# Temperature in the LBD Cooperative Effort Area

2016 – 2020 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

## Overview -Temperature Monitoring in CEA





Sites maintained by GCWIN, Northern Water, USGS, BLM



Financial support from many stakeholders



LBD program supplemental to existing monitoring

### Colorado Temperature Standards

There is a little more we can say about the temperature standards, too. The acute standard is designed to protect fish from conditions that might directly kill them. The chronic standard is designed to protect fish from conditions that might reduce their growth and reproduction.

All temperature standards in <sup>o</sup>C

#### **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)

Assessment Period: Previous 5 years

#### New sites

- 2 new sites in 2020
  - RC-5.8 (Ranch Creek above revegetation area on Quad Ranch)
  - RC-5.1 (Ranch Creek below revegetation area on Quad Ranch)

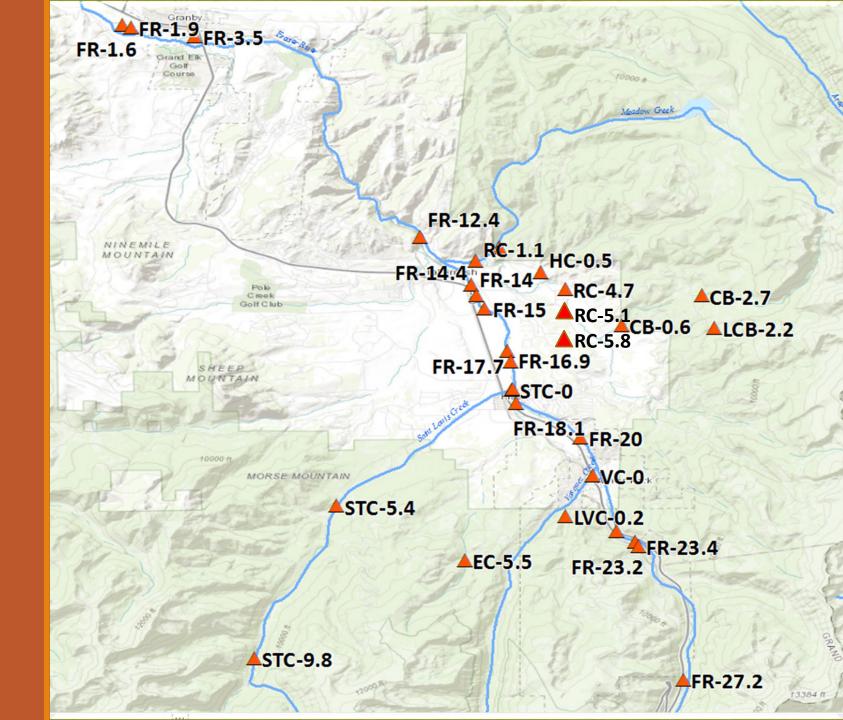
#### Frequency

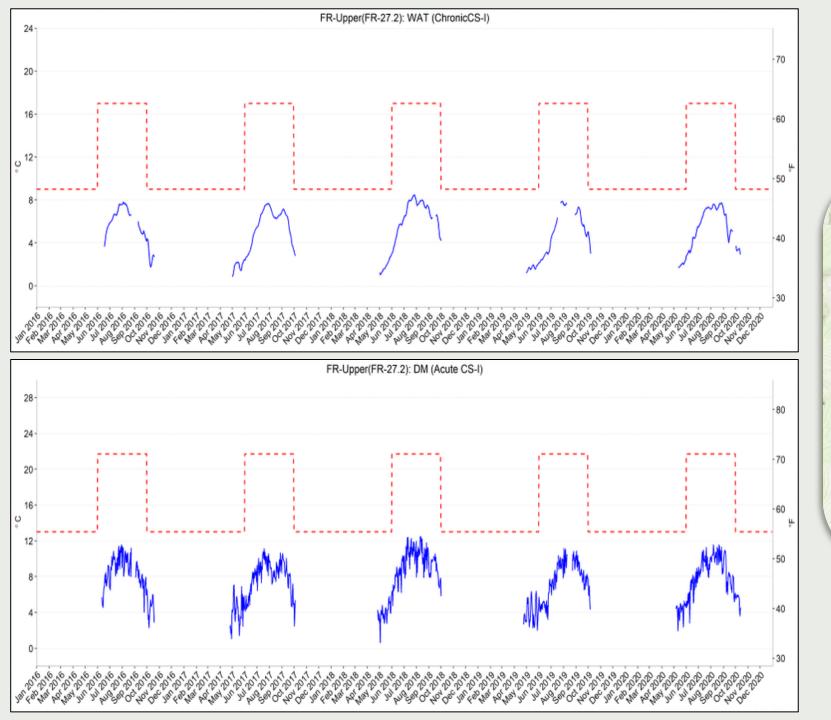
In 2020, data at six sites were downloaded and/or reviewed on a weekly basis to inform the Operations Subcommittee

- 1. STC-0 (Saint Louis Creek at confluence of Fraser River)
- 2. FR-3.5 (Fraser River at Hwy 40 in Granby)
- 3. CR- 28.7 (Colorado River downstream of Windy Gap)\*
- 4. CR-22.1 (Colorado River upstream of Hot Sulphur Water Treatment Plant)\*
- 5. CR-16.7 (Colorado River upstream of confluence with Williams Fork)\*
- 6. CR-2.3 (Colorado River, HWY 9 Bridge upstream of confluence with Blue River) \*Northern Water's real-time temperature monitoring sites.

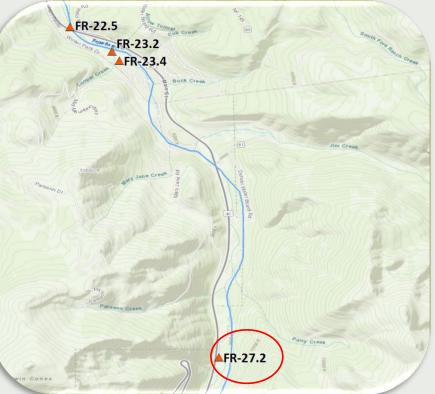
## 2020 LBD Program

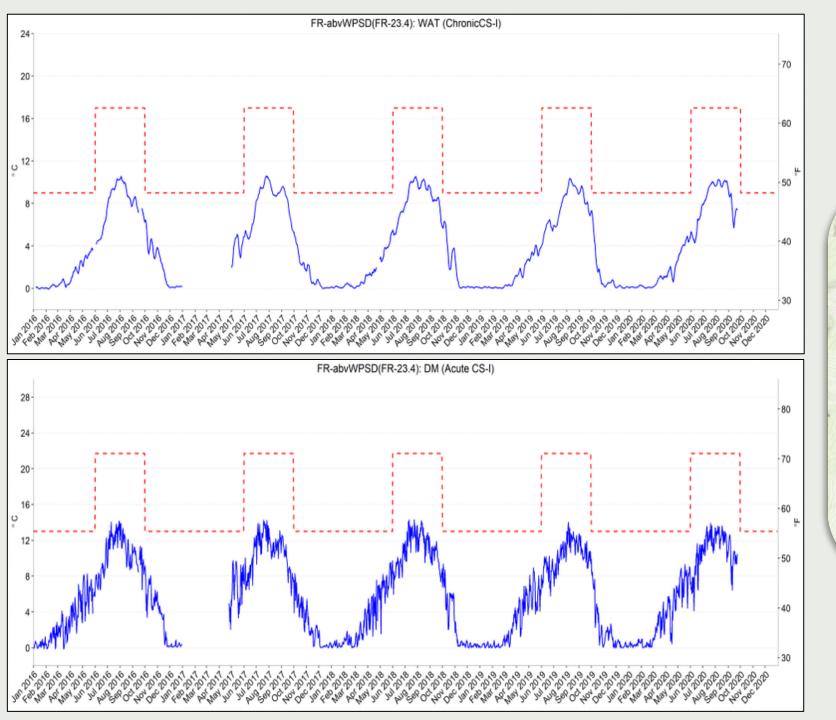
## Fraser River and Tributaries



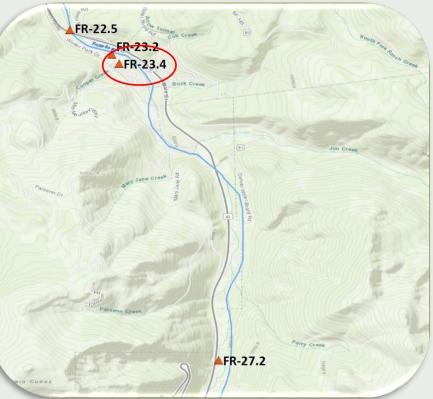


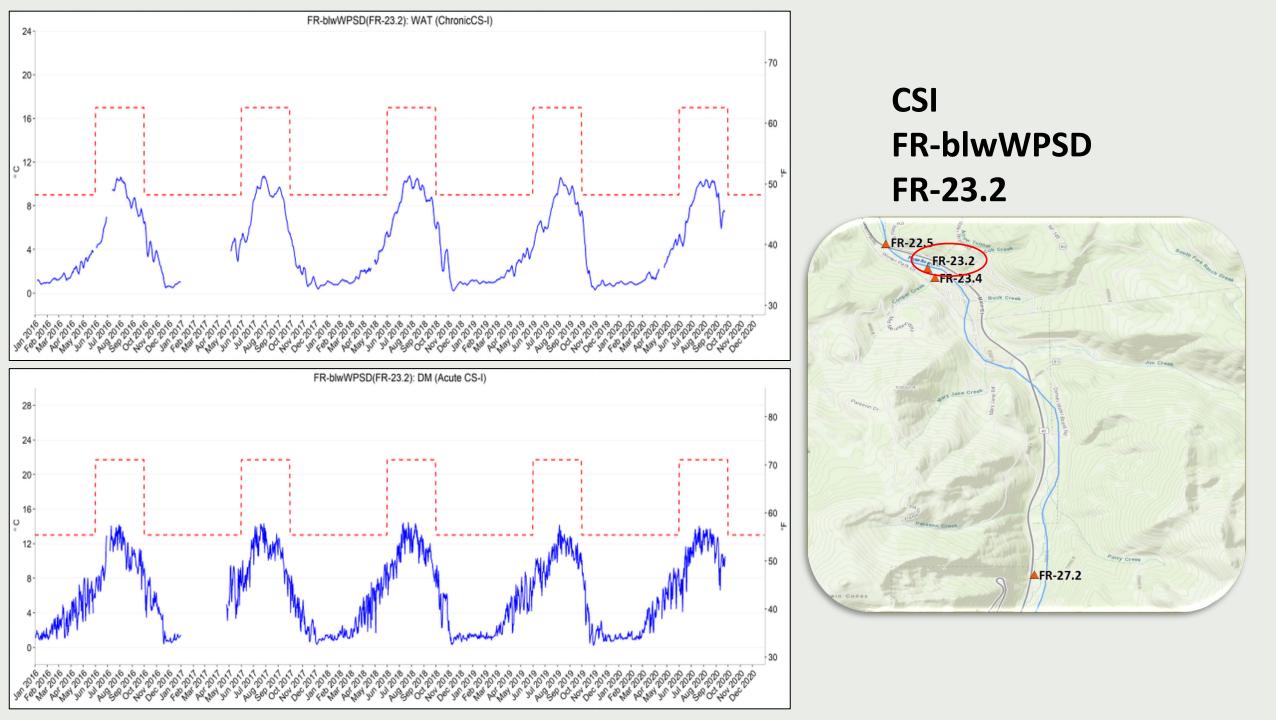
#### CSI FR-Upper FR-27.2

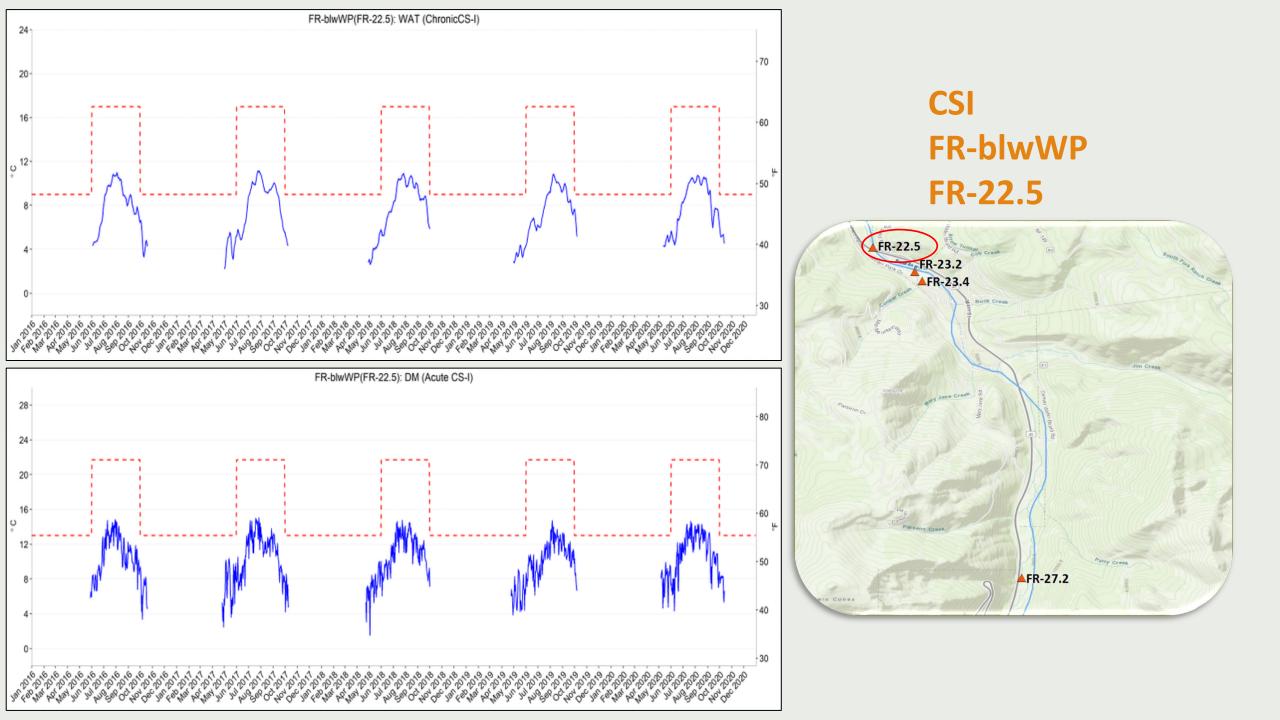


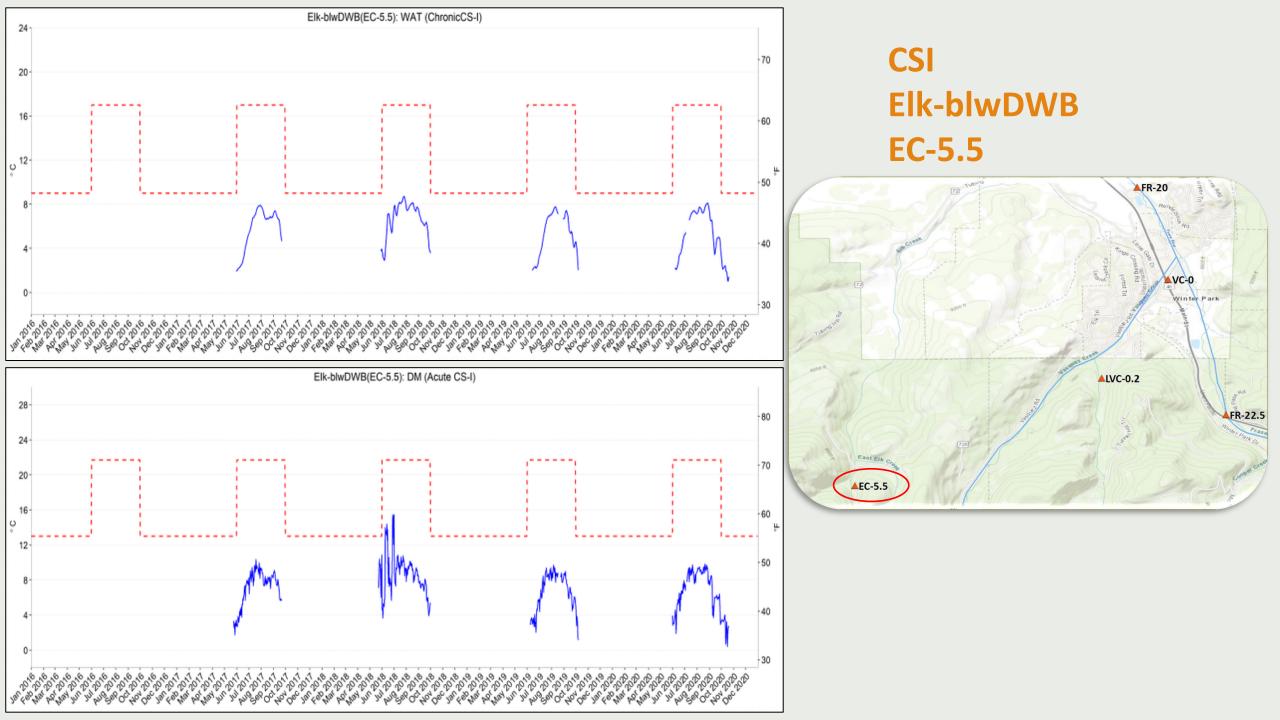


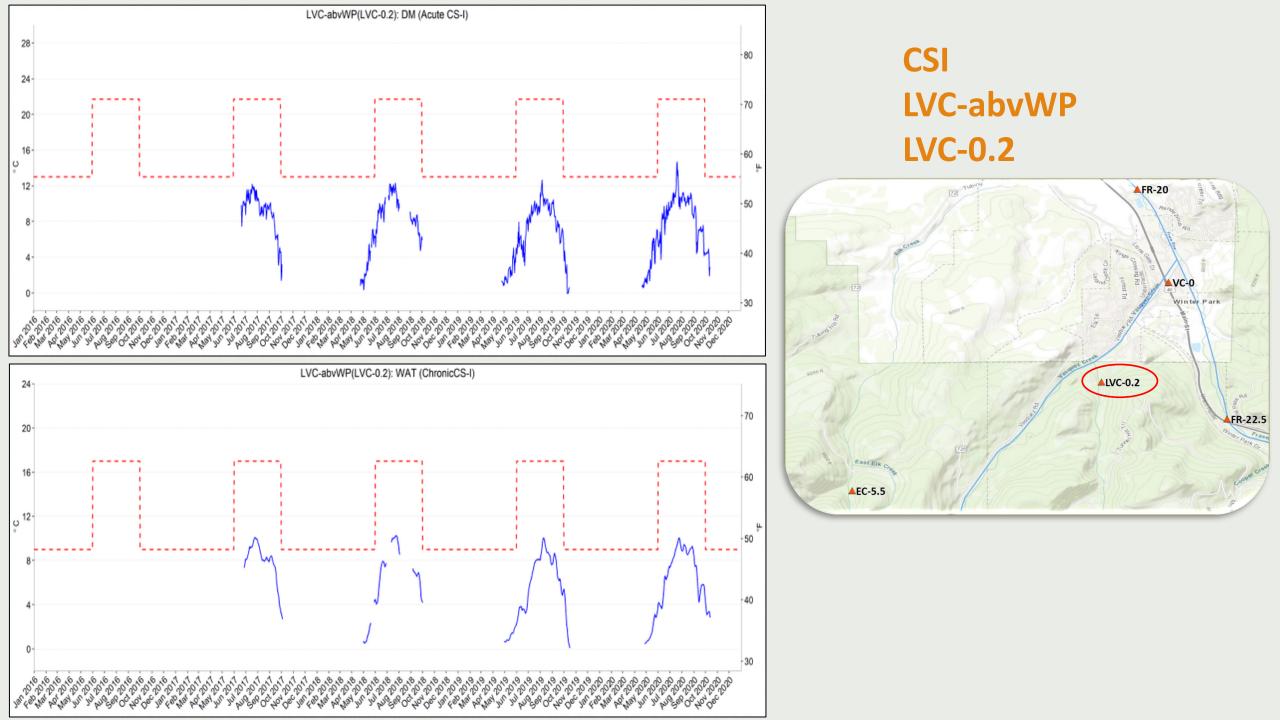
#### CSI FR-abvWPSD FR-23.4

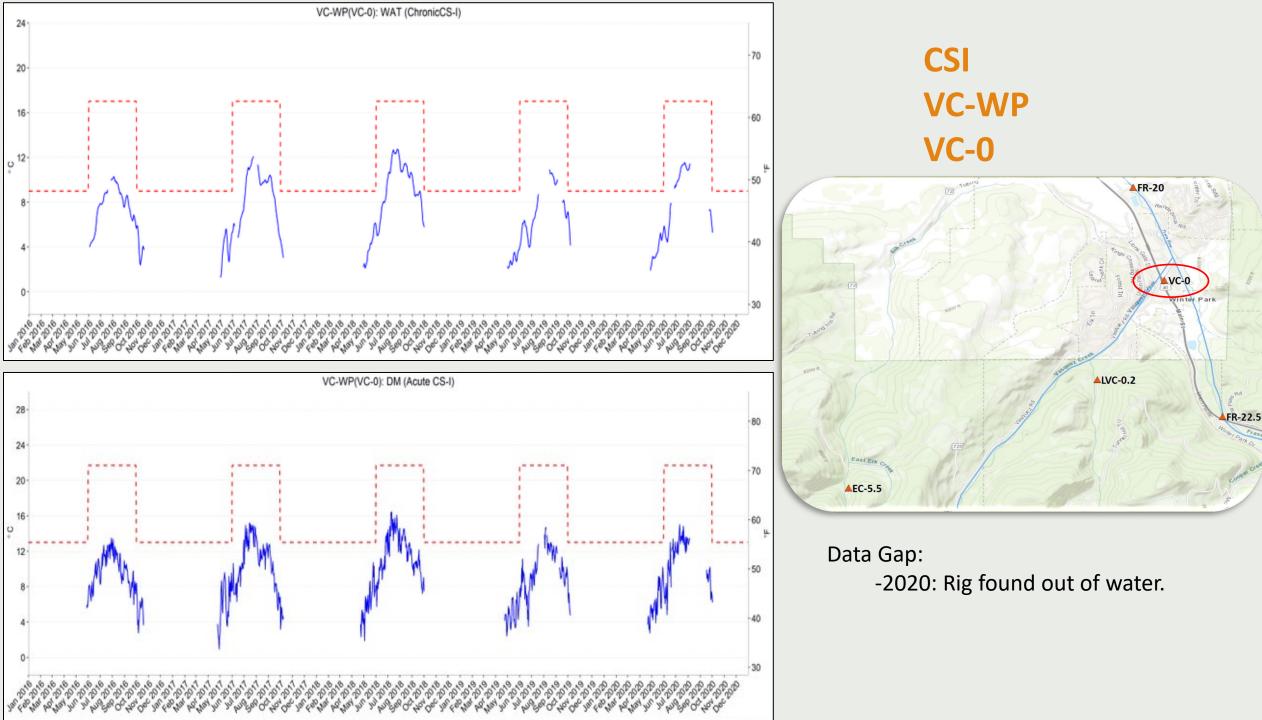


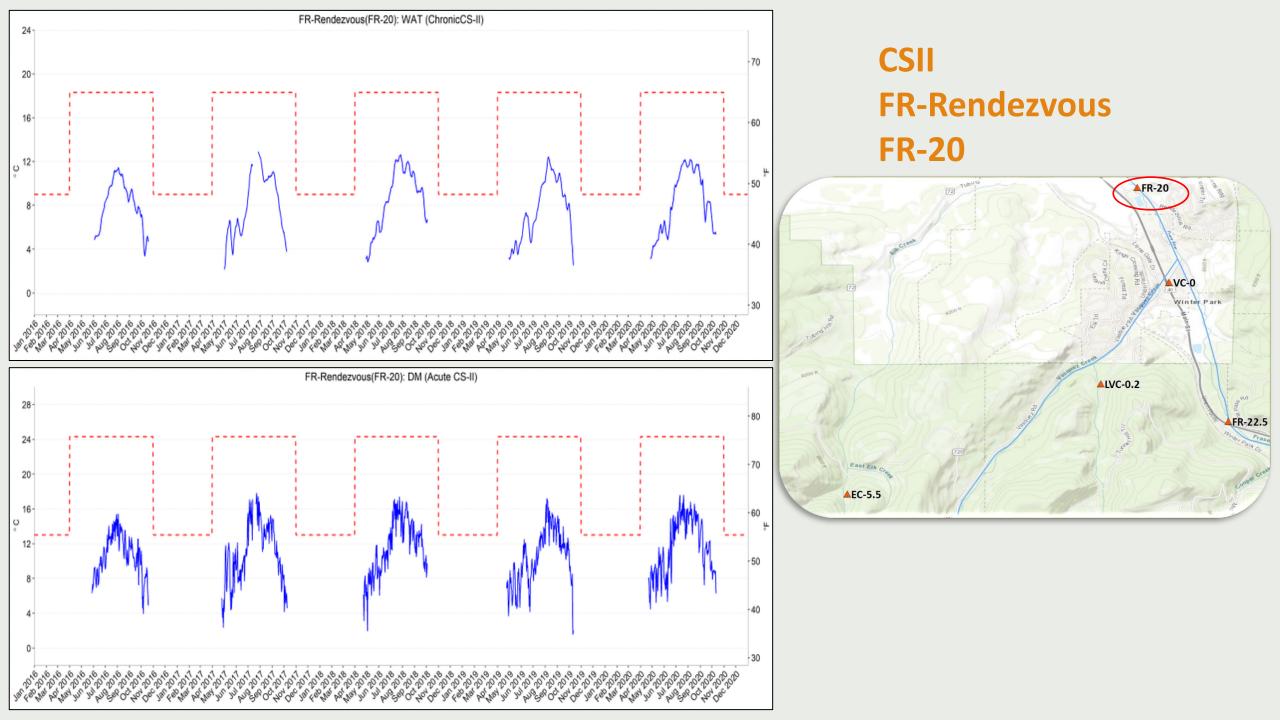


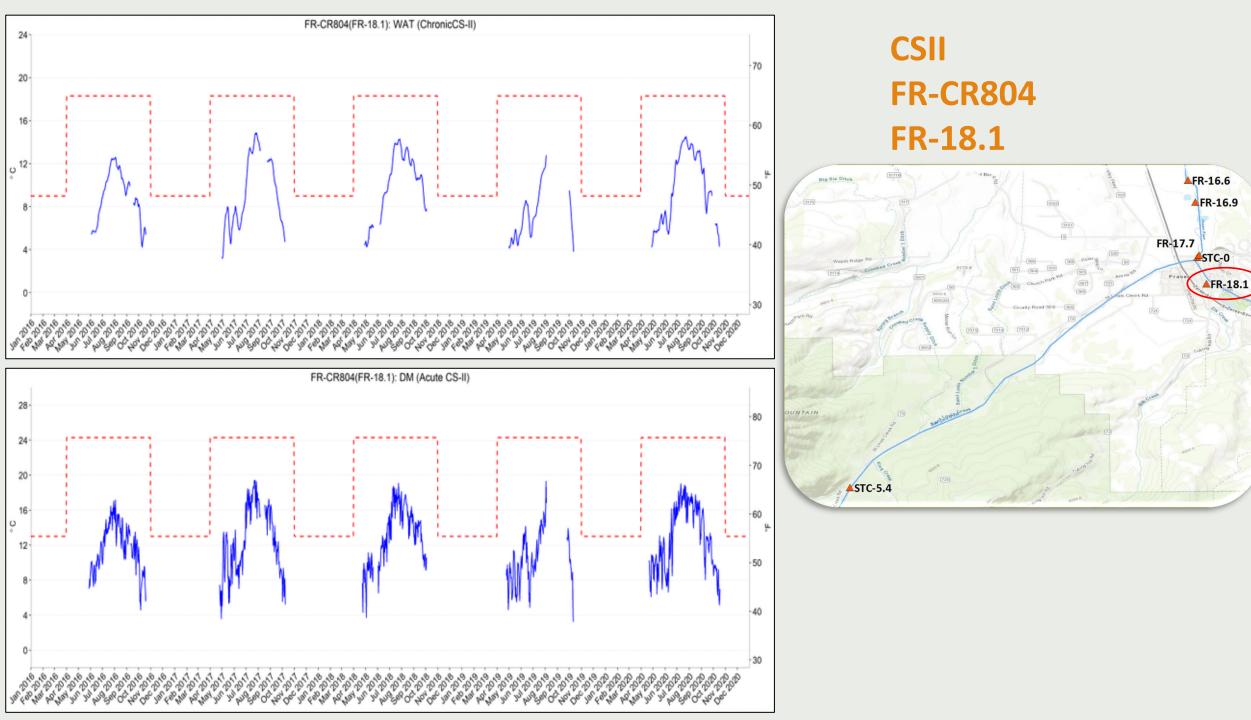


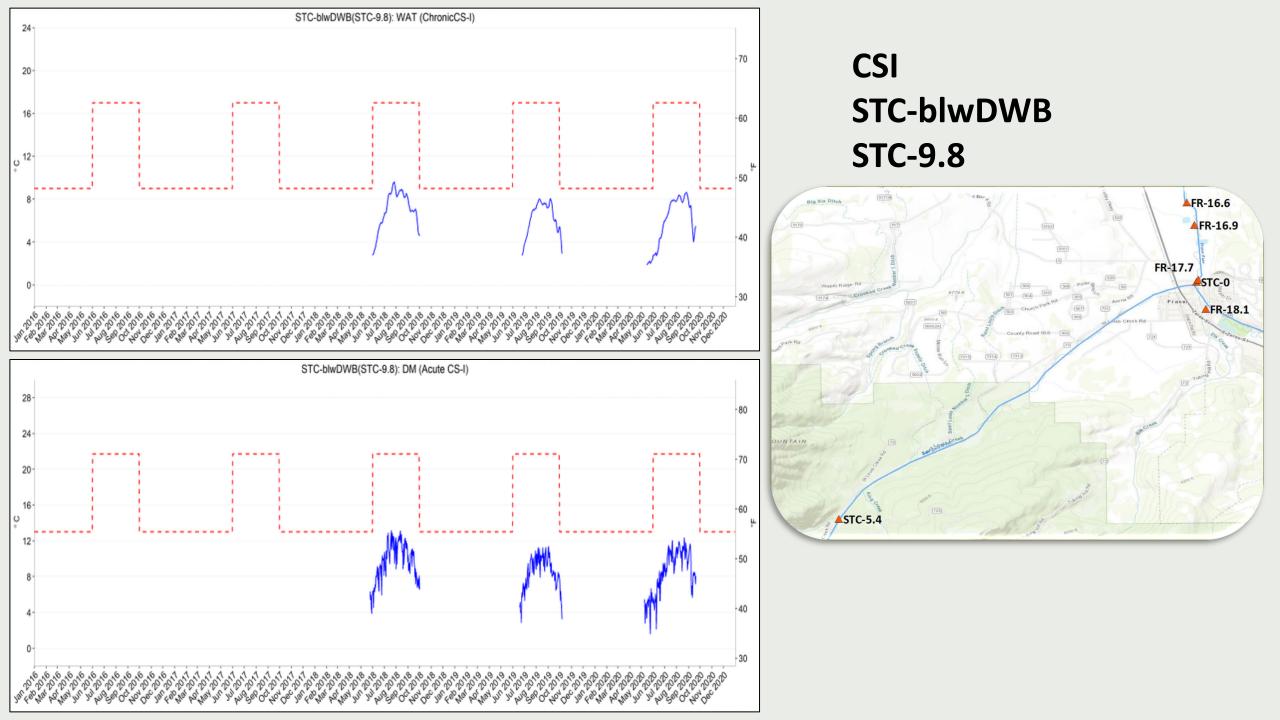


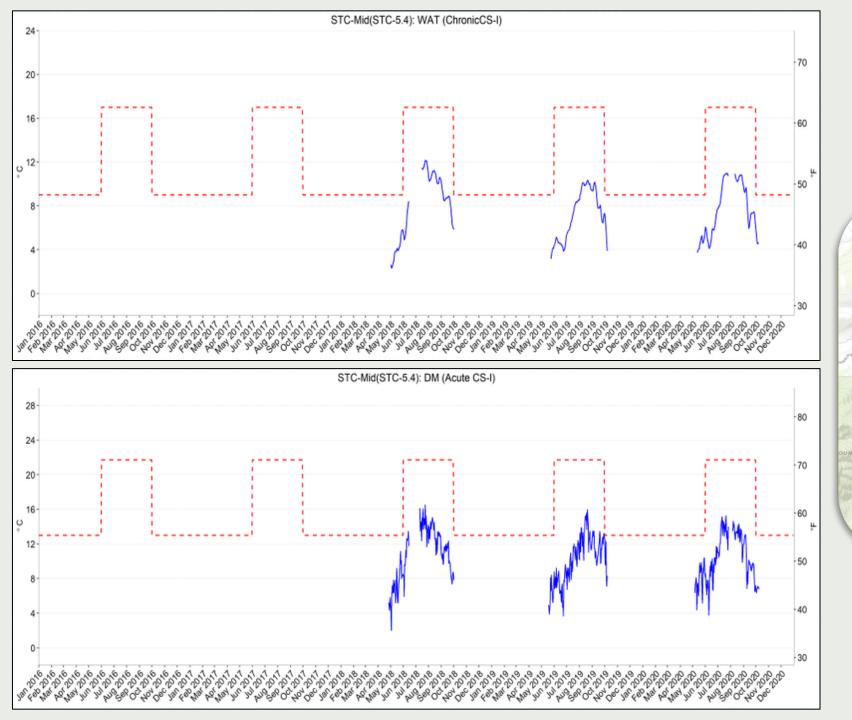




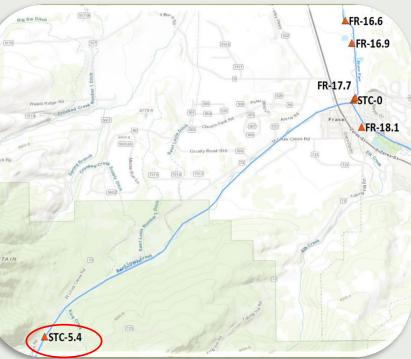


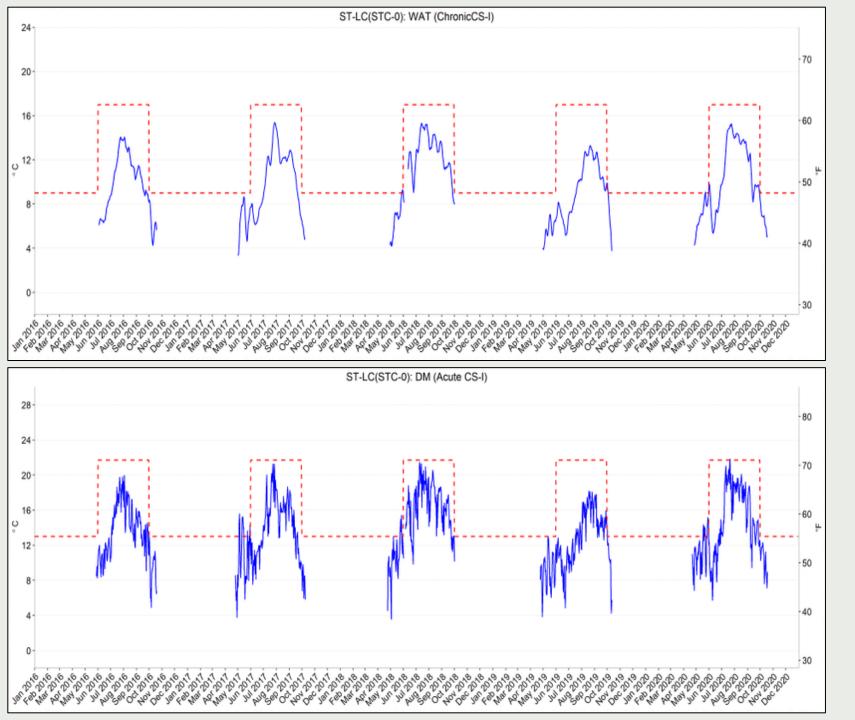






#### CSI STC-Mid STC-5.4

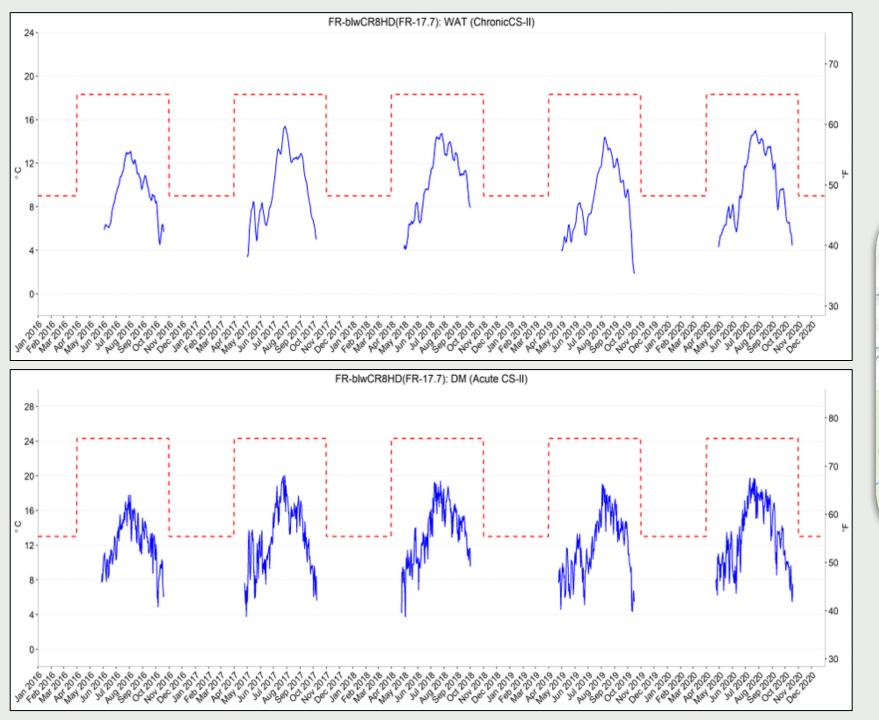




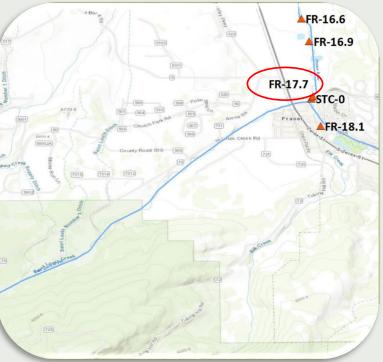
#### CSI - ST-LC - STC-0

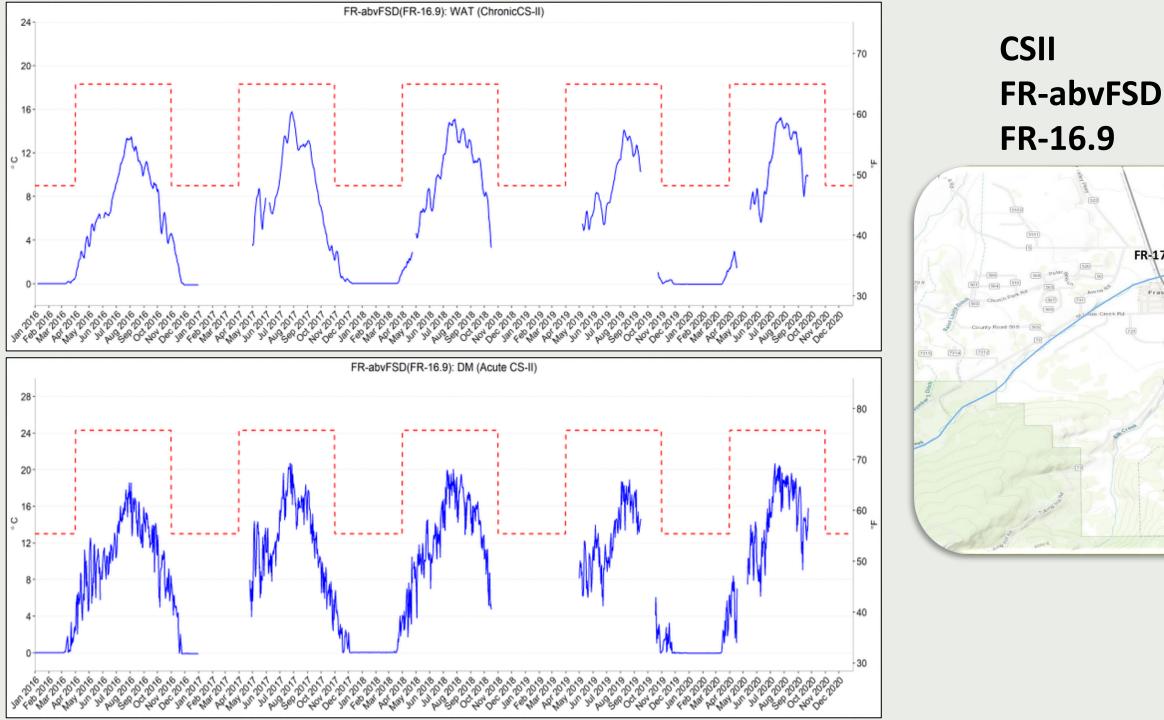


2020 Above WAT	standard	
5/23/2020	9.07	°C
5/31/2020	9.33	°C
2020 Above DM s	standard	
5/18/2020	14.33	°C
5/20/2020	14.12	°C
5/22/2020	13.98	°C
5/28/2020	14.77	°C
5/29/2020	15.14	°C
5/30/2020	14.67	°C
7/21/2020	21.82	°C



#### CSII FR-blwCR8HD FR-17.7





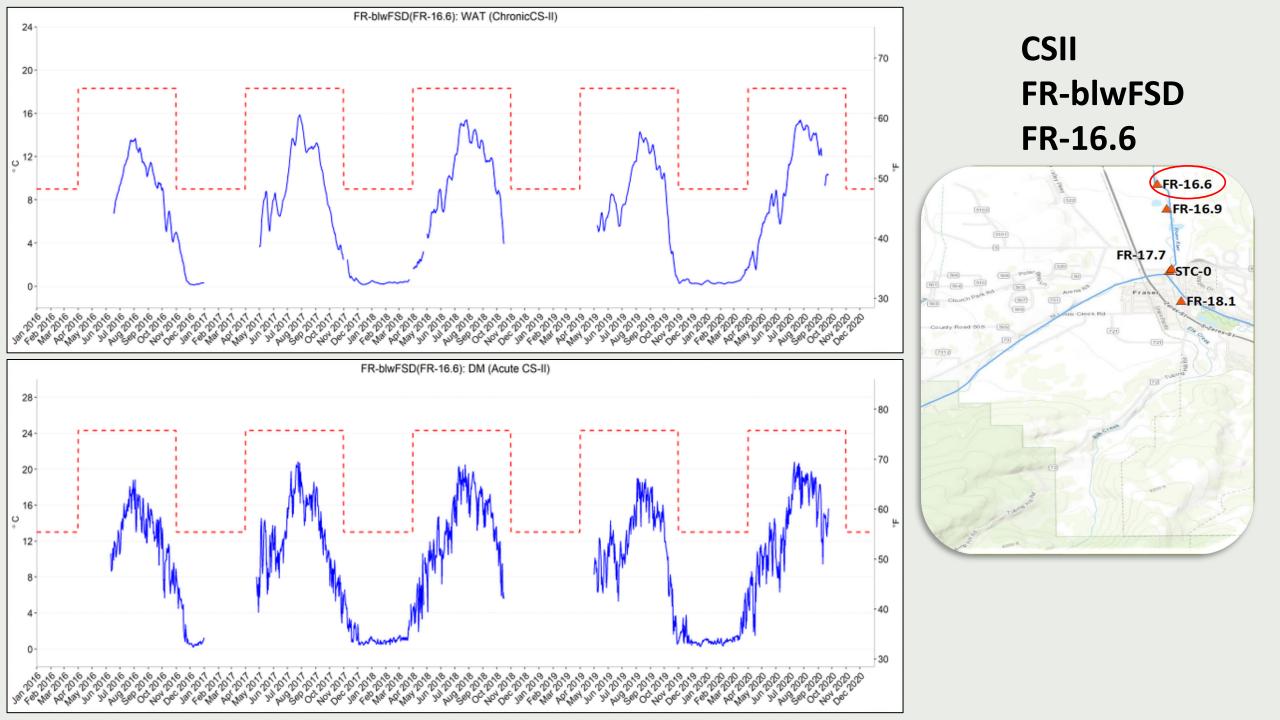
AFR-16.6 FR-16.9

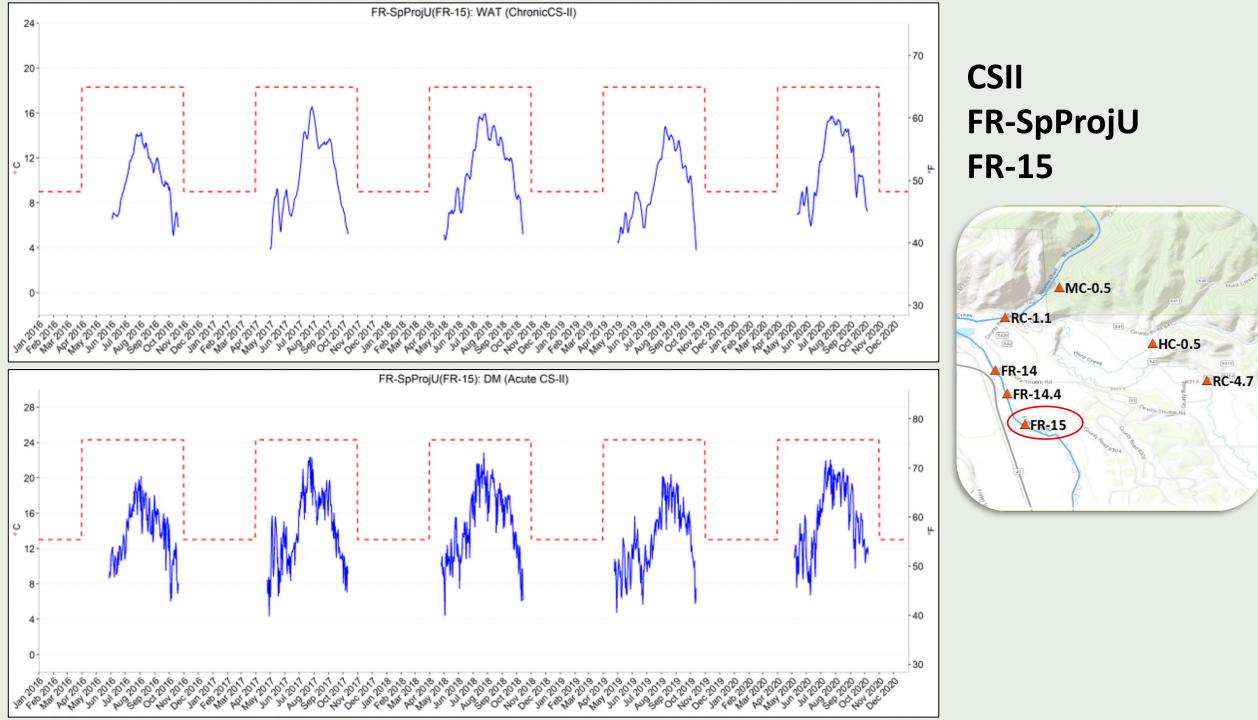
STC-0

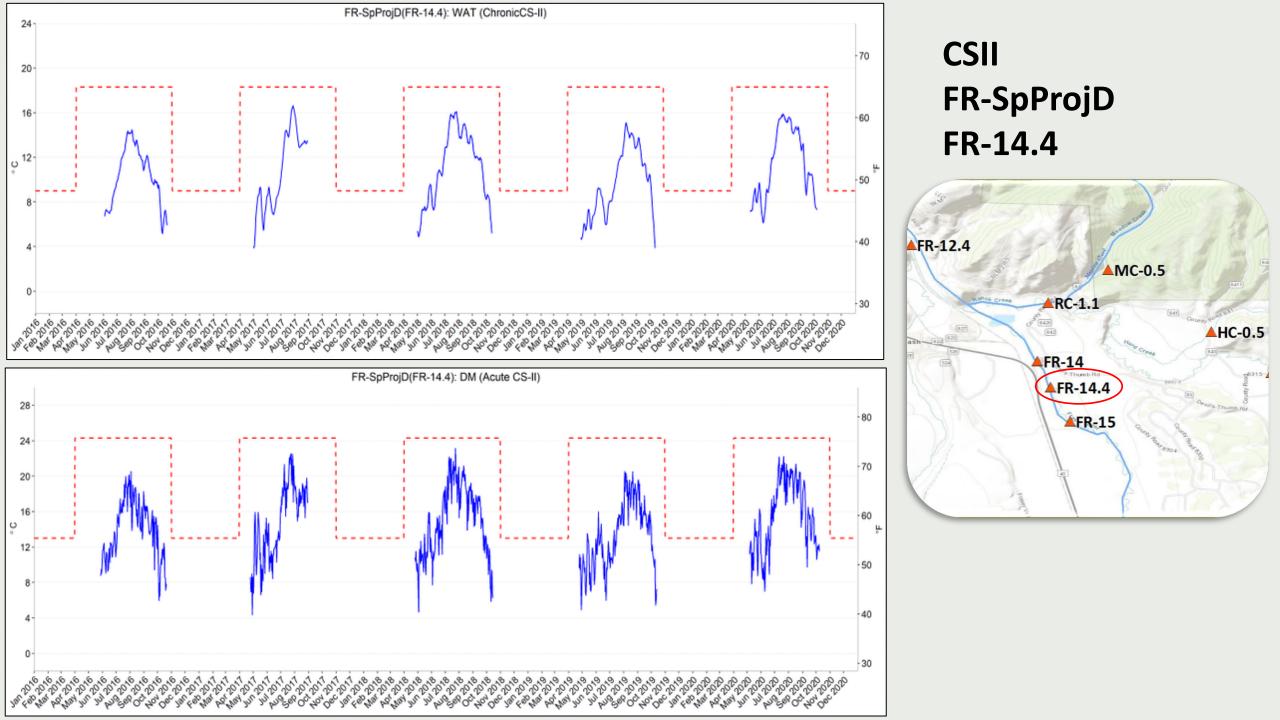
FR-18.1

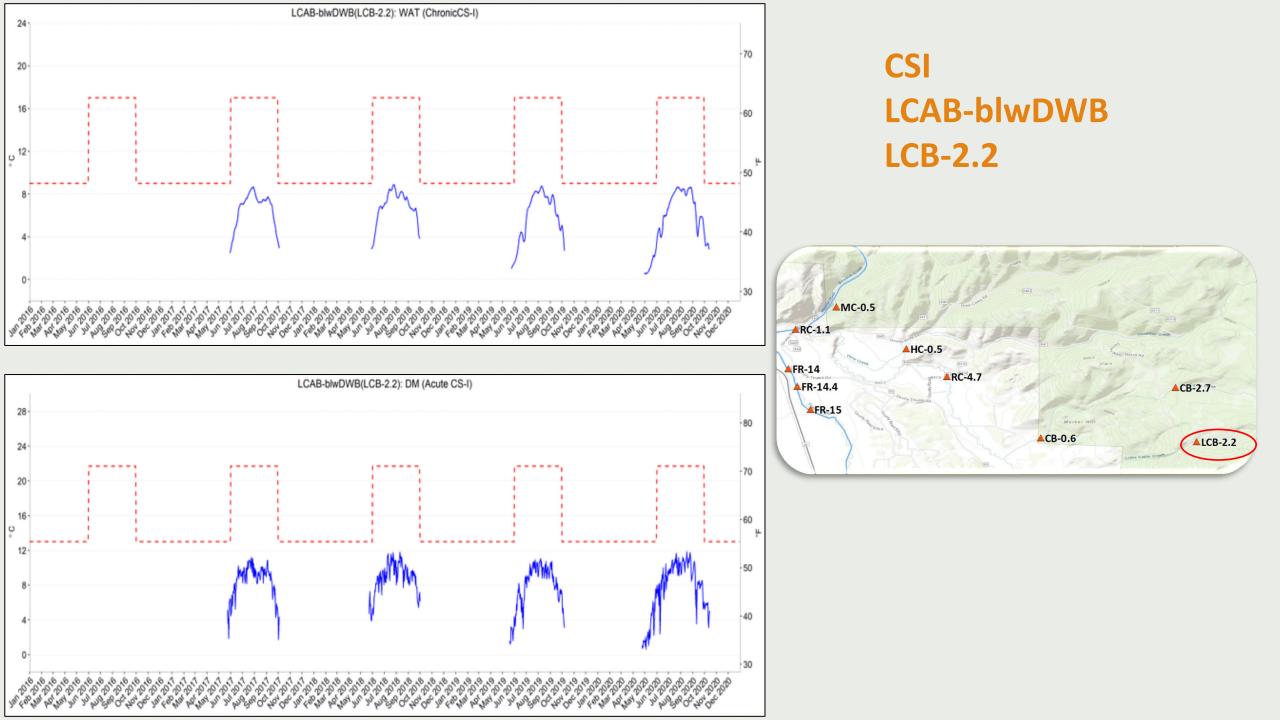
FR-17.7

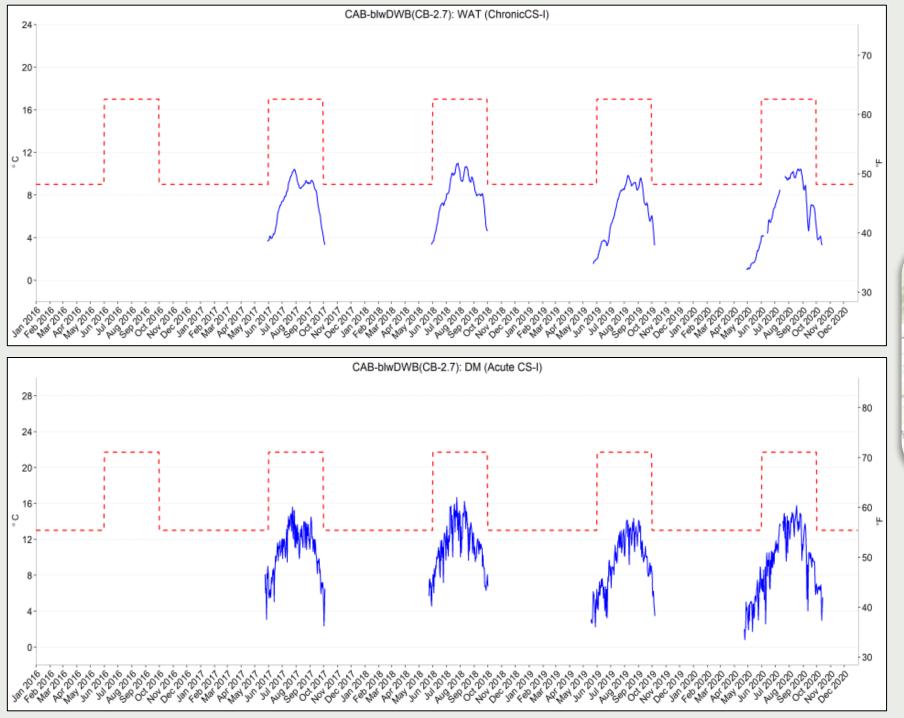
Frase



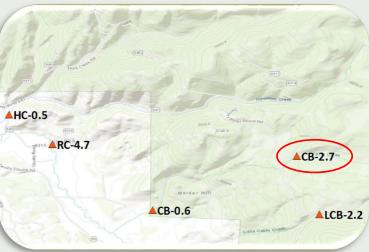


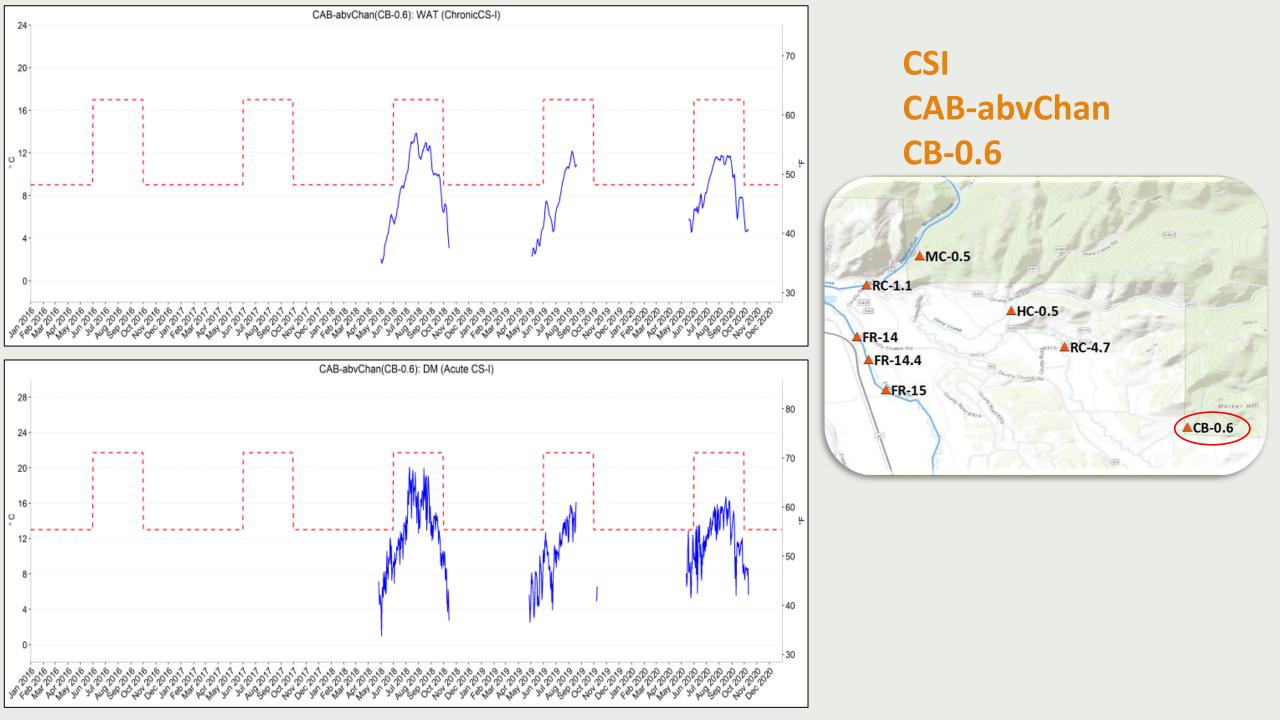


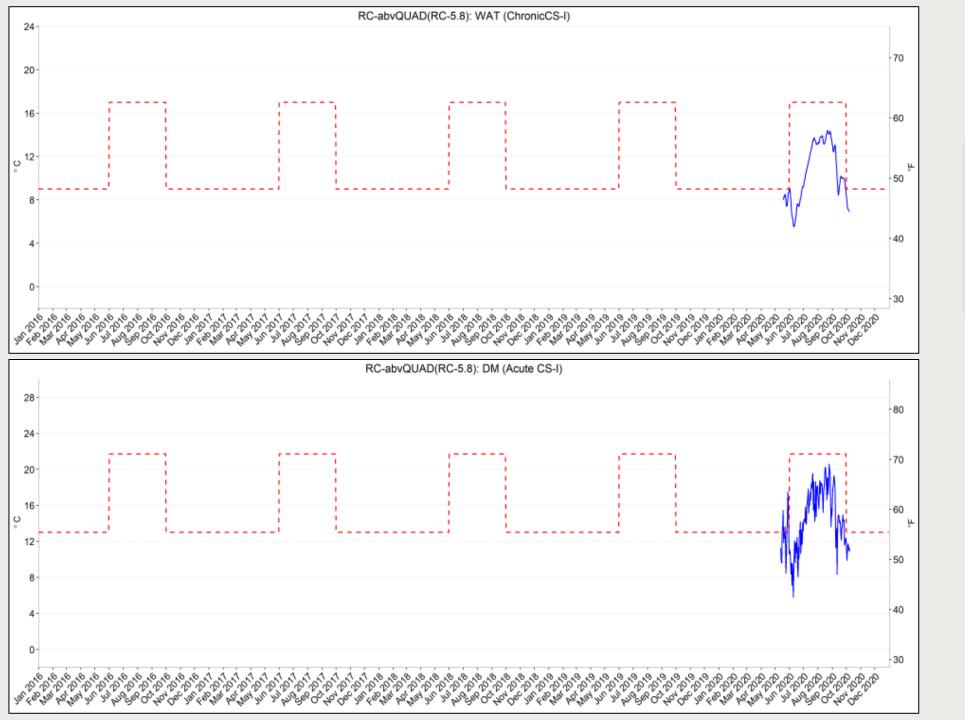




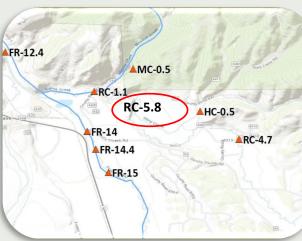
#### CSI CAB-blwDWB CB-2.7



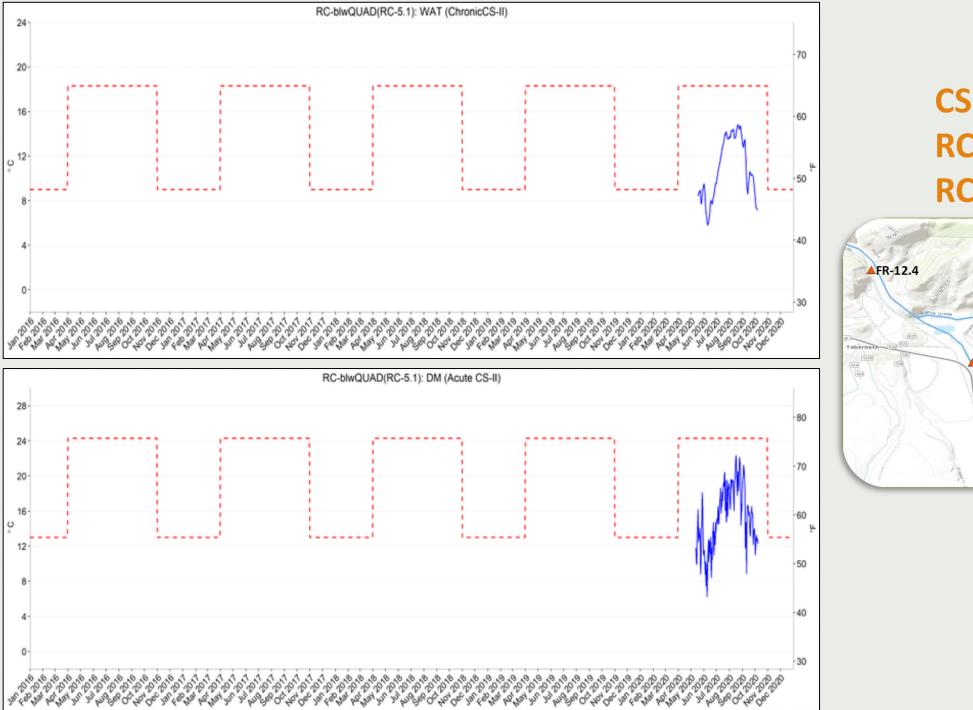




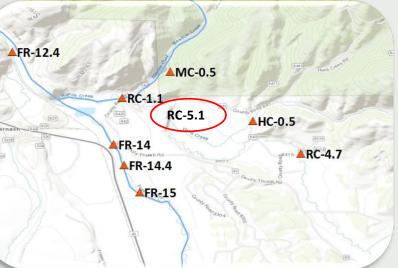
#### CSI - RC-abvQuad RC-5.8

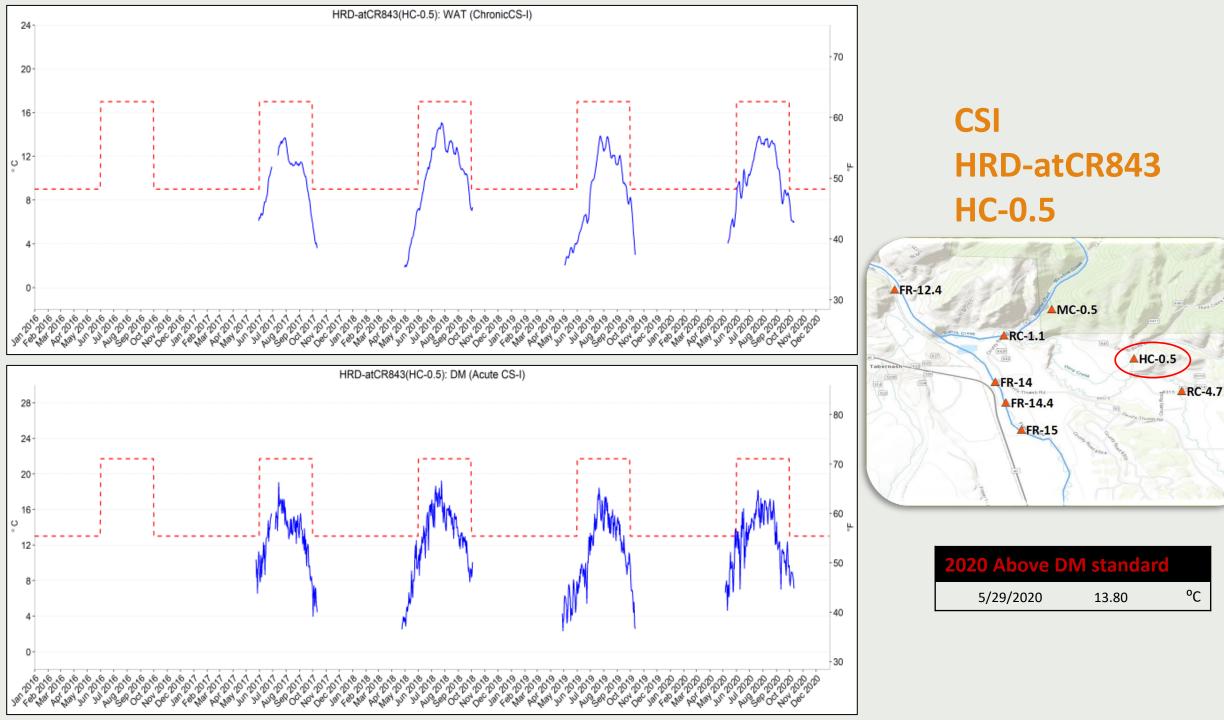


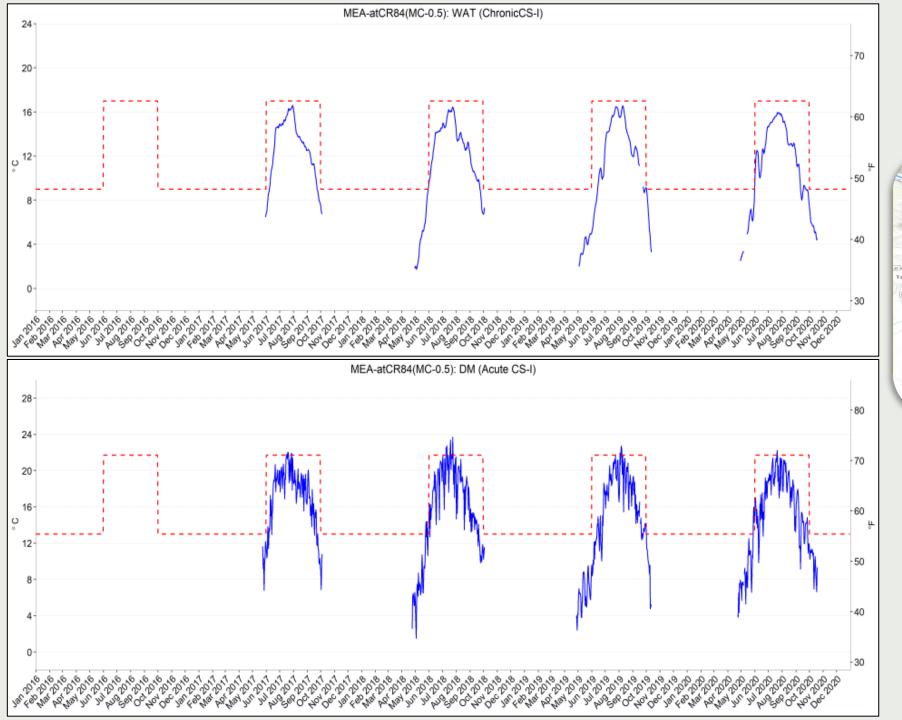
2020 Above	WAT standard	
5/20 - 5/23	9.29	٥C
5/29 - 5/31	9.68	٥C
2020 Above	DM standard	
5/17/2020	13.76	٥C
5/18/2020	15.44	°C
5/22/2020	13.62	°C
5/26/2020	13.49	°C
5/27/2020	13.74	°C
5/28/2020	17.51	٥C
5/29/2020	16.50	٥C



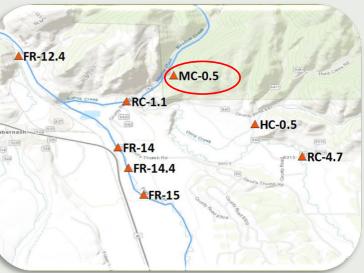
#### CSI RC-blwQuad RC-5.1



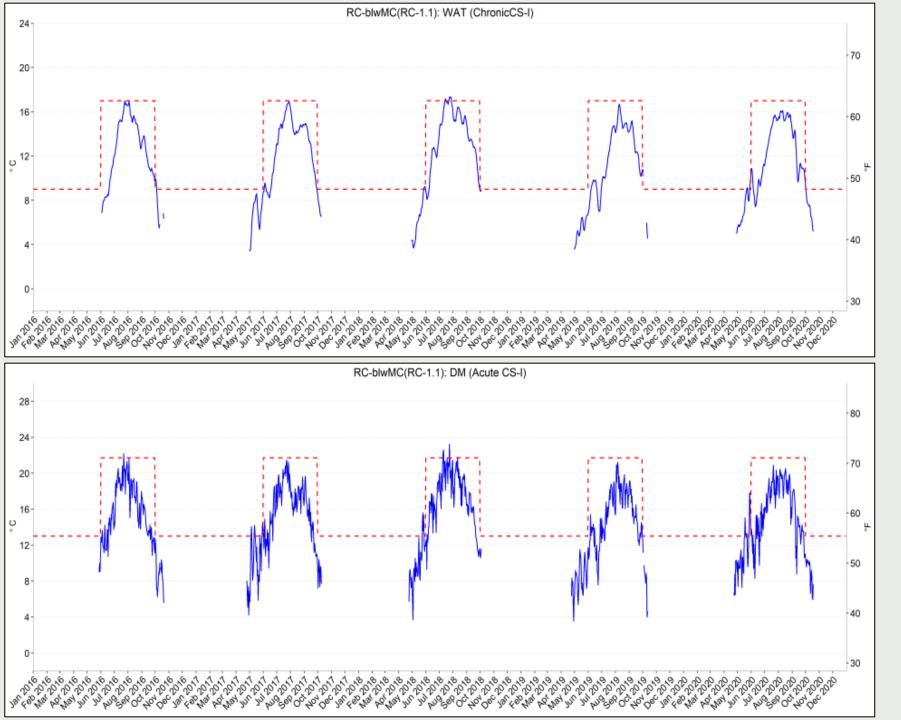




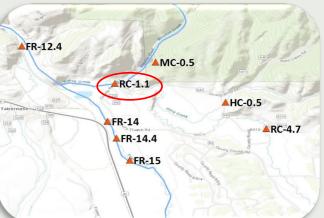
#### CSI MEA-atCR84 MC-0.5



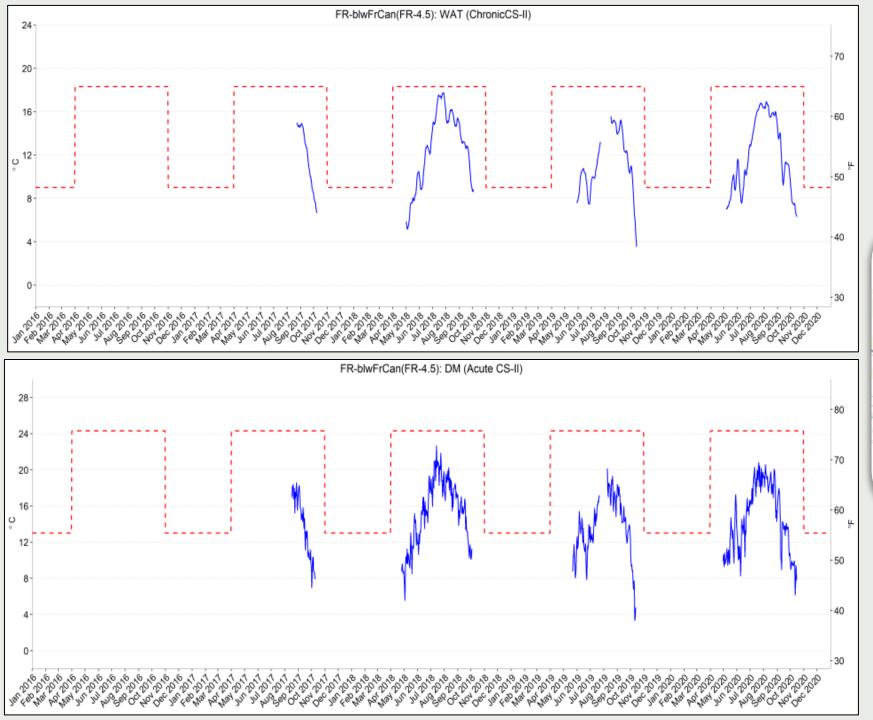
2020 Above DN	/I standard	
5/28/2020	14.75	°C
5/29/2020	15.96	٥C
5/30/2020	14.26	°C
5/31/2020	14.96	°C
7/20/2020	21.86	°C
7/21/2020	22.22	°C



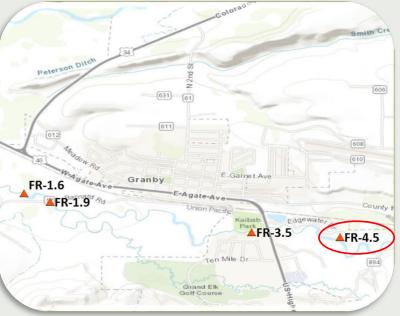
#### CSI - RC-blwMC - RC-1.1

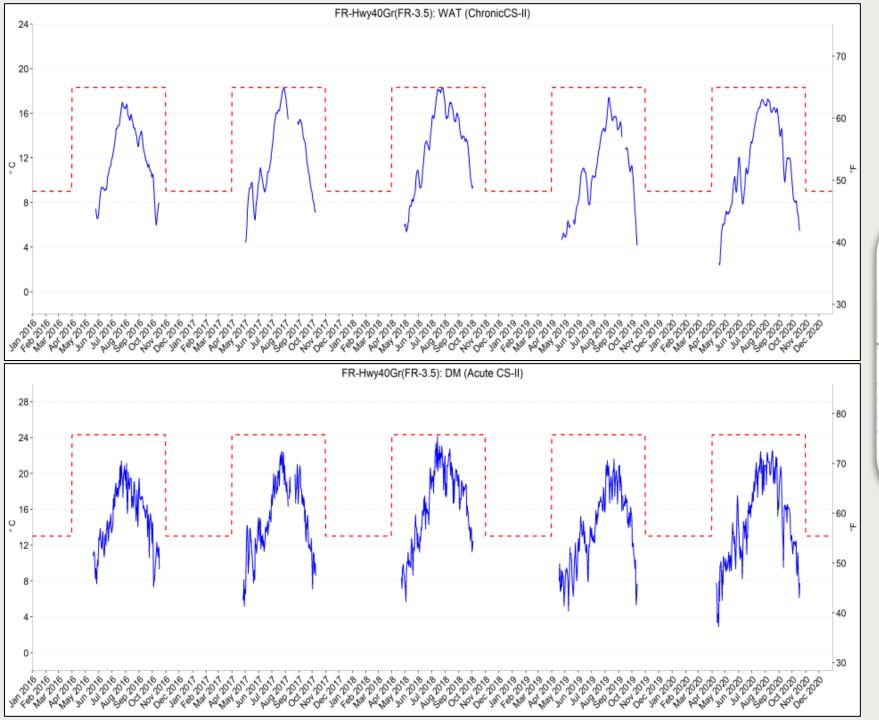


2020 Above	WAT standard	
5/22 – 5/23	9.29	°C
5/29 - 5/31	9.68	°C
10/01/2020	9.26	°C
2020 Above	DM standard	
5/18/2020	15.06	°C
5/19/2020	13.10	°C
5/20/2020	13.17	°C
5/22/2020	13.29	°C
5/26/2020	13.29	°C
5/27/2020	13.28	°C
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5/29/2020	17.68	°C
5/30/2020	14.73	°C
5/31/2020	13.12	°C

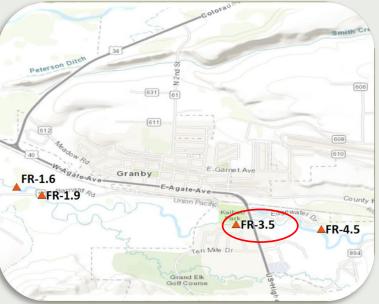


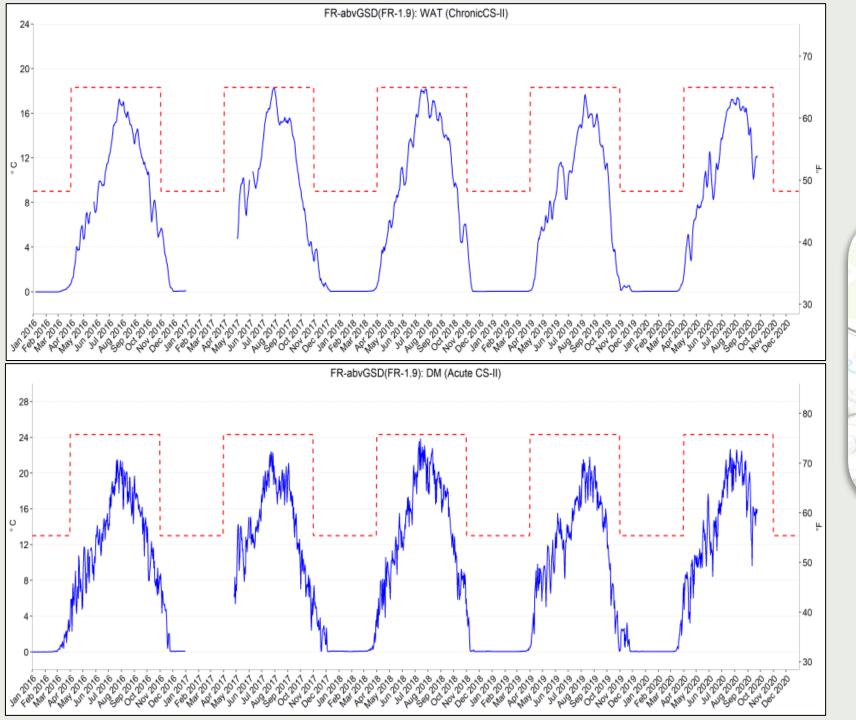
#### CSII FR-blwFrCan FR-4.5



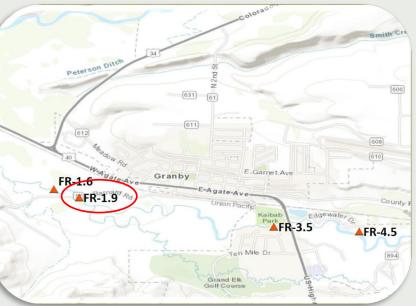


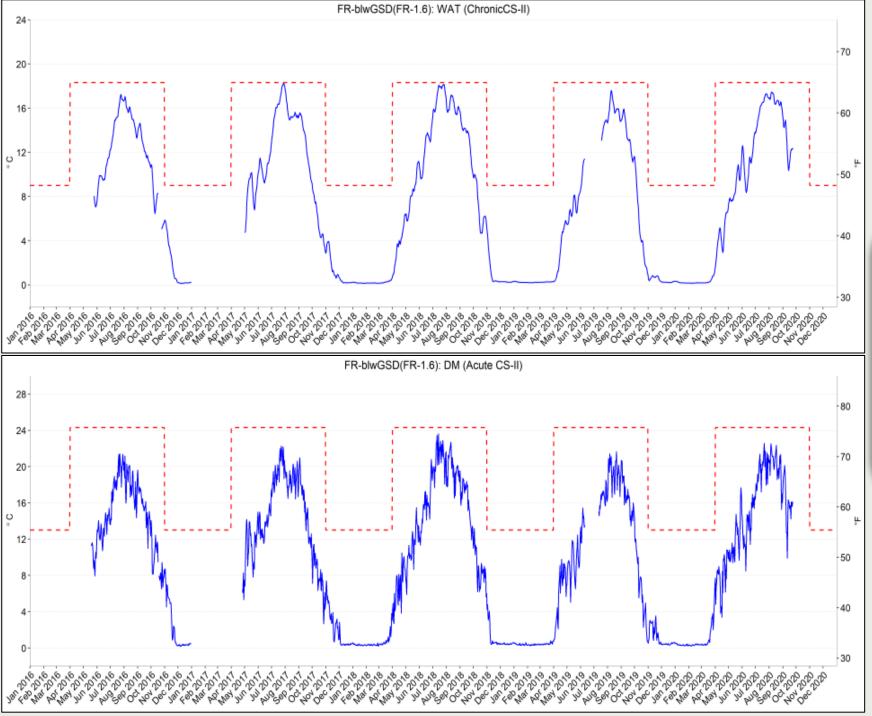
#### CSII FR-HWY40GR FR-3.5



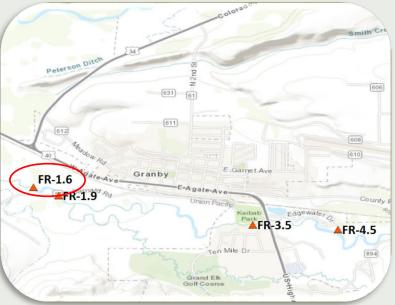


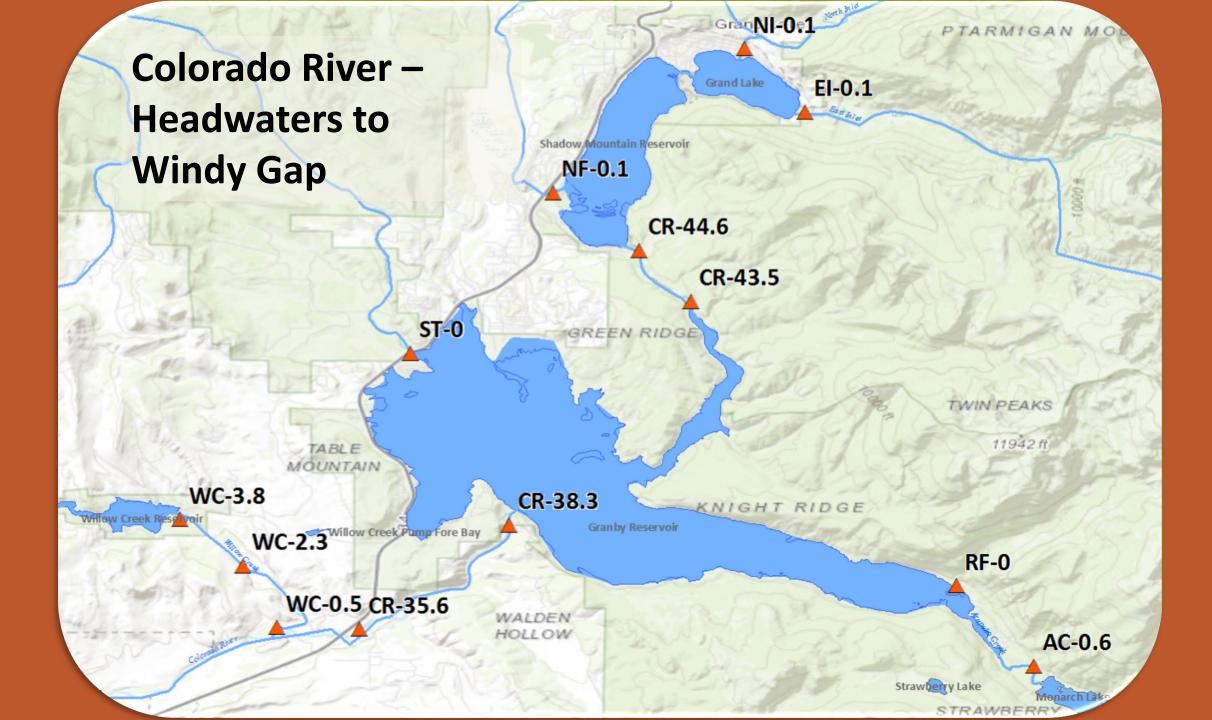
#### CSII FR-abvGSD FR-1.9

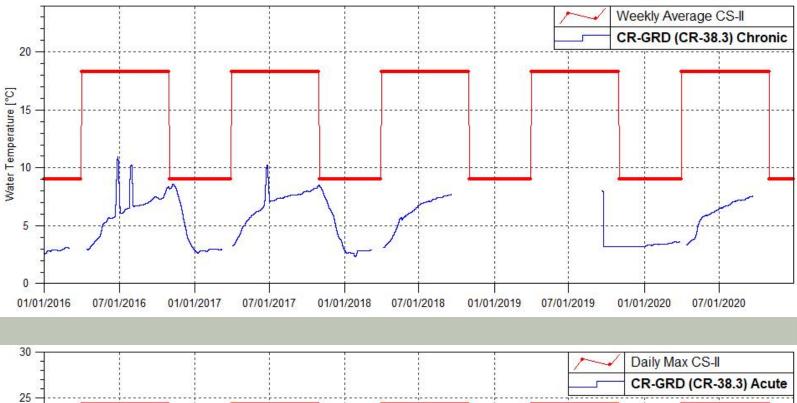




#### CSII FR-blwGSD FR-1.6





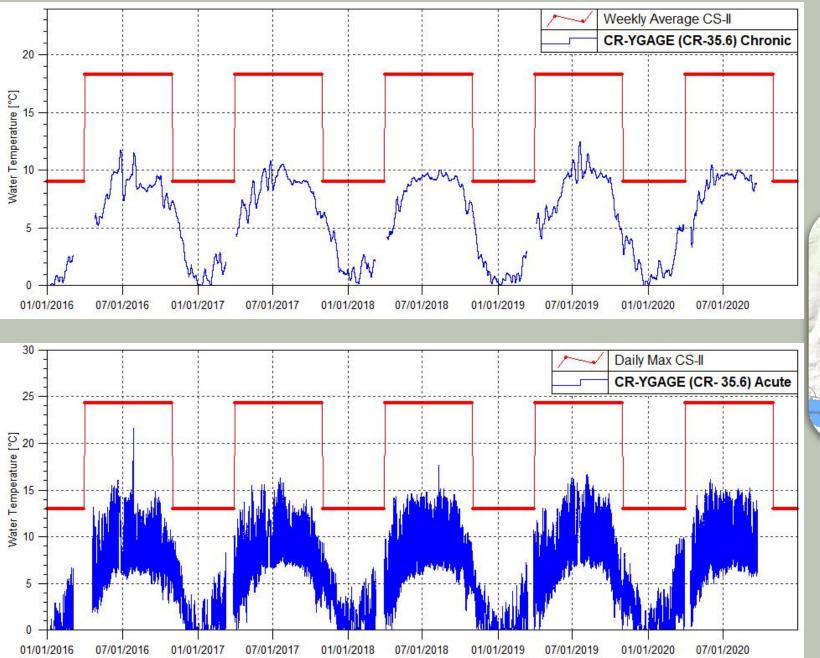


#### Colorado River downstream of Granby Reservoir- CSII



25 20 90 15 10 5 0 0 0 1/01/2016 07/01/2016 01/01/2017 07/01/2018 07/01/2019 07/01/2019 01/01/2019 01/01/2020 07/01/2020

Missing data due to gage replacement



#### Colorado River at Y-Gage -CSII



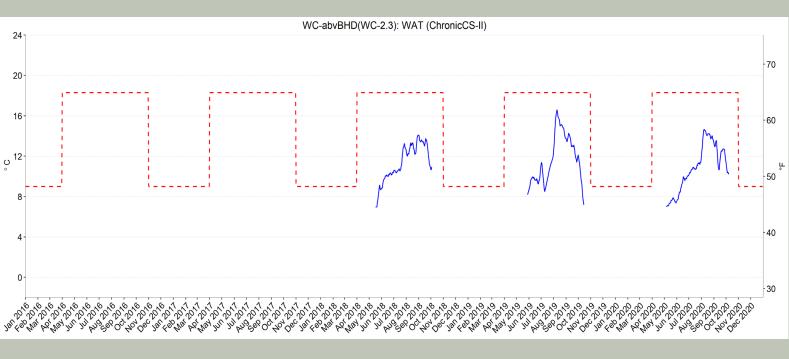


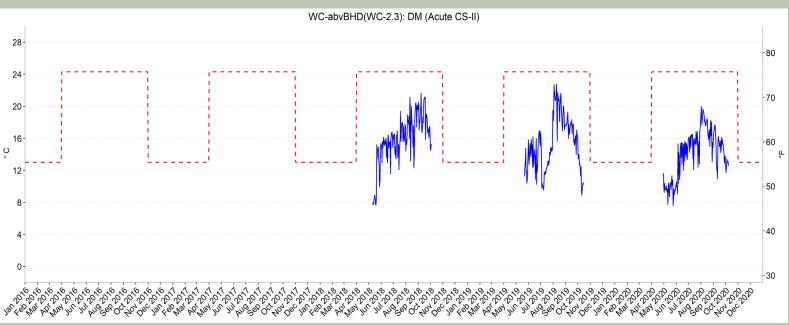
#### Willow Creek downstream of Reservoir – CS-II



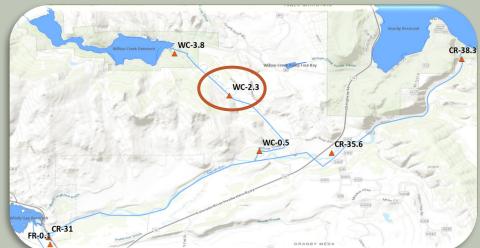


#### Changed from CS-I to CS-II

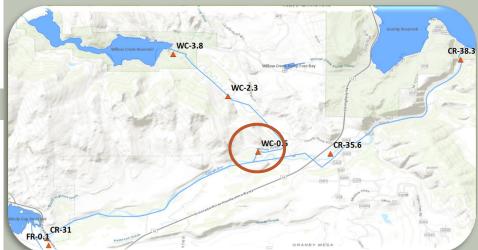


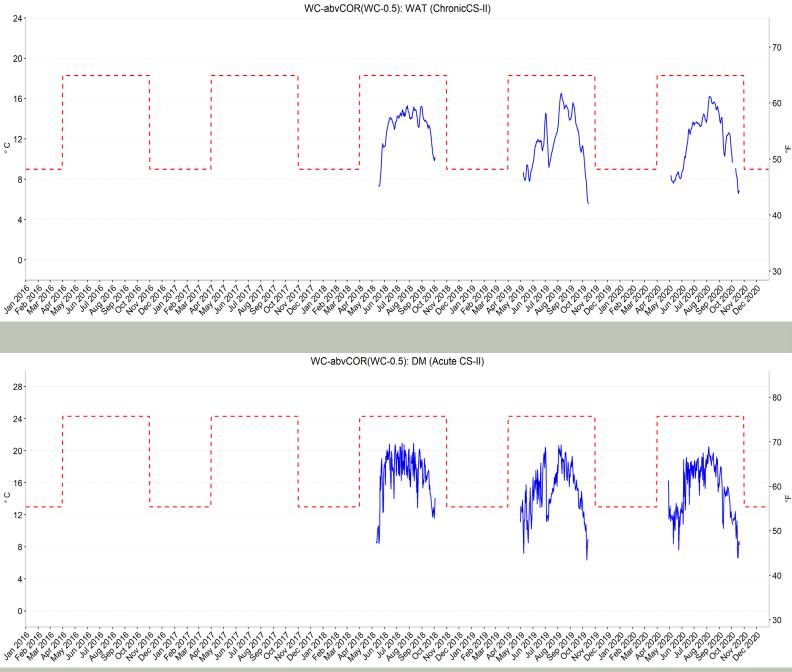


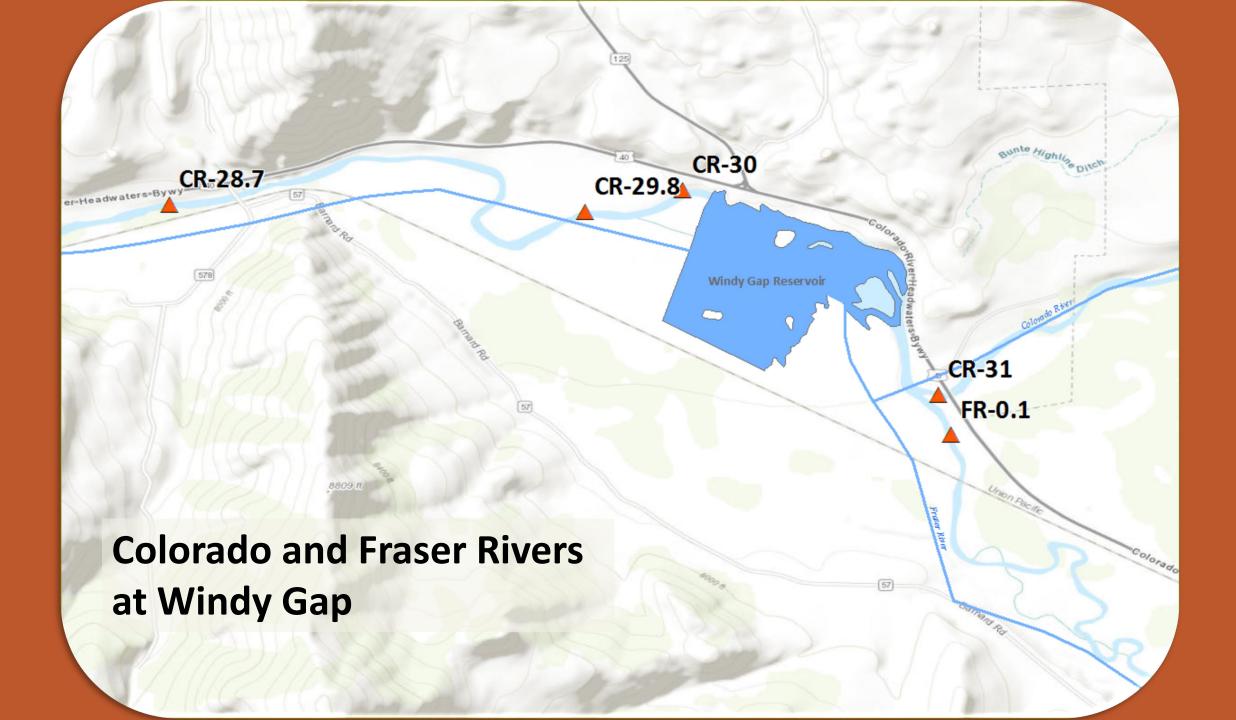
#### Willow Creek upstream Bunte Highline – CS-II

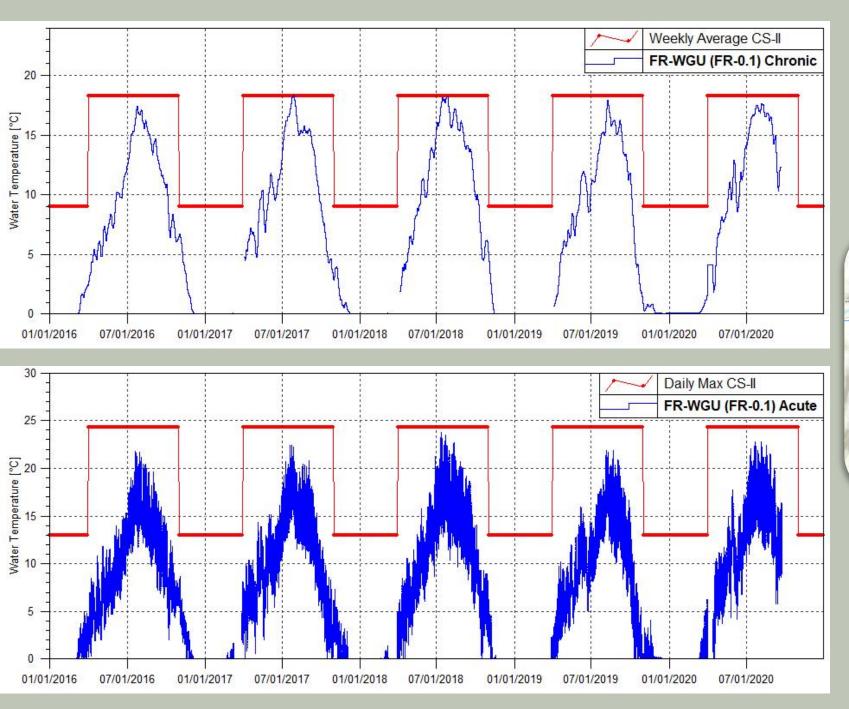


#### Willow Creek upstream Colorado River – CS-II

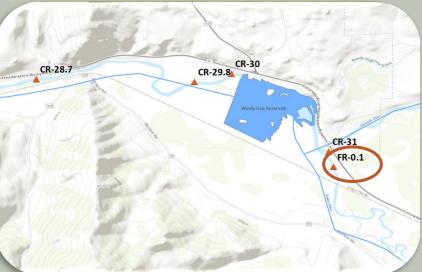


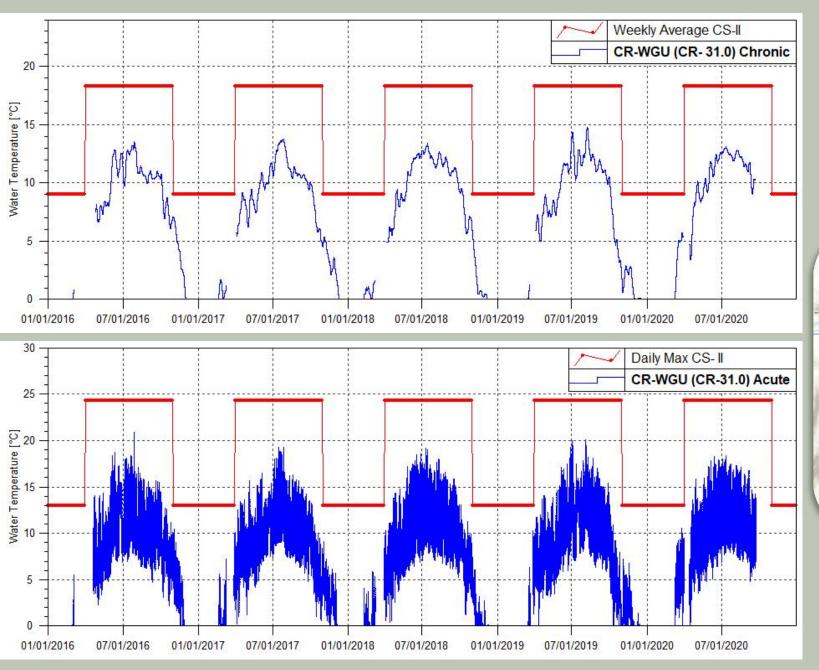




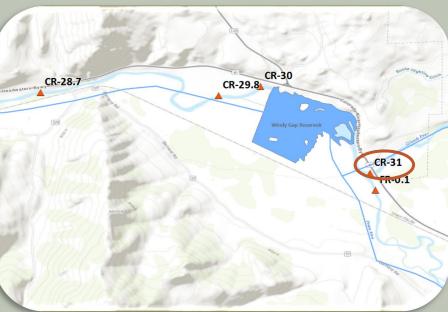


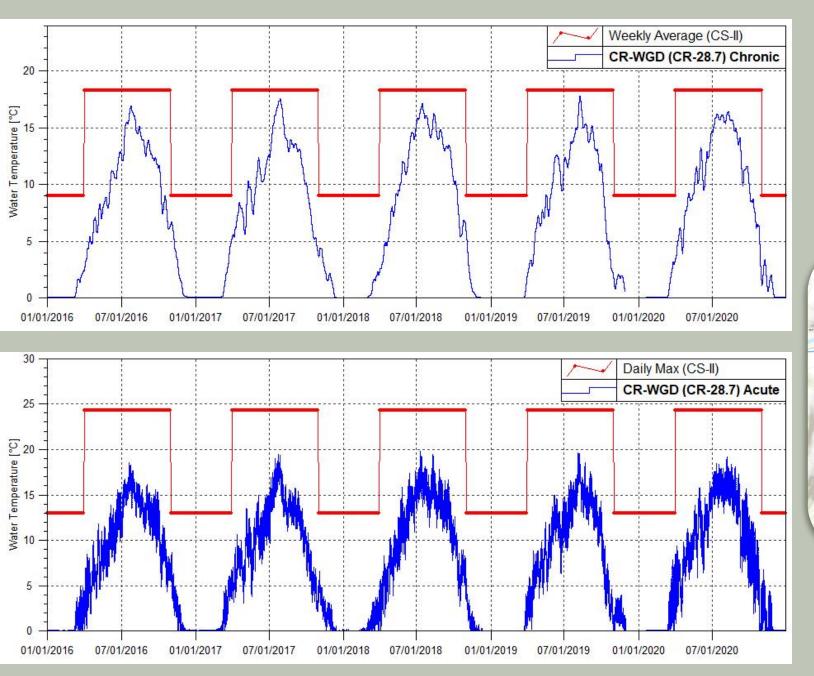
#### Fraser River upstream of Windy Gap – CSII



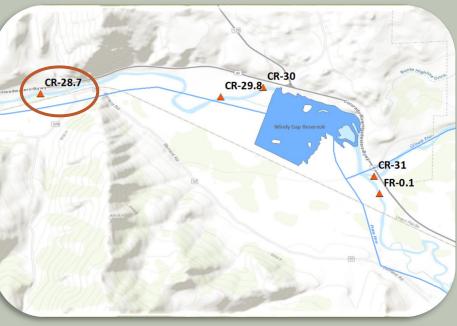


#### Colorado River upstream of Windy Gap – CSII

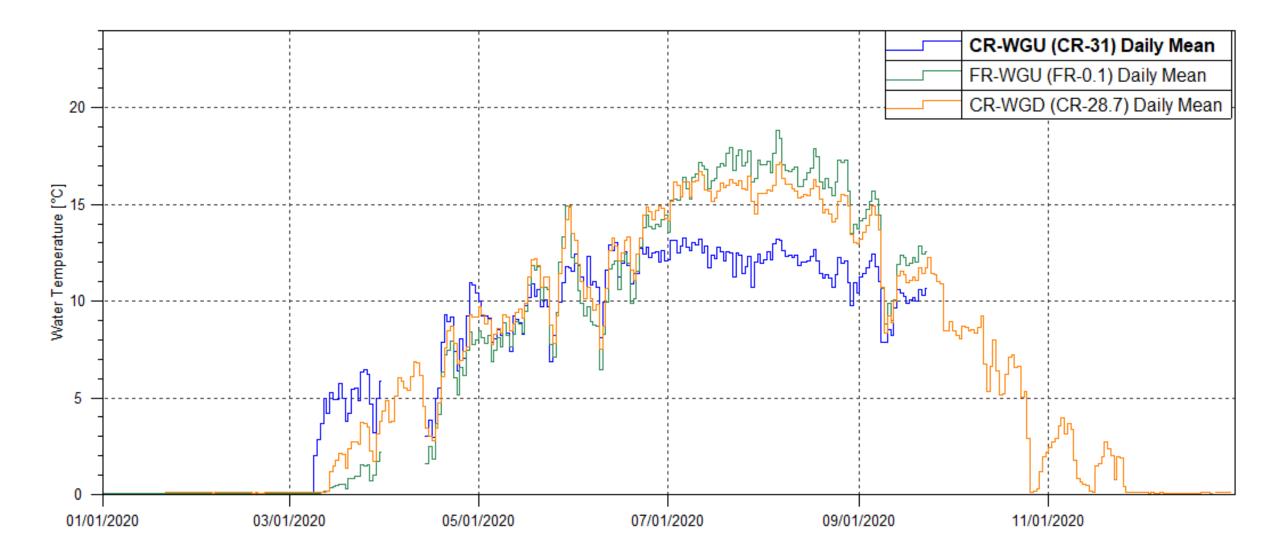


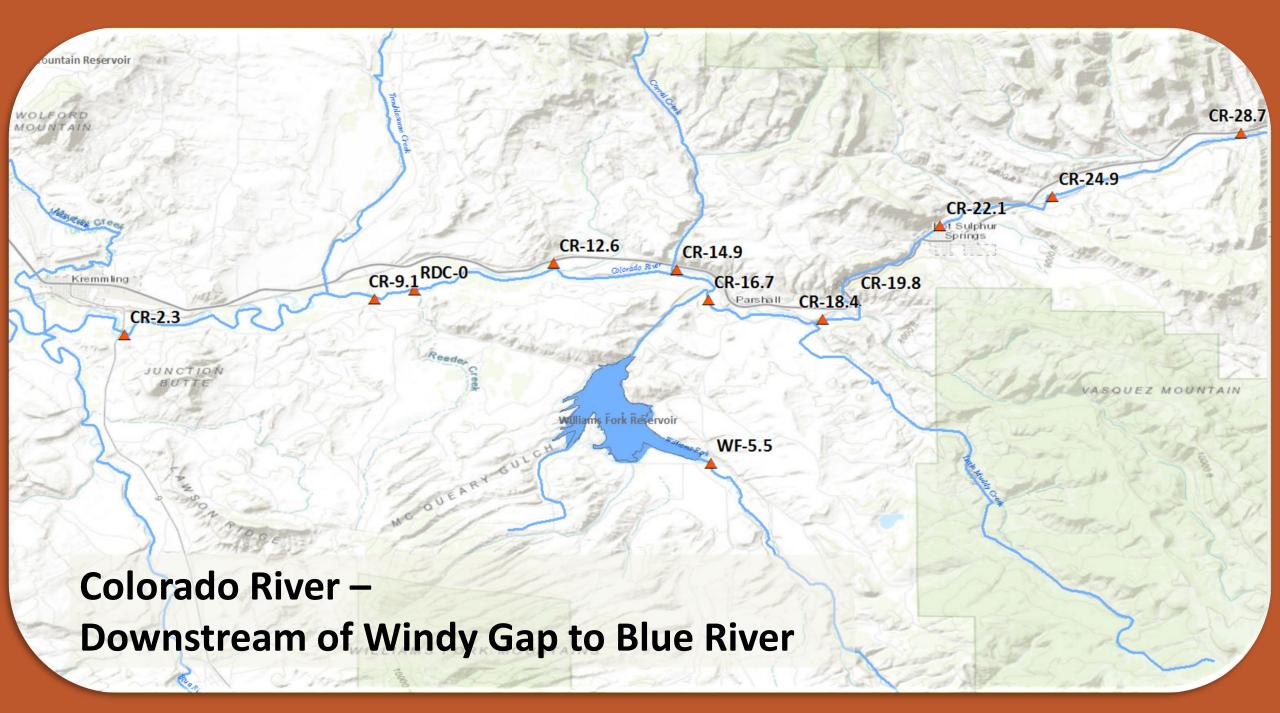


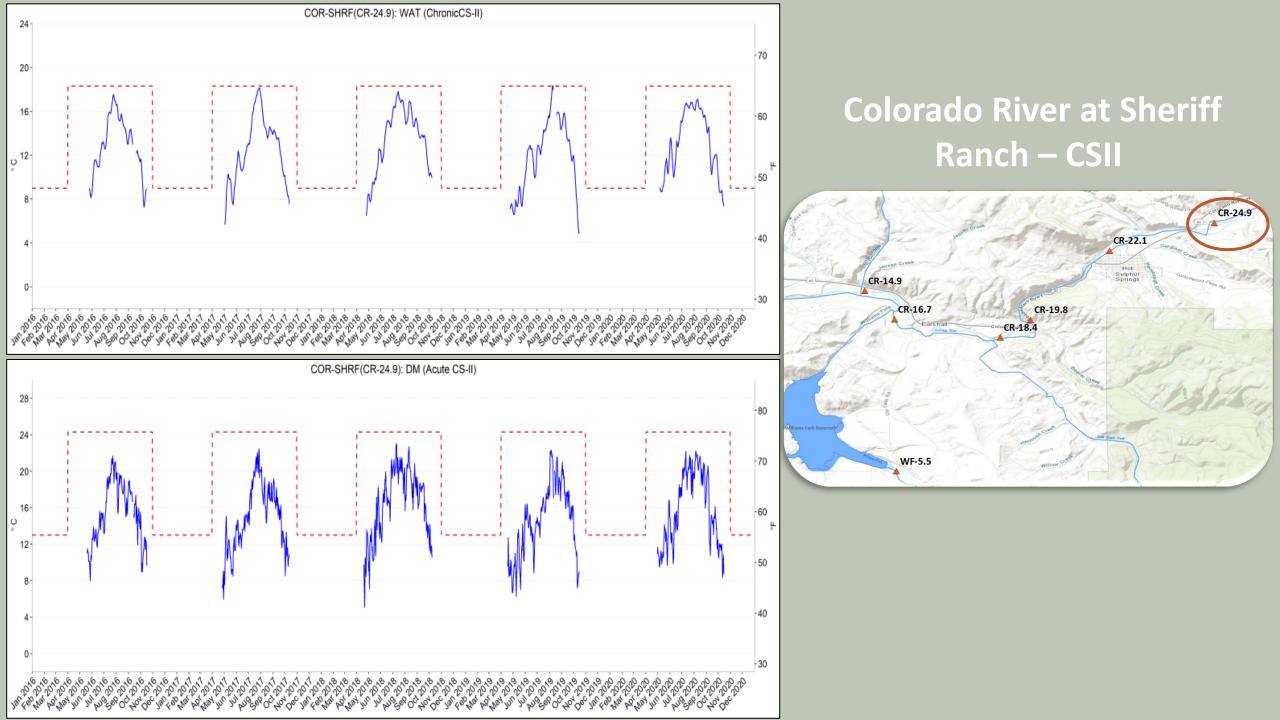
#### Colorado River downstream of Windy Gap – CSII

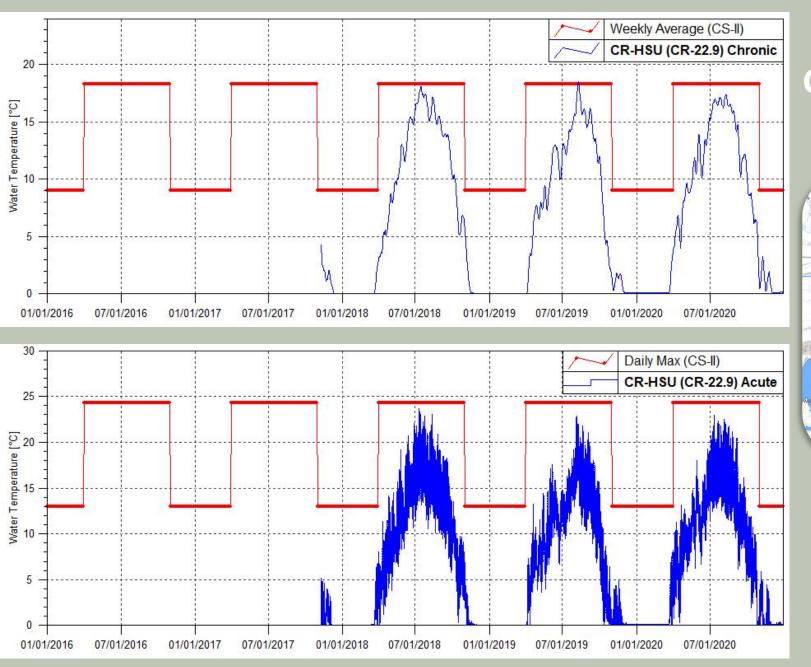


Northern Waters real-time site

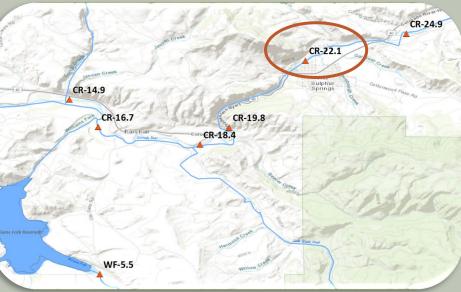






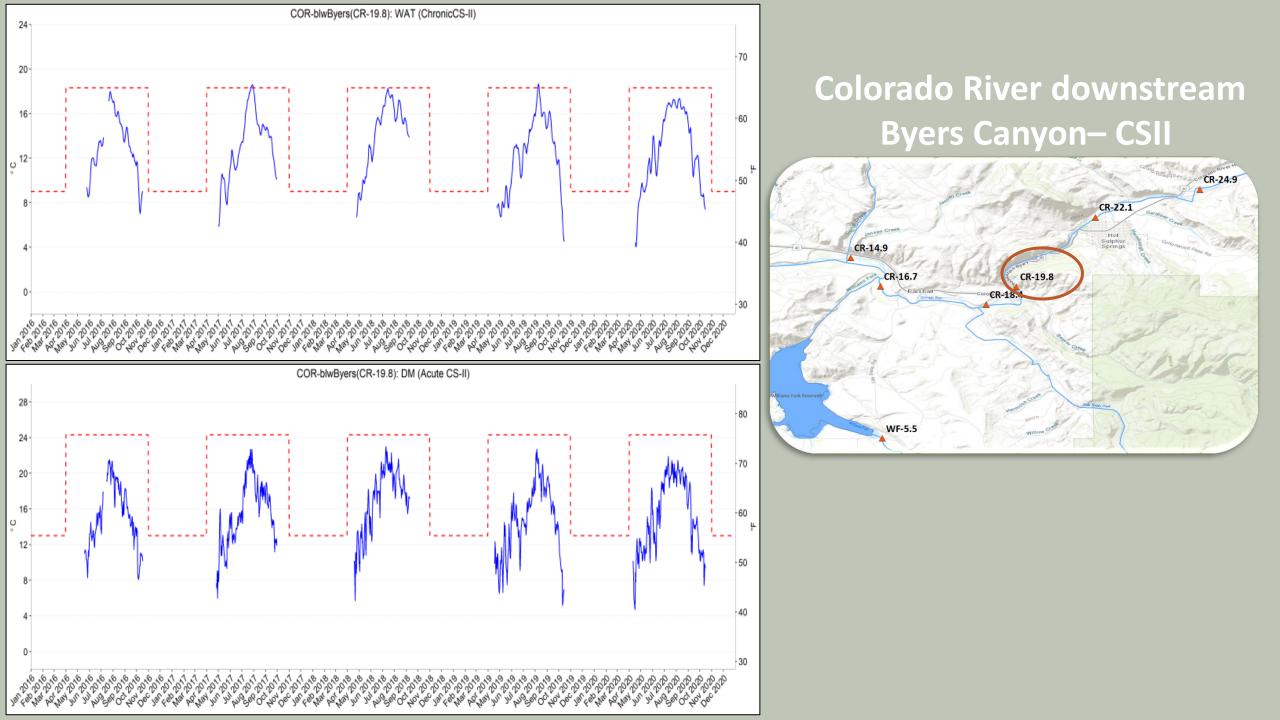


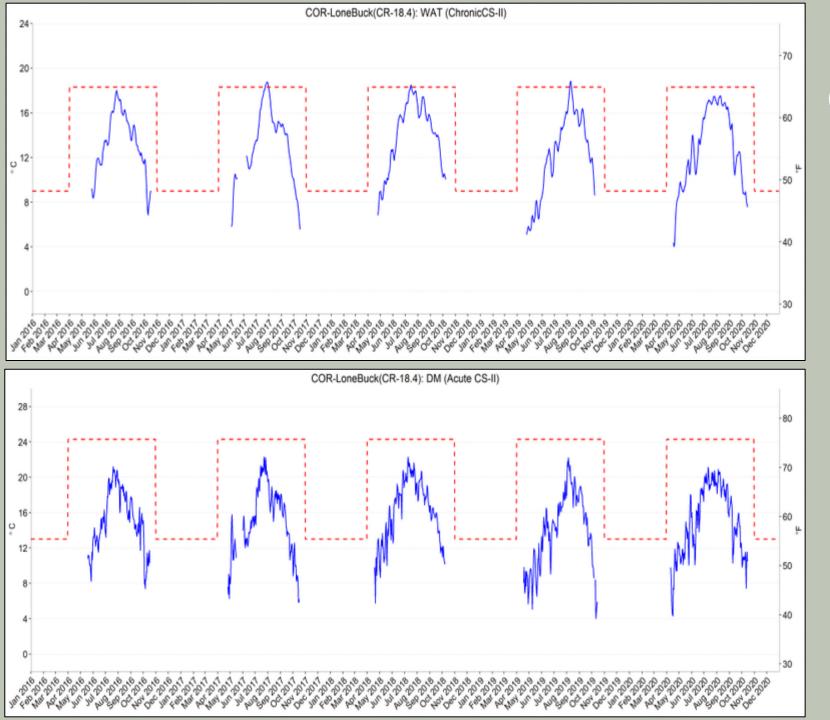
#### Colorado River upstream Hot Sulphur Springs – CSII



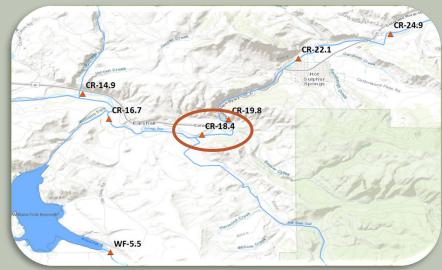
Northern Waters real-time site

\*2016 and 2017 GCWIN Data

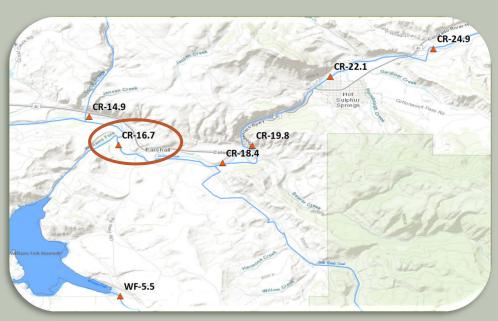




#### Colorado River at Lone Buck – CSII

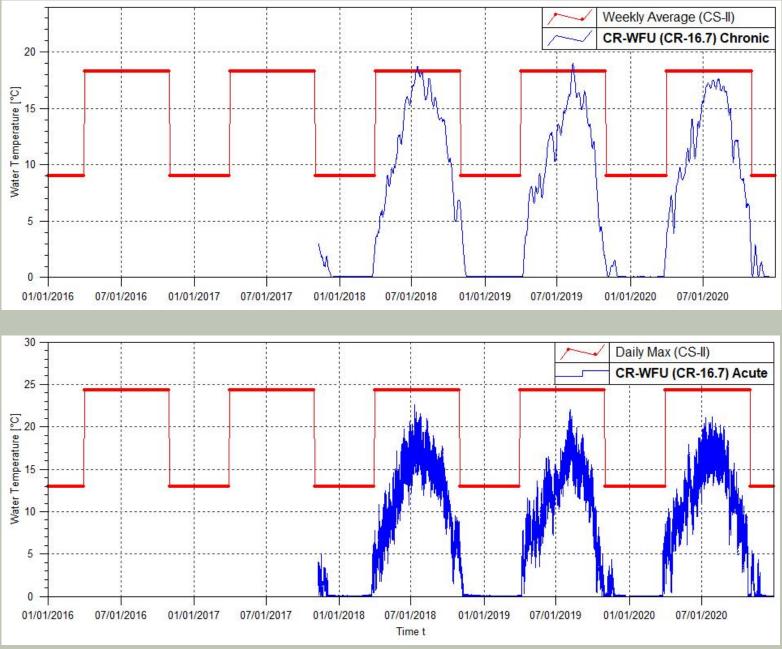


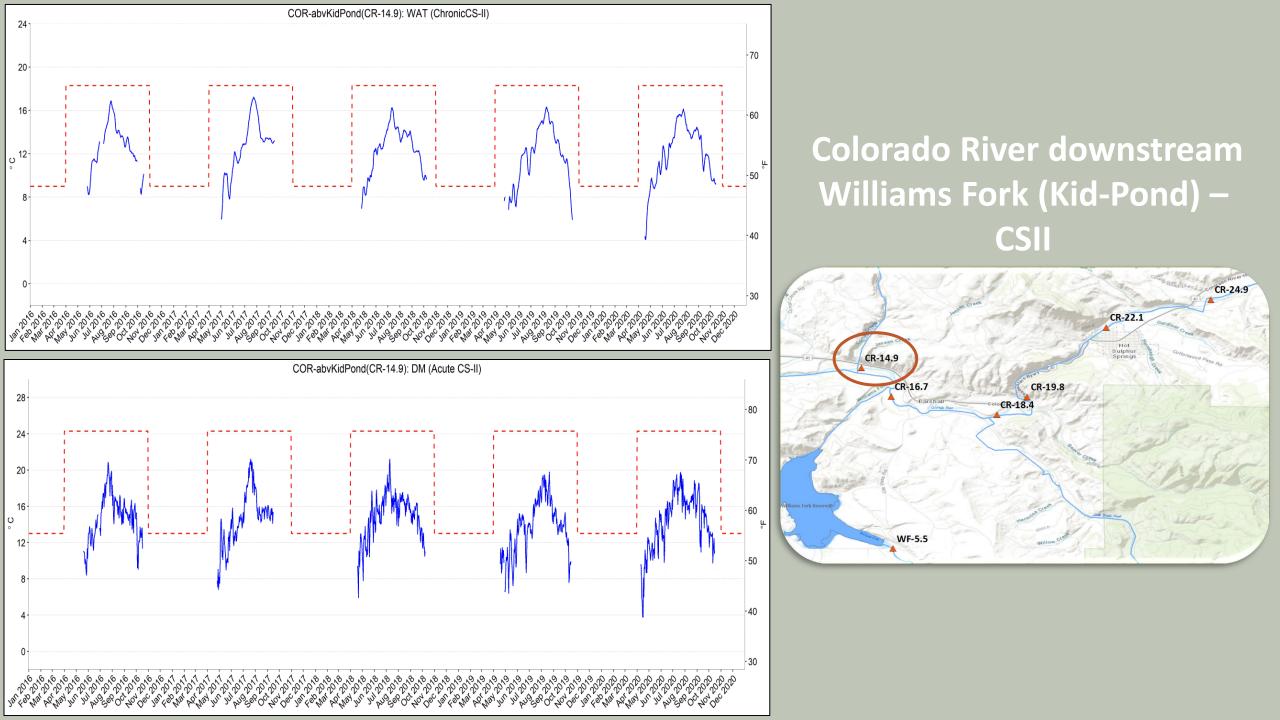


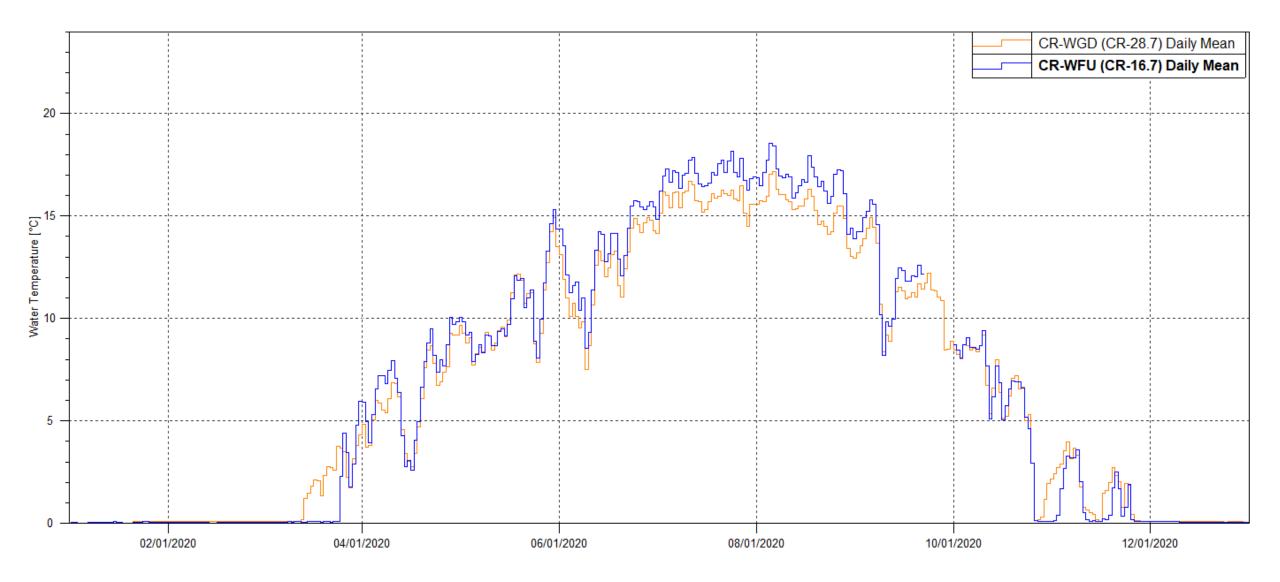


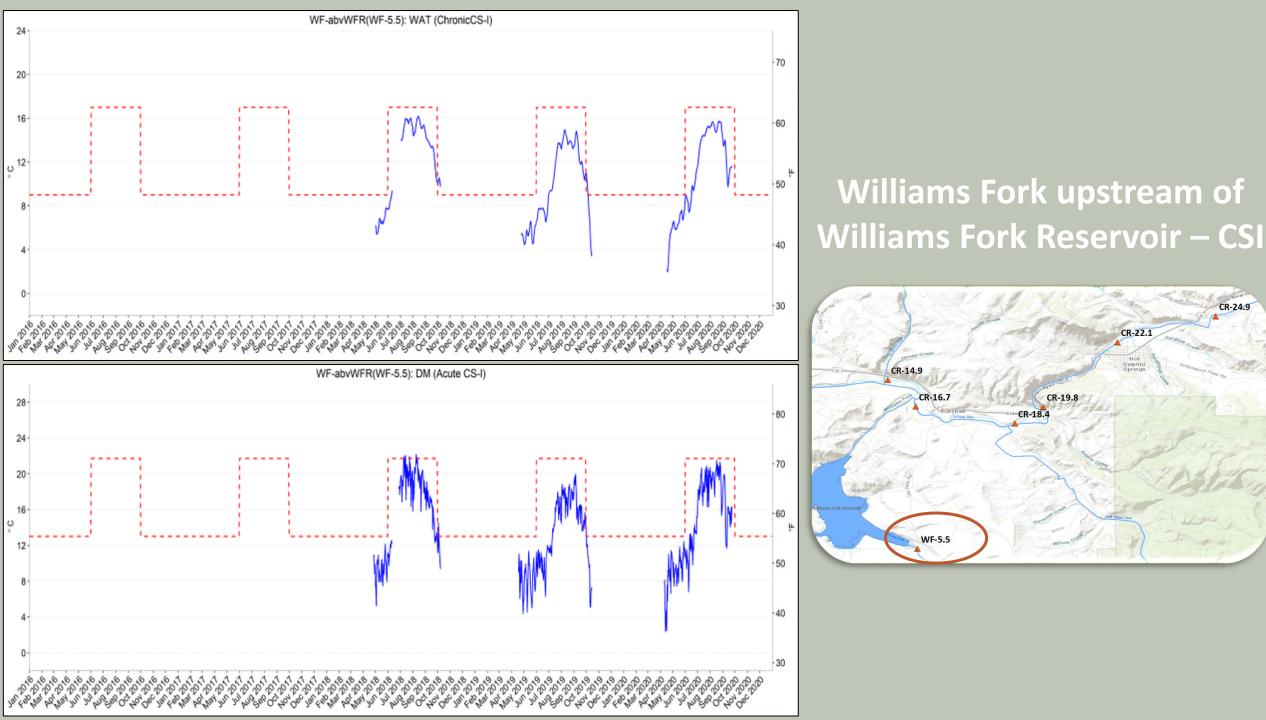
Northern Waters real-time site

\*2016 and 2017 GCWIN Data

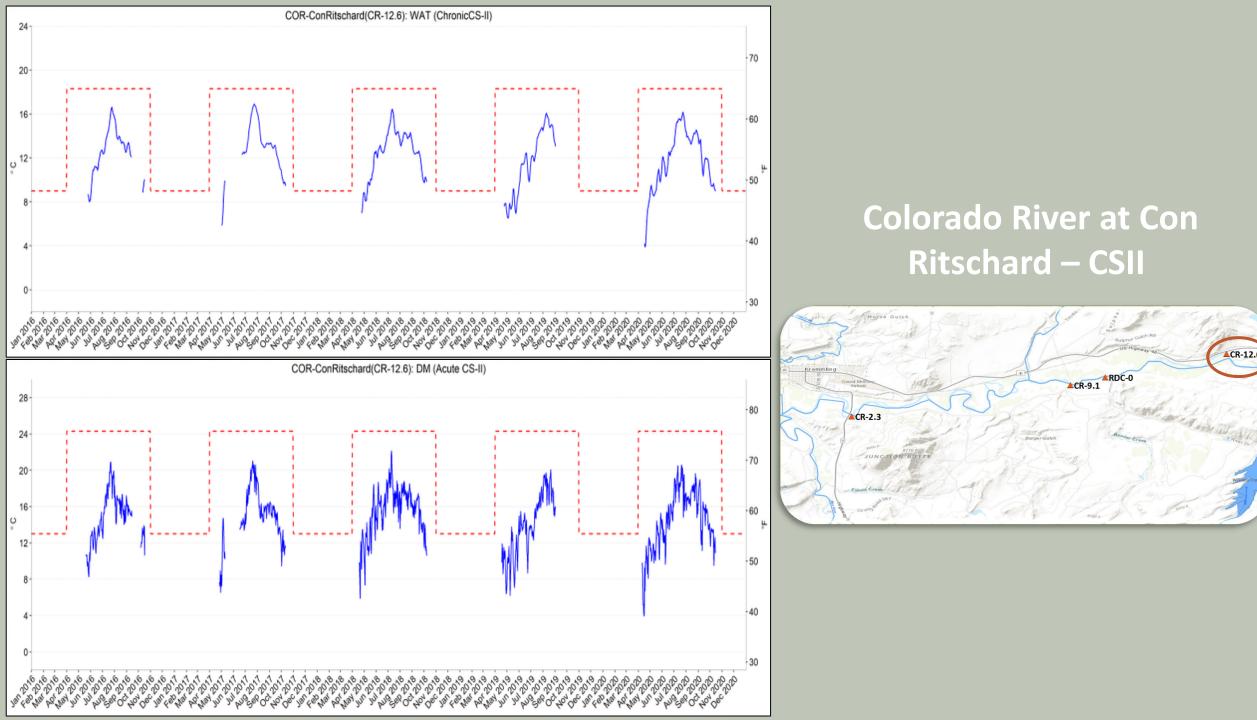


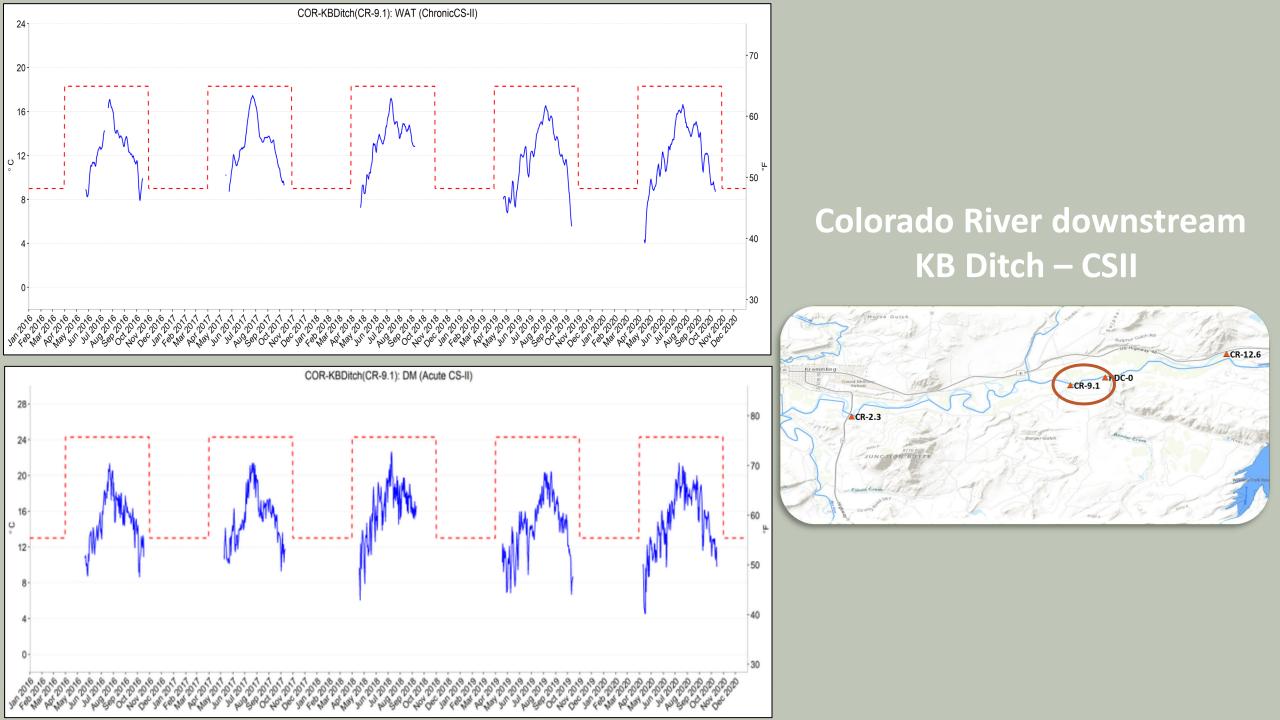


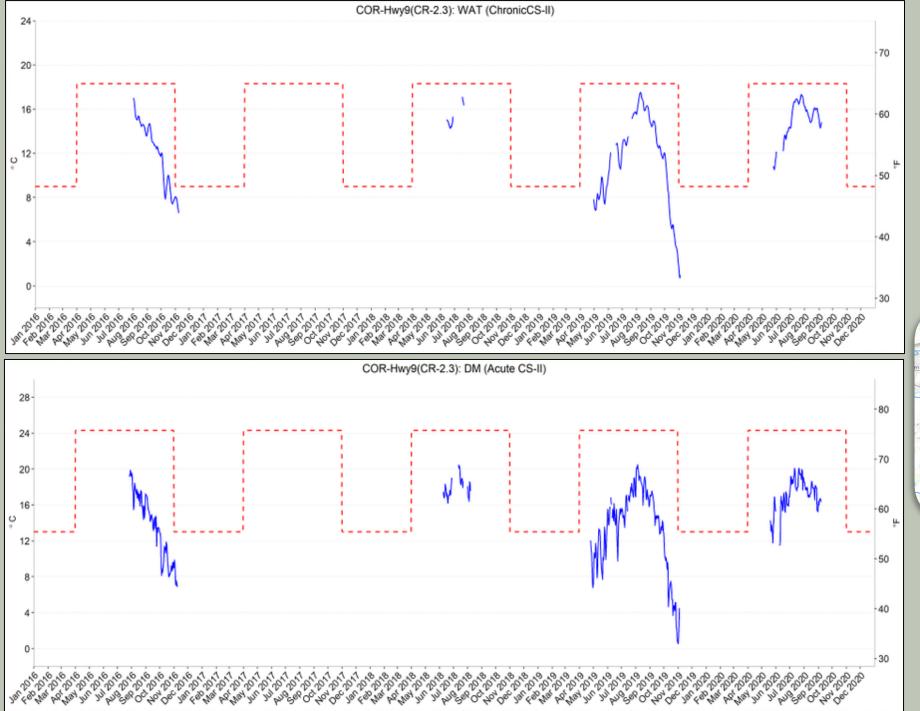




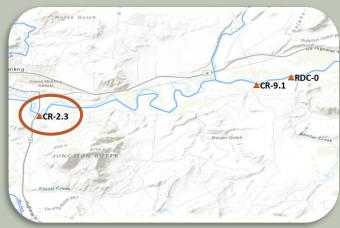
CR-24.9







CR 2.3 -Colorado River upstream Hwy 9 Bridge at Kremmling– CSII



# Fraser River Basin, including tributaries 2020 Summary

Fraser River Basin, including tributaries

➢ 32 sites assessed

28 sites in attainment with state temperature standards 6 sites above the state temperature threshold for acute (2-hr) exposure:

- Ranch Creek below CR 8315
- Ranch Creek below Meadow Creek
- Ranch Creek above Quad Ranch
- Meadow Creek at CR 84
- St. Louis Creek
- Hurd Creek on County Road 843

3 sites above the state temperature threshold for chronic (7-day) exposure:

- Ranch Creek below CR 8315
- Ranch above Quad Ranch
- St. Louis Creek

# Colorado River Basin, including Williams Fork 2020 Summary

### Colorado River/ Williams Fork

▶17 sites assessed

16 sites in attainment with state temperature standards No sites above the state temperature threshold for acute (2-hr) exposure\*

No sites exceeded the state temperature threshold for chronic (7-day) exposure\*

\*Note: Includes all sites with available data. At this time, the data for 8 sites above Granby Reservoir is not available; these sites will be reported in 2022.

## Questions & Comments

## **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
EC-5.5	Elk Creek below Denver Water diversion	Elk Creek	GCWIN	Elk-blwDWB	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
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	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
(R-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-abvKidPond	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