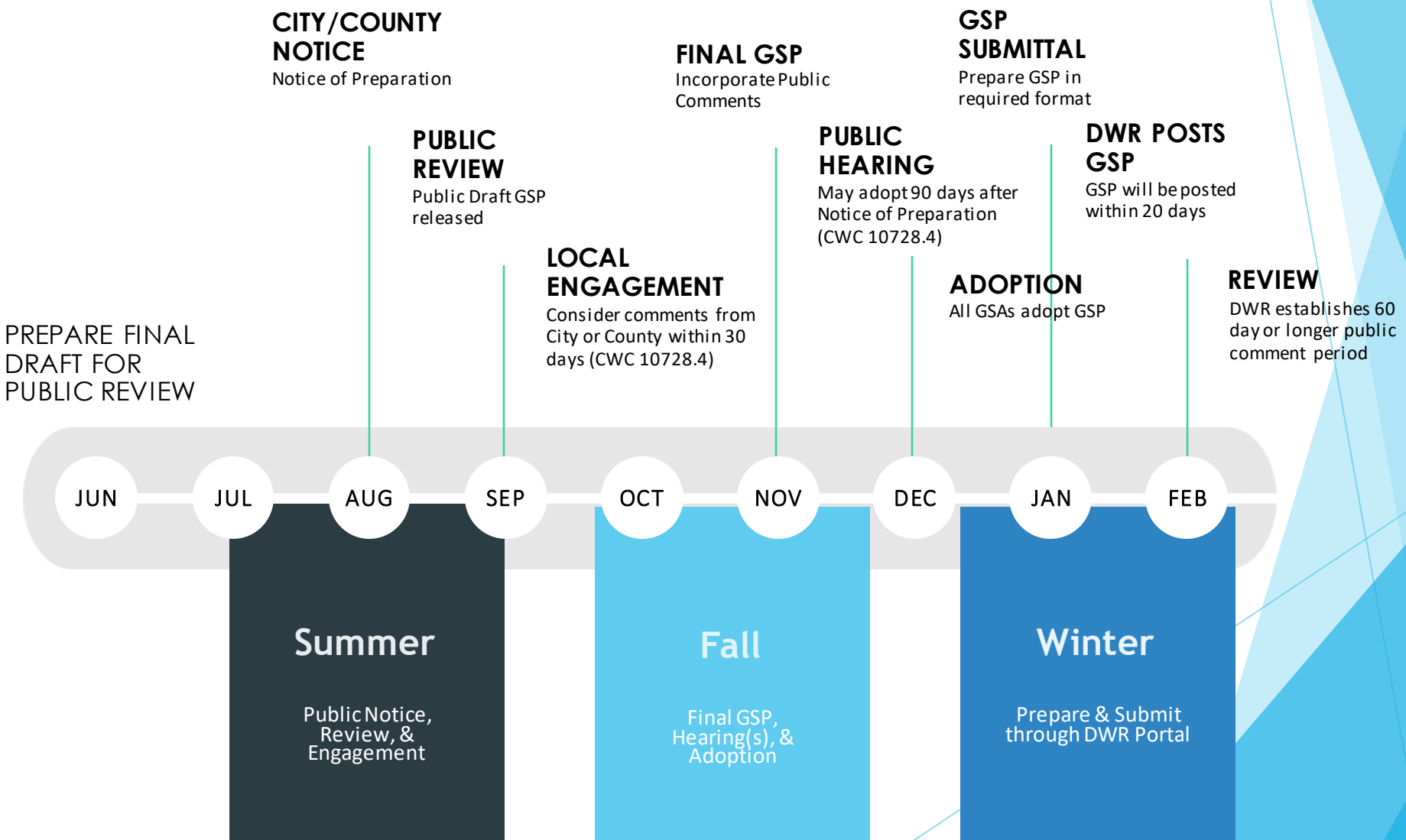
Tule Lake Subbasin GSP Effort Overview

October 2021

Overview

- GSP Process and Timeline
- GSP Outline
- Next Steps

GSP Public Release and Adoption Timeline



GSP Outline

- Section 1 – Introduction
- Section 2 – Plan Area
- Section 3 – Monitoring Network
- Section 4 – Water Budget Information
- Section 5 – Sustainable Management Criteria
- Section 6 – Projects and Management Actions
- Section 7 – Plan Implementation
- Section 8 – Notices and Communications (in progress)
- Section 9 – References

Section 1: Introduction

- Purpose of the GSP
- Introducing the GSAs

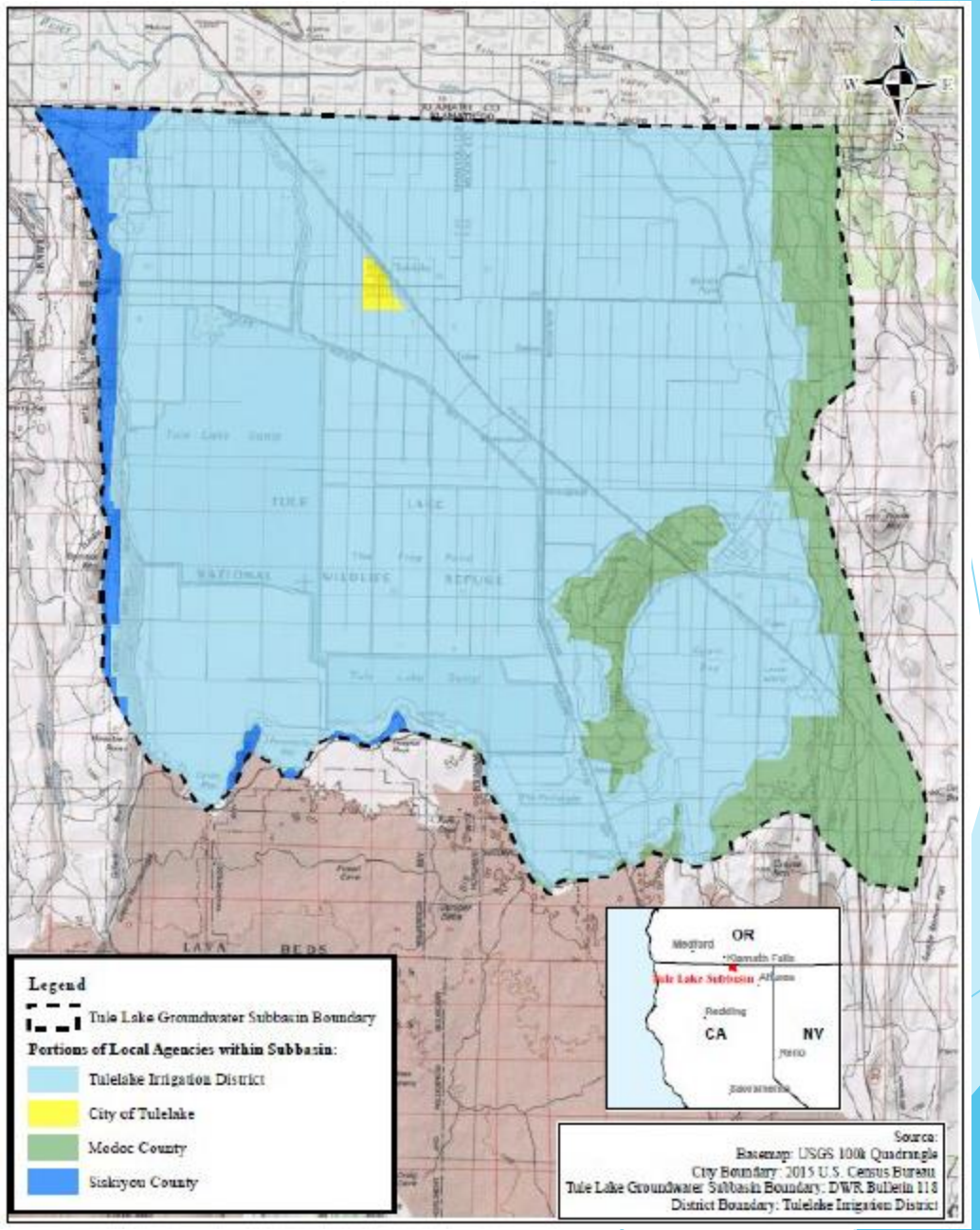
Purpose of the Groundwater Sustainability Plan

- Provides local water use agencies with the framework and authority to manage groundwater basins at the *local level*
- Defines what it means to be ***sustainable***
- Provides action items to achieve ***sustainability***

- ***More to come in Section 5 of the GSP***

Introducing the GSAs

- Groundwater Sustainability Agencies:
  - Tulelake Irrigation District
  - City of Tulelake
  - Modoc County
  - Siskiyou County
- Legal Authority - *MOU*

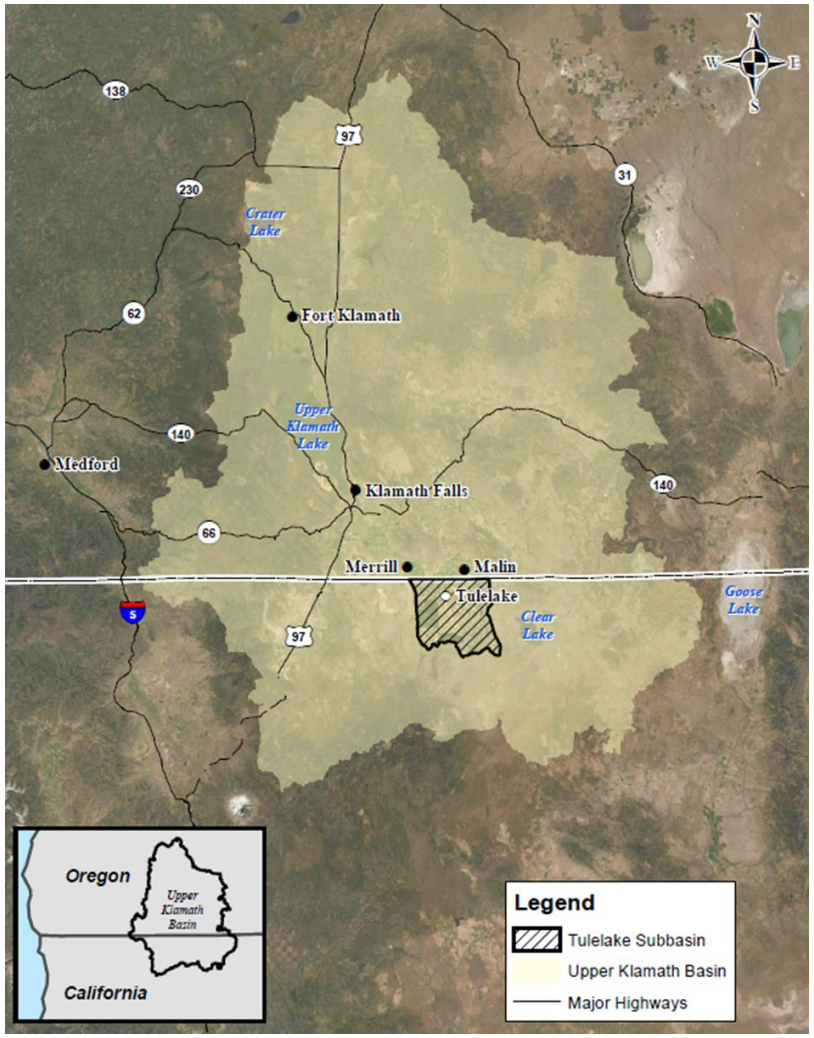


Section 2: Plan Area

- Description of the Area
- Basin Setting

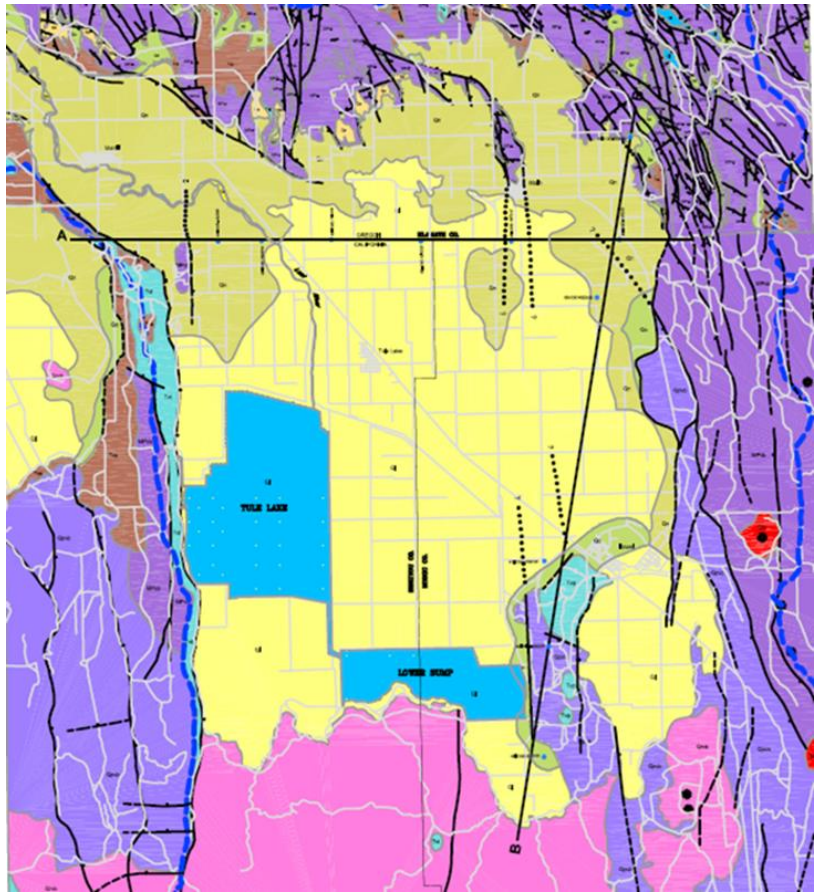
Description of the Area

- Water supply is dependent on the Klamath Project
- Isolated groundwater basin
- Stable population
- Majority of land use is Agriculture

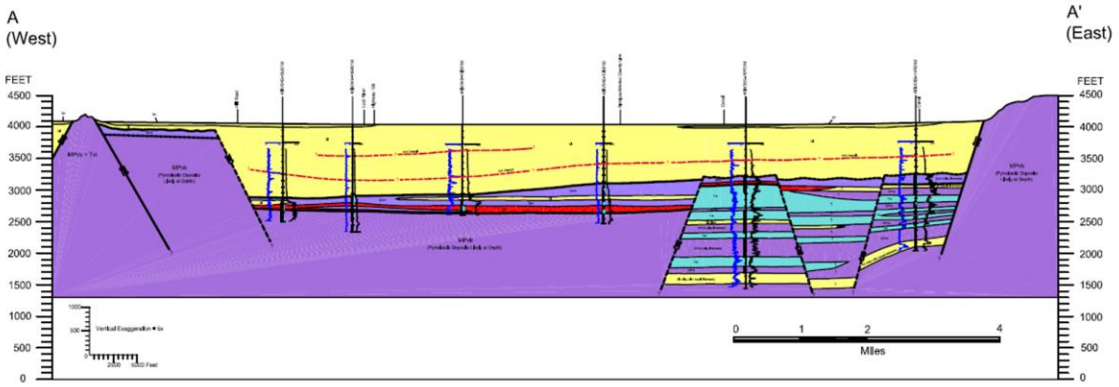


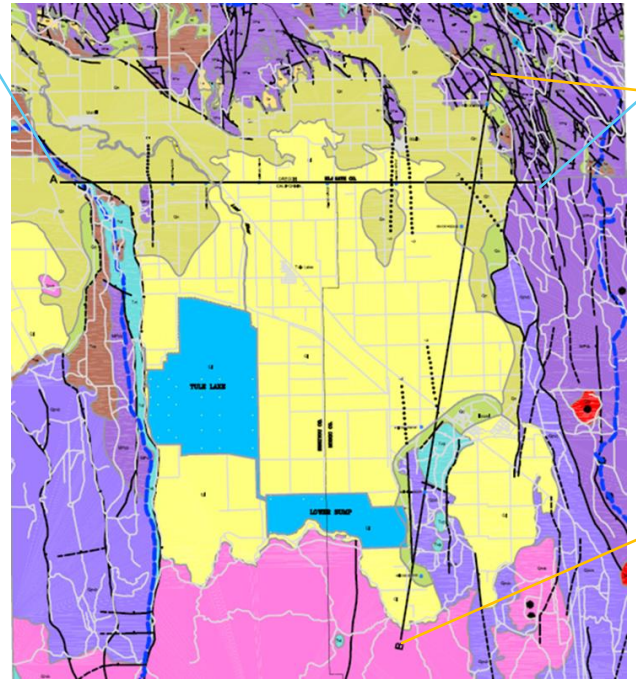
Basin Setting

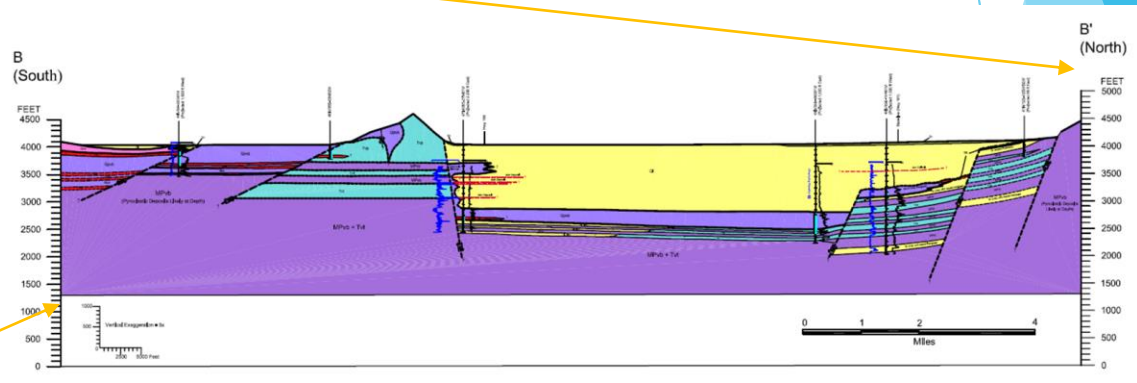
- Provides hydrogeologic basis for the technical elements of the GSP
- 2 main subsections:
  - Hydrogeologic Conceptual Model
  - Current and Historical groundwater conditions
- *Alluvial Subbasin underlain by volcanics*



Overview of Relevant Geology





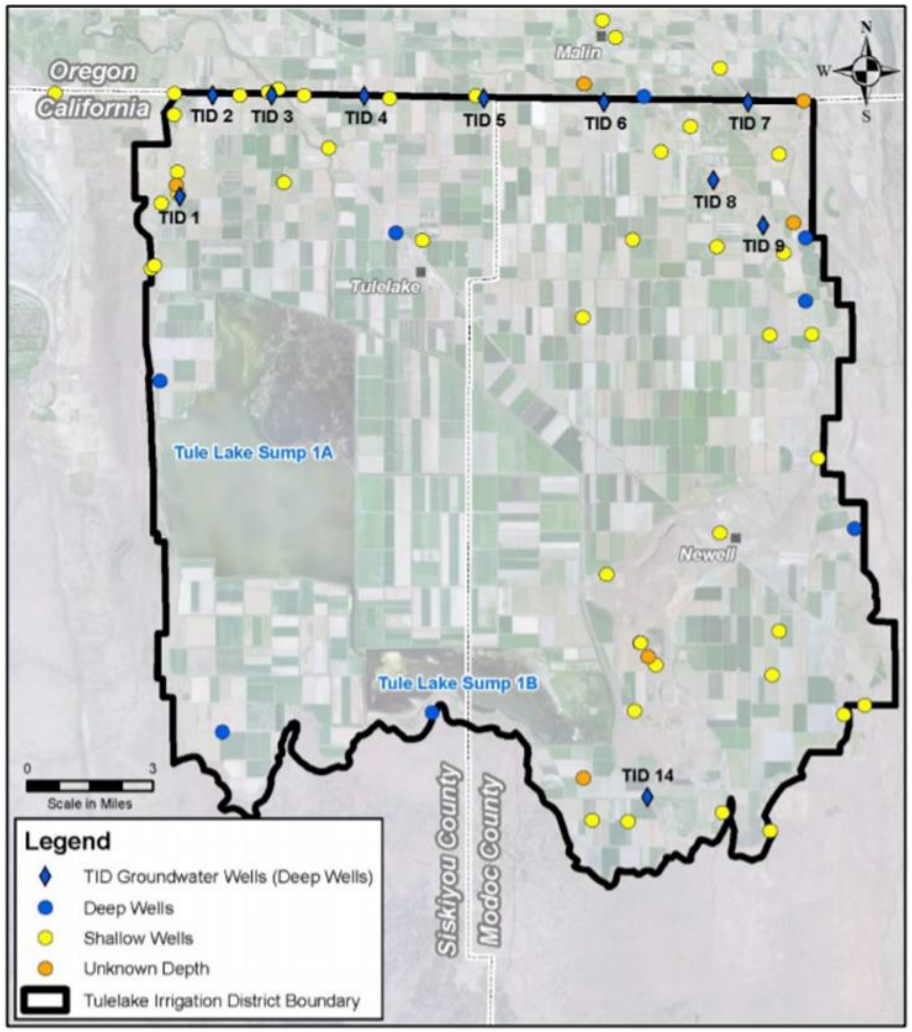


Section 3: Monitoring Network

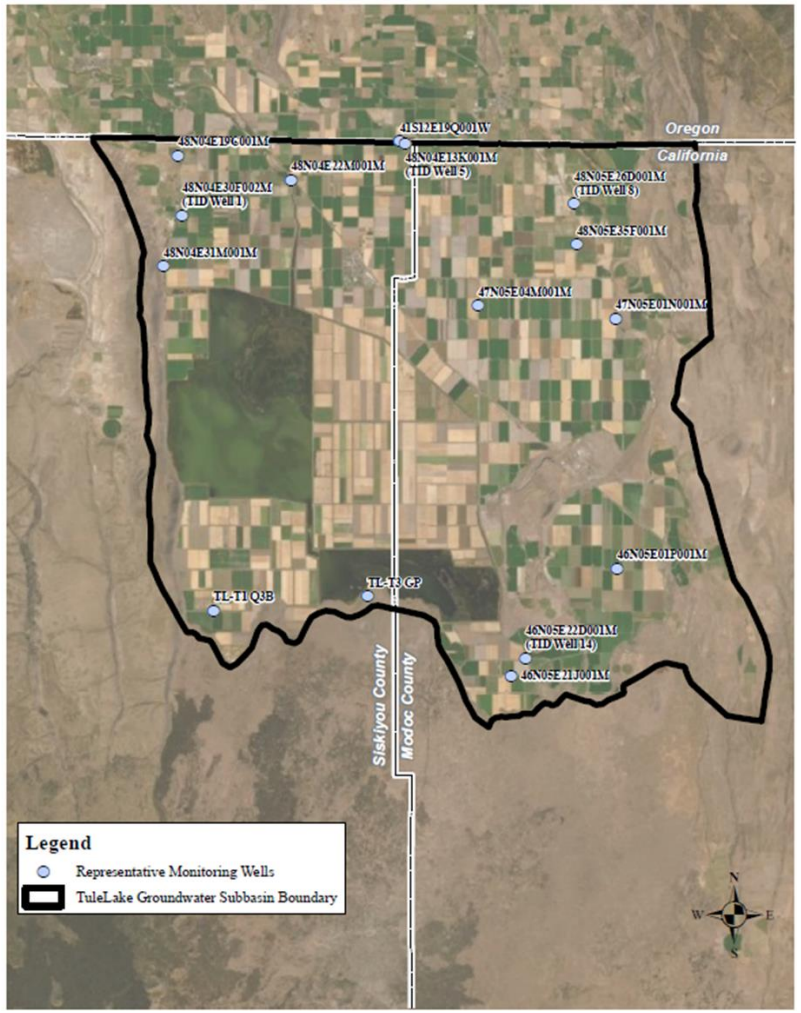
- Description of the Monitoring Network
- Monitoring Network Objectives

Describing the Network

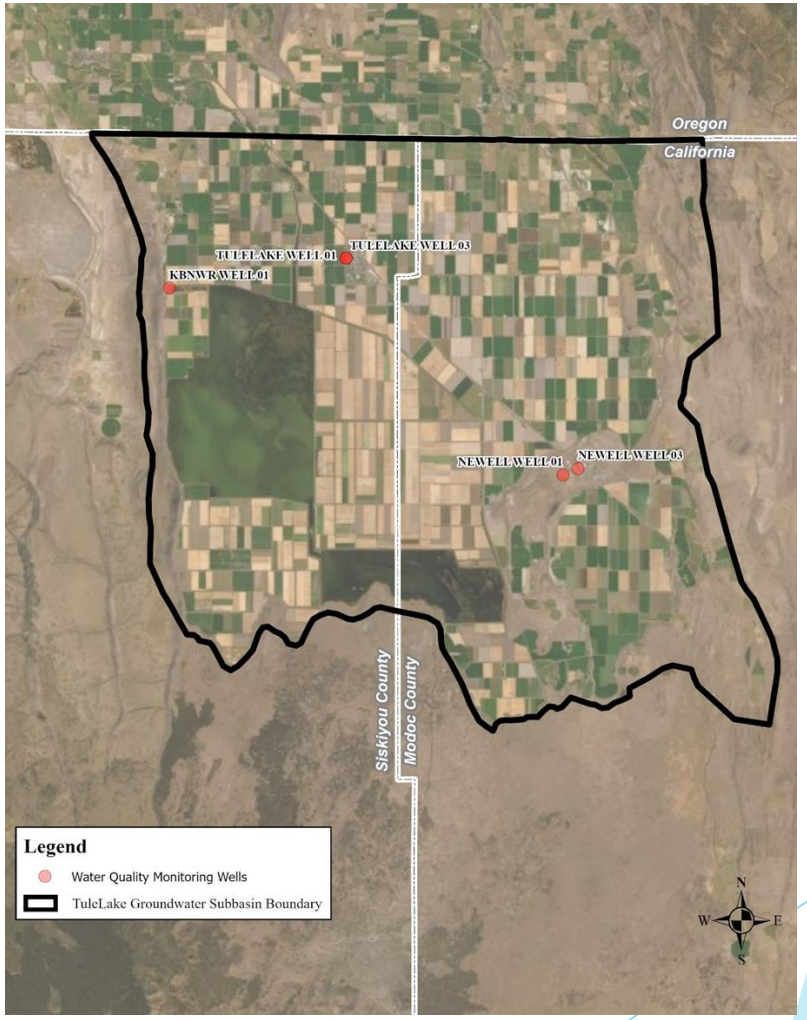
- Approximately 70 wells monitored at least twice per year
- Objective: measure progress towards sustainability
- **Sustainability criteria:**
  - Maintain Groundwater Levels
    - Chronic lowering of groundwater levels
    - Depletion of interconnected Surface Water
    - Land Subsidence
    - Reduction in Groundwater Storage
  - Maintain Water Quality
    - Degraded water quality
  - ~~Seawater intrusion~~



Representative Monitoring Wells



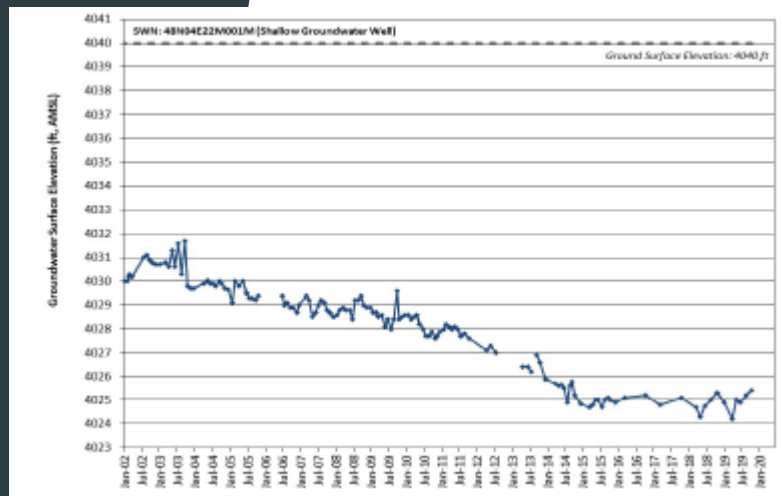
Groundwater Level

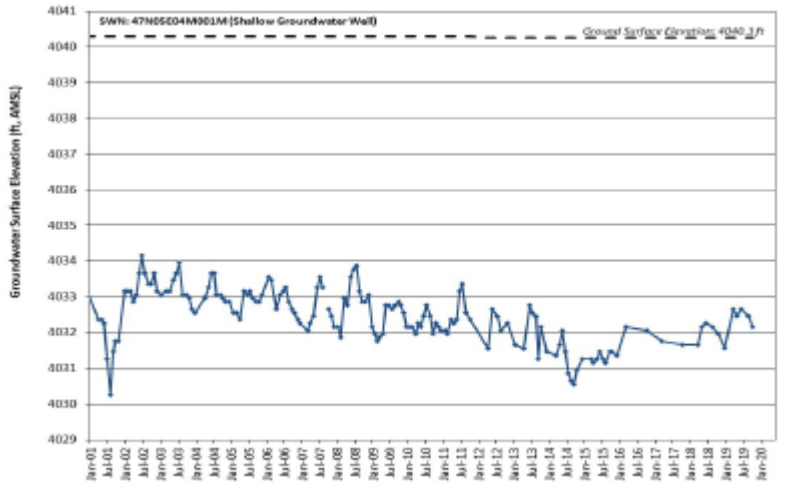


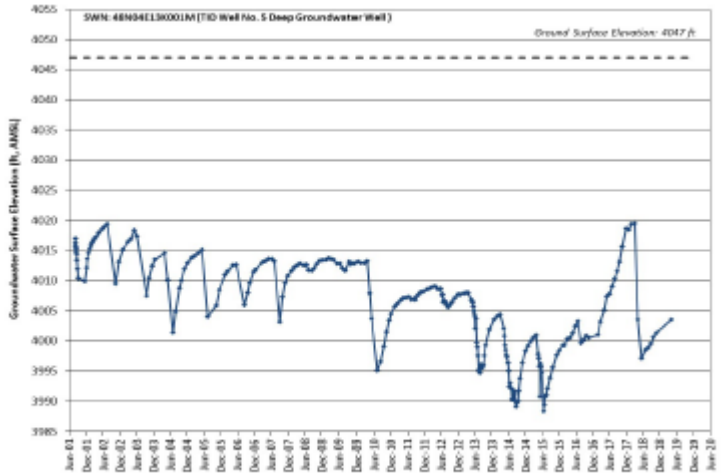
Water Quality

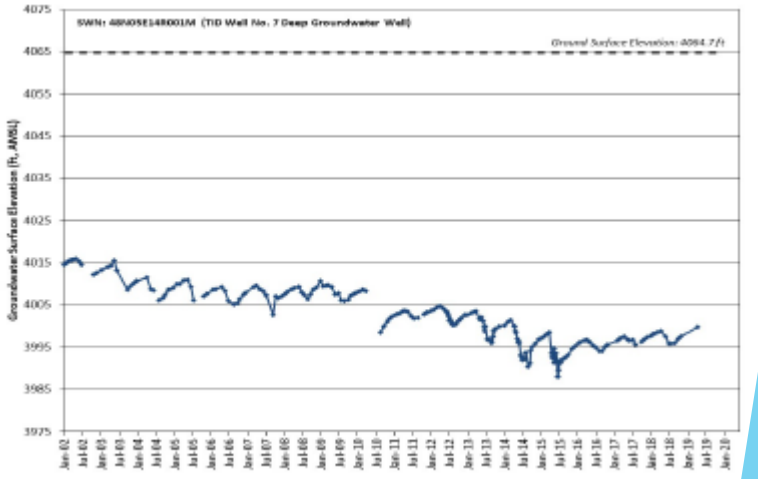
Examples of Hydrographs

- Generally stable; however, there is a slight decline seen in some wells.





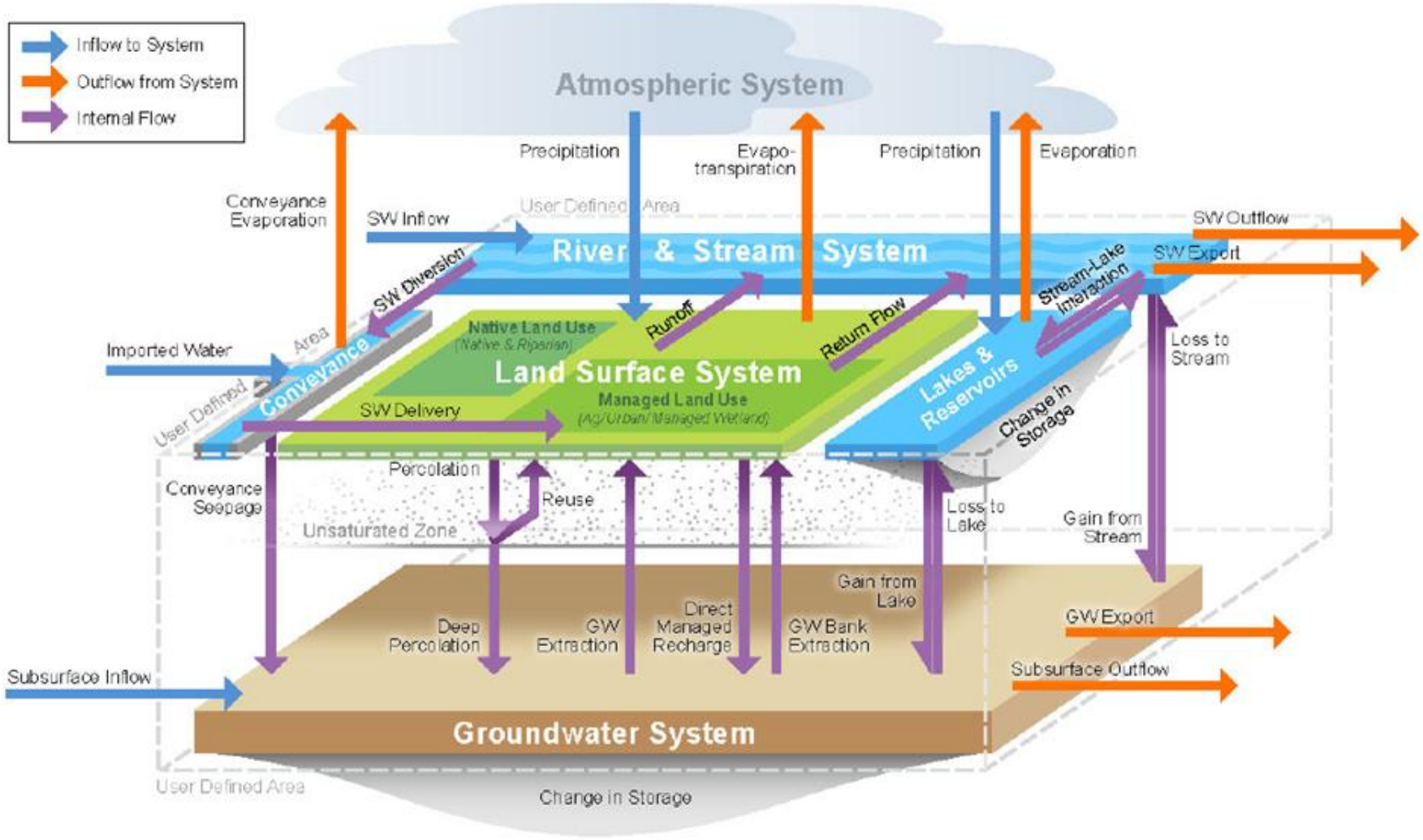




Section 4: Water Budget Information

- Historical
- Current
- Projected

Example Water Budget



Historical Water Budget

Not required to address undesirable results that occurred before and have not been corrected by January 1, 2015

48 Thousand Acre-Feet of Pumping (approximate sustainable yield)

Groundwater Budget Term	Historical 2000 - 2018 Avg (TAF)
Groundwater Recharge from Precipitation & Applied Water	59
Canal Laterals Leakage	92
Tulelake Sumps Leakage	5
Main Canals and Lost River Leakage	63
Subsurface Flow Into Subbasin	17
Total Inflow	**236**
Irrigation & M&I Groundwater Pumping	42
Private Groundwater Pumping	6
Groundwater Discharge to Drains	171
Shallow Groundwater Evapotranspiration	5
Groundwater Discharge to Tulelake Sumps	0
Groundwater Discharge to Main Canals and Lost Rivers	2
Subsurface Flow Out of Subbasin	14
Total Outflow	**240**
Change in Storage	-4

Land System Water Budget Term	Historical 2000 - 2018 Avg (TAF)
Precipitation	89
Water into the Rootzone	5
Surface Water Deliveries	100
Groundwater Deliveries	6
Total Inflow	**200**
Evapotranspiration of Precipitation	36
Evapotranspiration of Applied Water	90
Runoff From Farm	11
Groundwater Recharge from Precipitation & Applied Water	58
Shallow Groundwater Evapotranspiration	5
Total Outflow	**200**

Projected Water Budgets

Without Climate Change

Table 4.6. Projected Groundwater Budget Baseline

Groundwater Budget Term	Projected Baseline WY 2019 - 2071 Avg (TAF)
Groundwater Recharge from Precipitation & Applied Water	59
Canal Laterals Leakage	93
Tulelake Sumps Leakage	6
Main Canals and Lost River Leakage	66
Subsurface Flow Into Subbasin	15
Total Inflow	**238**
Irrigation & M&I Groundwater Pumping	42
Private Groundwater Pumping	6
Groundwater Discharge to Drains	165
Shallow Groundwater Evapotranspiration	5
Groundwater Discharge to Tulelake Sumps	0
Groundwater Discharge to Main Canals and Lost Rivers	1
Subsurface Flow Out of Subbasin	20
Total Outflow	**238**
Change in Storage	0

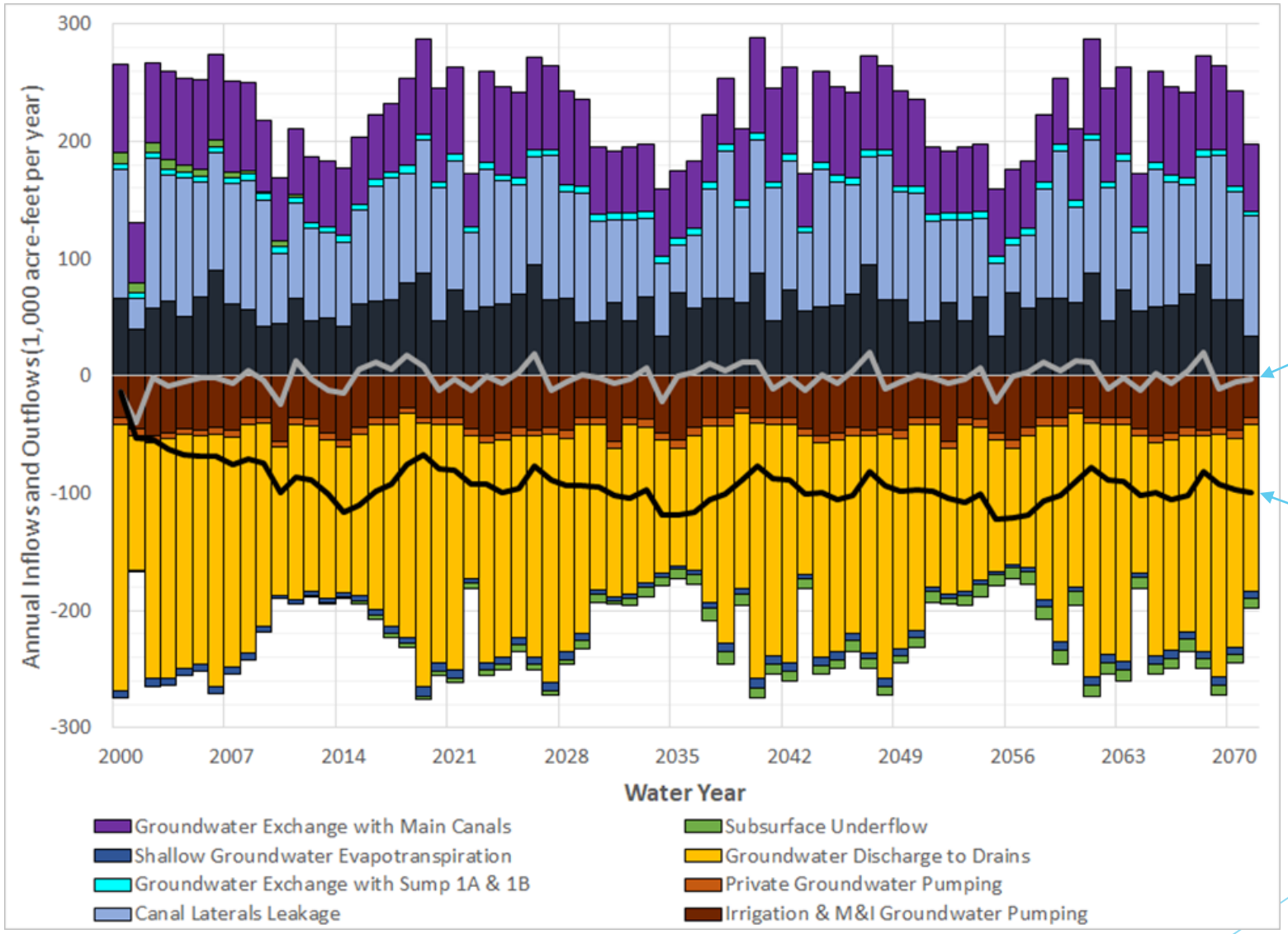
With Climate Change

Table 4.7. Projected Groundwater Budget with Climate Change Incorporated

Groundwater Budget Term	Projected Baseline w/ Climate Change WY 2019 - 2071 Avg (TAF)
Groundwater Recharge from Precipitation & Applied Water	63
Canal Laterals Leakage	93
Tulelake Sumps Leakage	6
Main Canals and Lost River Leakage	66
Subsurface Flow Into Subbasin	14
Total Inflow	**242**
Irrigation & M&I Groundwater Pumping	42
Private Groundwater Pumping	6
Groundwater Discharge to Drains	165
Shallow Groundwater Evapotranspiration	5
Groundwater Discharge to Tulelake Sumps	0
Groundwater Discharge to Main Canals and Lost Rivers	1
Subsurface Flow Out of Subbasin	22
Total Outflow	**242**
Change in Storage	0

Climate Change shows no effect on net change in storage

Projected Water Budget with Climate Change



Annual change in groundwater storage

Cumulative change in groundwater storage

Section 5: Sustainable Management Criteria

- Sustainability Goal
- Undesirable Results
- Quantifying the Criteria

***Sustainability Goal Definition**: GSAs' objectives and desired conditions of the groundwater basin, how the basin will get to that condition, and why the measures planned will lead to success.*

- **GSP Sustainability Goal**: maintain a locally governed, economically viable, reliable, and sustainable groundwater subbasin for current and future beneficial uses, without causing undesirable results.
- ***Adaptive Management*** will be utilized if necessary

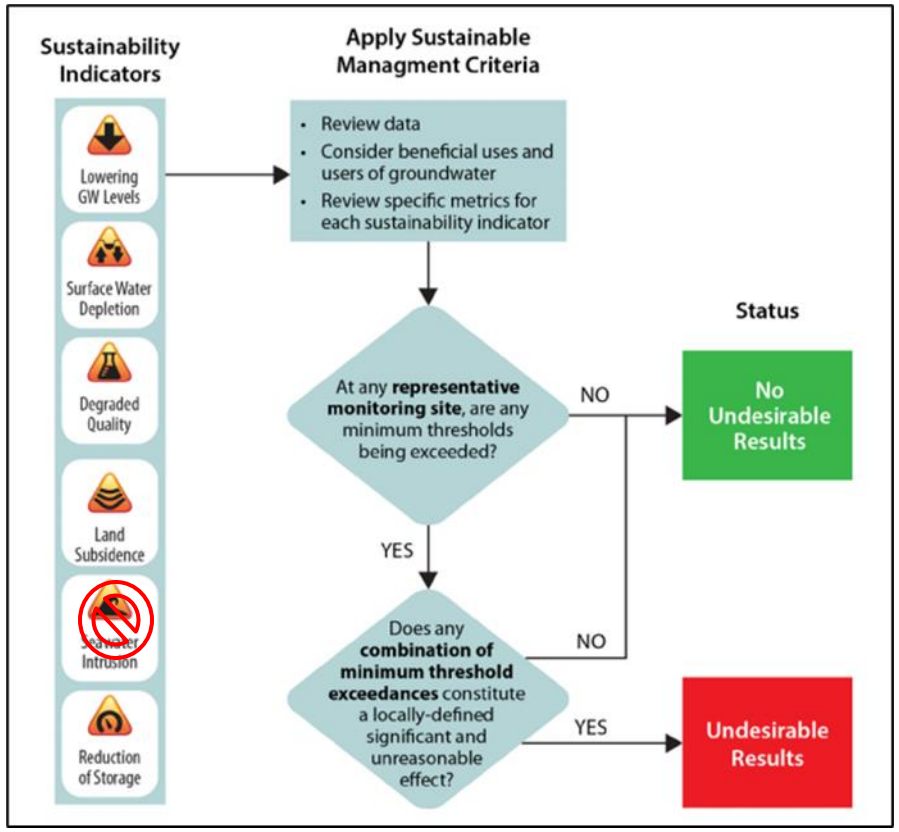


Figure 5-1. Relationship of Sustainability Indicators, SMCs, MTs, and Undesirable Results (DWR)

Undesirable Results - Qualitative

Groundwater Elevation

- *Groundwater elevations dropping below the Minimum Threshold criteria at four representative monitoring locations over three consecutive spring measurements.*
  - **5.2.1 Chronic Lowering of Groundwater Levels**
  - **5.2.2 Reduction in Groundwater Storage**
  - **5.2.4 Depletion of Interconnected Surface Water**
  - **5.2.3 Land Subsidence**

Water Quality

- *Changes in groundwater quality due to SGMA-related groundwater management activities (such as groundwater extraction and groundwater recharge) and groundwater quality that causes significant and unreasonable reductions in long-term viability of domestic, agricultural, municipal, and environmental uses over the planning and implementation horizon of this GSP as indicated by water quality data measured in at least 50% of representative monitoring wells exceeding the minimum thresholds for a groundwater quality constituent for two consecutive measurements at each location during non-drought years.*
  - **5.2.5 Degraded Water Quality**

NOTE: 5.2.6 Seawater Intrusion (not applicable to Tule Lake Subbasin)

Undesirable Results - Quantitative

Groundwater Levels

- Measurable Objectives
  - Based on average spring groundwater levels obtained since spring 2015
  - No reported negative impacts on beneficial use
- Minimum Thresholds
  - If the monitoring well is screened within the shallow aquifer and within three miles of a domestic well or wells, then the MT is defined as the minimum domestic well depth.
  - If the monitoring well is screened in the deeper aquifer, then the MT is defined as the historical low groundwater measurement plus a 10 percent buffer, rounded up to the nearest whole number.

Table 5.1. Groundwater Level Minimum Thresholds

State Well Number	Historic Low (ft bgs)	Min. Domestic Well Depth (ft bgs)	Minimum Threshold (ft bgs)	Measurable Objective (ft bgs)
48N05E35F001M	11	32	32	8
48N04E22M001M	29	50	50	15
48N04E31M001M	31	29	31	23
48N04E19C001M	15	38	38	11
47N05E04M001M	10	33	33	9
47N05E01N001M	22	65	65	15
46N05E21J001M	12	32	32	10
46N05E01P001M	13	24	24	11
41S12E19Q001W	14	50	50	6
48N04E30F002M (TID Well 1)	72	-	80	38
48N04E13K001M (TID Well 5)	192	-	212	42
48N05E26D001M (TID Well 8)	276	-	304	48
46N05E22D001M (TID Well 14)	90	-	99	40
TL-T1 Q3B	31	-	35	27
TL-T3 GP	14	-	16	12

***note: bgs = below ground surface*

Undesirable Results - Quantitative

Water Quality

- Measurable Objectives
  - Maintain existing water quality
- Minimum Thresholds
  - ***Nitrate**: allows for continued use of groundwater as a drinking water supply without local public water suppliers needing to invest in systems for nitrate removal*
  - ***TDS**: protective of the secondary standard for drinking water and water quality needed for irrigation purposes*

Table 5.2. Water Quality Quantitative Sustainable Management Criteria

WQ Monitoring Well	Nitrate (mg/L)		Total Dissolved Solids (mg/L)	
	MO	MT	MO	MT
TULELAKE WELL 03	2	9	205	900
TULELAKE WELL 01	2	9	190	900
KBNWR WELL 01	2	9	n/a	900
NEWELL WELL 01	2	9	540	900
NEWELL WELL 03	2	9	610	900
Note: There have been no measurements of TDS at KBNWR Well 01 since 2015.				

Section 6: Project and Management Actions

Table 6.1. Summary of Projects and Management Actions

Project or Management Action	Start Date	Timeline	Completion Date Goal
Perform Well Inventory	Implementation of GSP	5 years	2027
File for well installation application with TSS	Implementation of GSP	1 year	2023
Add 2 wells to WQ Monitoring Network	Implementation of GSP	1 year	2023
Complete field inspections of GDEs	Implementation of GSP	5 years	2027
Review AEM survey data	Release of data	3 years	2025
Recharge via Operation of Station 48	Implementation of GSP	Ongoing (Yearly)	Ongoing (Yearly)
Provide Domestic Well Assistance	Implementation of GSP	Ongoing (As needed)	Ongoing (As needed)
Adaptive Management Strategy	Implementation of GSP	Ongoing (As needed)	Ongoing (As needed)

Section 7: Plan Implementation

- Estimate of Costs
- Schedule for Implementation
- Reporting and Periodic Evaluations

Summary of Estimated Costs

- **Pursue Grant Funding**
  - ***Disadvantaged Community*** *(*Siskiyou County) and ***Severely Disadvantaged Community*** (Modoc County)

Table 7.1. Summary of Estimated Costs for Implementation

Description	<$50,000	$50,000-$150,000	>$150,000
Annual Reports	X		
5-Year Plan Updates		X	
Projects & Management Actions			
Well Inventory	X		
Groundwater Level Monitoring Wells1	X	X	
Water Quality Monitoring Network	X		
Groundwater Dependent Ecosystems	X		
Groundwater Recharge Project(s)	X	X	X
Domestic Well Assistance1	X	X	X
Adaptive Management Strategy[1]	X	X	X

[1] Cost is dependent on the size of the project. As appropriate, these costs will be further defined.

Final GSP

January 31, 2022

Annual Reports

April 1, Every Year

(Includes 2022)

5 Year Plan Update

April 1, Every 5 Years

Schedule for Implementation

Next Steps

- Review and address public comments as appropriate
- TCT Approval of Final GSP
- GSAs Adoption of Final GSP
- Submit GSP to DWR

Additional Information

- Submit questions and comments to:
  - TulelakeSGMA@gmail.com

- Public Draft GSP and Additional Information About Tulelake Core Team Activities:

  https://tulelakeid.com/