Executive Summary

Overview

In 2014, the California Legislature passed the Sustainable Groundwater Management Act (SGMA), which became effective on January 1, 2015. SGMA requires local Groundwater Sustainability Agencies (GSAs) to develop Groundwater Sustainability Plans (GSPs) that, among other things, explain how the basin will be managed sustainably over a 20-year timeframe. SGMA provides authorities to support locally controlled sustainable management of groundwater – meaning in a way that does not produce undesirable results such as chronic lowering of groundwater levels, causing subsidence or degrading water quality.

The North American Subbasin (NASb or Subbasin) includes five GSAs that have worked cooperatively to develop this single GSP covering the 535 square-mile subbasin that includes portions of Placer, Sacramento, and Sutter counties. The GSAs include: Reclamation District 1001 (RD 1001) GSA; Sacramento Groundwater Authority (SGA) GSA; South Sutter Water District (SSWD) GSA; Sutter County GSA; and West Placer GSA.

SGMA requires certain information be included in every GSP. This includes, among other things, the subbasin setting, a hydrogeological conceptual model, a comprehensive water budget, a basin-wide monitoring network, sustainable management criteria, and projects and management actions necessary to ensure the Subbasin's sustainability. A summary of each of the primary NASb GSP sections is provided below.

ES 1 – Introduction

SGMA effectively prescribes four basic steps to the management process: 1) form a GSA; 2) develop and adopt a GSP; 3) implement the GSP to achieve a sustainability goal and avoid undesirable results within 20 years; and 4) report the implementation activities to DWR to document whether progress towards the sustainability goal and the avoidance of undesirable results are being achieved.

Ultimately, five GSAs were formed to manage groundwater in the NASb, completing Step 1. Figure ES-1 shows the location of the Subbasin and the GSAs. This GSP and adoption by each GSA will complete Step 2. The GSP will be assessed every 5 years as additional information becomes available. Steps 3 and 4 will be implemented over the next 20 years.

The NASb is bounded by four adjacent subbasins. Figure ES-1 shows the location of the NASb along with the adjacent subbasin names and locations. The NASb is closely coordinating with these subbasins.

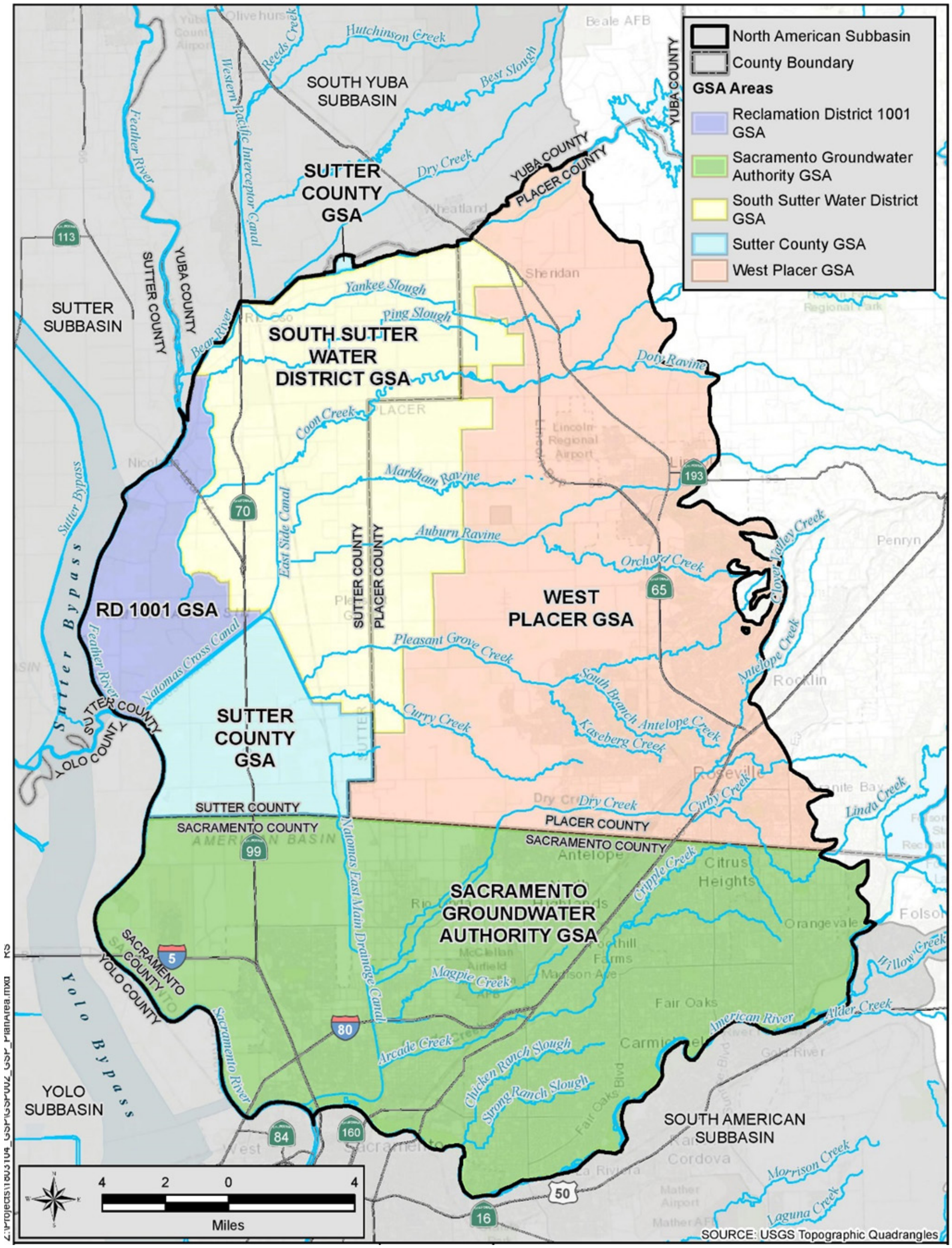

Figure ES-1. North American Subbasin, GSAs and Adjacent Subbasins

ES 2 – Agency Information

The five GSAs, by mutual agreement, selected the SGA GSA to be the Plan manager and lead agency for the preparation and implementation of the NASb GSP. The GSAs have entered into a Memorandum of Agreement (MOA) for the implementation of this GSP, which includes monitoring and reporting in the Subbasin along with projects and management actions.

ES 3 – Plan Area

The NASb encompasses about 342,000 acres in Sutter, Placer, and Sacramento counties and is bounded by the American, Bear, Feather, and Sacramento rivers. The Sierra Nevada foothills form the eastern boundary of the Subbasin. The NASb is about 40 percent urban, 30 percent farmland (mostly in Placer and Sutter counties), and less than 1 percent riparian vegetation. About 30 percent of the land is either native vegetation or fallowed farmland that could not be fully characterized. Most of the urban area is in Sacramento County and the southeastern portion of Placer County. Currently, the NASb has about 16,900 acres of habitat conservation preserves and easements, of which about 1,700 acres is riparian habitat. Figure ES-2 shows the general locations of these water use sectors.

Within the NASb, there are federal, state, county, and tribal agencies with land use jurisdiction. Within Placer and Sacramento counties, there are 20 water agencies, water districts, city/county water departments and water wholesalers that provide water to residents in the cities and towns. There are also over 40 small community water and non-community non-transient water systems, that are overseen by the counties and the state, whose water supply is from groundwater. Irrigation districts are also present that provide surface water for agriculture. Within many of the irrigation districts and cities are reclamation districts that are responsible for managing and maintaining the levees, freshwater channels, or sloughs, canals, pumps, and other flood protection structures in the area.

Surface water is available to most areas of the Subbasin and is supplemented with groundwater. There are about 3,800 water supply wells present in the Subbasin (about 2,600 domestic, 800 agricultural, 400 municipal and industrial wells).

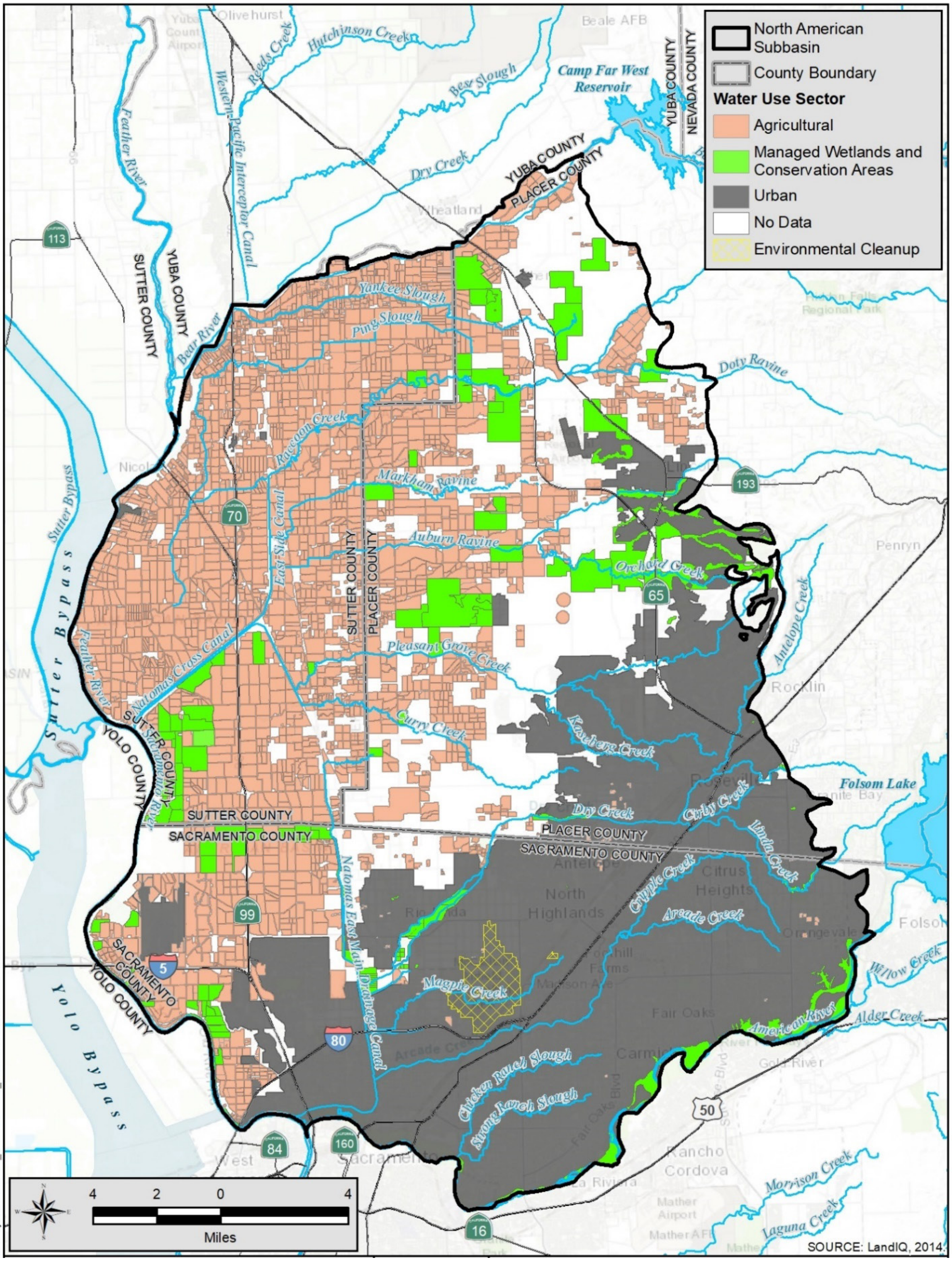

Figure ES-2. Water Use Sectors

ES 4 – Hydrogeologic Setting

The NASb is in the Sacramento Valley and is filled largely with sediments derived from the adjacent Sierra Nevada foothills, which contain fresh water. In general, these fresh-water bearing sediments beneath the NASb are thinnest to the east and thicken up to 2,000 feet to the west (see Figure ES-3). The sediments consist of alternating layers of clays, silts, sand and gravel. The sand and gravels layers into which wells are constructed are referred to as aquifers. These sand and gravel layers were deposited by meandering rivers and creeks, so they are not continuous across the entire Subbasin. Although the sediments are not present as continuous layers, they are interconnected. This was demonstrated by observing that groundwater levels in the various sand and gravel layers have similar levels and trends. Based on this information, the NASb is interpreted as having one principal aquifer.

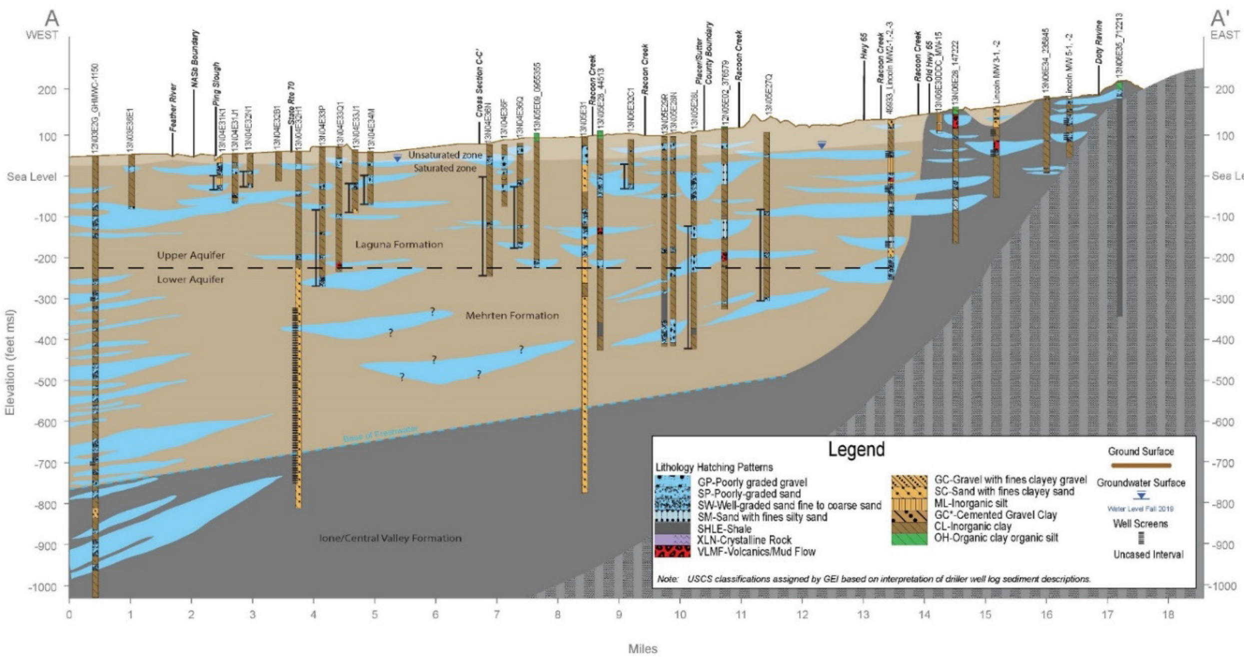

Figure ES-3. Geologic Section

Groundwater is recharged from throughout the surface of the Subbasin and from groundwater inflow from adjacent subbasins. No geologic sediments are impermeable, so some recharge occurs in all areas that are not covered by impermeable surfaces (such as asphalt or concrete). This is particularly important in agricultural areas where, even though there are low permeability soils, there are more than one hundred thousand acres of land that have applied or ponded water throughout the growing season, which results in large volumes of recharge to the Subbasin.

ES 5 – Groundwater Conditions

Groundwater levels in the western portion of the Subbasin are generally stable through time dating back to early in the 20th century. Groundwater levels in the central part of the Subbasin showed long-term declines in the north-central portion until the mid-1960s and in the south-central portion until the mid-1990s, when conjunctive use programs arrested these declines and allowed groundwater levels to begin to recover. Groundwater levels in the eastern portion of the subbasin have been generally stable since the 1970s, but they do show declines during dry periods with recovery during wet periods.

The groundwater contours show a pumping depression in the center of the Subbasin that is currently about 30 feet below mean sea level. Groundwater flows radially toward this depression, from the fringes of the Subbasin toward the center. The depression has been stabilized, with groundwater levels generally declining during dry periods and recovering during wet periods.

Limited land subsidence due to groundwater pumping was documented up to the early 1990s, but there were no documented impacts associated with the subsidence. Since then, the subsidence has been negligible.

Areas with surface water that is interconnected with groundwater were identified along portions of the American, Bear, Feather, and Sacramento rivers, along with creeks primarily in the western part of the Subbasin.

Potential groundwater dependent ecosystems (GDEs) identified in the natural communities commonly associated with groundwater dataset were evaluated using groundwater levels and the types of vegetation to classify them as *Likely*, *Less Likely* or *Unlikely* GDEs. Classifications of the species types and diversity of vegetation were used to further prioritize these areas. In many cases, GDEs were identified along canals and natural waterways that are used to convey surface water to agricultural users. In some cases, GDEs were identified in areas that could be supported by groundwater, but it appears their primary source of supply is groundwater pumped from wells.

Generally, the quality of groundwater in the Subbasin is suitable for nearly all uses, with the exception of contamination plumes and localized, naturally-occurring and human-caused quality issues, which may affect the supply, beneficial uses, and potential management of groundwater in the Subbasin if not properly managed. Total dissolved solids (TDS) and nitrate were identified as constituents that represent general conditions in the Subbasin, with some wells displaying upward trends. Nitrate is below the drinking water standards for all wells in the Subbasin. TDS exceeds the drinking water standards in some wells, predominantly in the western and eastern portions of the Subbasin. The higher salinity concentrations are generally considered to be present due to natural sources.

In the NASb, there are a few large groundwater contamination sites and multiple smaller sites that could affect supply and beneficial uses of groundwater in the Subbasin. The most significant of these sites are the former McClellan Air Force Base (AFB) and the Aerojet Superfund Site (outside of the Subbasin). Cleanup activities, as overseen by U.S. Environmental Protection Agency, SWRCB, and the California Department of Toxic Substances Control, have been in progress for years and contaminants appear to be contained. SGA and interested water agencies meet with regulators on a quarterly basis to discuss the plumes' containment and how groundwater management activities may affect the remediation.

ES 6 – Water Budgets

Water budgets were created utilizing the Cosumnes-South American-North American (CoSANA) model, a fully integrated surface and groundwater numerical flow model that covers the entire NASb as well as the adjacent South American and the Cosumnes subbasins. CoSANA integrates the groundwater aquifer with the surface hydrologic system and land surface processes and operations. CoSANA was used to preform analyses of hydrogeologic conditions, agricultural and urban water demands, agricultural and urban water supplies and an evaluation of current and projected future regional conditions, including climate change, for the NASb. Because the model is integrated with the adjacent subbasins to the south, future projected conditions, along with climate change and projects, were assessed for the entire region.

The water budget for current conditions in the NASb showed the Subbasin has a current surplus of water, which was confirmed by groundwater levels rising in the central portions of the Subbasin. This surplus continues into the future, but in lesser amounts. The future conditions modeling included planned new developments, along with changes in agriculture and projected changes in water supply. When the future conditions were modeled with a central tendency climate change scenario, the Subbasin has an estimated future deficit of about 3,500 acre-feet per year. Table ES-1 shows the average annual estimated change in groundwater storage under each of these conditions.

Table ES-1. Estimated Groundwater Change in Storage

Model Baseline Condition	Average Annual Groundwater Storage Change (acre-feet)
Historical (water years 2009 through 2018)	31,900
Current (water years 1970 through 2019)	14,900
Projected Future Demands over 50 years (using 1970 through 2019 hydrology)	5,400
Projected Future Demands over 50 years with Climate Change (using 1970 through 2019 hydrology)	-3,500

ES 7 – Monitoring Networks

Groundwater levels and water quality are currently being monitored by the GSAs, local agencies, counties, DWR and federal entities in over 160 wells, not including those present near contamination sites. Representative monitoring wells were selected from this larger network that are spatially distributed, actively being monitored, and have construction details to prove which portion of the aquifer they are monitoring. A total of 41 representative monitoring wells for groundwater levels (to monitor for chronic lowering of groundwater levels, reduction of storage, the potential for subsidence, and surface water depletion) were selected. The monitoring locations were developed to protect beneficial uses and users including, domestic well owners, GDEs and interconnected surface water.

Separate representative groundwater quality monitoring networks were developed. Sixteen shallow groundwater monitoring wells were selected to monitor water quality in the shallow portions of the aquifer in areas that are used by domestic well owners. The deeper portions of the aquifer, commonly used by public water systems, will be monitored by over 200 public supply wells that are required to monitor and report the analyses to state agencies.

There are instances of poorer water quality along the westerly and eastern edges of the Subbasin, so a separate sentry well monitoring network was developed to track the potential movement of these waters into the Subbasin. This sentry well network is not designated as being representative monitoring wells where minimum thresholds and measurable objectives would have been established.

ES 8 – Sustainable Management Criteria (SMC)

The NASb sustainability goal is to:

> *Manage groundwater resources sustainably for beneficial uses and users to support the lasting health of the Subbasin's community, economy, and environment. This will be achieved through:*
>
> - *The monitoring and management of established SMC;*
> - *Continued expansion of conjunctive management of groundwater and surface water;*
> - *Proactively working with local well permitting and land use planning agencies on effective groundwater policies and practices;*
> - *Continued GSA coordination and stakeholder engagement; and*
> - *Continued improvement of our understanding of the Subbasin.*

Undesirable results, minimum thresholds, and measurable objectives were developed for five of the six SGMA sustainability indicators: chronic lowering of groundwater levels, reduction of storage, land subsidence, degradation of water quality, and surface water depletion. Seawater intrusion has not occurred in the past and is unlikely to occur in the future and, therefore, sustainability criteria were not established for this sustainability indicator. As allowed under SGMA, the NASb uses groundwater elevations as a proxy for minimum thresholds and measurable objectives for its applicable sustainability indicators, with the exception of degradation of water quality. Undesirable results are summarized in Table ES-2 below.

Table ES-2. NASb Undesirable Results

Sustainability Indicator	Undesirable Result Definition
Chronic lowering of groundwater levels	*20% or more of all NASb representative monitoring sites have minimum threshold exceedances for 2 consecutive Fall measurements (8 out of 41 wells)*
Reduction of storage	*20% or more of all NASb representative monitoring sites have minimum threshold exceedances for 2 consecutive Fall measurements (8 out of 41 wells)*
Degraded groundwater quality	For public water system wells • *The basin wide average TDS concentrations of <u>all</u> public water system wells exceeds 400 mg/l* *OR* • *The basin wide average nitrate (as N) concentration of <u>all</u> public water system wells exceeds 8 mg/l* For the shallow aquifer (i.e. domestic and self-supplied) wells • *25% of the representative monitoring sites' (RMS) TDS or nitrate (as N) concentrations exceed state maximum contaminant levels (MCLs)*
Land Subsidence	*The rate of inelastic subsidence exceeds 0.5 feet over a five-year period over an area covering approximately five or more square miles*
Depletion of surface water	*20% or more of the NASb interconnected surface water (ISW) representative monitoring sites (RMSs) have minimum threshold exceedances for 2 consecutive Fall measurements (5 out of 21)*

ES 9 – Projects and Management Actions

Because the water budget estimated that the Subbasin may be about 3,500 AFY in deficit with future demands and with climate change, the NASb evaluated a conjunctive use project that can resolve the deficit and has a net benefit of reducing groundwater pumping by 5,000 AFY. The project uses, for the most part, existing infrastructure, so project costs are minimal and are to be funded by the public water suppliers participating in the program.

A second planned project will make improve flood protection and habitat for aquatic species in the Natomas Cross Canal. As part of the continued water resources management of the NASb, six supplemental projects that are in the conceptual or planning level stages are also identified in the event projected conditions are worse than expected.

Five management actions are identified. The first management action is to continue development of the Sacramento Regional Water Bank, which will expand conjunctive use to further ensure basin sustainability. The second action is to explore potential revisions to Placer, Sacramento, and Sutter counties' and the City of Roseville's well permitting programs to assess whether the permitting ordinances can be improved to be more protective of domestic wells, GDEs and interconnected surface water, along with reducing potential impacts to designated representative wells. The third action is to proactively coordinate with land use agencies on their development of plans and approvals of new developments, to improve communications with the agencies and inform them of findings of this GSP, annual report findings, and whether groundwater can be relied upon for future growth without causing undesirable results. The fourth action will improve data collection and communication with domestic and other shallow well owners to protect these beneficial users of groundwater in the NASb. The fifth action will continue monitoring and assessment of the NASb's GDEs to better understand these ecosystems to help protect them.

ES 10 – Plan Implementation

The NASb GSAs estimate a budget of $1.15 million over the next five years for monitoring, reporting, GSP assessment and update, data management, coordination, outreach, and management actions. The budget also includes a 20 percent contingency for unanticipated expenses. The GSAs have also identified a funding plan in an MOA for GSP implementation. The budget does not include estimates of the costs for conjunctive use or development of the Sacramento Regional Water Bank, which already have funding through individual participating agencies. The budget also does not include the value of the in-kind time being provided by the participating GSAs.

The GSP identifies 28 specific implementation actions with associated schedules, where applicable. These actions are organized into the following categories: monitoring; data management; data analysis; coordination and outreach; and other management activities.

ES 11 – Notice and Communications

The GSAs reached out to the public by developing a website (nasbgroundwater.org) and a list of more than 300 interested parties. The GSAs sought input from small community water systems by notifying them through direct mailer post cards. The GSAs developed informational materials and held over 40 public meetings (both at board and city councils and monthly technical committee meetings) and four NASb-wide public workshops.

The public had opportunities to comment directly on this GSP during releases of draft chapters, through workshops and on the Public Draft GSP. If a comment was specific to an individual section of the GSP, the GSP text was revised. General comments that raised substantial technical or policy issues may have resulted in changes to multiple GSP sections. Comments that were general in nature or that did not raise substantial issues were noted, but no changes were made. The GSAs plan to continue public outreach and stakeholder engagement through the GSP implementation phase through various activities, including an annual public meeting to release the results of the Annual Report and the status of projects and management actions.