

# 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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Oregon Department of Environmental Quality

# Agenda

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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

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

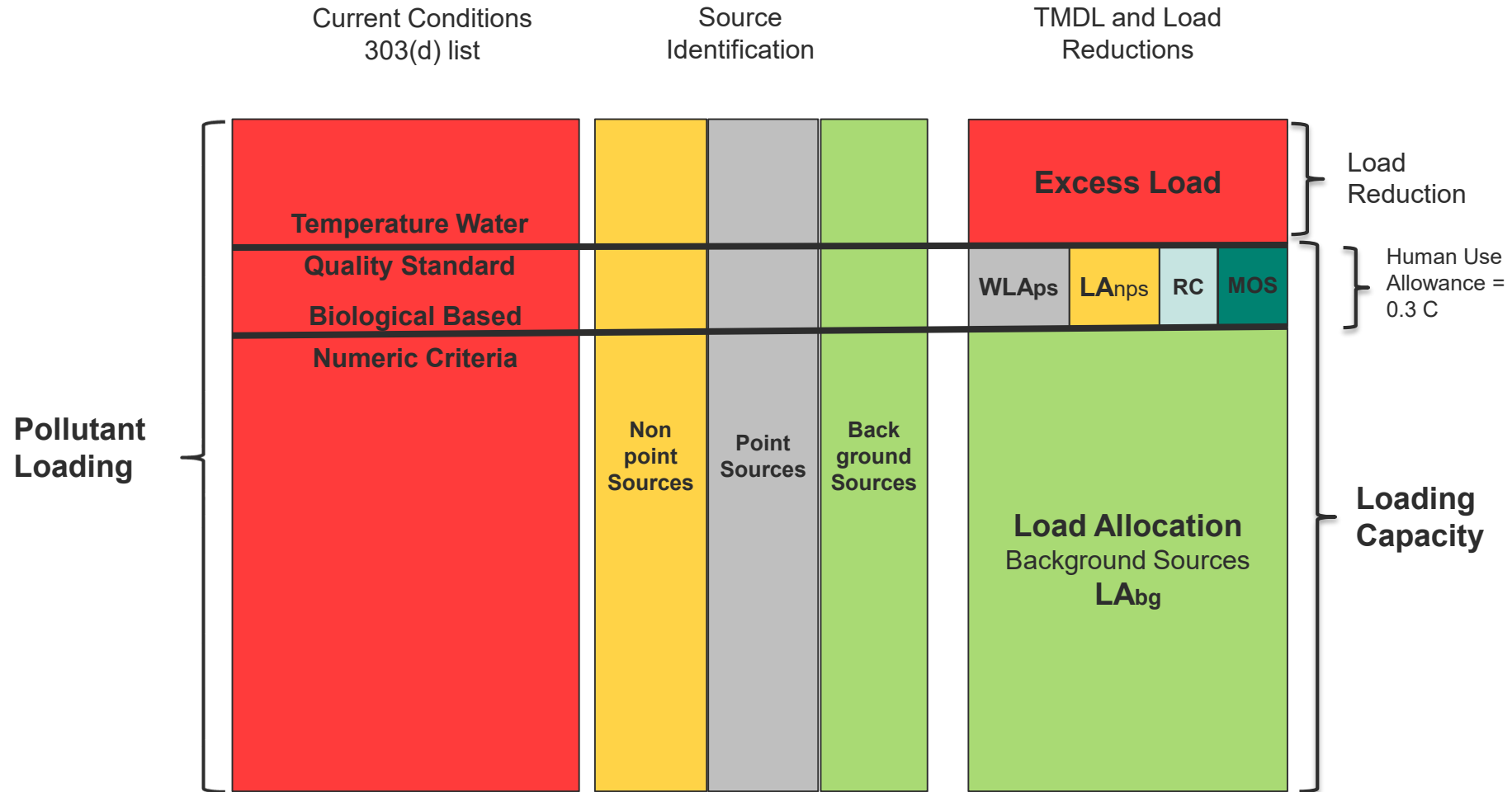
July 15, 2019: Public Comment Ends

Sept. 30, 2019: EPA approval of TMDL

# Typical Temperature TMDL

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

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)

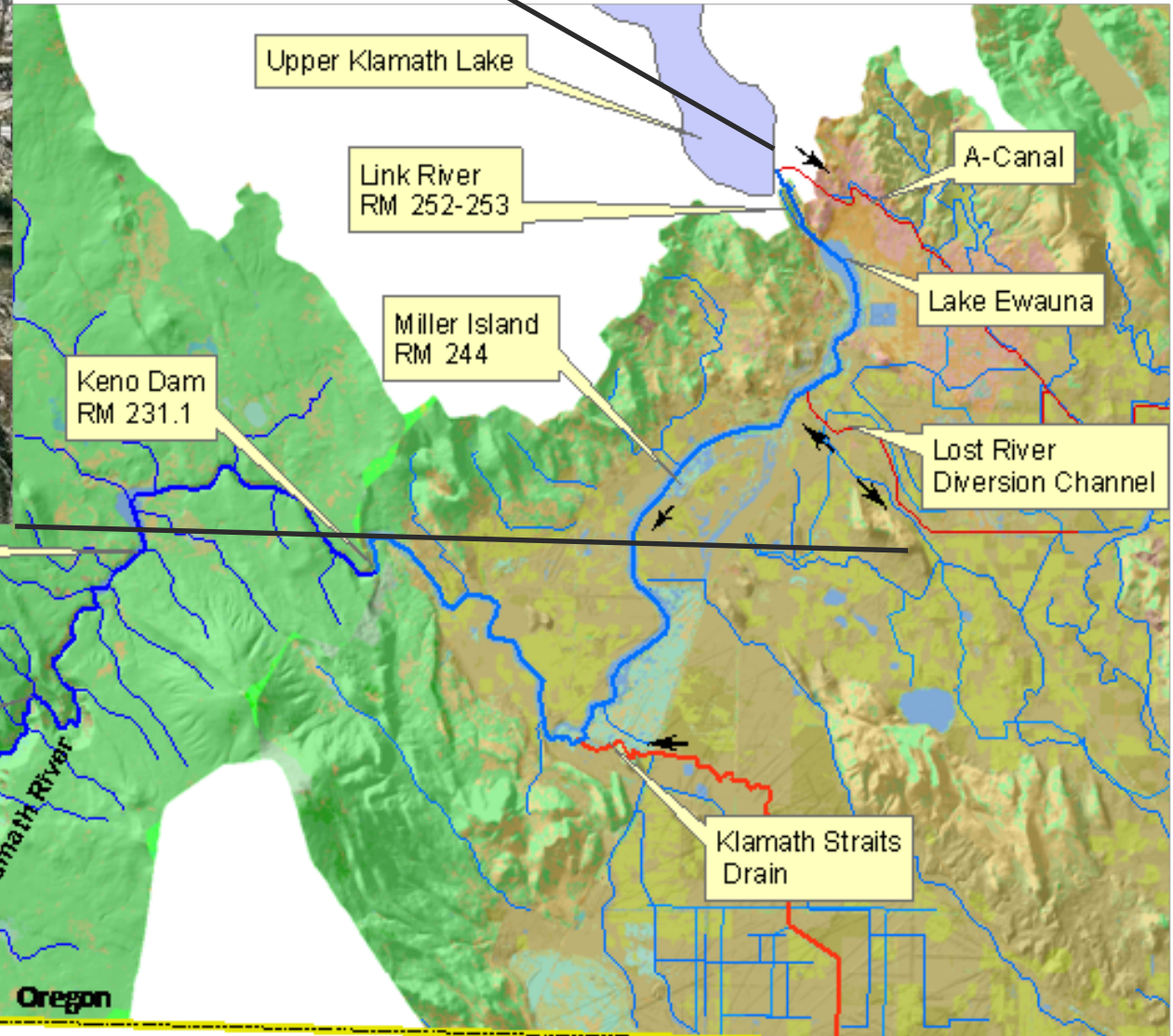
## Redband and Lahontan Use

- 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  $\leq 0.04$  deg-C)





# Klamath River

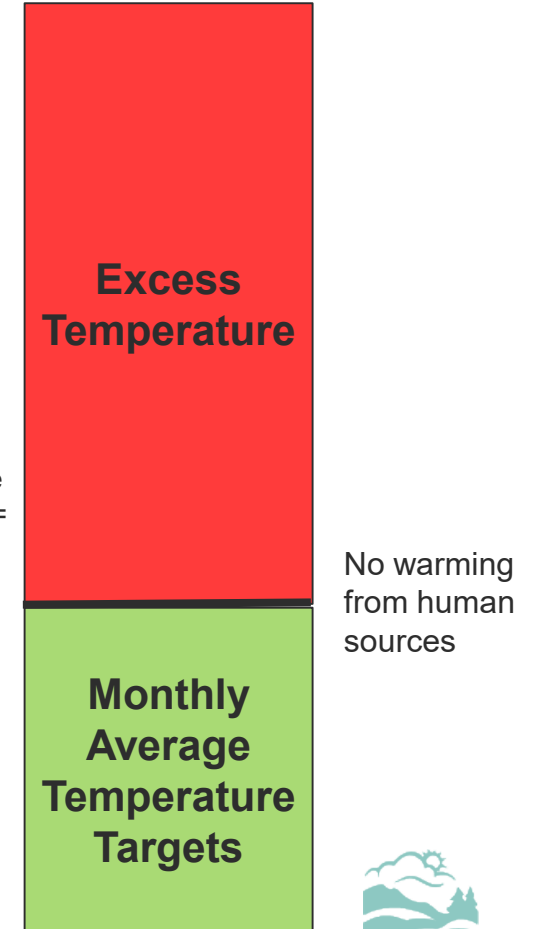
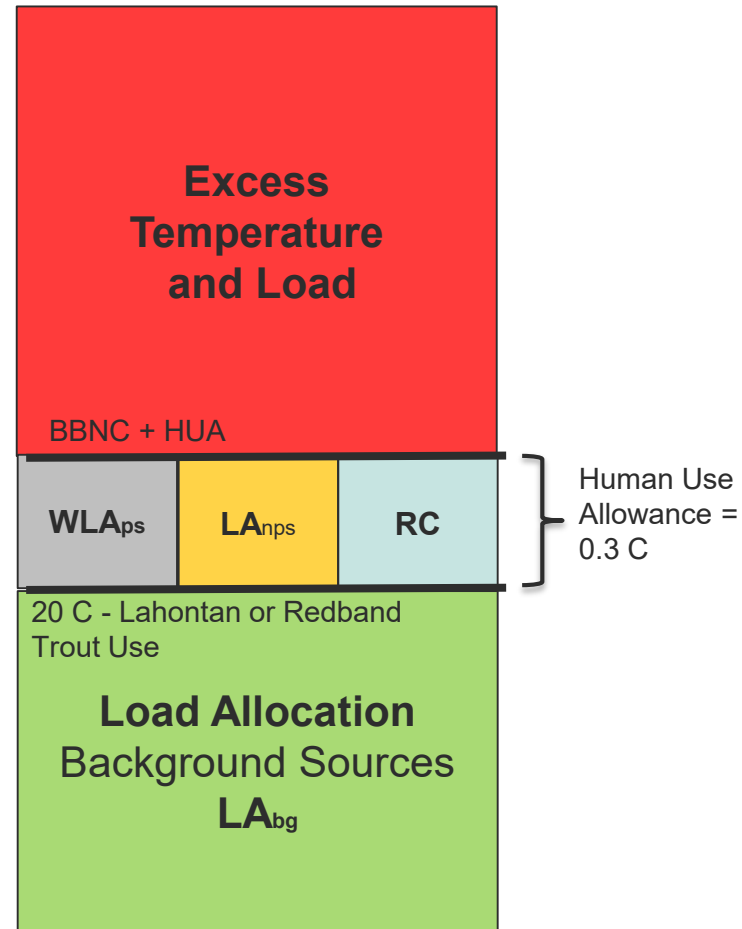
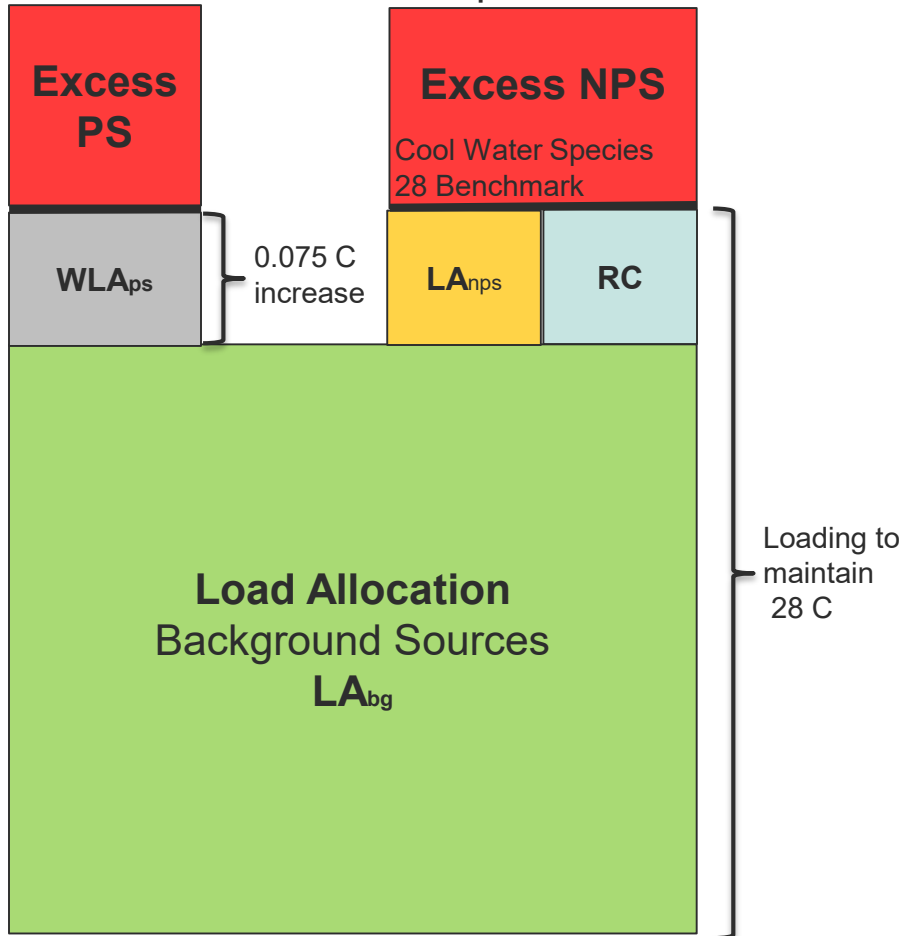
Upper Klamath Lake – Keno Dam

Keno Dam - Stateline

California

Point Sources

Nonpoint Sources



# Klamath River Source Reductions

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



# Criteria Driving Reductions

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## 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.

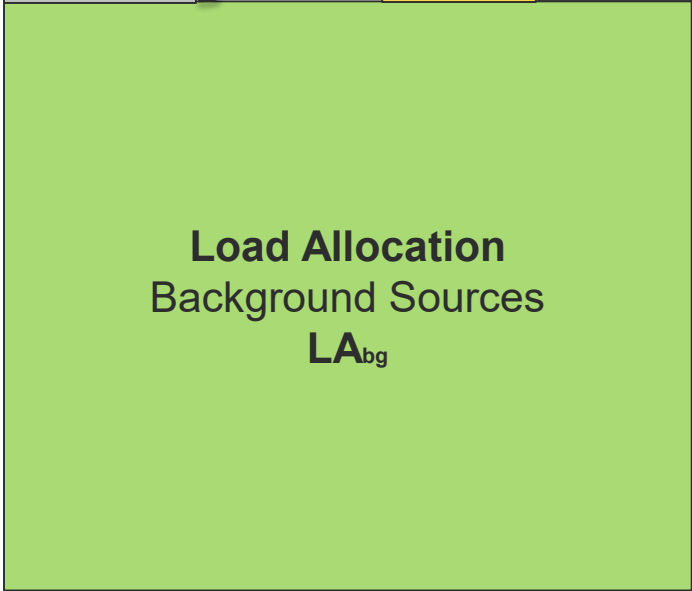
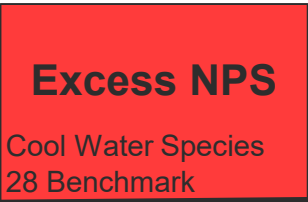
### Point Sources



0.015 C increase

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

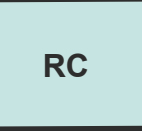
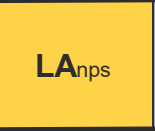
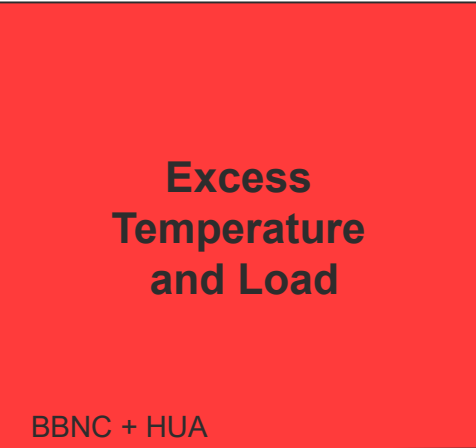
### Nonpoint Sources



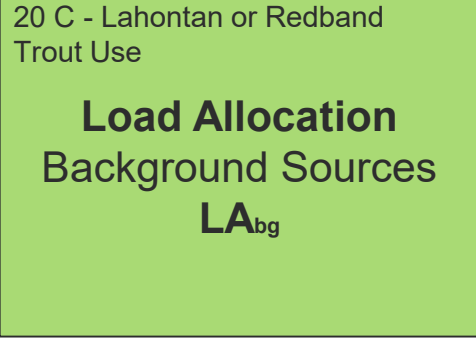
Loading to maintain 28 C

## Keno Dam - Stateline

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

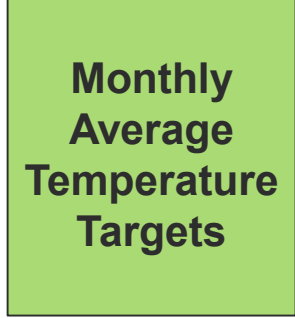


Human Use Allowance = 0.3 C



## California

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



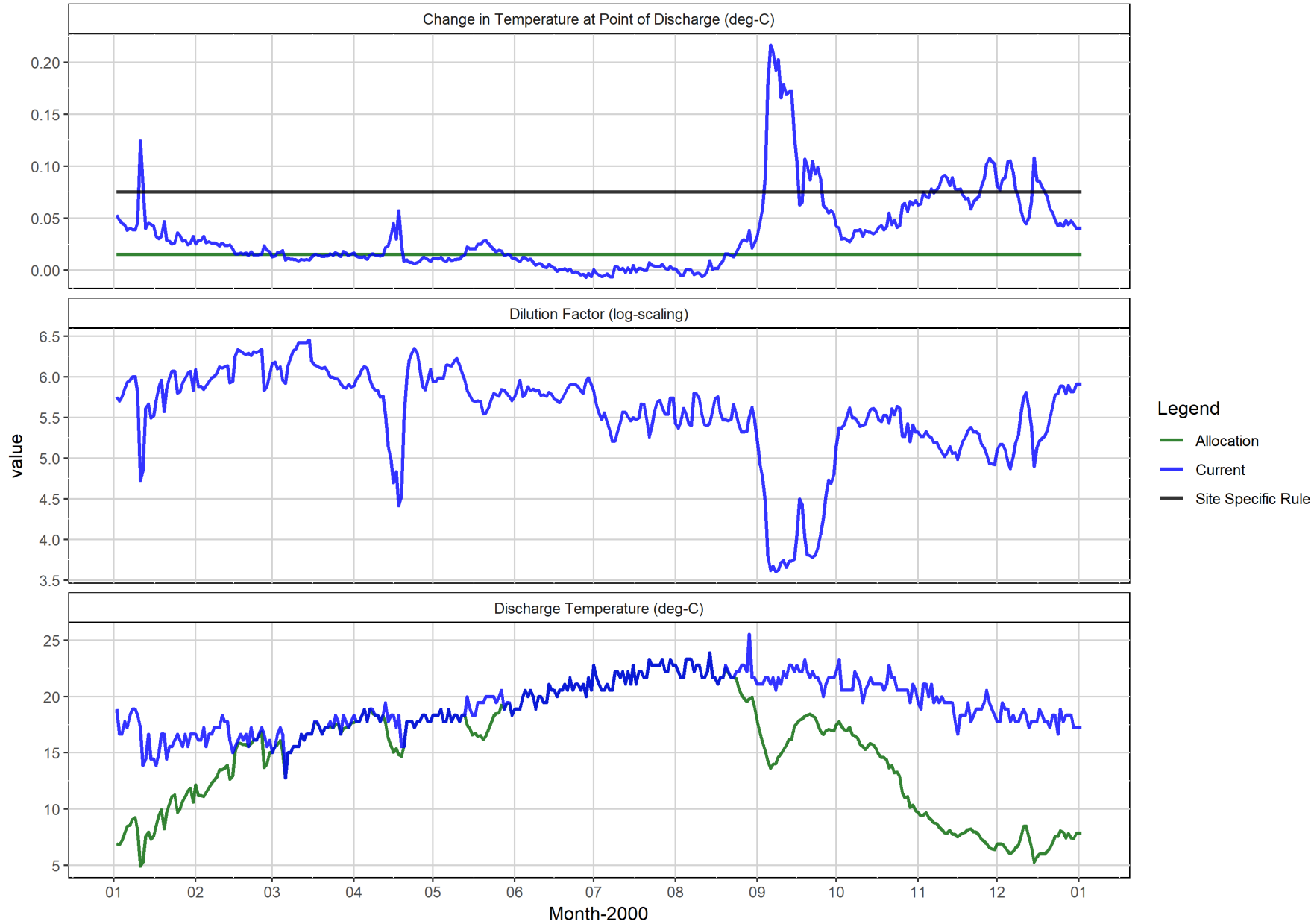
No warming from human sources



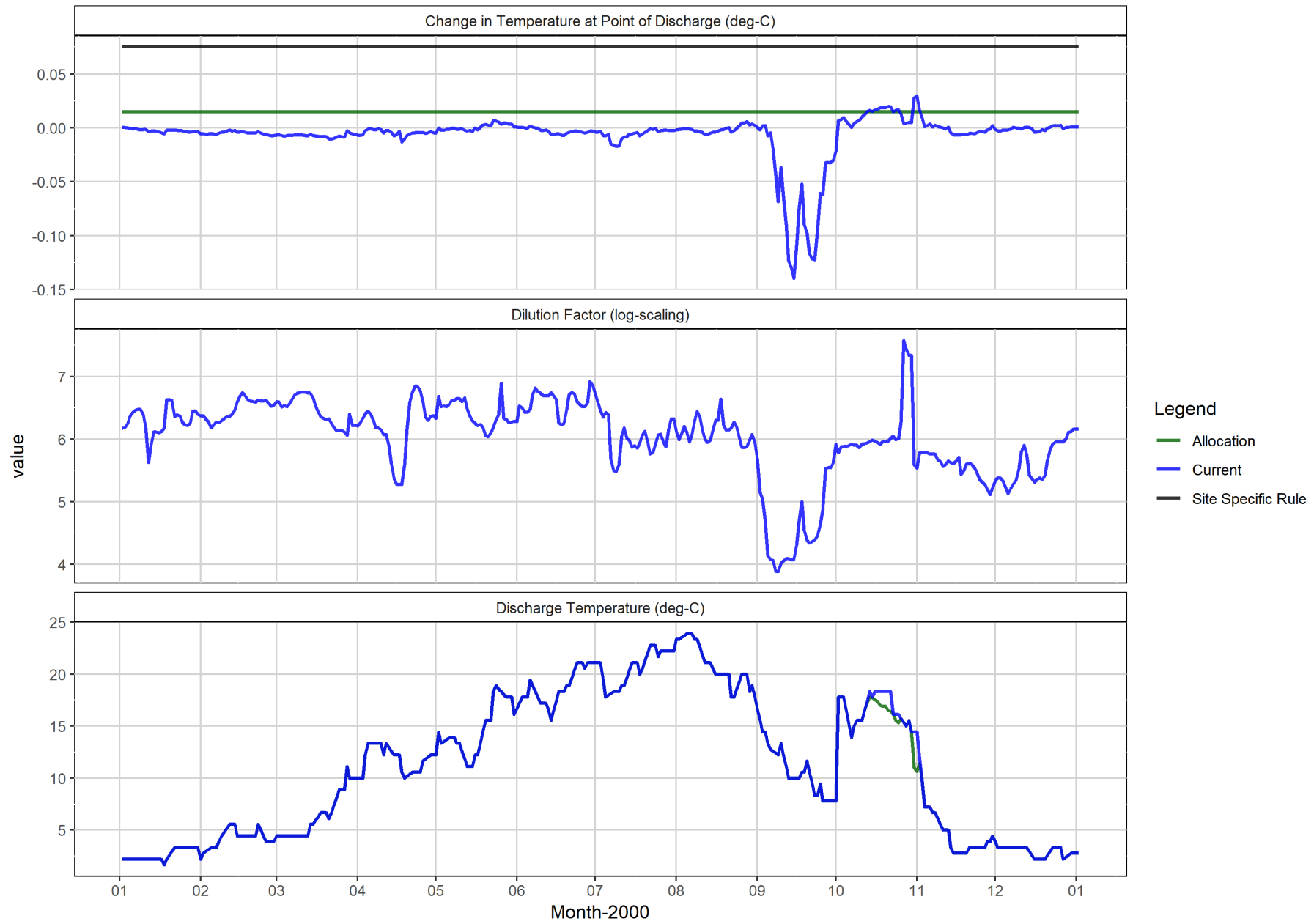
# Point Source Warming and Allocations



# Klamath Falls WWTP

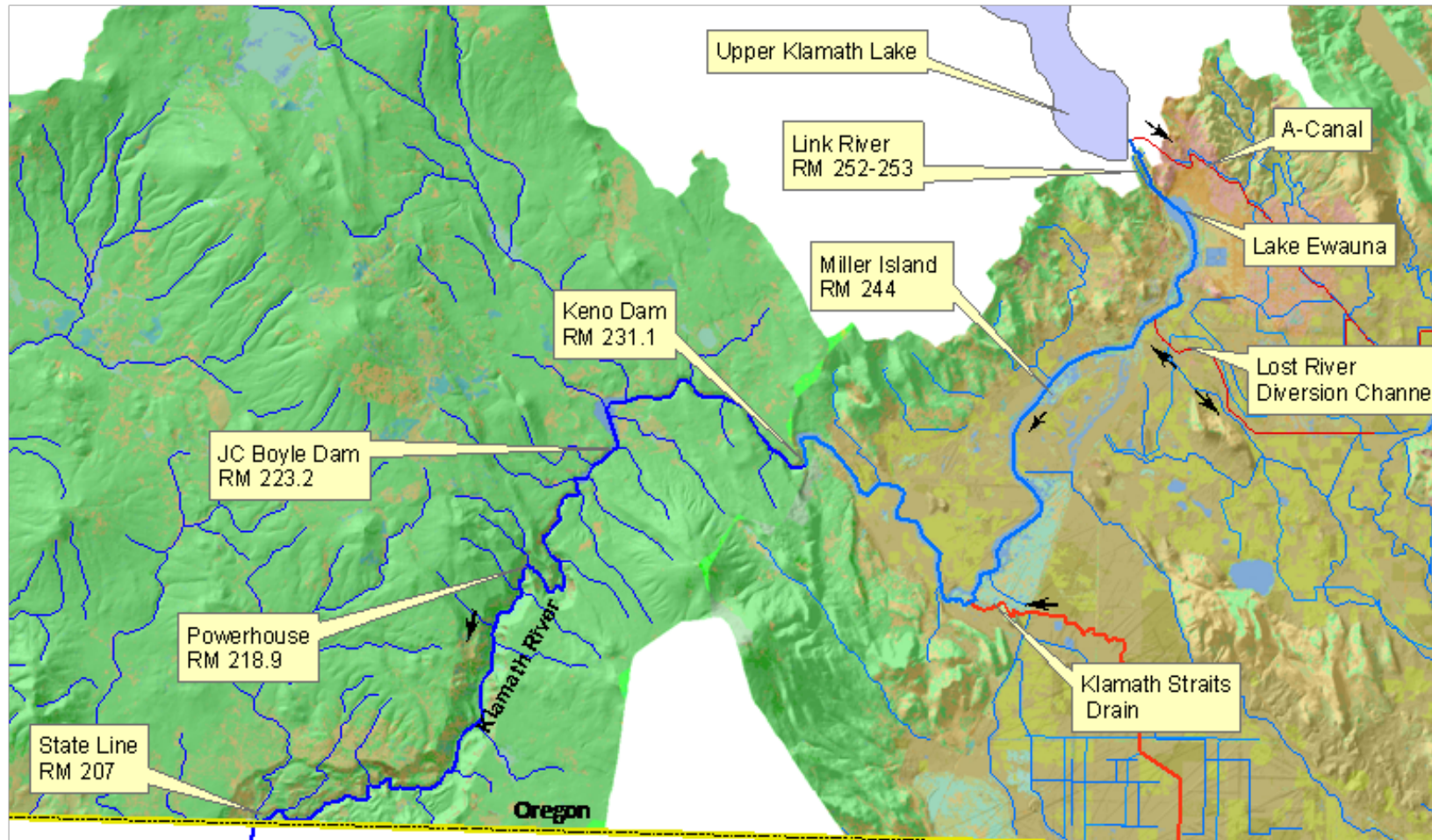


# South Suburban WWTP



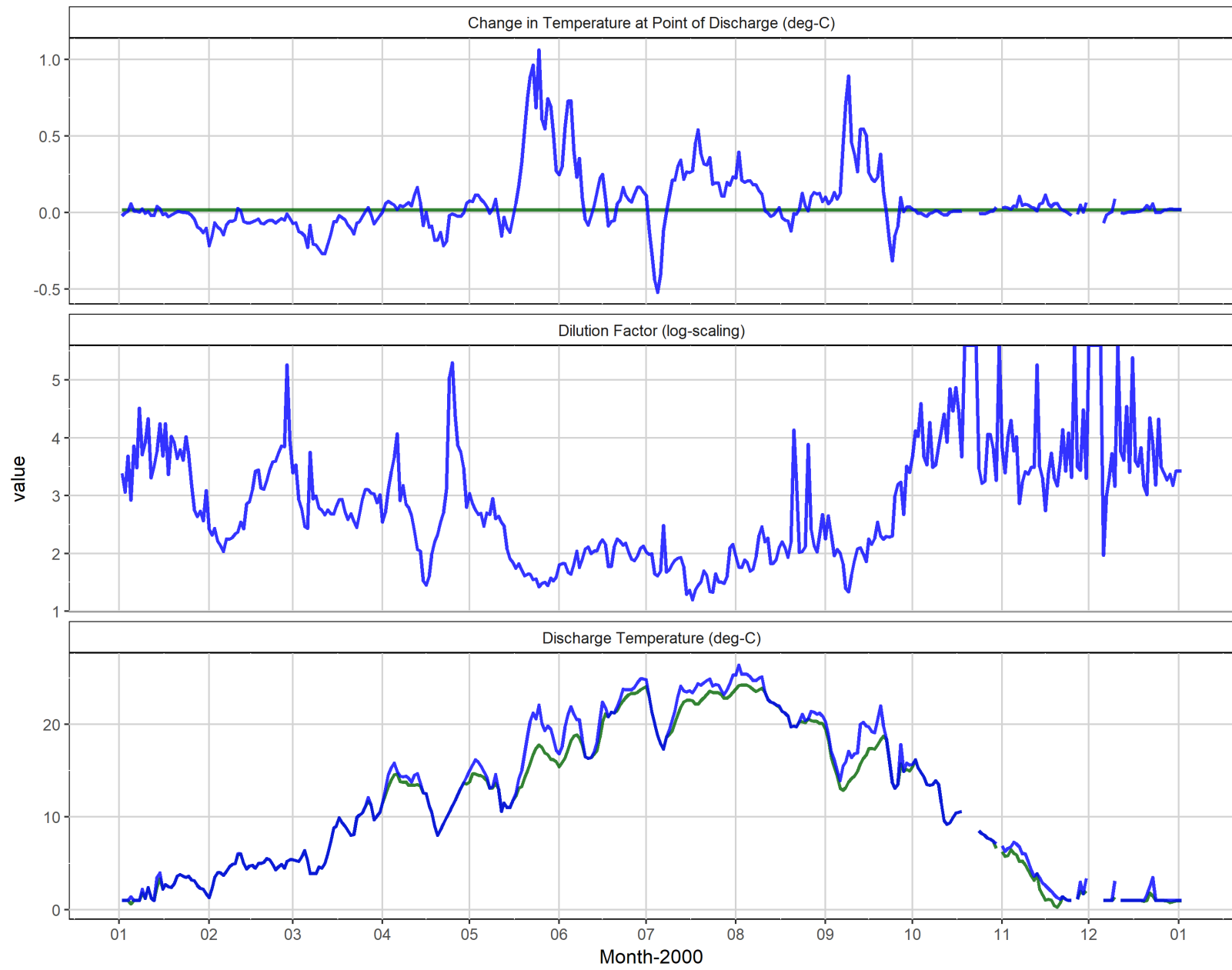


# KSD and LRDC Warming and Allocations





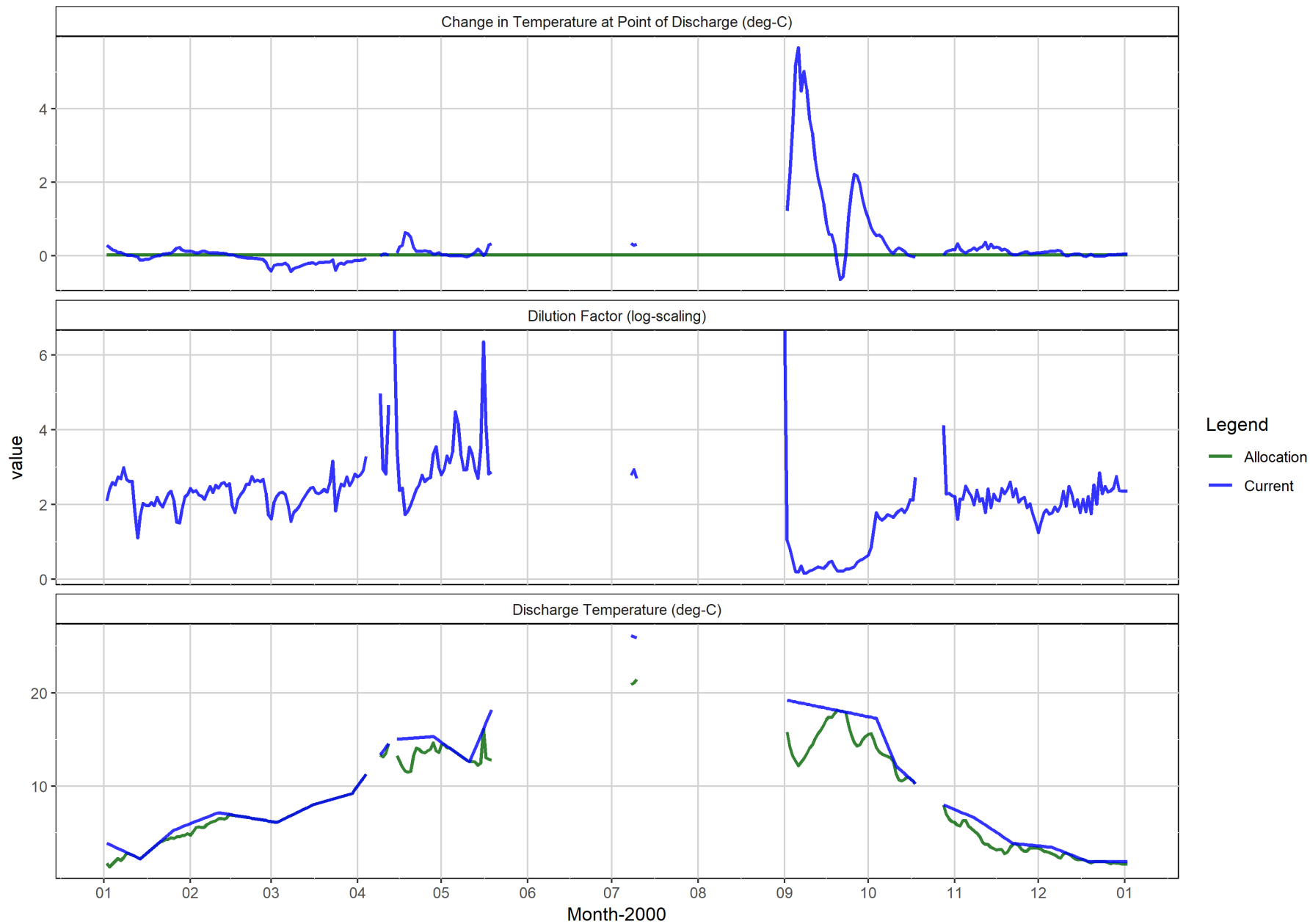
# Klamath Straits Drain



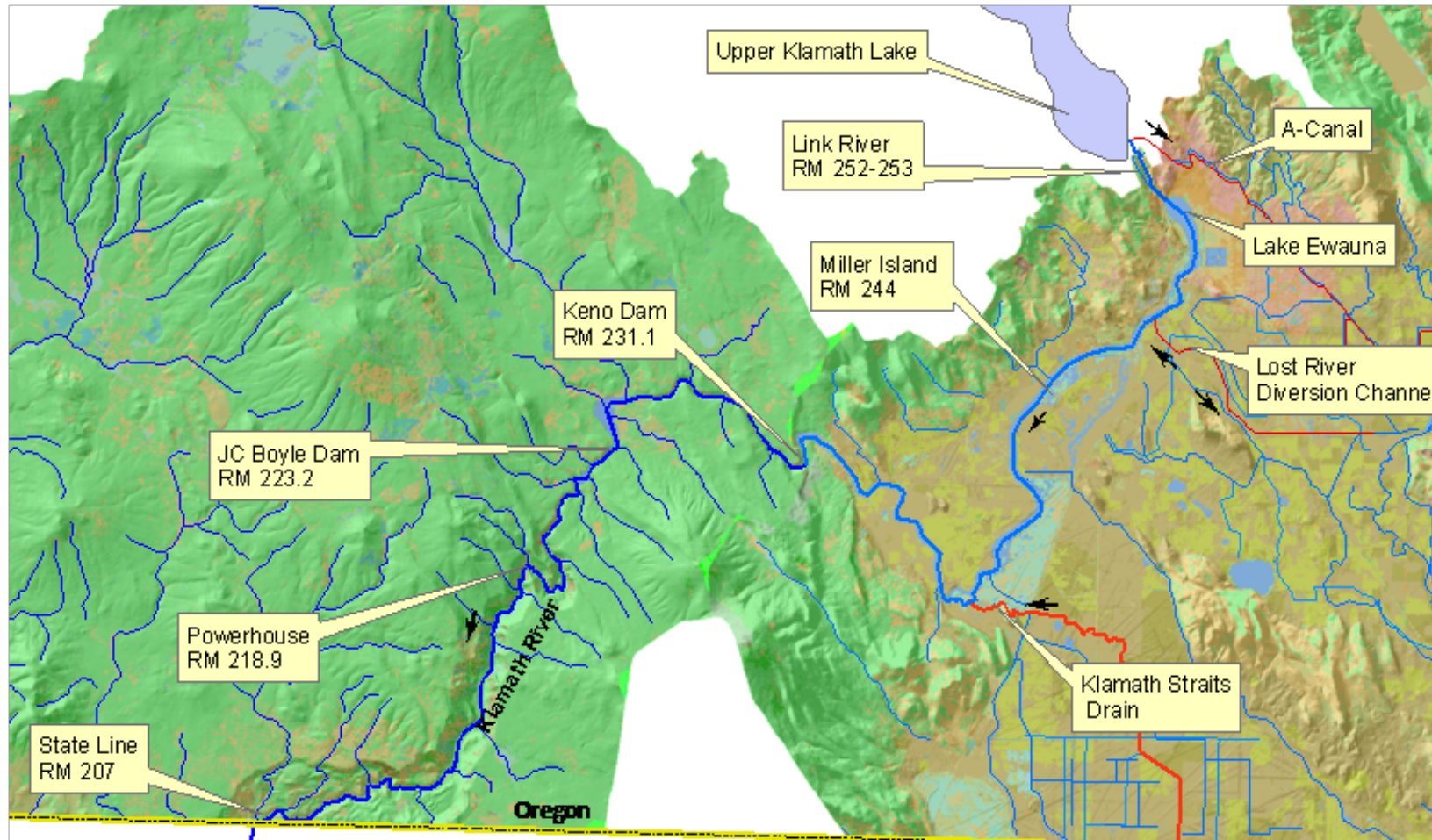
Legend  
— Allocation  
— Current



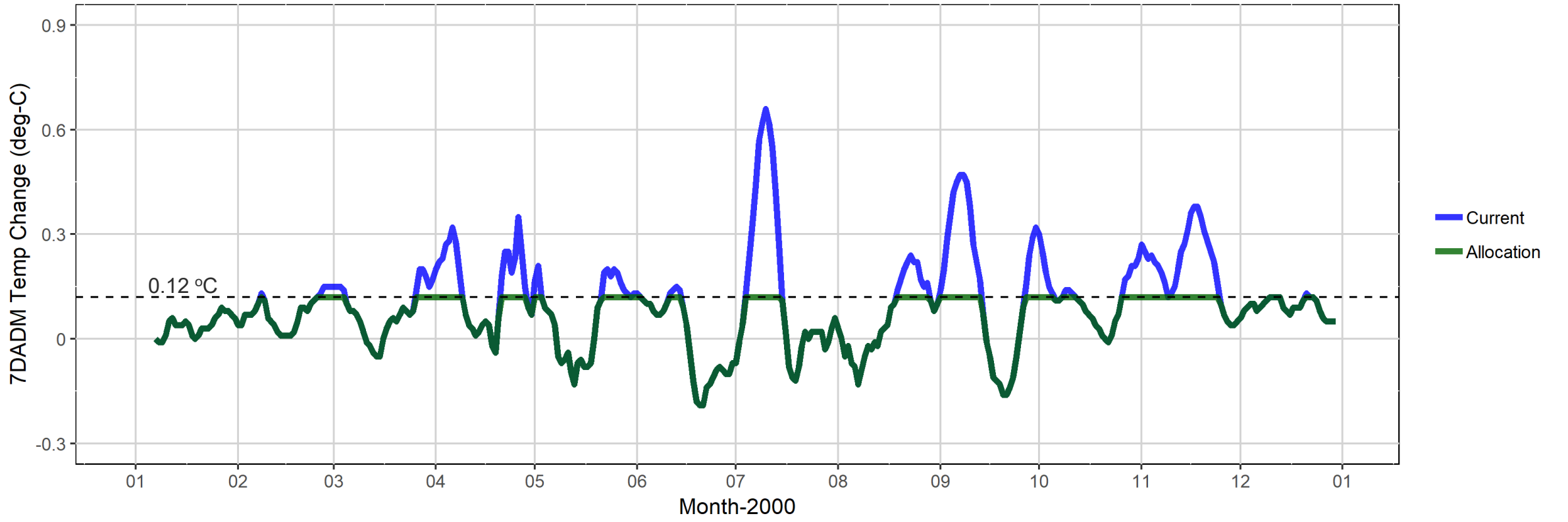
# Lost River Diversion Channel



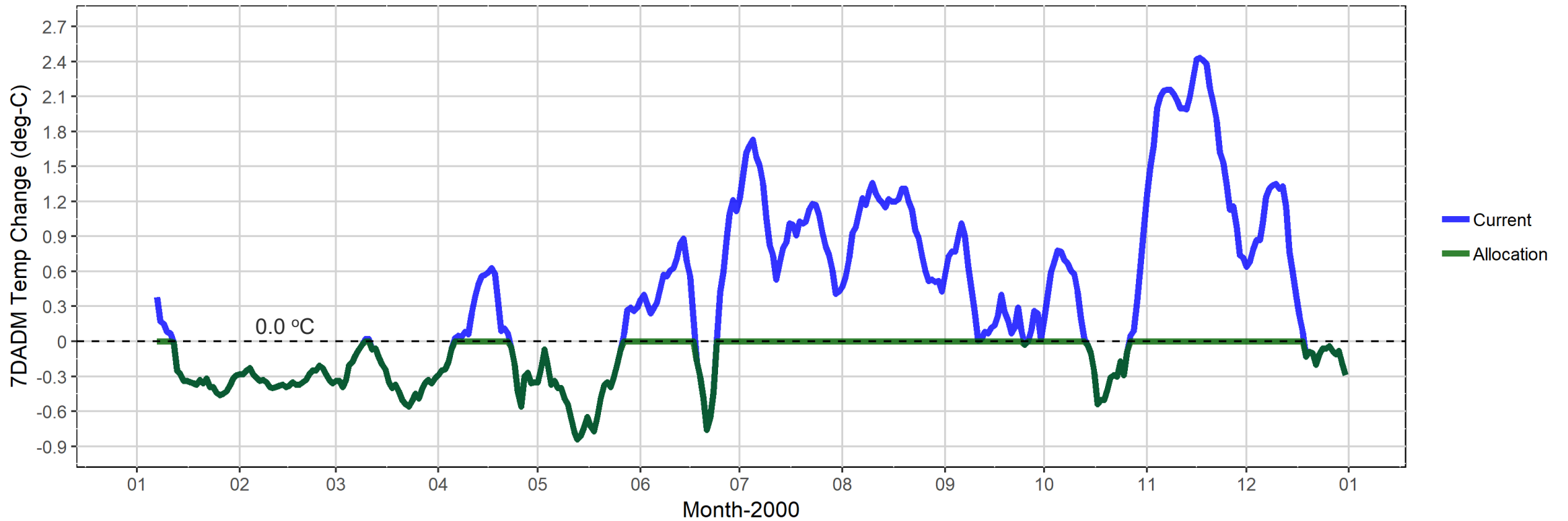
# Keno and J.C. Boyle Dams Warming and Allocation



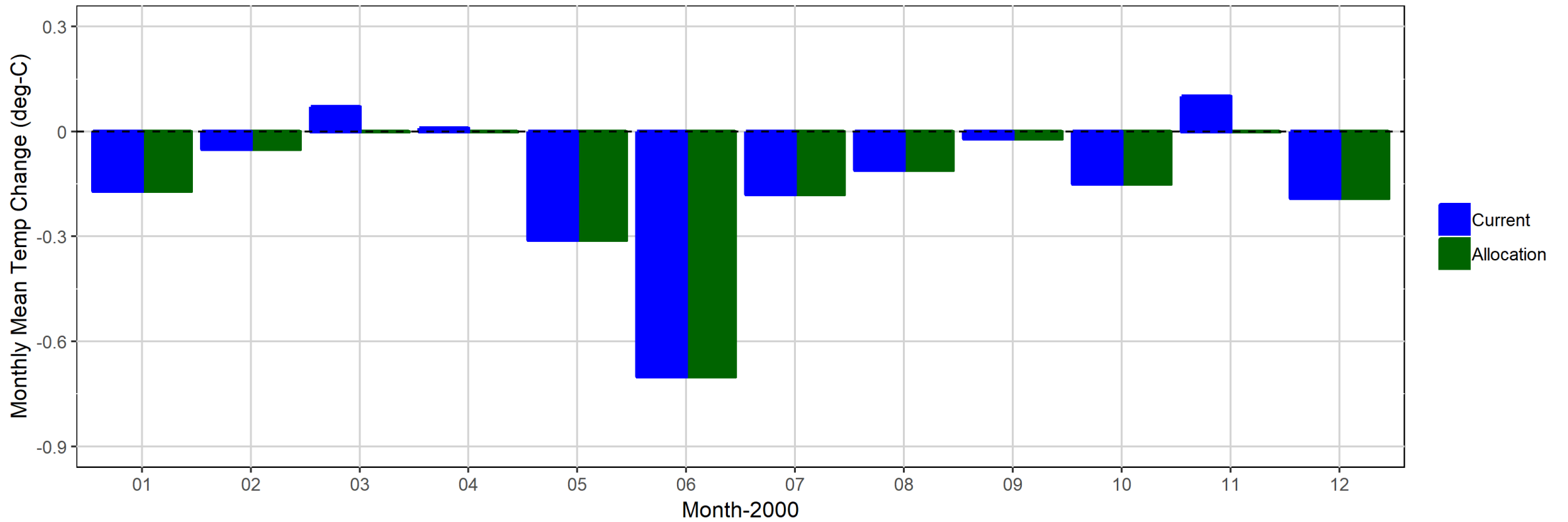
Temperature Change from Keno Dam at Outlet



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

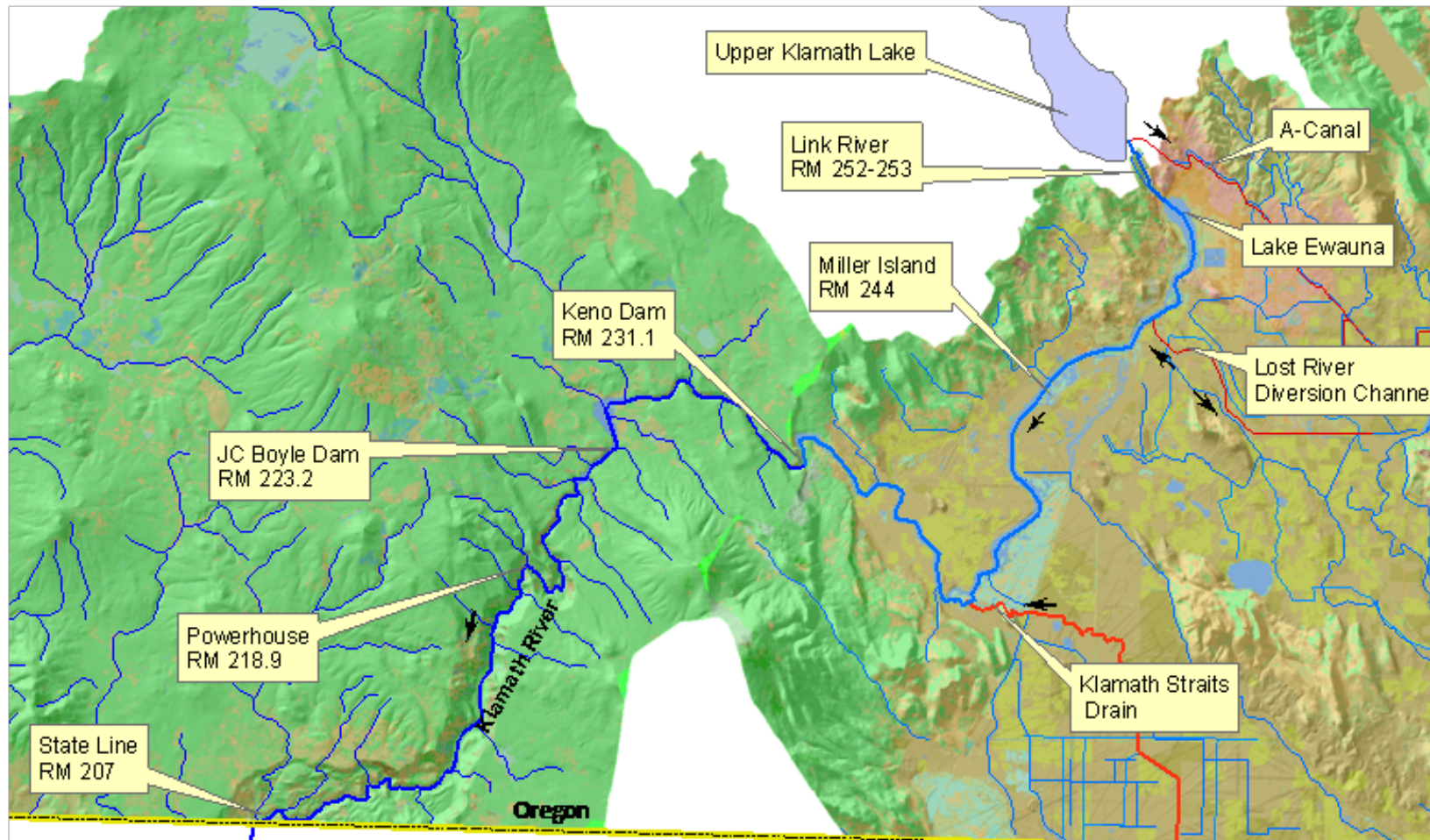


Temperature Change from J.C. Boyle and Keno Dam at OR/CA Stateline

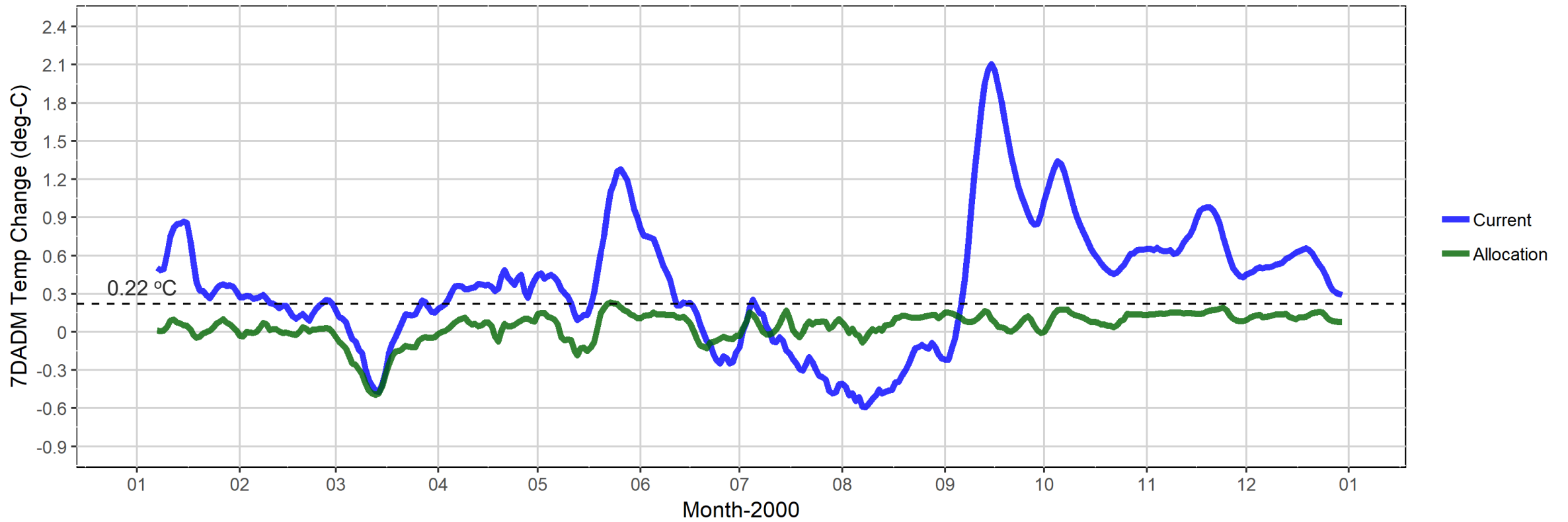




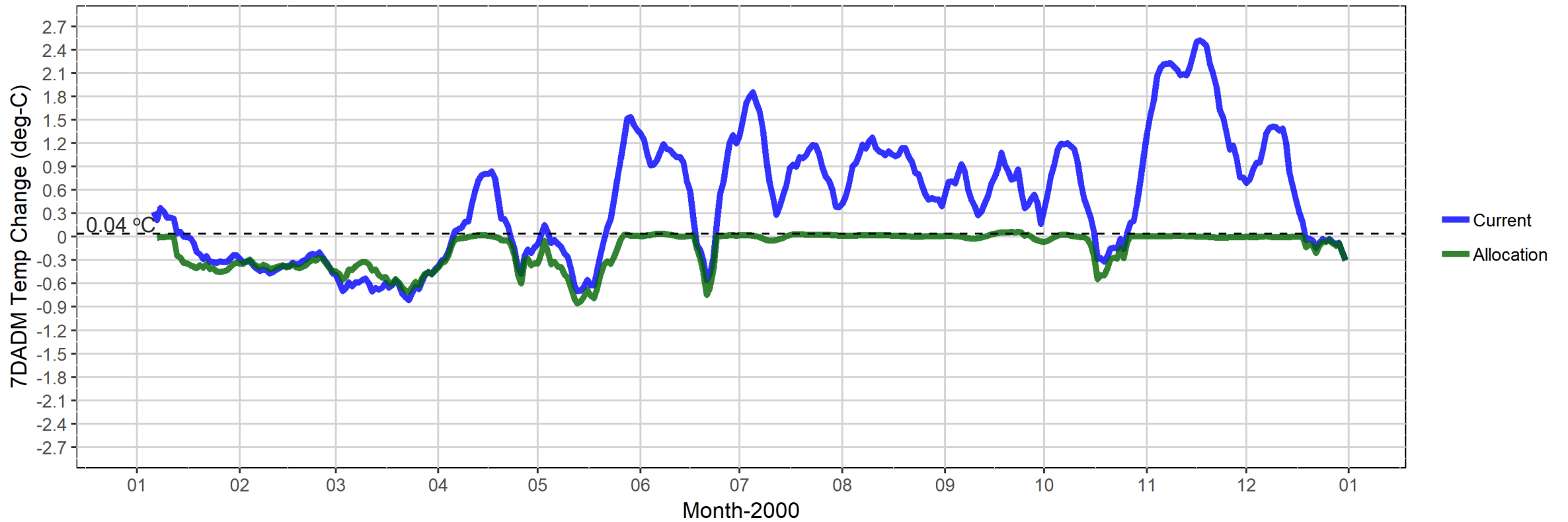
# Cumulative Source Warming and Allocation



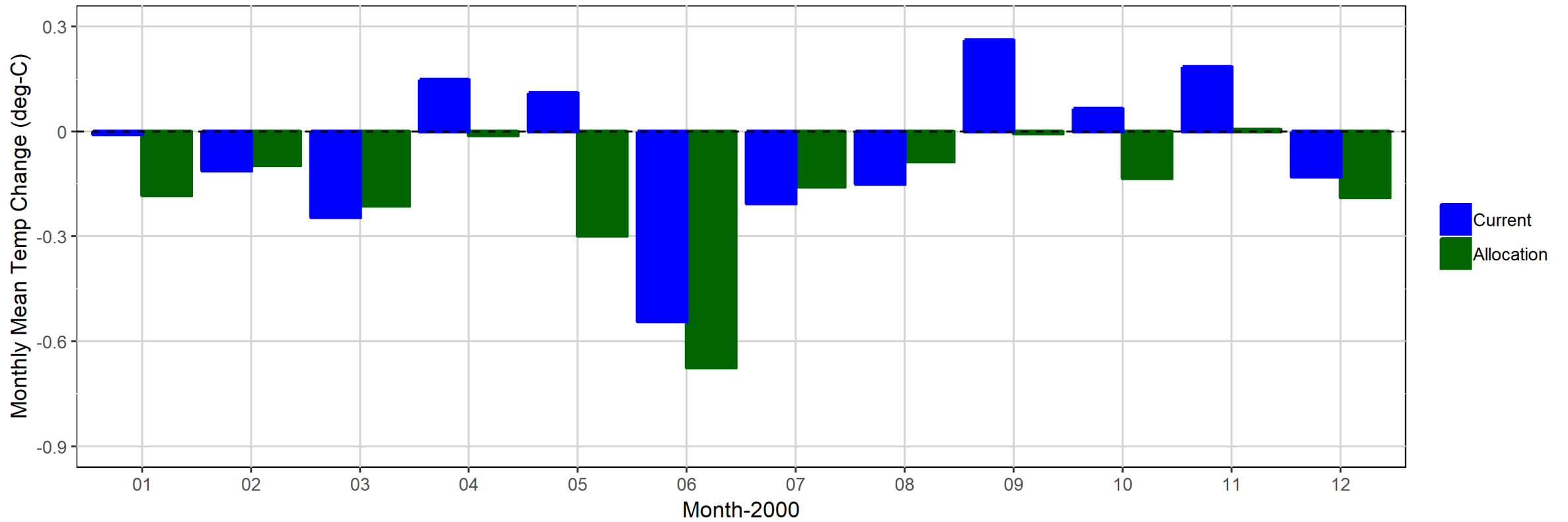
Temperature Change from Dams, KSD, LRDC, and Point Sources at Keno Dam Outlet



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



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



# Lost River Temperature Criteria

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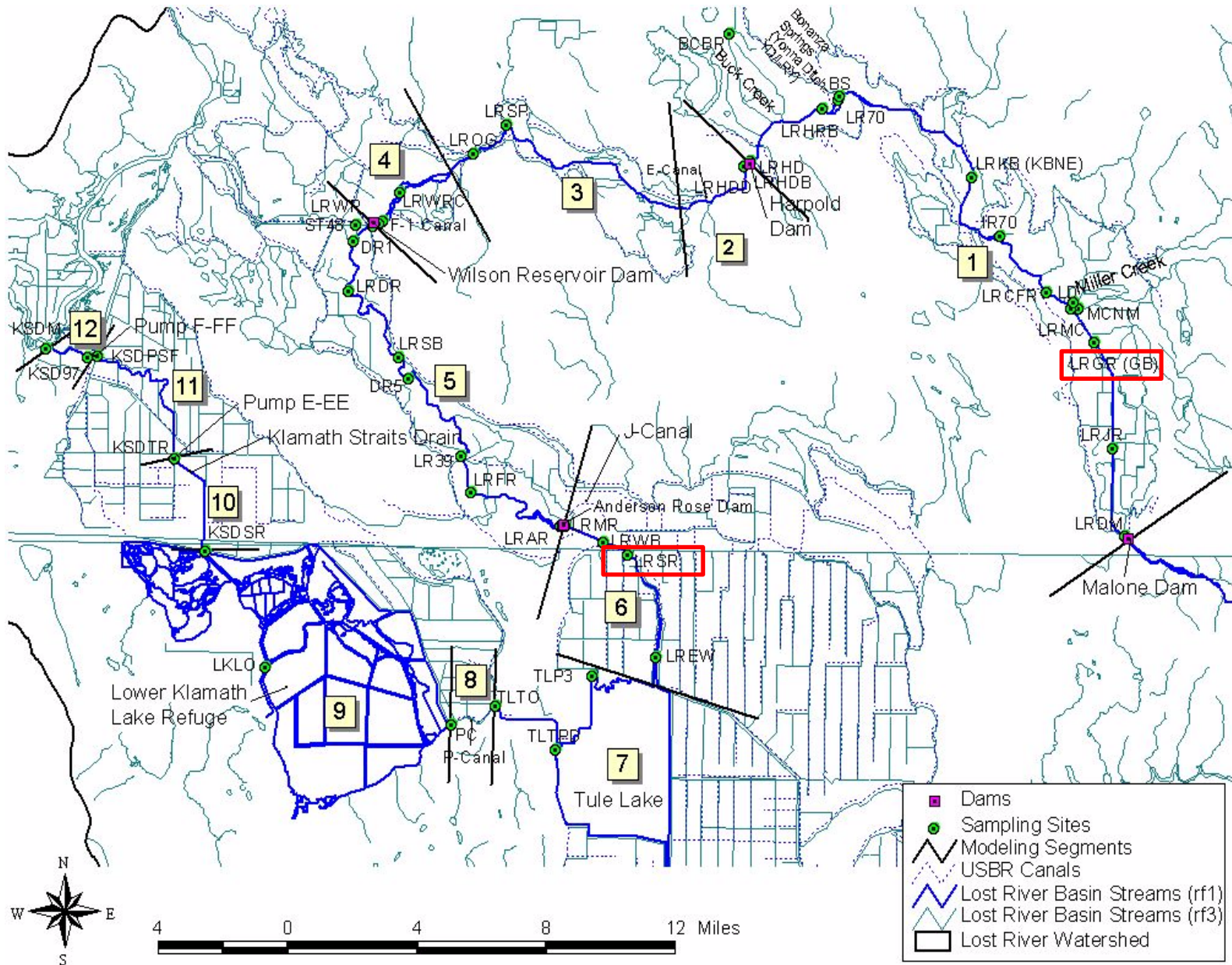
## Cool Water Species Narrative

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

## California Targets at Stateline

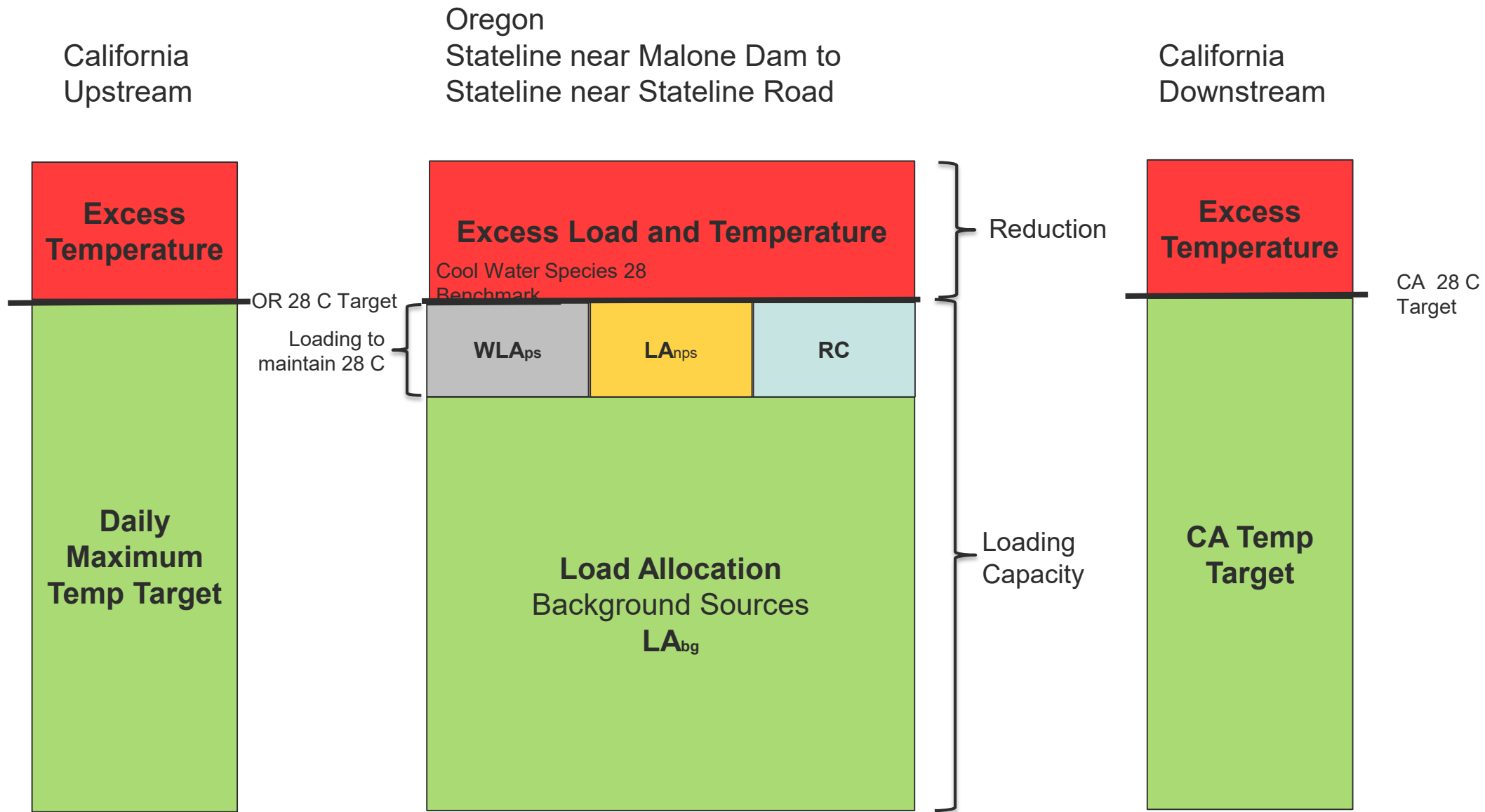
- 28 deg-C 7DADM







# Lost River



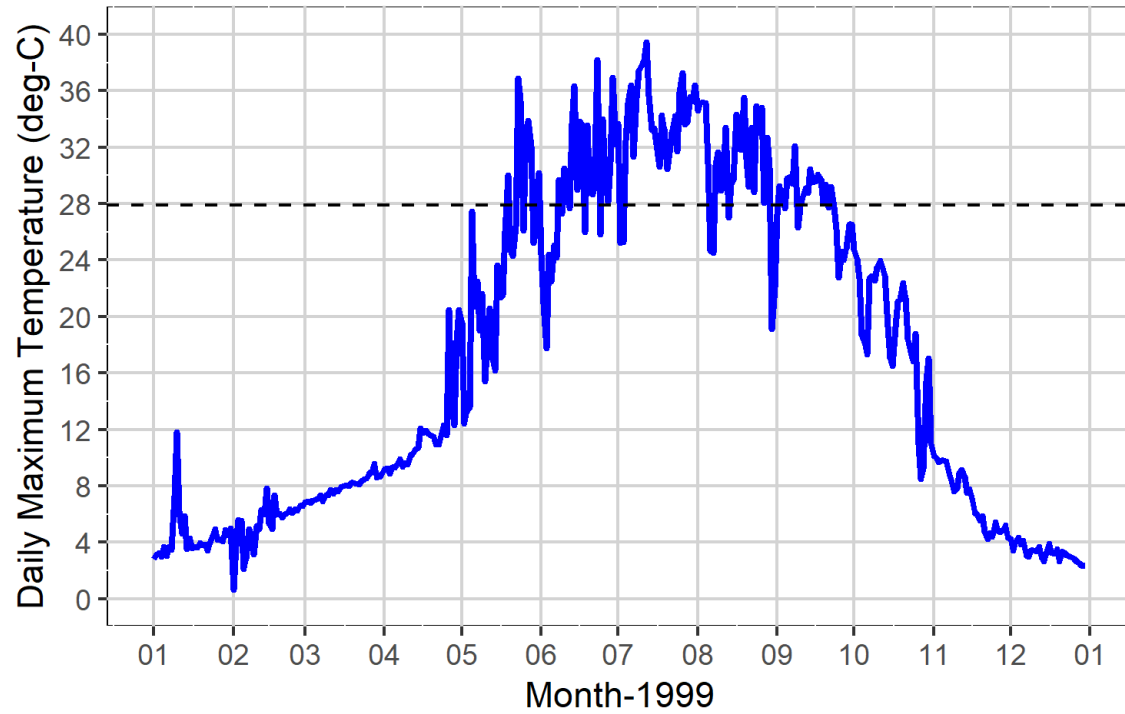
# Sources

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

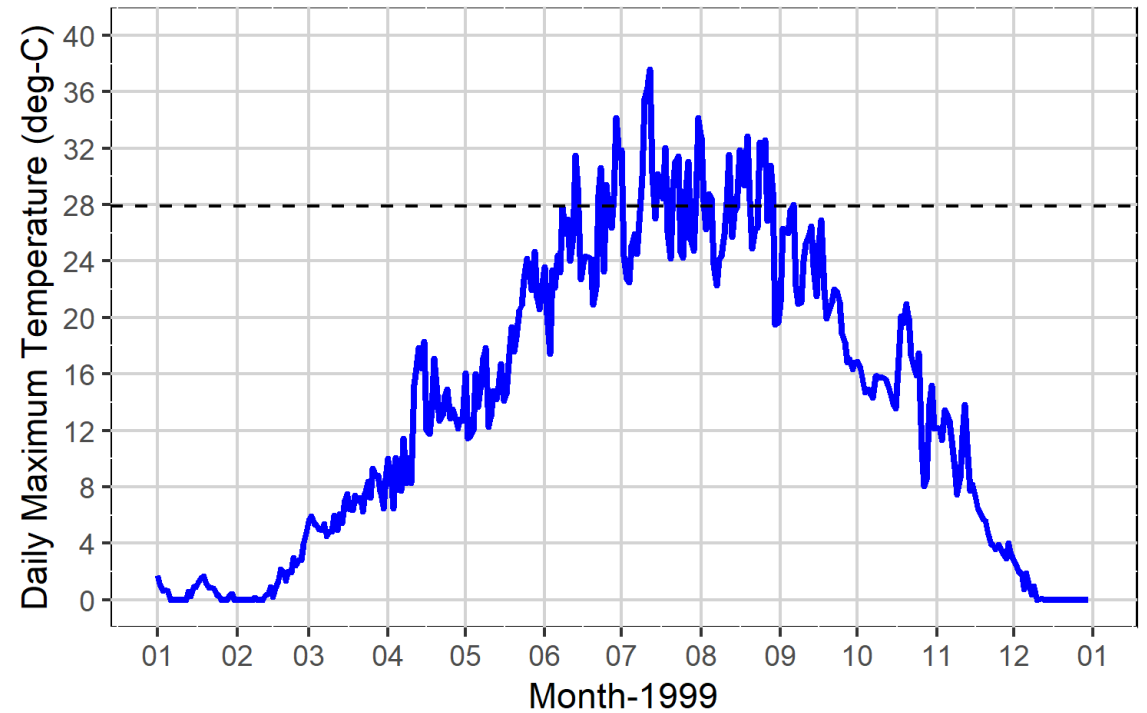
# Current Temperatures

Lost River at Gift Road (LRGR)



— Current

Lost River at Stateline Road (LRSR)



— Current

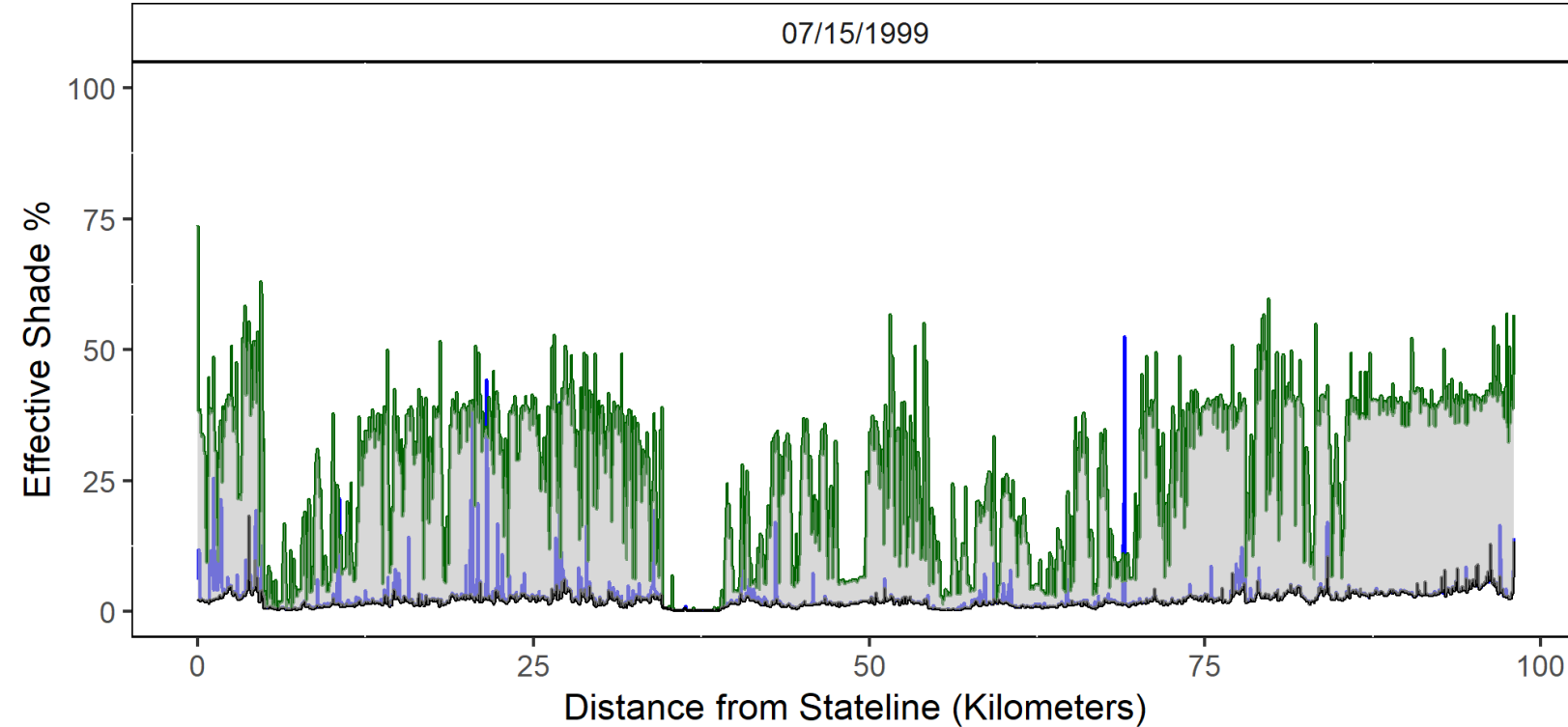
# Lost River Restored Vegetation

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
	<b>Composite Average</b>	<b>1.00</b>	<b>24.5</b>	<b>76%</b>	<b>3.0</b>
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
	<b>Composite Average</b>	<b>1.00</b>	<b>14.6</b>	<b>79%</b>	<b>0.0</b>

# Restored Vegetation

Lost River

07/15/1999



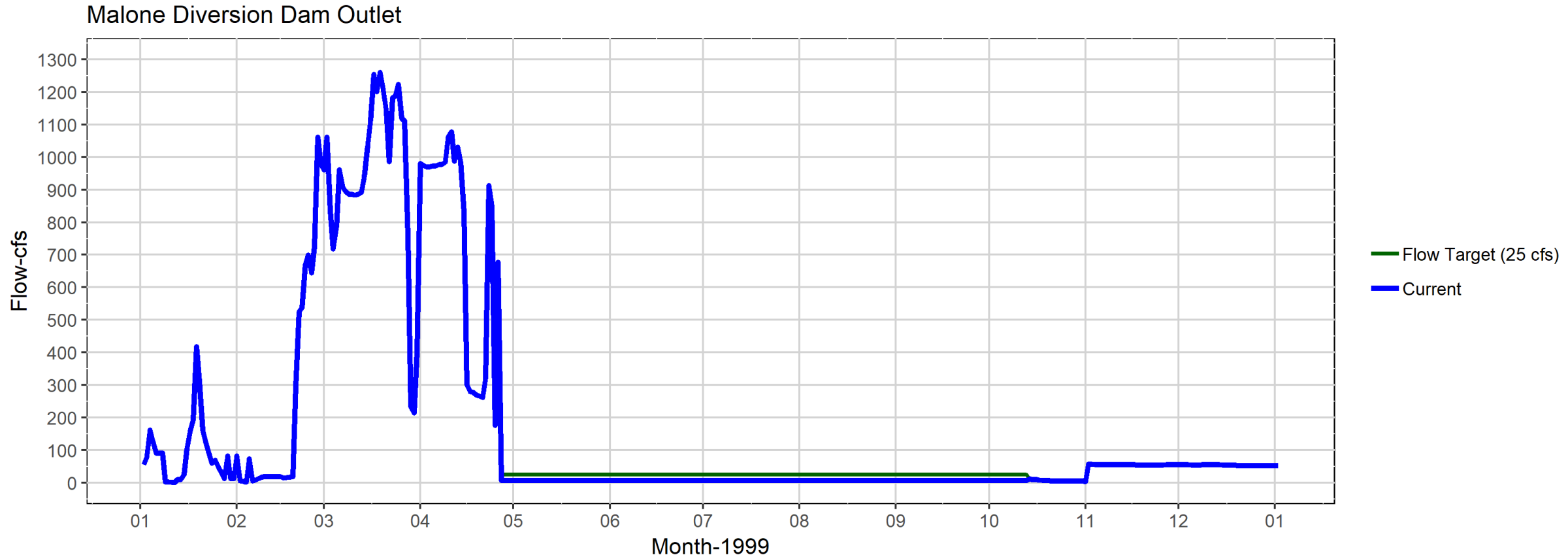
— Current Condition  
 — Restored Vegetation  
 — Topographic  
 ■ Disturbance Range

Extent	Mean Effective Shade Current Condition	Mean Effective Shade Restored Condition	Mean Effective Shade Deficit
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%

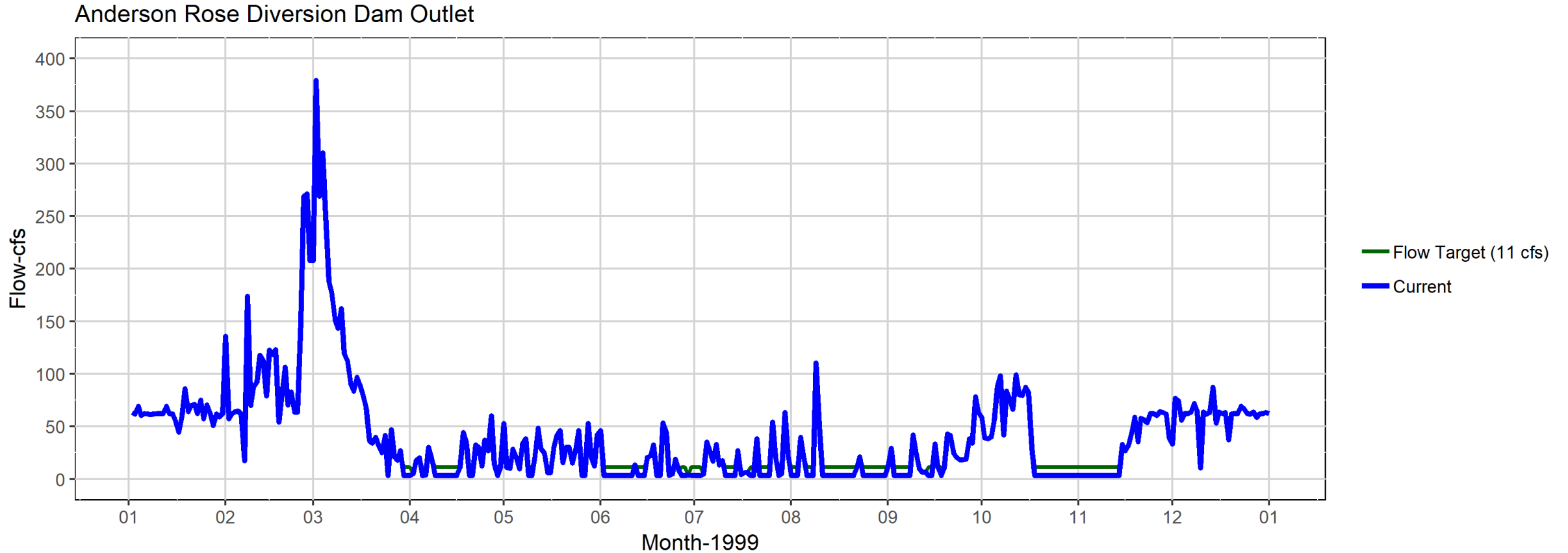




# Flow below Malone Diversion Dam

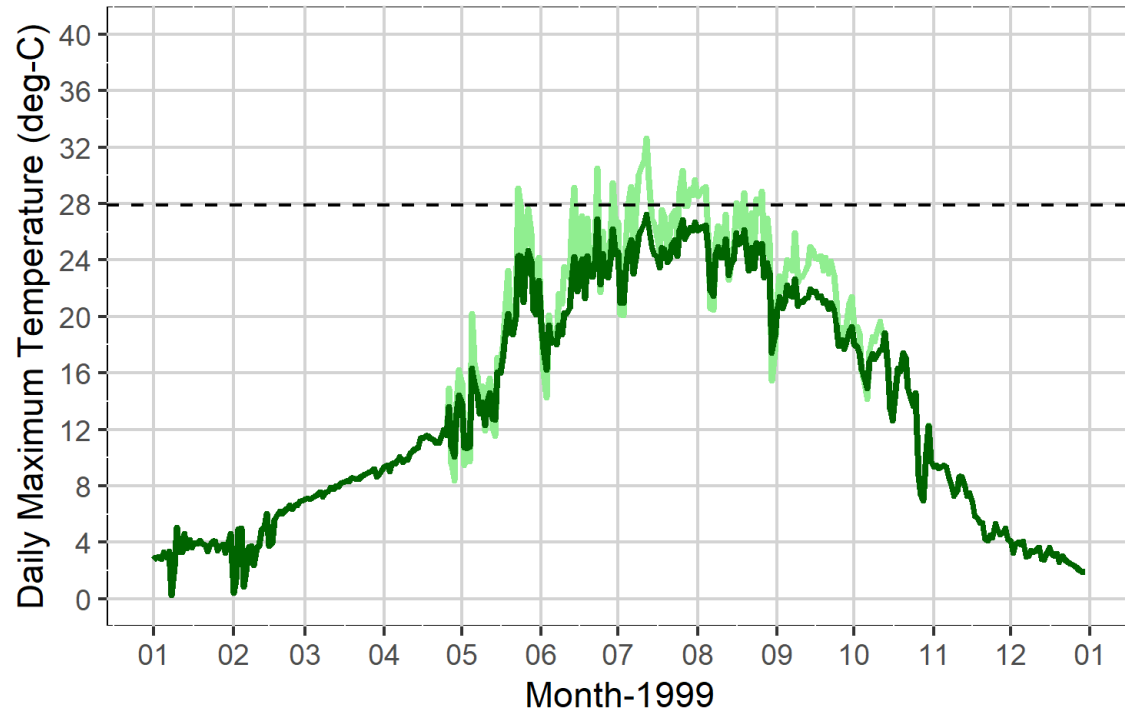


# Flow below Anderson Rose Diversion Dam



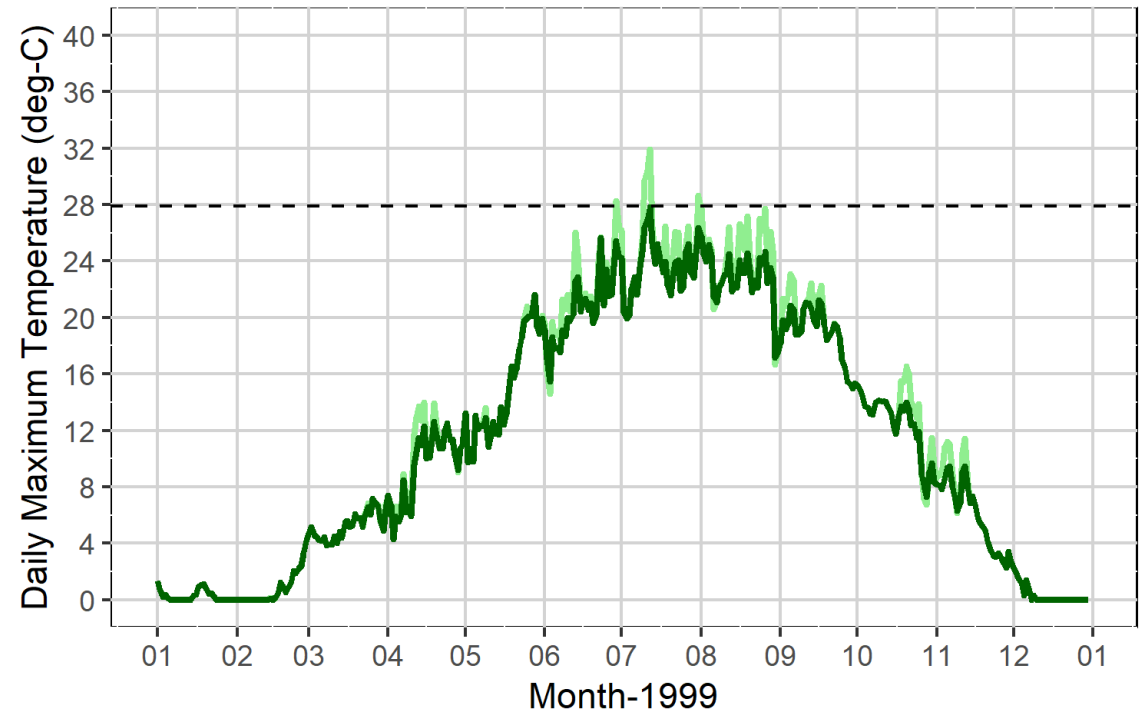
# Scenario Temperatures

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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