

Upper Klamath and Lost Subbasins Temperature TMDL

Technical Update and TMDL Allocations Overview

TMDL Advisory Meeting
April 30, 2019
Klamath Falls, OR

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Agenda

Schedule

General Temperature TMDL Approach

Water Quality Standards, TMDL Approach, and Allocations

- Klamath River
- Lost River

Technical analysis and results to support allocations

TMDL Schedule

May 15, 2019: Public Comment Begins (60-Day)

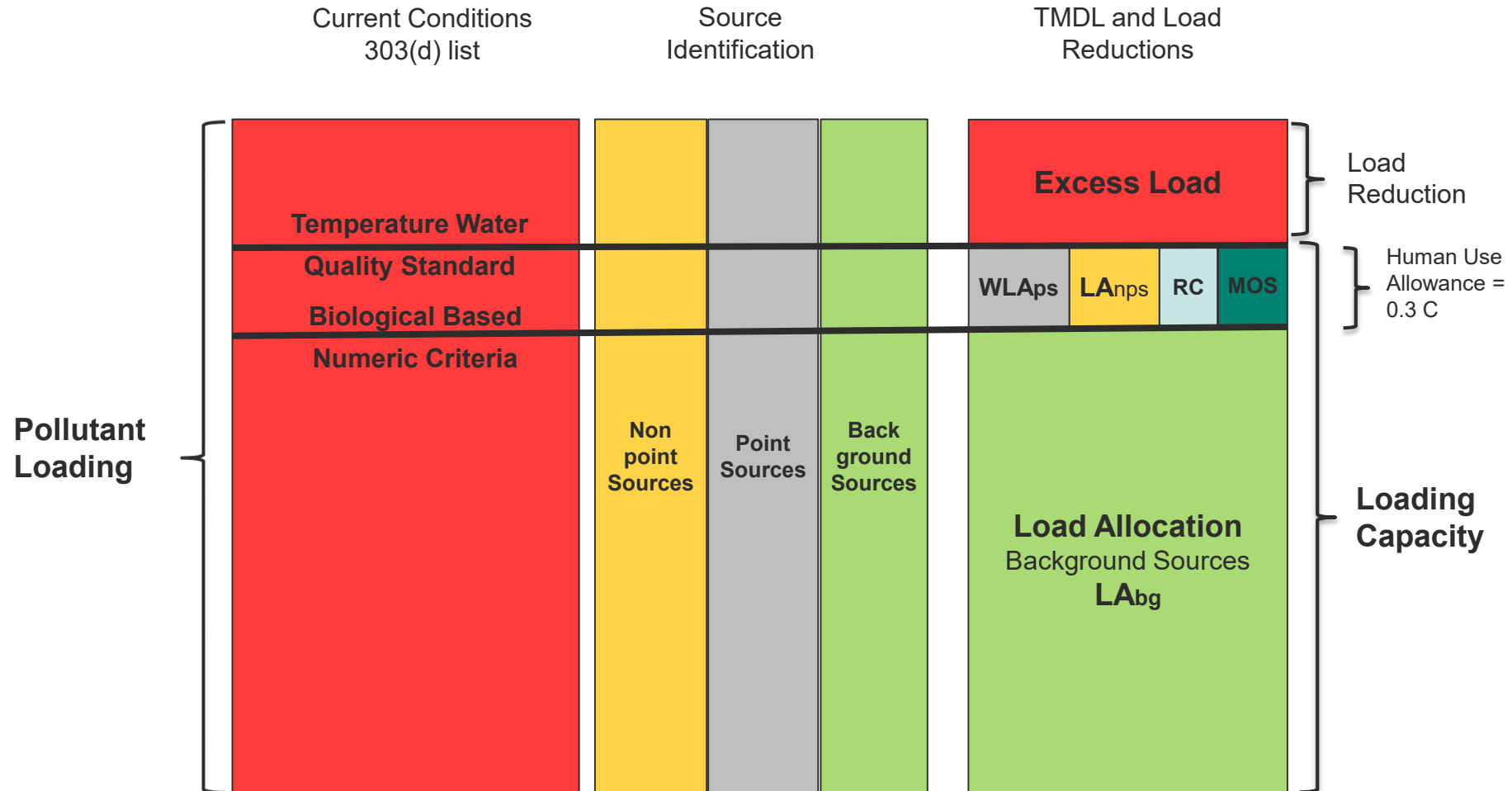
July 15, 2019: Public Comment Ends

Sept. 30, 2019: EPA approval of TMDL

Typical Temperature TMDL

$$\text{TMDL} = \text{WLA}_{\text{ps}} + \text{LA}_{\text{nps}} + \text{LA}_{\text{bg}} + \text{MOS} + \text{RC}$$

Temperature TMDLs



Klamath River Temperature Criteria

Point Source Site Specific Criterion

- Upper Klamath Lake to Keno Dam
- Applies June 1 – September 30
- 0.3 deg-C warming at 25% mix = 0.075 deg-C warming at 100% mix

Cool Water Species Narrative

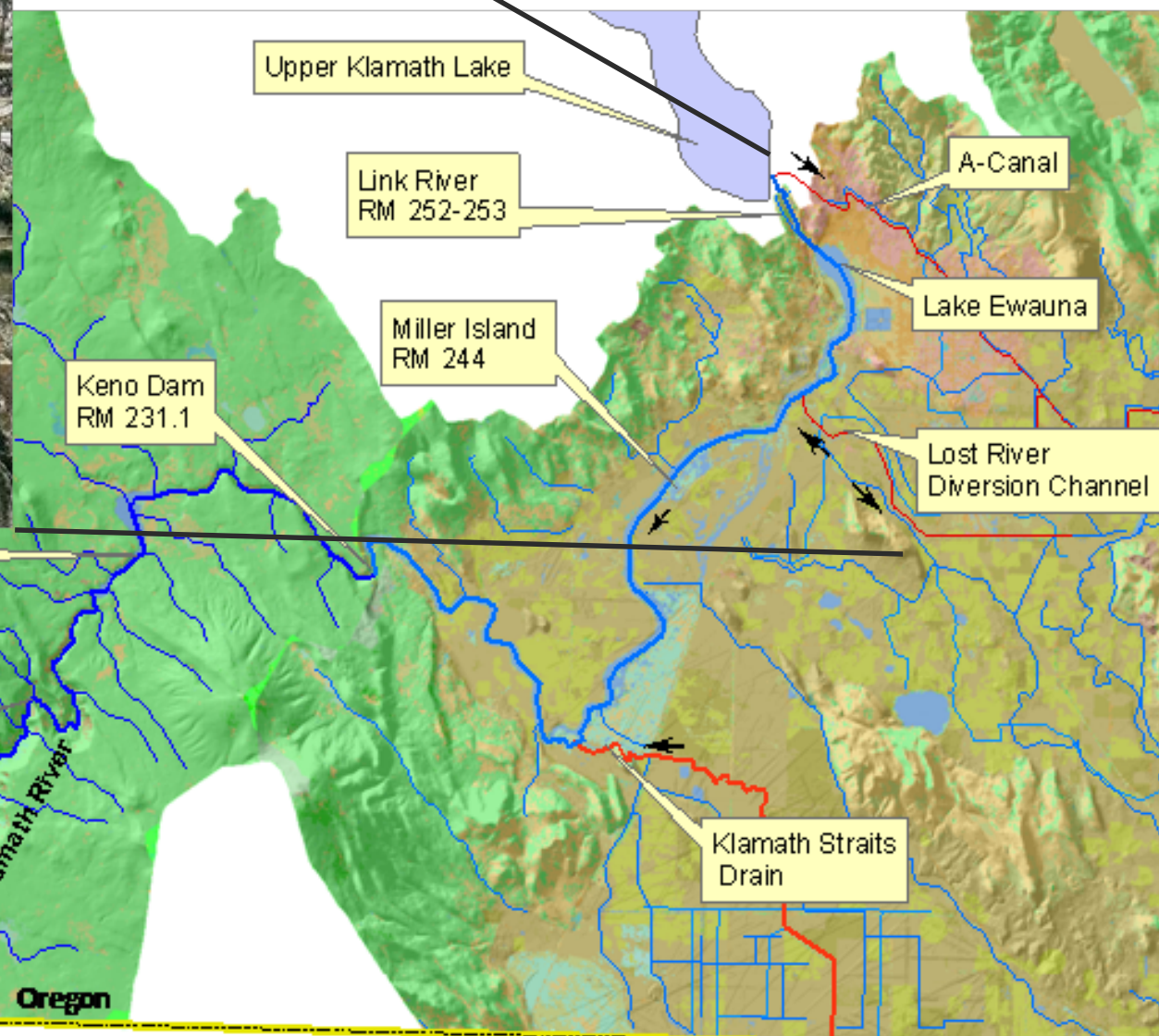
- Upper Klamath Lake to Keno Dam
- 28 deg-C Daily Maximum (all sources)

Redband and Lahontan Use

- Keno Dam to OR/CA Stateline
- 20 deg-C 7-Day Mean Daily Maximum
- 0.3 deg-C human use allowance

California Targets at Stateline

- Monthly average temperature targets (natural conditions)
- No warming from human sources (defined as ≤ 0.04 deg-C)

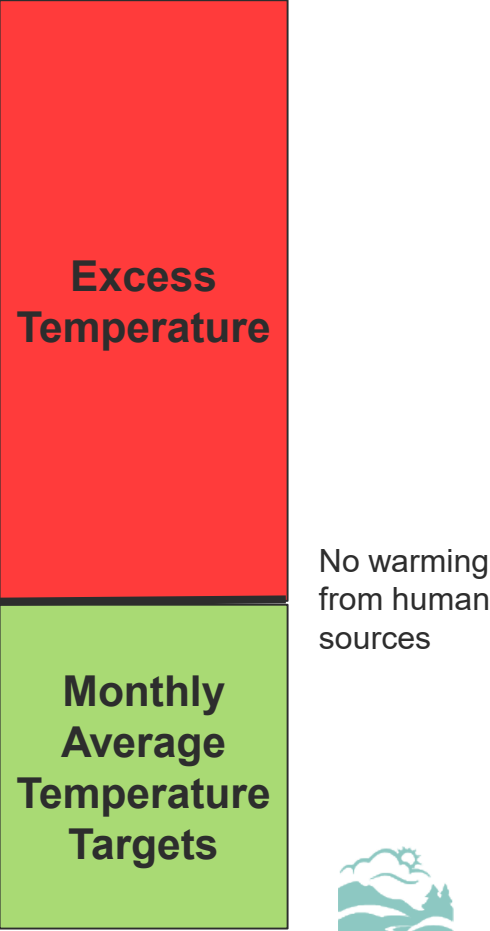
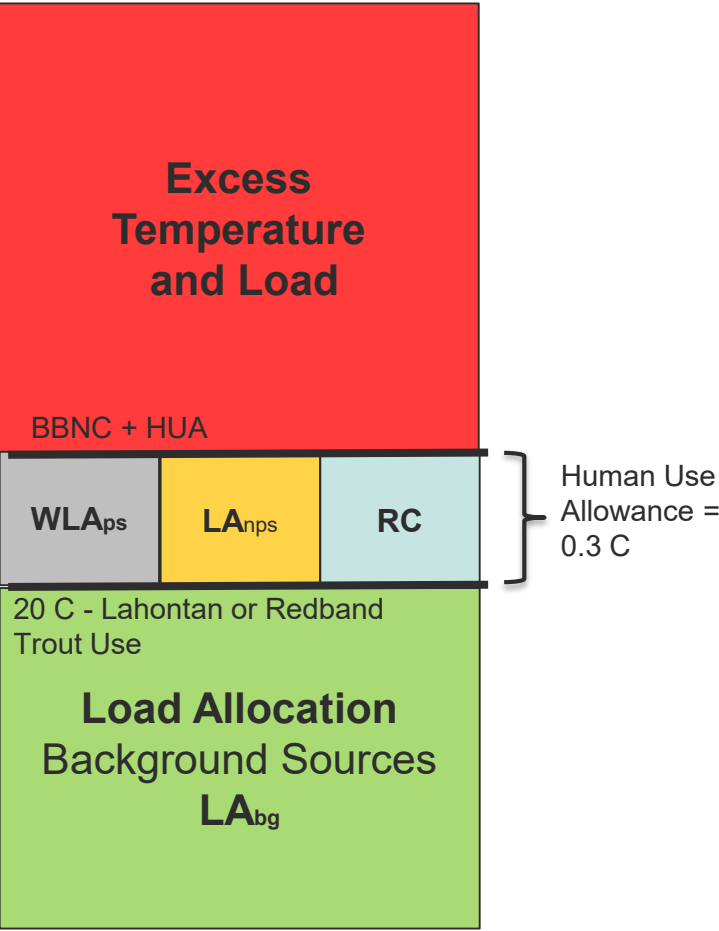
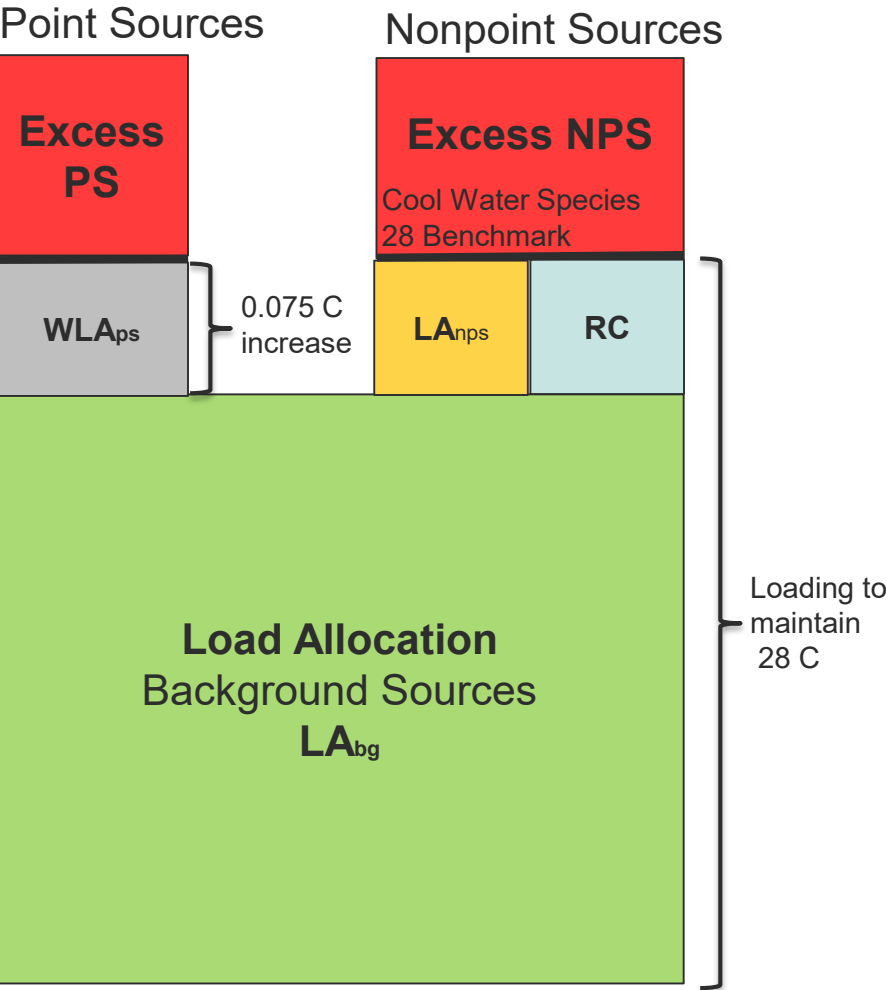


Klamath River

Upper Klamath Lake – Keno Dam

Keno Dam - Stateline

California



Klamath River Source Reductions

- Klamath Falls WWTP
- South Suburban WWTP
- KSD
- LRDC
- Keno Dam
- J.C. Boyle Dam
- Natural Sources

Criteria Driving Reductions

Point Sources

- Site Specific Criterion
- California Targets at Stateline

KSD and LRDC

- 0.3 deg-C Human Use Allowance
- California Targets at Stateline

Keno and J.C. Boyle Dams

- 0.3 deg-C Human Use Allowance
- California Targets at Stateline

Natural Sources

- 20 deg-C Redband and Lahonton Trout use downstream of Keno Dam

Klamath River Source Reductions

Upper Klamath Lake – Keno Dam

TMDL requires reductions from point sources to achieve site specific criteria and downstream criteria.

Point Sources

Excess PS

WLA_{ps}

0.015 C increase

TMDL requires reductions from nonpoint sources upstream of Keno Dam to achieve human use allowance downstream of Keno Dam.

Nonpoint Sources

Excess NPS

Cool Water Species
28 Benchmark

LA_{nps}

RC

**Load Allocation
Background Sources
LA_{bg}**

Loading to maintain
28 C

Keno Dam - Stateline

TMDL requires reductions from background sources upstream of Keno Dam to achieve 20 downstream of Keno Dam.

**Excess
Temperature
and Load**

BBNC + HUA

WLA_{ps}

LA_{nps}

RC

Human Use
Allowance =
0.3 C

20 C - Lahontan or Redband
Trout Use

**Load Allocation
Background Sources
LA_{bg}**

California

TMDL requires reductions from anthropogenic sources upstream of Stateline to achieve zero warming above monthly average temperature targets at Stateline.

**Excess
Temperature**

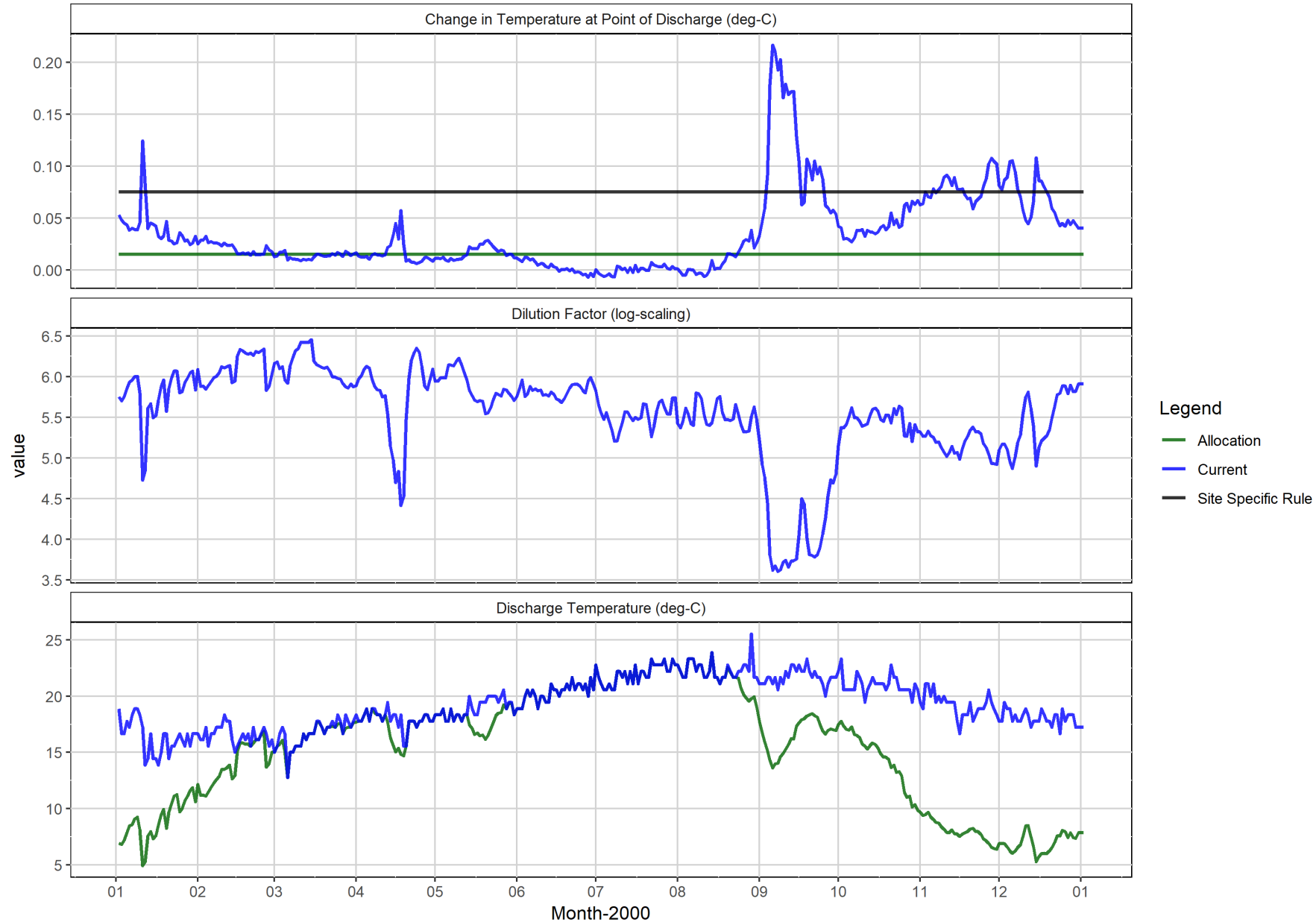
**Monthly
Average
Temperature
Targets**

No warming
from human
sources

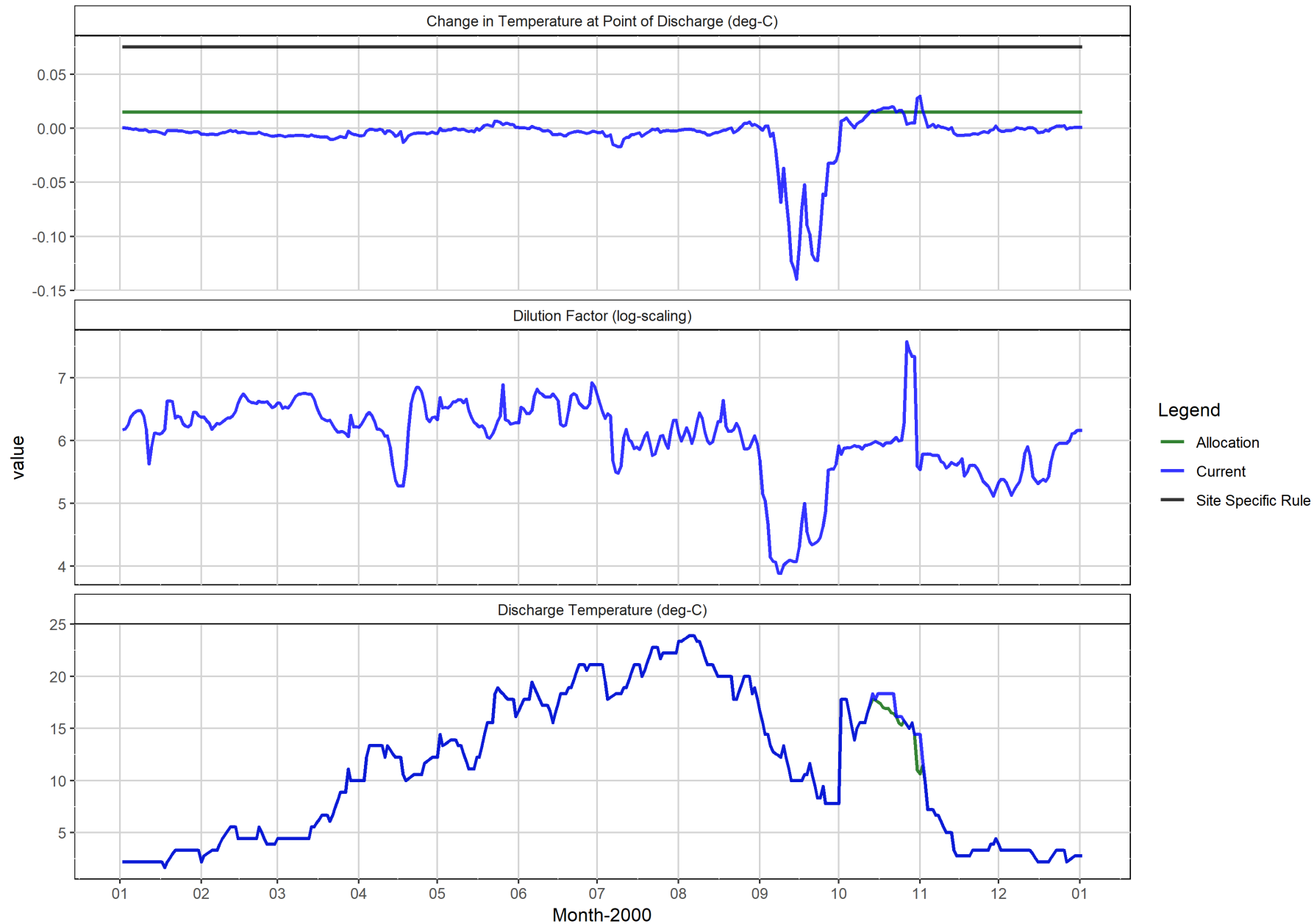
Point Source Warming and Allocations



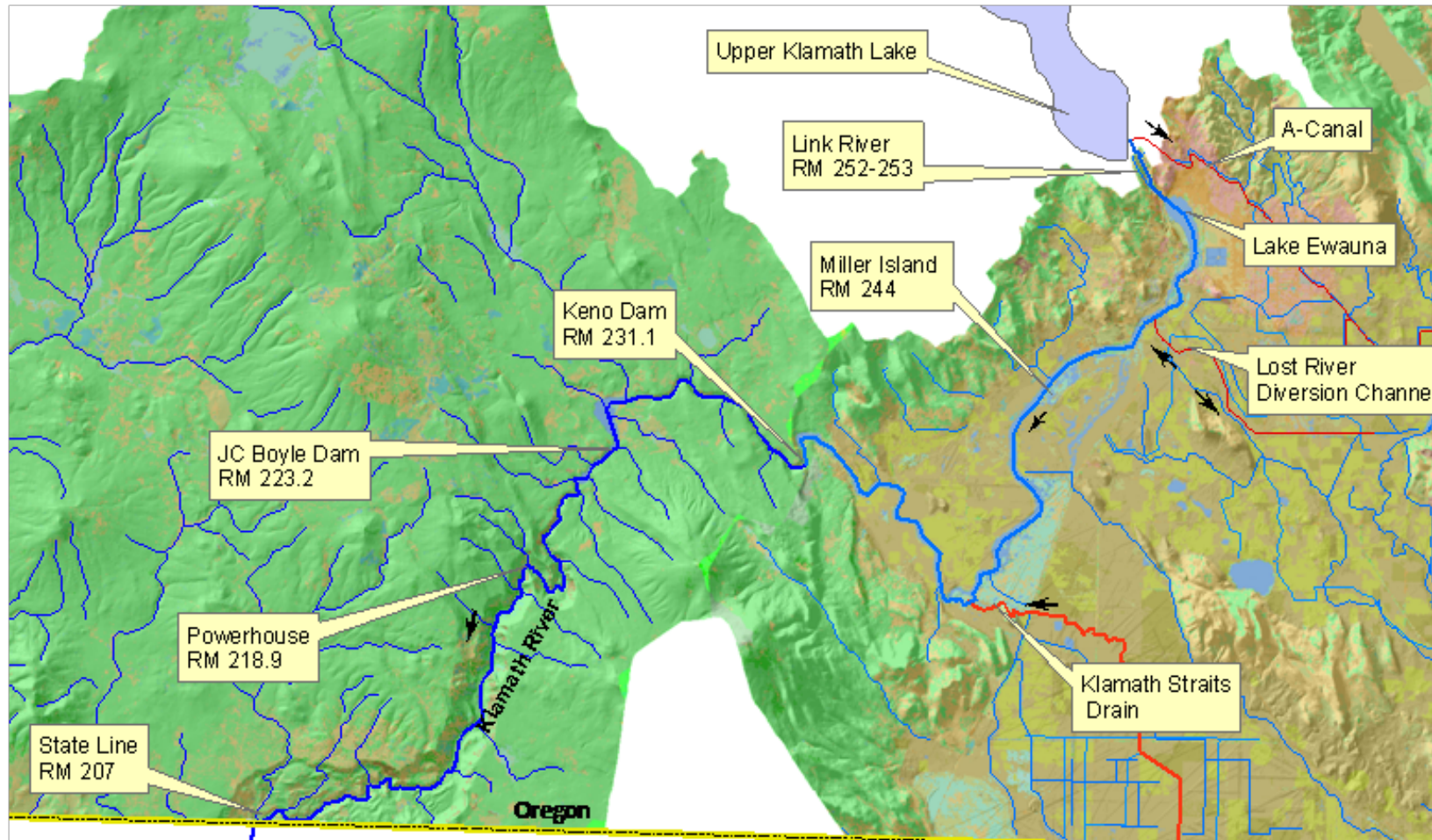
Klamath Falls WWTP



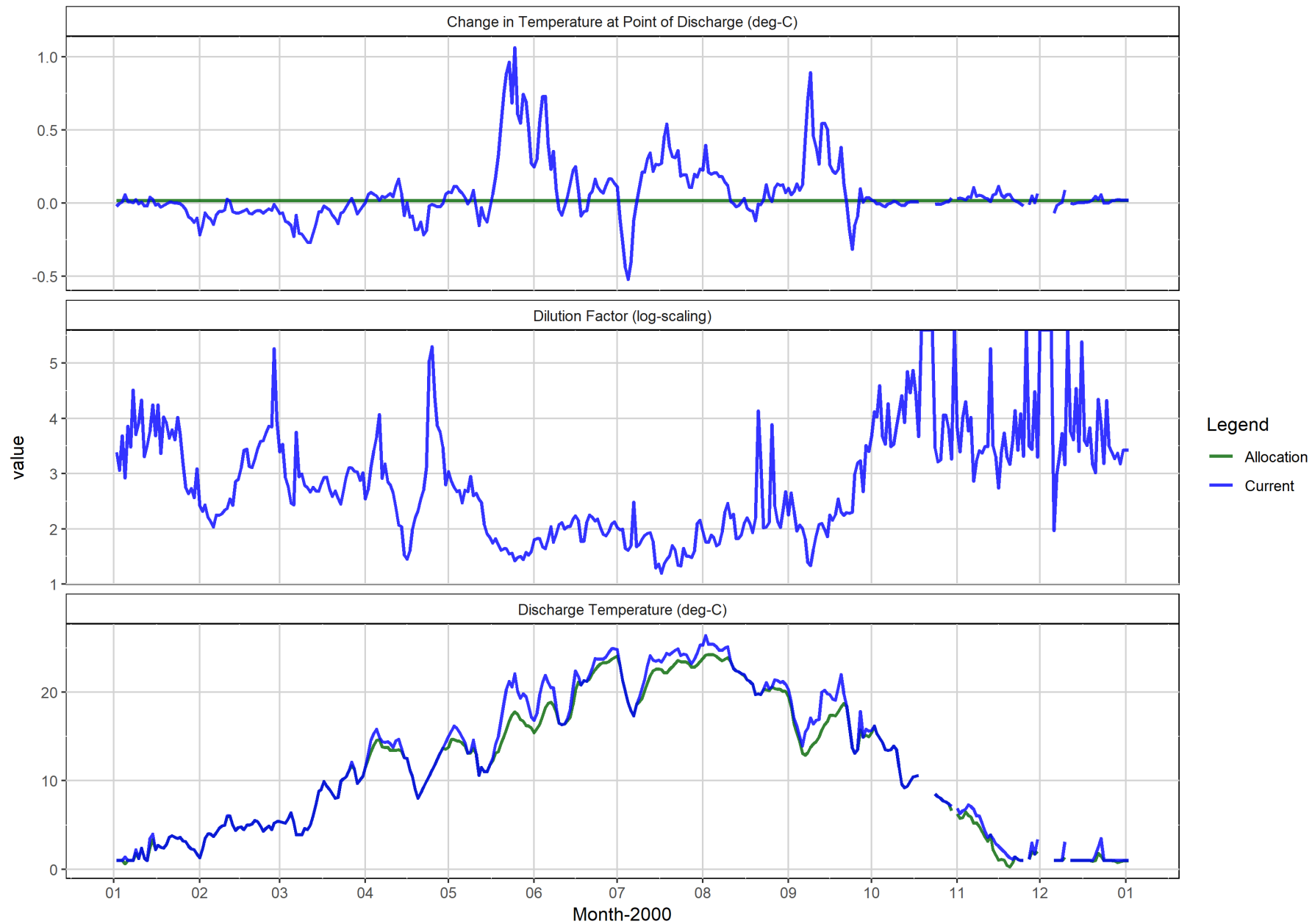
South Suburban WWTP



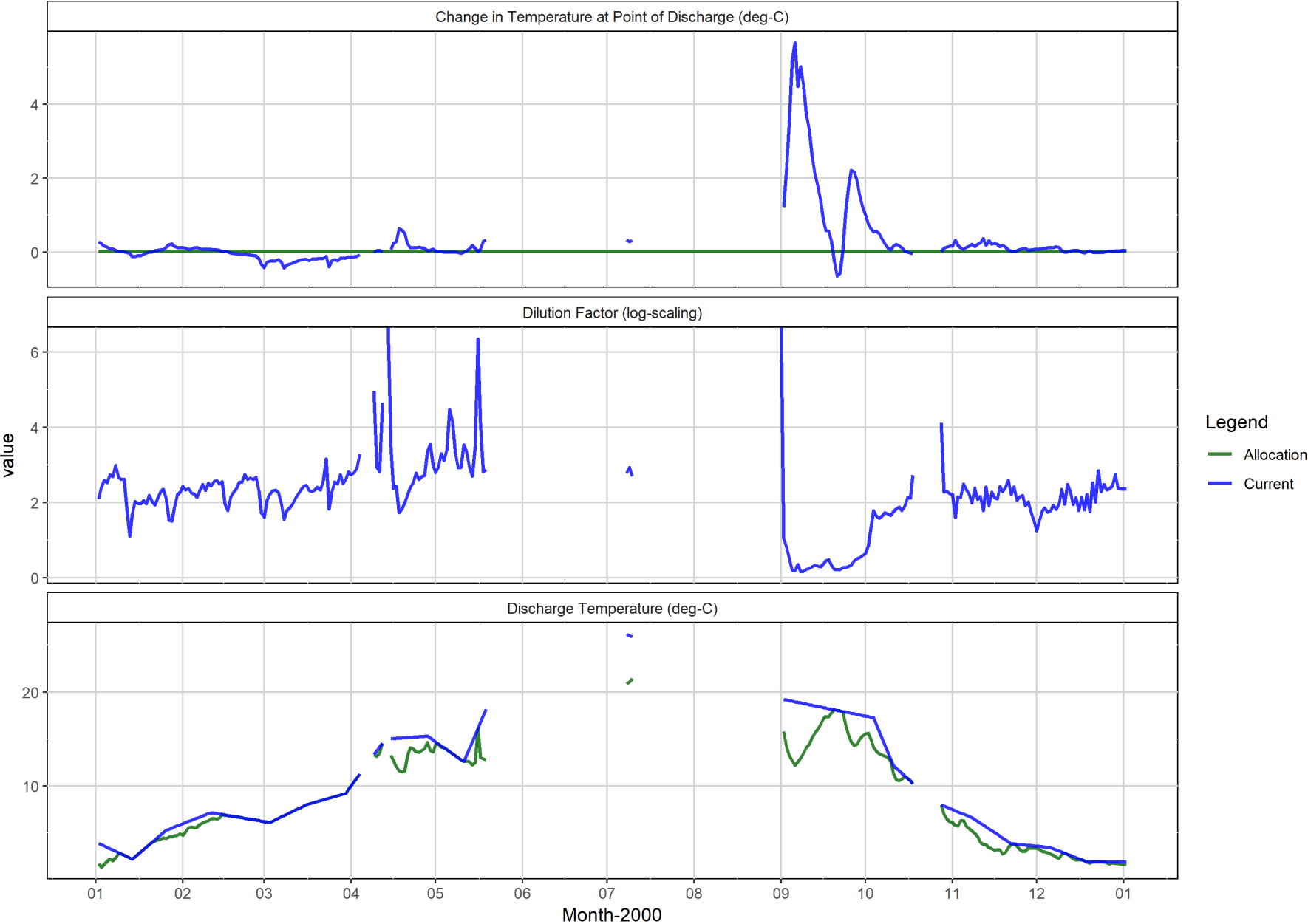
KSD and LRDC Warming and Allocations



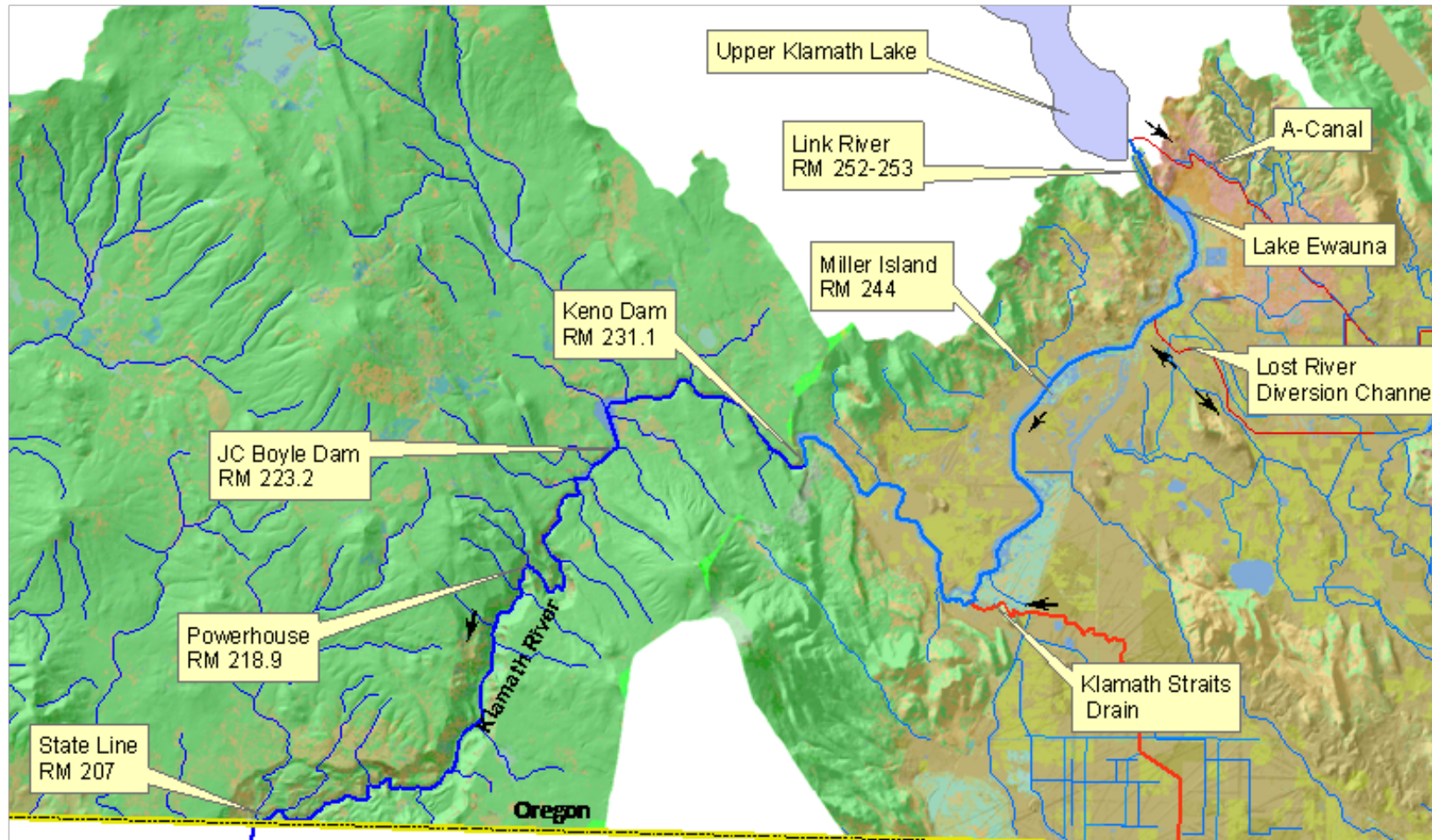
Klamath Straits Drain



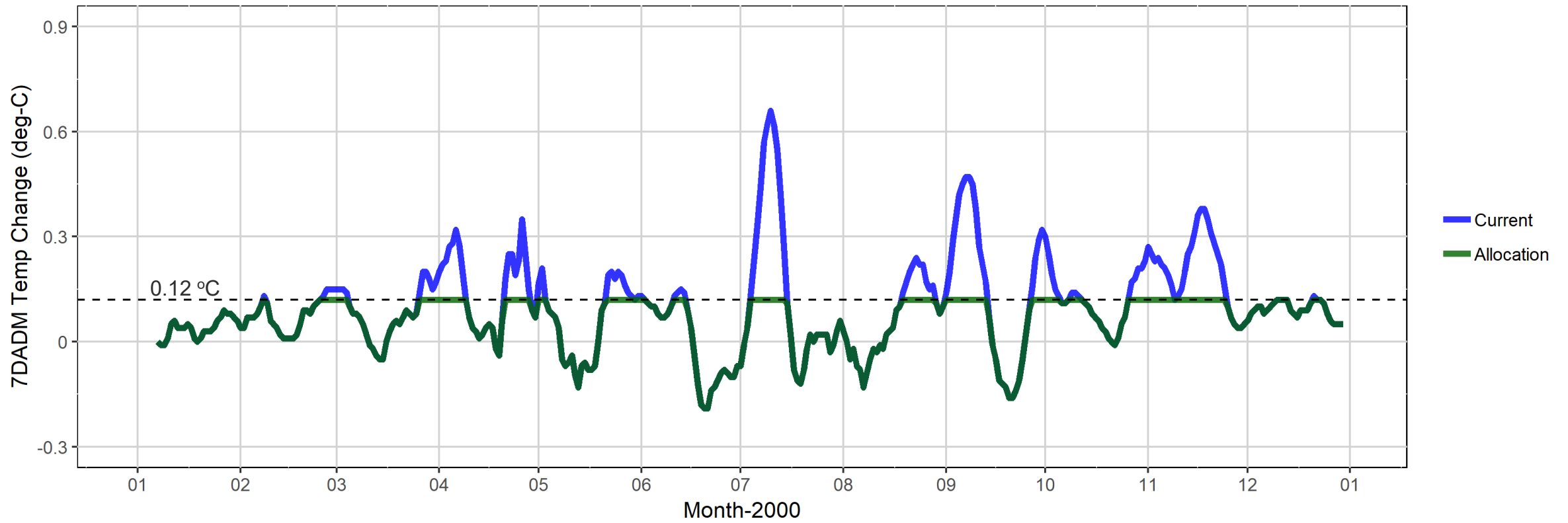
Lost River Diversion Channel



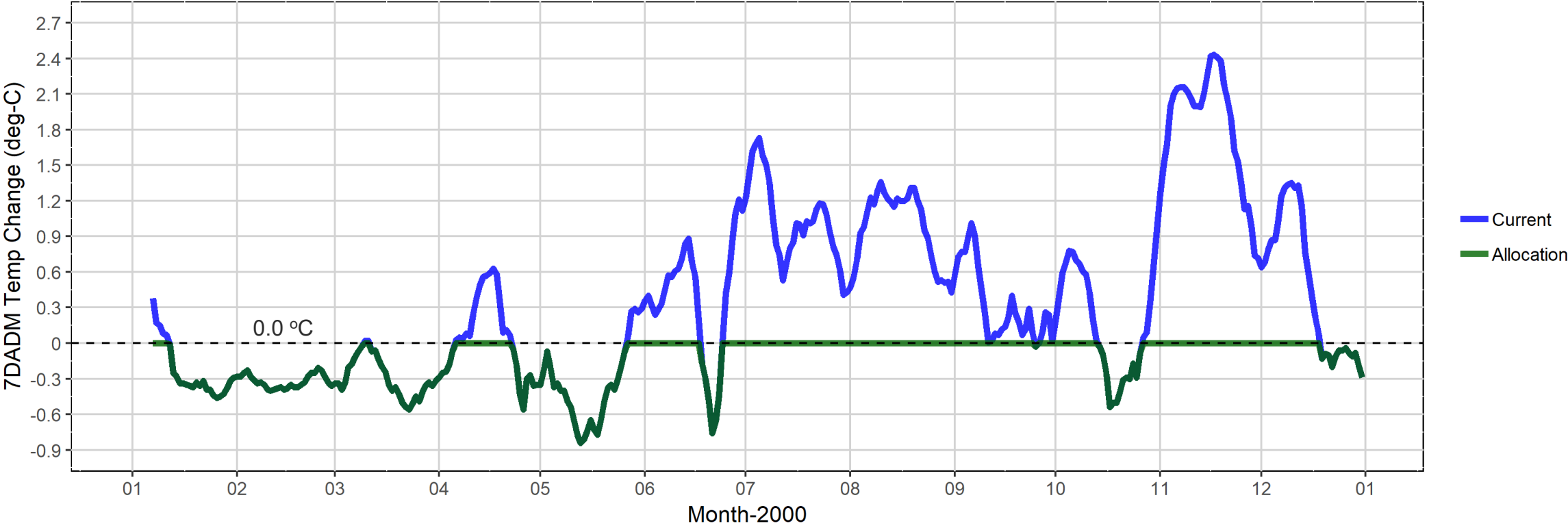
Keno and J.C. Boyle Dams Warming and Allocation



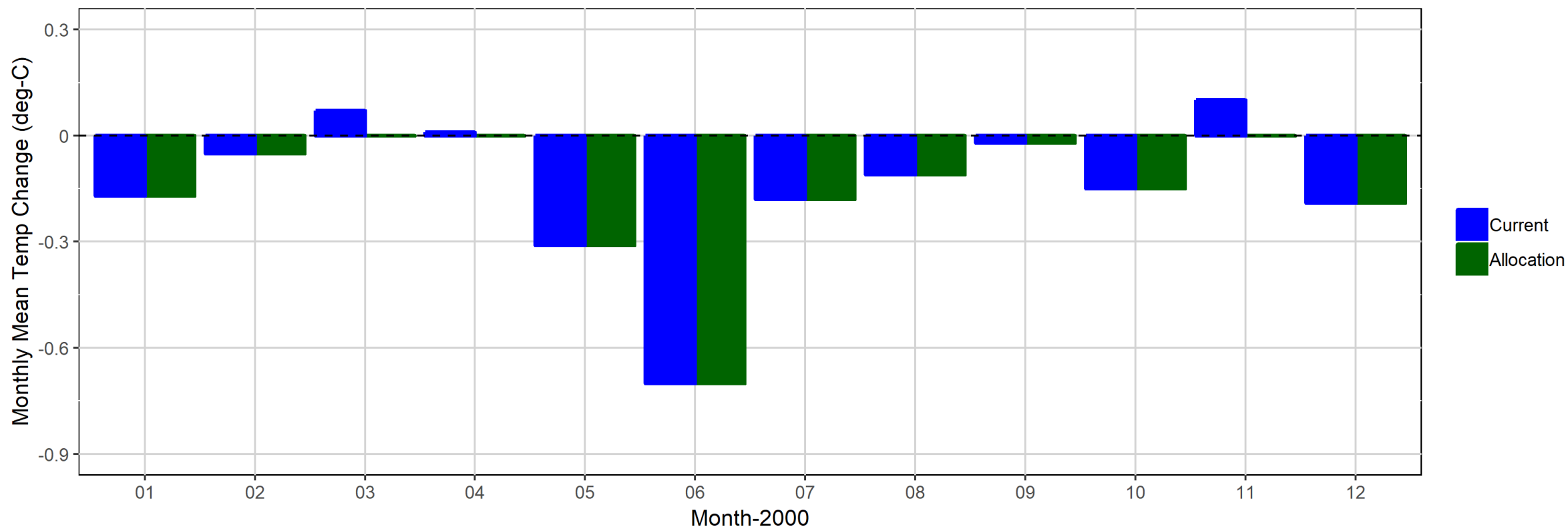
Temperature Change from Keno Dam at Outlet



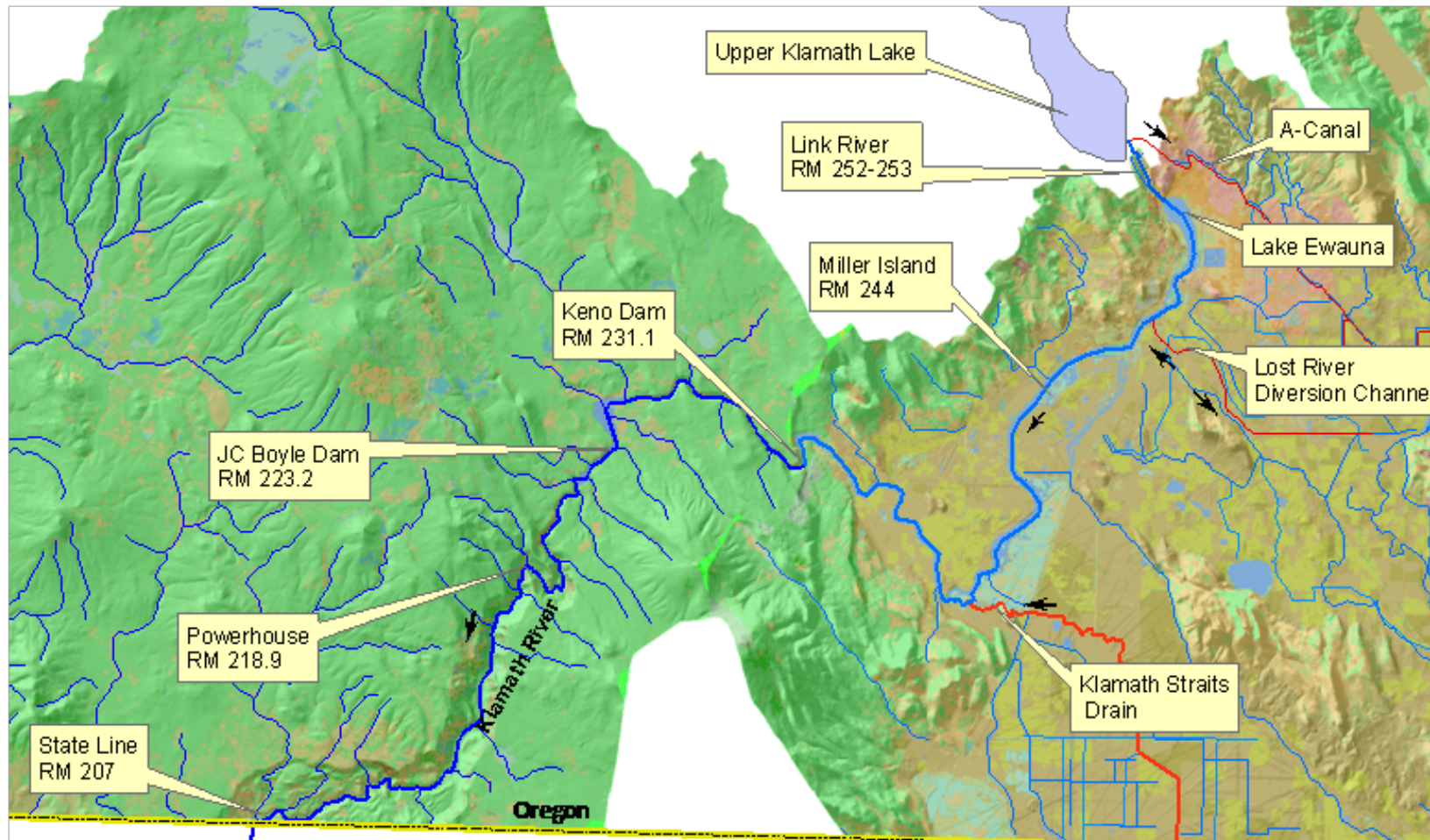
Temperature Change from J.C. Boyle and Keno Dam at OR/CA Stateline



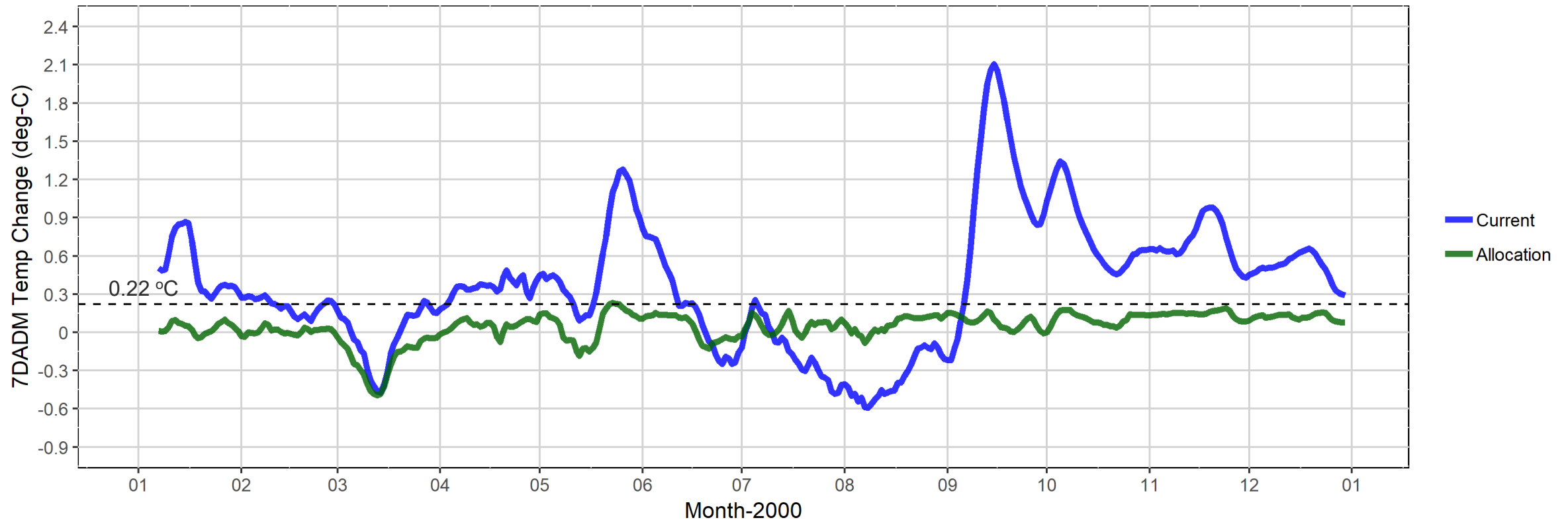
Temperature Change from J.C. Boyle and Keno Dam at OR/CA Stateline



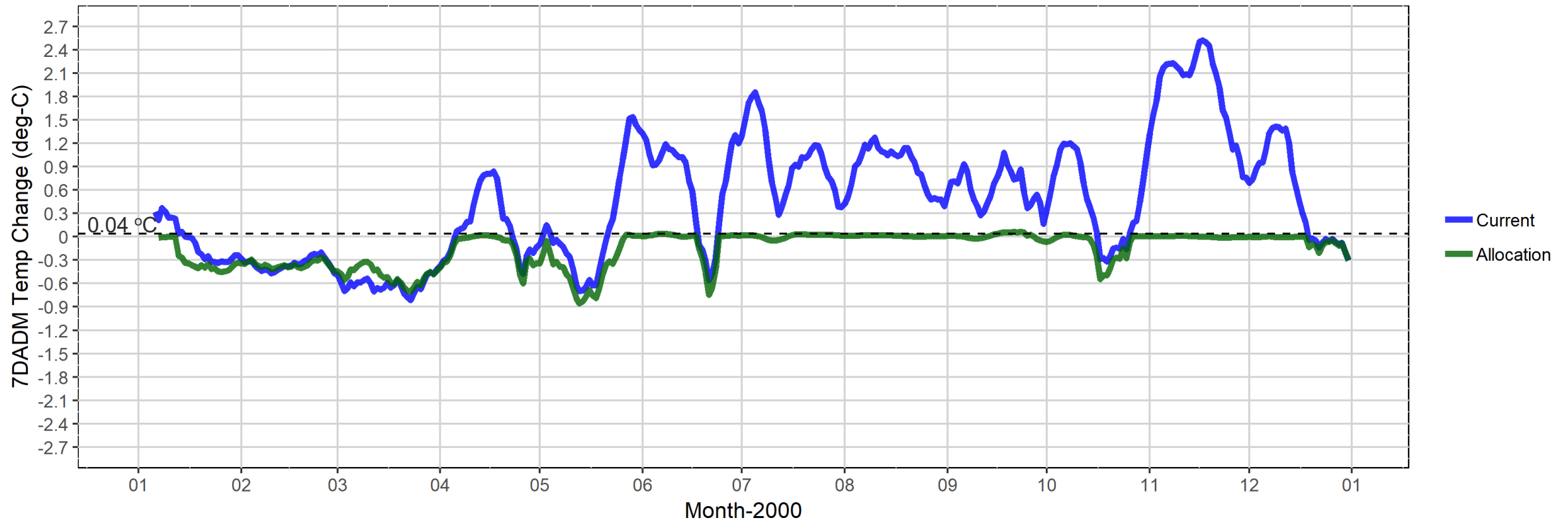
Cumulative Source Warming and Allocation



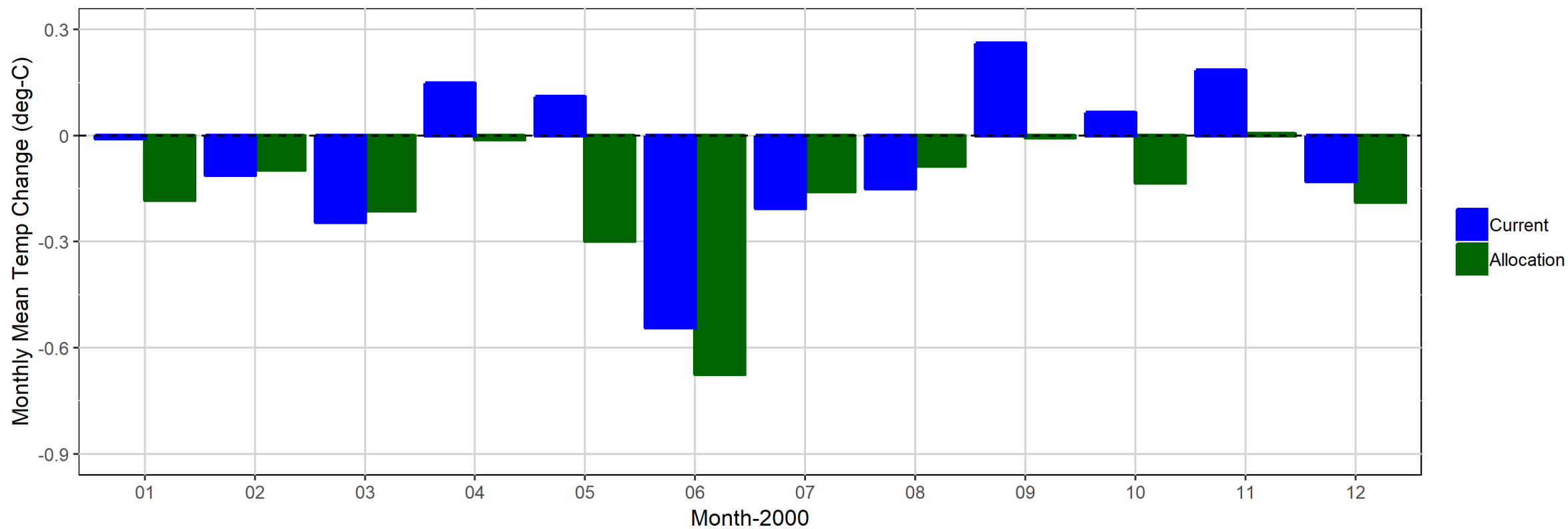
Temperature Change from Dams, KSD, LRDC, and Point Sources at Keno Dam Outlet



Temperature Change from Dams, KSD, LRDC, and Point Sources atOR/CA Stateline



Temperature Change from Dams, KSD, LRDC, and Point Sources at OR/CA Stateline



Lost River Temperature Criteria

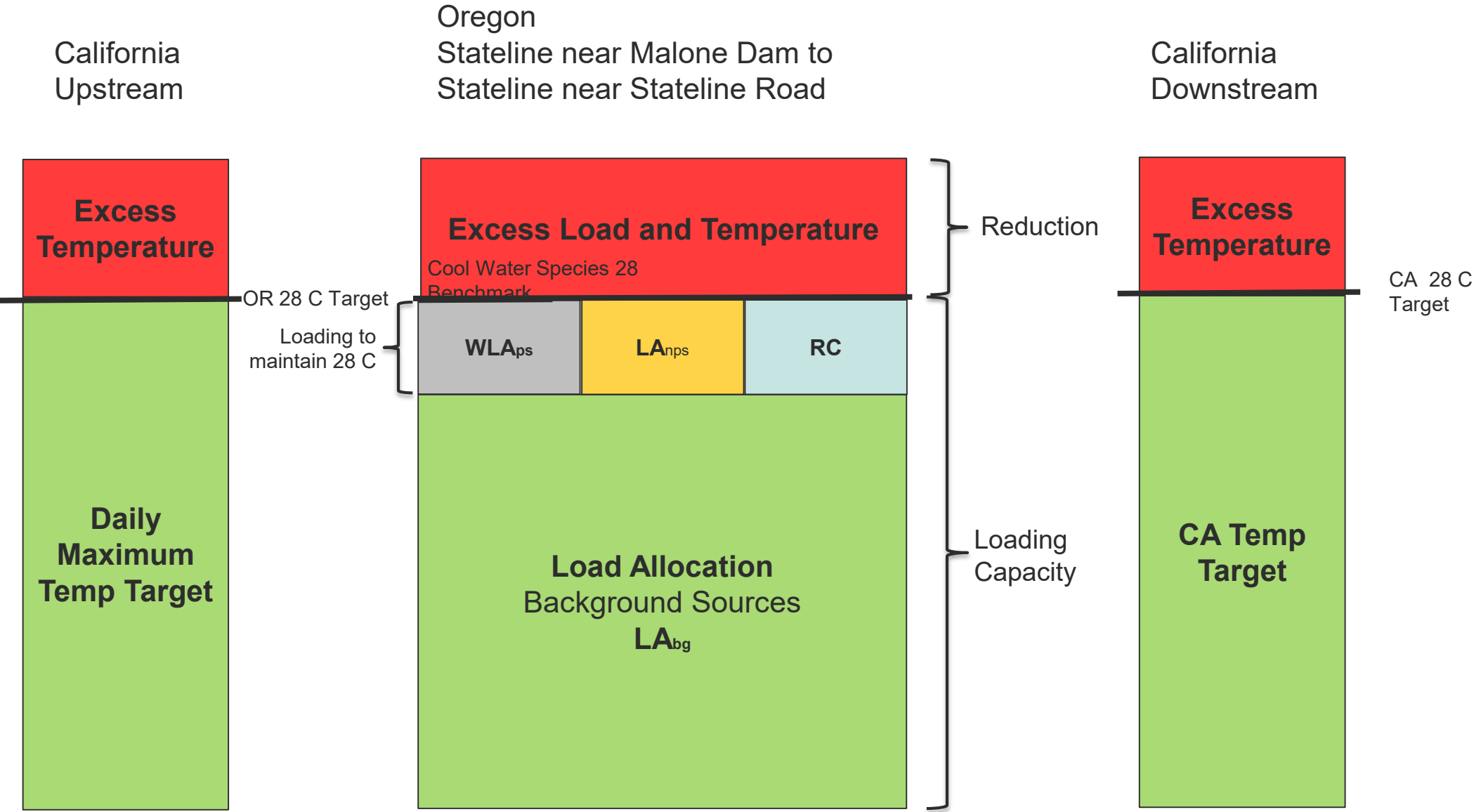
Cool Water Species Narrative

- OR/CA border (near Malone Dam) to OR/CA border (near State Line Road).
- 28 deg-C Daily Maximum

California Targets at Stateline

- 28 deg-C 7DADM

Lost River

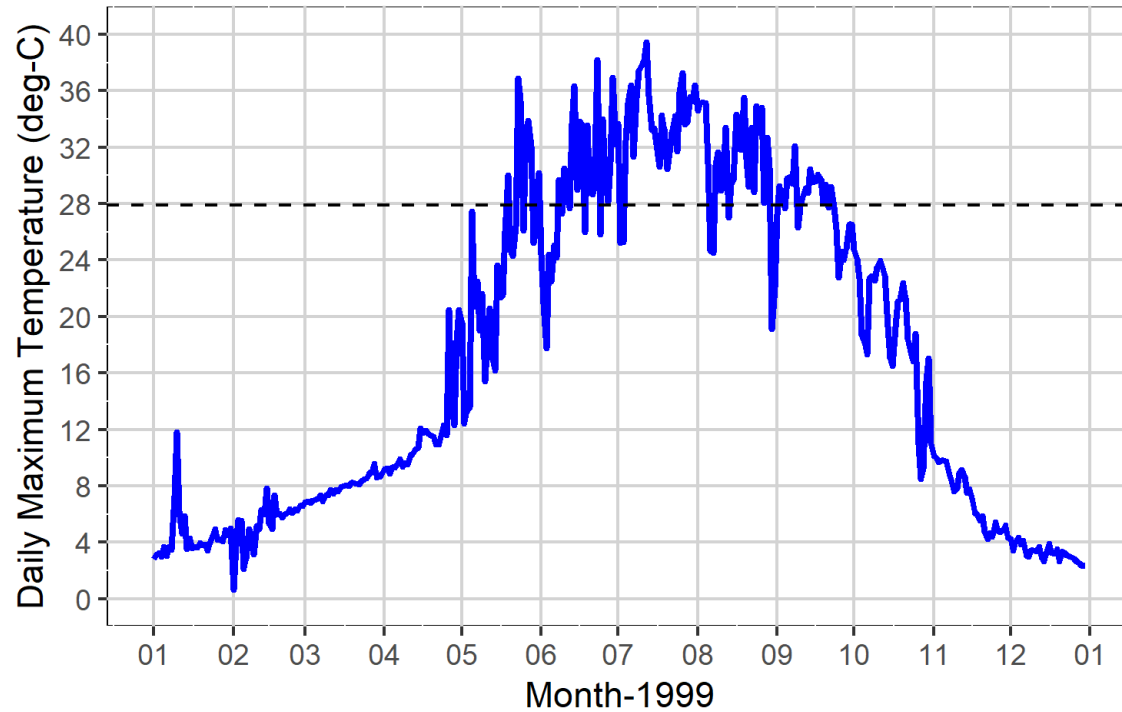


Sources

- Warming from loss of streamside vegetation
- Malone Diversion Dam
- Anderson Rose Dam

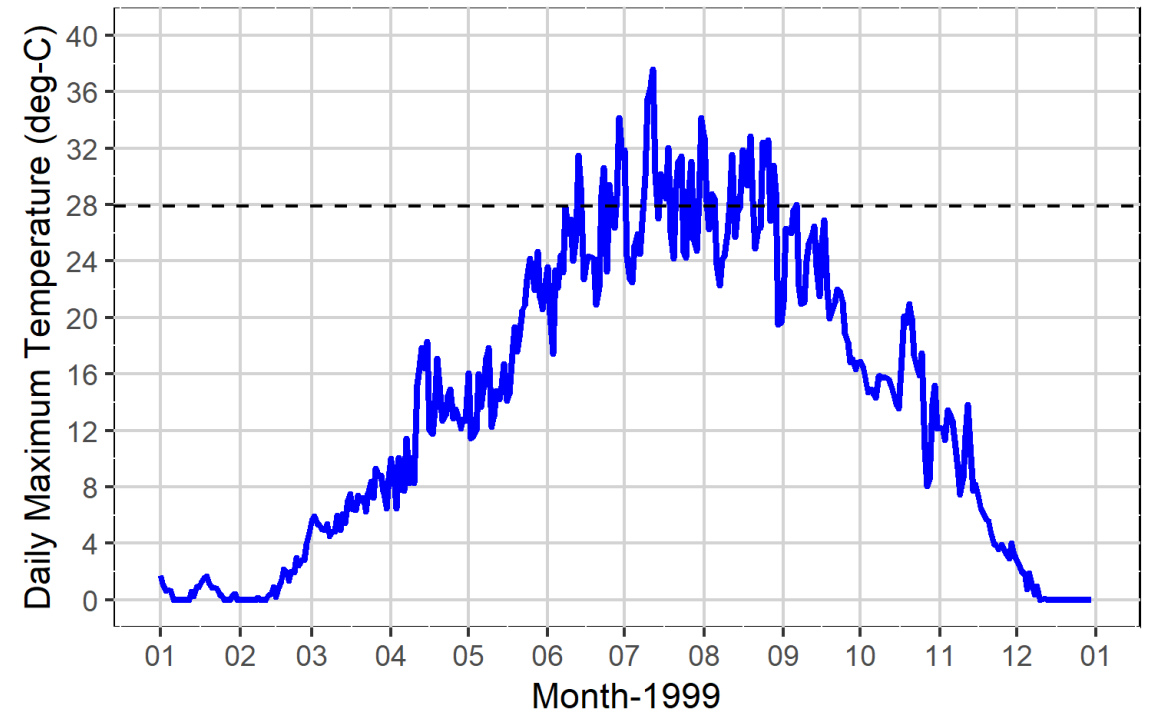
Current Temperatures

Lost River at Gift Road (LRGR)



— Current

Lost River at Stateline Road (LRSR)



— Current

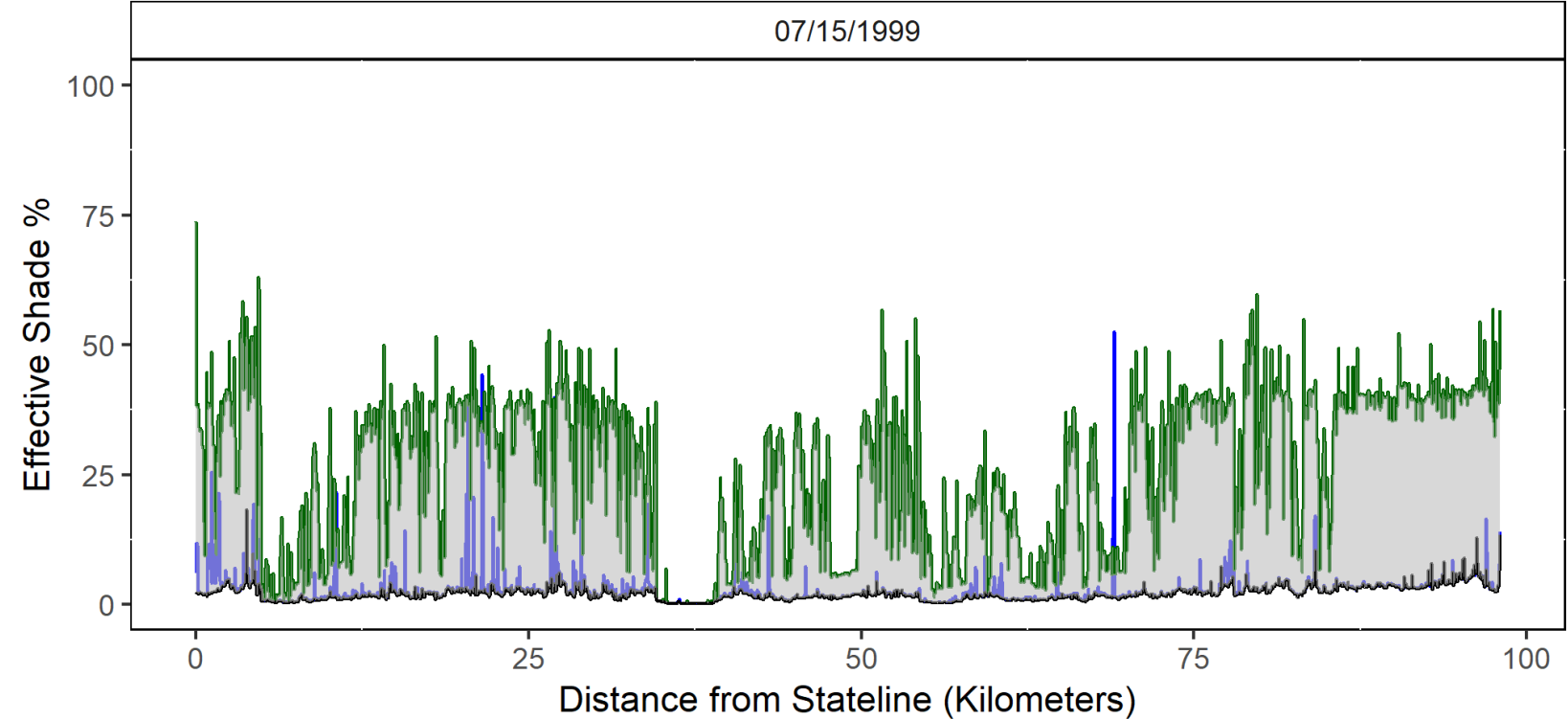
Lost River Restored Vegetation

Location	Vegetation Type	Proportion in model	Height (m)	Density	Overhang (m)
Within 10-meters from stream channel	Cottonwood	0.60	36.5	70%	3.0
	Aspen	0.10	12	70%	3.0
	Willow	0.30	4.5	90%	3.0
	Composite Average	1.00	24.5	76%	3.0
Beyond 10-meters from stream channel	Cottonwood	0.25	36.5	70%	0.0
	Aspen	0.20	12	70%	0.0
	Willow	0.30	4.5	90%	0.0
	Sagebrush and or Native Grasses	0.20	0.9	100%	0.0
	Ponderosa Pine	0.05	30.5	10%	0.0
	Composite Average	1.00	14.6	79%	0.0

Restored Vegetation

Lost River

07/15/1999

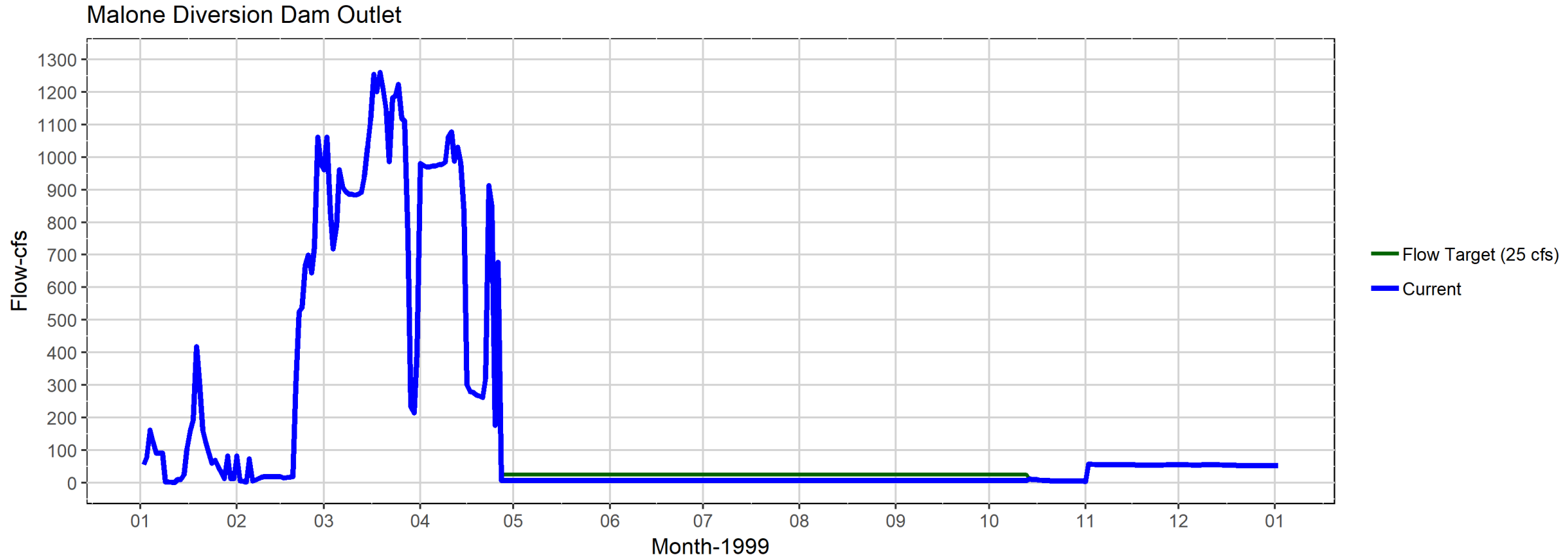


	Mean Effective Shade Current Condition	Mean Effective Shade Restored Condition	Mean Effective Shade Deficit
Extent			
Lost River in Oregon (Malone Dam to Stateline)	3%	26%	23%
Malone Dam to Harpold Dam	3%	30%	27%
Harpold Dam to Poe Valley Bridge (RM 27)	1%	12%	11%
Poe Valley Bridge (RM 27)-Wilson Reservoir	2%	20%	18%
Wilson Reservoir	0%	0%	0%
Wilson Dam to Anderson Rose Dam	3%	27%	24%
Anderson Rose Dam to Stateline	6%	37%	31%

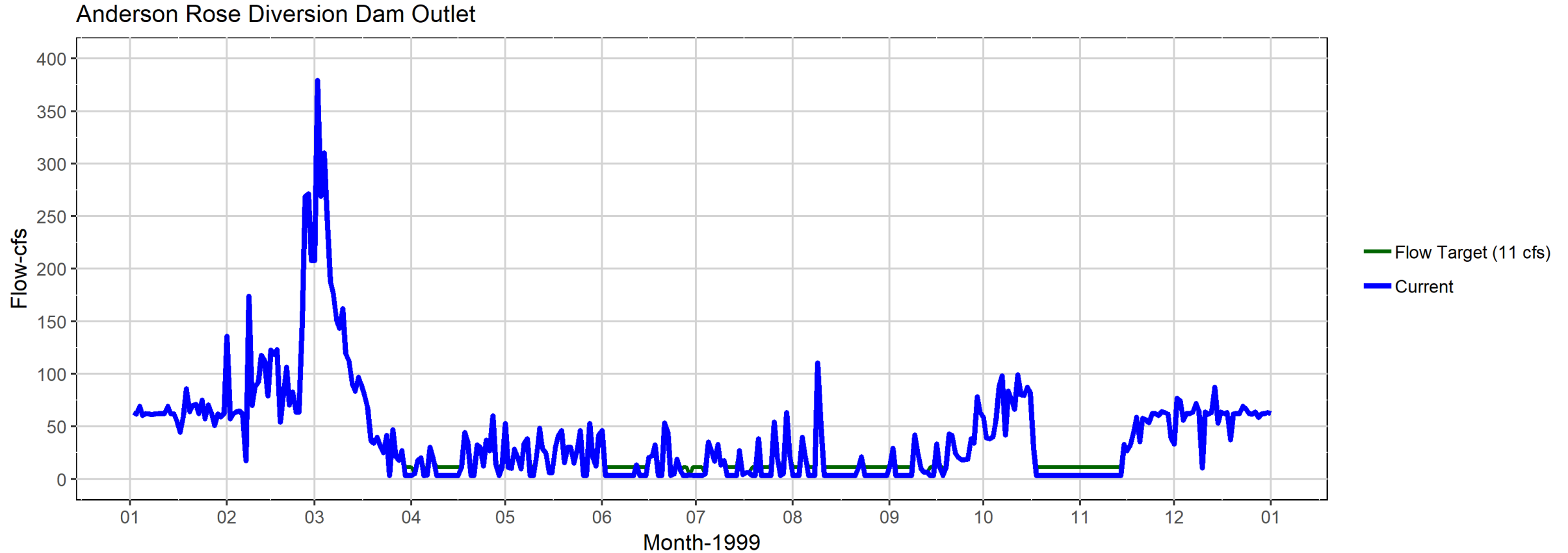
Current Condition Restored Vegetation Topographic Disturbance Range



Flow below Malone Diversion Dam

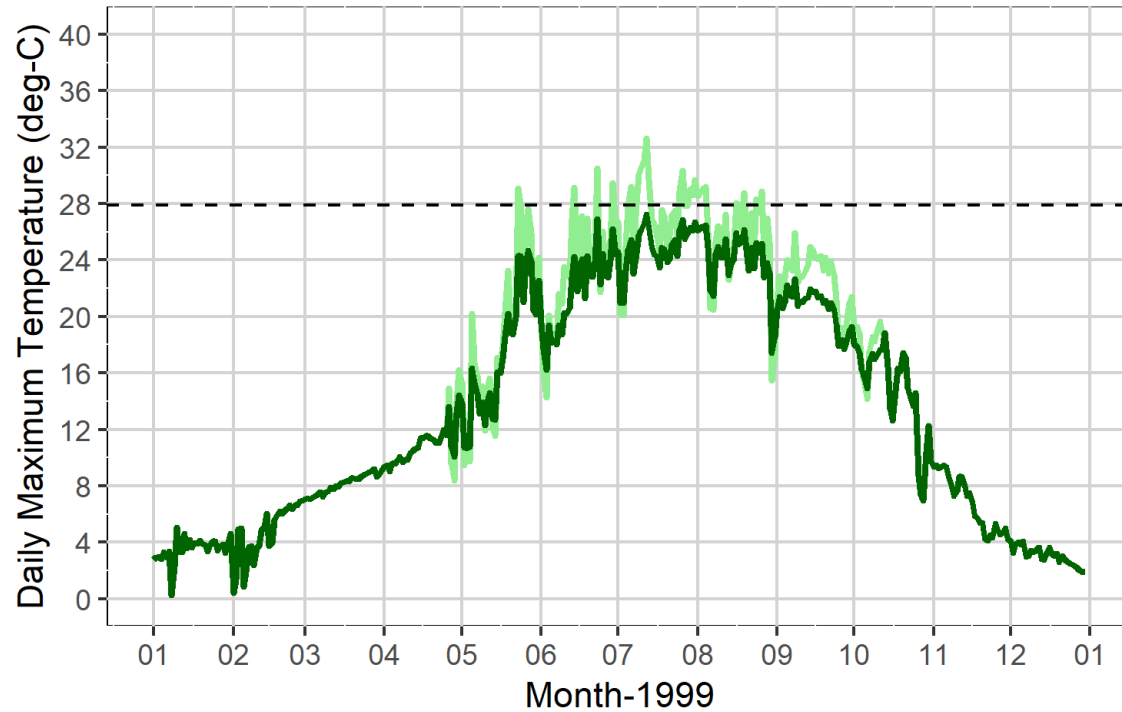


Flow below Anderson Rose Diversion Dam



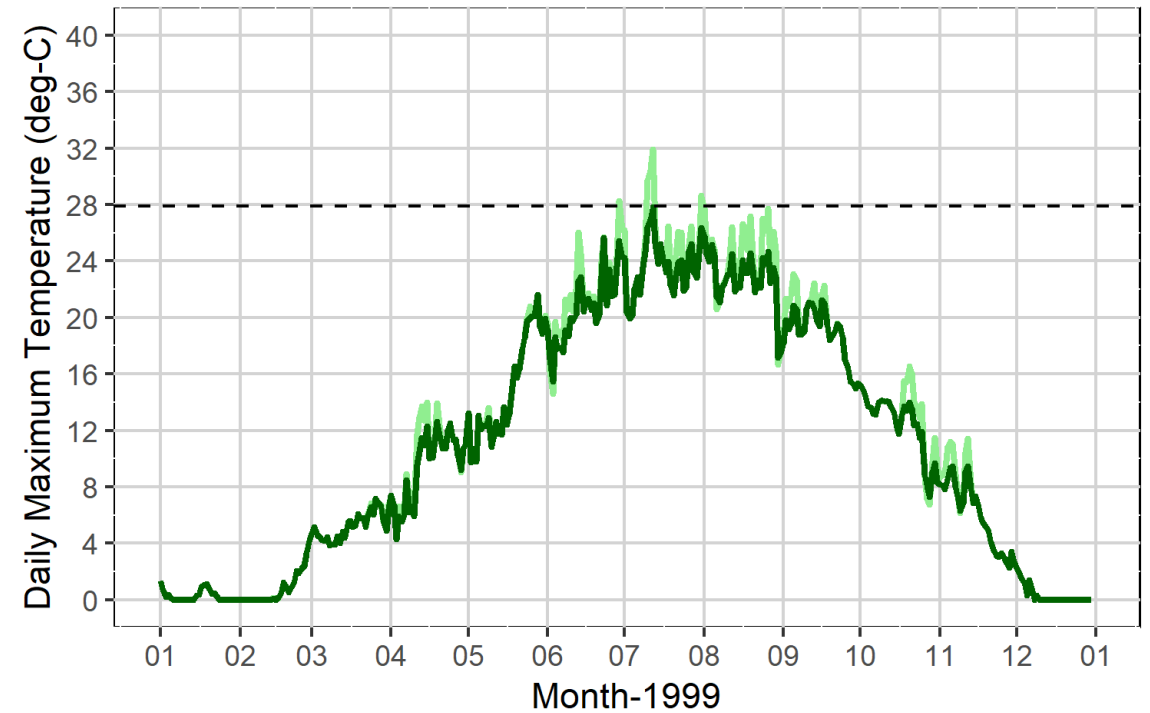
Scenario Temperatures

Lost River at Gift Road (LRGR)



— Shade — Flow Target and Shade

Lost River at Stateline Road (LRSR)



— Shade — Flow Target and Shade

Contact Information

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Acknowledgements:

TetraTech
EPA Region 10

