FUGRO CONSULTANTS, INC.

NORTHERN CITIES MANAGEMENT AREA
2014 ANNUAL MONITORING REPORT

Prepared for:
The Northern Cities Management Area Technical Group

City of Arroyo Grande
City of Grover Beach
Oceano Community Services District
City of Pismo Beach

Prepared by:
Fugro Consultants, Inc.

April 29, 2015

FUGRO CONSULTANTS, INC.

660 Clarion Court, Suite A
San Luis Obispo, California 93401
Tel: (805) 542-0797
Fax: (805) 542-9311

April 29, 2015
Project No. 04.62140105

Northern Cities Management Area

Northern Cities Management Area
2014 Annual Monitoring Report

Fugro Consultants, in collaboration with Rob Almy, PG, and GEI Consultants, Inc., is pleased to submit the 2014 Annual Monitoring Report for the Northern Cities Management Area. The report is prepared pursuant to the requirements of the Stipulation and Judgment for the Santa Maria Groundwater Adjudication. The report is prepared on behalf of the Northern Cities Management Area, which is comprised of the City of Arroyo Grande, City of Grover Beach, Oceano Community Services District, and City of Pismo Beach.

Sincerely,

FUGRO CONSULTANTS, INC.

Paul A. Sorensen, PG, CHg
Principal Hydrogeologist
Project Manager

Timothy A. Nicely, PG, CHG
Senior Hydrogeologist

GEI CONSULTANTS, INC.

Robert Almy, PG

Samuel W. Schaefer, PE
Senior Engineer

CONTENTS

TABLES

Page

FIGURES
(following text)

FIGURES – (CONT.)
(following text)

APPENDICES

NORTHERN CITIES MANAGEMENT AREA
2014 ANNUAL MONITORING REPORT

1.0 EXECUTIVE SUMMARY

This 2014 Annual Monitoring Report for the Northern Cities Management Area (NCMA) is prepared pursuant to the requirements of the Stipulation and Judgment for the Santa Maria Groundwater Basin Adjudication. The Annual Report provides an assessment of hydrologic conditions for the NCMA based on data collected during the calendar year of record. As specified in the Judgment, the Northern Cities agencies, consisting of the City of Arroyo Grande, City of Grover Beach, City of Pismo Beach, and Oceano Community Services District, are to conduct groundwater monitoring in the NCMA, and collect and analyze data pertinent to water supply and demand, including:

- Land and water uses in the basin;
- Sources of supply to meet those uses;
- Groundwater conditions (including water levels and water quality);
- Amount and disposition of developed water supplies; and
- Amount and disposition of other sources of water supply in the NCMA.

Results of the data compilation and analysis for calendar year 2014 are documented and discussed in this Annual Report.

1.1 FINDINGS

- Total water use in the NCMA in 2014, including urban use by the Northern Cities agencies as well as applied irrigation and private pumping by rural water users, was 9,849.17 acre feet (AF). Of this amount, Lopez Lake deliveries equaled 5,456.69 AF, State Water Project deliveries totaled 303 AF, and groundwater pumping accounted for approximately 4,020.18 AF. The breakdown is shown on the following table.

Urban Area	Lopez Lake	State Water Project	Groundwater	Other Supplies	Total
Arroyo Grande	*2,631.48*	*0.0*	*51.34*	*69.3*	2,752.12
Grover Beach	*835.06*	*0.0*	*512.13*	*0.0*	1,347.19
Pismo Beach	*1,442.43*	*303.0*	*203.81*	*0.0*	1,949.24
Oceano CSD	*547.72*	*0.0*	*259.1*	*0.0*	806.82
Urban Water Use Total	**5,456.69**	**303.0**	**1,026.38**	**69.3**	**6,855.37**
Applied Irrigation	*0.0*	*0.0*	*2,955.4*	*0.0*	2,955.4
Rural Water Users	*0.0*	*0.0*	*38.4*	*0.0*	38.4
Total	**5,456.69**	**303.0**	**4,020.18**	**69.3**	**9,849.17**

- On April 17, 2015, the County of San Luis Obispo sent a letter to the State Water Subcontractors entitled "State Water / Lopez Water Management Opportunities." The letter identified a possible re-statement of 2014 deliveries, which would result in increasing the amount of State Water Project deliveries shown in the table above for the City of Pismo Beach and the Oceano Community Services District, and decreasing the amount of Lopez Deliveries by an equal amount. If re-stated, then those changes would modify many of the references of water deliveries and sources of the water deliveries throughout this report. However, no changes are made at this time because the re-statement has not been finalized, total water deliveries are not affected, and groundwater pumping is not affected.
- Total groundwater pumping in the NCMA (urban, agriculture, and rural domestic) was 4,020.18 AF in 2014, which is 42% of the 9,500 AFY safe yield. However, even with the reduced pumping, water elevations throughout the area declined by several feet, with some areas finishing the year with water elevations below sea level. Typically, when pumping is less than the safe yield, the remaining volume of groundwater results in increased groundwater in storage, which is then manifested by rising water levels. The current condition, with groundwater extractions at 42% of the safe yield and declining water elevations, illustrates the impacts of the ongoing severe drought that has significantly reduced recharge. This current condition is also in part a result of the impacts of reduced subsurface inflow recharge from the east (Nipomo Mesa) that has occurred because of overdraft pumping in the Nipomo Mesa Management Area (NMMA), the development of a pumping depression beneath the Mesa, and the elimination of the groundwater divide between the NCMA and NMMA. This condition of declining water levels in the NCMA, even though total pumping is currently 42% of the basin safe yield, will be exacerbated if the NCMA agencies are required to increase their dependency on groundwater withdrawals due to reductions or interruptions in local surface water supplies or State Water Project deliveries.
- The overdraft condition in the NMMA, the deepening pumping depression within the central part of the NMMA, and expansion of the groundwater depression to the west and north of the Mesa, towards the NCMA, has eliminated the historical groundwater divide between the NCMA and NMMA. With the loss of this divide there has been a reversal of groundwater gradients and the development of a landward gradient in the central portion of the NCMA. The result of this landward gradient is the loss of historic aquifer recharge by subsurface inflow from the NMMA into the NCMA (thereby reducing the yield of the aquifer), which creates conditions favorable for seawater intrusion. This condition was recognized in previous years, and again confirmed by the evaluation of water levels by the NMMA (*NMMA 6th Annual Report CY 2013*). To mitigate the risk of seawater intrusion and restore the subsurface inflow into the aquifer, immediate conservation measures must be made to reduce demand in the NMMA. Additionally, the water purveyors overlying the NMMA should limit or discontinue issuance of will serve letters that would increase water demand in the area. It is important to note that the County of San Luis Obispo has implemented a Resource Management System (RMS), which is a component of its General Plan, that specifically addresses water resource constraints while considering land use decisions. For more effective land use decisions, the

County's RMS policies and directives need to be better aligned with the stipulations. If not, groundwater in storage in the aquifer will continue to decline, the risk of sea water will continue to increase, and potentially permanent damage to the basin will occur.

- Regular monitoring of water elevations in clustered sentry wells located along the coast are an essential tool for tracking critical groundwater elevation changes at the coast. Averaging the groundwater elevations from the three deep sentry wells provides a single, representative index, called the deep well index, for tracking the status and apparent health of the basin. Previous studies have suggested a deep well index value of 7.5 feet NAVD88 as a minimum threshold, below which the basin is in threat of encroaching sea water intrusion. As described in previous Annual Reports, the measured deep well index remained below 7.5 feet between October 2007 and August 2009, during which high concentrations of chloride and sodium occurred in two sentry wells in late 2009. This relationship implies a lag in time between lowered water levels in the deep sentry wells and significant increases in sodium and chloride. This relationship is potentially significant as it applies to current conditions, because the measured index level in April 2013 was as much as 6 feet below the 7.5-foot index and remained at or below the index until mid-December 2013. After briefly rising above the index for a few months, the measured deep well index level once again dropped below the 7.5-foot level in April 2014 and remained below the index throughout the remainder of 2014. A continuation of conditions with water elevations and index values below the 7.5-foot index creates an environment for increased risk of sea water intrusion.
- Rainfall in the NCMA for calendar year 2014 was 9.77 inches, equal to 61 percent of the long-term average annual rainfall for the area. Below average rainfall occurred for seven of the twelve months of the year. Most rainfall typically falls from November through April, however the year was marked by substantially lower than average rainfall (39 percent of normal) in the "wet" months of January, February, March, April, May, September, and November. Evaporation rates throughout the area exceeded rainfall in every month of the year except December, suggesting that recharge to groundwater from direct precipitation was very limited in 2014.
- Spring 2014 groundwater elevations were generally highest in the eastern portion of the NCMA which results in a generalized westward groundwater gradient, particularly in the northern part of the area. Groundwater elevations along the coast were generally below 5 feet above sea level, which represents a lowering of water elevations from normal historic conditions. Of note is the development of a westward-facing trough or pumping depression that developed in the Spring throughout the central portion of the area. A comparison with Spring 2013 contours shows that Spring 2014 water elevations were about 5 feet lower throughout most of the NCMA; in the central area pumping trough, water elevations were about 10 to 15 feet lower than in Spring 2013.
- Fall groundwater elevations in October 2014 were also generally highest in the eastern portion of the NCMA, and approximately 0 to 3 feet above sea level along the shoreline. Groundwater elevations were generally above mean sea level (msl) in the northern, eastern, and southern portions of the NCMA during the Fall, however the entire central part of the area exhibited water elevations below sea level with some measurements in

agricultural wells in the east-central part of the area as deep as -13.0 feet msl. These lower water level elevations maintain, and deepen, the previously recognized water table depression south of the municipal well fields and in the vicinity of, and south of, lower Arroyo Grande Creek. The previously developed pumping depression in the vicinity of the Oceano CSD production wells was maintained, and deepened, into the Fall of 2014. Water elevations in this area are generally 5 to 10 feet lower than levels measured in Fall 2013.

- February through April is the time of year that historically has the highest deep well index value (at least since January 2010). The index value at the end of 2014 is the lowest end-of-year value since 2009. If the wells experience a 1-foot rise through February to April followed by a 5-foot decline in water level elevations until October 2015 (as is typical), then the index value may approach sea level in October 2015. Considering the effects of any increased pumpage related to anticipated cutbacks in surface water deliveries, the index level may approach, or be lower than, the level seen in 2008-2009 just prior to observing the elevated chloride concentrations in the Pier Avenue well.
- Minor variations and changes in water quality were observed in the sentry wells throughout the year; however there are no indications of sea water intrusion in the sentry wells or in the primary groundwater production zone.
- The various water quality indicators observed in 2014 suggest that the local interface/mixing zone between seawater and fresh groundwater remains seaward of the sentry wells (shoreline). The location of the seawater interface is not known. The only indication of the location of the interface would be when the water quality in one or more monitored wells shows an increase in total dissolved solids, chlorides, sodium, or other constituent along with a geochemical signature resembling seawater. These changes may be brought on by reduced recharge (e.g. continued drought conditions or reduction of subsurface inflow from the Mesa) or if pumping exceeds available groundwater supply, or both.
- Numerous management objectives are described in the Annual Report. Due to potential constraints on supply, all NCMA agencies, both individually and jointly, are engaged in water resource management projects, programs, and planning efforts that address water supply and demand issues, particularly efforts to assure a long-term sustainable supply. Constraints on supply include drought cycles, limitations on surface water allocations and risk of seawater intrusion of the aquifer system.
- A key water supply planning and management activity completed in mid-2014 by the NCMA is the development of a joint Strategic Plan for the purpose of providing the NCMA Technical Group with a framework for identifying common water resource planning goals and objectives, and to establish a 10-year work plan for implementation of those efforts. Several key objectives have been identified, including water supply reliability, increased outreach, and basin management. Implementation of some of these identified strategies was started in 2014 and will continue throughout 2015.

2.0 INTRODUCTION

2.1 INTRODUCTION

This 2014 Annual Monitoring Report summarizes hydrologic conditions in calendar year 2014 in the Northern Cities Management Area (NCMA) of the Santa Maria Groundwater Basin (SMGB) in San Luis Obispo County, California. This report was prepared on behalf of four public agencies collectively referred to as Northern Cities, which includes the City of Arroyo Grande (Arroyo Grande), City of Grover Beach (Grover Beach), City of Pismo Beach (Pismo Beach) and the Oceano Community Services District (Oceano CSD). These agencies, along with local land owners, the County of San Luis Obispo (County), and the San Luis Obispo County Flood Control & Water Conservation District (SLOCFCWCD) have managed local surface water and groundwater resources in the area since the late 1970s to preserve the long-term integrity of water supplies.

The collaborative approach was formalized in the 2002 Management Agreement between the Northern Cities, Northern Landowners, and Other Parties, and incorporated in the 2005 Settlement Stipulation for the Santa Maria Groundwater Basin Adjudication (Stipulation). On June 30, 2005 the Stipulation was agreed upon by numerous parties, including the Northern Cities. The "Settlement Agreement" attached to the Stipulation included the Management Agreement of 2002. The approach was then adopted by the Superior Court of California, County of Santa Clara, in its Judgment After Trial, entered January 25, 2008 (Judgment). Although appeals to that decision were filed, a subsequent decision by the Sixth Appellate District (filed November 21, 2012) has upheld the Court's Judgment. Most recently, the Supreme Court of California denied a petition to review the decision on February 13, 2013.

The Judgment orders the stipulating parties to comply with all terms of the Stipulation. The 2002 Settlement Agreement is generally affirmed as part of the Judgment and its terms incorporated into the Stipulation. However provisions of the Stipulation supersede the 2002 Settlement Agreement in the areas of continuing jurisdiction, groundwater monitoring and reporting. As specified in the Judgment and as outlined in the *Monitoring Program for the Northern Cities Management Area* (Monitoring Program; Todd 2008), the Northern Cities agencies are to conduct groundwater monitoring of wells in the NCMA. In accordance with requirements of the Judgment, the agencies comprising the NCMA group collect and analyze data pertinent to water supply and demand, including:

- Land and water uses in the basin;
- Sources of supply to meet those uses;
- Groundwater conditions (including water levels and water quality);
- Amount and disposition of developed water supplies; and,
- Amount and disposition of other sources of water supply in the NCMA.

The Monitoring Program requires that the NCMA gather and compile pertinent information on a calendar year basis; this is accomplished through data collected by Northern Cities agencies (including necessary field work), requests to other public agencies, and from online sources. Periodic reports such as Urban Water Management Plans (UWMP) prepared by the Cities of

Arroyo Grande, Grover Beach and Pismo Beach provide information on demand, supply, and water supply facilities. Annual data are added to the comprehensive Northern Cities Management Area Database (NCMA DB) and analyzed. Results of the data compilation and analysis for calendar year 2014 are documented and discussed in this Annual Report.

As shown on Figure 1, the Northern Cities Management Area (NCMA) represents the northernmost portion of the Santa Maria Groundwater Basin, as defined in the adjudication and by California Department of Water Resources (DWR 1958) as the Santa Maria River Valley groundwater basin (Basin 3-12). Adjoining the NCMA to the southeast is the Nipomo Mesa Management Area (NMMA); the Santa Maria Valley Management Area (SMVMA) encompasses the remainder of the groundwater basin. Figure 2 shows the locations of the four Northern Cities agencies within the NCMA.

2.2 BACKGROUND

2.2.1 Description of the Northern Cities Management Area Technical Group

Pursuant to a requirement contained in the Stipulation, the NCMA Technical Group (TG) was formed. The TG is composed of representatives of Arroyo Grande, Grover Beach, Pismo Beach, and Oceano CSD (Table 1).

Table 1. NCMA TG Representatives

Agency	Representative
City of Arroyo Grande	Teresa McClish Director of Community Development
	Shane Taylor Utilities Services Supervisor
City of Grover Beach	Gregory A. Ray, PE Director of Public Works/City Engineer
	R.J. (Jim) Garing, PE Consulting City Engineer for Water and Sewer
City of Pismo Beach	Benjamin A. Fine, PE Director of Public Works/City Engineer
Oceano Community Services District	Paavo Ogren General Manager
	Tony Marracino Utility Systems Supervisor

The cities of Arroyo Grande, Pismo Beach, and Grover Beach contract with Water Systems Consulting, Inc. (WSC) to serve as staff extension to assist the TG in the roles and

responsibilities of the TG for purposes of managing the water supply resources. The full TG contracts with a consulting firm (currently Fugro Consultants, Inc.) to conduct the quarterly groundwater monitoring and sampling tasks, evaluate water demand and available supply, identify threats to water supply, and assist the group in preparation of the Annual Report.

2.2.2 Coordination with Management Areas

Since 1983, management of the NCMA has been based on cooperative efforts of the four Northern Cities agencies with ongoing collaboration with San Luis Obispo County, the SLOCFCWCD, and other local and state agencies. Specifically the NCMA agencies have limited their pumping and, in cooperation with SLOCFCWCD, invested in surface water supplies so as to not exceed the safe yield of the NCMA portion of the SMGB. In addition to the efforts discussed in this report, cooperative management occurs through many means including communication of the Northern Cities in their respective public meetings and participation in the Water Resources Advisory Council (the County-wide advisory panel on water issues). The NCMA agencies participated in preparation and adoption of the 2007 San Luis Obispo County Integrated Regional Water Management Plan (IRWMP) as well as the updated 2014 San Luis Obispo County IRWM Plan. The IRWMP promotes integrated regional water management to ensure sustainable water uses, reliable water supplies, better water quality, environmental stewardship, efficient urban development, protection of agriculture, and a strong economy.

Since the 2008 Judgment, the NCMA has taken the lead in cooperative management of its management area. The NCMA Technical Group met monthly (at a minimum) throughout 2014 and has been an active participant in the Santa Maria Groundwater Basin Management Area (SMGBMA) technical subcommittee, which formed in 2010. The purpose of the SMGBMA technical subcommittee is to coordinate efforts among the management areas such as enhanced monitoring of groundwater levels and improved sharing of data. The SMGBMA technical subcommittee met once in 2014.

A key water supply planning and management activity started in late 2013 and finalized in 2014 by the NCMA is the development of an NCMA Strategic Plan for the purpose of providing the NCMA TG with a mission statement to guide future initiatives, a framework for identifying and communicating water resource planning goals and objectives, and to formalize a 10-year Work Plan for implementation of those efforts. Several key objectives were identified related to enhancing water supply reliability, improving water resource management, and increasing effective public outreach. Implementation of some of these efforts started in 2014 and will continue throughout 2015.

3.0 BASIN DESCRIPTION

3.1 SETTING

The Santa Maria Groundwater Basin, as defined in the adjudication, generally has three hydrologic elements. As shown in Figure 1 (following text), the NCMA represents the northernmost portion of the Santa Maria Groundwater Basin. Adjoining the NCMA to the southeast is the NMMA, while the SMVMA encompasses the remainder of the groundwater basin.

Groundwater pumped from the NCMA is derived from the Paso Robles Formation, consisting of heterogeneous alluvial materials that extend westward at depth beneath the ocean. The northern and eastern portions of the basin are bounded by bedrock as well as faults that potentially reduce subsurface inflow recharge to the basin aquifer. The southern boundary of the NCMA is coincident with the NMMA portion of the Santa Maria Groundwater Basin; the southern and eastern boundary of the NCMA has historically been underlain by a groundwater high (groundwater divide) which has generally been described as an important source of recharge to the portion of the basin underlying NCMA (DWR 2002).

The groundwater resource developed in the NCMA has several sources of recharge: precipitation, agricultural return flow, seepage from stream flow, and subsurface inflow from adjacent areas. In addition, some return flows occur from imported surface supply sources including Lopez Reservoir and the State Water Project. Historically, groundwater elevations in wells throughout the NCMA have resulted in gradients that show that discharge occurs westward from the groundwater basin to the ocean. As discussed in Section 4.1, this discharge and positive westward gradient is an important groundwater control that is necessary to limit the risk of seawater from entering the production zones of the basin aquifer.

3.2 CLIMATE

Each year climatological and hydrologic (stream flow) data for the NCMA are added to the NCMA DB. Annual precipitation from 1950 to 2014 is presented on Figure 3. Monthly rainfall and evapotranspiration (ET) for 2014 as well as average monthly historical rainfall and ET are presented on Figure 4.

3.2.1 Precipitation

In the previous NCMA annual reports, historical rainfall data have been compiled on a monthly basis for the following four stations:

- National Oceanic and Atmospheric Administration (NOAA) Pismo Beach Fire Station (USC00046943) for 1949 to Present;
- Desert Research Institute (DRI): Western Regional Climate Center Pismo Station (Coop ID: 46943) for 1950 to Present;
- DWR California Irrigation Management Information System (CIMIS) Nipomo Station (No. 202) for 2006 to Present, and
- San Luis Obispo County-operated rain gage in Oceano for 2005 to 2009;

Further review of the sites discovered that the NOAA Pismo Beach Fire Station (USC00046943) and the Desert Research Institute (COOP 46943) sites are a single (duplicative) cooperative site monitored and reported by both entities. Thus, this and subsequent reports will use data from DRI to represent this station.

Precipitation values are only averaged for station readings for months when data are available. Average values are not weighted based on station location versus the study area. Figure 3 is a composite graph combining data from those three stations and illustrating annual rainfall totals from 1950 through 2014 (on a calendar year basis). Average annual rainfall for the NCMA is 16 inches.

During 2014 below average rainfall occurred for seven of the twelve months (58 percent of year). Slightly above average rainfall occurred in the summer months from June through August. Total rainfall for the year was 9.77 inches, equal to 61 percent of the average annual rainfall for the area. Figure 3 illustrates annual rainfall and exhibits several multi-year drought cycles (e.g., 6 years, 1984-1990) followed by cycles of above average rainfall (e.g., 7 years, 1991-1998). With the exception of 2010, the 7-year period from 2007 through 2014 has experienced below average annual rainfall suggesting a “dry” hydrologic period. The average rainfall from 2007 through 2014 (including 2010) is 11.15 inches, equal to 70 percent of the historical average.

Most regional rainfall typically occurs from November through April. The year 2014 was marked by lower (39 percent lower) than average rainfall in January, February, March, April, May, September and November. The remaining months experienced slightly higher than normal average rainfall, with the standout being December at 3.69 inches (the average is 2.51 inches).

It is worth noting that the only month in 2014 that rainfall exceeded evapotranspiration (described in Section 3.2.2) was in December. As such, there was likely little deep percolation from rainfall that contributed to groundwater recharge in 2014.

3.2.2 Evapotranspiration

The California Irrigation Management Information System (CIMIS) maintains weather stations in locations throughout the state in order to provide real time wind speed, humidity and evapotranspiration data. Two CIMIS stations are located near the NCMA; Nipomo and San Luis Obispo. The Nipomo and San Luis Obispo stations have gathered data since 2006 and 1986, respectively. Monthly evapotranspiration (ET) data for the Nipomo station is shown in Figure 4 for 2014 and average (8-years) conditions. Evapotranspiration rate affects recharge potential of rainfall and the amount of outdoor water use (irrigation). In all months in 2014 except December, ET in the NCMA exceeded rainfall, indicating that recharge to groundwater from direct precipitation in 2014 was very limited.

4.0 WATER SUPPLY AND DEMAND

4.1 WATER SUPPLY

Section 4.1 provides an overview of NCMA water supply sources, presents groundwater conditions that occurred in 2014, and discusses threats to water supply.

4.1.1 Sources of Supply

The NCMA water supply consists of three major sources: Lopez Lake, the State Water Project, and groundwater. Each source of supply has a defined delivery volume which varies from year to year.

4.1.1.1 Lopez Lake

Lopez Lake and Water Treatment Plant is operated by SLOCFCWCD Zone 3, provides water to all four agencies in the NCMA, and releases water to Arroyo Grande Creek for habitat conservation and agricultural purposes. The operational safe yield of Lopez Lake is 8,730 acre feet per year (AFY), which reflects the amount of sustainable water supply during a drought of defined severity. Of this yield, 4,530 AFY has been apportioned by agreements to contractors including each of the Northern Cities agencies plus County Service Area (CSA) 12 (in the Avila Beach area). Zone 3 allocations are summarized in Table 2. Of the 8,730 AFY safe yield, the 4,200 AFY that is not apportioned to NCMA and CSA 12 is used for downstream releases to maintain flows in Arroyo Grande Creek and provide groundwater recharge.

Table 2. Lopez Lake (SLOCFCWCD Zone 3 Contractors) Water Allocation (AFY)

Contractor	Water Allocation, (AFY)
City of Arroyo Grande	2,290
City of Grover Beach	800
City of Pismo Beach	892
Oceano CSD	303
CSA 12 (not in NCMA)	245
Total	**4,530**
Downstream Releases	*4,200*
Safe Yield of Lopez Lake	*8,730*

In the past, when management of releases resulted in a portion of the 4,200 AFY remaining in the reservoir, the water was offered to the contractors as surplus water. Surplus water was made available late in 2014, resulting in the delivery of 476.01 AF of surplus Lopez Lake water to the NCMA agencies. Total discharge from Lopez Lake in 2014 was 8,786.54 acre feet (AF), of which 5,456.69 AF was delivered to NCMA contractors, 130.77 AF delivered to

CSA 12, and 3,199.08 AF was released downstream to maintain flow in Arroyo Grande Creek (Table 3).

Table 3. 2014 Lopez Lake Deliveries (AF)

Agency	2014 Allocation Usage (AF)	2014 Surplus Usage (AF)	2014 Total Lopez Lake Water Delivery, (AF)
City of Arroyo Grande	2,631.48	0.00	2,631.48
City of Grover Beach	835.06	0.00	835.06
City of Pismo Beach	1,085.56	356.87	1,442.43
Oceano CSD	428.58	119.14	547.72
Total NCMA 2014 Usage	**4,980.68**	**476.01**	**5,456.69**
CSA 12 (not in NCMA)	100.09	30.68	130.77
Downstream Releases	3,199.08	--	3,199.08
Total 2014 Lopez Lake Deliveries	**8,279.85**	**506.69**	**8,786.54**

Source: SLOFCWD Zone 3 Monthly Operations Report

In December 2014, the SLOFCWCD Zone 3 adopted a Low Reservoir Response Plan (LRRP) to implement when the amount of water in storage in Lopez Reservoir drops below 20,000 AF. The purpose of the LRRP is to limit downstream releases and municipal diversions from Lopez Reservoir to preserve water within the reservoir, above the minimum pool, for a minimum of 3 to 4 years under drought conditions.

The LRRP is automatically enacted if the total volume of water in the reservoir falls below 20,000 AF and the County Board of Supervisors has declared an emergency related to Zone 3. The actions, once the LRRP is enacted, include:

- Reductions in entitlement water deliveries
- Reductions in downstream releases
- No new allocations of Surplus Water from unreleased downstream releases
- Extension of time that agencies can take delivery of existing unused water, throughout the duration that the Drought Emergency is in effect, subject to evaporation losses if the water is not used in the year originally allocated.

To provide the Zone 3 agencies and agricultural stakeholders with a framework for water supply planning, reduction strategies tied to the amount of water in the reservoir were developed for the LRRP. As the amount of water in the reservoir drops below the triggers (20,000; 15,000, 10,000; 5,000; and 4,000 AF), the hydrologic conditions will be reviewed and adaptive management utilized to meet the LRRP objectives. The municipal diversions are to be reduced according to the strategies described in Table 4.

Table 4. Lopez Lake Municipal Diversion Reduction Strategy Low Reservoir Response Plan

Amount of Water in Storage (AF)	Municipal Diversion Reduction	Municipal Diversion (AFY)
20,000	0%	4,530
15,000	10%	4,077
10,000	20%	3,624
5,000	35%	2,941
4,000	100%	0

The downstream releases are to be reduced according to the strategies described in Table 5. The release strategies represent the maximum amount of water that can be released. The SLOCFCWCD will control the timing of the reduced releases to meet the needs of the agricultural stakeholders and to address environmental requirements.

Table 5. Lopez Lake Downstream Release Reduction Strategy Low Reservoir Response Plan

Amount of Water in Storage (AF)	Downstream Release Reduction	Downstream Releases (AFY)
20,000	9.5%	3,800
15,000	9.5%	3,800
10,000	75.6%	1,026
5,000	92.9%	300
4,000	100%	0

As of December 31, 2014, the total volume of water in storage in Lopez Lake was 20,314 AF. However, because the reservoir storage volume includes approximately 1,000 AF of SWP carryover water, the initial triggers of the LRRP are in effect going into 2015. As a result, downstream releases and municipal deliveries, at least in early 2015, are subject to the target levels outlined in the LRRP, including:

- Annual downstream releases total no more than 3,800 AF
- No unreleased downstream water will be available as surplus in 2015 (a reduction of 400 AF)
- Municipal entitlements are capped at contract amounts (total 4,530 AF)
- Agencies may carry over any unused entitlement and/or surplus water from previous years.

The status of the reservoir and management actions related to the LRRP will be monitored throughout 2015.

4.1.1.2 **State Water Project**

Pismo Beach and Oceano CSD have contracts with SLOCFCWCD to receive water from the State Water Project (SWP). The SLOCFCWCD serves as the SWP contractor, providing the imported water to local retailers through the Coastal Branch pipeline. Pismo Beach and Oceano CSD have contractual water delivery allocations (commonly referred to as "Table A" water) of 1,100 AFY and 750 AFY, respectively (see Table 6, page 11). (Pismo Beach contracts for 1,240 AF of SWP, but 100 AF is owned by Pismo Ranch and 40 AF is owned by Brad Wilde). In addition to its Table A allocation, Pismo Beach holds 1,240 AFY of additional allocation with SLOCFCWCD. The additional allocation held by Pismo Beach (usually referred to as a "drought buffer") is available to bolster Pismo Beach's SWP water supply when the SWP Annual Allocation (i.e., percent of SWP water available) is less than 100%. However, due to contractual constraints, Pismo Beach's total SWP deliveries cannot exceed 1,240 AF in any given year.

On March 2, 2015, the allocation to SWP contractors for 2015 was set at 20 percent of Table A contractual allocation amounts. Although this allocation percentage is seriously undersupplied, it is an improvement on the 2014 allocation level which was set on January 31, 2014 at zero (0) percent and subsequently increased to 5 percent. However, SWP contractors have the opportunity to store or bank a portion of their allocated water in any current year for delivery during the next year. Normally, carryover water is water that has been exported during the year from the Delta, but has not been delivered. Storage for carryover water no longer becomes available if it interferes with storage of SWP water for project needs.

In 2014, Oceano CSD took no delivery of SWP water. By taking advantage of carryover water, Pismo Beach took delivery of 303 AF (including 5% of the Table A allocation plus carryover water). The amounts of SWP deliveries in 2014 may change because on April 17, 2015, the County of San Luis Obispo sent a letter to the State Water Subcontractors entitled "State Water / Lopez Water Management Opportunities." The letter identified a possible re-statement of 2014 deliveries, which would result in increasing the amount of State Water Project deliveries for the City of Pismo Beach and the Oceano Community Services District, and decreasing the amount of Lopez Deliveries by an equal amount. If re-stated, then those changes would be reflected in numerous references of water deliveries and sources of the water deliveries throughout this report. However, no changes are made at this time because the re-statement has not been finalized, total water deliveries are not affected, and groundwater pumping is not affected. Furthermore, the Oceano CSD is of the position that its 5% allocation should be reflected since this request was made for delivery in December 2014.

4.1.1.3 **Groundwater**

Each of the NCMA agencies have the capability to extract groundwater from municipal water supply wells located in the central and northern portion of the NCMA. Groundwater also satisfies applied irrigation and rural domestic demands throughout the NCMA. Groundwater use in the NCMA is governed by the Judgment and the 2002 Settlement Agreement which establishes that groundwater will continue to be allotted and independently managed by the "Northern Parties" (Northern Cities, NCMA overlying owners, and the SLOCFCWCD).

A calculated safe yield value of 9,500 AFY for the NCMA groundwater basin was cited in the 2002 Groundwater Management Agreement among the Northern Cities with allotments for applied irrigation (5,300 AFY), subsurface outflow to the ocean (200 AFY), and urban use (4,000 AFY). The Management Agreement's safe yield allotment for urban use was subdivided as follows and as shown in Table 6:

- City of Arroyo Grande: 1,202 AFY
- City of Grover Beach: 1,198 AFY
- City of Pismo Beach: 700 AFY
- Oceano Community Services District: 900 AFY

According to Todd (2007), the Groundwater Management Agreement's allotment for applied irrigation is higher than the actual applied irrigation demand, and the amount designated for subsurface outflow is unreasonably low. Since significant expansion of agricultural irrigation is not significant and a long-term increase of irrigation demand is unlikely, the current balance of water use between agriculture and municipal uses has been sustainable for the last 40 years.

Todd (2007) suggests that maintaining sufficient subsurface outflow to the coast and preservation of a westward groundwater gradient is essential to preventing seawater intrusion. While the minimum subsurface outflow needed to prevent seawater intrusion is unknown, a regional outflow on the order of 3,000 AFY was estimated as a reasonable approximation (Todd, 2007).

The 2002 Management Agreement provides that groundwater allotments of each of the urban agencies can be increased when land within the corporate boundaries is converted from agricultural use to urban use, referred to as an agricultural conversion credit. Agricultural conversion credits equal to 121 AFY and 209 AFY were developed in 2011 in the cities of Arroyo Grande and Grover Beach, respectively. These agricultural credits remain unchanged in 2014 (Table 6).

4.1.1.4 **Developed Water**

As defined in the Stipulation, "developed water" is "Groundwater derived from human intervention" and includes "Lopez Lake Water, Return Flow, and recharge resulting from storm water percolation ponds." Return flow results from deep percolation of water used in irrigation that is in excess of plant needs and from outdoor uses of Lopez Lake and SWP deliveries. These return flows have not been recently estimated, but would be considered part of the groundwater basin yield.

In 2008, the cities of Arroyo Grande, Grover Beach, and Pismo Beach prepared storm water management plans. In order to control storm water runoff and increase groundwater recharge, each City now requires new development to construct onsite retention or detention ponds. As these new ponds or basins are constructed, the resultant increase in groundwater recharge could result in recognition of substantial augmentation of basin yield and provision of recharge credits to one or more of the Northern Cities agencies. Thus a re-evaluation of estimated storm water recharge is warranted as new recharge facilities are installed and as additional information on flow rates, pond size, infiltration rates, and tributary watershed area becomes available. Pursuant to the Settlement Agreement, recharge credits would be based on

a mutually-accepted methodology to evaluate the amount of recharge which would involve quantification of such factors as Lopez Lake and State Water recharge, storm water runoff amounts, determination of effective recharge under various conditions, and methods to document actual recharge to developed aquifers.

4.1.1.5 **Water Use by Supply Source**

Table 6 summarizes the baseline (full allocation) water supply available to the Northern Cities agencies, assuming 100% delivery of the SWP allocation. These water supplies include Lopez Lake allocation, groundwater allotments, agricultural credits, and 100 % delivery of SWP allocations. This baseline water supply does not include Lopez Lake surplus or SWP carryover because these supplies are not always available. The category of "Other Supplies" includes groundwater pumped from outside the NCMA boundaries. This baseline supply for the NCMA agencies totals 10,625 AFY.

Table 6. Baseline (Full Allotment) Available Urban Water Supplies (AFY)

Urban Area	Lopez Lake	SWP Allocation (at 100%)	Groundwater Allotment	Ag Credit	Other Supplies	Total
Arroyo Grande	2,290	0	1,202	121	160	**3,773**
Grover Beach	800	0	1,198	209	0	**2,207**
Pismo Beach	892	1,100	700	0	0	**2,692**
Oceano CSD	303	750	900	0	0	**1,953**
Total	**4,285**	**1,850**	**4,000**	**330**	**160**	**10,625**

Table 7 shows the available water supply to the NCMA agencies in 2014, including normal (baseline) Lopez Lake allocations, Lopez Lake surplus water, the 2014 SWP 5% delivery schedule, and the available SWP carryover water. In addition to these direct available supplies, the Lopez water year 2013-14 was the final year of a 5-year agreement between Arroyo Grande and Oceano CSD for the temporary purchase of groundwater or Lopez Lake supplies. The final transfer of 100 AF from Oceano CSD to Arroyo Grande was completed in January 2014.

A graphical depiction of water use sorted by supply source for each NCMA agency since 1999 is presented as Figure 5. The graphs depict changes in water supply availability and use over time, including the increased use of SWP water during the early years of the period when SWP deliveries, which reached a maximum in 2001, were greater. Figure 5 also shows the reduced and less variable Lopez Lake water use due to the unavailability of Lopez Lake surplus flows from 2002 to 2008. Figure 6 shows total NCMA water use in 2014 for each supply source, including Lopez Lake, SWP, and groundwater.

Table 7. Available Urban Water Supplies, 2014 (AF)

Urban Area	Lopez Lake Allocation	Lopez Lake Surplus	2014 SWP Allocation (at 5% Delivery)	2014 Drought Buffer	2014 SWP Carryover	Ground-water Allotment	Ag Credit	Transfer	Other Supplies	Total (2014)
Arroyo Grande	2,290	1,176	0	0	0	1,202	121	100	160	**5,049**
Grover Beach	800	411	0	0	0	1,198	209	0	0	**2,618**
Pismo Beach	892	458.2	55	62	1,178	700	0	0	0	**3,345.2**
Oceano CSD	303	156	37.5	0	0	900	0	(100)	0	**1,296.5**
Total	**4,285**	**2,201.2**	**92.5**	**62**	**1,178**	**4,000**	**330**	--	**160**	**12,308.7**

In 2001 through 2003, SWP supplies (1,850 AFY) were used to the maximum extent. From 2004 to 2008, SWP use decreased to just over 1,100 AFY, mostly reflecting a partial shift by Pismo Beach from SWP to groundwater supply. This changed in 2009 and 2010 when Pismo Beach increased SWP use and significantly decreased groundwater use to ease the burden on the groundwater basin during the drought. In 2014 Pismo Beach took delivery of 303 AF of SWP water (equal to 24.4% of the Table A allocation, based on 5% SWP delivery schedule and available carryover water). Oceano CSD took delivery of 0.00 AF of SWP water.

Total groundwater use in the NCMA, including applied irrigation and rural uses, is shown in Table 8 and Figure 6. Total estimated groundwater pumpage in the NCMA in 2014 was 4,020.18 AF, which represents the lowest volume of groundwater production from the NCMA portion of the basin in the past 15 years.

Table 8. NCMA Groundwater Pumpage from Santa Maria Groundwater Basin, 2014 (AF)

Agency	Groundwater Allotment + Ag Conversion Credit (AF)	2014 Groundwater Use (AF)	Percent Pumped of Groundwater Allotment
City of Arroyo Grande	1,202 + 121 = 1,323	51.34	3.9%
City of Grover Beach	1,198 + 209 = 1,407	512.13	36.4%
City of Pismo Beach	700	203.81	29.1%
Oceano CSD	900	259.10	28.8%
Total Urban Groundwater Allotment / Use	**4,000 + 330 = 4,330**	**1,026.38**	**23.7%**
Applied Irrigation	**--**	**2,955.4**	**--**
Rural Water Users	**--**	**38.4**	**--**
Total NCMA Groundwater Allotment / Use	**9,500**	**4,020.18**	**42.3%**

With an estimated safe yield of 9,500 AFY, the difference between the safe yield and groundwater pumping would normally represent increased groundwater in storage as well as outflow to the ocean, an unknown but major portion of which is needed to repel seawater intrusion. However, with declining water levels throughout most of the NCMA portion of the basin (see Section 4.1.2), and reduced municipal groundwater production, the conditions likely illustrate a significantly reduced volume of natural recharge and reduced subsurface inflow to the basin from the east.

As shown in Figure 6, groundwater pumpage reached a peak in 2007, and then declined in 2008, 2009, and 2010. From 2010 through 2013, pumpage increased slightly every year, but even so, overall groundwater use remained significantly lower than historic annual pumpage rates. In 2014, urban groundwater use declined to 1,026.38 AF, which is 23.7%.of the 4,330 AFY of combined urban groundwater allotment and agricultural conversion credit.

4.1.2 Groundwater Conditions

The NCMA groundwater monitoring program includes: 1) compilation of groundwater elevation data from San Luis Obispo County, 2) water quality and groundwater elevation monitoring data from the network of sentry wells in the NCMA, 3) water quality data from the California Department of Public Health (CDPH), and 4) groundwater elevation data from municipal pumping wells. Analysis of this data is summarized below in accordance with the July 2008 Northern Cities Monitoring Program.

4.1.2.1 Groundwater Monitoring Network

Approximately 145 wells within the NCMA were monitored by the County at some time during the past few decades. The County currently monitors 38 wells on a semi-annual basis (April and October), including five “sentry well” clusters (piezometers) located along the coast and a relatively recently constructed monitoring well (County Well #3) on the eastern NCMA boundary between the NCMA and NMMA (Figure 7). The County monitors more than 60 additional wells in southern San Luis Obispo County. Following the findings of the 2008 Annual Report, the Northern Cities initiated a quarterly sentry well monitoring program to supplement the County’s semi-annual schedule. The quarterly monitoring well measurements include County Well #3.

To monitor overall changes in groundwater conditions, representative wells within the NCMA were selected for preparation of hydrographs and evaluation of water level changes. Wells were selected based on the following criteria:

- The wells must be part of the County’s current monitoring program;
- Detailed location information must be available;
- Construction details of the wells must be available;
- The locations of the wells should have a wide geographic distribution; and,
- The historic record of water level data must be long and relatively complete.

Many of the wells that have been used in the program are production wells that were not designed for monitoring purposes and may be screened in various producing zones. Moreover, many of the wells are active production wells or located near active wells and thus are potentially subject to localized pumping effects that result in measurements that are lower than the “static” or

more broadly representative water level. These effects are not always apparent at the time of measurement. As a result, the data cannot easily be identified as representing static groundwater levels in specific zones (e.g., unconfined or deep confined). Hence, the data should be considered as a whole in developing a general representation of groundwater conditions.

The "sentry wells" are a critical element of the groundwater monitoring network and provide an early warning system to identify and quantify potential seawater intrusion episodes in the basin (Figure 7). Each sentry well consists of a cluster of multiple wells allowing for the measurement of groundwater elevation and quality from discrete depths. Also shown on Figure 7 is the Oceano CSD Observation well cluster, a dedicated monitoring well cluster located just seaward of Oceano CSD production wells 7 and 8. Figure 8 shows the depth and well names of the sentry well clusters and the Oceano CSD observation well cluster.

The wells are divided into three basic depth categories: shallow, intermediate, and deep. Since initiation of the sentry well monitoring program, 24 quarterly events have been conducted with one each in May, August, and October 2009, and winter, spring, summer and fall 2010 through 2014, as well as January 2015 (the January 2015 data will be included in the 2015 annual report). These monitoring events include collection of synoptic groundwater elevation data and water quality samples for laboratory analysis.

4.1.2.2 **Groundwater Levels**

Groundwater elevation data is gathered from the network of wells throughout the NCMA. Water level measurements in these wells are used to monitor effects of groundwater use, groundwater recharge, and as an indicator of risk of seawater intrusion. Analysis of these groundwater elevation data has included development of groundwater surface contour maps, hydrographs, and an index of key sentry well water levels over time (Figures 9 through 13).

Water Level Contour Maps.

Contoured groundwater elevations for the Spring (April 2014) and Fall (October 2014) monitoring events, including data from the County of San Luis Obispo monitoring program, are shown on Figures 9 and 10. Figure 9 shows the Spring 2014 groundwater elevations were generally highest in the eastern portion of the NCMA, which results in a generalized westward groundwater gradient, particularly in the northern part of the area. Groundwater elevations along the coast were generally below 5 feet above sea level, which represents a lowering of water elevations from normal historic conditions. Of note is the development of a westward-facing trough or pumping depression that developed in the Spring throughout the central portion of the area, apparently in response to municipal pumping in the Oceano area and the agricultural production area along Arroyo Grande Creek. Pumping depressions centered in the area of Oceano CSD Wells 7 and 8 and another one in the eastern portion of the Cienega Valley helped create the pumping trough. A minor, localized pumping depression formed in the area of the Grover Beach and Arroyo Grande municipal wells. A comparison with Spring 2013 contours shows that Spring 2014 water elevations were about 5 feet lower throughout most of the NCMA; in the central pumping trough, water elevations were about 10 to 15 feet lower than in Spring 2013.

Groundwater elevations in October 2014 (Figure 10) were also highest in the eastern portion of the NCMA, and approximately 0 to 3 feet above sea level along the shoreline.

Groundwater elevations were generally above mean sea level (msl) in the northern, eastern, and southern portions of the NCMA during the Fall, however the entire central part of the area exhibited water elevations below sea level, with some measurements in agricultural wells in the east-central part of the area as deep as -13.0 feet msl. These lower water level elevations maintain, and deepen, the previously recognized water table depression in the water table south of the municipal well fields and in the vicinity of, and south of, lower Arroyo Grande Creek. The previously developed pumping depression in the vicinity of the Oceano CSD production wells was maintained, and deepened, into the Fall. Water elevations in this area are generally 5 to 10 feet lower than levels measured in Fall 2013.

Basin-wide Water Elevations.

Figure 11 shows hydrographs of selected wells from the County well monitoring program, illustrating long-term changes in groundwater levels in the NCMA. To provide geographic context, hydrographs from two wells located just east of the NCMA in the NMMA are also presented.

The hydrographs for wells 32D03 and 32D11, and wells 31H08 and 31H09 (Figure 11) are paired hydrographs for wells south of and in the vicinity of the municipal well fields. Depending on duration of pumping of the municipal wells, water levels in these wells have historically been below levels in other areas of the basin for prolonged periods of time. Although the data sets are incomplete, the hydrographs show that, historically, groundwater elevations in these wells have generally been above mean sea level. However, an area of lower groundwater elevations ("trough") beneath the active well field appeared during the period of reduced rainfall in 2007 and 2008. As illustrated in Figure 11, the water elevations of these two paired well sets are again declining to levels at or below sea level. The water elevation of Well 31H09 is lower (as of October 2014) than at any previous measurement, at about -14 feet msl. The groundwater elevations in these wells, representing the conditions in the vicinity of the NCMA municipal pumping area, are approaching levels observed in 2007 and 2008, just before water quality degradation was observed in the coastal wells.

Prior to 2013, groundwater elevations throughout the area recovered from the 2007-2008 lows and remained at levels similar to 2006 (a wet year). However, the last two years of very low rainfall (2013 and 2014) resulted in water levels throughout the area declining 10 to 20 feet.

Well 30K03, located in the central part of the agricultural area along Arroyo Grande Creek, also exhibits declining water elevations in response to continued pumping during this historic low rainfall period. Water levels in the well have declined almost 10 feet in the last 2 years, and more than 20 feet since 2011. Current (Fall 2014) water elevations in this well are about 5 feet msl.

Well 33K03, located along Highway 1 in the far eastern part of the NCMA almost on the border with NMMA, is exhibiting an even more alarming decline in water levels in apparent response to continued agricultural pumping in the Cienega Valley, minimal rainfall recharge, and apparent reduced subsurface inflow recharge from the east. Since Fall 2013, water elevations in this well declined 5 feet, reaching historic lows of -7 feet msl. Since early 2011, water levels in the well have dropped 30 feet.

Sentry Wells.

Regular monitoring of water elevations in clustered sentry wells located along the coast are an essential tool for tracking critical groundwater elevation changes at the coast.

Groundwater elevations in these wells are monitored quarterly as part of the sentry well monitoring program. As shown by the hydrographs for the five sentry well clusters (Figure 12), the sentry wells provide a long history of groundwater elevations. The deepest wells in the clusters (wells 24B03, 30F03, and 30N02) are screened at depths closely matching the screened depths of most local pumping wells. Hence, measured water elevations in these deepest wells reflect the net effect of changing groundwater recharge and discharge conditions in the primary production aquifer.

Averaging the groundwater elevations from the three deep sentry wells provides a single, representative index, called the deep well index, for tracking the status and apparent health of the basin. Previous studies have suggested a deep well index value of 7.5 feet NAVD88 as a minimum threshold, below which the basin is at risk for eastward migration of seawater and a subsequent threat of encroaching sea water intrusion. Historical variation of this index is represented by the average deep sentry well elevations on Figure 13. Figure 13 clearly shows three years of drought (2007-2009) followed by recovery of the index values in subsequent years as rainfall increased and pumpage declined. The graph shows that the index values improved significantly since 2008 and remained above the 7.5-foot index until late April 2013, when a temporary shutdown of the Lake Lopez supply, and resulting increased municipal pumping, resulted in a short-term decline in the index.

In mid-April 2014, the index again fell below the “trigger” value of 7.5-foot for several weeks from mid-April until early June. As pumpage declined slightly starting in early June, the index value responded by rising slightly to a level in July of 5.40 feet. From July through October, the index value remained below the trigger value with values between 6 feet and 4 feet. In October 2014, the value was 5.20 feet. The continued deep index values below the index trigger may correlate with increased risk of seawater intrusion.

Water levels in wells 30F03 and 30N02 on October 14, 2014 were 4.18 and 2.44 feet, respectively. The data indicate that the values have been considerably below the index value for a prolonged period. It is critically important to note that prolonged periods of time with groundwater levels below the index increases the risk of sea water intrusion.

To provide more detail regarding seasonal and other groundwater level changes in the area between the NCMA and NMMA, detailed water level monitoring of well 32C03 was initiated in April 2012 and monitored throughout 2013 and 2014. A sensor was installed to document long- and short-term changes in water level, temperature and electrical conductivity (EC). The acquired data indicates that water levels in Well 32C03 fluctuate on a daily basis by as much as one foot. The water level in well 32C03 declined between April 2012 (when the transducer was installed) and September 2012 by 15 feet, then increased by 10 feet through February 2013. From February 2013 to early October 2013, water levels declined by about 15 feet. From October 2013 to January 2014, water levels in the well increased about 6 feet, just prior to a steady decline in water levels throughout the remainder of 2014. The water level measurement in October 2014 showed a water elevation of -2.80 feet, reflecting the continuing decline of water levels throughout the agricultural area and, likely, on the Mesa.

As discussed earlier, the average elevation of the three deep wells has been used as a representative index of water levels in the main production zones. As shown on Figure 13, the index reflects both seasonal pumping and annual variations in the relationship between recharge

and discharge. In October 2014 the average water elevation in the representative key wells was 5.20 feet, which is 2.30 feet below the adjusted "index" of 7.5 feet NAVD88.

As shown on Figure 13, the index remained below 7.5 feet between October 2007 and August 2009. The index water level increased to 7.37 in October 2009 and 9.65 in January 2010. As discussed in previous annual reports and shown in Figure 13, high levels of chloride (and sodium) in wells 30N02 and 30N03 occurred between May 2009 and January 2010. This relationship implies a lag in time between lowered water levels in the deep sentry wells and significant increases in sodium and chloride. This is potentially significant because Figure 13 shows that during April 2013 and again in April 2014 the calculated index level was as deep as 6 feet below the index value of 7.5 and has remained below the index from April 2014 through the end of the year. Furthermore, the water level elevations in well 30F03 and 30N02 were below sea level for several weeks in late May-early June. Furthermore, the water elevation in 36L02, which is not part of the calculated deep well index but still represents water level conditions in the deep portion of the aquifer along the coast, reached historic low water levels in July 2014 and remained at historic low levels throughout the remainder of the year. Continued average values below the index create a potential environment for increased risk of sea water intrusion.

Additional observations include:

- Water levels in the deep sentry wells reached their lowest level in 2012 in September of that year; the lowest levels observed in 2013 and 2014 were observed in October.
- Water levels in the deep sentry wells reached their highest levels of 2014 in February.
- Water levels in the deep wells showed significant effects of short-term increased local groundwater extraction in April and May. Full recovery of the water levels following cessation of the short-term increased pumping did not occur until early June.
- The index value at the end of 2014 is approximately 5 feet lower than the end of year levels of 2010 through 2012. If the wells exhibit minor increased levels or at least stable levels into April followed by a 5-foot decline in water elevations through October 2015 (as is typical in past years), then the index value may potentially be close to sea level in October 2015. With the low anticipated delivery schedule of SWP (currently at 20% for 2015), minimal basin recharge from precipitation due to the ongoing drought, and the likely need to increase pumpage, the index level may approach sea level, or at least levels not seen since 2008-2009 just prior to observing the elevated chloride concentrations in the Pier Avenue well.

4.1.2.3 **Water Quality**

Water is used in several ways in the NCMA, each use requiring a certain minimum water quality. Since contaminants from seawater intrusion or anthropogenic sources can potentially lower the quality of water in the basin, water quality is monitored at each of the sentry well locations in the NCMA and at County Monitoring Well #3.

Four separate monitoring events occurred in 2014, with each piezometer in the sentry wells and in the Oceano CSD wells measured in January, April, July, and October 2014. During each event, the wells were all sampled in accordance with ASTM International Standard D4448-01. The water quality data from these events and available historical data from these wells are presented in Appendix A. Because water quality trends are utilized to monitor for seawater

intrusion, data collected in 2014 were added to previous data and the variation of selected constituents were plotted against time. Figures 19 and 20 show water quality hydrographs of chloride and TDS concentrations, respectively, since 2009.

The historic water quality data presented in Appendix A shows that water quality varied, sometimes widely, during the years 2009 through 2012. However, samples obtained in 2013 and 2014 show very little change (variation) throughout the year and a general improvement in overall quality compared to 2009 (Figure 21). The *NCMA 2009 Annual Monitoring Report* suggested the observed historic variation in water quality data could be due to a number of factors, including variable permeability of geologic materials; potential mixing with seawater; ion exchange in clay-rich units; and variability in surface recharge sources such as Arroyo Grande and Meadow creeks. Changes (reductions) in municipal groundwater demand since 2009 may have contributed to groundwater quality becoming relatively stable in the past few years.

With the exception of shallow Wells 24B01 and 30N01, the 2014 data indicate no significant change compared to recent past measurements. Well 24B01 continues to show higher levels of TDS, chloride and sodium than the other wells in the monitoring network, and the data indicate a slight increase in TDS but no change in chloride and sodium since the start of the year.

A second shallow well, Well 30N01, shows slight decreases in TDS, sodium and chloride concentrations compared to the previous year. Water quality results in the well continue to exhibit concentration levels of TDS, chloride and sodium more in the range of other sentry wells.

Sentry well cluster 32S/13E 30N (Pier Avenue) is located west of Highway 1 in Oceano and includes three piezometers. This sentry well cluster is within the area of broad lowering of the water table recognized in the water level contour maps (Figures 9 and 10). The deep and intermediate level piezometers at this location showed low groundwater levels in 2008 and 2009 (*NCMA 2008 and 2009 Annual Monitoring Reports*, respectively). Data from this sentry well cluster were interpreted to indicate localized seawater intrusion affecting the deep zone (30N02) and, to a lesser extent, the middle zone (30N03) in 2009. Thus, water quality in the 30N well cluster is considered a key indicator of potentially encroaching seawater intrusion.

Data collected in 2010 from piezometers 30N03 and 30N02 show geochemical signatures of seawater intrusion on Schoeller geochemical plots (Figures 21 and 23, respectively). The Schoeller diagrams shown on Figures 21 through 25 are graphical representations of common cation and anion concentrations in water expressed in milliequivalents per liter (meq/l). Because several samples may be plotted on the same graph, variation in hydrogeochemical water characteristics may be easily recognized. This approach allows graphical, or visual, means to evaluate measured water quality against potential water sources. Each line of connected points illustrates the water quality signature from a specific well (e.g., 30N03, Figure 21) for a given sample period. For comparison, the Schoeller diagrams included here also show the typical geochemical signature for seawater (in black) and the typical signature for a groundwater basin water supply well (labeled “GW Base”, in blue). Most of the water quality samples plotted on the lower portion of the diagram are similar in shape to the groundwater basin sample and are combined within the shaded area.

After the period of lower water level in the index wells in 2007 and 2008, wells 30N02 and 30N03 exhibited increased TDS, sodium and chloride in samples collected in 2009 (Figures 21 and 23). Beginning in 2010, both wells have shown lower TDS, sodium and chloride as well as a

more narrow range in chemical variation (Figures 22 and 24). TDS, sodium and chloride values in the 2014 Q4 samples from both 30N02 and 30N03 showed only nominal changes compared to 2012 and before.

The samples taken from the shallow completion well in this cluster (Well 30N01) continues to show somewhat elevated sodium and chloride levels; however it appears not to indicate sea level intrusion of the deeper levels that are screened in the groundwater production zone. This conclusion is based on the following related observations:

- The well is shallow (screened from 15 to 40 feet), located near a coastal lagoon, and may be influenced by periods of high sea level or seasonal stagnation.
- None of the deeper wells at any of the sentry well locations show high levels of TDS, sodium and chloride (indications of sea water intrusion).
- Water levels of all deep wells generally exhibit a greater seasonal range than Well 30N01.

The shallow well in sentry well cluster 32S/12E 24B (Well 24B01) has historically contained brackish water. This sentry well cluster is located in the northwestern corner of the basin in Pismo Beach. The shallow well (24B01) shows a similar geochemical signature (albeit muted) to that of seawater (Figure 25). Water samples from this well historically have shown high sodium and chloride concentrations. While these data have been interpreted by the California Department of Water Resources to be the result of a solution of residual marine and evaporative salts indigenous to the geologic environment in this part of the basin, it is likely because the well is located near the lagoon at the mouth of Pismo Creek and is subject to storm surge and local flooding during storm and high sea conditions. The water sample from the shallow piezometer (24B01) showed elevated Cl and Na in October 2010 and all quarterly samples taken since then while samples from the two deeper piezometers had TDS, Cl, and Na levels that indicate no such effect.

These various water quality indicators described above indicate that the local interface/mixing zone between seawater and fresh groundwater remains seaward of the sentry wells. The only indication of the location of the interface would be when one or more monitored wells show an increase in TDS along with a geochemical signature resembling seawater. Based on experience in the NCMA, retreat of the interface may be reversed, and again become shoreward, if seaward gradients are reduced or reversed. These changes may be brought on by reduced recharge (e.g. drought conditions) or if pumping exceeds available groundwater supply, or both.

Well 32C03 (County monitoring well #3) is located south and east of the main NCMA groundwater development area. It has exhibited little change compared to the initial sample taken in April 2012. Water in well 32C03 exhibits lower calcium, magnesium, and carbonates than all other wells and has a higher ratio of Na+Cl to CA+Mg+Carbonate.

4.1.3 Threats to Water Supply

Because the NCMA agencies depend on both local and imported water supplies, changes in either state-wide or local conditions can threaten the NCMA water supply. Water supply imported from other areas of the state may be threatened by State-wide drought, effects of climate change in the SWP source area, management and environmental protection issues in the Sacramento-San Joaquin Delta that affect the amount and reliability of SWP deliveries and risk of

seismic damage to the SWP delivery system. Local threats to NCMA water supply similarly include extended drought and climate change that may affect the yield from Lopez Lake as well as reduced recharge to the NCMA. In addition, the NCMA is not hydrologically isolated from the NMMA and the rest of the Santa Maria Groundwater Basin, and increased growth and excessive pumping on the Nipomo Mesa have contributed to a deepening groundwater depression underlying the NMMA. To address the pumping in excess of local recharge and the growing groundwater depression in the NMMA, the Settlement Stipulation and Judgment require the NCSD to purchase and deliver a minimum of 2,500 acre-feet per year (AFY) of supplemental water to the Nipomo Mesa, however this requirement has not been achieved. Demand continues to increase on the Mesa, which exacerbates and intensifies the growing groundwater depression under the NMMA. Furthermore, development continues to be approved on the Nipomo Mesa, which worsens the groundwater depression underlying the NMMA.

In addition, there is a potential impact from seawater intrusion if the groundwater system as a whole is not adequately monitored and managed. In particular the management of the basin may need to account for sea level rise and the relative change in groundwater gradient along the shore line as well as an ongoing overdraft in the NMMA (NMMA Technical Group. 2013). The ongoing drought has resulted in a lowering of groundwater levels throughout the NCMA, most notably in the agricultural production area and the upgradient (eastern) area represented by County Monitoring Well #3 (32C).

4.1.3.1 **Threats to Local Groundwater Supply**

An important component of groundwater recharge to the NCMA includes subsurface inflow into the aquifers that supply water wells serving the NCMA. Historically an important source of recharge has been subsurface inflow to the NCMA from the NMMA along the southeast boundary of the NCMA, previously estimated to be 1,300 AFY (DWR 2002). However, it appears that this important component of aquifer recharge in the form of subsurface inflow from the NMMA has been reduced, as recognized in 2008-2009, to "something approaching no subsurface flow" due to lower groundwater levels in the NMMA (*NMMA 2nd Annual Report CY 2009*, page 43). This condition has continued to worsen each year through continued deepening and expansion of the depression in water elevations in the inland portion of the NMMA. Contour maps prepared by DWR for spring 1975, 1985, 1995 and 2000 as well as Figures 6-5 and 6-6 from NMMA Annual Reports for Calendar Years 2010, 2011, 2012 and 2013, indicate a growing depression in water level elevations in the NMMA as a result of increased groundwater extractions. The most recent report (*NMMA 6th Annual Report CY 2013*) shows that the depression continued to expand and deepen in 2014.

The pumping depression in the central part of the NMMA creates a "general flattening of groundwater gradients" between the inland portion of the NMMA and the NCMA, with "only a small difference in groundwater elevation between the coastal plain of the NCMA, the central portion of the NMMA, and the pumping depression in the central portion of the NMMA" (*NMMA 6th Annual Report CY 2013*). This elimination of subsurface flow towards the NCMA, reversal of historical groundwater gradients, and the development of a landward gradient, all create a potentially significant condition favorable for seawater intrusion as well as effectively significantly reduce the perennial yield of the NCMA aquifer.

The *NMMA 5th Annual Report CY 2012* (Figures 6-5 and 6-6) describes the presence of a persistent northwest/southeast-trending depression in water level contours in the northern portion of the NMMA. Furthermore, "there are a number of direct measurements that indicate that demand exceeds the ability of the supply to replace water pumped from the aquifers" (*NMMA 4th Annual Report CY 2011* Finding 4, *NMMA 5th Annual Report CY 2012*, Finding 3, *NMMA 6th Annual Report CY 2013*, Finding 3). These findings, coupled with NMMA projections of an increasing water demand and groundwater use in the management area (*NMMA 6th Annual Report CY 2013*, page 34) results in a deepening and growing overdraft condition.

With an estimated "Dependable Yield" of 4,800 to 6,000 AFY (DWR, 2002) and a 2013 estimated consumptive water use of 12,900 AFY (based on an estimated groundwater production of 16,350 AF in 2013), the overdraft in the NMMA was 6,900 to 8,100 AF in 2013 (*NMMA 6th Annual Report CY 2013*, page 57). Increasing groundwater demand in the NMMA will continue to lower water elevations along the NMMA and NCMA boundary below current levels. Water level data from County Monitoring Well #3 (32N03) shows that water elevations along the NCMA/NMMA boundary are declining, with water elevations in Well #3 ending the year 3 to 4 feet below sea level. As the historical subsurface inflow recharge from the NMMA to the NCMA is reversed, the agricultural users in the southeastern portion of the NCMA will continue to see declining water levels, declining production capability, and conditions favorable for seawater intrusion. Although clearly exacerbated by the drought, the harbinger of these conditions was already observed in the water level data in the NCMA in October 2014, when water levels continued to decline in Monitoring Well #3 (32N03) and a pumping depression, with several water elevations below sea level (as much as 13 feet below sea level in one well), appeared in the southeastern agricultural production area of the NCMA (Figure 10).

As noted earlier, total groundwater pumping in the NCMA (urban, agriculture, and rural domestic) was 4,020.18 AF in 2014, which is 42% of the 9,500 AFY safe yield. However, even with the reduced pumping, water elevations throughout the area declined by several feet, with some areas finishing the year with water elevations below sea level. Typically, when pumping is less than the safe yield, the remaining volume of groundwater results in increased groundwater in storage, which is then manifested by rising water levels. The current condition, with groundwater pumping at 42% of the safe yield and declining water elevations, illustrates the impacts of the ongoing severe drought that has significantly reduced recharge. But it likely also illustrates the impacts of reduced subsurface inflow recharge from the east (Nipomo Mesa) because of overdraft pumping in the NMMA, the development of a pumping depression beneath the Mesa, and the elimination of the groundwater divide between the NCMA and NMMA. This condition of declining water levels in the NCMA, even though total pumping is currently 42% of the basin safe yield, will likely be exacerbated if the NCMA agencies are required to increase groundwater withdrawals due to reduction in local surface water supplies or State Water project deliveries.

4.1.3.2 **Threats to State Water Project Supply**

Both extended drought and long-term reduction in snowpack due to climate change can affect deliveries from the State Water Project. California is now deep into the fourth year of a drought, with 2014-15 representing historic dry (and warm) conditions that has resulted in below-average precipitation and runoff in the SWP source area. As a result, DWR has announced that storage in SWP reservoirs is low and deliveries for 2015 will again be substantially reduced (as of

March 2, 2015, DWR announced a Table A Allocation delivery schedule of 20 percent). In addition to drought conditions, SWP pumping capacity was reduced as the result of a May 2007 federal court ruling to protect Delta smelt. These factors will directly impact the allocation of water available to Pismo Beach and OCSD through the SLOCFCWCD in 2015.

4.1.3.3 **Seawater Intrusion**

The NCMA is underlain by an accumulation of alluvial materials that slope gently offshore and extend for many miles under the ocean (DWR 1970, 1975). Coarser materials within the alluvial materials comprise aquifer zones that receive freshwater recharge in areas above sea level. If sufficient outflow from the aquifer occurs, the dynamic interface between seawater and fresh water will be prevented from moving onshore. Sufficient differential pressure to maintain a net outflow is indicated by onshore groundwater elevations that are above mean sea level and establish a seaward gradient to maintain that outflow.

The 2008 Annual Report documented that a portion of the NCMA groundwater basin exhibited water surface elevations below sea level (*NCMA 2008 Annual Monitoring Report*). Hydrographs for NCMA sentry wells (Figure 12) show coastal groundwater elevations that were at relatively low levels for as long as two years. Such sustained low levels had not occurred previously in the historical record and reflected the impact of drought on groundwater levels. The low coastal groundwater levels indicated a potential for seawater intrusion. Increased TDS, Na and Cl concentrations were found in sentry well 32S/13E-N03 in August 2009 and in 32S/13E-N02 in August and October 2009.

Water elevation and water quality measurements in 2009 through October 2014 indicate the following:

- Sentry wells in the cluster 32S/13E 30N may be relatively sensitive to seawater intrusion because of their location near Arroyo Grande Creek and the more permeable sediments deposited by the ancestral creek (*NCMA 2009 Annual Monitoring Report*) as well as the lower groundwater elevations typical to the east (Figures 9 and 10). The well cluster seems to be at the “mouth” of the recently formed, but persistent, pumping trough that extends eastward into the agriculture production area as far east as the NMMA and farther.
- The initial portions of the seawater/groundwater interface were detected onshore at one site beginning with elevated chloride levels in May 2009; by October 2009 the interface had manifested in the middle and deep aquifer zones monitored by sentry wells 30-N02 and 30-N03. The extent to which seawater may have intruded other localized aquifer zones along the coast without being detected in the NCMA sentry wells is unknown due to heterogeneity of the aquifer and spacing of sentry wells.
- Above average precipitation and decreased groundwater withdrawal in 2010 resulted in increased water levels in the sentry wells on a comparative seasonal basis and an apparent relief of the water table depression immediately south of lower Arroyo Grande Creek. The ongoing drought, which started in 2012, has caused an overall lowering of water levels in the sentry wells and a resumption of the pumping depression that was recognized in 2009 (Figure 10).

- Water quality in most wells remains similar to historic measurements but more importantly, has not showed any indications of the effects of seawater intrusion. However, the continued average deep well index value since April 2014 below the 7.5-foot threshold is cause for concern due to lack of rainfall and potential cutbacks in other supplies.

4.1.3.4 Measures to Avoid Seawater Intrusion

In recognition of the risk of seawater intrusion, the Northern Cities have developed and implemented a water quality monitoring program for the sentry wells and Oceano CSD observation wells, as described earlier. The Northern Cities, SLOCFCWCD, and State of California have also worked cooperatively toward the protection of the sentry wells as long-term monitoring sites. Several measures are employed by the Northern Cities to reduce the potential for seawater intrusion. Specifically, the Northern Cities have voluntarily reduced coastal groundwater pumping, decreased overall water use via conservation, and initiated plans, studies and institutional arrangements to secure additional surface water supplies. As a result, each of the four major municipal water users reduced groundwater use between 25 and 90 percent between 2007 and 2010. In 2014, municipal groundwater use was 1,026 AF, which constitutes 23.7% of the urban user's groundwater allotment (including agricultural conversion credits) of the basin safe yield.

The deepening pumping depression within the NMMA appears to have eliminated the groundwater divide between the NCMA and NMMA. With the loss of this divide there has been a reversal of groundwater gradients and the development of a landward groundwater gradient in the southern portion of the NCMA. This landward gradient creates conditions favorable for seawater intrusion in the NCMA and NMMA. To limit further increases in the risk of seawater intrusion, immediate measures must be made to reduce demand in the NMMA. Additionally, the County of San Luis Obispo, which possesses land use authority, must restrict any future development that increases water demand in the NMMA.

4.2 WATER DEMAND

Water demand refers to the total amount of water used to satisfy various needs. In the NCMA, water is primarily used to satisfy urban demand and applied irrigation demand. The third category, rural demand, includes small community water systems, domestic, recreational and agriculture-related businesses, and has historically comprised a relatively minor component of the overall demand of the area. Table 9 presents the historical water demands for urban uses, applied irrigation, and rural uses.

4.2.1 Urban Demand

Urban water demands are presented in Table 9 for each of the Northern Cities from 2005 through 2014. These demand values reflect reported Lopez Lake and State Water Project (SWP) purchases and groundwater production data, and represent all water used within the service areas of the four agencies comprising Northern Cities, including the portions of Arroyo Grande and Pismo Beach that extend outside the NCMA (see Figure 2). The urban demand data include water delivered to municipal customers and all other water used by the respective municipal agency as well as system losses. Urban demand declined from 2010 to 2011, increased slightly each year for the three years from 2011 through 2013, but then declined dramatically in 2014.

Current urban demand is significantly below the demand levels experienced in any year throughout this period of review.

Table 9. Total Water Demand (Groundwater and Surface Water, AF)

Year	Arroyo Grande	Grover Beach	Pismo Beach	Oceano CSD	Total Urban	Applied Irrigation	Rural Water	Total Demand
2005	*3,460*	*2,082*	*2,142*	*931*	*8,615*	*2,056*	*36*	**10,707**
2006	*3,425*	*2,025*	*2,121*	*882*	*8,453*	*2,056*	*36*	**10,545**
2007	*3,690*	*2,087*	*2,261*	*944*	*8,982*	*2,742*	*36*	**11,760**
2008	*3,579*	*2,051*	*2,208*	*933*	*8,771*	*2,742*	*36*	**11,549**
2009	*3,315*	*1,941*	*2,039*	*885*	*8,180*	*2,742*	*36*	**10,958**
2010	*2,956*	*1,787*	*1,944*	*855*	*7,542*	*2,056*	*38*	**9,636**
2011	*2,922*	*1,787*	*1,912*	*852*	*7,473*	*2,742*	*38*	**10,253**
2012	*3,022*	*1,757*	*2,029*	*838*	*7,646*	*2,742*	*41*	**10,429**
2013	*3,111*	*1,792*	*2,148*	*888*	*7,939*	*2,742*	*42*	**10,722**
2014	*2,752.12*	*1,347.19*	*1,949.24*	*806.82*	*6,855.37*	*2,955.4*	*38.4*	**9,849.17**

4.2.2 Applied Irrigation Demand

Applied Irrigation Demand (Table 9) is an in-direct measurement that can be calculated using defined industry-standard practices. The San Luis Obispo County Water Master Report uses a crop-specific method for calculating Annual Gross Irrigation Water Requirement (AGIR) in acre-feet per year per acre (AFY/acre), based on crop evapotranspiration (ET), effective rainfall, leaching requirements, irrigation efficiency, and frost protection. Calculation of the AGIR, which is then used to estimate the applied water for irrigation for an aggregated area, is described in the following equation:

AGIR (Ft) = [(Crop ET – Effective Rainfall) / ((1-Leaching Requirement) x Irrigation Efficiency)] + Frost Protection Water

The calculated crop-specific applied water is multiplied by the specific crop acres to obtain the irrigation demand (crop water requirement) for a given crop type. Irrigation efficiency is assigned to calculate the applied water demand by crop type. The result is estimated irrigation applied water for each crop-type that is then summed to estimate the applied irrigation demand.

In recent years, the San Luis Obispo County Agricultural Commissioner's office (ACO) has compiled an estimate of irrigated acres with spatial information, compatible for use in GIS. A view displaying the irrigated agriculture land in the NCMA for 2014 is presented as Figure 26. The 2014 survey indicates a total of 1,456 acres in NCMA of irrigated agriculture; an additional 219 acres are considered uncultivated (unirrigated).

The estimate of applied irrigation water used in these calculations utilizes the Cal Poly San Luis Obispo Irrigation and Training Research Center (ITRC) crop ET values for the various crop categories for a dry year, drip irrigation application method. Less efficient irrigation application

methods are common in the Cienaga Valley, so an irrigation application efficiency of 70 percent was assigned for this calculation. Consequently, the computation of applied water is based on the estimated consumptive use using the various crop categories and estimated irrigation efficiency. The ITRC crop ET values used in this analysis are based on a coastal climate zone.

The irrigated acreage, crop type, ITRC ET factor, and calculated applied water for NCMA in 2014 is shown in Table 10. The data in Table 10 includes 59.4 AF of applied landscaping demand by the City of Arroyo Grande produced from the City's non-potable water supply well. Total applied irrigation water use in NCMA in 2014 was 2,955.4 AF.

Table 10. 2014 NCMA Applied Irrigation Demand

Crop	ITRC Assigned Category	Acres	ITRC ETc (AFY/acre)	Consumptive Demand (AFY)	Irrigation Efficiency	Applied Water (AF)
Rotational Crops	Small Vegetables	1,348	1.4	1,876	0.7	2,680
Potato, Rotational Crop	Potato	12	1.9	17	0.7	24
Strawberry, Rotational Crop	Strawberry	69	1.3	96	0.7	137
Flowering Plants and Landscape	Flowers and Nursery	27	1.4	38	0.7	54
Total, Irrigated		**1,456**		**2,027**		**2,896**
Uncultivated Agriculture	None Assigned	219				
Total		**1,675**				
City of Arroyo Grande Applied Irrigation						59.4
						2,955.4

4.2.3 Rural Demand

In the NCMA, rural water demand refers to uses not designated as urban demand or applied irrigation demand and includes small community water systems, individual domestic water systems, recreational uses, and agriculture-related business systems. Small community water systems using groundwater in the NCMA were identified initially through review of a list of water purveyors compiled in the 2007 San Luis Obispo County Integrated Regional Water Management Plan (IRWMP). These include the Halcyon Water System, Ken Mar Gardens, and Pacific Dunes

RV Resort. The Halcyon Water System serves 35 homes in the community of Halcyon, while Ken Mar Gardens provides water supply to 48 mobile homes on South Halcyon Road. The Pacific Dunes RV Resort, with 215 RV sites, provides water supply to a largely transitory population as well as a nearby riding stable. In addition, about 25 homes and businesses have been identified as served by private wells through inspection of aerial photographs of rural areas within NCMA. Two mobile home communities, Grande Mobile and Halcyon Estates, are served by Oceano CSD through the distribution system of Arroyo Grande, thus the demand summary of Oceano CSD includes these two communities. Based on prior reports, it is assumed that the number of private wells is negligible within the service areas of the four Northern Cities. The estimated rural water demand is shown in Table 11.

Table 11. Estimated Rural Water Demand

Groundwater User	No. of Units	Estimated Water Demand, AFY per Unit	Estimated Water Demand, AFY	Notes
Halcyon Water System	35	0.40	14	*1*
Ken Mar Gardens	48	0.25	8.4	*2*
Pacific Dunes RV Resort	215	0.03	6	*3*
Rural Users	25	0.40	10	*1*
Current Estimated Rural Use			**38.4**	

1 - Water demand/unit based on 2000 and 2005 Grover Beach water use per connection, 2005 UWMP.
2 - Demand based on metered water usage.
3 - Water demand/unit assumes 50 percent annual occupancy and 0.06 AFY per occupied site.

4.2.4 Changes in Water Demand

In general, urban water demand has ranged from 6,855 AF (current year 2014) to 8,982 AF (2007), with an average annual water use from 2005 to 2014 of 8,046 AFY (Table 9). The years 2010 through 2014 have been consistently below the average which may be attributed to the relatively slower economy and, particularly in recent years, conservation activities implemented by the Northern Cities. In the applied irrigation category, agricultural acreage has remained fairly constant. Thus, annual water demand for applied irrigation varies mostly with weather conditions. Acknowledging the variability due to weather conditions (see Table 9), applied irrigation water demand is not expected to change significantly given the relative stability of applied irrigation acreage and cropping patterns in the NCMA south of Arroyo Grande Creek. Changes in rural demand have not been significant.

5.0 COMPARISON OF WATER SUPPLY V. WATER DEMAND

Table 6 (page 11) shows the Baseline Available Urban Water Supplies for each of the Northern Cities, with a total available urban water supply of 10,625 AFY (assuming 100% delivery of SWP allocation and also assuming no Lopez surplus water or SWP carryover). In 2014, because of the availability of Lopez surplus water and SWP carryover water and despite a 5% SWP delivery, the total available urban water supply was 12,308.7 AF (Table 7).

The 2002 Management Agreement estimated that the historical safe yield from the groundwater basin was 9,500 AFY. Because all of the irrigation applied water demand is supplied by groundwater, the total available applied irrigation supply is a portion of the estimated groundwater safe yield; this portion was allocated as 5,300 AFY for agricultural and rural use. The agricultural conversion of 330 AFY reduces this allocation to 4,970 AFY. Of the estimated safe yield of 9,500 AFY, other than what is allocated for applied irrigation and rural use, the remaining 4,530 AFY is allocated for urban water use (4,330 AFY, including 4,000 AFY groundwater allocation plus 330 AFY in agricultural conversion credit) and an estimated 200 AFY for subsurface outflow to the ocean.

In 2014, the total estimated NCMA water demand was 9,849 AF (Tables 9 and 12). The 2014 water demand, by source, of each city and agency is shown in Table 12.

Table 12. 2014 Water Demand by Source (AF)

Urban Area	Lopez Lake	State Water Project	Groundwater	Other Supplies	Total
Arroyo Grande	*2,631.48*	*0.0*	*51.34*	*69.3*	2,752.12
Grover Beach	*835.06*	*0.0*	*512.13*	*0.0*	1,347.19
Pismo Beach	*1,442.43*	*303.0*	*203.81*	*0.0*	1,949.24
Oceano CSD	*547.72*	*0.0*	*259.1*	*0.0*	806.82
Urban Water Use Total	**5,456.69**	**303.0**	**1,026.38**	**69.3**	**6,855.37**
Applied Irrigation	*0.0*	*0.0*	*2,955.4*	*0.0*	2,955.4
Rural Water Users	*0.0*	*0.0*	*38.4*	*0.0*	38.4
Total	**5,456.69**	**303.0**	**4,020.18**	**69.3**	**9,849.17**

Urban water demand in 2014 to the NCMA was supplied from 5,456.69 AF of Lopez Lake water, 303 AF of State Water Project water, and 1,026.38 AF of groundwater. The 69.3 AF of "Other Supplies" delivered to Arroyo Grande consists of groundwater pumped from the Pismo Formation, which is located outside of the shared groundwater basin.

Based on the estimated groundwater safe yield, the baseline (full allocation) total available supply for all uses is 15,595 AFY, which is the sum of 10,625 AFY for urban plus the allocation for

applied irrigation and rural area of 4,970 AFY. In 2014, factoring in the 5% SWP delivery schedule and availability of SWP carryover water and Lopez surplus, the total available supply for all uses (in 2014) was 17,216.7 AF. Total 2014 NCMA water demand is estimated at 9,849.17 AF. It must be noted, however, that this comparative review of available 2014 supply vs. demand must be viewed with caution because of the previously expressed concerns related to the groundwater supply. As described earlier, the NCMA agencies pumped only 42% of their "available" groundwater allotment, yet the basin experienced declining water levels and the development of groundwater depressions with water elevations below sea level. It is clear that the NCMA agencies could not have utilized their entire groundwater allotment this past year without significantly lowering water elevations below current conditions and potentially seriously exacerbating the threat of sea water intrusion.

6.0 MANAGEMENT ACTIVITIES

The NCMA and overlying private well users have actively managed surface water and groundwater resources in the Northern Cities area for more than 30 years. Management objectives and responsibilities were first established in the 1983 Gentlemen's Agreement and updated in the 2002 Management Agreement. The responsibility and authority of the Northern Parties for NCMA groundwater management was formally established through the 2002 Settlement Agreement, 2005 Stipulation, and 2008 Judgment. Throughout the long history of collaborative management, which was formalized through the Agreement, Stipulation, and Judgment, the overall management goal for the Northern Cities is to preserve the long-term integrity of water supplies in the NCMA portion of the Santa Maria Groundwater Basin (SMGB).

6.1 MANAGEMENT OBJECTIVES

Eight basic objectives have been established for ongoing NCMA groundwater management. Under each objective, the NCMA technical group has identified a number of strategies to meet the objectives. These strategies are listed and then discussed under each of the eight objectives listed below. Other potential objectives are outlined in the final section.

A major management undertaking of the NCMA TG in 2014 was the development of a Strategic Plan (WSC, 2014) to provide the NCMA with:

- A Mission Statement to guide future initiatives
- A framework for communicating water resource goals, and
- A formalized Work Plan for the next 10 years.

Through the strategic planning process, the TG identified several key objectives to guide their efforts. These efforts include:

1. <u>Enhance Water Supply Reliability</u>
    - Prepare the Northern Cities for prolonged drought conditions
    - Develop coordinated response plan for salt water intrusion and other supply emergencies
    - Analyze impacts of pumping on the groundwater basin
    - Better protect against threats to groundwater sustainability
2. <u>Improve Water Resource Management</u>
    - Update the 2002 Settlement Agreement
    - Develop more formalized structure/governance for the NCMA TG
3. <u>Increase Effective Outreach</u>
    - Engage agriculture stakeholders
    - Improve coordination with SLOFCWCD and other regional efforts
    - Increase communication with City Council and Board of Directors

The Strategic Plan formalized many of the water resource management projects, programs, and planning efforts that the Northern Cities, both individually and jointly, have been

engaged in that address water supply and demand issues, particularly with respect to efforts to assure a long-term sustainable supply. The following section discusses the major management activities that the NCMA agencies have pursued during 2014, and incorporates the planning objectives outlined in the 2014 Strategic Plan.

6.1.1 Share Groundwater Resources and Manage Pumping

Strategies:

- Continued reduction of groundwater pumping, maintain below safe yield.
- Coordinated delivery of Lopez Lake water to the maximum amount available, pursuant to the Lopez Lake Low Reservoir Response Plan.
- Continue to import State Water Project supplies to Oceano CSD and Pismo Beach.
- Maintain surface water delivery infrastructure to maximize capacity.

Discussion:

A longstanding objective of water users in the NCMA has been to cooperatively share and manage groundwater resources. In 1983 the Northern Parties mutually agreed on an initial safe yield estimate (defined by DWR) and an allotment of pumping between the urban users and applied irrigation users of 57 percent and 43 percent, respectively. In this agreement the Northern Cities also established pumping allotments among themselves. Subsequently, the 2002 Management Agreement included provisions to account for changes such as agricultural land conversions. The agreements provide that any increase or decrease in the safe yield based on ongoing assessments would be shared on a pro rata basis. Pursuant to the stipulation the Northern Cities conducted a water balance study to update the safe yield estimate (Todd 2007). Among other results, the parties agreed to maintain the existing pumping allotment among the urban users and established a consistent methodology to address agricultural land use conversion.

In addition to cooperatively sharing and managing groundwater resources, the Northern Cities have coordinated delivery of water from Lopez Lake and the City of Pismo Beach and Oceano Community Services District have continued to import SWP water to maximize use of available surface water supplies. These activities allow the Northern Cities, as a whole, to actively and effectively manage the groundwater resource, particularly in years of normal rainfall and “normal” SWP delivery schedules. However, because the State limited SWP deliveries to 5% of subscription in 2014, Pismo Beach, taking advantage of carryover water, received 303 AF of SWP water (including 5% of Table A allocation and available carryover water). Despite the reduced SWP delivery, 2014 municipal groundwater pumpage is less than any year during the 15-year period from 1999 through 2013.

Many aspects of the NCMA’s water management strategy shifted direction in 2014 as a result of the severity of the ongoing drought. Adoption of the LRRP by SLOCFCWCD will, as of the end of 2014, result in the implementation of at least the first stage of LRRP reduction triggers, including potential reductions in entitlement of water deliveries, reductions in downstream releases, and no new allocations of surplus water from unreleased downstream releases. The ongoing drought which forces these actions has forced the NCMA agencies to emphasize

conservation, even more than in previous years, in order to adequately and safely manage the water resource.

The water balance study (Todd 2007) highlighted the threat of seawater intrusion as the most important potential adverse impact to consider in managing the basin. Seawater intrusion, a concern since the 1960s, would degrade the quality of water in the aquifer and potentially render portions of the basin unsuitable for groundwater production (DWR 1970). A deep sentry well index of 7.5 feet (NAVD 88) has been recognized as the index, above which it is thought that there is sufficient fresh water (groundwater) outflow to prevent seawater intrusion. From late 2009 to April 2013, the Northern Cities management of groundwater levels and groundwater pumpage maintained the sentry well index above the 7.5-foot level. However, for several weeks in April and May, and then again from early July through mid-December 2013, and then again from mid-April 2014 through the end of 2014, the index value dropped below the target.

Another potential adverse impact of localized pumping includes reduction of flow in local streams, notably Arroyo Grande (Todd 2007). The Northern Cities (as Zone 3 contractors) have participated with SLOCFCWCD in preparation of the Arroyo Grande Creek Habitat Conservation Plan (HCP) that addresses reservoir releases to maintain both groundwater levels and habitat diversity in the creek. The SLOFCWCD contracted with ECORP in 2015 to conduct the additional studies to finalize the HCP.

6.1.2 Enhance Management of NCMA Groundwater

Strategies:

- Develop a groundwater model for the NCMA or the entire SMGB
- Coordinate with the County and NMMA to develop new monitoring well(s) in key locations within the SMGB
- Develop a Salt and Nutrient Management Plan for the NCMA/NMMA
- Develop and implement a framework for groundwater storage/conjunctive use, including return flows
- Update the 2002 Agreement Regarding Management of the Arroyo Groundwater Basin

Discussion:

NCMA participated in the oversight of the performance of the Santa Maria Basin Characterization Study, which was primarily accomplished in 2014 and will be completed in early 2015. In addition to the collection and analysis of extensive data sets to be utilized in the development of a numerical groundwater flow model and Salt/Nutrient Management Plan, continuous monitoring transducers will be installed in 2015 in coastal sentry Wells 36L01 and 36L02, which are part of the NCMA monitoring program. In cooperation with the SLOFCWCD and NMMA, potential locations for new monitoring well(s) were identified to enhance the coastal monitoring well network.

The NCMA meetings provide for collaborative development of joint budget proposals for studies and plans as well as shared water resources (as discussed in Section 6.1.1 and 6.1.4). In addition, the monthly meetings provide a forum for discussing the data collected as part of the quarterly monitoring reports (as discussed in Sections 6.1.2 and 6.1.3).

6.1.3 Monitor Supply and Demand and Share Information

Strategies:

- Develop a coordinated UWMP for the Northern Cities
- Develop a coordinated Water Shortage Contingency Plan to respond to a severe water shortage condition within the NCMA.
- Share groundwater pumping data at monthly NCMA Technical Group meetings.
- Evaluate future water demands through comparison to UWMP projections.
    - Arroyo Grande 2010 UWMP
    - Pismo Beach 2010 UWMP
    - Grover Beach 2010 UWMP
    - OCSD is not required to prepare an UWMP because the community population does not meet the minimum requirement threshold

Discussion:

Regular monitoring of activities that affect the groundwater basin, and sharing that information, has occurred for many years. The monitoring efforts include gathering data on hydrologic conditions, water supply and demand, and groundwater pumping, levels, and quality. The current monitoring program is managed by the Northern Cities in accordance with the 2005 Stipulation and 2008 Judgment, guided by the July 2008 Monitoring Program for the NCMA. The monitoring data and a summary of groundwater management activities are summarized in the Annual Reports. Arroyo Grande, Grover Beach, and Pismo Beach have each evaluated their future water demands as part of their respective 2010 UWMP updates. The NCMA shares information with the two other management areas (NMMA and SMVMA) through data exchange and regular meetings throughout the annual report preparation cycle.

6.1.4 Manage Groundwater Levels and Prevent Seawater Intrusion

Strategies:

- Utilize storm-water ponds to capture storm-water run-off and recharge the groundwater basin.
- Install transducers in key monitoring wells to provide continuous groundwater elevation data; the following wells have transducers:
    - 24B01
    - 24B03
    - 30F03
    - 30N02
    - County Monitoring Well #3
- Collect and evaluate daily municipal pumping data to determine impact on local groundwater elevation levels.

Discussion:

Prevention of seawater intrusion through the management of groundwater levels is essential to protect the shared resource. The NCMA agencies both increase groundwater recharge with storm water infiltration as well as closely monitoring groundwater levels and water quality in sentry wells along the coast.

Arroyo Grande and Grover Beach each maintain storm water retention ponds within their jurisdiction; the SLOCFCWCD maintains the storm water system, including retention ponds, in Oceano. These ponds collect storm water runoff, allowing it to recharge the underlying aquifers. There are approximately 140 acres of detention ponds in Arroyo Grande and 48 acres of detention ponds in Grover Beach. The storm water detention pond in Oceano CSD is approximately one-half acre. Grover Beach modified its storm water system in 2012 to direct additional flow into one of its recharge basins.

While closely related to the objectives to manage pumping, monitor supply and demand, and share information, this objective also specifically recognizes the proximity of production wells to the coast and the threat of seawater intrusion. The Northern Cities and SLOCFCWCD have long cooperated in the monitoring of groundwater levels, including quarterly measurement by the NCMA of groundwater levels in sentry wells at the coast. Upon assuming responsibility for the coastal monitoring wells, the NCMA became aware of the need to upgrade their condition. In July 2010 the well-heads (surface completions) at four sentry monitoring well clusters within the Northern Cities Management Area were renovated. The modifications occurred at well clusters:

- 32S/12E-24B01, B02, B03;
- 32S/13E-30F01, F02, F03;
- 32S/13E-30N01, N02, N03; and
- 12N/36W-36L01, L02.

The renovations included raising the elevations of the top of each individual well casing by two to three feet in order to reduce the risk of surface water entering the wells. Because the top of the well casing is used as the reference point for all depth to water measurements, the new surface completions were surveyed relative to the NAVD 88 standard in late September 2010 (Wallace Group 2010). The individual well casings have been raised above ground surface and protective locking steel risers now enclose each cluster. As a result of this work, the sentry wells within the NCMA are now protected from surface contamination and tampering.

Quarterly measurement of groundwater levels aids in assessing the risk of seawater intrusion along the coast. To enhance the data collection and assessment efforts, the NCMA installed transducers in five of the key sentry monitoring wells to provide continuous groundwater levels at key locations. By combining this with the collection and evaluation of daily municipal pumping data, the NCMA is better able to determine the response of local groundwater levels to extractions and therefore better manage the basin.

In order to gain insight into water level fluctuation and water quality variation in the area between the NCMA and NMMA, a continuous monitor was installed in Well 32C03 (County Well #3). Well 32C03 was constructed and is owned by the County of San Luis Obispo and is part of their county-wide groundwater monitoring network. To provide more detail regarding seasonal

and other groundwater level changes in the area between the NCMA and NMMA, detailed water level monitoring was initiated in April 2012. Sensors were installed to document long- and short-term changes in water level, temperature and specific conductance. The results from detailed monitoring of Well 32C03 are provided in Figure 18.

Additional studies to enhance basin management efforts that have been discussed by the NCMA TG include:

- Implement a monthly water level elevation data analysis of the sentry wells during periods when the deep well index value is below the index target of 7.5 feet.
- Implement a monthly analysis of electrical conductivity (EC) data from the wells with downhole transducers (24B01, 24B03, 30F03, 30N02) during periods when the deep well index value is below the index target of 7.5 feet to track potential water quality degradation (an enhanced monitoring schedule of County Well #3 is not necessary because background water quality does not change or fluctuate significantly). If EC data suggests water quality degradation, implement a monthly sampling and monitoring program.
- Assess the potential impacts on sentry well water level elevations from extended periods of increased groundwater pumping by conducting analytical modeling analyses to predict water level responses given certain pumping scenarios. These analyses may prove fruitful as scenarios unfold regarding decreased SWP deliveries or short-term emergency cuts to Lopez Lake deliveries.
- Perform enhanced water level monitoring in the vicinity of the Oceano CSD production well field while municipal pumping is reduced, to monitor the direct impacts of OCSD pumping.

Lastly, the 2005 Settlement requires NCSD and the other Mesa parties to import 2,500 AFY to mitigate overpumping that has impacted groundwater inflow to the NCMA, and thus may facilitate seawater intrusion in both NCMA and NMMA. This requirement has not been achieved, so overpumping on the Mesa continues and the terms and requirements of the Settlement have not been fulfilled.

6.1.5 Protect Groundwater Quality

Strategies:

- Perform quarterly water quality monitoring at all sentry wells and County Well #3.
- Gather temperature and electrical conductivity data from five monitoring wells to continuously track water quality indicators for seawater intrusion.
- Prepare a Salt and Nutrient Management Plan pursuant to State policy utilizing the results of the Santa Maria Groundwater Basin Characterization study, which will be finalized in early 2015.
- Construct a Recycle Water system in the City of Pismo Beach, pursuant to the results of the recently completed Recycled Water Facilities Planning Study.
- Support performance of a Water Recycling Facilities Planning Study by the South San Luis Obispo County Sanitation District

Discussion:

The objective to protect groundwater quality is closely linked with the objective for monitoring and data sharing. To meet this objective all sources of water quality degradation, including the threat of seawater intrusion, need to be recognized. Water quality threats and possible degradation affect the integrity of the groundwater basin, potentially resulting in loss of use or expensive water treatment processes. Sentry wells are monitored quarterly and data from other NCMA production wells are assessed annually. The monitoring program includes evaluation of potential contaminants in addition to those that might indicate seawater intrusion. Temperature and electrical conductivity probes have been installed in five monitoring wells to provide continuous water quality tracking for early indication of seawater intrusion. A sixth sentry well cluster will be instrumented in 2015 as part of the Santa Maria Groundwater Basin Characterization Study. The results of the SMGB Characterization Study (in early 2015) will provide the foundation for preparation of a Salt and Nutrient Management Plan.

The City of Pismo Beach conducted a Recycled Water Facilities Planning Study (RWFPS) in 2014 to investigate alternatives for constructing a recycled water system that will enable the City to produce and beneficially use recycled water to augment its water supply. Implementation of the recommended alternatives from the study, will allow the City to utilize recycled water to recharge the groundwater basin and provide a new, drought proof, source of water supply for the area. The RWFPS was funded in part by a grant from the California State Water Resources Control Board Water Recycling Funding Program.

The South San Luis Obispo County Sanitation District (SSLOCSD) provides wastewater transmission and treatment for the Cities of Arroyo Grande and Grover Beach and the Oceano Community Services District. The SSLOCSD proposes to prepare a Water Recycling Facilities Planning Study to evaluate and select a preferred alternative for a Satellite Water Resource Recovery Facility or scalping plant to develop recycled water as a supplemental water supply source and improve the water supply reliability for the area.

6.1.6 Manage Cooperatively

Strategies:

- Improve agriculture outreach by enhancing coordination with the Ag/Farm Bureau.
- Include the Santa Maria Valley Management Area (SMVMA) in the Santa Maria Groundwater Basin Management Areas (SMGB MA) Technical Subcommittee.
- Coordinate groundwater monitoring data sharing and annual report preparation with the NCMA, NMMA and the SMVMA.
- Improve inter-agency coordination within the NCMA agencies and include the County.

Discussion:

Since 1983, NCMA management has been based on cooperative efforts of the affected parties, including the Northern Cities entities, private agricultural groundwater users, San Luis Obispo County, the SLOCFCWCD, and other local and state agencies. Specifically the NCMA agencies have limited their pumping and, in cooperation with SLOCFCWCD, invested in surface water supplies so as to not exceed the safe yield of the NCMA portion of the SMGB. Other

organizations participate, as appropriate. In addition to the efforts discussed in this report, cooperative management occurs through many other venues and forums, including communication by the Northern Cities in their respective public meetings and participation in the Water Resources Advisory Council (the County-wide advisory panel on water issues).

The NCMA agencies participated in preparation and adoption of the 2014 update of the San Luis Obispo County Integrated Regional Water Management Plan (IRWMP). The IRWMP promotes integrated regional water management to ensure sustainable water uses, reliable water supplies, better water quality, environmental stewardship, efficient urban development, protection of agriculture, and a strong economy. The IRWMP integrates all of the programs, plans, and projects within the region into water supply, water quality, ecosystem preservation and restoration, groundwater monitoring and management, and flood management programs.

Since the 2008 Judgment, the NCMA has taken the lead in cooperative management of its management area. The NCMA Technical Group met monthly (at a minimum) throughout 2014 and has been an active participant in the Santa Maria Groundwater Basin Management Area (SMGBMA) technical subcommittee, which formed in 2010. The purpose of the SMGBMA technical subcommittee is to coordinate efforts among the management areas such as enhanced monitoring of groundwater levels and improved sharing of data. The SMGBMA technical subcommittee met once in 2014. With the deepening groundwater depression in the NMMA and elimination of the western groundwater gradient, greater communication, analytical collaboration, and data sharing between NCMA and NMMA must be achieved.

6.1.7 Encourage Water Conservation

Strategies:

- Share updated water conservation information
- Implement UWMPs

Discussion:

Water conservation, or water use efficiency, is linked to the monitoring of supply and demand and the management of pumping. Water conservation reduces overall demand on all sources, including groundwater, and supports management objectives to manage groundwater levels and prevent seawater intrusion. In addition, water conservation is consistent with State policies seeking to achieve a 20% reduction in water use by the year 2020. Water conservation activities in the NCMA are summarized in various documents produced by the Northern Cities, including the 2010 Urban Water Management Plans of Arroyo Grande, Grover Beach, and Pismo Beach.

The Northern Cities implement water conservation activities to reduce water use and thus reduce groundwater demand. The Cities participate in a wide range of water conservation activities designed to educate the public on ways to reduce water use.

City of Arroyo Grande

The City of Arroyo Grande implemented in 2014 a series of water conservation restrictions as well as offered a comprehensive program of water conservation incentives. The mandatory water conservation measures include:

- Use of water which results in excessive gutter runoff is prohibited.
- No water shall be sued for cleaning driveways, patios, parking lots, sidewalks, streets, or other such use except where necessary to protect the public health and safety.
- Outdoor water use for washing vehicles shall be attended and have hand-controlled water devices.
- Outdoor irrigation is prohibited between the hours of 10:00 a.m. and 4:00 p.m.
- Irrigation of private and public landscaping, turf areas and gardens is permitted at even-numbered addresses only on Mondays and Thursdays and at odd-numbered addresses only on Tuesdays and Fridays.
- No irrigation of private and public landscaping, turf areas and gardens is permitted on Wednesdays. Irrigation is permitted at all addresses on Saturdays and Sundays.
- In all cases, customers are directed to use no more water than necessary to maintain landscaping.
- Emptying and refilling swimming pools and commercial spas are prohibited except to prevent structural damage and/or to provide for the public health and safety.
- Use of potable water for soil compaction or dust control purposes in construction activities is prohibited.

More than 50% of the City's water use goes to landscaping, with most of the water used in the five months between May and September. To help manage the resource, the City offers several water conservation rebate programs designed to decrease the high summer usage. The conservation programs include:

- *Cash for Grass*. The program rebates water customers for each square foot of grass (500 square feet minimum) and replaced with drought tolerant plants or mulch.
- *Mandatory Plumbing Retrofit*. Upon change of ownership of any residential property, the seller must retrofit the property's plumbing fixtures to meet defined low-water use criteria.
- *Smart Irrigation Controller and Sensor Program*. The City offers Smart Irrigation Controllers and Sensors at no charge to customers to encourage residents to upgrade their old irrigation controllers with new weather-based sensor technology.
- *Washing Machine Rebate*. This program pays water customers a one-time rebate for the installation of a certified energy efficient tier 3 washing machine.

The water conservation efforts of Arroyo Grande have been successful; the ongoing programs have decreased water use per residential connection from 186 gallons per capita per day (gpcd) in 2010 to 144 gpcd in 2014. With a defined target per capita usage for 2020 of 149 gpcd (based on the City's 2010 UWMP), the City has exceeded its conservation goals originally set in 2010.

City of Pismo Beach

The City of Pismo Beach approved several Water Conservation Incentive Programs in 2014 to help reduce water consumption and ensure reliable future water supply. The programs include:

- *Cash for Grass*. The program reimburses residents for each square foot of lawn removed and replaced with drought tolerant landscaping, which is required to have drip or micro spray irrigation and be on an automatic timer.
- *Washing Machine Rebate*. This program will pay a one-time amount for the purchase and installation of a certified energy efficient tier 3 washing machine.
- *Smart Irrigation Controller Program*. This program pays a one-time amount towards the cost of a new irrigation controller and associated sensors.
- *Irrigation Retrofit Program*. This program provides a one-time rebate for conversion of a manually operated irrigation system to automatic irrigation.
- *Commercial Urinal Rebate Program*. This program provides a one-time rebate for each conventional flushing urinal with a flushless urinal.
- *High Efficiency Toilet Rebate Program*. This program provides a one-time rebate for each 3.5 gallon per flush or higher toilet replaced with a 1.28 gallon per flush or lower toilet.

In July 2014, the City of Pismo Beach declared a "Severely Restricted Water Supply" with modified restrictions, including:

- Use of water which results in excessive gutter runoff is prohibited.
- No outdoor water use – except irrigation.
    - No water shall be used for cleaning driveways, patios, parking lots, sidewalks, streets or other such uses except where necessary to protect the public health and safety;
    - Outdoor water use for washing vehicles or boats shall be attended and have hand-controlled watering devices.
    - Using potable water in decorative water features that do not recirculate the water is prohibited.
- Outdoor Irrigation.
    - Outdoor irrigation is prohibited between the hours of ten a.m. and four p.m.;
    - Irrigation of private and public landscaping, turf areas and gardens is permitted at even- numbered addresses only on Mondays and Thursdays and at odd-numbered addresses only on Tuesdays and Fridays.
    - Using outdoor irrigation during and 48 hours following measurable precipitation is prohibited.
- Restaurants shall serve drinking water only in response to a specific request by a customer.

- Hotels and Motels must provide guests with the option of not having towels and linens laundered daily.
- Use of potable water for compaction or dust control purposes in construction activities is prohibited.

The water conservation efforts of Pismo Beach helped reduce water consumption in the City by 12.5% in 2014 compared to 2013. Based on a per capita residential water use of 236 gallons per capita per day (gpcd) in 2010, the City is committed to implementing these water conservation programs to help reach its per capita water use goals of 192 gpcd by 2020.

City of Grover Beach

In June 2014, the City of Grover Beach declared a Stage III Water Shortage that requires all water customers to reduce their water usage by 10%. Many of the prohibitions that had previously been voluntary during the two years of the Stage II Water Shortage Declaration became mandatory with the Stage III declaration. The declaration also provides the City with the authority to impose penalties for failure to comply with the water reduction or use prohibitions. These prohibitions include:

- Washing of sidewalks, driveways, or roadways where air-blowers or sweeping provides a reasonable alternative.
- Refilling of private pools except to maintain water levels.
- Planting of turf and other new landscaping, unless it consists of drought tolerant plants.
- Washing vehicles, boats, etc. without a quick-acting shut-off nozzle on the hose.
- Washing any exterior surfaces unless using a quick-acting shut-off nozzle on the hose.
- Restaurant water service, unless requested.
- Use of potable water for construction purposes, unless no other source of water or method can be used.
- Operation of ornamental fountain or car wash unless water is re-circulated.

Grover Beach has implemented demand management rebate programs including “Cash for Grass” rebates, Smart Irrigation Controller and Sensor rebates, and Washing Machine rebates. The 10-year baseline average water use for Grover Beach is 140.7 gpcd. The target water use for 2015 is 127 gpcd, while the target water use for 2020 is 113 gpcd.

Oceano Community Services District

Due to the population of its service area, Oceano CSD is not required to prepare an UWMP or reduce water consumption by 20% by 2020; however the OCSD encourages water conservation and has achieved a 10.85% demand reduction due to conservation since the State policy was enacted. In April 2015, the Oceano CSD adopted a rate increase that included conservation measures to meet a 20% reduction in comparison to 2013. If the 20% conservation goal is not achieved, the generated excess revenues will be dedicated to conservation programs.

6.1.8 Evaluate Alternative Sources of Supply

Strategies:

- Evaluate expanded use of recycled water;
- Analyze capacity of the Lopez Lake and Coastal Branch pipelines to maximize deliveries of surface water. The following analyses have been completed:
    - Lopez Pipeline Capacity Evaluation
    - Lopez Pipeline Capacity Re-Evaluation
    - Coastal Branch Capacity Assessment
- Optimize existing surface water supplies, including surface water storage through the development of a framework for interagency exchanges and transfers, including SWP and Lopez supplies
- Maximize Lopez pipeline capacity
- Improve Lopez WTP capacity and reliability

Discussion:

The Northern Cities continue to evaluate alternative sources of water supply which could provide a more reliable and sustainable water supply for the NCMA. An expanded portfolio of water supply sources will support sustainable management of the groundwater resource and help to reduce the risk of water shortages. These alternative sources include:

State Water Project

Oceano CSD and Pismo Beach are currently SWP customers and could utilize additional water deliveries. Pismo Beach has increased its SWP allocation by securing a "drought buffer" to increase the availability of supply during periods of SWP shortfalls. Grover Beach and Arroyo Grande are not SWP customers.

Water Recycling

As discussed in Section 6.1.5, the SSLOCSD is in the process of preparing a Water Recycling Facilities Planning Study to evaluate and select a preferred alternative for a Satellite Water Resource Recovery Facility or scalping plant to develop recycled water as a supplemental water supply source and improve the water supply reliability for the member agencies, including the cities of Arroyo Grande and Grover Beach and the Oceano Community Services District.

Section 6.1.5 also includes a description of efforts in 2014 by the City of Pismo Beach to prepare a Recycled Water Facilities Planning Study that will enable the City to produce recycled water to augment its water supply. Construction of the new facility will allow the City to utilize recycled water to recharge the groundwater basin and provide a new, drought proof, source of water supply for the area.

Lopez Lake Expansion

In 2008, San Luis Obispo County sponsored a preliminary assessment of the concept of installing an inflatable rubber dam at the Lopez Dam spillway. Subsequently, the SLOCFCWCD

Service Area 12 and the Cities of Arroyo Grande, Grover Beach and Pismo Beach funded a study to further analyze the feasibility of increasing the yield of Lopez Lake by raising the spillway height with an inflatable dam or permanent extension. The study was finalized in 2013 and identified the potential to increase the annual yield from the lake by 500 AFY with a spillway height increase by 6 feet (Stetson 2013). The NCMA agencies are continuing to evaluate other aspects of the project, including pipeline capacity and impacts on the HCP process (Stetson 2013).

Desalination

In 2006, Arroyo Grande, Grover Beach, and Oceano CSD utilized Prop 50 funds to complete a feasibility study on desalination as an additional water supply option for the NCMA. This alternative supply is not considered to be a viable option at this time.

Nacimiento Pipeline Extension

In 2006, Arroyo Grande, Grover Beach, and Oceano CSD completed a Nacimiento pipeline extension evaluation to determine the feasibility of delivery water from the Nacimiento reservoir to the NCMA. This alternative supply is not considered to be a viable option at this time.

7.0 REFERENCES

California Department of Water Resources (DWR). 1958. San Luis Obispo County Investigation, Bulletin No. 18, vol 1 and 2.

California Department of Water Resources (DWR). 1970. Sea-Water Intrusion: Pismo-Guadalupe Area. Bulletin No. 63-3,76 p.

California Department of Water Resources (DWR). 1975. Sea-Water Intrusion in California, Inventory of Coastal Ground Water Basins, Bulletin 63-5.

California Department of Water Resources (DWR). 1979. Ground Water in the Arroyo Grande Area, Southern District Report.

California Department of Water Resources. 2002. Water resources of the Arroyo Grande – Nipomo Mesa area: Southern District Report, 156 p.

California Polytechnic State University. 2012. California Evapotranspiration Data for Irrigation District Water Balances, Irrigation Training & Research Center, San Luis Obispo, CA 93407-0730.

Carollo Engineers. 2011. City of Pismo Beach 2010 Urban Water Management Plan.

City of Arroyo Grande. 2010. City of Arroyo Grande 2010 Urban Water Management Plan.

City of Grover Beach. 2010. City of Grover Beach 2010 Urban Water Management Plan.

EDAW, Inc. August 1998. San Luis Obispo County Master Water Plan Update.

Miller, G. A. and Evenson, R. E. 1966. Utilization of Groundwater in the Santa Maria Valley Area, California. USGS Water Supply Paper 1819-A.

Northern Cities Management Area 2008 Annual Monitoring Report, prepared by Todd Engineers. April 2009.

Northern Cities Management Area 2009 Annual Monitoring Report, prepared by Todd Engineers. April 2010.

Northern Cities Management Area 2010 Annual Monitoring Report, prepared by GEI Consultants. April 2011.

Northern Cities Management Area 2011 Annual Monitoring Report, prepared by GEI Consultants. May 2012.

Northern Cities Management Area 2012 Annual Monitoring Report, prepared by GEI Consultants. April 2013.

Northern Cities Management Area 2013 Annual Monitoring Report, prepared by Fugro Consultants. April 2014.

Nipomo Mesa Management Area, 2nd Annual Report, Calendar Year 2009, prepared by the NMMA Technical Group, April 2010.

Nipomo Mesa Management Area, 3rd Annual Report, Calendar Year 2010, prepared by the NMMA Technical Group, April 2011.

Nipomo Mesa Management Area, 4th Annual Report, Calendar Year 2011, prepared by the NMMA Technical Group, April 2012.

Nipomo Mesa Management Area, 5th Annual Report, Calendar Year 2012, prepared by the NMMA Technical Group, April 2013.

Nipomo Mesa Management Area, 6th Annual Report, Calendar Year 2013, prepared by the NMMA Technical Group, April 2014.

Stetson Engineers. 2013. Lopez Lake Spillway Raise Project Report.

Superior Court of California, County of Santa Clara, in Judgment After Trial, entered January 25, 2008 incorporating 2002 Settlement Agreement among the Northern Cities, Northern Landowners, and Other Parties, and 2005 Settlement Stipulation for the Santa Maria Groundwater Basin adjudication.

Todd. 2007. Water Balance Study for the Northern Cities Area. Todd Engineers. April 2007.

Todd. 2008. Monitoring Program for the Northern Cities Management Area. Todd Engineers, July 2008.

Todd Engineers. 2010. Summary of Renovations for the Northern Cities Management Area Sentry Wells, San Luis Obispo County, California.

Wallace Group, 2010. Survey Report on the “Sentry” Well Elevation Establishment for Cities of Arroyo Grande, Grover Beach, Pismo Beach and the Oceano Community Services District.

Water Systems Consulting, Inc. (WSC), 2014, Final Draft Strategic Plan for the Northern Cities Management Area Technical Group, June 2014.

FIGURES

Legend

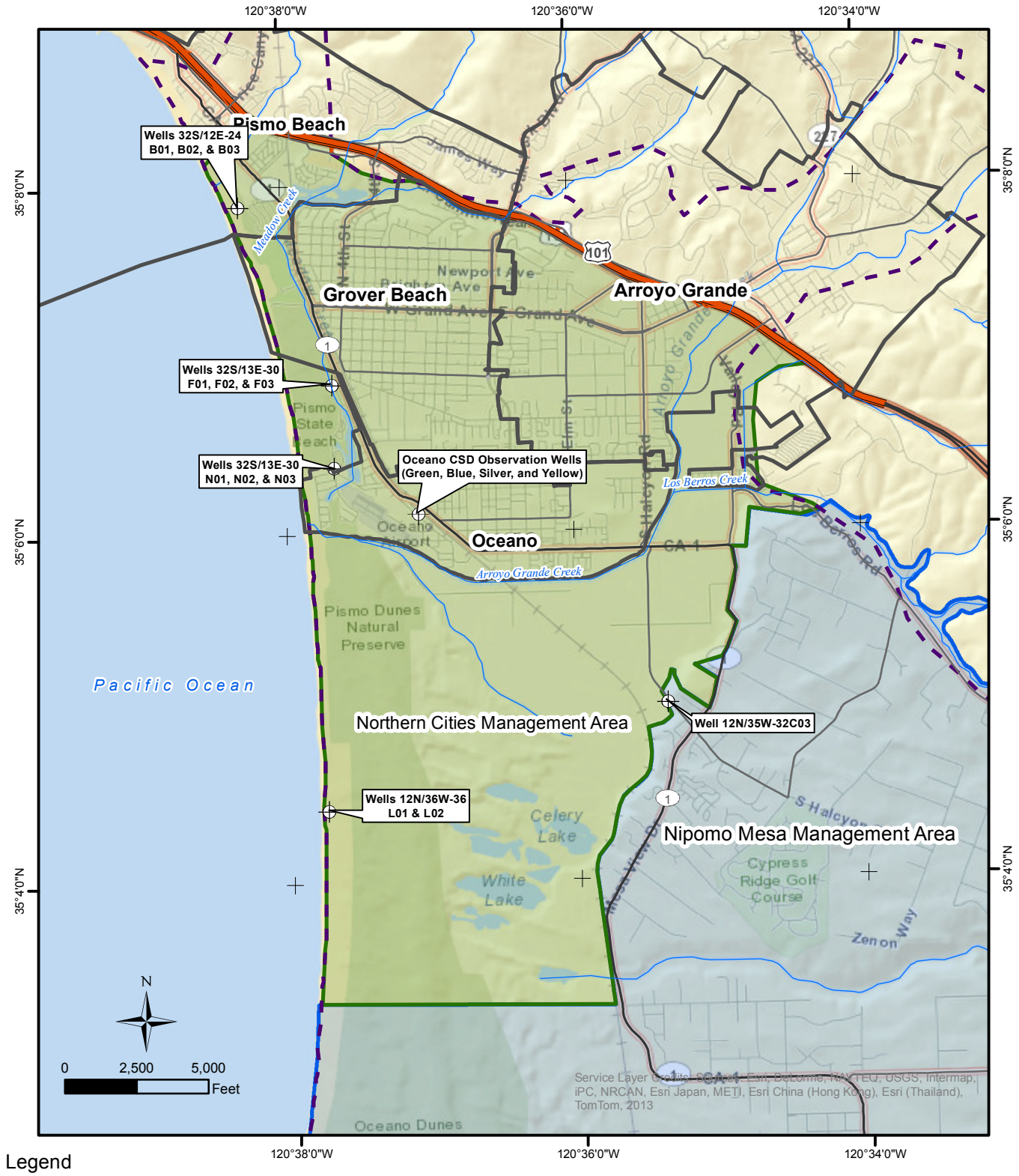
- Northern Cities Management Area
- Adjudication Area Boundary
- Santa Maria Groundwater Basin (DWR Bulletin 118)

SANTA MARIA GROUNDWATER BASIN

Northern Cities Management Area
San Luis Obispo County, California

FIGURE 1

\\Venwest10\Data5\Projects\04_2014\04_6214_0105_NCMA_2014AnnualReport\Outputs\2014_NCMA_Annual_Monitoring_Report\mxd\Figure 1 SantaMariaGroundwaterBasin.mxd, 04/01/15, tricely



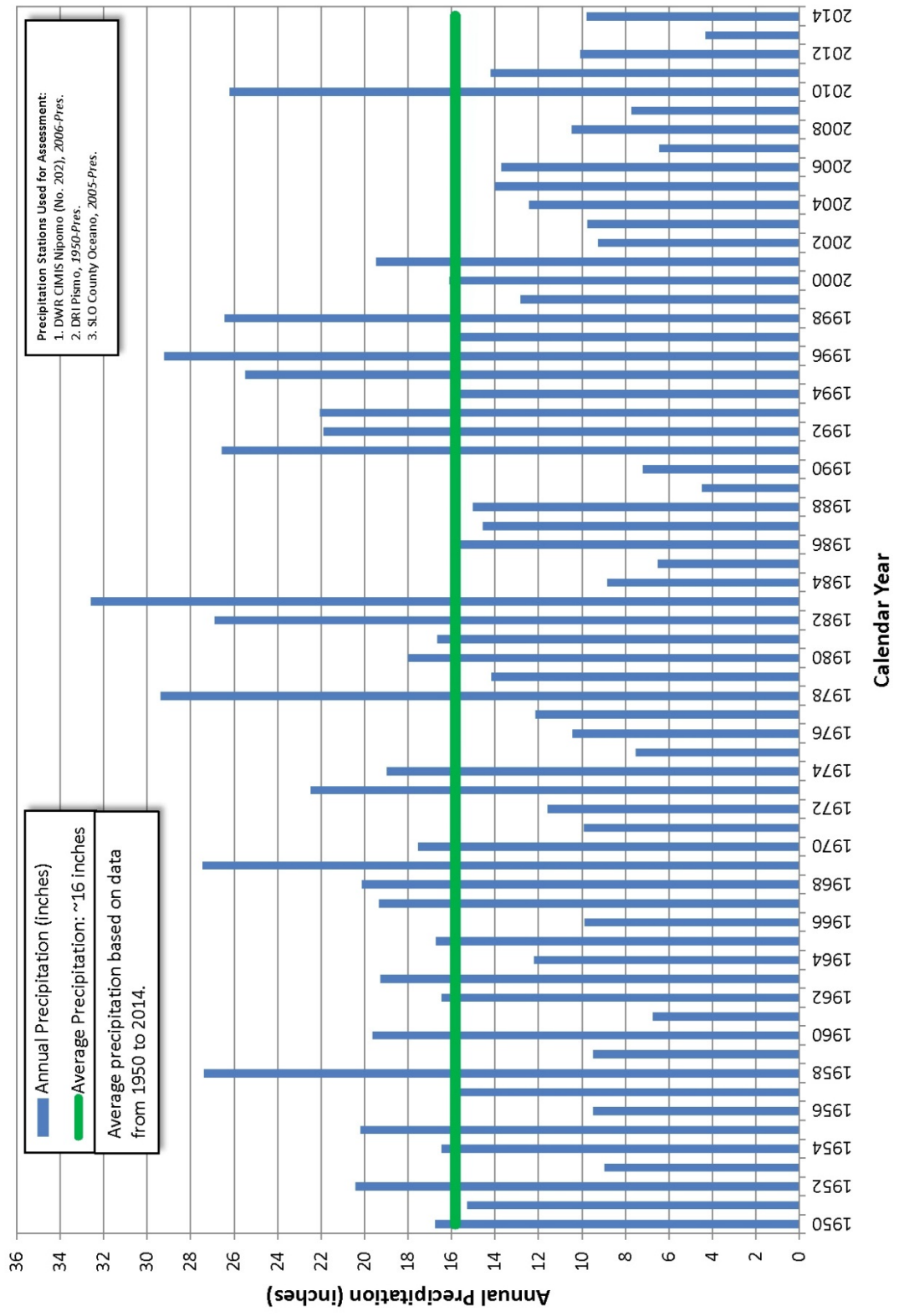
Legend

- City Limits
- Santa Maria Groundwater Basin (DWR Bulletin 118)
- Northern Cities Management Area
- Nipomo Mesa Management Area

NORTHERN CITIES MANAGEMENT AREA
Northern Cities Management Area
San Luis Obispo County, California

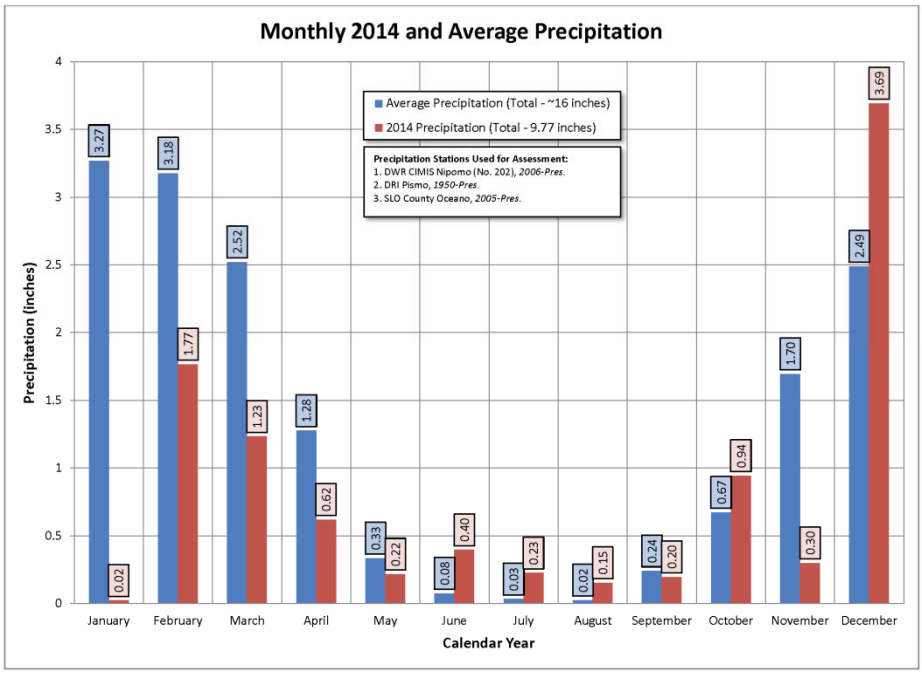
FIGURE 2

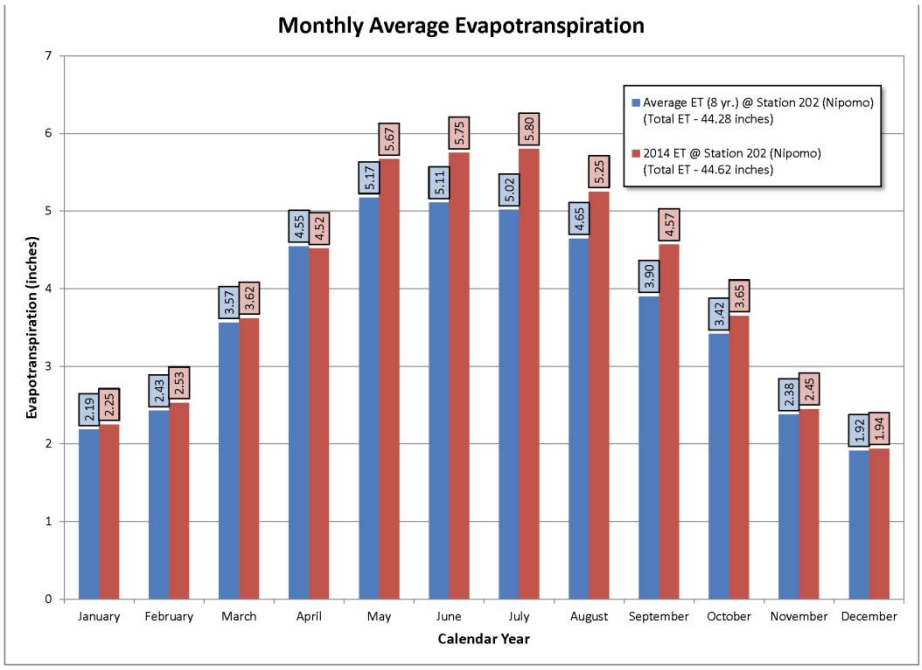
\\Venwest10\Data5\Projects\04_2014\04_6214_0105_NCMA_2014AnnualReport\Outputs\2014_NCMA_Annual_Monitoring_Report\mxd\Figure 2 Northern Cities Management Area.mxd, 04/01/15, tnicely



ANNUAL PRECIPITATION 1950 TO 2014
Northern Cities Management Area
San Luis Obispo County, California

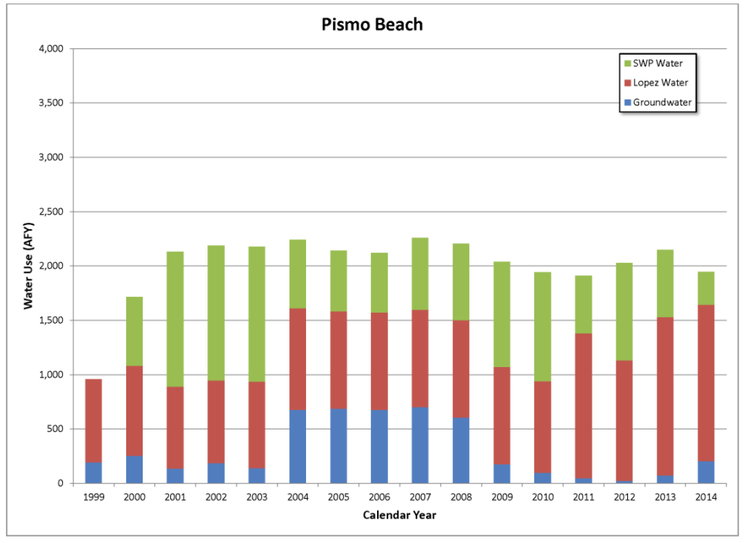
FIGURE 3

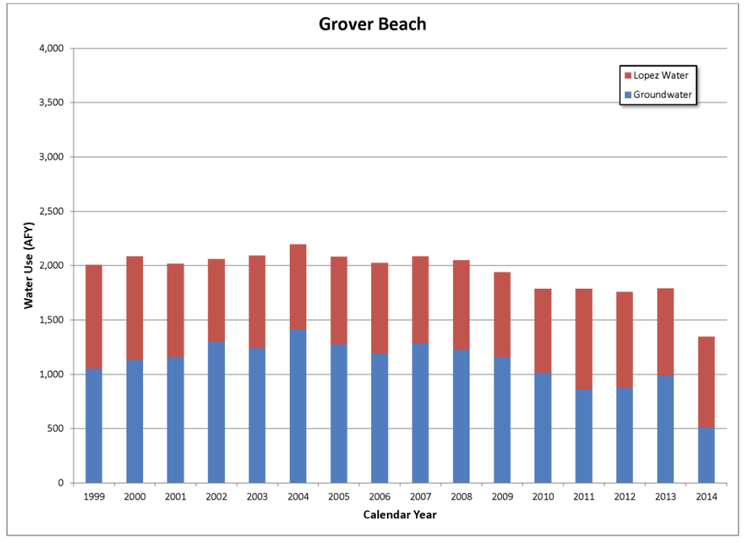


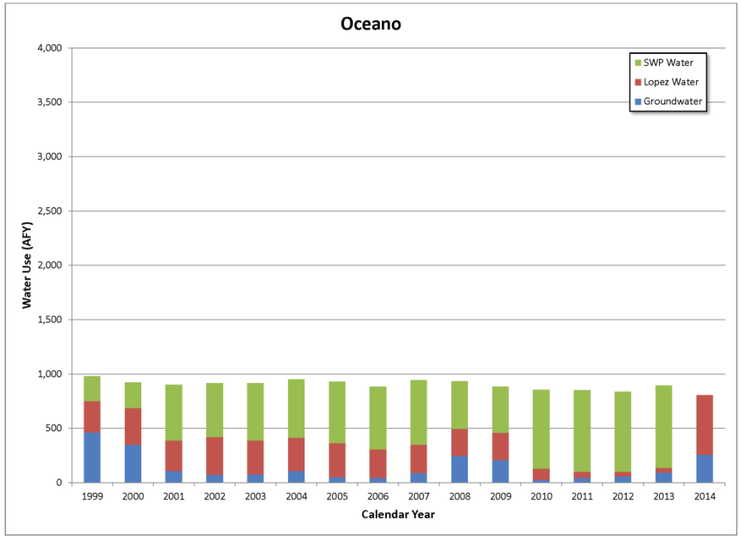


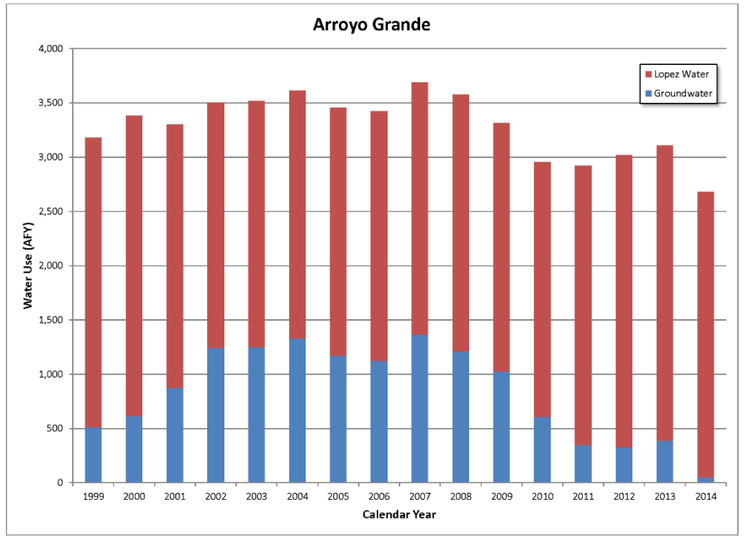
MONTHLY 2014 AND AVERAGE PRECIPITATION AND EVAPORATION
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 4



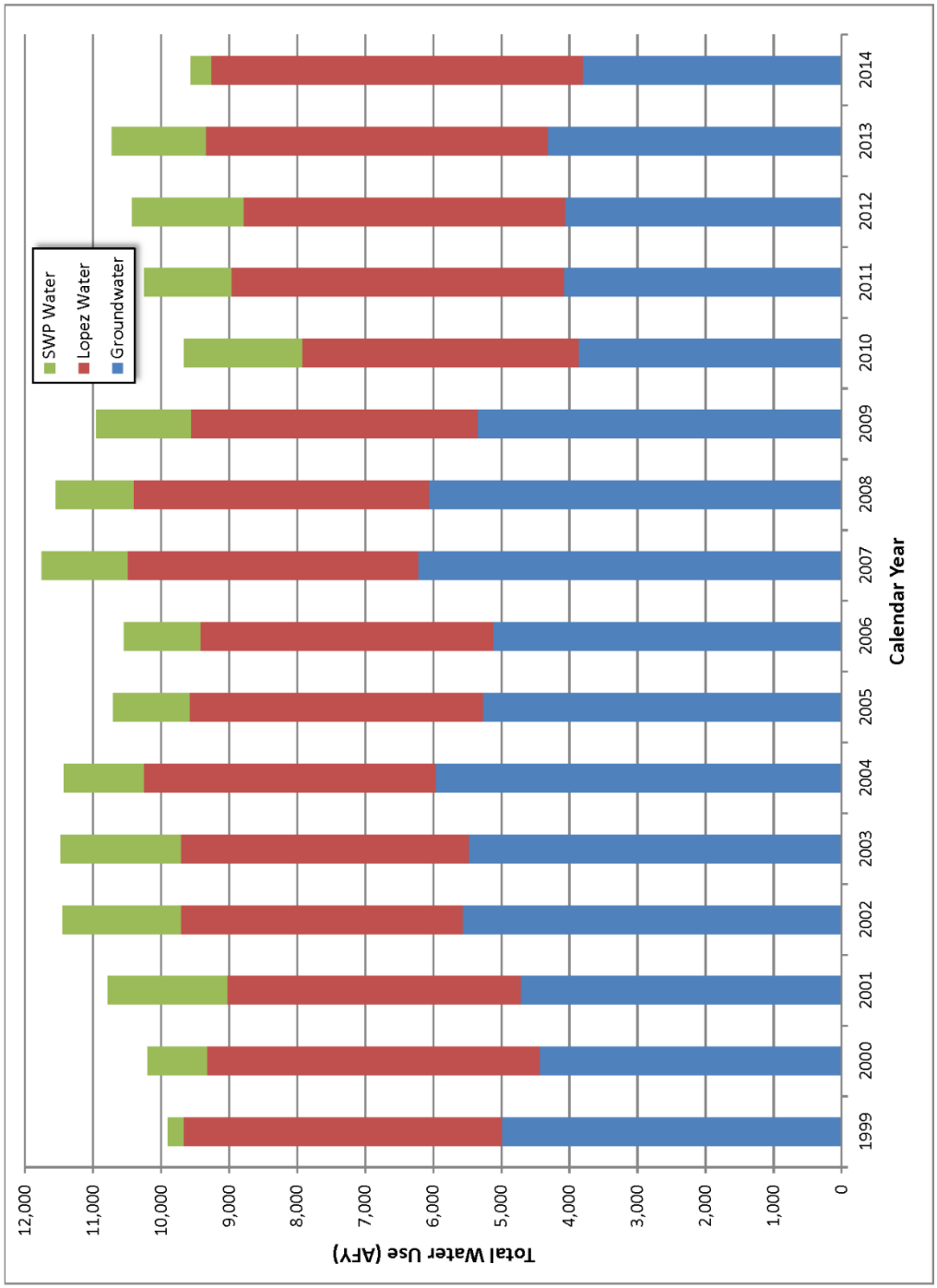






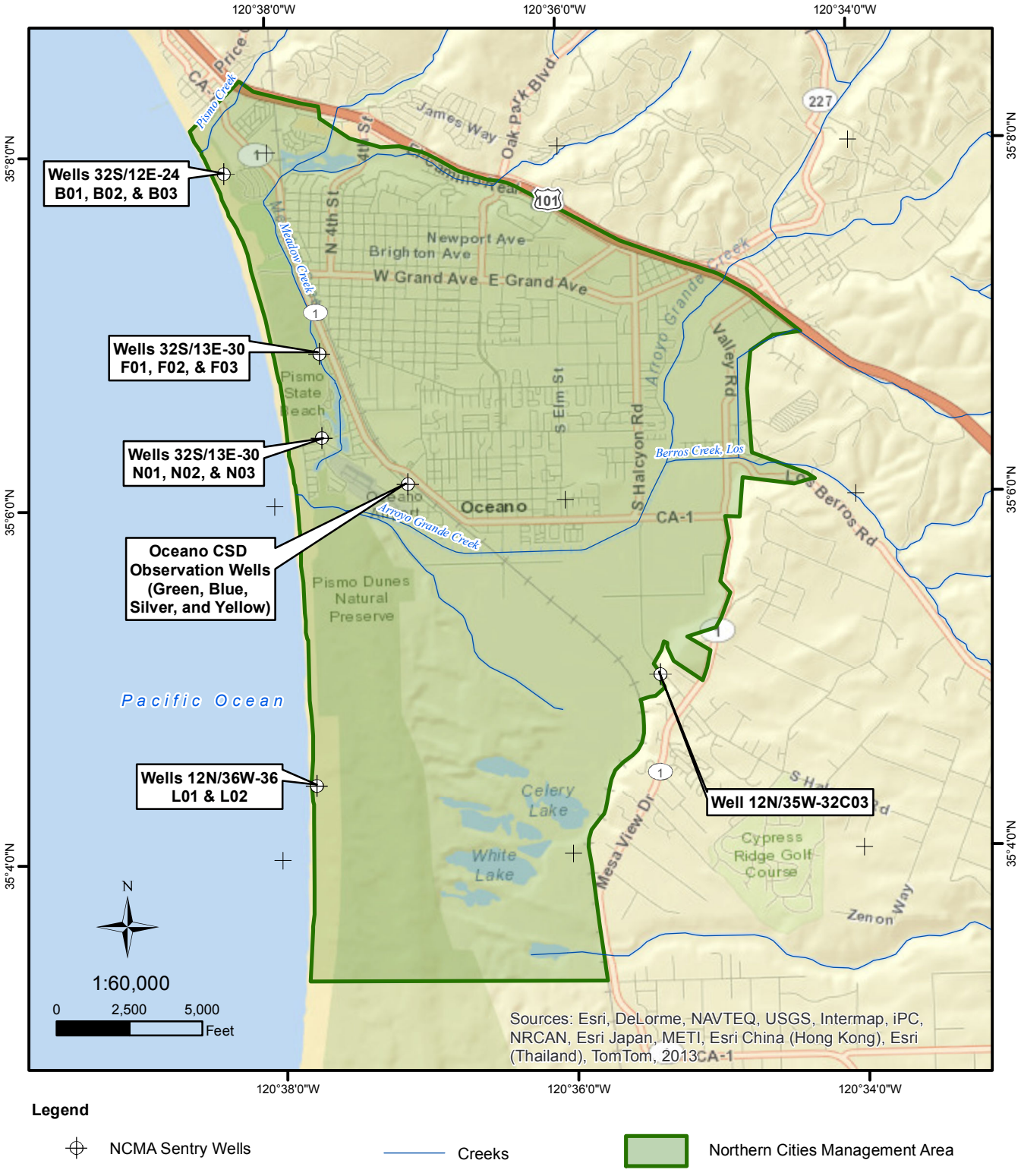
MUNICIPAL WATER USE BY SOURCE
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 5



TOTAL WATER USE BY SOURCE
Northern Cities Management Area
San Luis Obispo County, California

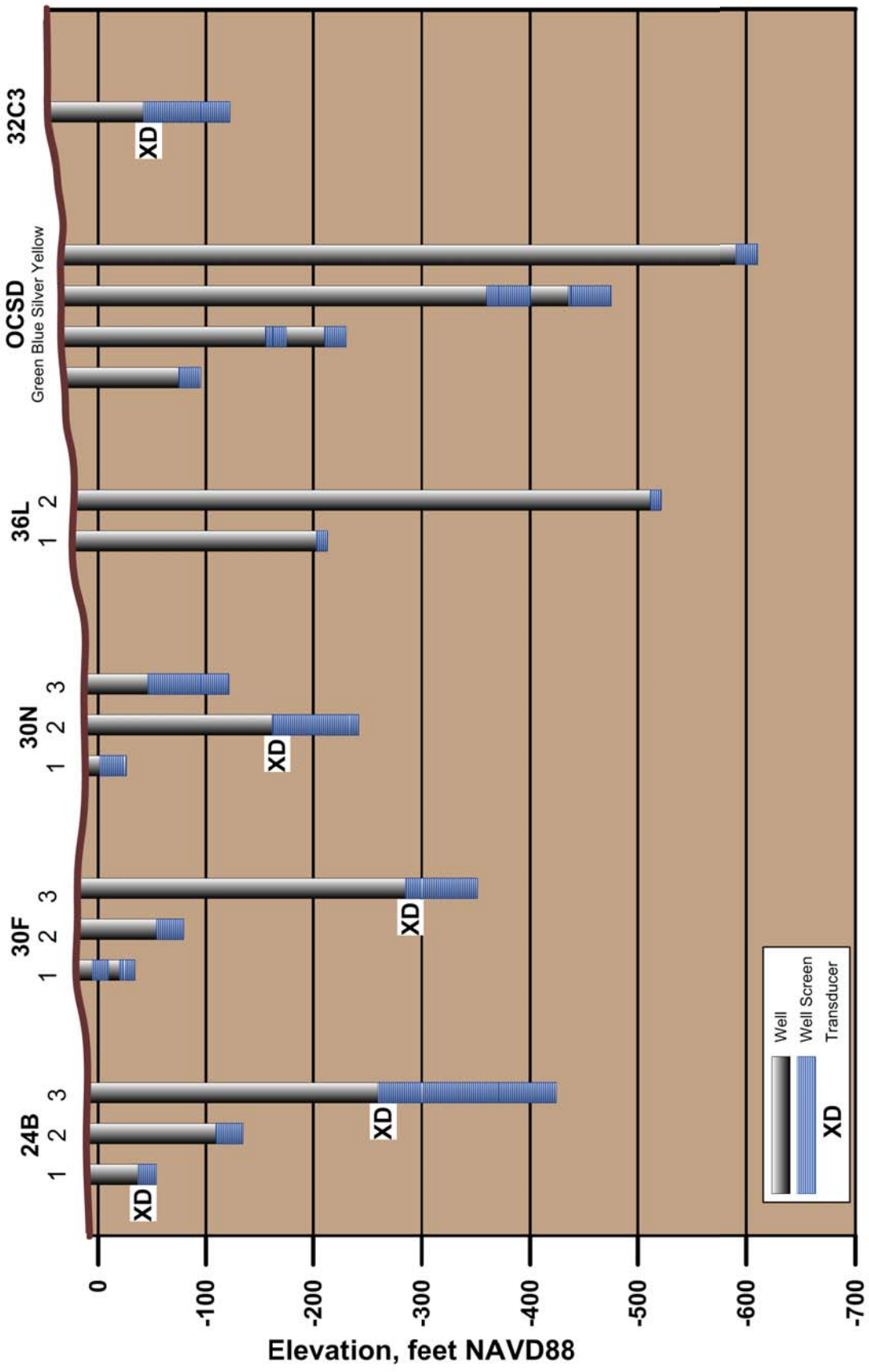
FIGURE 6



\\Venwest10\Data5\Projects\04_2014\04_6214_0105_NCMA_2014AnnualReport\Outputs\2014_NCMA_Annual_Monitoring_Report\mxd\Figure 7 Location of Sentry Wells.mxd, 04/01/15, tnicely

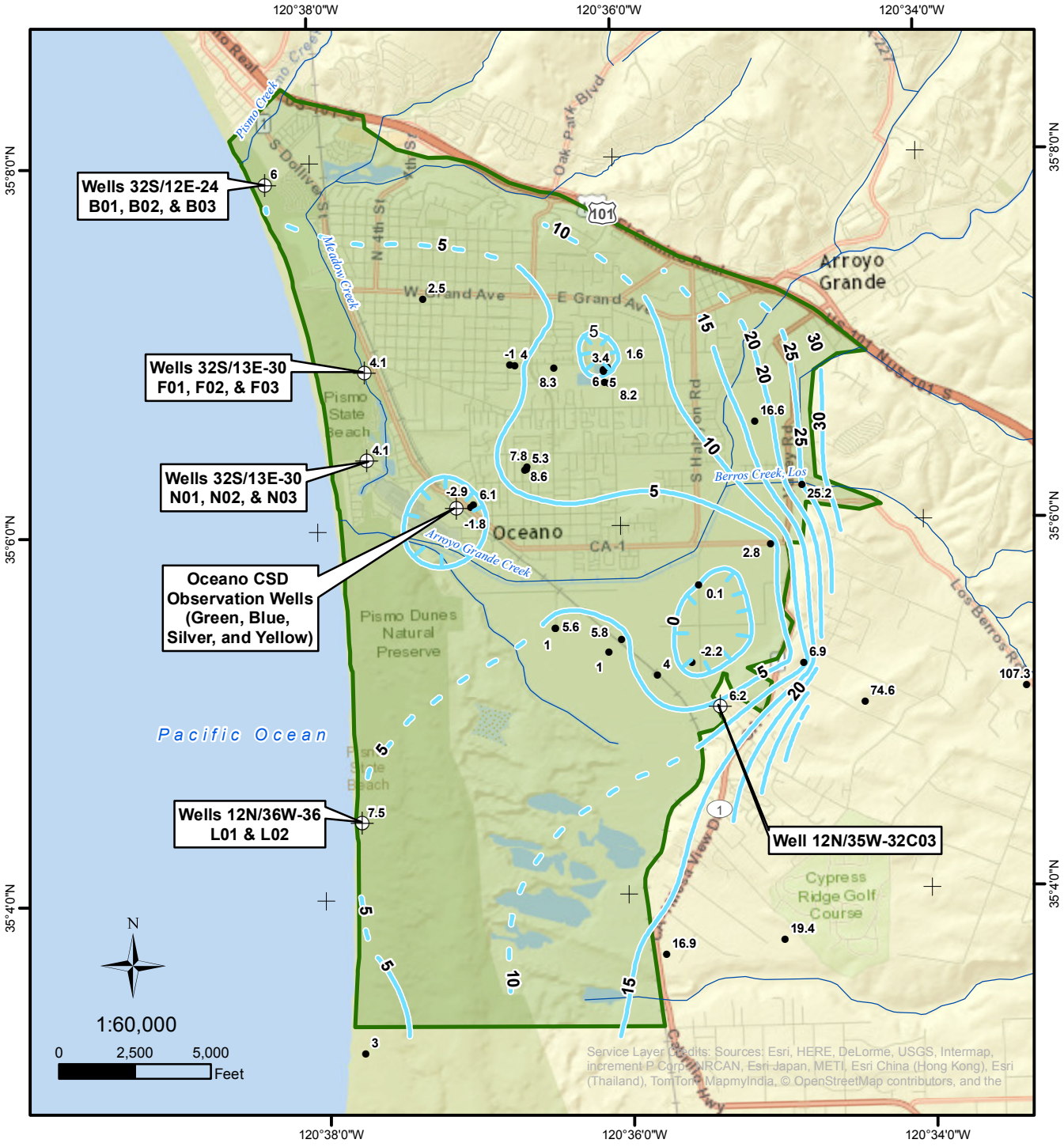
LOCATION OF SENTRY WELLS
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 7



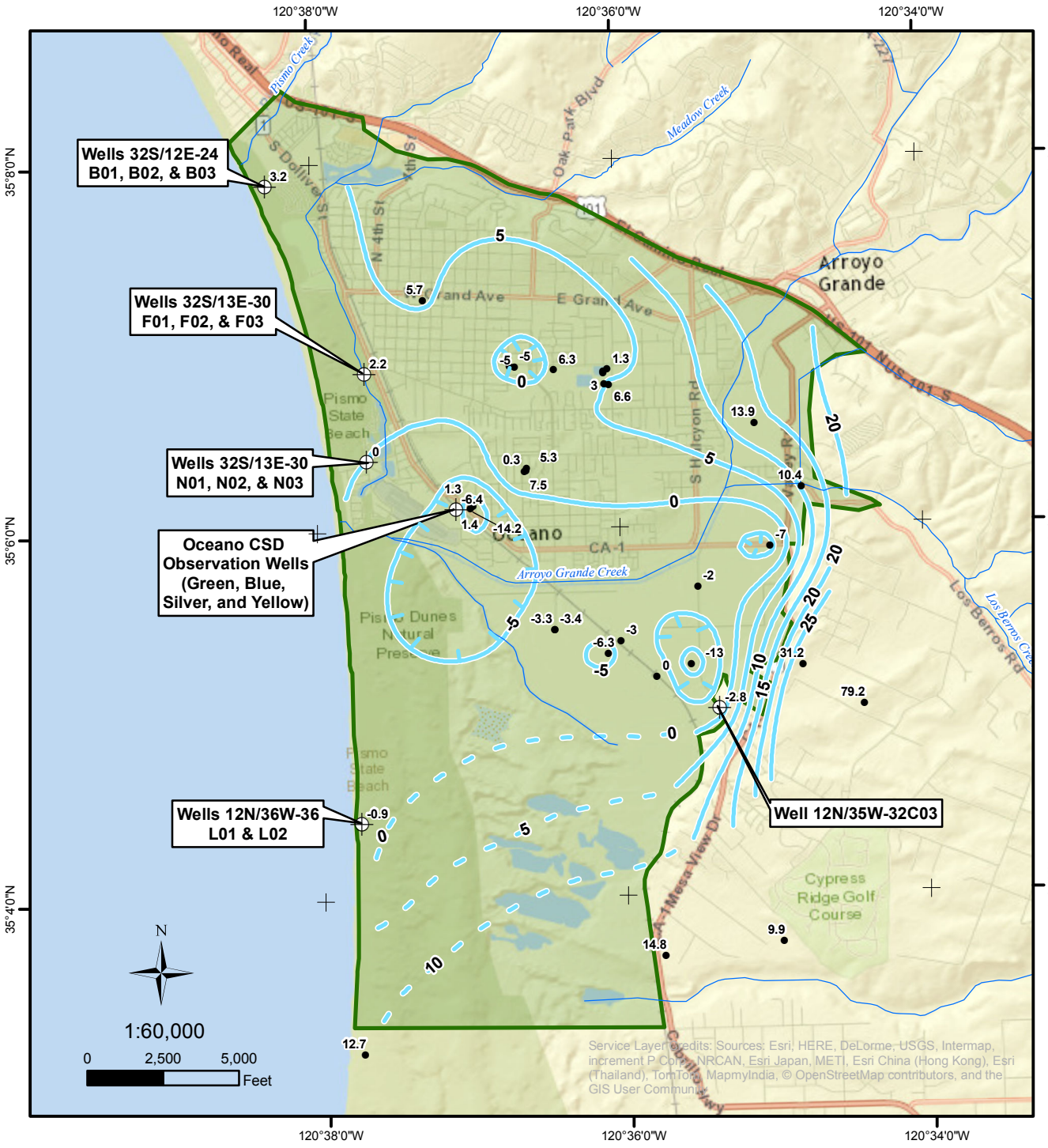
DEPTHS OF SENTRY WELLS
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 8



WATER LEVEL CONTOURS, APRIL 2014
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 9



Legend

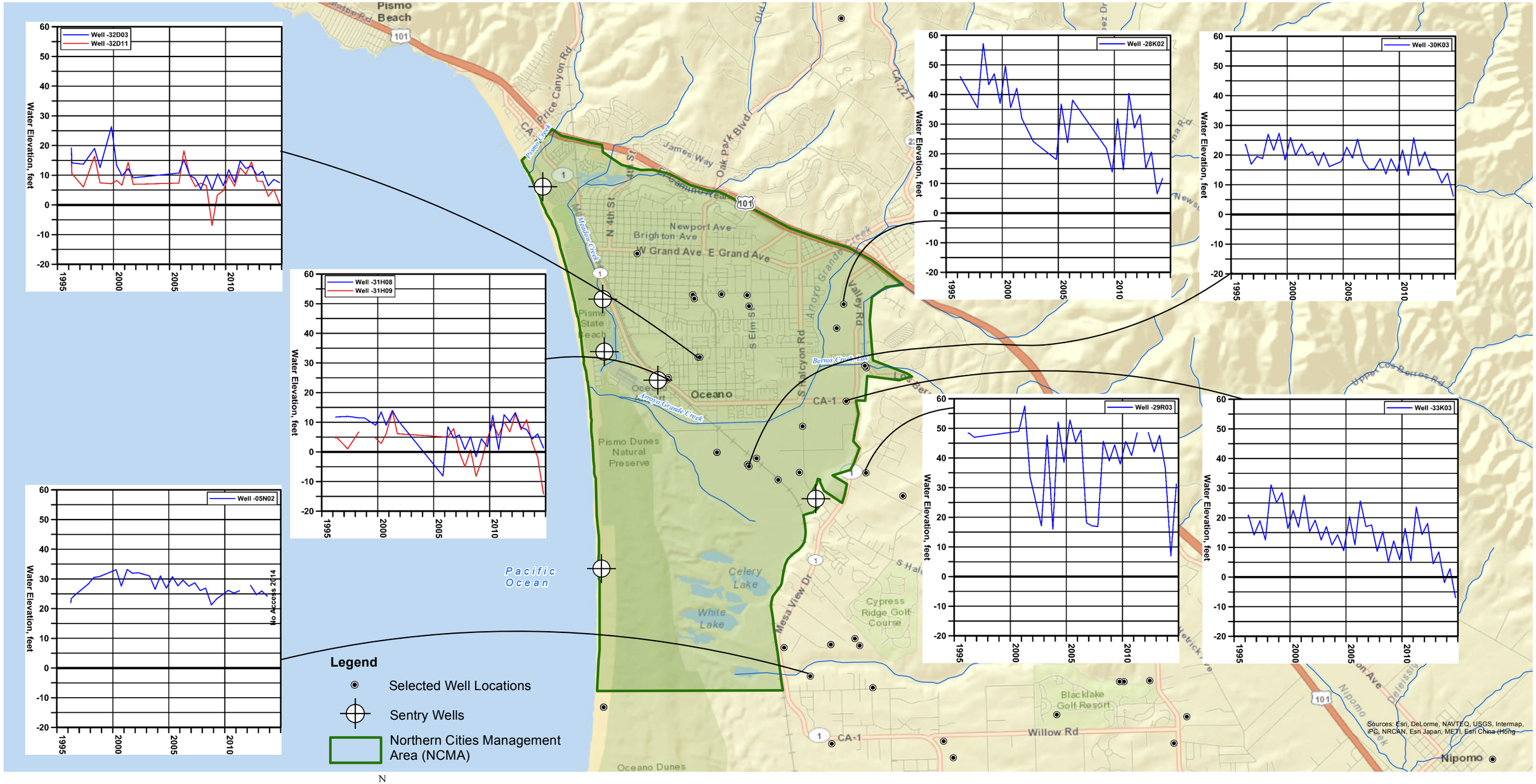
- NCMA Sentry Wells
- Wells Used in Groundwater Contouring
- 5 Water Level Contours (October 2014)
- Creeks
- Northern Cities Management Area

\\VENWEST10\Data5\Projects\04_2014\04_6214_0105_NCMA_2014AnnualReport\Outputs\2014_NCMA_Annual_Monitoring_Report\mxd\Figure 10_2014 October NCMA Contours.mxd, 2/19/2015, tnicely

WATER LEVEL CONTOURS, OCTOBER 2014

Northern Cities Management Area
San Luis Obispo County, California

FIGURE 10



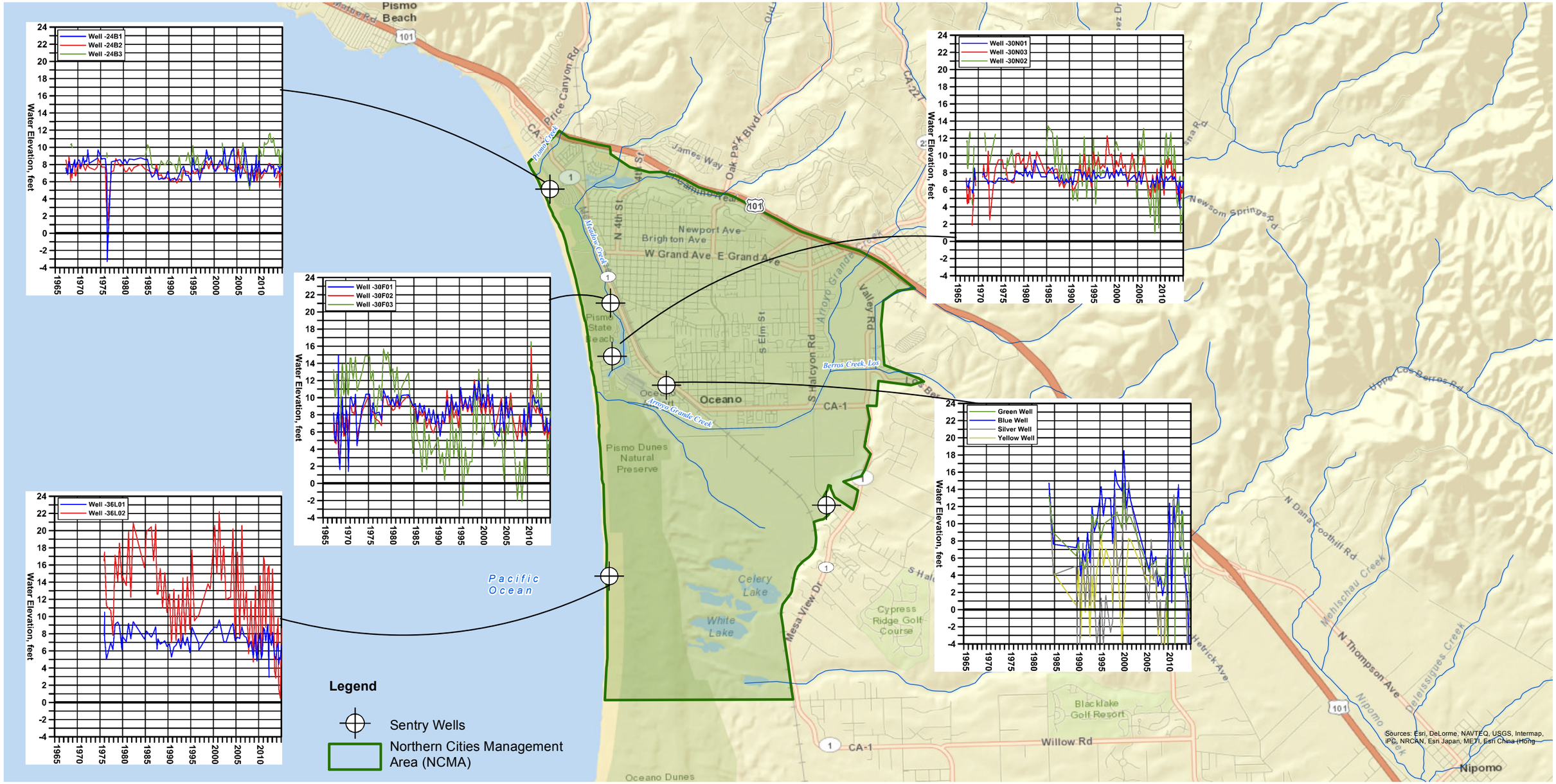
N

1 inch equals 1 mile

0 1 2 Miles

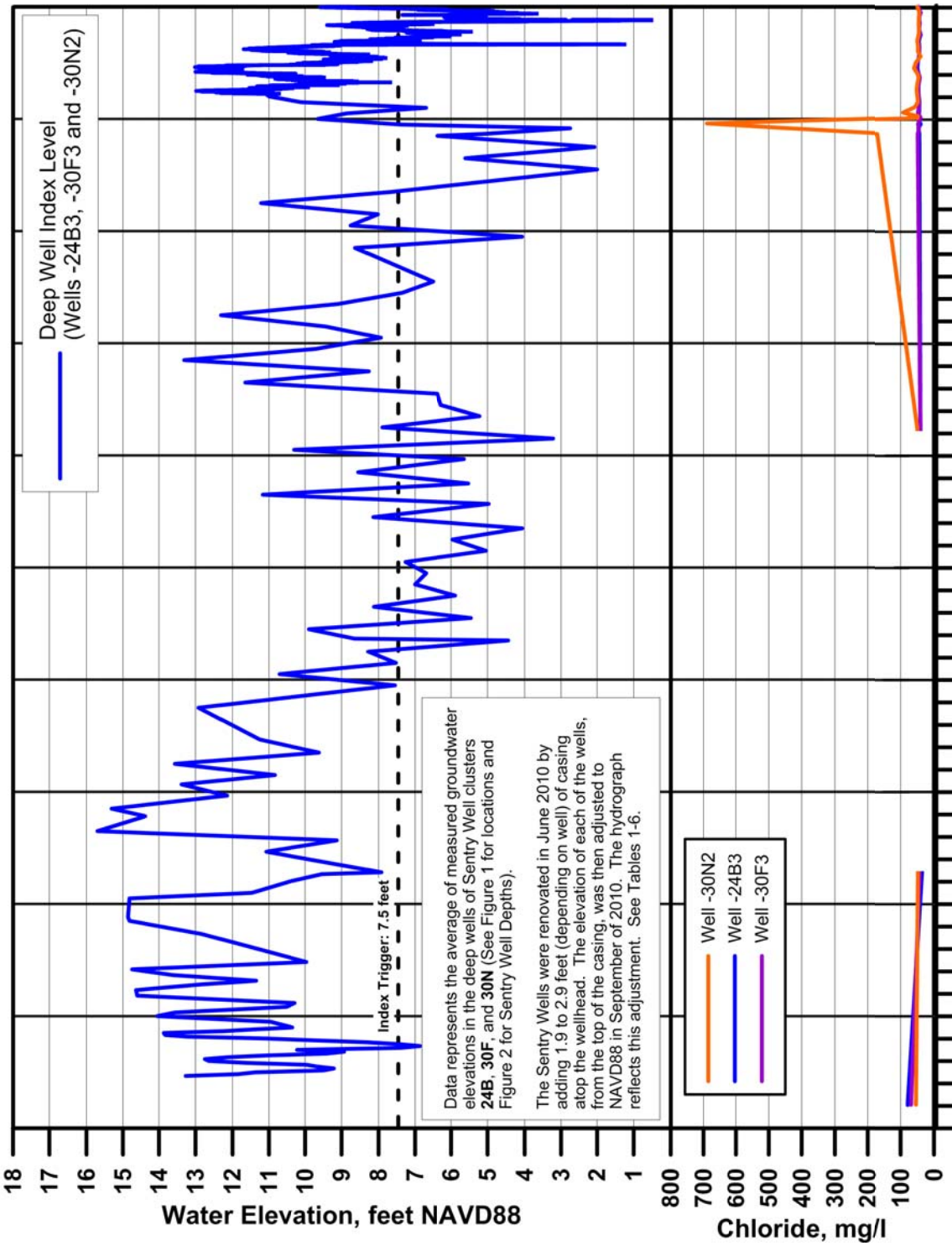
SELECTED HYDROGRAPHS
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 11



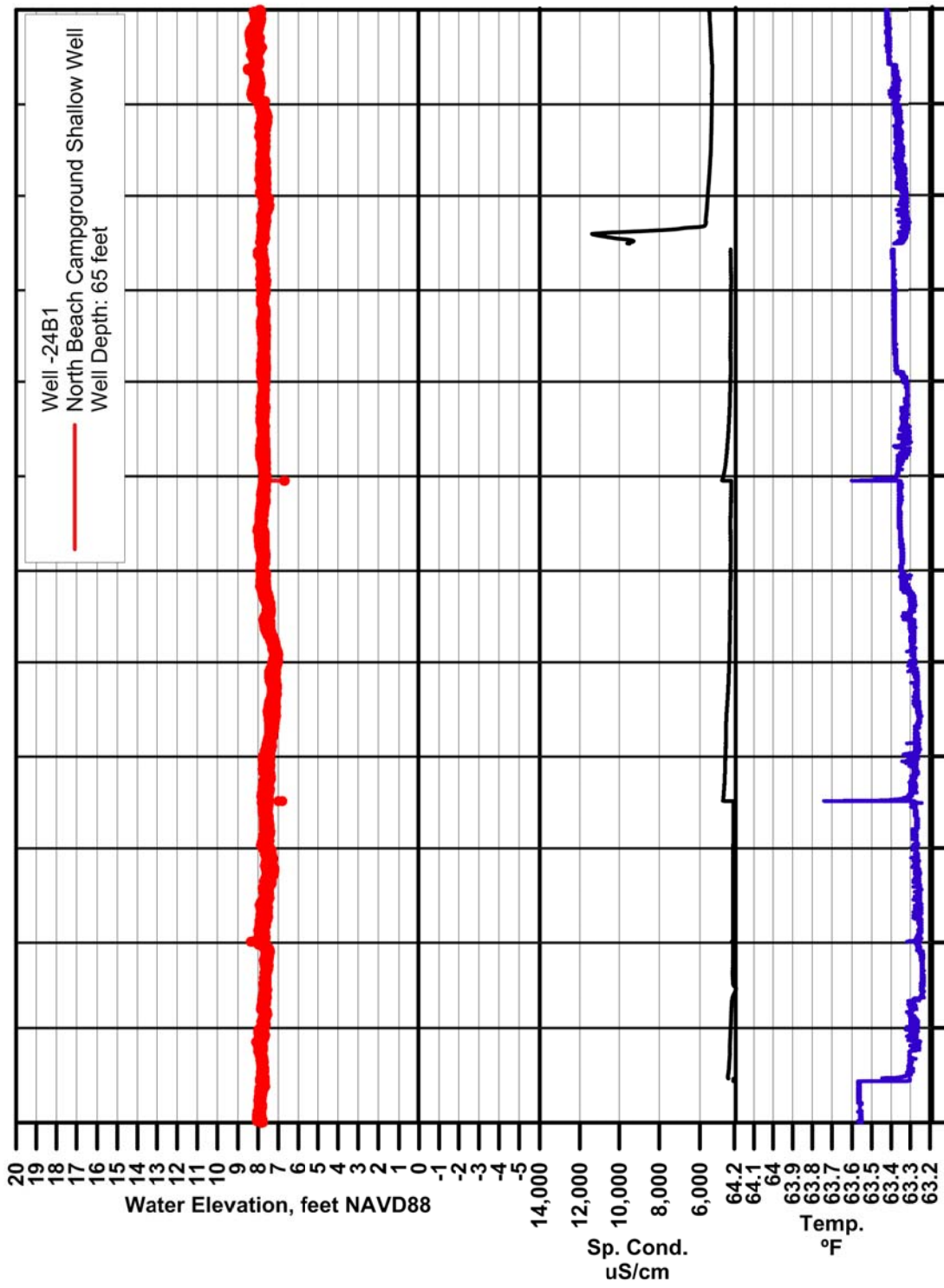
SENTRY WELL HYDROGRAPHS
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 12



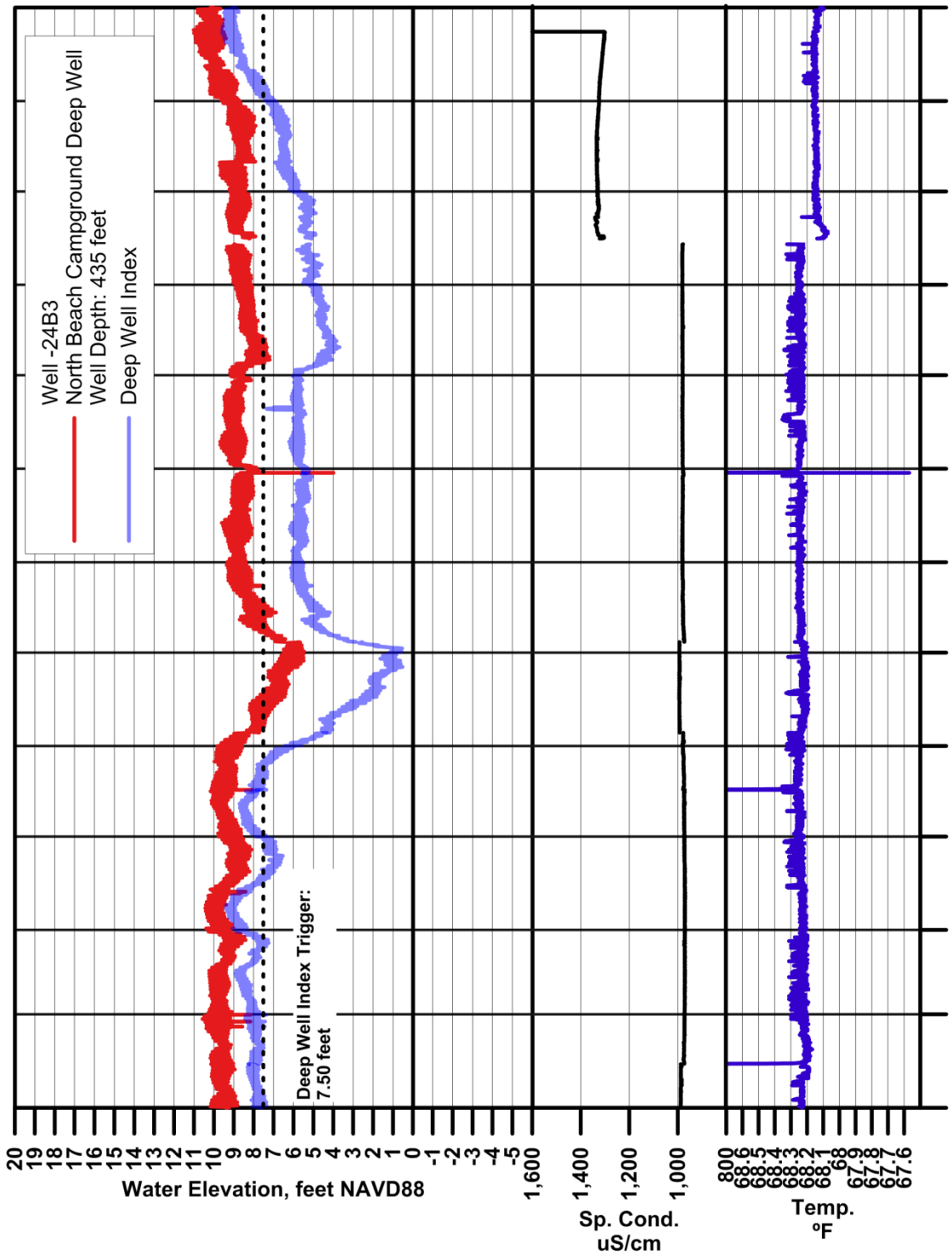
HYDOGRAPH OF AVERAGE DEEP SENTRY WELL ELEVATIONS
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 13



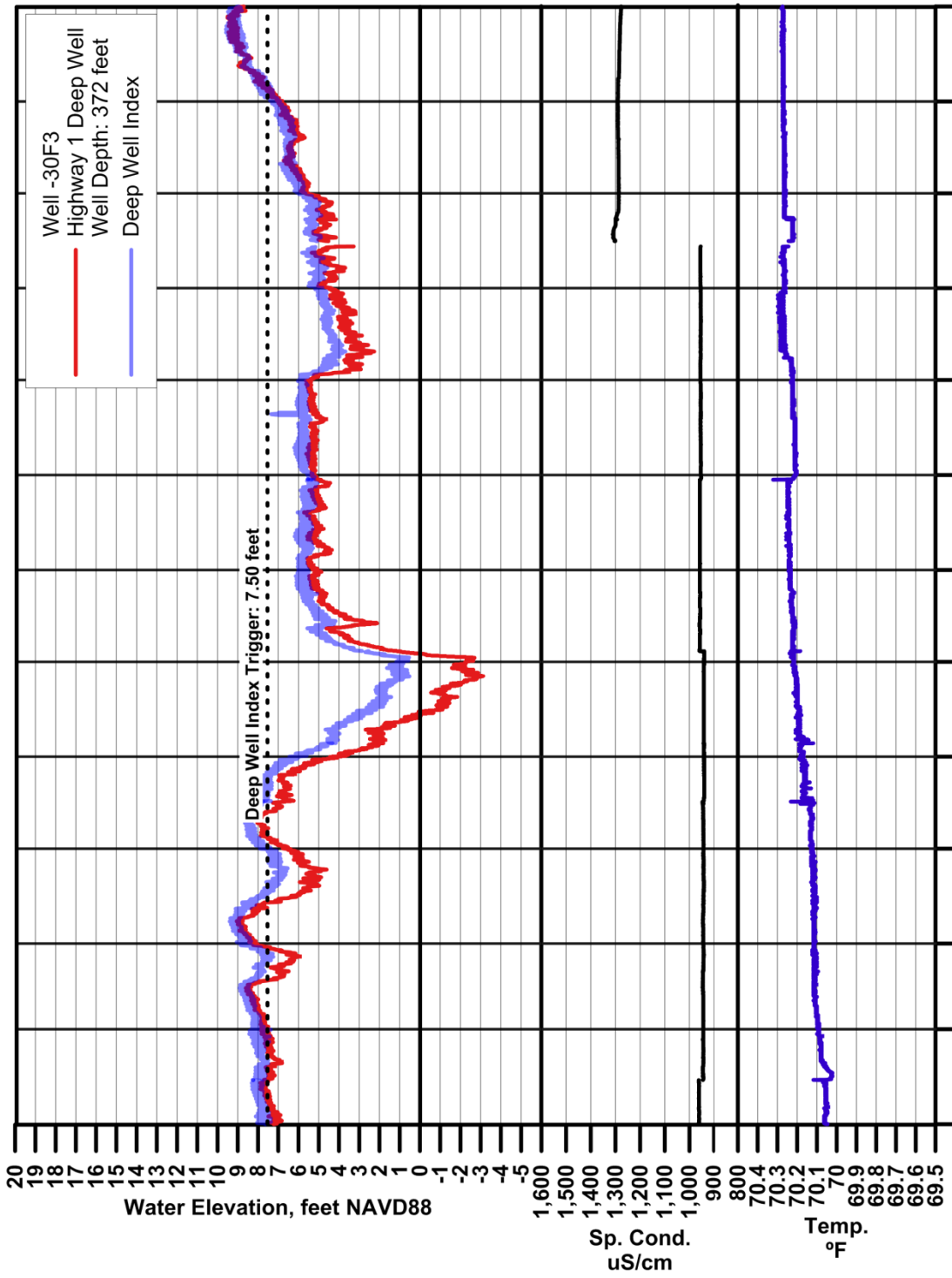
WATER ELEVATION, CONDUCTIVITY, AND TEMPERATURE, WELL 24B01
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 14



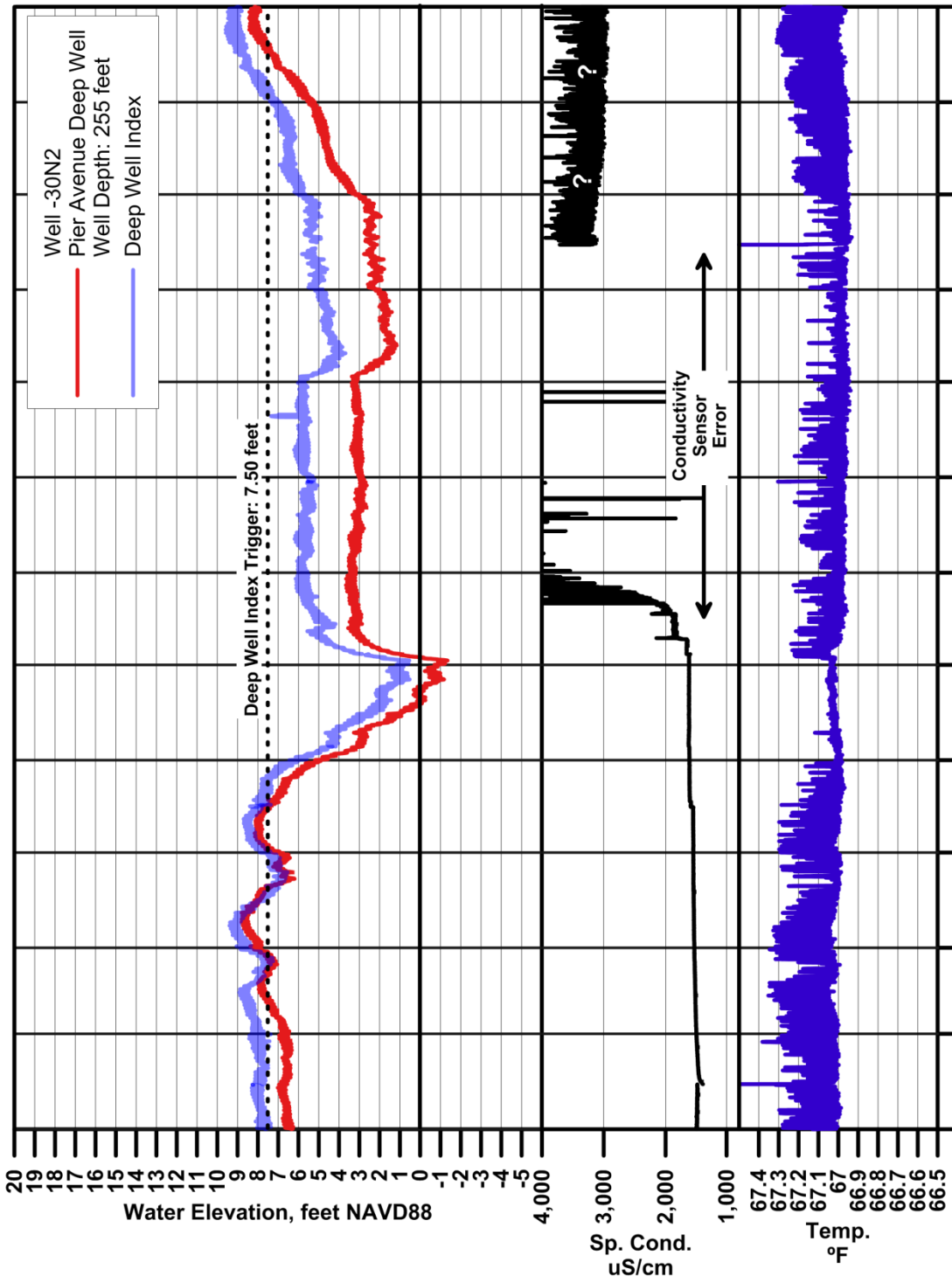
WATER ELEVATION, CONDUCTIVITY, AND TEMPERATURE, WELL 24B03
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 15



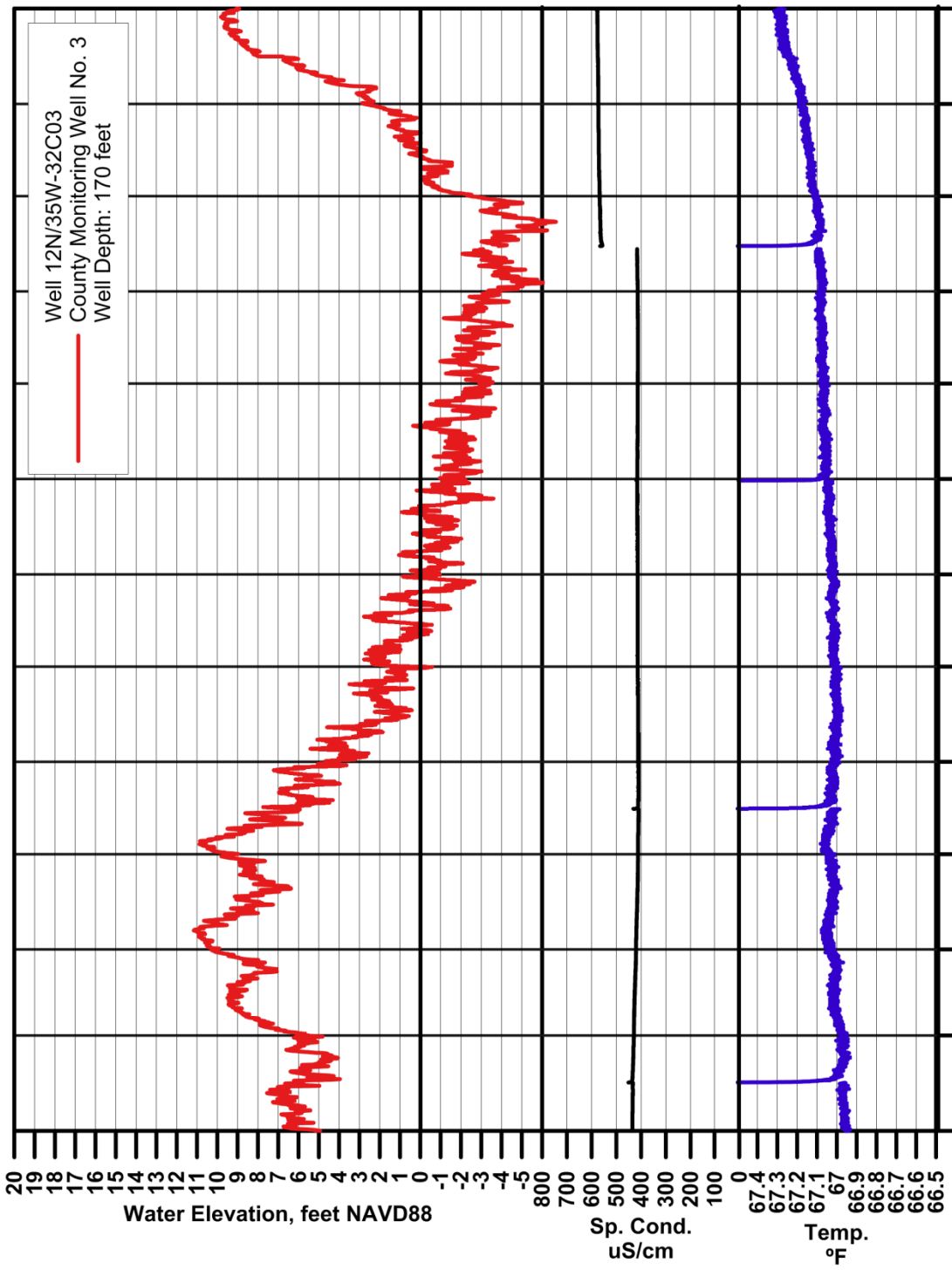
WATER ELEVATION, CONDUCTIVITY, AND TEMPERATURE, WELL 30F03
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 16



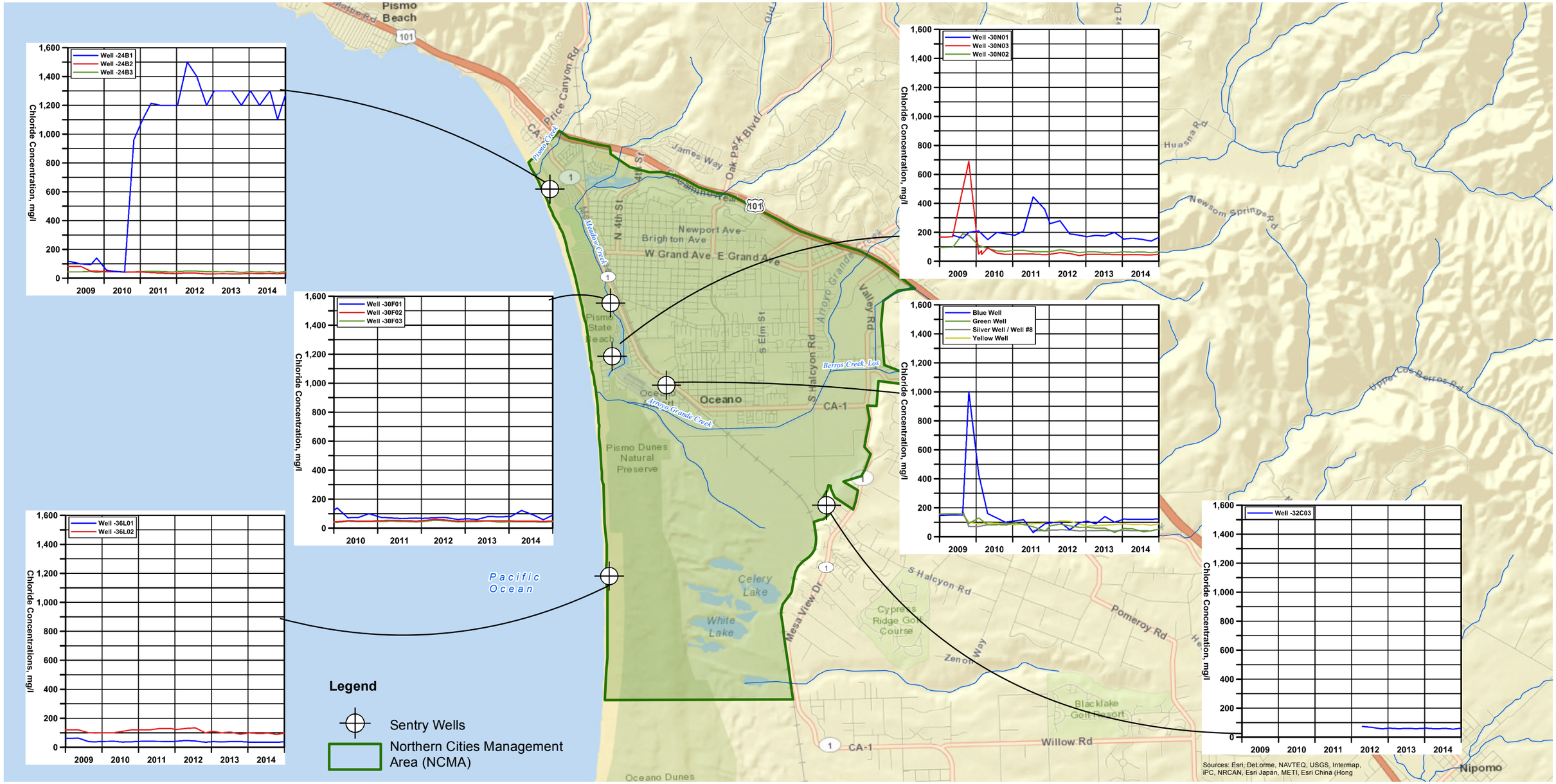
WATER ELEVATION, CONDUCTIVITY, AND TEMPERATURE, WELL 30N02
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 17



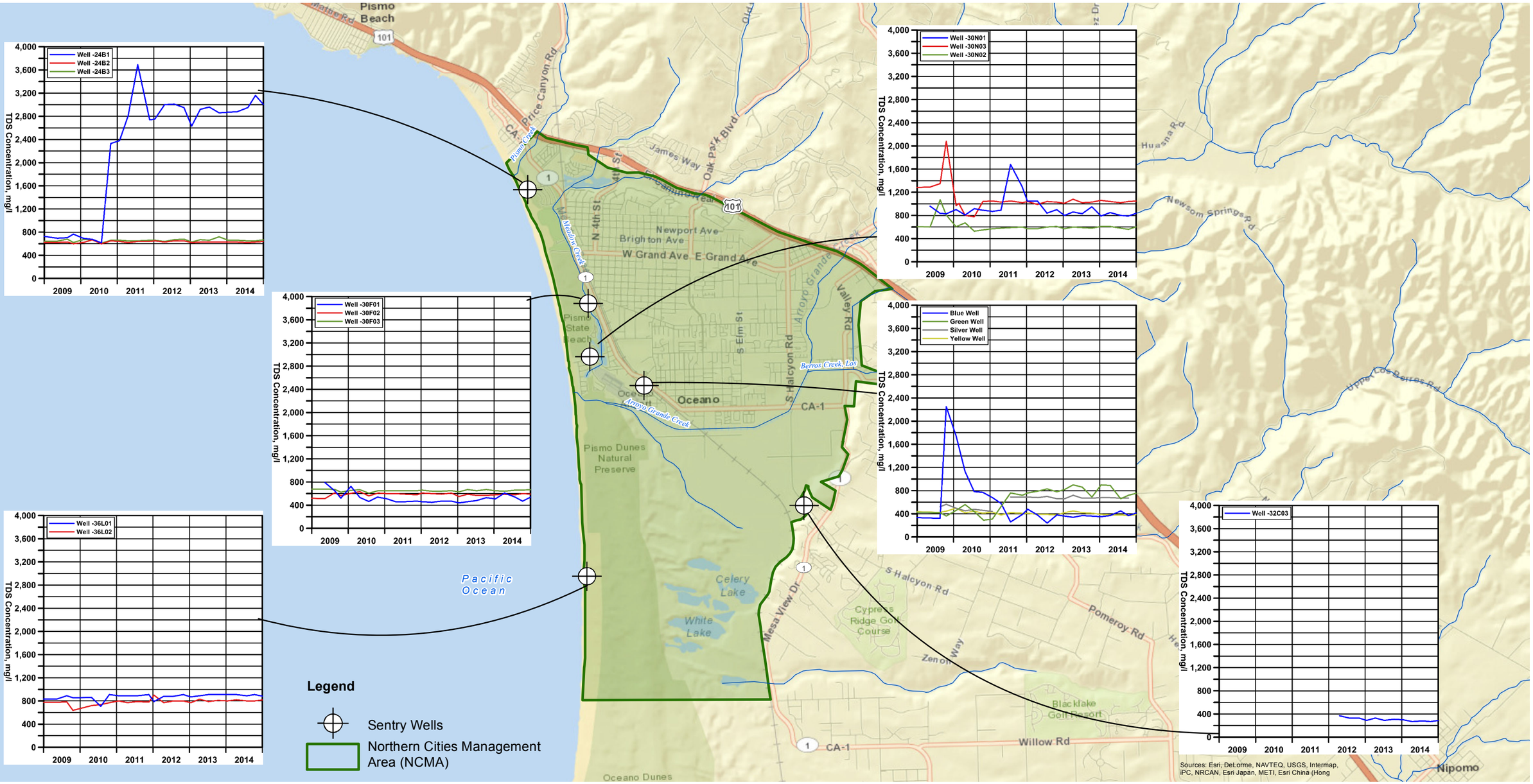
WATER ELEVATION, CONDUCTIVITY, AND TEMPERATURE, WELL 32C03
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 18



CHLORIDE CONCENTRATIONS IN SENTRY WELLS
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 19



Legend

- Sentry Wells
- Northern Cities Management Area (NCMA)

N

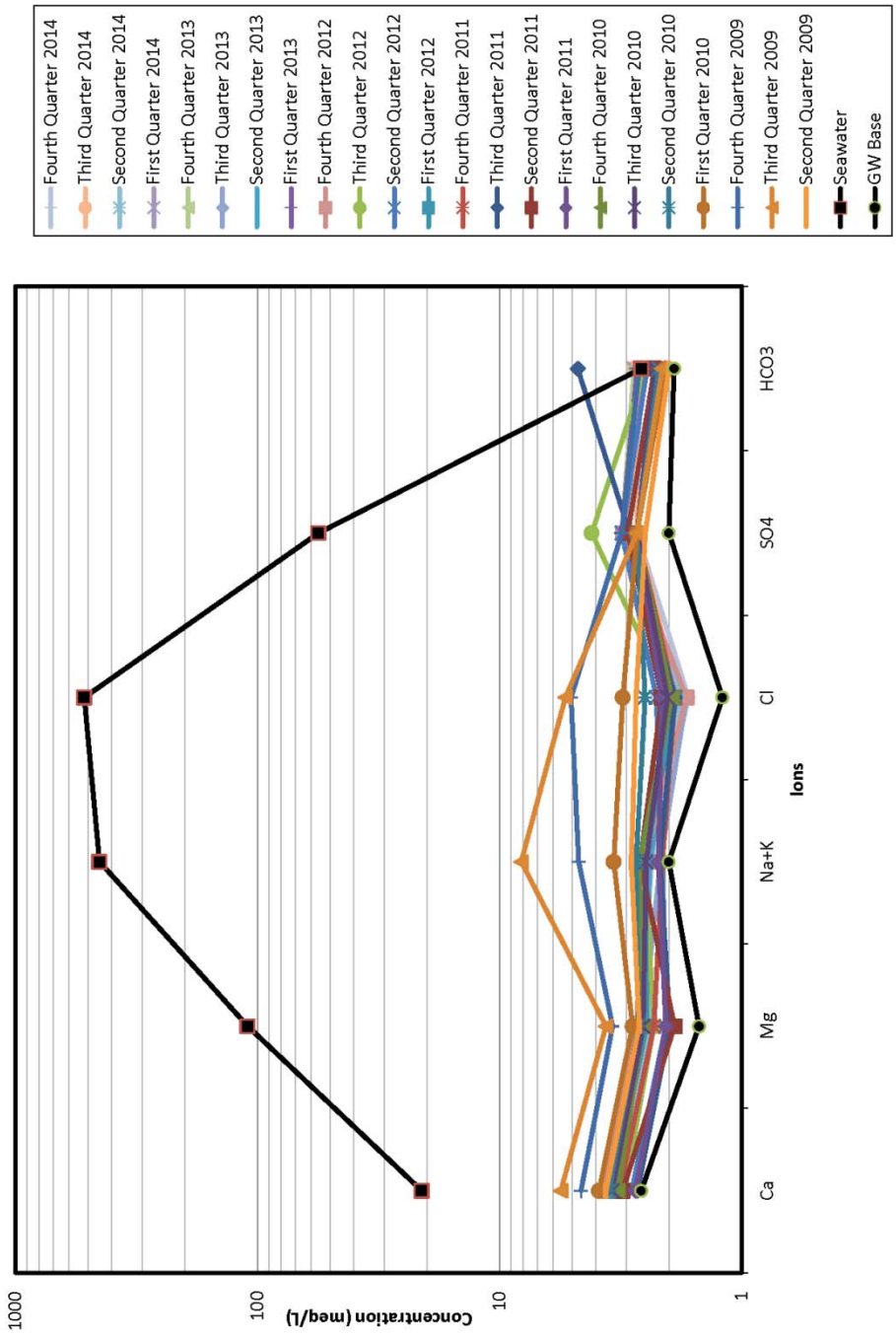
1 inch equals 1 mile

0 1 2 Miles

TOTAL DISSOLVED SOLIDS CONCENTRATIONS IN SENTRY WELLS
Northern Cities Management Area
San Luis Obispo County, California

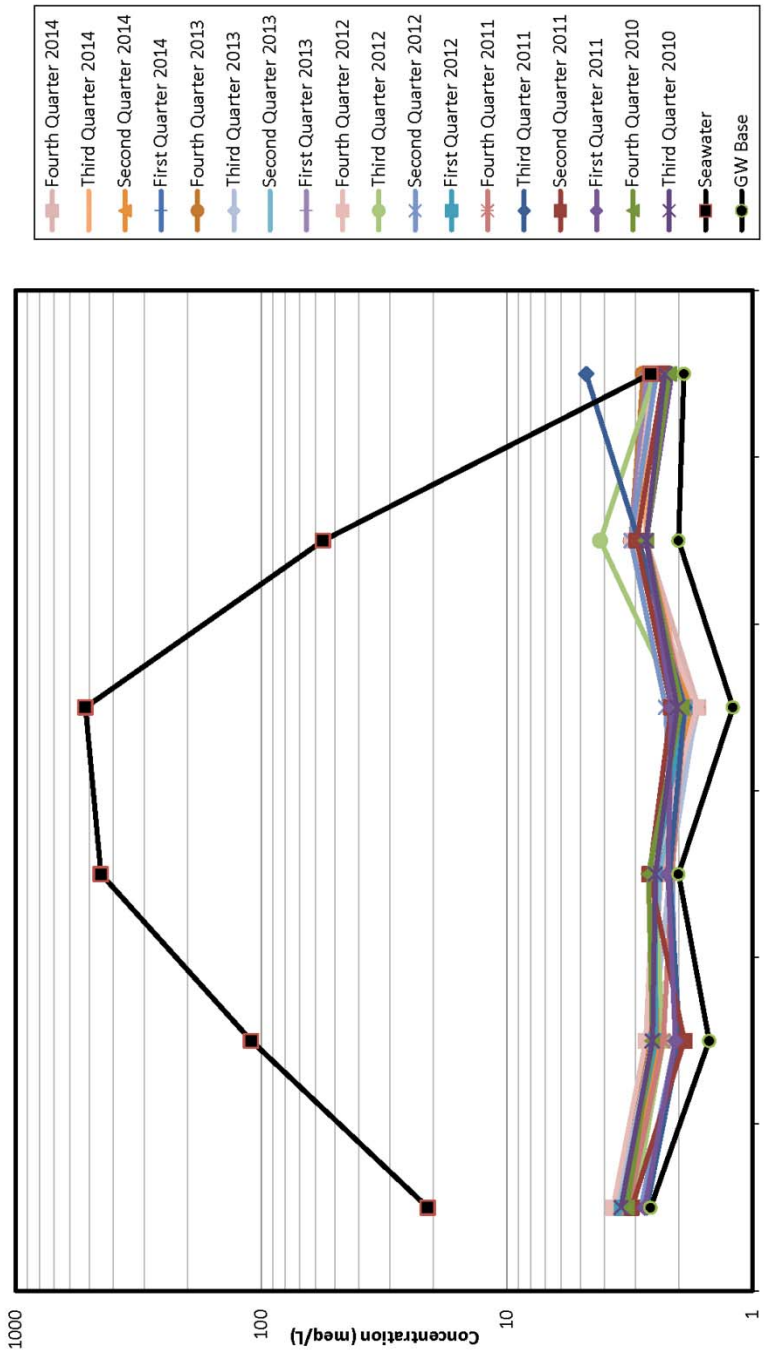
FIGURE 20

\\Venwest10\Data5\Projects\04_2014\04_6214_0105_NCMA_2014AnnualReport\Outputs\2014_NCMA_Annual_Monitoring_Report\mxd\Figure 20 TDS Concentrations Sentry Wells.mxd, 03/17/15, lnicely



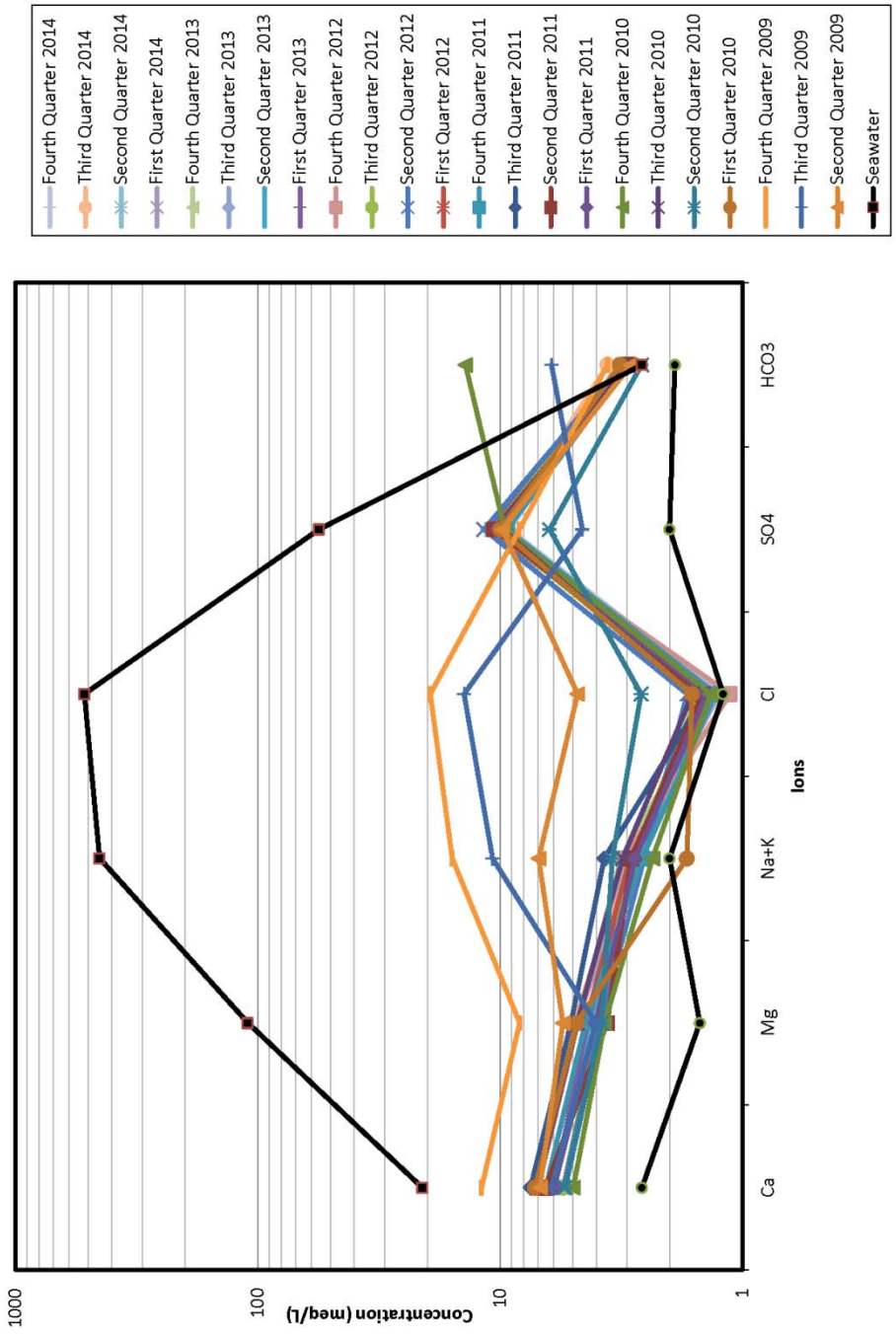
SCHOELLER DIAGRAM SENTRY WELL 30N03 (MAY 2009 – OCTOBER 2014)
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 21



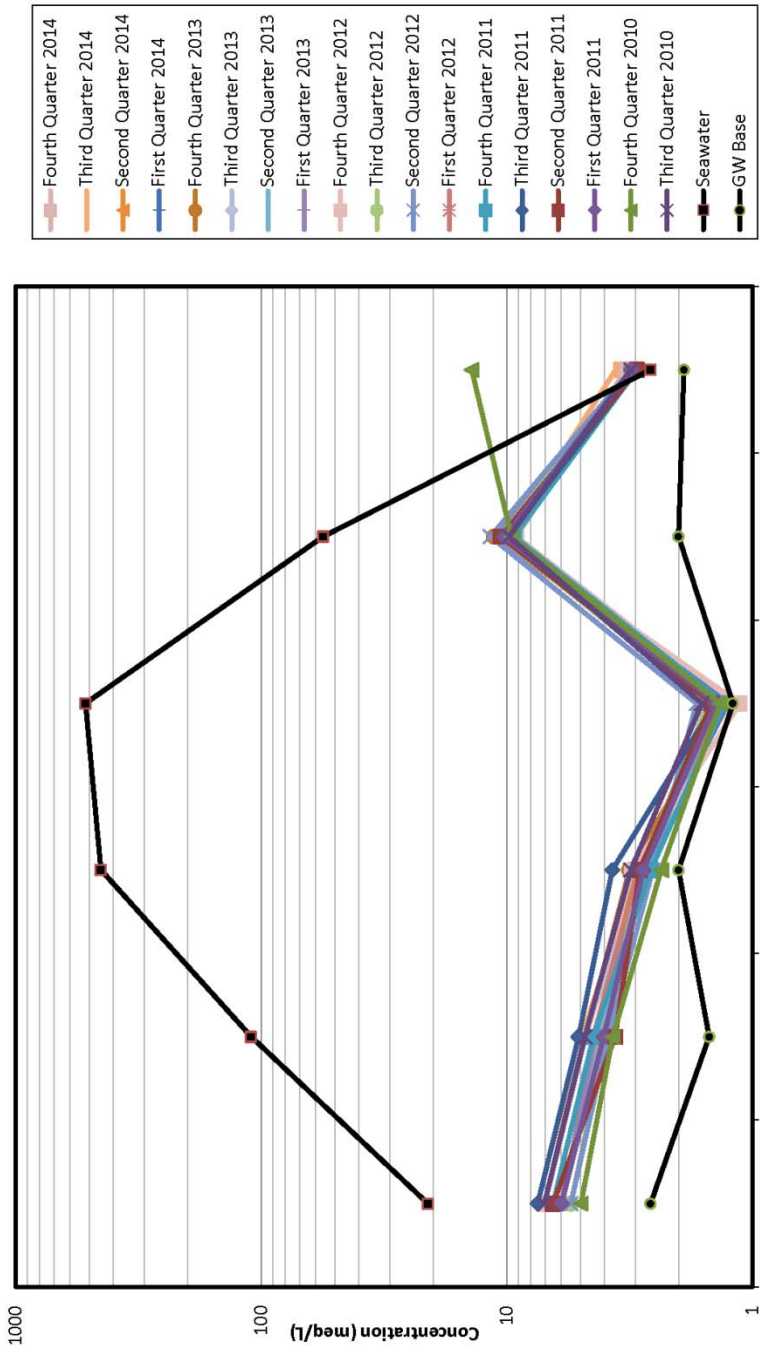
SCHOELLER DIAGRAM SENTRY WELL 30N03 (OCTOBER 2010 – OCTOBER 2014)
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 22



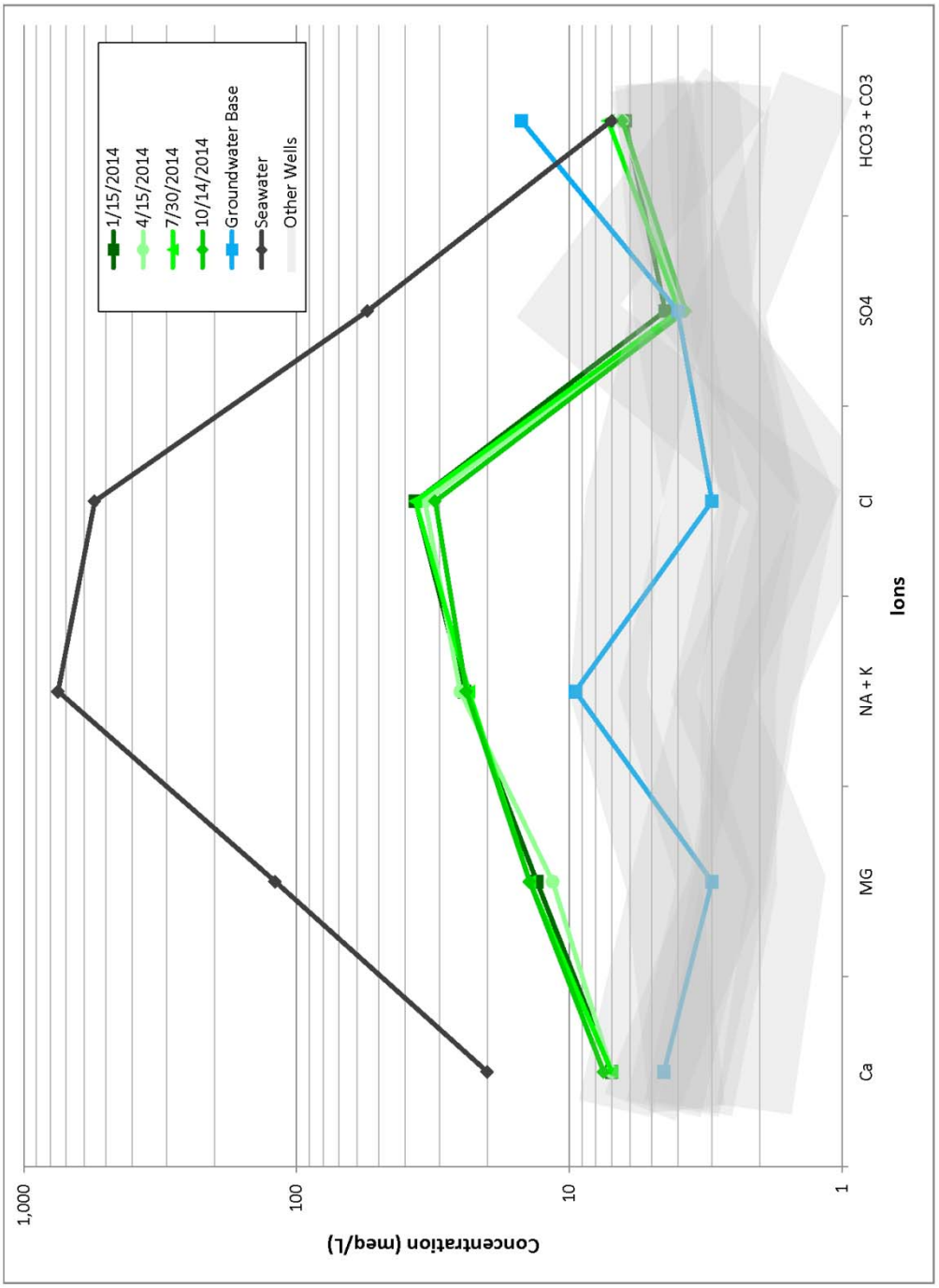
SCHOELLER DIAGRAM SENTRY WELL 30N02 (MAY 2009 – OCTOBER 2014)
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 23



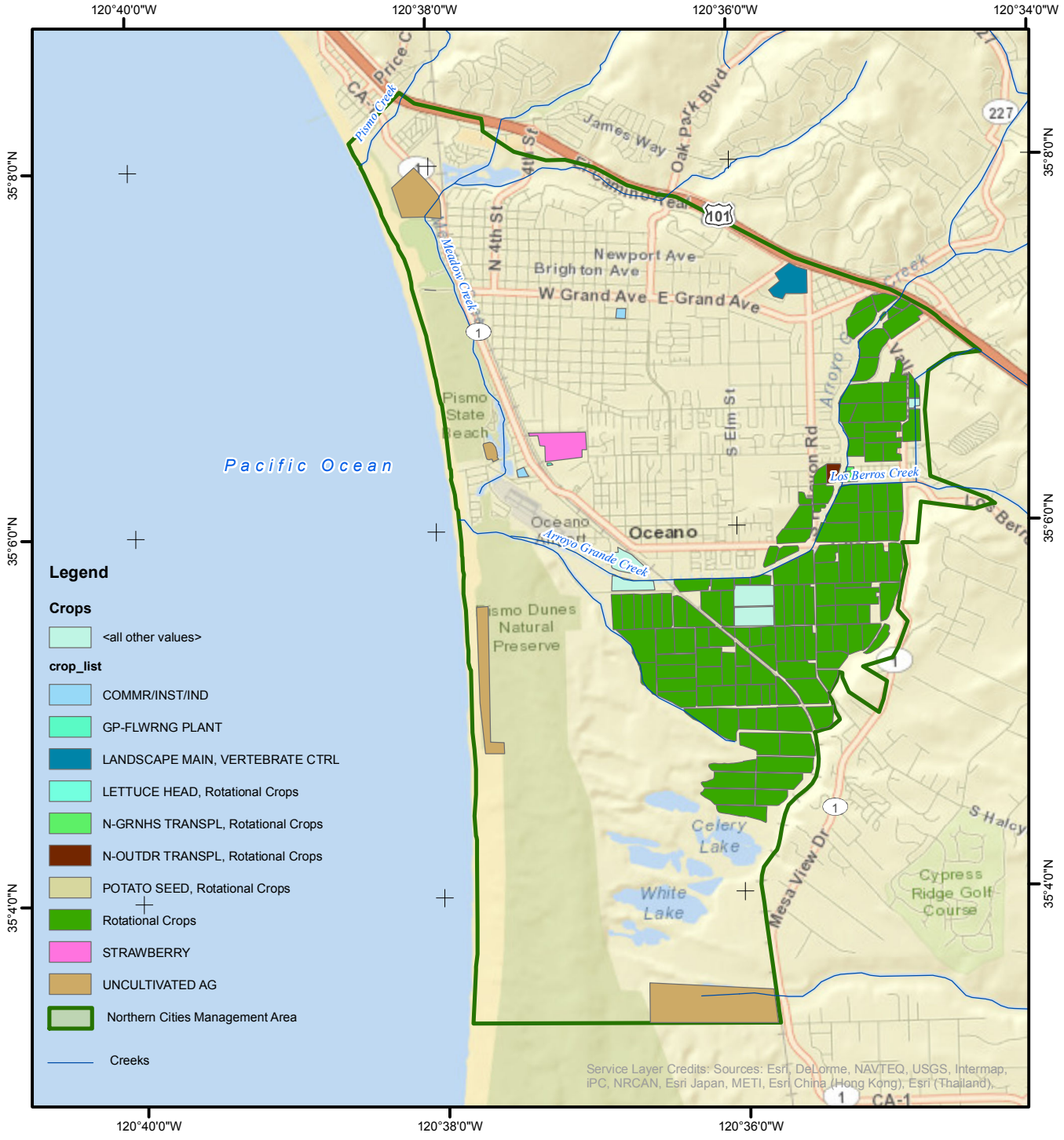
SCHOELLER DIAGRAM SENTRY WELL 30N02 (OCTOBER 2010 – OCTOBER 2014)
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 24



SCHOELLER DIAGRAM SENTRY WELL 24B01
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 25



NCMA AGRICULTURAL LAND 2014
Northern Cities Management Area
San Luis Obispo County, California

FIGURE 26

\\Venwest10\Data5\Projects\04_2014\04_6214_0105_NCMA_2014AnnualReport\Outputs\2014_NCMA_Annual_Monitoring_Report\mxd\Figure 26 NCMA Agricultural Land 2014.mxd, 04/01/15, tricely

APPENDIX A

A-1. NCMA Sentry Well Water Level and Water Quality Data
Well 24B01, North Beach Campground, Shallow

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/12E-24B01	Screened from 48-65' - 2-inch diameter	**13.58**										
Height of steel casing added to the concrete pad elevation		2.88	10/14/2014	5.76	7.82	3,160	1100	530	32	150	170	390
	Pad elevation NAVD 88	10.70	7/30/2014	NA	NA	2,950	1300	520	29	140	170	440
TOC elevation prior to renovation (Approximate)		10.7	7/29/2014	5.99	7.59	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	6.52	7.06	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	5.95	7.63	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	2,880	1200	560	29	140	140	390
			1/15/2014	NA	NA	2,870	1300	540	30	140	160	380
			1/14/2014	5.75	7.83	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	2,860	1200	560	31	150	160	380
			10/14/2013	6.07	7.51	NA	NA	NA	NA	NA	NA	NA
			7/9/2013	6.09	7.49	2,960	1300	560	32	150	160	395
			4/10/2013	7.00	6.58	2,920	1300	540	30	140	150	410
			1/14/2013	5.72	7.86	2,630	1300	540	30	140	140	410
			10/29/2012	5.92	7.66	2,950	1200	590	34	150	160	360
			7/23/2012	5.79	7.79	3,010	1400	530	30	120	130	397
			4/18/2012	5.58	8.00	3,000	1500	450	27	120	120	400
			1/11/2012	5.72	7.86	2,750	1200	520	30	140	140	400
			11/21/2011	5.80	7.78	2,740	1200	410	25	130	120	380
			7/26/2011	6.38	7.20	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	3,690	1199.9	530	33	140	150	380
			4/20/2011	6.40	7.18	2,810	1214	500	27	140	130	400
			1/24/2011	5.78	7.42	2,380	1100	370	24	110	120	380
			10/28/2010	NA	NA	2,330	960	390	25	140	140	350
			10/21/2010	6.37	7.21	NA	NA	NA	NA	NA	NA	NA
			7/27/2010	6.48	7.1	616	43	52.5	6.21	115	44.7	341
			4/27/2010	3.84	6.86	676	47	54.7	4.60	107	43.6	327
			1/27/2010	3.13	7.57	694	55	56.2	6.80	123	43.2	340
			10/19/2009	2.28	8.42	766	140	121	16.7	111	52.4	303
			8/20/2009	3.25	7.45	705	94	86.8	11.7	116	35.6	286
			5/12/2009	3.58	7.12	695	100	82.1	13.2	108	45	288
			3/26/1996	NA	NA	1,870	773	380	24.0	125	95	427
			6/9/1976	NA	NA	1,706	667	400	16.2	94	95	474
			1/17/1966	NA	NA	1,700	652	406	20.0	95	83	440

A-1 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 24B01, North Beach Campground, Shallow

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	180	0.32	2.2	0.16	<0.5	<0.01	1.1	<0.5	390	<10	<10	4,780	0.67	NA	NA
7/30/2014	190	<0.25	1.9	0.11	<0.5	0.03	1.1	2.6	440	<10	<10	4,830	0.62	0.0020	500
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	190	<0.05	2.2	0.130	<0.5	0.03	0.92	2.9	390	<10	<10	4,790	0.72	0.0024	414
1/15/2014	214	<0.25	2.4	0.17	<0.5	<0.01	1.0	3.0	380	<10	<10	4,800	0.71	0.0023	433
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	200	<0.25	2.2	0.13	<0.5	<0.01	1.0	3.0	380	<10	<10	4,810	0.75	0.0025	400
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/9/2013	215	<0.25	2.4	0.16	<0.5	<0.01	1.1	2.0	395	<10	<10	4,850	0.81	0.0015	650
4/10/2013	220	<0.25	1.9	0.16	<0.1	<0.01	1.00	3.5	410	<10	<10	4,830	0.67	0.0027	371
1/14/2013	220	<0.05	2.7	0.15	<0.1	<0.01	0.96	2.8	410	<10	<10	4,790	0.72	0.0022	464
10/29/2012	200	<0.25	2.4	0.18	<0.5	<0.01	1.1	11	360	<10	<10	4,750	0.78	0.0092	109
7/23/2012	210	<0.05	2.1	0.15	<0.1	0.041	0.86	3	397	<10	<10	4,720	1.4	0.0021	467
4/18/2012	230	<0.1	2	0.13	0.13	<0.01	0.89	3.12	400	<10	<10	4,660	0.6	0.0021	481
1/11/2012	170	<0.1	4	0.18	0.1	0.033	0.94	3.2	400	<10	<10	4,560	0.55	0.0027	375
11/21/2011	200	<0.3	2.3	0.13	<0.6	0.053	0.9	2.73	380	<10	<10	4,470	0.7	0.0023	440
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	200.2	<0.05	1.8	0.14	<0.1	0.053	0.91	3.281	380	<5	<5	4,900	0.73	0.0027	366
4/20/2011	216	<0.05	1.7	0.24	0.18	0.067	0.95	3.3	400	<2.0	<2.0	4,430	NA	0.0027	368
1/24/2011	180	<0.15	1.8	0.16	<0.3	0.63	0.68	2.8	380	<2.0	<2.0	4,020	0.89	0.0025	393
10/28/2010	160	<0.1	3.9	0.15	<0.1	NA	0.75	2.6	350	<10	<10	3,860	1.3	0.0027	369
10/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/27/2010	160	< 0.10	2.9	0.063	< 0.10	0.11	0.274	0.18	341	< 1.0	< 1.0	1,000	9.34	0.0042	239
4/27/2010	140	< 0.10	0.98	0.0714	< 0.10	< 0.10	0.0458	0.18	327	< 1.0	< 1.0	990	4.06	0.0038	261
1/27/2010	150	0.40	1.7	0.12	< 0.10	0.33	0.875	0.19	340	< 1.0	< 1.0	1,000	16.6	0.0035	289
10/19/2009	150	0.25	2.8	0.0959	0.11	< 0.10	0.208	0.47	303	< 1.0	< 1.0	1,200	7.79	0.0034	298
8/20/2009	150	0.21	2.7	NA	< 0.10	0.12	0.248	0.38	286	< 1.0	< 1.0	1,000	7.15	0.0040	247
5/12/2009	150	NA	NA	NA	0.11	NA	0.66	0.29	288	< 1.0	< 1.0	1,100	23.9	0.0029	345
3/26/1996	154	0.2	NA	0.27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/9/1976	159	0.4	NA	0.12	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/17/1966	175	1	NA	0.07	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-2. NCMA Sentry Well Water Level and Water Quality Data
Well 24B02, North Beach Campground, Intermediate

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/12E-24B02	Screened from 120-145' - 2-inch diameter	**13.58**										
Height of steel casing added to the concrete pad elevation		2.88	10/14/2014	6.61	6.97	630	30	41	3.9	100	32	290
	Pad elevation NAVD 88	10.70	7/29/2014	NA	NA	620	33	42	3.5	100	33	300
TOC elevation prior to renovation (Approximate)		10.7	7/29/2014	7.05	6.53	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	8.25	5.33	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	6.55	7.03	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	630	32	43	4.3	88	28	300
			1/15/2014	NA	NA	630	33	46	3.9	100	34	290
			1/14/2014	6.34	7.24	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	630	30	44	3.8	98	32	290
			10/14/2013	7.08	6.50	NA	NA	NA	NA	NA	NA	NA
			7/9/2013	7.17	6.41	630	30	43	3.9	110	33	295
			4/10/2013	6.33	7.25	630	31	44	4	100	32	310
			1/14/2013	5.61	7.97	620	30	43	4	97	31	305
			10/29/2012	5.88	7.7	650	29	45	4.2	100	32	280
			7/23/2012	6.12	7.46	650	35	45	4.3	87	27	297
			4/18/2012	5.48	8.1	630	37	39	3.7	88	28	310
			1/11/2012	5.47	8.11	650	33	46	4.6	110	32	300
			11/21/2011	5.69	7.89	640	32	39	3.9	93	29	290
			7/26/2011	6.51	7.07	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	640	36	48	4.2	97	31	290
			4/20/2011	6.30	7.28	620	39	46	7.4	90	36	320
			1/24/2011	5.69	7.53	640	43	44	5.9	87	28	270
			10/28/2010	NA	NA	650	43	50	4.5	110	35	270
			10/21/2010	6.79	6.79	NA	NA	NA	NA	NA	NA	NA
			7/27/2010	7.05	6.53	598	42	48.9	4.29	111	40.5	318
			4/27/2010	4.34	6.36	668	46	52.7	4.73	111	43.2	349
			1/27/2010	3.38	7.32	622	45	58.0	5.39	115	32.2	270
			10/19/2009	2.26	8.44	600	49	59.1	5.12	112	30.1	281
			8/20/2009	4.09	6.61	630	49	63.5	5.85	128	30.1	288
			5/12/2009	4.74	5.96	622	82	67.5	6.33	114	34.5	282
			3/26/1996	NA	NA	652	54	46	5	107	24	344
			6/9/1976	NA	NA	565	34	52	4	104	27	337
			1/17/1966	NA	NA	651	62	79	5	101	32	380

A-2 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 24B02, North Beach Campground, Intermediate

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	140	<0.05	<1	0.065	<0.1	<0.01	0.15	<0.1	290	<10	<10	940	0.44	NA	NA
7/29/2014	150	<0.05	<1	<0.1	<0.1	<0.01	0.14	<0.1	300	<10	<10	940	0.37	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	150	<0.05	<1	0.067	<0.1	<0.01	0.12	<0.1	300	<10	<10	940	0.32	NA	NA
1/15/2014	165	<0.05	<1	<0.05	<0.1	<0.01	0.14	<0.1	290	<10	<10	940	0.37	NA	NA
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	170	<0.05	<1	<0.05	<0.1	<0.01	0.13	<0.1	290	<10	<10	920	0.39	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/9/2013	170	<0.05	<1	0.076	<0.1	<0.01	0.14	<0.1	295	<10	<10	940	0.6	NA	NA
4/10/2013	160	<0.05	<1	0.08	<0.1	<0.01	0.13	<0.1	310	<10	<10	940	0.41	NA	NA
1/14/2013	170	<0.05	<1	0.079	<0.1	<0.01	0.12	<0.1	305	<10	<10	950	0.72	NA	NA
10/29/2012	160	<0.05	<1	0.074	0.14	<0.01	0.13	<0.1	280	<10	<10	950	0.56	NA	NA
7/23/2012	170	<0.05	<1	<0.1	<0.1	<0.01	0.12	<0.1	297	<10	<10	950	0.43	NA	NA
4/18/2012	171	<0.1	<1	<0.1	0.16	<0.01	0.099	<0.2	310	<10	<10	950	0.26	NA	NA
1/11/2012	150	<0.1	1.3	<0.1	0.21	<0.02	0.13	0.03	300	<10	<10	950	1.7	0.0010	971
11/21/2011	150	<0.05	<1	0.064	<0.1	<0.01	0.096	<0.1	290	<10	<10	930	0.32	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	165.3	<0.05	<1	<0.1	<0.1	<0.01	0.096	<0.1	290	<5	<5	950	0.88	NA	NA
4/20/2011	174	<0.05	<1	0.17	0.14	0.014	<0.005	<0.1	320	<2.0	<2.0	950	NA	NA	NA
1/24/2011	170	<0.05	<1.0	0.11	<0.1	0.14	0.085	<0.1	270	<2.0	<2.0	940	1.3	NA	NA
10/28/2010	160	<0.1	<1.0	0.12	<0.1	NA	0.085	<0.3	270	<10	<10	970	0.63	NA	NA
10/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/27/2010	160	< 0.10	1.3	0.0609	< 0.10	0.11	0.106	0.15	318	< 1.0	< 1.0	980	2.84	0.0036	280
4/27/2010	150	< 0.10	1.3	0.0666	< 0.10	0.14	0.101	0.16	349	< 1.0	< 1.0	980	6.66	0.0035	288
1/27/2010	160	0.18	0.84	0.117	< 0.10	0.14	0.209	0.16	270	< 1.0	< 1.0	920	3.49	0.0036	281
10/19/2009	160	< 0.10	0.98	0.0776	0.14	< 0.10	0.163	0.19	281	< 1.0	< 1.0	870	1.14	0.0039	258
8/20/2009	150	< 0.10	0.98	NA	< 0.10	< 0.10	0.203	0.20	288	< 1.0	< 1.0	920	3.22	0.0041	245
5/12/2009	150	NA	NA	NA	0.11	NA	0.252	0.24	282	< 1.0	< 1.0	990	6.76	0.0029	342
3/26/1996	169	0.2	NA	0.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/9/1976	153	0.6	NA	0.02	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/17/1966	147	0	NA	0.05	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-3. NCMA Sentry Well Water Level and Water Quality Data
Well 24B03, North Beach Campground, Deep

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/12E-24B03	Screened from 270-435' - 2-inch diameter	**13.58**										
Height of steel casing added to the concrete pad elevation		2.88	10/14/2014	4.60	8.98	650	40	48	4.1	100	41	330
	Pad elevation NAVD 88	10.70	7/30/2014	NA	NA	650	45	45	3.1	94	40	390
TOC elevation prior to renovation (Approximate)		10.7	7/29/2014	4.78	8.80	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	7.33	6.25	NA	NA	NA	NA	NA	NA	NA
			5/5/2014	5.36	8.22	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	3.94	9.64	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	660	43	46	4.3	90	35	330
			1/15/2014	NA	NA	660	45	52	4.0	100	41	320
			1/14/2014	3.81	9.77	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	720	40	51	4.0	100	40	310
			10/14/2013	4.50	9.08	NA	NA	NA	NA	NA	NA	NA
			7/9/2013	4.48	9.1	660	46	47	3.9	110	41	310
			4/10/2013	3.41	10.17	670	44	46	3.8	96	38	320
			1/14/2013	2.48	11.1	630	45	47	3.9	96	37	320
			10/29/2012	3.01	10.57	680	45	49	4.1	100	39	305
			7/23/2012	2.98	10.6	670	49	47	4.1	86	35	318
			4/18/2012	1.93	11.65	640	50	40	3.4	84	33	320
			1/12/2012	2.15	11.43	660	46	48	3.2	92	36	300
			11/21/2011	2.93	10.65	660	43	41	3.7	91	34	310
			7/26/2011	3.17	10.41	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	650	46.3	50	6.0	98	38	310
			4/20/2011	3.25	10.33	650	47	48	4.6	95	31	310
			1/24/2011	2.65	10.58	660	46	44	5.6	87	33	320
			10/28/2010	NA	NA	660	44	48	3.8	110	39	315
			10/21/2010	4.60	8.98	NA	NA	NA	NA	NA	NA	NA
			7/27/2010	4.54	9.04	610	44	51.4	8.34	112	41.6	328
			4/27/2010	1.43	9.27	666	45	53.2	4.84	118	44	357
			1/27/2010	0.94	9.76	672	48	56.4	5.40	119	43.4	336
			10/19/2009	0.81	9.89	622	40	55.1	3.93	110	42.6	342
			8/19/2009	4.18	6.52	680	47	54.9	5.21	128	43.4	337
			5/12/2009	3.18	7.52	645	44	53.2	4.53	108	41.8	332
			3/26/1996	NA	NA	646	41	52	4.3	104	42	412
			6/9/1976	NA	NA	569	36	53	3.7	85	39	330
			1/17/1966	NA	NA	670	79	74	5	103	36	345

A-3 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 24B03, North Beach Campground, Deep

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	142	<0.05	<1	0.061	<0.1	<0.01	0.010	<0.1	330	<10	<10	1,010	0.19	NA	NA
7/30/2014	150	<0.05	<1	<0.1	<0.1	<0.01	<0.005	<0.1	390	<10	<10	1,020	0.19	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5/5/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	150	0.23	<1	0.056	<0.1	<0.01	<0.005	0.11	330	<10	<10	1,010	0.16	0.0026	391
1/15/2014	165	<0.05	<1	<0.05	<0.1	<0.01	0.0090	<0.1	320	<10	<10	1,010	0.17	NA	NA
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	170	<0.05	<1	<0.05	<0.1	<0.01	0.0090	<0.1	310	<10	<10	1,010	0.2	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/9/2013	170	<0.05	<1	0.066	<0.1	<0.01	0.0100	<0.1	310	<10	<10	1,010	0.27	NA	NA
4/10/2013	160	<0.05	<1	0.071	<0.1	<0.01	0.0080	<0.1	320	<10	<10	1,010	0.19	NA	NA
1/14/2013	170	<0.05	<1	0.065	<0.1	<0.01	0.0080	<0.1	320	<10	<10	1,010	0.26	NA	NA
10/29/2012	158	<0.05	<1	0.069	0.1	<0.01	0.0090	<0.1	305	<10	<10	1,010	0.22	NA	NA
7/23/2012	170	<0.05	<1	<0.1	<0.1	<0.01	0.0150	<0.1	318	<10	<10	1,010	0.24	NA	NA
4/18/2012	160	<0.1	<1	<0.1	<0.2	<0.01	0.0070	<0.2	320	<10	<10	1,010	0.23	NA	NA
1/12/2012	150	<0.1	<1	<0.1	0.35	<0.02	0.0080	<0.2	300	<10	<10	1,000	0.15	NA	NA
11/21/2011	150	<0.05	1.6	0.046	<0.1	0.014	0.0090	<0.1	310	<10	<10	970	0.12	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	159.6	<0.05	<1	<0.1	<0.1	0.011	0.0100	<0.1	310	<5	<5	1,010	0.21	NA	NA
4/20/2011	168	<0.05	<1	0.11	0.08	0.015	0.0080	<0.1	310	<2.0	<2.0	1,020	NA	NA	NA
1/24/2011	160	<0.05	<1.0	NA	<0.1	0.15	0.0096	<0.1	320	<2.0	<2.0	1,020	0.22	NA	NA
10/28/2010	50	<0.1	<1.0	0.089	<0.1	NA	0.0120	<0.3	315	<10	<10	1,020	0.55	NA	NA
10/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/27/2010	160	< 0.10	1.8	0.0533	< 0.10	0.17	0.0602	0.16	328	< 1.0	< 1.0	1,000	6.7	0.0036	275
4/27/2010	150	< 0.10	1.5	0.0636	< 0.10	0.1	0.0519	0.17	357	< 1.0	< 1.0	980	9.71	0.0038	265
1/27/2010	150	< 0.10	1.4	0.101	< 0.10	0.15	0.140	0.15	336	< 1.0	< 1.0	1,000	5.18	0.0031	320
10/19/2009	160	< 0.10	< 0.50	0.0613	< 0.10	0.13	0.0181	0.14	342	< 1.0	< 1.0	880	0.343	0.0035	286
8/19/2009	150	< 0.10	2.2	NA	< 0.10	0.66	0.182	0.15	337	< 1.0	< 1.0	1,000	14.3	0.0032	313
5/12/2009	140	NA	NA	NA	< 0.10	NA	0.124	0.16	332	< 1.0	< 1.0	1,000	5.9	0.0036	275
3/26/1996	164	0.2	NA	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/9/1976	165	0	NA	0.06	0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/17/1966	158	1	NA	0	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-4. NCMA Sentry Well Water Level and Water Quality Data
Well 30F01, Highway 1, Shallow

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/13E-30F01	Screened from 15- 30 and 40-55' - 1-inch diameter	**23.16**										
Height of steel casing added to the concrete pad elevation		2.80	10/14/2014	17.05	6.11	470	58	64	2.2	42	19	84
Pad elevation NAVD 88		20.36	7/30/2014	NA	NA	540	89	71	2	46	24	94
TOC elevation prior to renovation (Approximate)		20.4	7/29/2014	17.11	6.05	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	16.82	6.34	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	15.56	7.60	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	610	122	78	3.3	47	22	100
			1/15/2014	NA	NA	510	80	69	2.3	45	22	94
			1/14/2014	16.58	6.58	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	530	78	73	2.3	47	22	86
			10/14/2013	17.07	6.09	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	480	80	64	2.2	49	22	85
			7/9/2013	16.17	6.99	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	460	60	60	2.20	38	18	78
			4/10/2013	14.58	8.58	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	440	65	64	2.40	40	19	95
			1/14/2013	14.36	8.8	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	14.95	8.21	470	60	66	2.50	43	20	75
			7/24/2012	14.00	9.16	470	73	66	2.70	36	18	86
			4/19/2012	NA	NA	450	72	52	1.90	32	15	81
			4/18/2012	13.42	9.74	NA	NA	NA	NA	NA	NA	NA
			1/10/2012	13.80	9.36	460	67	61	2.00	35	17	81
			11/21/2011	13.78	9.38	NA	NA	NA	NA	NA	NA	NA
			11/17/2011	NA	NA	470	70	82	2.40	40	19	78
			7/26/2011	13.50	9.66	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	460	65.8	68	4.40	37	19	78
			4/20/2011	12.82	10.34	460	71	69	2.60	36	14	87
			1/24/2011	13.33	9.97	510	75	64	4.00	34	18	83
			10/21/2010	16.55	6.61	540	100	73	2.00	43	21	88
			7/26/2010	15.68	7.48	464	74	82.2	2.16	47.9	25.1	88.0
			4/27/2010	11.02	9.38	534	72	77.1	2.59	45.8	23.6	100
			1/28/2010	12.73	7.67	725	140	99.9	2.70	76.4	35.8	214
			10/19/2009	14.33	6.07	522	74	85.6	2.35	52.8	26.3	102
			8/19/2009	14.34	6.06	648	92	98.9	3.84	63.1	31.9	113
			5/12/2009	12.38	8.02	792	110	108	2.89	80.2	39.9	136

A-4 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 30F01, Highway 1, Shallow

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	120	10	<1	0.081	<0.1	<0.01	<0.005	0.172	84	<10	<10	730	<0.05	0.0030	337
7/30/2014	130	13.6	<1	<0.1	<0.1	<0.01	<0.005	0.101	94	<10	<10	860	<0.05	0.0011	881
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	140	12	<1	0.100	<0.1	<0.01	<0.005	0.17	100	<10	<10	970	<0.05	0.0014	718
1/15/2014	136	12.6	13.00	<0.1	<0.1	<0.01	<0.005	0.19	94	<10	<10	810	<0.05	0.0024	421
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	140	12	<1	0.072	<0.1	<0.01	<.005	0.17	86	<10	<10	830	<0.05	0.0022	459
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	140	12.2	<1	0.089	<0.1	<0.01	<0.005	<0.1	85	<10	<10	770	<0.05	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	120	12	<1	0.091	<0.1	<0.01	<0.005	0.2	78	<10	<10	710	<0.05	0.0033	300
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	130	12	<1	0.090	<0.1	<0.01	<0.005	0.11	95	<10	<10	720	0.05	0.0017	591
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	123	12	<1	0.087	<0.1	<0.01	<0.005	0.13	75	<10	<10	720	<0.05	0.0022	462
7/24/2012	120	13	<1	<0.1	<0.1	<0.01	0.019	0.11	86	<10	<10	720	<0.05	0.0015	664
4/19/2012	130	13	<1	<0.1	<0.2	<0.01	<0.005	<0.2	81	<10	<10	700	<0.1	NA	NA
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/10/2012	120	11	<1	<0.1	0.12	<0.01	<0.005	<0.1	81	<10	<10	720	<0.1	NA	NA
11/21/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/17/2011	120	12	<1	<0.1	<0.1	<0.01	<0.005	0.16	78	<10	<10	720	<0.1	0.0023	438
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	117.4	12.17	<1	0.100	0.101	<0.01	0.014	0.178	78	<5	<5	720	0.11	0.0027	370
4/20/2011	124	12	<1	0.180	0.11	<0.01	<0.005	0.17	87	<2.0	<2.0	730	NA	0.0024	418
1/24/2011	140	11	<1.0	0.170	0.11	<0.10	<0.005	<0.1	83	<2.0	<2.0	780	<0.1	NA	NA
10/21/2010	120	13	<1.0	0.067	<0.1	NA	<0.005	<0.3	88	<10	<10	894	<.1	NA	NA
7/26/2010	120	12	< 0.50	0.098	< 0.10	< 0.10	0.0817	0.37	88.0	< 1.0	< 1.0	710	0.79	0.0050	200
4/27/2010	140	9.8	0.56	0.129	< 0.10	< 0.10	0.112	0.29	100	< 1.0	< 1.0	780	1.02	0.0040	248
1/28/2010	170	1.6	0.84	0.120	< 0.10	< 0.10	0.112	0.56	214	< 1.0	< 1.0	1,200	0.640	0.0040	250
10/19/2009	150	13	0.70	0.136	0.13	< 0.10	0.123	0.32	102	< 1.0	< 1.0	770	1.30	0.0043	231
8/19/2009	190	10	0.56	NA	< 0.10	0.12	1.03	0.32	113	< 1.0	< 1.0	970	4.52	0.0035	288
5/12/2009	280	NA	NA	NA	< 0.10	NA	0.0353	0.39	136	< 1.0	< 1.0	1,200	0.281	0.0035	282

A-5. NCMA Sentry Well Water Level and Water Quality Data
Well 30F02, Highway 1, Intermediate

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/13E-30F02	Screened from 75-100' - 2-inch diameter	**23.16**										
Height of steel casing added to the concrete pad elevation		2.80	10/14/2014	17.33	5.83	600	46	42	2.6	76	32	310
	Pad elevation NAVD 88	20.36	7/30/2014	NA	NA	580	49	46	2.6	80	35	210
TOC elevation prior to renovation (Approximate)		20.4	7/29/2014	17.31	5.85	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	18.00	5.16	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	16.27	6.89	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	590	49	45	3.3	68	30	200
			1/15/2014	NA	NA	580	50	45	2.7	76	31	190
			1/14/2014	17.01	6.15	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	570	50	45	2.7	75	33	190
			10/14/2013	17.52	5.64	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	570	50	38	2.6	78	32	190
			7/9/2013	17.15	6.01	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	590	50	41	2.6	70	30	190
			4/10/2013	15.76	7.4	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	550	50	44	2.9	72	31	200
			1/14/2013	15.01	8.15	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	15.27	7.89	610	48	45	3.0	79	34	188
			7/24/2012	14.82	8.34	590	56	46	3.2	69	30	194
			4/19/2012	NA	NA	600	60	40	2.7	68	30	200
			4/18/2012	14.38	8.78	NA	NA	NA	NA	NA	NA	NA
			1/12/2012	14.31	8.85	610	52	45	3.0	73	32	200
			11/21/2011	14.94	8.22	580	49	38	2.7	73	30	190
			7/26/2011	14.46	8.7	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	590	52.1	46	5.1	73	31	190
			4/20/2011	14.23	8.93	600	54	57	4.2	74	29	200
			1/24/2011	14.36	8.93	600	51	43	4.9	71	31	210
			10/28/2010	NA	NA	610	49	38	2.3	70	30	210
			10/21/2010	7.39	15.77	NA	NA	NA	NA	NA	NA	NA
			7/26/2010	16.21	6.95	560	49	45.8	2.95	85.4	36.8	223
			4/27/2010	12.14	8.26	634	51	50.3	3.12	87.9	38.6	225
			1/28/2010	13.09	7.31	604	44	52.2	4.47	92.1	38.5	230
			10/19/2009	14.36	6.04	566	49	49.5	2.80	88.3	37.6	240
			8/19/2009	14.81	5.59	614	49	51.8	3.19	87.3	36.8	225
			5/12/2009	14.34	2.96	514	54	48.7	3.26	81.1	34.9	206
			3/27/1996	NA	NA	678	49	52	3.8	98	42	305
			6/9/1976	NA	NA	637	48	55	2.8	98	43	343
			1/20/1966	NA	NA	580	68	47	2	94	38	280

A-5 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 30F02, Highway 1, Intermediate

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	120	12	<1	0.08	<0.1	<0.01	0.22	0.37	310	<10	<10	890	<0.05	0.0080	124
7/30/2014	130	13	<1	<0.1	<0.1	<0.01	0.02	0.27	210	<10	<10	890	<0.05	0.0055	181
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	130	12	<1	0.089	<0.1	<0.01	0.011	0.44	200	<10	<10	890	<0.05	0.0090	111
1/15/2014	136	13.1	13.4	<0.1	<0.1	<0.01	0.054	0.4	190	<10	<10	890	<0.05	0.0080	125
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	140	12	<1	0.69	0.19	<0.01	0.099	0.38	190	<10	<10	890	<0.05	0.0076	132
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	180	<0.05	<1	0.08	0.13	<0.01	0.14	<0.1	190	<10	<10	880	<0.05	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	140	14	<1	0.09	0.1	<0.01	0.082	0.43	190	<10	<10	880	<0.05	0.0086	116
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	140	13	<1	0.09	0.1	<0.01	0.011	0.32	200	<10	<10	880	0.12	0.0064	156
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	135	13	<1	0.09	<0.1	<0.01	0.06	0.31	188	<10	<10	890	0.011	0.0065	155
7/24/2012	140	14	<1	<0.1	0.11	<0.01	0.038	0.27	194	<10	<10	880	<0.05	0.0048	207
4/19/2012	140	14	<1	<0.1	<0.2	<0.01	0.19	0.3	200	<10	<10	890	0.11	0.0050	200
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/12/2012	130	12	<1	<0.1	0.25	<0.02	0.29	0.33	200	<10	<10	890	<0.1	0.0063	158
11/21/2011	120	13	<1	0.07	<0.1	<0.01	0.022	0.34	190	<10	<10	870	<0.1	0.0069	144
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	134.3	13.19	<1	<0.1	0.127	<0.1	0.025	0.387	190	<5	<5	900	<0.1	0.0074	135
4/20/2011	141	13	<1	0.18	0.17	<0.01	0.025	0.38	200	<2.0	<2.0	920	NA	0.0070	142
1/24/2011	140	12	<1.0	0.15	0.12	0.27	0.041	0.3	210	<2.0	<2.0	920	<0.1	0.0059	170
10/28/2010	130	11	<1.0	0.10	<0.1	NA	0.0094	<0.3	210	<10	<10	920	<0.1	NA	NA
10/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/26/2010	130	11	2.5	0.0928	< 0.10	0.13	0.0646	0.59	223	< 1.0	< 1.0	890	< 0.100	0.0120	83
4/27/2010	130	10	0.8	0.112	< 0.10	< 0.10	0.615	0.51	225	< 1.0	< 1.0	880	3.28	0.0100	100
1/28/2010	150	11	1.4	0.127	< 0.10	< 0.10	0.913	0.48	230	< 1.0	< 1.0	920	4.55	0.0109	92
10/19/2009	140	11	1.0	0.0942	0.17	< 0.10	0.924	0.51	240	< 1.0	< 1.0	850	2.15	0.0104	96
8/19/2009	130	11	2.00	NA	0.10	< 0.10	2.24	0.54	225	< 1.0	< 1.0	920	19.4	0.0110	91
5/12/2009	120	NA	NA	NA	0.11	NA	1.87	0.53	206	< 1.0	< 1.0	890	3.23	0.0098	102
3/27/1996	166	49	NA	0.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/9/1976	172	17.6	NA	0.1	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/20/1966	152	27	NA	0.08	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-6. NCMA Sentry Well Water Level and Water Quality Data
Well 30F03, Highway 1, Deep

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/13E-30F03	Screened from 305-372' - 2-inch diameter	**23.16**										
Height of steel casing added to the concrete pad elevation		2.80	10/14/2014	18.98	4.18	660	41	35	3.0	99	42	310
	Pad elevation NAVD 88	20.36	7/30/2014	NA	NA	660	44	38	2.6	96	46	300
TOC elevation prior to renovation (Approximate)		20.4	7/29/2014	18.62	4.54	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	22.27	0.89	NA	NA	NA	NA	NA	NA	NA
			5/5/2014	21.34	1.82	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	16.14	7.02	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	640	44	36	3.3	55	38	310
			1/15/2014	NA	NA	650	45	35	2.5	90	41	300
			1/14/2014	15.35	7.81	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	670	41	40	2.7	100	44	280
			10/14/2013	17.30	5.86	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	650	50	33	2.4	100	43	290
			7/9/2013	16.61	6.55	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	670	45	36	2.7	94	42	300
			4/10/2013	14.69	8.47	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	630	45	36	2.3	92	41	295
			1/14/2013	12.62	10.54	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	14.61	8.55	650	43	40	3.1	100	46	280
			7/24/2012	14.50	8.66	640	51	36	2.7	81	37	296
			4/19/2012	NA	NA	640	54	32	2.3	84	36	290
			4/18/2012	10.43	12.73	NA	NA	NA	NA	NA	NA	NA
			1/12/2012	12.37	10.79	660	46	39	2.1	94	42	280
			11/21/2011	13.24	9.92	650	43	33	2.6	93	39	290
			7/26/2011	14.22	8.94	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	650	46.5	46	5.1	73	31	190
			4/21/2011	NA	NA	650	48	40	3.8	91	34	280
			4/20/2011	12.51	10.65	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	12.67	10.64	650	46	36	4.7	87	38	300
			10/28/2010	NA	NA	650	46	37	2.7	100	43	280
			10/21/2010	6.62	16.54	NA	NA	NA	NA	NA	NA	NA
			7/26/2010	17.32	5.84	608	45	43.8	2.94	107	46.8	294
			4/27/2010	11.38	9.02	668	48	40.8	2.91	101	44.7	304
			1/28/2010	10.98	9.42	656	40	43.1	3.91	112	47.2	310
			10/19/2009	14.18	6.22	626	48	43.3	3.14	108	46.2	308
			8/19/2009	20.23	0.17	672	45	43.1	3.15	111	44.3	290
			5/12/2009	17.68	2.72	678	49	44.8	3.32	109	42.9	276
			3/27/1996	NA	NA	686	41	40	3.4	109	48	379
			6/7/1976	NA	NA	616	43	41	2.6	96	49	333
			1/19/1966	NA	NA	642	69	49	4	109	40	321

A-6 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 30F03, Highway 1, Deep

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	150	<0.05	<1	<0.05	<0.1	0.011	0.017	<0.10	310	<10	<10	990	<0.05	NA	NA
7/30/2014	160	<0.05	<1	0.28	0.12	0.02	0.015	<0.1	300	<10	<10	990	<0.05	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5/5/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	169	<0.05	<1	0.062	0.12	0.02	0.011	0.11	310	<10	<10	990	<0.05	0.0025	400
1/15/2014	173	<0.05	<1	<0.05	0.13	0.01	0.015	0.12	300	<10	<10	990	<0.05	0.0027	375
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	179	<0.05	<1	<0.05	0.14	0.02	0.016	<0.1	280	<10	<10	990	<0.05	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	140	13.5	<1	0.055	<0.1	0.02	0.017	0.23	290	<10	<10	990	<0.05	0.0046	217
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	170	<0.05	<1	0.06	0.13	0.02	0.016	0.12	300	<10	<10	990	<0.05	0.0027	375
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	180	<0.05	<1	0.06	0.11	<0.01	0.015	<0.1	295	<10	<10	980	<0.05	NA	NA
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	170	<0.05	<1	0.06	<0.1	0.03	0.016	<0.1	280	<10	<10	990	0.02	NA	NA
7/24/2012	180	<0.05	<1	<0.1	0.17	<0.01	0.016	0.2	296	<10	<10	990	<0.05	0.0039	255
4/19/2012	180	<0.1	<1	<0.1	<0.2	0.01	0.014	<0.2	290	<10	<10	990	<0.1	NA	NA
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/12/2012	160	<0.1	<1	<0.1	0.2	0.025	0.016	<0.2	280	<10	<10	990	<0.1	NA	NA
11/21/2011	160	<0.05	<1	0.04	0.15	0.028	0.016	<0.1	290	<10	<10	960	<0.1	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	170.5	<0.05	<1	<0.1	0.155	0.02	0.025	<0.1	190	<5	<5	900	<0.1	NA	NA
4/21/2011	179	<0.05	<1	0.1	0.2	0.029	0.015	0.11	280	<2.0	<2.0	1,000	NA	0.0023	436
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	170	<0.05	<1.0	0.11	0.17	0.24	0.016	<0.1	300	<2.0	<2.0	990	<0.1	NA	NA
10/28/2010	160	<0.1	<1.0	0.10	<0.1	NA	0.032	<0.3	280	<10	<10	1,000	0.53	NA	NA
10/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/26/2010	160	1.3	0.84	0.0479	< 0.10	0.10	0.129	0.24	294	< 1.0	< 1.0	900	7.55	0.0053	188
4/27/2010	160	0.21	0.84	0.0733	0.14	0.11	0.0694	0.23	304	< 1.0	< 1.0	940	2.62	0.0048	209
1/28/2010	180	< 0.20	2.8	0.0833	0.13	< 0.10	0.287	0.21	310	< 1.0	< 1.0	980	4.80	0.0053	190
10/19/2009	170	< 0.10	1.8	0.0646	0.22	< 0.10	0.255	0.17	308	< 1.0	< 1.0	910	2.09	0.0035	282
8/19/2009	170	< 0.10	2.5	NA	0.14	< 0.10	0.468	0.19	290	< 1.0	< 1.0	980	18.5	0.0042	237
5/12/2009	180	NA	NA	NA	0.17	NA	0.146	0.18	276	< 1.0	< 1.0	960	1.16	0.0037	272
3/27/1996	197	0.2	NA	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/7/1976	190	0.4	NA	0.05	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/19/1966	182	1	NA	0.05	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-7. NCMA Sentry Well Water Level and Water Quality Data
Well 30N01, Pier Avenue, Shallow

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/13E-30N01	Screened from 15-40' - 1-inch diameter	**16.13**										
Height of steel casing added to the concrete pad elevation		2.60	10/15/2014	NA	NA	790	140	110	30.0	62	53	300
	Pad elevation NAVD 88	13.53	10/14/2014	9.95	6.18	NA	NA	NA	NA	NA	NA	NA
TOC elevation prior to renovation (Approximate)		13.5	7/30/2014	NA	NA	800	150	110	27.0	61	52	310
			7/29/2014	9.88	6.25	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	9.54	6.59	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	9.17	6.96	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	850	160	112	26.0	55	43	310
			1/15/2014	NA	NA	790	154	110	26.0	56	45	260
			1/14/2014	9.61	6.52	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	950	200	140	32.0	74	60	330
			10/14/2013	9.86	6.27	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	830	175	120	29.0	71	54	310
			7/9/2013	9.40	6.73	NA	NA	NA	NA	NA	NA	NA
			4/10/2013	8.98	7.15	860	180	120	29.0	67	54	320
			1/14/2013	8.60	7.53	800	170	120	32.0	66	53	280
			10/29/2012	8.96	7.17	900	180	120	34.0	77	60	300
			7/23/2012	8.54	7.59	840	190	120	31.0	56	45	266
			4/18/2012	8.53	7.60	1,050	280	140	31.0	59	47	330
			1/9/2012	8.74	7.39	1,050	260	170	34.0	68	52	307
			11/21/2011	8.78	7.35	NA	NA	NA	NA	NA	NA	NA
			11/17/2011	NA	NA	1,300	360	320	40	90	69	390
			7/26/2011	9.01	7.12	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	1,680	445.3	230	42	99	81	380
			4/20/2011	8.59	7.54	890	210	130	26	68	46	180
			1/24/2011	8.18	7.35	870	180	100	28	84	46	240
			10/21/2010	9.99	6.14	890	190	120	26	58	45	246
			7/27/2010	8.97	7.16	917	200	130	30.0	75.0	56.2	241
			4/27/2010	6.14	7.36	808	150	130	29	136	55.6	286
			1/26/2010	4.90	8.60	902	210	155	33.5	156	66.4	307
			10/20/2009	6.53	7.00	828	200	159	34.3	118	59.8	238
			8/20/2009	6.71	6.82	835	160	150	27.8	121	49.4	235
			5/11/2009	6.03	7.50	960	180	175	33.5	86.7	46.2	274

A-7 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 30N01, Pier Avenue, Shallow

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/15/2014	160	0.68	<1	0.21	0.29	<0.01	0.084	1.2	300	<10	<10	1,350	2.5	0.0086	117
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/30/2014	160	<0.05	<1	0.81	0.33	0.01	0.081	1.1	310	<10	<10	1,360	2.4	0.0073	136
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	170	<0.05	<1	0.20	0.33	0.01	0.077	1.3	310	<10	<10	1,410	2.4	0.0081	123
1/15/2014	190	<0.05	<1	0.19	0.41	<0.01	0.077	1.4	260	<10	<10	1,340	2.5	0.0091	110
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	180	<0.05	<1	0.21	0.33	0.01	0.095	1.3	330	<10	<10	1,570	2.8	0.0065	154
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	185	<0.05	<1	0.22	0.32	0.01	0.087	0.84	310	<10	<10	1,430	2.3	0.0048	208
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/10/2013	180	<0.05	1.1	0.21	0.31	0.01	0.087	1.2	320	<10	<10	1,470	2.5	0.0067	150
1/14/2013	200	<0.05	1.1	0.22	0.26	<0.01	0.09	1.2	280	<10	<10	1,380	2.5	0.0071	142
10/29/2012	190	<0.05	<1	0.21	0.40	0.011	0.098	1.2	300	<10	<10	1,500	2.8	0.0067	150
7/23/2012	200	<0.05	<1	0.22	0.43	<0.01	0.096	1.2	266	<10	<10	1,370	2.3	0.0063	158
4/18/2012	210	<0.1	1.4	0.2	0.50	<0.01	0.078	1.3	330	<10	<10	1,680	2.4	0.0046	215
1/9/2012	200	<0.05	2.7	0.21	0.41	<0.01	0.088	1.9	307	<10	<10	1,760	2.9	0.0073	137
11/21/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/17/2011	220	<0.1	<1	0.23	0.38	0.017	0.11	2.5	390	<10	<10	2,210	3.4	0.0069	144
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	255.5	<0.05	1.2	0.21	<0.1	<0.01	0.12	3.016	380	<5	<5	2,480	4.2	0.0068	148
4/20/2011	215	<0.05	<1	0.24	0.39	0.013	0.086	4.57	180	<2.0	<2.0	1,550	NA	0.0218	46
1/24/2011	210	<0.05	<1.0	<0.1	0.34	0.12	0.24	3.63	240	<2.0	<2.0	1,430	18	0.0202	50
10/21/2010	200	<0.1	<1.0	<0.1	0.37	NA	0.078	2.3	246	<10	<10	1,498	<0.1	0.0121	83
7/27/2010	220	< 0.10	< 0.50	0.165	0.29	0.23	0.101	2.8	241	< 1.0	< 1.0	1,400	2.61	0.0140	71
4/27/2010	210	0.76	1.7	0.171	0.37	0.19	0.276	2.6	286	< 1.0	< 1.0	1,300	20.4	0.0173	58
1/26/2010	230	< 0.10	1.7	0.317	0.30	0.12	0.333	3.2	307	< 1.0	< 1.0	1,500	27.3	0.0152	66
10/20/2009	230	< 0.10	1.3	0.241	0.38	< 0.10	0.157	3.2	238	< 1.0	< 1.0	1,300	5.33	0.0160	63
8/20/2009	220	< 0.10	1.3	NA	0.37	0.12	0.228	2.9	235	< 1.0	< 1.0	1,400	15.9	0.0181	55
5/11/2009	220	NA	NA	NA	0.36	NA	0.113	3.2	274	< 1.0	< 1.0	1,500	2.26	0.0178	56

A-8. NCMA Sentry Well Water Level and Water Quality Data
Well 30N03, Pier Avenue, Intermediate

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/13E-30N03	Screened from 60-135' - 2-inch diameter	**16.13**										
Height of steel casing added to the concrete pad elevation		2.60	10/15/2014	NA	NA	560	59	52	3.5	67	32	160
	Pad elevation NAVD 88	13.53	10/14/2014	10.52	5.61	NA	NA	NA	NA	NA	NA	NA
TOC elevation prior to renovation (Approximate)		13.5	7/30/2014	NA	NA	580	65	55	3.2	69	32	170
			7/29/2014	10.22	5.91	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	11.33	4.80	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	9.31	6.82	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	610	63	55	4.3	65	29	170
			1/15/2014	NA	NA	610	66	54	3.2	67	31	170
			1/14/2014	10.26	5.87	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	580	60	57	3.3	71	32	170
			10/14/2013	10.72	5.41	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	590	60	48	3.1	71	31	160
			7/9/2013	10.36	5.77	NA	NA	NA	NA	NA	NA	NA
			4/10/2013	8.26	7.87	600	66	53	3.3	69	31	160
			1/14/2013	7.71	8.42	570	66	55	3.4	68	30	165
			10/29/2012	8.01	8.12	610	60	56	3.7	74	33	155
			7/23/2012	9.15	6.98	600	71	56	3.5	61	28	152
			4/18/2012	6.72	9.41	570	80	47	3.0	57	25	150
			1/11/2012	7.17	8.96	570	67	55	3.9	68	30	140
			11/21/2011	6.45	9.68	600	67	47	3.2	64	28	140
			7/26/2011	7.59	8.54	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	590	67	47	5.0	54	24	290
			4/20/2011	6.65	9.48	580	76	58	4.2	62	23	140
			1/24/2011	6.68	8.75	570	76	48	4.8	55	25	130
			10/21/2010	10.76	5.37	550	69	59	3.3	65	31	133
			7/27/2010	9.53	6.60	528	72	55.1	3.41	68.7	31.0	139
			4/27/2010	6.14	7.36	672	89	60.6	3.65	70.6	32.5	134
			1/26/2010	5.88	7.62	606	110	75.0	4.51	77.8	34.3	126
			10/20/2009	6.56	6.94	806	180	93.3	25.5	92.3	41.5	162
			8/20/2009	7.50	6.00	1,070	190	151	61.6	112	44.2	130
			5/12/2009	6.33	7.17	602	97	63.4	3.96	72.9	32.2	122
			3/27/1996	NA	NA	624	70	62	4	78	35	150
			6/7/1976	NA	NA	705	90	54	2.9	99	43	189
			1/21/1966	NA	NA	804	57	54	3	132	59	410

A-8 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 30N03, Pier Avenue, Intermediate

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/15/2014	130	14	0.54	0.066	0.14	<0.01	<0.005	0.452	160	<10	<10	890	<0.05	0.0077	131
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/30/2014	130	15	<1	<0.1	0.16	<0.01	<0.005	0.34	170	<10	<10	910	<0.05	0.0052	191
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	140	13.00	<1	0.08	0.15	<0.01	0.058	0.38	170	<10	<10	910	<0.05	0.0060	166
1/15/2014	149	14.8	15	<0.1	0.16	<0.01	0.065	0.46	170	<10	<10	910	0.27	0.0070	143
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	150	14	<1	0.057	0.16	<0.01	0.370	0.41	170	<10	<10	910	0.1	0.0068	146
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	150	15.1	<1	0.074	0.18	<0.01	1.3	0.17	160	<10	<10	900	0.43	0.0028	353
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/10/2013	150	15	<1	0.11	0.2	<0.01	0.064	0.35	160	<10	<10	910	<0.05	0.0053	189
1/14/2013	150	15	<1	0.093	0.2	<0.01	0.028	0.27	165	<10	<10	900	0.084	0.0041	244
10/29/2012	148	14	<1	0.081	0.2	<0.01	0.027	0.3	155	<10	<10	900	0.04	0.0050	200
7/23/2012	200	<0.05	<1	0.1	<0.1	<.002	0.120	0.3	152	<10	<10	890	0.44	0.0042	237
4/18/2012	150	16	<1	0.1	0.3	<0.01	<0.005	0.28	150	<10	<10	880	<0.1	0.0035	286
1/11/2012	130	14	<1	0.1	0.2	<0.02	0.0510	0.39	140	<10	<10	870	0.17	0.0058	172
11/21/2011	130	15	1.2	0.088	0.2	<0.01	<0.005	0.62	140	<10	<10	850	<0.1	0.0093	108
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	139.8	15	<1	<0.1	0.2	<0.01	0.0520	0.79	290	<5	<5	890	0.14	0.0118	85
4/20/2011	142	16	<1	0.12	0.2	<0.1	0.0510	0.92	140	<2.0	<2.0	890	NA	0.0121	83
1/24/2011	130	16	<1.0	0.12	0.2	<0.10	0.0088	1.7	130	<2.0	<2.0	900	<0.1	0.0224	45
10/21/2010	130	15	<1.0	<0.1	0.1	NA	<0.005	1.1	133	<10	<10	886	<0.1	0.0159	63
7/27/2010	130	15.0	< 0.50	0.0672	0.14	0.11	< 0.00500	1.3	139	< 1.0	< 1.0	860	< 0.100	0.0181	55
4/27/2010	130	14.0	< 0.50	0.0779	0.18	0.11	< 0.00500	1.2	134	< 1.0	< 1.0	870	< 0.100	0.0135	74
1/26/2010	130	14	1.4	0.0654	0.15	< 0.10	0.0130	1.3	126	< 1.0	< 1.0	990	0.653	0.0118	85
10/20/2009	150	9.7	2.2	0.107	0.26	< 0.10	0.245	1.4	162	< 1.0	< 1.0	1,200	0.344	0.0078	129
8/20/2009	130	16	3.4	NA	0.20	< 0.10	0.151	1.6	130	< 1.0	< 1.0	1,700	1.93	0.0084	119
5/12/2009	120	NA	NA	NA	0.22	NA	24	1.2	122	< 1.0	< 1.0	900	2.24	0.0124	81
3/27/1996	161	106.8	NA	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/7/1976	168	112.5	NA	0.08	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/21/1966	250	1	NA	0.08	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-9. NCMA Sentry Well Water Level and Water Quality Data
Well 30N02, Pier Avenue, Deep

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
32S/13E-30N02	Screened from 175-255' - 2-inch diameter	**16.13**										
Height of steel casing added to the concrete pad elevation		2.60	10/15/2014	NA	NA	1,040	44	65	5.0	140	58	200
	Pad elevation NAVD 88	13.53	10/14/2014	13.69	2.44	NA	NA	NA	NA	NA	NA	NA
TOC elevation prior to renovation (Approximate)		13.5	7/29/2014	NA	NA	1,020	45	66	4.6	140	60	220
			7/29/2014	13.27	2.86	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	15.20	0.93	NA	NA	NA	NA	NA	NA	NA
			5/5/2014	13.19	2.94	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	8.57	7.56	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	1,040	46	66	5.0	120	50	190
			1/15/2014	NA	NA	1,060	45	60	4.1	120	49	190
			1/14/2014	9.30	6.83	NA	NA	NA	NA	NA	NA	NA
			10/15/2013	NA	NA	1,030	46	70	4.9	140	58	190
			10/14/2013	12.13	4.00	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	1,020	50	61	4.5	140	59	185
			7/9/2013	11.05	5.08	NA	NA	NA	NA	NA	NA	NA
			4/10/2013	7.06	9.07	1,080	48	60	4.3	120	52	185
			1/14/2013	4.98	11.15	1,010	48	63	4.5	120	53	188
			10/29/2012	8.52	7.61	1,030	40	68	5.0	140	58	180
			7/23/2012	8.31	7.82	1,040	54	63	4.5	110	48	188
			4/18/2012	3.45	12.68	990	60	56	4.2	110	47	190
			1/11/2012	4.88	11.25	1,040	49	64	4.9	130	54	180
			11/21/2011	5.35	10.78	1,020	46	57	4.5	130	54	180
			7/26/2011	7.25	8.88	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	1,050	50.4	81	7.7	150	62	180
			4/20/2011	3.53	12.60	1,030	52	63	5.4	130	44	180
			1/24/2011	3.67	11.76	1,050	50	60	6.4	120	49	190
			10/21/2010	10.42	5.71	1,040	48	52	3.5	100	45	181
			7/27/2010	10.02	6.11	777	57	67.6	7.31	141	58.5	190
			4/27/2010	5.26	8.27	800	93	71.9	12.50	108	46.3	159
			2/25/2010	1.72	11.78	1,000	48	71.4	4.70	141	58.1	195
Confirmation Sample Collected from Pump Discharge at End of Purge:			2/25/2010	1.72	11.78	1,010	74	76.9	10.2	138	55.8	195
Confirmation Sample Collected by Standard Method (Bailer):			1/26/2010	3.72	9.78	970	50	74.2	4.77	152	62.2	195
			10/20/2009	7.38	6.12	2,080	690	274	151	239	101.0	220
			8/20/2009	11.94	1.56	1,350	500	199	82.2	123	49.0	199
			5/11/2009	6.98	6.52	1,290	170	129	52	137	66.9	176
			3/27/1996	NA	NA	1,050	50	71	5.5	145	60	243
			6/7/1976	NA	NA	1,093	48	62	4.7	150	60	248
			1/21/1966	NA	NA	1,069	54	71	5	148	63	232

A-9 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 30N02, Pier Avenue, Deep

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/15/2014	440	0.77	<1	0.13	<0.1	<0.01	<0.005	<0.1	200	<10	<10	1,370	<0.05	NA	NA
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/29/2014	470	0.51	<1	0.10	0.13	<0.01	<0.005	<0.4	220	<10	<10	1,340	<0.05	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5/5/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	520	0.47	<1	0.14	0.1	<0.01	<0.005	<0.1	190	<10	<10	1,350	<0.05	NA	NA
1/15/2014	477	0.65	1.1	0.13	0.43	<0.01	<0.005	<0.2	190	<10	<10	1,370	<0.05	NA	NA
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/15/2013	541	0.46	<1	0.12	0.18	<0.01	<0.005	<0.2	190	<10	<10	1,360	<0.05	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	500	0.63	<1	0.14	0.12	<0.01	<0.005	<0.1	185	<10	<10	1,370	<0.05	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/10/2013	500	0.50	<1	0.15	<0.2	<0.01	<0.005	<0.2	185	<10	<10	1,360	<0.05	NA	NA
1/14/2013	530	0.40	<1	0.14	<0.2	<0.01	<0.005	<0.2	188	<10	<10	1,350	0.07	NA	NA
10/29/2012	500	<0.25	<1	0.14	<0.5	<0.01	<0.005	<0.5	180	<10	<10	1,360	<0.05	NA	NA
7/23/2012	510	0.13	<1	0.15	0.15	<0.01	0.01	<0.1	188	<10	<10	1,360	<0.05	NA	NA
4/18/2012	560	0.14	<1	0.12	0.21	<0.01	<0.005	0.28	190	<10	<10	1,360	<0.1	0.0047	214
1/11/2012	460	1.30	<1	0.17	0.16	<0.02	<0.005	<0.2	180	<10	<10	1,360	<0.1	NA	NA
11/21/2011	450	0.15	<1	0.15	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,360	<0.1	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	479.1	0.15	<1	0.16	0.144	<0.01	0.006	<0.1	180	<5	<5	1,370	0.49	NA	NA
4/20/2011	508	0.17	<1	0.19	0.2	<0.01	<0.005	<0.1	180	<2.0	<2.0	1,380	NA	NA	NA
1/24/2011	490	0.24	<1.0	0.17	0.17	<0.10	0.064	<0.1	190	<2.0	<2.0	1,380	0.12	NA	NA
10/21/2010	460	0.15	<1.0	<0.1	<0.1	NA	<0.005	<0.3	181	<10	<10	1,377	<0.1	NA	NA
7/27/2010	470	0.3	3.5	0.138	< 0.10	0.11	0.102	0.28	190	< 1.0	< 1.0	1,300	3.43	0.0049	204
4/27/2010	300	7.0	3.2	0.123	0.13	0.11	0.0776	0.7	159	< 1.0	< 1.0	1,100	3.27	0.0075	133
2/25/2010	490	0.16	< 0.50	0.15	0.15	< 0.10	0.0393	0.16	195	< 1.0	< 1.0	1,300	3.30	0.0033	300
2/25/2010	440	0.13	2.4	0.142	0.16	< 0.10	0.0579	0.24	195	< 1.0	< 1.0	1,400	1.69	0.0032	308
1/26/2010	510	0.14	< 0.50	0.129	0.11	< 0.10	< 0.00500	0.16	195	< 1.0	< 1.0	1,300	< 0.100	0.0032	313
10/20/2009	400	< 0.10	7.0	0.201	0.16	0.87	0.398	2.0	220	< 1.0	< 1.0	2,800	5.50	0.0029	345
8/20/2009	220	6.4	6.3	NA	0.23	0.14	0.339	2.8	199	< 1.0	< 1.0	2,100	4.91	0.0056	179
5/11/2009	470	NA	NA	NA	0.18	NA	0.128	0.56	176	< 1.0	< 1.0	1,800	5.24	0.0033	304
3/27/1996	516	0.9	NA	0.23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/7/1976	484	0	NA	0.13	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/21/1966	483	0	NA	0.12	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-10. NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Green, Shallow

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
Oceano MW-Green	Screened from 110-130' - 3-inch diameter	**30.49**										
	Casing relative to concrete pad	-4.14	10/16/2014	NA	NA	720	41	46	3.7	110	53	330
	Pad elevation above MSL, approximate	34.63	10/14/2014	31.64	2.99	NA	NA	NA	NA	NA	NA	NA
	All elevations relative to MSL		7/30/2014	NA	NA	660	34	35	2.4	95	49	420
			7/29/2014	32.30	2.33	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	32.82	1.81	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	27.98	6.65	NA	NA	NA	NA	NA	NA	NA
			4/17/2014	NA	NA	890	55	70	5.4	100	45	250
			1/16/2014	NA	NA	900	57	66	4.60	110	50	240
			1/14/2014	28.55	6.08	NA	NA	NA	NA	NA	NA	NA
			10/16/2013	NA	NA	690	30	40	3.40	100	49	340
			10/14/2013	30.31	4.32	NA	NA	NA	NA	NA	NA	NA
			7/11/2013	NA	NA	860	60	50	4.40	110	47	240
			7/9/2013	29.98	4.65	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	900	60	69	4.60	110	47	250
			4/10/2013	23.30	11.33	NA	NA	NA	NA	NA	NA	NA
			1/16/2013	NA	NA	820	66	76	5.00	100	47	260
			1/14/2013	23.59	11.04	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	27.31	7.32	780	65	75	4.70	100	46	255
			7/25/2012	27.15	7.48	830	76	80	5.30	96	45	250
			4/19/2012	NA	NA	790	87	69	4.50	52	37	250
			4/18/2012	21.65	12.98	NA	NA	NA	NA	NA	NA	NA
			1/12/2012	23.29	11.34	760	76	85	4.00	79	40	270
			11/21/2011	22.46	12.17	720	39	38	3.40	96	43	320
			7/26/2011	25.51	9.12	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	760	69.3	66	6.40	80	35	310
			4/20/2011	114.79	-80.16	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	106.59	-71.96	310	98	22	8.1	34	9.2	19.0
			10/28/2010	NA	NA	290	81	26	9.3	64	11	160.0
			10/21/2010	112.71	-82.22	NA	NA	NA	NA	NA	NA	NA
			7/26/2010	95.61	-65.12	438	85	34.3	1.93	61.7	30.4	30.0
			4/26/2010	63.90	-33.41	560	83	47.7	5.7	86.1	48.3	62
			1/27/2010	43.71	-13.22	460	130	45.0	25.4	682	124	112
			10/20/2009	29.20	1.29	362	92	39.6	2.92	19.2	45.1	76.8
			8/19/2009	24.55	5.94	420	160	48.4	3.37	49.9	20.4	17.6
			5/16/1983	15.80	14.69	665	35	40	NA	85	65	360

A-10 (continued). NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Green, Shallow

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/16/2014	200	<0.05	<1	0.10	<0.1	<0.01	0.17	<0.1	330	<10	<10	1,090	6.5	NA	NA
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/30/2014	160	<0.05	<1	<0.1	0.16	<0.01	0.17	<0.1	420	<10	<10	1,040	6.5	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/17/2014	380	<0.05	<1	0.15	0.12	0.01	0.31	0.13	250	<10	<10	1,260	4.9	0.0024	423
1/16/2014	360	<0.05	<1	0.180	0.2	0.02	0.32	<0.1	240	<10	<10	1,260	6.0	NA	NA
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2013	190	<0.05	<1	0.091	0.14	<0.01	0.23	<0.1	340	<10	<10	1,050	7.4	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/11/2013	340	<0.05	<1	0.18	0.15	0.02	0.28	<0.1	240	<10	<10	1,230	4.9	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	350	0.82	<1	0.2	0.12	0.03	0.28	<0.2	250	<10	<10	1,250	5.7	NA	NA
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/16/2013	320	<0.1	<1	0.21	0.13	<0.01	0.31	<0.2	260	<10	<10	1,230	4.2	NA	NA
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	280	<0.05	<1	0.19	0.14	0.04	0.23	<0.1	255	<10	<10	1,190	4	NA	NA
7/25/2012	310	<0.05	<1	0.22	0.15	0.04	0.24	<0.1	250	<10	<10	1,220	6.7	NA	NA
4/19/2012	270	<0.1	<1	0.19	0.21	0.05	0.17	<0.2	250	<10	<10	1,180	4	NA	NA
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/12/2012	190	<0.1	<1	0.23	0.21	0.069	0.23	<0.2	270	<10	<10	1,150	4.8	NA	NA
11/21/2011	180	<0.05	3.5	0.079	0.19	0.013	0.17	<0.1	320	<10	<10	1,050	4.8	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	208.8	<0.05	<1	0.16	0.17	0.041	0.23	0.199	310	<5	<5	1,170	5.3	0.0029	348
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	53	<0.05	<1.0	<0.1	0.2	4.42	0.4	0.63	19.0	<2.0	<2.0	480	10	0.0064	156
10/28/2010	68	<0.1	<1.0	<0.1	0.2	NA	0.85	0.36	160.0	<10	<10	520	38	0.0044	225
10/21/2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/26/2010	210	< 0.10	< 0.50	0.0435	0.58	0.22	1.46	0.32	30.0	< 1.0	< 1.0	690	36	0.0038	266
4/26/2010	310	< 0.10	0.84	< 0.02	< 0.1	0.56	2.54	0.31	62.0	< 1.0	< 1.0	880	233	0.0037	268
1/27/2010	100	0.56	NA	< 0.0200	0.21	0.25	32.4	0.49	112.0	< 1.0	< 1.0	760	4,360	0.0038	265
10/20/2009	110	< 0.10	< 0.50	0.0697	< 0.10	< 0.10	0.242	0.39	80.0	3.2	< 1.0	590	11.4	0.0042	236
8/19/2009	54	< 0.10	1.1	NA	< 0.10	0.25	1.76	0.68	17.6	< 1.0	< 1.0	690	242	0.0043	235
5/16/1983	90	< 4	NA	NA	0.2	NA	0.01	NA	360	ND	ND	950	0.10	NA	NA

A-11. NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Blue, Intermediate Shallow

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
Oceano MW-Blue	Screened from 190-210' and 245-265' - 3-inch diameter	**30.54**										
	Casing relative to concrete pad	-4.09	10/16/2014	NA	NA	370	120	78	13.0	4.2	29	53
	Pad elevation above MSL, approximate	34.63	10/14/2014	32.70	1.93	NA	NA	NA	NA	NA	NA	NA
	All elevations relative to MSL		7/30/2014	NA	NA	450	120	71	4.4	9.6	43	53
			7/29/2014	32.69	1.94	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	34.02	0.61	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	27.07	7.56	NA	NA	NA	NA	NA	NA	NA
			4/17/2014	NA	NA	370	120	89	14.0	2.4	17	76
			1/16/2014	NA	NA	350	122	89	15	2	18	68
			1/14/2014	27.86	6.77	NA	NA	NA	NA	NA	NA	NA
			10/16/2013	NA	NA	360	100	98	20	3.1	15	66
			10/14/2013	30.98	3.65	NA	NA	NA	NA	NA	NA	NA
			7/11/2013	NA	NA	370	140	70	6.3	4	23	82
			7/9/2013	29.36	5.27	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	340	90	81	14	2.9	18	78
			4/10/2013	24.45	10.18	NA	NA	NA	NA	NA	NA	NA
			1/16/2013	NA	NA	360	107	99	7.1	3.3	24	110
			1/14/2013	23.14	11.49	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	27.68	6.95	380	97	100	6.4	4.5	24	130
			7/25/2012	27.18	7.45	240	49	56	11	5.4	22	99
			4/19/2012	NA	NA	380	100	87	5.5	3.5	26	150
			4/18/2012	20.10	14.53	NA	NA	NA	NA	NA	NA	NA
			1/12/2012	22.26	12.37	480	96	110	4.9	5.6	33	154
			11/21/2011	22.73	11.90	390	90	78	4.6	5.2	24	111
			7/26/2011	25.29	9.34	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	260	29.3	23	5.3	8.7	20	84
			4/21/2011	NA	NA	580	118	70	19	49	17	8.8
			4/20/2011	22.59	12.04	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	24.87	9.76	680	110	60	17	64	22	5.0
			10/21/2010	30.11	0.43	770	100	68	12	88	31	14.0
			7/26/2010	24.74	5.80	783	130	80.1	8.58	142	42.0	2.8
			4/26/2010	18.52	12.02	1,130	160	70.2	6.48	208	50.7	8.4
			1/27/2010	22.06	8.48	1,740	430	55.6	4.98	282	43.0	< 1.0
			10/20/2009	27.50	3.04	2,250	1,000	19.5	2.40	487	22.5	5.0
			8/19/2009	24.65	5.89	322	150	93.2	16.7	23.9	12.1	3.0
			5/16/1983	13.30	17.24	840	80	90	NA	100	50	250

A-11 (continued). NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Blue, Intermediate Shallow

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/16/2014	77	<0.05	<1	0.17	<0.1	0.11	0.040	0.35	88	<10	<10	740	4.5	0.0029	343
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/30/2014	130	0.13	<1	0.15	0.12	0.1	0.078	0.29	73	20	<10	800	8	0.0024	414
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/17/2014	39	<0.05	<1	0.16	<0.1	0.12	0.03	0.43	121	45	<10	720	3.7	0.0036	279
1/16/2014	42	<0.05	<1	0.17	0.1	0.09	0.026	0.48	125	57.5	<10	710	2.3	0.0039	254
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2013	36	<0.05	<1	0.19	<0.1	0.11	0.057	0.38	139	73	<10	710	4.1	0.0038	263
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/11/2013	40	0.4	<1	0.2	0.11	0.11	0.043	0.44	117	35	<10	730	3.2	0.0031	318
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	30	<0.05	<1	0.19	0.12	0.07	0.046	0.3	155	77.5	<10	650	3.2	0.0033	300
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/16/2013	36	<0.05	<1	0.25	<0.1	<0.01	0.048	0.4	165	55	<10	720	3.7	0.0037	268
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	38	<0.05	<1	0.28	<0.1	0.1	0.09	0.2	168	38	<10	720	6.1	0.0021	485
7/25/2012	43	<0.05	<1	0.16	0.19	0.023	0.11	<0.1	132	33	<10	470	6.6	NA	NA
4/19/2012	79	<0.1	<1	0.27	0.26	0.09	0.033	0.68	180	30	<10	750	1.6	0.0068	147
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/12/2012	95	<0.1	<1	0.28	<0.2	0.11	0.01	0.306	180	26	<10	850	0.2	0.0032	314
11/21/2011	86	<0.05	<1	0.19	0.13	0.092	0.014	0.28	128	17	<10	720	0.5	0.0031	321
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	80	<0.05	<1	<0.1	0.199	0.072	0.041	<0.1	89	<5	<5	440	2.7	NA	NA
4/21/2011	274	<0.05	<1	<0.1	0.29	0.109	0.091	0.4	11.3	2.5	<2.0	950	NA	0.0034	295
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	330	<0.05	<1.0	<0.1	0.22	0.96	0.16	0.31	11.2	6.2	<2.0	1,040	10.0	0.0028	355
10/21/2010	380	<0.1	<1.0	<0.1	0.28	NA	0.054	<0.3	14.0	<10	<10	1,163	2.2	NA	NA
7/26/2010	450	< 0.10	< 0.50	< 0.0200	0.26	0.31	3.97	0.8	2.8	< 1.0	< 1.0	1,200	593	0.0059	169
4/26/2010	530	< 0.10	0.56	< 0.02	0.23	0.54	3.10	1.0	8.4	< 1.0	< 1.0	1,600	383	0.0061	165
1/27/2010	680	< 0.10	< 0.50	0.0819	0.14	0.41	9.41	2.0	< 1.0	< 1.0	< 1.0	2,300	170	0.0047	215
10/20/2009	410	< 0.10	0.98	0.0532	0.13	< 0.10	13.1	4.5	5.0	< 1.0	< 1.0	3,100	236	0.0045	222
8/19/2009	4.0	< 0.10	1.3	NA	0.19	0.5	0.7	0.74	23.0	20.0	< 1.0	640	153	0.0049	203
5/16/1983	160.0	< 4	NA	ND	0.2	NA	0.14	NA	250.0	ND	ND	1,200	0.10	NA	NA

A-12. NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Silver, Intermediate Deep

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
Oceano MW-Silver	Screened from 395-435' and 470-510' - 3-inch diameter	**30.48**										
	Casing relative to concrete pad	-4.15										
	Pad elevation above MSL, approximate	34.63	10/14/2014	43.01	-8.38	NA	NA	NA	NA	NA	NA	NA
	All elevations relative to MSL		7/29/2014	33.65	0.98	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	36.33	-1.70	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	42.20	-7.57	NA	NA	NA	NA	NA	NA	NA
			1/14/2014	37.78	6.85	NA	NA	NA	NA	NA	NA	NA
			10/14/2013	30.92	3.71	NA	NA	NA	NA	NA	NA	NA
			7/9/2013	30.91	3.72	NA	NA	NA	NA	NA	NA	NA
			4/10/2013	26.08	8.55	NA	NA	NA	NA	NA	NA	NA
			1/14/2013	23.12	11.51	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	27.14	7.49	NA	NA	NA	NA	NA	NA	NA
			7/25/2012	27.68	6.95	NA	NA	NA	NA	NA	NA	NA
			4/18/2012	20.13	14.5	NA	NA	NA	NA	NA	NA	NA
			1/11/2012	23.00	11.63	NA	NA	NA	NA	NA	NA	NA
			11/21/2011	22.85	11.78	NA	NA	NA	NA	NA	NA	NA
			7/26/2011	25.23	9.4	NA	NA	NA	NA	NA	NA	NA
			4/21/2011	NA	NA	410	97	100	7.2	3.5	21	80
			4/20/2011	21.27	13.36	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	22.02	12.61	440	92	90	9.2	3.4	27	90
			10/21/2010	29.11	5.52	460	90	110	15	6.8	32	94
			7/26/2010	24.24	6.24	478	83	109	5.94	52.9	30.4	122.0
			4/26/2010	19.04	11.44	452	83	83	7.42	29.3	34.5	72.0
			1/27/2010	21.05	9.43	496	71	92.2	10.6	22.9	39.1	13.0
			10/20/2009	27.52	2.96	564	71	80.8	8.63	33.2	49.8	49.6
			8/19/2009	29.34	1.14	522	180	148	71.6	95.2	8.42	30.0
			5/16/1983	13.50	16.98	630	40	40	NA	90	50	330

A-12 (continued). NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Silver, Intermediate Deep

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/11/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
11/21/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/21/2011	134	<0.05	<1	0.23	0.18	0.097	0.065	0.42	100	20	<2.0	770	NA	0.0043	231
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	140	<0.05	<1.0	0.25	0.11	0.94	0.041	0.35	110	20	<2.0	810	2.2	0.0038	263
10/21/2010	140	<0.1	<1.0	0.2	0.1	NA	0.1	0.38	124	30	<10	868	3.5	0.0042	237
7/26/2010	94	< 0.10	<0.50	0.255	< 0.10	0.41	0.477	0.56	130.0	8.0	< 1.0	730	61.0	0.0067	148
4/26/2010	190	< 0.1	0.56	0.134	< 0.10	0.65	0.702	0.4	86.0	14.0	< 1.0	810	71.0	0.0048	208
1/27/2010	230	<0.10	< 0.50	0.323	< 0.10	0.20	0.604	0.29	51.0	38.0	< 1.0	780	54.4	0.0041	245
10/20/2009	310	<0.10	< 0.50	0.148	< 0.10	< 0.10	0.337	0.32	64.0	14.4	< 1.0	850	20.0	0.0045	222
8/19/2009	3.5	<0.10	1.7	NA	0.24	0.52	2.36	0.76	170	140	< 1.0	1,000	278	0.0042	237
5/16/1983	80	< 4	NA	NA	0.1	NA	0.02	NA	330	ND	ND	900	0.05	NA	NA

A-13. NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD #8

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
Oceano # 8												
			10/16/2014	NA	NA	670	40	43	2.8	110	50	3500
	Casing relative to concrete pad		7/30/2014	NA	NA	670	43	43	2.2	110	48	360
	Pad elevation above MSL, approximate		4/15/2014	NA	NA	680	42	43	3.3	87	43	340
	All elevations relative to MSL		1/16/2014	NA	NA	680	45	42	2.6	100	46	360
			10/16/2013	NA	NA	670	40	44	2.6	100	47	350
			7/10/2013	NA	NA	670	44	43	2.8	110	52	350
			4/11/2013	NA	NA	720	43	40	2.7	98	46	350
			1/16/2013	NA	NA	660	43	43	2.7	100	47	360
			10/30/2012	NA	NA	660	40	44	2.9	110	49	345
			7/24/2012	NA	NA	700	47	44	2.8	93	45	356
			4/25/2012	NA	NA	680	48	44	2.7	95	43	350
			1/10/2012	NA	NA	690	45	44	2.6	100	44	340
			11/22/2011	NA	NA	690	41	39	2.7	100	46	350
			7/25/2011	NA	NA	690	44	39	4.5	86	40	340

A-13 (continued). NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD #8

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/16/2014	150	<0.05	<1	0.055	0.103	<0.01	0.03	<0.1	350	<10	<10	1,060	0.064	NA	NA
7/30/2014	160	<0.05	<1	<0.1	0.15	<0.01	0.029	<0.1	360	<10	<10	1,070	0.057	NA	NA
4/15/2014	170	<0.05	<1	0.09	0.11	<0.01	0.023	<0.1	340	<10	<10	1,070	0.05	NA	NA
1/16/2014	171	<0.05	<1	<0.05	0.13	<0.01	0.032	<0.1	360	<10	<10	1,060	0.18	NA	NA
10/16/2013	180	0.47	<1	<0.05	0.15	<0.01	0.03	<0.1	350	<10	<10	1,053	0.11	NA	NA
7/10/2013	180	<0.05	<1	0.072	0.12	<0.01	0.032	<0.1	350	<10	<10	1,070	0.11	NA	NA
4/11/2013	170	<0.05	<1	0.072	0.14	<0.01	0.029	<0.1	350	<10	<10	1,070	0.12	NA	NA
1/16/2013	180	<0.05	<1	0.07	0.1	<0.01	0.031	<0.1	360	<10	<10	1,060	0.130	NA	NA
10/30/2012	170	<0.05	<1	0.071	0.14	<0.01	0.03	<0.1	345	<10	<10	1,070	0.086	NA	NA
7/24/2012	180	<0.05	<1	<0.1	0.17	<0.01	0.029	<0.1	356	<10	<10	1,070	0.660	NA	NA
4/25/2012	200	<0.1	<1	<0.1	0.26	<0.01	0.032	<0.2	350	<10	<10	1,070	0.200	NA	NA
1/10/2012	160	<0.05	<1	<0.1	0.2	<0.01	0.024	<0.1	340	<10	<10	1,070	0.100	NA	NA
11/22/2011	160	<0.1	<1	0.046	<0.2	0.013	0.03	<0.2	350	<10	<10	1,010	0.0	NA	NA
7/25/2011	166.9	<0.05	<1	<0.1	0.145	<0.01	0.026	<0.1	340	<5	<5	1,070	<0.1	NA	NA

A-14. NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Yellow, Deep

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
Oceano MW-Yellow	Screened from 625-645' - 3-inch diameter	**30.52**										
	Casing relative to concrete pad	-4.11	10/16/2014	NA	NA	370	80	84	5.0	3.2	32	146
	Pad elevation above MSL, approximate	34.63	10/14/2014	41.12	-6.49	NA	NA	NA	NA	NA	NA	NA
	All elevations relative to MSL		7/30/2014	NA	NA	380	86	81	4.2	3.6	35	158
			7/29/2014	33.72	0.91	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	36.55	-1.92	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	39.06	-4.43	NA	NA	NA	NA	NA	NA	NA
			4/17/2014	NA	NA	380	84	86	5.2	3	26	120
			1/16/2014	NA	NA	390	89	91	5.0	4.1	34	119
			1/14/2014	27.80	6.83	NA	NA	NA	NA	NA	NA	NA
			10/16/2013	NA	NA	410	84	87	4.7	5.3	33	114
			10/14/2013	30.83	3.80	NA	NA	NA	NA	NA	NA	NA
			7/11/2013	NA	NA	420	80	70	4.8	4.5	35	116
			7/9/2013	30.41	4.22	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	450	77	77	4.7	5.8	38	113
			4/10/2013	26.09	8.54	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	420	74	78	4.7	7.0	40	110
			1/14/2013	23.25	11.38	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	27.23	7.40	380	88	99	5.7	3.3	30	160
			7/25/2012	27.69	6.94	390	108	107	5.5	2.7	29	13
			4/19/2012	NA	NA	390	110	83	4.3	2.5	26	400
			4/18/2012	20.05	14.58	NA	NA	NA	NA	NA	NA	NA
			1/12/2012	23.08	11.55	410	94	95	4.5	3.0	28	300
			11/21/2011	22.98	11.65	410	94	83	4.6	3.4	30	152
			7/26/2011	26.73	7.90	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	420	89.7	84	7.1	4.4	31	148
			4/21/2011	NA	NA	380	88	110	6.3	4.0	27	140
			4/20/2011	21.30	13.33	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	22.01	12.62	430	83	73	6	6.3	31	160
			10/21/2010	28.22	2.30	410	87	100	3.9	6.0	33	148
			7/26/2010	25.50	5.02	446	94	93.0	8.81	10.2	32.0	38.4
			4/26/2010	19.17	11.35	416	96	87.6	9.86	14.8	37.1	46.0
			1/27/2010	20.58	9.94	498	89	79.6	10.2	15.6	38.0	31.0
			10/20/2009	25.80	4.72	446	100	97.1	12.8	16.4	37.9	26.6
			8/19/2009	31.04	-0.52	426	160	101	18.9	93.2	29.1	64.4
			5/16/1983	14.30	16.22	770	60	70	NA	90	70	330

A-14 (continued). NCMA Sentry Well Water Level and Water Quality Data
Oceano CSD Yellow, Deep

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/16/2014	59	<0.05	<1	0.19	<0.1	0.055	0.044	0.18	170	24	<10	720	0.61	0.0023	444
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/30/2014	61	<0.05	<1	0.16	<0.1	0.05	0.047	0.17	175	17	<10	730	0.25	0.0020	506
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/17/2014	87	<0.05	<1	0.18	<0.1	0.08	0.032	0.3	143	23	<10	730	0.45	0.0036	280
1/16/2014	103	<0.05	<1	0.20	<0.1	0.06	0.043	0.34	136	17	<10	740	0.30	0.0038	262
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2013	130	<0.05	<1	0.17	<0.1	0.08	0.053	0.3	124	10	<10	760	0.28	0.0036	280
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/11/2013	120	<0.05	<1	0.19	<0.1	0.06	0.047	0.21	136	20	<10	760	0.19	0.0026	381
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	150	<0.05	<1	0.19	<0.1	0.06	0.069	0.2	128	15	<10	780	0.15	0.0026	385
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	180	<0.05	<1	0.18	<0.1	<0.01	0.087	<0.1	125	15	<10	810	0.55	NA	NA
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	63	<0.05	<1	0.25	<0.1	0.08	0.035	0.3	168	7.5	<10	740	0.33	0.0034	293
7/25/2012	66	<0.05	<1	0.28	<0.1	0.079	0.0037	0.23	168	155	<10	750	0.84	0.0021	470
4/19/2012	68	<0.1	<1	0.22	0.23	0.09	0.032	0.39	420	20	<10	790	0.24	0.0035	282
4/18/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/12/2012	68	<0.1	<1	0.24	<0.2	0.1	0.032	0.31	320	20	<10	760	0.89	0.0033	303
11/21/2011	72	<0.05	<1	0.21	<0.1	0.09	0.035	0.3	160	8	<10	730	0.65	0.0032	313
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	91.8	<0.05	<1	0.20	<0.1	0.071	0.046	0.297	150	2.5	<5	760	1.90	0.0033	302
4/21/2011	101	<0.05	<1	0.41	0.14	0.07	0.13	0.33	140	<2.0	<2.0	750	N/A	0.0038	267
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	100	<0.05	<1.0	0.22	0.11	0.66	0.078	0.28	160	<2.0	<2.0	780	0.49	0.0034	296
10/21/2010	100	<0.1	<1.0	0.14	<0.1	NA	0.087	<0.3	148	<10	<10	796	0.66	NA	NA
7/26/2010	120	< 0.10	< 0.50	0.142	< 0.10	0.32	0.196	0.48	56.0	17.6	< 1.0	700	22.4	0.0051	196
4/26/2010	150	< 0.1	0.63	0.132	< 0.10	0.39	0.579	0.44	58.0	12.0	< 1.0	780	56.2	0.0046	218
1/27/2010	180	< 0.10	0.56	0.132	< 0.10	0.19	0.283	0.38	51.0	20.0	< 1.0	810	23.6	0.0043	234
10/20/2009	180	< 0.10	0.56	0.168	0.2	< 0.10	0.180	0.42	42.6	16.0	< 1.0	760	18.9	0.0042	238
8/19/2009	36	< 0.10	0.98	NA	0.2	0.31	5.490	0.60	84.4	20.0	< 1.0	790	682	0.0038	267
5/16/1983	120	9	NA	NA	0.1	NA	0.02	NA	330	ND	ND	1,100	0.24	NA	NA

A-15. NCMA Sentry Well Water Level and Water Quality Data
Well 36L01, Oceano Dunes, Intermediate

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
12N/36W-36L01	Screened from 227-237' - 2-inch diameter	**26.77**										
Height of steel casing added to the concrete pad elevation		2.79	10/15/2014	NA	NA	910	34	58	3.7	120	43	180
	Pad elevation NAVD 88	23.98	10/14/2014	21.75	5.02	NA	NA	NA	NA	NA	NA	NA
TOC elevation prior to renovation (Approximate)		24.0	7/29/2014	NA	NA	890	36	61	3.2	120	47	180
			7/29/2014	21.57	5.20	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	22.36	4.41	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	19.89	6.88	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	910	36	46	2.6	76	27	180
			1/16/2014	NA	NA	910	35	60	3.1	110	42	180
			1/14/2014	20.38	6.39	NA	NA	NA	NA	NA	NA	NA
			10/16/2013	NA	NA	910	40	63	4.5	120	43	170
			10/14/2013	21.71	5.06	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	910	39	54	3.2	120	42	175
			7/9/2013	21.37	5.4	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	890	38	59	3.6	110	43	180
			4/10/2013	20.10	6.67	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	870	39	61	3.4	110	41	178
			1/14/2013	18.62	8.15	NA	NA	NA	NA	NA	NA	NA
			10/31/2012	20.11	6.66	910	35	66	4.0	130	46	165
			7/24/2012	19.42	7.35	880	43	65	3.9	110	41	168
			4/20/2012	18.26	8.03	NA	NA	NA	NA	NA	NA	NA
			4/18/2012	23.83	2.94	880	47	52	3.2	95	36	180
			1/11/2012	17.68	9.09	790	41	64	4.1	120	44	170
			11/21/2011	18.08	8.69	910	39	55	3.5	110	40	180
			7/26/2011	19.63	7.14	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	890	40.5	65	5.7	110	43	170
			4/21/2011	NA	NA	890	42	61	4.2	100	30	170
			4/20/2011	18.26	8.51	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	17.61	8.68	890	41	55	5.1	98	36	180
			10/21/2010	20.75	5.54	910	38	76	3.6	130	47	169
			7/27/2010	21.18	5.11	707	36	64.2	3.70	127	47.4	182
			4/26/2010	15.94	8.06	860	42	70.3	4.13	129	48.9	191
			10/21/2009	17.72	6.28	856	38	72.0	4.64	131	48.2	192
			8/20/2009	19.16	4.84	890	39	78.0	4.21	138	48.1	184
			5/11/2009	17.68	6.32	832	63	83.8	4.88	111	45.4	204
			3/26/1996	NA	NA	882	35	66	4.8	124	47	233
			6/8/1976	NA	NA	936	38	72	3.5	130	48	223

A-15 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 36L01, Oceano Dunes, Intermediate

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/15/2014	380	0.950	<1	0.14	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,210	<0.05	NA	NA
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/29/2014	390	0.603	<1	0.12	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,220	<0.05	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	440	0.77	<1	0.15	<0.1	<0.01	<0.005	<0.1	180	<10	<10	1,200	<0.05	NA	NA
1/16/2014	416	1.00	1.1	0.14	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,190	<0.05	NA	NA
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2013	460	0.76	<1	0.13	<0.2	<0.01	<0.005	<0.2	170	<10	<10	1,210	<0.05	NA	NA
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	430	0.78	<1	0.14	<0.1	<0.01	<0.005	<0.1	175	<10	<10	1,210	0.18	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	420	0.82	<1	0.16	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,200	<0.05	NA	NA
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	440	0.57	<1	0.15	<0.2	<0.01	<0.005	<0.2	178	<10	<10	1,190	0.13	NA	NA
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/31/2012	400	1.60	<1	0.16	0.2	<0.01	<0.005	<0.5	165	<10	<10	1,200	<0.05	NA	NA
7/24/2012	420	<0.05	<1	0.16	<0.1	<0.01	0.02	<0.1	168	<10	<10	1,190	0.19	NA	NA
4/20/2012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/18/2012	450	0.42	<1	0.12	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,190	<0.1	NA	NA
1/11/2012	380	1.30	<1	0.19	0.18	<0.02	<0.005	<0.2	170	<10	<10	1,190	<0.1	NA	NA
11/21/2011	380	0.37	<1	0.16	<0.2	<0.01	<0.005	<0.2	180	<10	<10	1,200	<0.1	NA	NA
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	408.9	0.39	<1	0.15	<0.1	<0.01	<0.005	<0.1	170	<5	<5	1,200	0.024	NA	NA
4/21/2011	415	0.60	<1	0.19	0.07	<0.01	<0.005	<0.1	170	<2.0	<2.0	1,200	NA	NA	NA
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	400	0.50	<1.0	0.20	0.15	<0.10	<0.005	<0.1	180	<2.0	<2.0	1,200	<0.1	NA	NA
10/21/2010	400	0.39	<1.0	0.10	<0.1	NA	<0.005	<0.3	169	<10	<10	1,213	<0.1	NA	NA
7/27/2010	420	0.40	< 0.50	0.158	< 0.10	< 0.10	< 0.00500	0.11	182	< 1.0	< 1.0	1,100	< 0.100	0.0031	327
4/26/2010	400	0.45	0.77	0.223	< 0.1	0.15	0.057	0.14	191	< 1.0	< 1.0	1,100	4.53	0.0033	300
10/21/2009	420	0.49	0.84	0.150	0.12	< 0.10	0.0994	0.13	192	< 1.0	< 1.0	1,100	1.68	0.0034	292
8/20/2009	390	0.49	0.56	NA	< 0.10	< 0.10	0.185	0.14	184	< 1.0	< 1.0	1,200	2.03	0.0036	279
5/11/2009	330	NA	NA	NA	0.12	NA	0.551	0.22	204	< 1.0	< 1.0	1,200	4.02	0.0035	286
3/26/1996	408	2	NA	0.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/8/1976	423	0.6	NA	0.15	0.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-16. NCMA Sentry Well Water Level and Water Quality Data
Well 36L01, Oceano Dunes, Deep

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
12N/36W-36L02	Screened from 535-545' - 2-inch diameter	**26.77**										
Height of steel casing added to the concrete pad elevation		2.79	10/15/2014	NA	NA	800	88	96	6.4	91	40	260
	Pad elevation NAVD 88	23.98	10/14/2014	26.30	0.47	NA	NA	NA	NA	NA	NA	NA
TOC elevation prior to renovation (Approximate)		24.0	7/29/2014	NA	NA	800	98	99	5.8	88	39	280
			7/29/2014	25.64	1.13	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	25.22	1.55	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	16.94	9.83	NA	NA	NA	NA	NA	NA	NA
			4/16/2014	NA	NA	820	95	89	6.3	73	31	280
			1/16/2014	NA	NA	800	100	87	5	76	33	270
			1/14/2014	18.76	8.01	NA	NA	NA	NA	NA	NA	NA
			10/16/2013	NA	NA	810	90	110	6.4	91	40	260
			10/14/2013	23.94	2.83	NA	NA	NA	NA	NA	NA	NA
			7/10/2013	NA	NA	790	105	94	5.8	88	38	260
			7/9/2013	23.15	3.62	NA	NA	NA	NA	NA	NA	NA
			4/11/2013	NA	NA	830	100	99	6.2	83	37	260
			4/10/2013	15.35	11.42	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	770	110	110	6.7	84	38	265
			1/14/2013	11.24	15.53	NA	NA	NA	NA	NA	NA	NA
			10/31/2012	18.81	7.96	800	100	120	7.3	90	39	265
			7/24/2012	19.05	7.72	800	134	125	7.4	83	35	277
			4/18/2012	10.81	15.96	770	130	95	6.2	75	33	270
			1/11/2012	11.18	15.59	900	122	110	7.2	95	37	290
			11/21/2011	13.99	12.78	780	130	95	6.1	77	33	270
			7/26/2011	18.03	8.74	NA	NA	NA	NA	NA	NA	NA
			7/25/2011	NA	NA	790	128.8	110	9.1	74	33	280
			4/21/2011	NA	NA	770	120	90	5.3	86	26	280
			4/20/2011	10.33	16.44	NA	NA	NA	NA	NA	NA	NA
			1/24/2011	9.37	16.92	800	120	95	7.6	75	30	300
			10/21/2010	19.77	6.52	770	120	130	7.6	89	44	275
			7/27/2010	20.53	5.76	737	110	121	7.81	91.1	38.9	268
			4/26/2010	9.24	14.76	720	100	116	6.88	85.4	32.4	215
			10/21/2009	17.65	6.35	638	99	113	6.15	81.6	23.0	172
			8/20/2009	19.15	4.85	785	100	131	6.66	89.8	36.6	290
			5/11/2009	14.38	9.62	775	120	132	7.24	84	39.7	294
			3/26/1996	NA	NA	772	127	130	8.7	86	36	390
			6/8/1976	NA	NA	820	126	118	6.6	94	44	393

A-16 (continued). NCMA Sentry Well Water Level and Water Quality Data
Well 36L01, Oceano Dunes, Deep

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/15/2014	210	<0.05	2.1	0.32	<0.1	0.092	0.14	0.358	260	<10	<10	1,230	0.12	0.0041	246
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/29/2014	210	<0.05	2.4	0.28	0.11	0.09	0.14	0.19	280	<10	<10	1,240	0.27	0.0019	516
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/16/2014	210	<0.05	2.3	0.31	<0.1	0.09	0.13	0.35	280	<10	<10	1,240	0.22	0.0037	271
1/16/2014	230	<0.05	2.3	0.31	0.23	0.09	0.14	0.44	270	<10	<10	1,230	0.41	0.0044	227
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2013	240	<0.05	2.2	0.32	<0.1	0.1	0.15	0.32	260	<10	<10	1,220	0.54	0.0036	281
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/10/2013	240	<0.05	2.5	0.34	<0.1	0.08	0.13	0.11	260	<10	<10	1,240	0.31	0.0010	955
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/11/2013	220	<0.05	2.2	0.35	<0.1	0.098	0.14	0.45	260	<10	<10	1,240	0.60	0.0045	222
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	220	<0.05	2.8	0.36	<0.1	0.02	0.14	0.20	265	<10	<10	1,240	0.61	0.0018	550
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/31/2012	200	<0.1	2.4	0.4	0.34	0.12	0.14	0.34	265	<10	<10	1,250	0.30	0.0034	294
7/24/2012	200	<0.05	2.3	0.42	0.13	0.12	0.14	0.31	277	<10	<10	1,250	0.52	0.0023	432
4/18/2012	210	0.42	4	0.35	0.36	0.12	0.13	<0.2	270	<10	<10	1,250	0.77	NA	NA
1/11/2012	170	<0.1	4.8	0.48	0.28	<0.02	0.17	0.45	290	<10	<10	1,250	1.80	0.0037	271
11/21/2011	160	<0.1	<1	0.4	<0.2	<0.01	0.13	0.45	270	<10	<10	1,240	0.40	0.0035	289
7/26/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/25/2011	177	<0.05	2.3	0.36	0.12	0.14	0.13	0.51	280	<5	<5	1,280	2.30	0.0040	252
4/21/2011	206	<0.05	2.3	0.24	0.26	0.14	0.004	0.57	280	<2.0	<2.0	1,270	NA	0.0048	211
4/20/2011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/24/2011	190	<0.05	2.3	0.39	0.16	1.31	0.13	0.53	300	<2.0	<2.0	1,270	1.40	0.0044	226
10/21/2010	160	<0.1	3.4	0.48	<0.1	NA	0.15	0.54	275	<10	<10	1,293	0.12	0.0045	222
7/27/2010	190	< 0.10	< 0.50	0.427	0.10	0.77	0.180	0.80	268	< 1.0	< 1.0	1,200	0.845	0.0073	138
4/26/2010	210	1.5	0.77	0.382	0.2	0.28	0.167	0.7	215	< 1.0	< 1.0	1,100	3.870	0.0070	143
10/21/2009	200	< 0.10	3.2	0.268	0.33	57	0.128	0.61	172	< 1.0	< 1.0	940	0.255	0.0062	162
8/20/2009	190	< 0.10	3.8	NA	0.15	0.27	0.307	0.75	290	< 1.0	< 1.0	1,200	0.830	0.0075	133
5/11/2009	180	NA	NA	NA	0.18	NA	0.426	0.78	294	< 1.0	< 1.0	1,300	0.958	0.0065	154
3/26/1996	148	0.2	NA	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/8/1976	184	0	NA	NA	0.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A-17. NCMA Sentry Well Water Level and Water Quality Data
Well 32C03, County MW#3, Intermediate

Well	Construction	Top of Casing Elevation (feet NAVD)	Date	Depth to Water (feet)	Groundwater Elevation (feet NAVD)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Bicarbonate (as CaCO3) (mg/L)
County MW-3 12N/35W-32C03	Screened from 90-170' - 5-inch diameter	47.70										
	Casing relative to concrete pad		10/16/2014	NA	NA	270	55	54	2.7	13	5.7	51
	Pad elevation above MSL, approximate	47.70	10/14/2014	50.50	-2.80	NA	NA	NA	NA	NA	NA	NA
	All elevations relative to MSL		7/30/2014	NA	NA	280	60	58	1.9	14	6.5	60
			7/29/2014	44.02	3.68	NA	NA	NA	NA	NA	NA	NA
			6/4/2014	45.46	2.24	NA	NA	NA	NA	NA	NA	NA
			4/15/2014	41.51	6.19	270	57	55	2.2	12	5	54
			1/16/2014	NA	NA	300	62	57	2.8	14	6.3	54
			1/14/2014	41.00	6.70	NA	NA	NA	NA	NA	NA	NA
			10/16/2013	NA	NA	310	58	62	2.9	15	6.4	54
			10/14/2013	45.26	2.66	NA	NA	NA	NA	NA	NA	NA
			7/11/2013	NA	NA	290	60	45	2.4	14	5.9	61
			7/9/2013	43.83	3.87	NA	NA	NA	NA	NA	NA	NA
			4/12/2013	NA	NA	330	58	55	2.9	16	6.6	60
			4/10/2013	37.89	9.81	NA	NA	NA	NA	NA	NA	NA
			1/15/2013	NA	NA	290	62	57	2.8	15	6.3	55
			1/14/2013	32.26	15.44	NA	NA	NA	NA	NA	NA	NA
			10/30/2012	40.05	7.65	330	57	60	3.3	19	7.5	60
			7/25/2012	38.62	9.08	330	67	61	3.3	17	6.4	59
			4/19/2012	23.02	24.68	370	74	52	2.9	30	12	120

A-17. NCMA Sentry Well Water Level and Water Quality Data
Well 32C03, County MW#3, Intermediate

Date	Sulfate (mg/L)	Nitrate (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Boron (mg/L)	Fluoride (mg/L)	Iodide (mg/L)	Manganese (mg/L)	Bromide (mg/L)	Alkalinity, Total (as CaCO3) (mg/L)	Carbonate (as CaCO3) (mg/L)	Hydroxide (as CaCO3) (mg/L)	Specific Conductance (umhos/cm)	Iron (mg/L)	Bromide / Chloride Ratio	Chloride / Bromide Ratio
10/16/2014	26	7.3	0.3	0.069	<0.1	<0.01	0.005	<0.1	51	<10	<10	430	0.35	NA	NA
10/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/30/2014	29	7.3	<1	<0.1	<0.1	<0.01	<0.005	<0.1	60	17	<10	450	0.16	NA	NA
7/29/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6/4/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/15/2014	29	7.1	<1	0.096	<0.1	<0.01	<0.005	0.11	54	<10	<10	430	0.21	0.0019	518
1/16/2014	35	8.1	8.2	<0.1	<0.1	<0.01	0.008	0.12	54	<10	<10	450	0.47	0.0019	517
1/14/2014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/16/2013	38	7.5	<1	0.06	<0.1	<0.01	0.009	0.1	54	<10	<10	450	0.21	0.0017	580
10/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7/11/2013	30	7.4	<1	0.071	<0.1	<0.01	0.006	<0.1	61	<10	<10	440	0.17	NA	NA
7/9/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4/12/2013	35	7.5	<1	0.091	<0.1	<0.01	0.019	0.1	60	<10	<10	460	0.49	0.0017	580
4/10/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1/15/2013	38	8.3	<1	0.089	<0.1	<0.01	0.01	<0.1	55	<10	<10	470	0.23	NA	NA
1/14/2013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10/30/2012	36	7.8	<1	0.09	<0.1	<0.01	0.033	<0.1	60	<10	<10	470	1.9	NA	NA
7/25/2012	35	8.2	<1	<0.1	<0.1	<0.01	0.068	<0.1	59	<10	<10	460	0.49	NA	NA
4/19/2012	58	5	<1	0.17	0.2	<0.01	0.056	<0.2	120	<10	<10	580	1.3	NA	NA