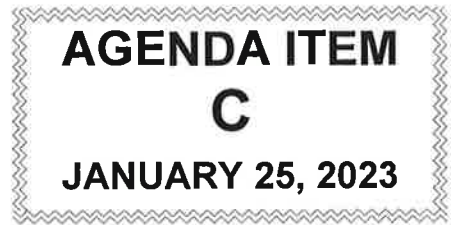



TO: BOARD OF DIRECTORS
FROM: MARIO IGLESIAS
GENERAL MANAGER
DATE: JANUARY 20, 2023



PRESENTATIONS AND REPORTS

The following presentations and reports are scheduled:

- C-1 2022 FALL GROUNDWATER INDEX REVIEW [RECOMMEND RECEIVE AND FILE REPORT]
- C-2) DIRECTORS' ANNOUNCEMENTS OF DISTRICT AND COMMUNITY INTEREST AND REPORTS ON ATTENDANCE AT PUBLIC MEETINGS, TRAINING PROGRAMS, CONFERENCES AND SEMINARS. Receive Announcements and Reports from Directors
- C-3) RECEIVE PUBLIC COMMENT ON PRESENTATIONS AND REPORTS PRESENTED UNDER ITEM C AND BY MOTION RECEIVE AND FILE PRESENTATIONS AND REPORTS

TO: BOARD OF DIRECTORS
FROM: MARIO IGLESIAS
GENERAL MANAGER 
DATE: JANUARY 18, 2023

AGENDA ITEM
C-1
JANUARY 25, 2023

2022 FALL GROUNDWATER INDEX REVIEW

ITEM

Receive the Fall 2022 Groundwater Index Report for the Nipomo Mesa area. [RECOMMEND RECEIVE AND FILE REPORT]

BACKGROUND

Dr. Brad Newton provided the attached Technical Memorandum #45 (“Memorandum”) for Board review and consideration. The Memorandum provides the most current data for the Ground Water Index (“GWI”) and provides the Fall 2022 Ground Water Index reading. In summary, the Fall 2022 GWI has decrease in comparison with Fall 2021 GWI, from 38,000 acre feet to 36,000 acre feet.

Dr. Newton’s report and the Groundwater Index is an independent work product of the District and is not reviewed by the Nipomo Mesa Management Area Technical group.

FISCAL IMPACT

Funds for preparation of this report are included in the FY 2022-23 Budget.

STRATEGIC PLAN

Goal 1. WATER SUPPLIES. Actively plan to provide reliable water supply of sufficient quality and quantity to serve both current customers and those in the long-term future.

1.6 Continue to monitor and participate in water supply issues and programs with other local and regional organizations.

RECOMMENDATION

Staff recommends that the Board receive the Report and give direction to staff as needed.

ATTACHMENTS

- A. Technical Memorandum #45 - Fall 2022 Ground Water Index
- B. Fall 2022 Ground Water Index Presentation

JANUARY 25, 2023

ITEM C-1

ATTACHMENT A



1 **TECHNICAL MEMORANDUM**
2

3 **TO:** Mario Iglesias, General Manager NCSD
4 **FROM:** Brad Newton, Ph.D., P.G.
5 **RE:** Technical Memorandum #45 - Fall 2022 Ground Water Index and 2022 Key Wells
6 Index
7 **DATE:** January 17, 2023

8 **INTRODUCTION**

9 Groundwater surface elevations (GSE) underlying the Nipomo Mesa are regularly
10 measured at many places (wells) across the mesa. The Fall 2022 Ground Water Index (GWI) has
11 been computed from GSE measurements collected during spring across the Nipomo Mesa and
12 presented herein along with historical GWI from 1975 to present. Limited measurements of
13 GSE were available for the years 1978, 1982, 1983, 1984, 1994 and 1997, precluding a reliable
14 calculation of GWI for those years.

15 **The Nipomo Mesa Management Area (NMMA) Technical Group (TG) has not**
16 **reviewed this technical memorandum, its findings, or any presentation of this evaluation.**
17

18 **RESULTS**

19 The Fall 2022 GWI is 36,000 AF (Table 1, Figure 1), a decrease from both Spring 2022
20 (42,000 AF) and Fall 2021 (38,000 AF). The GWI has been in decline since the turn of the
21 century, despite the minor increases that occurred in 2006, 2012, and 2017. The decline in the
22 GWI is largely responding to less than average annual rainfall of 13.33 inches per year since
23 2011 along with the consumptive use of groundwater. Average annual rainfall from 1975 to
24 2011 is 16.83 inches per year, slightly above the long-term average annual rainfall of 16.03
25 inches per year since 1975. The estimated rainfall for this year is approximately 10.75 inches, 67
26 percent of the long-term average annual rainfall of 16.03 inches. The longest local rainfall
27 record is from 1921 to present measured at the Mehlschau Ranch (Gauge #38) with an average
28 annual rainfall of 16.49 inches per year.

29 Generally, the GWI has been in decline since the turn of the century, even while rainfall
30 was slightly above average from 1998 to 2012 (Figure 2). Consumptive use of ground water
31 produced is certainly a contributing factor to the GWI (Technical Memorandum #30 - Fall 2014
32 Ground Water Index and Hydrologic Inventory Analysis, December 10, 2014). Consumptive
33 use of ground water produced is the only significant component of the hydrologic inventory

TO: Mario Iglesias, GM NCSO
RE: Fall 2022 GWI
DATE: January 17, 2023
Page 2

1 that is currently being managed through conservation and the new water brought to the
2 Nipomo Mesa through the Nipomo Supplemental Water Project (NSWP). An additional benefit
3 of new NSWP water brought to the Nipomo Mesa is that the return flow increases the amount
4 of groundwater available for future production.

5 The 2022 Key Well Index (KWI) value (7.8 ft msl) has decreased from the previous year
6 (8.7 ft msl), and remains in the Severe Water Shortage Condition (see Methodology for KWI
7 explanation). The KWI generally follows the same historical trends as the GWI (Figure 1).

8 **METHODOLOGY**

9 The calculation of spring and fall GWI are based on GSE measurements regularly made by
10 San Luis Obispo County Department of Public Works (SLO DPW), NCSO, USGS, and
11 Woodlands. The integration of GSE data is accomplished by using computer software to
12 interpolate between measurements and calculate GWI within the principal production aquifer
13 assuming an unconfined aquifer and a specific yield of 11.7 percent. Limited measurements of
14 GSE were available for the years 1982, 1983, 1984, 1994 and 1997, precluding a reliable
15 calculation of GWI for those years.

16 **Groundwater Surface Elevation Measurements**

17 Groundwater surface elevation data were obtained from SLO DPW, NCSO, USGS, and
18 Woodlands. SLO DPW measures GSE in monitoring wells during the spring (April) and the fall
19 (October) of each year. Woodlands and NCSO measures GSE in their monitoring wells
20 monthly. For the years 1975 to 1999, available representative GSE data were used to compute
21 GWI. For the years 2000 to 2017, only GSE data from the same 45 wells were used to compute
22 GWI.

23 The GSE data was reviewed in combination with well completion reports and historical
24 hydrographic records in order to exclude measurements that likely do not accurately represent
25 static water levels within the principal production aquifer. Wells that do not access the
26 principal production aquifer or were otherwise determined to not accurately represent static
27 water levels within the aquifer were not included in analysis.

28 **Groundwater Surface Interpolation**

29 The individual GSE measurements from each year were used to produce a GSE field by
30 interpolation using the inverse distance weighting method.

31 **Ground Water Index**

32 The GWI is defined as the annually normalized value of the saturated volume above sea
33 level and bedrock multiplied by the specific yield of 11.7 percent. The GWI is comprised from
34 approximately 45 ground water elevation measurements made by the County of San Luis

TO: Mario Iglesias, GM NCSD

RE: Fall 2022 GWI

DATE: January 17, 2023

Page 3

1 Obispo each April and October. The value of the Ground Water Index was computed for an
2 area approximately similar to the NMMA Boundary. The base of the saturated volume is mean
3 sea level surface (elevation equals zero) or the bedrock, whichever is higher. The bedrock
4 surface elevation is based on Figure 11: Base of Potential Water-Bearing Sediments, presented in
5 the report, Water Resources of the Arroyo Grande - Nipomo Mesa Area (DWR 2002). The
6 bedrock surface elevation was preliminarily verified by reviewing driller reports obtained from
7 DWR. The specific yield is based on the average weighted specific yield measurement made at
8 wells within the Nipomo Mesa Hydrologic Sub-Area (DWR 2002, pg. 86). The GWI is similar to
9 the Key Well Index presented in the Nipomo Mesa Management Area Technical Group annual
10 report to the Court, but is not directly comparable.

11 **Key Well Index**

12 The Key Well Index (KWI) was developed by the NMMA Technical Group from eight
13 inland wells representing the whole of the groundwater basin within the NMMA. The Key
14 Well Index was defined for each year from 1975 to present as the average of the normalized
15 spring groundwater data from each well. The lowest value of the Key Well Index could be
16 considered the "historical low" within the NMMA.

17

18 **REFERENCES**

19 Department of Water Resources (DWR). 2002. Water Resources of the Arroyo Grande - Nipomo
20 Mesa Area, Southern District Report. 2002.

21

TO: Mario Iglesias, GM NCSD
 RE: Fall 2022 GWI
 DATE: January 17, 2023
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**Spring and Fall
 Groundwater Index
 (GWI)**

Year	Rainfall Water Year (inches)	Spring GWI (Acre-Feet)	Number of Wells	Fall GWI (Acre-Feet)	Number of Wells	Spring to Fall Difference (Acre-Feet)
1975	17.29	99,000	54	91,000	54	8,000
1976	13.45	82,000	45	76,000	65	6,000
1977	10.23	64,000	59	54,000	63	10,000
1978	30.00	84,000	62	---	35	---
1979	15.80	72,000	57	77,000	63	(5,000)
1980	16.57	88,000	55	89,000	46	(1,000)
1981	14.32	97,000	46	75,000	47	22,000
1982	18.58	123,000	42	---	31	---
1983	33.09	---	35	95,000	42	---
1984	10.38	---	14	76,000	37	---
1985	12.20	106,000	37	82,000	41	24,000
1986	16.85	98,000	51	67,000	51	31,000
1987	11.29	83,000	48	71,000	52	12,000
1988	12.66	80,000	51	66,000	49	14,000
1989	12.25	59,000	47	47,000	57	12,000
1990	7.12	62,000	55	49,000	53	13,000
1991	13.18	62,000	52	55,000	54	7,000
1992	15.66	61,000	52	35,000	48	26,000
1993	20.17	72,000	54	52,000	61	20,000
1994	12.15	60,000	54	---	36	---
1995	25.87	87,000	35	74,000	52	13,000
1996	16.54	76,000	45	62,000	57	14,000
1997	20.50	---	20	91,000	48	---
1998	33.67	105,000	41	93,000	44	12,000
1999	12.98	106,000	56	88,000	49	18,000
2000	14.47	108,000	44	84,000	41	24,000
2001	21.62	118,000	43	85,000	35	33,000
2002	10.25	96,000	29	79,000	41	17,000
2003	11.39	94,000	37	66,000	42	28,000
2004	12.57	89,000	42	81,000	35	8,000
2005	22.23	98,000	38	79,000	39	19,000
2006	20.83	107,000	44	78,000	41	29,000
2007	7.11	93,000	44	66,000	42	27,000
2008	15.18	83,000	43	65,000	42	18,000
2009	10.31	76,000	44	65,000	43	11,000
2010	20.07	80,000	45	67,000	42	13,000
2011	34.05	87,000	43	81,000	43	6,000
2012	15.35	89,000	45	65,000	44	24,000
2013	8.07	67,000	45	42,000	43	25,000
2014	4.72	57,000	45	47,000	42	10,000
2015	8.65	52,000	42	45,000	39	7,000
2016	11.48	62,000	39	50,000	41	12,000
2017	29.41	70,000	36	52,000	43	18,000
2018	10.16	58,000	42	56,000	38	2,000
2019	23.71	57,000	42	40,000	42	17,000
2020	15.85	61,000	39	38,000	41	23,000
2021	8.48	34,000	41	38,000	39	(4,000)
2022	10.75	42,000	37	36,000	38	6,000

---: Insufficient for evaluation

Table 1: Spring and Fall GWI computed from Spring 1975 to present.

1
2

TO: Mario Iglesias, GM NCSD
RE: Fall 2022 GWI
DATE: January 17, 2023
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Spring and Fall Groundwater Index (GWI)

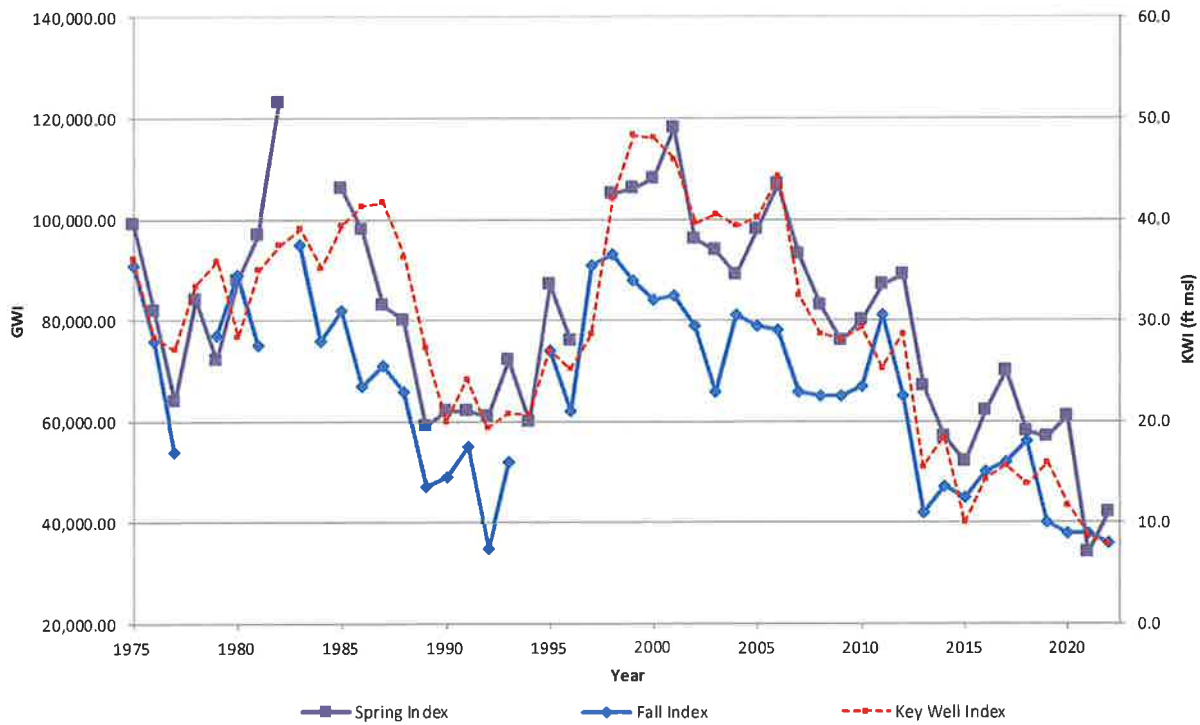
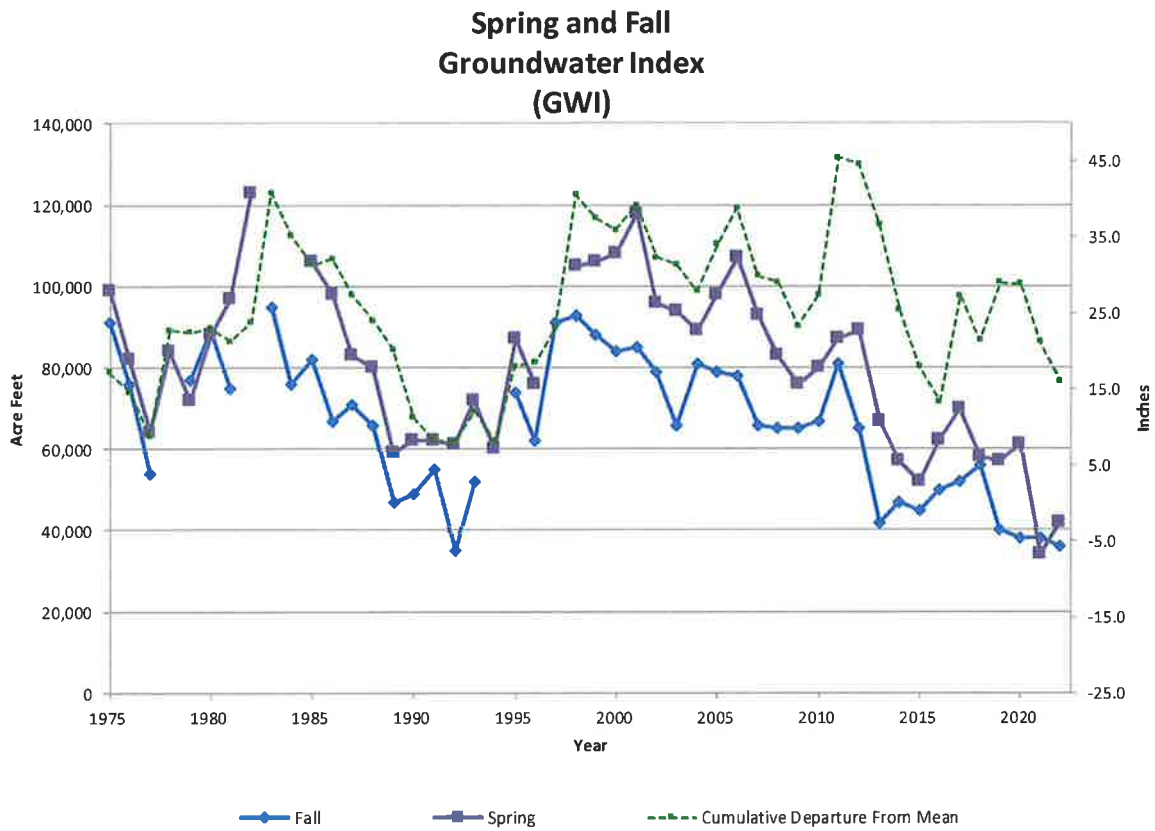


Figure 1: Spring and Fall GWI, and KWI (Spring only) from 1975 to present.

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TO: Mario Iglesias, GM NCSD
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 DATE: January 17, 2023
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1
2
3

Figure 2: Spring and Fall GWI, and Cumulative Departure of Annual Rainfall from the Mean Rainfall, 1975 to present.

JANUARY 25, 2023

ITEM C-1

ATTACHMENT B

An aerial photograph of a rural landscape, likely a farm or agricultural area, with a yellow boundary line tracing a path through the fields. The terrain is a mix of green and brown, suggesting different crops or stages of growth. The boundary line starts in the upper left, follows the edge of a field, then curves around a cluster of buildings, and continues through more fields towards the bottom right.

Fall 2022 Ground Water Conditions

Prepared by
Newton Geo-Hydrology Consulting Services
January 25, 2023

An aerial photograph of a rural area with a yellow boundary line and a blue horizontal line. The yellow line follows a path through the landscape, possibly a river or a specific administrative boundary. The blue line is a simple horizontal line across the top of the image.

OUTLINE

Ground Water Index – Fall 2022
Key Wells Index 2022
Rainfall

GWI 1975 - 2022

GWI

Spring and Fall
Groundwater Index
(GW)

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Spring and Fall
Groundwater Index
(GWI)

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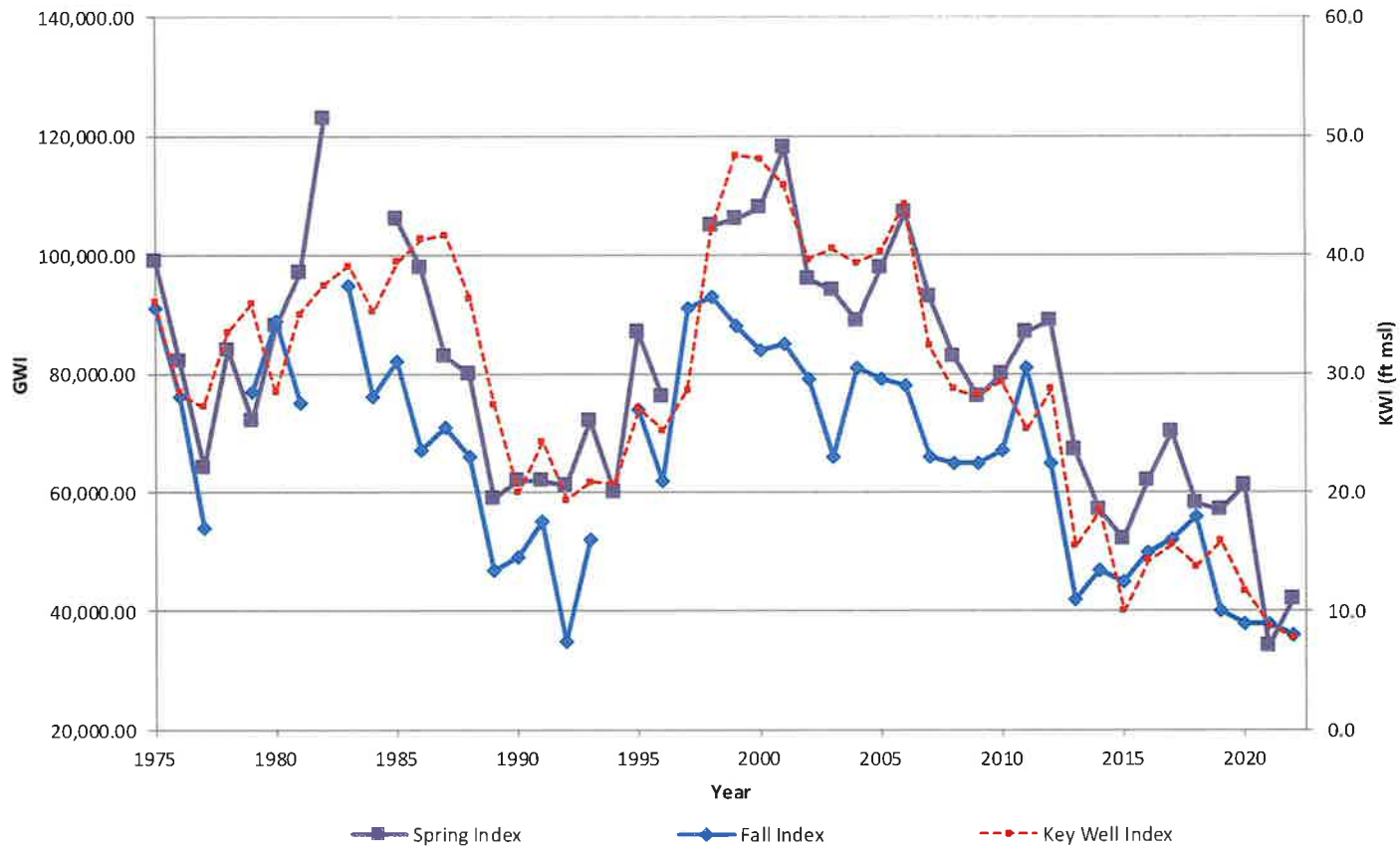
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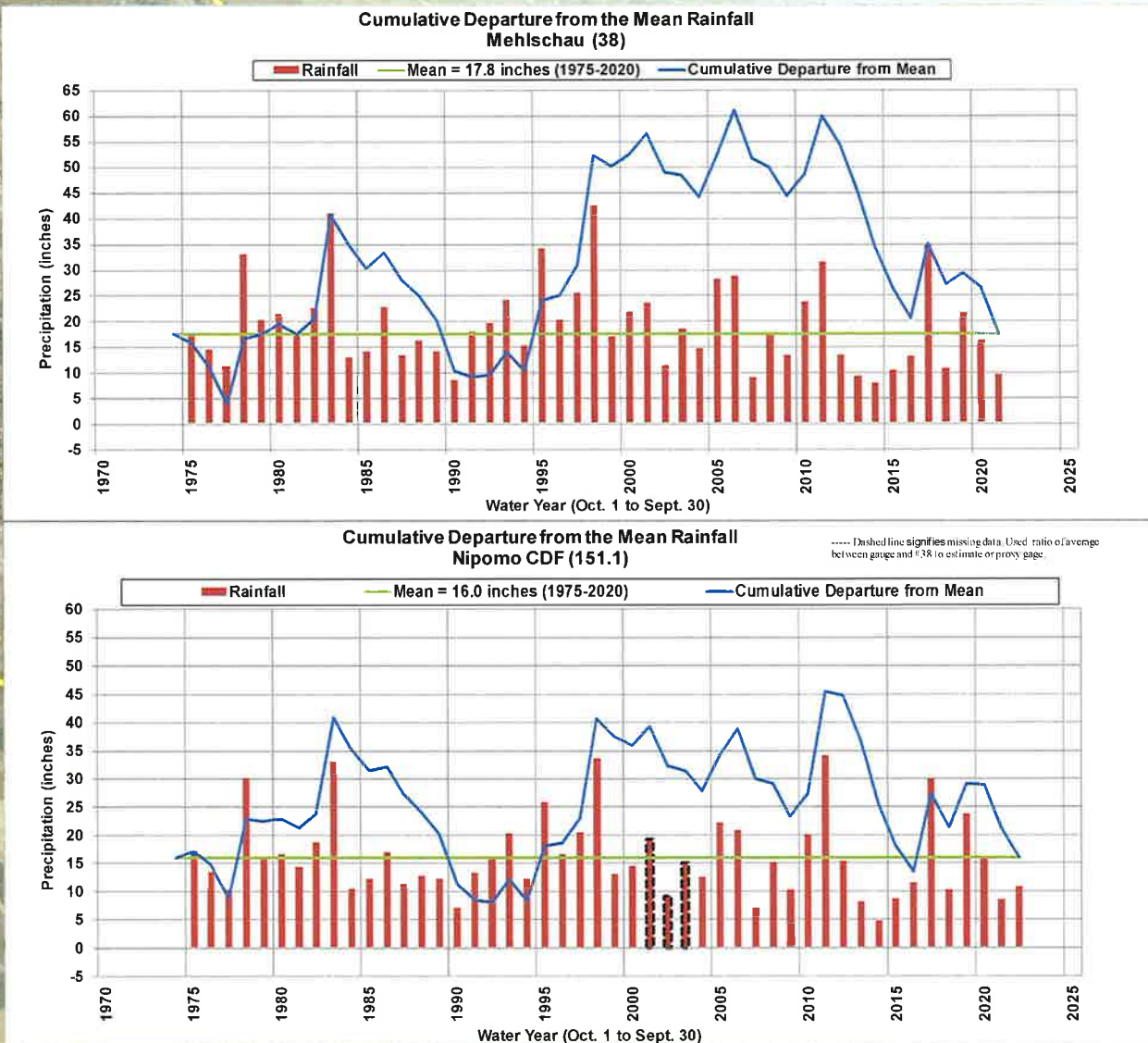
GW and KWI

Spring and Fall Groundwater Index (GWI)



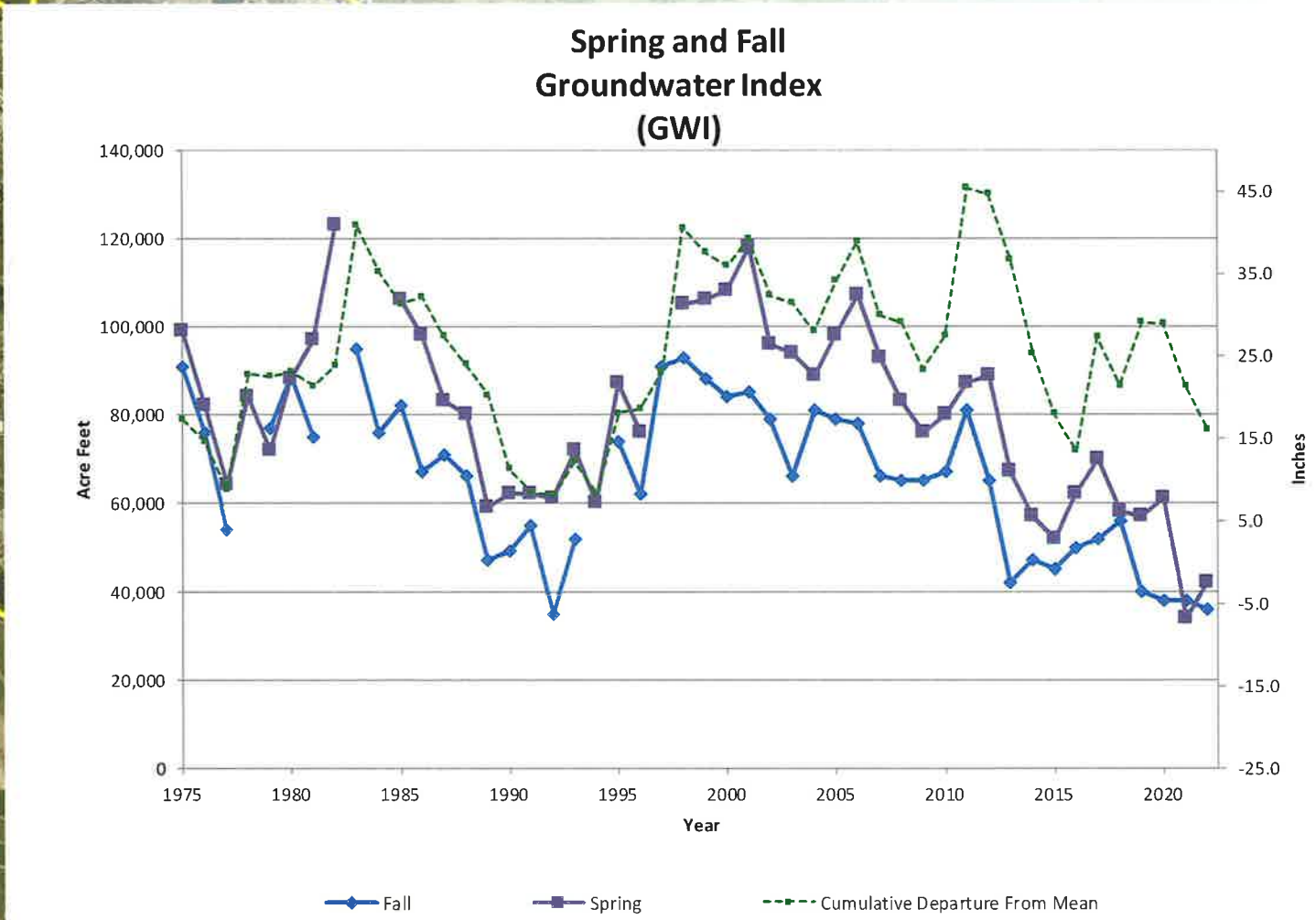
Rainfall 1975 to 2022

Melschau & Nipomo CDF



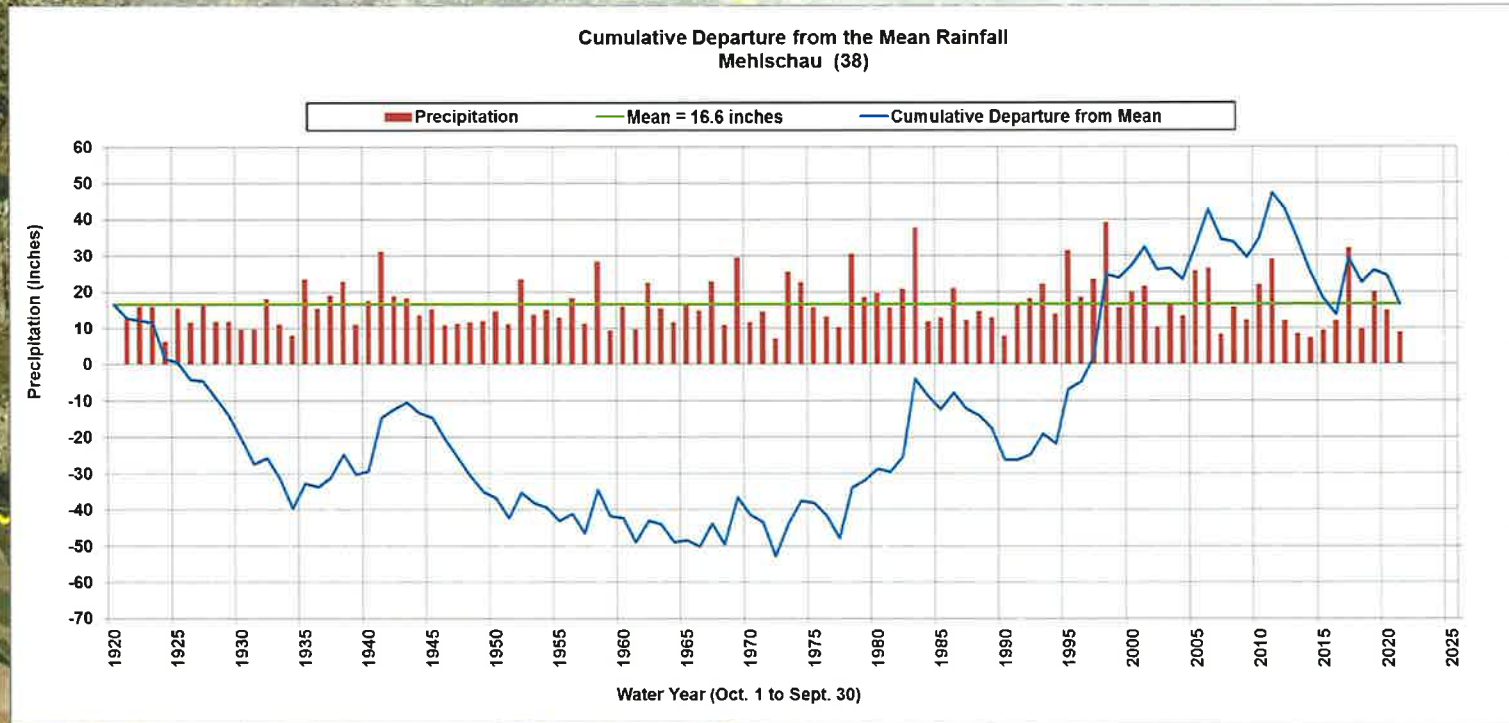
GWI - CDMR

GWI Rainfall

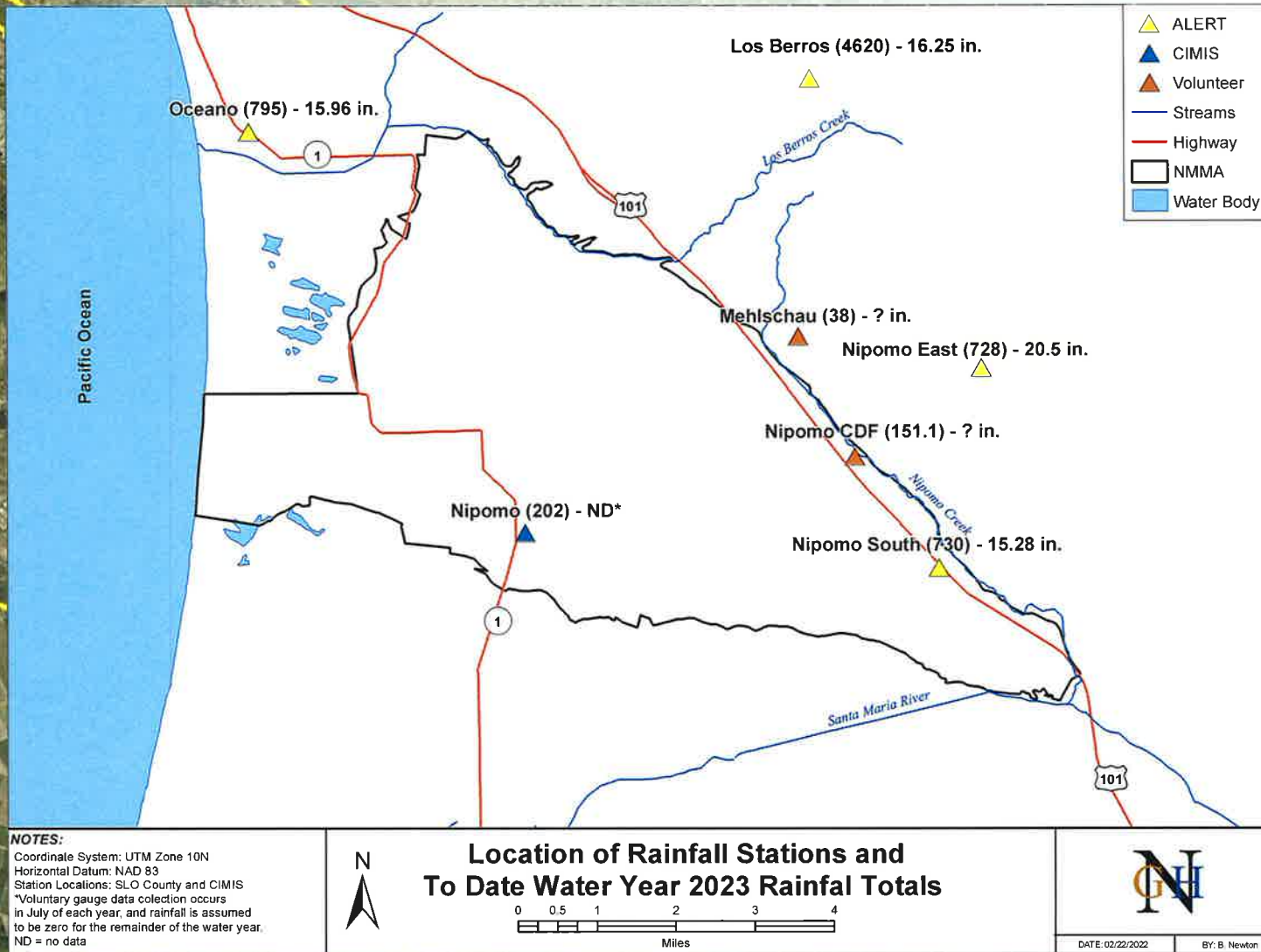


Rainfall @ Mehlschau (#38) 1921 - 2021

GW and CSDMr



To-Date 2023 WY Rainfall Totals



To-Date 2023 WY Reservoirs Totals

- Twitchell Reservoir (598) 32%, 61,778 AF
- Lopez Reservoir (737) 50%, 24,717 AF
- Salinas Reservoir 100%, 25,429 AF
- Nacimiento 87%
- San Antonio 32%

An aerial photograph of a rural landscape, possibly a farm or agricultural area. The image shows a mix of green fields, brown patches, and some buildings. A prominent yellow line outlines a specific area, and a blue horizontal line runs across the top of the image. The word "QUESTIONS?" is overlaid in the center.

QUESTIONS?