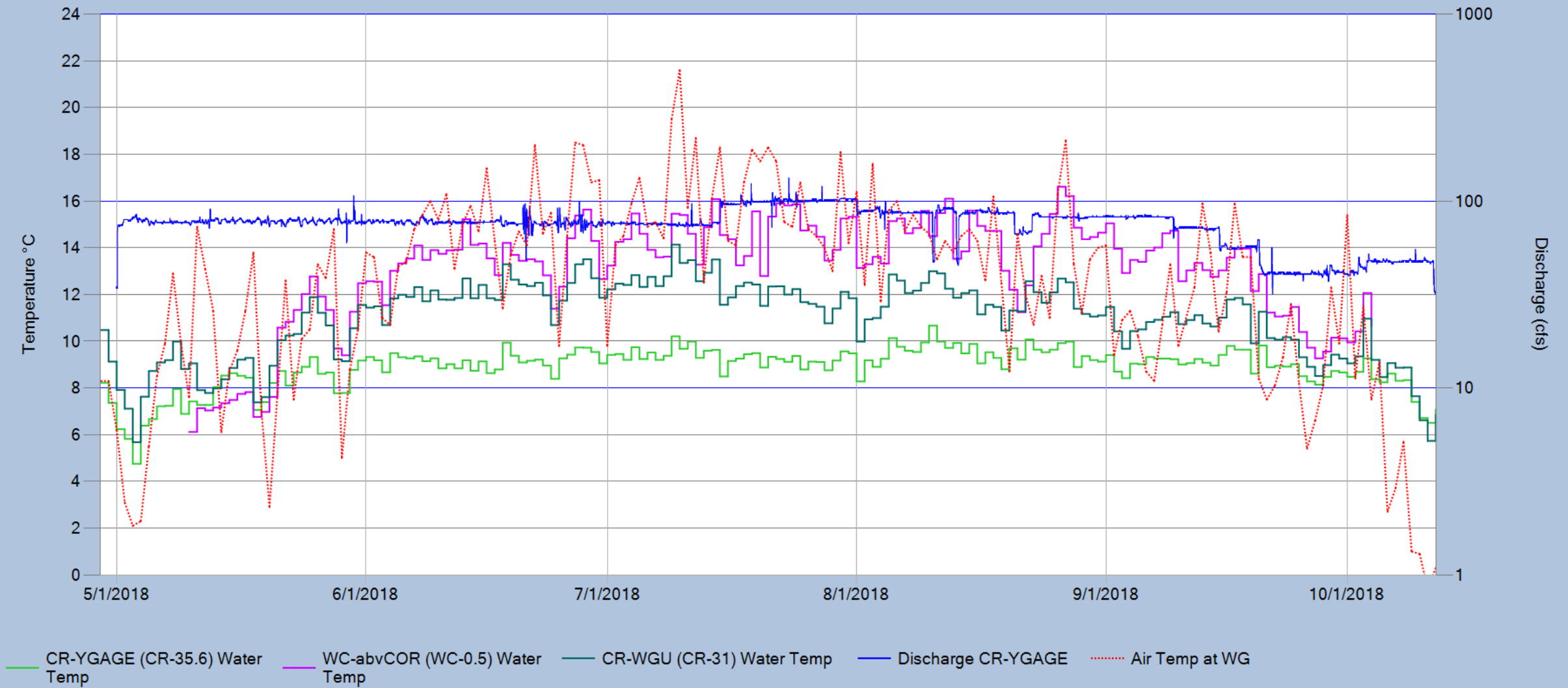


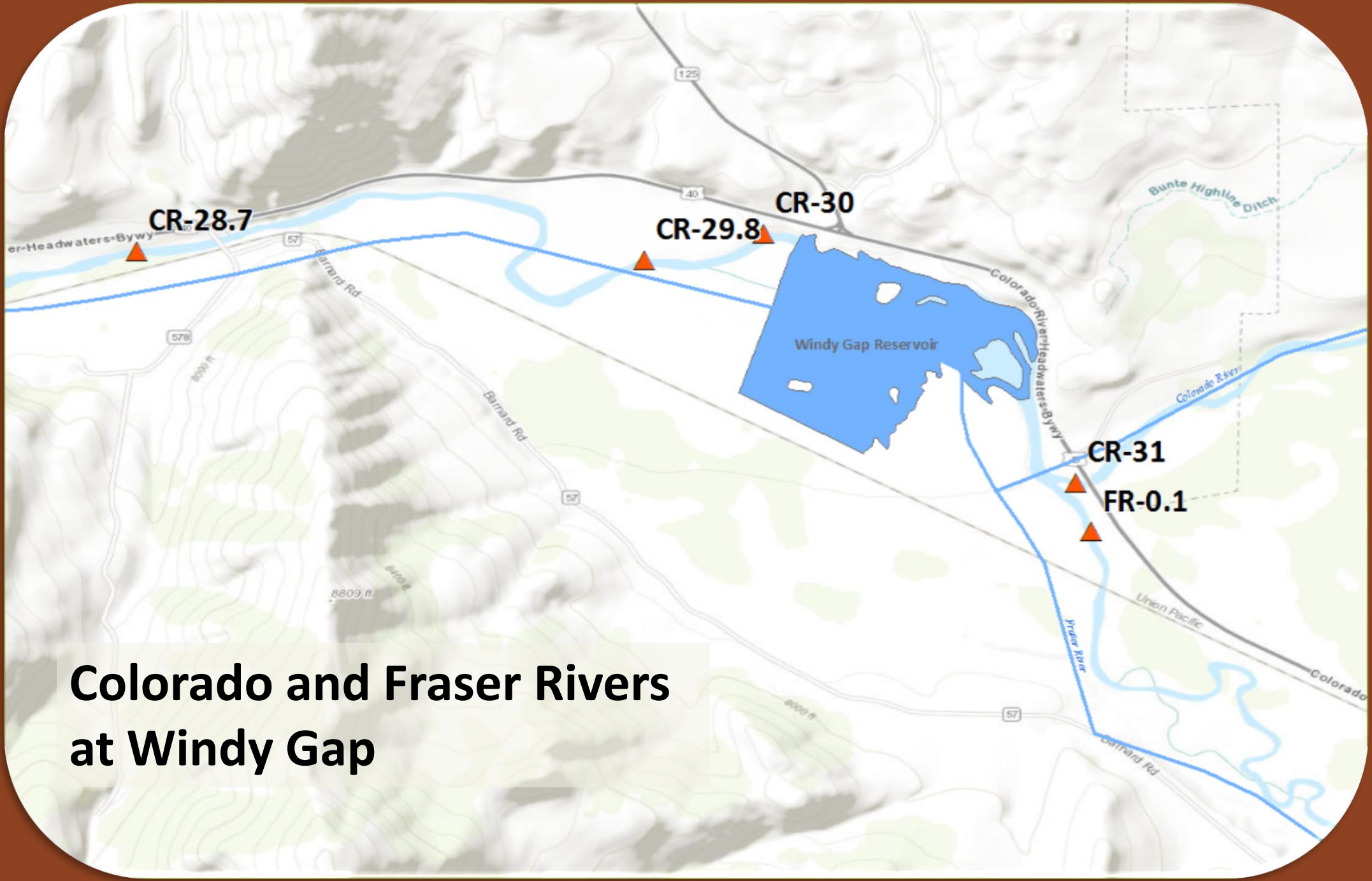
— WC-WCRD (WC-3.8) — WC-abvBHD (WC-2.3) — WC-abvCOR (WC-0.5)

Water/Air Temperature and Flow downstream of Willow Creek Reservoir



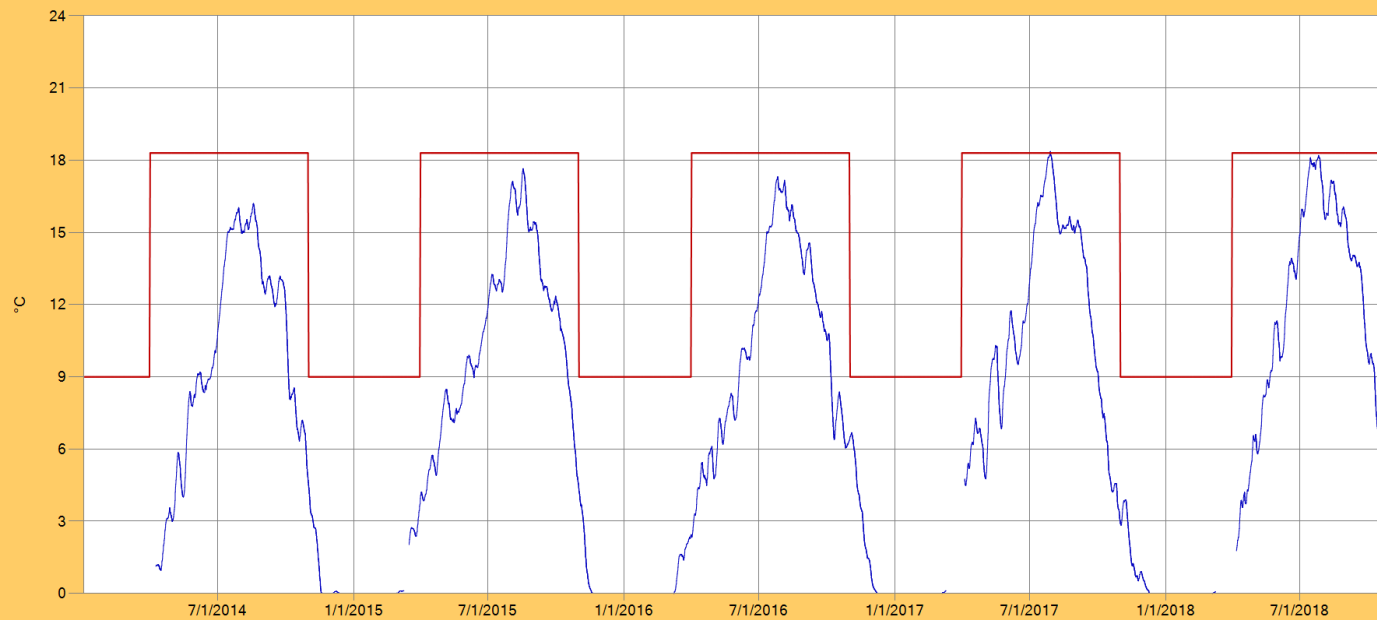
Water/Air Temperature and Flow Comparison downstream Granby Reservoir to Windy Gap



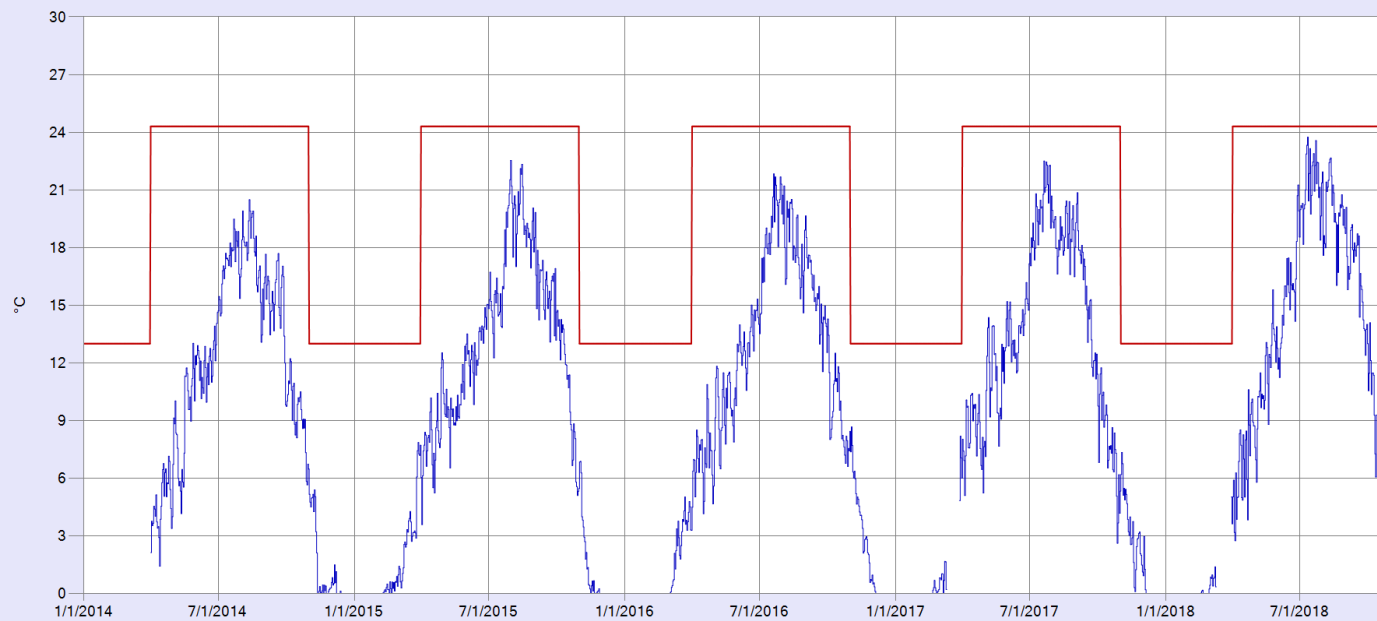


Colorado and Fraser Rivers at Windy Gap

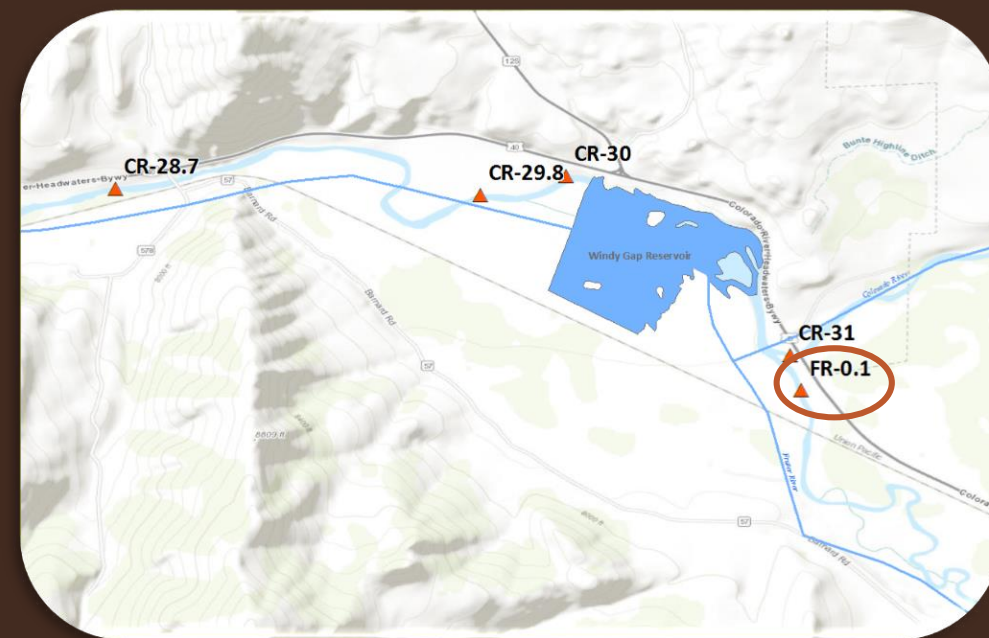
FR-WGU (FR-0.1) - Weekly Average Temperature



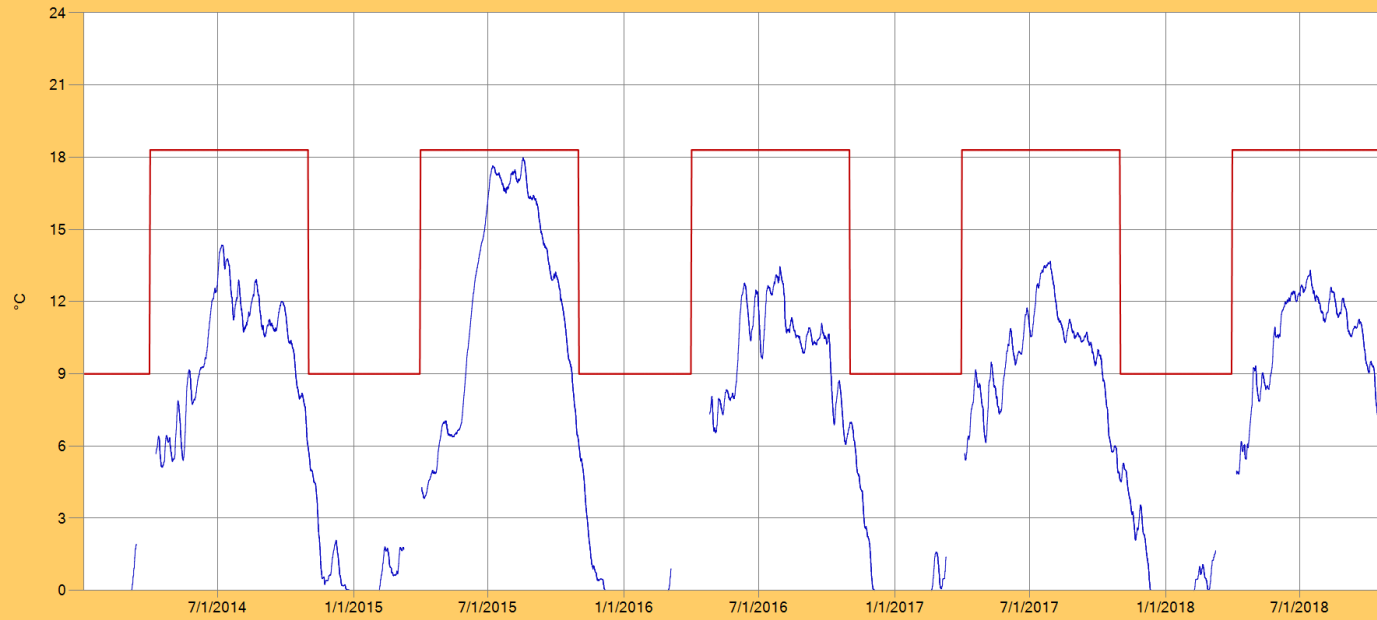
FR-WGU (FR-0.1) - Maximum Daily Temperature



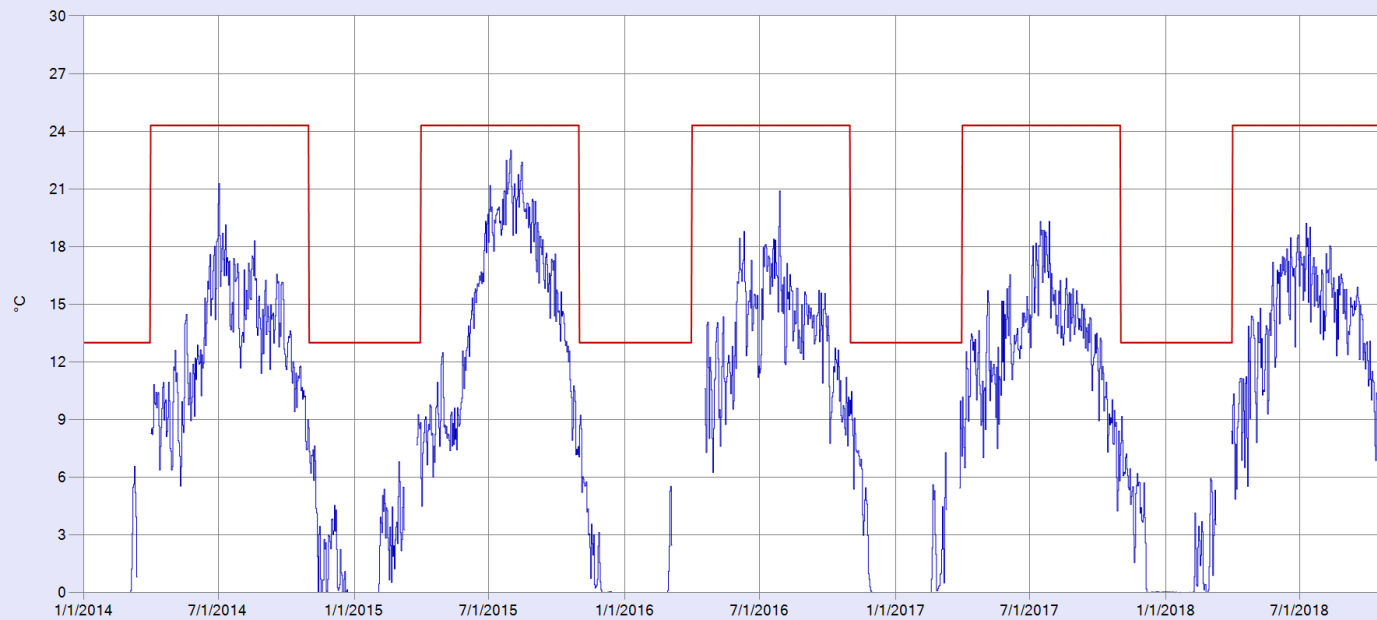
Fraser River upstream of Windy Gap – CSII



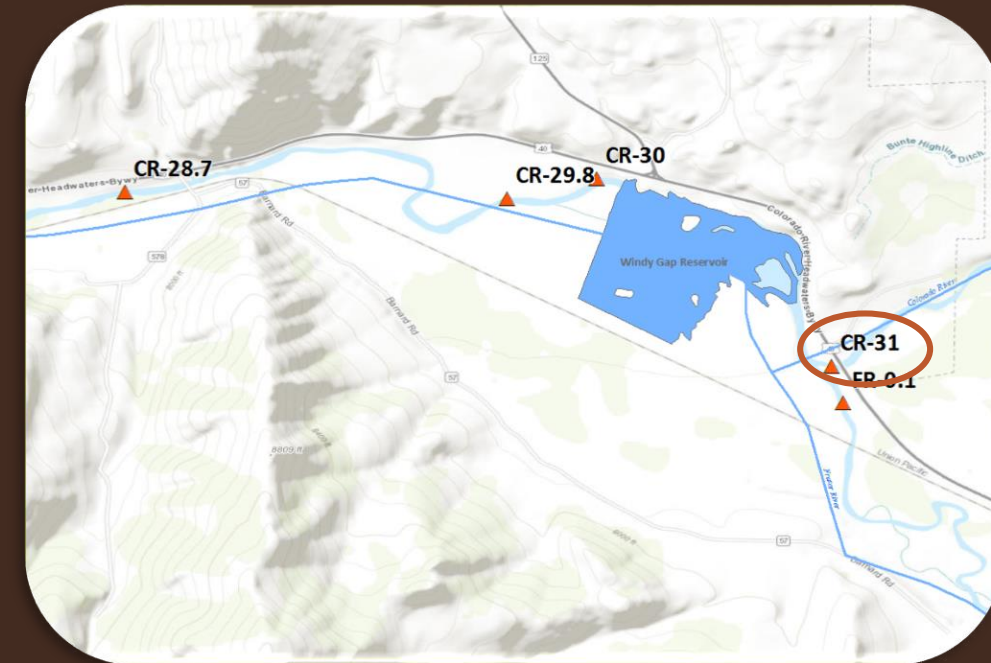
CR-WGU (CR-31) - Weekly Average Temperature



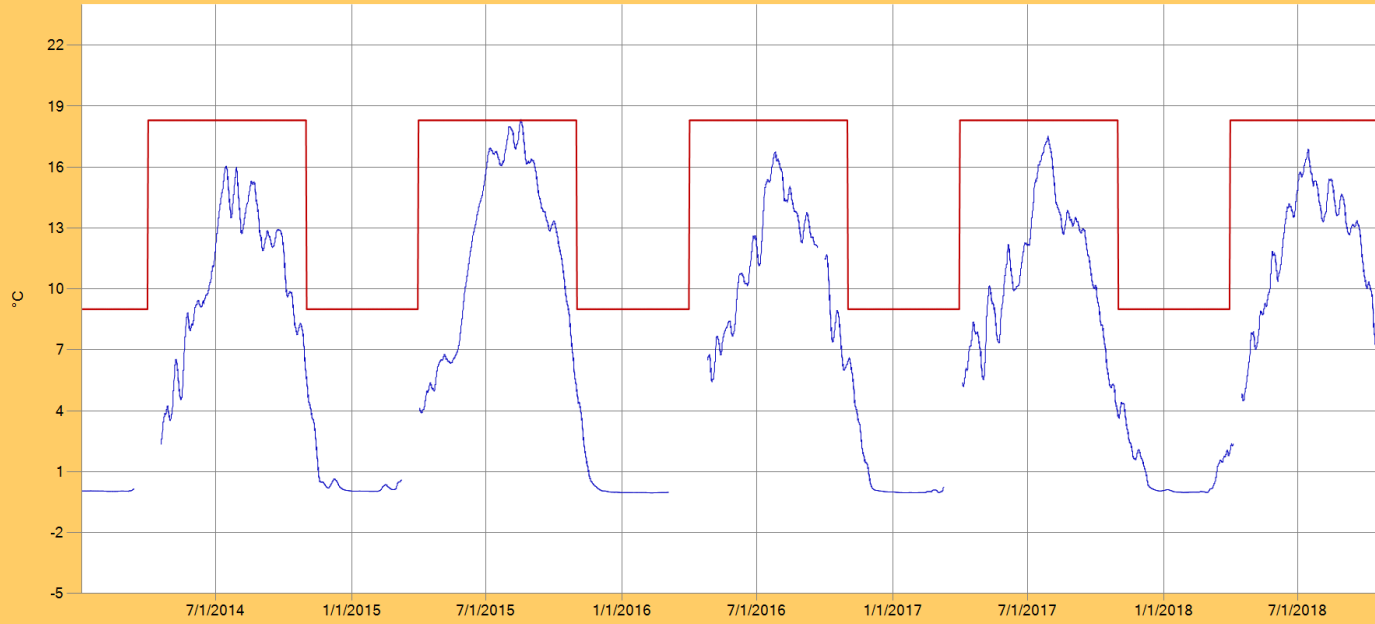
CR-WGU (CR-31) - Maximum Daily Temperature



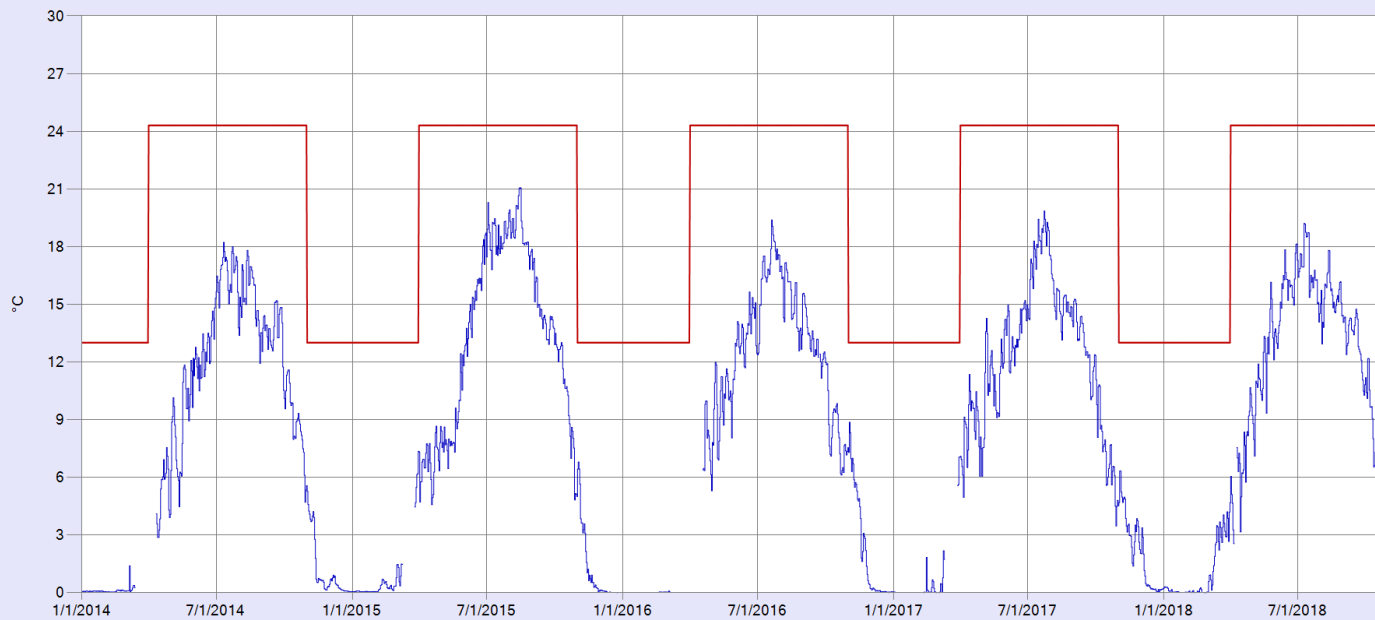
Colorado River upstream of Windy Gap – CSII



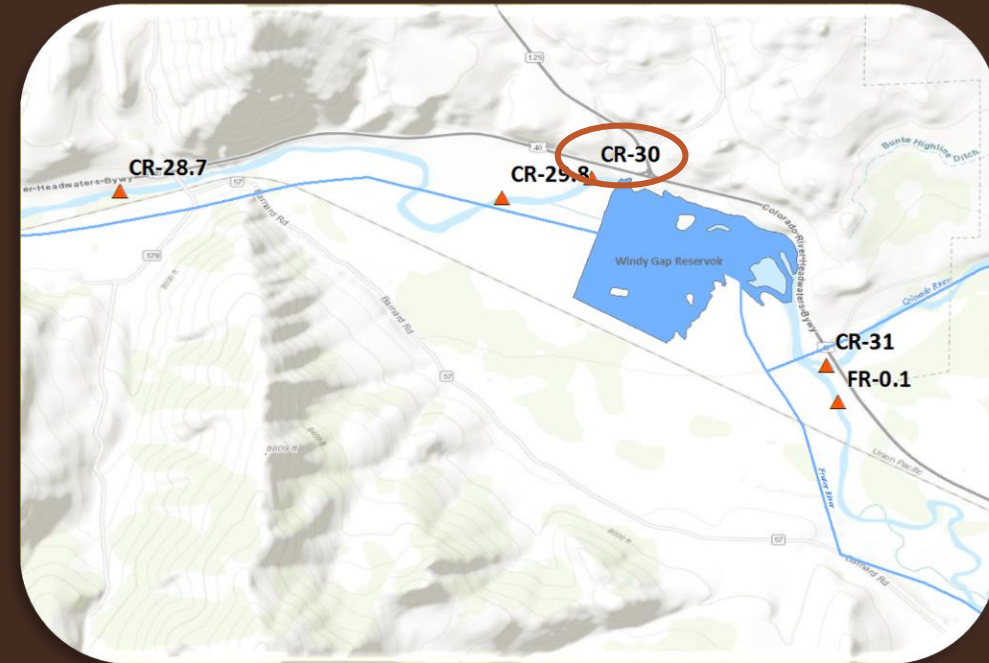
CR-WGB (CR-30) - Weekly Average Temperature



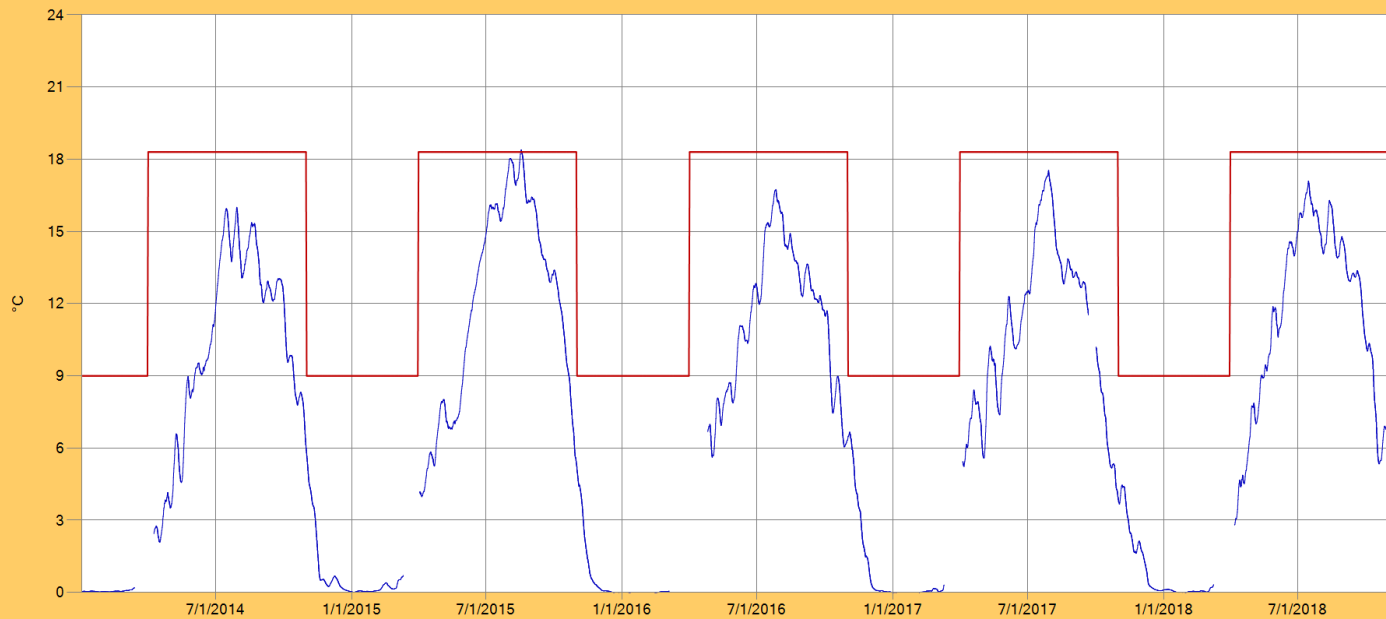
CR-WGB (CR-30) - Maximum Daily Temperature



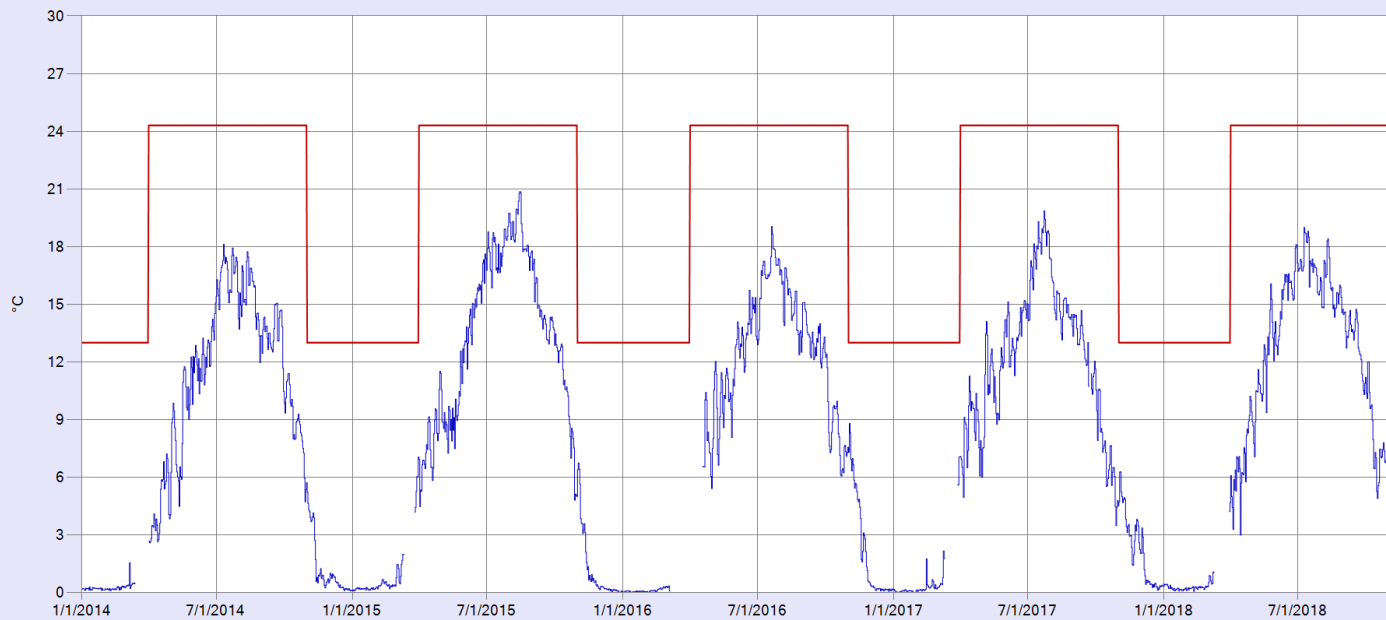
Windy Gap Bypass – CSII



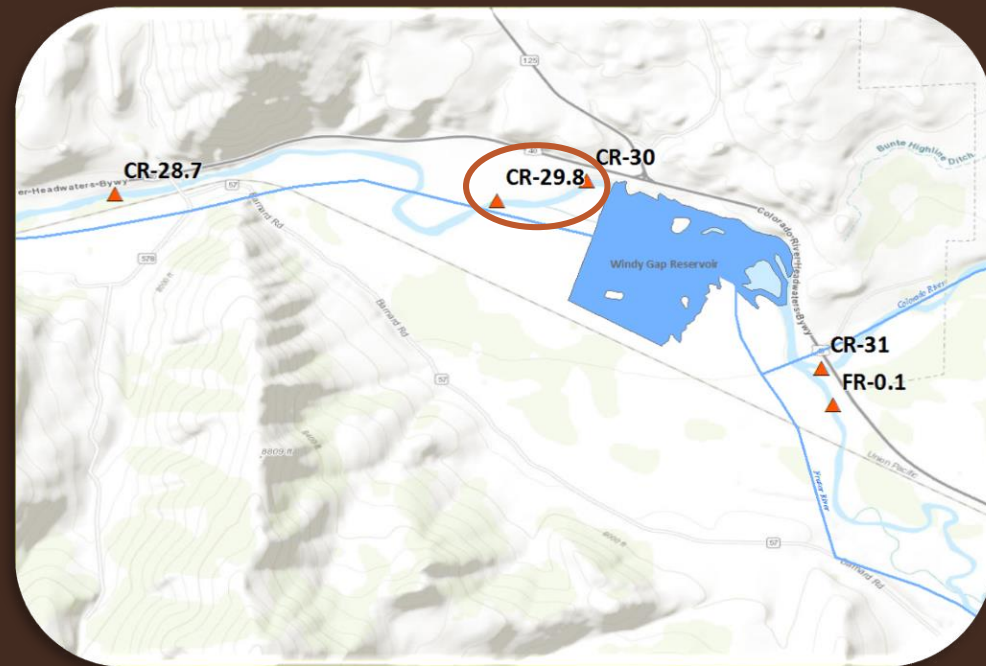
CR-WGC (CR-29.8) - Weekly Average Temperature



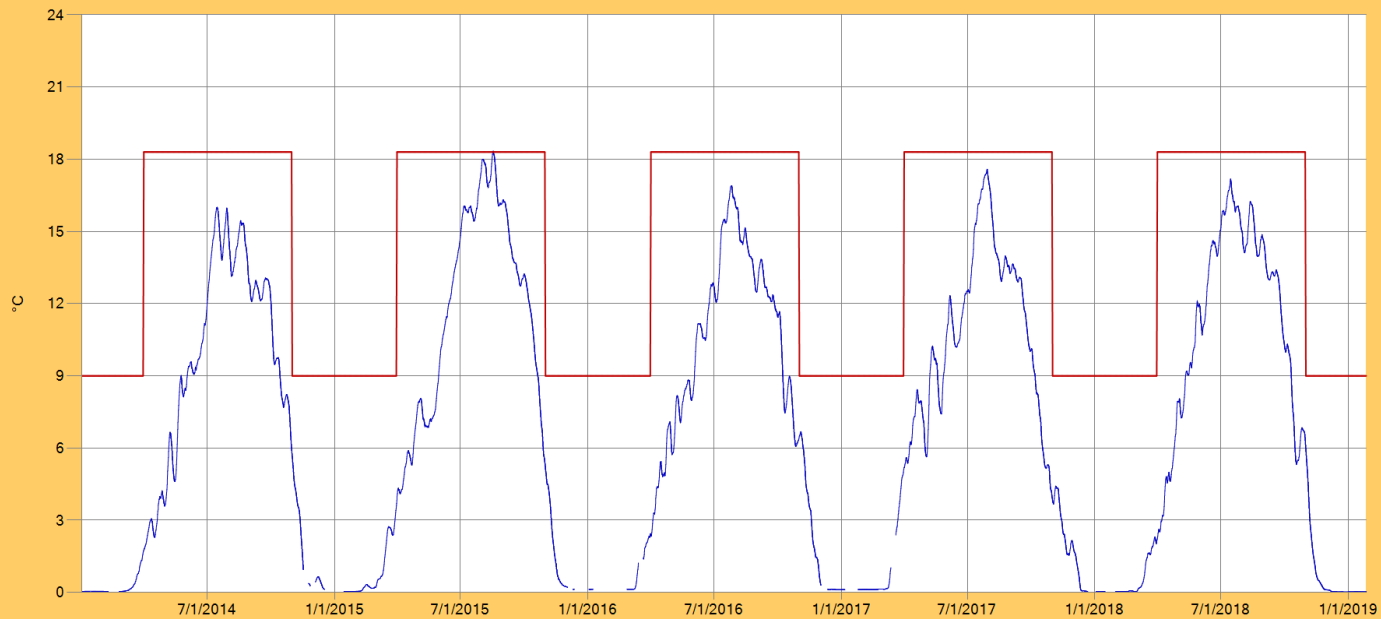
CR-WGC (CR-29.8) - Maximum Daily Temperature



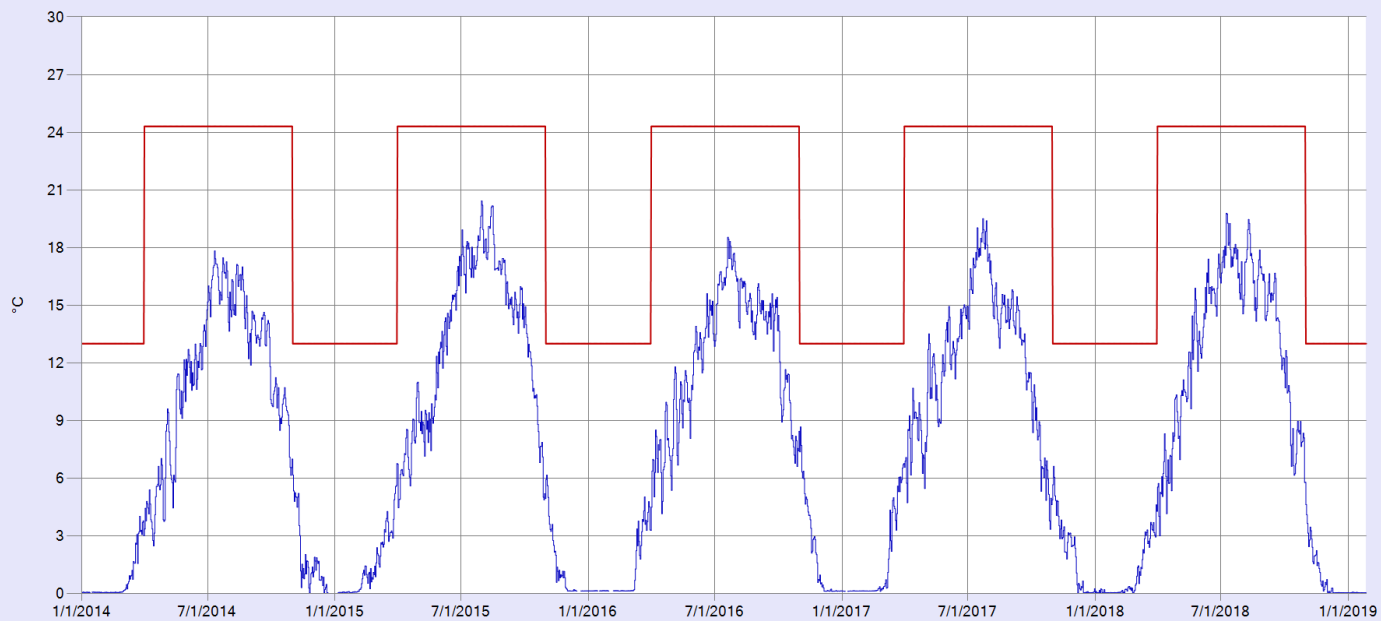
Windy Gap confluence of Bypass and Spillway – CSII



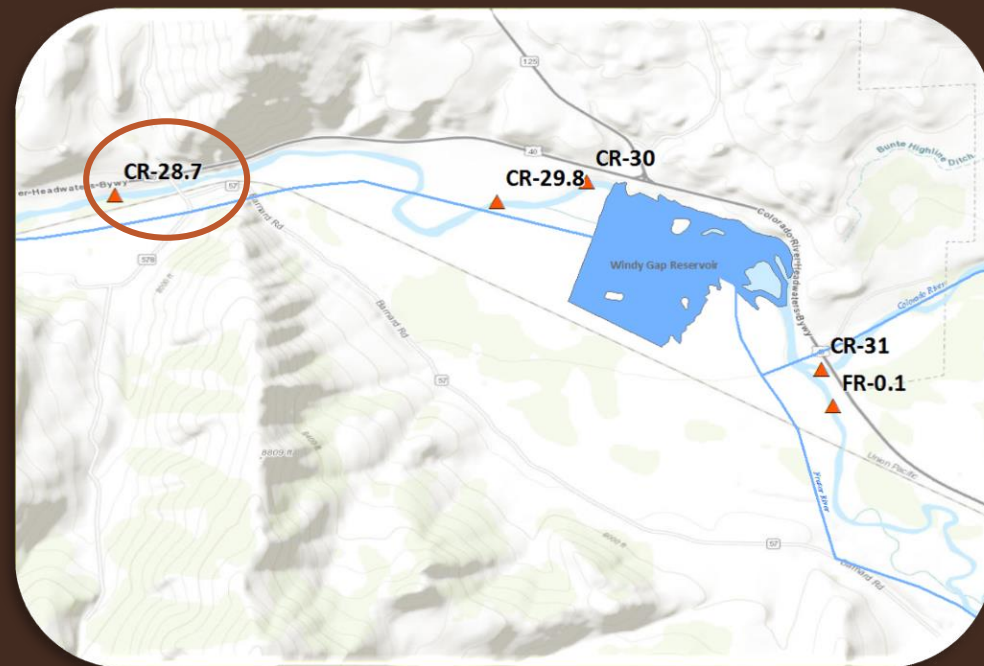
CR-WGD (CR-28.7) - Weekly Average Temperature



CR-WGD (CR-28.7) - Maximum Daily Temperature

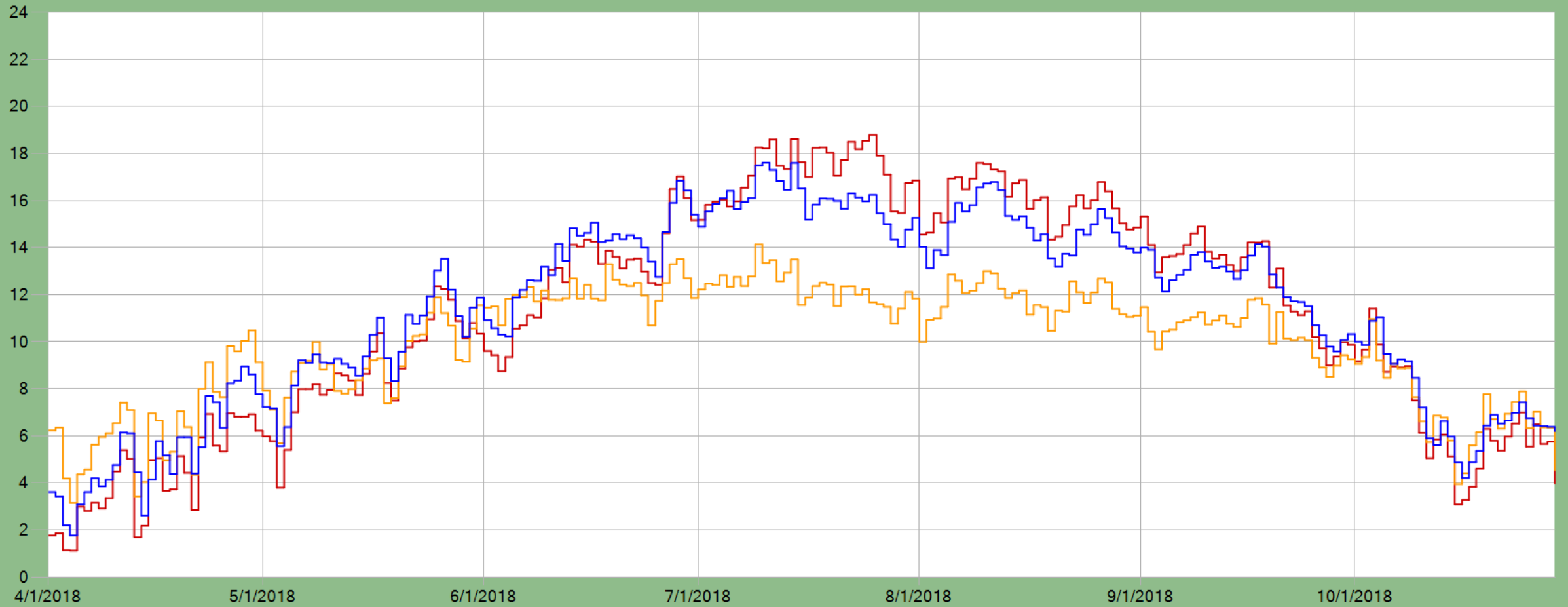


Colorado River downstream of Windy Gap – CSII

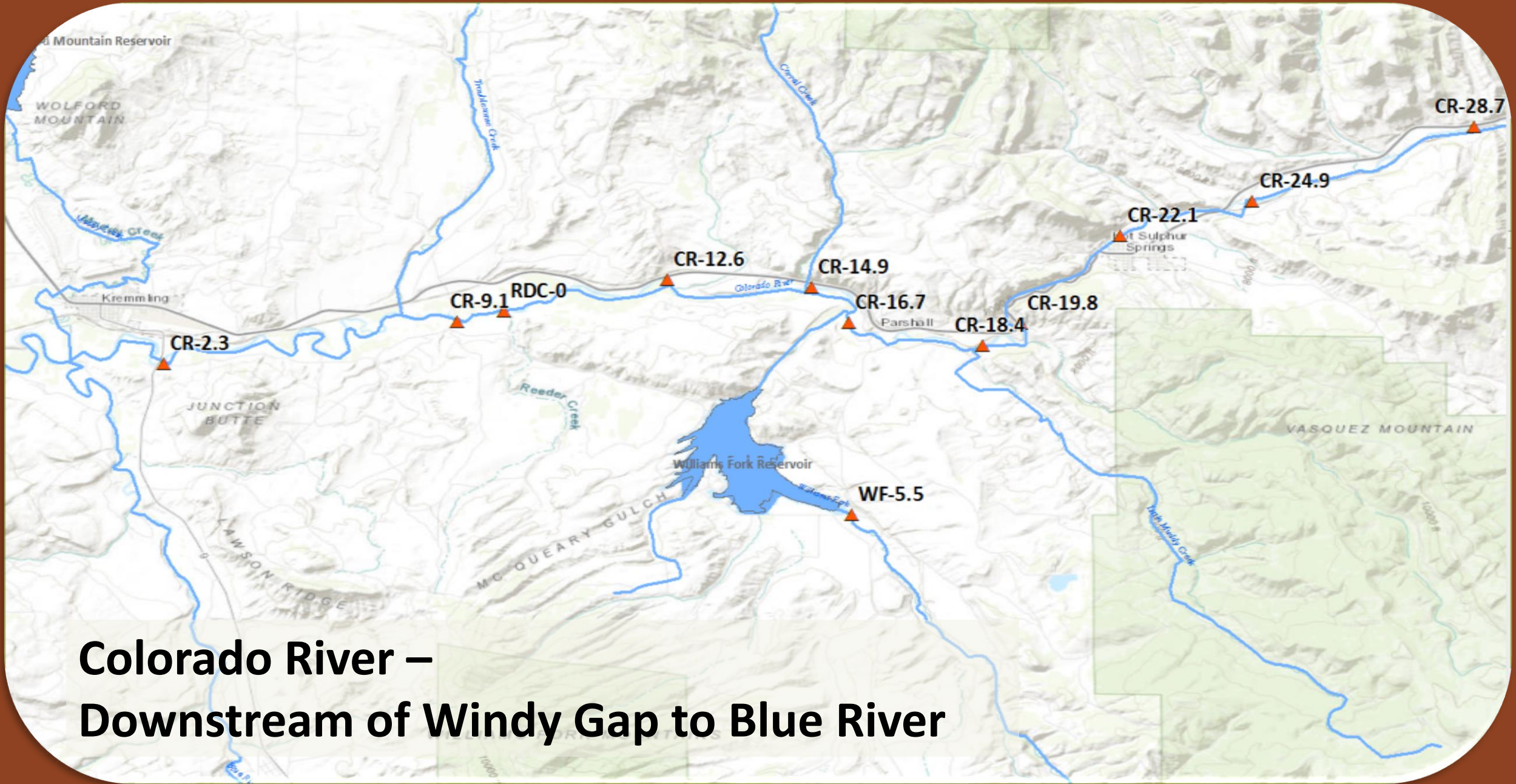


Northern Waters real-time site

Colorado River Daily Average Temperature Upstream and Downstream of Windy Gap Reservoir

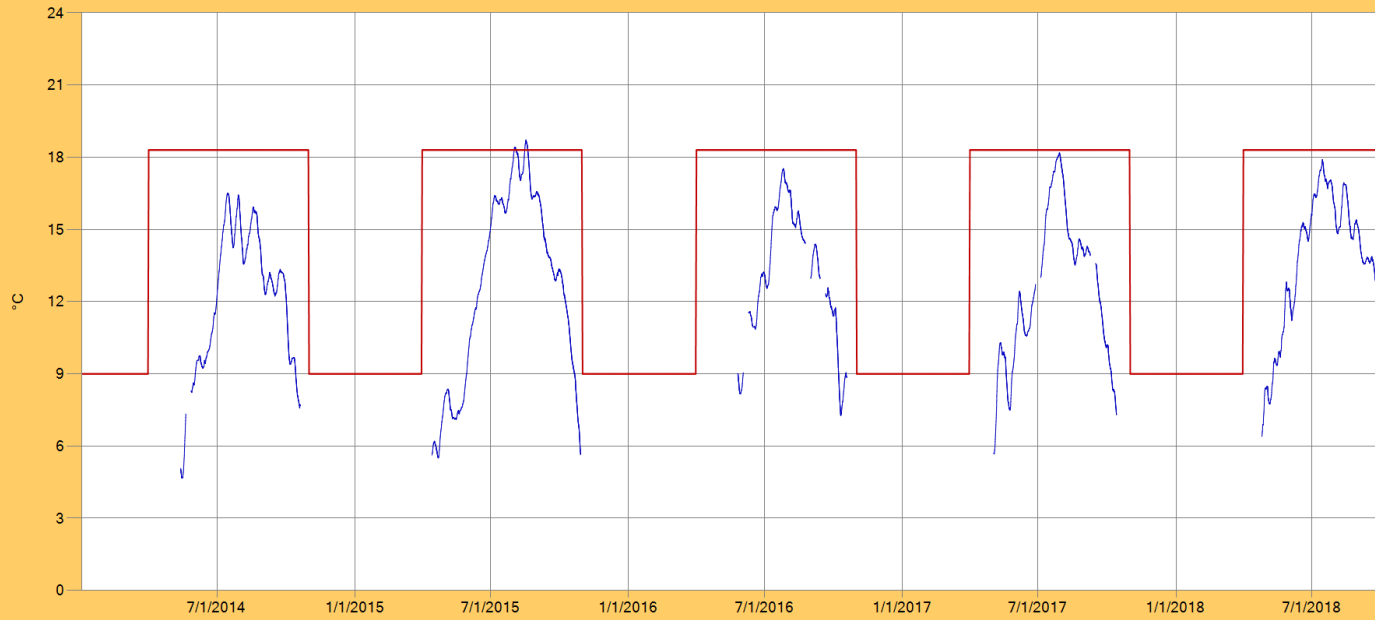


— Fraser Upstream FR-0.1 (FR-WGU) — Colorado Upstream CR-31 (CR-WGU) — Colorado Downstream CR-28.7 (CR-WGD)

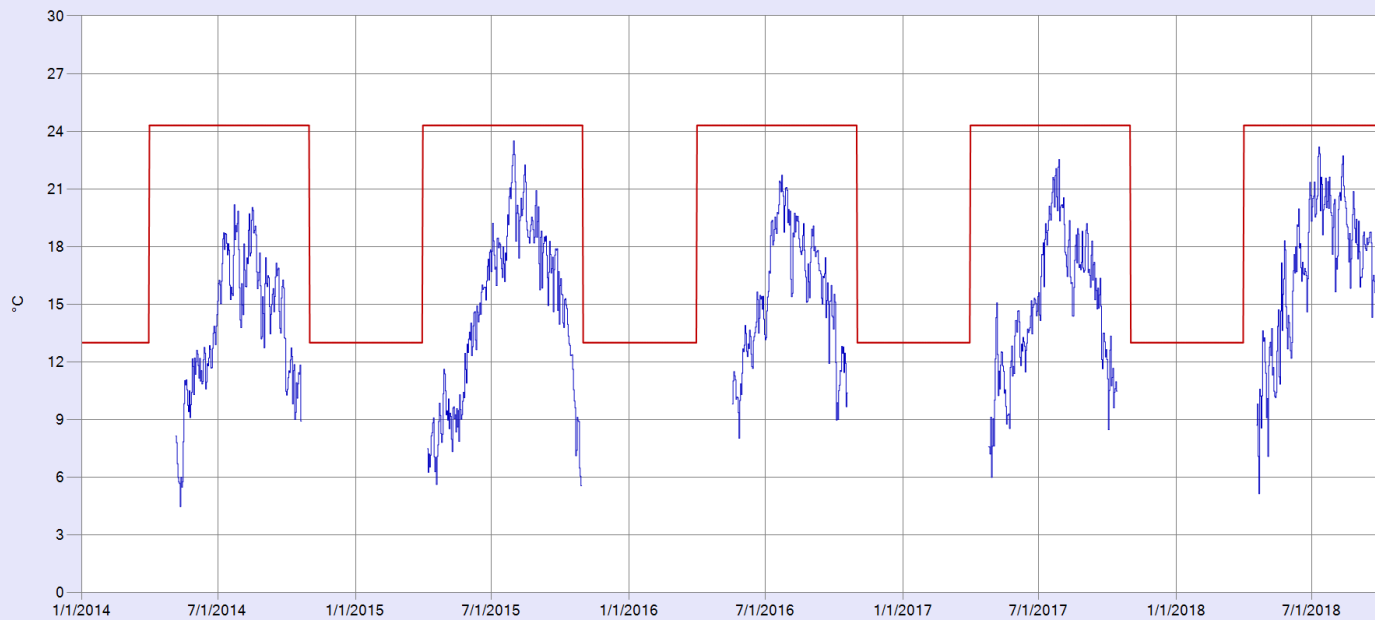


**Colorado River –
Downstream of Windy Gap to Blue River**

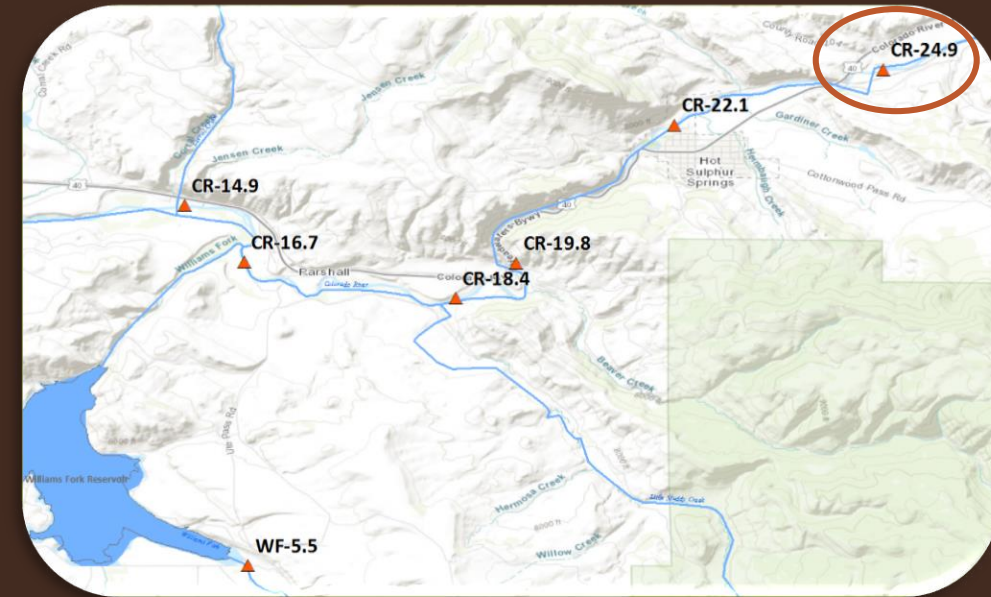
CR-SHRF (CR-24.9) - Weekly Average Temperature



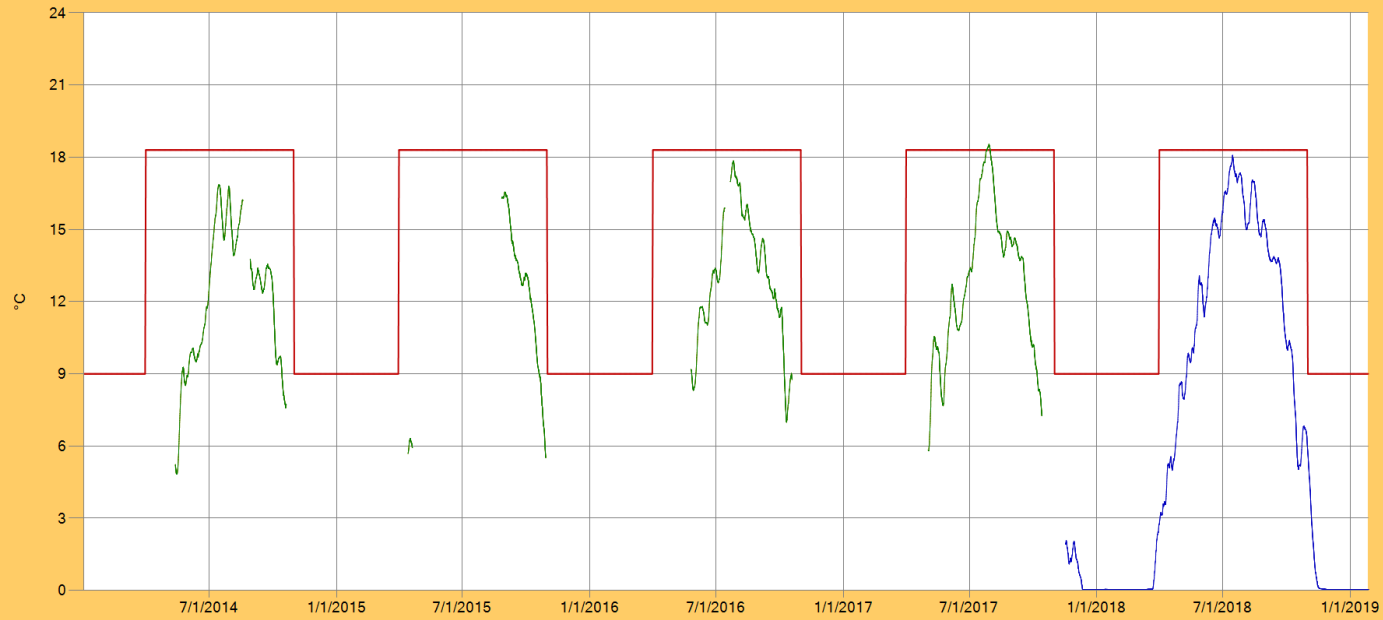
CR-SHRF (CR-24.9) - Maximum Daily Temperature



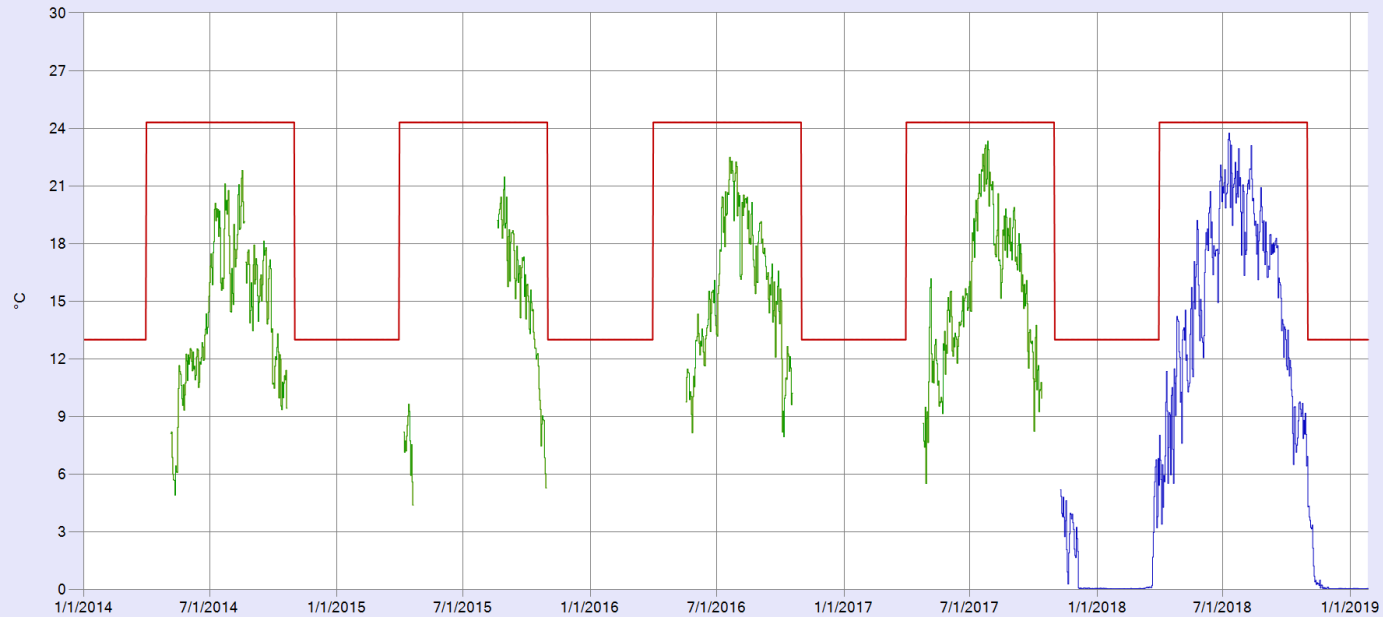
Colorado River at Sheriff Ranch – CSII



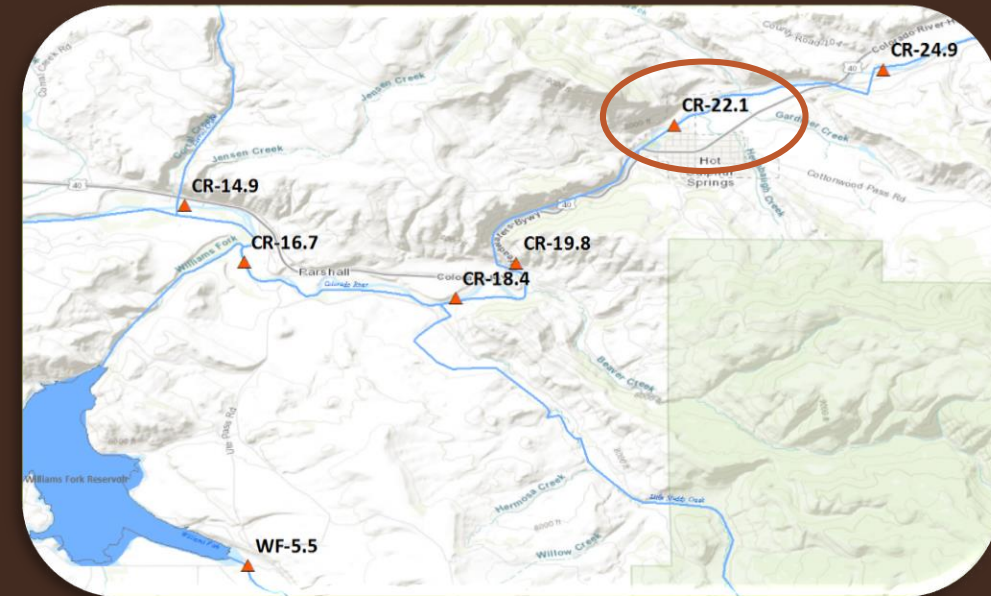
CR-HSU2 (CR-22.1) - Weekly Average Temperature



CR-HSU2 (CR-22.1) - Maximum Daily Temperature

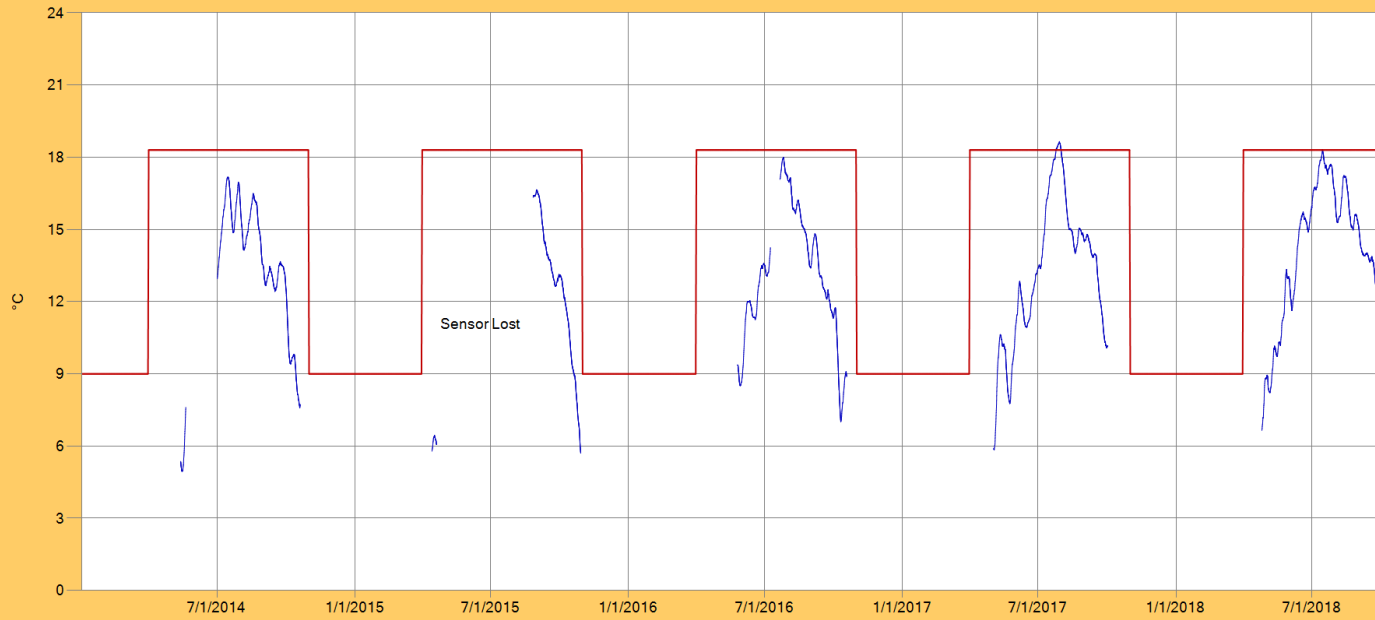


Colorado River upstream Hot Sulphur Springs – CSII



Northern Waters real-time site

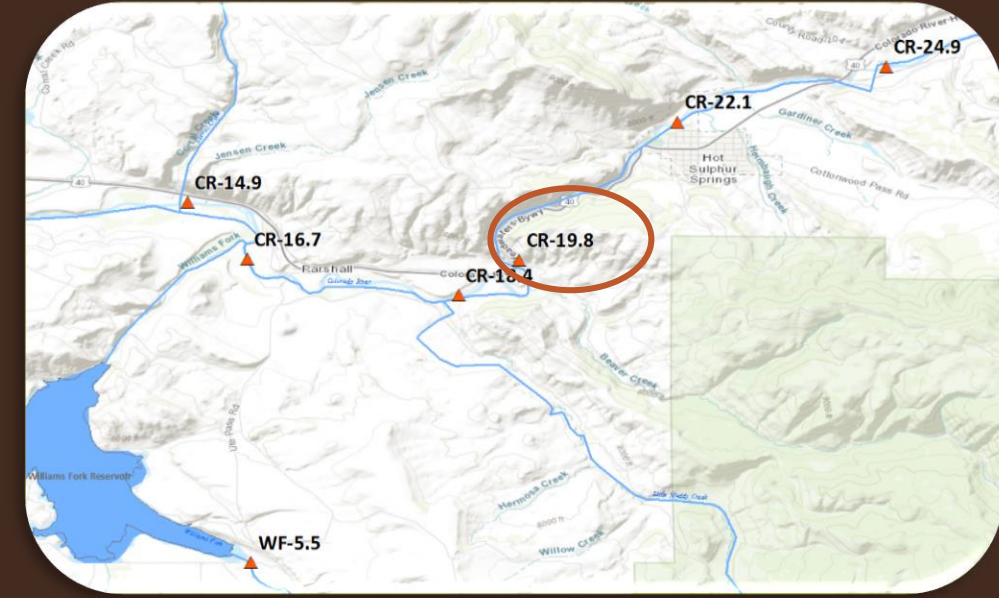
CR-HRD (CR-19.8) - Weekly Average Temperature



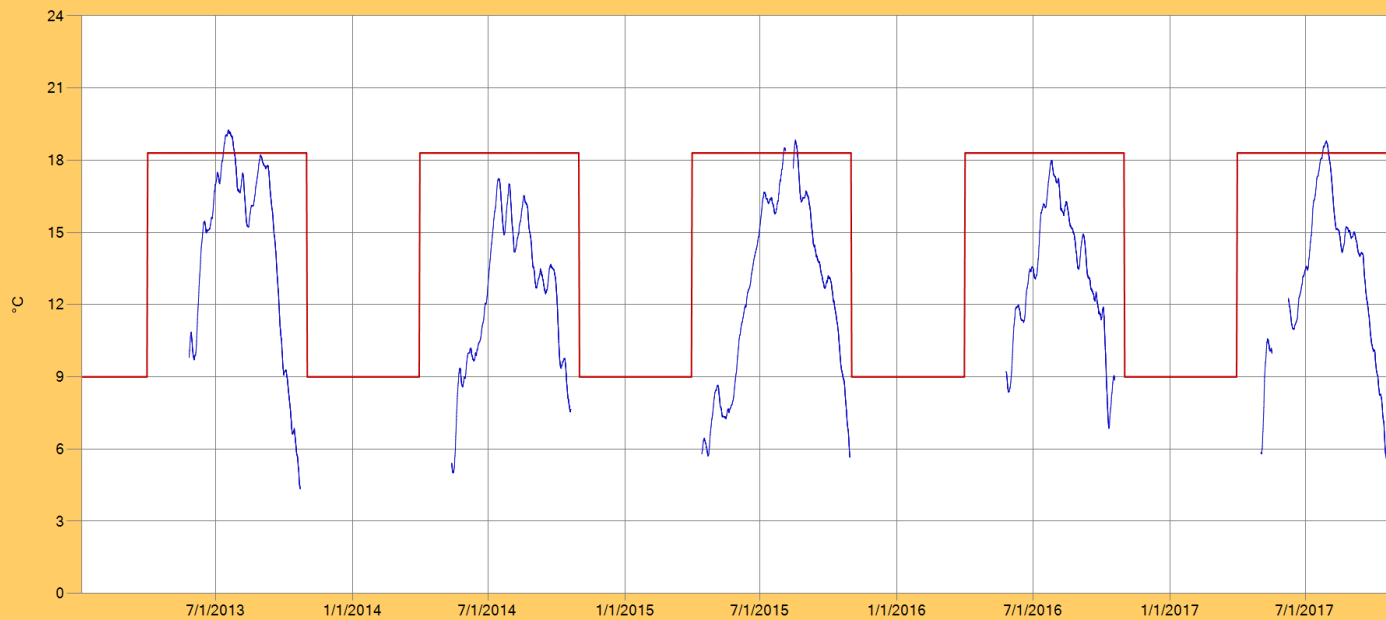
CR-HRD (CR-19.8) - Maximum Daily Temperature



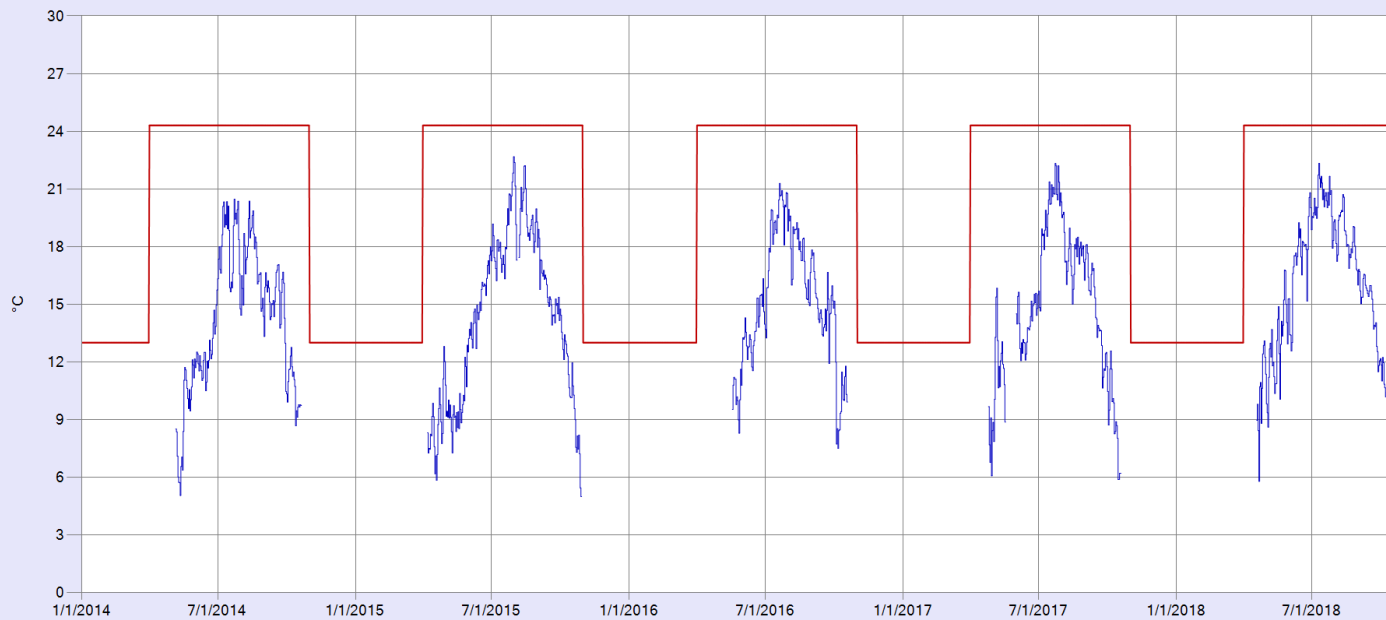
Colorado River downstream Byers Canyon— CSII



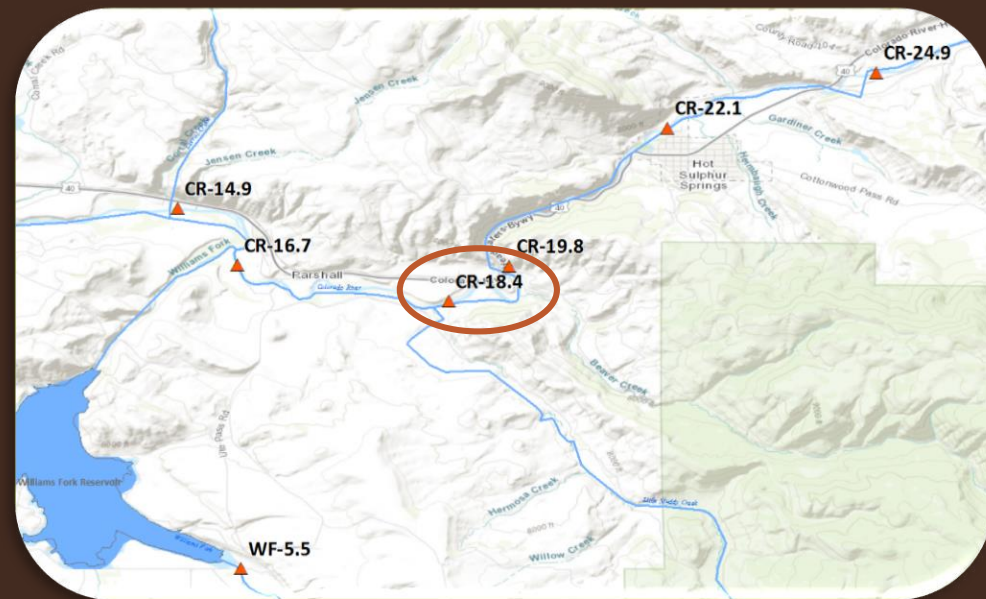
CR-LB (CR-18.4) - Weekly Average Temperature



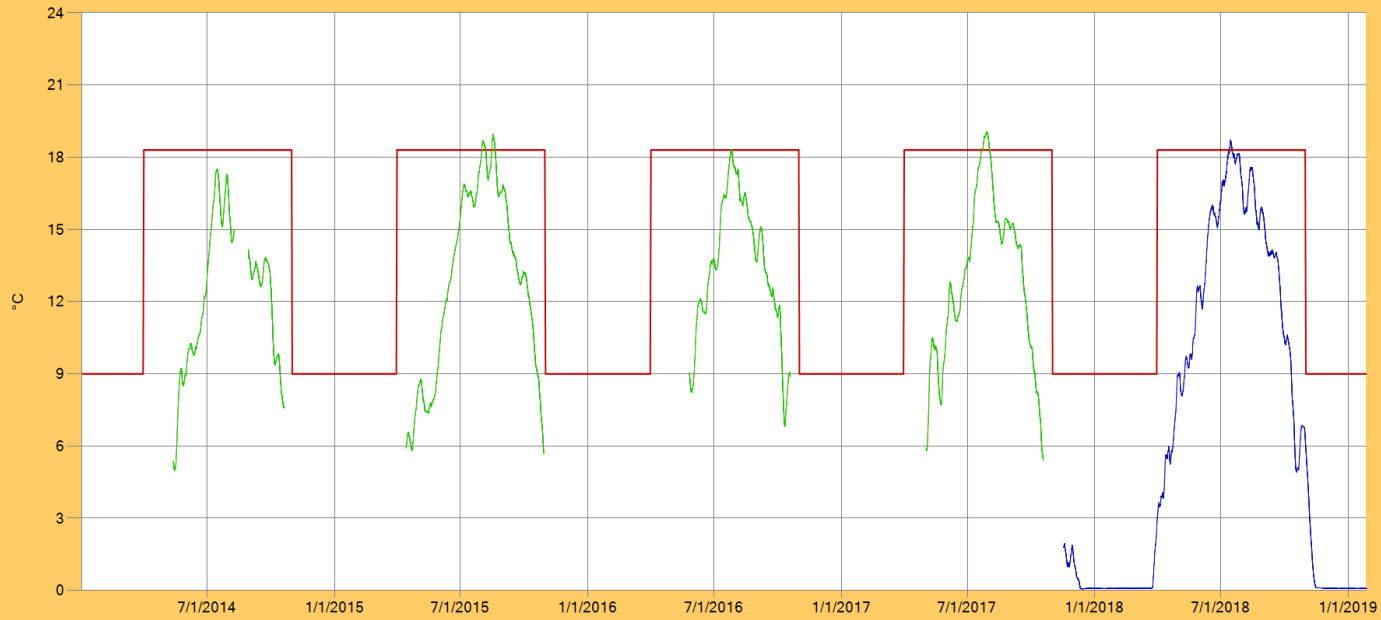
CR-LB (CR-18.4) - Maximum Daily Temperature



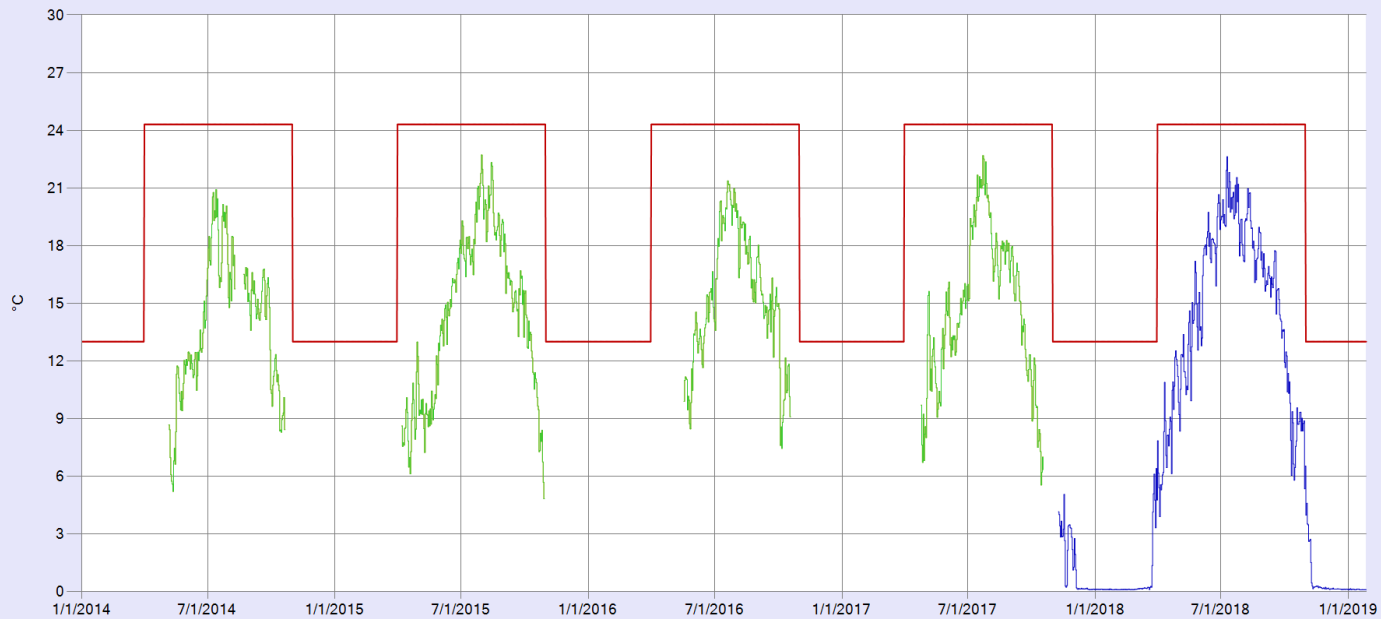
Colorado River at Lone Buck – CSII



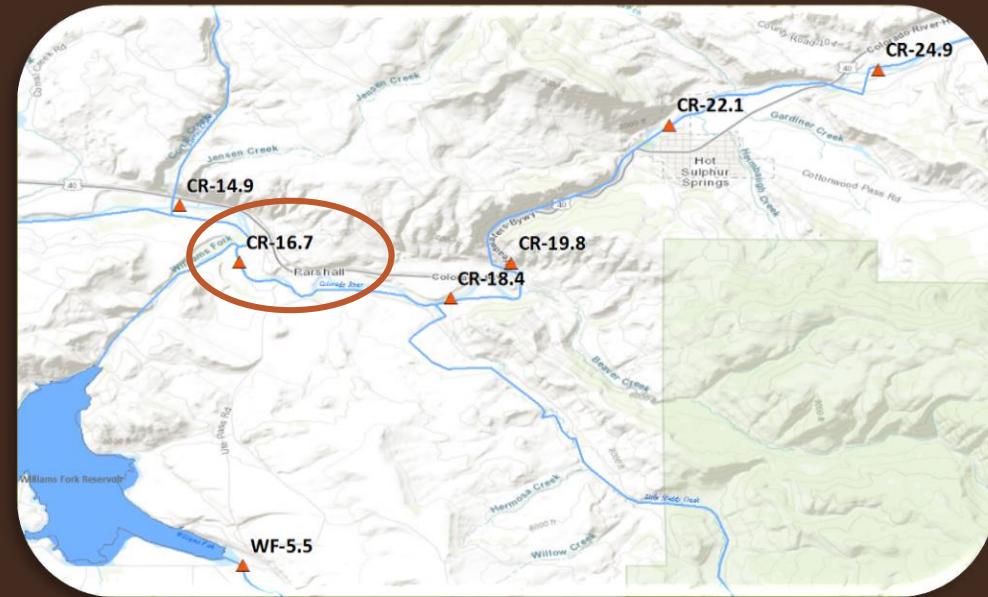
CR-WFU2 (CR-16.7) - Weekly Average Temperature



CR-WFU2 (CR-16.7) - Maximum Daily Temperature

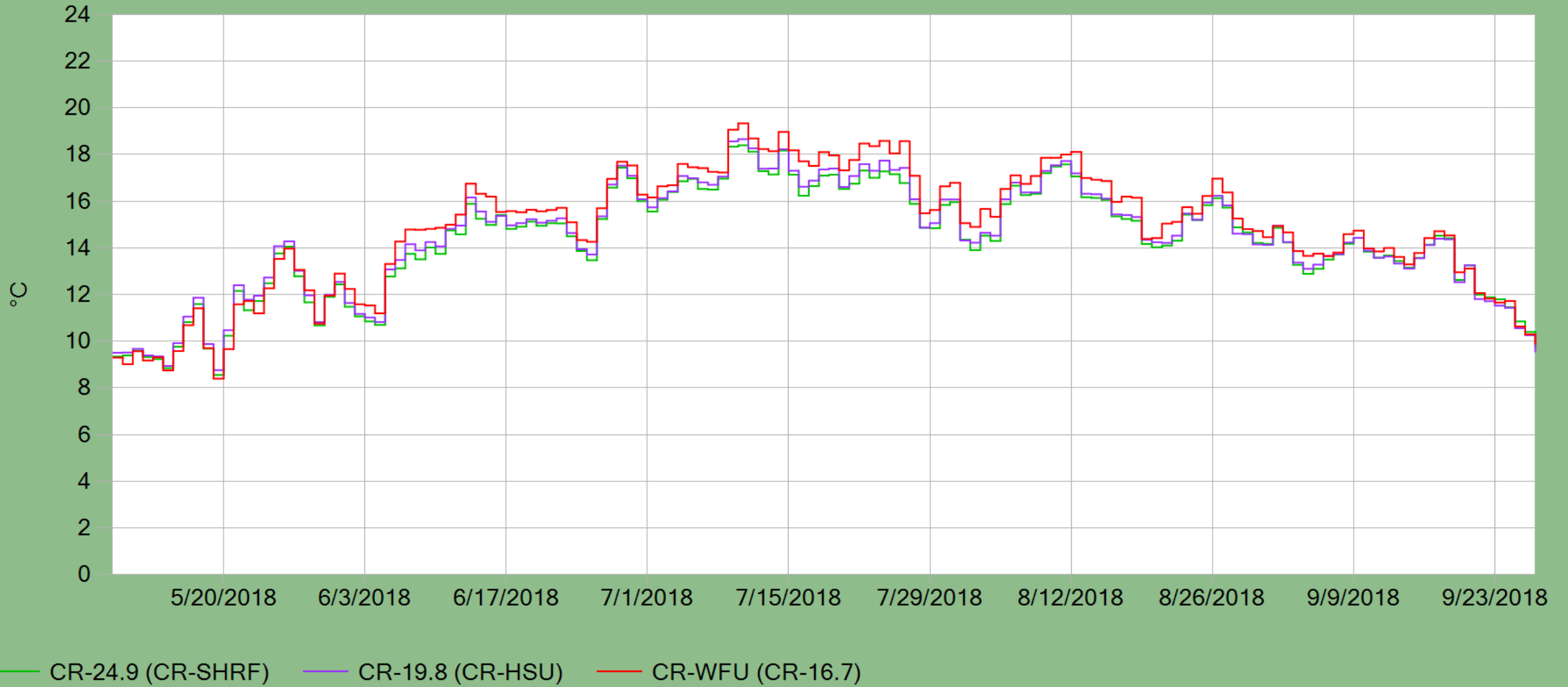


Colorado River upstream Williams Fork – CSII

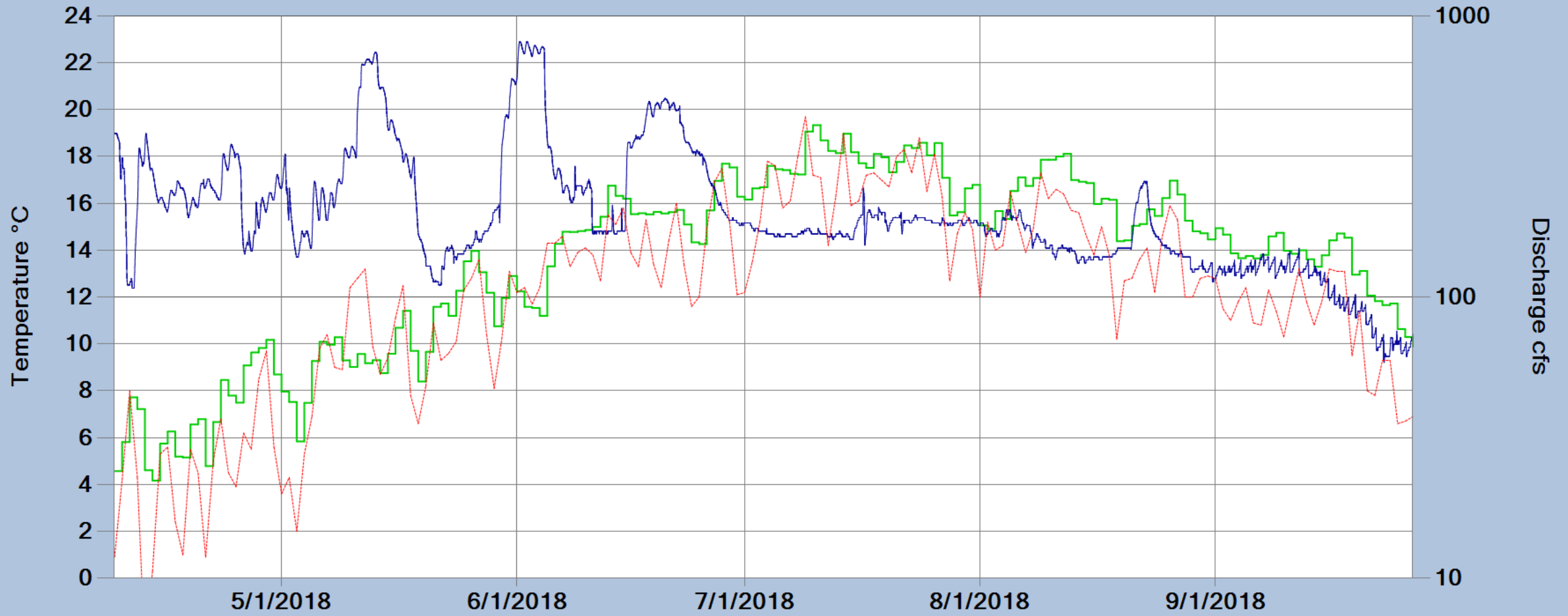


Northern Waters real-time site

Colorado River Daily Average Temperature Downstream of Windy Gap to Upstream of Williams Fork Confluence

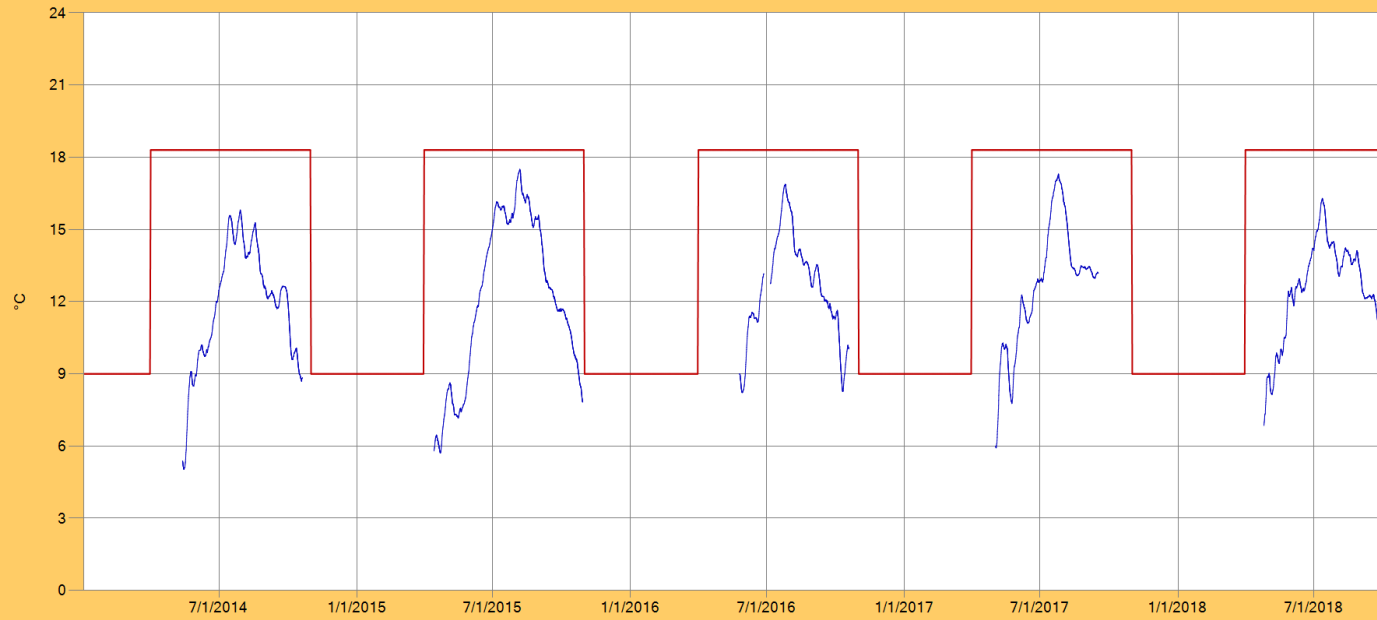


Water/Air Temperature and Flow Comparison upstream of Williams Fork

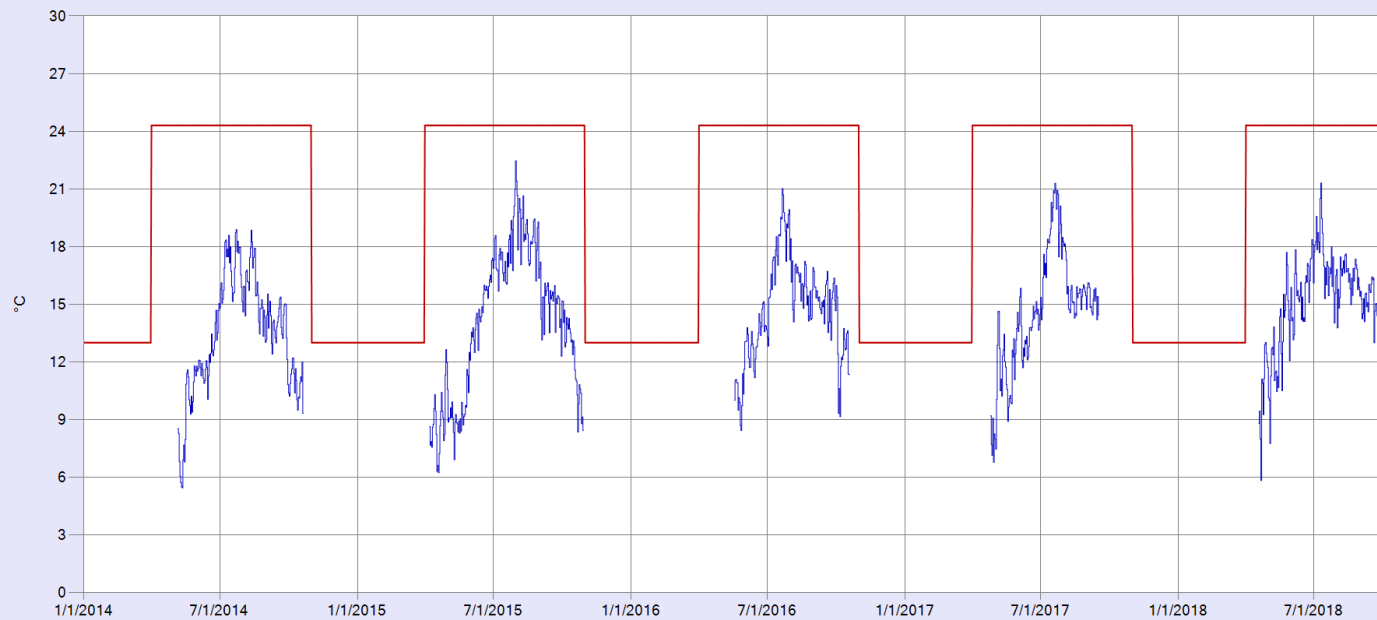


— CR-16.7(CR-WFU) Water Temp — CR-23.5 (CR-HSU) Discharge - - - - Air Temp HSU

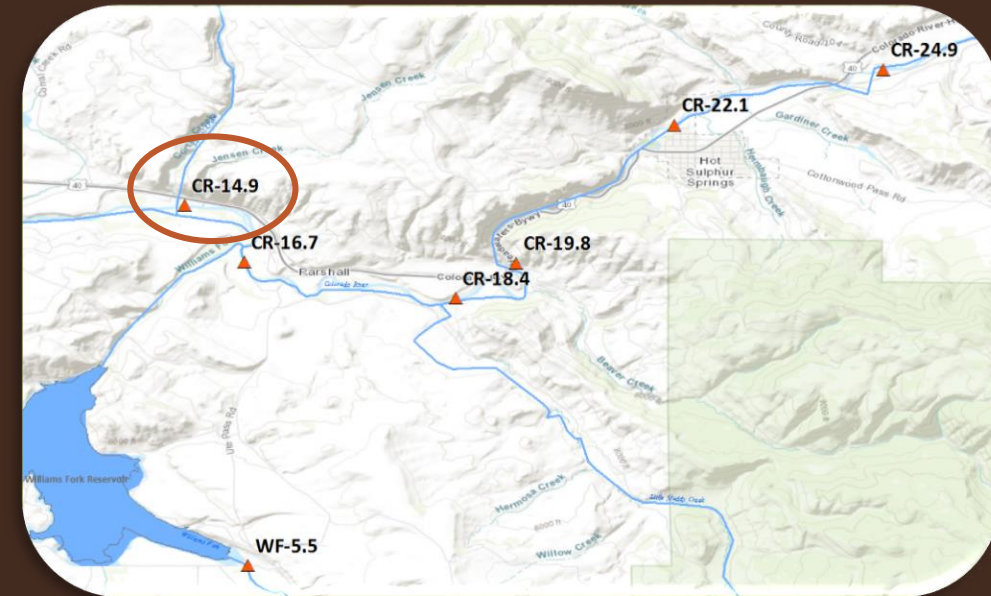
CR-PAD (CR-14.9) - Weekly Average Temperature



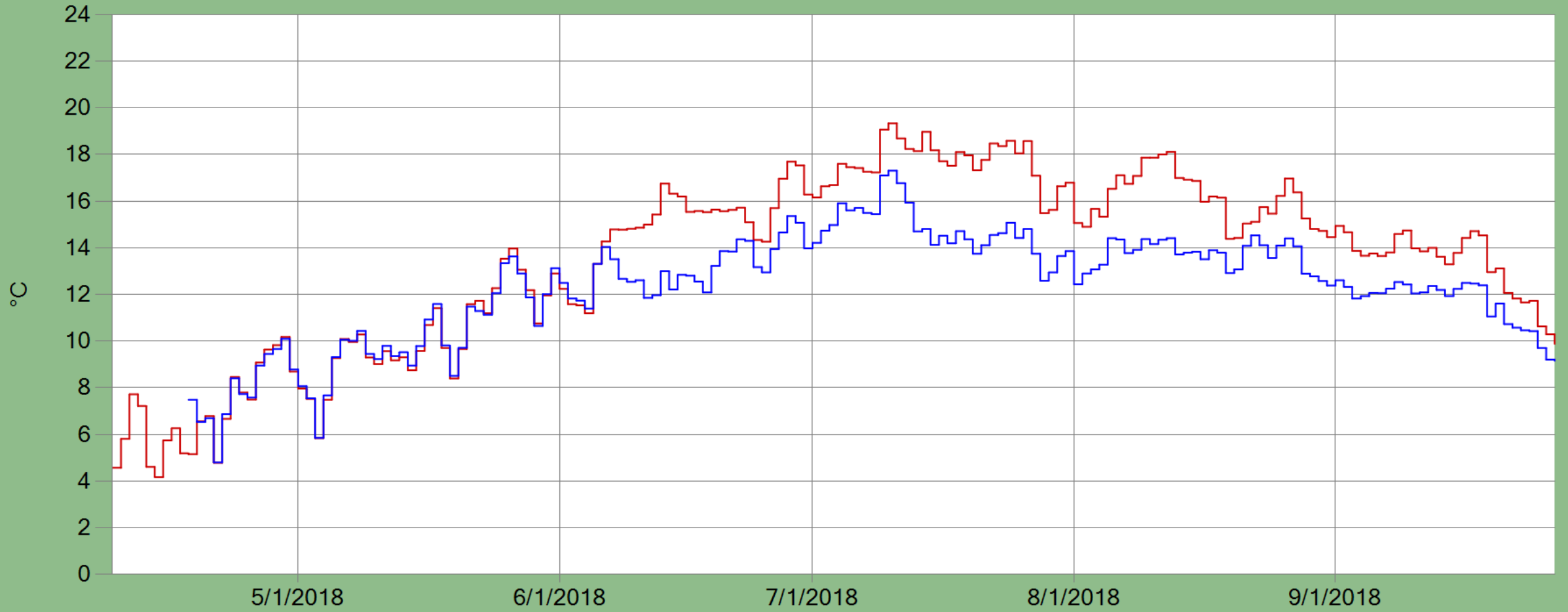
CR-PAD (CR-14.9) - Maximum Daily Temperature



Colorado River downstream Williams Fork – CSII

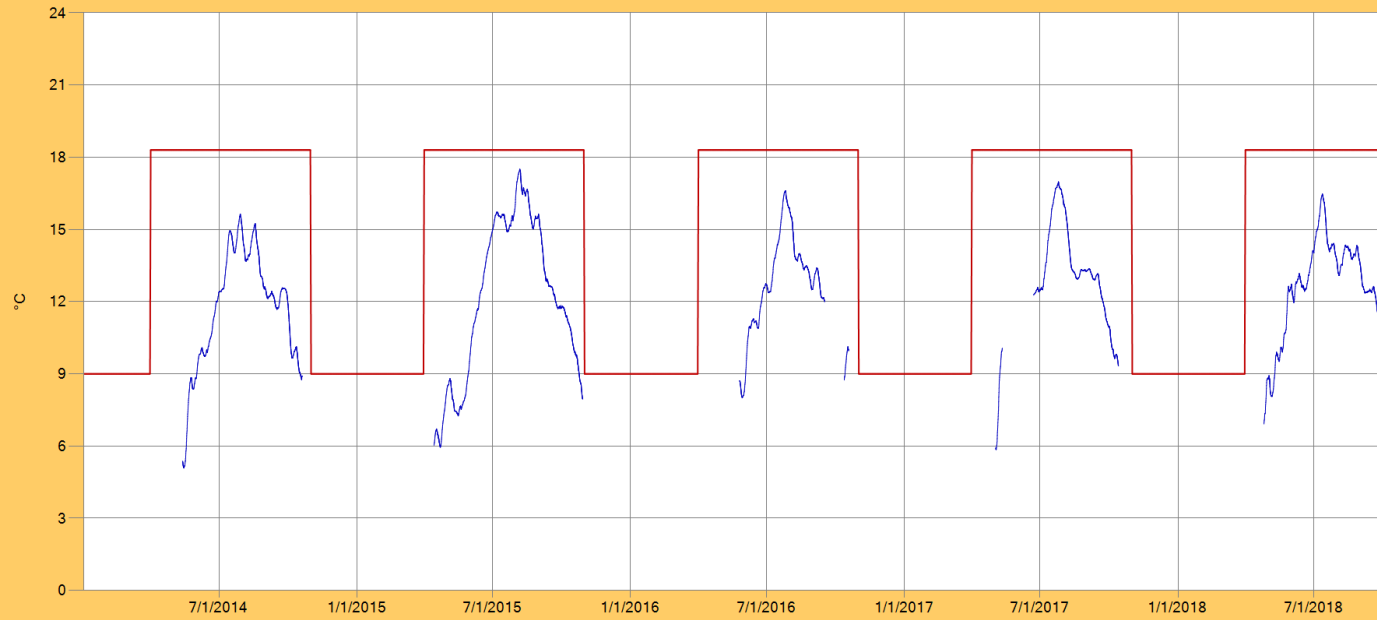


Colorado River Daily Average Temperature Upstream and Downstream of Williams Fork Confluence



— CR-16.7 (CR-WFU) Upstream — CR-14.9 (CR-PAD) Downstream

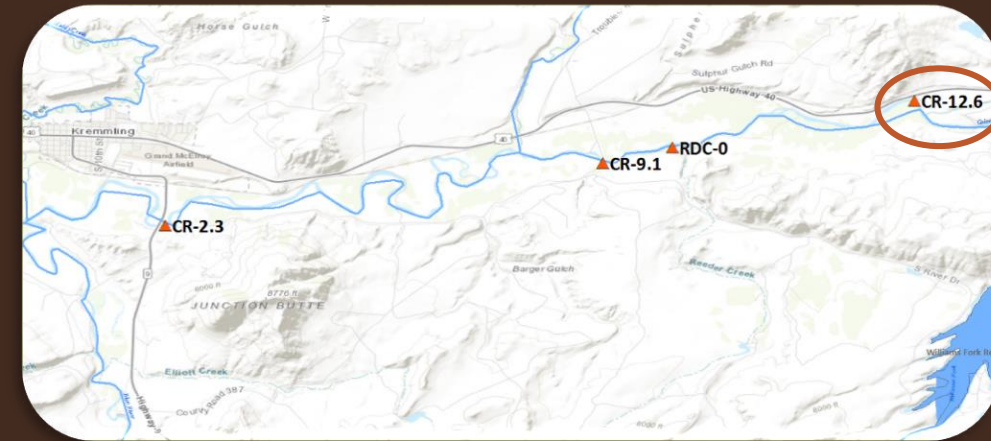
CR-CON (CR-12.6) - Weekly Average Temperature

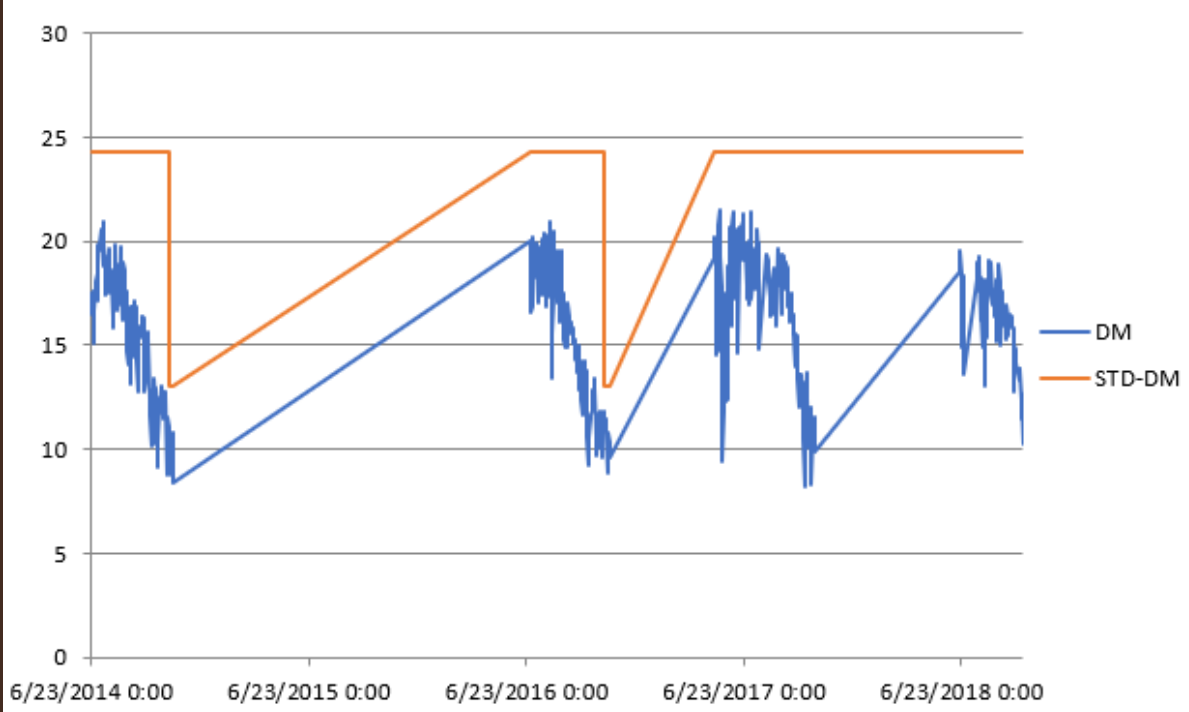
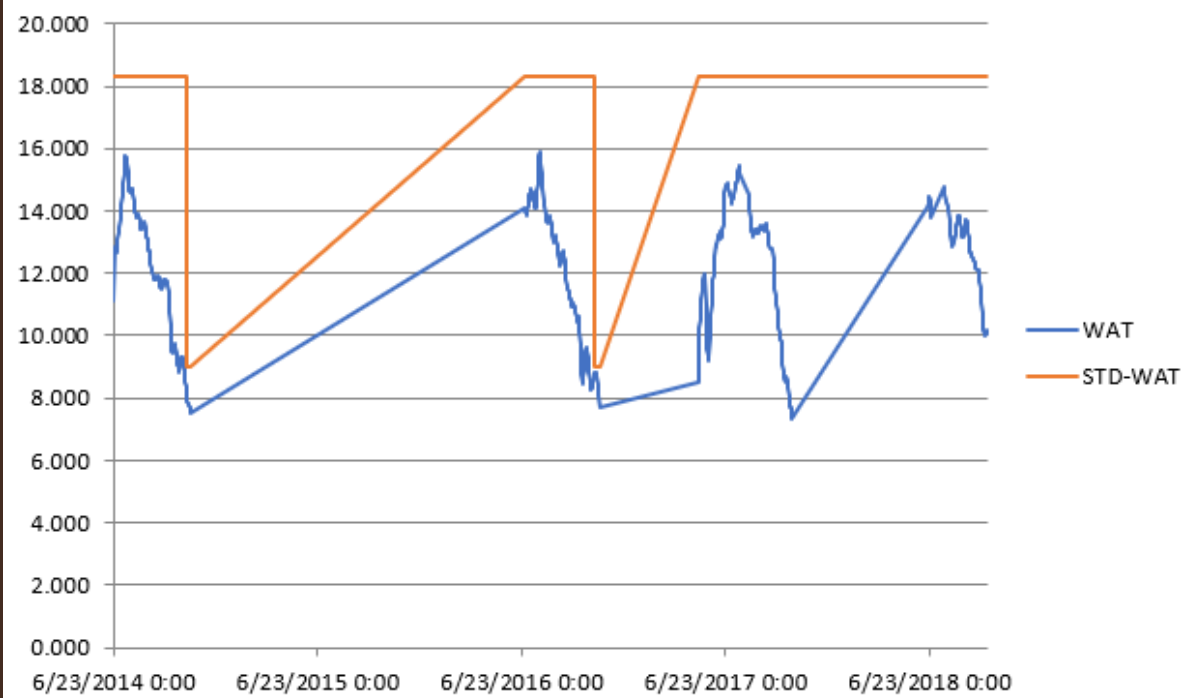


CR-CON (CR-12.6) - Maximum Daily Temperature

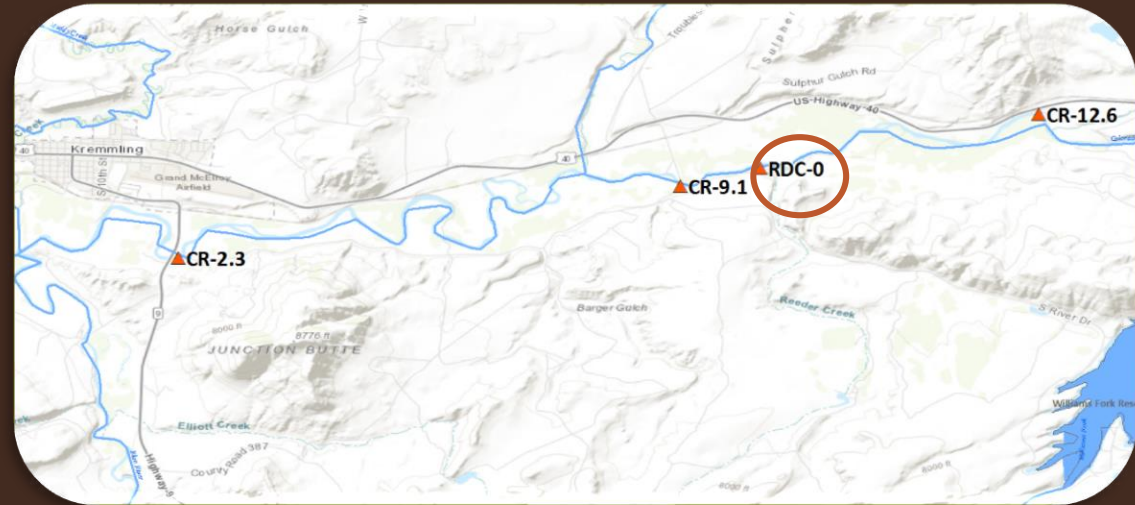


Colorado River downstream Williams Fork – CSII

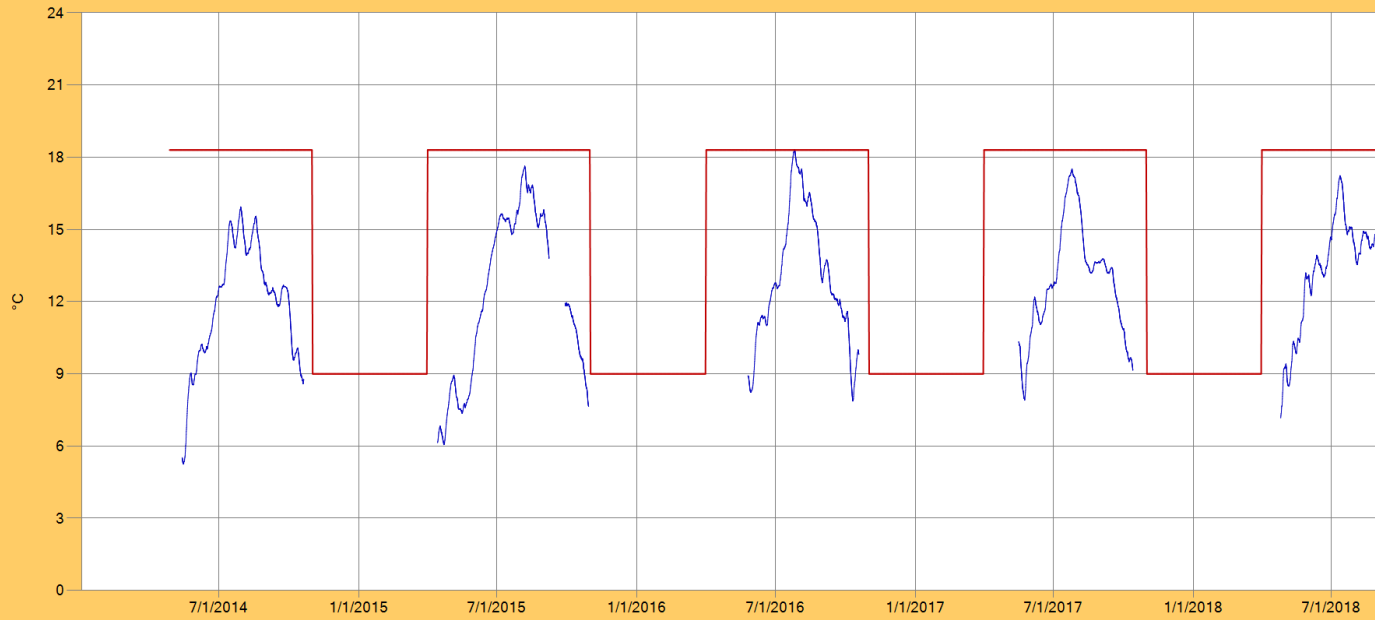




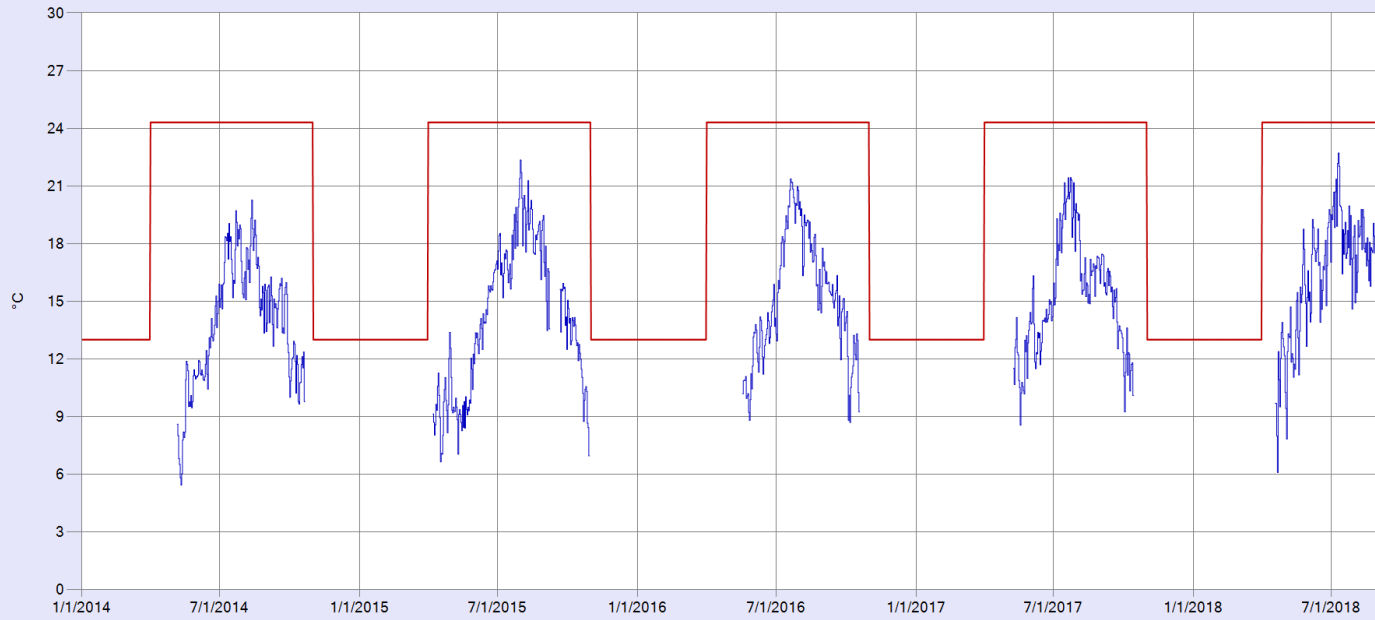
Reeder Creek upstream Colorado River – CSII



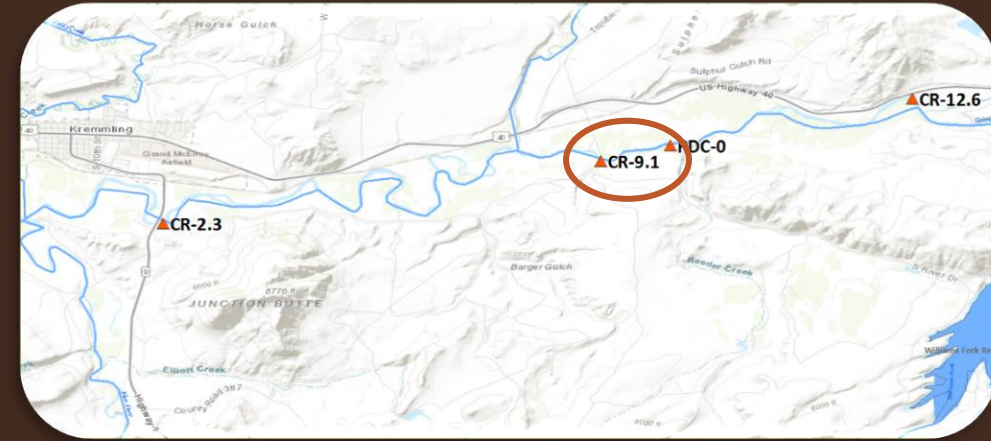
CR-KBD (CR-9.1) - Weekly Average Temperature



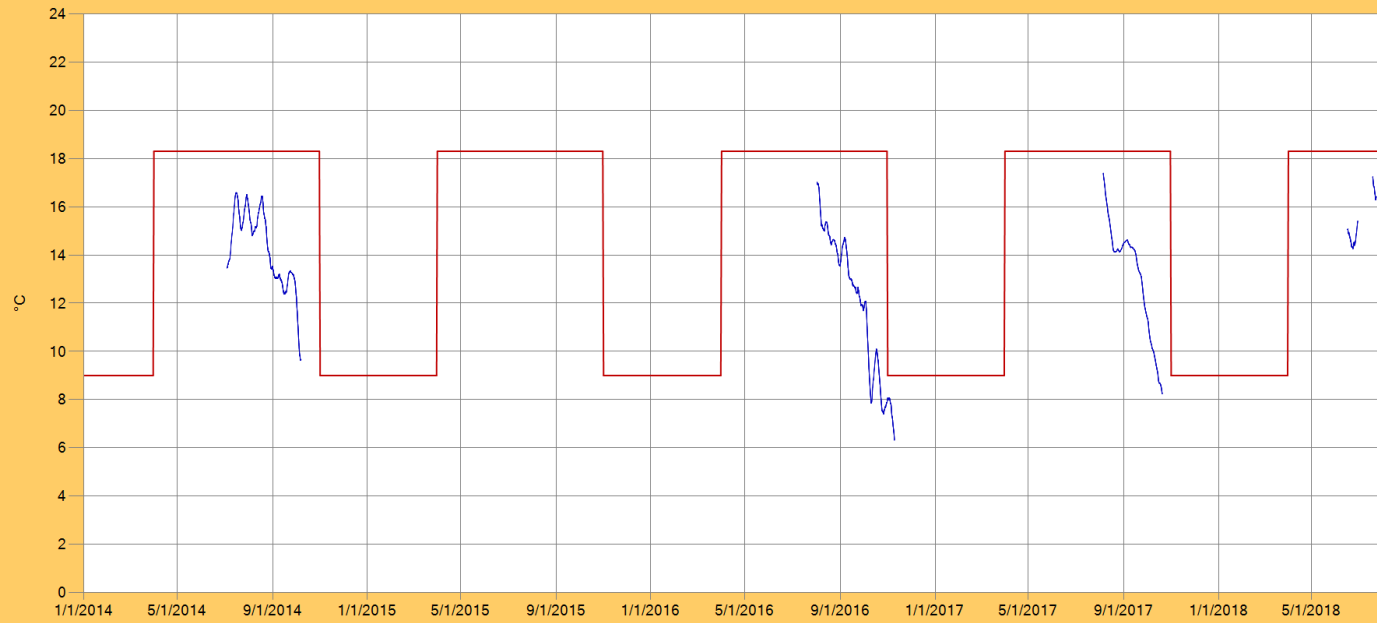
CR-KBD (CR-9.1) - Maximum Daily Temperature



Colorado River downstream KB Ditch – CSII



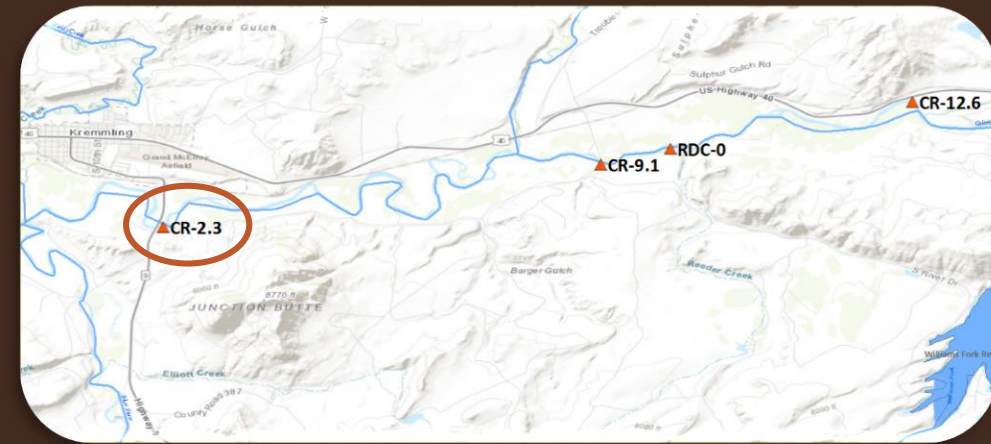
CR-BLU (2.3) - Maximum Weekly Average Temperature



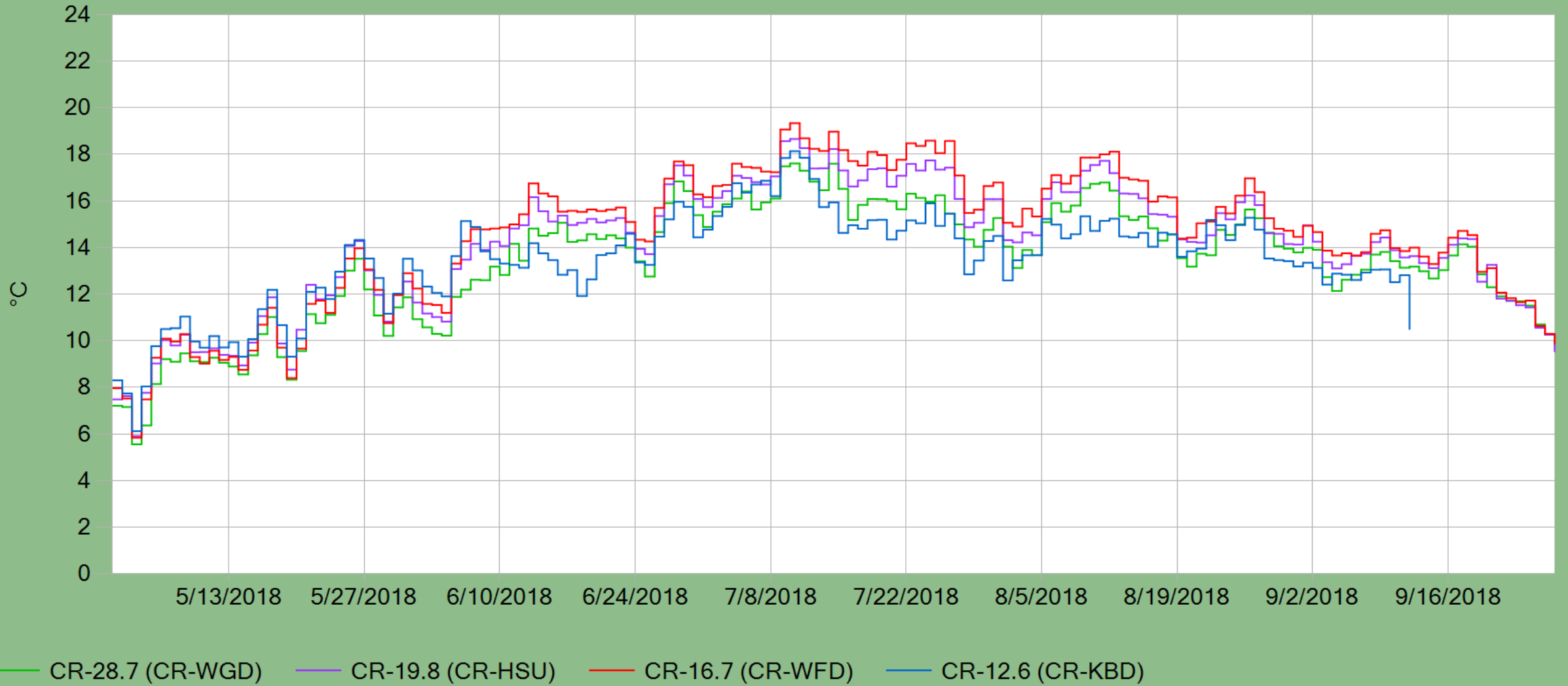
CR-BLU (CR-2.3) - Maximum Daily Temperature



Colorado River upstream Blue River – CSII

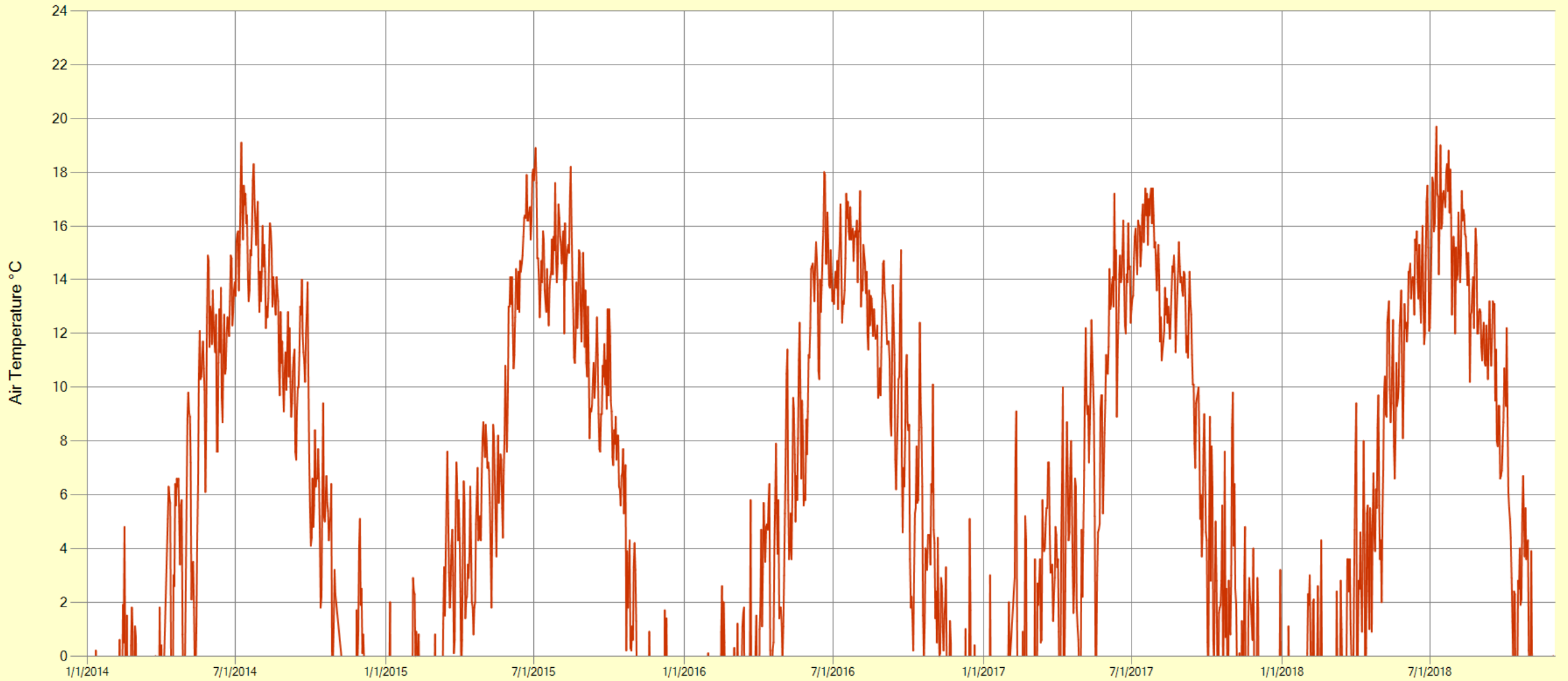


Colorado River Daily Average Temperature Downstream of Windy Gap to Upstream of Blue River Confluence

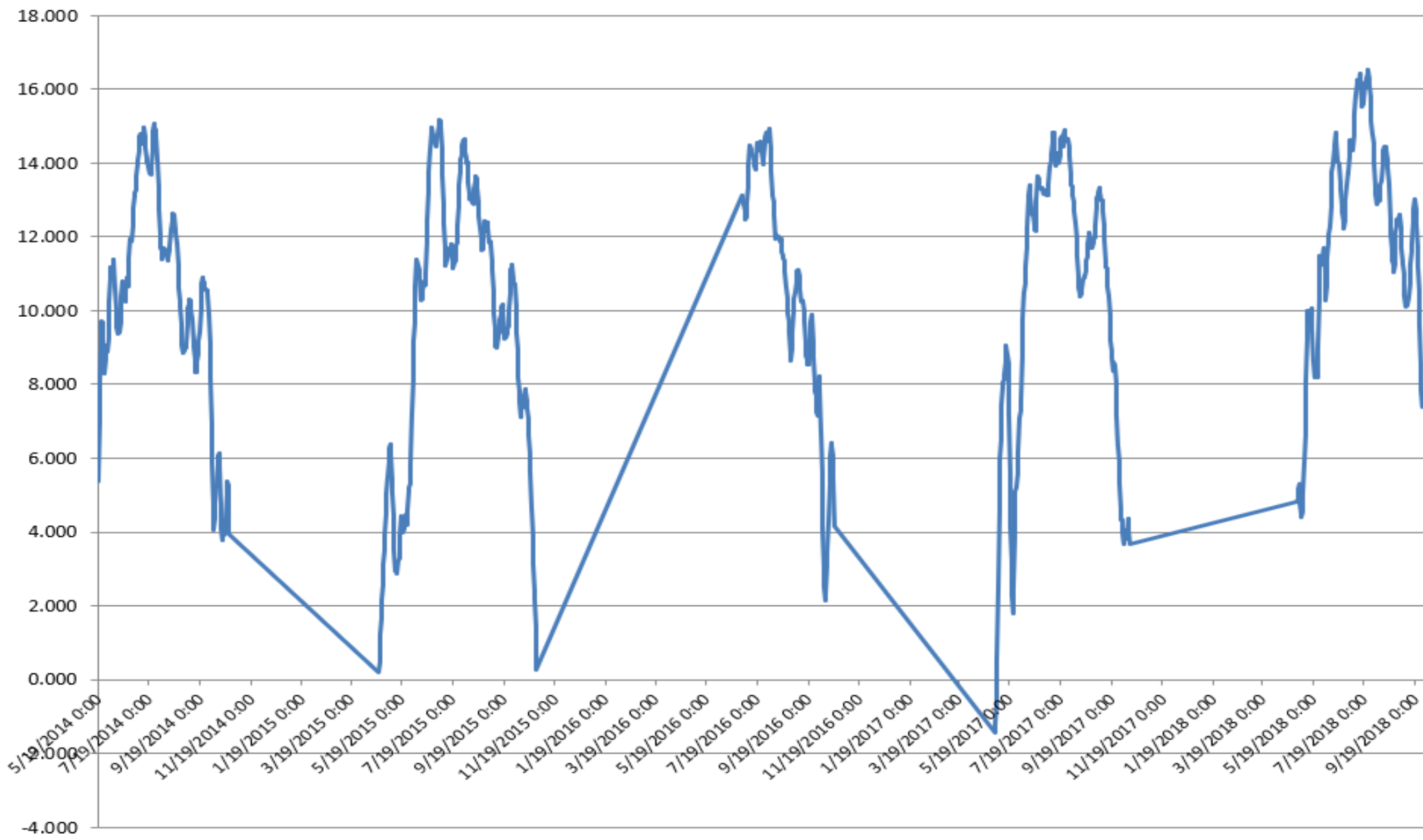


Questions & Comments

Daily Average Air Temperature at Hot Sulphur Springs from 2014-2018



Weekly Average Air Temperature at Winter Park from 2014-2018



Fraser River and Tributaries

River Mile ID	Description	River	Sampling Entity	Entity Station ID	Tier
FR-27.2	Fraser River above Mary Jane entrance to Winter Park	Fraser River	GCWIN	FR-Upper	CS-I
FR-23.4	Fraser River above Winter Park Sanitation District	Fraser River	GCWIN	FR-abvWPSD	CS-I
FR-23.2	Fraser River below Winter Park Sanitation	Fraser River	GCWIN	FR-blwWPSD	CS-I
FR-22.5	Fraser River below Winter Park Resort at Idlewild Campground	Fraser River	GCWIN	FR-blwWP	CS-I
LVC-0.2	Little Vasquez above Winter Park on Arapaho Road	Little Vasquez	GCWIN	LVC-abvWP	CS-I
VC-0	Vasquez Creek at the town of Winter Park	Vasquez Creek	GCWIN	VC-WP	CS-I
FR-20	Fraser River at Rendezvous Bridge	Fraser River	GCWIN	FR-Rendezvous	CS-II
EC-5.5	Elk Creek below Denver Water diversion	Elk Creek	GCWIN	Elk-blwDWB	CS-I
FR-18.1	Fraser River below County Rd 804	Fraser River	GCWIN	FR-CR804	CS-II
STC-9.8	Saint Louis Creek upstream of Denver Water Board diversion	St. Louis Creek	GCWIN	STC-blwDWB	CS-I
STC-5.4	Saint Louis Creek at Fraser Experimental Forest	St. Louis Creek	GCWIN	STC-Mid	CS-I
STC-0	Saint Louis Creek above confluence with Fraser River	St. Louis Creek	GCWIN	ST-LC	CS-I
FR-17.7	Fraser River below County Rd 8 at Hammond Ditch	Fraser River	GCWIN	FR-blwCR8HD	CS-II
FR-16.9	Fraser River above Fraser Sanitation	Fraser River	GCWIN	FR-abvFSD	CS-II
FR-16.6	Fraser River below Fraser Sanitation	Fraser River	GCWIN	FR-blwFSD	CS-II
FR-15	Fraser River LBD Restoration Project, Upstream end	Fraser River	GCWIN	FR-SpProjU	CS-II
FR-14.4	Fraser River LBD Restoration Project, Downstream end	Fraser River	GCWIN	FR-SpProjD	CS-II

Fraser River and Tributaries

River Mile ID	Description	River	Sampling Entity	Entity Station ID	Tier
FR-14	Fraser River At Tabernash Co.	Fraser River	USGS	09027100	CS-II
LCB-2.2	Little Cabin Creek below Denver Water diversion	Little Cabin	GCWIN	LCAB-blwDWB	CS-I
CB-2.7	Cabin Creek below Denver Water diversion	Cabin Creek	GCWIN	CAB-blwDWB	CS-I
CB-0.6	Cabin Creek upstream of North and South Channels	Cabin Creek	GCWIN	CAB-abvChan	CS-I
RC-4.7	Ranch Creek below County Rd 8315	Ranch Creek	GCWIN	RC-blwCR8315	CS-I
HC-0.5	Herd Creek on County Road 843	Herd Creek	GCWIN	HRD-atCR843	CS-I
MC-0.5	Meadow Creek on County Road 84/USFS 129	Meadow Creek	GCWIN	MEA-atCR84	CS-I
RC-1.1	Ranch Creek below Meadow Creek near Tabernash CO	Ranch Creek	USGS	09033100	CS-I
RC-1.1	Ranch Creek below Meadow Creek	Ranch Creek	GCWIN	RC-blwMC	CS-I
FR-12.4	Fraser River above Fraser Canyon below Tabernash	Fraser River	GCWIN	FR-abvFrCan	CS-II
FR-4.5	Fraser River below Fraser Canyon at Granby Ranch	Fraser River	GCWIN	FR-blwFrCan	CS-II
FR-3.5	Fraser River below Highway 40 in Granby	Fraser River	GCWIN	FR-Hwy40Gr	CS-II
FR-1.9	Fraser River above Granby Sanitation District	Fraser River	GCWIN	FR-abvGSD	CS-II
FR-1.6	Fraser River below Granby Sanitation District	Fraser River	GCWIN	FR-blwGSD	CS-II

Colorado River- Headwaters to Windy Gap

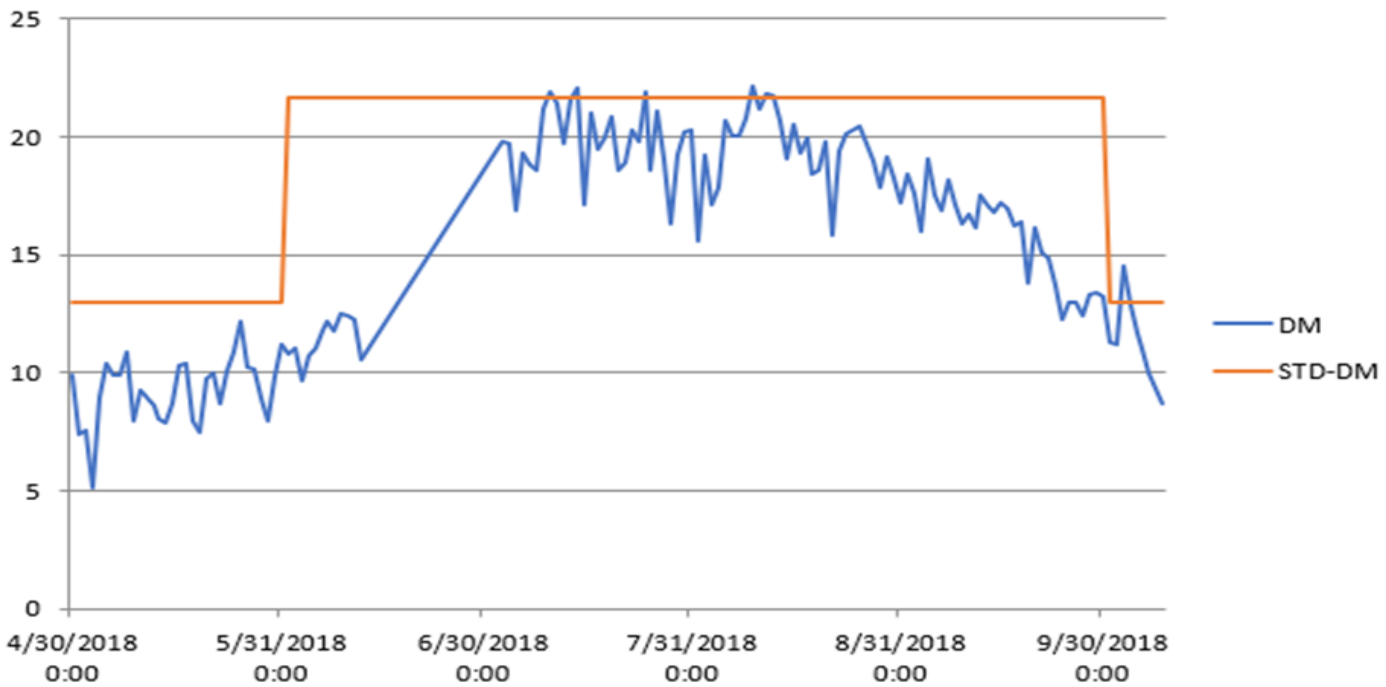
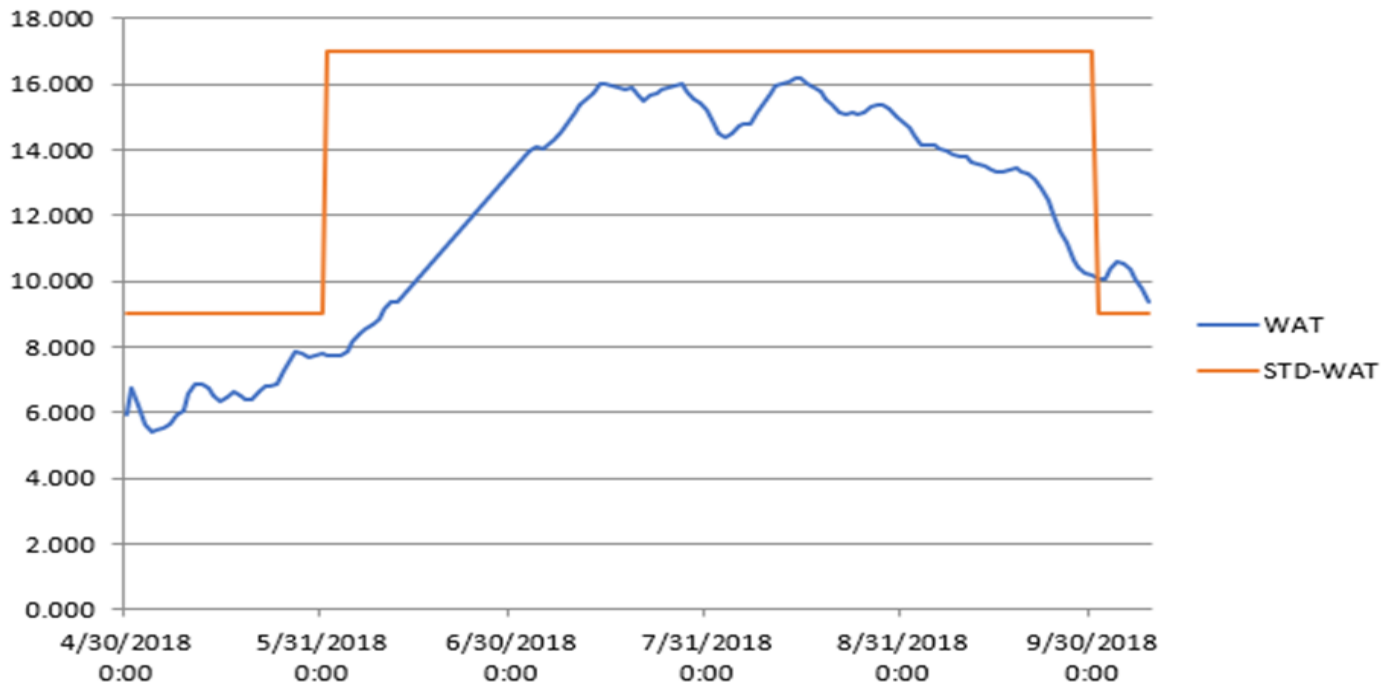
River Mile ID	Description	River	Sampling Entity	Entity Station ID	Tier
EI-0.1	East Inlet upstream of Grand Lake	East Inlet	Northern	EI-GLU	CS-I
NI-0.1	North Inlet upstream Grand Lake	North Inlet	Northern	NI-GLU	CS-I
NF-0.1	North Fork of Colorado River upstream Shadow Mountain Reservoir	North Fork	Northern	CR-SMU	CS-I
CR-44.6	Colorado River downstream of Shadow Mountain Reservoir	Colorado River	Northern	CR-SMD	CS-I
CR-43.5	Colorado River upstream of Lake Granby	Colorado River	Northern	CR-GRU	CS-I
ST-0	Stillwater Creek upstream Lake Granby	Stillwater Creek	Northern	ST-GRU	CS-I
RF-0	Roaring Fork upstream Lake Granby	Roaring Fork	Northern	RF-GRU	CS-I
AC-0.6	Arapaho Creek upstream Lake Granby	Arapaho Creek	Northern	AC-GRU	CS-I
CR-38.3	Colorado River downstream of Lake Granby	Colorado River	Northern	CR-GRD	CS-II
CR-35.6	Colorado River downstream of Lake Granby at flow gage	Colorado River	Northern	CR-YGAGE	CS-II
WC-3.8	Willow Creek downstream of Willow Creek Reservoir	Willow Creek	Northern	WC-WCRD	CS-I
WC-2.3	Willow Creek upstream of Bunte Highline Ditch	Willow Creek	GCWIN	WC-abvBHD	CS-I
WC-0.5	Willow Creek upstream of confluence with Colorado River	Willow Creek	GCWIN	WC-abvCOR	CS-I

Colorado and Fraser River at Windy Gap

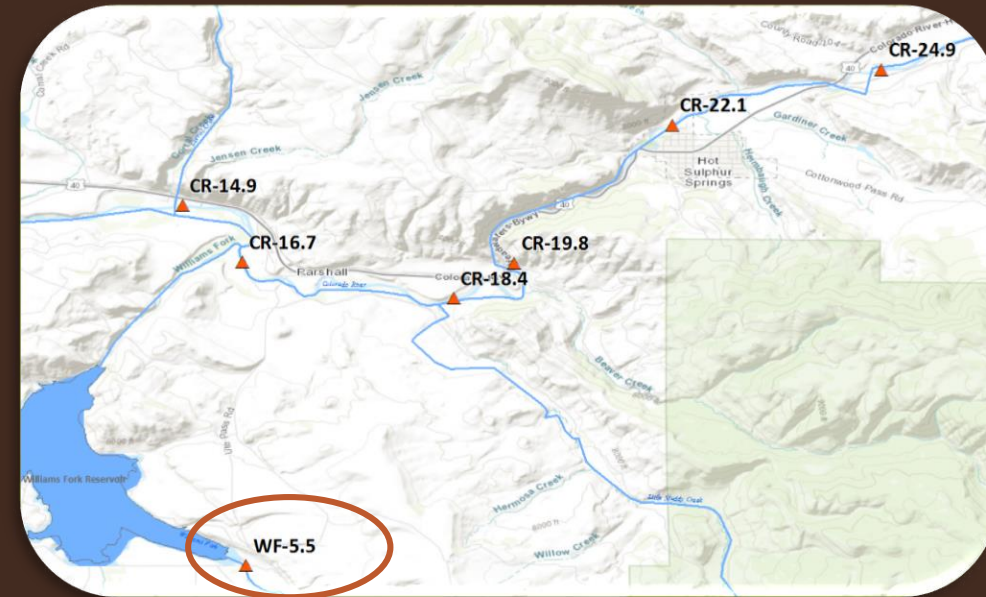
River Mile ID	Description	River	Sampling Entity	Entity Station ID	Tier
CR-31	Colorado River upstream of Windy Gap and Fraser River confluence	Colorado River	Northern	CR-WGU	CS-II
FR-0.1	Fraser River upstream of confluence with Colorado River	Fraser River	Northern	FR-WGU	CS-II
CR-30	Colorado River at Windy Gap Bypass	Colorado River	Northern	CR-WGB	CS-II
CR-29.8	Colorado River at confluence of Windy Gap spillway and bypass	Colorado River	Northern	CR-WGC	CS-II
CR-28.7	Colorado River downstream of Windy Gap Reservoir	Colorado River	Northern	CR-WGD	CS-II

Colorado River- Downstream Windy Gap to Blue River

River Mile ID	Description	River	Sampling Entity	Entity Station ID	Tier
CR-24.9	Colorado River at Sheriff Ranch	Colorado River	GCWIN	COR-SHRF	CS-II
CR-22.1	Colorado River upstream Hot Sulphur Springs	Colorado River	Northern	CR-HSU	CS-II
CR-19.8	Colorado River downstream of Byers Canyon	Colorado River	GCWIN	COR-blwByers	CS-II
CR-18.4	Colorado River at Lone Buck	Colorado River	GCWIN	COR-LoneBuck	CS-II
CR-16.7	Colorado River upstream of Williams Fork	Colorado River	Northern	CR-WFU	CS-II
WF-5.5	Williams Fork upstream of Williams Fork Reservoir	Williams Fork	GCWIN	WF-abvWFR	CS-I
CR-14.9	Colorado River above Kid Fishing Pond	Colorado River	GCWIN	COR-KidPond	CS-II
CR-12.6	Colorado River at ConRitschard	Colorado River	GCWIN	COR-ConRitschard	CS-II
RDC-0	Reeder Creek upstream of Colorado River confluence	Reeder Creek	BLM	REE-Upper	CS-II
CR-9.1	Colorado River downstream of KB Ditch	Colorado River	GCWIN	COR-KBDitch	CS-II
CR-2.3	Colorado River upstream Hwy 9 Bridge at Kremmling	Colorado River	BLM	COR-Hwy9	CS-II
MC-2.1	Muddy Creek below Hwy 40 in Kremmling	Muddy Creek	BLM	MC-blwHwy40	CS-II



Williams Fork upstream of Williams Fork Reservoir – CSI



Tier II
MC-blwHwy40
MC-2.1

