Deschutes River, Capitol Lake, and Budd Inlet Total Maximum Daily Load Study

Key Graphics

Briefing for Deschutes Advisory Group

April 22, 2009

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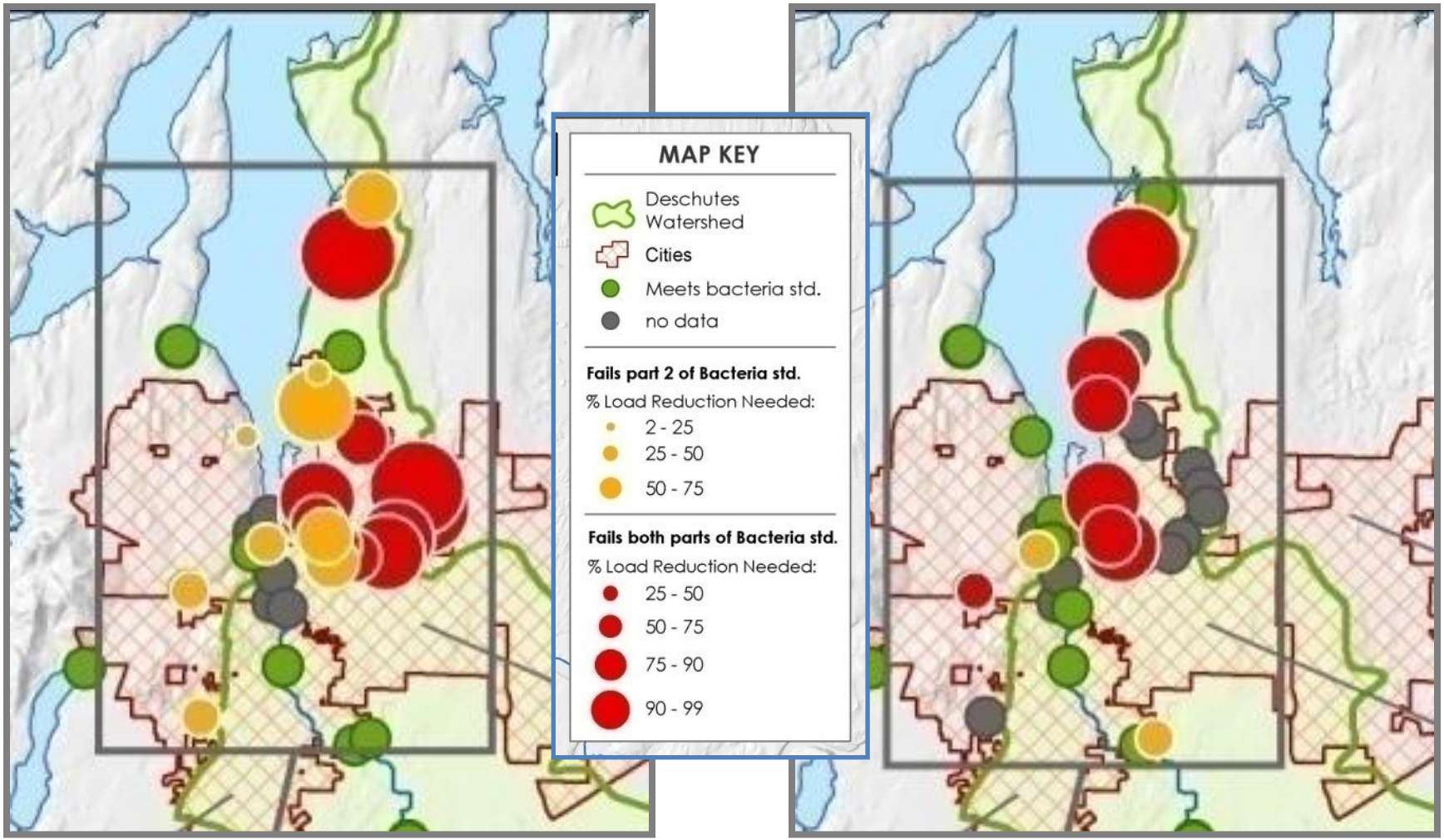
Potential geographic groupings

Location	Bacteria	Temp	DO	pH	Fine Sediment
Budd Inlet tributaries and watersheds	X				
Capitol Lake and Budd Inlet	X		X	X	
Percival Creek/Black Lake Ditch and watershed	X	X	X	X	
Lower Deschutes River and tributaries	X	X	X	X	
Upper Deschutes River and tributaries		X	X	X	X
?Middle Deschutes River and tributaries?					
Other?					

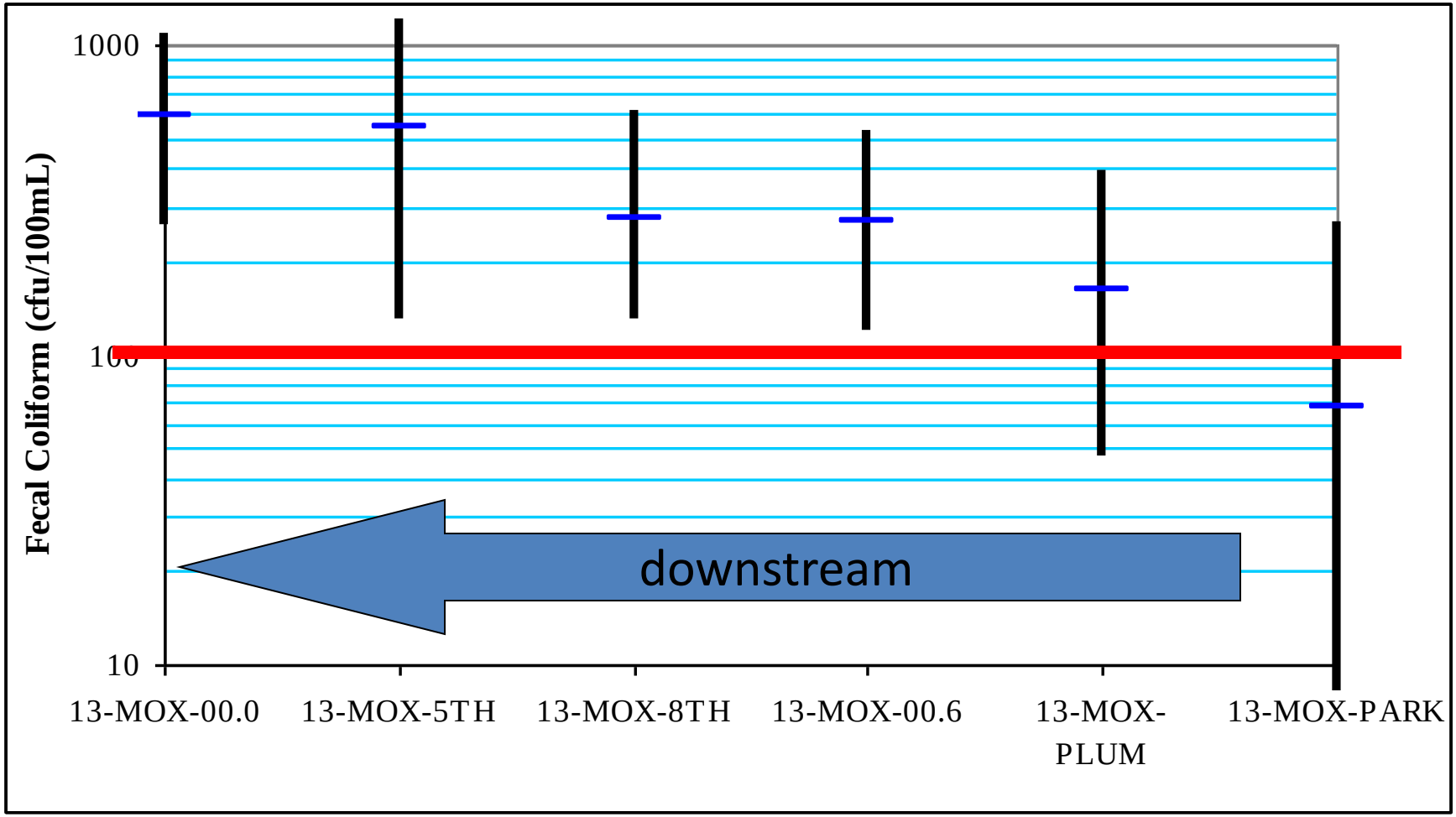
1. Budd Inlet tributaries and watersheds

Winter

Summer

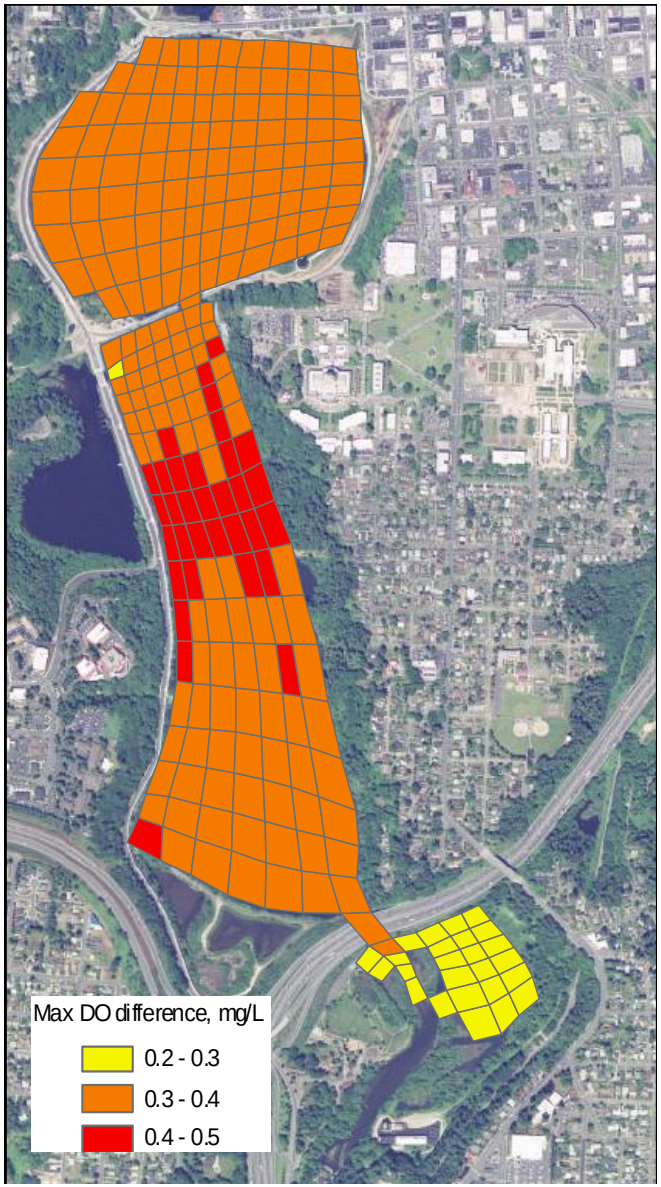


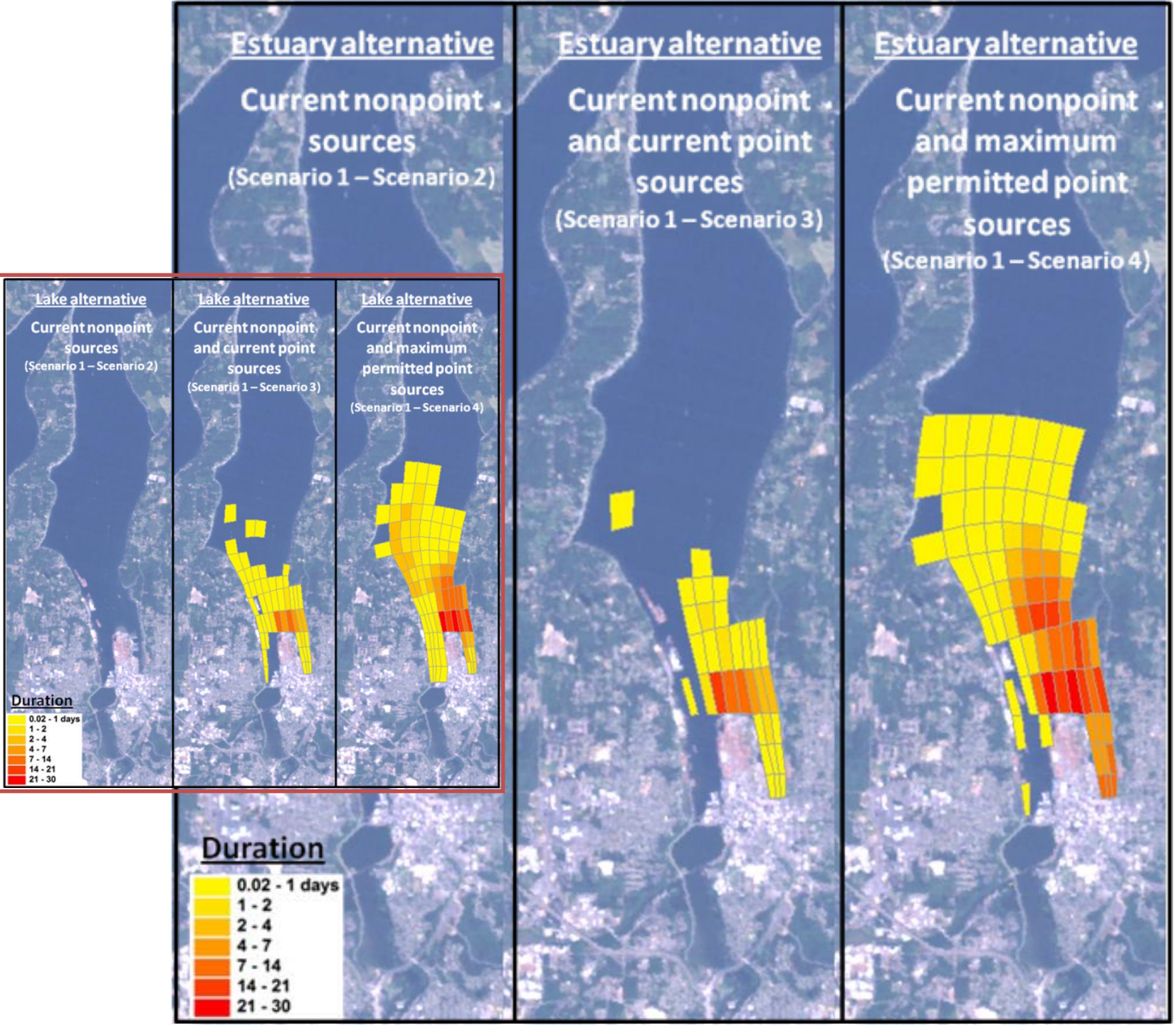
Moxlie Creek (storm conditions)



2. Capitol Lake and Budd Inlet

- Scenario 1: natural conditions
- Scenario 2: current nonpoint sources in Deschutes River and Percival Creek
- Scenario 2 – Scenario 1 = effect of nonpoint sources

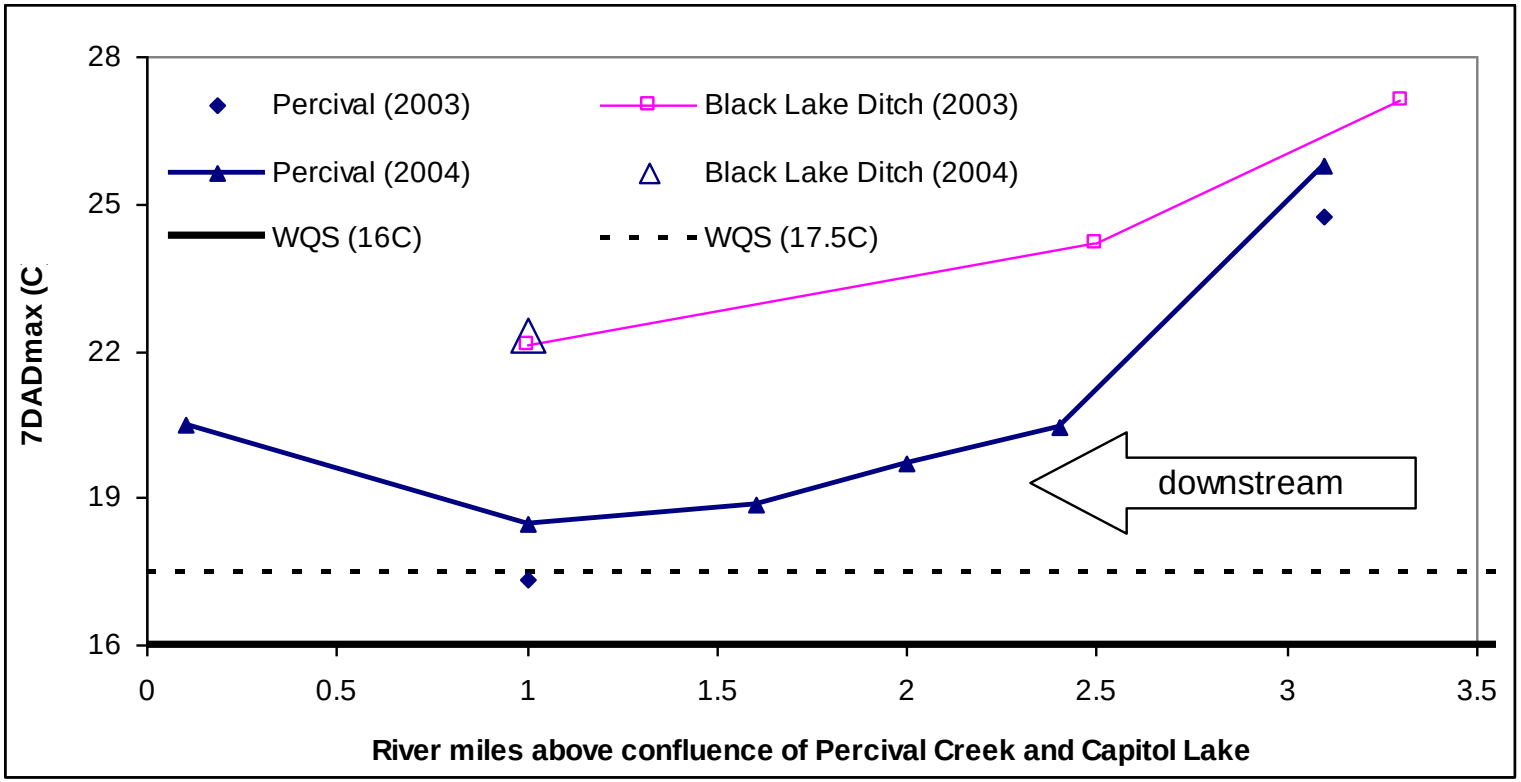



Estuary alternative
Current nonpoint sources
(Scenario 1 – Scenario 2)
Estuary alternative
Current nonpoint and current point sources
(Scenario 1 – Scenario 3)
Estuary alternative
Current nonpoint and maximum permitted point sources
(Scenario 1 – Scenario 4)
Lake alternative
Current nonpoint sources
(Scenario 1 – Scenario 2)
Lake alternative
Current nonpoint and current point sources
(Scenario 1 – Scenario 3)
Lake alternative
Current nonpoint and maximum permitted point sources
(Scenario 1 – Scenario 4)
Duration
0.02 - 1 days
1 - 2
2 - 4
4 - 7
7 - 14
14 - 21
21 - 30

Before or after Deschutes River?

- Before
  - Set nonpoint source load reduction targets for nitrogen from the Deschutes River
- After
  - Understand the nature of the nutrient sources better

3. Percival Creek and Black Lake Ditch



When to tackle Percival/Black Lake

- Before Deschutes River
  - Most of the parameters common to Deschutes River, so good to try out strategy on small area
- After Deschutes River
  - Deschutes is much bigger source of nutrients to Capitol Lake and Budd Inlet

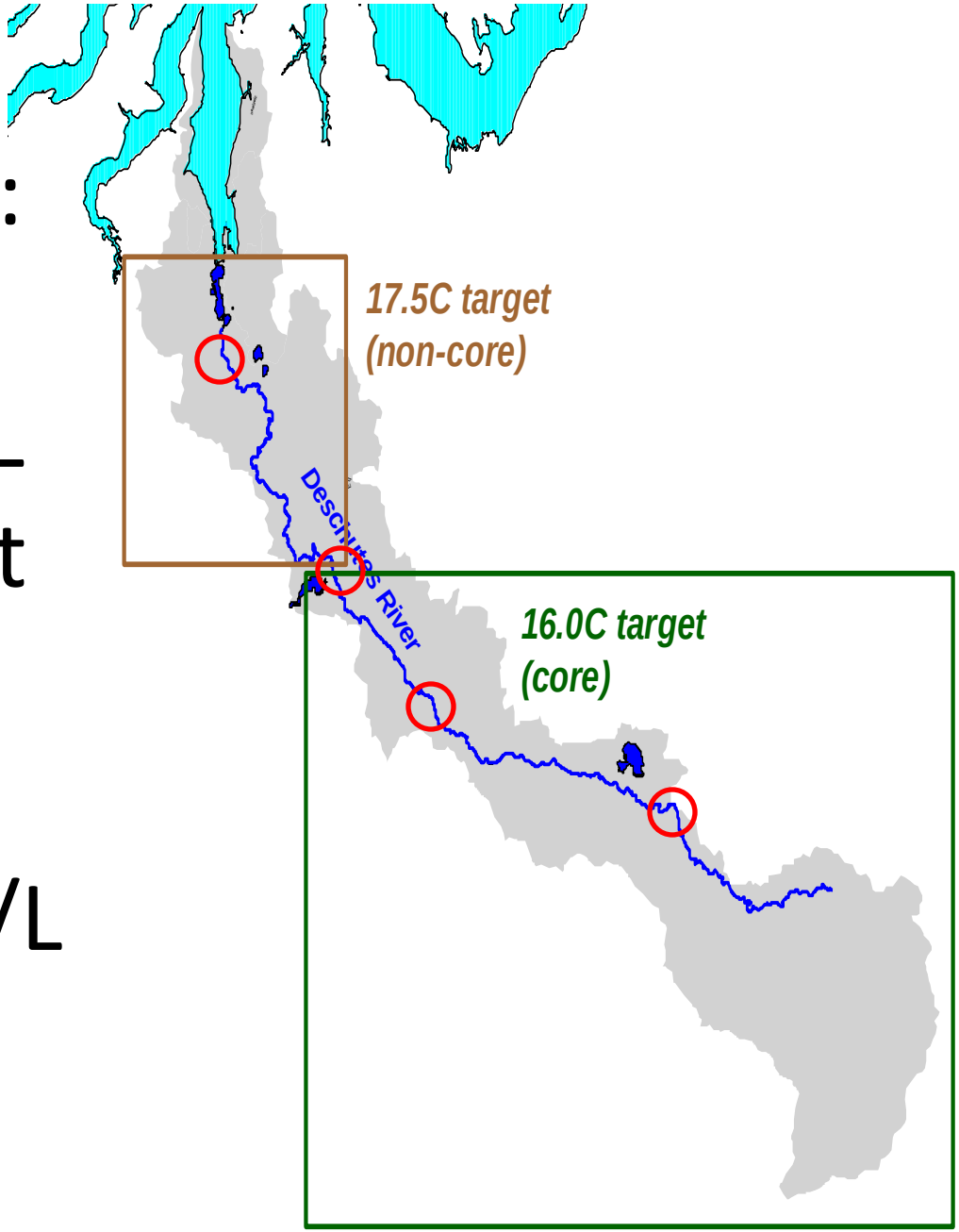
4. Options for Deschutes River

- Upper and lower
  - Offut Lake (water quality standards jump)
  - Route 507/Rainier or Spurgeon (population)
  - Fall Creek (geology)
- Upper, middle, lower?
  - Similar breaks

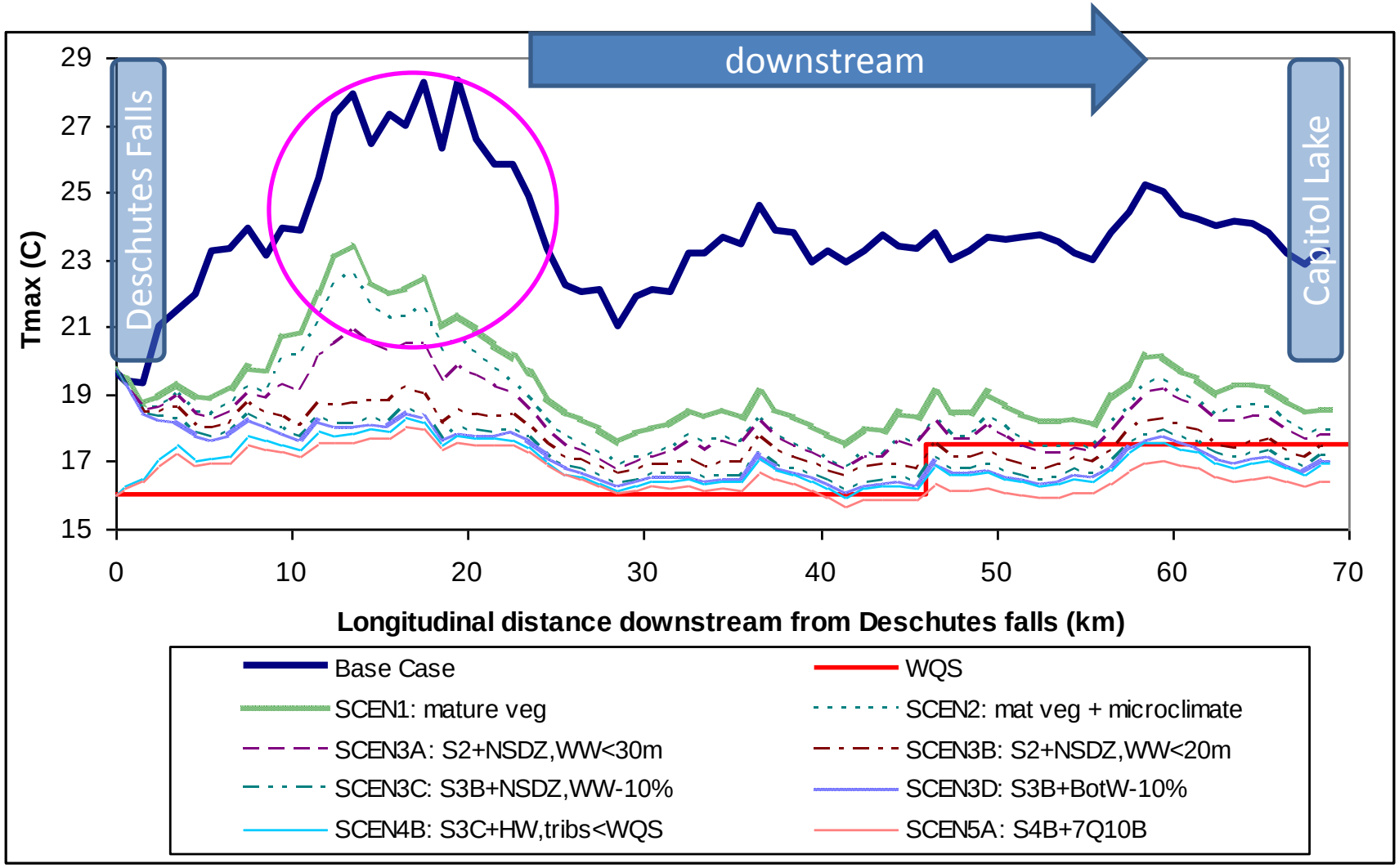
Upper/Lower? Deschutes targets:

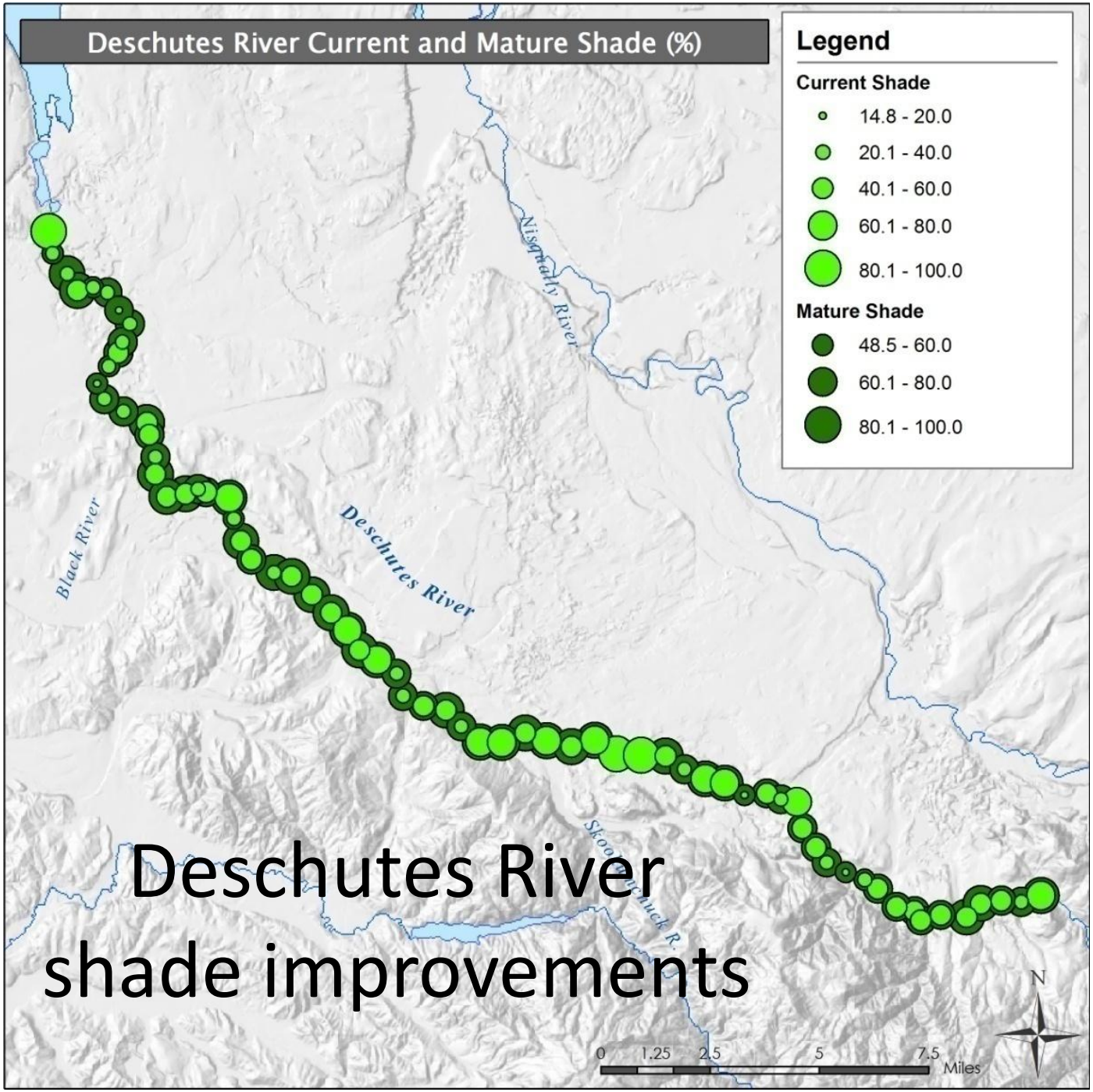
16 C and 9.5 mg/L (upstream of Offut Lake)

17.5 C and 8.0 mg/L (downstream of Offut Lake)



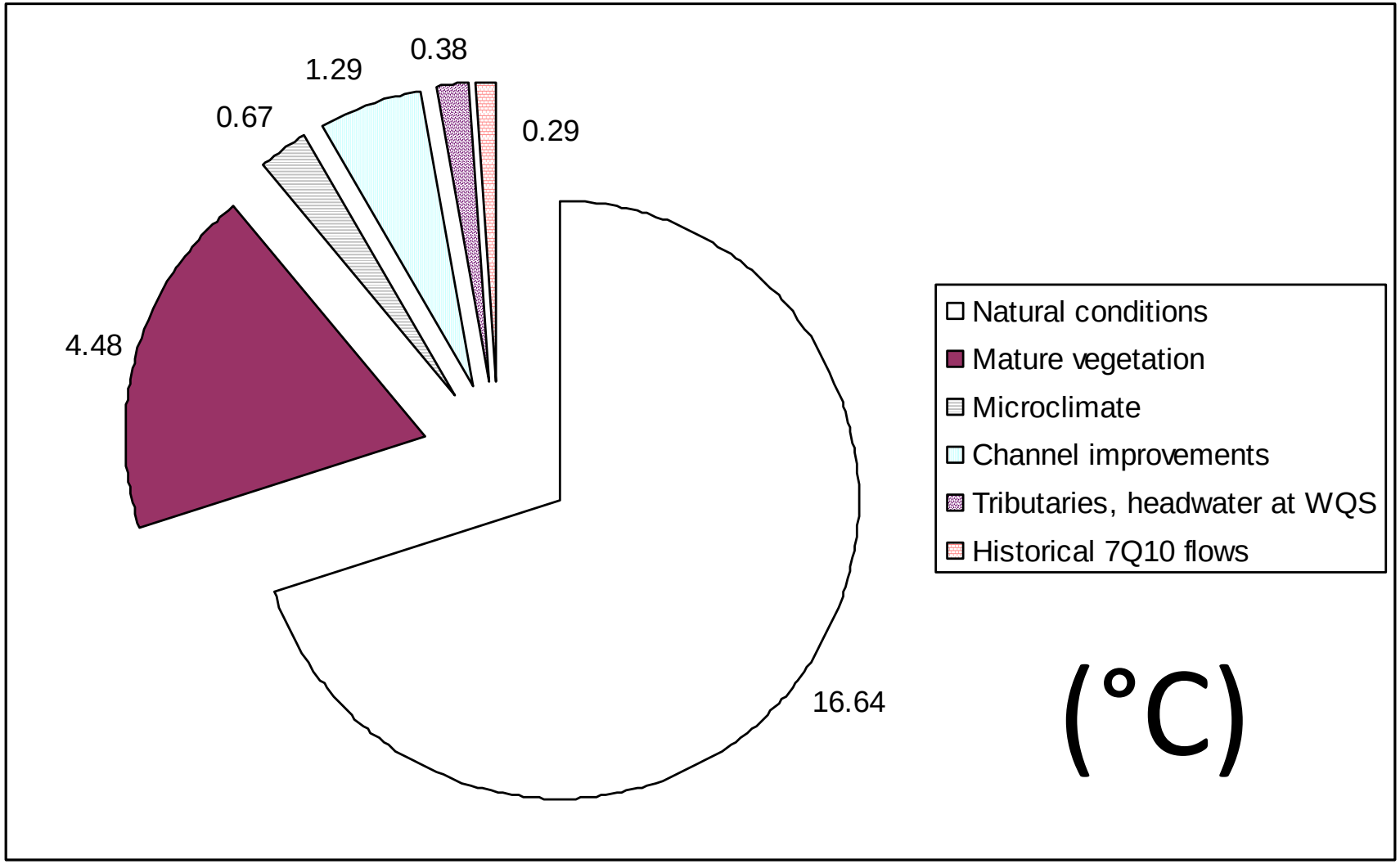
Temperature benefits of management actions



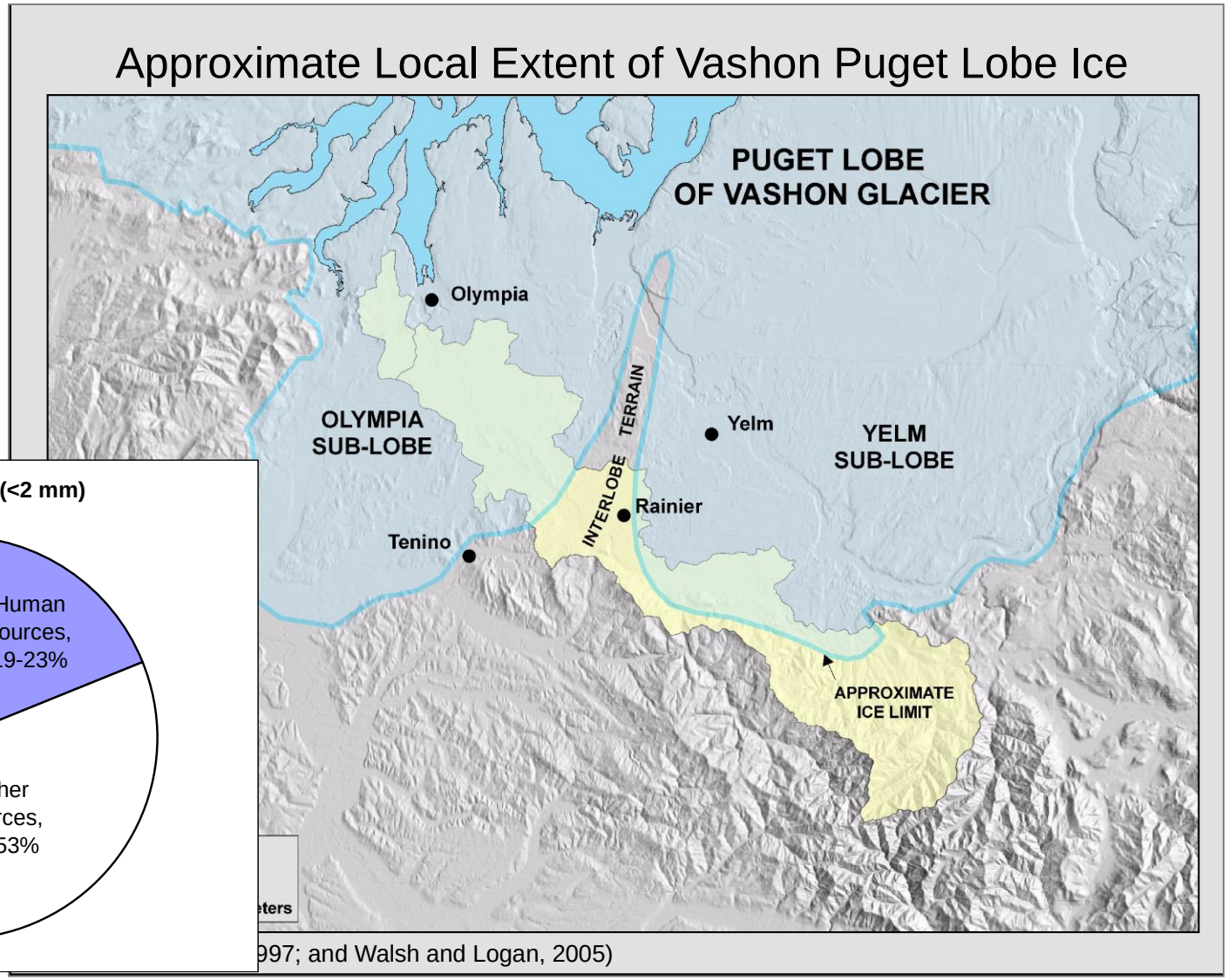


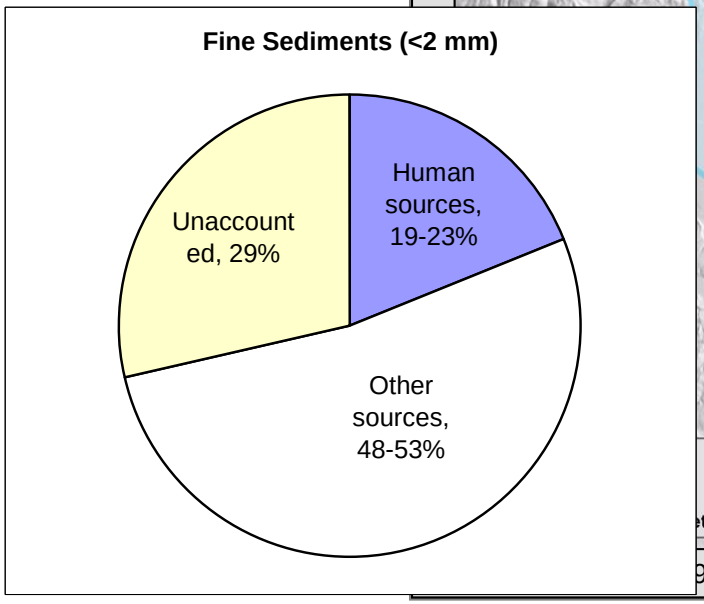
Deschutes River shade improvements

Decrease peak water temperature in the Deschutes River

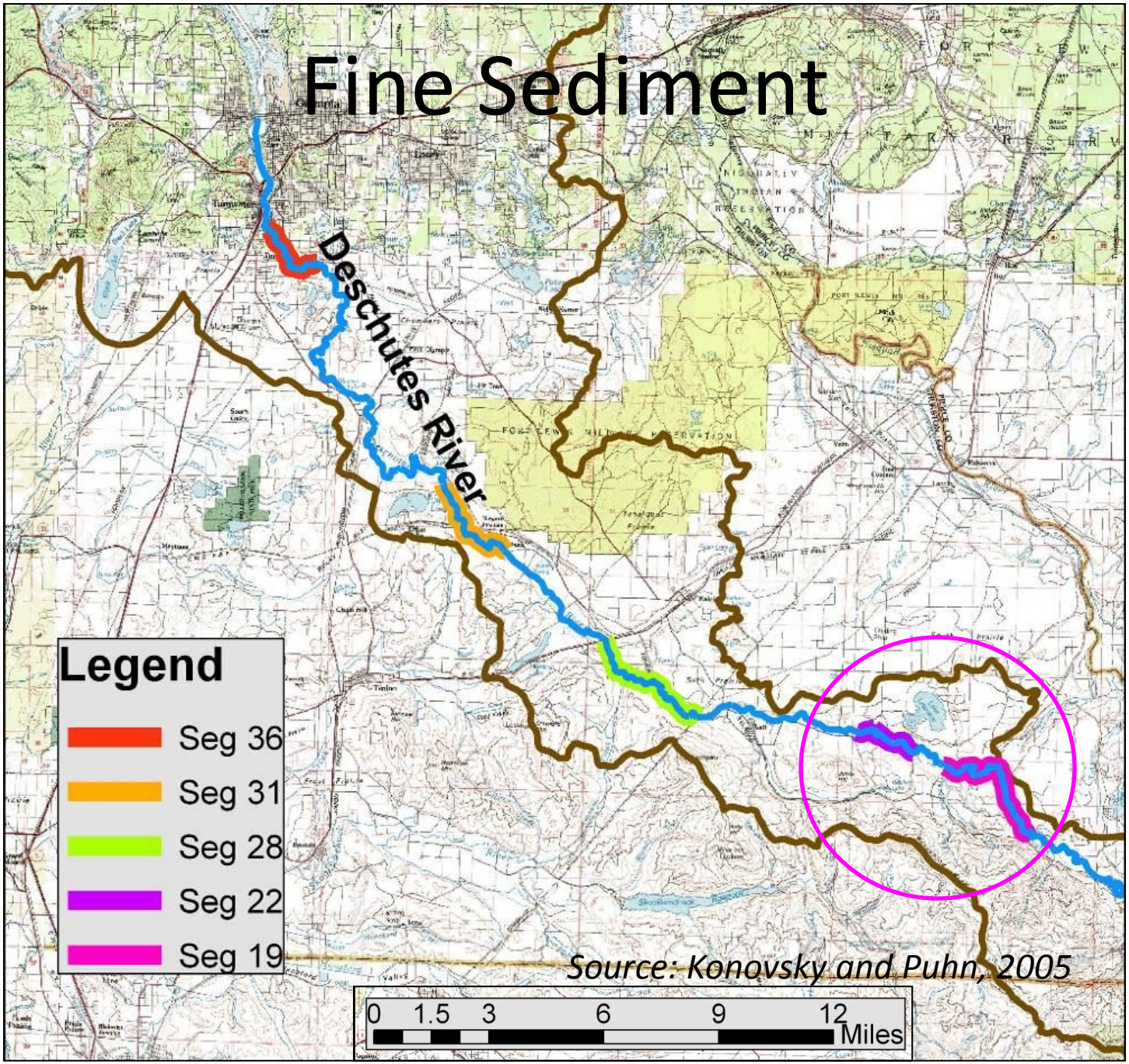


Sediment sources





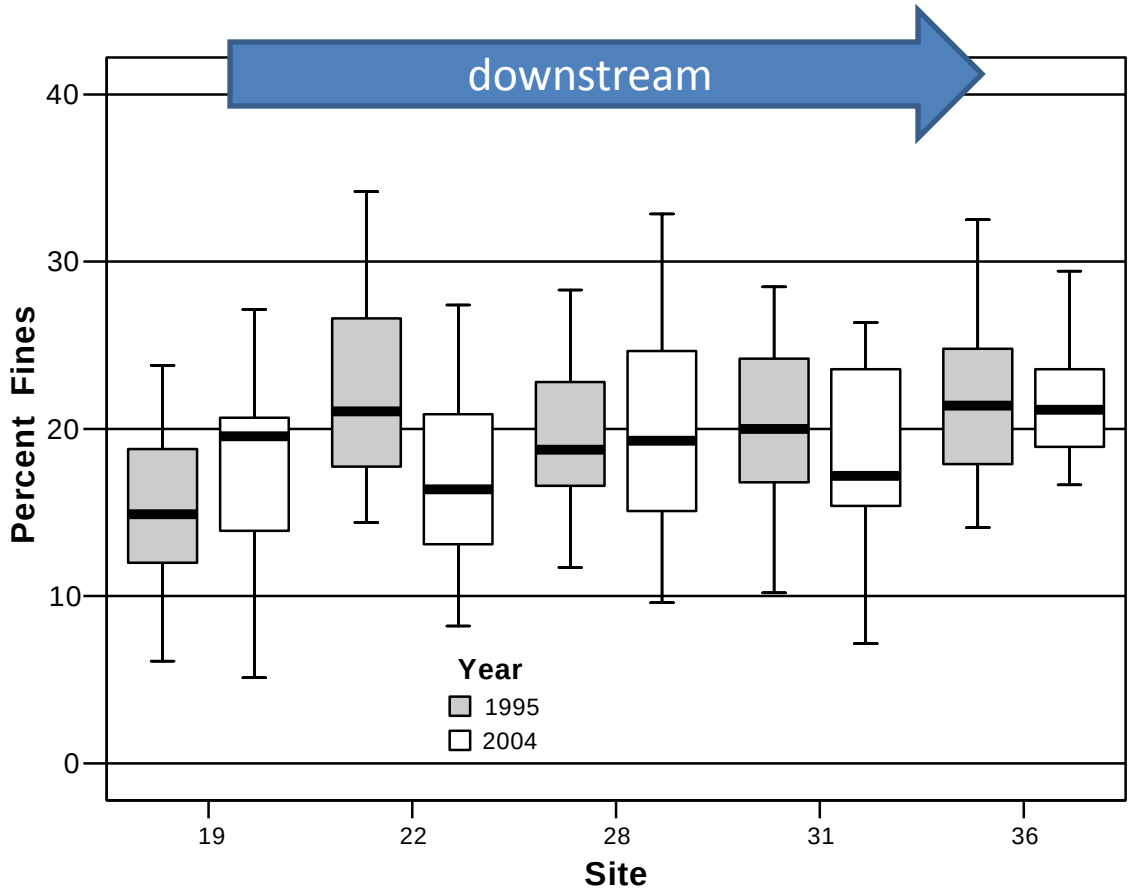
Fine Sediment



Source: Konovsky and Puhn, 2005

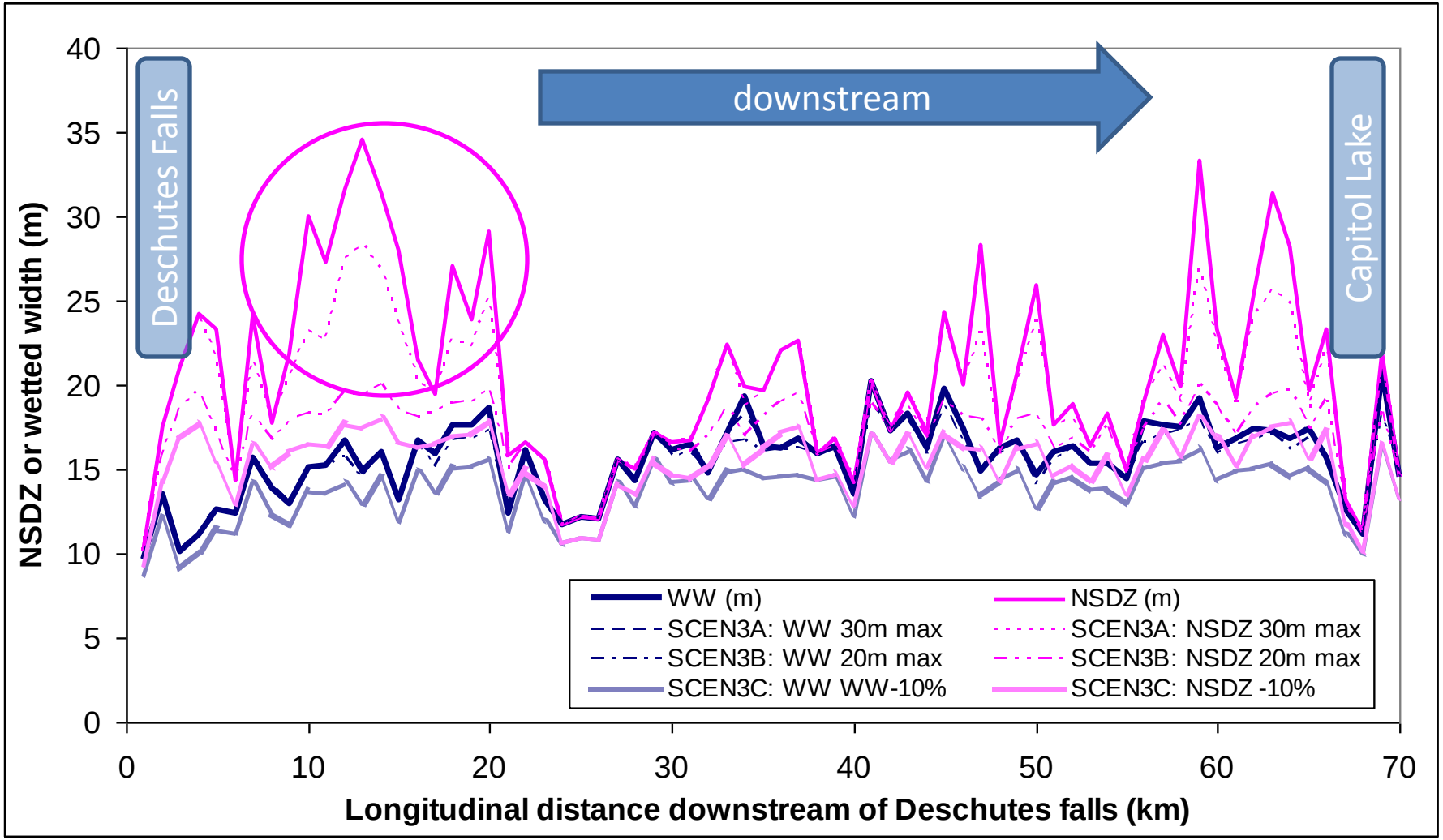
Konovsky and Puhn (2005)

- No trend with time
- High levels throughout
- Weak trend (increasing fines) downstream
- Do not meet healthy levels

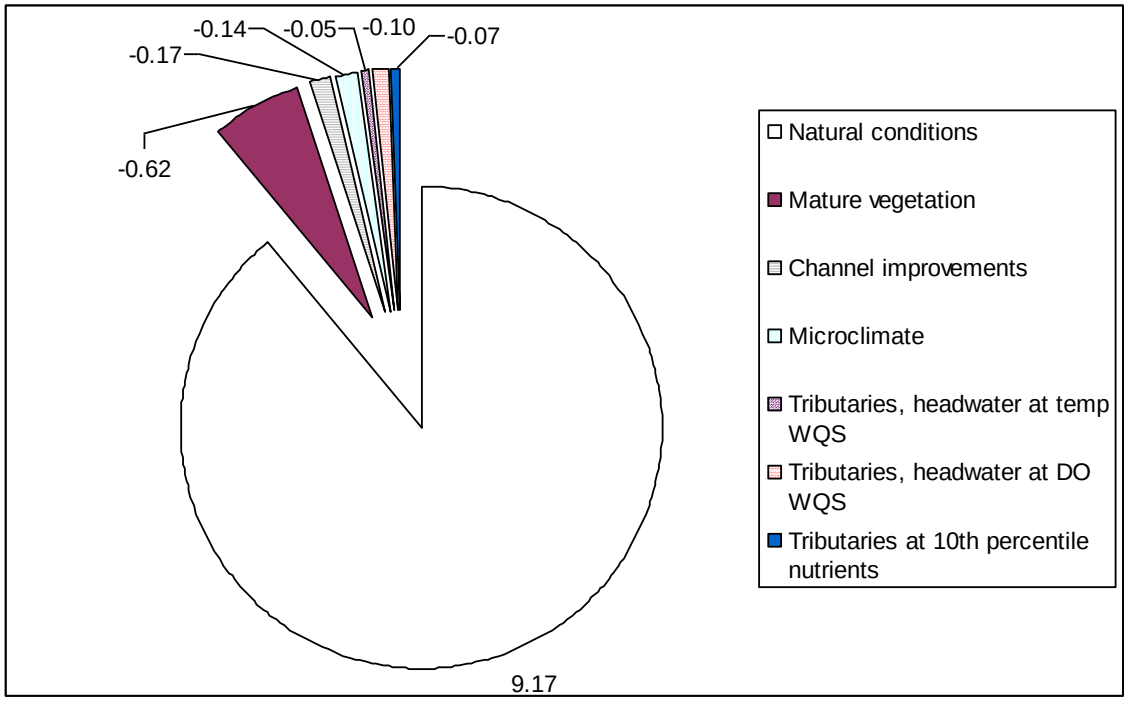


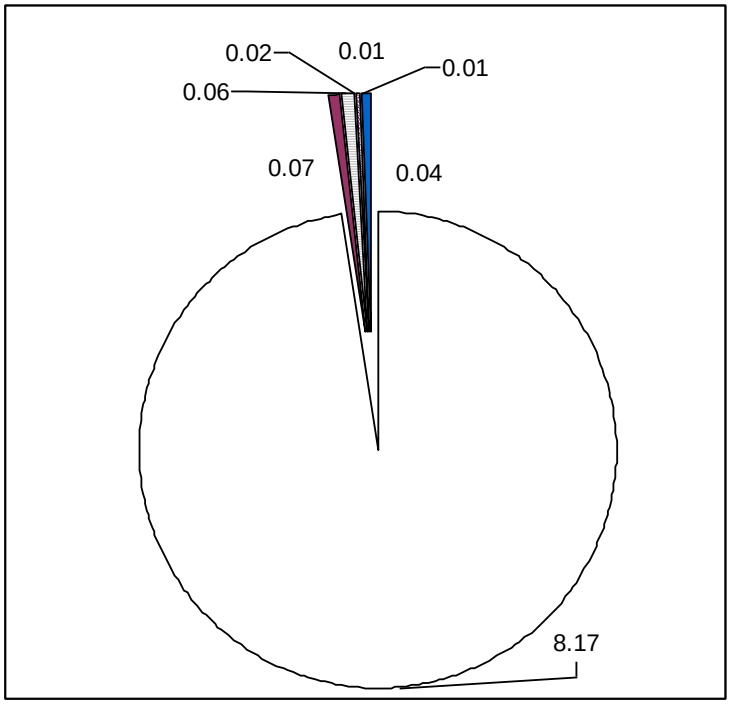
Source: Konovsky and Puhn, 2005

Deschutes River is too wide

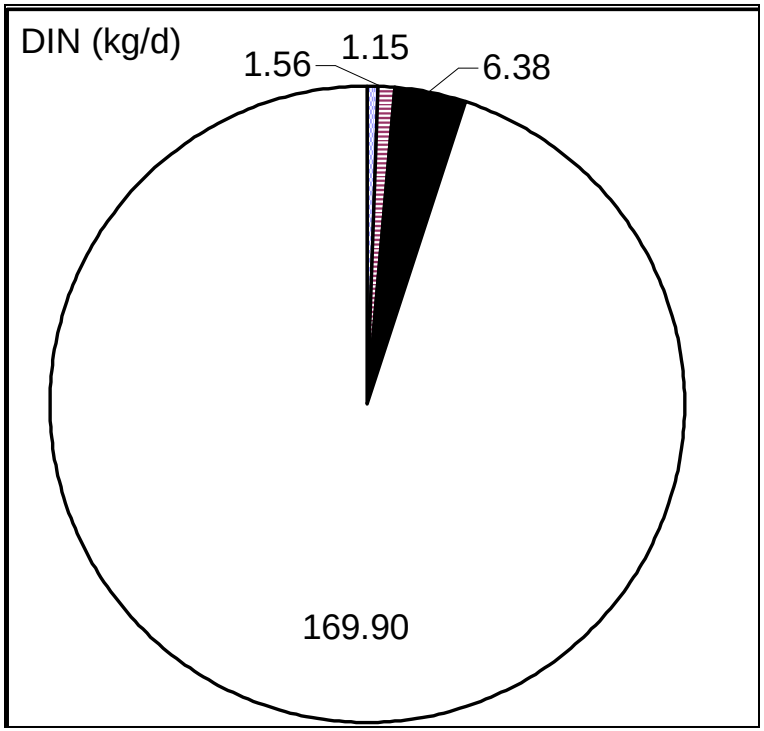


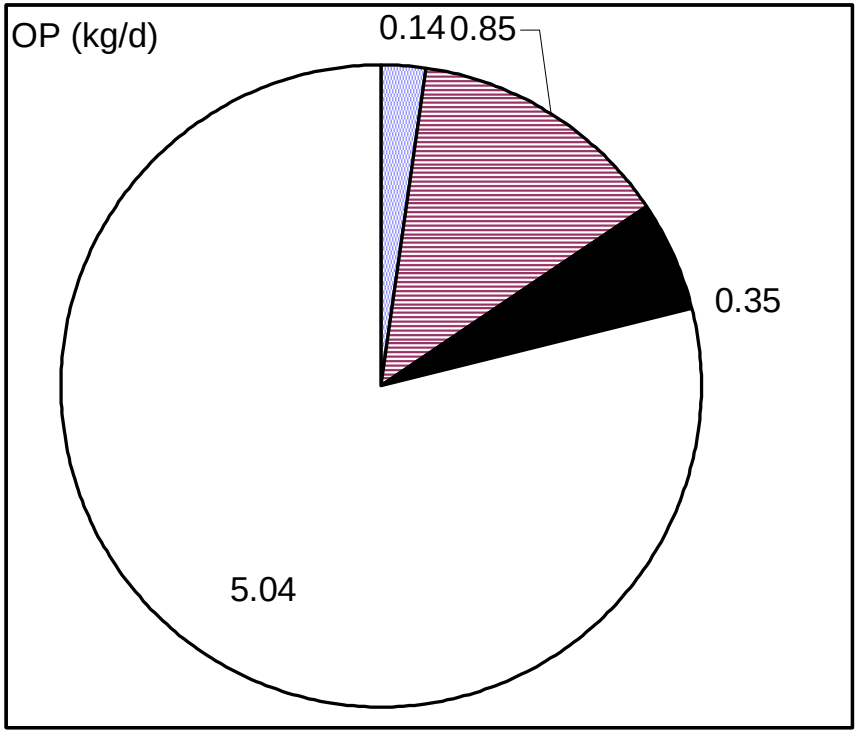
Improving temperature will improve DO and pH





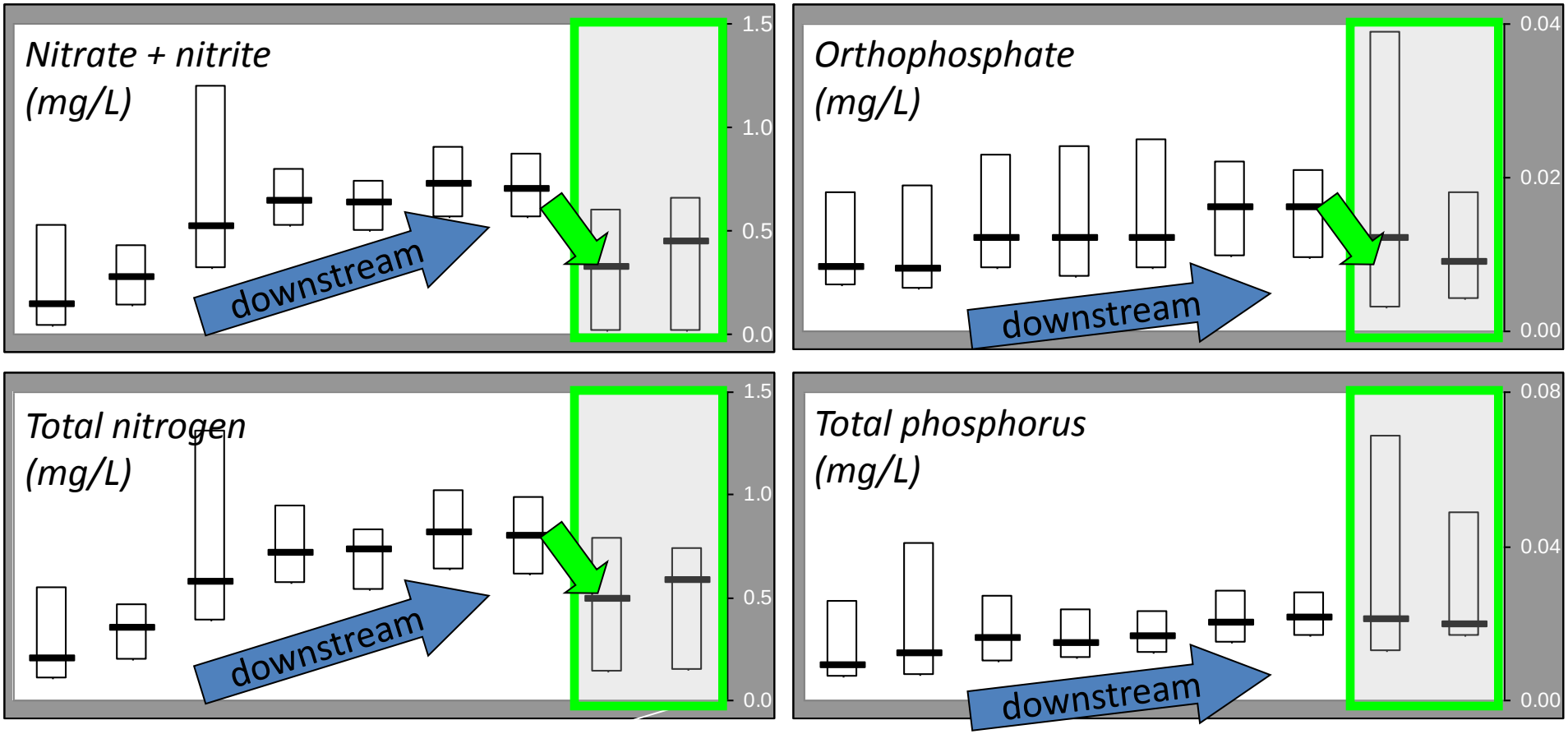
Deschutes River nutrient loads





- Headwaters
- Tributaries (base)
- Tributaries (current-base)
- Groundwater

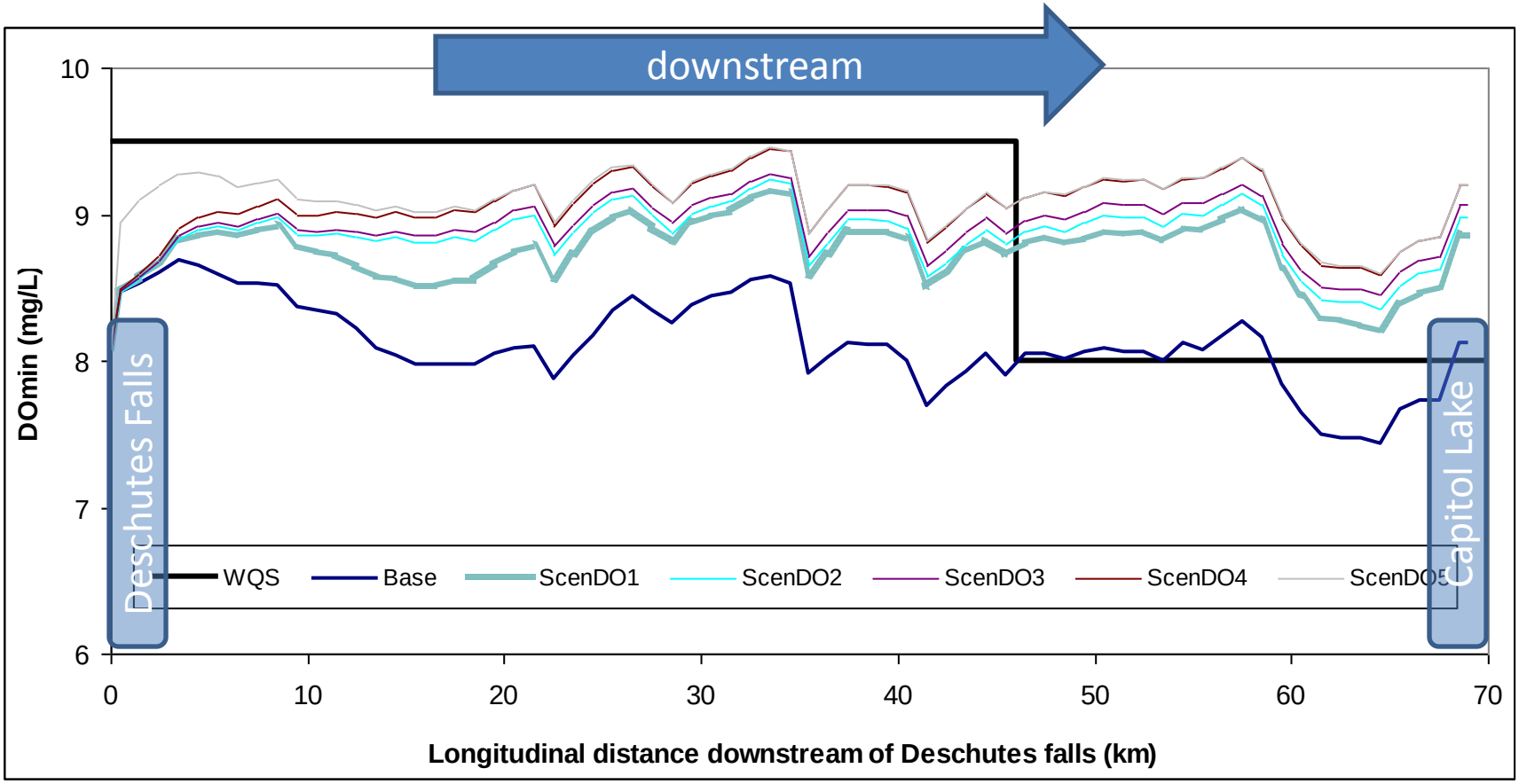
Deschutes River nutrient profile



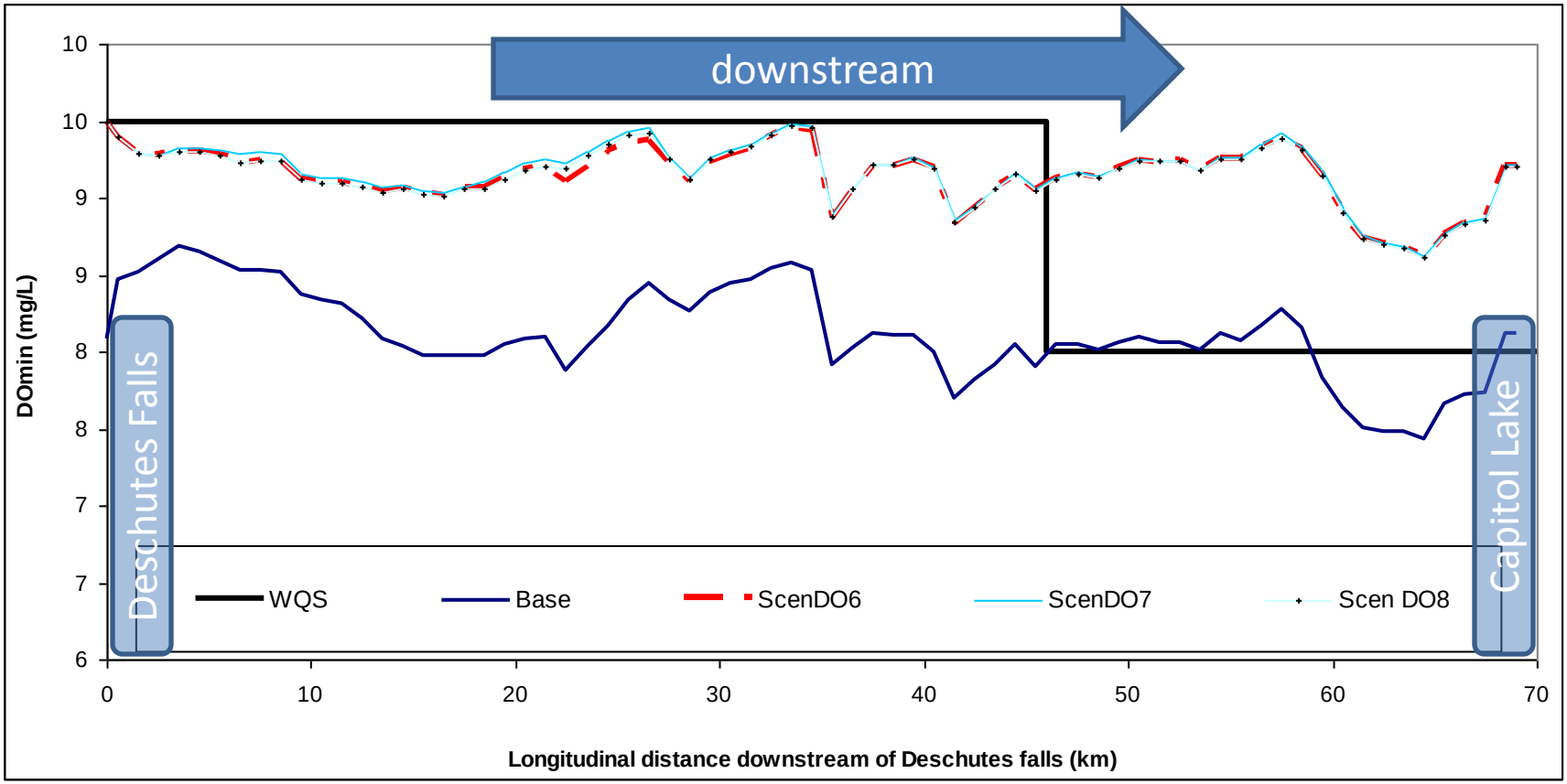
Capitol Lake

… decreases nutrient concentrations part of the year.

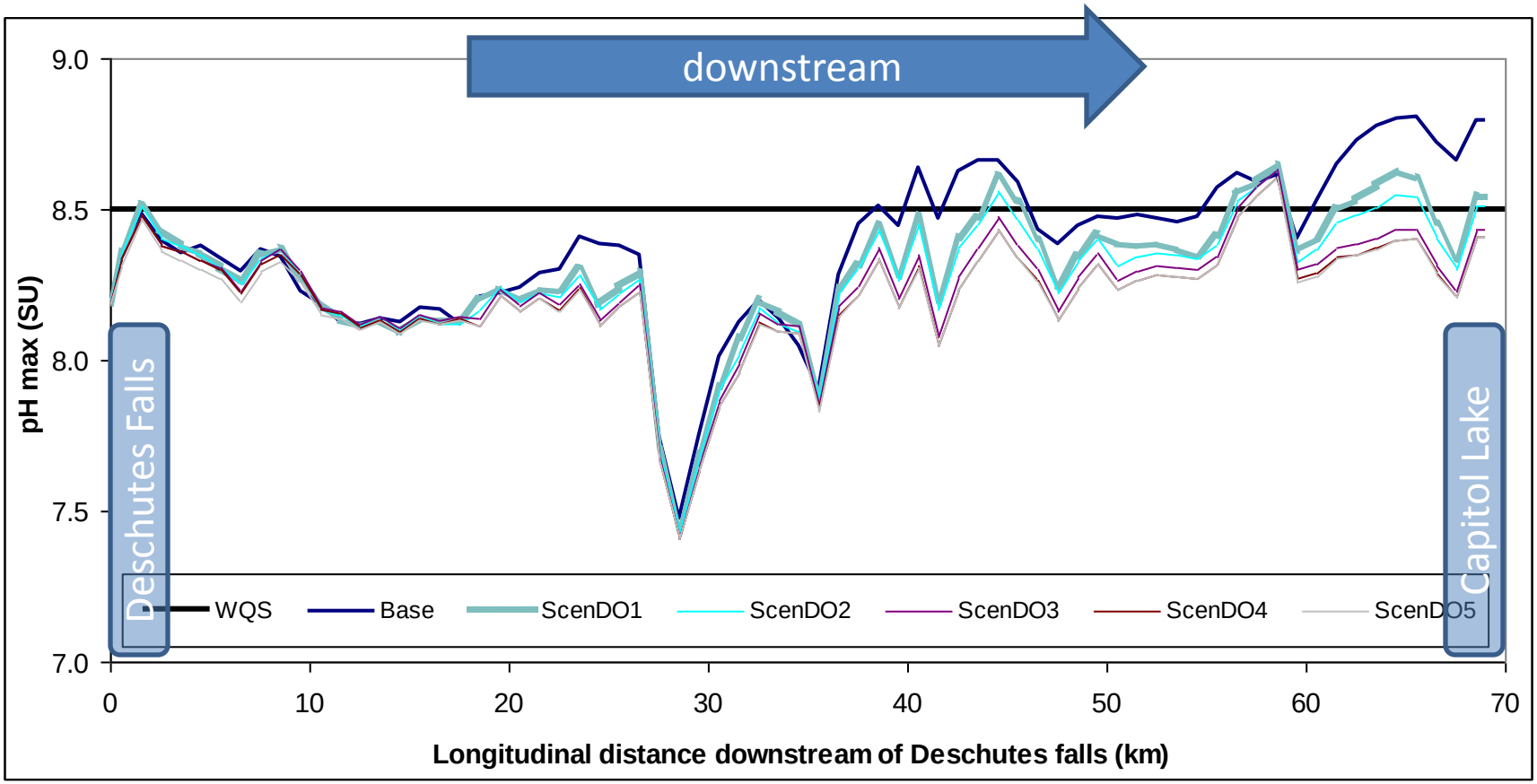
Deschutes River DO_{min} improvements (temperature scenarios)



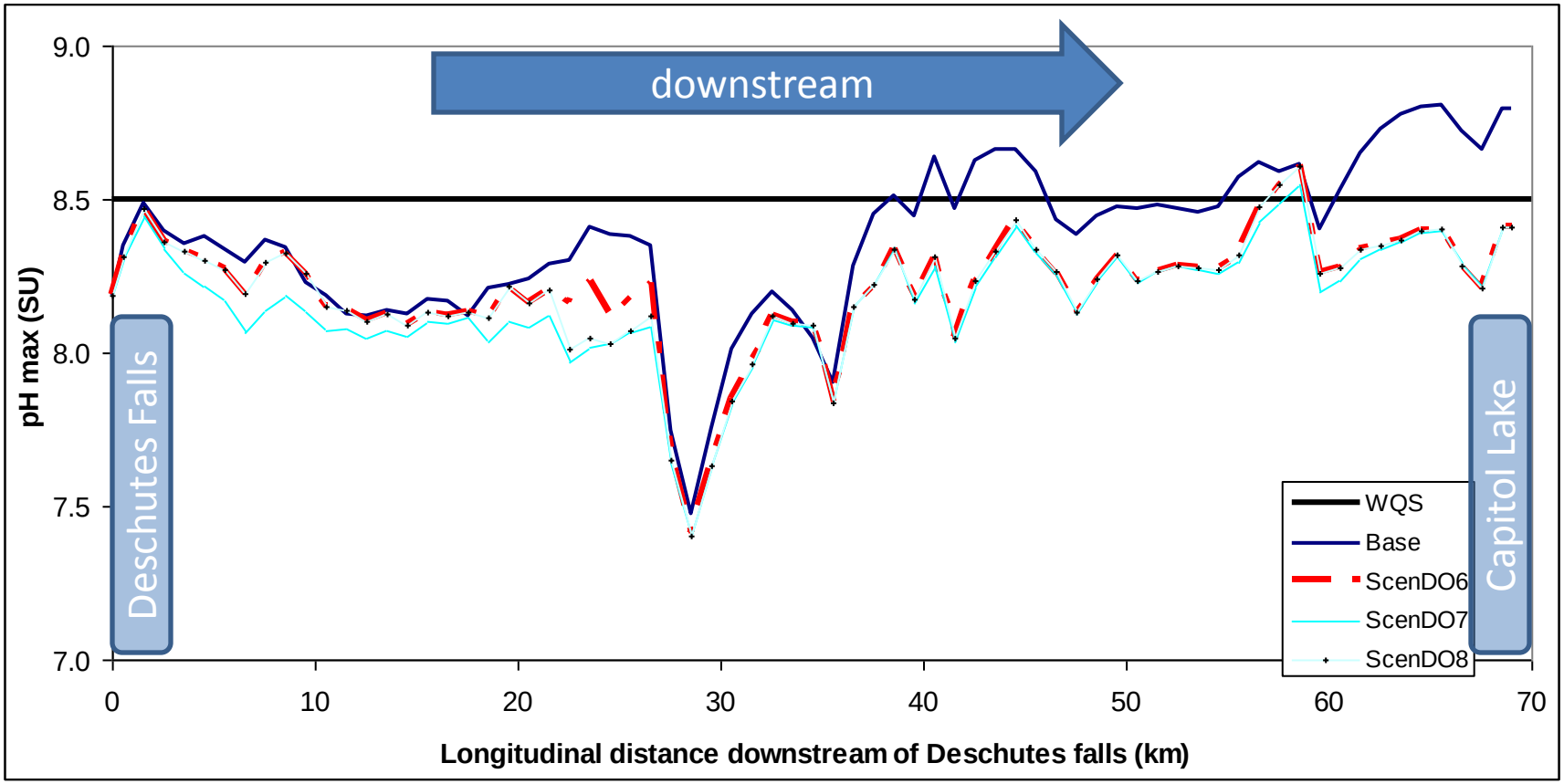
Deschutes River DO_{min} improvements (nutrient scenarios)



Deschutes River pH_{max} improvements (temperature scenarios)

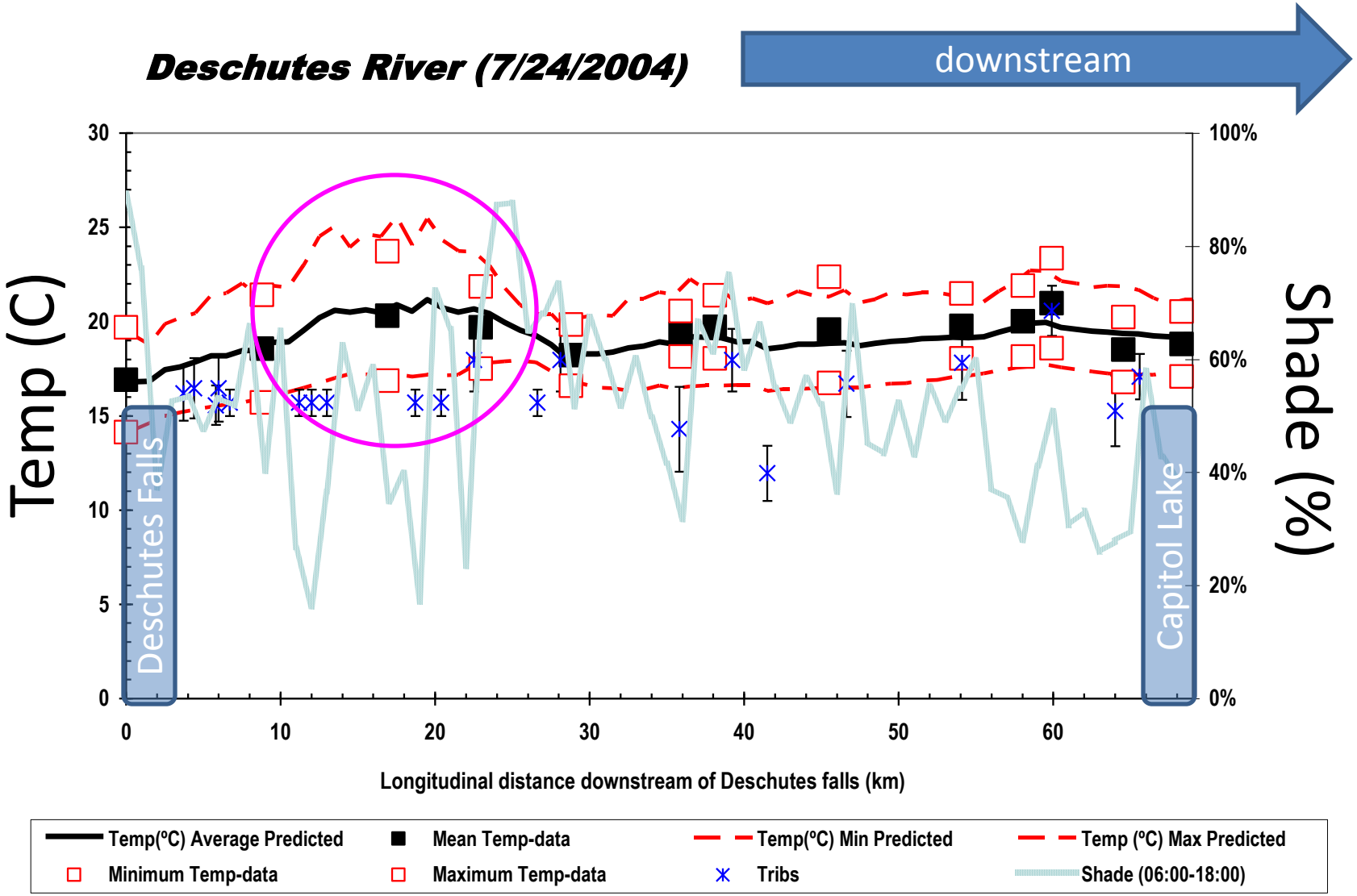


Deschutes River pH_{max} improvements (nutrient scenarios)

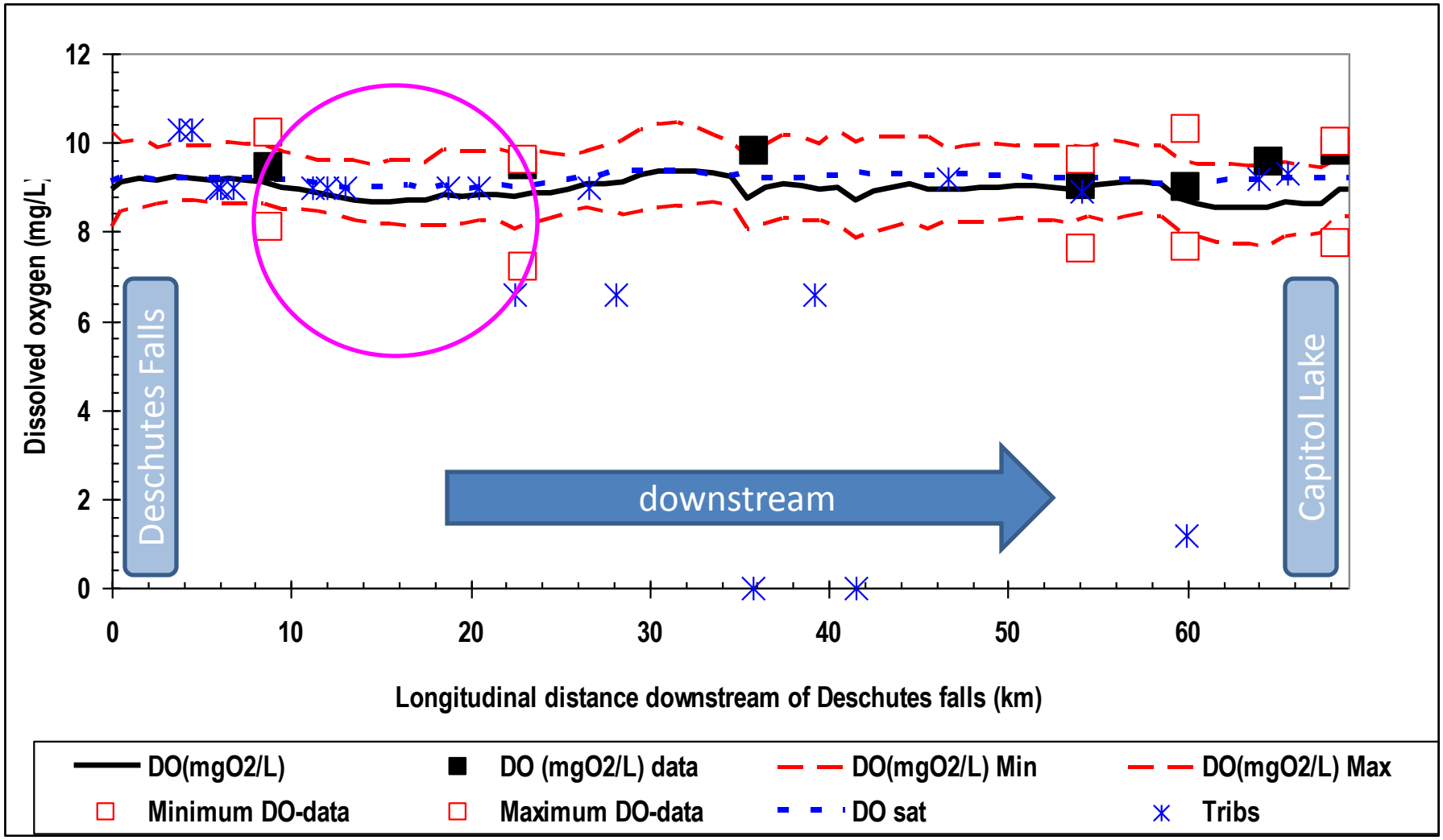


Outtakes

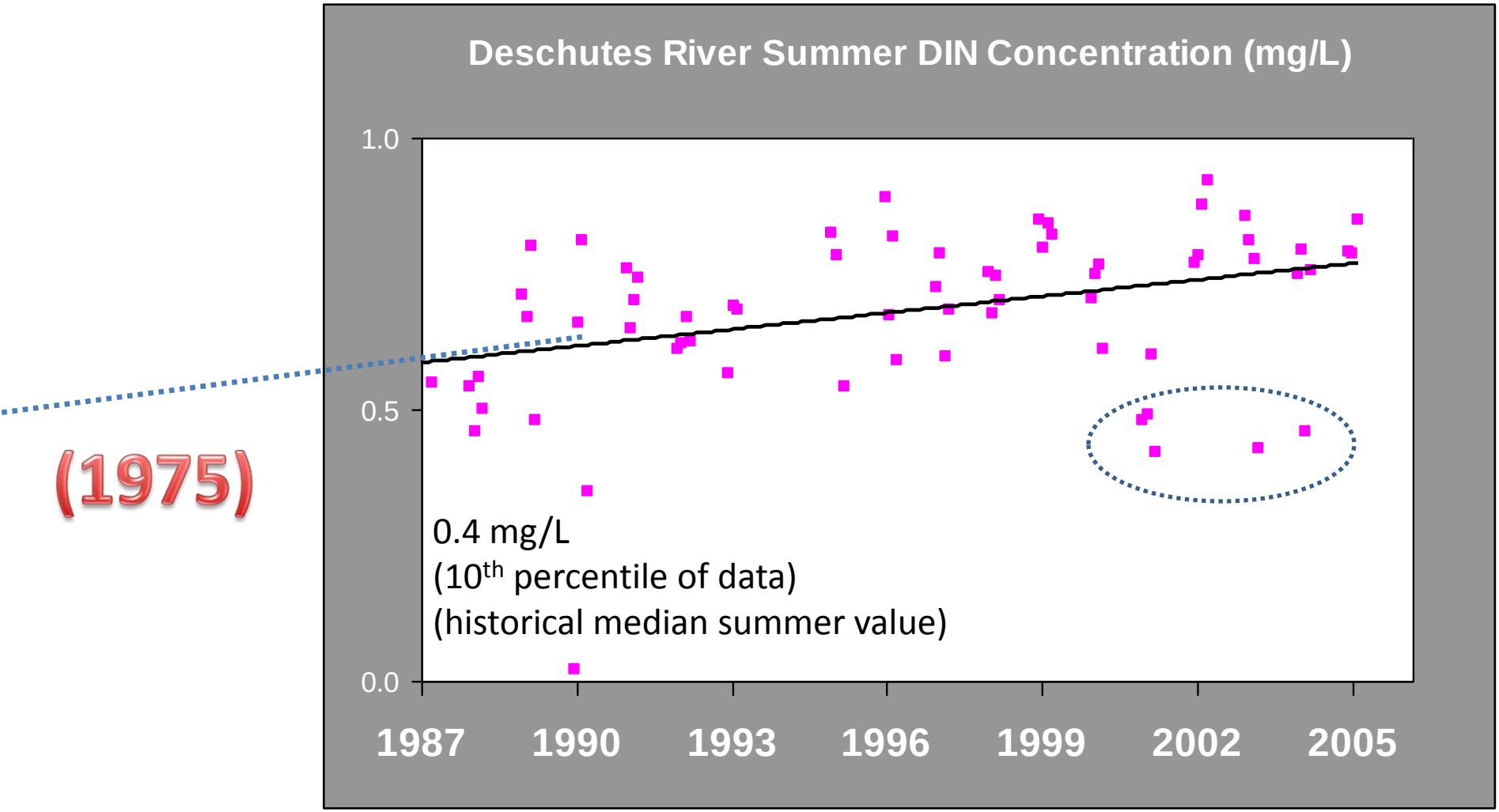
Temperature profile

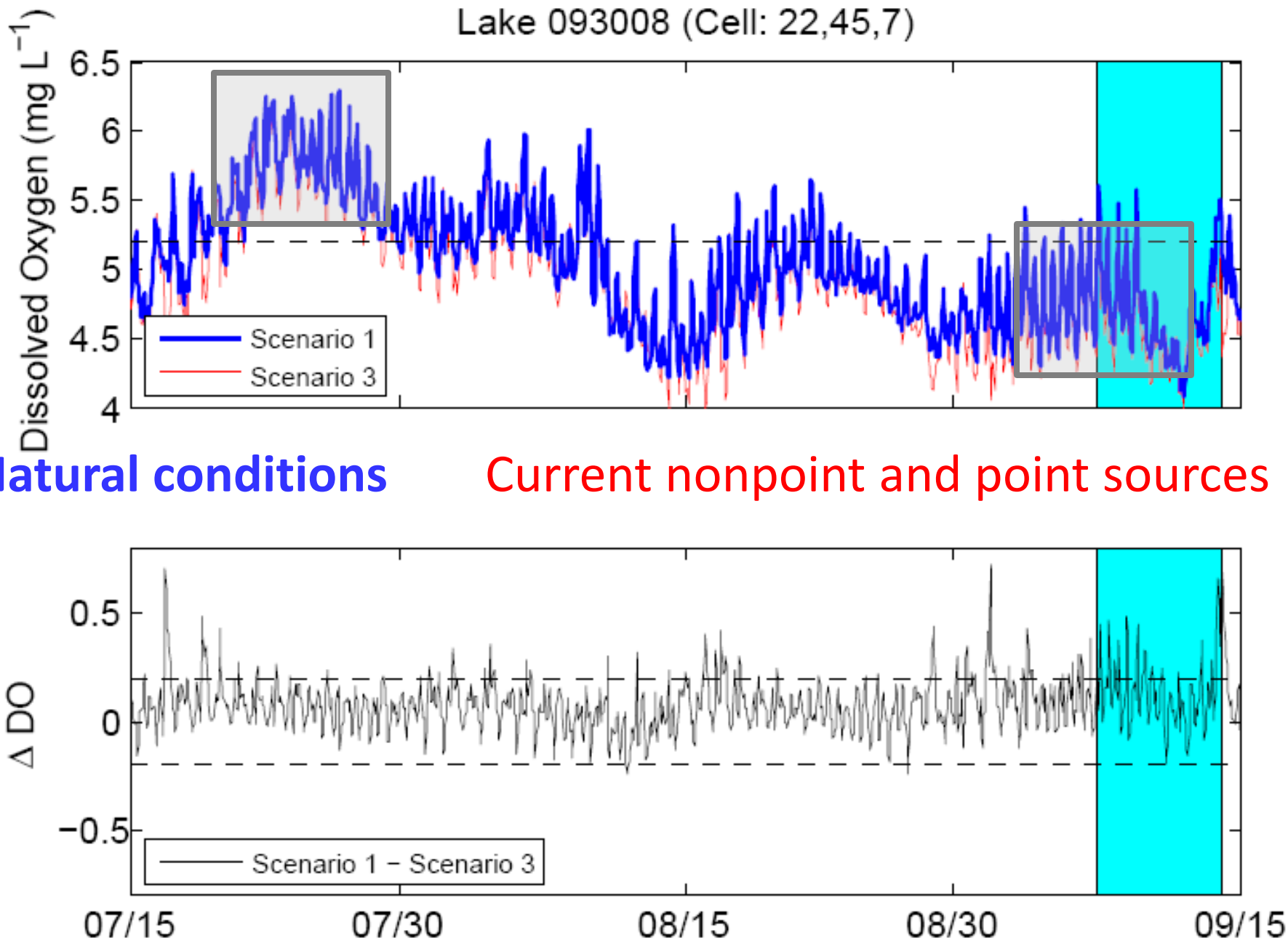


Dissolved oxygen profile



Deschutes River natural conditions (example)




Lake 093008 (Cell: 22,45,7)
Dissolved Oxygen (mg L^{-1})
6.5
6
5.5
5
4.5
4
Scenario 1
Scenario 3
Natural conditions
Current nonpoint and point sources
Δ DO
0.5
0
−0.5
Scenario 1 − Scenario 3
07/15
07/30
08/15
08/30
09/15