Rose Valley Reservoir & watershed protection

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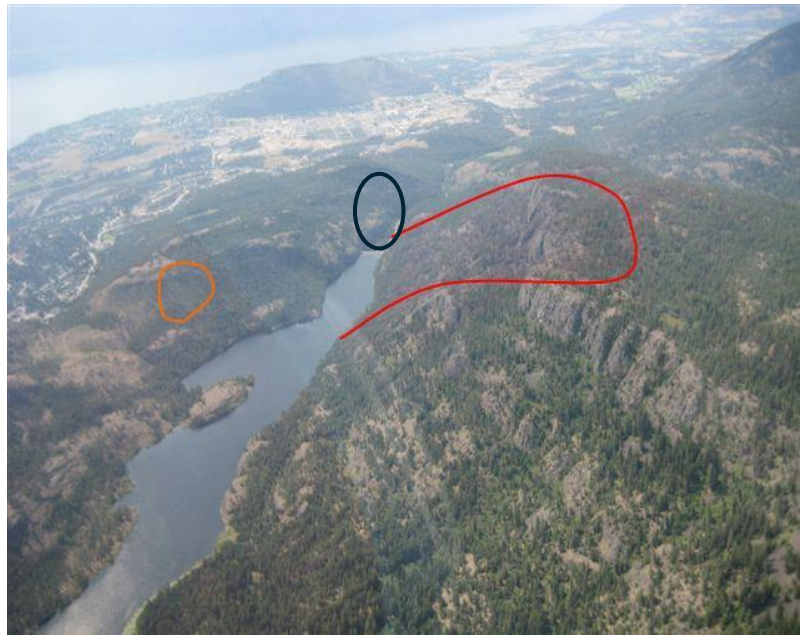
Rose Valley Reservoir & watershed protection

Presentation to CWK Council Nov 26, 2024

Do you remember when we thought these 3 human-caused wildfires were bad?



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Rose Valley Reservoir (RVR) Timeline

Windmill

Reduced water level

Aerator installed

Aerator upgraded

Siphon installed to remove low oxygen water

failing aerator and new manganese guideline

Interventions for low dissolved oxygen issues

Dam Built

1950 1960 1970 Dam raised 1980 1990 2000 2010 2020

Interventions for algae issues

Potassium Permanganate

Feed grade copper sulphate application begins

+

LID hires LAC

Automated headgate from Bear Ck to control nutrients

(Mechanical failures)

Feed grade copper sulphate application ends

RVWTP Opens

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RVR's Two Biggest Challenges:

1) Low dissolved oxygen concentrations in deep water
   - Historic issue

2) 2023 McDougall Rim wildfire
   - New issue

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Low Dissolved Oxygen, Algae, and TOC loops

1) Low DO releases nutrients for algae and bacteria

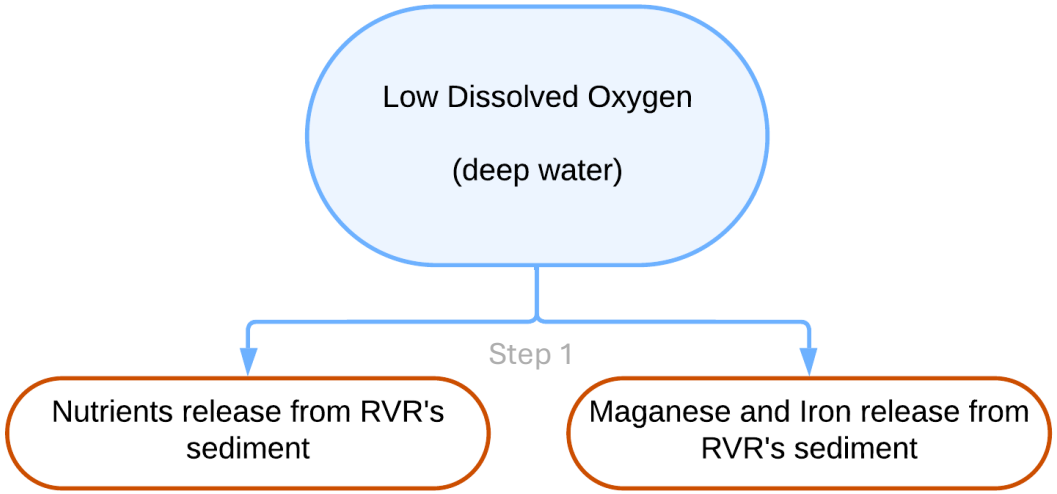
2) Algae and bacteria “bloom”

3) When algae and bacteria increase, the amount of ff carbon in the water increases too

- This increases Total Organic Carbon (TOC) and dissolved organic carbon (DOC)

4) These feed back loops accelerate nutrient and metal release from the sediments

5) Then the wildfire



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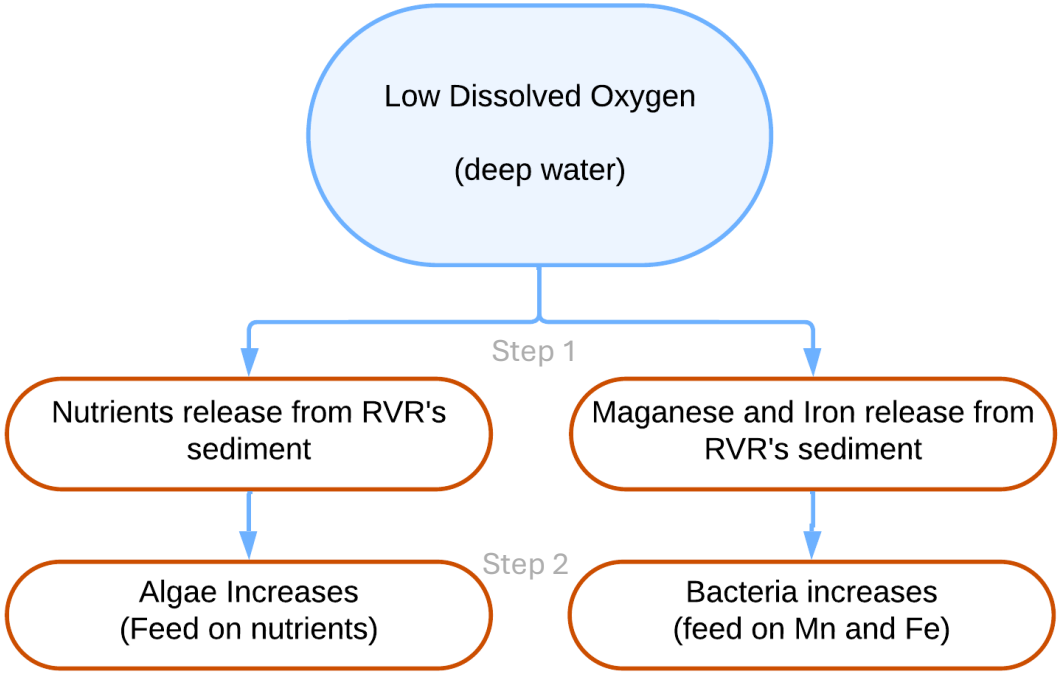

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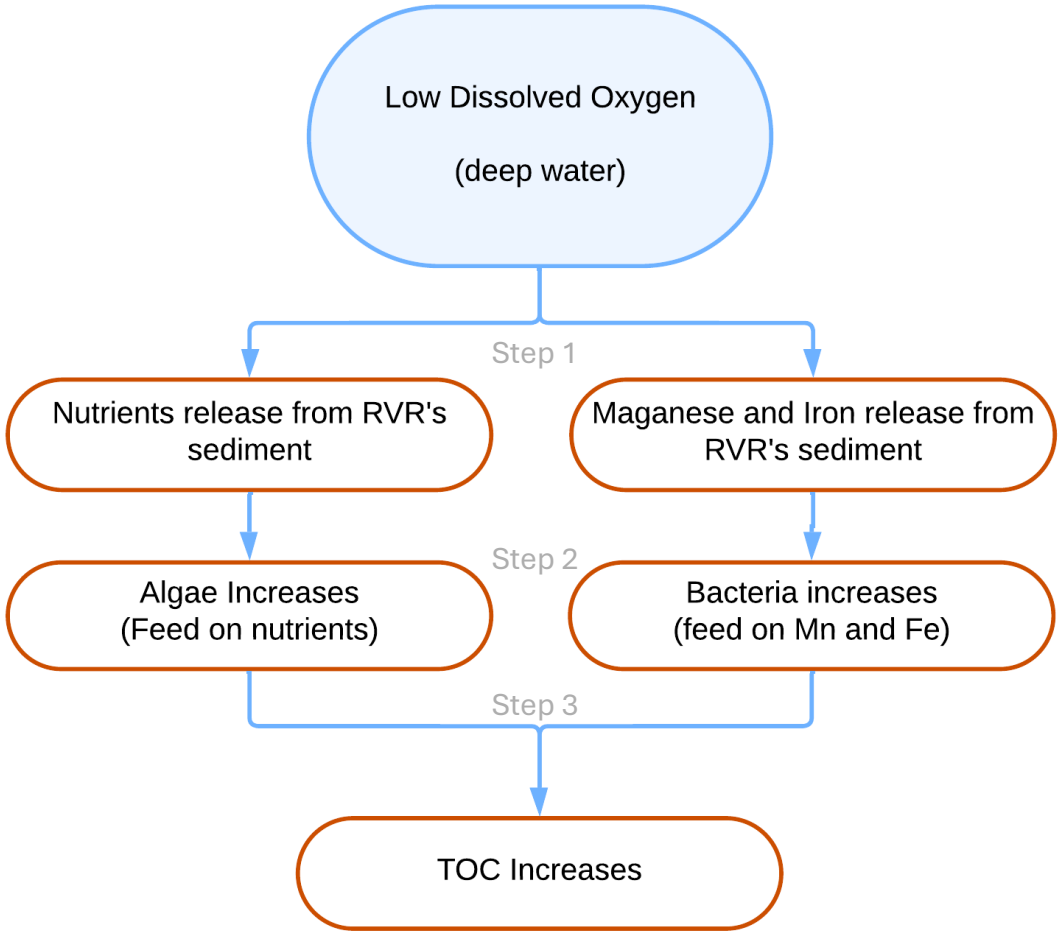

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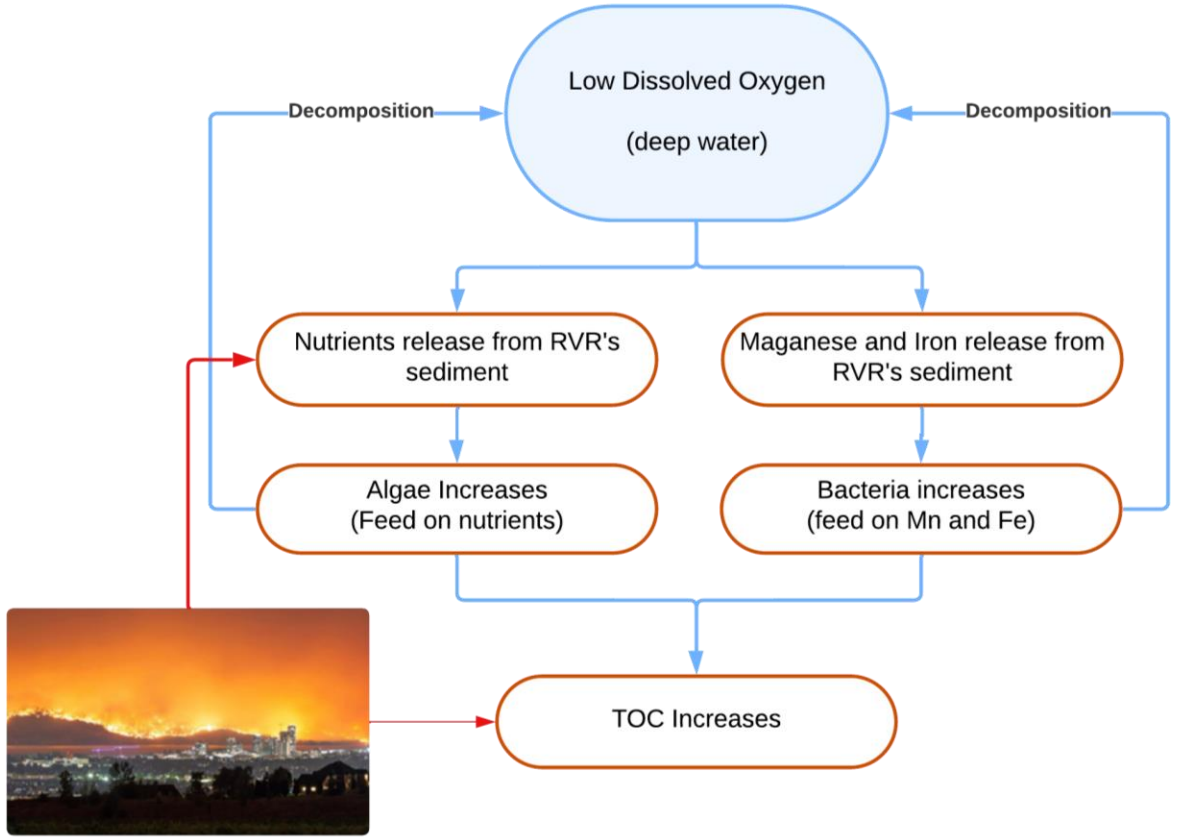
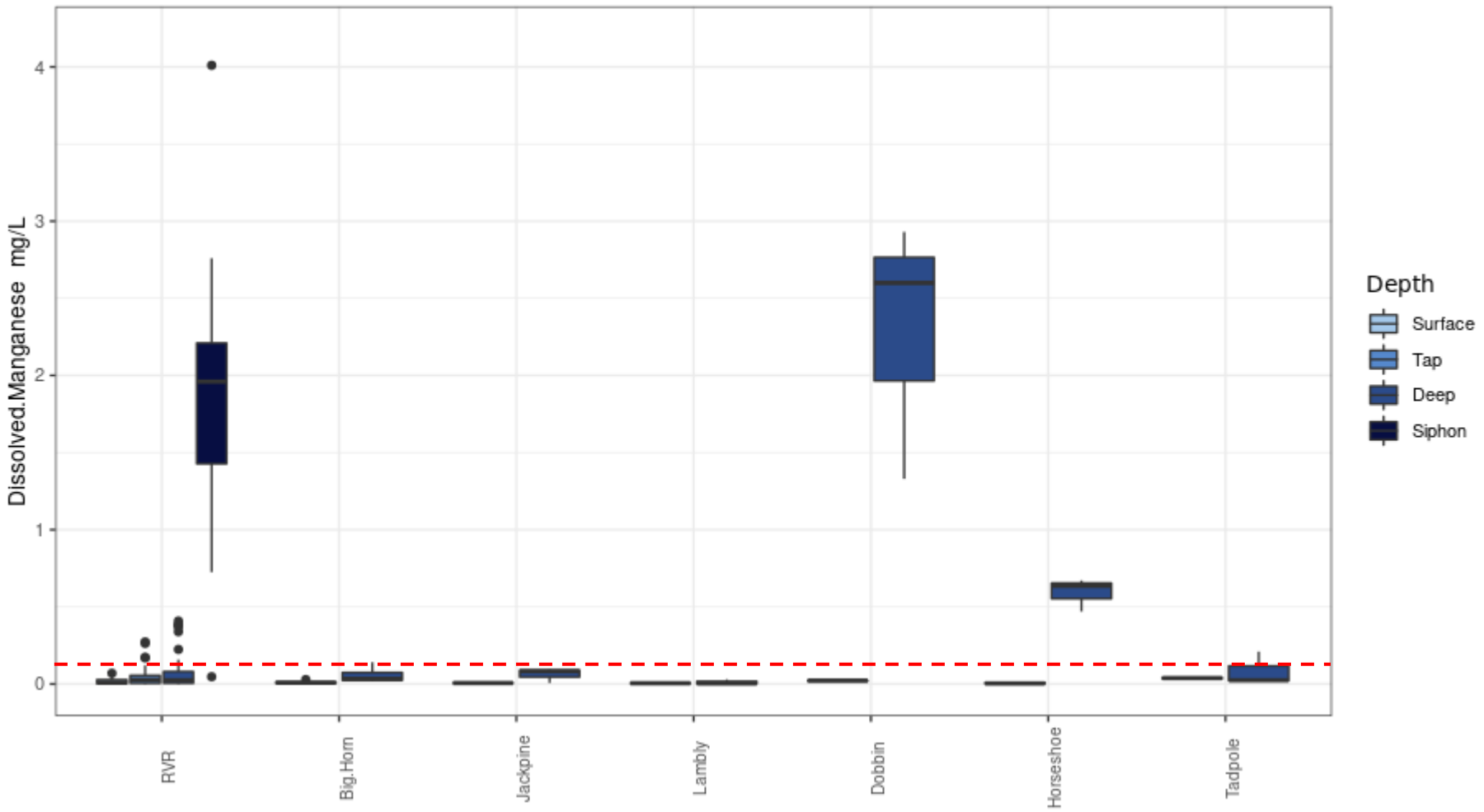


Manganese in CWK reservoirs



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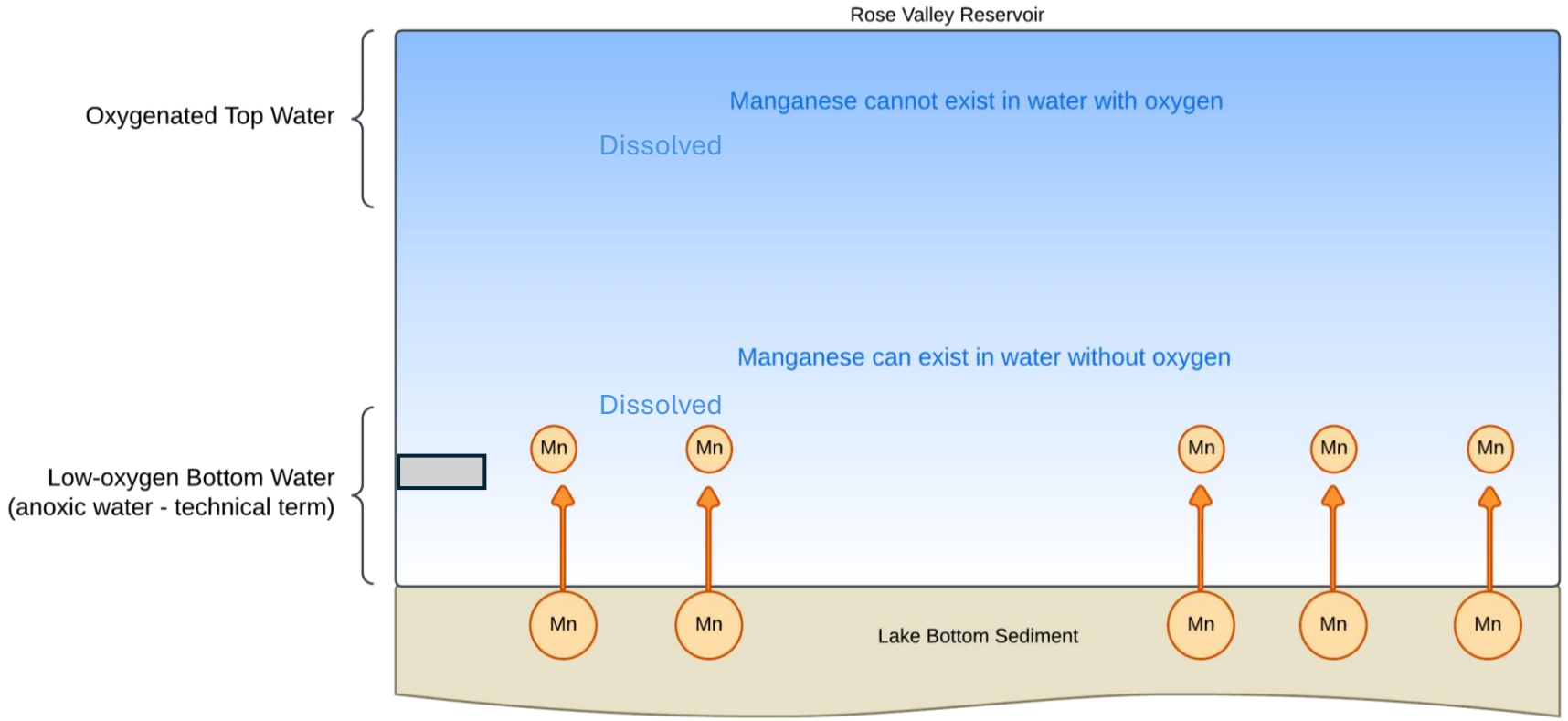
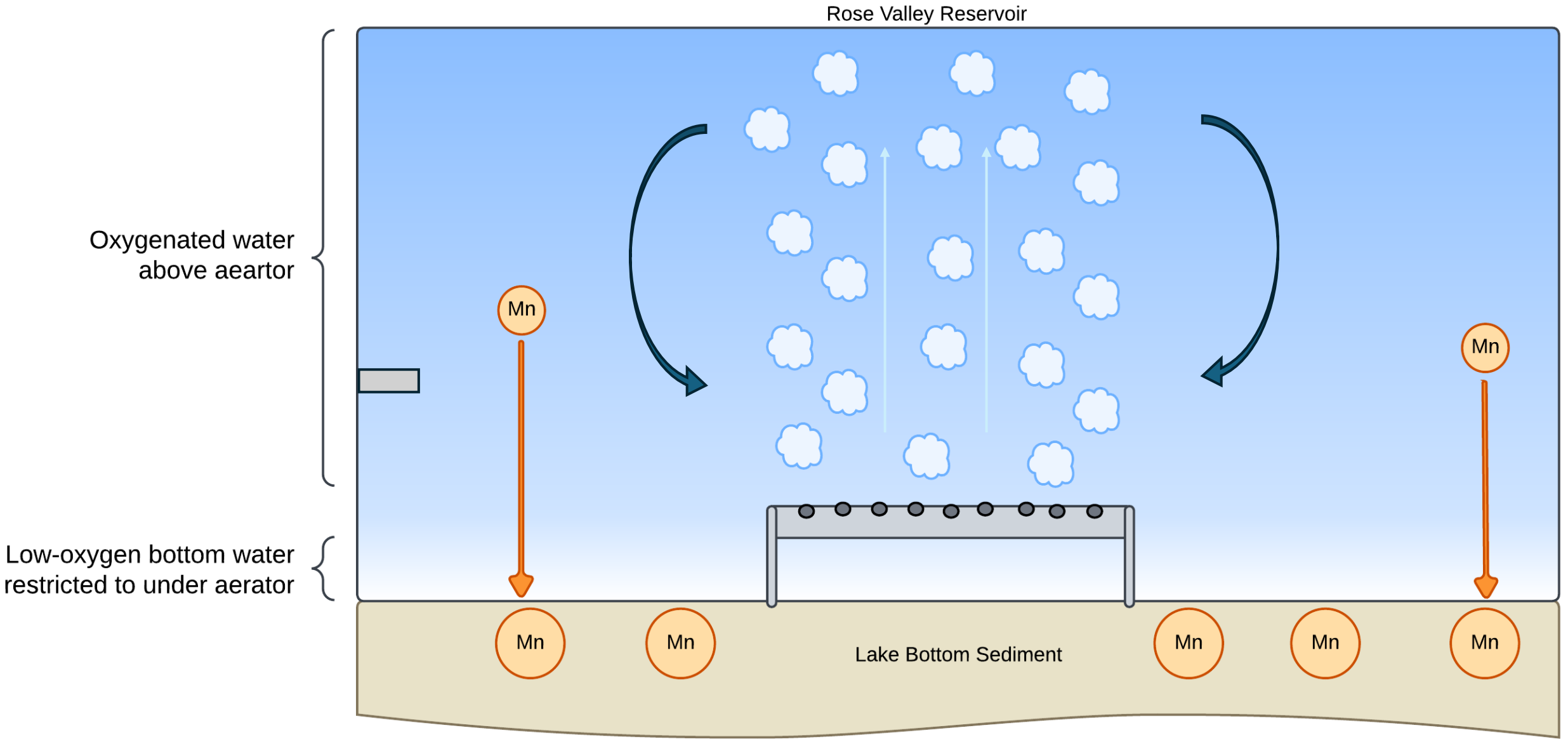
Why does Manganese exceed in RVR?

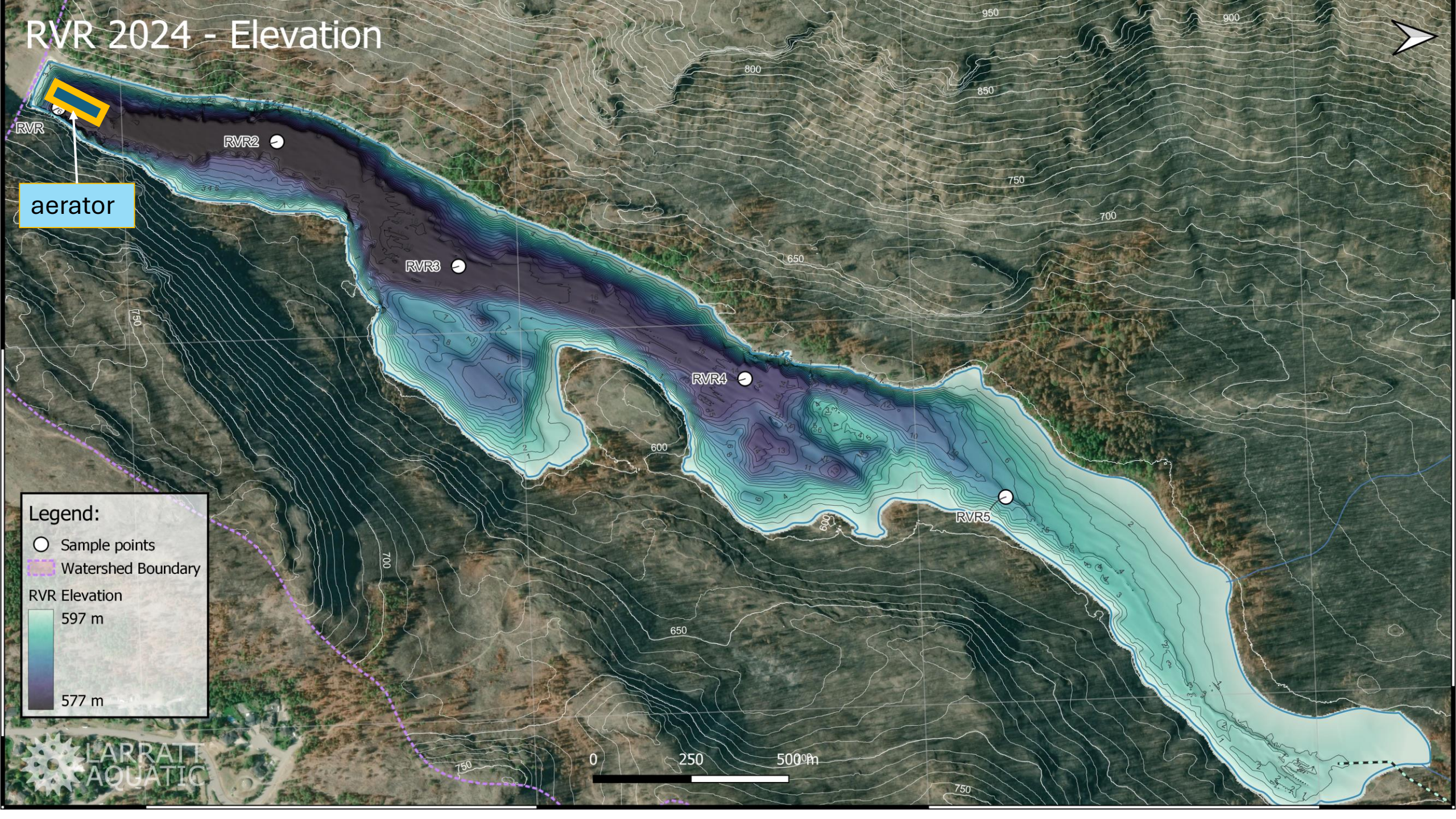
Seasonal low oxygen conditions in deep water encourages Mn release:

- every summer (July-September)
- sometimes March in winters with a long ice cover or following severe algae blooms



Destratification Aeration and Manganese




RVR 2024 - Elevation
RVR
RVR2
RVR3
RVR4
RVR5
aerator
Legend:
Sample points
Watershed Boundary
RVR Elevation
597 m
577 m
0
250
500 m
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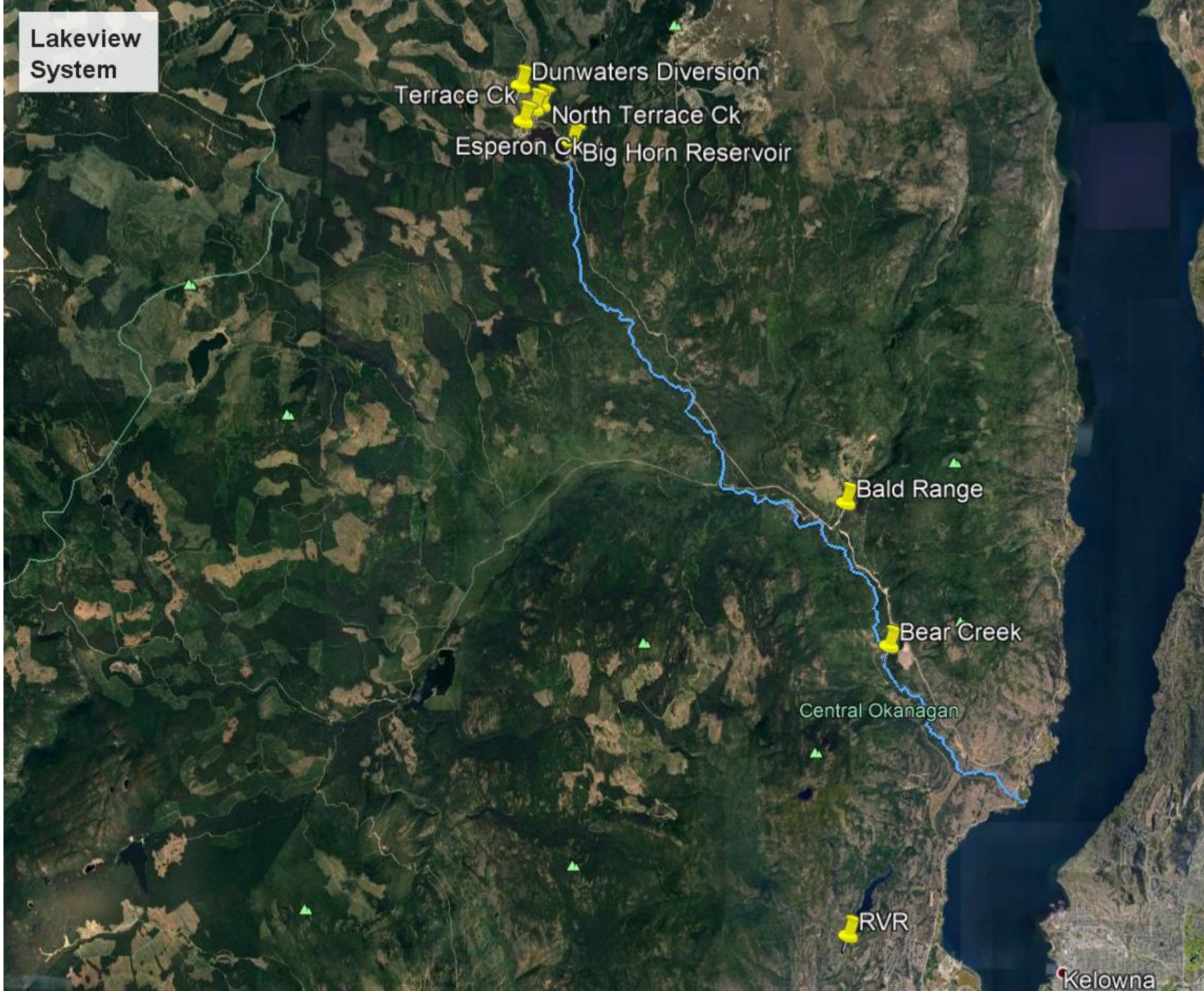
What does Lambly watershed do ?

BENEFITS

- Filters
- Acts like gigantic snow storage tank
- Removes/deactivates pathogens
- Delays arrival of storm flows to creeks

BUT the watershed:

- Is losing its filtration capacity due to logging roads/trails
- Freshet is earlier and harsher while summer low flows are lower due to increasing roads, trails, cut blocks



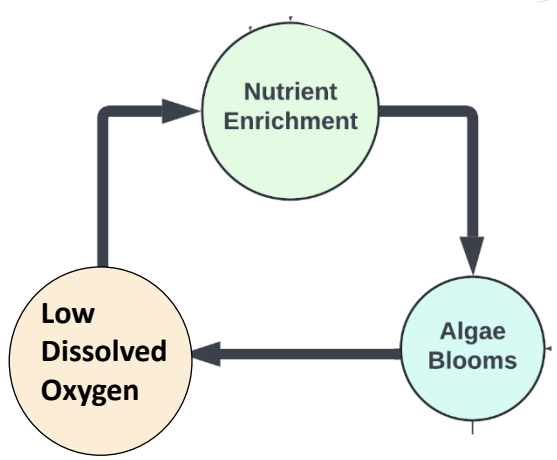
Watershed Protection Issues

What happens in the watershed affects Okanagan Lake

RVR Dynamics Flowchart

Legend:

- ◯ Eutrophication Cycle
- ◇ Intervention
- □ Negative outcome
- ⬭ External factor



RVR's Two Biggest Challenges:

1) Low dissolved oxygen concentrations in deep water

Top priority for RVR: Restore aeration

- will reduce the duration and intensity of low oxygen conditions that degrade source water quality
- therefore, reduce Mn and THM treatment costs (Do a cost analysis of aeration versus additional WTP treatment).
- provides a barrier to poor water quality at the source of the TOC/DOC/THM, color/turbidity, Mn/Fe, algae/cyanobacteria problems.
- protects the reservoir environment for fish and recreators Historic issue

2) 2023 McDougall Rim wildfire

New issue: McDougall Rim wildfire impacts will be severe for ~5+ years

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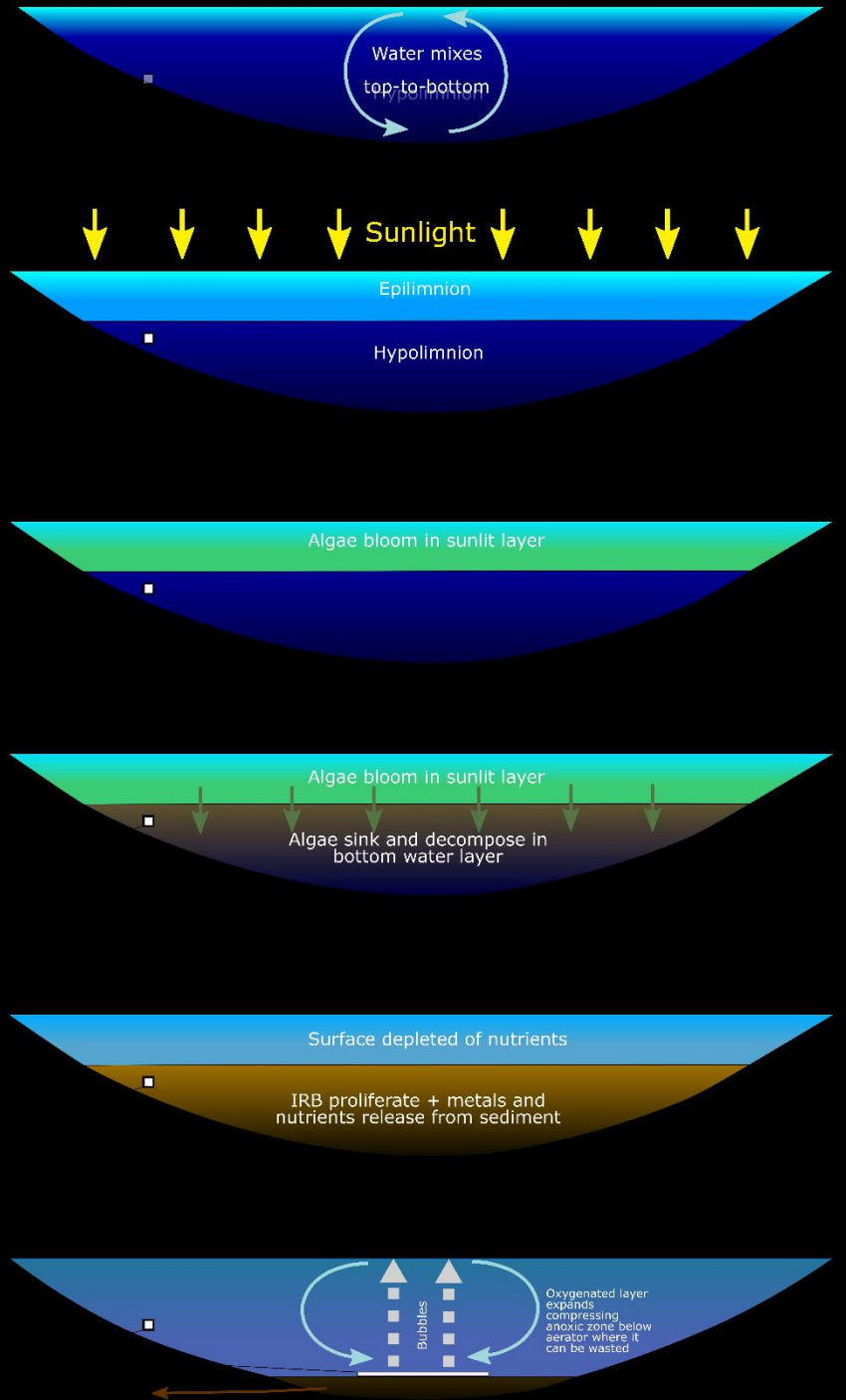
Questions?


Water mixes
top-to-bottom
Sunlight
Epilimnion
Hypolimnion
Algae bloom in sunlit layer
Algae bloom in sunlit layer
Algae sink and decompose in
bottom water layer
Surface depleted of nutrients
IRB proliferate + metals and
nutrients release from sediment
Bubbles
Oxygenated layer
expands
compressing
anoxic zone below
aerator where it
can be wasted