

Mendocino Groundwater Overview

February 27, 2023

Overview

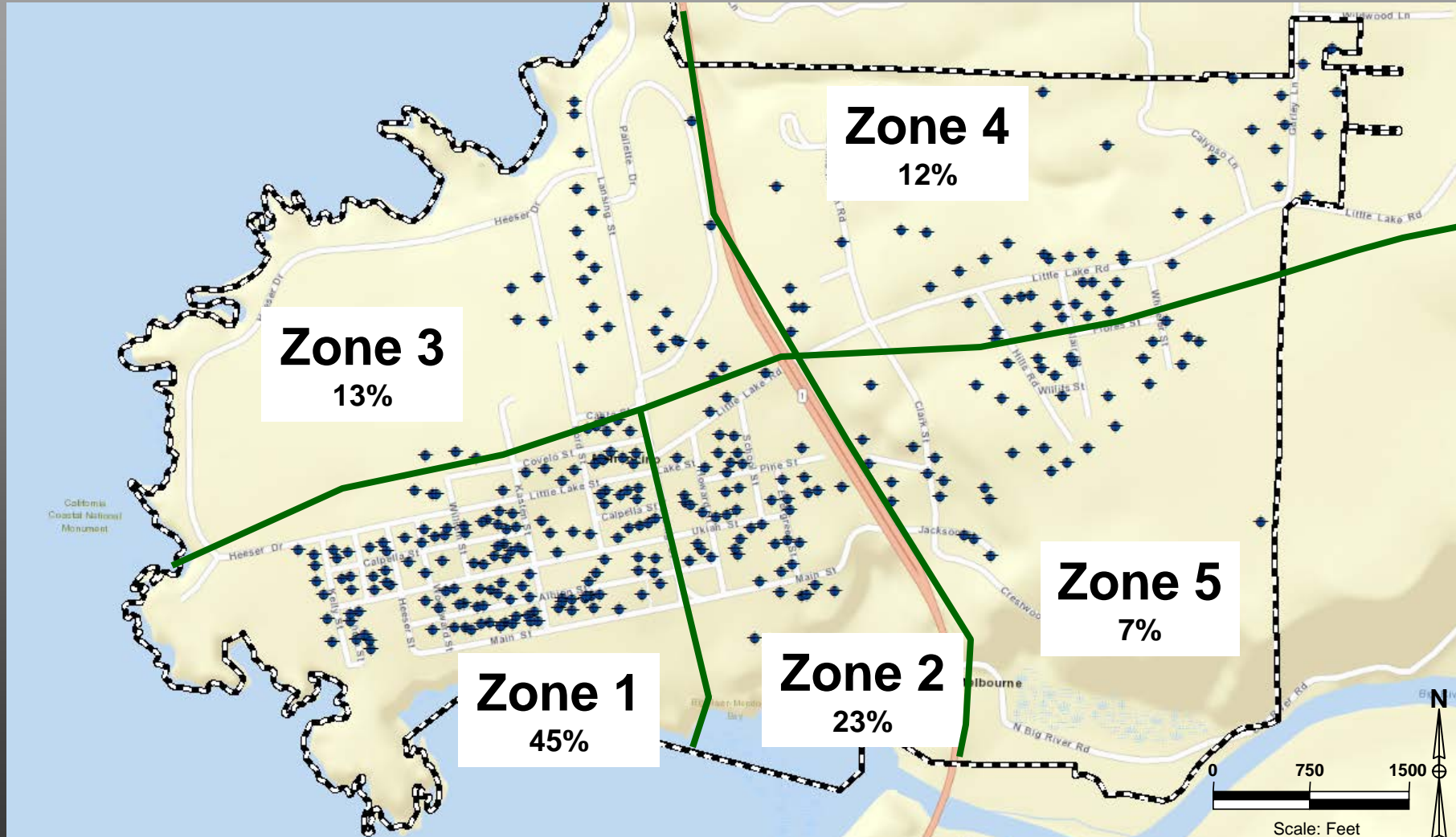
- Mendocino Water Supply
- Mendocino Aquifer System
- Relationship of Rainfall and Groundwater Levels
- Water Shortage Contingency Plan
- 2023 Outlook

Understanding of Mendocino Aquifer Built on Past Work

- **California Dept. of Water Resources (DWR)**
 - Mendocino County Coastal Groundwater Study (1982)
 - Town of Mendocino Groundwater Study (1985)
 - California Groundwater Bulletin 118 (2003, 2016)
- **Questa Engineering (for Mendocino County and MCCSD)**
 - Review of 1985 DWR Report (1987)
 - Mendocino Coastal Groundwater Development Guide (1988)
 - Groundwater Modeling Study of Mendocino Headlands (2004)
 - Water Shortage Contingency Plan (2006)
- **Kennedy/Jenks & Todd Groundwater (for MCCSD)**
 - Groundwater Updates (2007, 2008, 2009, 2010, 2014, 2015, 2016, 2020)
- **MCCSD**
 - Ongoing data collection (rainfall, groundwater levels and pumping)
 - Hydraulic Test Reports (ongoing)

Mendocino Water Supply

Water supply is derived from individual, privately-owned wells



MCCSD Residents Implement Effective Water Conservation

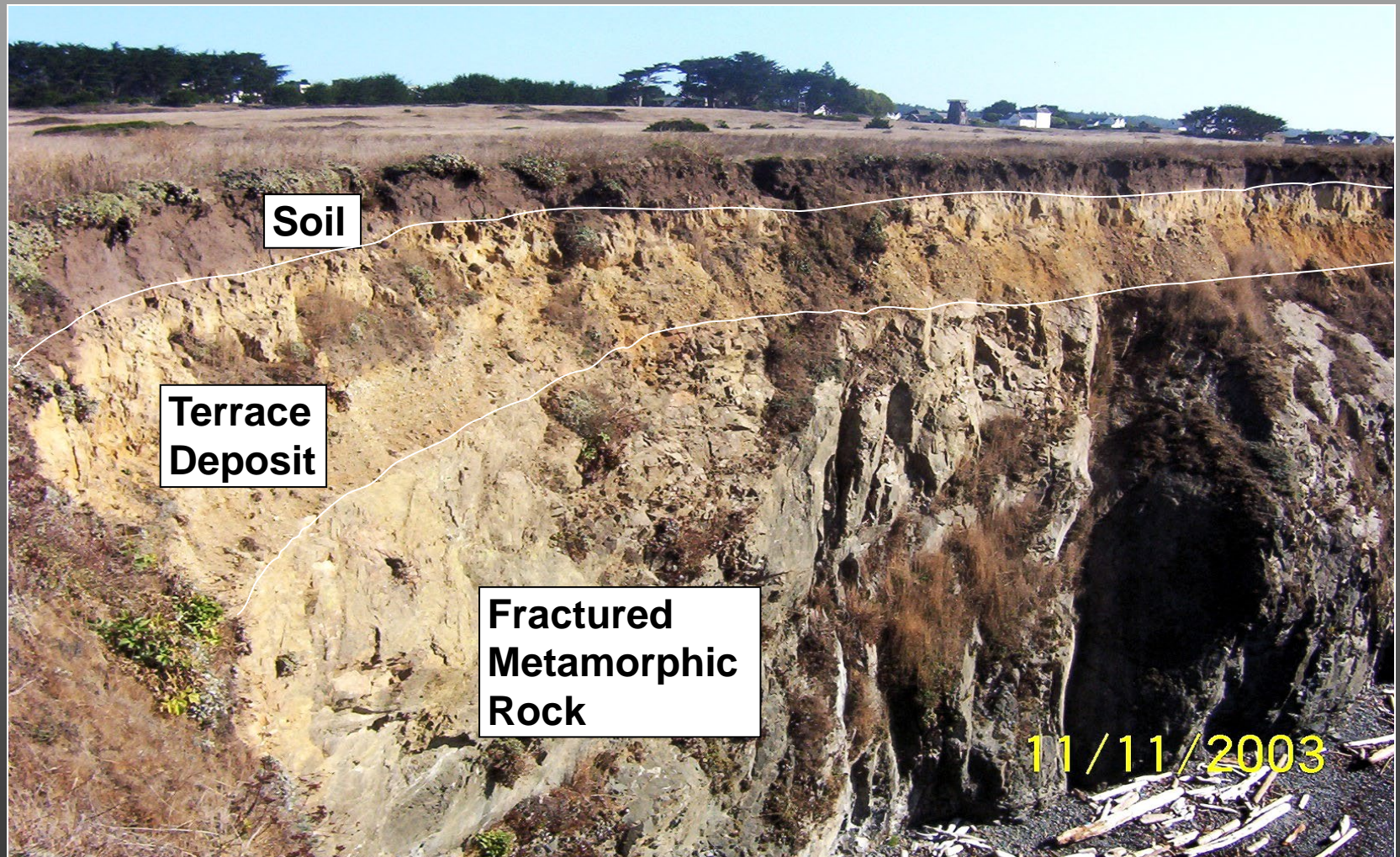
- **Pumping has declined over time**
 - Recent (2015-2020) annual pumping
 - 23 million gallons (2015-2020)
 - Community-wide water use about 30% to 40% of allotment
 - Historic (1980s) annual pumping
 - Estimated 40 to 50 million gallons
 - Water use was about double current usage
- **Decline generally due to increased water conservation by residents and businesses**
 - Most are permanent changes in water use

Mendocino Drought Vulnerability

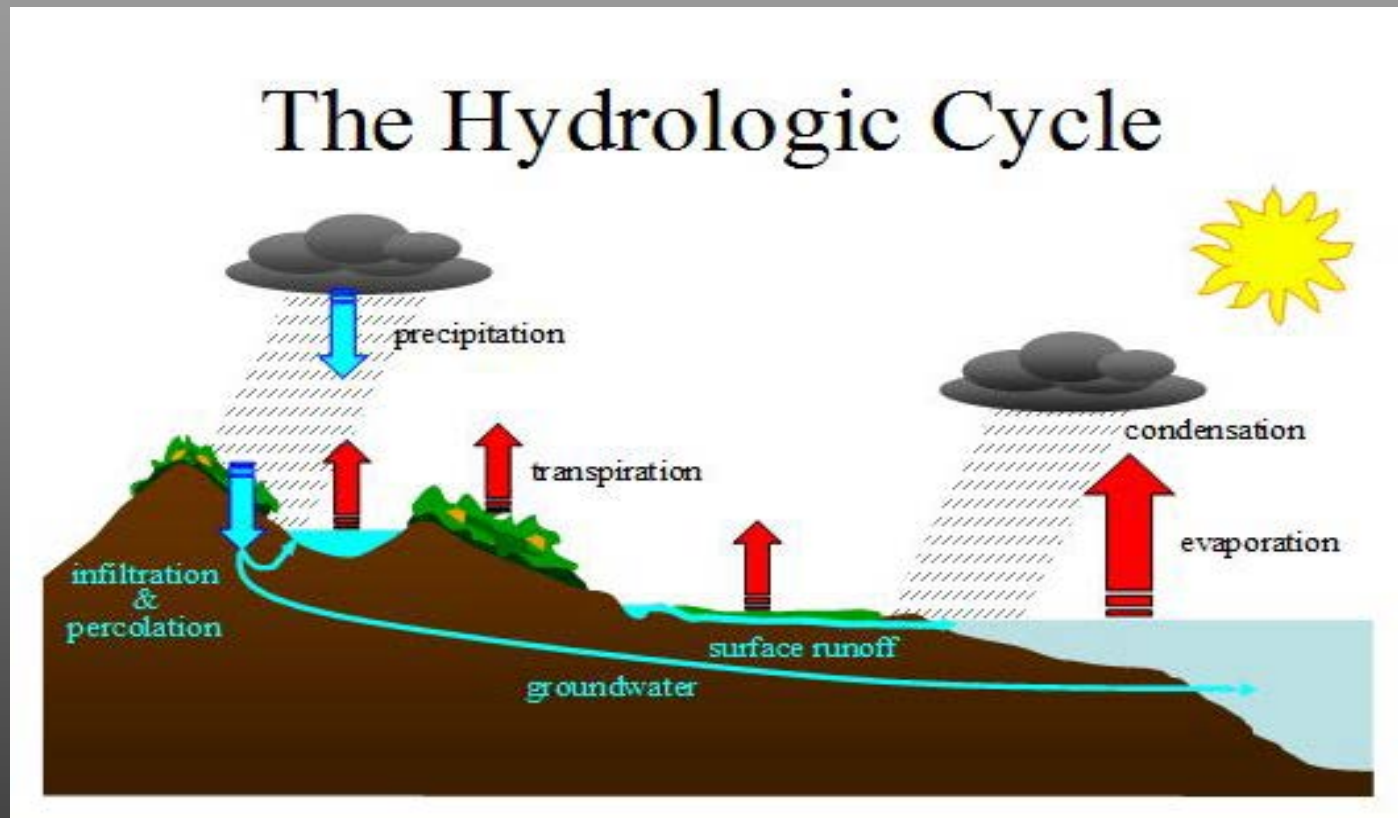
- **Precipitation is only water source**
 - Single drought year can result in well supply issues
 - Multi-year droughts compounds effect
 - Groundwater levels can recover in one season
- **Aquifer quickly responds to changes in rainfall**
 - Spring rainfall important for sustaining summer groundwater levels
 - Requires year-to-year decision-making
- **Water Conservation Benefits**
 - Reduced pumping helps to sustain groundwater levels through the summer
 - For every gallon conserved, a half gallon carries over to next year

Mendocino Aquifer System

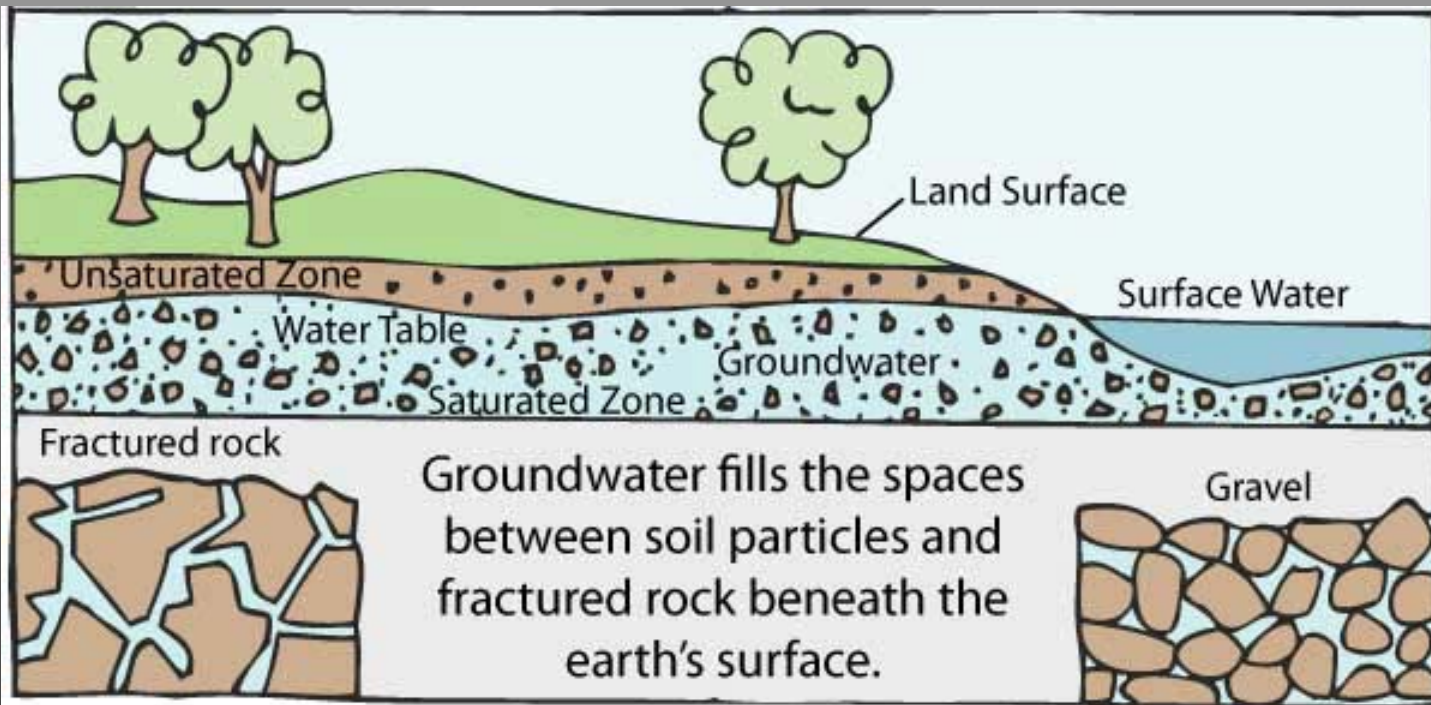
Generalized Mendocino Aquifer System Sand Terrace Overlying Fractured Rock



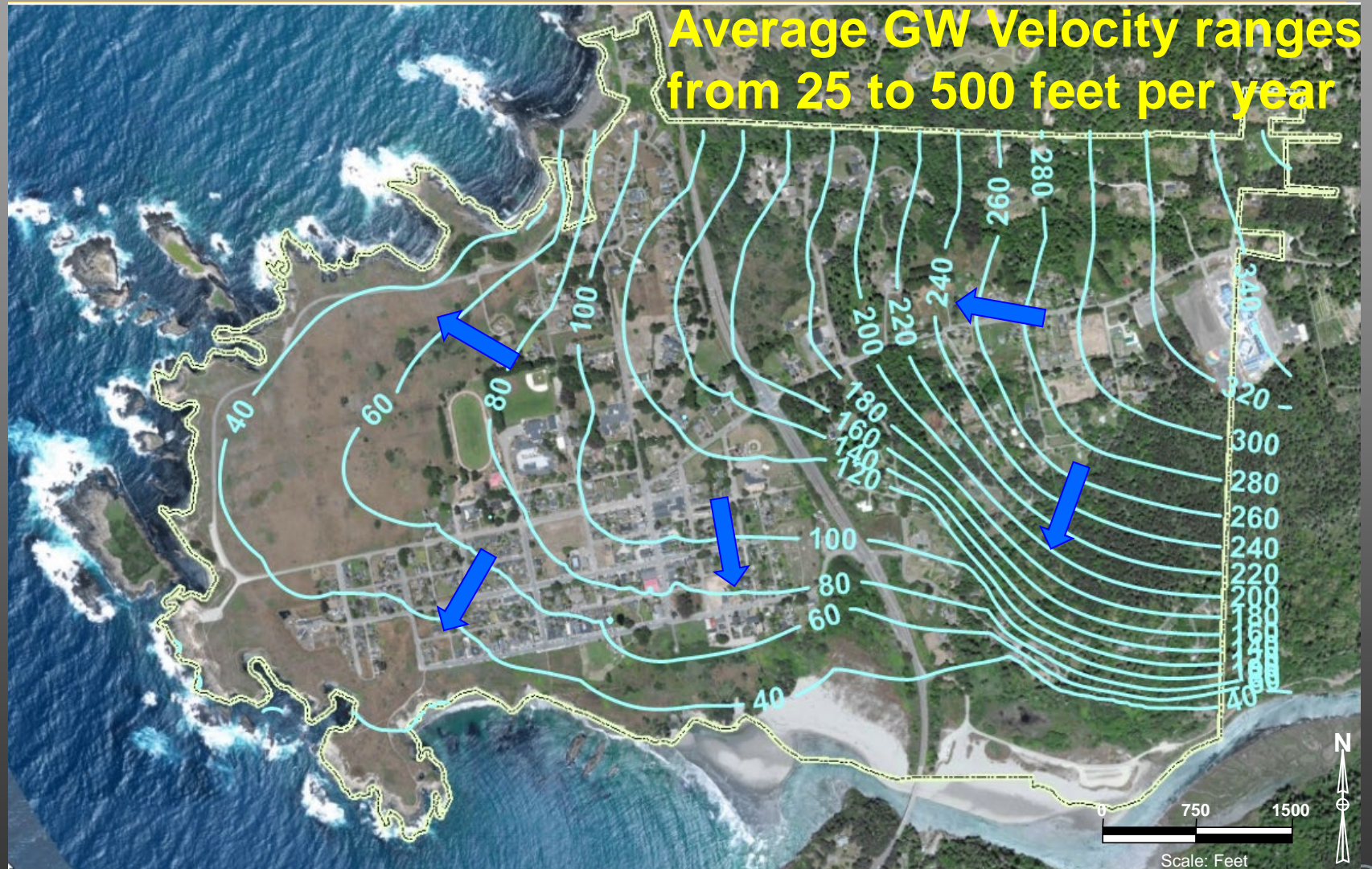
Groundwater is Derived from Rain and Discharges to the Ocean



Groundwater Flows through the Void Space in Sand and Rock



Groundwater Flows towards Springs and Creeks



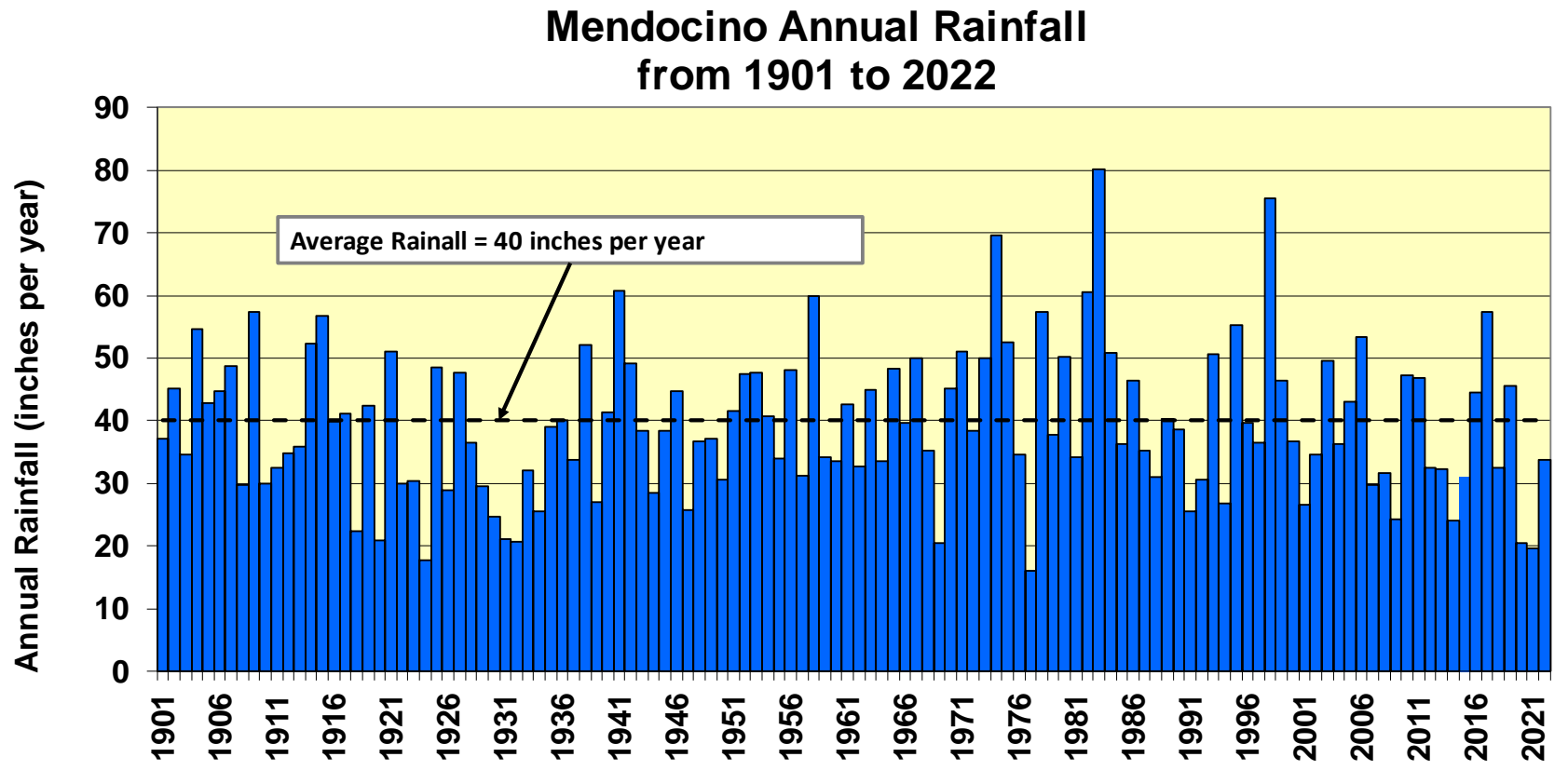
Natural Outflow from Springs, Creeks and Vegetation



Relationship of Rainfall and Groundwater Levels

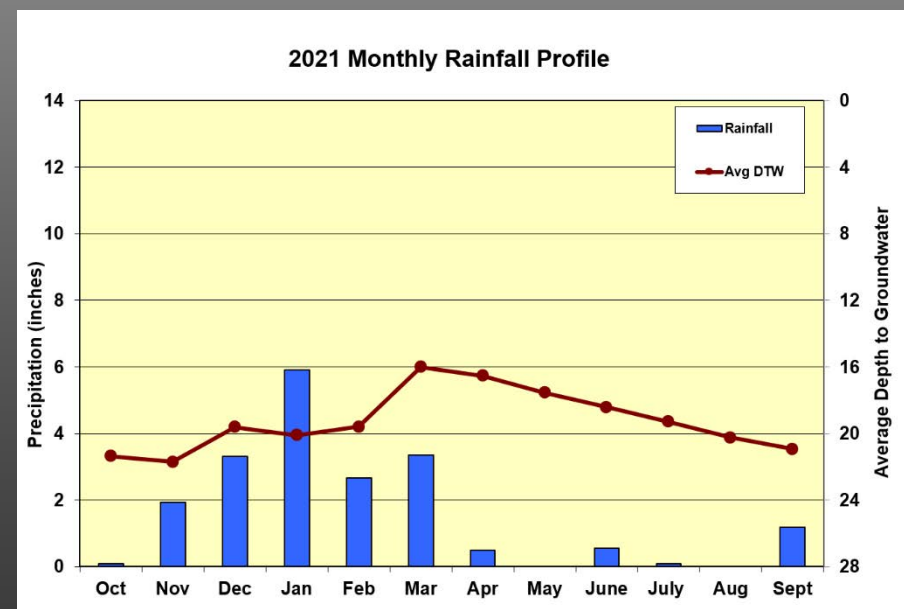
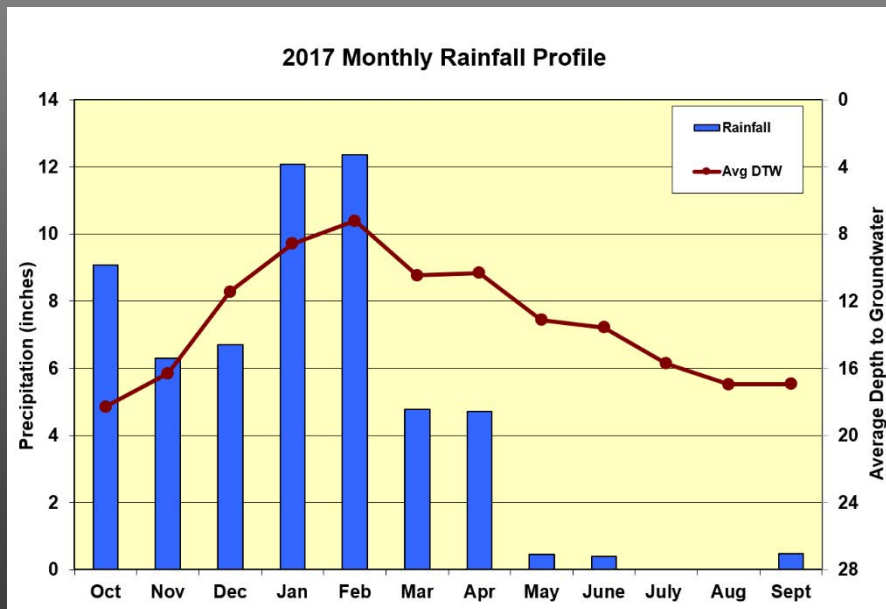
Precipitation is Primary Source of Mendocino Water Supply

- Annual Average Rainfall is about 40 inches per year
- Range from 18 to 80 inches per year

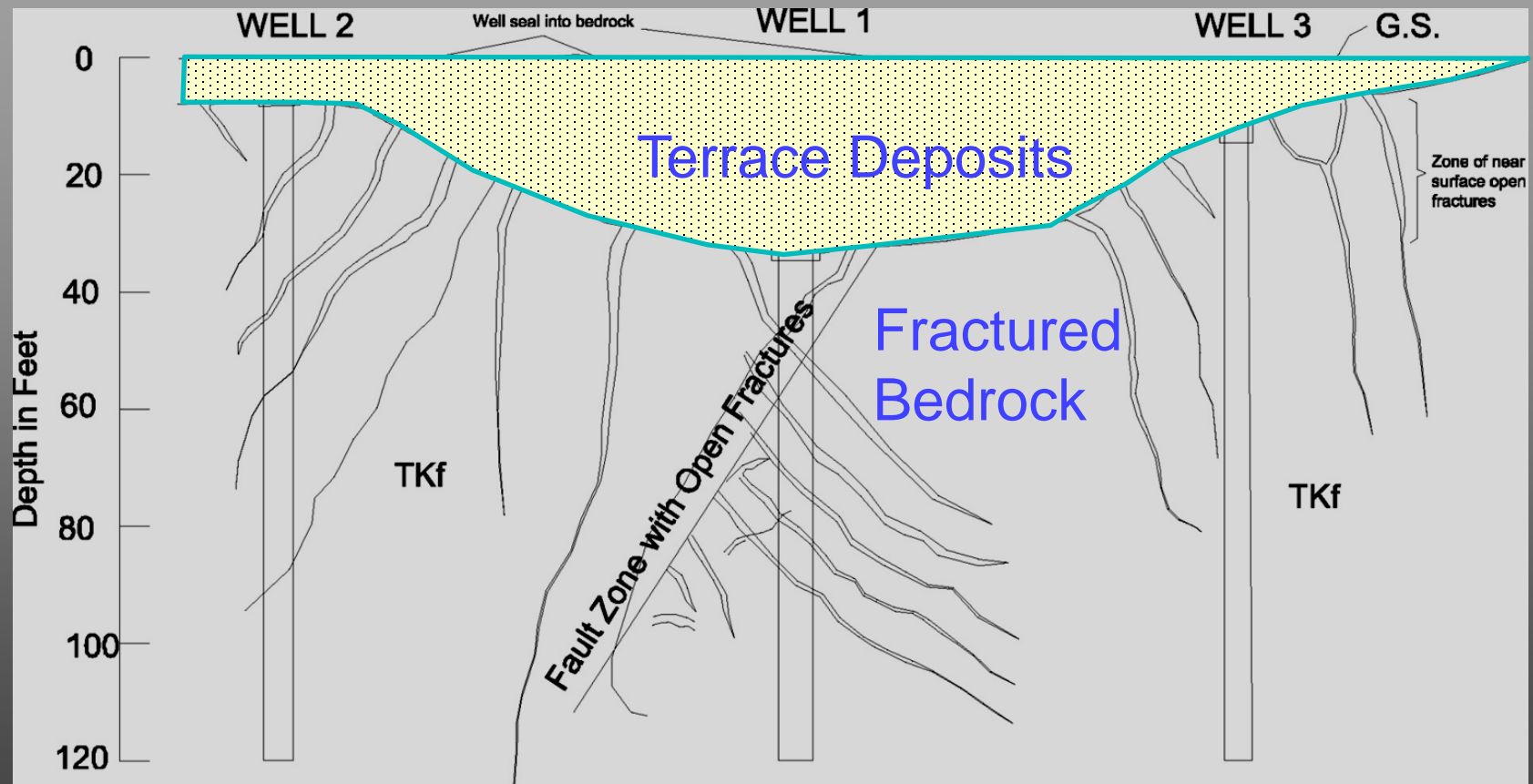


Mendocino Water Supply is Strongly Influenced by Seasonal Rainfall

- Majority of rainfall occurs in November to March
- Groundwater levels respond quickly to precipitation
- Key for summer water supply is height and timing of spring peak water level

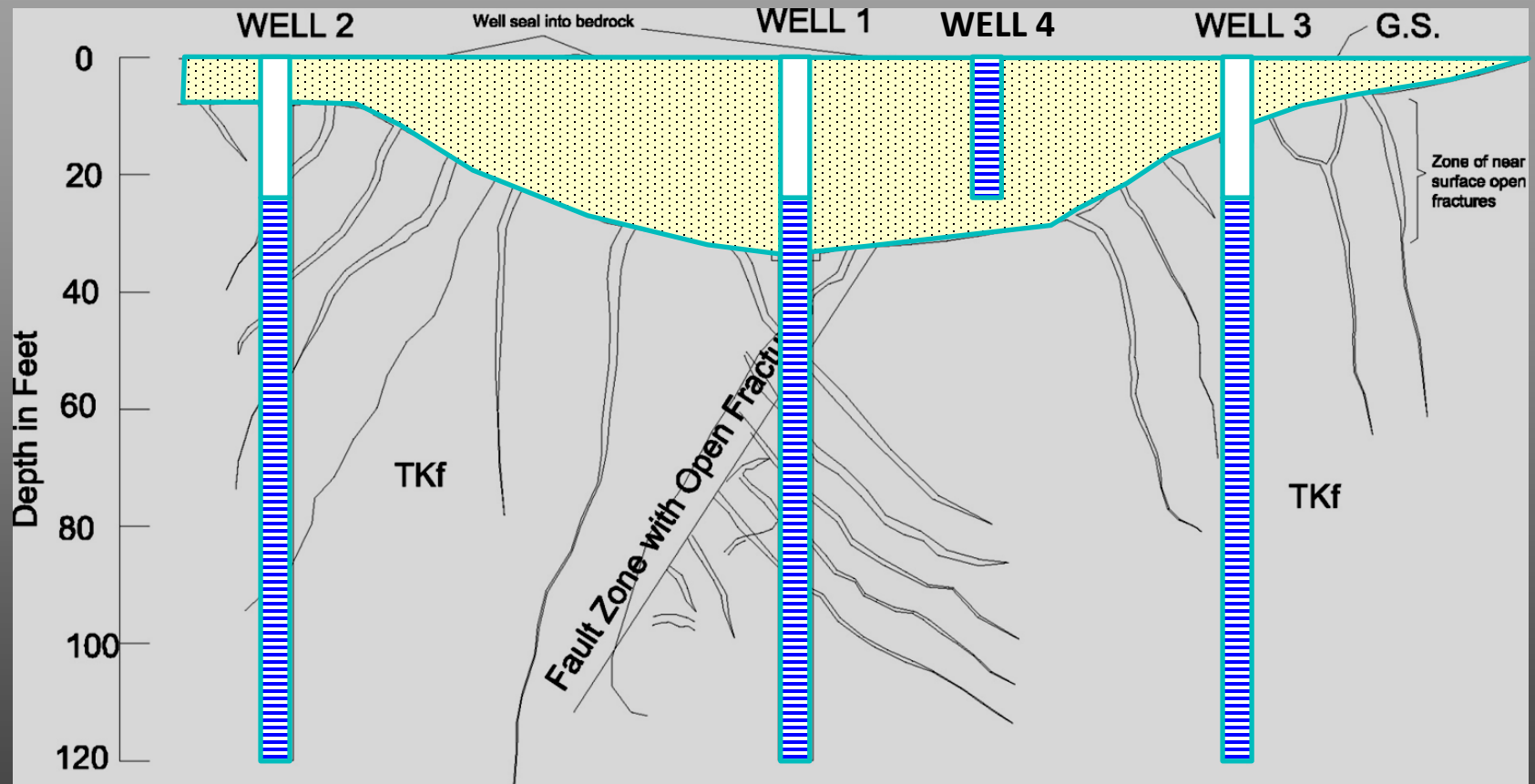


Groundwater occurs in both the Terraces and Fractured Bedrock



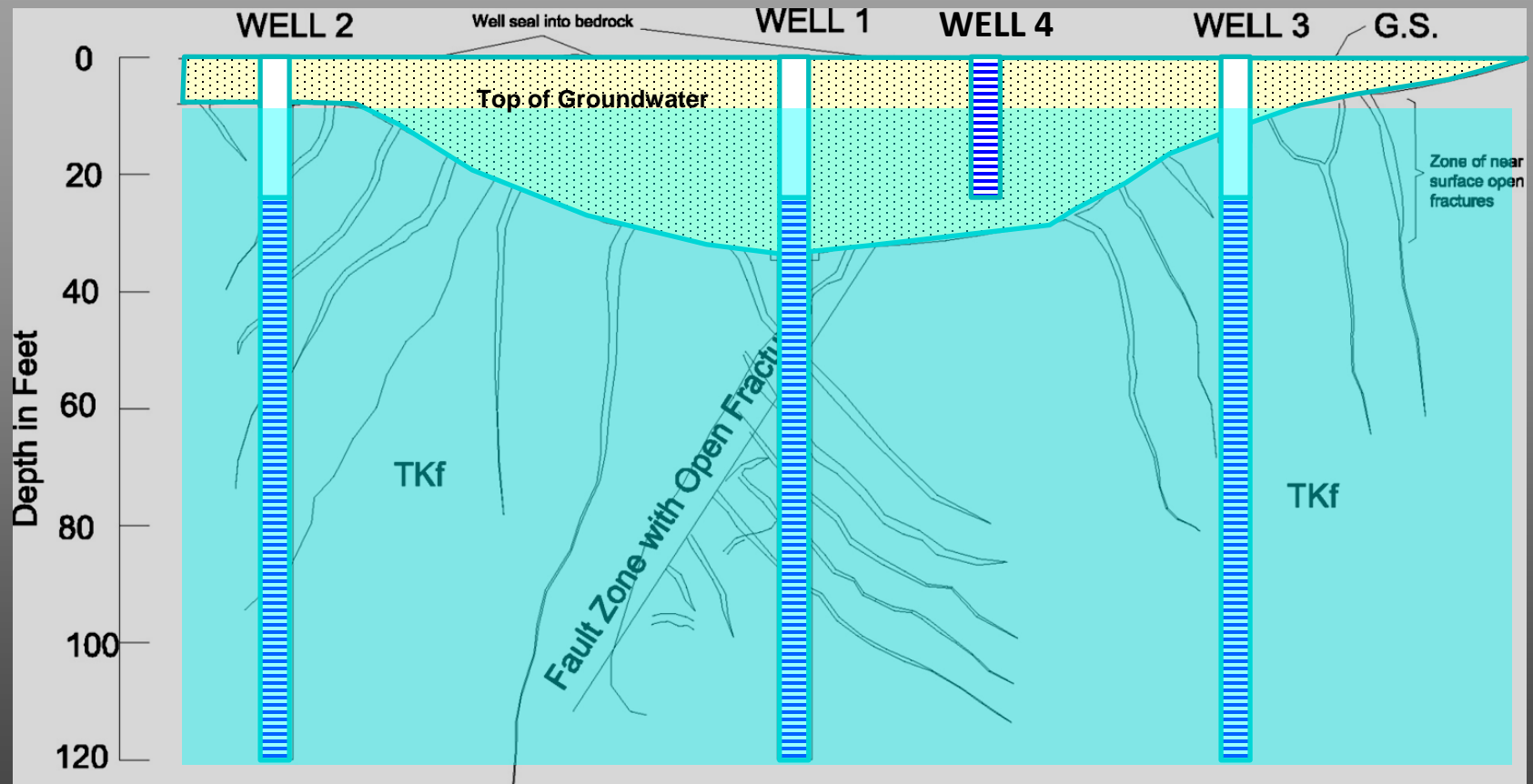
Source: DWR (1985)

Wells Pump from Shallow Terraces and Deep Fractured Bedrock



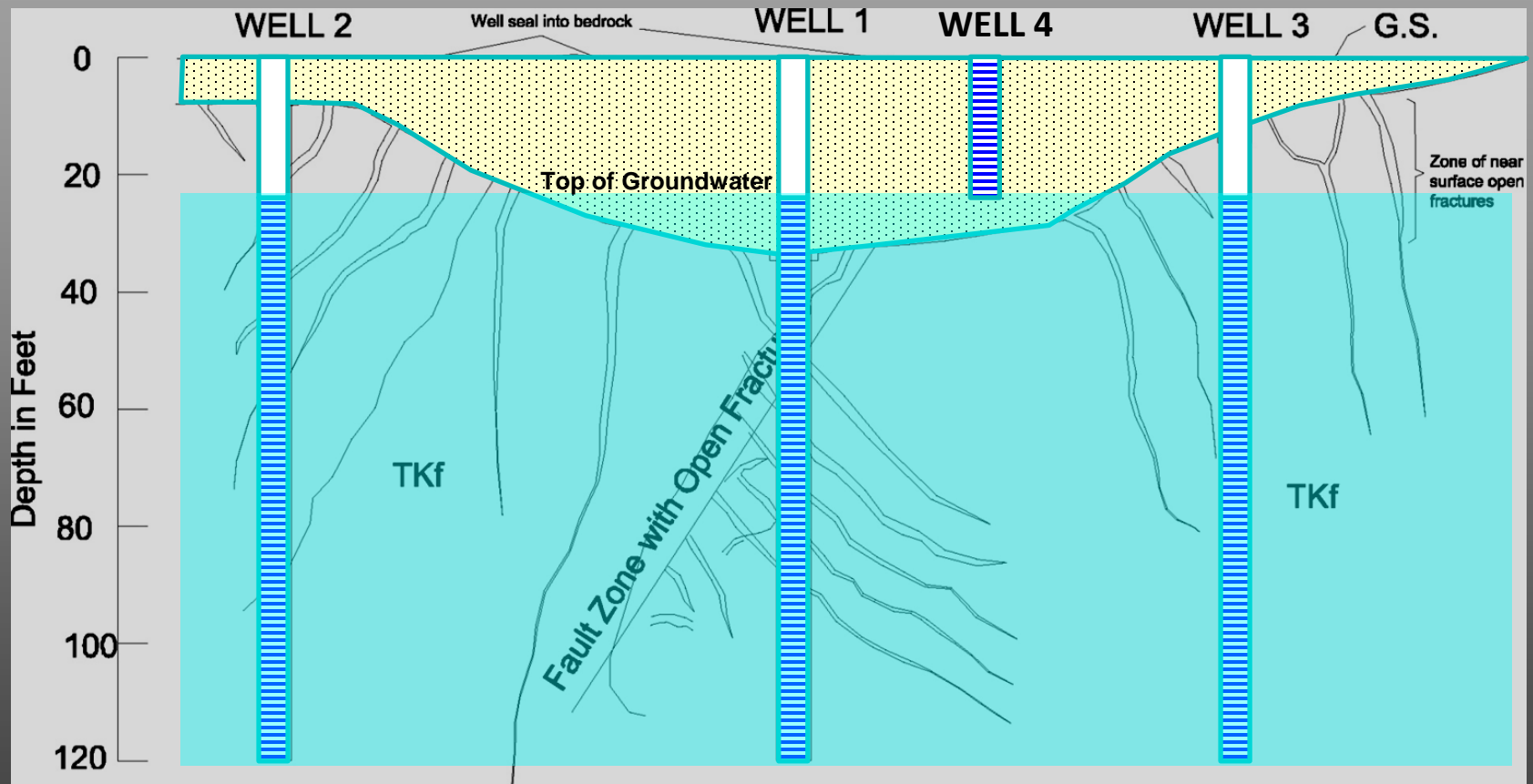
Source: DWR (1985)

Water in Terrace Deposits Pressurizes the Fractured Bedrock Aquifer System



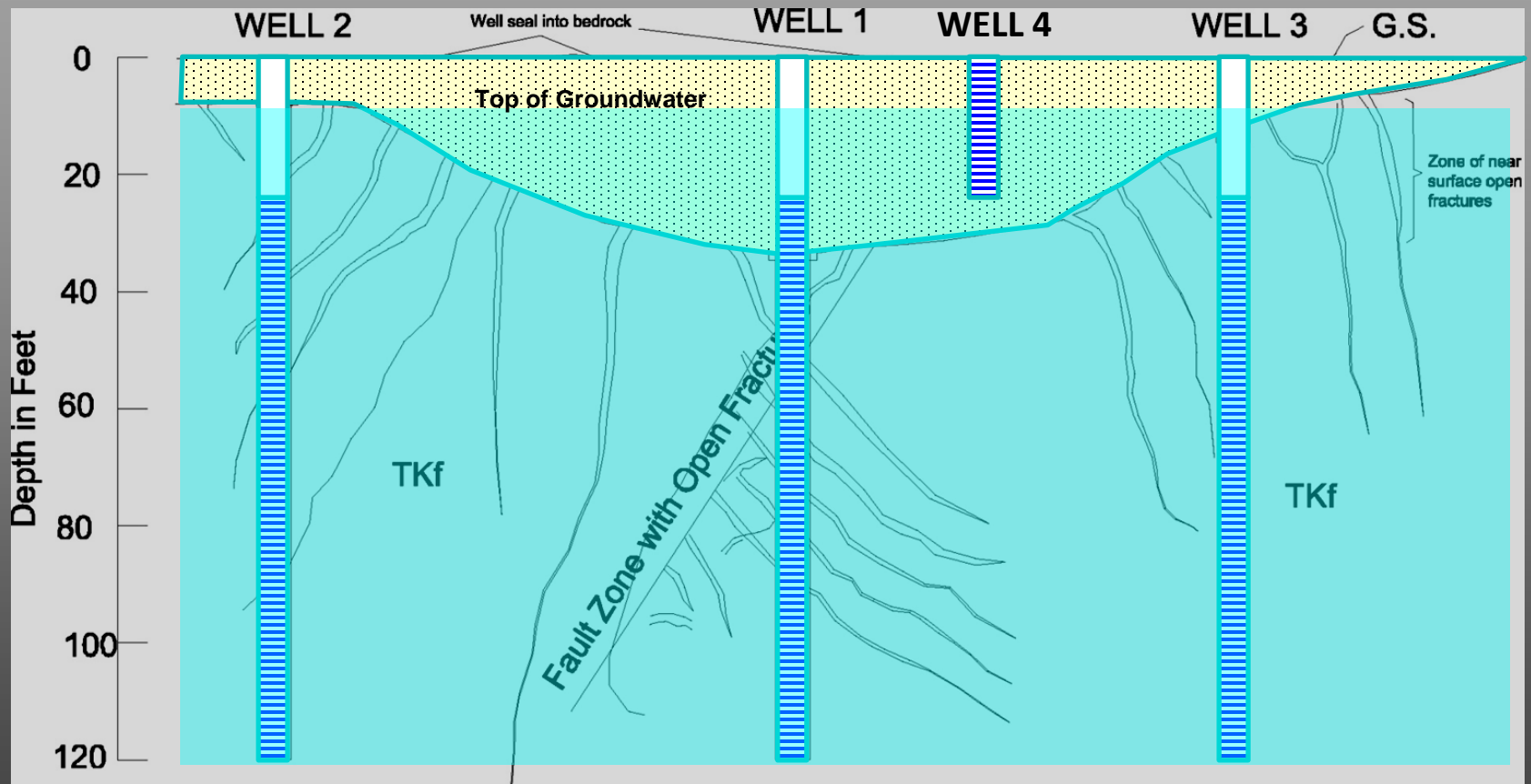
Source: DWR (1985)

When groundwater levels are low, some wells unable to sustain pumping



Source: DWR (1985)

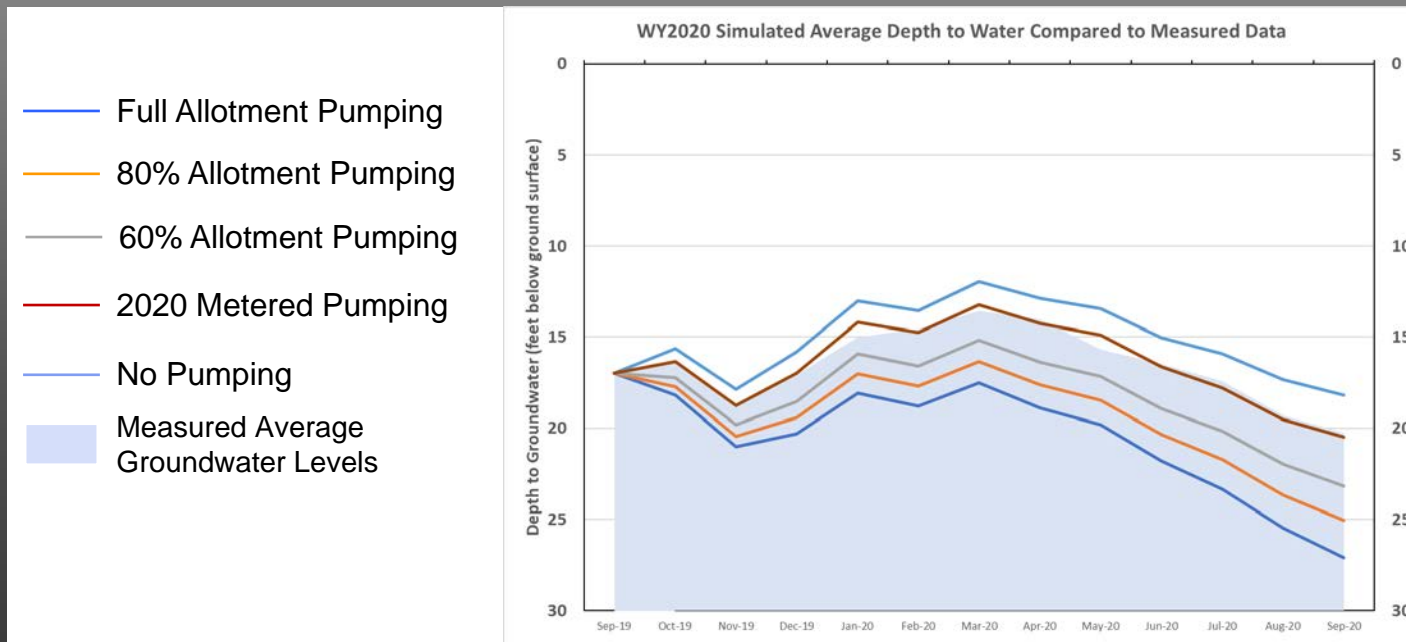
Aquifer responds quickly to rainfall, so can recover in a single year



Source: DWR (1985)

Water Use Analysis Illustrates Water Conservation Effectiveness

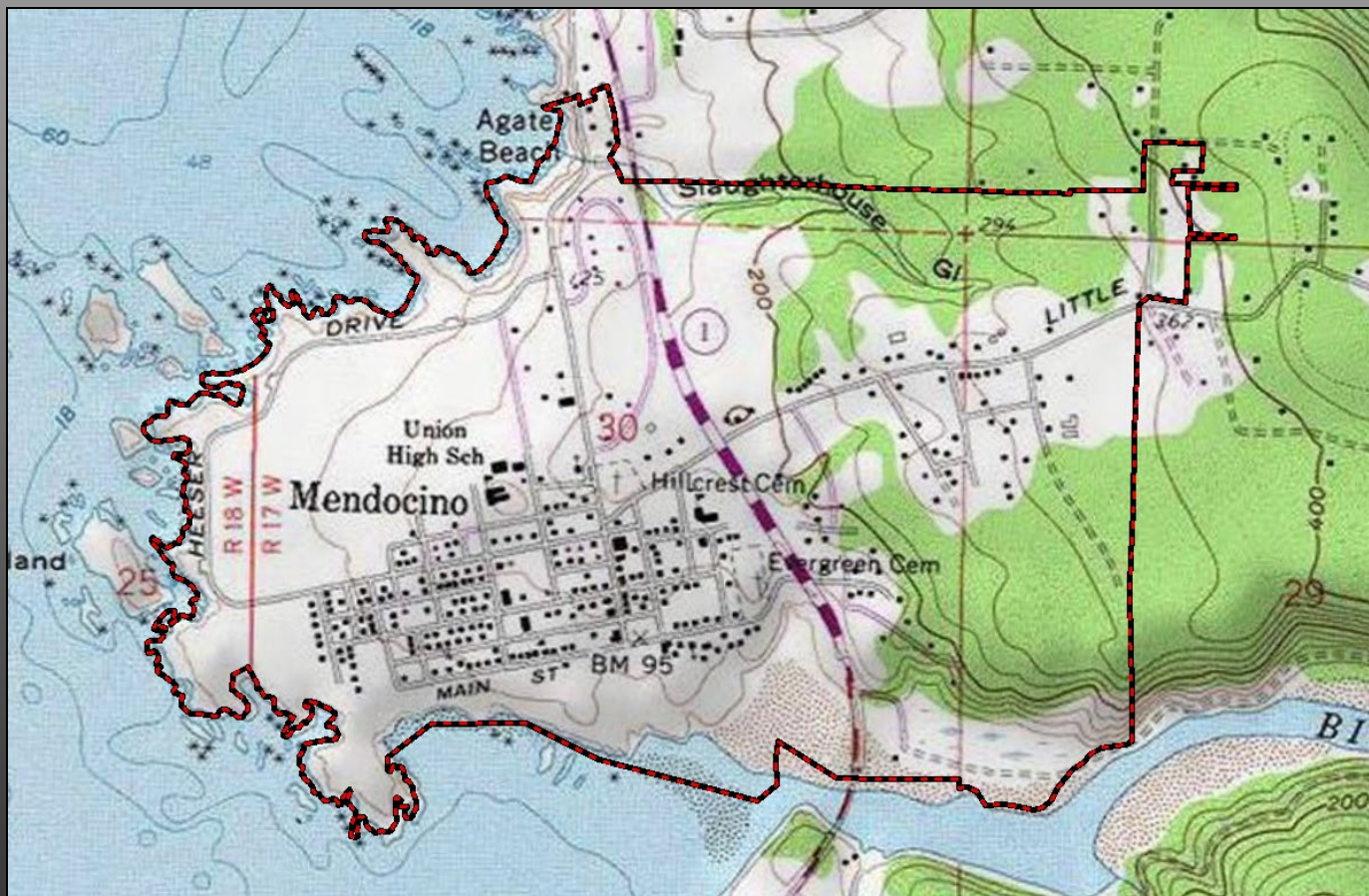
- Reduced pumping helps sustain summer groundwater levels
- For every gallon conserved, about half gallon carries into next year
- Water conservation help to reduce impacts of recent drought relative to comparable historic droughts



Water Shortage Contingency Plan (WSCP)

MCCSD is Special Legislative Groundwater Management District

In 1990, the MCCSD took over groundwater management authority within district from Mendocino County.



1976-77 Drought Triggered Changes in County Water Policy for Coastal Areas

- **Groundwater Extraction Ordinance**
 - Groundwater Extraction Permit
 - Hydrologic Study
- **Groundwater Management Programs**
 - Water Recycling Programs
 - Water Conservation Program
 - Groundwater Monitoring Program
- **Water Shortage Contingency Plan**
 - Drought Stages

Water Shortage Contingency Plan Provides Framework for Drought Response

- Provide Process to Forecast Potential Drought Conditions
- Define Criteria with Specific Dates and Directly Measurable Quantity
- Identify Conditions Early so Timely Mitigation Measures Can Be Taken
- Provide Mechanism to Evaluate Recovery from Drought Conditions

MCCSD Water Shortage Contingency Plan

Water Shortage Contingency Plan

Mendocino City Community Services District

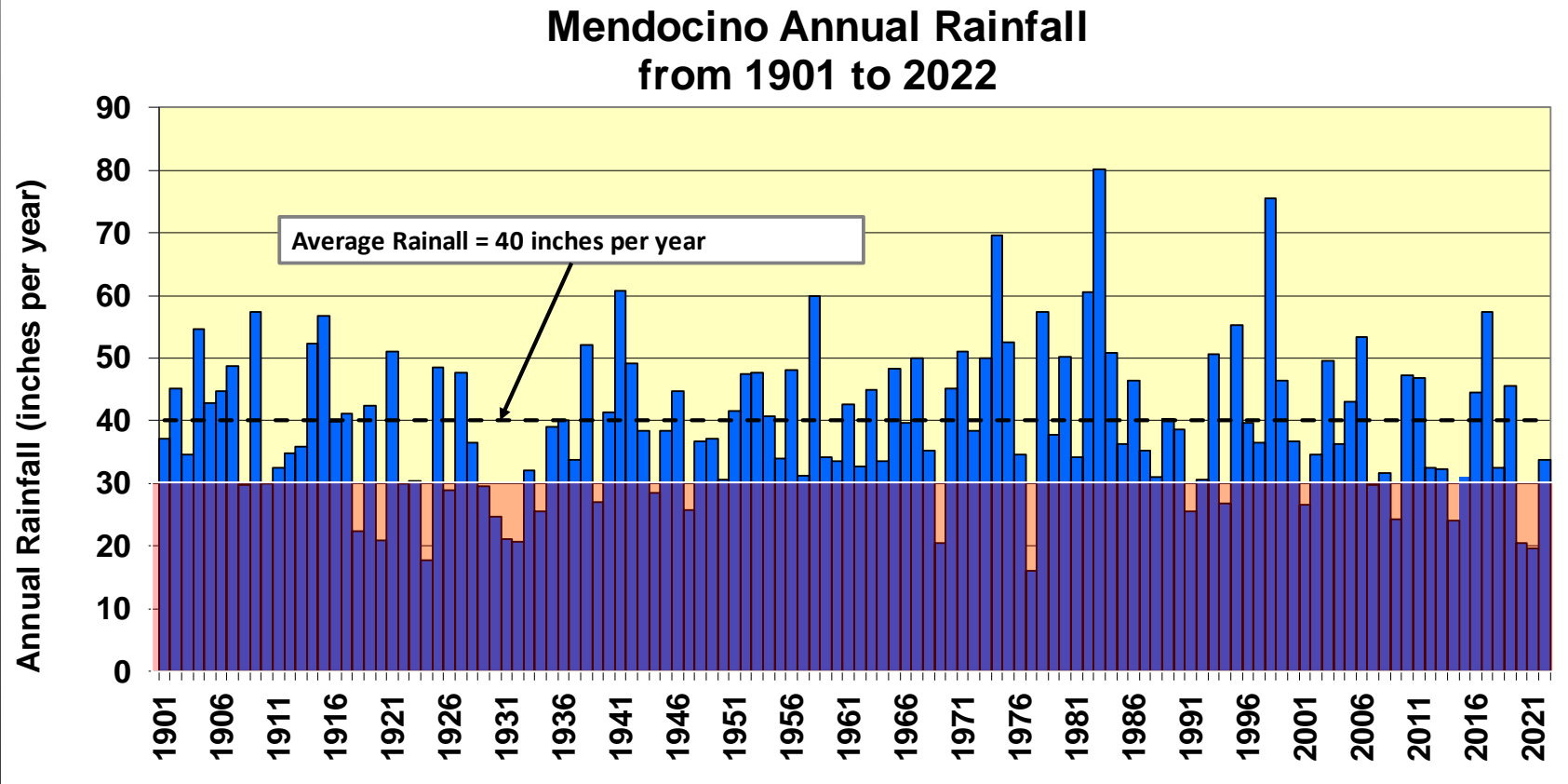
Mendocino, California

Based on a 2006 Report prepared by:
Questa Engineering Corporation
P.O. Box 70356
Point Richmond, California 94807

Adopted May 11, 2020

Drought defined relative over 100-year historical rainfall data

- Recent Extended Drought Period Shows Pattern Similar to 1929 - 1934 Drought Period



WSCP Stages Correlated to Rainfall and Groundwater Levels

- **Rainfall as Early Indicator**

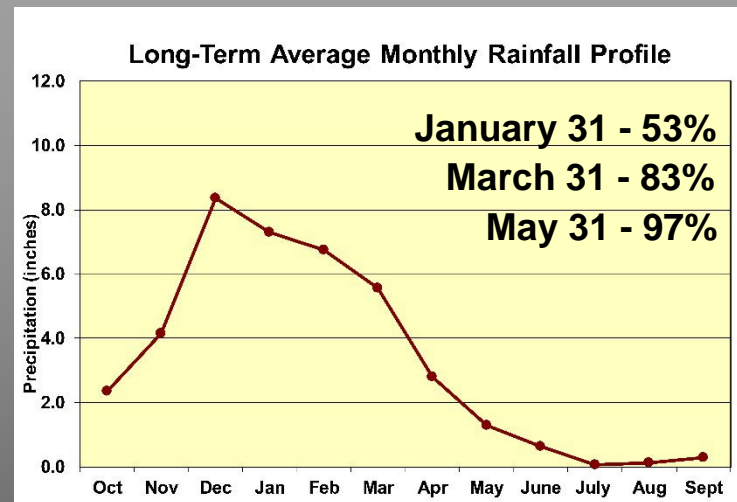
- Total rainfall since October 1
- Spring rainfall since February 1
- Three evaluation dates
 - January 31, March 31, May 31

- **Summer and Fall Assessment**

- Groundwater Levels and Rainfall
- Three evaluation dates
 - August 31, November 30, December 31

- **Multi-Year Drought**

- If previous year a Stage 2, 3 or 4 drought, then modify to next most severe stage



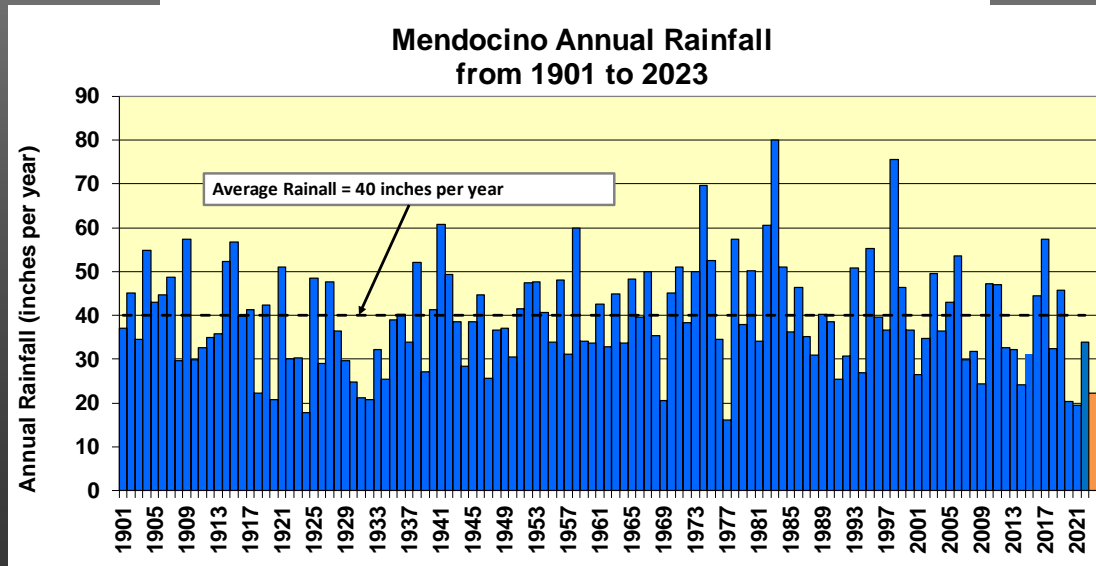
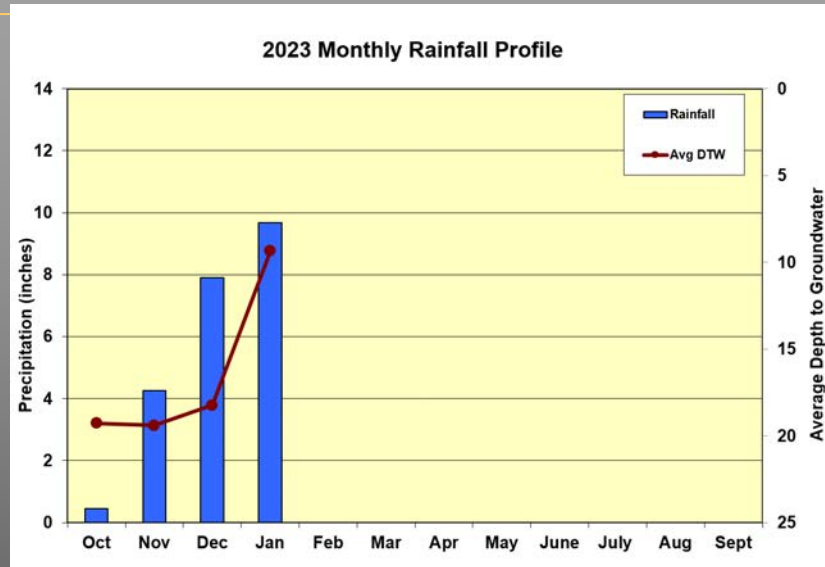
WSCP Stages Based on Percent of Average Rainfall

- Water conservation reduction is relative to Allotment rather than recent water use
- For MCCSD water users, no changes required if water use already below WSCP Stage allotment reduction

Water Shortage Stage	Severity	% of Average Rainfall	Water Conservation
1 Alert	mild	75% to 82.5%	Voluntary 10%
2 Warning	moderate	60% to 75%	Voluntary 15%
3 Emergency	severe	50% to 60%	Mandatory 20%
4 Crisis	historic	less than 50%	Mandatory 40%

2023 Outlook

2023 Water Year Has a Good Start



Despite Good Start, 2023 Drought Potential Still Exists

- **October - January – 22.3 inches of rain**
 - 3.5 inches in September
- **For May 31 Evaluation Date**
 - Average February to May Rain = 16.8 inches over past 32 years
 - Stage 4 - < 2 inches (0%)
 - Stage 3 - 2 - 7 inches (16%)
 - Stage 2 - 7 - 9 inches (10%)
 - Stage 1 - 9 - 10 inches (0%)
 - No Drought - >10 inches (74%)

Questions

