

TO: BOARD OF DIRECTORS
FROM: MICHAEL S. LEBRUN *MSL*
GENERAL MANAGER
DATE: JUNE 7, 2013



2013 SPRING GROUNDWATER INDEX

ITEM

Receive Spring 2013 Groundwater Index Presentation by Brad Newton, PhD, PG of Newton Geo-Hydrology Consulting Services LLC [RECEIVE PRESENTATION]

BACKGROUND

Mr. Brad Newton is scheduled to summarize the 2013 Spring groundwater index. The report is an independent product of Newton Geo-Hydrology Consulting Services and is not reviewed or recognized by the Nipomo Mesa Management Area Technical group.

FISCAL IMPACT

Development of this report is included in the contract budget with Newton Geo-Hydrology Consulting Services (Formally of Wagner & Bonsignore).

STRATEGIC PLAN

Strategic Plan Goal 1.1 – Protect, Enhance and Assess available Water Supplies

RECOMMENDATION

Staff recommends that the Board receive the report and give direction to staff.

ATTACHMENTS

- A. 2013 Spring Groundwater Index Technical Memorandum
- B. Presentation Slides

JUNE 12, 2013

ITEM E-10

ATTACHMENT A

TO: NCS D Board of Directors
RE: Spring 2013 GWI
DATE: June 06, 2013
Page 2 of 5

1 (October) of each year. Woodlands and NCS D measures GSE in their monitoring wells
2 monthly. For the years 1975 to 1999, available representative GSE data were used to compute
3 GWI. For the years 2000 to 2011, only GSE data from the same 45 wells were used to compute
4 GWI.

5 The GSE data was reviewed in combination with well completion reports and historical
6 hydrographic records in order to exclude measurements that do not accurately represent static
7 water levels within the principal production aquifer. Wells that do not access the principal
8 production aquifer or were otherwise determined to not accurately represent static water levels
9 within the aquifer were not included in analysis.

10 **Groundwater Surface Interpolation**

11 The individual GSE measurements from each year were used to produce a GSE field by
12 interpolation using the inverse distance weighting (IDW) method.

13 **Groundwater Index**

14 The GWI is defined as the saturated volume above sea level and bedrock multiplied by the
15 specific yield of 11.7 percent. The GWI is comprised from approximately 45 ground water
16 elevation measurements made by the County of San Luis Obispo each April and October. The
17 value of the groundwater index was computed for an area approximately similar to the NMMA
18 Boundary. The base of the saturated volume is mean sea level surface (elevation equals zero) or
19 the bedrock above sea level, whichever is higher. The bedrock surface elevation is based on
20 Figure 11: Base of Potential Water-Bearing Sediments, presented in the report, Water Resources
21 of the Arroyo Grande - Nipomo Mesa Area (DWR 2002). The bedrock surface elevation was
22 preliminarily verified by reviewing driller reports obtained from DWR (Figure 2). The specific
23 yield is based on the average weighted specific yield measurement made at wells within the
24 Nipomo Mesa Hydrologic Sub-Area (DWR 2002, pg. 86). The GWI is similar to the Key Well
25 Index presented in the Nipomo Mesa Management Area Technical Group annual report to the
26 Court, but is not directly comparable.

27 **Key Well Index**

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

33

34 **REFERENCES**

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

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**Spring and Fall
 Groundwater Index
 (GWI)**

Year	Rainfall (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	30.66	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	13.39	97,000	46	75,000	47	22,000
1982	18.58	123,000	42	—	31	—
1983	33.21	—	35	95,000	42	—
1984	11.22	—	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	12.22	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	17.07*	108,000	44	84,000	41	24,000
2001	18.52*	118,000	43	85,000	35	33,000
2002	8.87*	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	6.48*	67,000	45			

—: Insufficient for evaluation

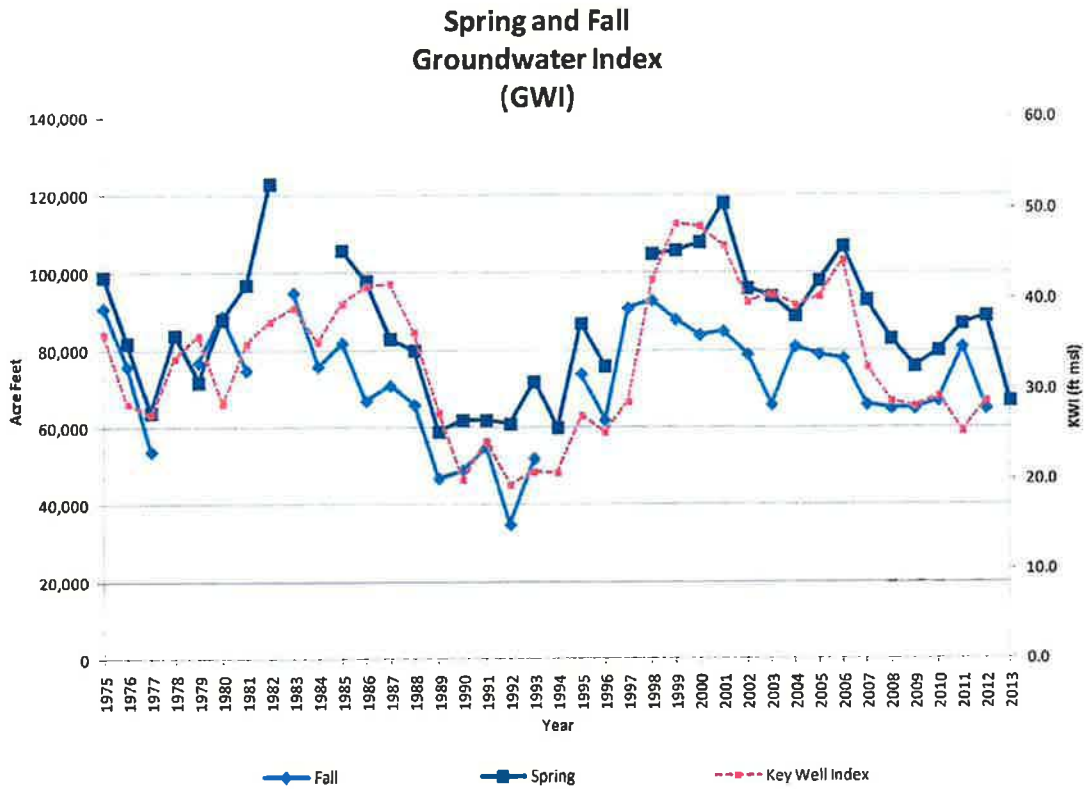
*: Preliminary value

1
2

Table 1: Groundwater Index computed from Spring 1975 to Spring 2013.

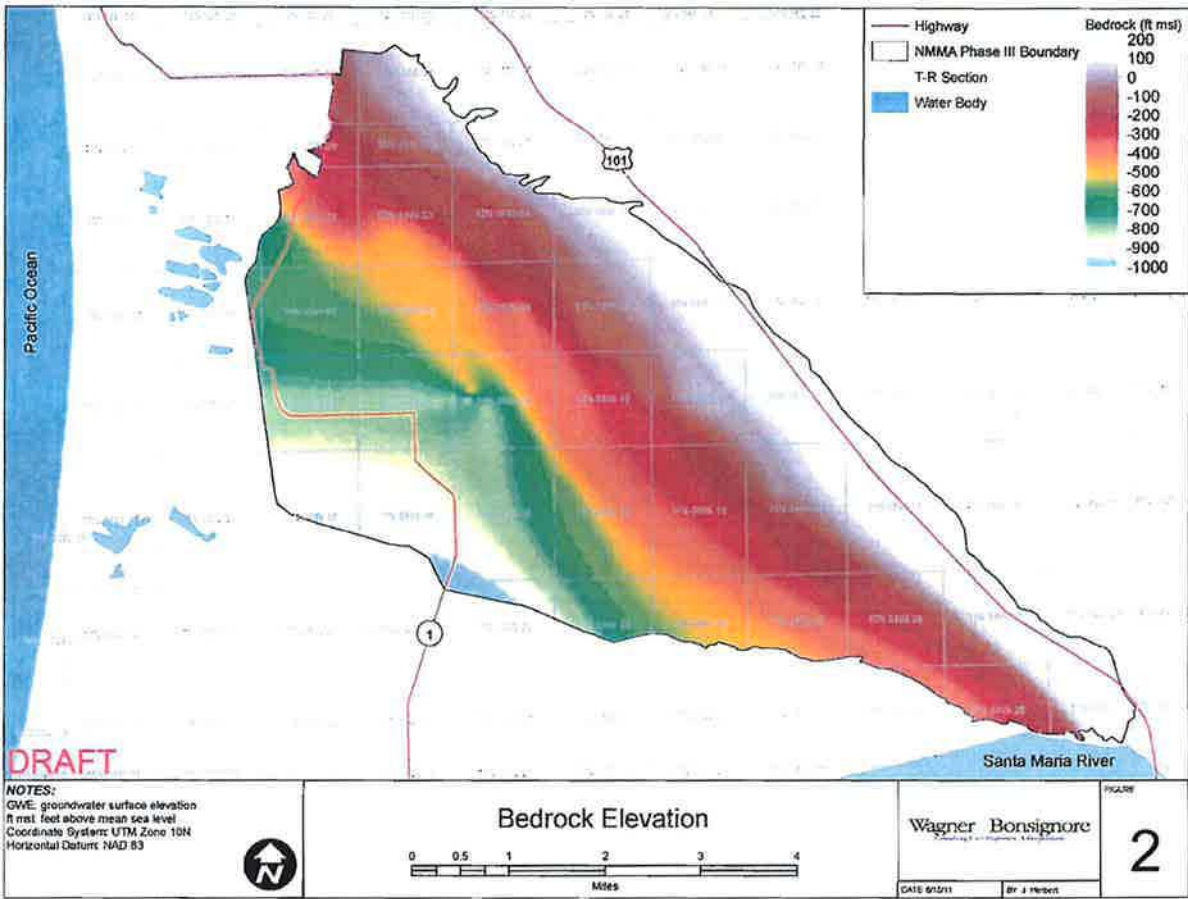
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1
 2 Figure 1: Groundwater Index from Spring 1975 to Spring 2013 and the Key Well Index computed from Spring 1975 to Spring
 3 2012

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1
 2

Figure 2: Elevation of bedrock underlying the NMMA.

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ATTACHMENT B

An aerial photograph of a rural landscape, likely in the Newton area, showing a mix of green fields, brown patches, and some buildings. A yellow line is drawn across the image, possibly representing a boundary or a specific area of interest. The text is overlaid on this image.

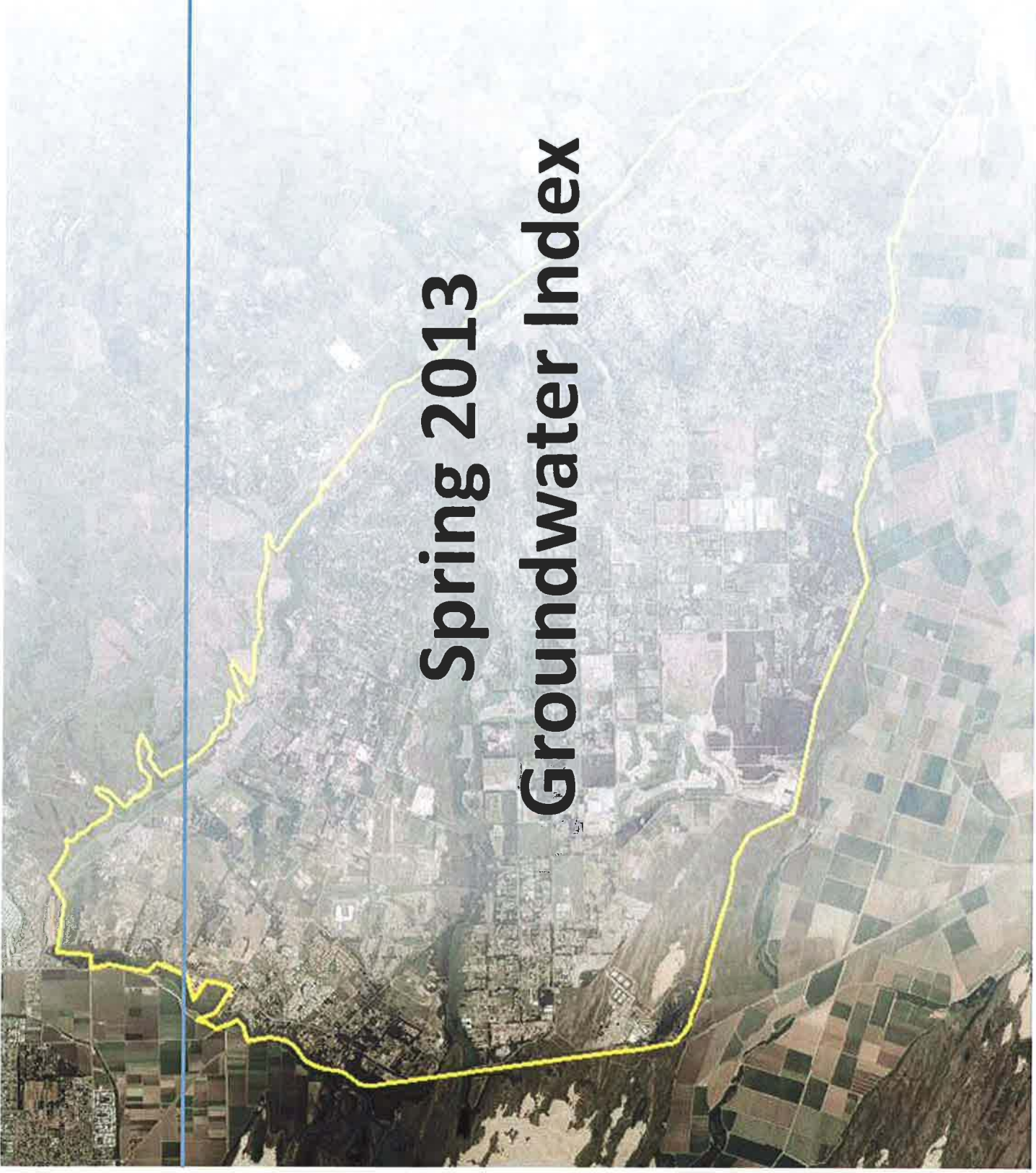
Spring 2013 Groundwater Surface Elevations and Rainfall 2013

Prepared by
Newton Geo-Hydrology Consulting Services

June 12, 2013

Overview

- Estimate of Spring 2013 Groundwater Index
- Rainfall 2013

An aerial photograph of a rural landscape, likely a valley or basin, showing a mix of agricultural fields in various shades of green and brown, and some built-up areas. A prominent yellow line traces a boundary across the terrain. A solid blue vertical line is positioned on the left side of the image. The text 'Spring 2013 Groundwater Index' is overlaid in the center in a large, bold, black font.

Spring 2013 Groundwater Index

GWI Estimate

Spring and Fall
Groundwater Index
(GWI)

Year	Rainfall (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
2006	107,000		44		78,000	41
2007	93,000		44		66,000	42
2008	83,000		43		65,000	42
2009	76,000		44		65,000	43
2010	80,000		45		67,000	42
2011	87,000		43		81,000	43
2012	89,000		45		65,000	44
2013	67,000		45			

1997	20.50	10,000	20	91,000	48	15,000
1998	33.67	105,000	41	93,000	44	12,000
1999	12.98	106,000	56	88,000	49	18,000
2000	17.07	108,000	44	84,000	41	24,000
2001	18.52	118,000	43	85,000	35	33,000
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2003	11.39	94,000	37	66,000	42	28,000
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2005	22.63	96,000	38	79,000	39	19,000
2006	20.83	107,000	44	78,000	41	29,000
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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	6.48*	67,000	45			

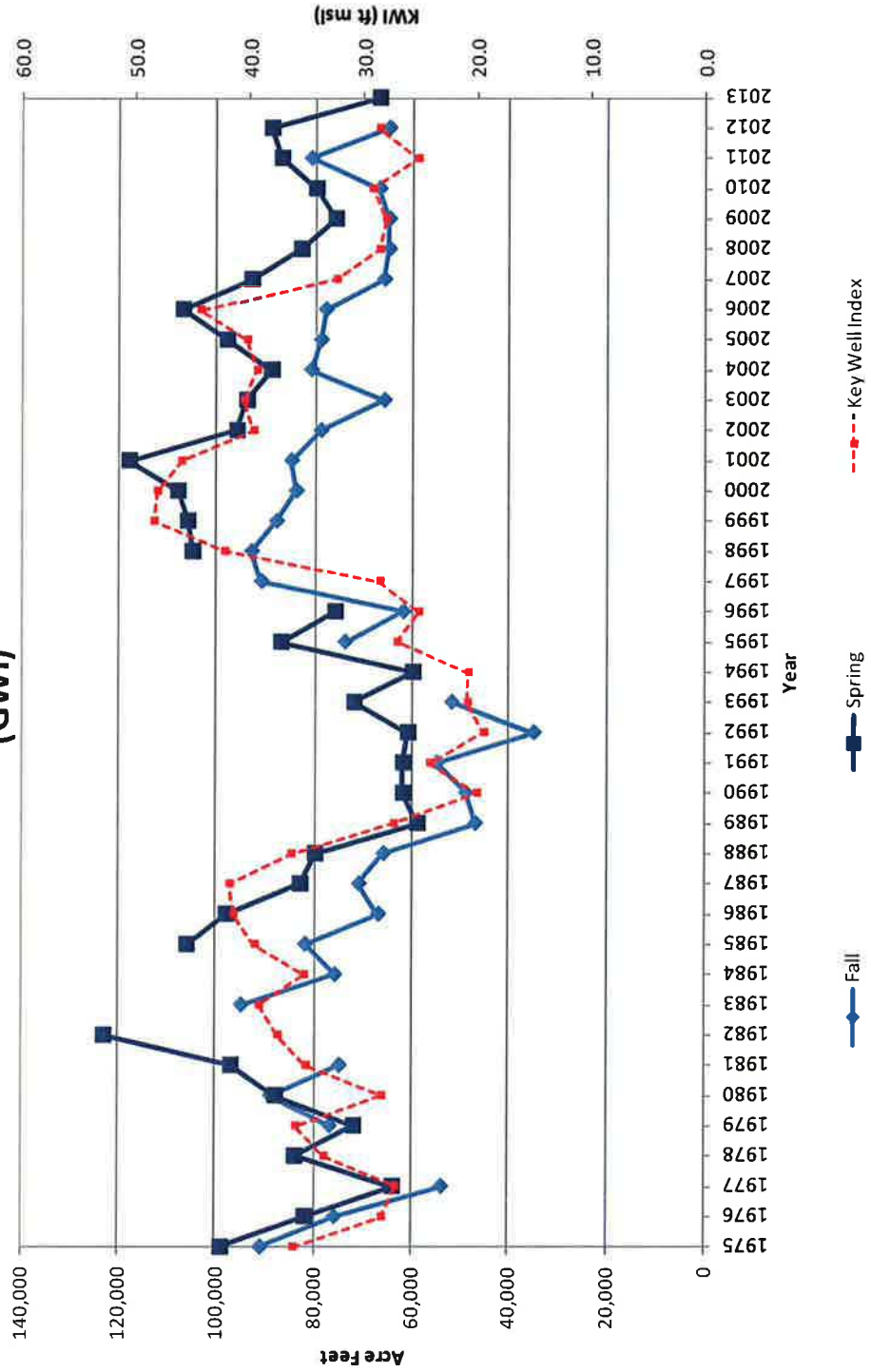
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*: Preliminary value

Spring 2013 GWI

GWI Estimate

Spring and Fall
Groundwater Index
(GWI)

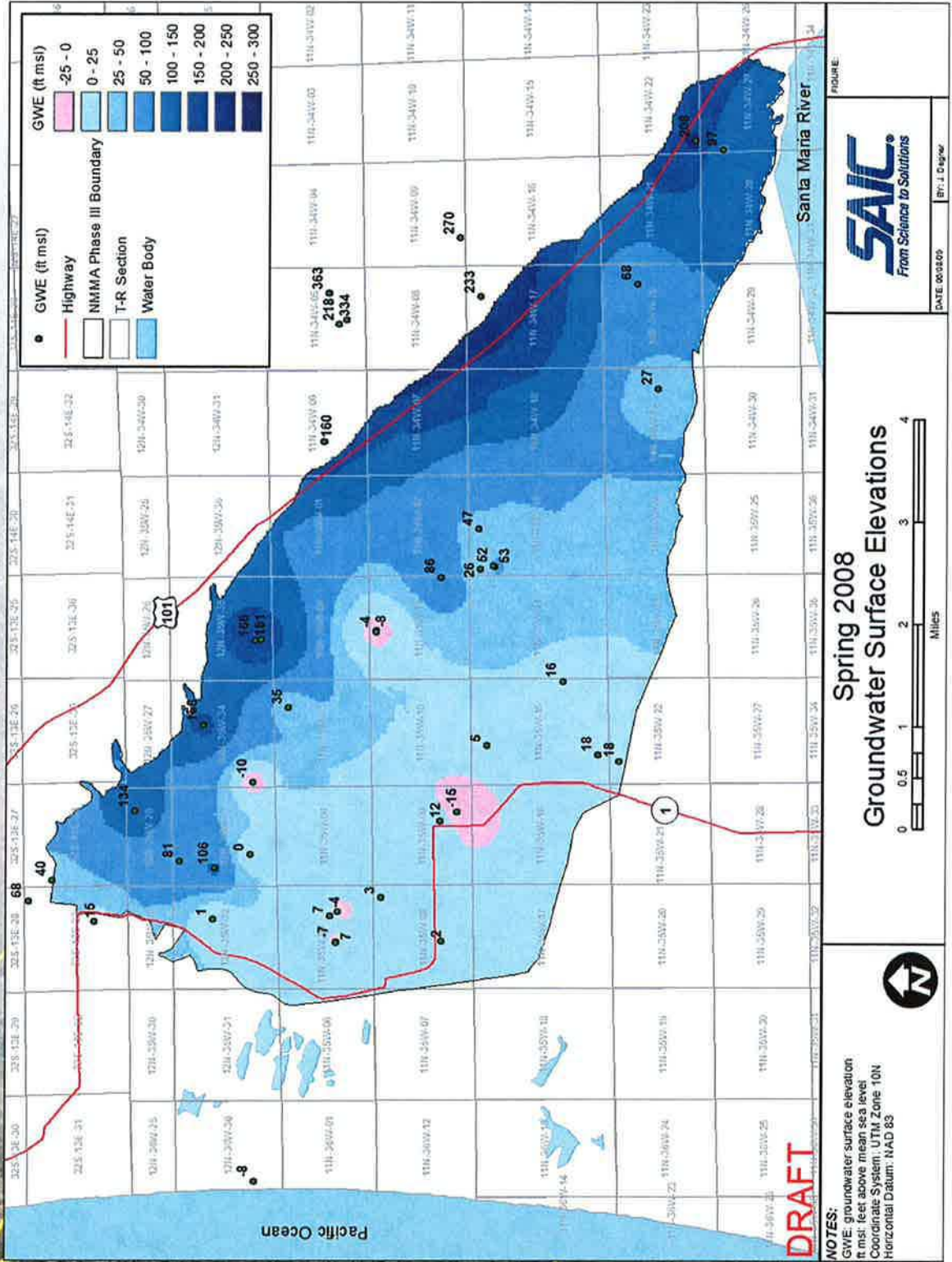


Spatial Distribution

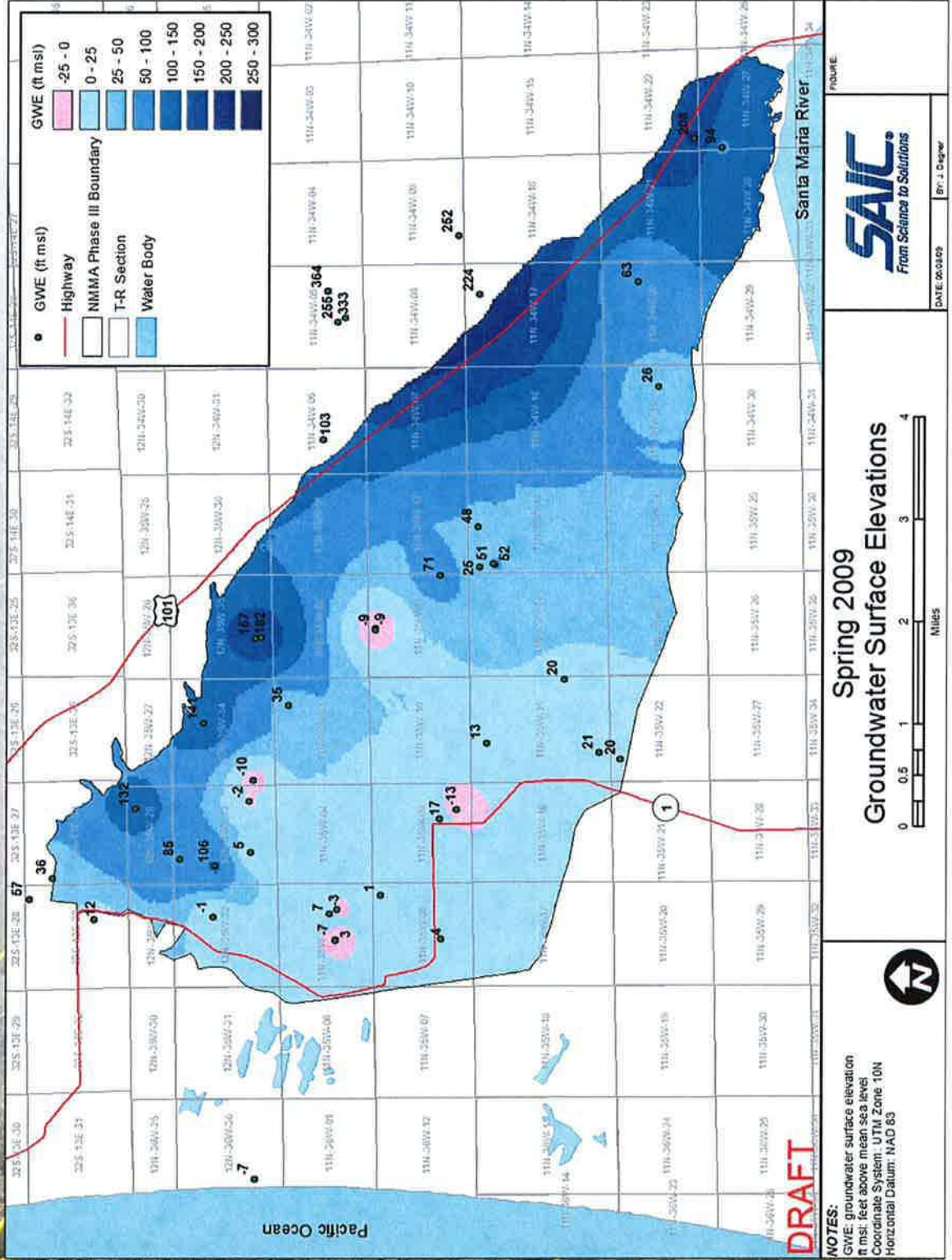
- Groundwater surface elevations are not uniform
- Lowest water levels are in the central and western portion of the Nipomo Mesa
- Several GWE are below sea level in the western portion of the Nipomo Mesa

Spring 2013 GWI

Groundwater Surface Elevation Map

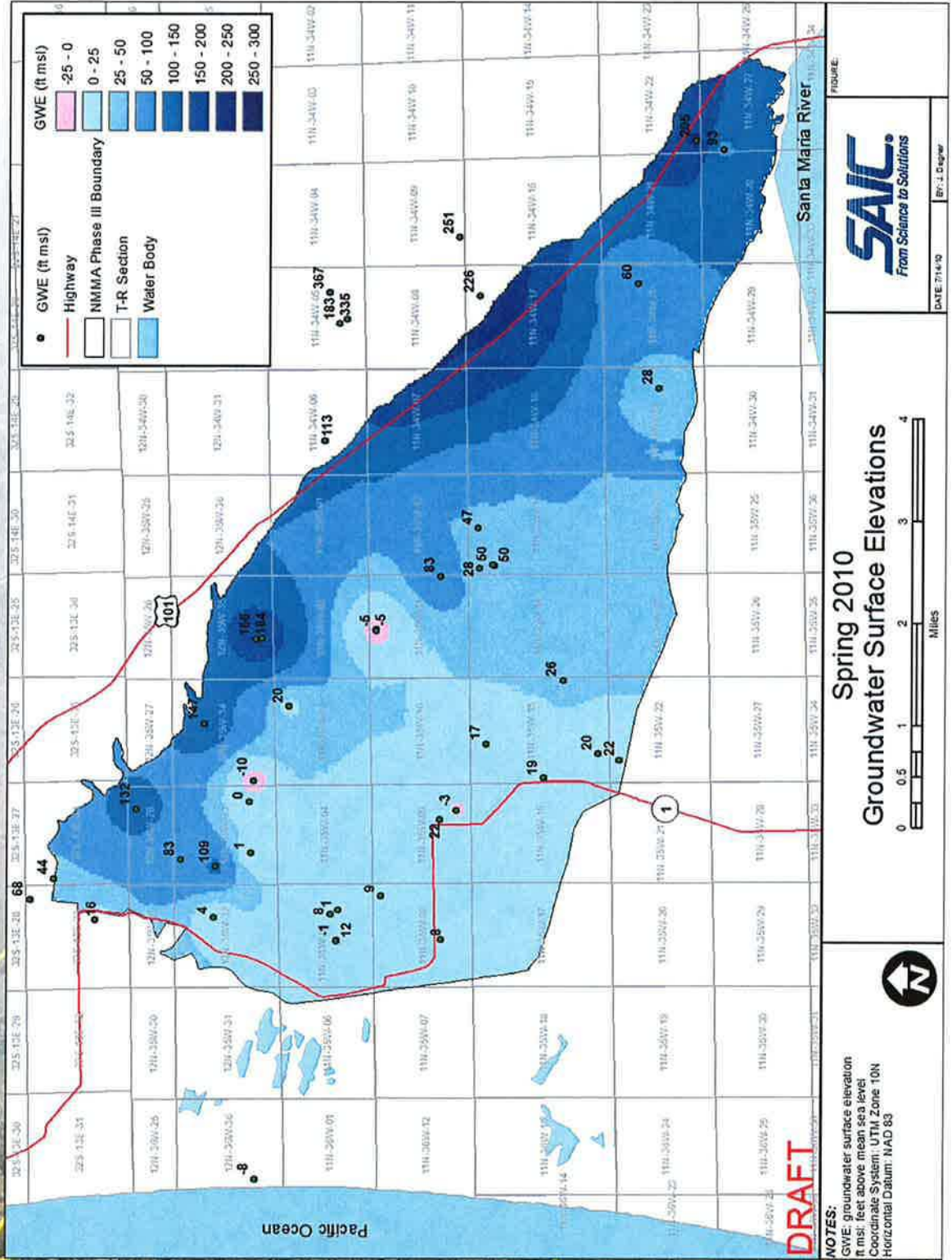


Groundwater Surface Elevation Map



Spring 2013 GW

Groundwater Surface Elevation Map

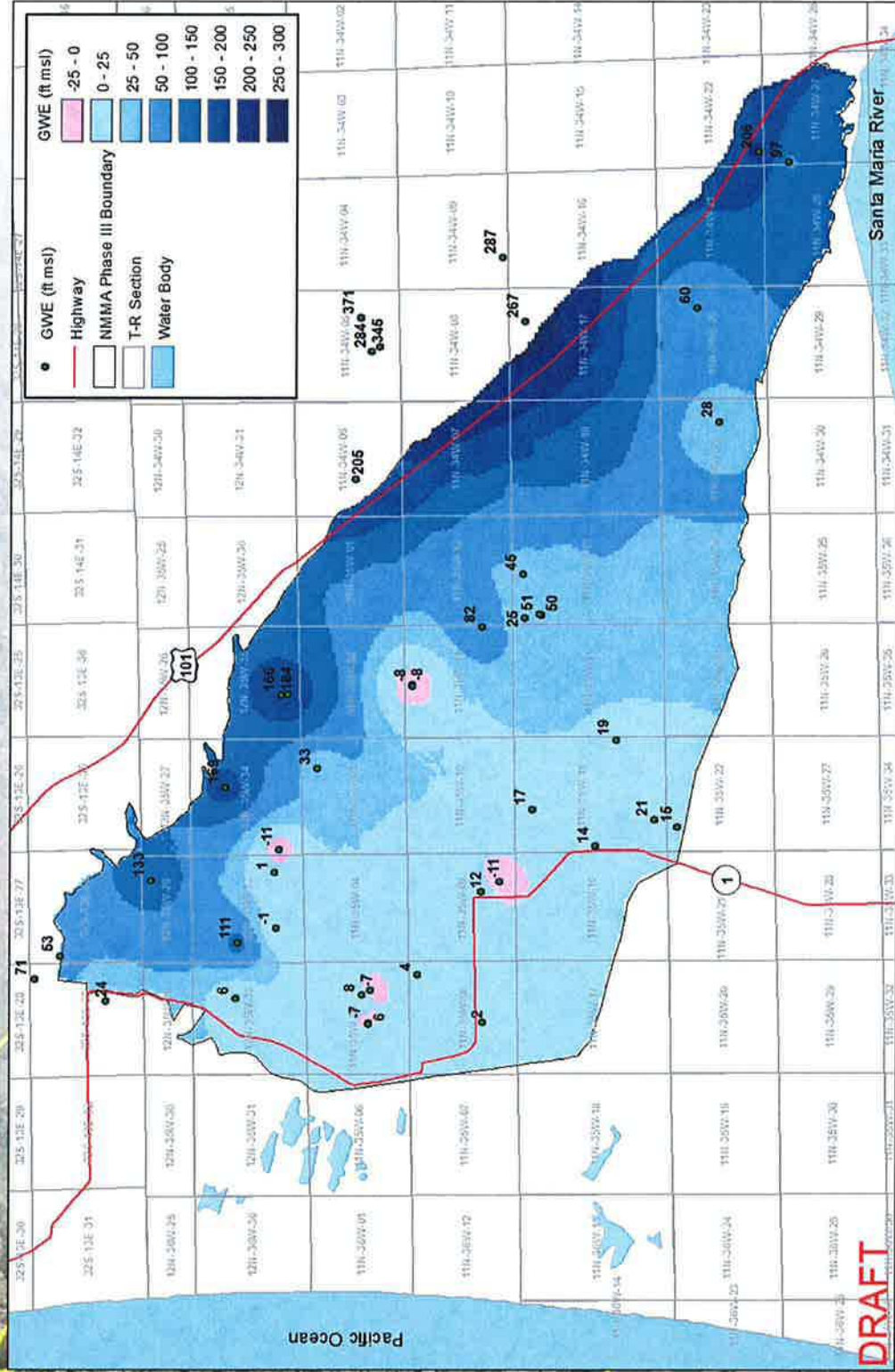


Spring 2010
Groundwater Surface Elevations



Spring 2013 GW

Groundwater Surface Elevation Map



NOTES:
 GWE: groundwater surface elevation
 ft msl: feet above mean sea level
 Coordinate System: UTM Zone 10N
 Horizontal Datum: NAD 83

DRAFT

**Spring 2011
 Groundwater Surface Elevations**

0 0.5 1 2 3 4
 Miles

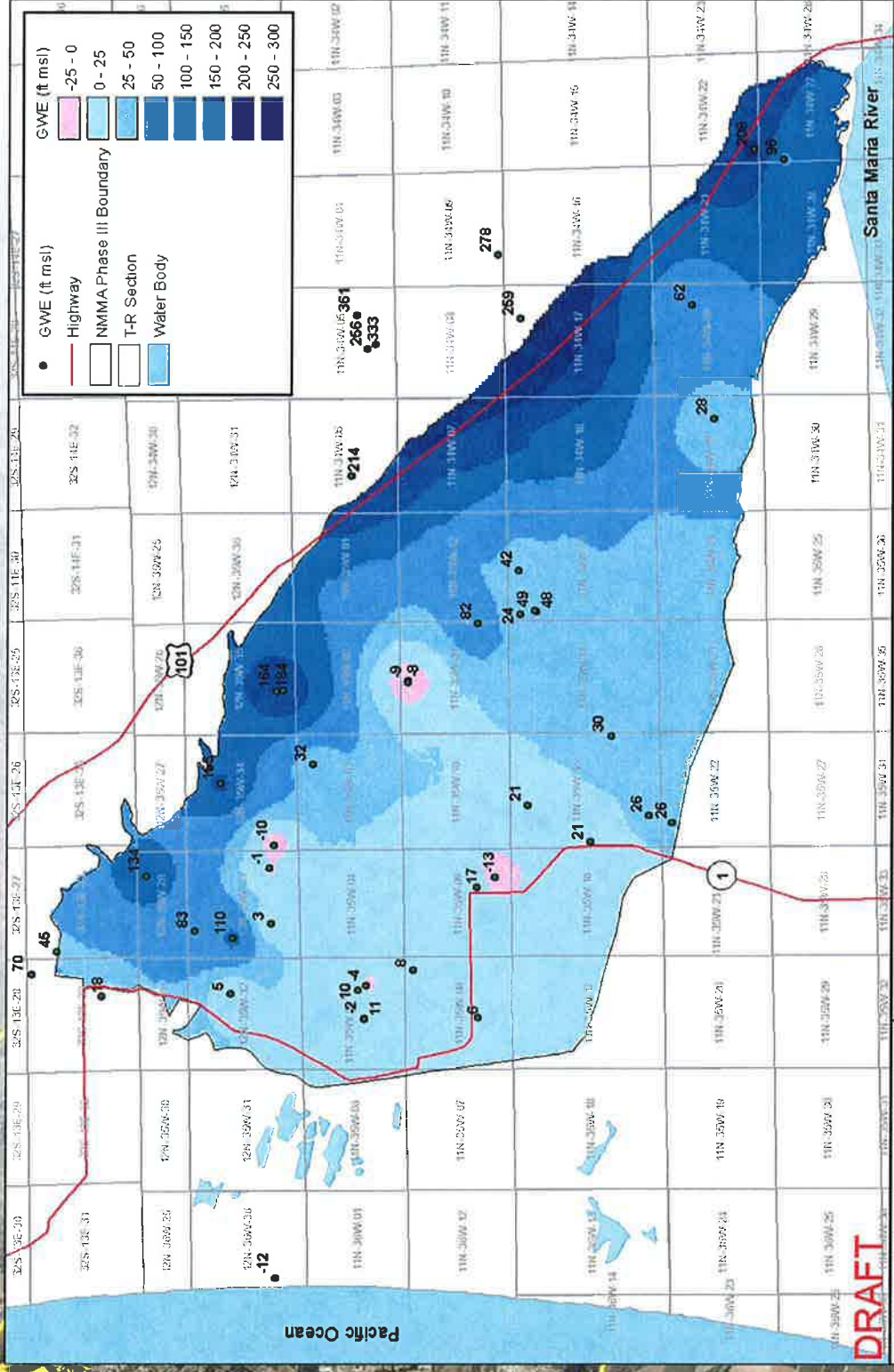
Wagner & Bonsignore
 Consulting Civil Engineers & Geologists

DATE: 6/11 BY: J. Hebert

FIGURE

Spring 2013 GWM

Groundwater Surface Elevation Map



NOTES:

- GWE: groundwater surface elevation (ft msl) feet above mean sea level
- Coordinate System: UTM zone 10N
- Horizontal Datum: NAD 83

Scale: 0 0.5 1 2 3 4 Miles

Figure Title: Spring 2012 Groundwater Surface Elevations

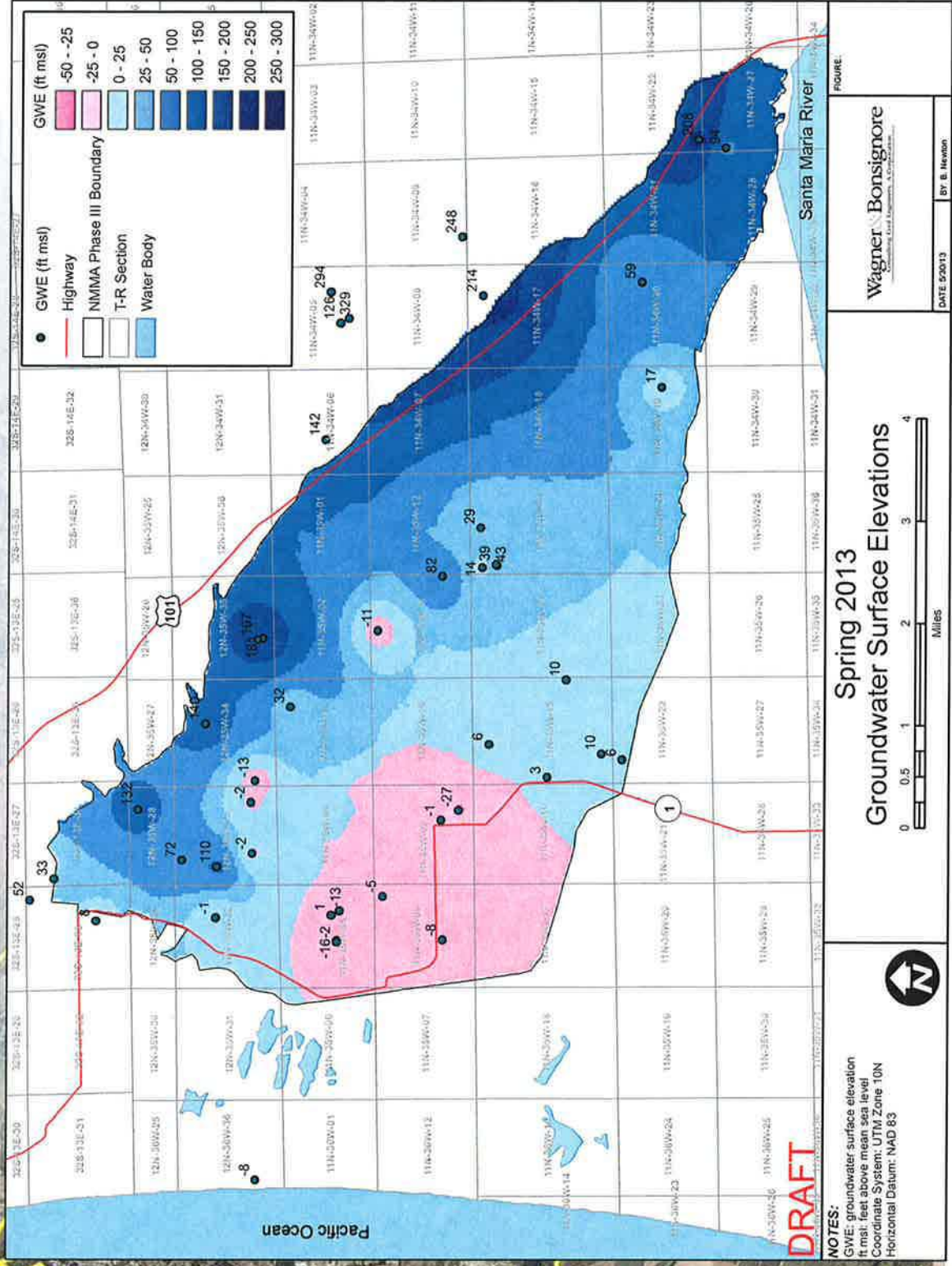
Logo: Wagner & Bonsignore

Date: DATE: 5/24/12

Author: [E] J. Hebert

Spring 2013 GWI

Groundwater Surface Elevation Map



An aerial photograph of a rural landscape, likely a valley or plain, showing a patchwork of agricultural fields in various shades of green, brown, and tan. A prominent yellow line traces an irregular boundary across the terrain. A solid blue vertical line is positioned on the left side of the image. The text is overlaid in the center of the image.

Rainfall 2013 across the Nipomo Mesa

Rainfall 2013

Annual Data

Spring and Fall
Groundwater Index
(GW)

Year	Rainfall (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
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1983	33.21	—	35	95,000	42	—
1984	11.22	—	14	76,000	37	—
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1986	16.85	98,000	51	67,000	51	31,000
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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	105,000	56	88,000	49	18,000
2000	17.07	105,000	44	84,000	41	24,000
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2011	34.05	87,000	43	81,000	43	6,000
2012	15.35*	89,000	45	85,000	44	24,000
2013	6.48*	67,000	45	—	—	—

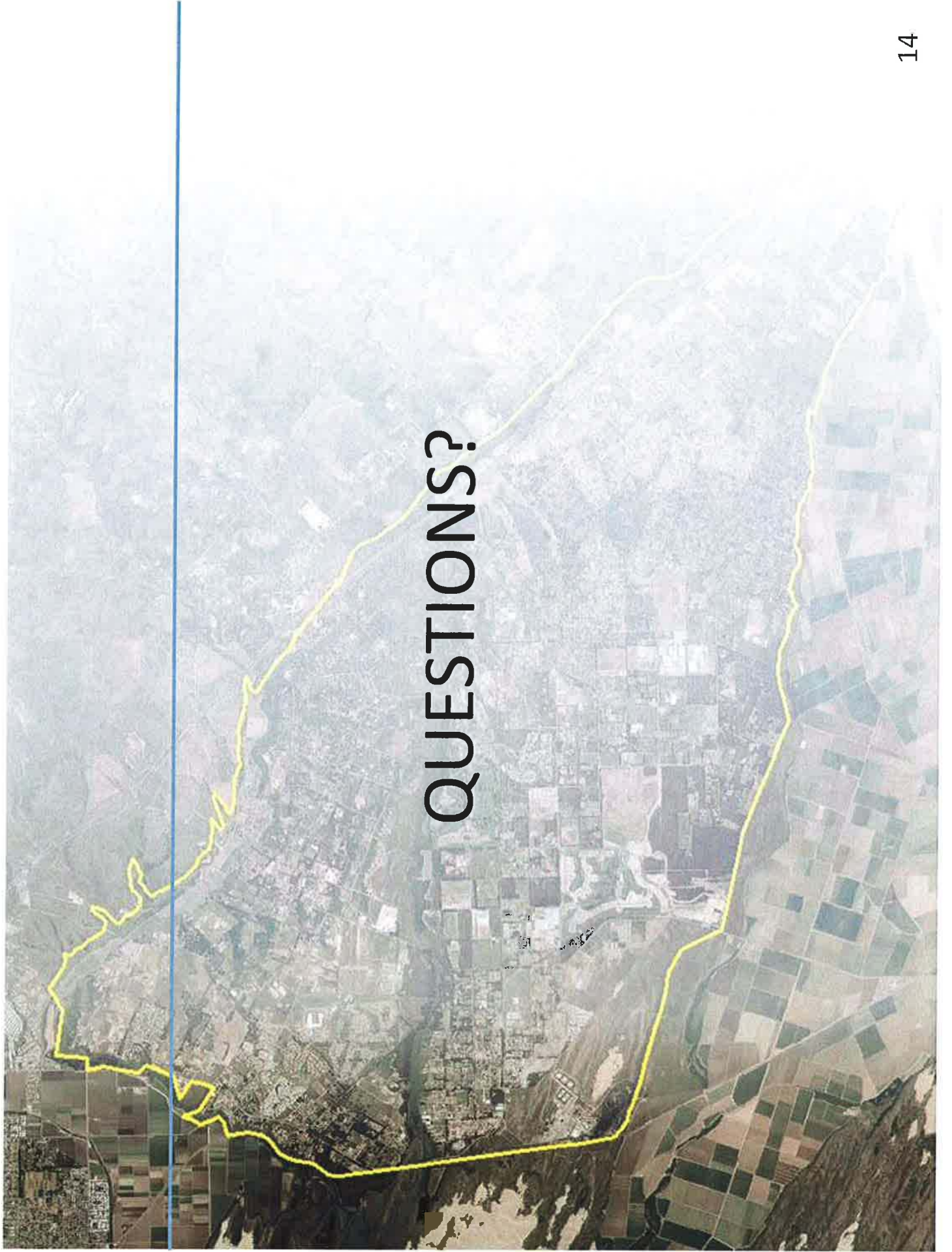
2012-2013

Nipomo East (728)
Currently – 5.90 in.

Nipomo South (730)
Currently – 6.97 in.

Oceano (795)
Currently – 6.57 in.

—: Insufficient for evaluation
*: Preliminary value



QUESTIONS?