CALIFORNIA DREAMING

LEVERAGING WATER REUSE INNOVATIONS INSPIRING PNW'S SUSTAINABLE FUTURE

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WSP

MAY 3, 2024

Agenda

Water in the PNW, Washington State

Recycled Water

Tribes within Washington State

Case Study

Prediction of Future for Recycled Water in PNW

Water in the PNW

Question:
Which figure best reflects Washington State weather?

Which figure best reflects Washington State weather?

0%

0%

0%

Since January 1st, 2024 it has rained more in...

Seattle

Portland

Los Angeles

Since January 1st, 2024 it has rained more in...

Seattle

0%

Portland

0%

Los Angeles

0%

Since January 1st, 2024 it has rained more in...

Seattle

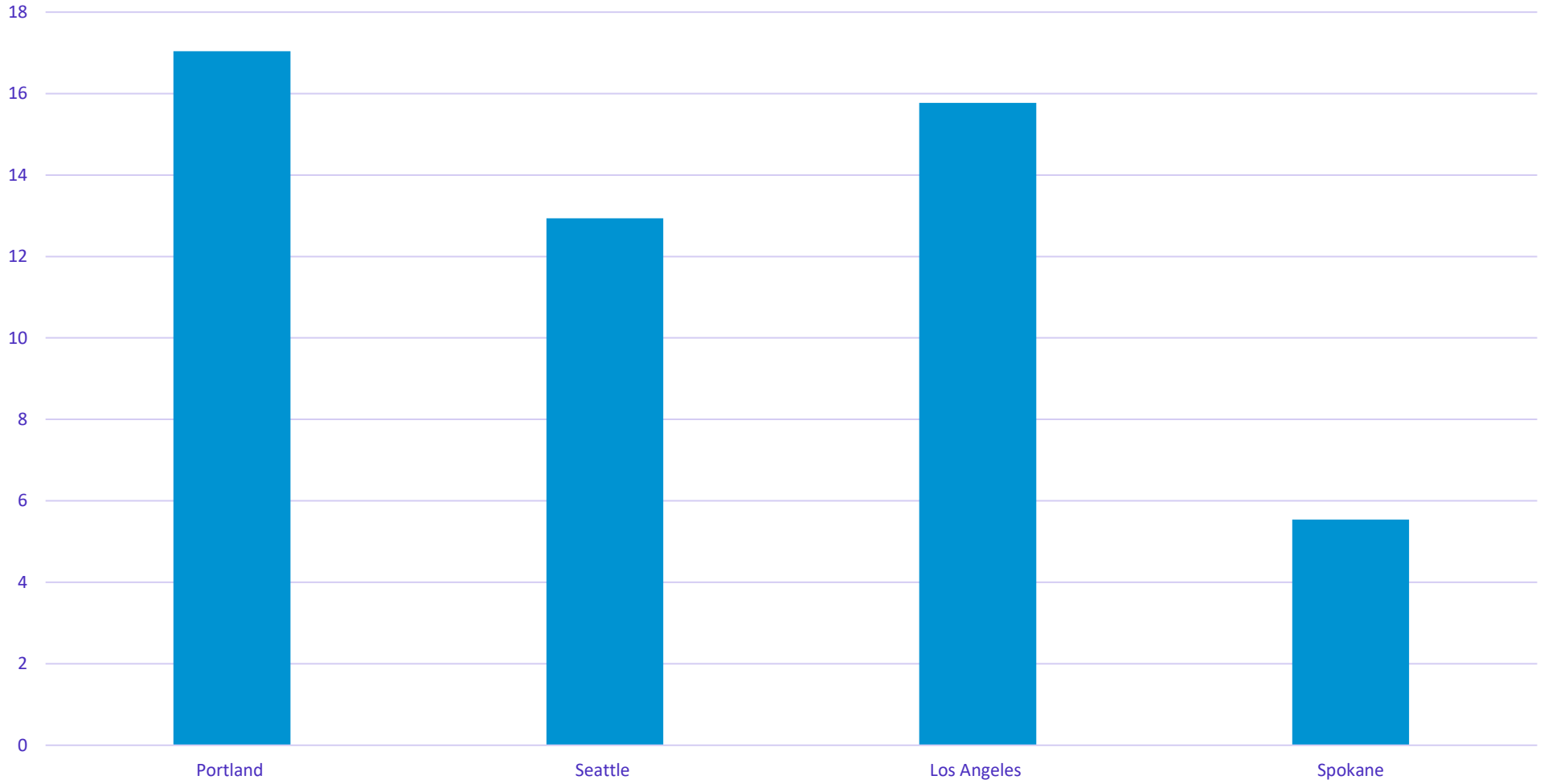
0%

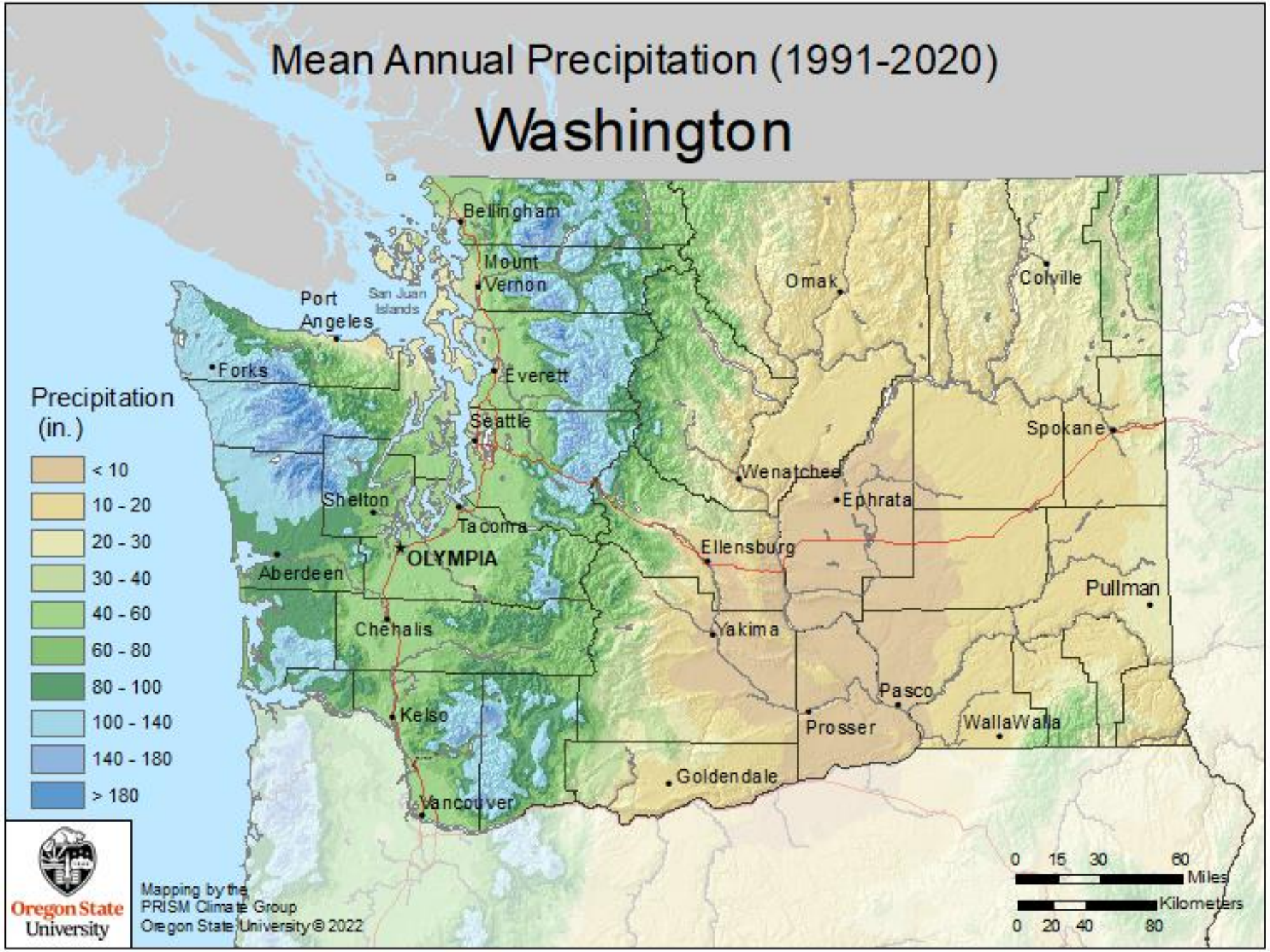
Portland

0%

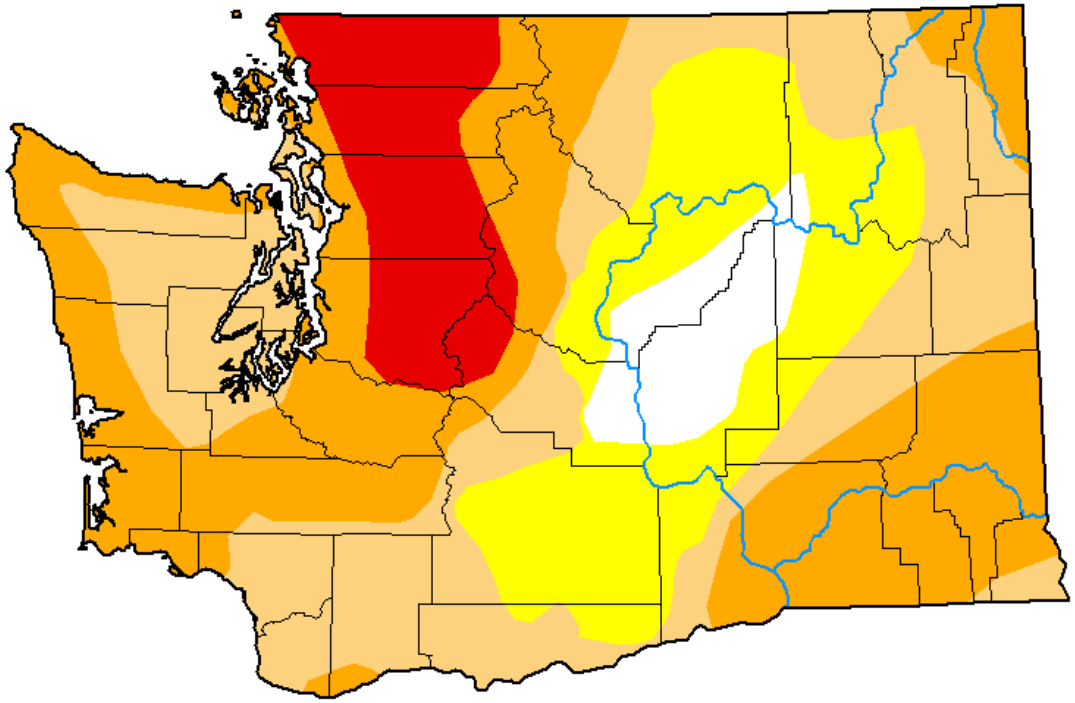
Los Angeles

0%


18
16
14
12
10
8
6
4
2
0
Portland
Seattle
Los Angeles
Spokane


Mean Annual Precipitation (1991-2020)
Washington
Precipitation (in.)
< 10
10 - 20
20 - 30
30 - 40
40 - 60
60 - 80
80 - 100
100 - 140
140 - 180
> 180
Bellingham
Mount Vernon
San Juan Islands
Port Angeles
Forks
Everett
Seattle
Shelton
Tacoma
OLYMPIA
Aberdeen
Chehalis
Kelso
Vancouver
Omak
Colville
Spokane
Wenatchee
Ephrata
Ellensburg
Yakima
Pullman
Pasco
Prosser
WallaWalla
Goldendale
0 15 30 60
Miles
0 20 40 80
Kilometers
Oregon State University
Mapping by the PRISM Climate Group
Oregon State University © 2022

2023 Drought Actual



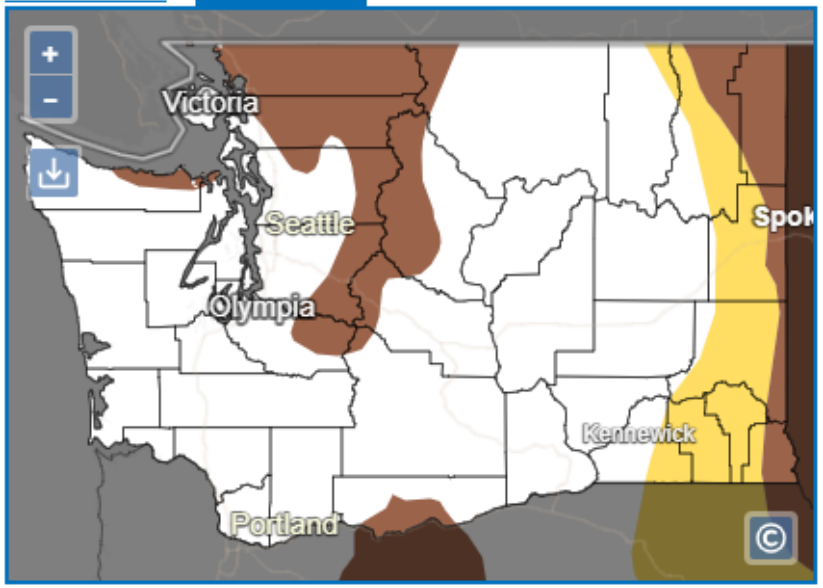
Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

Source: https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?WA

Drought Outlooks for Washington

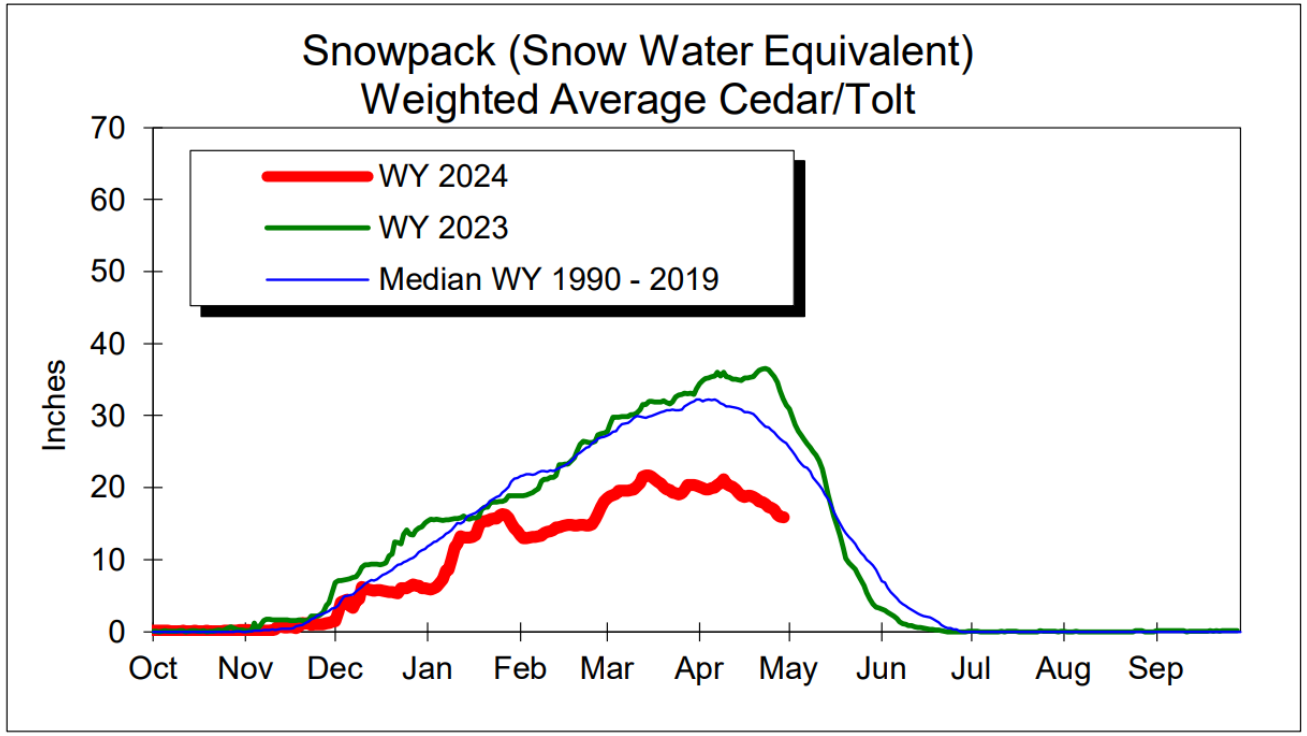
Monthly | Seasonal



Legend

Drought Is Predicted To...

Persist | Improve | End | Develop | N/A



The average snow accumulation across the sites SPU monitors is estimated to be about 15.9 inches which is below the long-term average for this time

- 75% of Washington State water supply comes from surface water
- Snowpack feeds surface water
- Drier conditions lead to minimized absorption to groundwater
- Region's snowpack has **shrunk by a third since 1955**
- Snowpack predicted to be **reduced by 70% more by the 2080's** depending on climate model & global emissions.

Water Will Impact Energy – And Outside of Washington State

- In 2022, hydroelectric power accounted for 67% of Washington's total electricity net generation
- Washington provides hydropower supply to other states during drought, future supply may be limited

Washington state drinking water, hydropower at risk as Pacific Northwest snowpack shrinks

By Conrad Swanson, The Seattle Times
Published: February 12, 2024, 6:00am

Share:

Business

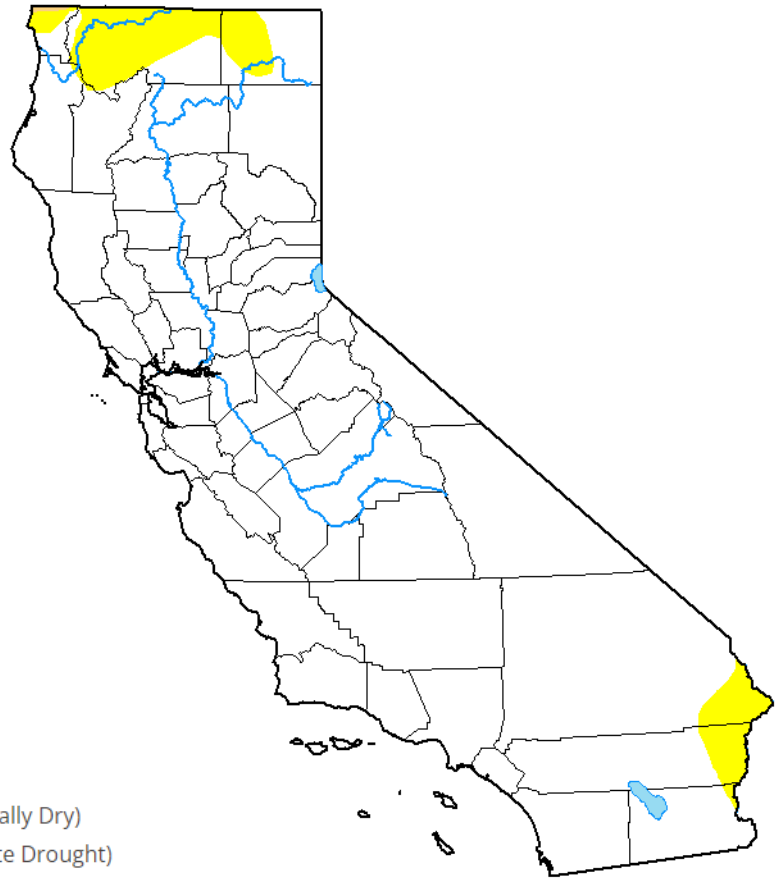
Seattle City Light raises rates, cites weather impacting hydropower production

Elizabeth Ingram
10.17.2023

Share |

Water in California

September 26, 2023



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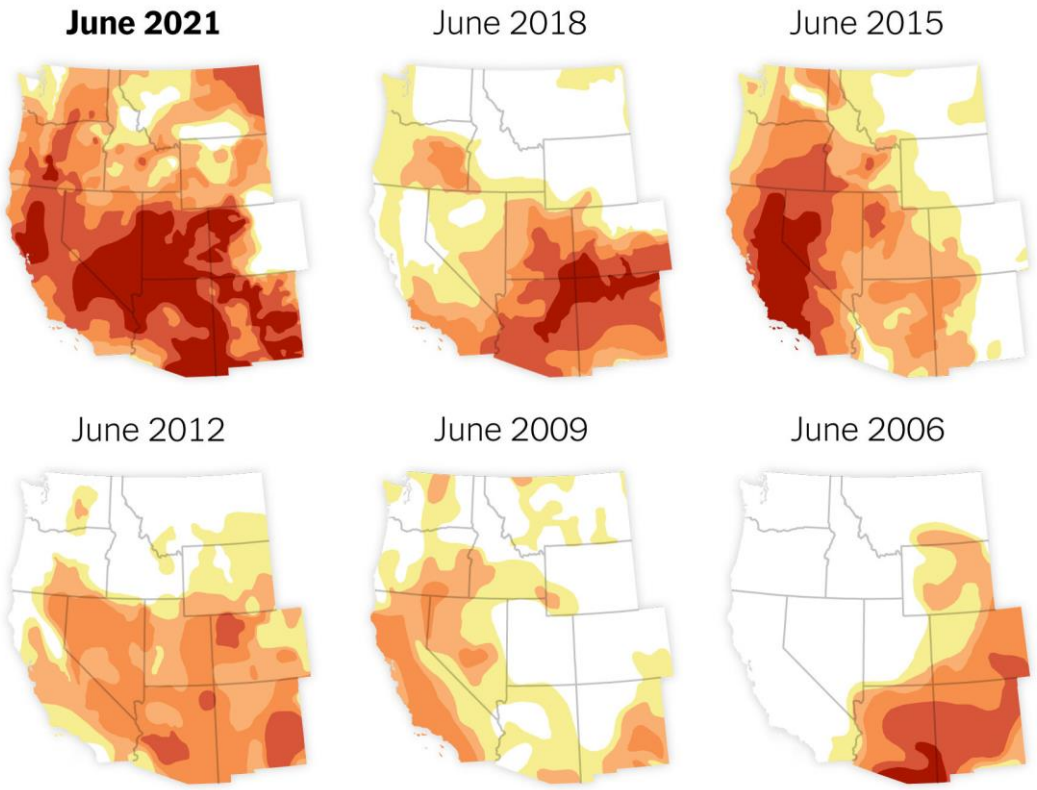
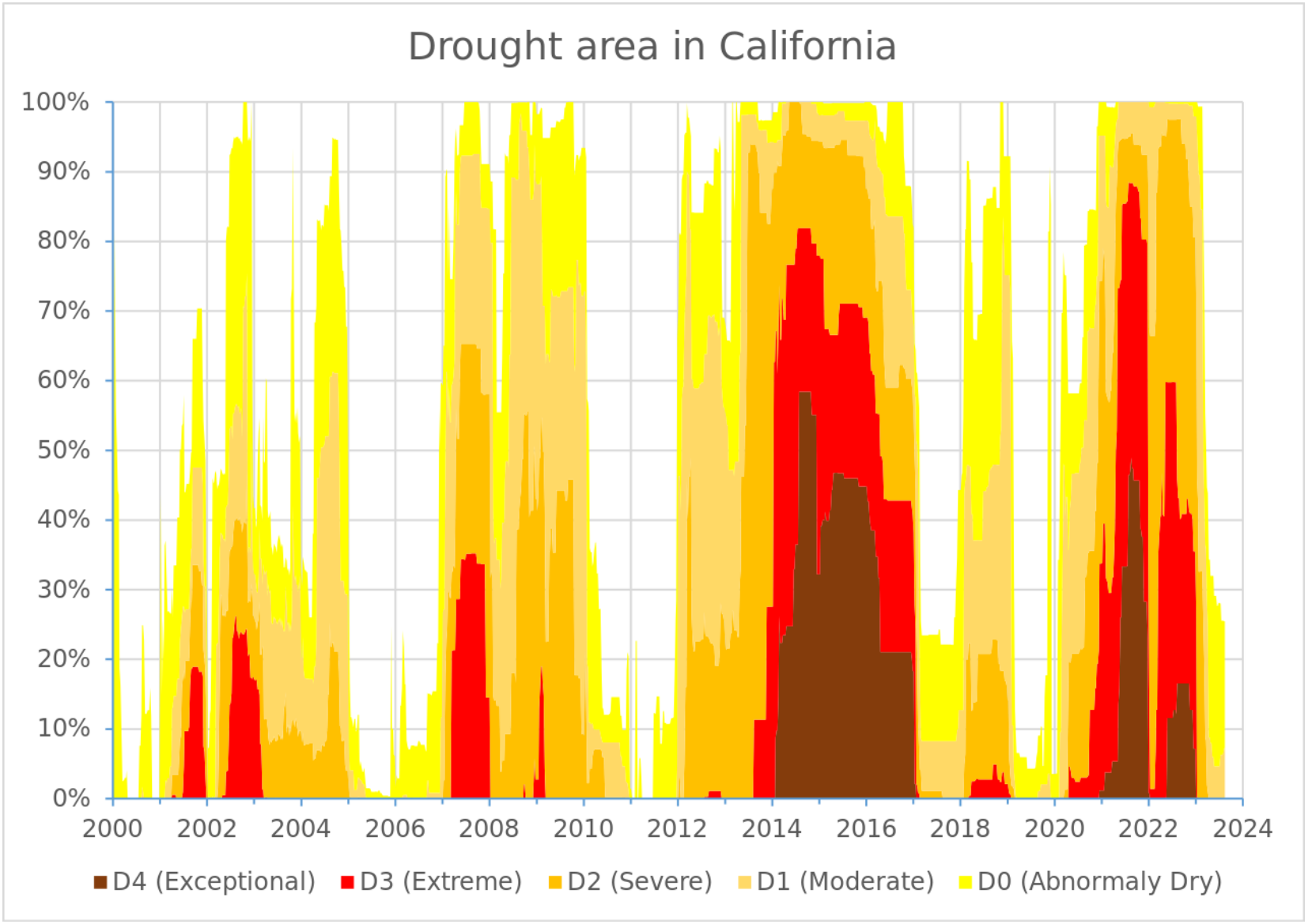



Drought area in California
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
D4 (Exceptional)
D3 (Extreme)
D2 (Severe)
D1 (Moderate)
D0 (Abnormaly Dry)

Water Reuse Timeline

State of Washington

1891
Water Right Statute allows making claim to water, influenced by mining law

1917
Washington Water Code; First law to recognize need to protect water, establish regulations, ensure adequate water supplies for future generations

1945
Legislature passed 90.44 RCW: Regulation of Public Groundwater

1992
Reclaimed Water Act, Chapter 90.46 of the Revised Code of Washington

2011
Chapter 246-274 WAC sets requirements for using greywater for subsurface irrigation

2018
WA State Department of Ecology completed and adopted rules

State of California

1851
Appropriative right system "first in time, first in right" principle

1910
35 farms use recycled water for agriculture

1918
CA develops first USA regulations to address use of recycled water for agricultural irrigation

1991
CA Recycled Water Policy is adopted providing guidelines for recycled water

2010
State Water Board adopts regulations for on-site treatment and reuse

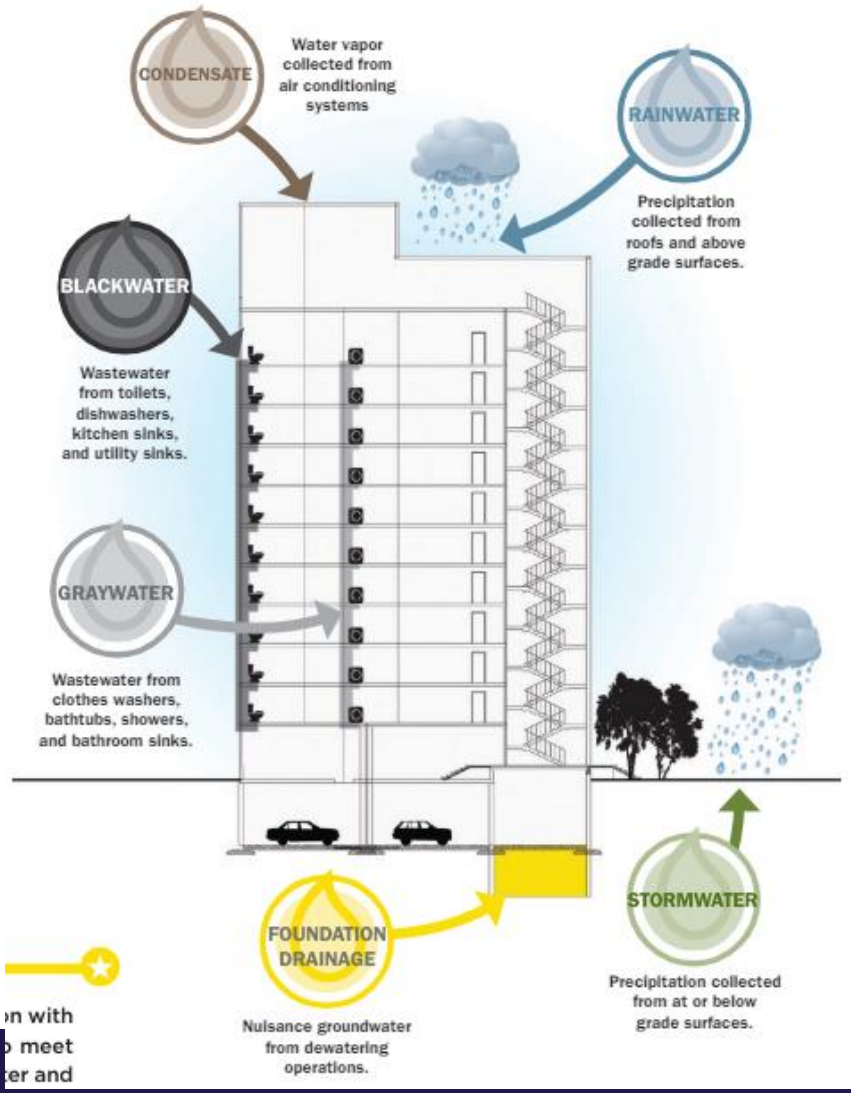
2017
State Water Board Division of Drinking Water tasked for creating direct potable reuse criteria

2023
Direct Potable Reuse regulation passed

Non-Potable Reuse – Ventura

- Agricultural irrigation through a non-potable system (& ASR)
- Distribution system to offset groundwater pumping using treated wastewater

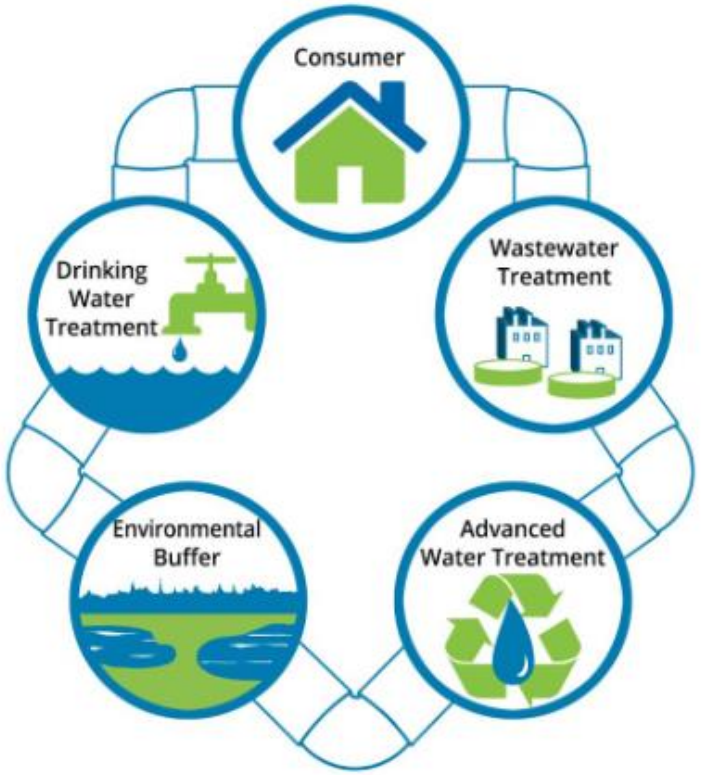
Onsite Non-Potable Reuse – San Francisco



- New developments 250,000 sq ft or greater must install onsite non-potable reuse systems
- Water budgets required 40,000 – 250,000 sq ft buildings

San Francisco Water Power Sewer
Services of the San Francisco Public Utilities Commission

Indirect Potable Reuse – City of Santa Monica



- Treats wastewater & stormwater for up to 10% of City's water demand
- Sustainable Water Infrastructure Project
- Reuse of 1.5 MGD

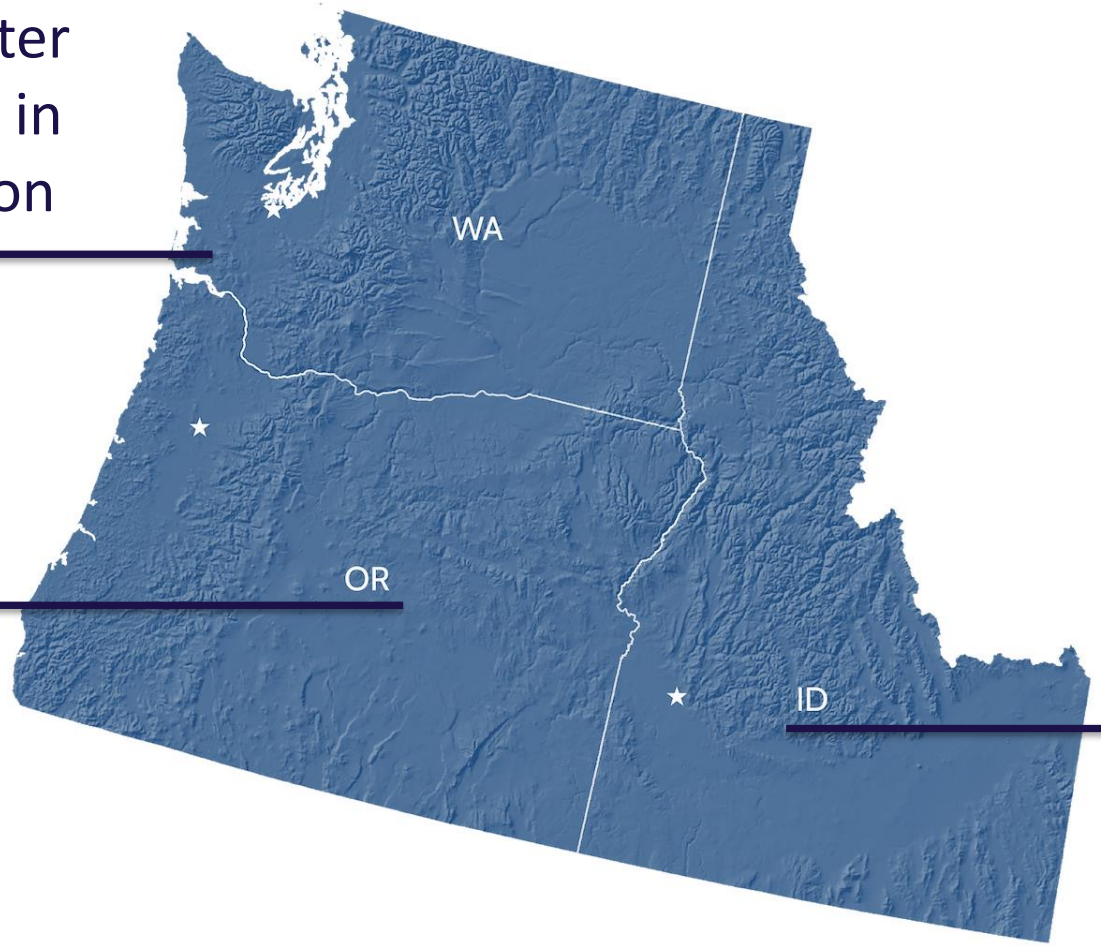
Direct Potable Reuse – San Diego

- December 2023 CA passed DPR regulations
- Purification of wastewater through ozonation, BAC filters, membrane filtration, RO, UV and advanced oxidation
- By 2035 will produce 83 Million Gallons of purified water

PNW Existing Reuse Projects

~30 reclaimed water facilities, with 1/3 in Eastern Washington

~140 recycled water systems



~140 Reuse permits
Reuse began in 1988

Tribes Within Washington State

In 2019, Washington Tribes were the

7th

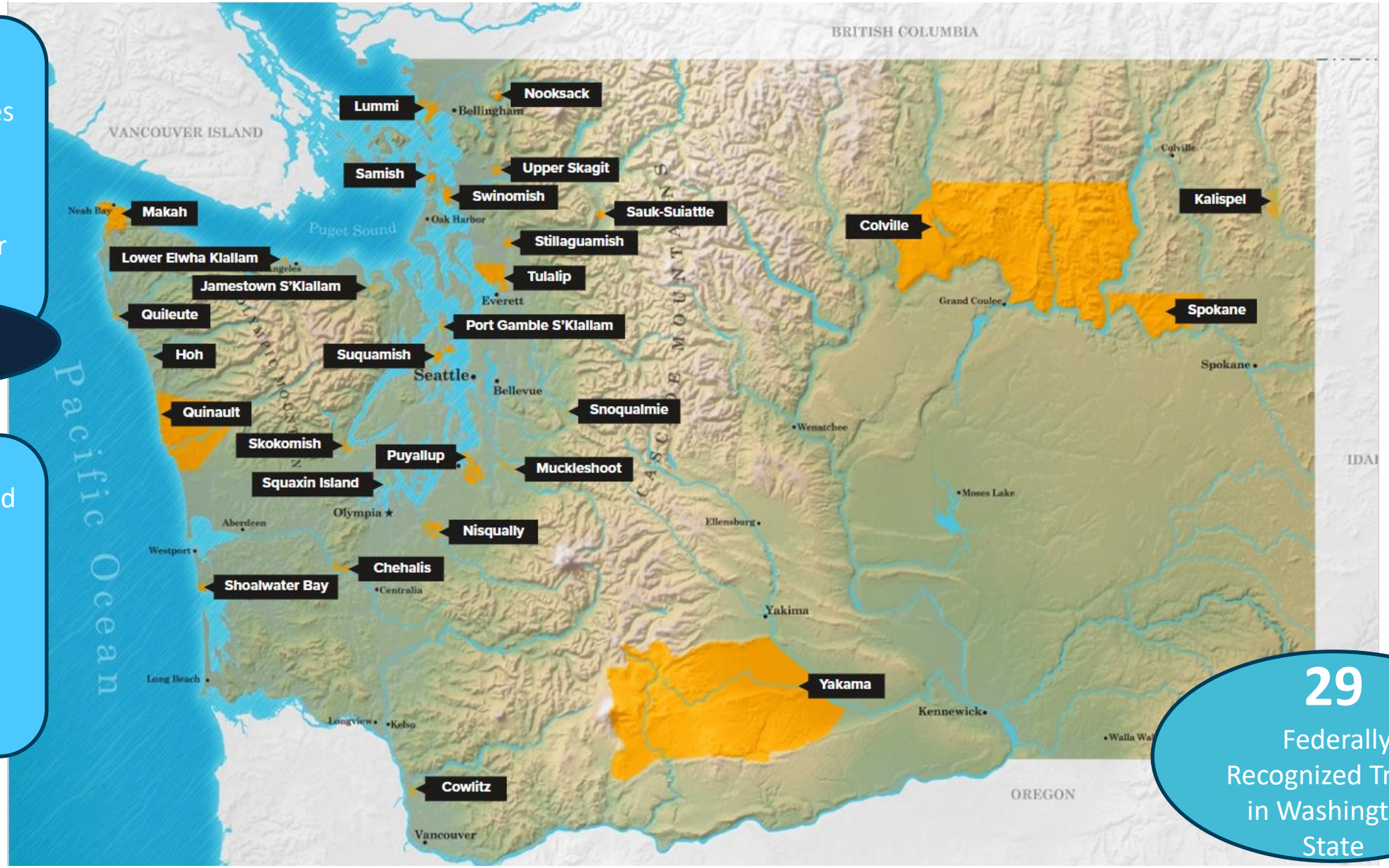
Largest Employer in the State

Larger than Starbucks & Costco, combined!

Tribal Economic Activity Accounted for

$5.6 billion

in Washington State



29

Federally Recognized Tribes in Washington State

Source: https://www.washingtontribes.org/the-tribes-of-washington/

Treatment as a State (TAS)

- Clean Water Act 1970
  - Powers Delegated to the State did not include Tribal Nations
- 1987 Congress passed Treatment as a State (TAS) allowing tribes to set own water quality standards, similar to states
- Of the 29 federally recognized tribes in Washington State, only 11 Tribes have TAS provisions

Sovereignty

“Sovereignty means tribes inherently possess governmental (legal) power to regulate people and things within their territories for the benefit of tribal citizens.”

~ National Tribal Water Council

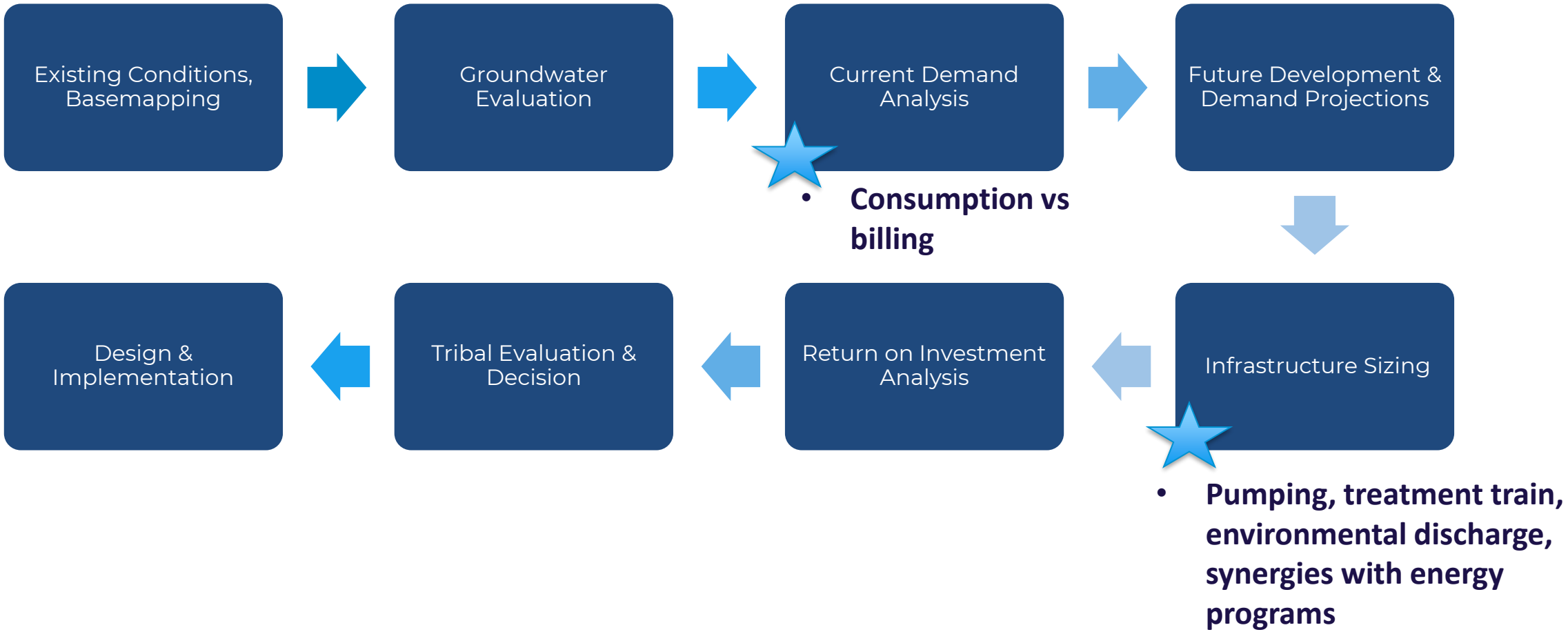
- Sovereignty and sustainability with climate change is a priority for many tribes

Case Study: Water Reuse on Tribal Lands

Case Study

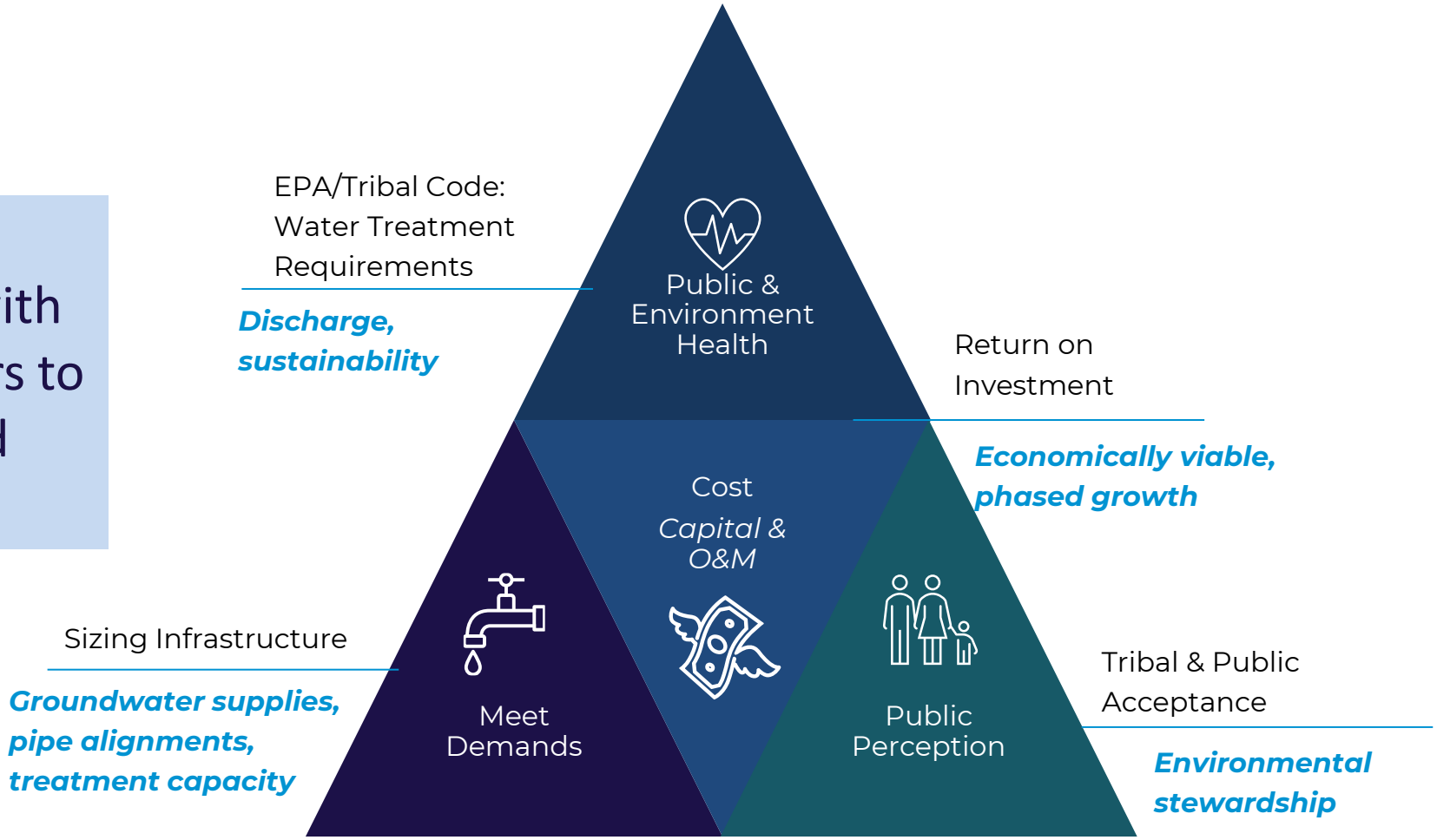
- Tribal Organization in Washington State
- Project originated as an evaluation of the feasibility to establish an independent water/sewer utility
  - ***Water Sovereignty***
  - ***Self Sufficient for Future Generations***
  - ***Support & growth of industrial, economic & recreational facilities***
- Phased Approach Evaluation
- Reuse **not** part of the initial project

Project Progression



Opportunities & Challenges for Reuse

Facilitated discussions with Tribal members to understand priorities



Method of Evaluating Reuse Options

Guiding Questions	• How is water currently being used? • How much wastewater is being produced?	• How could water be managed in the future? • How could biosolids be managed in the future? • How might demand and supply change?	• What is the estimated total cost to construct & operate? • What is the estimated return on investment?
Evaluation	Meter Records, Water Bills, Demand Fluctuation, Largest Water Consumers	Existing Technologies, Public Health, Future Water Demand, Tribal values	Water Bills, Sewer Bills, Engineer Cost Estimate, Inflation, Loans & Grants

Tribe’s Criteria for Evaluation of Reuse

- Capital & O&M Cost
- Treatment Requirements
- Ability to Offset Demands
- Public Opinion

Decision Matrix for Evaluation of Water Reuse Options

- Scenario Evaluation
  - DPR, IPR, Non-potable reuse, 3 onsite reuse options

Facilitated scoring with Tribal members to identify favorable options

	Evaluation Criteria					
System Type	Capital/O&M Cost	Treatment Requirements for Public Health	Ability to Offset Water/Sewer Demands	Public Opinion	Total	Ranking
DPR	2	1	5	1	9	5
IPR with Groundwater Augmentation	2	3	3	4	12	2
Non-Potable Recycled Water	1	4	2	3	10	4
Onsite Non-Potable Reuse	1	2	4	2	9	5
Onsite Non-Potable Reuse	4	2	4	2	12	2
Onsite Non-Potable Reuse	4	4	1	5	14	1

Evaluation Criteria Scale

5 -Favorable	4	3	2	1- Unfavorable

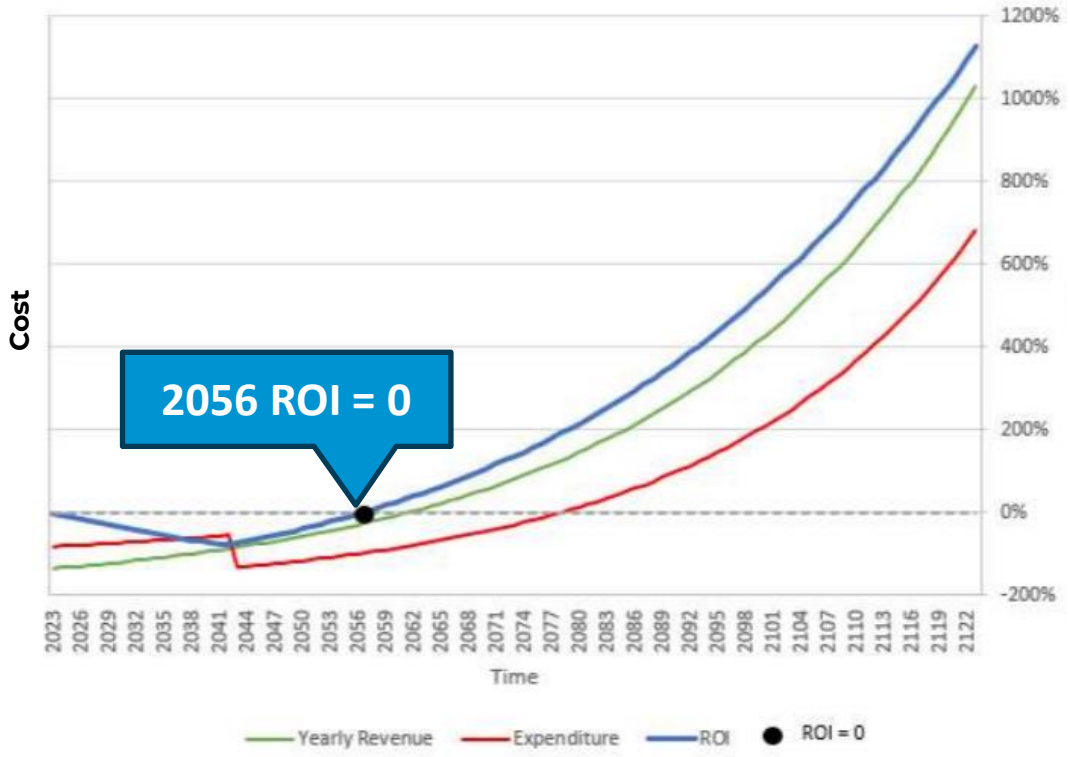
Ranking Scale

1 -Favorable	2	3	4	5- Unfavorable

Evaluation of Return on Investment

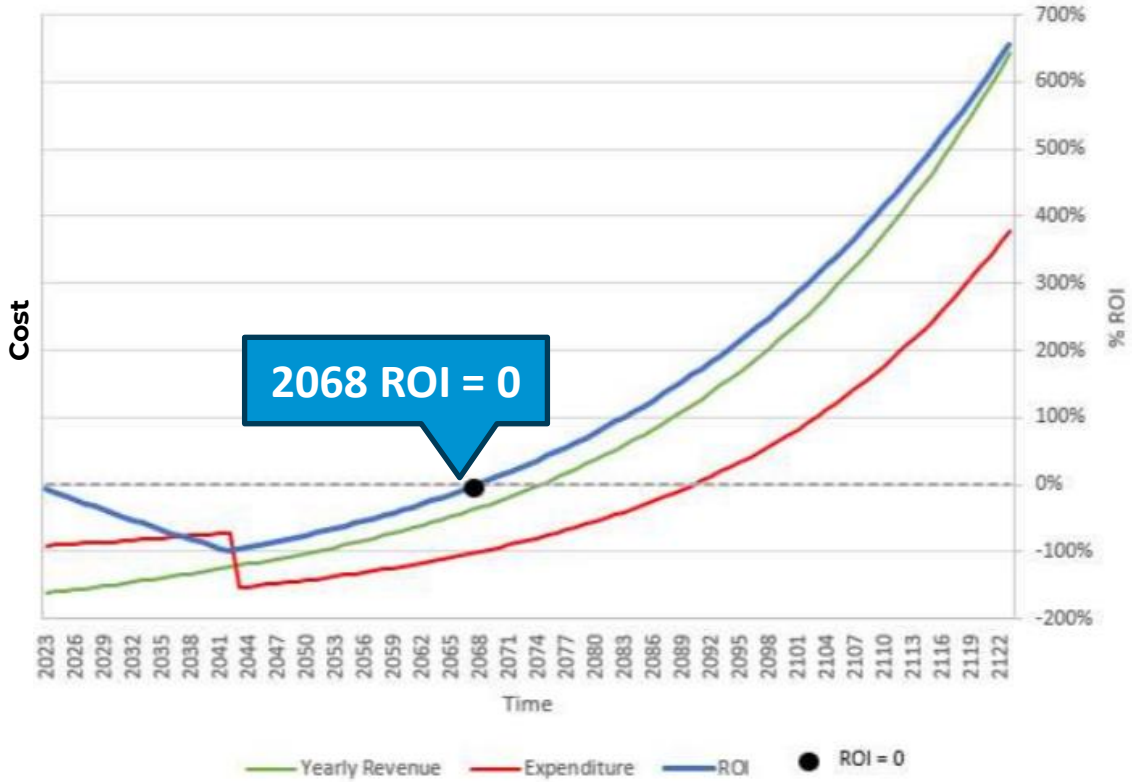
Phase 1 Implementation

- Smaller Project
- Smaller Investment
- Earlier ROI , Less Financial Risk

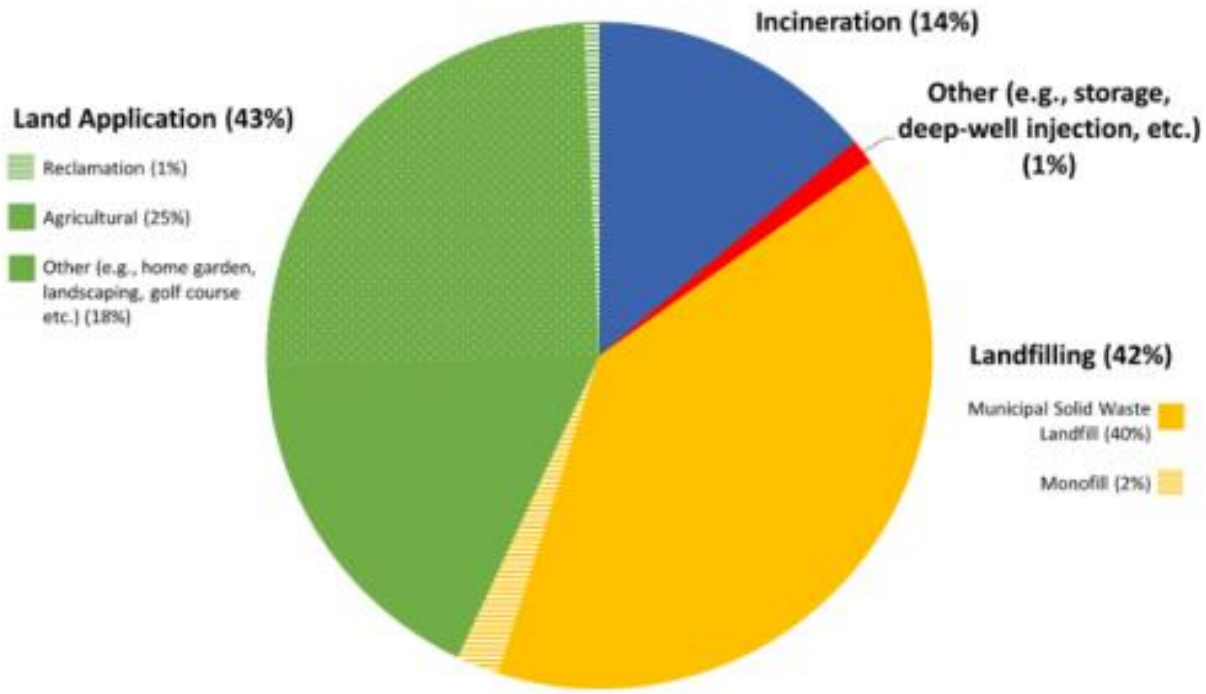


Phase 1 + Phase 2 Implementation

- Larger Project
- Larger Investment
- Later ROI , More Financial Risk



Biosolid Reuse Across the USA



Source: EPA, 2021

Biosolid Reuse Evaluation

- Self-Land Application
  - Class A Biosolids
  - Class B Biosolids
- Partnered Land application
  - Farmer Partnership
  - Bagged Biosolids
- Energy Generation by Incineration
- Energy Generation by Anerobic Digestion

Identification of Feasible Options → Calculation of Solids Generation → Short Term Options → Long Term Options

No Cost-Effective Opportunity Currently

Land Application or Synergies with other Energy Projects

What’s Next for the Tribe?

Water Portfolio Development

- Meter Data Collection & Analysis
- Negotiation with local entity on rates

Tribal Council Evaluation

- Water Quality Public Health
- Synergies with Future Project & Development
- Reuse Framework

Engineering Design

- Project Phasing
- Groundwater Supply Analysis
- Wastewater Treatment Train

Looking to the Future

Short-Term Gains

- Cost savings
- Sustainable initiatives
- Manageable growth; using similar projects as guide

Long-Term Gains

- Sovereignty & self-reliance
- Long-term economic benefit to tribe
- Strengthen governance

Prediction of Future for Recycled Water in the Pacific Northwest

In 1-2 words, what do you think will be the driver of recycled water projects in Water Abundant Regions?

Nobody has responded yet.

Hang tight! Responses are coming in.

Our Prediction of Drivers for the Future of Recycled Water in the PNW

Climate Change

- Need for redundancy & resiliency
- Severity between wet/dry

Environmental

- Pollutant loading to environment
- Protection of public health
- Replenishing groundwater and maintaining river/stream volumes

Population Growth & Water Demands

- Efficiency in water usage
- Increased temperatures → increased demands
- Increased population

Growth in Technologies & Knowledge

- Other regions paving the way for the PNW
- Public perception/acceptance

Resources for Water Reuse

- Water Reuse Association, Pacific Northwest Chapter
- EPA REUSExplorer Tool
  - https://www.epa.gov/waterreuse/regulations-and-end-use-specifications-explorer-reusexplorer
- National Water Reuse Action Plan (WRAP)
  - https://www.epa.gov/waterreuse/national-water-reuse-action-plan-online-platform
- National Blue Ribbon Commission
- Washington
  - WA Department of Ecology
    - https://ecology.wa.gov/water-shorelines/water-quality/reclaimed-water
  - WA Department of Health
    - https://doh.wa.gov/community-and-environment/wastewater-management/water-reclamation
- Oregon
  - https://www.epa.gov/waterreuse/summary-oregons-water-reuse-guideline-or-regulation-agriculture
  - Oregon DEQ
    - https://www.oregon.gov/deq/wq/programs/pages/water-reuse.aspx
- Idaho
  - https://www.epa.gov/waterreuse/summary-idahos-water-reuse-guideline-or-regulation-centralized-non-potable-reuse#:~:text=Idaho%20approves%20the%20reuse%20of,17).

Questions?

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